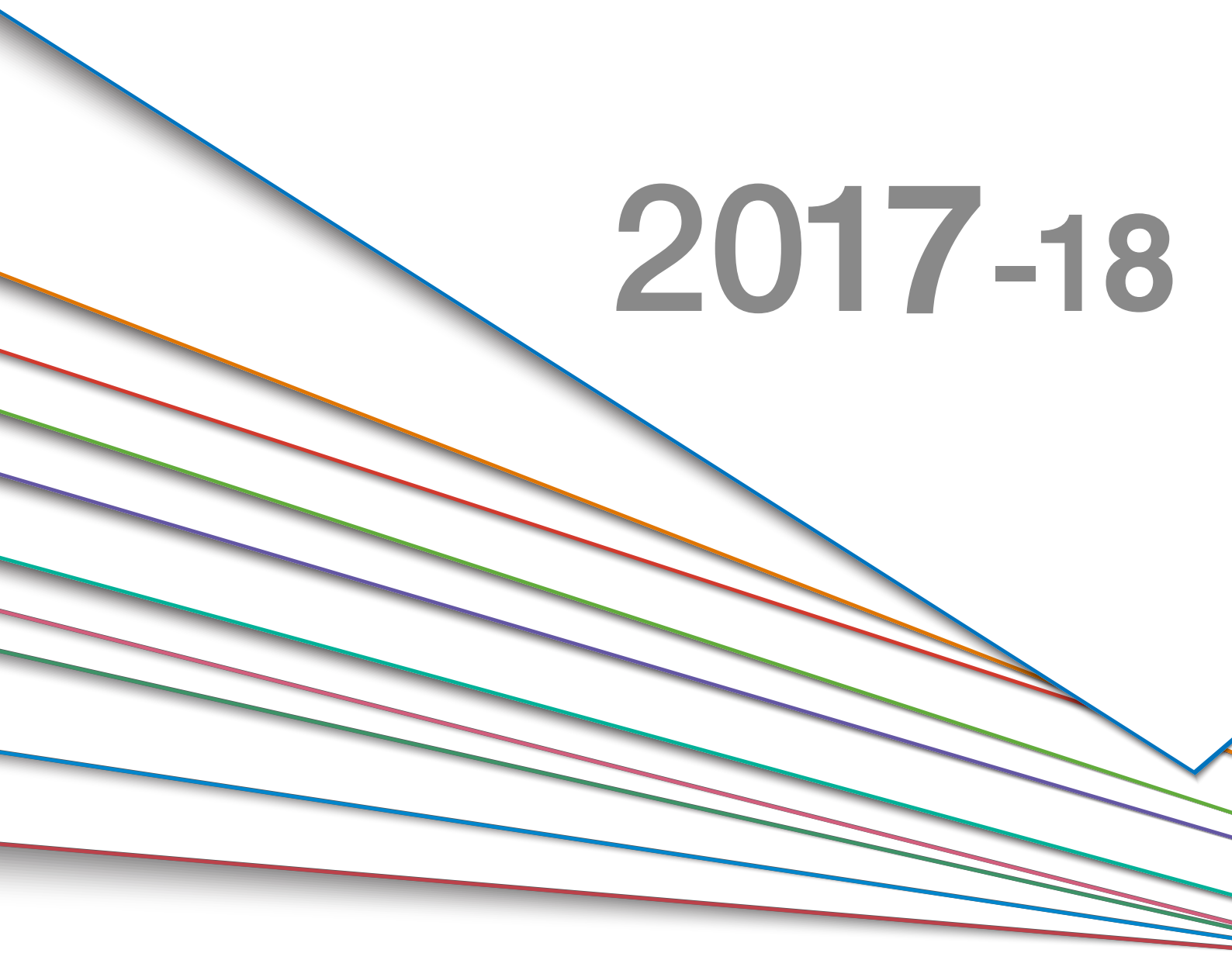
eco Changes for a greener tomorrow

MITSUBISHI ELECTRIC
Changes for the Better

FACTORY AUTOMATION

FA PRODUCT CATALOG

2017-18



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FA Integrated Solution
e-F@ctory

This solution solves customers' issues and concerns by enabling visualization and analysis that lead to improvements and increase availability at production sites.

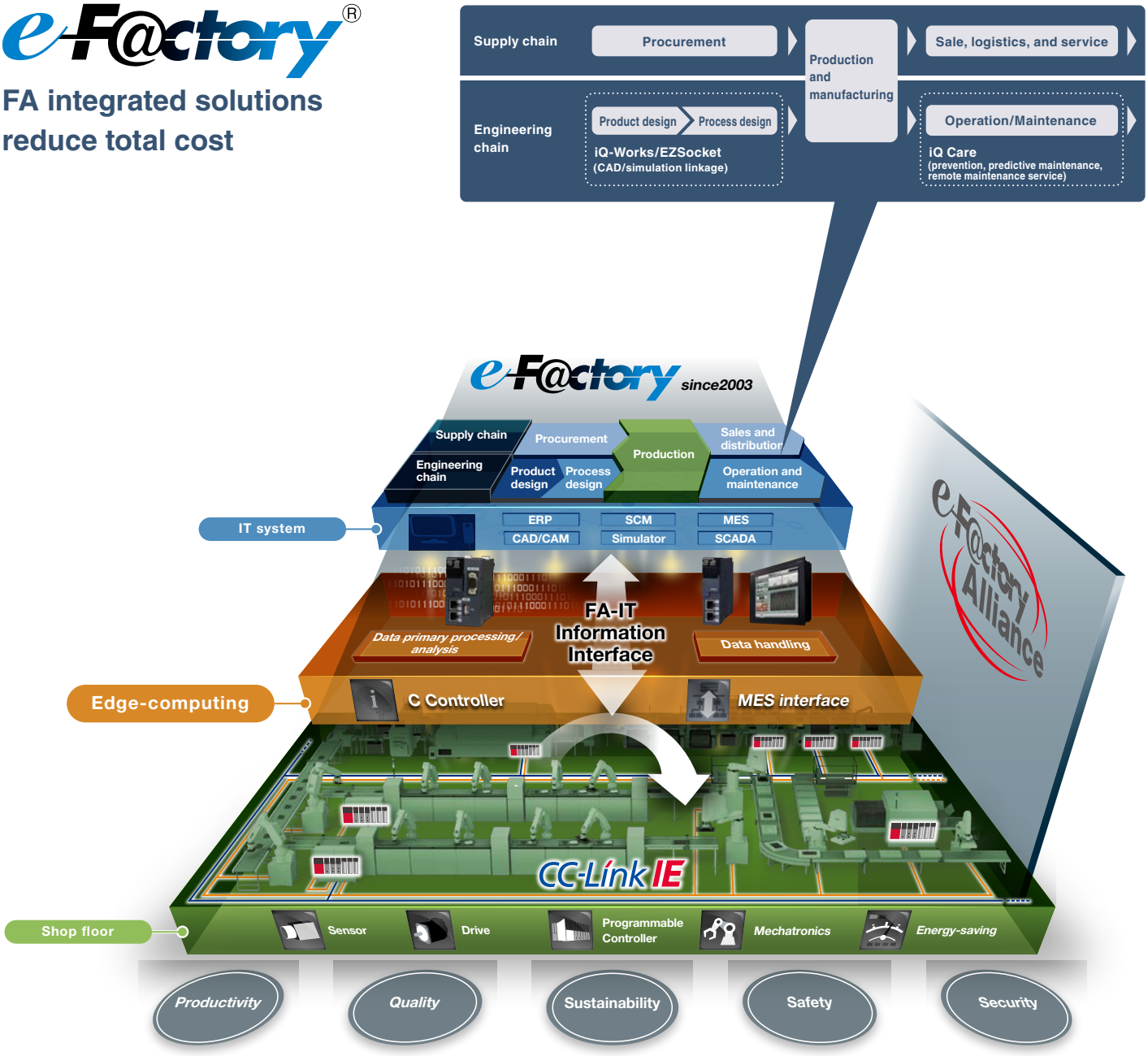


*1 Visualize, analyze, and improve

Utilizing our FA and IT technologies and collaborating with e-F@ctory Alliance partners, we reduce the total cost across the entire supply chain and engineering chain, and support the improvement initiatives and one-step-ahead manufacturing of our customers.

e-Factory®

FA integrated solutions reduce total cost



Overall production information is captured in addition to energy information, enabling the realization of efficient production and energy use (energy savings).

To realize e-F@ctory®

iQ Platform

e-F@ctory is a FA integrated solution based on the concept of reducing total cost across the board, from development and production to maintenance. It supports the future of manufacturing by optimizing factory operations utilizing advanced technologies and information.
The foundation of e-F@ctory is the FA integrated platform, iQ Platform. iQ Platform integrates and links the controllers and HMI that control production systems, engineering environments and networks. It contributes to cost reductions throughout all phases of manufacturing, from design to launch, operation, and maintenance. Mitsubishi Electric optimizes its customers' systems with leading technologies and solutions that will continue to support the future of manufacturing.

Controllers and HMI Improves productivity and product quality

①Significantly improves total system performance through the high-speed performance of MELSEC Series system buses
②Equipped with dedicated FB and label memory necessary for program standardization
③Equipped with a robust integrated security function

Engineering environment Achieves efficient development, operation, and maintenance

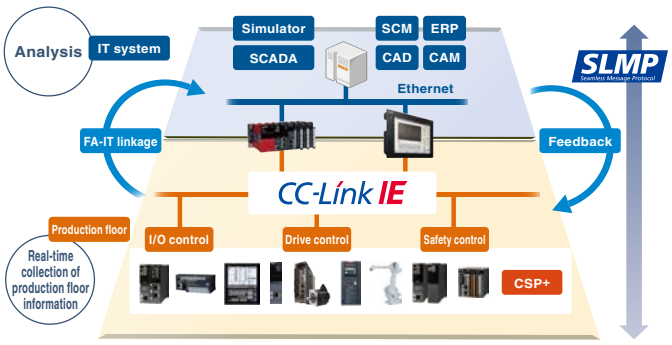
①Detect and generate large-scale network configuration diagrams from the actual machine
②Mutual parameter reflection between MELSOFT Navigator and individual engineering software programs
③Automatically follows changes to system label devices commonly owned by each controller and HMI

Networks Reduce loss with high accuracy and production speed

①Utilizing CC-Link IE, 1 Gbps high-speed communication retrieval with no loss
②Seamless communication between each device using SLMP

CC-Link IE

Integration of all functions required in control applications such as a high-speed, large-volume, enhanced diagnosis function, and the unification of general I/O control/motion functions and a safety communication function. Also achieves improved productivity, quality and energy savings through the utilization of IT, real-time collection of data from the production floor-necessary for reducing TCO-as well as seamless integration with IT systems. By linking each component with CC-Link IE, the customer's overall system is optimized, and TCO can be reduced across all phases, from development to production and maintenance.



CSP+:A device profile enabling configuration and monitoring regardless of device type
SLMP:A common protocol realizing seamless data communication between networks

Delivering networks made in Japan to the world -CC-Link Partner Association

CC-Link is an open field network made in Japan. The CC-Link Partner Association (CLPA) is expanding its global activities to promote CC-Link. These activities, including exhibitions in and outside Japan, are coming to fruition. CC-Link is now certified as a standard by the ISO and the IEC, international standardization management organizations. CC-Link is growing to become a genuine world-standard network. Moreover, supporting the need to optimize entire systems, the CLPA has introduced CC-Link IE, an integrated network based on the Ethernet that enables the expansion of seamless communications from upstream information systems to production sites. As one of the board companies of the CLPA, Mitsubishi Electric is cooperating with CLPA partners in and outside Japan to actively promote CC-Link.

*Ethernet is a trademark of Xerox Corporation.

FA Integrated Solution
e-F@ctory

Mitsubishi Electric Nagoya Works realizes significant improvement in productivity, quality, energy-efficiency, safety, and security through the introduction of e-F@ctory.

Mitsubishi Electric's Nagoya Works has some e-F@ctory model factories within the premises of the Works, enabling the actual effects of improving productivity and equipment operating ratio to be examined. Please see for yourself how e-F@ctory is being used Mitsubishi Electric factories.



Example of operation management/energy conservation/work support system introduction: Nagoya Works, E4 Building: Programmable controller manufacturing factory

Aim of introduction

- Stabilization of operating ratio by reducing the installation of incorrect parts
- Reduction of time taken for failure analysis
- Alleviation of burden on experienced operators who provide guidance
- Safety countermeasures for operators who perform loading/unloading work

Examples of introduction

- Introduction of a surface-mounting operation management system utilizing C-language controllers
- Introduction of a work instruction system based on HMI screens
- Introduction of an energy conservation system for AC/lighting using programmable controllers
- Introduction of a vertical conveyance system using safety programmable controllers

Results of introduction

- Down 30% reduction in energy cost
- Down 50% reduction in quality loss
- Up 30% increase in productivity
- Down 65% reduction in man-hours required for new employee training



Example of quality control on assembly line: Nagoya Works, W3 Building: Servo motor manufacturing factory

Aim of introduction

- Response to varying demand and high-mix, variable production
- Improvement of equipment operating ratio and quality

Examples of introduction

- Direct collection of information inside equipment from the MES interface (programmable controller)
- Strengthen information management through direct connection of equipment with the manufacturing execution system (MES) and conducting various improvement activities

Results of introduction

- Down 50% reduction in lead-time
- Down 40% reduction in processing time
- Down 50% reduction in quality loss
- Down 65% reduction in system construction time
- Down 50% reduction in manufacturing process duration

* Figures have been calculated based on a computer-free, program-free state.



Example of productivity improvement through AI robot introduction: Nagoya Works, Kani Factory: Magnetic Motor Starters manufacturing factory

Aim of introduction

- Improve operating ratio of lines with a high number of processes
- Support high-mix, low-volume, high-cycle production
- Reduce equipment installation area

Examples of introduction

- Introduction of a robot production system that fuses people and machines
- Uniform management of quality and equipment information by utilizing e-F@ctory
- Collection and management (traceability) of product data (barcodes) and quality (inspection) data for each machine
- Utilization of robot intelligent technologies (assembly/inspection using force sensors)

Results of introduction

- Up 30% increase in productivity
- Down 55% decrease in number of processes
- Down 85% decrease in installation rate
- Up 60% increase in operating ratio



Example of productivity improvement of shaft processing line through introduction of e-F@ctory: Nagoya Works, Shinshiro factory: 3-phase motor manufacturing factory

Aim of introduction

- Improve line balance by reducing grinding time of bottleneck processes

Examples of introduction

- Manage production information through introduction of e-F@ctory
  Automatic work instructions to the processing lines based on information from the upper production management server
  Expand unmanned operation through planned set-up changeover and improve productivity
- A grinder-free system utilizing a C-language controller
  Automatically calculating the offset value of the lathe from the automatically calculated outer-diameter dimensions and achieving stable finishing on the lathe
  Significant reduction of cycle time through the abolishment of the shaft rotor grinding process

Results of introduction

- Down 15% reduction in processing time
- Up 30% increase in productivity

FA Integrated Solution
e-F@ctory

Firmly linking partner companies, e-F@ctory Alliance offers solutions for diversified needs.

The e-F@ctory Alliance is a FA manufacturer partnering program that strongly links the connection compatibility of Mitsubishi Electric FA equipment utilizing excellent software and machinery offered by partners, thereby enabling systems to be built by systems integration partners and the proposal of optimal solutions to customers.





Create entire production systems. Realize advanced systems integration.

Combining Mitsubishi Electric FA equipment and other products, systems integrators propose systems solutions for everything from shop floors to information systems.

Production line	Energy-saving	Instrument
Traceability	Production management	Preventive maintenance
Safety	Quality control	Renewal

etc



Develop applications software that further enhance connection compatibility of Mitsubishi Electric FA equipment.

Utilizing information-sharing products and technologies such as Mitsubishi Electric's EZSocket and SLMP, vendors develop and propose excellent application software and drivers that ensure the connection compatibility of Mitsubishi Electric FA equipment.

MES	SCADA	SCM
CAD/PLM	ERP	MRP
Data logger	FA simulator	APS

etc



Propose Mitsubishi Electric FA equipment and other machinery with superior compatibility. Realize improved systems construction and maintenance.

Manufacturers proposing peripheral equipment that is easy to connect with Mitsubishi Electric FA equipment and is easier to use.

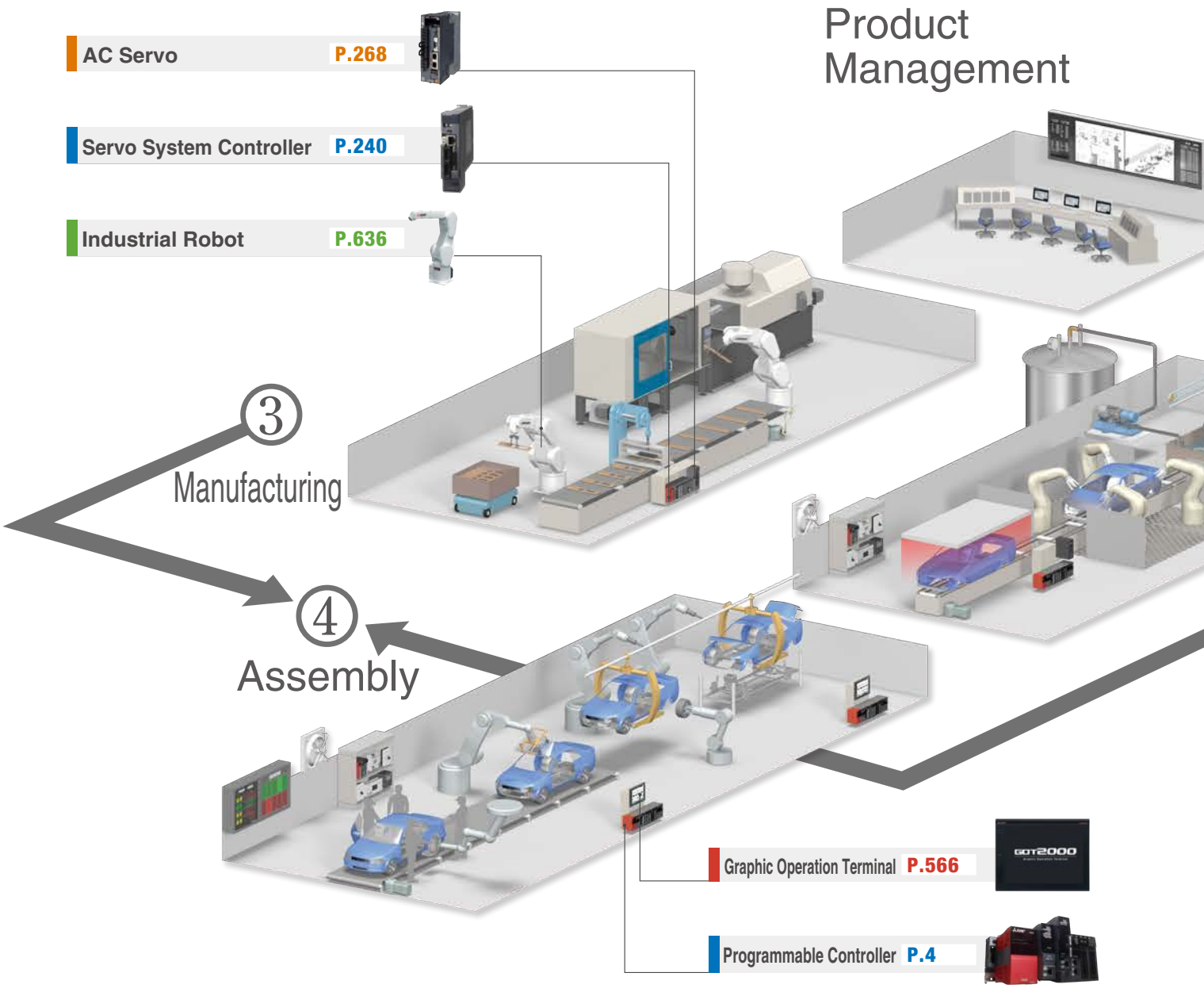
Sensor	Actuator	Communication cable
Visualization system	RFID	Analyzer
Laser marker	Recorder	Relay terminal block

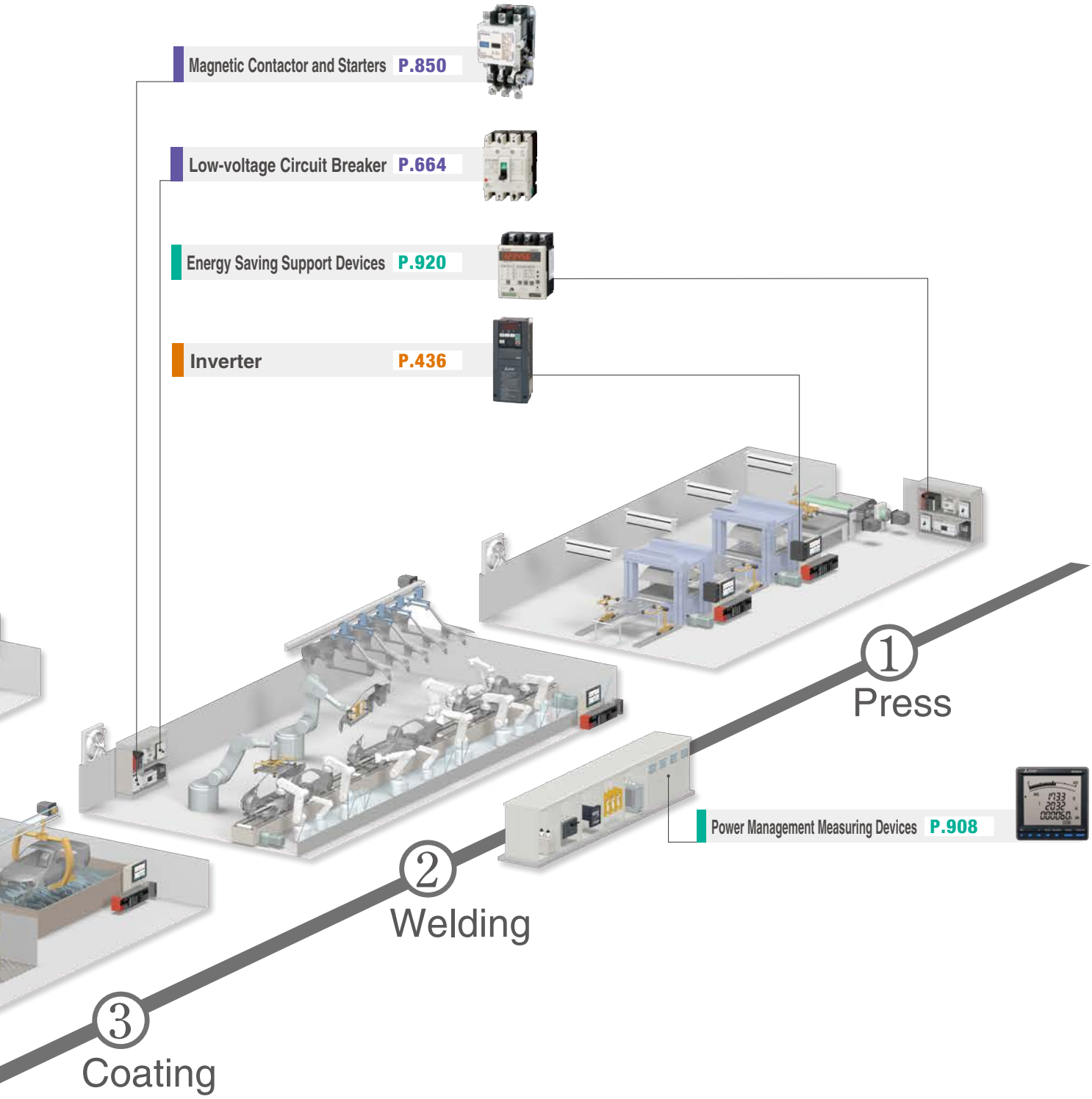
etc

Example of Product Application

Various production sites' various locations are supported by the our optimized FA device.

With expanding our product line-up, we always continue to challenge product development to respond to customer needs.
Responding to customer needs by cutting edge technology… That is our mission as an FA total supplier.




Magnetic Contactor and Starters P.850
Low-voltage Circuit Breaker P.664
Energy Saving Support Devices P.920
Inverter P.436
Power Management Measuring Devices P.908
1
Press
2
Welding
3
Coating

3-year warranty

Product warranty extended to 3 years



[Applicable models] Programmable Controller /Indicator

Programmable Controller
MELSEC Series



- iQ-R Series
- Q Series
- L Series
- iQ-F Series
- F Series

Human Machine Interface



- GOT2000 Series
- GOT1000 Series

*Our product warranty is valid for 3 years after the date of customer purchase or the date of delivery to your designated location (within 42 months of manufacturing and with up to a six month circulation period after shipping from our manufacturer).
Additionally, the coverage of this warranty will be determined by our company internal regulations.

FA Products Mobile Showroom

The latest product for our customers



The Mobile Showroom is equipped with our latest line-up of Mitsubishi FA products, and is available across the entire country to introduce our products to customers. Even without our customers coming to meet us or securing a meeting room, we can quickly hold an exhibition in a single corner of a customer's parking lot. By all means, if you are interested, please let us know.
We are available anywhere throughout the country.





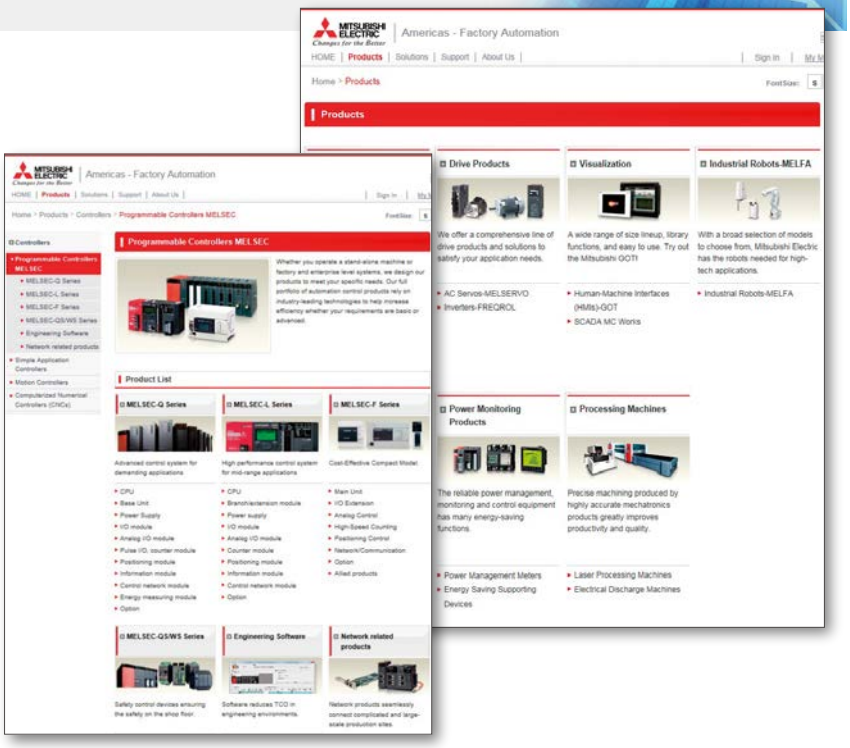
Mobile Showroom for Robot products



WEB

Easier to see, easier to use, and easier to understand!

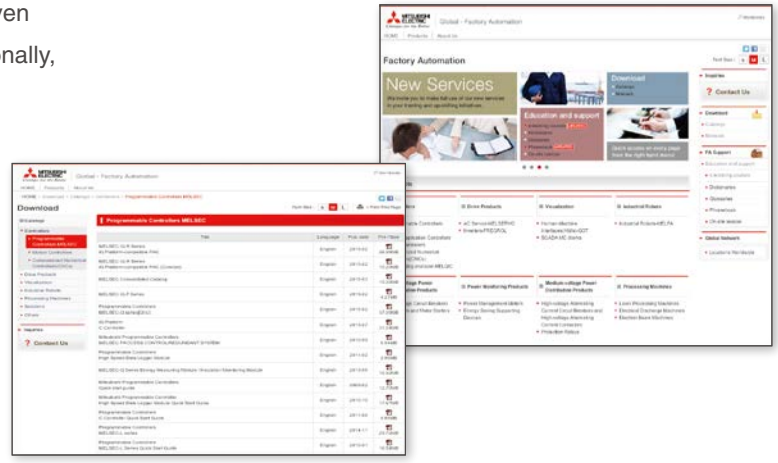
In addition to our Mitsubishi electrical products we provide a variety of useful information regarding partner company's products and services, and now each of our services is even easier to use.



Download

Refine conditions for a significant power-up in search functions

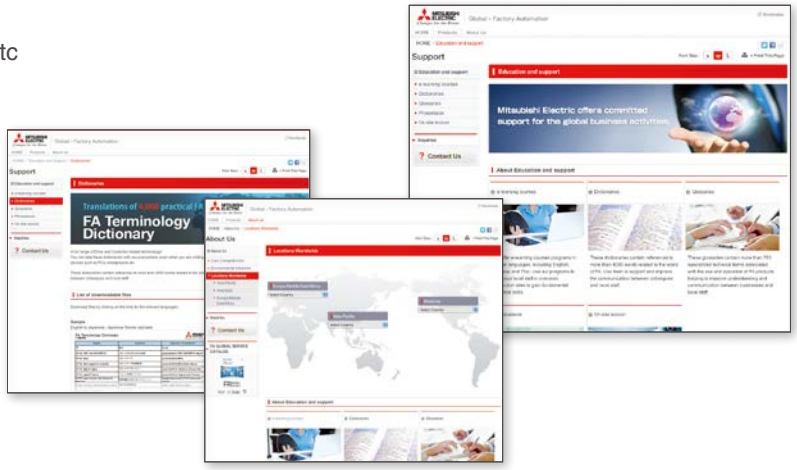
Our downloadable catalogs and manuals, etc. are made even easier to use with the refining and search functions. Additionally, you can quickly download even large amounts of data.



Overseas Expansion

Global business support

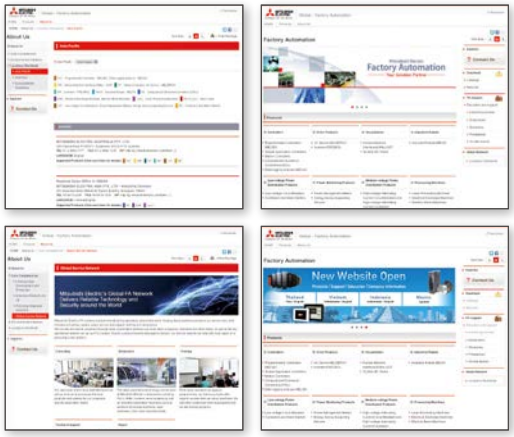
In addition to support sites and Japanese language contacts in all over the world, phrase books, glossaries, etc are available in every language.



Global

Throughout the world, Mitsubishi Electric FA Information can be easily accessed.

From the “Worldwide” link on the upper right of the page, you can easily access the global FA site.
On the global page, in addition to products that can be purchased globally, you can also check-out various regional services, such as regional product information and international language catalogs and manuals. By all means, please make use of these services when expanding your business overseas.



FA e-Learning

Learn at your own pace whenever and wherever.



In the office, out of the office, and in your own home — You can attend the Mitsubishi FA Equipment Usage e-Learning sessions for free from anywhere.

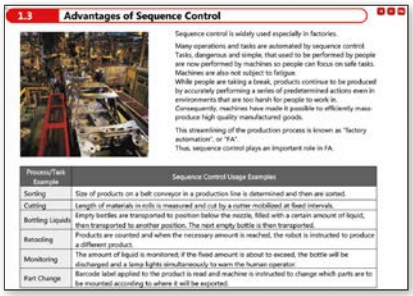
e-Learning tools

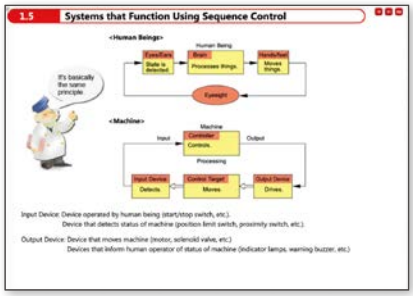
e-Learning is available with many language.

Languages: English, Chinese, Korean, Thai, Indonesian, Vietnamese, Malay, Portuguese (South American), Spanish (Central and South American), Turkish, Hindi.

http://www.MitsubishiElectric.co.jp/fa/glosup/e-learning/index.html

e-Learning





1

All courses are free of charge

2

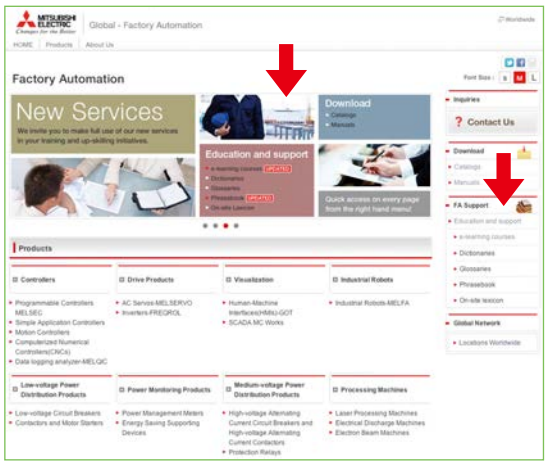
Learning at your own pace, whenever and wherever.

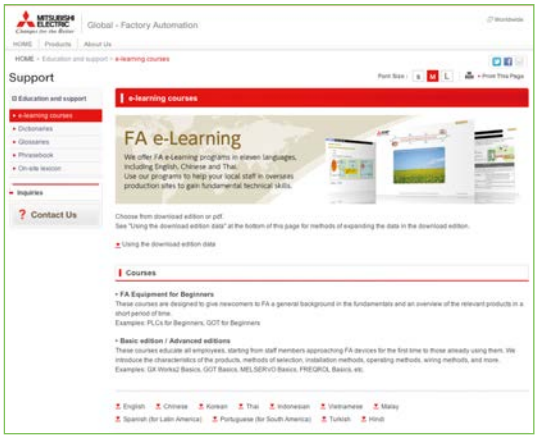
- You can learn whenever & wherever.
- You can repeat lessons as needed.
- You can quickly and easily check your learning progress.

3

Effective multi-media learning

- You can understand deeply with animations and videos.
- You can operate programming software with simulator.





●Access directly from the following URL.
http://www.mitsubishielectric.com/fa/assist/e-learning/index.html

CONTROLLERS

Programmable Controllers MELSEC

Servo System Controller

Adaptable to a wide range of operations,
from miniaturized machines to
large-scale infrastructure monitoring

MELSEC

Programmable Controllers MELSEC

MELSEC Series; Innovating technology

The MELSEC Series continued to respond to the demands of production sites and made refinements.
Our highly reliable and extensive lineup offers new possibilities to advanced production sites.

Product details P.4



Servo System Controller

Capable of high-speed, high-accuracy drive control of various industrial machines.
Our lineup of motion controllers and simple motion units allow you to make the best choice for your control needs.

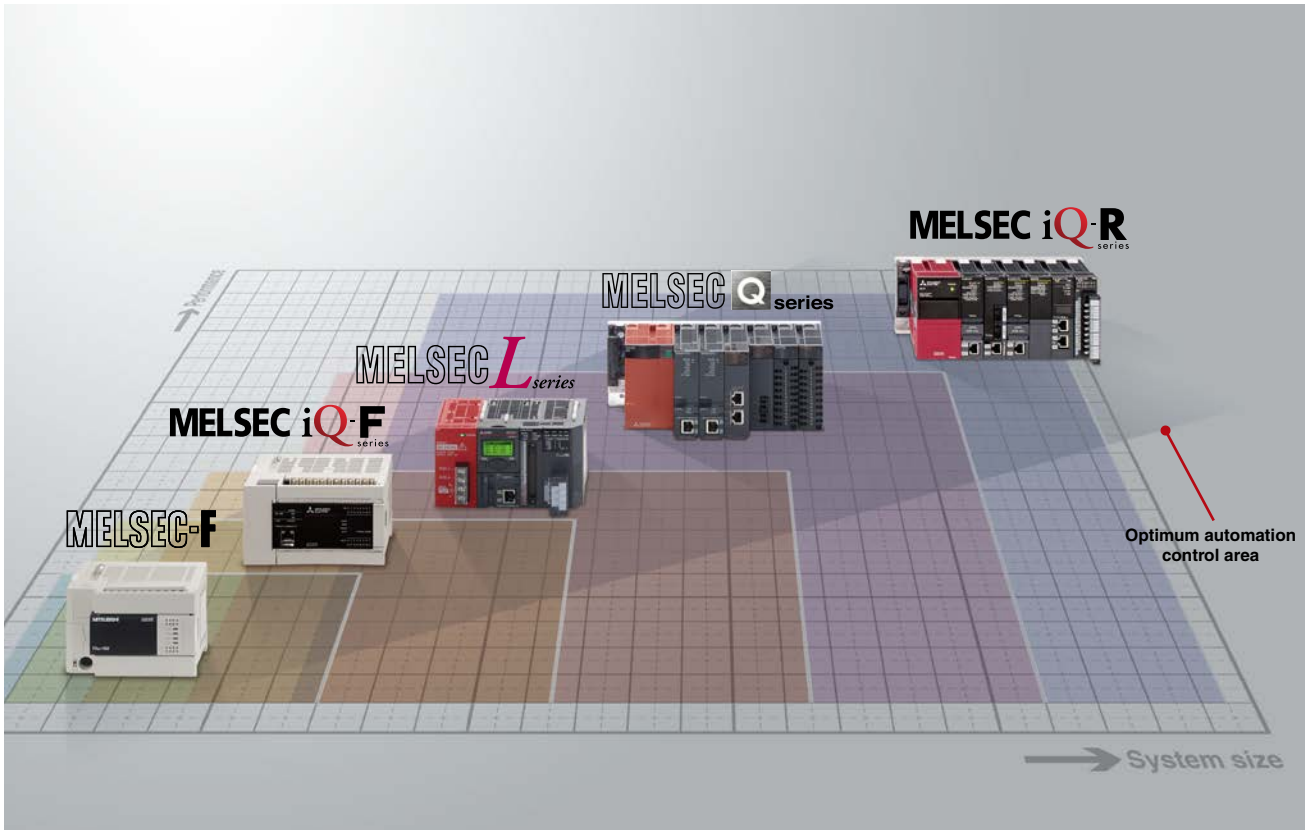
Product details P.240



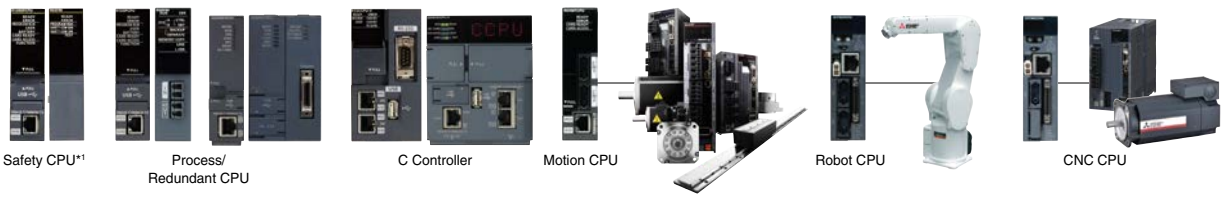
Programmable Controllers

MELSEC Series; Innovating technology

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Our highly reliable and extensive lineup offers new possibilities to advanced production sites.



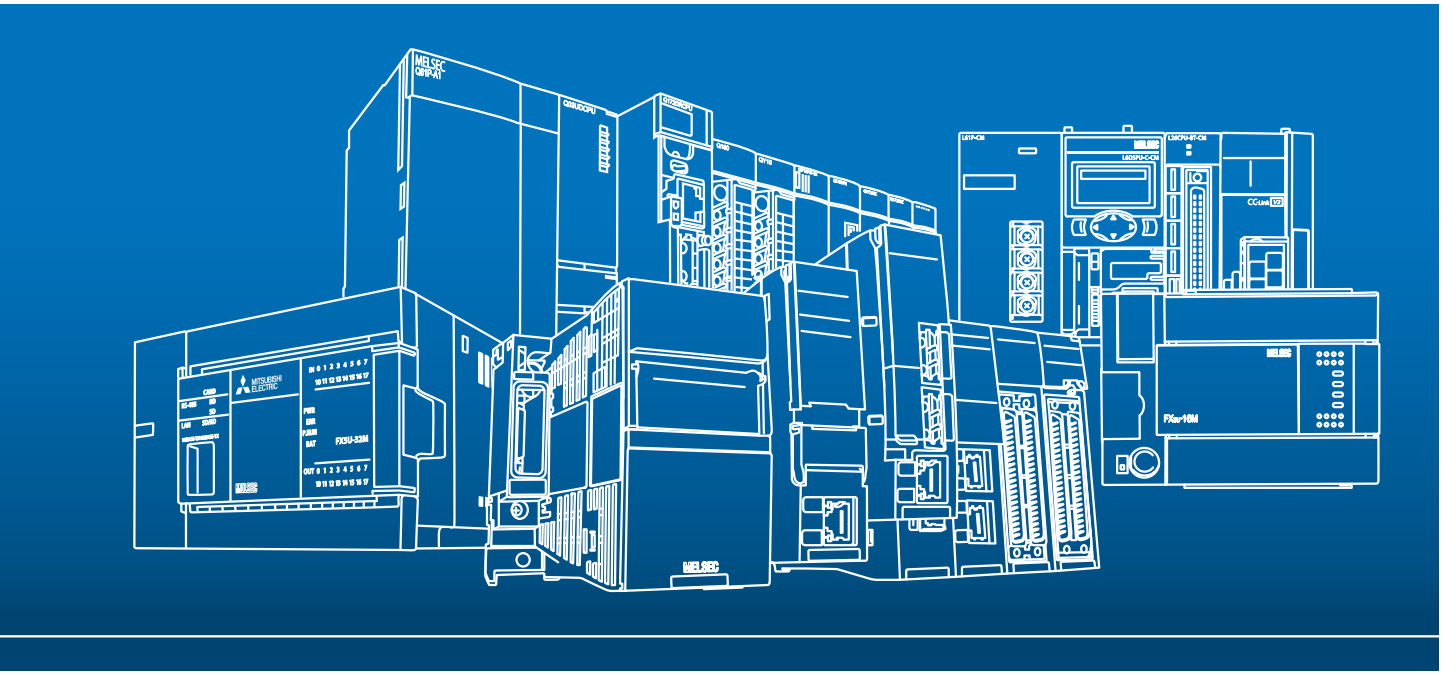
Application-specific CPUs



iQ Platform

These best-in-class CPUs, integrated into the iQ Platform, are designed for specific needs across various different industry areas.

*1: R□SFCPU-SET includes both a safety CPU and safety function module



Medium- to large-scale control



P.10

MELSEC iQ-R Series

A next-generation programmable automation controller (PAC), the MELSEC iQ-R Series incorporates a revolutionary high-speed system bus that improves productivity through advanced performance and functionality.



P.88

MELSEC-Q Series

The first to incorporate the multiple CPU architecture, the MELSEC-Q Series wide-range of CPUs enables control of multiple operations, improving the performance and scalability of the overall production system.

Small- to medium-scale control



P.118

MELSEC-L Series

The MELSEC-L Series is a baseless highly scalable controller ideal for applications having limited space. With various I/O functionality embedded into the CPU head, exceptional cost versus performance is achieved in a compact body.

Small-scale and stand-alone



P.48

MELSEC iQ-F Series

Designed to provide outstanding performance and superior drive control, the MELSEC iQ-F Series is a high-performance compact-class controller with a rich assortment of integrated functions.



P.134

MELSEC-F Series

Incorporating abundant features with a flexible system configuration, the MELSEC-F Series has a power supply, CPU and I/Os into a single compact body. Furthermore, a diverse range of options are available to further expand its capabilities.

Safety control



MELSEC-WS Series

P.150



MELSEC-QS Series

“MELSEC Safety”, the Total Safety Solution delivers safety control while securing compatibility with the MELSEC programmable controllers. Our extensive lineup offers safety equipment best suited to your system configuration.

Network related products

P.160

CC-Link IE CC-Link

Supports seamless network construction from office to production sites, based on the platform of a consistent design approach. Built to deliver seamless collaboration from lower field system to higher information system to realize an optimized network according to purpose and use.

Engineering software

MELSOFT

P.184

GX Works3 GX Works2

MELSOFT iQ Works

Lineup of engineering software for comprehensive support of programmable controller design and maintenance work. By sharing system design such as system configuration and programing among the overall system, it makes possible to enhance the efficiency of system design and programing.

iQ Sensor Solution

P.202

iQSS

iQSS (iQ Sensor Solution) simplifies sensor setting and maintenance process. Linkage among sensors, indicators, and engineering environment is strengthened further to reduce TCO (Total Cost of Ownership) of individual customers.

MELSEC Designed with automation in mind

Mitsubishi Electric offers a wide range of controllers capable of satisfying the diversified application needs in various industries. The high-speed, high-accuracy controllers in the MELSEC series covers them all, providing highly flexible cost-effective solutions.

iQ-R : MELSEC iQ-R Series
Q : MELSEC-Q Series
L : MELSEC-L Series
iQ-F : MELSEC iQ-F Series
F : MELSEC-F Series
S : Safety
P : Process/Redundant system
C : C Controller
M : Servo system controller
R : Robot controller
N : CNC CPU

Automotive

iQ-R Q S M R N



Improve productivity and realize flexibility in different automotive assembly lines with high-accuracy motion control, including linear/circular interpolation and electric cam profile.

Automated warehouse

iQ-R Q iQ-F F C M R



Realize advanced logistics coordination and eliminate errors in repetitive processes. Servo-based high-speed material handling and highly accurate positioning improving productivity and reduce energy consumption.

Food and beverage, CPG

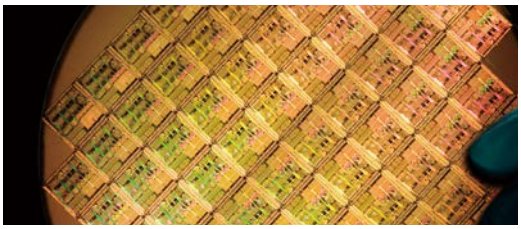
iQ-R Q L iQ-F F P M



Realize improvements in various packaging applications such as high-speed filling, which requires a highly accurate, continuous feed rate and precision.

Semiconductor

iQ-R Q S C M



Reduce maintenance costs using the high-durability MELSEC Series. Having the compact, robust design desired for semiconductor manufacturing, MELSEC products solve the small footprint, high-performance requirements.

Pick-and-place

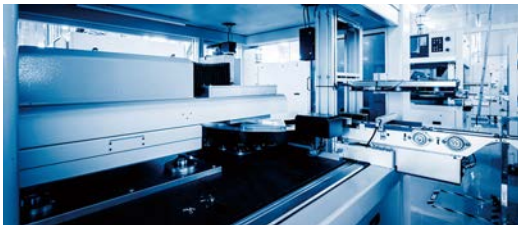
iQ-R M



Achieve highly precise, fast and accurate placement of components in various sizes and shapes such as that required by SMT pick-and-place equipment, further improving productivity.

Flat panel display (FPD)

iQ-R Q S C M R



Improve the large data bandwidth and high performance requirements common in FPD manufacturing processes using MELSEC's integrated control platform. The integrated controller and network solution offer increased flexibility and enhanced performance.

Chemical

iQ-R Q P



Improve control of processes involving chemical manufacturing using highly scalable solutions that integrate process control and factory automation.

Inspection machines

iQ-R C



Easily integrate Inspection machine control into automated systems, thereby reducing maintenance and overall operational costs.

Renewable energy

iQ-R P C



Easily integrate renewable energy plant management utilizing plant-wide data acquisition and extensive real-time control, thereby reducing overall investment and maintenance costs.

Building automation

iQ-R Q L iQ-F F C



Increase security and ensure effective use of energy management capabilities by supporting various building automation protocols, resulting in a reduced carbon footprint.

Printing and packaging machinery

iQ-R Q C M



We provide system solutions enabling high-precision synchronization of roll-up and roll-out operations as part of the printing and packaging process. This allows flexible realization of high-speed, high-grade converting applications.

Injection molding

iQ-R Q iQ-F F M



Achieve reductions in machine operation costs and improve productivity by integrating MELSEC controllers that utilize an easy-to-use control platform combined with highly accurate motion control.

Machine tool

iQ-R Q L iQ-F F N



Improve productivity, operating efficiency and overall equipment effectiveness using the scalable control of MELSEC products, supporting tasks such as drilling, grinding, and milling.

General automation

iQ-R Q L iQ-F F C



Alternative automation applications such as automatic car washes and automated hydroponic farming require a high-level of automation similar to industrial solutions.

Controller lineup

Series	Modular type	Modular type	Baseless type
			
	MELSEC iQ-R	MELSEC-Q	MELSEC-L
	PAC (Programmable automation controller)	Programmable controller CPU	Programmable controller CPU
Lineup	・Programmable controller CPU: 5 models ・CC-Link IE embedded CPU: 5 models ・Safety CPU: 4 models ・Process CPU*1: 4 models ・C Controller: 1 model ・Motion CPU: 3 models	・Programmable controller CPU (Universal model): 25 models ・Process CPU: 4 models ・Redundant CPU: 2 models ・C Controller: 4 models ・Motion controller: 2 models ・Robot controller: 1 model ・CNC CPU: 1 model	・Programmable controller CPU ・Sink type: 5 models ・Source type: 5 models
Control method	Stored program cyclic operation	Stored program cyclic operation	Stored program cyclic operation
I/O control mode	Refresh mode	Refresh mode	Refresh mode
Programming language	・Ladder diagram ・Structured text (ST) ・Sequential function chart (SFC)*2 ・Function block diagram (FBD/LD) ・Function block (FB) ・C/C++*4	・Ladder diagram ・Structured text (ST) ・Instruction list ・MELSAP3 (SFC), MELSAP-L ・Function block diagram (FBD) ・Function block (FB) ・C/C++*4	・Ladder diagram ・Structured text (ST) ・Instruction list ・MELSAP3 (SFC), MELSAP-L ・Function block (FB)
Safety standard conformance level	・ISO 13849-1 PL e ・IEC 61508 SIL 3*18	—	—
Engineering environment	MELSOFT GX Works3 MELSOFT MT Works2 CW Workbench	MELSOFT GX Works2 MELSOFT PX Developer CW Workbench MELSOFT MT Works2	MELSOFT GX Works2
Program size (K step)	1200	1000	260
Number of I/O points [X/Y] (point)	4096	4096	4096
Device/label memory/ standard RAM (K byte)	3380	1792	768
Data memory/ standard ROM (byte)	40M	16M	2M
Processing speed			
LD instruction (ns)	0.98	1.9	9.5
MOV instruction (ns)	1.96	3.9	19
Floating point addition (μs)	0.01	0.014	0.057
Memory interface			
Extended SRAM cassette	●	●*3	—
SD memory card	●	●*3	●*6
SRAM card, FLASH card, ATA card	—	●*5	—
External interface			
USB	●	●	●
Ethernet (1000BASE-T*7/ 100BASE-TX/10BASE-T)	●	●*8	●*6
RS-232	—	●*9	●*10
RS-422/485	—	—	—
Display unit	—	—	●
CC-Link IE connection port			
Ethernet (1000BASE-T/100BASE-TX/10BASE-T)	●*12	—	—
Network connectivity (adapter/module)			
Ethernet (1000BASE-T*13/100BASE-TX/10BASE-T)	●	●	●
CC-Link IE Control	●	●	—
CC-Link IE Field	●	●*15	●
CC-Link	●	●	●
CC-Link Safety	—	—	—
CC-Link/LT	—	●	●
SSCNET Ⅲ/H	●	●	●
AnyWire	●	●	●
BACnet™	●	●	●
MODBUS®/TCP	●	●	●
MODBUS®	●	●	●
General specifications/conformed standards			
Operating ambient temperature	0...55℃ (60℃*17)	0...55℃	0...55℃
International safety standards (ISO 13849-1 PL e, IEC 61508 SIL 3)	●*18	—	—
Standard on corrosive atmosphere (JIS C 60721-3-3/ IEC 60721-3-3 3C2)	●*19	—	—
CE: Council Directive of the European Communities	●	●	●
UL: Underwriters Laboratories Listing	●	●	●
LR: Lloyd's Register of Shipping approval	●	●	—
DNV: Norwegian Maritime approval	●	●	—
RINA: Italian Maritime approval	●	●	—
NK: ClassNK approval	●	●	—
ABS: American Bureau of Shipping approval	●	●	—
BV: Bureau Veritas approval	●	●	—
GL: Germanischer Lloyd approval	●	●	—
Key features/functions	・Line manufacturing ・Distributed control ・Large-scale I/O control ・Security ・Inter-modular sync ・Built-in database ・Integrated network ・Multiple CPU ・Process control ・High-reliability control ・C programming ・Data logging ・IT gateway ・Advanced motion ・Safety ・Real-time monitor	・Line manufacturing ・Distributed control ・Large-scale I/O control ・Integrated network ・Multiple CPU ・Process control ・High-reliability control ・C programming ・Data logging ・IT gateway ・Advanced motion	・Machine control ・Distributed control ・Small-scale I/O control ・Large-scale I/O control ・Space/cost saving ・Integrated network ・Extensive built-in functions ・Data logging ・Motion control ・Real-time monitor

*1: Supports redundant system when paired with R6RFM
*2: SFC is not supported in redundant mode and by safety CPU
*3: Q□UDVCPU only.
*4: When using CW Workbench
*5: Does not support QnUDVCPU and certain models
*6: Does not support L02SCPU(-P)
*7: Supports the user Ethernet port of Q24DHCCPU-V/VG/LS and Q26DHCCPU-LS only
*8: Supports Q□UDE(H)CPU and Q□UDVCPU only
*9: Does not support Q□UDE(H)CPU and Q□UDVCPU
*10: Supports L02SCPU(-P) only
*11: Supports FX3G only
*12: R□ENCPU only.
*13: Supports the MELSEC iQ-R Series only
*14: Supported by expansion board

Compact type	Compact type			Modular type	Baseless type
					
MELSEC iQ-F	MELSEC-F			MELSEC-QS	MELSEC-WS
Programmable controller CPU	Programmable controller CPU			Safety programmable controller	Safety controller
FX5U/FX5UC	FX_{3S}	FX_{3G}/FX_{3GC}	FX_{3U}/FX_{3UC}		
・FX5U: 12 models ・FX5UC: 6 models	・FX_{3S}: 27 models	・FX_{3G}: 24 models ・FX_{3GC}: 2 models	・FX_{3U}: 37 models ・FX_{3UC}: 12 models	・CPU: 1 models	・CPU: 3 models
Stored program cyclic operation	Stored program cyclic operation			Stored program cyclic operation	—
Refresh mode	Refresh mode			Refresh mode	—
・Ladder diagram ・Structured text (ST) ・Function block diagram (FBD/LD) ・Function block (FB)	・Ladder diagram ・Structured text (ST) ・SFC for FX Series ・Function block (FB)			・Ladder diagram ・Function block (FB)	・Function block (FB)
—	—	—	—	・ISO 13849-1 PL e ・IEC 61508 SIL3	・ISO 13849-1 PL e ・IEC 61508 SIL3
MELSOFT GX Works3	MELSOFT GX Works2			MELSOFT GX Developer Ver.8	Setting/monitoring tool (free)
64	4	32	64	14	—
256	30	128	256	1024	144
120	—	—	—	—	—
5M	—	—	—	128K	—
34	210	210	65	100	—
34	520	520	640	350	—
3.06	11.96	11.96	14.2	—	—
—	●	●*11	●	—	—
●	—	—	—	—	—
—	—	—	—	—	—
—	●	●	●*14	●	●*21
●	—	—	—	—	—
—	●	●	●	—	●
●	●	●	●	—	—
—	●	●*11	●	—	—
—	—	—	—	—	—
●	●	●	●	●	●
—	—	—	—	●	—
●	—	—	—	●	—
●	—	●	●	—	●
—	—	—	—	●	—
—	—	●	●	—	—
●	—	—	●*16	—	—
●	—	●	●	—	—
—	—	—	—	—	—
●	—	—	—	—	—
●	●	●	●	—	—
−20...55℃*20	0...55℃	0...55℃	0...55℃	0...55℃	−25...55℃
—	—	—	—	●	●
—	—	—	—	—	—
●	●	●	●	●	●
●	●	●	●	●	●
—	●	●	●	—	—
—	●	●	●	—	—
—	●	●	●	—	—
—	●	●	●	—	—
—	●	●	●	—	—
—	●	●	●	—	—
・Machine control ・Distributed control ・Small-scale I/O control ・Space/cost saving ・Security ・Integrated network ・Extensive built-in functions ・Motion control	・Machine control ・Small-scale I/O control ・Space/cost saving ・Motion control			・Line manufacturing ・Large-scale I/O control ・Safety	・Line manufacturing ・Small-scale I/O control ・Safety

*15: Does not support Q□(P)(H)CPU and Q□PRHCPU
*16: Supports SSCNET Ⅲ
*17: Only supported when used together with extended temperature range main/extension base units
*18: R□SFCPU-SET only.
*19: For protection against aggressive atmosphere and gases, products with a conformal coating (JIS C 60721-3-3/IEC 60721-3-3 Class 3C2) are available on request
*20: Operating ambient temperature from −20°C is supported by products produced from June 2016 (serial number "166" or later). For details, on supported products, please refer to the relevant product manual.
*21: Supports WS0-CPU3 only

MELSEC iQ-R Series

Revolutionary, next-generation controllers building a new era in automation

As the core for next-generation automation environment,
realizing an automation controller with added value while reducing TCO*

*TCO: Total cost of ownership

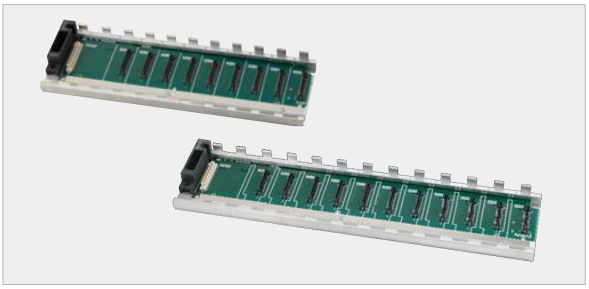
CPU Module

Designed to control programmable controller systems. Lineup of CPUs to address various control demands.



Base Unit

Enable to mount power supply module, CPU module, I/O module. Our lineup of base units are designed to meet your system needs.



Power Supply Module

Supplies power to CPU module, I/O module and other modules.



I/O Module

Connects input and output devices.
Wide lineup of I/O modules for various system configurations.



Analog I/O Module

Inputs and outputs data in analog form and built for process control needs as well. Lineup of analog modules for high-speed, high-precision control.



Simple Motion Module/ Positioning Module

Delivers high-speed, high-precision positioning control. Lineup of positioning modules to suit various uses.



High-Speed Counter Module

Compatible with high resolution devices. High-speed counter module for high-speed, high-precision control.



Information Coordination Module

Enables information communication with upper management system. Lineup of modules designed for production efficiency through sampling and management of various production information.



Network Module

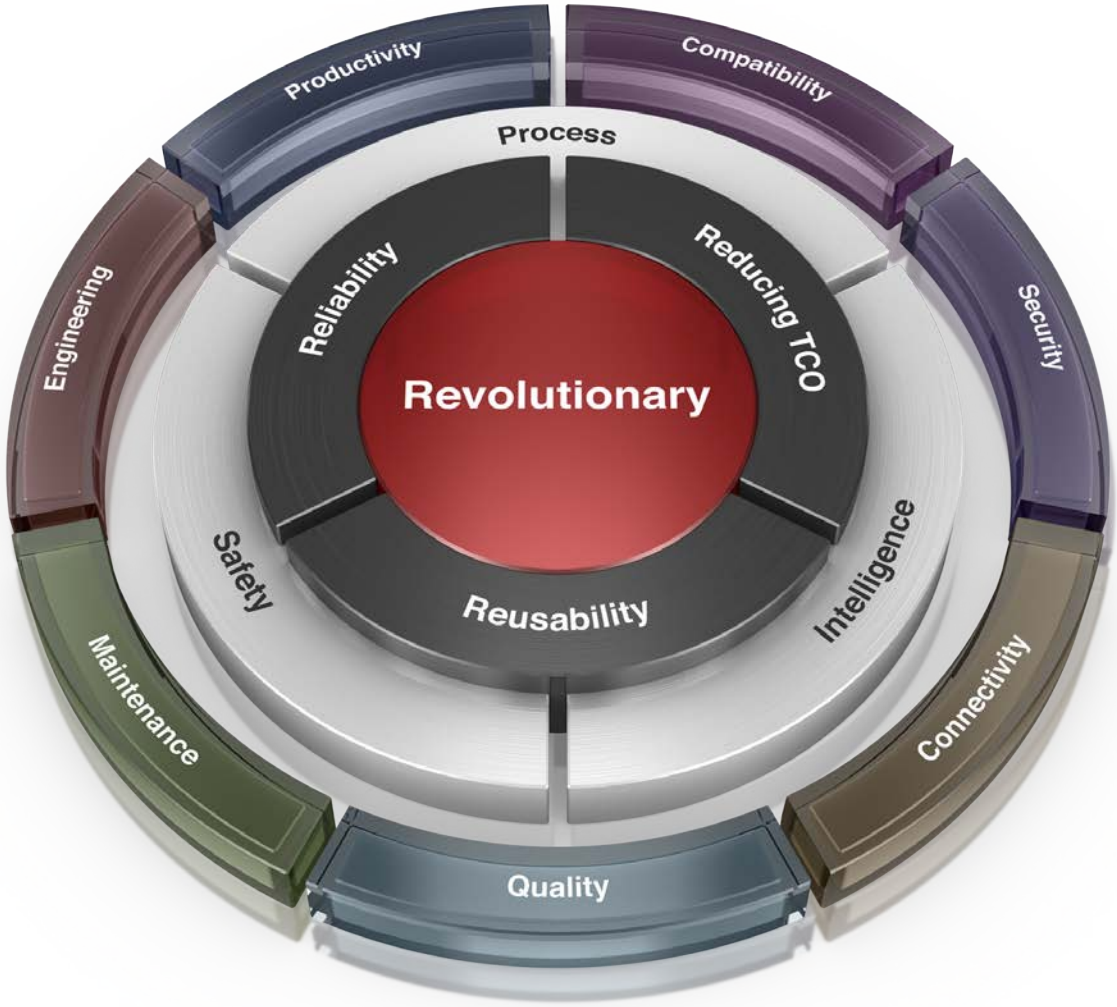
Control system network interface module.
Delivers seamless integration of individual FA hierarchies through wide network.





To succeed in highly competitive markets, it's important to build automation systems that ensure high productivity and consistent product quality. The MELSEC iQ-R Series has been developed from the ground up based on common problems faced by customers and rationalizing them into seven key areas: Productivity, Engineering, Maintenance, Quality, Connectivity, Security and Compatibility. Mitsubishi Electric is taking a three-point approach to solving these problems: **Reducing TCO***, increasing **Reliability** and **Reusability** of existing assets.

As a bridge to the next generation in automation, the MELSEC iQ-R Series is a driving force behind **revolutionary** progress in the future of manufacturing.



Mitsubishi Electric PAC MELSEC iQ-R "Promotion" Movie

Process

High availability process control in a scalable automation solution

- Extensive visualization and data acquisition
- High availability across multiple levels
- Integrated process control software simplifies engineering

Safety

System design flexibility with integrated safety control

- Integrated generic and safety control
- Consolidated network topology
- Complies with international safety standards

Intelligence

Extensive data handling from shop floor to business process systems

- Direct data collection and analysis
- C/C++ based programming
- Collect factory data in real-time
- Expand features using third party partner applications

Productivity

Improve productivity through advanced performance/functionality

- New high-speed system bus realizing shorter production cycle
- Super-high-accuracy motion control utilizing advanced multiple CPU features
- Inter-modular synchronization resulting in increased processing accuracy

Connectivity

Seamless network reduces system costs

- Seamless connectivity within all levels of manufacturing
- High-speed and large data bandwidth ideal for large-scale control systems
- Easy connection of third-party components utilizing device library

Engineering

Reducing development costs through intuitive engineering

- Intuitive engineering environment covering the product development cycle
- Simple point-and-click programming architecture
- Understanding globalization by multiple language support

Security

Robust security that can be relied on

- Protect intellectual property
- Unauthorized access protection across distributed control network

Maintenance

Reduce maintenance costs and downtime utilizing easier maintenance features

- Visualize entire plant data in real-time
- Extensive preventative maintenance functions embedded into modules

Compatibility

Extensive compatibility with existing products

- Utilize existing assets while taking advantage of cutting-edge technology
- Compatible with most existing MELSEC-Q Series I/O

Quality

Reliable and trusted MELSEC product quality

- Robust design ideal for harsh industrial environments
- Improve and maintain actual manufacturing quality
- Conforms to main international standards

Mitsubishi Electric PAC MELSEC iQ-R "Process" Movie



Process

High-available process control in a scalable automation solution

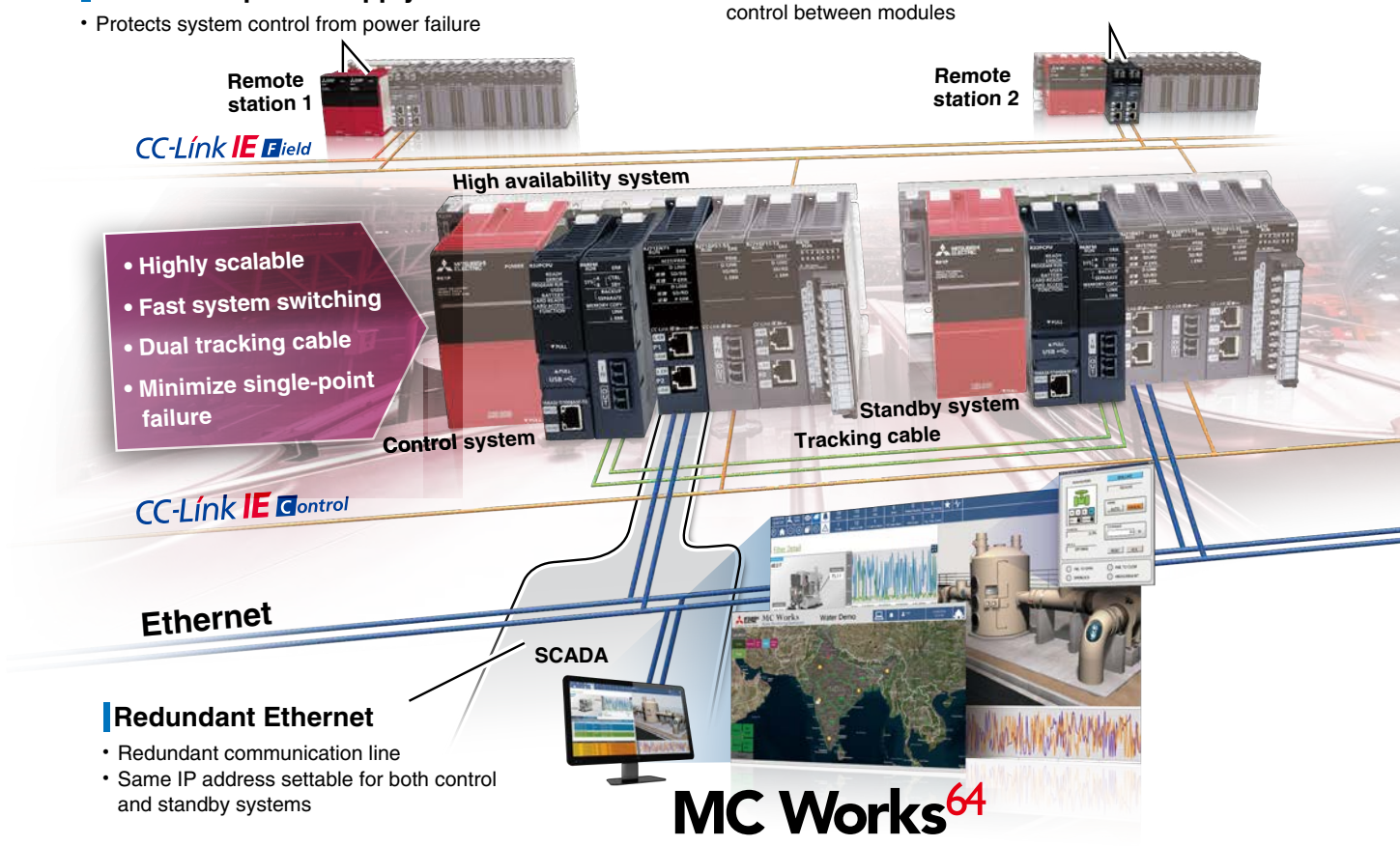
MELSEC iQ-R Series process CPU modules are designed to cover wide-ranging process control applications, from small- to large-scale. All models provide high-speed performance coupled with the ability to handle large PID loops utilizing embedded PID control algorithms; integrating both general and process control into one module. When paired with a redundant function module, a redundant control system ideal for applications that require highly reliable control can be easily realized at a low cost.

Redundant power supply module

- Protects system control from power failure

Remote station
Redundant remote network head module

- Enables continuous data communications by switching control between modules



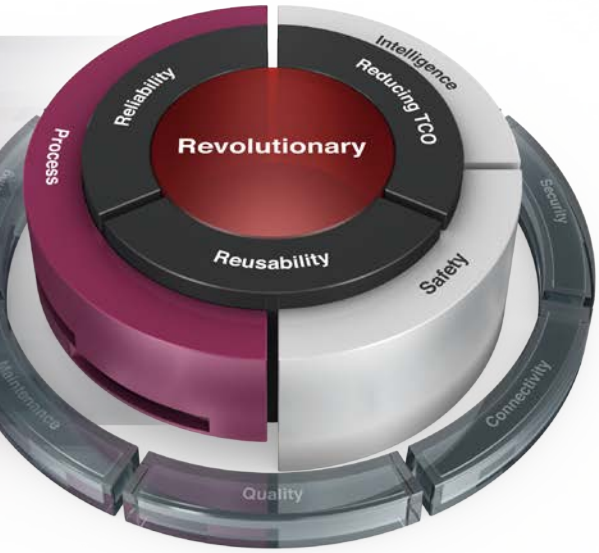
Redundant Ethernet

- Redundant communication line
- Same IP address settable for both control and standby systems

Extensive visualization and data acquisition

SCADA

Mitsubishi SCADA MC Works64*1 is a next generation supervisory control and data acquisition (SCADA) software providing extensive visualization with its enhanced interconnectivity with the MELSEC iQ-R Series. Advanced features such as energy management, scheduling, alarm and event management, trending, reporting, historian, and Geo-SCADA monitoring realize intuitive factory-wide control.

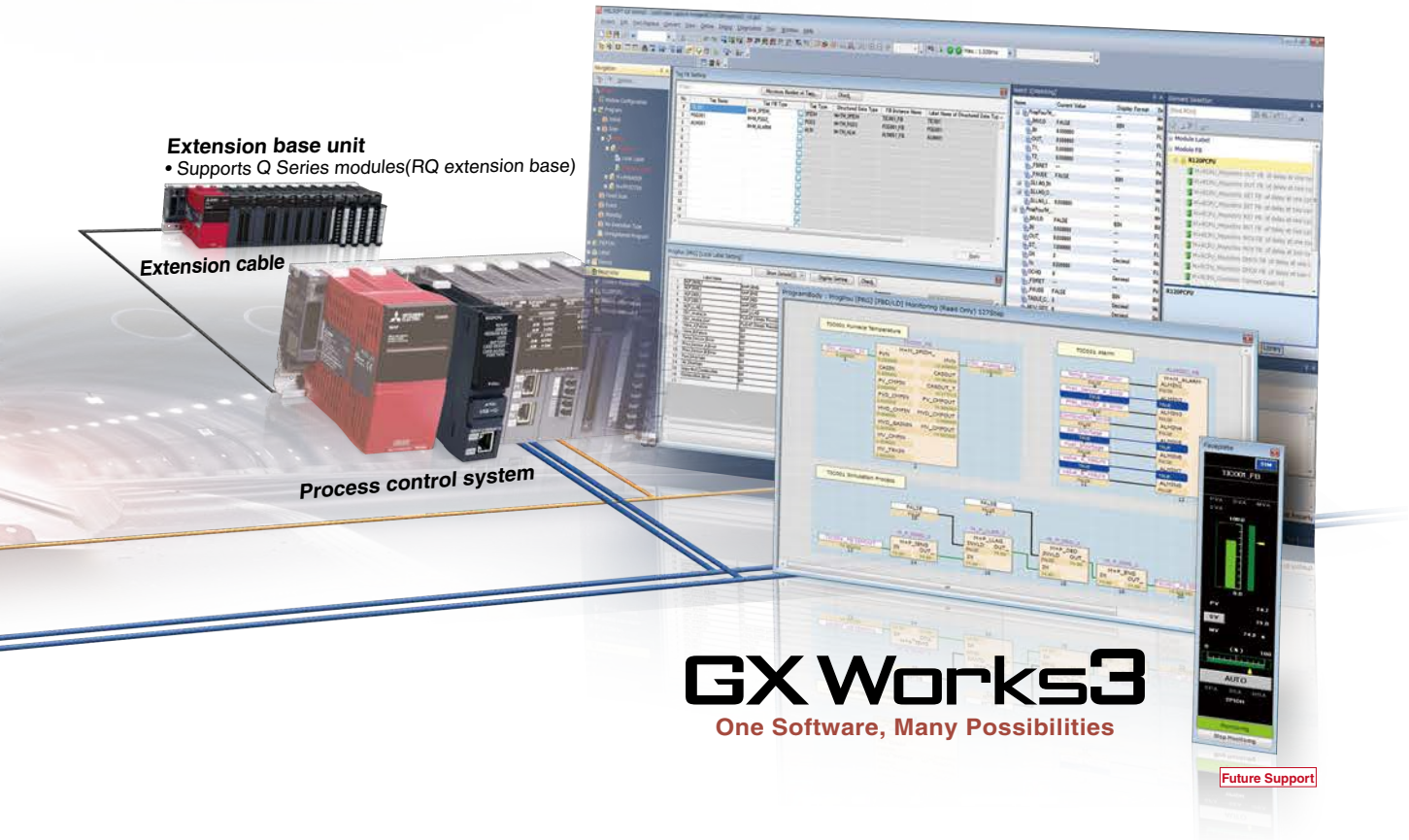




Embedded PID algorithms

PID control

The process CPU includes dedicated algorithms such as two-degree-of-freedom PID, sample PI, and auto-tuning support advanced process control.





Multi-level redundancy ensuring continuous control

High availability

Highly reliable control systems can be easily realized minimizing the possibility of single-point failure at the visualization (SCADA), control, and network levels, thereby avoiding system downtime and ensuring continuous control and operation of critical systems.



One package process control software

Integrated engineering

GX Works3*2, the standard integrated engineering software for the MELSEC iQ-R Series, makes programming redundant process control systems relatively easy. The program editor uses function block diagram (FBD) language for process control and simplifies system configuration with its intuitive features such as process tag label (variables) sharing, simple program structure, and easy project upload/download to the process CPU.

*1. MC Works64 redundant Ethernet connection will be supported in the future.
*2. Process features such as process tag and faceplate will be supported in the future.

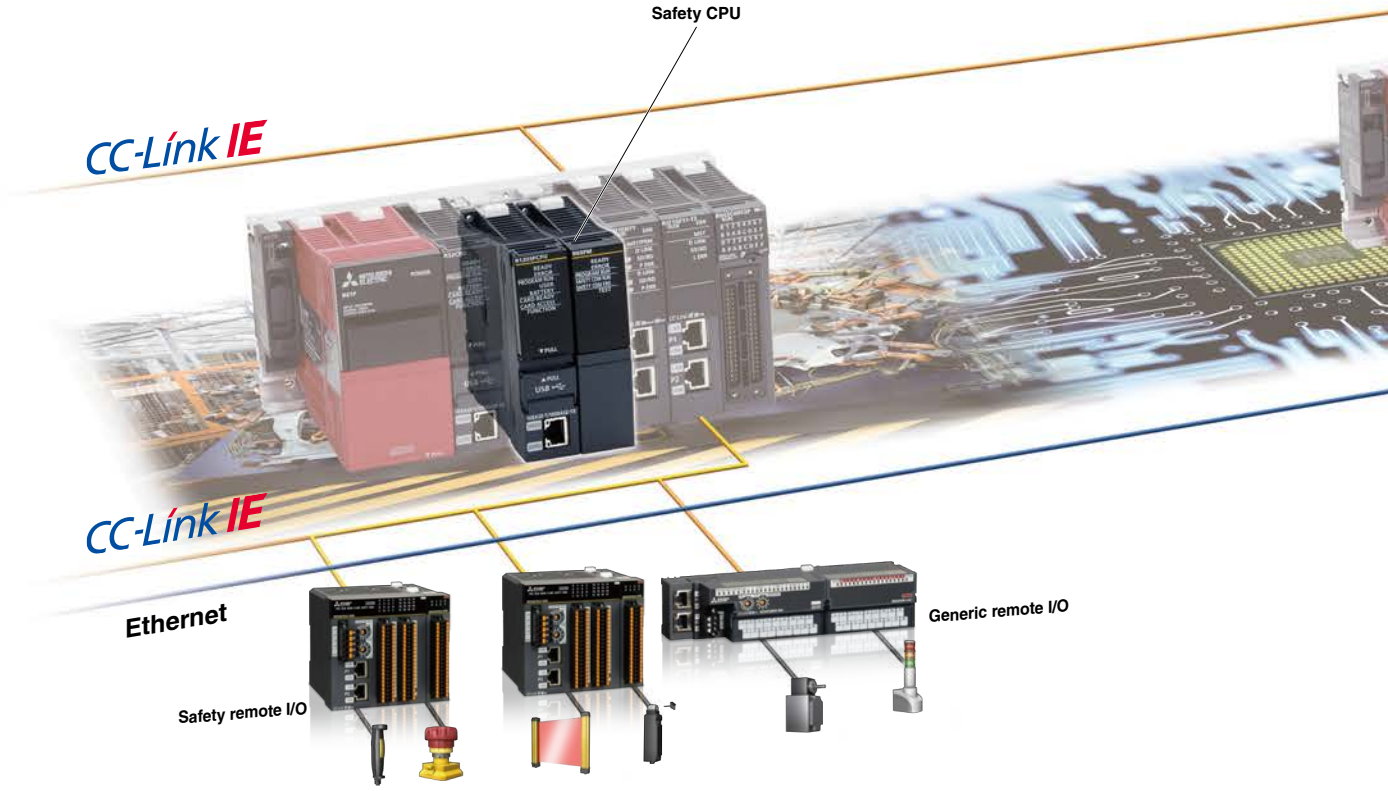
Mitsubishi Electric PAC MELSEC iQ-R "Safety" Movie



Safety

Integrated safety control offering a total system solution

Ensuring the safety of personnel on the factory floor is a fundamental requirement of manufacturing plants and requires stringent safety regulations. To adhere to this safety code for control systems, the MELSEC iQ-R Series is equipped with a safety CPU that is compliant with international safety standards, enabling safety devices to be connected via the CC-Link IE Field network. The entire system can be programmed using GX Works3 programming software as standard.



Compliant with international safety standards

Quality

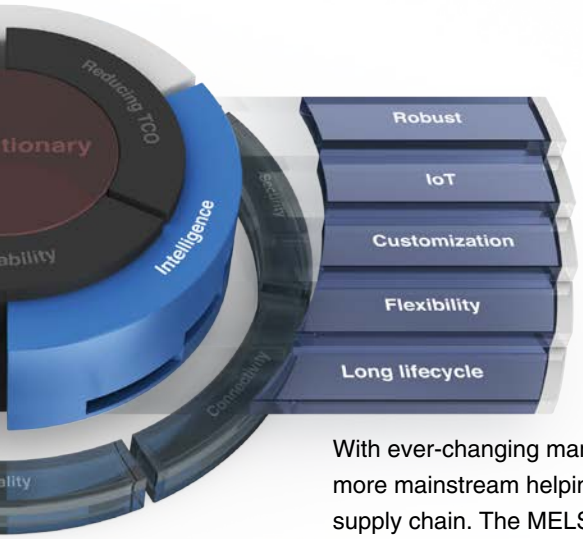
The Safety CPU is compliant with ISO 13849-1 PL e and IEC 61508 SIL 3 and is certified by TÜV Rheinland®.

Generic and safety control in one CPU

Space-saving

Can be installed directly on the MELSEC iQ-R base rack, and is easily integrated into an existing or new control system.

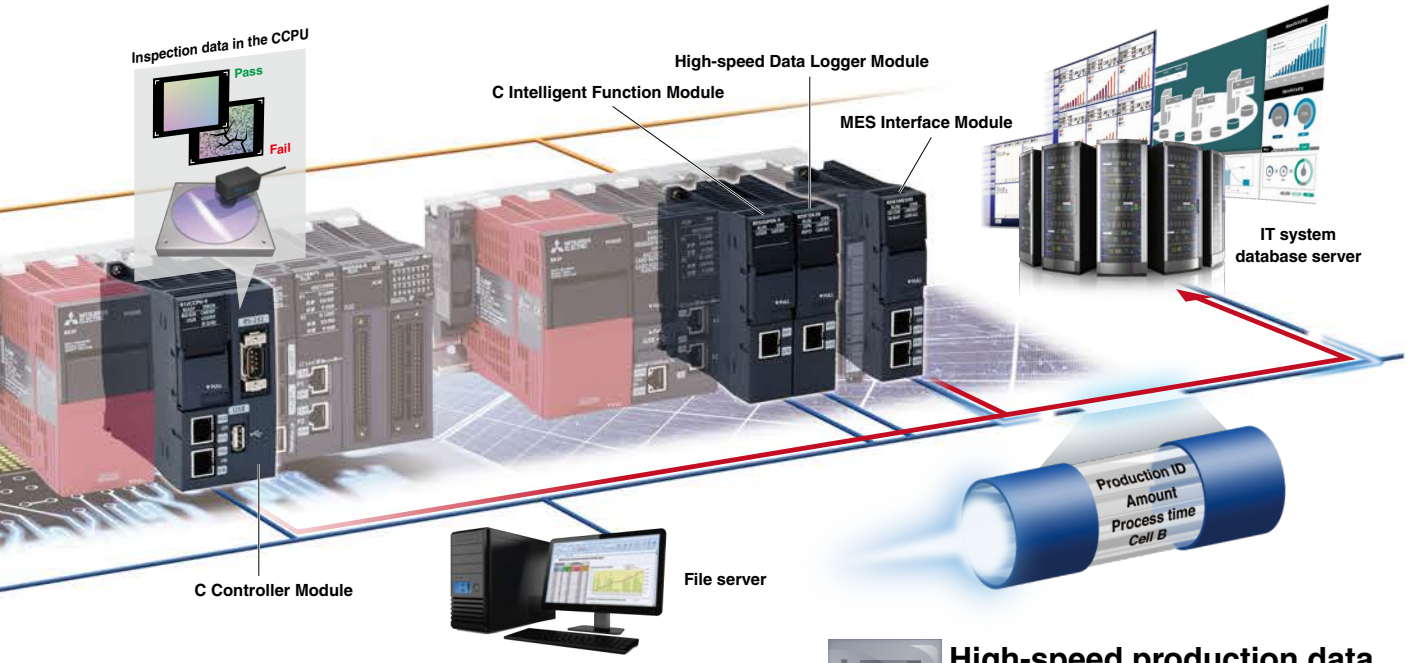
Mitsubishi Electric PAC MELSEC iQ-R "Intelligence" Movie



Intelligence

Extensive data handling from shop floor to business process systems

With ever-changing manufacturing trends, production data management, analysis, and planning are more mainstream helping to realize leaner operations, improve yield, and create a more efficient supply chain. The MELSEC iQ-R Series includes the MES Interface, C Controller and C Intelligent function, and High-speed data logger modules as part of the “Intelligence” lineup of interconnected advanced information products.



C/C++ based programming

Flexibility

Based on the ARM® dual-core Cortex A9 processor, the real-time OS VxWorks® C Controller CPU is ideal for high-end analytical requirements where raw data has to be processed, such as for in-line manufacturing quality testing. The C Intelligent Function Module, based on the same processor, is a versatile programmable module that can be used for installing industryspecific communications protocols; for example, plant-wide monitoring of wind power generation farms, building automation and industrial open fieldbus networks.

High-speed production data collection

Data logging

Enables high-speed data logging that can be synchronized with the controller scan time, as an alternative to a dedicated logging client computer. Includes features such as triggering and reporting that improve troubleshooting of the manufacturing process.

Direct access to IT system database servers

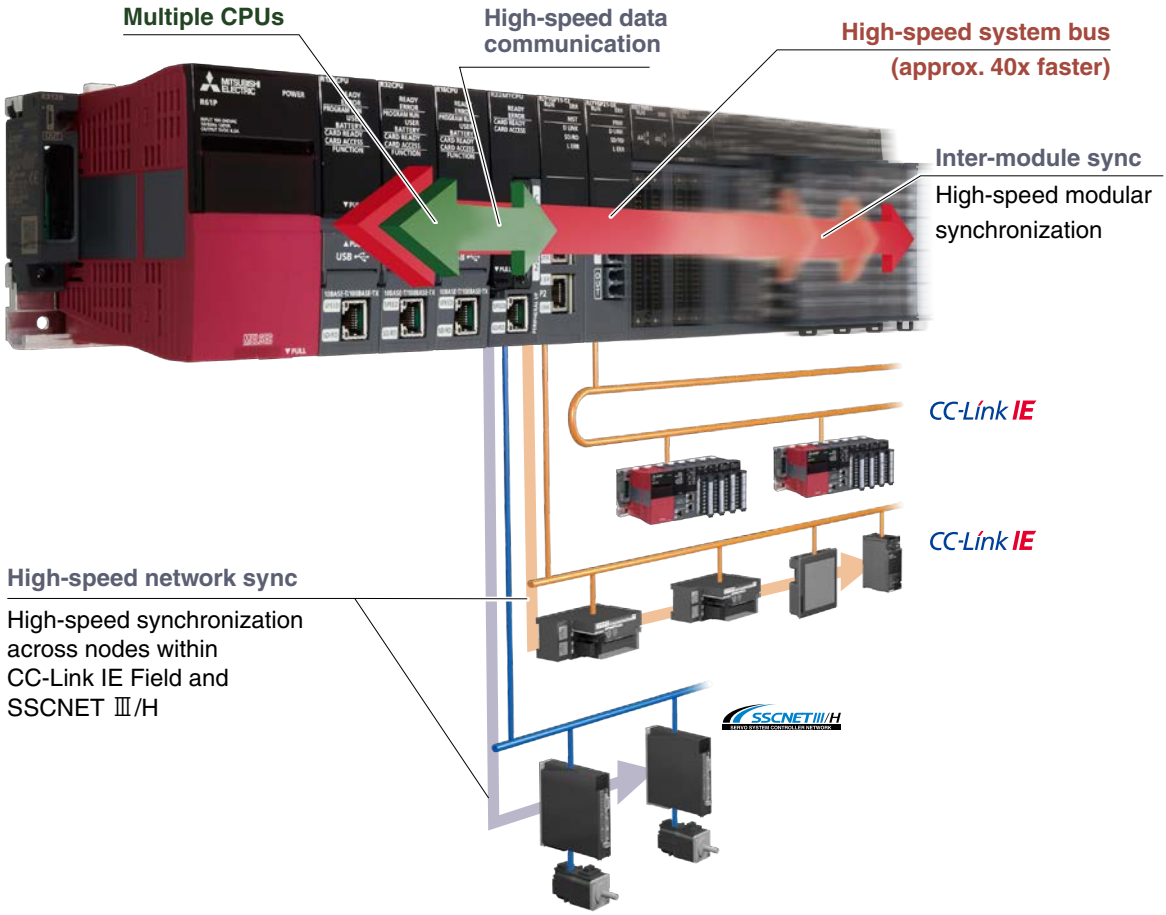
Information connection

Improve production management and recipe data handling via real-time direct access to IT system database servers such as Oracle® and Microsoft® (SQL Server®, Access®). Overall system cost is also reduced as additional programming, which can increase engineering time, and gateway computers are no longer required.

Productivity

Improve productivity through advanced performance/functionality

Integrating high-performance capabilities based on the high-end iQ-R system bus, high-speed network, and an advanced motion control system; applications requiring these characteristics can be easily realized using the MELSEC iQ-R Series as the core of the automation system.



New high-speed system bus realizes improved production cycle

The newly developed high-speed system bus is 40-times faster compared to existing models, realizing very fast and large-capacity data processing between modules (network, I/O, multi-CPU, etc.), enabling the optimum utilization of MELSEC iQ-R Series performance and functionality.

High-speed system bus
40x faster*1

Multi-CPU system realizes very accurate motion control

By supporting synchronized data communications between the programmable controller CPU and motion CPU via the high-speed system bus, performance is improved by up to four times compared to existing models, easily realizing super-high motion control accuracy.

Synchronized data exchange with motion CPU
4x faster*2

*1: Compared to MELSEC-Q Series.
*2: Compared to Q173DSCPU/Q172DSCPU.

Mitsubishi Electric PAC MELSEC iQ-R "Productivity" Movie

Inter-modular synchronization realizes increased processing accuracy

More flexible control over performance

Realizing high processing accuracy could not be any simpler when utilizing the inter-modular synchronization feature, which enables precise data synchronization between controller CPUs and various interface modules via the high-speed system bus (backplane). In addition, network level synchronization (both CC-Link IE Field and SSCNET Ⅲ/H) is now possible, realizing deterministic performance by ensuring synchronization between nodes without being influenced by varying network transmission delays.

New controller performance architecture further reduces H/W costs

High-speed processing of structured programs

The processing performance of the controller CPU has been substantially enhanced thanks to the newly designed CPU engine. The memory consumption for program and internal devices used in function block (FB) and structured text (ST) programs have been improved. This results in one CPU being able to do the job that used to require several CPUs in order to achieve the expected performance level and memory capacity.

Built-in database eliminates the need for a PC-based database server

Recipe data and production results data, previously managed using a database server, can now be managed via the database in the programmable controller. Use of dedicated commands for the built-in database makes it easy to search, add and update data on the fly. Furthermore, the import/export correlation with spreadsheet software is made easier.

Realize high-speed system performance

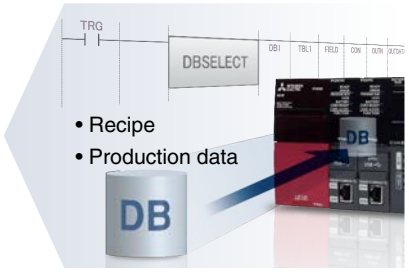
Approx. 8X faster than QCPU*3





- Realizes high-speed control performance
- Inherits MELSEC-Q Series functions
- Large-capacity memory ideal for large-scale control

Data management realized with built-in database



- Easy to switch between recipes
- Realize product batch control
- Efficiently switch between systems

LD instruction speed	PC MIX*4 (instructions/µs)	Fixed-cycle interrupt program	ST instruction (IF text, bit condition)	Program capacity
0.98 ns	419	50 µs	8 ns	1200K steps

*3: Based on a typical application example, the system benchmark test measures the CPU scan time, taking into consideration the network refresh time and monitoring processing time with external devices as compared to Universal model QCPU (QnUDEHCPU).
*4: Average number of instructions such as for basic instructions and data processing executed in 1µs (the larger the value, the faster the processing speed).

Engineering

Reducing development costs through intuitive engineering

The engineering software is sometimes considered a fundamental part of the control system in addition to the hardware components. The core of the system, it includes various steps of the product life cycle, from the design stage all the way to commissioning and maintenance of the control system. Today, intuitive, easy-to-use software suites are expected as a standard for modern manufacturing needs. GX Works3 is the latest generation of programming and maintenance software offered by Mitsubishi Electric specifically designed for the MELSEC iQ-R Series control system. It includes many new features and technologies to ensure a trouble-free engineering environment solution.

Intuitive engineering software covering the product development cycle

Graphic-based configuration realizing easier programming

Various intuitive features such as graphic-based system configuration and an extensive module library (module label/FB) provided as standard.

Integrated motion-control system configuration

From setting simple motion module parameters and positioning data setup to servo amplifier configuration, everything is packaged into an easy-to-use engineering environment.

Conforms to IEC 61131-3

GX Works3 realizes structured programming such as ladder and ST, making project standardization across multiple users even easier.

Simple point and click programming architecture

System design | Programming | Debug/maintenance

Straightforward graphic based system configuration design

- Simply drag and drop from the module list to easily create system configuration
- Directly setup parameters for each module
- Automatically reflect changes in the layout to the module parameters

System design | **Programming** | Debug/maintenance

MELSOFT library enables efficient programming through “Module Label/FB”

- Assign convenient label names to internal devices, rather than manually entering a device name every time
- Simply drag & drop module FBs from the MELSOFT Library directly into the ladder program, making programming even easier

System design | Programming | **Debug/maintenance**

Extensive version control features

- Flexibly register program change (historical) save points
- Easily visualize and confirm program changes

Simple motion setting tool

Easily configure the simple motion module with this convenient integrated tool.

Tab view multiple editors

Conveniently work on multiple editors without having to switch between software screens.

Navigation window

Easily access project components
Organize program file list.

Module configuration

Easily parameterize each module directly from the configuration editor.

Module list

Simply drag & drop modules directly into the module configuration.

Mitsubishi Electric PAC MELSEC iQ-R "Engineering" Movie

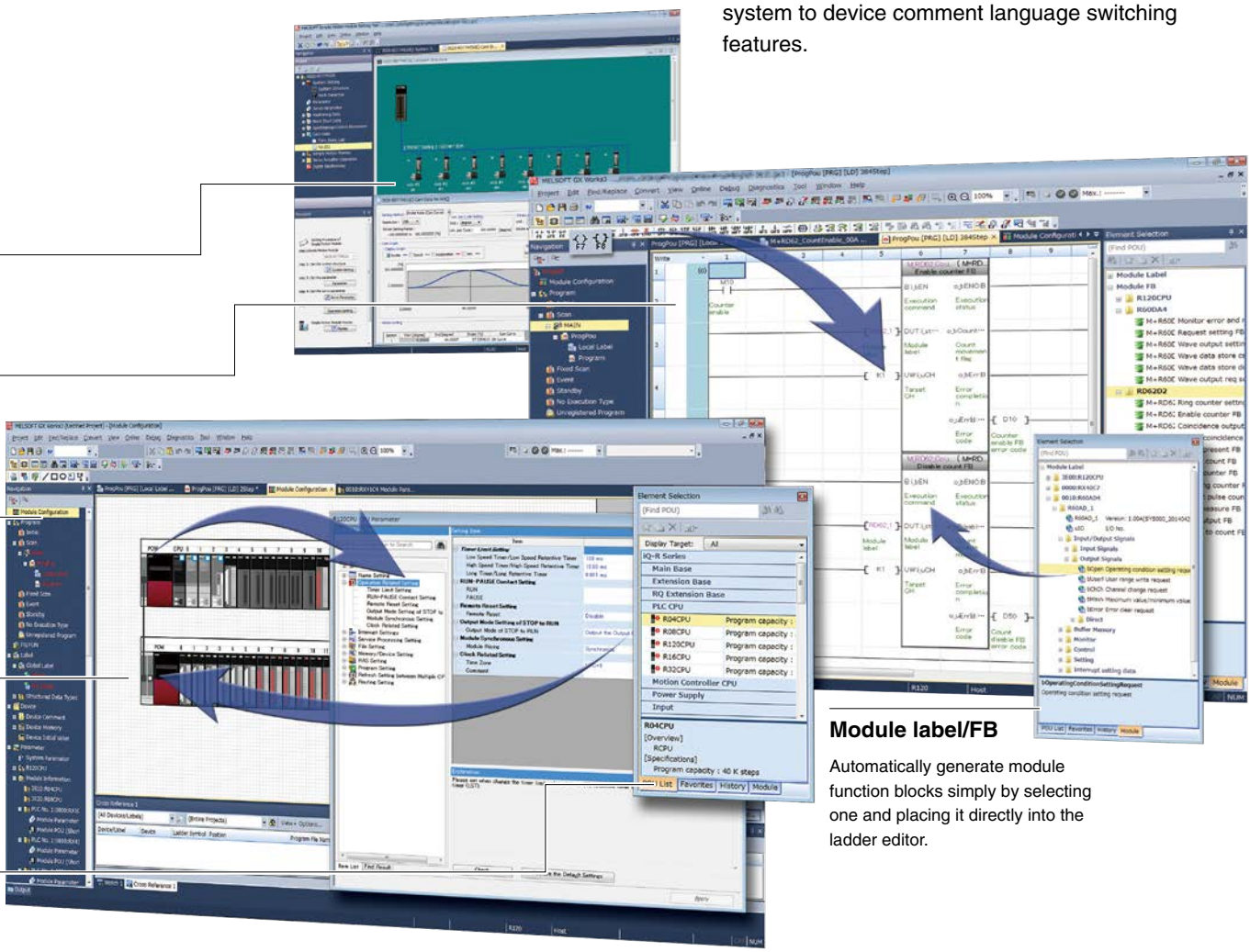
GX Works3

One Software, Many Possibilities

Reduce engineering time by 60%*1

Global realization by multi-language support

To adhere to today's global production needs, GX Works3 supports multi-language features at various levels, from the multiple language software menu system to device comment language switching features.



Module label/FB

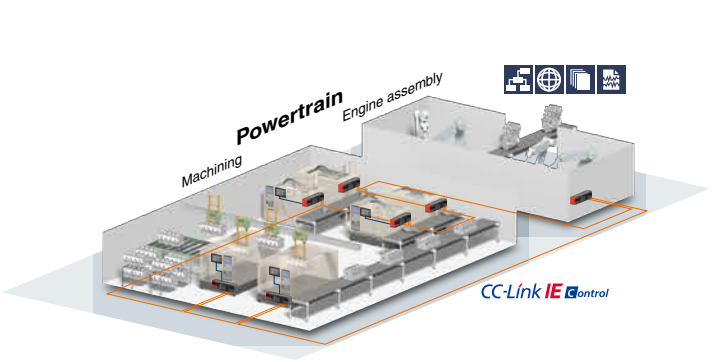
Automatically generate module function blocks simply by selecting one and placing it directly into the ladder editor.

*1 Based on new project test benchmarks between GX Works2 and GX Works3.

Maintenance

Reduce maintenance costs and downtime utilizing easier maintenance features

A manufacturing plant is seldom stopped or taken offline and continuously produces the desired product or component. However, the control system occasionally requires maintenance; for example, at the time of a faulty product or system upgrade for manufacturing a new or updated component. At that time, thanks to the extensive maintenance functions embedded in the hardware and software, the user can trust the control system to handle transition into/out of the maintenance period for both preventive and post maintenance.

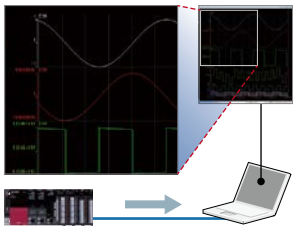




Preventive maintenance CPU module

Visualize manufacturing data in real-time

- Monitor live manufacturing process data across the plant
- Very easy setup using the dedicated GX LogViewer monitoring tool

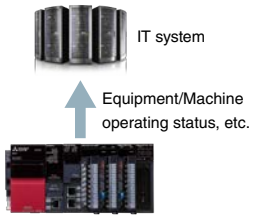


Real-time monitor

Preventive maintenance MES interface module

Direct access to enterprise level

- Registers device values directly into database
- Visible shop floor data enables actions before event occurs



Preventive maintenance Output module

Prevent system downtime with relay monitoring

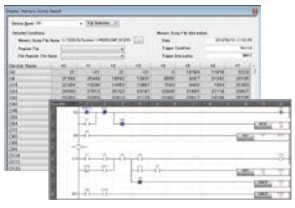
- Monitors relay switching amount
- Check relay condition from GOT (HMI)
- Plan module maintenance prior to malfunction of relay



Corrective maintenance CPU module

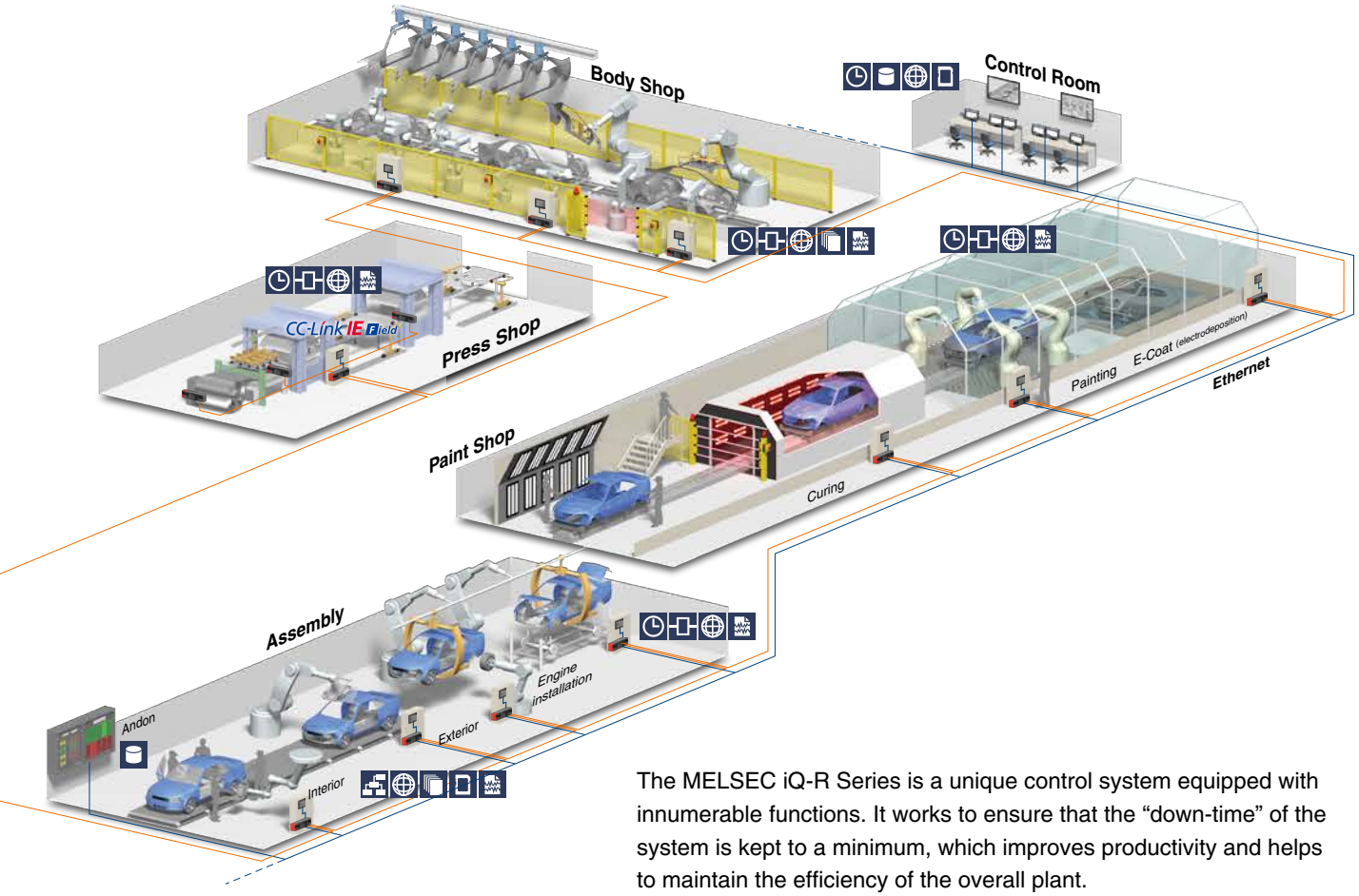
Memory dump enables confirmation of operation problems

- Saves block of device data when error occurs
- Root cause analysis by confirming data on device monitor screen and offline via program editing window



Memory dump results
(Program editor)

Mitsubishi Electric PAC MELSEC iQ-R "Maintenance" Movie

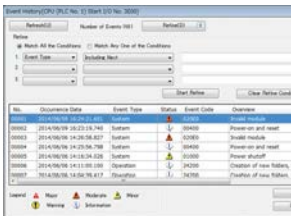


The MELSEC iQ-R Series is a unique control system equipped with innumerable functions. It works to ensure that the “down-time” of the system is kept to a minimum, which improves productivity and helps to maintain the efficiency of the overall plant.

Corrective maintenance **CPU module**

Efficient diagnostics with extensive event logging

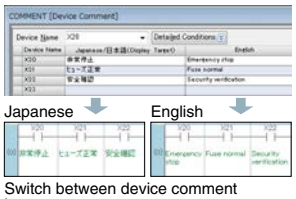
- Logging of program change events, errors and when the power is turned off
- Event logging displayed in list form
- Quickly detect problems due to operating mistakes by multiple users


Event log list

Corrective maintenance **GX Works3**

Multi-language software improves global support

- Comment/label names can be registered in multiple languages
- Easy to switch between languages
- No need for multiple programs to satisfy regional requirements

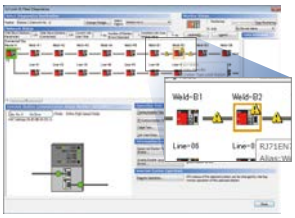


Switch between device comment languages

Corrective maintenance **GX Works3**

Quickly find network errors

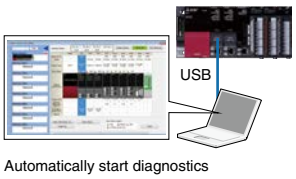
- Visualize error location from network system image
- Easy network error corrective measures


CC-Link IE Field diagnosis window

Corrective maintenance **GX Works3**

Simple troubleshooting, even for novice users

- Start diagnostics screen on GX Works3 just by connecting via USB
- Display detailed error information and corrective procedures



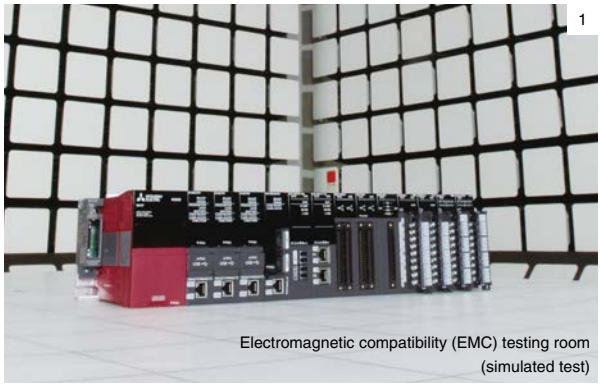
Automatically start diagnostics

Quality

Reliable and trusted MELSEC product quality

The MELSEC iQ-R Series is based on two fundamental aspects of quality.
“Quality of product”
“Quality for application”
These two characteristics are part of the main principle behind the MELSEC iQ-R Series. This new control system includes various features designed-in to provide a solution that not only improves the overall manufacturing productivity, but also maintains a high level of industrial quality that is ideal for the harsh and rugged environments that it is subjected to on a daily basis.

1



Electromagnetic compatibility (EMC) testing room (simulated test)

2



3



4



5



Robust design ideal for harsh industrial environments

Synonymous with the Mitsubishi Electric name, the MELSEC iQ-R Series is designed with high quality and reliability, which is a prerequisite for industrial applications. In addition, the overall aesthetics and usability enable easier maintenance that customers routinely expect.

Classification according to IEC 60721-3-3 Class 3C2

For protection against aggressive atmosphere and gases, products with a conformal coating (IEC 60721-3-3 Class 3C2) are available on request*1

*1: Please contact your local Mitsubishi Electric office or representative for further details.

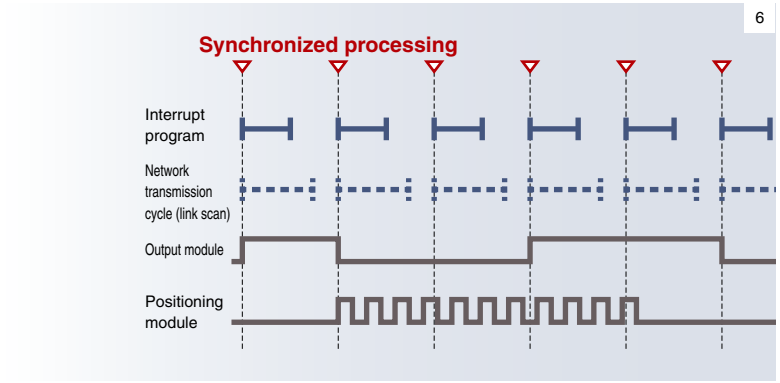
1. Conforms to stringent quality evaluations and tests that are based on robust industrial environments including EMC, LSI, temperature, vibration and HALT tests.
2. High manufacturing quality control through QR code based quality management system.
3. The front face has a wide and open design with an easy-to-use front cover.
4. High-quality CPU module manufacturing with in-line high-low temperature testing.
5. The base rack design includes a dedicated earth rail to prevent noise interference in low power supply conditions and a robust structure that enables easy installation without extensive damage to bus connectors.

Mitsubishi Electric PAC MELSEC iQ-R "Quality" Movie

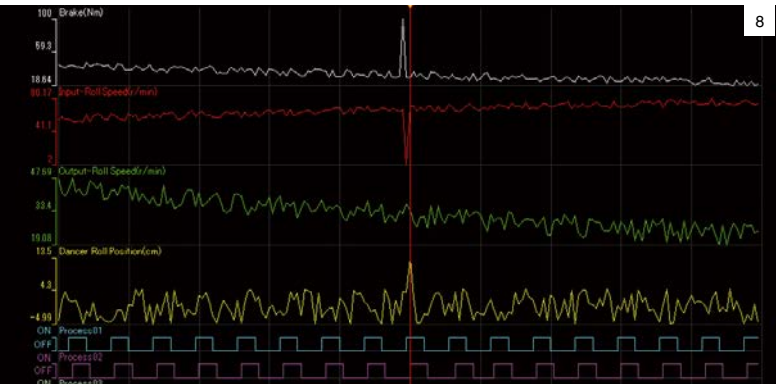
Conforms to main international quality standards

The MELSEC iQ-R Series conforms to most of the main international standards that realizes applications requiring multiple global locations.

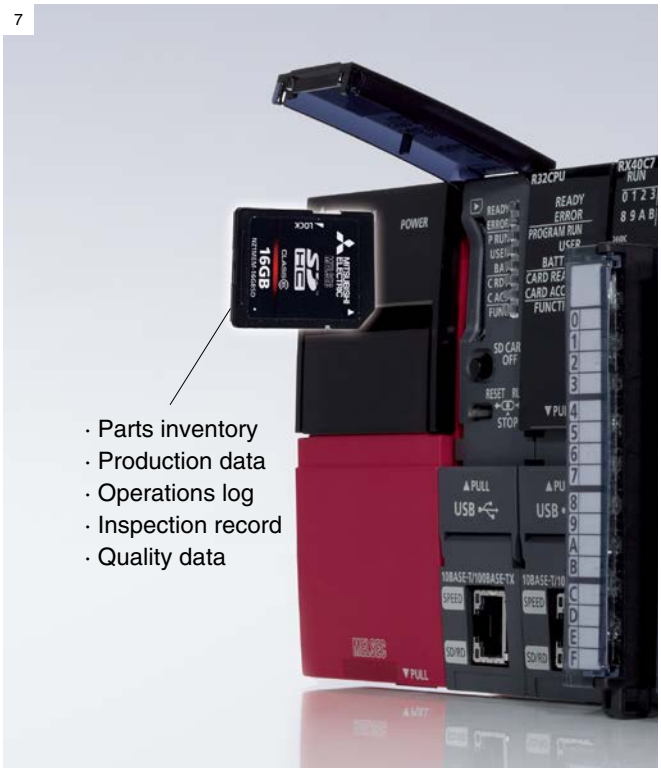
6



8



7



6. Graph showing the signal synchronization between several modules.
7. Data required for traceability is collected on the SD memory card.
8. Collected data is analyzed using a dedicated viewer.

Improve and maintain actual manufacturing quality

Maintains product quality during manufacturing

With inter-module synchronization, it is now possible to precisely synchronize interrupt programs with the network communications cycle (link scan). Any variations in data transmission response time (network transmission delay time) between the controller and other devices on the network are eliminated, realizing high integrity between manufacturing processes that are dependent on each other, ensuring high performance and processing.

Realizes traceability through data logging

Simple settings enable the collection of production data needed for traceability. Furthermore, collected data can be analyzed easily using a dedicated viewer. Analyzing various data on production processes provides an indicator for quality improvements and manufacturing cost reductions, thereby supporting optimization of the production system.

Connectivity

Seamless network reduces system costs

The MELSEC iQ-R Series is part of a family of products all interconnected across various levels of automation. Based on the seamless message protocol (SLMP*1), data flows transparently between the sensor level and the management level across multiple industry-standard automation networks. CC-Link IE, Asia's No. 1 industrial network, realizes fast gigabit data transmission speeds, further optimizing the manufacturing cycle. In addition, the SSCNET Ⅲ/H high-speed motion control network further enhance the factory-wide connectivity solution.



CC-Link IE embedded CPU



CC-Link IE Field Network compatible Simple Motion module

Cost-saving integrated network CPU module

The MELSEC iQ-R Series includes a lineup of CPUs with embedded industrial network connection ports (CC-Link IE and Ethernet). System costs can be further reduced by approximately 50% using the embedded network CPU module, which realizes the same features as a generic network interface module.

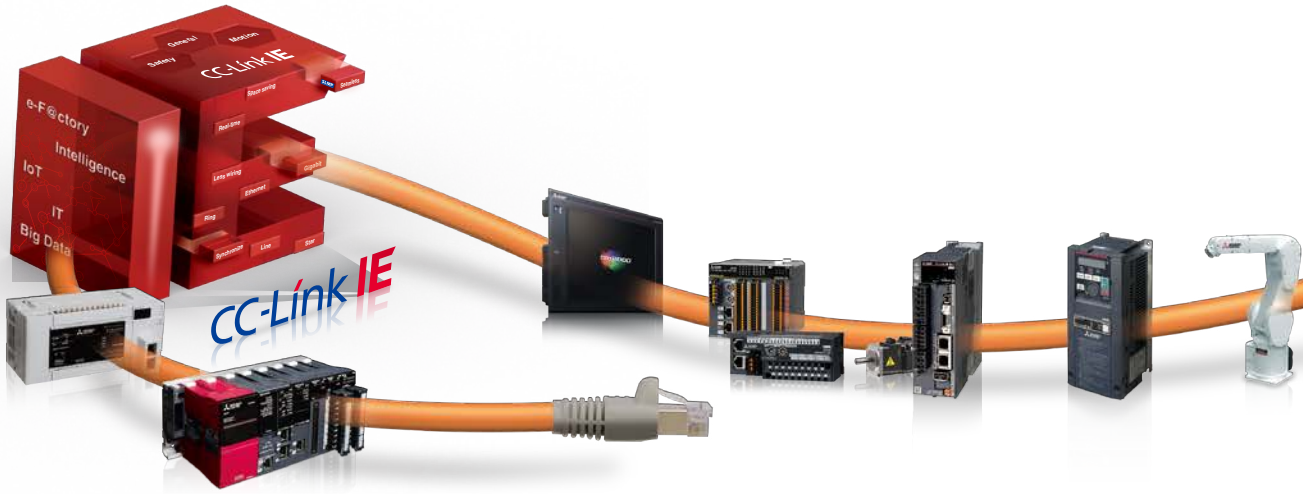
System hardware costs **Reduced 50%** *2

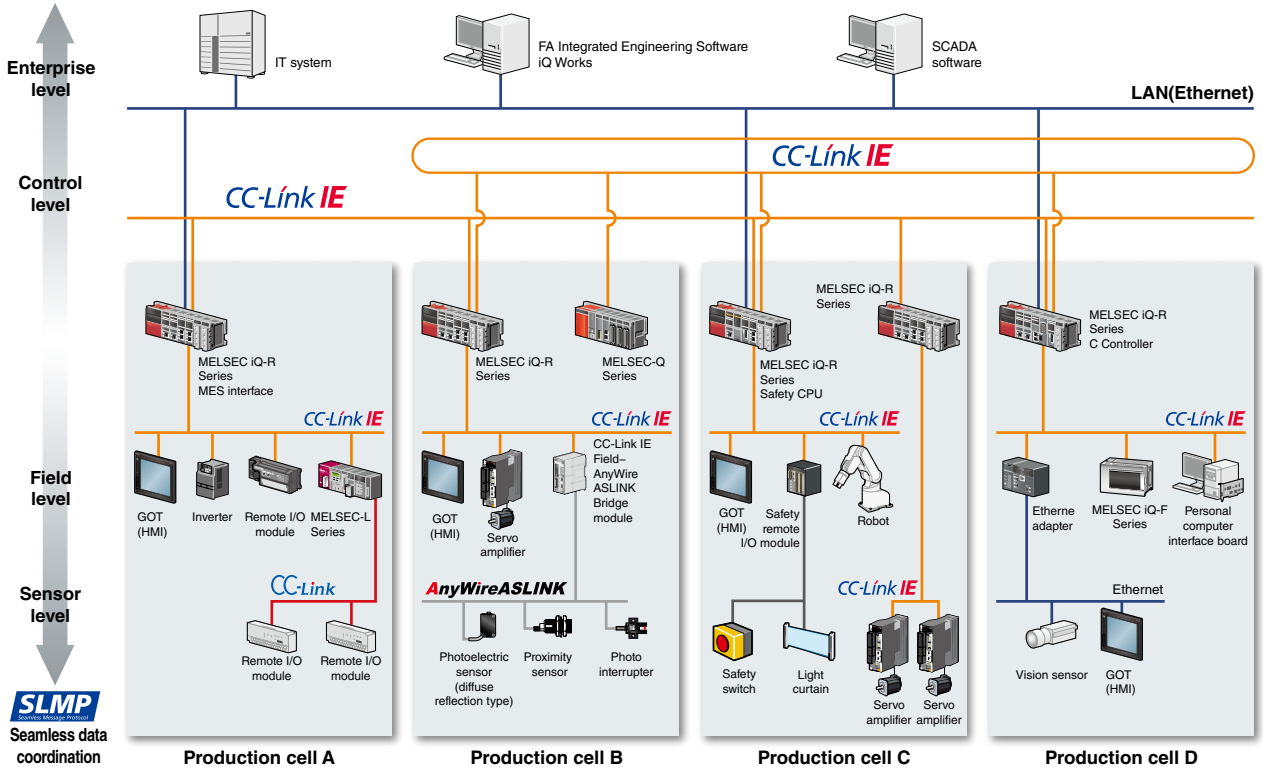
Integrate motion control into one network

The CC-Link IE Field Network compatible Simple Motion module can be used as a master station*3 on the network. System configuration cost can be reduced as only one module is required for both Motion control and network connectivity.

*1: Seamless Message Protocol (SLMP): A simple client-server common protocol that enables communication between Ethernet products and CC-Link IE-compatible machines.
*2: Cost comparison of using the MELSEC iQ-R Series R04CPU + RJ71EN71 modules.
*3: The sub-master and safety communication functions are not supported.

Mitsubishi Electric PAC MELSEC iQ-R "Connectivity" Movie





High-speed and large bandwidth ideal for large-scale control systems

The Ethernet-based open network CC-Link IE is an industry-leading 1 Gbps high-speed, large-capacity network. The division of 1 Gbps broadband into uses for distributed control and field data communications secures the reliability of control communications and realizes real-time data collection, which can be difficult with standard Ethernet.

CC-Link IE Control (twisted-pair cable)

Utilizing a system architecture that has no constraints and enables one to choose freely such as star/line/ring topologies, adding and removing equipment is easier. Moreover, compatibility with standard twisted-pair cabling means that wiring costs can be reduced.

Connect to two different types of networks with the same module

Ethernet and CC-Link IE network communications can be realized with the same network module. Since multiple network types can use one module, equipment costs can be further reduced.

Security

Robust security that can be relied on

As technology becomes more complex and the distribution of manufacturing systems more global, the protection of intellectual property is even more significant. When shipping a finished product overseas, the last thing an OEM needs to consider is unauthorized copying or changing of the original project data. In addition to this, unauthorized access to the control system can have very serious implications to the control system and the end user, which can compromise the overall safety of the plant.

The MELSEC iQ-R Series has a number of embedded features that help to maintain these requirements, such as hardware and software keys to protect intellectual property, and multi-level user access password hierarchy to protect the project at the design stage.

Mitsubishi Electric PAC MELSEC iQ-R "Security" Movie

Powerful security features protecting intellectual property

Security key authentication protecting project data

The security key authentication prevents programs from being opened on personal computers where the security key has not been registered. Furthermore, because programs cannot be executed by CPU modules where the security key has not been registered, the integrity of customer technologies and other intellectual property is not compromised. The security key can also be registered on an extended SRAM cassette. Therefore, when replacing the CPU module, there is no need to re-register the security key, making replacement very simple.



Prevent unauthorized access across the network



Device with registered IP address (access permitted)

Device without registered IP address (access denied)

The IP filter can be used to register the IP addresses of devices permitted to access the CPU module. As a result, access from non-registered devices can be blocked, thereby lowering the risk of program hacking and unauthorized access by a third party.
Another feature is a remote password function for password-based security. Passwords of up to 32 characters can be set to prevent unauthorized access to the CPU module via networks such as Ethernet.

Compatibility

Extensive compatibility with existing products

Whenever introducing a new system or technology into an existing manufacturing plant or control system, utilization of existing assets as much as feasibly possible is a mandatory requirement with today's manufacturing needs. The MELSEC iQ-R Series addresses these subtle but substantial needs with various system hardware support and engineering project compatibility to achieve an easy path to higher technology and improved performance capabilities.

Mitsubishi Electric PAC MELSEC iQ-R "Compatibility" Movie

Utilize existing MELSEC-Q Series assets

Current programs can be fully utilized

A simply conversion process*1 is all it takes to enable the use of MELSEC-Q Series programs with the MELSEC iQ-R Series. Customers can effectively use the program assets they have accumulated, thereby reducing the overall engineering time.

*1: For detailed information about converting to GX Works3 programs, please refer to the "GX Works3 Operating Manual".





Variety of compatible modules

By utilizing the dedicated extension base, most MELSEC-Q Series modules*2 can be re-used. This makes it possible to introduce the high-performance MELSEC iQ-R Series while controlling the cost of supplementary equipment.

*2: For further details, please refer to the "MELSEC iQ-R Module Configuration Manual".

Possible to divert external device wiring

The MELSEC iQ-R Series I/O module, analog module, and counter module pin layouts and connectors are the same as those of the MELSEC-Q Series. Accordingly, existing external device wiring (connectors, terminal blocks) can be diverted without changes and wiring costs can be reduced.



CPU

Programmable Controller CPU Module

Select the most suitable CPU based on the size of your program, CC-Link IE built-in functions and other requirements.



Model	LD instruction speed	Program capacity	Number of I/O points [X/Y]	Interface connection port	Compatible memory card	Others
R04CPU	0.98 ns	40K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DB, DATA LOG, MEM DUMP, RT MON, SYNCHRO, MULTI CPU
R08CPU	0.98 ns	80K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DB, DATA LOG, MEM DUMP, RT MON, SYNCHRO, MULTI CPU
R16CPU	0.98 ns	160K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DB, DATA LOG, MEM DUMP, RT MON, SYNCHRO, MULTI CPU
R32CPU	0.98 ns	320K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DB, DATA LOG, MEM DUMP, RT MON, SYNCHRO, MULTI CPU
R120CPU	0.98 ns	1200K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DB, DATA LOG, MEM DUMP, RT MON, SYNCHRO, MULTI CPU
R04ENCPU	0.98 ns	40K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DB, DATA LOG, MEM DUMP, RT MON, SYNCHRO, CC-Link IE
R08ENCPU	0.98 ns	80K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DB, DATA LOG, MEM DUMP, RT MON, SYNCHRO, CC-Link IE
R16ENCPU	0.98 ns	160K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DB, DATA LOG, MEM DUMP, RT MON, SYNCHRO, CC-Link IE
R32ENCPU	0.98 ns	320K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DB, DATA LOG, MEM DUMP, RT MON, SYNCHRO, CC-Link IE
R120ENCPU	0.98 ns	1200K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DB, DATA LOG, MEM DUMP, RT MON, SYNCHRO, CC-Link IE

SD SD memory card
Extended SRAM Extended SRAM cassette
DB Data base function
DATA LOG Data logging function
MEM DUMP Memory dump function
RT MON Real-time monitor function
SYNCHRO Inter-modular synchronization function
MULTI CPU Multi-CPU system functions
CC-Link IE CC-Link IE Field Network function (For more information, please refer to the CC-Link IE Field Network master/local module.)

Process CPU Module



The process CPU module is capable of both loop control and sequence control on a single module, and is suitable for process control systems in which PID loop control is primarily required. Four CPUs are available with memory sizes from 80K to 1200K steps to suit specific control requirements (number of loop control).

Model	LD instruction speed	Program capacity	Number of I/O points [X/Y]	Interface connection port	Compatible memory card	Others
R08PCPU	0.98 ns	80K steps	4096 points	USB Ethernet	SD Extended SRAM	DATA LOG, SYNCHRO *1, MULTI CPU *1, PROCESS, OC
R16PCPU	0.98 ns	160K steps	4096 points	USB Ethernet	SD Extended SRAM	DATA LOG, SYNCHRO *1, MULTI CPU *1, PROCESS, OC
R32PCPU	0.98 ns	320K steps	4096 points	USB Ethernet	SD Extended SRAM	DATA LOG, SYNCHRO *1, MULTI CPU *1, PROCESS, OC
R120PCPU	0.98 ns	1200K steps	4096 points	USB Ethernet	SD Extended SRAM	DATA LOG, SYNCHRO *1, MULTI CPU *1, PROCESS, OC

SD SD memory card Extended SRAM Extended SRAM cassette DATA LOG Data logging function SYNCHRO Inter-modular synchronization function MULTI CPU Multi-CPU system function
PROCESS Process control function OC Online module change

*1: Inter-modular synchronization is not supported when used in redundant mode.

Redundant Function Module



A redundant system can be configured by combining this module with the process CPU. Various redundancy compatible network modules (Ethernet, CC-Link IE) can cover customer requirements, greatly improving reliability.

Model	Communication cable	Max. distance	Tracking cable data capacity
R6RFM	Multi-mode optical cable	550 m (when the core outer diameter is 50 µm)	1M word

Safety CPU


R□SFCPU R6SFM

The safety CPU module enables control of both generic and safety programs in the same module and is easily programmed utilizing the intuitive features of GX Works3. Compliant with internationally recognized safety standards, the safety CPU enables safety devices such as safety light curtains, emergency switches, and door switches to be connected via the CC-Link IE Field Network without requiring a separate dedicated network line. Safety CPUs are certified as being compliant with ISO 13849-1 PL e and IEC 61508 SIL 3 by TÜV Rheinland®, the world-leading third party testing institution. As such, they can be trusted for use in safety control applications.

Model	LD instruction speed	Program capacity	Number of I/O points [X/Y]	Interface connection port	Compatible memory card	Others
R08SFCPU-SET*1	0.98 ns	80K steps (40K steps for safety programs)	4096 points	USB, Ethernet	SD, Extended SRAM	DATA LOG, MULTI CPU, SAFETY
R16SFCPU-SET*1	0.98 ns	160K steps (40K steps for safety programs)	4096 points	USB, Ethernet	SD, Extended SRAM	DATA LOG, MULTI CPU, SAFETY
R32SFCPU-SET*1	0.98 ns	320K steps (40K steps for safety programs)	4096 points	USB, Ethernet	SD, Extended SRAM	DATA LOG, MULTI CPU, SAFETY
R120SFCPU-SET*1	0.98 ns	1200K steps (40K steps for safety programs)	4096 points	USB, Ethernet	SD, Extended SRAM	DATA LOG, MULTI CPU, SAFETY

SD SD memory card Extended SRAM Extended SRAM cassette DATA LOG Data logging function MULTI CPU Multi-CPU system function SAFETY Safety function

*1: Product package includes a safety CPU(R□SFCPU) and safety function module (R6SFM).

C Controller Module



The multi-core ARM®-based controller pre-installed with VxWorks® Version 6.9, realizes the simultaneous execution of programs.

Model	OS	Endian format	Number of I/O points [X/Y]	Communication interface	Compatible memory card
R12CCPU-V	VxWorks® Version 6.9	Little endian	4096 points	USB, RS-232, Ethernet	SD

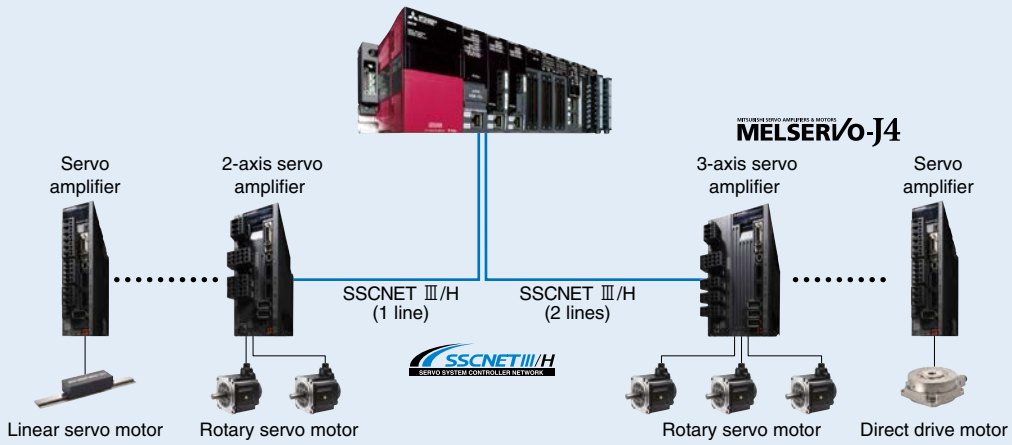
SD SD memory card

Motion CPU Module

Our motion controllers are designed for high-speed control, capable of delivering a maximum of 64 axes per single CPU, or up to 192 axes using 3 CPUs by a multi-CPU system. Compact and small footprint, the new-generation motion controllers are packed with the latest features that deserves.

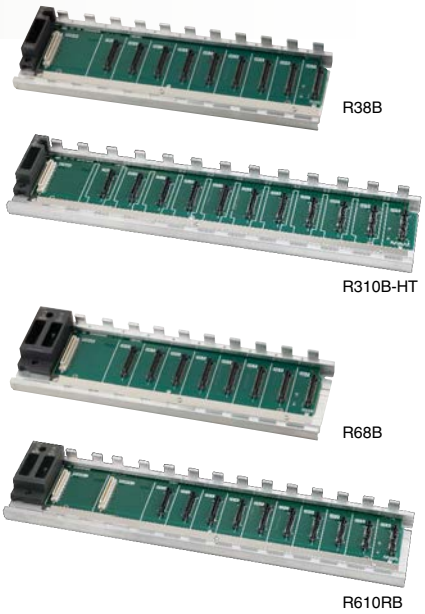
Model	Number of control axes	Servo amplifier network	
R16MTCPU	16 axes	SSCNET Ⅲ/H	1 line
R32MTCPU	32 axes	SSCNET Ⅲ/H	2 lines
R64MTCPU	64 axes	SSCNET Ⅲ/H	2 lines

Programmable Controller CPU Modules + Motion CPU Modules



Base Unit

Product modules of the MELSEC iQ-R Series can be mounted. Select the most suitable base unit for your configuration system.



Type	Model	Number of module installed	Power supply module
Main base unit	R35B	CPU + 5 slots	Mounting required
	R38B	CPU + 8 slots	Mounting required
	R312B	CPU + 12 slots	Mounting required
Redundant power supply main base	R310RB	CPU + 10 slots	2 redundant modules
Extended temperature range main base	R310B-HT	CPU + 10 slots	Mounting required
Extended temperature range redundant power supply main base	R38RB-HT	CPU + 8 slots	2 redundant modules
Extension base unit	R65B	5 slots	Mounting required
	R68B	8 slots	Mounting required
	R612B	12 slots	Mounting required
Redundant power supply extension base	R610RB	10 slots	2 redundant modules
Extended temperature range extension base	R610B-HT	10 slots	Mounting required
Extended temperature range redundant power supply extension base	R68RB-HT	8 slots	2 redundant modules
RQ extension base unit*1	RQ65B	5 slots	Mounting required*2
	RQ68B	8 slots	Mounting required*2
	RQ612B	12 slots	Mounting required*2

2 redundant modules 2 redundant power supply modules required

*1: For mounting the MELSEC-Q Series modules.
*2: Mount the power supply module of the MELSEC-Q Series.

Power Supply Module

Power supply modules for the MELSEC iQ-R Series.



Power supply module Redundant power supply module

Type	Model	Input voltage	Output voltage	Output current
Power supply	R61P	100...240 V AC	5 V DC	6.5 A
	R62P	100...240 V AC	5/24 V DC	3 A/0.6 A
	R63P	24 V DC	5 V DC	6.5 A
	R64P	100...240V AC	5 V DC	9 A
Redundant power supply module	R64RP	100...240V AC	5 V DC	9 A

I/O Module

Input Module



Our lineup of input modules covers various control situations. Select the appropriate model according to voltage, input format, input points, wiring method, etc.

Type	Model	Number of input points	Rated input voltage	Rated input current	Common terminal arrangement	Response time	External interface
AC input	RX10	16 points	100...120 V AC	8.2 mA (100 V AC, 60Hz) / 6.8 mA (100 V AC, 50Hz)	16 points/common	20 ms	Screw terminal block
DC input (positive common)	RX40PC6H	16 points	24 V DC	6.0 mA	8 points/common	5 µs...70 ms	Screw terminal block
DC input (positive/negative shared common)	RX40C7	16 points	24 V DC	7.0 mA	16 points/common	0.2...70 ms	Screw terminal block
	RX41C4	32 points	24 V DC	4.0 mA	32 points/common	0.2...70 ms	40-pin connector
	RX42C4	64 points	24 V DC	4.0 mA	32 points/common	0.2...70 ms	40-pin connector (2×)
	RX41C6HS	32 points	24 V DC	6.0 mA	32 points/common	1 µs...70 ms	40-pin connector
	RX61C6HS	32 points	5 V DC	6.0 mA	32 points/common	1 µs...70 ms	40-pin connector
DC input (negative common)	RX40NC6H	16 points	24 V DC	6.0 mA	8 points/common	5 µs...70 ms	Screw terminal block
DC (with diagnostic functions) input (negative common)*1	RX40NC6B	16 points	24 V DC	6.0 mA	16 points/common	1...70 ms	Screw terminal block

*1: For more information about diagnostic functions, please refer to the relevant product manual.

Output Module



Select the appropriate module according to application such as transistor output or relay and number of outputs.

Type	Model	Number of output points	Rated load voltage	Max. load current (Rated switching current)	Common terminal arrangement	Response time	External interface
Relay output	RY10R2	16 points	24 V DC/240 V AC	2 A/points 8 A/common	16 points/common	12 ms	Screw terminal block
Transistor (sink) output	RY40NT5P	16 points	12...24 V DC	0.5 A/points 5 A/common	16 points/common	1 ms	Screw terminal block
	RY41NT2P	32 points	12...24 V DC	0.2 A/points 2 A/common	32 points/common	1 ms	40-pin connector
	RY42NT2P	64 points	12...24 V DC	0.2 A/points 2 A/common	32 points/common	1 ms	40-pin connector (2×)
	RY41NT2H	32 points	5...24 V DC	0.2 A/points 2 A/common	32 points/common	2 µs	40-pin connector
Transistor (source) output	RY40PT5P	16 points	12...24 V DC	0.5 A/points 5 A/common	16 points/common	1 ms	Screw terminal block
	RY41PT1P	32 points	12...24 V DC	0.1 A/points 2 A/common	32 points/common	1 ms	40-pin connector
	RY42PT1P	64 points	12...24 V DC	0.1 A/points 2 A/common	32 points/common	1 ms	40-pin connector (2×)
	RY41PT2H	32 points	5...24 V DC	0.2 A/points 2 A/common	32 points/common	2 µs	40-pin connector
Transistor (with diagnostic functions) output*1	RY40PT5B	16 points	24 V DC	0.5 A/points 5 A/common	16 points/common	1.5 ms	Screw terminal block

*1: For more information about diagnostic functions, please refer to the relevant product manual.

I/O Combined Module



The combined module is capable of both input and output controls by a single module.

Type	Model	Number of I/O points	Rated input voltage/ Rated load voltage	Rated input current	Max. load current	Common terminal arrangement	Response time	External interface
DC input/Transistor output	RH42C4NT2P	Input 32 points	24 V DC	4.0 mA	–	32 points/common	0.2...70 ms	40-pin connector (2×)
		Output 32 points	12...24 V DC	–	0.2 A/points 2 A/common	32 points/common	1 ms	

Analog Module

Analog Input/Analog Output

Our wide range of analog modules incorporates a variety of functions for supporting site control situations.
The lineup also includes modules that support channel isolated, which is ideal for process control.



Type	Model	Number of channels	Input/Output	Resolution	Conversion speed (Sampling cycle)	External interface	Others
Voltage input	R60ADV8	8 ch	-10...10 V DC	-32000...32000	80 µs/ch	Screw terminal block	–
Current input	R60ADI8	8 ch	0...20 mA DC	0...32000	80 µs/ch	Screw terminal block	–
Voltage, current input	R60AD4	4 ch	-10...10 V DC 0...20 mA DC	-32000...32000 0...32000	80 µs/ch	Screw terminal block	–
	R60ADH4	4 ch	-10...10 V DC 0...20 mA DC	-32000...32000 0...32000	10 µs/ch 20 µs/ch 5 µs/4 ch	Screw terminal block	–
	R60AD8-G	8 ch	-10...10 V DC 0...20 mA DC	-32000...32000 0...32000	10 ms/ch	40-pin connector	Channel isolated
	R60AD16-G	16 ch	-10...10 V DC 0...20 mA DC	-32000...32000 0...32000	10 ms/ch	40-pin connector (2×)	Channel isolated
Voltage output	R60DAV8	8 ch	-10...10 V DC	-32000...32000	80 µs/ch	Screw terminal block	–
Current output	R60DAI8	8 ch	0...20 mA DC	0...32000	80 µs/ch	Screw terminal block	–
Voltage, current output	R60DA4	4 ch	-10...10 V DC 0...20 mA DC	-32000...32000 0...32000	80 µs/ch	Screw terminal block	–
	R60DA8-G	8 ch	-12...12 V DC 0...20 mA DC	-32000...32000 0...32000	1 ms/ch	40-pin connector	Channel isolated
	R60DA16-G	16 ch	-12...12 V DC 0...20 mA DC	-32000...32000 0...32000	1 ms/ch	40-pin connector (2×)	Channel isolated

Temperature Input Module, Temperature Control Module

Available are a lineup of temperature input modules compatible with various temperature sensors and a lineup of temperature controllers that ensure standard control, heating-cooling control and optimum temperature control by detecting heater disconnection.



Temperature input module



Temperature control module

Type	Model	Number of channels	Input/Output	Resolution	Conversion speed (Sampling cycle)	External interface	Others
Temperature input	Thermocouple	R60TD8-G	8 ch	Thermocouple (B,R,S,K,E,J,T,N)	30 ms/ch	40-pin connector	Channel isolated Disconnection detected
	RTD	R60RD8-G	8 ch	Platinum RTD (Pt100,JPt100,Pt50) Niokel RTD (Ni100)	10 ms/ch	40-pin connector	Channel isolated Disconnection detected
Temperature control	Thermocouple/ RTD	R60TCTRT2TT2	4 ch	Thermocouple (B,R,S,K,E,J,T,N,U,L,PLⅡ,W5Re/W26Re) Platinum RTD *1 (Pt100,JPt100)	250 ms / 4 ch 500 ms / 4 ch	Screw terminal block	Channel isolated Standard control heating and cooling control
		R60TCTRT2TT2BW	4 ch	Thermocouple (B,R,S,K,E,J,T,N,U,L,PLⅡ,W5Re/W26Re) Platinum RTD *1 (Pt100,JPt100)	250 ms / 4 ch 500 ms / 4 ch	Screw terminal block (2×)	Channel isolated Standard control heating and cooling control Heater disconnection detection
	RTD	R60TCRT4	4 ch	Platinum RTD (Pt100,JPt100)	250 ms / 4 ch 500 ms / 4 ch	Screw terminal block	Channel isolated Standard control heating and cooling control
		R60TCRT4BW	4 ch	Platinum RTD (Pt100,JPt100)	250 ms / 4 ch 500 ms / 4 ch	Screw terminal block (2×)	Channel isolated Standard control heating and cooling control Heater disconnection detection

*1: Only for executing 4 ch in 2 ch (ch1 and ch2)

Motion, Positioning

Simple Motion Module

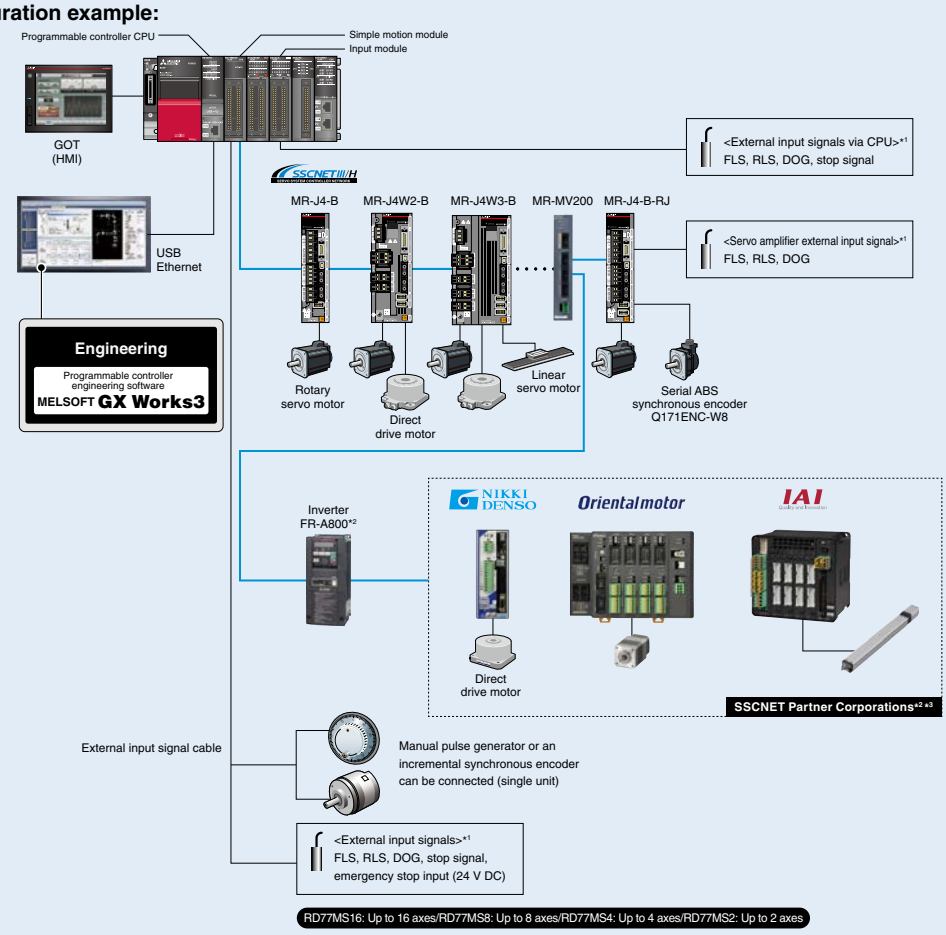


Various controls can be made similar to positioning modules. The sequence program handles highly-advanced and wide range of motion controls, including the synchronous control, cam control, speed and torque (pressing control) and others. Synchronous encoder, mark detection function, and other necessary features are equipped as standard.

Servo amplifier network	Model	Maximum number of control axes	Control unit	Operation cycle	Positioning data
CC-Link IE Field Network	RD77GF4	4 axes	mm, inch, degree, pulse	0.5 ms, 1.0 ms, 2.0 ms, 4.0 ms	600
	RD77GF8	8 axes	mm, inch, degree, pulse	0.5 ms, 1.0 ms, 2.0 ms, 4.0 ms	600
	RD77GF16	16 axes	mm, inch, degree, pulse	0.5 ms, 1.0 ms, 2.0 ms, 4.0 ms	600
SSCNET Ⅲ/H	RD77MS2	2 axes	mm, inch, degree, pulse	0.444 ms, 0.888 ms, 1.777 ms, 3.555 ms	600
	RD77MS4	4 axes	mm, inch, degree, pulse	0.444 ms, 0.888 ms, 1.777 ms, 3.555 ms	600
	RD77MS8	8 axes	mm, inch, degree, pulse	0.444 ms, 0.888 ms, 1.777 ms, 3.555 ms	600
	RD77MS16	16 axes	mm, inch, degree, pulse	0.444 ms, 0.888 ms, 1.777 ms, 3.555 ms	600

600 600 data/axis

System configuration example:



*1: Destination of the external input signals (FLS, RLS, DOG, stop signal) can be changed with parameters.
*2: Use versions of partner products and inverter FR-A800 that are compatible with simple motion modules. (Refer to the "MELSEC iQ-R Simple Motion Module User's Manual (Application).")
*3: For details about partner products, refer to the servo system partner product catalog.

Positioning Module



High-speed, high-precision positioning modules support various positioning controls, including 2 - 4-axis linear interpolation, 2-axis circular interpolation, 3-axis helical interpolation, and trajectory control.

Type	Model	Maximum number of control axes	Control unit	Positioning data	Max. output pulse	External interface
Open collector output	RD75P2	2 axes	mm inch degree pulse	600	200 kpps	40-pin connector
	RD75P4	4 axes	mm inch degree pulse	600	200 kpps	40-pin connector (2×)
Differential output	RD75D2	2 axes	mm inch degree pulse	600	5 Mpps	40-pin connector (2×)
	RD75D4	4 axes	mm inch degree pulse	600	5 Mpps	40-pin connector (2×)

600 600 data/axis

High-speed Counter Module



Positioning and other controls are available by combining with external encoders. The maximum counting speed can be switched for counting, from a high-speed pulse to a gentle rise/fall low-frequency pulse.

Model	Number of channels	Counting speed switch	Count input signal	External input	Coincidence output	External interface
RD62P2	2 ch	200 kpps 100 kpps 10 kpps	5 V DC 12 V DC 24 V DC	5 V DC 12 V DC 24 V DC	Transistor (sink) 12/24 V DC, 0.5 A/point 2 A/common	40-pin connector
RD62P2E	2 ch	200 kpps 100 kpps 10 kpps	5 V DC 12 V DC 24 V DC	5 V DC 12 V DC 24 V DC	Transistor (source) 12/24 V DC, 0.1 A/point 0.4 A/common	40-pin connector
RD62D2	2 ch	8 Mpps 4 Mpps 2 Mpps 1 Mpps 500 kpps 200 kpps 100 kpps 10 kpps	Differential line driver	5 V DC 12 V DC 24 V DC	Transistor (sink) 12/24 V DC, 0.5 A/point 2 A/common	40-pin connector

Advanced Information Module

MES Interface Module



Realize improved production management and reduce overall system costs through real-time direct access to IT system database servers without requiring additional programming and gateway computers.

Model	Number of database connections	Connectable database	Max. No. of job settings	Data sampling interval	Amount of sampled data	Function
RD81MES96	16 server	Oracle® 11g, Oracle® 12c, Microsoft® SQL Server® 2008 R2, Microsoft® SQL Server® 2012, Microsoft® SQL Server® 2014, Microsoft® Access® 2010, Microsoft® Access® 2013, MySQL®, PostgreSQL	Max. 64	General data sampling 0.1...0.9 s, 1...3600 s High speed data sampling 1...900 ms, 1...60 s, per scan	Max. 65536	DB record read/write function Device memory read/write function Trigger condition monitoring function Data operation and processing function Program execution function DB buffering function Trigger buffering function Variable I/O function Job execution monitoring function One-shot execution function

High-speed Data Logger Module



High-speed data logger module enables logging of various data without using a computer. High-speed accurate data logging is easily realized at a low cost. The sophisticated data collection rules can be easily created using wizard-like High-speed Data Logger Module Configuration Tool. Logged data are viewable using the logging data display and analysis tool, GX LogViewer, and can be used for data analysis.

Model	Data sampling interval	Amount of sampled data	Save file format	Function
RD81DL96	General data sampling Time specification:0.1...32767 s Time interval specification (specify hour/minute/second)	General data sampling Overall amount of data: 65536 (per setting: 1024) Overall number of device points: 262144 (per setting: 4096)	TXT file CSV file EXCEL format BIN file	High-speed data sampling function FTP server function File transfer function Recipe function Email function Trigger logging function Event-logging function Auto logging function
	High-speed data sampling Sequence scan time synchronization Time specification:0.5...32767 s (for trigger logging)/ 2...32767 ms (for continuous logging)	High-speed data sampling Overall amount of data: 32768 (per setting: 1024) Overall number of device points: 32768 (per setting: 4096)		

C Intelligent Function Module



The C Intelligent function module is available with a multi-core ARM®-based controller pre-installed with VxWorks® Version 6.9, which realizes simultaneous execution of programs, thereby providing a robust and deterministic alternative to computer-based systems.

Model	OS	Endian format	Communication interface	Compatible memory card
RD55UP06-V	VxWorks® Version 6.9	Little endian	Ethernet	SD

SD SD memory card

Network Module

Ethernet Interface Module



The Ethernet interface module offers the best choice for the system and other devices. The engineering tool setting enables to use the Ethernet port (P1 and P2) in Ethernet and CC-Link IE networks.

Model	Ethernet standard	Number of channels	Transmission speed	Others
RJ71EN71	1000BASE-T 100BASE-TX 10BASE-T	2 ch	1 Gbps 100 Mbps 10 Mbps	MELSOFT connection SLMP communication Communication protocol CC-Link IE Field
RnENCPU*1	1000BASE-T 100BASE-TX 10BASE-T	2 ch	1 Gbps 100 Mbps 10 Mbps	MELSOFT connection SLMP communication Communication protocol CC-Link IE Field

Communication protocol Predefined Protocol support function

CC-Link IE Field CC-Link IE function (For more information, please refer to the CC-Link IE Control Network module, CC-Link IE Field Network master/local module.)

CC-Link IE Control Network Module



The CC-Link IE Control Network control/normal stations are designed for a large-scale controller-distributed control and to link with individual field networks. This high-reliability distributed control network can handle very large data communications (128K word) over a high-speed (1 Gbps) dual-loop optical cable topology.

CC-Link IE

Model	Connection cable	Communication speed	Transmission path	Overall cable distance	Max. number of link points per network
RJ71GP21-SX	Optical fiber cable (multi-mode optical fiber)	1 Gbps	Duplex loop	66000 m (When 120 stations are connected)	120 stations
RJ71EN71*1	Ethernet cable that meets 1000 BASE-T standard: Category 5e or higher, straight cable (double shielded, STP)	1 Gbps	Line topology Star topology Ring topology Coexistence of line topology and star topology is possible.	Line topology: 11,900 m (When 120 stations are connected) Star topology: Depends on the system configuration Ring topology: 12,000 m (When 120 stations are connected)	120 stations
RnENCPU*1*2	Ethernet cable that meets 1000 BASE-T standard: Category 5e or higher, straight cable (double shielded, STP)	1 Gbps	Line topology Star topology Ring topology Coexistence of line topology and star topology is possible.	Line topology: 11,900m (When 120 stations are connected) Star topology: Depends on the system configuration Ring topology: 12,000m (When 120 stations are connected)	120 stations

*1: When using the CC-Link IE Field Network device.

CC-Link IE Field Network Master/Local Module



The CC-Link IE Field Network master/local station for an all-round field network system that integrates the controller distributed control, I/O control, safety control, and motion control. Its high-speed (1Gbps) and enhanced communication responsiveness brings significant reduction of tact time.

CC-Link IE

Model	Connection cable	Communication speed	Transmission path	Overall cable distance	Compatible station	Max. number of link points per network
RJ71GF11-T2	Ethernet cable that meets 1000 BASE-T standard: Category 5e or higher, straight cable (double shielded, STP)	1 Gbps	Line topology Star topology Ring topology Coexistence of line topology and star topology is possible.	Line topology: 12,000 m (master station: 1, slave station: 120) Star topology: Depends on the system configuration Ring topology: 12,100 m (master station: 1, slave station: 120)	Master station Local station (including safety station)	121 stations (master station: 1, slave station: 120)
RJ71EN71*1	Ethernet cable that meets 1000 BASE-T standard: Category 5e or higher, straight cable (double shielded, STP)	1 Gbps	Line topology Star topology Ring topology Coexistence of line topology and star topology is possible.	Line topology: 12,000 m (master station: 1, slave station: 120) Star topology: Depends on the system configuration Ring topology: 12,100 m (master station: 1, slave station: 120)	Master station Local station (except for safety station)	121 stations (master station: 1, slave station: 120)
RnENCPU*1*2	Ethernet cable that meets 1000 BASE-T standard: Category 5e or higher, straight cable (double shielded, STP)	1 Gbps	Line topology Star topology Ring topology Coexistence of line topology and star topology is possible.	Line topology: 12,000 m (master station: 1, slave station: 120) Star topology: Depends on the system configuration Ring topology: 12,100 m (master station: 1, slave station: 120)	Master station Local station (except for safety station)	121 stations (master station: 1, slave station: 120)

*1: When using the CC-Link IE Field Network device.

CC-Link IE Field Network Remote Head Module



The CC-Link IE Field head module can control the I/O and intelligent function modules directly when installed on the same base unit, and can operate as a network remote station. Network system reliability can be improved by installing redundant head modules and redundant network cables.

CC-Link IE

Model	Connection cable	Communication speed	Transmission path	Overall cable distance	Compatible station	Max. number of link points per network
RJ72GF15-T2	Ethernet cable (Category 5e or higher, double shielded, STP)	1 Gbps	Line topology Star topology Ring topology Coexistence of line topology and star topology is possible.	Line topology: 12,000 m (master station: 1, slave station: 120) Star topology: Depends on the system configuration Ring topology: 12,100 m (master station: 1, slave station: 120)	Remote station	121 stations (master station: 1, slave station: 120)

CC-Link System Master/Local Module



Field network module which delivers outstanding cost-performance of I/O control, and can be used as either a CC-Link Ver.1 or Ver.2 compatible master/local station.

CC-Link

Model	Connection cable	Communication speed	Transmission path	Overall cable distance	Compatible station	Max. number of link points per network
RJ61BT11	Ver.1.10-compatible CC-Link dedicated cable	156 kbps	Bus (RS-485)	1200 m	Ver.2 Master station Ver.2 Local station Ver.1 Master station Ver.1 Local station	65 stations (master station: 1, slave station: 64)
		625 kbps		900 m		
		2.5 Mbps		400 m		
		5 Mbps		160 m		
		10 Mbps		100 m		

AnyWireASLINK Master Module DB

AnyWireASLINK is a sensor-level network that realizes a smaller installation space and reduces wiring owing to its easy wiring topology. This master module allows miniature sensors to be freely arranged on the network and can control 512 I/O points maximum.



AnyWireASLINK
DB Co-developed with other companies

Model	Connection cable	Transmission path	Overall cable distance	Max. number of link points per network
RJ51AW12AL	Universal 2-wire/4-wire cable, universal cable, dedicated flat cable	Bus (multi-drop, T-branch, tree branch)	200 m	128 stations (varies according to each slave module's current consumption)

Serial Communication Module

This module communicates with various external devices (PC, GOT(HMI), bar code reader, measuring equipment, etc.) for data sampling/change, monitoring/management, and measurement data sampling of the programmable controller.



Model	Transmission interface	Number of channels	Transmission speed	Overall transmission distance (Overall cable distance)	Others
RJ71C24	RS-232 RS-422/485	2 ch CH1:RS-232, CH2:RS-422/485	1200 bps 2400 bps 4800 bps 9600 bps 14400 bps 19200 bps 28800 bps 38400 bps 57600 bps 115200 bps 230400 bps	RS-232: Max. 15 m RS-422/485: Max. 1200 m	MELSOFT connection MC protocol communication Communication protocol
RJ71C24-R2	RS-232	2 ch	1200 bps 2400 bps 4800 bps 9600 bps 14400 bps 19200 bps 28800 bps 38400 bps 57600 bps 115200 bps 230400 bps	Max. 15 m	MELSOFT connection MC protocol communication Communication protocol
RJ71C24-R4	RS-422/485	2 ch	1200 bps 2400 bps 4800 bps 9600 bps 14400 bps 19200 bps 28800 bps 38400 bps 57600 bps 115200 bps 230400 bps	Max. 1200 m	MELSOFT connection MC protocol communication Communication protocol

Communication protocol Predefined Protocol support function

Programmable Controller CPU Module Specifications

Programmable controller CPU modules, Process CPU: Hardware specifications

Item		R04CPU R04ENCPU	R08CPU R08ENCPU R08PCPU	R16CPU R16ENCPU R16PCPU	R32CPU R32ENCPU R32PCPU	R120CPU R120ENCPU R120PCPU
Control method		Stored program cyclic operation				
I/O control mode		Refresh mode (Direct access I/O is available by specifying direct access I/O (DX, DY).)				
Instruction processing time	LD instruction	0.98 ns				
	MOV instruction	1.96 ns				
Instruction processing time (ST language)	IF statement	1.96 ns				
	CASE statement	1.96 ns				
	FOR statement	1.96 ns				
Memory size	Program size	40K steps (160K bytes)	80K steps (320K bytes)	160K steps (640K bytes)	320K steps (1280K bytes)	1200K steps (4800K bytes)
	Program memory	160K bytes	320K bytes	640K bytes	1280K bytes	4800K bytes
	SD memory card	SD memory card capacity level (SD/SDHC memory cards up to 32GB)				
	Device/label memory*1	400K bytes	1188K bytes	1720K bytes	2316K bytes	3380K bytes
	Data memory	2M bytes	5M bytes	10M bytes	20M bytes	40M bytes
	CPU buffer memory	1072K bytes (536K word) (includes periodic communication area (24K word))				
	Refresh memory	2048K bytes*2				
Maximum number of files for storage	Program memory (P: Number of program files, FB: Number of FB files)	188 files (P: 124 files, FB: 64 files (up to 64 can be stored to 1 file))	380 files (P: 252 files, FB: 128 files (up to 64 can be stored to 1 file))			
	Device/label memory	324 files (regardless of the extended SRAM cassette use)*3				
	Data memory*4	256 files	512 files			
	SD memory card*4	• NZ1MEM-2GBSD: 256 files • NZ1MEM-4GBSD, NZ1MEM-8GBSD, NZ1MEM-16GBSD: 32767 files				
Maximum number of folders	Data memory*4	256 files	512 files			
	SD memory card*4	• NZ1MEM-2GBSD: 256 files • NZ1MEM-4GBSD, NZ1MEM-8GBSD, NZ1MEM-16GBSD: 32767 files*4				
USB port		USB2.0 High Speed (miniB) ×1				
Ethernet port		10BASE-T/100BASE-TX×1				
CC-Link IE communication port		Ethernet (1000BASE-T/100BASE-TX/10BASE-T)*5*6				

*1: Total capacity for the device area, label area, latch label area, the local device area, and the file storage area. Capacity of each area can be changed from the parameter setting. Extended SRAM cassette can be mounted to increase the device/label memory capacity.
*2: Total capacity of the device and the unit label areas.
*3: Number including system files.
*4: This is the total number (including system files and system folder) that can be created in the root folder when the file name and folder name are 13 characters (including extension) or less. When creating in a sub folder, up to 32767 files can be created. Note, however, that the number decreases when a file and folder having a name longer than 13 characters (including extension) are created.
*5: Available with R□ENCPU.
*6: The following networks are supported, Ethernet, CC-Link IE Control (twisted pair cable), and CC-Link IE Field (two simultaneous Ethernet networks and combined CC-Link IE Field and CC-Link IE Control networks are not supported).

Programmable controller CPU modules, Process CPU: Programming specifications

Item			R04CPU R04ENCPU	R08CPU R08ENCPU R08PCPU	R16CPU R16ENCPU R16PCPU	R32CPU R32ENCPU R32PCPU	R120CPU R120ENCPU R120PCPU
Program language			• Ladder Diagram (LD) • Sequential Function Chart (SFC)*1*2 • Structured Text (ST) • Function Block Diagram (FBD/LD)				
Programming extensions			Function block (FB), label programming (system/local/global)				
Program operation	Execution type		Initial execution type, scan execution type, periodic execution type, event execution type, wait type				
	Interrupt type		Internal timer interrupt (I28...I31), high-speed internal timer interrupt 1 (I49), high-speed internal timer interrupt 2 (I48), interrupt from the unit, synchronous interrupt between units (I44)*2, synchronous interrupt between multi-CPUs (I45)*2*3				
Number of program execution			124 programs	252 programs			
Number of FB files			64 programs	128 programs			
Tact performance	Constant scanning		0.1...2000 ms (setting can be made in 0.1 ms increments)				
	Periodic interrupt		0.5...1000 ms (setting can be made in 0.5 ms increments)				
	High-speed internal timer interrupt		0.05...1000 ms (setting can be made in 0.05 ms increments)				
	Synchronous interrupt between units*2		0.1...10.00 ms (setting can be made in 0.05 ms increments)				
	Synchronous interrupt between multi-CPUs*2*3		0.1...10.00 ms (setting can be made in 0.05 ms increments)				
Timer performance	Low-speed timer		1...1000 ms (default is 100 ms)				
	High-speed timer		0.01...100 ms (default is 10 ms)				
	Long timer		0.001...1000 ms (default is 0.001 ms)				
Input/output points			4096 points				
User device points	Input (X)		12288 points (fixed)				
	Output (Y)		12288 points (fixed)				
	Internal relay (M)		12288 points (changeable with use of a parameter)*4				
	Latching relay (L)		8192 points (changeable with use of a parameter)*4				
	Link relay (B)		8192 points (changeable with use of a parameter)*4				
	Link special relay (SB)		2048 points (changeable with use of a parameter)*4				
	Annunciator (F)		2048 points (changeable with use of a parameter)*4				
	Edge relay (V)		2048 points (changeable with use of a parameter)*4				
	Step relay (S)*1*2*5		0 points (changeable with use of a parameter)*4				
	Timer system	Timer (T)	1024 points (changeable with use of a parameter)*4				
		Long timer (LT)	1024 points (changeable with use of a parameter)*4				
	Integrating timer system	Integrating timer (ST)	0 points (changeable with use of a parameter)*4				
		Long integrating timer (LST)	0 points (changeable with use of a parameter)*4				
	Counter system	Counter (C)	512 points (changeable with use of a parameter)*4				
		Long counter (LC)	512 points (changeable with use of a parameter)*4				
	Data register (D)		18432 points (changeable with use of a parameter)*4				
	Link register (W)		8192 points (changeable with use of a parameter)*4				
	Link special register (SW)		2048 points (changeable with use of a parameter)*4				
System device points	Special relay (SM)		4096 points (fixed)				
	Special register (SD)		4096 points (fixed)				
	Function input (FX)		16 points (fixed)				
	Function output (FY)		16 points (fixed)				
	Function register (FD)		5 points × 4 words (fixed)				
File register points	File register (R/ZR)		0 points (changeable with use of a parameter)*4				
Index register points	Index register (Z)		20 points (Maximum 24 points changeable with use of a parameter)				
	Long index register (LZ)		2 points (Maximum 12 points changeable with use of a parameter)				
Pointer points	Pointer (P) (Global/local)		8192 points (Maximum 16384 points changeable with use of a parameter)				8192 points (Maximum 32768 points changeable with use of a parameter)
	Interrupt pointer (I)		1024 points (fixed)				
Link direct device points	Link input (J□¥X□)		Maximum 16384 points*6				
	Link output (J□¥Y□)		Maximum 16384 points*6				
	Link relay (J□¥B□)		Maximum 32768 points*6				
	Link register (J□¥W□)		Maximum 131072 points*6				
	Link special relay (J□¥SB□)		Maximum 512 points*6				
	Link special register (J□¥SW□)		Maximum 512 points*6				
Unit access device points	Intelligent function unit device (U□¥G□)		Maximum 268435456 points*6				
CPU buffer memory access device points	Buffer memory (U3E□¥G□)		Maximum 524288 points*6				
	Buffer memory periodic communication area (U3E□¥HG□)*2		Maximum 12288 points*7				
Refresh data register points	Refresh data register (RD)		524288 points (Maximum 1048576 points)				
Nesting points	Nesting (N)		15 points				

*1: When using on the RnCPU or process CPU, check the version of the CPU module and engineering tool.
*2: Cannot be used on a process CPU (redundancy mode).
*3: Cannot be used on the RnENCPU.
*4: Changeable from the parameter setting and within the capacity scope of the CPU built-in memory and the extended SRAM cassette.
*5: Used in the SFC program. For details on the SFC program, refer to the manual.
*6: Indicate the maximum value that CPU can handle, and the actual points differ among units.
*7: The maximum value differs according to parameter setting (multi-CPU setting).

Safety CPU: Hardware specifications

Item		R08SFCPU	R16SFCPU	R32SFCPU	R120SFCPU
Control method		Stored program cyclic operation			
I/O control mode		Refresh mode (Direct access I/O is available by specifying direct access I/O (DX, DY).)			
Instruction processing time	LD instruction SA¥X0	0.98 ns			
	MOV instruction SA¥D0 SA¥D1	1.96 ns			
Memory size	Program size	80K steps (320K bytes) (40K steps for safety programs (160K bytes))	160K steps (640K bytes) (40K steps for safety programs (160K bytes))	320K steps (1280K bytes) (40K steps for safety programs (160K bytes))	1200K steps (4800K bytes) (40K steps for safety programs (160K bytes))
	Program memory	320K bytes (160K bytes for safety programs)	640K bytes (160K bytes for safety programs)	1280K bytes (160K bytes for safety programs)	4800K bytes (160K bytes for safety programs)
	Device/label memory*1	1178K bytes	1710K bytes	2306K bytes	3370K bytes
	Data memory	5M bytes	10M bytes	20M bytes	40M bytes
	CPU buffer memory	1024K bytes (512K word) (includes built-in function information area size 4M bytes (2K word))			
	Refresh memory	2048K bytes*2			
Maximum number of files for storage	Program memory (P: Number of program files, FB: Number of FB files)	380 files (including those for the safety program) (P: 252 files, FB: 128 files (up to 64 can be stored to 1 file))			
	Program memory (P: Number of safety program files, FB: Number of safety FB files)	48 files (P: 32 files, FB: 16 files (up to 64 can be stored to 1 file))			
	Device/label memory	323 files (regardless of the extended SRAM cassette use)*3			
	Data memory	512 files*4			
	SD memory card	• NZ1MEM-2GBSD: 256 files*4 • NZ1MEM-4GBSD, NZ1MEM-8GBSD, NZ1MEM-16GBSD: 32767 files*4			
Maximum number of folders	Data memory	512 files*4			
	SD memory card	• NZ1MEM-2GBSD: 256 files*4 • NZ1MEM-4GBSD, NZ1MEM-8GBSD, NZ1MEM-16GBSD: 32767 files*4			
USB port		USB2.0 High Speed (miniB) ×1			
Ethernet port		100BASE-TX/10BASE-T×1			

*1: The size of device area, label area, latch label area, and file storage are can be changed by parameter settings. Device/label memory size can be increased by mounting the extended SRAM cassette.
*2: This is the total size of device area and unit label area.
*3: Number including system files.
*4: This is the total number (including system files and system folder) that can be created in the root folder when the file name and folder name are 13 characters (including extension) or less. When creating in a sub folder, up to 32767 files can be created. Note, however, that the number decreases when a file and folder having a name longer than 13 characters (including extension) are created.

Safety CPU: Programming specifications

Item			R08SFCPU	R16SFCPU	R32SFCPU	R120SFCPU
Program language			• Ladder Diagram (LD) • Structured Text (ST)*1 • Function Block Diagram (FBD/LD)*1			
Programming extensions			Function block (FB), label programming (system/local/global)			
Program operation	Execution type	General program	Initial execution type, scan execution type, periodic execution type, event execution type, wait type			
		Safety program	periodic execution type			
	Interrupt type	General program	Internal timer interrupt (I28...I31), interrupt from the unit			
Number of program execution		General program	252 programs (including those for safety program)			
		Safety program	32 programs			
Number of FB files		FB file	128 programs (up to 64 can be stored to 1 file) (including those for safety FB files)			
		Safety FB file	16 programs (up to 64 can be stored to 1 file)			
Tact performance	Constant scanning		0.2...2000 ms (setting can be made in 0.1 ms increments)			
	Periodic interrupt		0.5...1000 ms (setting can be made in 0.5 ms increments)			
Timer performance	Low-speed timer		1...1000 ms (default is 100 ms)			
	High-speed timer		0.01...100 ms (default is 10ms)			
	Long timer*1		0.001...1000 ms (default is 0.001 ms)			
Input/output points			4096 points			
User device points	Input (X)*1		12288 points (fixed)			
	Output (Y)*1		12288 points (fixed)			
	Internal relay (M)*1		12288 points (changeable with use of a parameter)*2			
	Latching relay (L)*1		8192 points (changeable with use of a parameter)*2			
	Link relay (B)*1		8192 points (changeable with use of a parameter)*2			
	Link special relay (SB)*1		2048 points (changeable with use of a parameter)*2			
	Annunciator (F)*1		2048 points (changeable with use of a parameter)*2			
	Edge relay (V)*1		2048 points (changeable with use of a parameter)*2			
	Timer system	Timer (T)*1	1024 points (changeable with use of a parameter)*2			
		Long timer (LT)*1	1024 points (changeable with use of a parameter)*2			
	Integrating timer system	Integrating timer (ST)*1	0 points (changeable with use of a parameter)*2			
		Long integrating timer (LST)*1	0 points (changeable with use of a parameter)*2			
	Counter system	Counter (C)*1	512 points (changeable with use of a parameter)*2			
		Long counter (LC)*1	512 points (changeable with use of a parameter)*2			
	Data register (D)*1		18432 points (changeable with use of a parameter)*2			
	Link register (W)*1		8192 points (changeable with use of a parameter)*2			
	Link special register (SW)*1		2048 points (changeable with use of a parameter)*2			
Number of safety user device points	Safety input (SA¥X)*3		8192 points (either 8192 or 12288 points can be selected with use of a parameter)*4			
	Safety output (SA¥Y)*3		8192 points (either 8192 or 12288 points can be selected with use of a parameter)*4			
	Safety internal relay (SA¥M)*3		6144 points (changeable with use of a parameter)*2			
	Safety link relay (SA¥B)*3		4096 points (changeable with use of a parameter)*2			
	Safety timer (SA¥T)*3		512 points (changeable with use of a parameter)*2			
	Safety integrating timer (SA¥ST)*3		0 points (changeable with use of a parameter)*2			
	Safety counter (SA¥C)*3		512 points (changeable with use of a parameter)*2			
	Safety data register (SA¥D)*3		12288 points (changeable with use of a parameter)*2			
	Safety link register (SA¥W)*3		4096 points (changeable with use of a parameter)*2			
System device points	Special relay (SM)*1		4096 points (fixed)			
	Special register (SD)*1		4096 points (fixed)			
	Function input (FX)*1		16 points (fixed)			
	Function output (FY)*1		16 points (fixed)			
	Function register (FD)*1		5 points × 4 words (fixed)			
Safety system device points	Safety special relay (SA¥SM)*3		4096 points (fixed)			
	Safety special register (SA¥SD)*3		4096 points (fixed)			
File register points	File register (R/ZR)*1		0 points (changeable with use of a parameter)*2			
Index register points	Index register (Z)*1		20 points (Maximum 24 points changeable with use of a parameter)			
	Long index register (LZ)*1		2 points (Maximum 12 points changeable with use of a parameter)			
Pointer points	Pointer (P)*1 (Global/local)		8192 points (Maximum 16384 points changeable with use of a parameter)			16384 points (Maximum 32768 points changeable with use of a parameter)
	Interrupt pointer (I)*1		1024 points (fixed)			
Link direct device points	Link input (J□¥X□)*1		Maximum 16384 points*5			
	Link output (J□¥Y□)*1		Maximum 16384 points*5			
	Link relay (J□¥B□)*1		Maximum 32768 points*5			
	Link register (J□¥W□)*1		Maximum 131072 points*5			
	Link special relay (J□¥SB□)*1		Maximum 512 points*5			
	Link special register (J□¥SW□)*1		Maximum 512 points*5			
Unit access device points	Intelligent function unit device (U□¥G□)*1		Maximum 268435456 points*5			
CPU buffer memory access device points	Buffer memory (U3E□¥G□)*1		Maximum 268435456 points*5			
Refresh data register points	Refresh data register (RD)*1		524288 points (Maximum 1048576)			
Nesting points	Nesting (N)		15 points			

*1: Cannot be used in safety programs.
*2: For details about the permissible range, refer to the manual.
*3: Cannot be used in general programs.
*4: When 12288 points is selected, check the version of the CPU module and engineering tool.
*5: Indicate the maximum value that CPU can handle, and the actual points differ among units.

MELSEC iQ-F Series

Designed on the concepts of outstanding performance, superior drive control and user centric programming, Mitsubishi's MELSEC-F Series has been reborn as the MELSEC iQ-F Series.

From stand alone use to networked system applications, MELSEC iQ-F Series brings your business to the next level of industry.

MELSEC iQ-F series

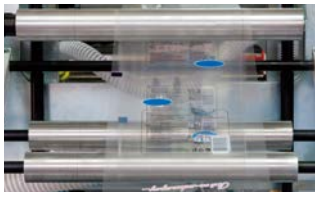


The next level of industry

Further extending the range of applications through improved fundamental performance, cooperation with drive devices and improved programming environment.


Conveyance


Food & Beverage


Packaging


Air-conditioning

New micro PLC designed on the concepts of ...



- *High-speed system bus*
- *Extensive built-in functions*
- *Enhanced security functions*
- *Battery-less*



- *Easy built-in positioning (4-axis 200 kpps)*
- *Simple interpolation functions*
- *4-axis synchronous control with simple motion module (dedicated positioning software not needed)*



- *Easy programming by drag and drop*
- *Reduced development time with module FB*
- *Parameterized setup for a variety of functions*



GX Works3



MELSEC iQ-F series The next level of industry

iQ Platform

Taking the iQ Platform to the next level.

iQ platform minimizes TCO* by providing innovative solutions for :

Building a stable production system with enhanced productivity

Reducing the time from system development to startup for shorter product cycles

Efficiently managing and servicing the system to reduce down time and maintain productivity

Ensuring product quality by swiftly processing large volumes of control data and production data and establishing traceability

*TCO: Total Cost of Ownership

PLC & HMI

1. High-speed bus performance greatly enhances the total system performance with the high-speed system bus performance (150× conventional speed*1)
2. Standardize programs with pre-defined module function blocks and module labels
3. Uniform and powerful security functions

Network

1. Achieve loss-less retrieval with CC-Link IE Field 1 Gbps high-speed communication (link refresh performance 40× conventional levels*1)
2. Seamless connectivity with each device using SLMP*

*SLMP: SeamLess Message Protocol

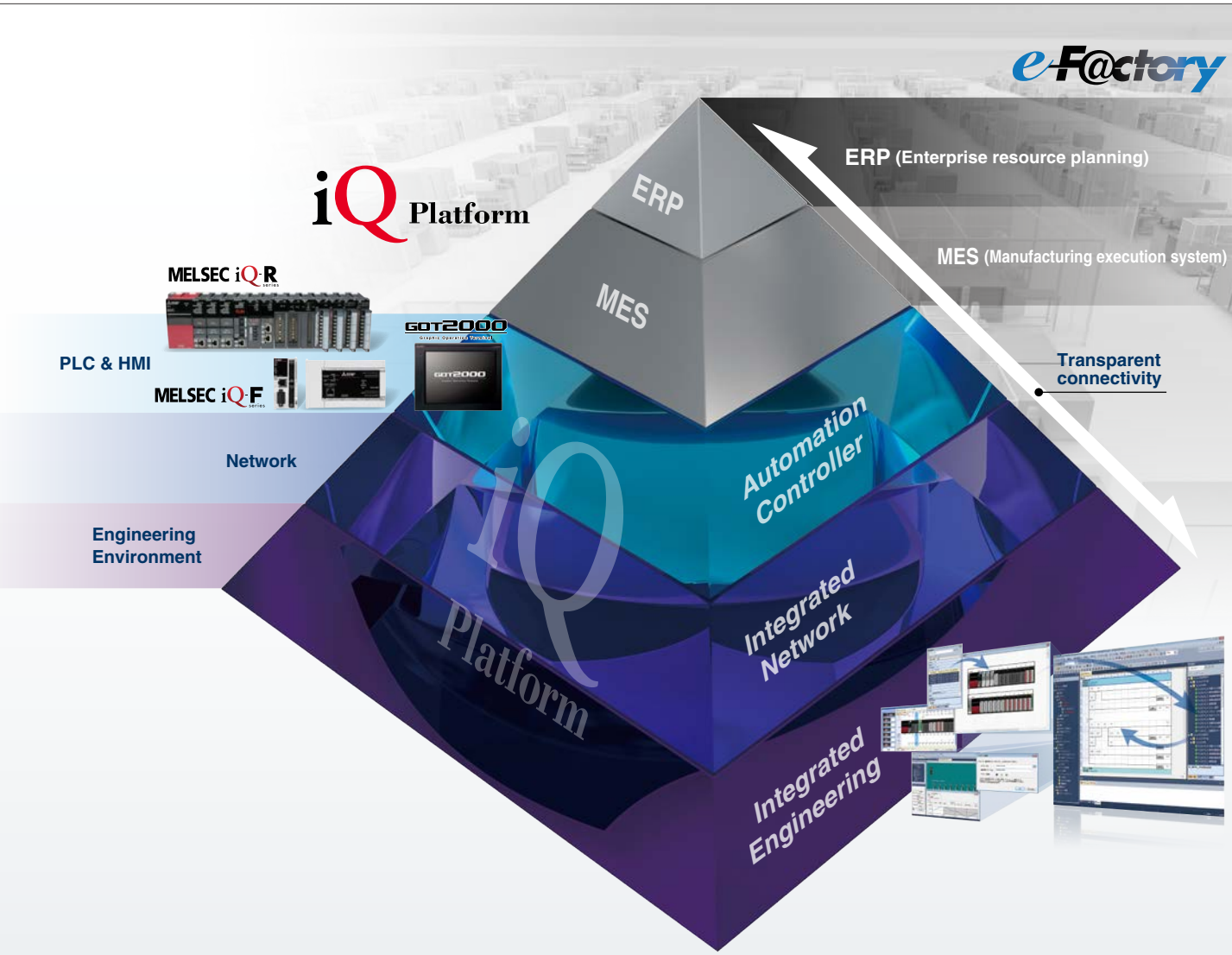
Engineering Environment

1. The intuitive programming environment of GX Works3 reduces development cost.
2. Module configuration drawings can be generated through direct reading from actual hardware.
3. Share parameters across multiple engineering software via MELSOFT Navigator.





*1: Comparison with FX3U


e-F@ctory
iQ Platform
ERP (Enterprise resource planning)
MES (Manufacturing execution system)
ERP
MES
MELSEC iQ-R
GOT2000
PLC & HMI
MELSEC iQ-F
Transparent connectivity
Network
Automation Controller
Engineering Environment
Integrated Network
Integrated Engineering
iQ Platform


MITSUBISHI ELECTRIC
GOT2000
USB
Ethernet

Advanced Built-in Functions

CPU Performance

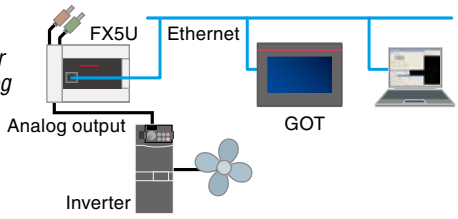
MELSEC iQ-F is powered by a high speed CPU that can execute the LD instruction in 34 ns.
Furthermore, MELSEC iQ-F can execute structured programs, execute multiple programs and handle ST language and function blocks.

Program capacity 64 k Step	Instruction execution speed (LD, MOV instruction) 34 ns
PC MIX value 14.6 instructions/μs	Fixed Cycle Interrupt Program Min. 1 ms

Built-in Analog Input/Output (with alarm output) FX5U

FX5U is equipped with 12-bit 2ch analog input and 1ch analog output. With parameter setup, no programming is required. Value shifting, scaling and alarm output can also be set easily with parameters.

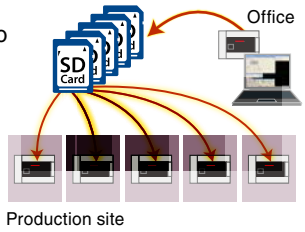
›› *Example of inverter control using analog output*



Built-in SD Memory Card Slot

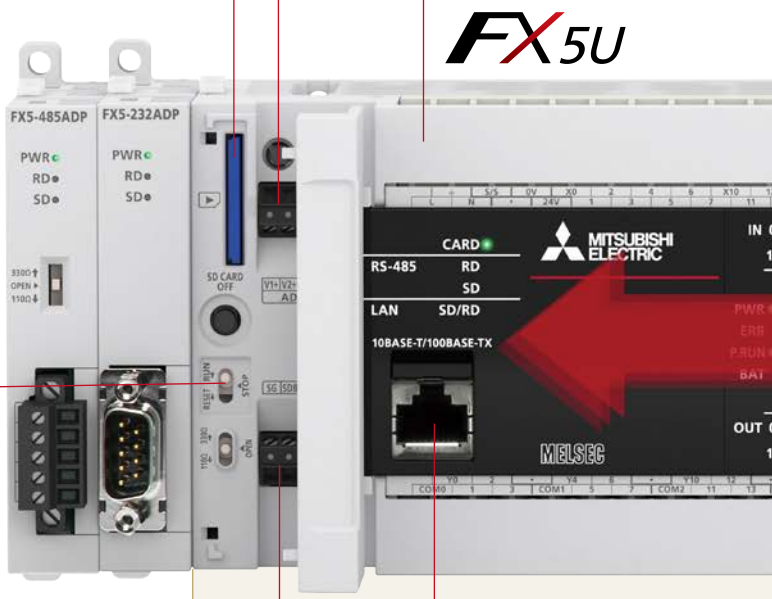
A built-in SD memory card slot is convenient for updating the program and mass production of equipment. Data can be logged in SD memory card (future support), making it easy to analyze the system status and production state, etc.

›› *Example of mass-production of equipment using SD memory card*



RUN/STOP/RESET Switch

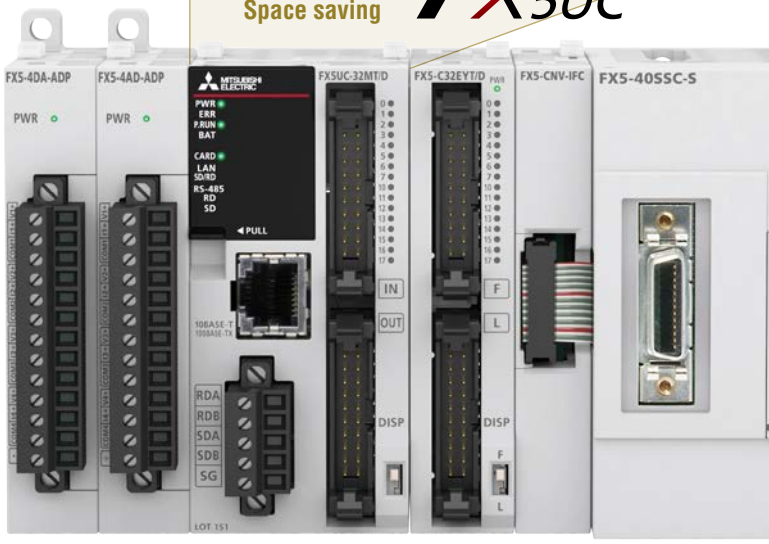
RUN/STOP/RESET switch is built in.
PLC can be rebooted without turning off the main power for efficient debugging.



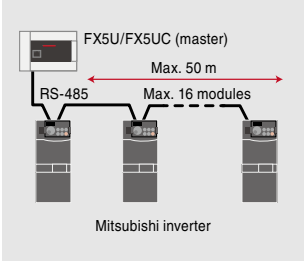
Built-in RS-485 Port (with MODBUS® function)

Connect to serial devices up to 50 m away with built-in RS-485 port. Control for up to 16 Mitsubishi inverters is possible with dedicated inverter communication instructions. MODBUS is also supported and can connect up to 32 MODBUS devices such as PLCs, sensors and temperature controllers.

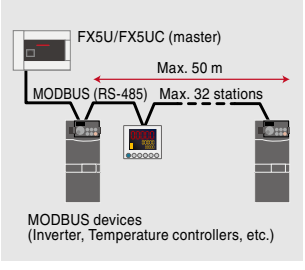
Space saving



›› Inverter Communication



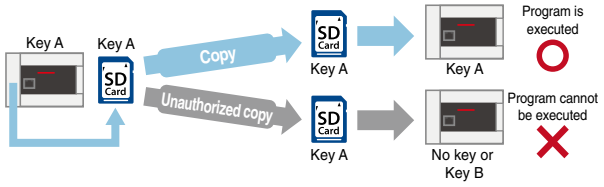
›› MODBUS Communication



Security

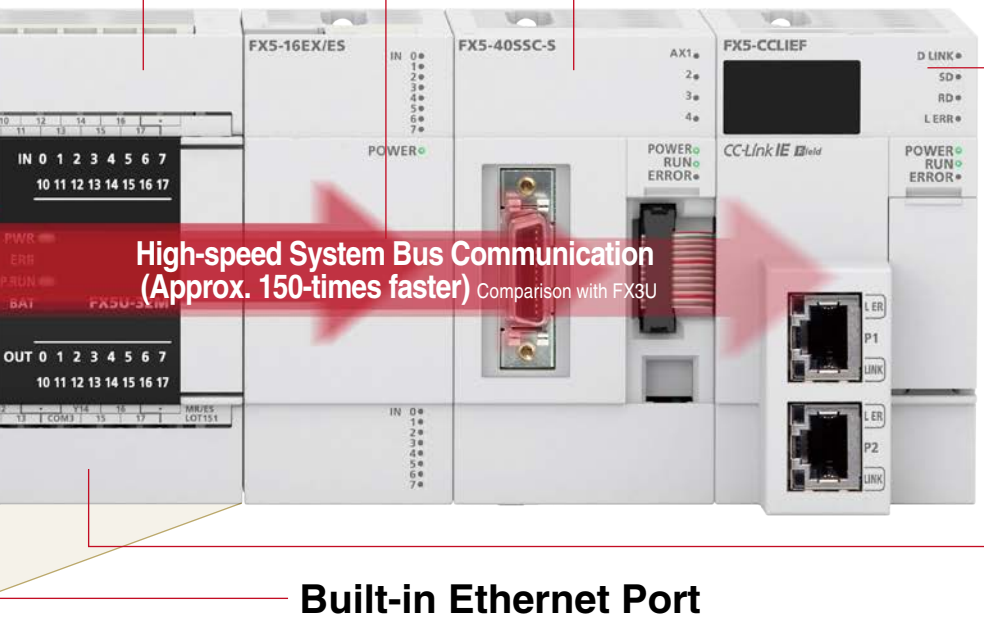
MELSEC iQ-F has advanced security functions (file password, remote password, security key) to prevent data theft and illegal operations by unauthorized persons.

›› *Example of security key function*



High-speed System Bus Communication

High-speed system bus communication at 1.5 K words/ms (approximately 150 times faster compared with FX3U), together with high speed CPU, allows MELSEC iQ-F to output maximum performance even when heavy data communication intelligent function modules are used.



SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

CC-Link IE Field

Battery-less and Maintenance-free

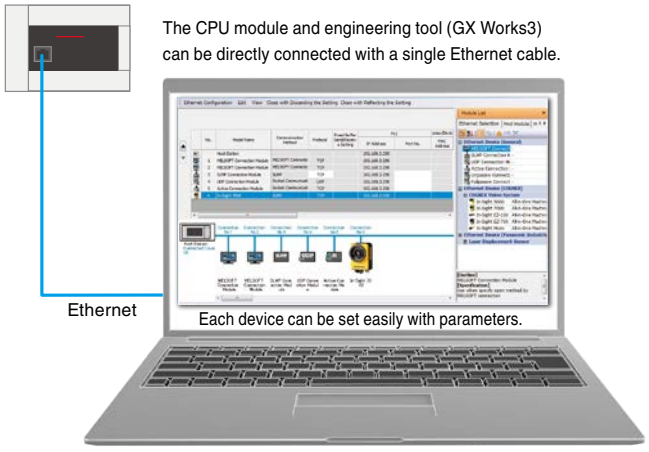
MELSEC iQ-F series holds programs and devices in nonvolatile memory such as flash ROM, and does not require a battery.

*: It is possible to increase the capacity of held devices by using an optional battery.

Built-in Ethernet Port

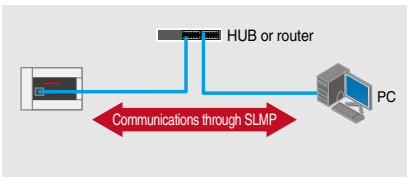
The Ethernet communication port can handle communication of up to 8 connections on the network, and can support multiple connections with personal computer and other devices. In addition, the Ethernet communication port can handle seamless SLMP communication with the upper-level device.





›› SLMP Communication

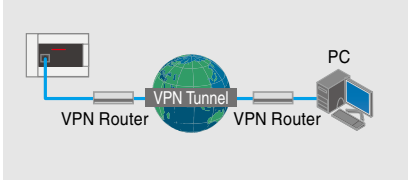
PC and other devices can read/write to the CPU module via the open protocol SLMP*.



*: SeamLess Message Protocol

›› Remote Maintenance

Program read/write can be made by GX Works3 connected via VPN.

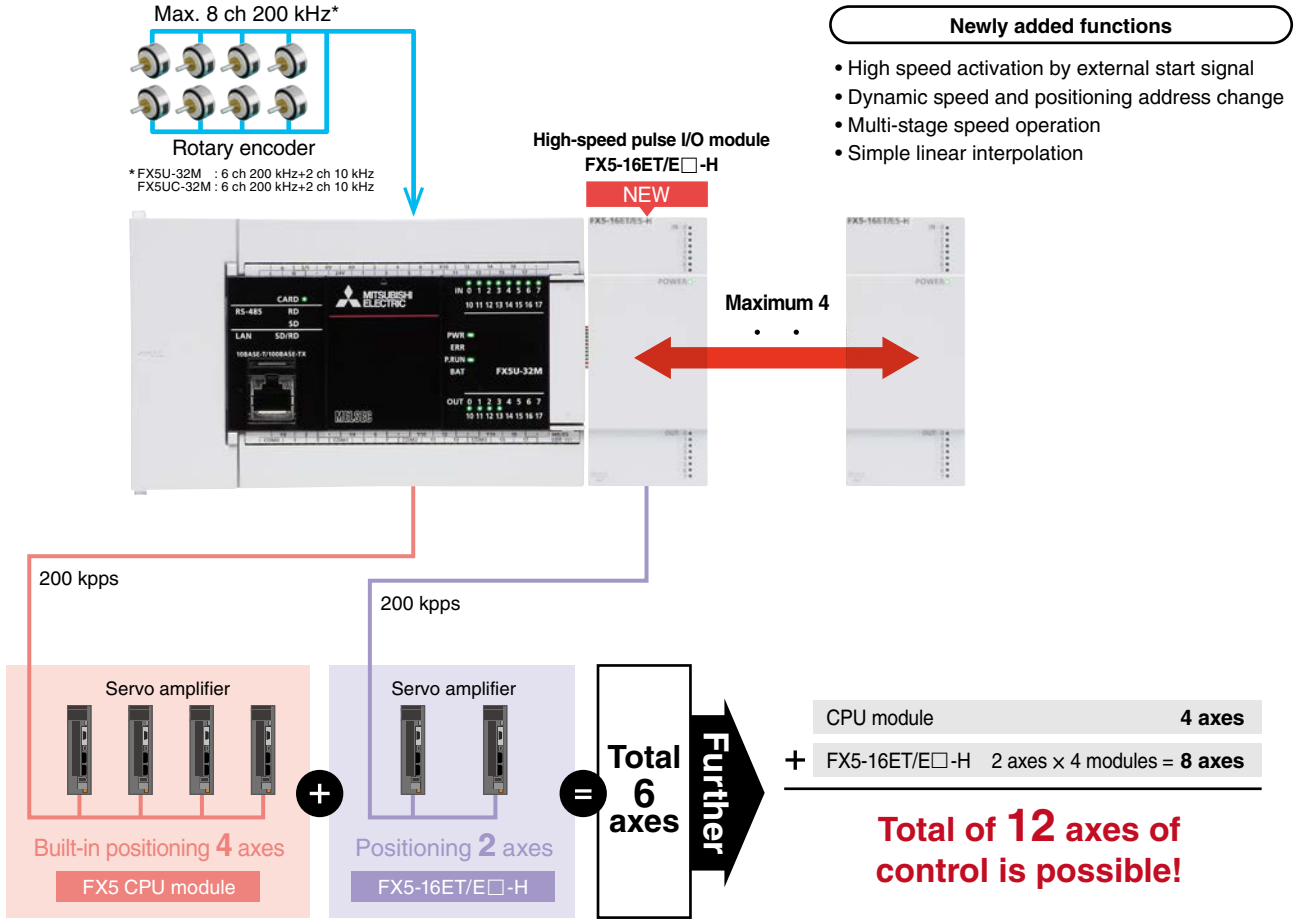


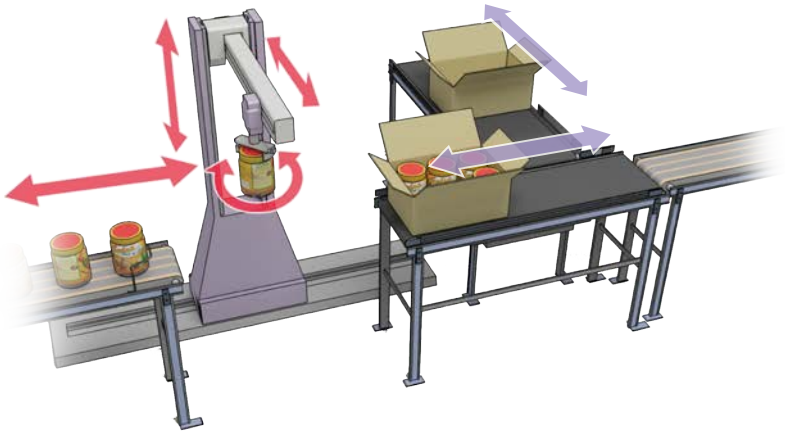
Advanced Positioning Function

Built-in Positioning (200 kpps, 4 axes built in) + Positioning 2 axes (200 kpps, 2 axes)

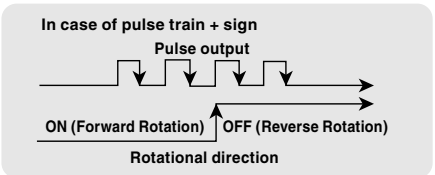
Positioning capable of 20 µs high-speed start

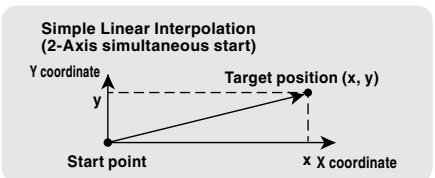
FX5U/FX5UC is equipped with built-in positioning functions that can utilize 8 ch high speed counter function and 4 axes pulse output.
In addition to the existing interrupt stop operation and variable speed operation, new functions have been added and made even easier to use. Furthermore, up to four high-speed pulse I/O modules can be connected for affordable multi-axis control.





[Example of carton packing system]





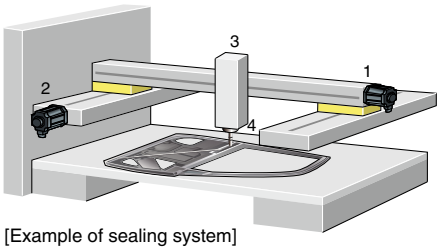
Simple Motion Module <4-axis control module>



SSCNETIII/H
SERVO SYSTEM CONTROLLER NETWORK
FX5-40SSC-S

Positioning control with SSCNETIII/H

FX5-40SSC-S is equipped with a 4-axis positioning function compatible with SSCNETIII/H. By combining linear interpolation, 2-axis circular interpolation and continuous trajectory control in the program set with a table, a smooth trajectory can be easily drawn.



1. X axis
2. Y axis
3. Z axis
4. Paint

[Example of sealing system]

Main functions

- Linear interpolation
- Circular interpolation
- Continuous trajectory control
- S-curve acceleration/deceleration

Application examples

- Sealing system
- Palletizer
- Grinding system

Advanced Motion Control

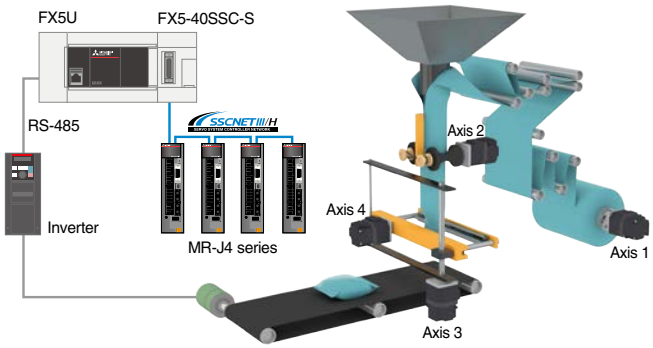
Making simple motion with compactly packed extra functions

By starting with parameter settings and the sequence program, the simple motion modules can realize a variety of motion control including positioning control, advanced synchronous control, cam control and speed-torque control.

Synchronous control

In addition to synchronous control that replaces physical machine mechanisms such as gears, shaft, transmission and cam with software, functions such as cam control, clutch and cam auto-generation are easily realized. Since synchronous control can be started and stopped for each axis, programs can contain both synchronous control axes and positioning control axes.

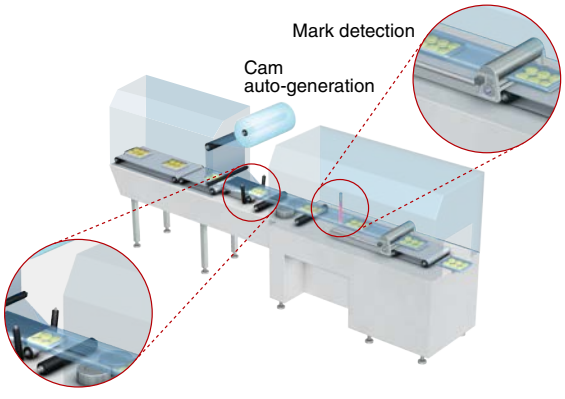
Up to four axes can be synchronized to the synchronous encoder axis, enabling use with a variety of systems.



- Use synchronous control and cam control to build a system perfect for your equipment.
- Register up to 64 types of cam patterns to respond to any type of packaging needs.
- Perform continuous operation without stopping the workpiece operation.

Mark detection function

The cutter axis deviation can be compensated by detecting a mark on the workpiece so the workpiece can be cut at a constant position.



[Example of rotary cutter control with mark detection and cam data]

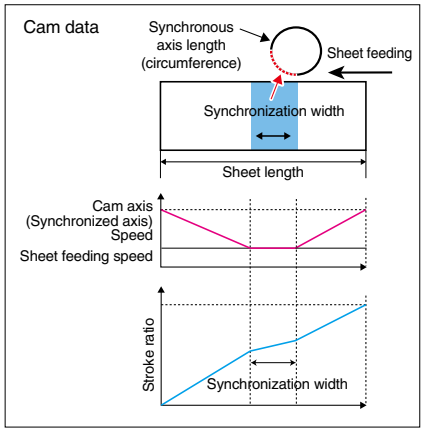
Cam data auto-generation

Easily program and automatically generate difficult cam data for rotary cutters just by inputting the sheet length, synchronization width, and cam resolution, etc.

User-created GOT screen



Parameter settings, including items like sheet length, etc.

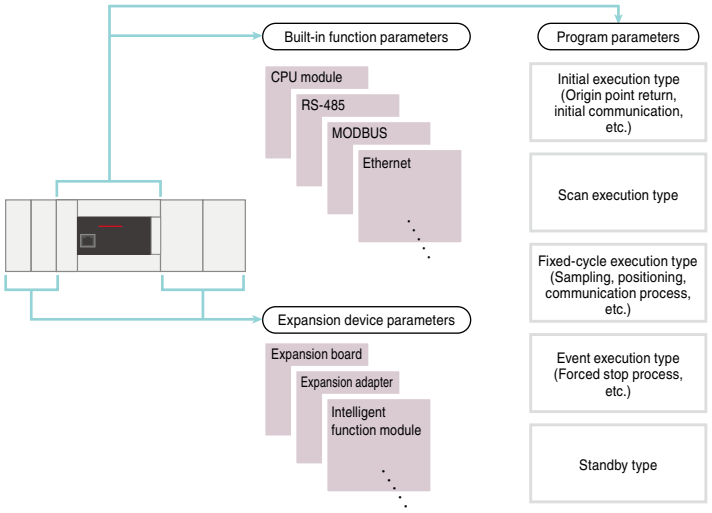


Advanced MELSEC iQ-F Series

Simple and convenient parameter settings

With MELSEQ iQ-F, various device settings that conventionally had to be programmed can be input in table format.
Easily set the built-in functions as well as expansion devices just by inputting values into the parameters.
The program's execution trigger can also be set with the parameters.

[Functions set with parameters]
- Settings for CPU parameters, Ethernet port, RS-485 communication port, input response time, expansion board, memory card, security, etc.
- Settings for expansion adapters and intelligent function module and program parameters

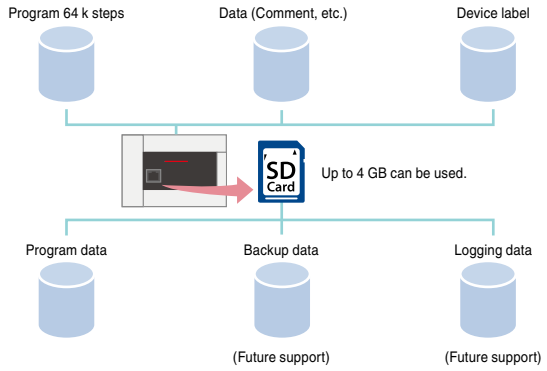


Memory area for each application

The CPU module has 64 k steps of program memory capacity, but the MELSEC iQ-F has a memory data area for each application, so all 64 k steps can be used as the program area.
Comments and statements can be written freely without affecting the program area.

[Maximum number of characters]
Comment: 1024 characters Statement: 5000 characters

MELSEC iQ-F Series stores the program and devices in non-volatile memory such as Flash ROM, so no battery is required.



Flexible internal devices

A variety of devices including new latch relays and link relays, and expanded timers and counters are available.
The number of device points can be reassigned and used in the internal memory.

Providing the convenience of special devices

In addition to the conventional special devices, up to 12000 points of convenient system devices compatible with upper level devices are added.

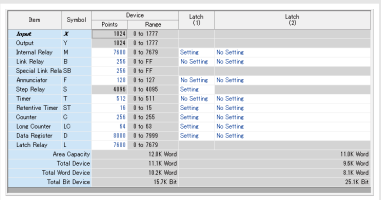
New upper level compatible system devices
- SM/SD0 to 4099 Compatible with MELSEC iQ-R

Conventional convenient devices
- Conventional M8000 or later devices →Has changed to SM8000 or later devices
- Conventional D8000 or later devices →Has changed to SD8000 or later devices

(When migrating an FX3U/FX3UC program created using GX Works2 to MELSEC iQ-F Series, the devices are automatically converted.)

Freely customize the latch range setting

The latch range can be set for each device, so the latch clear range can be selected during the clearing operation.



Handy timer and counter settings

The timer and counter properties are determined by data type and how instruction is written, so programs can be created regardless of the device number.

Timers:
OUT T0.....100 ms timer
OUTH T0.....10 ms timer
OUTHS T0.....1 ms timer
OUT ST0.....Retentive timer

Counters:
OUT C0.....16 bit counter
OUT LC0.....32 bit counter

Software

Dramatically more dedicated instructions

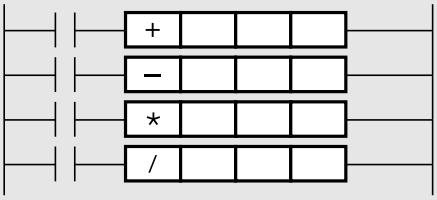
A great number of dedicated instructions have been added since the FX3.

[FX3] 510 types → **[FX5]** 1014 types

The newly added instructions include convenient ones that are interchangeable with the MELSEC iQ-R and dedicated instructions for built-in functions. (Only FX3U and FX3UC programs can be imported)

Intuitive and easy-to-understand arithmetic operations

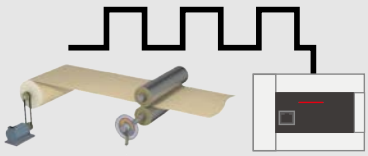
Symbols can be input in the arithmetic operations making it easy and intuitive to describe programs.



High-performance built-in high-speed counter function

Input and measure three modes by setting the parameters.

- Normal mode
- Pulse density measurement mode
- Rotation speed measurement mode

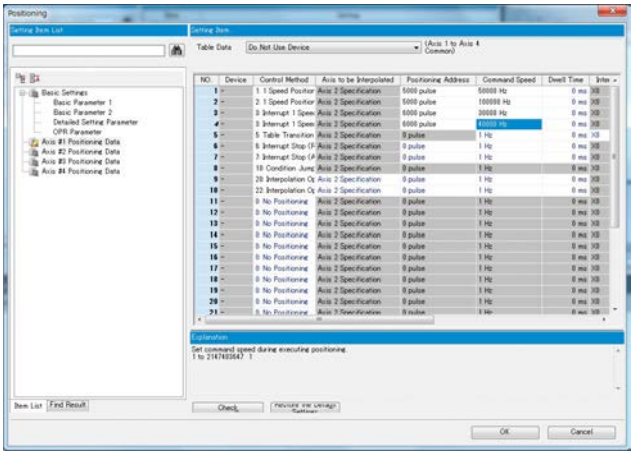


Up to 32 tables can be set for the high-speed comparison table and up to 128 tables for the multi-point output high-speed comparison table. The DHCMOV instruction can be used to read the latest values from the special registers.

Reinforced built-in positioning function

Positioning can be easily performed with table operation instructions. Even advanced positioning like simple linear interpolation is possible with the multi-table operation (DRVTBL) instruction and multi-axis table operation (DRVMUL) instruction.

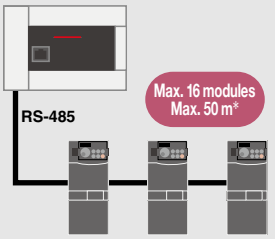
Diverse table operation settings for multi-speed and interrupt positioning, etc.



Inverter communication command function

The built-in Mitsubishi inverter protocol makes it possible to use inverter communication instructions to control a Mitsubishi inverter connected with RS-485 communication.

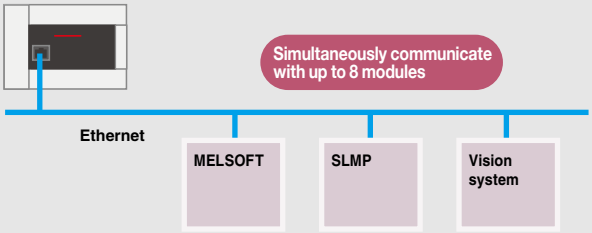
- IVCK : Operation monitor
- IVDR : Operation control
- IVRD : Parameter read
- IVWR : Parameter write
- IVBWR: Parameter batch write
- IVMC : Multiple command (2 types of settings and 2 types of read)



*: For built-in RS-485 and RS-485 expansion boards

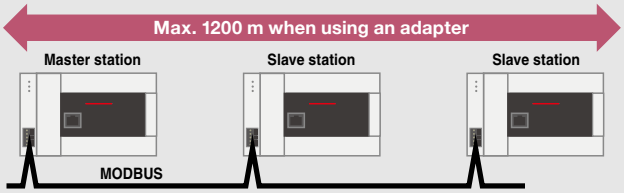
Built-in Ethernet function

Communication is set with parameters easily.
Functions include the diagnosis function from GX Works3, SLMP function, socket communication function and IP address change function, and unauthorized access from an external source can be prevented with remote password.



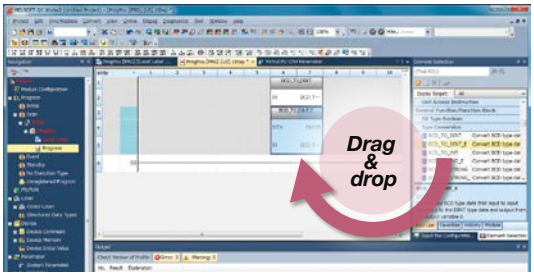
MODBUS function

The MODBUS function can be used with parameter settings and ADPRW (MODBUS master communication instruction [data read/write.]) Communicate with devices up to 1200 m away using the RS-485 communication adapter.



Standard function/function block function

110 types of basic standard function and function blocks are provided. These can be used as parts by dragging and dropping, so when used together with dedicated instructions, programming time can be greatly reduced.



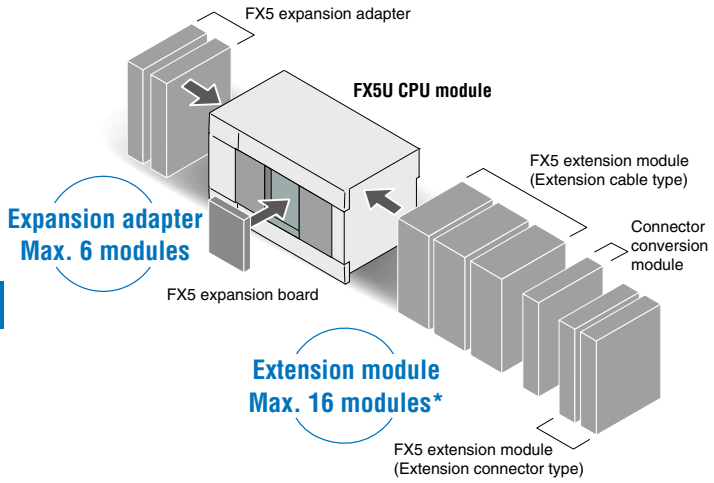
System Configuration

FX5U

Flagship model equipped with advanced built-in functions and diverse expandability

Simplifying use with renewed extension modules!

FX5U is equipped with analog functions, communication and high-speed I/O, and can easily be expanded with expansion boards and adapters. The high-speed system bus communication brings out the maximum performance of extension devices equipped with intelligent functions.



*: Up to 12 modules can be directly connected to CPU module. Up to 16 modules can be connected by connecting a powered I/O module or an extension power supply module. Extension power supply modules and connector conversion modules are not included in the number of connected modules.

FX5 expansion adapters



Max. 2 modules

For Communication

FX5-232ADP	For RS-232C communication
FX5-485ADP	For RS-485 communication



Max. 4 modules

Analog

FX5-4AD-ADP	For analog input
FX5-4DA-ADP	For analog output

FX5 expansion boards



Max. 1 module

For Communication

FX5-232-BD	For RS-232C communication
FX5-485-BD	For RS-485 communication
FX5-422-BD-GOT	For RS-422 communication (For GOT connection)

Peripheral device

HMI

GOT2000, GOT1000

FX5U CPU module



	FX5U-32MR/ES	AC D2	R
	FX5U-32MT/ES	AC D2	T1
	FX5U-32MT/ESS	AC D2	T2
NEW	FX5U-32MR/DS	DC D2	R
NEW	FX5U-32MT/DS	DC D2	T1
NEW	FX5U-32MT/DSS	DC D2	T2

Input: 16 points/Output: 16 points



	FX5U-64MR/ES	AC D2	R
	FX5U-64MT/ES	AC D2	T1
	FX5U-64MT/ESS	AC D2	T2
Available soon	FX5U-64MR/DS	DC D2	R
Available soon	FX5U-64MT/DS	DC D2	T1
Available soon	FX5U-64MT/DSS	DC D2	T2

Input: 32 points/Output: 32 points



	FX5U-80MR/ES	AC D2	R
	FX5U-80MT/ES	AC D2	T1
	FX5U-80MT/ESS	AC D2	T2
Available soon	FX5U-80MR/DS	DC D2	R
Available soon	FX5U-80MT/DS	DC D2	T1
Available soon	FX5U-80MT/DSS	DC D2	T2

Input: 40 points/Output: 40 points

AC AC power supply
DC DC power supply
D2 DC input (sink/source)
T1 Transistor output (sink)
T2 Transistor output (source)
R Relay output

Connector connection
Cable connection

Option

Terminal module



FX-16E-TB	FX-16E-TB/UL
FX-32E-TB	FX-32E-TB/UL
FX-16EYR-TB	FX-16EYR-ES-TB/UL
FX-16EYS-TB	FX-16EYS-ES-TB/UL
FX-16EYT-TB	FX-16EYT-ES-TB/UL
	FX-16EYT-ESS-TB/UL

I/O cable



●General-purpose I/O cable
FX-16E-500CAB-S (5 m, 20-pin)

●For terminal modules
FX-16E-□CAB (Both end, 20-pin)
□: 150 (1.5 m)/300 (3 m) /500 (5 m)

●For terminal modules
FX-16E-□CAB-R (20-pin)
□: 150 (1.5 m)/300 (3 m)/500 (5 m)

Battery

FX3U-32BL

SD memory card

NZ1MEM-2GBSD (2 GB)
NZ1MEM-4GBSD (4 GB)

Engineering tool

GX Works3

Power supply cable

●Power supply cable
FX2NC-100BPCB (1 m)
●Power crossover cable
FX2NC-10BPCB1 (0.1 m)

Extended extension cable



●Extended extension cable
NEW FX5-30EC*2
NEW FX5-65EC*2



●Connector conversion adapter
NEW FX5-CNV-BC

Generic Specifications

Item		Generic Specifications
Power supply	Rated voltage	AC power supply type: 100 to 240 V AC, 50/60 Hz DC power supply type: 24 V DC
	Power consumption*1	AC power supply type: 30 W (32M), 40 W (64M), 45 W (80M) DC power supply type: 30 W
	Rush current	AC power supply type: 32M: max. 25 A for 5 ms or less/100 V AC, max. 50 A for 5 ms or less/200 V AC 64M/80M: max. 30 A for 5 ms or less/100 V AC, max. 60 A for 5 ms or less/200 V AC DC power supply type: max. 50 A for 0.5 ms or less/24 V DC
	5 V DC internal power supply capacity	AC power supply type: 900 mA (32M), 1100 mA (64M/80M) DC power supply type: 900 mA (775 mA)*2
	24 V DC service power supply capacity	AC power supply type: 400 mA [300 mA*3] (32M), 600 mA [300 mA*3] (64M/80M) When an external power supply is used for the input circuit of the CPU module: 480 mA [380 mA*3] (32M), 740mA [440 mA*3] (64M), 770 mA [470 mA*3] (80M)
	24 V DC internal power supply capacity	DC power supply type: 480 mA (360 mA)*2
Input/output	Input specifications	5.3 mA/24 V DC (X020 and later: 4.0 mA/24 V DC)
	Output specifications	Relay output type: 2 A/1 point, 8 A or less/4 points common, 8 A or less/8 points common, 30 V DC or less, 240 V AC or less (250 V AC or less in case of noncompliance with CE, UL/cUL Standards) Transistor output type: 0.5 A/1 point, 0.8 A or less/4 points common, 1.6 A or less/8 points common, 5 to 30 V DC
	Input/output extension	Extension devices for FX5 can be connected: when adding an extension connector type, the connector conversion module (FX5-CNV-IF) is required.
Built-in communication port		Ethernet (100BASE-TX/10BASE-T), RS-485 1 ch each
Built-in memory card slot		1 slot for SD memory card
Built-in analog input/output		Input 2 ch, output 1 ch

*1: The values show the state where the service power of 24 V DC is consumed to the maximum level in case that its configuration has the max. no. of connections provided to CPU module. (Including the current in the input circuit)
*2: The values in the parentheses ( ) indicate the power supply capacity to be resulted when the power supply voltage falls in the range from 16.8 to 19.2 V DC.
*3: The values in the brackets [ ] will result when the ambient temperature is less than 0°C during operations.

Please choose the I/O type of CPU module or I/O module suited for your equipment.
Refer to the page below for the details of I/O type of each product.

FX5 extension module

I/O module

Powered I/O module



Powered I/O module
FX5-32ER/ES
FX5-32ET/ES
FX5-32ET/ESS
NEW FX5-32ER/DS
NEW FX5-32ET/DS
NEW FX5-32ET/DSS

I/O module



Input module
FX5-8EX/ES
FX5-16EX/ES

High-speed pulse input/output module
NEW FX5-16ET/ES-H
NEW FX5-16ET/ESS-H



Output modules
FX5-8EYR/ES
FX5-8EYT/ES
FX5-8EYT/ESS
FX5-16EYR/ES
FX5-16EYT/ES
FX5-16EYT/ESS

Intelligent function module



SSCNET III/H
Simple motion
FX5-40SSC-S



CC-Link IE Field
Network
NEW FX5-CCLIEF

Extension power supply module



Extension power supply module
FX5-1PSU-5V*3

FX5 extension module (Extension cable type)

Connector conversion module



Connector conversion module
NEW FX5-CNV-IF

FX5 extension module (Extension connector type)

I/O module



Input module
FX5-C16EX/D
FX5-C16EX/DS
FX5-C32EX/D
FX5-C32EX/DS

Output module
FX5-C16EYT/D
FX5-C16EYT/DSS
FX5-C32EYT/D
FX5-C32EYT/DSS



Input/output module
FX5-C32ET/D
FX5-C32ET/DSS

Extension power supply module



Extension power supply module
FX5-C1PS-5V*1*4

Bus conversion module



Bus conversion module
FX5-CNV-BUSC



Bus conversion module
FX5-CNV-BUS

FX3 extension module

Intelligent function module

Analog	
FX3U-4AD	For input
FX3U-4DA	For output
Temperature control	
FX3U-4LC	Temperature control
Positioning	
FX3U-1PG	For pulse output
High speed counter	
FX3U-2HC	For high-speed input
Communication/Network	
FX3U-64CCL	CC-Link slave
FX3U-16CCL-M	CC-Link master
FX3U-128ASL-M	AnyWireASLINK master

For the module requiring parameter in FX3 extension module, parameter settings by program are necessary. When connecting the FX3 extension module, the bus speed for FX3 applies for access.

Extension power supply module



Extension power supply module
FX3U-1PSU-5V*1

*1: When adding the extension module, it is necessary to connect it to the front stage of extension module in case of a shortage of internal power supply in CPU module.
*2: Attach when connecting an extension cable type module to a distant location or when making two-tier connections. The connector conversion adapter (FX5-CNV-BC) is required when connected with an input/output module (extension cable type), high-speed pulse input/output module, or an intelligent function module. When using also the bus conversion module in the same system, connect the FX5 extension power supply module or the powered I/O module right after the extended extension cable.
*3: Can be connected only to the AC power type system.
*4: Can be connected only to the DC power type system.

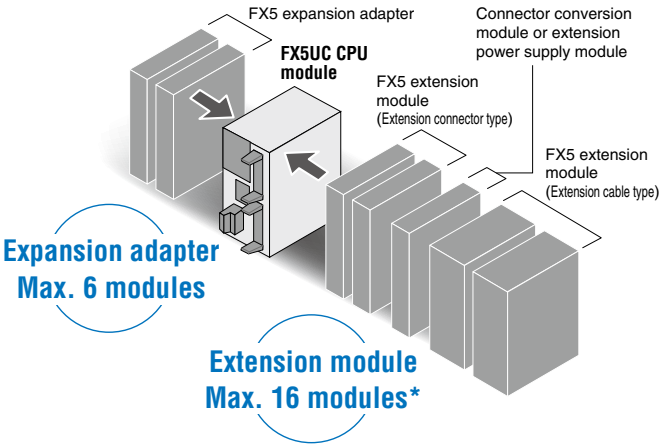
System Configuration

FX5UC

Compact body packed with diverse functions.

Simplifying use with renewed extension modules!

The extension module compatible with FX5UC is compact and easy-to-use, and helps to downsize your system. Easily connect to the FX5 and FX3 extension modules with the variety of conversion modules available.



*: Up to 12 modules can be directly connected to the CPU module. Up to 16 modules can be connected by connecting a powered I/O module or an extension power supply module. Extension power supply modules and connector conversion modules are not included in the number of connected modules.

FX5 expansion adapter



Max. 2 modules

For Communication

FX5-232ADP For RS-232C communication
FX5-485ADP For RS-485 communication



Max. 4 modules

Analog

FX5-4AD-ADP For analog input
FX5-4DA-ADP For analog output

FX5UC CPU module



FX5UC-32MT/D DC D1 T1
FX5UC-32MT/DSS DC D2 T2
Input: 16 points/Output: 16 points



FX5UC-64MT/D DC D1 T1
FX5UC-64MT/DSS DC D2 T2
Input: 32 points/Output: 32 points



FX5UC-96MT/D DC D1 T1
FX5UC-96MT/DSS DC D2 T2
Input: 48 points/Output: 48 points

DC DC power supply
D1 DC input (sink)
D2 DC input (sink/source)
T1 Transistor output (sink)
T2 Transistor output (source)

Connector connection
Cable connection

FX5 extension module (extension connector type)

I/O module



Input module

FX5-C16EX/D
FX5-C16EX/DS
FX5-C32EX/D
FX5-C32EX/DS

Output module

FX5-C16EYT/D
FX5-C16EYT/DSS
FX5-C32EYT/D
FX5-C32EYT/DSS

I/O module

FX5-C32ET/D
FX5-C32ET/DSS

Peripheral device

HMI

GOT2000, GOT1000

Option

Battery

FX3U-32BL

SD memory card

NZ1MEM-2GBSD (2 GB)
NZ1MEM-4GBSD (4 GB)

Engineering tool

GX Works3

I/O cable



●General-purpose I/O cable
FX-16E-500CAB-S (5 m, 20-pin)

●For terminal modules
FX-16E-□CAB (Both end, 20-pin)
□: 150 (1.5 m)/300 (3 m) /500 (5 m)

●For terminal modules
FX-16E-□CAB-R (20-pin)
□: 150 (1.5 m)/300 (3 m)/500 (5 m)

Terminal module



FX-16E-TB FX-16E-TB/UL
FX-32E-TB FX-32E-TB/UL
FX-16EYR-TB FX-16EYR-ES-TB/UL
FX-16EYS-TB FX-16EYS-ES-TB/UL
FX-16EYT-TB FX-16EYT-ES-TB/UL
FX-16EYT-ESS-TB/UL

Power supply cable

●CPU module power supply cable
FX2NC-100MPCB (1 m)
(attached to CPU module)

●Power supply cable
FX2NC-100BPCB (1 m)
(attached to FX5UC-□MT/D)

●Power supply crossover cable
FX2NC-10BPCB1 (0.1 m)
(attached to FX5-C□EX/D, FX5-C32ET/D)

Extended extension cable



●Extended extension cable
NEW FX5-30EC*3
NEW FX5-65EC*3



●Connector conversion adapter
NEW FX5-CNV-BC

Generic Specifications

Item		Generic Specifications
Power supply	Rated supply voltage	24 V DC
	Power consumption*1	5 W (32M), 8 W (64M), 11 W (96M)
	Rush current	32M: Max. 35 A 0.5 ms or less/24 V DC 64M/96M: Max. 40 A 0.5 ms or less/24 V DC
	5 V DC power supply capacity	720 mA
	24 V DC power supply capacity	500 mA
Input/output	Input specifications	5.3 mA/24 V DC (X020 and later: 4.0 mA/24 V DC)
	Output specifications	Transistor output type: Y000 to Y003 0.3 A/1 point, Y004 and later 0.1 A/1 point, 0.8 A/8 points common*2 5 to 30 V DC
	Input/output extension	Extension device for FX5 can be connected (extension power supply module (FX5-C1PS-5V) or connector conversion module (FX5-CNV-IFC) is required when connecting an extension cable type)
Built-in communication port		Ethernet (100BASE-TX/10BASE-T), RS-485 1 ch each
Built-in memory card slot		1 slot for SD memory card

*1: The values show the state where the power of 24 V DC is consumed to the maximum level in case that its configuration has the max. no. of connections provided to CPU module. (Including the current in an input circuit)
*2: 1.6 A or less when two common terminals are connected to the external part.

Please choose the I/O type of CPU module or I/O module suited for your equipment.
Refer to the page below for the details of I/O type of each product.

FX5 extension module (extension connector type)

Extension power supply module



Extension power supply module
FX5-C1PS-5V*1 *2

or

Connector conversion module



Connector conversion module
FX5-CNV-IFC

FX5 extension module (extension cable type)

I/O module

Powered I/O module



Powered I/O module
NEW FX5-32ER/DS
NEW FX5-32ET/DS
NEW FX5-32ET/DSS

Input/output module



Input module
FX5-8EX/ES
FX5-16EX/ES

High-speed pulse input/output module
NEW FX5-16ET/ES-H
NEW FX5-16ET/ESS-H



Output module
FX5-8EYR/ES
FX5-8EYT/ES
FX5-8EYT/ESS
FX5-16EYR/ES
FX5-16EYT/ES
FX5-16EYT/ESS

Intelligent function module



SSCNET III/H

Simple motion
FX5-40SSC-S



CC-Link IE Field

Network
NEW FX5-CCLIEF

Bus conversion module



Bus conversion module
FX5-CNV-BUS



Bus conversion module
FX5-CNV-BUSC

FX3 extension module

Intelligent function module

Analog
FX3U-4AD For input
FX3U-4DA For output

Positioning
FX3U-1PG For pulse output

Communication/Network
FX3U-64CCL CC-Link slave
FX3U-16CCL-M CC-Link master
FX3U-128ASL-M AnyWireASLINK master

Temperature control
FX3U-4LC Temperature control

High speed counter
FX3U-2HC For high-speed input

For the module requiring parameter in FX3 extension module, parameter settings by program are necessary.
When connecting the FX3 extension module, the bus speed for FX3 applies for access.

*1: When adding the extension module, it is necessary to connect it to the front stage of extension module in case of a shortage of internal power supply in CPU module.
*2: Next-stage extension connector of an extension power supply module can be used only for either connector connection or cable connection. In case of connector connection, an extension connector type module can be connected.
*3: Attach when connecting an extension cable type module to a distant location or when making two-tier connections. The connector conversion adapter (FX5-CNV-BC) is required when connected with an input/output module (extension cable type) or an intelligent function module. When using also the bus conversion module in the same system, connect the powered I/O module right after the extended extension cable.

Selecting the FX5U Model

Product Configuration



- Control scale: 32 to 256 points (CPU module: 32/64/80 points)
- Control points up to 512 input/output points, including remote I/O*

*: For CC-Link and AnyWireASLINK



For details about the connection positions, refer to the manual.

Type	Details	Connection details, model selection
1 CPU module	PLC with built-in CPU, power supply, input/output and program memory.	Various extension devices can be connected.
2 4 I/O module (extension cable type)	Product for extending I/O of extension cable type. Some products are powered.	Input/output can be extended to up to 256 points. Up to 16 extension modules can be connected. (Extension power supply modules and connector conversion modules are not included in the number of connected modules.) Up to 4 high-speed pulse I/O modules can be connected. For details, refer to “Rules for System Configuration” on p. 66.
3 FX5 Extension power supply module	Module for extending power supply if CPU module's internal power supply is insufficient. Extension cable is enclosed.	Power can be supplied to I/O module, intelligent function module, and bus conversion module. Up to 2 modules can be connected.
5 FX5 intelligent function module	Module with functions other than input/output.	Up to 16 extension modules including the I/O module can be connected (Extension power supply modules and connector conversion modules are not included in the number of connected modules.)
6 Connector conversion module	Module for connecting FX5 Series (extension connector type) extension module.	An extension module (extension connector type) for FX5 can be connected.
7 I/O module (extension connector type)	Product for adding extension connector type inputs/outputs.	The maximum number of points for input/output extension is 256. Up to 16 extension modules can be connected. (Extension power supply modules and connector conversion modules are not included in the number of connected modules.) Using this type of I/O module requires the connector conversion module.
8 Bus conversion module	Conversion module for connecting FX3 Series extension module.	FX3 extension module can be connected only to the right side of the bus conversion module. When using FX5-CNV-BUSC, a connector conversion module is required.
9 FX5 Expansion board	Board connected to front of CPU module to expand functions.	Up to 1 module can be connected to the front of the CPU module. (Expansion adapter can also be used.)
10 FX5 Expansion adapter	Adapter connected to left side of CPU module to expand functions.	Up to 6 modules can be connected to the left side of the CPU module.
11 FX3 Extension power supply module	Module for extending power supply if CPU module's internal power supply is insufficient. Extension cable is enclosed.	Up to 2 modules can be connected. The bus conversion module is required for use.
12 FX3 intelligent function module	Module with functions other than input/output.	When using the FX3 extension power supply module, up to 8 modules* can be used. When not using the FX3 extension power supply module, up to 6 modules* can be used. The bus conversion module is required for use.

*: Excluding some models

1 -1) CPU module (AC power supply, DC input type)

Model	Function	Number of occupied input/output points	Power supply capacity		I/O type	No. of input points	No. of output points
			5 V DC power supply	24 V DC service power supply			
FX5U-32MR/ES	CPU module (24 V DC service power built-in)	32 points	900 mA	400 mA (480 mA*1) [300 mA (380 mA*1)]*2	DC input (sink/source)/relay output	16 points	16 points
FX5U-32MT/ES					DC input (sink/source)/transistor (sink)		
FX5U-32MT/ESS					DC input (sink/source)/transistor (source)		
FX5U-64MR/ES		64 points	1100 mA	600 mA (740 mA*1) [300 mA (440 mA*1)]*2	DC input (sink/source)/relay output	32 points	32 points
FX5U-64MT/ES					DC input (sink/source)/transistor (sink)		
FX5U-64MT/ESS					DC input (sink/source)/transistor (source)		
FX5U-80MR/ES		80 points	1100 mA	600 mA (770 mA*1) [300 mA (470 mA*1)]*2	DC input (sink/source)/relay output	40 points	40 points
FX5U-80MT/ES					DC input (sink/source)/transistor (sink)		
FX5U-80MT/ESS					DC input (sink/source)/transistor (source)		

*1: Power supply capacity when an external power supply is used for input circuits
*2: Value inside [ ] indicates the power supply capacity when the CPU module is used at the operating ambient temperature of less than 0°C.

1 -2) CPU module (DC power supply/DC input type)

Model	Function	Number of occupied input/output points	Power supply capacity		I/O type	No. of input points	No. of output points
			5 V DC power supply	24 V DC power supply			
FX5U-32MR/DS	CPU module	32 points	900 mA [775 mA]*	480 mA [360 mA]*	DC input (sink/source)/relay output	16 points	16 points
FX5U-32MT/DS					DC input (sink/source)/transistor output (sink)		
FX5U-32MT/DSS					DC input (sink/source)/transistor output (source)		

*: Value inside [ ] indicates the power supply capacity when the supply voltage is 16.8 to 19.2 V DC.

2 -1) I/O module (AC power supply/DC input type) (extension cable type)

Model	Function	Number of occupied input/output points	Power supply capacity		I/O type	No. of input points	No. of output points
			5 V DC power supply	24 V DC service power supply			
FX5-32ER/ES*1	I/O module (24 V DC service power built-in)	32 points	965 mA	250 mA (310 mA*2)	DC input (sink/source)/relay output	16 points	16 points
FX5-32ET/ES*1					DC input (sink/source)/transistor (sink)		
FX5-32ET/ESS*1					DC input (sink/source)/transistor (source)		

*1: Can be connected only to the AC power type system
*2: Power supply capacity when an external power supply is used for input circuits

2 -2) I/O module (DC power supply/DC input type) (extension cable type)

Model	Function	Number of occupied input/output points	Power supply capacity		I/O type	No. of input points	No. of output points
			5 V DC power supply	24 V DC power supply			
FX5-32ER/DS*	I/O module	32 points	965 mA	310 mA	DC input (sink/source)/relay output	16 points	16 points
FX5-32ET/DS*					DC input (sink/source)/transistor output (sink)		
FX5-32ET/DSS*					DC input (sink/source)/transistor output (source)		

*: Can be connected only to the DC power type system

3 FX5 Extension power supply module

Model	Function	Number of occupied input/output points	Power supply capacity	
			5 V DC power supply	24 V DC power supply
FX5-1PSU-5V*1	Extension power supply	—	1200 mA*3	300 mA*3
FX5-C1PS-5V*2	Extension power supply	—	1200 mA*3	625 mA*3

*1: Can be connected only to the AC power type system
*2: Can be connected only to the DC power type system
*3: Derating occurs when the ambient temperature exceeds 40°C. For details, refer to manuals of each product.

4 I/O module (extension cable type)

Model	I/O type	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-8EX/ES	DC input (sink/source)	8 points	75 mA	50 mA*2	—
FX5-16EX/ES	DC input (sink/source)	16 points	100 mA	85 mA*2	
FX5-8EYR/ES	Relay output	8 points	75 mA	75 mA	
FX5-8EYT/ES	Transistor output (sink)				
FX5-8EYT/ESS	Transistor output (source)				
FX5-16EYR/ES	Relay output	16 points	100 mA	125 mA	
FX5-16EYT/ES	Transistor output (sink)				
FX5-16EYT/ESS	Transistor output (source)				
FX5-16ET/ES-H*1	DC input (sink/source)/transistor output (sink)	16 points	100 mA	125 mA (85 mA)*3	
FX5-16ET/ESS-H*1	DC input (sink/source)/transistor output (source)				

*1: Compatible with FX5U CPU modules from Ver. 1.030 (Serial number: 165****(May 2016))
*2: Adopt "0 mA" in the current consumption calculation for the system configuration when an external power supply is used for input circuits.
*3: Current consumption when an external power supply is used for input circuits (not including the input circuit current)

5 FX5 intelligent function module

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-40SSC-S	Simple motion 4-axis control (SSCNETIII/H compatible)	8 points	—	—	250 mA
FX5-CCLIEF*	CC-Link IE field network intelligent device station	8 points	10 mA	—	230 mA

*: Compatible with FX5U CPU modules from Ver. 1.030 (Serial number: 165**** (May 2016))

6 Connector conversion module

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-CNV-IF	Connector conversion (FX5 (Extension cable type) →FX5 (Extension connector type))	—	—	—	—

7 I/O module (extension connector type)

Model	I/O type	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-C16EX/D	DC input (sink)	16 points	100 mA	—	65 mA*
FX5-C32EX/D		32 points	120 mA		130 mA*
FX5-C16EX/DS	DC input (sink/source)	16 points	100 mA		65 mA*
FX5-C32EX/DS		32 points	120 mA		130 mA*
FX5-C16EYT/D	Transistor output (sink)	16 points	100 mA	100 mA	—
FX5-C32EYT/D		32 points	120 mA	200 mA	
FX5-C16EYT/DSS	Transistor output (source)	16 points	100 mA	100 mA	
FX5-C32EYT/DSS		32 points	120 mA	200 mA	
FX5-C32ET/D	DC input (sink)/transistor output (sink)	32 points (16 input points, 16 output points)	120 mA	100 mA	65 mA*
FX5-C32ET/DSS	DC input (sink/source)/transistor output (source)				

*: Current consumption when a service power supply is used for the input circuit.

8 Bus conversion module

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-CNV-BUSC	Bus conversion FX5 (extension connector type) →FX3 extension	8 points	150 mA	—	—
FX5-CNV-BUS	Bus conversion FX5 (extension cable type) →FX3 extension				

9 FX5 Expansion board

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-232-BD	RS-232C communication	—	20 mA	—	—
FX5-485-BD	RS-485 communication				
FX5-422-BD-GOT	RS-422 communication (for GOT connection)		20 mA*		

*: The current consumption will increase when the 5 V type GOT is connected.

10 FX5 Expansion adapter

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-232ADP	RS-232C communication	—	30 mA	30 mA	—
FX5-485ADP	RS-485 communication		20 mA		
FX5-4AD-ADP	4 ch voltage input/current input		10 mA	20 mA	
FX5-4DA-ADP	4 ch voltage output/current output			—	160 mA

11 FX3 Extension power supply module

Model	Function	Number of occupied input/output points	Power supply capacity		
			5 V DC power supply	24 V DC power supply	24 V DC external power supply
FX3U-1PSU-5V	Extension power supply	—	1000 mA*	300 mA*	—

*: Derating occurs when the ambient temperature exceeds 40°C. For details, refer to manuals of each product.

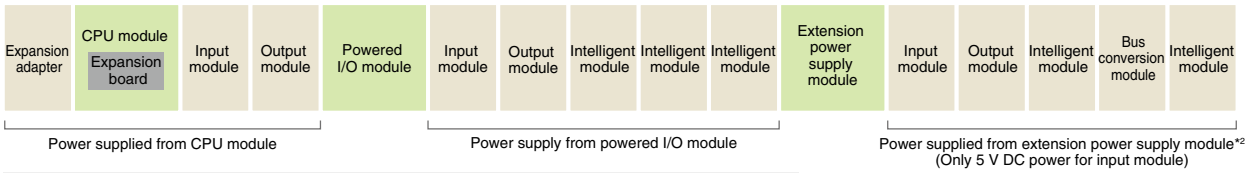
12 FX3 intelligent function module

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX3U-4AD	4 ch voltage input/current input	8 points	110 mA	—	90 mA
FX3U-4DA	4 ch voltage output/current output		120 mA		160 mA
FX3U-4LC	4-loop temperature control (resistance thermometer/thermocouple/low voltage)		160 mA		50 mA
FX3U-1PG	Pulse output for 1-axis control		150 mA		40 mA
FX3U-2HC	2 ch high-speed counter		245 mA		—
FX3U-16CCL-M	CC-Link master	*	—		240 mA
FX3U-64CCL	CC-Link intelligent device station	8 points			220 mA
FX3U-128ASL-M	AnyWireASLINK master	*	130 mA		—

*: Varies according to settings.

Calculation of current consumed by extension modules (For the AC power supply type)*1

The power required for the expansion adapter, expansion board and extension module is supplied from the CPU module or extension power supply module. Use the following calculations to confirm whether the required power can be supplied. (All calculations must be satisfied.)



■ Power supply from CPU module

[5 V DC power supply]

5 V DC power supply capacity (CPU module) — (Total current consumption (Total no. of extension devices to be connected)) = Calculation results ≥ **0 mA**

[24 V DC power supply]

24 V DC service power supply capacity (CPU module) — (Total current consumption (Total no. of extension devices to be connected)) = Calculation results ≥ **0 mA*3**

■ Power supply from powered I/O module

[5 V DC power supply]

5 V DC power supply capacity (Powered I/O module) — (Total current consumption (Total no. of extension devices to be connected)) = Calculation results ≥ **0 mA**

[24 V DC power supply]

24 V DC service power supply capacity (Powered I/O module) — (Total current consumption (Total no. of extension devices to be connected)) = Calculation results ≥ **0 mA*3**

■ Power supply from extension power supply module (When using FX3 extension power supply module, another calculation is required. Refer to manuals for more details.)

[5 V DC power supply]

5 V DC power supply capacity (Extension power supply module) — (Total current consumption (Total no. of extension devices to be connected)) = Calculation results ≥ **0 mA**

[24 V DC power supply]

24 V DC power supply capacity (Extension power supply module) — (Total current consumption (Total no. of extension devices to be connected)) = Calculation results ≥ **0 mA**

<Cautions>

If the calculation results are negative, the power capacity is exceeded so review the system configuration.

*1: For calculation for the DC power supply type, refer to the manual.

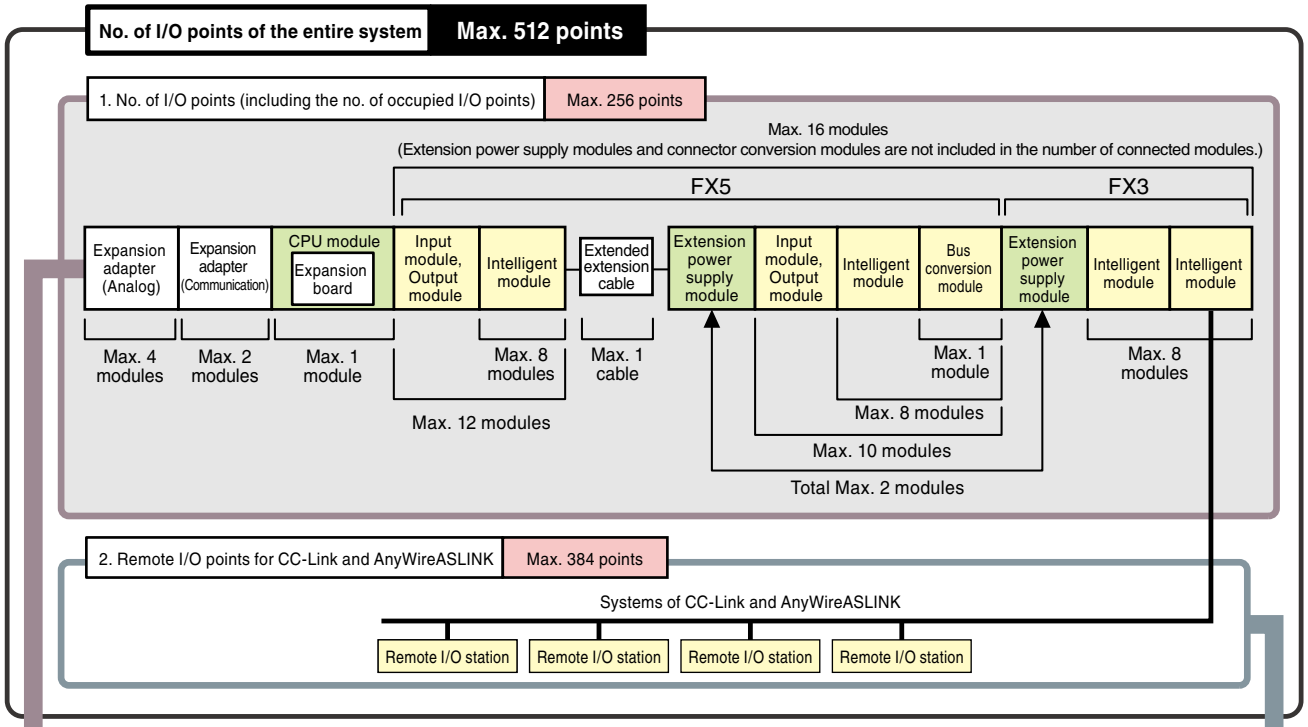
*2: When connecting an input module to the back stage (right side) of the extension power supply module , power will be supplied from the CPU module or a powered I/O module.
5V DC power is supplied from an extension power supply module.

*3: The 24 V DC service power calculation results value (when positive) indicates the 24 V DC service power supply's remaining capacity, and can be used as an external load power.

Refer to the next section for the details of some products since the number of connected modules may be limited.

Rules for System Configuration

The total number of I/O points and remote I/O points for the CPU module and extension devices controllable in FX5U CPU module is 512 points or less.



■No. of I/O points

The max. no. of I/O points configurable in FX5U is as follows:

Max. no. of I/O points: 256 points ≥ No. of occupied I/O points: CPU module (A) points + I/O module Total (B) points + Intelligent module (C) modules × 8 points

The no. of occupied I/O points does not include those of the expansion adapter, expansion board, connector conversion module and extension power supply module.

(A): I/O points of CPU module (B): Total I/O points of I/O module (C): Total no. of intelligent modules

Total 512 points or less

■No. of I/O points when using a network master module

The max. no. of I/O points when using a network master module is as follows:

Max. no. of I/O points: 384 points ≥ No. of occupied remote I/O points: AnyWireASLINK*1 (D) points + CC-Link*2 (E) stations × 32 points

As for CC-Link, the no. of remote I/O points x 32 points.
(calculated as 32 points regardless of the no. of remote I/O points)

(D): Remote I/O points of AnyWireASLINK (E): No. of CC-Link Remote I/O stations (no. of modules)

*1: Please recognize the no. of I/O points set by the rotary switch of AnyWireASLINK master as the no. of remote I/O points.
*2: When simultaneously using CC-Link master and AnyWireASLINK master, please connect AnyWireASLINK master to the front stage (left side). FX5U CPU occupies the max. 256 points of remote I/O points including the no. of those not occupied since CC-Link master parameters are set by PLC program. Therefore, when connecting CC-Link master to the front stage (left side), the no. of remote I/O points of AnyWireASLINK master may be less than 128. Refer to the "FX3U-128ASL-M and FX3U-16CCL-M user's manual" for simultaneous use.

Limitation on power supply type when connecting

It is not possible to install both the AC type and the DC type in one system.
The power supply type is limited for extension modules connectable to the following CPU modules. For details, refer to the manual of each product.

Type/model/power supply type	Connectable extension module	
	Type	Model/power supply type
FX5U CPU module FX5U-□M□/E□ (AC power supply type)	Powered I/O module	FX5-32E□/E□ (AC power supply type)
	Extension power supply module	FX5-1PSU-5V (AC power supply type)
FX5U CPU module FX5U-□M□/D□ (DC power supply type)	Powered I/O module	FX5-32E□/D□ (DC power supply type)
	Extension power supply module	FX5-C1PS-5V (DC power supply type)

Limitation on number of modules when extending

The number of connectable modules is limited for the following products. For details, refer to manuals of each product.

Type	Model/type	Setting method/precautions
I/O module (Extension cable type)	FX5-16ET/ES-H	Up to 4 modules can be connected for the entire system.
	FX5-16ET/ESS-H	
FX5 intelligent function module	FX5-CCLIEF	Only 1 module can be connected in the whole system.
FX3 intelligent function module	FX3U-4AD	■When using FX3U-1PSU-5V: Up to 8 modules can be connected per system. ■When not using FX3U-1PSU-5V: Up to 6 modules can be connected per system.
	FX3U-4DA	
	FX3U-1PG	
	FX3U-4LC	
	FX3U-128ASL-M	Up to 1 module of each model type can be connected in the whole system.
	FX3U-16CCL-M	
	FX3U-64CCL	
	FX3U-2HC	Up to 2 modules can be connected for the entire system. When not using the FX3U-1PSU-5V, connect immediately after the bus conversion module.

*Refer to the manual for details on each model.

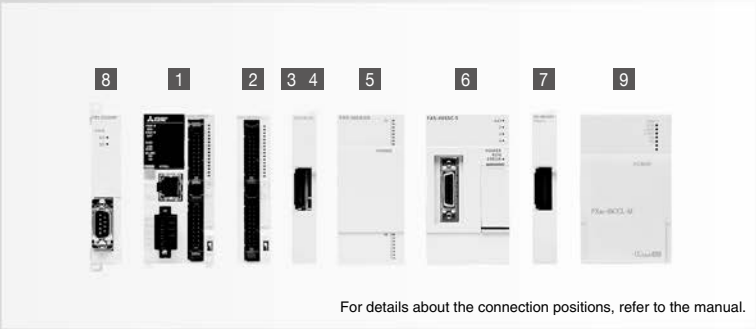
Selecting the FX5UC Model

Product Configuration



- Control scale: 32 to 256 points (CPU module: 32/64/96 points)
- Control points up to 512 input/output points, including remote I/O*

*: For CC-Link and AnyWireASLINK



For details about the connection positions, refer to the manual.

Type	Details	Connection details, model selection
1 CPU module	PLC with built-in CPU, power supply, input/output and program memory.	Various extension devices can be connected.
2 I/O module (extension connector type)	Product for extension I/O of extension connector type.	Input/output can be extended to up to 256 points. Up to 16 extension modules can be connected. (Extension power supply modules and connector conversion modules are not included in the number of connected modules.) For details, refer to “Rules for System Configuration” on p. 71.
3 FX5 Extension power supply module	Module for extension power supply if CPU module's internal power supply is insufficient. Connector conversion function is also provided.	Power can be supplied to I/O module, intelligent function module, and bus conversion module. Up to 2 modules can be connected.
4 Connector conversion module	Module for connecting FX5 Series (extension cable type) extension module.	Extension devices (extension cable type) for FX5 can be connected.
5 I/O module (extension cable type)	Product for extending I/O of extension cable type.	Input/output can be extended to up to 256 points. Up to 16 extension modules can be connected. (Connector conversion modules are not included in the number of connected modules.) Up to 4 high-speed pulse I/O modules can be connected. Using this type of I/O module requires the connector conversion module.
6 FX5 intelligent function module	Module with functions other than input/output.	Up to 16 extension modules including I/O modules can be connected. (Connector conversion modules are not included in the number of connected modules.) Using this type of module requires the connector conversion module.
7 Bus conversion module	Conversion module for connecting FX3 extension module.	FX3 Series extension modules can be connected only to the right side of the bus conversion module. Using the FX5-CNV-BUS requires the connector conversion module or extension power supply module.
8 FX5 Expansion adapter	Adapter connected to left side of CPU module to expand functions.	Up to 6 modules can be connected to the left side of the CPU module.
9 FX3 intelligent function module	Module with functions other than input/output.	Up to 6 modules* can be connected to the right side of the bus conversion module. The bus conversion module is required for use.

*: Excluding some models

1 CPU module

Model	Function	Number of occupied input/output points	Power supply capacity		I/O type	No. of input points	No. of output points
			5 V DC power supply	24 V DC power supply			
FX5UC-32MT/D	CPU module	32 points	720 mA	500 mA	DC input (sink)/transistor (sink)	16 points	16 points
FX5UC-32MT/DSS					DC input (sink/source)/transistor (source)		
FX5UC-64MT/D		64 points			DC input (sink)/transistor (sink)	32 points	32 points
FX5UC-64MT/DSS					DC input (sink/source)/transistor (source)		
FX5UC-96MT/D		96 points			DC input (sink)/transistor (sink)	48 points	48 points
FX5UC-96MT/DSS					DC input (sink/source)/transistor (source)		

2 I/O module (extension connector type)

Model	I/O type	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-C16EX/D	DC input (sink)	16 points	100 mA	—	65 mA*
FX5-C32EX/D		32 points	120 mA		130 mA*
FX5-C16EX/DS	DC input (sink/source)	16 points	100 mA		65 mA*
FX5-C32EX/DS		32 points	120 mA		130 mA*
FX5-C16EYT/D	Transistor output (sink)	16 points	100 mA	100 mA	—
FX5-C32EYT/D		32 points	120 mA	200 mA	
FX5-C16EYT/DSS	Transistor output (source)	16 points	100 mA	100 mA	
FX5-C32EYT/DSS		32 points	120 mA	200 mA	
FX5-C32ET/D	DC input (sink)/transistor output (sink)	32 points (16 input points, 16 output points)	120 mA	100 mA	65 mA*
FX5-C32ET/DSS	DC input (sink/source)/transistor output (source)				

*: Adopt "0 mA" in the current consumption calculation for the system configuration when an external power supply is used for input circuits.

3 FX5 Extension power supply module

Model	Function	Number of occupied input/output points	Power supply capacity	
			5 V DC power supply	24 V DC power supply
FX5-C1PS-5V	Extension power supply	—	1200 mA*	625 mA*

*: Derating occurs when the ambient temperature exceeds 40°C. For details, refer to the manual.

4 Connector conversion module

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-CNV-IFC	Connector conversion (FX5 (Extension connector type) →FX5 (Extension cable type))	—	—	—	—

5 -1) I/O module (DC power supply/DC input type) (extension cable type)

Model	Function	Number of occupied input/output points	Power supply capacity		I/O type	No. of input points	No. of output points
			5 V DC power supply	24 V DC power supply			
FX5-32ER/DS	Input/output module	32 points	965 mA	310 mA	DC input (sink/source)/relay output	16 points	16 points
FX5-32ET/DS					DC input (sink/source)/transistor output (sink)		
FX5-32ET/DSS					DC input (sink/source)/transistor output (source)		

5 -2) I/O module (extension cable type)

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-8EX/ES	DC input (sink/source)	8 points	75 mA	50 mA*1	—
FX5-16EX/ES	DC input (sink/source)	16 points	100 mA	85 mA*1	
FX5-8EYR/ES	Relay output	8 points	75 mA	75 mA	
FX5-8EYT/ES	Transistor output (sink)				
FX5-8EYT/ESS	Transistor output (source)				
FX5-16EYR/ES	Relay output	16 points	100 mA	125 mA	
FX5-16EYT/ES	Transistor output (sink)				
FX5-16EYT/ESS	Transistor output (source)				
FX5-16ET/ES-H*2	DC input (sink/source)/transistor output (sink)	16 points	100 mA	125 mA (85 mA)*3	
FX5-16ET/ESS-H*2	DC input (sink/source)/transistor output (source)				

*1: Adopt "0 mA" in the current consumption calculation for the system configuration when an external power supply is used for input circuits.
*2: Compatible with FX5UC CPU modules from Ver. 1.030 (Serial number: 165**** (May 2016))
*3: Current consumption when an external power supply is used for input circuits (not including the input circuit current)

6 FX5 intelligent function module

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-40SSC-S	Simple motion 4-axis control (SSCNETIII/H compatible)	8 points	—	—	250 mA
FX5-CCLIEF*	CC-Link IE field network intelligent device station	8 points	10 mA	—	230 mA

*: Compatible with FX5UC CPU modules from Ver. 1.030 (Serial number: 165**** (May 2016))

7 Bus conversion module

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-CNV-BUSC	Bus conversion FX5 (extension connector type) →FX3 extension	8 points	150 mA	—	—
FX5-CNV-BUS	Bus conversion FX5 (extension cable type) →FX3 extension				

8 FX5 Expansion adapter

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX5-232ADP	RS-232C communication	—	30 mA	30 mA	—
FX5-485ADP	RS-485 communication		20 mA		
FX5-4AD-ADP	4 ch voltage input/current input		10 mA	20 mA	
FX5-4DA-ADP	4 ch voltage output/current output			—	160 mA

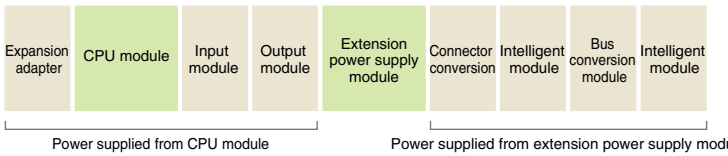
9 FX3 intelligent function module

Model	Function	Number of occupied input/output points	Current consumption		
			5 V DC internal current consumption	24 V DC internal current consumption	24 V DC external power supply
FX3U-4AD	4 ch voltage input/current input	8 points	110 mA	—	90 mA
FX3U-4DA	4 ch voltage output/current output		120 mA		160 mA
FX3U-4LC	4-loop temperature control (resistance thermometer/thermocouple/low voltage)		160 mA		50 mA
FX3U-1PG	Pulse output for 1-axis control		150 mA		40 mA
FX3U-2HC	2 ch high-speed counter		245 mA		—
FX3U-16CCL-M	CC-Link master	*	—		240 mA
FX3U-64CCL	CC-Link intelligent device station	8 points			220 mA
FX3U-128ASL-M	AnyWireASLINK master	*	130 mA		—

*: Varies according to settings.

Calculation of current consumed by extension modules

The power required for the expansion adapter and extension module is supplied from the CPU module.
Use the following calculations to confirm whether the required power can be supplied. (All calculations must be satisfied.)



■ **Power supply from CPU module**

[5 V DC power supply]

5 V DC power supply capacity (CPU module) — Total current consumption (Total no. of extension devices to be connected) = Calculation results ≥ **0 mA**

[24 V DC power supply]

24 V DC power supply capacity (CPU module) — Total current consumption (Total no. of extension devices to be connected) = Calculation results ≥ **0 mA**

■ **Power supply from extension power supply module**

[5 V DC power supply]

5 V DC power supply capacity (Extension power supply module) — Total current consumption (Total no. of extension devices to be connected) = Calculation results ≥ **0 mA**

[24 V DC power supply]

24 V DC power supply capacity (Extension power supply module) — Total current consumption (Total no. of extension devices to be connected) = Calculation results ≥ **0 mA**

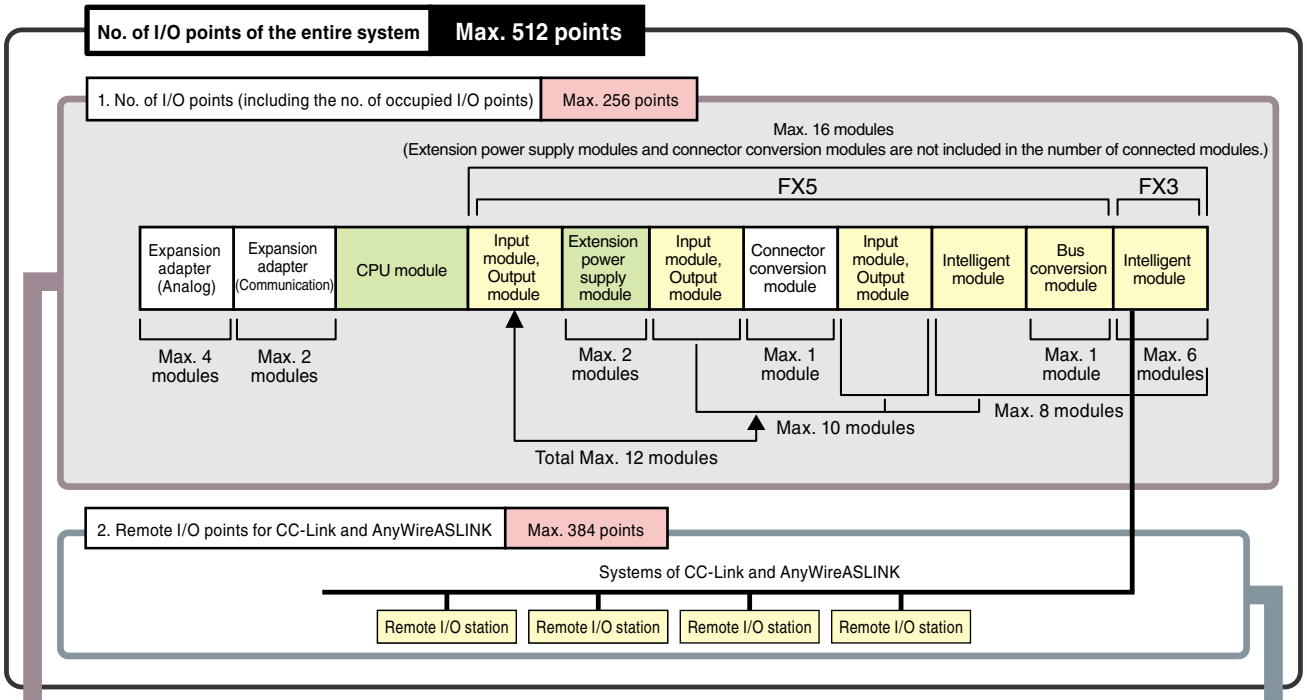
<Cautions>

If the calculation results are negative, the power capacity is exceeded so review the system configuration.

Refer to the next section for the details of some products since the number of connected modules may be limited.

Rules for System Configuration

The total number of I/O points and remote I/O points for the CPU module and extension devices controllable in FX5UC CPU module is 512 points or less.



■No. of I/O points

The max. no. of I/O points configurable in FX5UC is as follows:

Max. no. of I/O points		No. of occupied I/O points
256 points	≥	CPU module (A) points + I/O module Total (B) points + Intelligent module (C) modules × 8 points

The number of occupied I/O points does not include those of the expansion adapter, connector conversion module, extension power supply module.

(A): I/O points of CPU module (B): Total I/O points of I/O module (C): Total no. of intelligent modules

Total 512 points or less

■No. of I/O points when using a network master module

The max. no. of I/O points when using a network master module is as follows:

Max. no. of I/O points		No. of occupied remote I/O points
384 points	≥	AnyWireASLINK*1 (D) points + CC-Link*2 (E) stations × 32 points

As for CC-Link, the no. of remote I/O points x 32 points.
(calculated as 32 points regardless of the no. of remote I/O points)

(D): Remote I/O points of AnyWireASLINK (E): No. of CC-Link Remote I/O stations (no. of modules)

*1: Please recognize the no. of I/O points set by the rotary switch of AnyWireASLINK master as the no. of remote I/O points.
*2: When simultaneously using CC-Link master and AnyWireASLINK master, please connect AnyWireASLINK master to the front stage (left side). FX5UC CPU occupies the max. 256 points of remote I/O points including the no. of those not occupied since CC-Link master parameters are set by PLC program. Therefore, when connecting CC-Link master to the front stage (left side), the no. of remote I/O points of AnyWireASLINK master may be less than 128. Refer to the "FX3U-128ASL-M and FX3U-16CCL-M user's manual" for simultaneous use.

Limitation on power supply type when connecting

It is not possible to install both the AC type and the DC type in one system.
The power supply type is limited for extension modules connectable to the following CPU modules. For details, refer to the manual of each product.

Type/model/power supply type	Connectable extension module	
	Type	Model/power supply type
FX5U CPU module FX5U-□M□/D□ (DC power supply type)	Powered I/O module	FX5-32E□/D□ (DC power supply type)
	Extension power supply module	FX5-C1PS-5V (DC power supply type)

Limitation on number of modules when extending

The number of connectable modules is limited for the following products. For details, refer to manuals of each product.

Type	Model/type	Setting method/precautions
I/O module (Extension cable type)	FX5-16ET/ES-H	Up to 4 modules can be connected for the entire system.
	FX5-16ET/ESS-H	
FX5 intelligent function module	FX5-CCLIEF	Only 1 module can be connected in the whole system.
FX3 intelligent function module	FX3U-4AD	Up to 6 modules can be connected for the entire system.
	FX3U-4DA	
	FX3U-1PG	
	FX3U-4LC	
	FX3U-128ASL-M	Up to 1 module of each model type can be connected in the whole system.
	FX3U-16CCL-M	
	FX3U-64CCL	
	FX3U-2HC	Up to 2 modules can be connected for the entire system. Connect immediately after the bus conversion module.

*Refer to the manual for details on each model.

Product Specifications

General, power supply, input/output specifications

General specifications

Item	Specifications								
	FX5U					FX5UC			
Operating ambient temperature*1	-20 to 55°C (-4 to 131°F), non-freezing*2 *3								
Storage ambient temperature	-25 to 75°C (-13 to 167°F), non-freezing								
Operating ambient humidity	5 to 95%RH, non-condensation*4								
Storage ambient humidity	5 to 95%RH, non-condensation								
Vibration resistance*5 *6		Frequency	Acceleration	Half amplitude	Sweep count	Frequency	Acceleration	Half amplitude	Sweep count
	Installed on DIN rail	5 to 8.4 Hz	—	1.75 mm	10 times each in X, Y, Z directions (80 min in each direction)	5 to 8.4 Hz	—	1.75 mm	10 times each in X, Y, Z directions (80 min in each direction)
		8.4 to 150 Hz	4.9 m/s²	—		8.4 to 150 Hz	4.9 m/s²	—	
	Direct installing	5 to 8.4 Hz	—	3.5 mm		—			
		8.4 to 150 Hz	9.8 m/s²	—					
Shock resistance*5	147 m/s², Action time: 11 ms, 3 times by half-sine pulse in each direction X, Y, and Z								
Noise durability	By noise simulator at noise voltage of 1000 Vp-p, noise width of 1 ms and period of 30 to 100 Hz								
Grounding	Class D grounding (grounding resistance: 100 Ω or less) <Common grounding with a heavy electrical system is not allowed.>*7								
Working atmosphere	Free from corrosive or flammable gas and excessive conductive dust								
Operating altitude*8	0 to 2000 m								
Installation location	Inside a control panel								
Overvoltage category*8	II or less								
Pollution degree*10	2 or less								
Equipment class	Class 2								

*1: The simultaneous ON ratio of available PLC inputs or outputs changes with respect to the ambient temperature. For details, refer to manuals of each product.
*2: 0 to 55°C for products manufactured before June 2016. For intelligent function modules, refer to the manual of each product.
The following products cannot be used when the ambient temperature is less than 0°C:
FX5-40SSC-S, FX5-CNV-BUS, FX5-CNV-BUSC, battery (FX3U-32BL), SD memory cards (NZ1MEM-2GBSD, NZ1MEM-4GBSD, L1MEM-2GBSD and L1MEM-4GBSD),
FX3 extension modules, terminal modules and I/O cables (FX-16E-500CAB-S, FX-16E-□CAB and FX-16E-□CAB-R)
*3: The specifications are different in the use at less than 0°C. For details, refer to the manual of each product.
*4: When used in a low-temperature environment, use in an environment with no sudden temperature changes. If there are sudden temperature changes because of opening/closing of the control panel or other reasons, condensation may occur, which may cause a fire, fault, or malfunction. Furthermore, use an air conditioner in dehumidifier mode to prevent condensation.
*5: The criterion is shown in IEC61131-2.
*6: When the system has equipment which specification values are lower than above mentioned vibration resistance specification values, the vibration resistance specification of the whole system is corresponding to the lower specification.
*7: For grounding, refer to manuals of each product.
*8: The PLC cannot be used at a pressure higher than the atmospheric pressure to avoid damage.
*9: This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.
*10: This index indicates the degree to which conductive material is generated in the environment in which the equipment is used. Pollution level 2 is when only non-conductive pollution occurs. Temporary conductivity caused by condensation must be expected occasionally.

Power supply specifications

FX5U CPU module, AC power supply type

Item		Specifications		
		FX5U-32M□/E□	FX5U-64M□/E□	FX5U-80M□/E□
Rated voltage		100 to 240 V AC		
Allowable supply voltage range		85 to 264 V AC		
Voltage fluctuation range		—		
Frequency rating		50/60 Hz		
Allowable instantaneous power failure time		Operation can be continued upon occurrence of instantaneous power failure for 10 ms or less. If the supply voltage is 200 V AC system, change in the range from 10 to 100 ms can be made by the user program.		
Power fuse		250 V 3.15 A Time-lag Fuse	250 V 5 A Time-lag Fuse	
In-rush current		25 A Max. 5 ms or less/100 V AC 50 A Max. 5 ms or less/200 V AC	30 A Max. 5 ms or less/100 V AC 60 A Max. 5 ms or less/100 V AC	
Power consumption*1		30 W	40 W	45 W
5 V DC internal power supply capacity*3		900 mA	1100 mA	1100 mA
24 V DC service power supply*2	Supply capacity when service power supply is used for input circuit of the CPU module*4	400 mA (300 mA)	600 mA (300 mA)	600 mA (300mA)
	Supply capacity when external power supply is used for input circuit of the CPU module*4	480 mA (380 mA)	740 mA (440 mA)	770 mA (470mA)

*1: The values show the state where the service power of 24 V DC is consumed to the maximum level in case that its configuration has the max. no. of connections provided to CPU module. (Including the current in an input circuit)
*2: When I/O modules are connected, they consume current from the 24 V DC service power supply, resulting in decrease of usable current. For details about the service power supply, refer to the manual.
*3: The values designate power supply capacity for an intelligent function module, expansion adapter, and expansion board.
*4: The values in the parentheses ( ) will result when the ambient temperature is less than 0°C during operations.

FX5U CPU module, DC power supply type

Item	Specifications
	FX5U-32M□/D□
Rated voltage	24 V DC
Allowable supply voltage range	16.8 to 28.8 V DC
Allowable instantaneous power failure time	Operation can be continued upon occurrence of instantaneous power failure for 5 ms or less.
Power fuse	250 V 3.15 A Time-lag Fuse
In-rush current	50 A Max. 0.5 ms or less/24 V DC
Power consumption*1	30 W
5 V DC internal power supply capacity*2 *3	900 mA (775 mA)
24 V DC internal power supply capacity*2	480 mA (360 mA)

*1: The values show the state where power is consumed to the maximum level in case that the configuration has the max. no. of connections provided to CPU module.
*2: The values in the parentheses ( ) indicate the power supply capacity to be resulted when the power supply voltage falls in the range from 16.8 to 19.2 V DC.
*3: The values designate power supply capacity for an intelligent function module, expansion adapter, and expansion board.

FX5UC CPU module

Item	Specifications		
	FX5UC-32MT/□	FX5UC-64MT/□	FX5UC-96MT/□
Rated voltage	24 V DC		
Allowable supply voltage range	+20%, -15%		
Allowable instantaneous power failure time	Operation can be continued upon occurrence of instantaneous power failure for 5 ms or less.		
Power fuse	125 V 3.15 A Time-lag Fuse		
In-rush current	35 A Max. 0.5 ms or less/24 V DC	40 A Max. 0.5 ms or less/24 V DC	
Power consumption*	5 W/24 V DC (30 W/24 V DC +20%, -15%)	8 W/24 V DC (33 W/24 V DC +20%, -15%)	11 W/24 V DC (36 W/24 V DC +20%, -15%)
5 V DC internal power supply capacity	720 mA		
24 V DC internal power supply capacity	500 mA		

*: The value results when the CPU module is used alone.
The values in the parentheses ( ) result when the maximum no. of connections have been made to the CPU module. (External DC 24 V power supplies of extension modules are not included.)

FX5-4AD-ADP

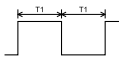
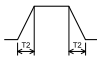
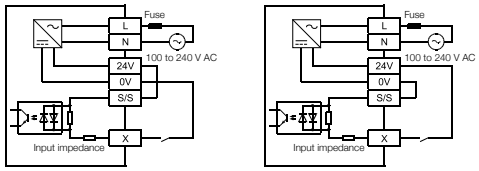
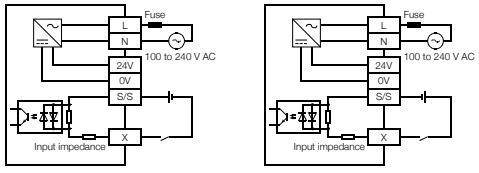
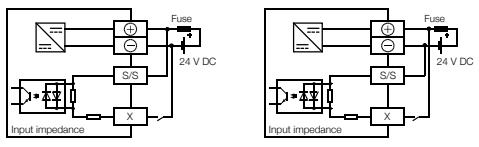
Item	Specifications
Internal power feed (A/D conversion circuit)	24 V DC 20 mA Power is internally fed from the 24 V DC power supply of the CPU module.
Internal power feed (interface)	5 V DC 10 mA Power is internally fed from the 5 V DC power supply of the CPU module.

FX5-4DA-ADP

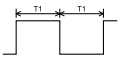
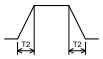
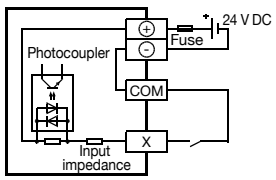
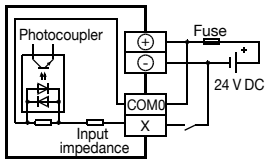
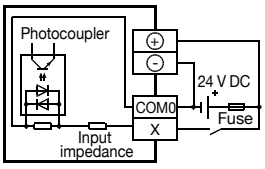
Item	Specifications
External power feed (D/A conversion circuit)	24 V DC +20%/-15% 160 mA Power is externally fed from the power supply connector of the adapter.
Internal power feed (interface)	5 V DC 10 mA Power is internally fed from the 5 V DC power supply of the CPU module.

Input specifications

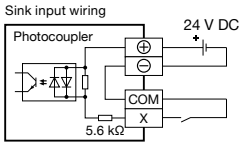
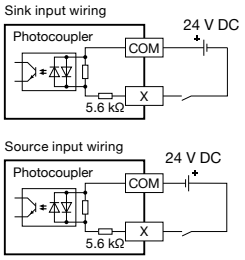
FX5U CPU module

Item		Specifications		
		FX5U-32M□	FX5U-64M□	FX5U-80M□
No. of input points		16 points	32 points	40 points
Connection type		Removable terminal block (M3 screws)		
Input type		Sink/source		
Input signal voltage		24 V DC +20%, -15%		
Input signal current	X000 to X017	5.3 mA/24 V DC		
	X020 and subsequent	4.0 mA/24 V DC		
Input impedance	X000 to X017	4.3 kΩ		
	X020 and subsequent	5.6 kΩ		
ON input sensitive current	X000 to X017	3.5 mA or more		
	X020 and subsequent	3.0 mA or more		
OFF input sensitivity current		1.5 mA or less		
Input response frequency	X000 to X005	200 kHz	—	
	X000 to X007	—	200 kHz	
	X006 to X017	10 kHz	—	
	X010 to X017	—	10 kHz	
Pulse waveform	Waveform	 T1 (pulse width)	 T2 (rise/fall time)	
	X000 to X005	T1: 2.5 µs or more, T2: 1.25 µs or less	—	
	X000 to X007	—	T1: 2.5 µs or more, T2: 1.25 µs or less	
	X006 to X017	T1: 50 µs or more, T2: 25 µs or less	—	
	X010 to X017	—	T1: 50 µs or more, T2: 25 µs or less	
Input response time (H/W filter delay)	X000 to X005	ON: 2.5 µs or less, OFF: 2.5 µs or less	—	
	X000 to X007	—	ON: 2.5 µs or less, OFF: 2.5 µs or less	
	X006 to X017	ON: 30 µs or less, OFF: 50 µs or less	—	
	X010 to X017	—	ON: 30 µs or less, OFF: 50 µs or less	
	X020 and subsequent	—	ON: 50 µs or less, OFF: 150 µs or less	
Input response time (Digital filter setting value)		None, 10 µs, 50 µs, 0.1 ms, 0.2 ms, 0.4 ms, 0.6 ms, 1 ms, 5 ms, 10 ms (initial values), 20 ms, 70 ms When using this product in an environment with much noise, set the digital filter.		
Input signal format		No-voltage contact input Sink: NPN open collector transistor Source: PNP open collector transistor		
Input circuit isolation		Photo-coupler isolation		
Input operation display		LED is lit when input is on		
Input circuit configuration	AC power supply type	- When using service power supply Sink input wiring / Source input wiring 		
		- When using external power supply Sink input wiring / Source input wiring 		
	DC power supply type	Sink input wiring / Source input wiring 		

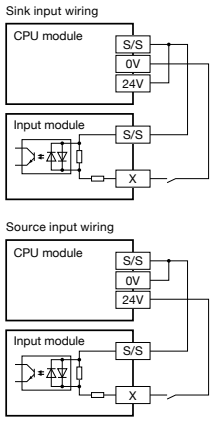
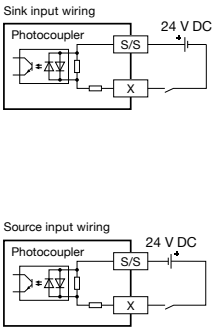
FX5UC CPU module

Item		Specifications		
		FX5UC-32MT/□	FX5UC-64MT/□	FX5UC-96MT/□
No. of input points		16 points	32 points	48 points
Connection type		Connector		
Input type		FX5UC-□MT/D: Sink FX5UC-□MT/DSS: Sink/source		
Input signal voltage		24 V DC +20%, -15%		
Input signal current	X000 to X017	5.3 mA/24 V DC		
	X020 and subsequent	4.0 mA/24 V DC		
Input impedance	X000 to X017	4.3 kΩ		
	X020 and subsequent	5.6 kΩ		
ON input sensitivity current	X000 to X017	3.5 mA or more		
	X020 and subsequent	3.0 mA or more		
OFF input sensitivity current		1.5 mA or less		
Input response frequency	X000 to X005	200 kHz	—	
	X000 to X007	—	200 kHz	
	X006 to X017	10 kHz	—	
	X010 to X017	—	10 kHz	
Pulse waveform	Waveform	 T1 (pulse width)	 T2 (rise/fall time)	
	X000 to X005	T1: 2.5 µs or more, T2: 1.25 µs or less	—	
	X000 to X007	—	T1: 2.5 µs or more, T2: 1.25 µs or less	
	X006 to X017	T1: 50 µs or more, T2: 25 µs or less	—	
	X010 to X017	—	T1: 50 µs or more, T2: 25 µs or less	
Input response time (H/W filter delay)	X000 to X005	ON: 2.5 µs or less, OFF: 2.5 µs or less	—	
	X000 to X007	—	ON: 2.5 µs or less, OFF: 2.5 µs or less	
	X006 to X017	ON: 30 µs or less, OFF: 50 µs or less	—	
	X010 to X017	—	ON: 30 µs or less, OFF: 50 µs or less	
	X020 and subsequent	—	ON: 50 µs or less, OFF: 150 µs or less	
Input response time (Digital filter setting value)		None, 10 µs, 50 µs, 0.1 ms, 0.2 ms, 0.4 ms, 0.6 ms, 1 ms, 5 ms, 10 ms (initial values), 20 ms, 70 ms When using this product in an environment with much noise, set the digital filter.		
Input signal format		FX5UC-□MT/D No-voltage contact input NPN open collector transistor		
		FX5UC-□MT/DSS No-voltage contact input Sink: NPN open collector transistor Source: PNP open collector transistor		
Input circuit isolation		Photo-coupler isolation		
Input operation display		LED is lit when input is on (DISP switch: IN)		
Input circuit configuration		FX5UC-□MT/D Sink input wiring 		
		FX5UC-□MT/DSS Sink input wiring  Source input wiring 		

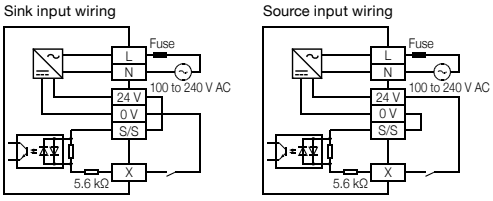
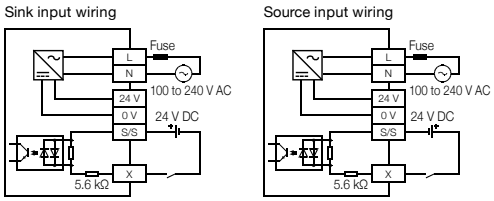
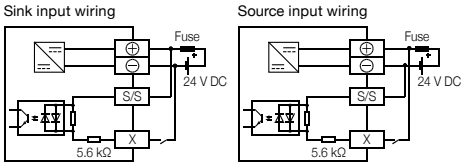
Extension module (extension connector type), input, input/output module

Item		Specifications					
		FX5-C16EX/D	FX5-C32EX/D	FX5-C32ET/D	FX5-C16EX/DS	FX5-C32EX/DS	FX5-C32ET/DSS
Connection type		Connector					
Input type		Sink			Sink/source		
Input signal voltage		24 V DC +20%, -15%					
Input signal current		4.0 mA/24 V DC					
Input impedance		5.6 kΩ					
Input sensitivity current	ON	3.0 mA or more					
	OFF	1.5 mA or less					
Input response time		ON: 50 µs or less OFF: 150 µs or less					
Input signal format		No-voltage contact input Sink: NPN open collector transistor			No-voltage contact input Sink: NPN open collector transistor Source: PNP open collector transistor		
Input circuit isolation		Photo-coupler isolation					
Input operation display		LED is lit when input is on.	LED is lit when input is on. (F/L of DISP switch is used to change between lower and higher numbers.)	LED is lit when input is on. (DISP switch: IN)	LED is lit when input is on.	LED is lit when input is on. (F/L of DISP switch is used to change between lower and higher numbers.)	LED is lit when input is on. (DISP switch: IN)
Input circuit configuration							

Extension module (extension cable type), input, input/output module

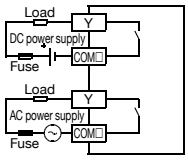
Item		Specifications			
		FX5-8EX/ES	FX5-16EX/ES	FX5-16ET/ES-H	FX5-16ET/ESS-H
Connection type		Terminal block (M3 screws)			
Input type		Sink/source			
Input signal voltage		24 V DC +20%, -15%			
Input signal current		4.0 mA/24 V DC		5.3 mA/24 V DC	
Input impedance		5.6 kΩ		4.3 kΩ	
Input sensitivity current	ON	3.0 mA or more		3.5 mA or more	
	OFF	1.5 mA or less			
Input response time		ON: 50 µs or less OFF: 150 µs or less		X0 to 5 ON: 2.5 µs or less OFF: 2.5 µs or less X6, 7 ON: 30 µs or less OFF: 50 µs or less	
Input signal format		No-voltage contact input Sink: NPN open collector transistor Source: PNP open collector transistor			
Input circuit isolation		Photo-coupler isolation			
Input operation display		LED is lit when input is on.			
Input circuit configuration		When using service power supply 		When using external power supply 	

Extension module powered input/output module

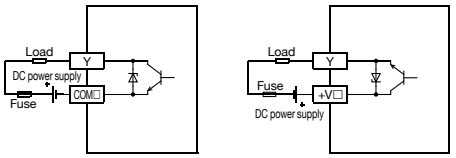
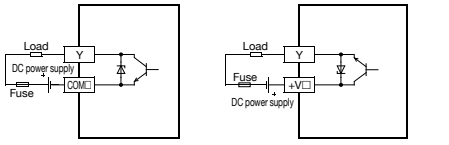
Item		Specifications					
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Connection type		Terminal block (M3 screws)					
Input type		Sink/source					
Input signal voltage		24 V DC +20%, -15%					
Input signal current		4.0 mA/24 V DC					
Input impedance		5.6 kΩ					
Input sensitivity current	ON	3.0 mA or more					
	OFF	1.5 mA or less					
Input response time		ON: 50 μs or less OFF: 150 μs or less					
Input signal format		No-voltage contact input Sink: NPN open collector transistor Source: PNP open collector transistor					
Input circuit isolation		Photo-coupler isolation					
Input operation display		LED is lit when input is on.					
Input circuit configuration		When using service power supply Sink input wiring / Source input wiring  When using external power supply Sink input wiring / Source input wiring 		When using service power supply Sink input wiring / Source input wiring 		

Output specifications

Relay output (FX5U CPU module)

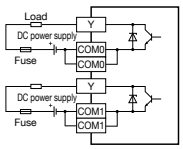
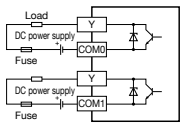
Item		Specifications		
		FX5U-32MR/☐	FX5U-64MR/☐	FX5U-80MR/☐
No. of output points		16 points	32 points	40 points
Connection type		Removable terminal block (M3 screws)		
Output type		Relay		
External power supply		30 V DC or less 240 V AC or less ("250 V AC or less" if not a CE, UL, cUL compliant item)		
Max. load		2 A/point The total load current per common terminal should be the following value. · 4 output points/common terminal: 8 A or less · 8 output points/common terminal: 8 A or less		
Min. load		5 V DC, 2 mA (reference values)		
Open circuit leakage current		—		
Response time	OFF→ON	Approx. 10 ms		
	ON→OFF	Approx. 10 ms		
Isolation of circuit		Mechanical isolation		
Indication of output operation		LED is lit when output is on		
Output circuit configuration		 A number is entered in the ☐ of [COM☐].		

Transistor output (FX5U/FX5UC CPU module)

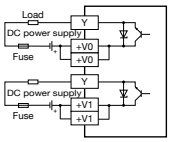
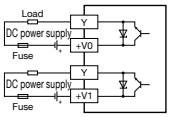
Item		Specifications					
		FX5U-32MT/□	FX5U-64MT/□	FX5U-80MT/□	FX5UC-32MT/□	FX5UC-64MT/□	FX5UC-96MT/□
No. of output points		16 points	32 points	40 points	16 points	32 points	48 points
Connection type		Removable terminal block (M3 screws)			Connector		
Output type		Transistor/sink output (FX5U-□MT/ES, FX5U-32MT/DS) Transistor/source output (FX5U-□MT/ESS, FX5U-32MT/DSS)			Transistor/sink output (FX5UC-□MT/D) Transistor/source output (FX5UC-□MT/DSS)		
External power supply		5 to 30 V DC					
Max. load		0.5 A/point The total load current per common terminal should be the following value. · 4 output points/common terminal: 0.8 A or less · 8 output points/common terminal: 1.6 A or less			Y000 to Y003: 0.3 A/1 point Y004 and subsequent: 0.1 A/1 point The total load current per common terminal should be the following value. · 8 output points/common terminal: 0.8 A or less*		
Open circuit leakage current		0.1 mA or less/30 V DC					
Voltage drop when ON	Y000 to Y003	1.0 V or less					
	Y004 and subsequent	1.5 V or less					
Response time	Y000 to Y003	2.5 µs or less/10 mA or more (5 to 24 V DC)					
	Y004 and subsequent	0.2 ms or less/200 mA or more (24 V DC)			0.2 ms or less/100 mA (24 V DC)		
Isolation of circuit		Photo-coupler isolation			Photo-coupler isolation		
Indication of output operation		LED is lit when output is on			LED is lit when output is on (DISP switch set to OUT)		
Output circuit configuration		Sink output wiring / Source output wiring  A number is entered in the □ of [COM□]. A number is entered in the □ of [+V□].			Sink output wiring / Source output wiring  A number is entered in the □ of [COM□]. A number is entered in the □ of [+V□].		

*: 1.6 A or less when two common terminals are connected outside.

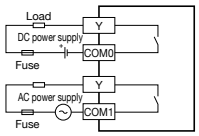
Transistor output (sink output, extension module)

Item		Specifications							
		FX5-C16EYT/D	FX5-C32EYT/D	FX5-C32ET/D	FX5-8EYT/ES	FX5-16EYT/ES	FX5-32ET/ES	FX5-32ET/DS	FX5-16ET/ES-H
Connection type		Connector			Terminal block (M3 screws)				
Output type		Transistor output/sink output							
External power supply		5 to 30 V DC							
Max. load		0.1 A/1 point The total load current per common terminal should be the following value. · 8 output points/common terminal: 0.8 A or less			0.5 A/1 point The total load current per common terminal should be the following value. · 4 output points/common terminal: 0.8 A or less · 8 output points/common terminal: 1.6 A or less				
Open circuit leakage current		0.1 mA/30 V DC							
Voltage drop when ON		1.5 V or less							
Response time	OFF→ON	0.2 ms or less/100 mA (at 24 V DC)			0.2 ms or less/200 mA (at 24 V DC)				Y0, Y1, Y4, Y5: 2.5 µs or less/10 mA (at 5 to 24 V DC) Y2, Y3, Y6, Y7: 0.2 ms or less / 200 mA (at 24 V DC)
	ON→OFF	0.2 ms or less/100 mA (at 24 V DC)			0.2 ms or less/200 mA (at 24 V DC)				Y0, Y1, Y4, Y5: 2.5 µs or less/10 mA (at 5 to 24 V DC) Y2, Y3, Y6, Y7: 0.2 ms or less / 200 mA (at 24 V DC)
Isolation of circuit		Photo-coupler isolation							
Isolation of output operation		LED is lit when output is on.	LED is lit when output is on. (F/L of DISP switch is used to change between lower and higher numbers.)	LED is lit when output is on. (DISP switch set to OUT)	LED is lit when output is on.				
Output circuit configuration									

Transistor output (source output, extension module)

Item		Specifications							
		FX5-C16EYT/DSS	FX5-C32EYT/DSS	FX5-C32ET/DSS	FX5-8EYT/ESS	FX5-16EYT/ESS	FX5-32ET/ESS	FX5-32ET/DSS	FX5-16ET/ESS-H
Connection type		Connector			Terminal block (M3 screws)				
Output type		Transistor/source output							
External power supply		5 to 30 V DC							
Max. load		0.1 A/1 point The total load current per common terminal should be the following value. · 8 output points/common terminal: 0.8 A or less			0.5 A/1 point The total load current per common terminal should be the following value. · 4 output points/common terminal: 0.8 A or less · 8 output points/common terminal: 1.6 A or less				
Open circuit leakage current		0.1 mA/30 V DC							
Voltage drop when ON		1.5 V or less							
Response time	OFF→ON	0.2 ms or less/100 mA (at 24 V DC)			0.2 ms or less/200 mA (at 24 V DC)				Y0, Y1, Y4, Y5: 2.5 µs or less/10 mA (at 5 to 24 V DC) Y2, Y3, Y6, Y7: 0.2 ms or less / 200 mA (at 24 V DC)
	ON→OFF	0.2 ms or less/100 mA (at 24 V DC)			0.2 ms or less/200 mA (at 24 V DC)				Y0, Y1, Y4, Y5: 2.5 µs or less/10 mA (at 5 to 24 V DC) Y2, Y3, Y6, Y7: 0.2 ms or less / 200 mA (at 24 V DC)
Isolation of circuit		Photo-coupler isolation							
Indication of output operation		LED is lit when output is on.	LED is lit when output is on. (F/L of DISP switch is used to change between lower and higher numbers.)	LED is lit when output is on. (DISP switch set to OUT)	LED is lit when output is on.				
Output circuit configuration									

Relay output (extension module)

Item		Specifications			
		FX5-8EYR/ES	FX5-16EYR/ES	FX5-32ER/ES	FX5-32ER/DS
Connection type		Terminal block (M3 screws)			
Output type		Relay			
External power supply		30 V DC or less 240 V AC or less ("250 V AC or less" if not a CE, UL, cUL compliant item)			
Max. load		2 A/1 point The total load current per common terminal should be the following value. · 4 output points/common terminal: 8 A or less · 8 output points/common terminal: 8 A or less			
Min. load		5 V DC, 2 mA (reference values)			
Response time	OFF→ON	Approx. 10 ms			
	ON→OFF	Approx. 10 ms			
Isolation of circuit		Mechanical isolation			
Indication of output operation					

Built-in analog input

Item		Specifications
		FX5U CPU module
Analog input points		2 points (2 channels)
Analog input	Voltage	0 to 10 V DC (input resistance 115.7 kΩ)
Digital output		Unsigned 12-bit binary
Input characteristics, maximum resolution	Digital output value	0 to 4000
	Maximum resolution	2.5 mV
Precision (Accuracy in respect to full-scale digital output value)	Ambient temperature 25 ±5°C (77±41°F)	Within ±0.5% (±20 digit*2)
	Ambient temperature 0 to 55°C (32±131°F)	Within ±1.0% (±40 digit*2)
	Ambient temperature -20 to 0°C (32±131°F)*1	Within ±1.5% (±60 digit*2)
Conversion speed		30 µs/channels (data refreshed every operation cycle)
Absolute maximum input		-0.5 V, +15 V
Isolation		No isolation from the CPU module internal circuit, no isolation between the input terminals (channels)
Number of occupied input/output points		0 points (No concern with the maximum no. of input/output points of the CPU module)
Terminal block used		European-type terminal block

*1: Products manufactured earlier than June 2016 do not support this specification.
*2: The term "digit" refers to "digital value".

Built-in analog output

Item		Specifications
		FX5U CPU module
Analog output points		1 point (1 channel)
Digital input		Unsigned 12-bit binary
Analog output	Voltage	0 to 10 V DC (external load resistance 2 kΩ to 1 MΩ)
Output characteristics, maximum resolution	Digital input value	0 to 4000
	Maximum resolution	2.5 mV
Accuracy (Accuracy in respect to full-scale analog output value)	Ambient temperature 25 ±5°C (77±41°F)	Within ±0.5% (±20 digit*2)
	Ambient temperature 0 to 55°C (32±131°F)	Within ±1.0% (±40 digit*2)
	Ambient temperature -20 to 0°C (32±131°F)*1	Within ±1.5% (±60 digit*2)
Conversion speed		30 µs (data refreshed every operation cycle)
Isolation		No isolation from the CPU module internal circuit
Number of occupied input/output points		0 points (No concern with the maximum no. of input/output points of the CPU module)
Terminal block used		European-type terminal block

*1: Products manufactured earlier than June 2016 do not support this specification.
*2: The term "digit" refers to "digital value".

Built-in RS-485 communication

Item	Specifications
	FX5U / FX5UC CPU module
Transmission standards	Conforms to RS-485/RS-422 specifications
Data transmission speed	Max. 115.2 kbps
Communication method	Full-duplex (FDX) / Half-duplex (HDX)
Maximum transmission distance	50 m
Protocol type	MELSOFT connection
	MELSEC Communication protocol (3C/4C frames)
	Non-protocol communication
	MODBUS RTU communication
	Inverter communication
	N:N network
	Predefined protocol support
Isolation of circuit	Not isolated
Terminal resistors	Built-in (OPEN/110 Ω/330 Ω)
Terminal block used	European-type terminal block

Built-in Ethernet communication

Item		Specifications
		FX5U / FX5UC CPU module
Data transmission speed		100/10 Mbps
Communication method		Full-duplex (FDX) / Half-duplex (HDX)*1
Interface		RJ45 connector
Transmission method		Base band
Maximum segment length (The distance between hub and node)		100 m
Cascade connection	100BASE-TX	Cascade connection max. 2 stages*3
	10BASE-T	Cascade connection max. 4 stages*3
Protocol type		MELSOFT connection
		SLMP (3E frame)
		Socket communication
		Predefined protocol support
Number of connections		Total of 8 for MELSOFT connection, SLMP, socket communication and predefined protocol support (Up to 8 external devices can access one CPU module at the same time.)
Hub*1		Hubs with 100BASE-TX or 10BASE-T ports*4 are available.
IP address		Initial value: 192.168.3.250
Isolation of circuit		Pulse transformer isolation
Cable used*2	For 100BASE-TX connection	Ethernet standard-compatible cable, category 5 or higher (STP cable)
	For 10BASE-T connection	Ethernet standard-compatible cable, category 3 or higher (STP cable)

*1: IEEE802.3x flow control is not supported.
*2: Straight cables can be used. When connecting a CPU module with GOTs directly through Ethernet cables, crossover cables (category 5e or less) can also be used.
*3: No. of connectable stages when using a repeater hub. For the no. of connectable stages when a switching hub is in use, check with the manufacturer of the switching hub.
*4: The ports must comply with the IEEE802.3 100BASE-TX or IEEE802.3 10BASE-T standards.

Built-in positioning function

Item	Specifications
	FX5U / FX5UC CPU module
Number of control axes	4 axes* (Simple linear interpolation by 2-axis simultaneous start)
Maximum frequency	2147483647 (200 kpps in pulses)
Positioning program	Sequence program, Table operation
Pulse output instruction	PLSY and DPLSY instructions
Positioning instruction	DSZR, DDSZR, DVIT, DDVIT, TBL, DRVTBL, DRVMUL, DABS, PLSV, DPLSV, DRVI, DDRVI, DRVA, and DDRVA instructions

*: The number of control axes is 2 when the pulse output mode is CW/CCW mode.

Built-in high speed counter function

Item	Specifications	
	FX5U / FX5UC CPU module	
Types of high-speed counters	Input specifications	Maximum frequency
	1 phase, 1 input counter (S/W)	200 kHz
	1 phase, 1 input counter (H/W)	200 kHz
	1 phase, 2 input counter	200 kHz
	2 phase, 2 input counter [1 edge count]	200 kHz
	2 phase, 2 input counter [2 edge count]	100 kHz
	2 phase, 2 input counter [4 edge count]	50 kHz
Input allocation	Parameter setup*	
High-speed counter instruction	[High-speed processing instruction] - Setting 32-bit data comparison (DHSCS) - Resetting 32-bit data comparison (DHSCR) - Comparison of 32-bit data band (DHSZ) - Start/stop of the 16-bit data high-speed I/O function (HIOEN) - Start/stop of the 32-bit data high-speed I/O function (DHIOEN) [High-speed transfer instruction of current value] - High-speed current value transfer of 16-bit data (HCMOV) - High-speed current value transfer of 32-bit data (DHCMOV)	

*: For details, refer to manuals of each product.

Extension Device Specifications

I/O Modules

Powered input/output modules

Model	Total No. of points	No. of input/output points & Input/output type				Connection type
		Input			Output	
FX5-32ER/ES	32 points	16 points	24 V DC (Sink/source)	16 points	Relay	Terminal block
FX5-32ET/ES					Transistor (Sink)	
FX5-32ET/ESS					Transistor (Source)	
FX5-32ER/DS					Relay	
FX5-32ET/DS					Transistor (Sink)	
FX5-32ET/DSS					Transistor (Source)	

Input module

Model	Total No. of points	No. of input/output points & Input/output type				Connection type
		Input		Output		
FX5-8EX/ES	8 points	8 points	24 V DC (Sink/source)	–	–	Terminal block
FX5-16EX/ES	16 points	16 points	24 V DC (Sink/source)			Connector
FX5-C16EX/D			24 V DC (Sink)			
FX5-C16EX/DS			24 V DC (Sink/source)			
FX5-C32EX/D	32 points	32 points	24 V DC (Sink)			
FX5-C32EX/DS			24 V DC (Sink/source)			

Output module

Model	Total No. of points	No. of input/output points & Input/output type				Connection type
		Input		Output		
FX5-8EYR/ES	8 points	–	–	8 points	Relay	Terminal block
FX5-8EYT/ES					Transistor (Sink)	
FX5-8EYT/ESS					Transistor (Source)	
FX5-16EYR/ES	16 points			16 points	Relay	
FX5-16EYT/ES					Transistor (Sink)	
FX5-16EYT/ESS					Transistor (Source)	
FX5-C16EYT/D					Transistor (Sink)	Connector
FX5-C16EYT/DSS					Transistor (Source)	
FX5-C32EYT/D	32 points			32 points	Transistor (Sink)	
FX5-C32EYT/DSS					Transistor (Source)	

I/O module

Model	Total No. of points	No. of input/output points & Input/output type				Connection type
		Input		Output		
FX5-C32ET/D	32 points	16 points	24 V DC (Sink)	16 points	Transistor (Sink)	Connector
FX5-C32ET/DSS			24 V DC (Sink/source)		Transistor (Source)	

High-speed pulse input/output module

Model	Total No. of points	No. of input/output points & Input/output type				Connection type
		Input		Output		
FX5-16ET/ES-H*	16 points	8 points	24 V DC (Sink/source)	8 points	Transistor (Sink)	Terminal block
FX5-16ET/ESS-H*					Transistor (Source)	

*: Compatible with FX5U/FX5UC CPU modules from Ver. 1.030 (Serial number: 165**** (May 2016))

Expansion adapter

FX5-232ADP

Item	Specifications
Transmission standard/ Maximum transmission distance/Isolation	Conforming to RS-232C/15 m/Photo-coupler isolation (Between communication line and CPU module)
External device connection method	9-pin D-sub, male
Communication method	Half-duplex bidirectional/Full-duplex bidirectional
Baud rate	300/600/1200/2400/4800/9600/19200/38400/57600/115200 (bps)*
Compatible CPU module	FX5U, FX5UC
Number of occupied input/output points	0 point (no points occupied)
Control power (supplied from CPU module)	5 V DC, 30 mA / 24 V DC, 30 mA

*: The communication method and baud rate vary depending on the type of communication.

FX5-485ADP

Item	Specifications
Transmission standard/ Maximum transmission distance/Isolation	Conforming to RS-485, RS-422/1200 m/Photo-coupler isolation (Between communication line and CPU module)
External device connection method	European terminal block
Communication method	Half-duplex bidirectional/Full-duplex bidirectional
Baud rate	300/600/1200/2400/4800/9600/19200/38400/57600/115200 (bps)*
Terminal resistor	Built-in (OPEN/110 Ω/330 Ω)
Compatible CPU module	FX5U, FX5UC
Number of occupied input/output points	0 point (no points occupied)
Control power (supplied from CPU module)	5 V DC, 20 mA / 24 V DC, 30 mA

*: The communication method and baud rate vary depending on the type of communication.

FX5-4AD-ADP

Item	Specifications			
Analog input points	4 points (4 channels)			
Analog input voltage	-10 to +10 V DC (input resistance 1 MΩ)			
Analog input current	-20 to +20 mA DC (input resistance 250 Ω)			
Digital output value	14-bit binary value			
Input characteristics, resolution*1	Analog input range		Digital output value	Resolution
	Voltage	0 to 10 V	0 to 16000	625 μV
		0 to 5 V	0 to 16000	312.5 μV
		1 to 5 V	0 to 12800	312.5 μV
		-10 to +10V	-8000 to +8000	1250 μV
	Current	0 to 20 mA	0 to 16000	1.25 μA
		4 to 20 mA	0 to 12800	1.25 μA
		-20 to +20 mA	-8000 to +8000	2.5 μA
Accuracy (Accuracy in respect to full-scale digital output value)	Ambient temperature 25±5°C: within ±0.1% (±16 digit) Ambient temperature 0 to 55°C: within ±0.2% (±32 digit) Ambient temperature -20 to 0°C*2: within ±0.3% (±48 digit)			
Absolute maximum input	Voltage: ±15 V, Current: ±30 mA			
Isolation	Between input terminal and PLC: Photo-coupler isolation Between input channels: No isolation			
Compatible CPU module	FX5U,FX5UC			
Number of occupied input/output points	0 point (no points occupied)			

*1: For the input conversion characteristic, refer to manuals of each product.
*2: Products manufactured earlier than June 2016 do not support this specification.

FX5-4DA-ADP

Item	Specifications			
Analog output points	4 points (4 channels)			
Analog output voltage	-10 to +10 V DC (external load resistance value 1 kΩ to 1 MΩ)			
Analog output current	0 to 20 mA DC (external load resistance value 0 to 500 Ω)			
Digital input	14-bit binary value			
Output characteristics, resolution*1	Analog output range		Digital value	Resolution
	Voltage	0 to 10 V	0 to 16000	625 μV
		0 to 5 V	0 to 16000	312.5 μV
		1 to 5 V	0 to 16000	250 μV
		-10 to +10V	-8000 to +8000	1250 μV
	Current	0 to 20 mA	0 to 16000	1.25 μA
		4 to 20 mA	0 to 16000	1 μA
Accuracy (Accuracy in respect to full-scale analog output value)	Ambient temperature 25±5°C: within ±0.1% (Voltage ±20 mV, Current ±20 μA) Ambient temperature -20 to 55°C*2: within ±0.2% (Voltage ±40 mV, Current ±40 μA)			
Isolation	Between output terminal and PLC: Photo-coupler isolation Between output channels: No isolation			
Compatible CPU module	FX5U, FX5UC			
Number of occupied input/output points	0 point (no points occupied)			

*1: For details on the output conversion characteristic, refer to manuals of each product.
*2: The ambient temperature specification is 0 to 55°C for products manufactured earlier than June 2016.

Expansion board

Item	Specifications		
	FX5-232-BD	FX5-485-BD	FX5-422-BD-GOT
Transmission standards	Conforming to RS-232C	Conforming to RS-485, RS-422	Conforming to RS-422
Maximum transmission distance	15 m	50 m	According to the specification of the GOT
External device connection method	9-pin D-sub, male	European-type terminal block	8-pin MINI-DIN, female
Isolation	Not isolation (Between communication line and CPU module)	Not isolation (Between communication line and CPU module)	Not isolation (Between communication line and CPU module)
Communication method	Half-duplex bidirectional/ Full-duplex bidirectional*	Half-duplex bidirectional/ Full-duplex bidirectional*	Half-duplex bidirectional
Baud rate	300/600/1200/2400/ 4800/9600/19200/ 38400/57600/115200 (bps)*	300/600/1200/2400/ 4800/9600/19200/ 38400/57600/115200 (bps)*	9600/19200/38400/ 57600/115200 (bps)
Terminal resistor	–	Built-in (OPEN/110 Ω/330 Ω)	–
Compatible CPU module	FX5U	FX5U	FX5U
Number of occupied input/output points	0 point (no points occupied)	0 point (no points occupied)	0 point (no points occupied)

*: The communication method and baud rate vary depending on the type of communication.

Extension power supply module

FX5-1PSU-5V

Item		Specifications
Rated supply voltage		100 to 240 V AC
Allowable range of supply voltage		85 to 264 V AC
Frequency rating		50/60 Hz
Allowable instantaneous power failure time		Operation can be continued upon occurrence of instantaneous power failure for 10 ms or less.
Power fuse		250 V, 3.15 A time-lag fuse
In-rush current		25 A Max. 5 ms or less/ 100 V AC 50 A Max. 5 ms or less/ 200 V AC
Power consumption		20 W Max.
Output current* (For power supply to rear stage)	24 V DC	300 mA (Maximum output current depends on the ambient temperature.)
	5 V DC	1200 mA (Maximum output current depends on the ambient temperature.)
Compatible CPU module		FX5U (AC power supply type)
Number of occupied input/output points		0 points (no points occupied)

*: For details on the current conversion characteristic, refer to manuals of each product.

FX5-C1PS-5V

Item		Specifications
Supply voltage		24 V DC
Voltage fluctuation range		+20%, -15%
Allowable time of momentary power failure		Operation can be continued upon occurrence of instantaneous power failure for 5 ms or less.
Power fuse		125 V, 3.15 A time-lag fuse
In-rush current		35 A Max. 0.5 ms or less/24 V DC
Power consumption		30 W Max.
Output current* (For power supply to rear stage)	24 V DC	625 mA (Maximum output current depends on the ambient temperature.)
	5 V DC	1200 mA (Maximum output current depends on the ambient temperature.)
Compatible CPU module		FX5U (DC power supply type) FX5UC
Number of occupied input/output points		0 points (no points occupied)

*: For details on the current conversion characteristic, refer to manuals of each product.

Bus conversion module

FX5-CNV-BUS (FX5 (extension cable type)→FX3 extension)

Item	Specifications
Compatible CPU module	FX5U, FX5UC
Number of occupied input/output points	8 points (Either input or output is available for counting)
Control power (supplied from PLC)	5 V DC 150 mA

FX5-CNV-BUSC (FX5 (extension connector type)→FX3 extension)

Item	Specifications
Compatible CPU module	FX5U, FX5UC
Number of occupied input/output points	8 points (Either input or output is available for counting)
Control power (supplied from PLC)	5 V DC 150 mA

Connector conversion module

FX5-CNV-IF (FX5 (extension cable type)→ FX5 (extension connector type) extension)

Item	Specifications
Compatible CPU module	FX5U
Number of occupied input/output points	0 points (no points occupied)
Control power (supplied from PLC)	0 mA (no power consumed)

FX5-CNV-IFC (FX5 (extension connector type)→ FX5 (extension cable type) extension)

Item	Specifications
Compatible CPU module	FX5U
Number of occupied input/output points	0 points (no points occupied)
Control power (supplied from PLC)	0 mA (no power consumed)

Intelligent function module

FX5-CCLIEF

Item		Specifications
Station type		Intelligent device station
Station number		1 to 120 (sets by parameter or program)
Communication speed		1 Gbps
Network topology		Line topology, star topology (coexistence of line topology and star topology is also possible), and ring topology
Maximum station-to-station distance		Max. 100 m (Conforming to ANSI/TIA/EIA-568-B (Category 5e))
Cascade connection		Max. 20 stages
Communication method		Token passing
Maximum number of link points*1	RX	384 points, 48 bytes
	RY	384 points, 48 bytes
	RWr	1024 points, 2048 bytes*2
	RWw	1024 points, 2048 bytes*2
Compatible CPU module		FX5U, FX5UC from Ver. 1.030 (Serial number: 165**** (May 2016))
Number of occupied input/output points		8 points (Either input or output is available for counting)
Control power (supplied from PLC)		5 V DC 10 mA
Control power (supplied from outside)		24 V DC 230 mA

*1: The maximum number of link points that a master station can assign to one FX5-CCLIEF module.
*2: 256 points (512 bytes) when the mode of the master station is online (High-Speed Mode).

Simple Motion Module

FX5-40SSC-S

Control specification

Item		Specifications
Number of control axes (Virtual servo amplifier axis included)		Max. 4 axes
Operation cycle (Operation cycle settings)		1.777 ms
Interpolation function		Linear interpolation (Up to 4 axes)
Control system		PTP (Point To Point) control, Trajectory control (both linear and arc), Speed control, Speed-position switching control, Position-speed switching control, Speed-torque control
Acceleration/deceleration process		Trapezoidal acceleration/deceleration, S-curve acceleration/ deceleration
Compensation function		Backlash compensation, Electronic gear, Near pass function
Synchronous control		Synchronous encoder input, Cam, Phase compensation, Cam auto-generation
Control unit		mm, inch, degree, pulse
Number of positioning data		600 data (positioning data No. 1 to 600)/axis (Can be set with MELSOFT GX Works3 or a sequence program.)
Backup		Parameters, positioning data, and block start data can be saved on flash ROM (battery-less backup)
Home position return	Home position return method	Proximity dog method, Count method 1, Count method 2, Data set method, Scale home position signal detection method
	Fast home position return control	Provided
	Auxiliary functions	Home position return retry, Home position shift
Positioning control	Linear control	Linear interpolation control (Up to 4 axes)*1 (Vector speed, Reference axis speed)
	Fixed-pitch feed control	Fixed-pitch feed control (Up to 4 axes)
	2-axis circular interpolation	Auxiliary point-specified circular interpolation, Central point-specified circular interpolation
	Speed control	Speed control (Up to 4 axes)
	Speed-position switching control	INC mode, ABS mode
	Position-speed switching control	INC mode
	Current value change	Positioning data, Start No. for a current value changing
	NOP instruction	Provided
	JUMP instruction	Unconditional JUMP, Conditional JUMP
	LOOP, LEND	Provided
	High-level positioning control	Block start, Condition start, Wait start, Simultaneous start, Repeated start
Manual control	JOG operation	Provided
	Inching operation	Provided
	Manual pulse generator	Possible to connect 1 module (Incremental), Unit magnification (1 to 10000 times)
Expansion control	Speed-torque control	Speed control without positioning loops, Torque control, Tightening & press-fit control
Absolute position system		Made compatible by setting a battery to servo amplifier
Synchronous encoder interface		Up to 4 channels (Total of the internal interface, via PLC CPU interface, and servo amplifier interface)
	Internal interface	1 ch (Incremental)
Functions that limit control	Speed limit function	Speed limit value, JOG speed limit value
	Torque limit function	Torque limit value same setting, torque limit value individual setting
	Forced stop	Valid/Invalid setting
	Software stroke limit function	Movable range check with current feed value, movable range check with machine feed value
	Hardware stroke limit function	Provided
Functions that change control details	Speed change function	Provided
	Override function	1 to 300 [%]
	Acceleration/deceleration time change function	Provided
	Torque change function	Provided
	Target position change function	Target position address and speed are changeable
Other functions	M-code output function	WITH mode/AFTER mode
	Step function	Deceleration unit step, Data No. unit step
	Skip function	Via PLC CPU, Via external command signal
	Teaching function	Provided
Parameter initialization function		Provided
External input signal setting function		Via CPU
Amplifier-less operation function		Provided
Mark detection function		Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode
	Mark detection signal	Up to 4 points
	Mark detection setting	4 settings
Optional data monitor function		4 points/axis
Driver communication function		Provided
SSCNET connect/disconnect function		Provided
Digital oscilloscope function*2	Bit data	16 ch
	Word data	16 ch

*1: 4-axis linear interpolation control is enabled only at the reference axis speed.
*2: 8 ch word data and 8 ch bit data can be displayed in real time.

Module specification

Item			Specifications
Servo amplifier connection method			SSCNETIII/H
Maximum overall cable distance [m]			400
Maximum distance between stations [m]			100
Peripheral I/F			Via CPU module (Ethernet)
Manual pulse generator operation function			Possible to connect 1 module
Synchronous encoder operation function			Possible to connect 4 modules (Total of the internal interface, via PLC CPU interface, and servo amplifier interface)
Input signals (DI)		No. of input points	4 points
		Input method	Positive common/Negative common shared (Photocoupler isolation)
		Rated input voltage/current	24 V DC/Approx. 5 mA
		Operating voltage range	19.2 to 26.4 V DC (24 V DC +10%/-20%, ripple ratio 5% or less)
		ON voltage/current	17.5 V DC or more/3.5 mA or more
		OFF voltage/current	7 V DC or less/1.0 mA or less
		Input resistance	Approx. 6.8 kΩ
		Response time	1 ms or less (OFF→ON, ON→OFF)
		Recommended wire size	AWG24 (0.2 mm²)
Forced stop input signal (EMI)		No. of input points	1 point
		Input method	Positive common/Negative common shared (Photocoupler isolation)
		Rated input voltage/current	24 V DC/Approx. 5 mA
		Operating voltage range	19.2 to 26.4 V DC (24 V DC +10%/-20%, ripple ratio 5% or less)
		ON voltage/current	17.5 V DC or more/3.5 mA or more
		OFF voltage/current	7 V DC or less/1.0 mA or less
		Input resistance	Approx. 6.8 kΩ
		Response time	4 ms or less (OFF→ON, ON→OFF)
		Recommended wire size	AWG24 (0.2 mm²)
Manual pulse generator/Incremental synchronous encoder signal	Signal input form		Phase A/Phase B (magnification by 4/ magnification by 2/magnification by 1), PULSE/SIGN
	Differential output type (26LS31 or equivalent)	Input pulse frequency	Max. 1 Mpulse/s (After magnification by 4, up to 4 Mpulse/s)
		Pulse width	1 µs or more
		Leading edge/trailing edge time	0.25 µs or less
		Phase difference	0.25 µs or more
		Rated input voltage	5.5 V DC or less
		High/Low-voltage	2.0 to 5.25 V DC/0 to 0.8 V DC
		Differential voltage	±0.2 V
		Cable length	Up to 30 m
	Voltageoutput/ Opencollector type (5 V DC)	Input pulse frequency	Max. 200 kpulse/s (After magnification by 4, up to 800 kpulse/s)
		Pulse width	5 µs or more
		Leading edge/trailing edge time	1.2 µs or less
		Phase difference	1.2 µs or more
		Rated input voltage	5.5 V DC or less
		High/Low-voltage	3.0 to 5.25 V DC/2 mA or less, 0 to 1.0 V DC/5 mA or more
		Cable length	Up to 10 m
Compatible CPU module			FX5U, FX5UC
Number of occupied input/output points			8 points (Either input or output is available for counting)
24 V DC internal current consumption			0.25 A

Standards

List of Compatible Products

Model	CE		UL cUL	KC	Ship approvals							
	EMC	LVD			ABS	DNV	LR	GL	BV	RINA	NK	KR
◆ FX5U CPU modules												
FX5U-32MR/ES	○	○	○	○	—	—	—	—	—	—	—	—
FX5U-32MT/ES	○	○	○	○	—	—	—	—	—	—	—	—
FX5U-32MT/ESS	○	○	○	○	—	—	—	—	—	—	—	—
FX5U-64MR/ES	○	○	○	○	—	—	—	—	—	—	—	—
FX5U-64MT/ES	○	○	○	○	—	—	—	—	—	—	—	—
FX5U-64MT/ESS	○	○	○	○	—	—	—	—	—	—	—	—
FX5U-80MR/ES	○	○	○	○	—	—	—	—	—	—	—	—
FX5U-80MT/ES	○	○	○	○	—	—	—	—	—	—	—	—
FX5U-80MT/ESS	○	○	○	○	—	—	—	—	—	—	—	—
FX5U-32MR/DS	○	○	○	○	—	—	—	—	—	—	—	—
FX5U-32MT/DS	○	□	○	○	—	—	—	—	—	—	—	—
FX5U-32MT/DSS	○	□	○	○	—	—	—	—	—	—	—	—
◆ FX5UC CPU modules												
FX5UC-32MT/D	○	□	○	○	—	—	—	—	—	—	—	—
FX5UC-32MT/DSS	○	□	○	○	—	—	—	—	—	—	—	—
FX5UC-64MT/D	○	□	○	○	—	—	—	—	—	—	—	—
FX5UC-64MT/DSS	○	□	○	○	—	—	—	—	—	—	—	—
FX5UC-96MT/D	○	□	○	○	—	—	—	—	—	—	—	—
FX5UC-96MT/DSS	○	□	○	○	—	—	—	—	—	—	—	—
◆ FX5 I/O modules (extension cable type)												
FX5-8EX/ES	○	□	○	○	—	—	—	—	—	—	—	—
FX5-16EX/ES	○	□	○	○	—	—	—	—	—	—	—	—
FX5-8EYR/ES	○	○	○	○	—	—	—	—	—	—	—	—
FX5-8EYT/ES	○	□	○	○	—	—	—	—	—	—	—	—
FX5-8EYT/ESS	○	□	○	○	—	—	—	—	—	—	—	—
FX5-16EYR/ES	○	○	○	○	—	—	—	—	—	—	—	—
FX5-16EYT/ES	○	□	○	○	—	—	—	—	—	—	—	—
FX5-16EYT/ESS	○	□	○	○	—	—	—	—	—	—	—	—
FX5-16ET/ES-H	○	□	○	○	—	—	—	—	—	—	—	—
FX5-16ET/ESS-H	○	□	○	○	—	—	—	—	—	—	—	—
FX5-32ER/ES	○	○	○	○	—	—	—	—	—	—	—	—
FX5-32ET/ES	○	○	○	○	—	—	—	—	—	—	—	—
FX5-32ET/ESS	○	○	○	○	—	—	—	—	—	—	—	—
FX5-32ER/DS	○	○	○	○	—	—	—	—	—	—	—	—
FX5-32ET/DS	○	□	○	○	—	—	—	—	—	—	—	—
FX5-32ET/DSS	○	□	○	○	—	—	—	—	—	—	—	—
◆ FX5 I/O module (extension connector type)												
FX5-C16EX/D	○	□	○	○	—	—	—	—	—	—	—	—
FX5-C16EX/DS	○	□	○	○	—	—	—	—	—	—	—	—
FX5-C32EX/D	○	□	○	○	—	—	—	—	—	—	—	—
FX5-C32EX/DS	○	□	○	○	—	—	—	—	—	—	—	—
FX5-C16EYT/D	○	□	○	○	—	—	—	—	—	—	—	—
FX5-C16EYT/DSS	○	□	○	○	—	—	—	—	—	—	—	—
FX5-C32EYT/D	○	□	○	○	—	—	—	—	—	—	—	—
FX5-C32EYT/DSS	○	□	○	○	—	—	—	—	—	—	—	—
FX5-C32ET/D	○	□	○	○	—	—	—	—	—	—	—	—
FX5-C32ET/DSS	○	□	○	○	—	—	—	—	—	—	—	—

Model	CE		UL cUL	KC	Ship approvals							
	EMC	LVD			ABS	DNV	LR	GL	BV	RINA	NK	KR
◆ FX5 intelligent function module												
FX5-40SSC-S	○	□	○	○	—	—	—	—	—	—	—	—
FX5-CCLIEF	○	□	○	○	—	—	—	—	—	—	—	—
◆ FX5 extension power supply module												
FX5-1PSU-5V	○	○	○	○	—	—	—	—	—	—	—	—
FX5-C1PS-5V	○	□	○	○	—	—	—	—	—	—	—	—
◆ FX5 bus conversion module												
FX5-CNV-BUS	○	□	○	○	—	—	—	—	—	—	—	—
FX5-CNV-BUSC	○	□	○	○	—	—	—	—	—	—	—	—
◆ FX5 connector conversion module												
FX5-CNV-IF	○	□	○	○	—	—	—	—	—	—	—	—
FX5-CNV-IFC	○	□	○	○	—	—	—	—	—	—	—	—
◆ FX5 expansion adapter												
FX5-4AD-ADP	○	□	○	○	—	—	—	—	—	—	—	—
FX5-4DA-ADP	○	□	○*1	○	—	—	—	—	—	—	—	—
FX5-232ADP	○	□	○	○	—	—	—	—	—	—	—	—
FX5-485ADP	○	□	○	○	—	—	—	—	—	—	—	—
◆ FX5U expansion board												
FX5-232-BD	○	□	—	○	—	—	—	—	—	—	—	—
FX5-485-BD	○	□	—	○	—	—	—	—	—	—	—	—
FX5-422-BD-GOT	○	□	—	○	—	—	—	—	—	—	—	—
◆ Terminal module												
FX-16E-TB	—	—	○	□	—	—	—	—	—	—	—	—
FX-32E-TB	—	—	○	□	—	—	—	—	—	—	—	—
FX-16EYR-TB	—	—	○	□	—	—	—	—	—	—	—	—
FX-16EYS-TB	—	—	—	—	—	—	—	—	—	—	—	—
FX-16EYT-TB	—	—	○	□	—	—	—	—	—	—	—	—
FX-16E-TB/UL	—	—	○	□	—	—	—	—	—	—	—	—
FX-32E-TB/UL	—	—	○	□	—	—	—	—	—	—	—	—
FX-16EYR-ES-TB/UL	—	—	○	□	—	—	—	—	—	—	—	—
FX-16EYS-ES-TB/UL	—	—	○	□	—	—	—	—	—	—	—	—
FX-16EYT-ES-TB/UL	—	—	○	□	—	—	—	—	—	—	—	—
FX-16EYT-ESS-TB/UL	—	—	○	□	—	—	—	—	—	—	—	—
◆ Extended extension cable												
FX5-30EC	○	□	○	○	—	—	—	—	—	—	—	—
FX5-65EC	○	□	○	○	—	—	—	—	—	—	—	—
◆ Connector conversion adapter												
FX5-CNV-BC	○	□	○	○	—	—	—	—	—	—	—	—
◆ FX3 intelligent function module												
FX3U-4AD	○	□	○	○	—	—	—	—	—	—	—	—
FX3U-4DA	○	□	○	○	—	—	—	—	—	—	—	—
FX3U-4LC	○	□	○	○	—	—	—	—	—	—	—	—
FX3U-1PG	○	□	○	○	—	—	—	—	—	—	—	—
FX3U-2HC	○	□	○	○	—	—	—	—	—	—	—	—
FX3U-16CCL-M	○	□	○	○	—	—	—	—	—	—	—	—
FX3U-64CCL	○	□	○	○	—	—	—	—	—	—	—	—
FX3U-128ASL-M	○*2	□	○	—	—	—	—	—	—	—	—	—
◆ FX3 extension power supply module												
FX3U-1PSU-5V	○	○	○	○	—	—	—	—	—	—	—	—

○: Compliant with standards or self-declaration □: No need to comply
*1: Supported by manufacturing serial number 1660001 and later
*2: Zone A

■EN Standards: Compliance with EC Directives/CE marking

EC Directives were issued by the European Council of Ministers to unify standards in the EU Community, and to ensure smooth distribution of products for which safety is ensured. Approximately 20 types of EC Directives for product safety have been issued.
Attachment of a CE mark (CE marking) is mandatory on specific products before they may be distributed in the EU.
The EMC Directive (Electromagnetic Compatibility Directive) and LVD Directive (Low Voltage Directive) apply to the programmable controller, which is labeled as an electrical part of a machine product under the EC Directives.

1) EMC Directive

The EMC Directive is a directive that requires products to have "Capacity to prevent output of obstructive noise that adversely affects external devices: Emission damage" and "Capacity to not malfunction due to obstructive noise from external source: Immunity".

2) LVD Directive (Low Voltage Directive)

The LVD Directive is enforced to distribute safe products that will not harm or damage people, objects or assets, etc. With the programmable controller, this means a product that does not pose a risk of electric shock, fire or injury, etc.

CE

■"ISO 9001" international standard for quality-assurance system

Mitsubishi Electric Corporation Nagoya Works has acquired "ISO 9001" international standard for quality-assurance system for the development/ manufacture on the whole from order reception to shipment of all series of micro sequencer.
Of the ISO 9000 series by which the International Organization for Standardization (ISO) defines the standards of quality-assurance systems, "ISO 9001" assumes a wide range of quality-assurance systems related to development, manufacture, materials, quality and sales. The MELSEC iQ-F Series is manufactured under the control system based on an internationally recognized quality-assurance system.
It is also used as a registration site of "ISO 14001" environmental management system.

■UL/cUL Standards

UL is the United State's main private safety testing and certification agency for ensuring public safety.
UL sets the safety standards for a variety of fields. Strict reviews and testing are performed following the standards set forth by UL. Only products which pass these tests are allowed to carry the UL Mark.
As opposed to the EN Standards, the UL Standards do not have a legally binding effect. However, they are broadly used as the U.S. safety standards, and are an essential condition for selling products into the U.S.
UL is recognized as a certifying and testing agency by the Canadian Standards Association (CSA). Products evaluated and certified by UL in accordance with Canadian standards are permitted to carry the cUL Mark.

c UL® US LISTED

MEMO

MELSEC-Q Series

Improved Productivity.
All-round models for all kinds of use.

The “MELSEC-Q Series” Programmable Controller with nano-order basic instruction processing at high-speed can significantly enhance the performance of devices and machines.
Its fast-speed, high-precision, and high-volume data processing and machine control are ideal for ever-advancing production and manufacturing facilities.

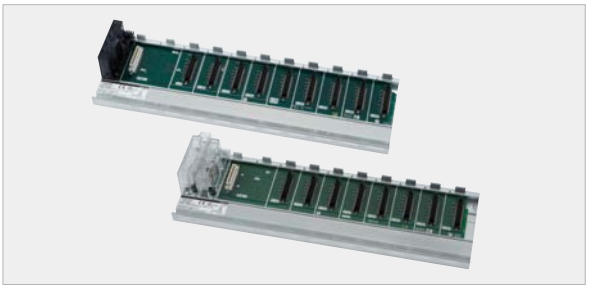
CPU Module

Designed to control programmable controller systems. Lineup of CPUs to address various control demands.



Base Unit

Enable to mount power supply module, CPU module, I/O module. Our lineup of base units are designed to meet your system needs.



Power Supply Module

Supplies power to CPU module, I/O module and other modules.



I/O Module

Connects input and output devices.
Wide lineup of I/O modules for various system configurations.



Analog I/O Module

Inputs and outputs data in analog form and built for process control needs as well. Lineup of analog modules for high-speed, high-precision control.



Simple Motion Module/ Positioning Module

Delivers high-speed, high-precision positioning control. Lineup of positioning modules to suit various uses.



High-speed Counter/ Pulse Input Module

Compatible with high resolution devices. Pulse-input and high-speed counter modules for high-speed, high-precision control.



Energy Measuring Module

Measures and monitors various energy information.



Information Collaborative Module

Enables information communication with upper management system. Lineup of modules designed for production efficiency through sampling and management of various production information.



Network Module

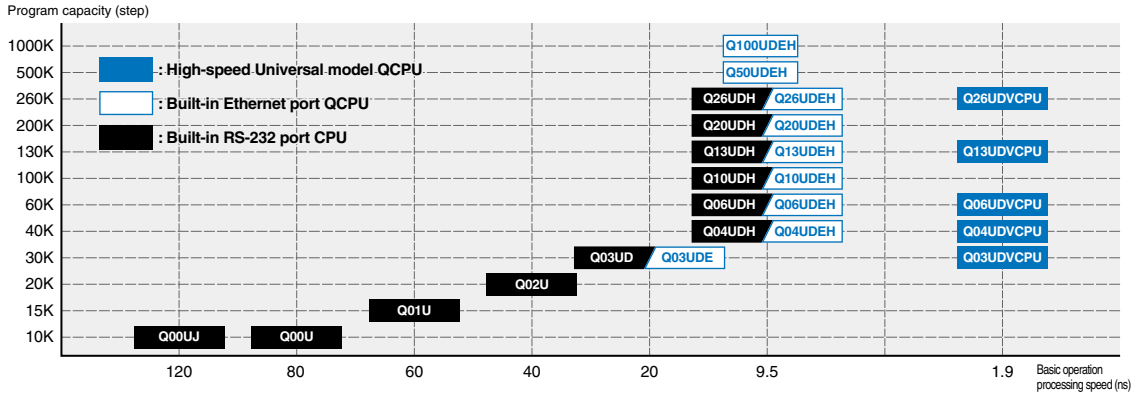
Control system network interface module.
Delivers seamless integration of individual FA hierarchies through wide network.



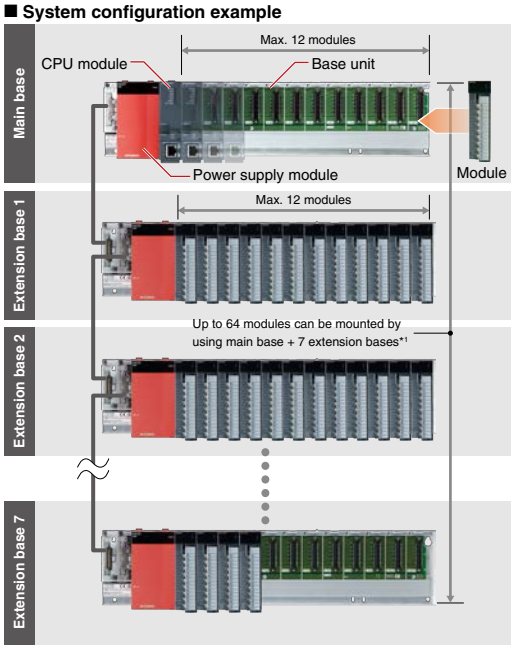


Performance on a different level brought to you with the programmable controller

Current production requirements are calling for an increase in productivity and carrying out production processes even faster due to an increase in production information such as production results and traceability. The MELSEC-Q Series programmable controller “Universal model QnU” is a leader for these market needs. High-speed basic instruction processing on a micro scale dramatically increases your system and machine performance.



■ System configuration example



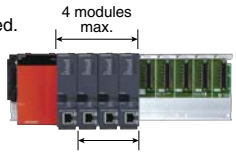
*1: Maximum number of mounting varies with CPU configuration.

■ CPU module

Up to 4 CPU modules can be mounted.

- Programmable controller CPU
- Motion CPU
- C Controller CPU
- Robot controller
- CNC CPU

iQ Platform



2nd module onward can be mounted in 0 to 2 slots

■ Base unit*2



- Main base unit (3, 5, 8, 12)
- Multiple CPU high speed main base unit (5, 8, 12)
- Slim type main base unit (2, 3, 5)
- Redundant power main base unit (8)
- Extension base (2, 3, 5, 8, 12)
- Redundant power extension base (8)
- Redundant type extension base (5)

*2: Value in brackets indicates the slot number.

■ Power supply module



- Power supply
- Power supply with life detection
- Slim type power supply
- Redundant power supply

■ I/O module/Intelligent function module



- I/O module
- Interrupt module
- Relay terminal module
- Analog I/O module
- Load cell input module
- CT input module
- Temperature input module
- Temperature control module
- Loop control module
- Simple motion module
- Positioning module
- High-speed counter module
- Channel isolated pulse input module
- Energy measuring module
- Isolation monitoring module
- MES interface module
- High-speed data logger module
- Intelligent communication module
- Network module

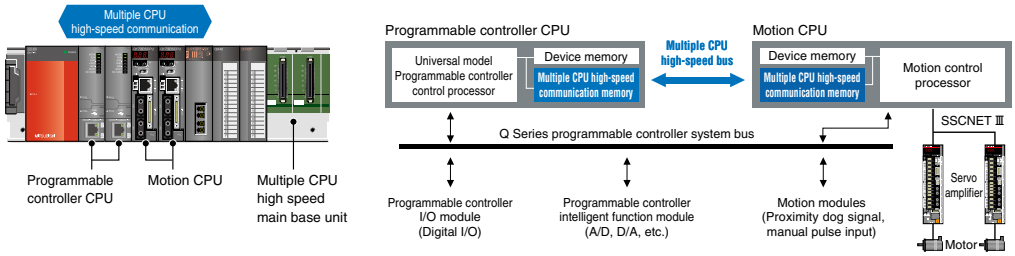
■ Options

- Battery
- Extended SRAM cassette
- SD/SDHC memory card
- Memory card (SRAM, FLASH, ATA)

High-speed, high-accuracy machine control

To achieve high-speed synchronized control between multiple CPUs, a dedicated bus is used, independent of control operation. (0.88 ms operation cycle)*1

This multiple CPU high-speed communication is synchronized with motion control to maximize efficiency. Additionally, the performance of the latest motion control CPU is twice as fast as the previous model, ensuring high-speed, high-accuracy machine control.



*1: Not supported by Q00UJ, Q00U, Q01U, Q02U.

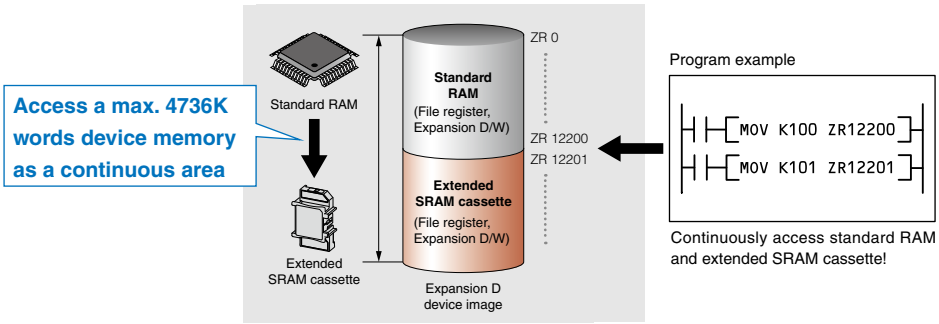
Large data volume at high-speed

Conventionally, continuous access to the standard RAM and SRAM card's file register area could not be achieved which had to be reflected in the user program.

When an 8 MB extended SRAM cassette*2 is installed in the High-speed Universal model QCPU, the standard RAM can be as one continuous file register with up to 4736K words capacity, simplifying the user program.

Even if the device memory is insufficient, the file register area can be expanded easily by installing the extended SRAM cassette.

High-speed Universal model QCPU



*2: Only supported by Q03UDV, Q04UDV, Q06UDV, Q13UDV, Q26UDV.

Easy logging without a program*3

Save collected data in CSV format on a SD memory card just by completing easy settings with the dedicated setting tool wizard. Various reference materials including daily reports, form creation and general reports can be created easily within the saved CSV file. This data can be used for a wide variety of applications requiring traceability, production data, etc.



Logging data display and analysis tool
GX LogViewer



GOT(HMI) log viewer function

*3: Only supported by Q03UDV, Q04UDV, Q06UDV, Q13UDV, Q26UDV.

CPU Module

User-friendly programmable controllers based on requirement of production sites; Mitsubishi Electric takes this approach in its manufacturing process. The MELSEC-Q Series offers programmable controller, process, redundant, C language, motion, robot and CNC CPUs to cover various different control requirements.

Programmable Controller CPU

Our full lineup delivers CPU modules suitable to your particular use.

Type		Model	Basic operation processing speed (LD instruction)	Program memory capacity	No. of I/O points [X/Y]	Peripheral connection ports	Compatible memory card	Others
High-speed Universal model QCPU		Q03UDVCPU	1.9 ns	30K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DATA LOG, Communication protocol
		Q04UDVCPU	1.9 ns	40K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DATA LOG, Communication protocol
		Q06UDVCPU	1.9 ns	60K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DATA LOG, Communication protocol
		Q13UDVCPU	1.9 ns	130K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DATA LOG, Communication protocol
		Q26UDVCPU	1.9 ns	260K steps	4096 points	USB, Ethernet	SD, Extended SRAM	DATA LOG, Communication protocol
Universal model QCPU		Q00UJCPU	120 ns	10K steps	256 points	USB, RS-232	–	Integrated power supply and base
		Q00UCPU	80 ns	10K steps	1024 points	USB, RS-232	–	–
		Q01UCPU	60 ns	15K steps	1024 points	USB, RS-232	–	–
		Q02UCPU	40 ns	20K steps	2048 points	USB, RS-232	SRAM, FLASH, ATA	–
		Q03UDCPU	20 ns	30K steps	4096 points	USB, RS-232	SRAM, FLASH, ATA	–
		Q04UDHCPU	9.5 ns	40K steps	4096 points	USB, RS-232	SRAM, FLASH, ATA	–
		Q06UDHCPU	9.5 ns	60K steps	4096 points	USB, RS-232	SRAM, FLASH, ATA	–
		Q10UDHCPU	9.5 ns	100K steps	4096 points	USB, RS-232	SRAM, FLASH, ATA	–
		Q13UDHCPU	9.5 ns	130K steps	4096 points	USB, RS-232	SRAM, FLASH, ATA	–
		Q20UDHCPU	9.5 ns	200K steps	4096 points	USB, RS-232	SRAM, FLASH, ATA	–
		Q26UDHCPU	9.5 ns	260K steps	4096 points	USB, RS-232	SRAM, FLASH, ATA	–
	Built-in Ethernet type	Q03UDECPU	20 ns	30K steps	4096 points	USB, Ethernet	SRAM, FLASH, ATA	–
		Q04UDEHCPU	9.5 ns	40K steps	4096 points	USB, Ethernet	SRAM, FLASH, ATA	–
		Q06UDEHCPU	9.5 ns	60K steps	4096 points	USB, Ethernet	SRAM, FLASH, ATA	–
		Q10UDEHCPU	9.5 ns	100K steps	4096 points	USB, Ethernet	SRAM, FLASH, ATA	–
		Q13UDEHCPU	9.5 ns	130K steps	4096 points	USB, Ethernet	SRAM, FLASH, ATA	–
		Q20UDEHCPU	9.5 ns	200K steps	4096 points	USB, Ethernet	SRAM, FLASH, ATA	–
		Q26UDEHCPU	9.5 ns	260K steps	4096 points	USB, Ethernet	SRAM, FLASH, ATA	–
		Q50UDEHCPU	9.5 ns	500K steps	4096 points	USB, Ethernet	SRAM, FLASH, ATA	–
		Q100UDEHCPU	9.5 ns	1000K steps	4096 points	USB, Ethernet	SRAM, FLASH, ATA	–

SD SD memory card Extended SRAM Extended SRAM cassette SRAM SRAM card FLASH Flash card ATA ATA card
DATA LOG Data logging function Communication protocol Predefined protocol support function Integrated power supply and base 5-slot base, with 100 to 240 V AC input/5 V DC/3 A output power supply

Q Series process controllers offer features that rival those of costly DCS systems at a fraction of the cost. A single CPU can control a large number of PID loops while simultaneously performing standard sequence control. MELSEC process control is a flexible, highly reliable platform with advanced functionality designed to cost-effectively meet the needs of a wide range of industries.



MELSEC PROCESS CONTROL

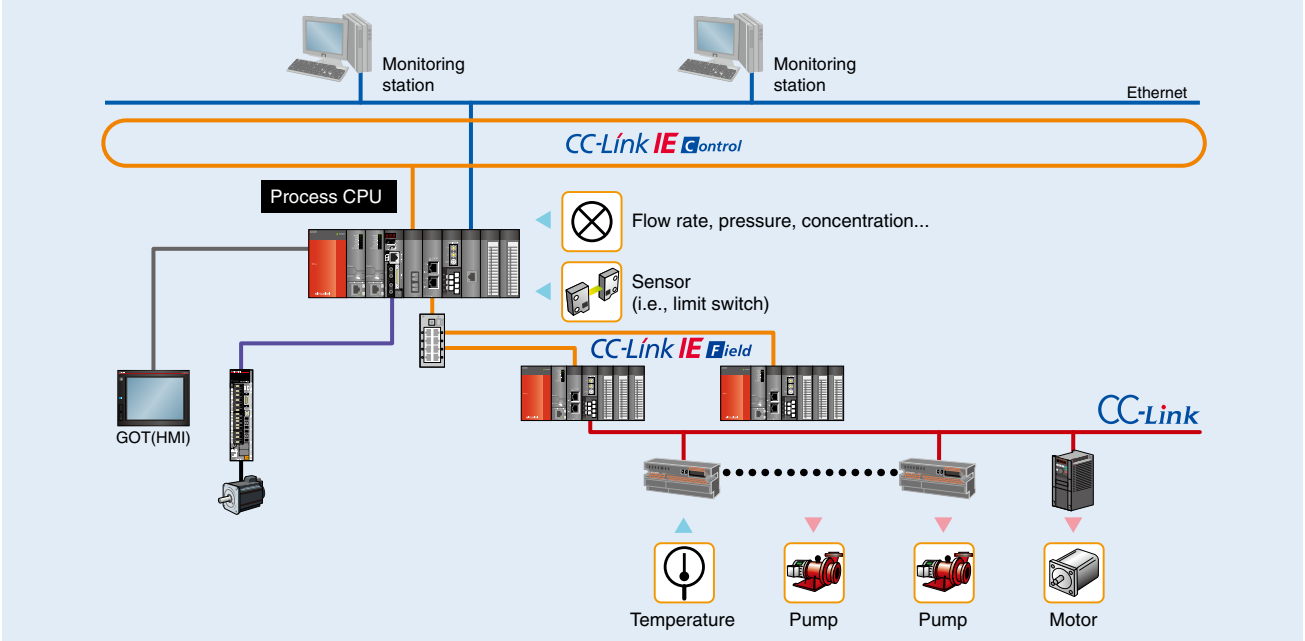
Process CPU



The process CPUs are complemented by a range of channel isolated high resolution analog I/O modules with online change (hot-swap) capability, and the function block programming and engineering software environment, PX Developer.

Type	Model	Basic operation processing speed (LD instruction)	Program memory capacity	No. of I/O points [X/Y]	Peripheral connection ports	Compatible memory card
Process CPU	Q02PHCPU	34 ns	28K steps	4096 points	USB RS-232	SRAM FLASH ATA
	Q06PHCPU	34 ns	60K steps	4096 points	USB RS-232	SRAM FLASH ATA
	Q12PHCPU	34 ns	124K steps	4096 points	USB RS-232	SRAM FLASH ATA
	Q25PHCPU	34 ns	252K steps	4096 points	USB RS-232	SRAM FLASH ATA

SRAM SRAM card FLASH Flash card ATA ATA card



Redundant CPU



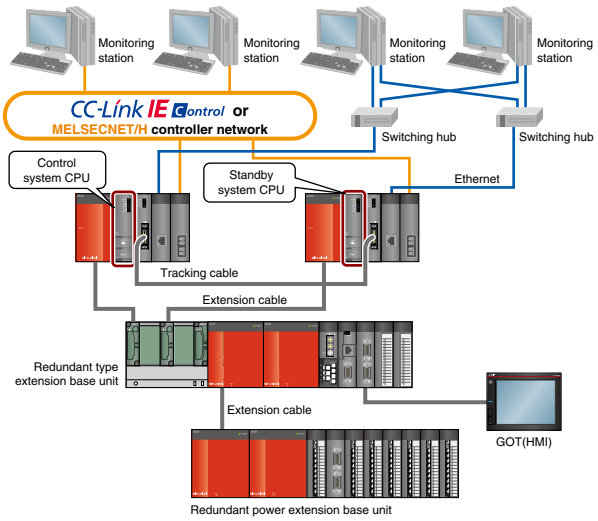
The redundant systems are designed to provide the users with systems that have the properties of Q Series and are not affected by sudden failures. The basic system including CPU module, power supply module, main base unit and network module is redundant to prevent system down. Programming can be performed without consciousness of redundancy.

Model	Basic operation processing speed (LD instruction)	Program memory capacity	No. of I/O points [X/Y]	Peripheral connection ports	Compatible memory card
Q12PRHCPU	34 ns	124K steps	4096 points	USB, RS-232	SRAM, FLASH, ATA
Q25PRHCPU	34 ns	252K steps	4096 points	USB, RS-232	SRAM, FLASH, ATA

SRAM SRAM card FLASH Flash card ATA ATA card

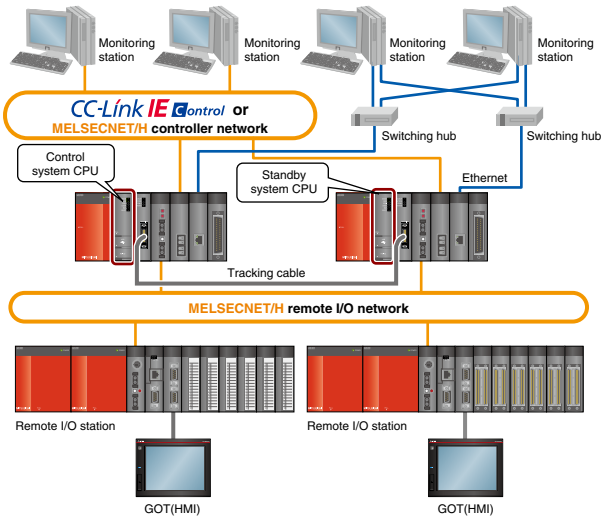
Redundant local I/O system

The CPU directly accesses I/O modules.
Ideal for systems requiring high-speed response.



Redundant remote I/O system

Ideal for distributed systems with multiple remote I/O stations.

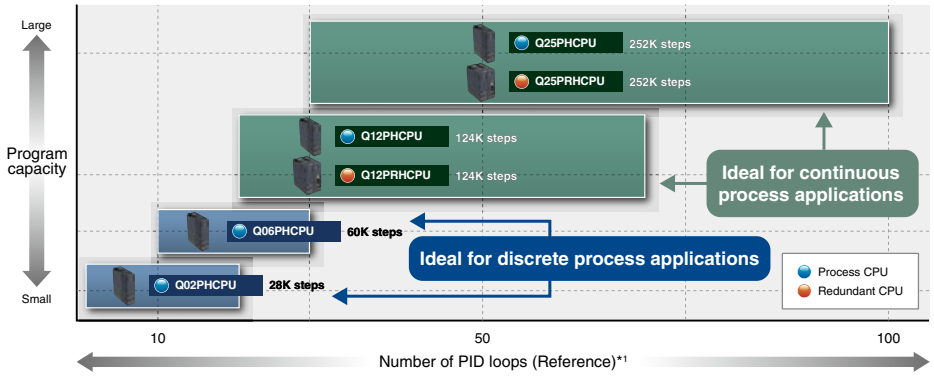


Discrete process control

Food processing equipment, semiconductor systems, air-conditioning equipment, industrial furnaces, etc.

Continuous process control

Chemical, steel, environmental and water treatment plants, DCS replacement, etc.



*1: The number of PID loops may change if programs (other than loop control) are large.
Refer to the PX Developer Version 1 Programming Manual or Process Technical Guide for details.

C Controller



The C Controller is a generic open platform controller that can execute C language type programs, based on the MELSEC system architecture. It utilizes industrial performance such as long term parts supply, high availability, and advanced functionality. The high-end model Q24DHCCPU-V/-VG comes pre-installed with VxWorks®, and supports advanced information processing and control system I/O. The standard model Q12DCCPU-V is a space saving controller that realizes high-speed I/O control. The Q24DHCCPU-LS and Q26DHCCPU-LS are an OS independent controller. Linux® based control can be easily realized by installing 3rd Party partner OS, supporting advanced information processing with a user interface environment close to conventional PCs. Wide scope of applications are realized with the availability of these C Controllers, used together with MELSEC-Q Series I/O modules, 3rd Party products, open source, and customized applications/programs.

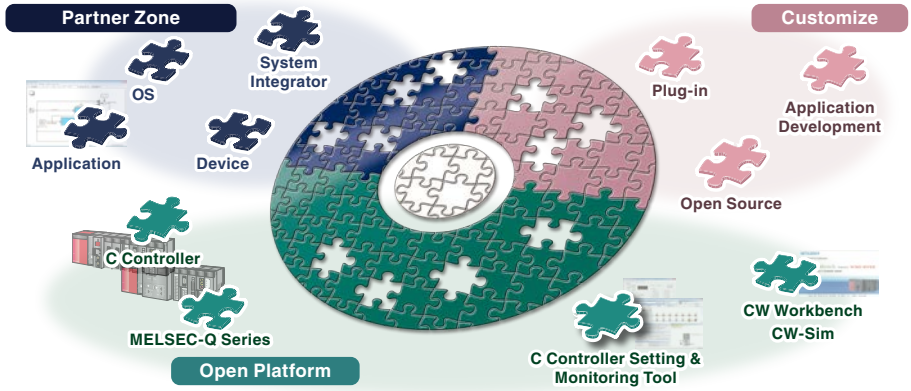
Model	OS	Endian	No. of I/O points [X/Y]	Peripheral connection ports	Compatible memory card
Q24DHCCPU-V	VxWorks® Version 6.8.1	Little Endian	4096 points	USB × 2, RS-232, Ethernet × 3	SD
Q24DHCCPU-VG-□*1	VxWorks® Version 6.8.1	Little Endian	4096 points	USB × 2, RS-232, Ethernet × 3, Analog RGB	SD
Q26DHCCPU-LS	No pre-installed operating system (Operating system installed by user)	Little Endian	4096 points	USB × 2, RS-232, Ethernet × 3, Analog RGB	SD
Q24DHCCPU-LS	No pre-installed operating system (Operating system installed by user)	Little Endian	4096 points	USB × 2, RS-232, Ethernet × 3, Analog RGB	SD
Q12DCCPU-V	VxWorks® Version 6.4	Little Endian	4096 points	USB, RS-232, Ethernet × 2	CF

SD SD memory card CF CF card

*1: Set product (Q24DHCCPU-VG-B000/B002) with GENWARE® 3-VG by International Laboratory Corporation.

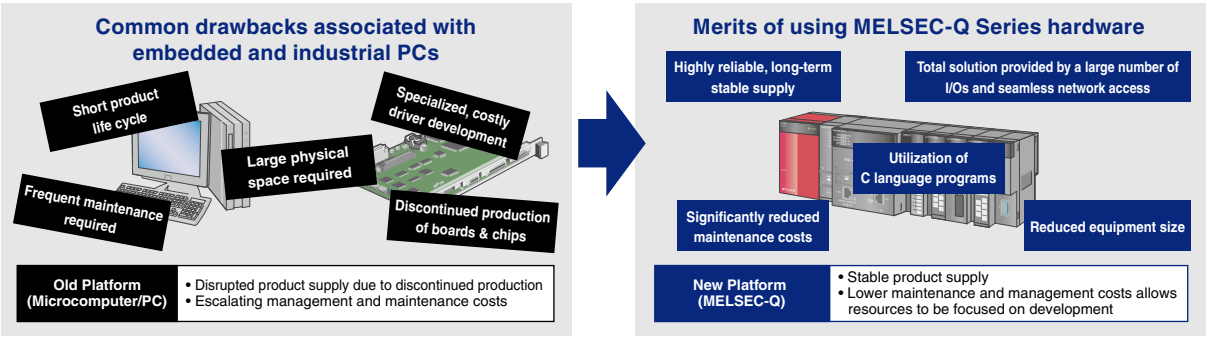
Ideal for a diverse range of systems, based on a generic platform architecture

Leveraging the C Controller to realizing customized systems, by utilization of 3rd Party applications, installation of 3rd Party partner OS, utilization of programs, and open source applications.



The C Controller overcomes the overheads associated with maintaining embedded PCs (micro boards, etc.) and industrial PCs realizing a cost effective solution.

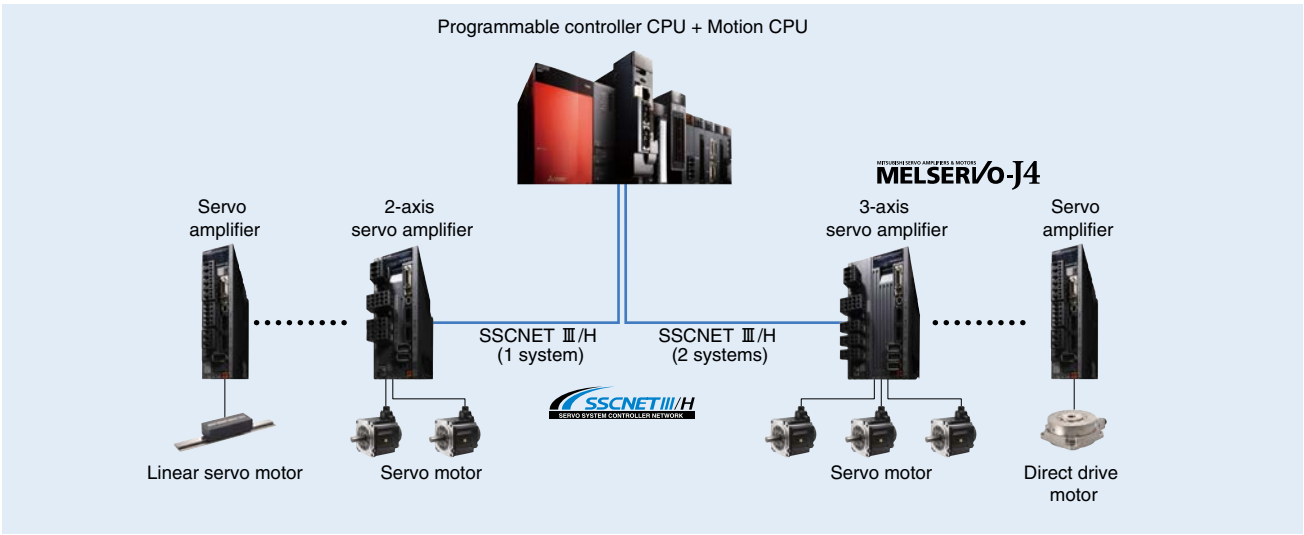
The C Controller platform is a solution that realizes PC level functionality without the burden of high maintenance costs usually associated with PCs. In addition, it includes a robust design that is ideal for industrial environments by being based on the high quality MELSEC control system.



Motion CPU

Each MELSEC-Q Series Motion controller is capable of high-speed control of up to 32 axes (96 axes when using three CPUs together). The new generation Motion controller is packed with advanced functions while saving space with its smaller size.

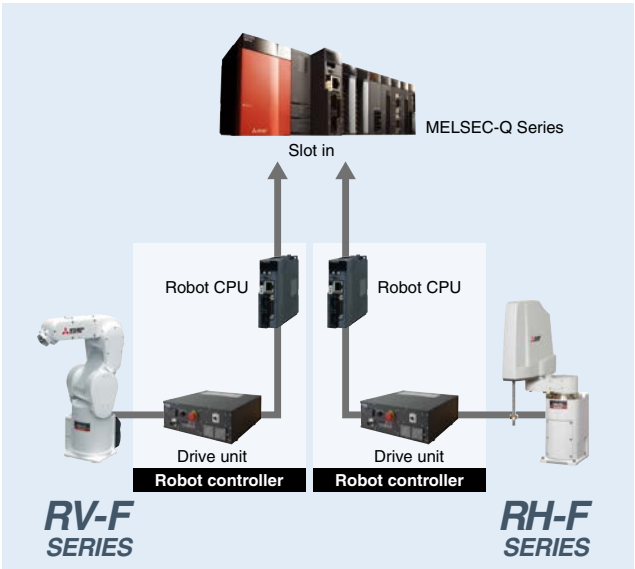
Model	Number of control axes	Servo amplifier connection method	
Q172DSCPU	16 axes	SSCNET III/H	1 system
Q173DSCPU	32 axes	SSCNET III/H	2 systems



Robot Controller

The iQ Platform compatible robot controller increases the speed of data communications between CPUs and dramatically reduces I/O processing times using a high-speed standard base between multiple CPUs.

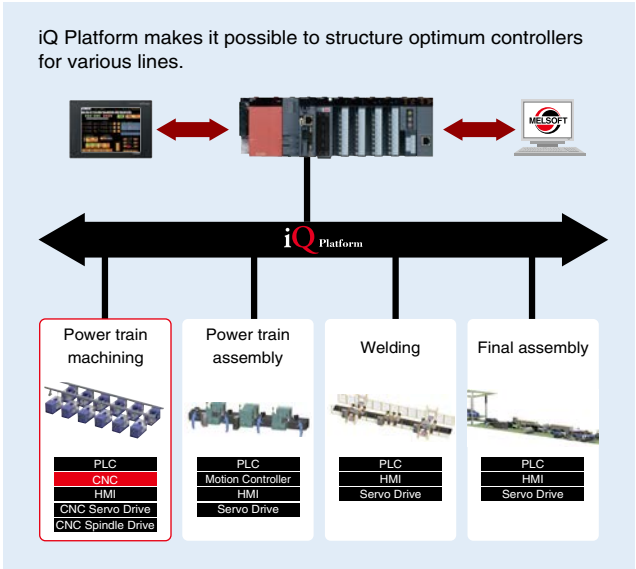
Controller model	CPU model	Route control method	Number of control axes	Others
CR750-Q	Q172DRCPU	PTP control CP control	Up to 6 axes + 8 additional axes can be added	Conventional compatible type
CR751-Q				Simple and thin type



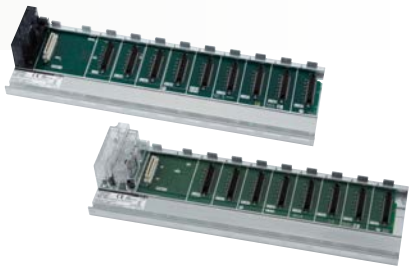
CNC CPU

This CNC controller is part of the Mitsubishi FA integration solution "iQ Platform". The integration of the high-performance CNC and high-speed programmable controller helps reduce the total operation cycle time. Supporting a wide range of interface and I/O modules flexible to many different applications.

CNC	CPU model	Maximum number of control axes
C70 Series	Q173NCCPU-S01	7 systems, 16 axes



Base Unit



The MELSEC-Q Series model modules can be mounted. Our full lineup offers the right base unit that meets your configuration system needs.

Type	Model	No. of module mounting slots	Power supply module
Main base	Q33B	CPU+3 slots	Required
	Q35B	CPU+5 slots	Required
	Q38B	CPU+8 slots	Required
	Q312B	CPU+12 slots	Required
Multiple CPU high-speed main base	Q35DB	CPU+5 slots	Required
	Q38DB	CPU+8 slots	Required
	Q312DB	CPU+12 slots	Required
Slim type main base	Q32SB	CPU+2 slots	Sllim type
	Q33SB	CPU+3 slots	Sllim type
	Q35SB	CPU+5 slots	Sllim type
Redundant power main base	Q38RB	CPU+8 slots	2 redundant modules
Extension base	Q63B	3 slots	Required
	Q65B	5 slots	Required
	Q68B	8 slots	Required
	Q612B	12 slots	Required
	Q52B	2 slots	Not required
	Q55B	5 slots	Not required
Redundant power extension base	Q68RB	8 slots	2 redundant modules
Redundant type extension base (Only compatible with redundant CPU system.)	Q65WRB	5 slots	2 redundant modules

Sllim type Slim type power supply module required
2 redundant modules 2 redundant power supply modules required

Power Supply Module



The MELSEC-Q Series power supply modules lineup offers four types; normal, life detection, slim, and redundant power supply types.

Type	Model	Input voltage	Output voltage	Output current
Power supply	Q61P	100 ... 240 V AC	5 V DC	6 A
	Q62P	100 ... 240 V AC	5/24 V DC	3/0.6 A
	Q63P	24 V DC	5 V DC	6 A
	Q64PN	100 ... 240 V AC	5 V DC	8.5 A
Power supply with life detection	Q61P-D	100 ... 240 V AC	5 V DC	6 A
Slim type power supply	Q61SP	100 ... 240 V AC	5 V DC	2 A
Redundant power supply	Q63RP	24 V DC	5 V DC	8.5 A
	Q64RP	100 ... 240 V AC	5 V DC	8.5 A

I/O Module

Input Module



Our lineup of input modules covers various control situations.
Select the appropriate model according to voltage, input format, input points, wiring method, etc.

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	External interface
AC input	QX10	16 points	100 ... 120 V AC	8 mA (100 V AC, 60 Hz) 7 mA (100 V AC, 50 Hz)	16 points/common	20 ms	Screw terminal block
	QX10-TS	16 points	100 ... 120 V AC	8 mA (100 V AC, 60 Hz) 7 mA (100 V AC, 50 Hz)	16 points/common	20 ms	SC terminal block
	QX28	8 points	100 ... 240 V AC	17 mA (200 V AC, 60 Hz) 14 mA (200 V AC, 50 Hz) 8 mA (100 V AC, 60 Hz) 7 mA (100 V AC, 50 Hz)	8 points/common	20 ms	Screw terminal block
DC input (Positive common)	QX40	16 points	24 V DC	4 mA	16 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	Screw terminal block
	QX40-TS	16 points	24 V DC	4 mA	16 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	SC terminal block
	QX40-S1	16 points	24 V DC	6 mA	16 points/common	0.1 ms 0.2 ms 0.4 ms 0.6 ms 1.0 ms	Screw terminal block
	QX40H	16 points	24 V DC	6 mA	8 points/common	0 ms 0.1 ms 0.2 ms 0.4 ms 0.6 ms 1.0 ms	Screw terminal block
	QX41	32 points	24 V DC	4 mA	32 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	40-pin C
	QX41-S1	32 points	24 V DC	4 mA	32 points/common	0.1 ms 0.2 ms 0.4 ms 0.6 ms 1.0 ms	40-pin C
	QX41-S2	32 points	24 V DC	6 mA	32 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	40-pin C
	QX42	64 points	24 V DC	4 mA	32 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	40-pin C x 2
	QX42-S1	64 points	24 V DC	4 mA	32 points/common	0.1 ms 0.2 ms 0.4 ms 0.6 ms 1.0 ms	40-pin C x 2
DC/AC input (Positive common/ Negative common)	QX50	16 points	48 V DC/AC	4 mA	16 points/common	20 ms	Screw terminal block
DC input (Positive common/ Negative common)	QX70	16 points	5/12 V DC	1.2 mA (5 V DC) 3.3 mA (12 V DC)	16 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	Screw terminal block
High-speed DC input module (Positive common)	QX70H	16 points	5 V DC	6 mA	8 points/common	0 ms 0.1 ms 0.2 ms 0.4 ms 0.6 ms 1.0 ms	Screw terminal block
DC input (Positive common/ Negative common)	QX71	32 points	5/12 V DC	1.2 mA (5 V DC) 3.3 mA (12 V DC)	32 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	40-pin C
	QX72	64 points	5/12 V DC	1.2 mA (5 V DC) 3.3 mA (12 V DC)	32 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	40-pin C x 2
DC input (Negative common)	QX80	16 points	24 V DC	4 mA	16 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	Screw terminal block
	QX80-TS	16 points	24 V DC	4 mA	16 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	SC terminal block
	QX80H	16 points	24 V DC	6 mA	8 points/common	0 ms 0.1 ms 0.2 ms 0.4 ms 0.6 ms 1.0 ms	Screw terminal block
	QX81	32 points	24 V DC	4 mA	32 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	37-pin D-sub C
	QX81-S2	32 points	24 V DC	6 mA	32 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	37-pin D-sub C
	QX82	64 points	24 V DC	4 mA	32 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	40-pin C x 2
	QX82-S1	64 points	24 V DC	4 mA	32 points/common	0.1 ms 0.2 ms 0.4 ms 0.6 ms 1.0 ms	40-pin C x 2
	QX90H	16 points	5 V DC	6 mA	8 points/common	0 ms 0.1 ms 0.2 ms 0.4 ms 0.6 ms 1.0 ms	Screw terminal block

SC terminal block Spring clamp terminal block 40-pin C 40-pin connector 40-pin C x 2 40-pin connector x 2 37-pin D-sub C 37-pin D-sub connector

Interrupt Module



This module inputs the starting conditions of the interrupt program while the main routine program is in execution mode.

Type	Model	No. of I/O points	Rated input voltage	Rated input current	Common type	Response time	External interface
DC input (Positive common)	QI60	16 points	24 V DC	6 mA	16 points/common	0.1 ms 0.2 ms 0.4 ms 0.6 ms 1.0 ms	Screw terminal block

Output Module



Our full lineup of transistor output, relay, and triac will meet your needs according to intended the use and number of outputs.

Type	Model	Output points	Rated load voltage	Maximum load current (Rated switching current)	Common type	Response time	External interface
Relay output	QY10	16 points	24 V DC/240 V AC	2 A/point, 8 A/common	16 points/common	12 ms	Screw terminal block
	QY10-TS	16 points	24 V DC/240 V AC	2 A/point, 8 A/common	16 points/common	12 ms	SC terminal block
	QY18A	8 points	24 V DC/240 V AC	2 A/point, 8 A/unit	all points independent	12 ms	Screw terminal block
Triac output	QY22	16 points	100 ... 240 V AC	0.6 A/point, 4.8 A/common	16 points/common	1 ms + 0.5 cycle	Screw terminal block
Transistor (Sink) output	QY40P	16 points	12 ... 24 V DC	0.1 A/point, 1.6 A/common	16 points/common	1 ms	Screw terminal block
	QY40P-TS	16 points	12 ... 24 V DC	0.1 A/point, 1.6 A/common	16 points/common	1 ms	SC terminal block
	QY41H	32 points	5 ... 24 V DC	0.2 A/point, 2 A/common	32 points/common	2µs	40-pin C
	QY41P	32 points	12 ... 24 V DC	0.1 A/point, 2 A/common	32 points/common	1 ms	40-pin C
	QY42P	64 points	12 ... 24 V DC	0.1 A/point, 2 A/common	32 points/common	1 ms	40-pin C × 2
	QY50	16 points	12 ... 24 V DC	0.5 A/point, 4 A/common	16 points/common	1 ms	Screw terminal block
Transistor (Independent) output	QY68A	8 points	5 ... 24 V DC	2 A/point, 8 A/unit	all points independent	10 ms	Screw terminal block
TTL CMOS output	QY70	16 points	5 ... 12 V DC	16 mA/point, 256 mA/common	16 points/common	0.5 ms	Screw terminal block
	QY71	32 points	5 ... 12 V DC	16 mA/point, 512 mA/common	32 points/common	0.5 ms	40-pin C
Transistor (Source) output	QY80	16 points	12 ... 24 V DC	0.5 A/point, 4 A/common	16 points/common	1 ms	Screw terminal block
	QY80-TS	16 points	12 ... 24 V DC	0.5 A/point, 4 A/common	16 points/common	1 ms	SC terminal block
	QY81P	32 points	12 ... 24 V DC	0.1 A/point, 2 A/common	32 points/common	1 ms	37-pin D-sub C
	QY82P	64 points	12 ... 24 V DC	0.1 A/point, 2 A/common	32 points/common	1 ms	40-pin C × 2

SC terminal block: Spring clamp terminal block
40-pin C: 40-pin connector
40-pin C × 2: 40-pin connector × 2
37-pin D-sub C: 37-pin D-sub connector

I/O Combined Module



This is an I/O combination module that controls input and output with a single unit.

Type	Model	I/O points	Rated input voltage/ Rated load voltage	Rated input current	Maximum load current	Common type	Response time	External interface
DC input/transistor output	QH42P*1	Input 32 points	24 V DC	4 mA	–	32 points/common	1 ms, 5 ms, 10 ms, 20 ms, 70 ms	40-pin C × 2
		Output 32 points	12 ... 24 V DC	–	0.1 A/point, 2 A/common	32 points/common	1 ms	
	QX41Y41P*2	Input 32 points	24 V DC	4 mA	–	32 points/common	1 ms, 5 ms, 10 ms, 20 ms, 70 ms	40-pin C × 2
		Output 32 points	12 ... 24 V DC	–	0.1 A/point, 2 A/common	32 points/common	1 ms	
	QX48Y57	Input 8 points	24 V DC	4 mA	–	8 points/common	1 ms, 5 ms, 10 ms, 20 ms, 70 ms	Screw terminal block
		Output 7 points	12 ... 24 V DC	–	0.5 A/point, 2 A/common	7 points/common	1 ms	

40-pin C × 2: 40-pin connector × 2

*1: The number of occupied input/output points are 32 points.
*2: The number of occupied input/output points are 64 points.

Analog I/O Module

Analog Input/Analog Output/Analog I/O Module, Load Cell Input, CT Input Module

Lineup of analog input/output, load cell, and CT input module equipped with various functions are ready to support various site control needs. Modules for channel-to-channel isolation, which are most suited to process control, are available as well.



Type	Model	Number of channels	Input/Output	Resolution	Conversion speed (Sampling cycle)	External interface	Others
Voltage input	Q68ADV	8 ch	-10 ... 10 V DC	-4000 ... 4000 -16000 ... 16000	80 µs/ch	Screw terminal block	–
Current input	Q62AD-DGH	2 ch	4 ... 20 mA DC	0 ... 32000 / 0 ... 64000	10 ms/2 ch	Screw terminal block	Channel isolated, supplies power to 2-wire transmitter
	Q66AD-DG	6 ch	4 ... 20 mA DC 0 ... 20 mA DC	0 ... 4000 / 0 ... 12000	10 ms/ch	40-pin C	Channel isolated, supplies power to 2-wire transmitter
	Q68ADI	8 ch	0 ... 20 mA DC	0 ... 4000 / 0 ... 12000	80 µs/ch	Screw terminal block	–
Voltage/current input	Q64ADH	4 ch	-10 ... 10 V DC 0 ... 20 mA DC	0 ... 20000 / -20000 ... 20000	20 µs/ch 80 µs/ch 1 ms/ch	Screw terminal block	–
	Q64AD	4 ch	-10 ... 10 V DC 0 ... 20 mA DC	0 ... 4000 / -4000 ... 4000 0 ... 12000 / -16000 ... 16000	80 µs/ch	Screw terminal block	–
	Q64AD-GH	4 ch	-10 ... 10 V DC 0 ... 20 mA DC	0 ... 32000 / -32000 ... 32000 0 ... 64000 / -64000 ... 64000	10 ms/4 ch	Screw terminal block	Channel isolated
	Q68AD-G	8 ch	-10 ... 10 V DC 0 ... 20 mA DC	0 ... 4000 / -4000 ... 4000 0 ... 12000 / -16000 ... 16000	10 ms/ch	40-pin C	Channel isolated
Voltage output	Q68DAVN	8 ch	-10 ... 10 V DC	-4000 ... 4000 -16000 ... 16000	80 µs/ch	Screw terminal block	–
Current output	Q68DAIN	8 ch	0 ... 20 mA DC	0 ... 4000 / 0 ... 12000	80 µs/ch	Screw terminal block	–
Voltage/current output	Q64DAH	4 ch	-10 ... 10 V DC 0 ... 20 mA DC	0 ... 20000 / -20000 ... 20000	20 µs/ch	Screw terminal block	–
	Q62DAN	2 ch	-10 ... 10 V DC 0 ... 20 mA DC	0 ... 4000 / -4000 ... 4000 0 ... 12000 / -16000 ... 16000	80 µs/ch	Screw terminal block	–
	Q62DA-FG	2 ch	-12 ... 12 V DC 0 ... 22 mA DC	0 ... 12000 / -16000 ... 16000	10 ms/2 ch	Screw terminal block	Channel isolated
	Q64DAN	4 ch	-10 ... 10 V DC 0 ... 20 mA DC	0 ... 4000 / -4000 ... 4000 0 ... 12000 / -16000 ... 16000	80 µs/ch	Screw terminal block	–
	Q66DA-G	6 ch	-10 ... 10 V DC 0 ... 20 mA DC	0 ... 4000 / -4000 ... 4000 0 ... 12000 / -16000 ... 16000	6 ms/ch	40-pin C	Channel isolated
Voltage and current input/output	Q64AD2DA	Input 4 ch	-10 ... 10 V DC 0 ... 20 mA DC	0 ... 4000 / -4000 ... 4000 0 ... 12000 / -16000 ... 16000	500 µs/ch	Screw terminal block	–
		Output 2 ch	-10 ... 10 V DC 0 ... 20 mA DC	0 ... 4000 / -4000 ... 4000 0 ... 12000 / -16000 ... 16000			
Load cell input	Q61LD	1 ch	0.0 ... 3.3 mV/V	0 ... 10000	10 ms	Screw terminal block	–
CT input module	Q68CT	8 ch	0 ... 5 A AC 0 ... 50 A AC 0 ... 100 A AC 0 ... 200 A AC 0 ... 400 A AC 0 ... 600 A AC	0 ... 10000	10 ms/8 ch 20 ms/8 ch 50 ms/8 ch 100 ms/8 ch	Screw terminal block	–

40-pin C 40-pin connector

Temperature Input, Temperature Control, Loop Control Module

Available are a lineup of temperature input modules compatible with various temperature sensors and a lineup of temperature controllers that ensure standard control, heating-cooling control and optimum temperature control by detecting heater disconnection, loop control module ideal for temperature and flow rate control environments which require fast response.


Temperature input module


Temperature control module


Loop control module

Type		Model	Number of channels	Input/Output	Conversion speed (Sampling cycle)	External interface	Others
Temperature input	Thermocouple	Q64TD	4 ch	Thermocouple (B,R,S,K,E,J,T,N)	40 ms/ch	Screw terminal block	Channel isolated Disconnection detection
		Q64TDV-GH	4 ch	Thermocouple (B,R,S,K,E,J,T,N) -100 ... 100 mV DC	20 ms/ch (Sampling cycle × 3)	Screw terminal block	Channel isolated Disconnection detection
		Q68TD-G-H01	8 ch	Thermocouple (B,R,S,K,E,J,T,N)	320 ms/8 ch	40-pin C	Channel isolated Disconnection monitor
		Q68TD-G-H02	8 ch	Thermocouple (B,R,S,K,E,J,T,N)	640 ms/8 ch	40-pin C	Channel isolated Disconnection detection
	RTD	Q64RD	4 ch	Platinum RTD (Pt100,JPt100)	40 ms/ch	Screw terminal block	Disconnection detection
		Q64RD-G	4 ch	Platinum RTD (Pt100,JPt100) Nickel RTD (Ni100)	40 ms/ch	Screw terminal block	Channel isolated Disconnection detection
		Q68RD3-G	8 ch	Platinum RTD (Pt100,JPt100) Nickel RTD (Ni100)	320 ms/8 ch	40-pin C	Channel isolated Disconnection detection
Temperature control	Thermocouple	Q64TCTTN	4 ch	Thermocouple (K,J,T,B,S,E,R,N,U,L,PLII,W5Re/W26Re)	500 ms/4 ch	Screw terminal block	Channel isolated Standard control Heating-cooling control *1
		Q64TCTTBWN	4 ch	Thermocouple (K,J,T,B,S,E,R,N,U,L,PLII,W5Re/W26Re)	500 ms/4 ch	Screw terminal block × 2	Channel isolated Standard control Heating-cooling control *1 Heater disconnection detection
	RTD	Q64TCRTN	4 ch	Platinum RTD (Pt100,JPt100)	500 ms/4 ch	Screw terminal block	Channel isolated Standard control Heating-cooling control *1
		Q64TCRTBWN	4 ch	Platinum RTD (Pt100,JPt100)	500 ms/4 ch	Screw terminal block × 2	Channel isolated Standard control Heating-cooling control *1 Heater disconnection detection
Loop control		Q62HLC	Input 2 ch	Thermocouple (K,J,T,B,S,E,R,N,PLII,W5Re/W26Re) -100 ... 100 mV DC -10 ... 10V DC 0 ... 20 mA DC	25 ms/2 ch	Screw terminal block	Channel isolated
			Output 2 ch	4 ... 20 mA DC	25 ms/2 ch		

40-pin C 40-pin connector

*1: 4-channel (loop) heating/cooling control can be made by using other output modules.

Simple Motion Module/Positioning Module

Simple Motion Module

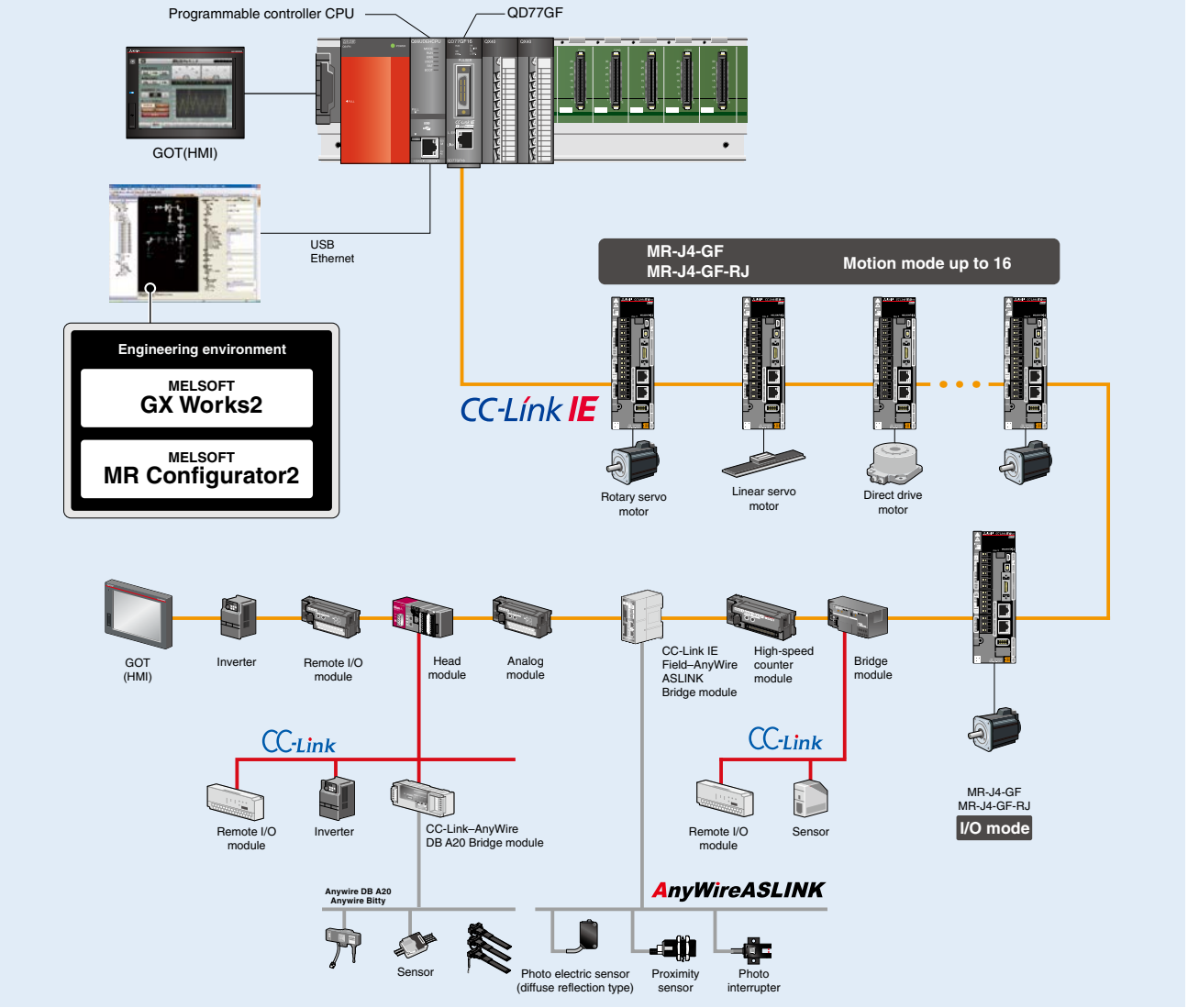


Offers a wide variety of controls with an intuitive approach of a positioning module. Control is all you need for simple setup of highly-advanced and wide range of motion controls including synchronous control, cam control, speed/torque control, and others. Essential functions such as synchronous encoder and mark detection are provided as standard features.

Servo amplifier connection method	Model	Maximum number of control axes	Control unit	Operation cycle	No. of positioning data
CC-Link IE Field network	QD77GF4	4 axes	mm, inch, degree, pulse	1.0 ms, 2.0 ms, 4.0 ms	600
	QD77GF8	8 axes	mm, inch, degree, pulse	1.0 ms, 2.0 ms, 4.0 ms	600
	QD77GF16	16 axes	mm, inch, degree, pulse	0.88 ms, 1.77 ms, 3.55 ms	600
SSCNET III/H	QD77MS2	2 axes	mm, inch, degree, pulse	0.88 ms	600
	QD77MS4	4 axes	mm, inch, degree, pulse	0.88 ms	600
	QD77MS16	16 axes	mm, inch, degree, pulse	0.88 ms, 1.77 ms	600

600 600 data/axis

System configuration example



Slave station: 120 (motion mode compatible servo amplifier 16 modules + 104 I/O modules)

Note: In the case of a star topology, a switching hub is required.

Positioning Module



High-speed, high-precision positioning modules support various positioning controls, including 2 - 4-axis linear interpolation, 2-axis circular interpolation, 3-axis helical interpolation, and trajectory control.

Type		Model	Maximum number of control axes	Control unit	No. of positioning data	Max. output pulse	External interface	Others
Specialised functionality type	Open collector output	QD75P1N	1 axis	mm inch degree pulse	600	200 kpps	40-pin C	–
		QD75P1	1 axis	mm inch degree pulse	600	200 kpps	40-pin C	–
		QD75P2N	2 axes	mm inch degree pulse	600	200 kpps	40-pin C	–
		QD75P2	2 axes	mm inch degree pulse	600	200 kpps	40-pin C	–
		QD75P4N	4 axes	mm inch degree pulse	600	200 kpps	40-pin C × 2	–
		QD75P4	4 axes	mm inch degree pulse	600	200 kpps	40-pin C × 2	–
	Differential output	QD75D1N	1 axis	mm inch degree pulse	600	4 Mpps	40-pin C	–
		QD75D1	1 axis	mm inch degree pulse	600	1 Mpps	40-pin C	–
		QD75D2N	2 axes	mm inch degree pulse	600	4 Mpps	40-pin C	–
		QD75D2	2 axes	mm inch degree pulse	600	1 Mpps	40-pin C	–
		QD75D4N	4 axes	mm inch degree pulse	600	4 Mpps	40-pin C × 2	–
		QD75D4	4 axes	mm inch degree pulse	600	1 Mpps	40-pin C × 2	–
	With SSCNET Ⅲ connectivity	QD75MH1	1 axis	mm inch degree pulse	600	–	40-pin C SSCNET Ⅲ connectivity	–
		QD75MH2	2 axes	mm inch degree pulse	600	–	40-pin C SSCNET Ⅲ connectivity	–
		QD75MH4	4 axes	mm inch degree pulse	600	–	40-pin C × 2 SSCNET Ⅲ connectivity	–
Simple control and fast-response type	Open collector output	QD70P4	4 axes	pulse	10	200 kpps	40-pin C	–
		QD70P8	8 axes	pulse	10	200 kpps	40-pin C × 2	–
	Differential output	QD70D4	4 axes	pulse	10	4 Mpps	40-pin C × 2	–
		QD70D8	8 axes	pulse	10	4 Mpps	40-pin C × 4	–
	With SSCNET Ⅲ connectivity	QD74MH8	8 axes	pulse	32	–	SSCNET Ⅲ connectivity	–
		QD74MH16	16 axes	pulse	32	–	SSCNET Ⅲ connectivity	–
Built-in counter function type	Open collector output	QD72P3C3	3 axes	pulse	1	100 kpps	40-pin C × 2	Counter: 3 channels, 100 kpps, count input signal: 5/24 V DC

600 600 data/axis 10 10 data/axis 32 32 data/axis 1 1 data/axis
40-pin C 40-pin connector 40-pin C × 2 40-pin connector × 2 40-pin C × 4 40-pin connector × 4

High-speed Counter/Pulse Input Module

High-speed Counter Module



Inputs may be connected to a variety of devices for positioning control, precision measurement, etc. The maximum counting speed may be adjusted via parameter (excluding QD64D2) for more reliable counting at lower frequencies.

Model	Number of channels	Counting speed switch	Count input signal	External input	Coincidence output	External interface
QD62	2 ch	200 kpps, 100 kpps, 10 kpps	5 V DC, 12 V DC, 24 V DC	5 V DC, 12 V DC, 24 V DC	Transistor (sink), 12/24 V DC, 0.5 A/point, 2 A/common	40-pin C
QD62E	2 ch	200 kpps, 100 kpps, 10 kpps	5 V DC, 12 V DC, 24 V DC	5 V DC, 12 V DC, 24 V DC	Transistor (source), 12/24 V DC, 0.1 A/point, 0.4 A/common	40-pin C
QD62D	2 ch	500 kpps, 200 kpps, 100 kpps, 10 kpps	Differential line driver	5 V DC, 12 V DC, 24 V DC	Transistor (sink), 12/24 V DC, 0.5 A/point, 2 A/common	40-pin C
QD63P6	6 ch	200 kpps, 100 kpps, 10 kpps	5 V DC	–	–	40-pin C
QD64D2	2 ch	4 Mpps	Differential line driver	24 V DC	Transistor (sink), 12/24 V DC, 0.5 A/point, 2 A/common	40-pin C
QD65PD2	2 ch	Differential input: 8 Mpps, 4 Mpps, 2 Mpps, 1 Mpps, 500 kpps, 200 kpps, 100 kpps, 10 kpps; DC input: 200 kpps, 100 kpps, 10 kpps	Differential input: Differential line driver; DC input: 5 V DC, 12 V DC, 24 V DC	24 V DC	Transistor (sink) output, 12/24 V DC 0.1 A/point, 0.8 A/common	40-pin C

40-pin C: 40-pin connector

Channel Isolated Pulse Input Module



This module is appropriate for the measurement of input pulse counts (related to speed, revolution, instantaneous flow rate, etc.) and the measurement of quantities (length, cumulative flow, and so forth). The QD60P8-G operates on a 10 ms control cycle, thus the minimum value refresh time is 10 ms.

Model	Number of channels	Counting speed switch	Count input signal	External interface	Others
QD60P8-G	8 ch	30 kpps, 10 kpps, 1 kpps, 100 pps, 50 pps, 10 pps, 1 pps, 0.1 pps	5/12 ... 24 V DC	Screw terminal block	Channel isolated

Energy Measuring Module

Energy Measuring Module



Using only one module, highly detailed information about electric energy (consumption and regeneration), reactive energy, current, voltage, electric power, power factor, and frequency can be measured.

Model	Phase wire system	Number of channels	Measurement items
QE81WH	Three-phase 3-wire type	1 ch	Power rate (consumption, regenerative) / Current / Voltage / Power / Reactive power / Power factor / Frequency
QE84WH	Three-phase 3-wire type	4 ch	Power rate (consumption, regenerative) / Current / Voltage / Power / Reactive power / Power factor / Frequency
QE81WH4W	Three-phase 4-wire type	1 ch	Power rate (consumption, regenerative) / Current / Voltage / Power / Reactive power / Apparent / Power factor / Frequency
QE83WH4W	Three-phase 4-wire type	3 ch	Power rate (consumption, regenerative) / Current / Voltage / Power / Reactive power / Apparent / Power factor / Frequency

Isolation Monitoring Module



The isolation monitoring module measures leakage current on its own.

Model	Number of channels	Measurement items
QE82LG	2 ch	Leakage current (Io) / Resistive component leakage current (Ior)

Information Collaborative Module

MES Interface Module



Make the jump from shop floor data to valuable information in real time.
Configuration of the module is easy, and does not require any programming.

Model	Number of database connection	Connectable database	Max. No. of job settings	Data sampling intervals	No. of sampling data	Key functions
QJ71MES96	Max. 32 DB per project	Oracle® 8i (32bit), Oracle® 9i (32bit), Oracle® 10g (32bit), Oracle® 11g (32bit, x64), Oracle® 12c (x64), Microsoft® SQL Server® 2000 (32bit), Microsoft® SQL Server® 2005 (32bit), Microsoft® SQL Server® 2008 (32bit, x64), Microsoft® SQL Server® 2012 (32bit, x64), Microsoft® SQL Server® 2014 (32bit, x64), Microsoft® SQL Server® 2000 Desktop Engine (MSDE2000), Microsoft® Access® 2000, Microsoft® Access® 2003, Microsoft® Access® 2007, Microsoft® Access® 2010 (32bit), Microsoft® Access® 2013 (32bit), Wonderware® Historian 9.0 (Industrial SQL Server®)	Up to 64	Normal sampling 1 ... 32767s Fast-speed sampling 100ms ... 60s (max. 96 points)	Up to 4096	Tag function Trigger monitoring function SQL statement transmission function Arithmetic processing function Program execution function DB buffering function Trigger buffering function Stored procedure call function

High-speed Data Logger Module



Fulfill the need for traceability and discover a powerful troubleshooting tool.
The high-speed data sampling function has the power to synchronize with the sequence program scan, ensuring that every value available to the program is logged for analysis.
The high-speed data logger module configuration tool enables the user to create sophisticated data collection rules using an intuitive step-by-step process. The wizard like interface is beginner-friendly and includes features like importing global labels and device comments.
The logging data display and analysis tool, GX LogViewer, has a simple and effective interface that is user customizable and includes features to maximize the efficiency of analyzing collected data.

Model	Data sampling intervals	No. of sampling data	Save file format	Key functions
QD81DL96	General-purpose sampling Timing specification: 0.1 ... 32767s Time interval designation (hour/minute/second)	General-purpose sampling Up to 16384 (256 per single setting)	CSV file EXCEL format Binary file	High-speed data sampling function FTP function Recipe function Email function Trigger logging function Event-logging function Auto logging function
	High-speed data sampling Sequence scan timing synchronization Timing specification: 1 ... 32767ms (trigger logging timing) / 3 ... 32767ms (sequential logging timing)	High-speed data sampling Up to 8192 (256 per single setting)		

High-Speed Data Communication Module



This module can transfer high-precision data synchronized with sequence scan to a PC. Its capability to transfer detailed control data supports real-time control data analysis by user application and enhances productivity and device value. Class libraries for user application can be used as well.

Model	Programming language	Data sampling intervals	Transfer intervals	No. of sampling data	Key functions
QJ71DC96	Visual C#(Microsoft® Visual Studio® 2010 Visual C#®, Microsoft® Visual Studio® 2012 Visual C#®), Java(Text Editor)	General-purpose sampling Timing specification: 0.1 ... 32767s	General-purpose sampling Sampling synchronization	General-purpose sampling Up to 65536 (16384 per single connection)	Streaming transfer function Label function Data writing function
		High-speed data sampling Per sequence scan Timing specification: 1 ... 32767 ms	High-speed data sampling Sampling synchronization: bundle transfer of multiple records enabled Timing specification: 2 ... 100ms	High-speed data sampling Up to 8192	

Network Module

Ethernet Interface Module



Interface module connectable with multiple Ethernet devices.

Model	Transmission interface	Number of channels	Transmission rates	Others	
QJ71E71-100	100 BASE-TX 10 BASE-T	1 ch	100 Mbps 10 Mbps	MELSOFT connection MC protocol	SLMP Communication protocol

Communication protocol Predefined protocol support function

CC-Link IE Control Network Module



CC-Link IE Control is a high-reliability distributed control network designed to handle very large data communications (128K word) over a high-speed (1 Gbps) dual loop optical cable topology.

CC-Link IE

Model	Connection cable	Communication speed	Transmission path	Overall cable distance	Supported station	Number of stations per network	Others
QJ71GP21-SX	Optical fiber cable (Multi-mode fiber)	1 Gbps	Dual loop	66000 m (When 120 stations are connected)	Control station Normal station	120 *1	–
QJ71GP21S-SX	Optical fiber cable (Multi-mode fiber)	1 Gbps	Dual loop	66000 m (When 120 stations are connected)	Control station Normal station	120 *1	With external power supply function

*1: When the control station is a Universal model QCPU. 64 modules if control station is other than the Universal model QCPU.

CC-Link IE Field Network Module



CC-Link IE Field Network master station/local station is an all-round field network that integrates the controller distributed control, I/O control, safety control, and motion control. High-speed (1Gbps) and enhanced communication responsiveness greatly reduces cycle time as well.

CC-Link IE

Model	Connection cable	Communication speed	Transmission path	Overall cable distance	Supported station	Number of stations per network
QJ71GF11-T2	Ethernet cable of category 5e or higher (Double shielded cable) which satisfies 1000BASE-T standard	1 Gbps	Line Star Ring (Line and star mixed)	Line topology: 12000m (with 1 master and 120 slaves connected) Star topology:Depends on the system configuration Ring topology:12100m (with 1 master and 120 slaves connected)	Master station Local station	121 stations (with 1 master and 120 slaves connected)

CC-Link Network Module



Field network module which delivers outstanding cost-performance in I/O control.
The QJ61BT11N module supports CC-Link version 1 and 2, and may be used as a local or master module.

CC-Link

Model	Connection cable	Communication speed	Transmission path	Maximum cable distance (CC-Link Ver. 1.10-compatible cable)	Supported station	Number of stations per network
QJ61BT11N	CC-Link Ver. 1.00/1.10-compatible cable	156 kbps 625 kbps 2.5 Mbps 5 Mbps 10 Mbps	Bus (RS-485)	1200 m 900 m 400 m 160 m 100 m	Ver.2 master station Ver.2 local station Ver.1 master station Ver.1 local station	65 stations (with 1 master and 64 slaves connected)

CC-Link/LT Network Module

This device prevent miswiring by complicate system in the control box.



CC-Link/LT

Model	Connection cable	Communication speed	Transmission path	Length of trunk line	Max. length drop line	Overall length drop lines	Supported station	Number of stations per network
QJ61CL12	Dedicated flat cable (0.75 mm² × 4), VCTF cable, Movable cable	156 kbps	T-branch topology	500 m	60 m	200 m	Master station	65 stations (with 1 master and 64 remote I/O stations connected)
		625 kbps		100 m	16 m	50 m		
		2.5 Mbps		35 m	4 m	15 m		

MELSECNET/H Network Module

A control network module capable of a large-scale and flexible network system configuration.



Model	Connection cable	Communication speed	Transmission path	Overall cable distance	Supported station	Number of stations per network	Others
QJ71LP21-25	SI/QSI/H-PCF/broadband H-PCF fiber optic cable	25 Mbps 10 Mbps	Dual loop	30 km	PLC to PLC network control station PLC to PLC network normal station	64 stations (Control station: 1, Normal station: 63)	–
					Remote master station	65 stations (Remote Master station: 1, Remote I/O station: 64)	
QJ71LP21S-25	SI/QSI/H-PCF/broadband H-PCF fiber optic cable	25 Mbps 10 Mbps	Dual loop	30 km	PLC to PLC network control station PLC to PLC network normal station	64 stations (Control station: 1, Normal station: 63)	With external power supply function
					Remote master station	65 stations (Remote Master station: 1, Remote I/O station: 64)	
QJ72LP25-25	SI/QSI/H-PCF/broadband H-PCF fiber optic cable	25 Mbps 10 Mbps	Dual loop	30 km	Remote I/O station	65 stations (Remote Master station: 1, Remote I/O station: 64)	–
QJ71LP21G	GI-50/125 fiber optic cable	10 Mbps	Dual loop	30 km	PLC to PLC network control station PLC to PLC network normal station	64 stations (Control station: 1, Normal station: 63)	–
					Remote master station	65 stations (Remote Master station: 1, Remote I/O station: 64)	
QJ72LP25G	GI-50/125 fiber optic cable	10 Mbps	Dual loop	30 km	Remote I/O station	65 stations (Remote Master station: 1, Remote I/O station: 64)	–
QJ71BR11	3C-2V/5C-2V coaxial cable	10 Mbps	Single bus	300 m (3C-2V) 500 m (5C-2V)	PLC to PLC network control station PLC to PLC network normal station	32 stations (Control station: 1, Normal station: 31)	–
					Remote master station	33 stations (Remote Master station: 1, Remote I/O station: 32)	
QJ72BR15	3C-2V/5C-2V coaxial cable	10 Mbps	Single bus	300 m (3C-2V) 500 m (5C-2V)	Remote I/O station	33 stations (Remote Master station: 1, Remote I/O station: 32)	–
QJ71NT11B	Twisted pair cable, CC-Link Ver. 1.10-compatible cable	156 kbps	Single bus (RS-485)	1200 m *1	PLC to PLC network control station PLC to PLC network normal station	32 stations (Control station: 1, Normal station: 31)	–
		312 kbps		900 m *1			
		625 kbps		600 m *1			
		1.25 Mbps		400 m *1			
		2.5 Mbps		200 m *1			
		5 Mbps		150 m *1			
		10 Mbps		100 m *1			

*1: When using a CC-Link Ver. 1.10-compatible cable.

AnyWireASLINK Master Module DB



This AnyWireASLINK master module links sensor I/O with programmable controller.
It freely arranges ultra-compact sensors to control the 512 I/O points.

AnyWireASLINK
DB Co-developed with other companies

Model	Transmission cable	Transmission path	Overall cable distance	Max. connected modules
QJ51AW12AL	Universal 2-wire/4-wire cable, universal cable, dedicated flat cable	Bus type (Multi-drop method, T-branch method, tree branch method)	200 m	128 modules

FL-net (OPCN-2) Interface Module



This interface module can be connected to the FL-net (OPCN-2) network.

Type	Model	Transmission interface	Transmission rates	Max. segment length
FL-net (OPCN-2) Version 2.00	QJ71FL71-T-F01	100 BASE-TX 10 BASE-T	100 Mbps 10 Mbps	100 m (Length between hub and node)
FL-net (OPCN-2) Version 1.00	QJ71FL71-T	10 BASE-T	10 Mbps	100 m (Length between hub and node)

MODBUS®, MODBUS®/TCP Interface Module



Connect with a large variety of devices using the MODBUS® interface module.
QJ71MB91 can communicate with various MODBUS® master/slave devices from other manufacturers.
QJ71MT91 can communicate with various MODBUS®/TCP master/slave devices from other manufacturers.

Type	Model	Transmission interface	Transmission rates	Maximum transmission distance (overall length)
MODBUS®	QJ71MB91	RS-232 RS-422/485	300 bps 600 bps 1200 bps 2400 bps 4800 bps 9600 bps 14400 bps 19200 bps 28800 bps 38400 bps 57600 bps 115200 bps	RS-232: Max.15 m RS-422/485: Max.1200 m
MODBUS®/TCP	QJ71MT91	100 BASE-TX 10 BASE-T	100 Mbps 10 Mbps	100 m Max. segment length

As-i Master Module



AS-i Ver.2.11-compatible, AS-i system master module.

Model	Connection cable	Communication speed	Transmission path	Transmission distance	Maximum number of slaves
QJ71AS92	AS-i cable	167 kbps	Bus network type (star, line, tree, or ring)	Max. 100m (or up to 300m with two repeaters)	62 (A Series: 31, B Series: 31)

Serial Communication Module



Communicates with various external devices (PC, GOT(HMI), bar code reader, measuring instrument, etc.) for data sampling/change, monitoring/management, and measurement data sampling of the programmable controller.

Model	Transmission interface	Number of channels	Transmission rates	Maximum transmission distance (overall length)	Others
QJ71C24N	RS-232 RS-422/485	2 ch CH1: RS-232, CH2: RS-422/485	50 bps 300 bps 600 bps 1200 bps 2400 bps 4800 bps 9600 bps 14400 bps 19200 bps 28800 bps 38400 bps 57600 bps 115200 bps 230400 bps (Total transmission speed of 2 channels: 230.4 kbps)	RS-232: Max.15 m RS-422/485 Max.1200 m	MELSOFT connection MC protocol Communication protocol
QJ71C24N-R2	RS-232	2 ch	50 bps 300 bps 600 bps 1200 bps 2400 bps 4800 bps 9600 bps 14400 bps 19200 bps 28800 bps 38400 bps 57600 bps 115200 bps 230400 bps (Total transmission speed of 2 channels: 230.4 kbps)	Max.15 m	MELSOFT connection MC protocol Communication protocol
QJ71C24N-R4	RS-422/485	2 ch	50 bps 300 bps 600 bps 1200 bps 2400 bps 4800 bps 9600 bps 14400 bps 19200 bps 28800 bps 38400 bps 57600 bps 115200 bps 230400 bps (Total transmission speed of 2 channels: 230.4 kbps)	Max.1200 m	MELSOFT connection MC protocol Communication protocol

Communication protocol Predefined protocol support function

CPU Module Performance Specifications

Universal model QCPU

Item		Q03UDVCPU	Q04UDVCPU	Q06UDVCPU	Q13UDVCPU	Q26UDVCPU	Q00UJCPU	Q00UCPU	Q01UCPU
Control method		Sequence program control method							
I/O control mode		Refresh							
Program language (sequence control language)		• Relay symbol language (ladder) • Logic symbolic language (list) • MELSAP3 (SFC), MELSAP-L • Function block • Structured text (ST)							
Peripheral connection port	USB*1	●							
	Ethernet (100BASE-TX/10BASE-T)	●					—		
	RS-232	—					●		
Memory card interface		● (SD memory card, SDHC memory card)*2					—		
Extended SRAM cassette port		●					—		
Processing speed*3	LD instruction	1.9 ns					120 ns	80 ns	60 ns
	MOV instruction	3.9 ns					240 ns	160 ns	120 ns
	PC MIX value*4 (instruction/μs)	227					4.92	7.36	9.79
	Floating point addition	0.014 μs					0.42 μs	0.30 μs	0.24 μs
Total number of instructions*5		859					821	855	
Floating point instruction		●							
Character string processing instruction		●							
PID instruction		●							
Special function instruction (Trigonometric function, square root, exponential operation, etc.)		●							
Constant scan (Function for keeping regular scan time)		0.5 ... 2000 ms (setting available in units of 0.1 ms)					0.5 ... 2000 ms (setting available in units of 0.5 ms)		
Program capacity*6		30K steps	40K steps	60K steps	130K steps	260K steps	10K steps		15K steps
Number of I/O device points [X/Y]		8192 points							
Number of I/O points [X/Y]		4096 points					256 points	1024 points	
Internal relay [M]*7		9216 points	15360 points		28672 points		8192 points		
Latch relay [L]*7		8192 points							
Link relay [B]*7		8192 points							
Timer [T]*7		2048 points							
Retentive timer [ST]*7		0 point							
Counter [C]*7		1024 points							
Data register [D]*7		13312 points	22528 points		41984 points		12288 points		
Extended data register [D]*7		0 point					—	0 point	
Link register [W]		8192 points							
Extended link register [W]*7		0 point					—	0 point	
Annunciator [F]*7		2048 points							
Edge relay [V]*7		2048 points							
Link special relay [SB]*7		2048 points							
Link special register [SW]*7		2048 points							
File register [R, ZR]		98304 points*8	131072 points*8	393216 points*8	524288 points*8	655360 points*8	—	65536 points	
Step relay [S]*7		8192 points							
Index register/standard device register [Z]		Max. 20 points							
Index register [Z] (32-bit ZR indexing)		Max. 10 points (Index register [Z] is used in double words.)					—	Max. 10 points (Index register [Z] is used in double words.)	
Pointer [P]		4096 points					512 points		
Interrupt pointer [I]		256 points					128 points		
Special relay [SM]		2048 points							
Special register [SD]		2048 points							
Function input [FX]		16 points							
Function output [FY]		16 points							
Function register [FD]		5 points							
Local device		●					—	●	
Device initial values		●							

*1: The USB port terminal is mini-B.
*2: The operation of devices that are not manufactured or recommended as compatible products by Mitsubishi Electric cannot be guaranteed.
*3: The processing speed is the same even when the device is indexed.
*4: The PC MIX value is the average number of instructions such as the basic and data processing instructions executed in 1μs. A larger value indicates a higher processing speed.
*5: Intelligent function module dedicated instructions are not included.
*6: When the QnUD(H)CPU or QnUDE(H)CPU is replaced with the QnUDVCPU, the number of steps in the program may change (increase or decrease). For more information, refer to the relevant manual.
*7: Indicates the number of points in the default state. This can be changed with the parameter.
*8: Indicates the number of points when using the built-in memory (standard RAM). This can be increased with the extended SRAM cassette.
When using together with the extended SRAM cassette, the value obtained by totaling the number of points in the following table is the number of file registers that can be used.

With Q4MCA-1MBS (1 MB)	With Q4MCA-2MBS (2 MB)	With Q4MCA-4MBS (4 MB)	With Q4MCA-8MBS (8 MB)
524288 points	1048576 points	2097152 points	4194304 points

*9: Indicates the number of points when using the built-in memory (standard RAM). This can be expanded with the SRAM card or Flash card. (Writing from the program is not possible with the Flash card.)
Up to 4184064 points can be used with the SRAM card.

	Q02UCPU	Q03UDECPU Q03UDCPU	Q04UDEHCPU Q04UDHCPU	Q06UDEHCPU Q06UDHCPU	Q10UDEHCPU Q10UDHCPU	Q13UDEHCPU Q13UDHCPU	Q20UDEHCPU Q20UDHCPU	Q26UDEHCPU Q26UDHCPU	Q50UDEHCPU	Q100UDEHCPU
	Sequence program control method									
	Refresh									
	• Relay symbol language (ladder) • Logic symbolic language (list) • MELSAP3 (SFC), MELSAP-L • Function block • Structured text (ST)									
	●									
	—	Q03UDECPU	Q04UDEHCPU	Q06UDEHCPU	Q10UDEHCPU	Q13UDEHCPU	Q20UDEHCPU	Q26UDEHCPU	●	
	●	Q03UDCPU	Q04UDHCPU	Q06UDHCPU	Q10UDHCPU	Q13UDHCPU	Q20UDHCPU	Q26UDHCPU	—	
	● (SRAM card, Flash card, ATA card)									
	—									
	40 ns	20 ns	9.5 ns							
	80 ns	40 ns	19 ns							
	14	28	60							
	0.18 µs	0.12 µs	0.057 µs							
	857	Q03 ... Q26UDE(H)CPU: 865 Q03 ... 26UD(H)CPU: 855							865	
	●									
	●									
	●									
	●									
	0.5 ... 2000 ms (setting available in units of 0.5 ms)									
	20K steps	30K steps	40K steps	60K steps	100K steps	130K steps	200K steps	260K steps	500K steps	1000K steps
	8192 points									
	2048 points	4096 points								
	8192 points									
	8192 points									
	8192 points									
	2048 points									
	0 point									
	1024 points									
	12288 points									
	0 point								131072 points	
	8192 points									
	0 point									
	2048 points									
	2048 points									
	2048 points									
	2048 points									
	65536 points*9	98304 points*9	131072 points*9	393216 points*9	524288 points*9		655360 points*9		786432 points*9	917504 points*9
	8192 points									
	Max. 20 points									
	Max. 10 points (Index register [Z] is used in double words.)									
	4096 points								8192 points	
	256 points									
	2048 points									
	2048 points									
	16 points									
	16 points									
	5 points									
	●									
	●									

Basic model QCPU

Item		Q00JCPU	Q00CPU	Q01CPU
Control method		Sequence program control method		
I/O control mode		Refresh		
Program language (sequence control language)		• Relay symbol language (ladder) • Logic symbolic language (list) • MELSAP3 (SFC), MELSAP-L • Function block • Structured text (ST)		
Peripheral connection port	USB	—		
	RS-232	●		
Memory card interface		—		
Processing speed*1	LD instruction	200 ns	160 ns	100 ns
	MOV instruction	700 ns	560 ns	350 ns
	PC MIX value (instruction/μs)*2	1.6	2.0	2.7
	Floating point addition	65.5 μs	60.5 μs	49.5 μs
Total number of instructions*3		534	564	
Floating point instruction		●		
Character string processing instruction		●*4		
PID instruction		●		
Special function instruction (Trigonometric function, square root, exponential operation, etc.)		●		
Constant scan (Function for keeping regular scan time)		1 ... 2000 ms (setting available in units of 1 ms)		
Program capacity		8K steps		14K steps
Number of I/O device points [X/Y]		2048 points		
Number of I/O points [X/Y]		256 points	1024 points	
Internal relay [M]*5		8192 points		
Latch relay [L]*5		2048 points		
Link relay [B]*5		2048 points		
Timer [T]*5		512 points		
Retentive timer [ST]*5		0 point		
Counter [C]*5		512 points		
Data register [D]*5		11136 points		
Link register [W]*5		2048 points		
Annunciator [F]*5		1024 points		
Edge relay [V]*5		1024 points		
Link special relay [SB]		1024 points		
Link special register [SW]		1024 points		
File register [R, ZR]		—	65536 points	
Step relay [S]		2048 points		
Index register [Z]		10 points		
Pointer [P]		300 points		
Interrupt pointer [I]		128 points		
Special relay [SM]		1024 points		
Special register [SD]		1024 points		
Function input [FX]		16 points		
Function output [FY]		16 points		
Function register [FD]		5 points		
Local device		—		
Device initial values		●		

*1: The processing speed is the same even when the device is indexed.
*2: The PC MIX value is the average number of instructions such as the basic and data processing instructions executed in 1 μs. A larger value indicates a higher processing speed.
*3: Intelligent function module dedicated instructions are not included.
*4: Character strings can be used only when using the character string transfer command ($MOV).
*5: Indicates the number of points in the default state. This can be changed with the parameter.

High Performance QCPU

Item		Q02CPU	Q02HCPU	Q06HCPU	Q12HCPU	Q25HCPU
Control method		Sequence program control method				
I/O control mode		Refresh				
Program language (sequence control language)		• Relay symbol language (ladder) • Logic symbolic language (list) • MELSAP3 (SFC), MELSAP-L • Function block • Structured text (ST)				
Peripheral connection port	USB	—	●			
	RS-232	●				
Memory card interface		● (SRAM card, Flash card, ATA card)				
Processing speed*1	LD instruction	79 ns	34 ns			
	MOV instruction	237 ns	102 ns			
	PC MIX value (instruction/μs)*2	4.4	10.3			
	Floating point addition	1.8 μs	0.78 μs			
Total number of instructions*3		725				
Floating point instruction		●				
Character string processing instruction		●				
PID instruction		●				
Special function instruction (Trigonometric function, square root, exponential operation, etc.)		●				
Constant scan (Function for keeping regular scan time)		0.5 ... 2000 ms (setting available in units of 0.5 ms)				
Program capacity		28K steps		60K steps	124K steps	252K steps
Number of I/O device points [X/Y]		8192 points				
Number of I/O points [X/Y]		4096 points				
Internal relay [M]*4		8192 points				
Latch relay [L]*4		8192 points				
Link relay [B]*4		8192 points				
Timer [T]*4		2048 points				
Retentive timer [ST]*4		0 point				
Counter [C]*4		1024 points				
Data register [D]*4		12288 points				
Link register [W]*4		8192 points				
Annunciator [F]*4		2048 points				
Edge relay [V]*4		2048 points				
Link special relay [SB]		2048 points				
Link special register [SW]		2048 points				
File register [R, ZR]		32768 points*5	65536 points*5		131072 points*5	
Step relay [S]		8192 points				
Index register [Z]		16 points				
Pointer [P]		4096 points				
Interrupt pointer [I]		256 points				
Special relay [SM]		2048 points				
Special register [SD]		2048 points				
Function input [FX]		16 points				
Function output [FY]		16 points				
Function register [FD]		5 points				
Local device		●				
Device initial values		●				

*1: The processing speed is the same even when the device is indexed.
*2: The PC MIX value is the average number of instructions such as the basic and data processing instructions executed in 1 μs. A larger value indicates a higher processing speed.
*3: Intelligent function module dedicated instructions are not included.
*4: Indicates the number of points in the default state. This can be changed with the parameter.
*5: Indicates the number of points when the built-in memory (standard RAM) is used. Capacity can be expanded by using an SRAM card or a Flash card. (Writing from a program is not possible with a Flash card.) With an SRAM card, up to 1041408 points can be used.

Process CPU

Item		Q02PHCPU	Q06PHCPU	Q12PHCPU	Q25PHCPU
Control method		Sequence program control method			
I/O control mode		Refresh			
Program language	Sequence control language	• Relay symbol language (ladder) • Logic symbolic language (list) • MELSAP3 (SFC), MELSAP-L • Function block • Structured text (ST)			
	Process control language	• Process control FBD*1			
Peripheral connection port	USB	●			
	RS-232	●			
Memory card interface		● (SRAM card, Flash card, ATA card)			
Processing speed*2	LD instruction	34 ns			
	MOV instruction	102 ns			
	PC MIX value (instruction/μs)*3	10.3			
	Floating point addition	0.78 μs			
Total number of instructions*4		757			
Floating point instruction		●			
Character string processing instruction		●			
PID instruction		—			
Process control instruction		●			
Special function instruction (Trigonometric function, square root, exponential operation, etc.)		●			
Constant scan (Function for keeping regular scan time)		0.5 ... 2000 ms (setting available in units of 0.5 ms)			
Program capacity		28K steps	60K steps	124K steps	252K steps
Number of I/O device points [X/Y]		8192 points			
Number of I/O points [X/Y]		4096 points			
Internal relay [M]*5		8192 points			
Latch relay [L]*5		8192 points			
Link relay [B]*5		8192 points			
Timer [T]*5		2048 points			
Retentive timer [ST]*5		0 point			
Counter [C]*5		1024 points			
Data register [D]*5		12288 points			
Link register [W]*5		8192 points			
Annunciator [F]*5		2048 points			
Edge relay [V]*5		2048 points			
Link special relay [SB]		2048 points			
Link special register [SW]		2048 points			
File register [R, ZR]		65536 points*6		131072 points*6	
Step relay [S]		8192 points			
Index register [Z]		16 points			
Pointer [P]		4096 points			
Interrupt pointer [I]		256 points			
Special relay [SM]		2048 points			
Special register [SD]		2048 points			
Function input [FX]		16 points			
Function output [FY]		16 points			
Function register [FD]		5 points			
Local device		●			
Device initial values		●			

*1: PX Developer is required for programming by FBD.
*2: The processing speed is the same even when the device is indexed.
*3: The PC MIX value is the average number of instructions such as the basic and data processing instructions executed in 1 μs. A larger value indicates a higher processing speed.
*4: Intelligent function module dedicated instructions are not included.
*5: Indicates the number of points in the default state. This can be changed with the parameter.
*6: Indicates the number of points when the built-in memory (standard RAM) is used. Capacity can be expanded by using an SRAM card or a Flash card. (Writing from a program is not possible with a Flash card.) With an SRAM card, up to 1041408 points can be used.

Redundant CPU

Item		Q12PRHCPU	Q25PRHCPU
Control method		Sequence program control method	
I/O control mode		Refresh	
Program language	Sequence control language	• Relay symbol language (ladder) • Logic symbolic language (list) • MELSAP3 (SFC), MELSAP-L • Function block • Structured text (ST)	
	Process control language	• Process control FBD*1	
Peripheral connection port	USB	●	
	RS-232	●	
Memory card interface		● (SRAM card, Flash card, ATA card)	
Processing speed*2	LD instruction	34 ns	
	MOV instruction	102 ns	
	PC MIX value (instruction/μs)*3	10.3	
	Floating point addition	0.78 μs	
Total number of instructions*4		778	
Floating point instruction		●	
Character string processing instruction		●	
PID instruction		●	
Process control instruction		●	
Special function instruction (Trigonometric function, square root, exponential operation, etc.)		●	
Constant scan (Function for keeping regular scan time)		0.5 ... 2000 ms (setting available in units of 0.5 ms)	
Program capacity		124K steps	252K steps
Number of I/O device points [X/Y]		8192 points	
Number of I/O points [X/Y]		4096 points	
Internal relay [M]*5		8192 points	
Latch relay [L]*5		8192 points	
Link relay [B]*5		8192 points	
Timer [T]*5		2048 points	
Retentive timer [ST]*5		0 point	
Counter [C]*5		1024 points	
Data register [D]*5		12288 points	
Link register [W]*5		8192 points	
Annunciator [F]*5		2048 points	
Edge relay [V]*5		2048 points	
Link special relay [SB]		2048 points	
Link special register [SW]		2048 points	
File register [R, ZR]		131072 points*6	
Step relay [S]		8192 points	
Index register [Z]		16 points	
Pointer [P]		4096 points	
Interrupt pointer [I]		256 points	
Special relay [SM]		2048 points	
Special register [SD]		2048 points	
Function input [FX]		16 points	
Function output [FY]		16 points	
Function register [FD]		5 points	
Local device		●	
Device initial values		●	

*1: PX Developer is required for programming by FBD.
*2: The processing speed is the same even when the device is indexed.
*3: The PC MIX value is the average number of instructions such as the basic and data processing instructions executed in 1 μs. A larger value indicates a higher processing speed.
*4: Intelligent function module dedicated instructions are not included.
*5: Indicates the number of points in the default state. This can be changed with the parameter.
*6: Indicates the number of points when the built-in memory (standard RAM) is used. Capacity can be expanded by using an SRAM card or a Flash card. (Writing from a program is not possible with a Flash card.) With an SRAM card, up to 1041408 points can be used.

MELSEC-L Series

The L Series advances the production sites. Offers ease of use thanks to its job-site oriented design.

Design concept based on passion for manufacturing, reliable technology and reliability, and forethought on deployment and operation.
Equipped with various I/O functions. The L Series improves on-site efficiency by realizing “simplicity,” “ease of use,” and “diverse ease of use controls.”

CPU Module

Designed to control programmable controller systems.
The L Series CPU is equipped with various I/O functions.



Power Supply Module

Supplies power to CPU, I/O, and other modules.



Branch/Extension Module

System expandable according to production equipment scale.



I/O Module

Connects input and output devices.
Various lineup of I/O modules according to your system configuration needs.



Analog I/O Module

Inputs and outputs analog data.
Enables high-speed, high-precision, high-resolution controls.



Simple Motion Module/ Positioning Module

Enable high-speed, high-precision positioning control.



High-Speed Counter Module/ Flexible High-Speed I/O Control Module

Counts high-speed pulse easily and accurately.



Network Module

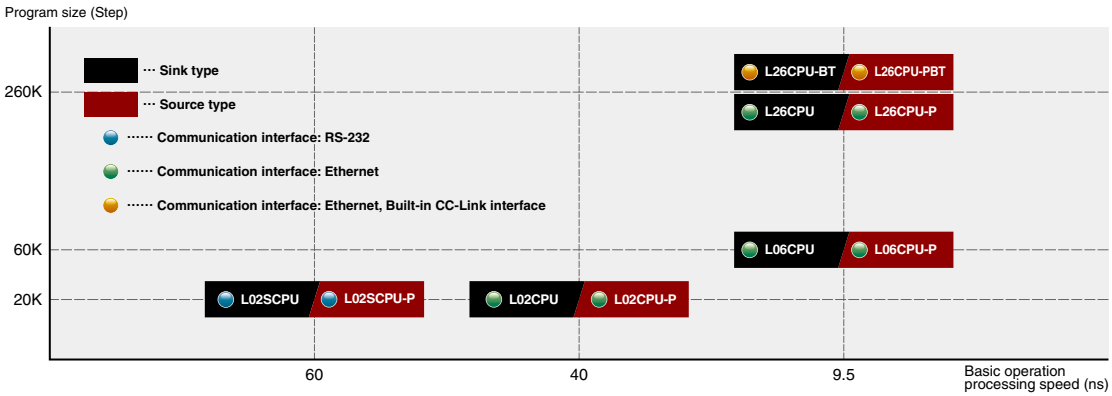
Interfaces with control-system network and modules that enable to communicate information with upper management systems.
Built with diverse network to seamlessly connect each FA layers.



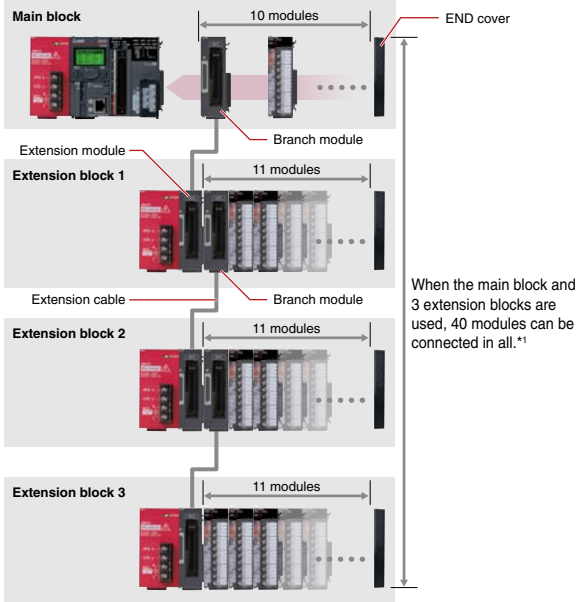


Convenience that fits in the palm of your hand

The L Series is a compact-class controller, part of the MELSEC products renowned for exceptional cost verses performance and strong reliability. It provides the performance, functions, and capabilities required for today's demanding applications in a small package. MELSEC-L Series greatly expands the range of functionality traditionally associated with compact programmable controllers and through user-centric design, pushes the limits of ease of use.



■ Example of largest system configuration of L26CPU-BT



■ CPU Module



- PLC CPU (Sink type/Source type) built-in communication interface
  - ►RS232
  - ►Ethernet
  - ►Ethernet + CC-Link

■ Options



- Display unit
- RS-232 adapter
- RS-422/485 adapter
- Battery
- SD/SDHC memory card

■ Power Supply Module



- Power supply module
- Power supply module (Slim type)

■ Branch/Extension Module



- Branch module
- Extension module

■ Module



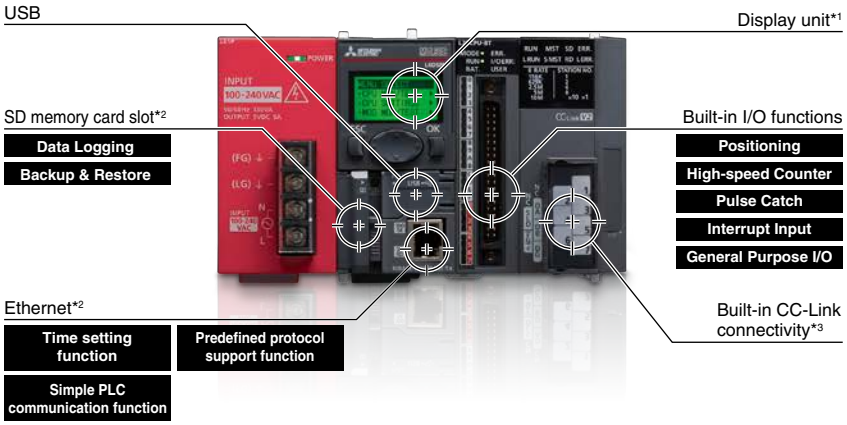
- I/O modules
- Analog module
- Temperature control module
- Simple motion module
- Positioning module
- High-speed counter module
- Flexible high-speed I/O control module
- Network module

CPU module	Number of extension blocks	Number of connectable modules*2
L02SCPU(-P) L02CPU(-P)	Up to 2 blocks	Main block: 10 modules Extension block: 11 modules
L06CPU(-P) L26CPU(-P) L26CPU-(P)BT	Up to 3 blocks	

*1: Total number of I/O modules, intelligent function modules and network modules, excluding branch modules.
*2: Total number of I/O modules, intelligent function modules, network modules and branch modules.
This does not include the following: Power supply, CPU, display units, extension modules, RS-232 adapter, RS-422/485 adapter, and END covers.

Equipped with various built-in I/O functions and interfaces

Compact in size yet built with extensive I/O functions. Due to an abundance of advanced functionality, L Series CPUs are flexible enough to meet a wide variety of needs. The user-friendly display unit enables routine operations without a computer. An SD memory card slot is included as standard for data logging and program storage. Upload programs and manage L Series controllers using GX Works2 and iQ Works, the most advanced and effective software for Mitsubishi controllers yet.



*1: Option (sold separately). Not available for L02SCPU(-P).
*2: Included with L02CPU(-P), L06CPU(-P), L26CPU(-P), L26CPU-(P)BT
*3: Included with L26CPU-(P)BT

Gain more flexibility with an integrated system bus structure

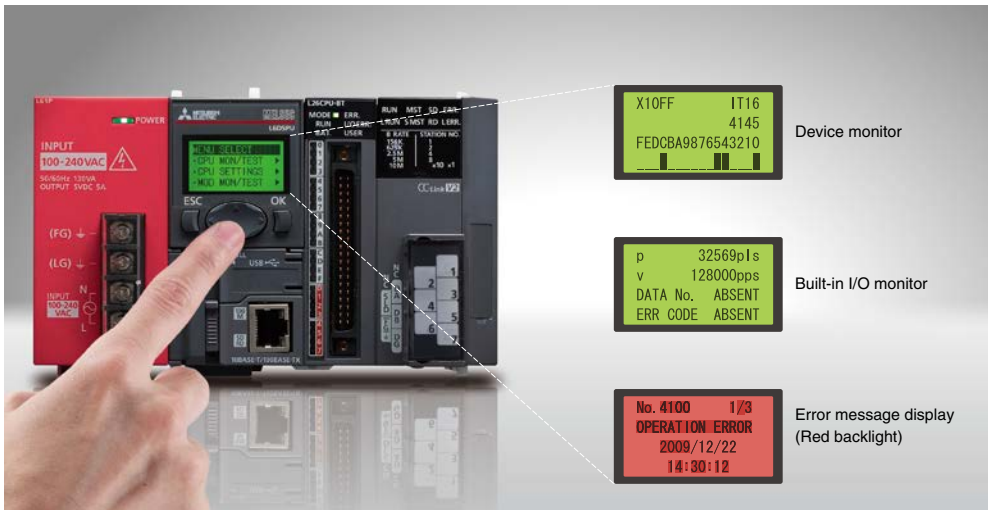
The L Series do not require a base; simply attach directly to the DIN rail. The installation space is not restricted by base size, and the system can be installed with minimal required space.
Furthermore, the addition of modules to the system is not restricted by the number of available base unit slots and costs may be reduced due to the elimination of extension base units.



Easy to use display

Check the system status and make setting changes directly from the display*4. Error status is clearly identified and troubleshooting and error investigation can be performed all without the need for any connections or engineering software.

*4: Not available for L02SCPU(-P).



CPU Module

Our extensive lineup offers the best CPU module suited to your use.



Type	Model	Basic operation processing speed (LD instruction)	Program capacity	Number of I/O points [X/Y]	Peripheral connection ports	Compatible memory card	Others
Output: Sink type	L02SCPU	60 ns	20K steps	1024 points	USB, RS-232	–	Communication protocol, Built-in I/O functions (Input: 16 points, Output: 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter)
	L02CPU	40 ns	20K steps	1024 points	USB, Ethernet	SD	Communication protocol, Built-in I/O functions (Input: 16 points, Output: 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter)
	L06CPU	9.5 ns	60K steps	4096 points	USB, Ethernet	SD	Communication protocol, Built-in I/O functions (Input: 16 points, Output: 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter)
	L26CPU	9.5 ns	260K steps	4096 points	USB, Ethernet	SD	Communication protocol, Built-in I/O functions (Input: 16 points, Output: 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter)
	L26CPU-BT	9.5 ns	260K steps	4096 points	USB, Ethernet	SD	Communication protocol, Built-in I/O functions (Input: 16 points, Output: 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter)
Output: Source type	L02SCPU-P	60 ns	20K steps	1024 points	USB, RS-232	–	Communication protocol, Built-in I/O functions (Input: 16 points, Output: 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter)
	L02CPU-P	40 ns	20K steps	1024 points	USB, Ethernet	SD	Communication protocol, Built-in I/O functions (Input: 16 points, Output: 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter)
	L06CPU-P	9.5 ns	60K steps	4096 points	USB, Ethernet	SD	Communication protocol, Built-in I/O functions (Input: 16 points, Output: 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter)
	L26CPU-P	9.5 ns	260K steps	4096 points	USB, Ethernet	SD	Communication protocol, Built-in I/O functions (Input: 16 points, Output: 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter)
	L26CPU-PBT	9.5 ns	260K steps	4096 points	USB, Ethernet	SD	Communication protocol, Built-in I/O functions (Input: 16 points, Output: 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), CC-Link

SD SD Memory Card
Communication protocol Predefined protocol support function
CC-Link CC-Link master/local station function

*Bundled products including CPU module, display module (L6DSPU), power supply module (L61P) are also available. Please refer to the product list for more details.



Power Supply Module



MELSEC-L Series power supply module comes in normal and slim types.

Type	Model	Input voltage	Output voltage	Output current	Others
Power supply	L61P	100...240 V AC	5 V DC	5 A	–
	L63P	24 V DC	5 V DC	5 A	–
Slim type power supply	L63SP	24 V DC	5 V DC	5 A	No isolation

Branch Module/Extension Module



Branch and extension modules can be used for block extension.

Type	Model	Internal current consumption	Others
Branch module	L6EXB	0.08 A	–
Extension module	L6EXE	0.08 A	END cover included

RS-232 Adapter, RS-422/485 Adapter



Adapter unit to connect RS-232 and RS-422/485 compatible peripheral devices. GOT(HMI) and other RS-232, RS-422/485 compatible peripheral devices can be connected.

Type	Model	Interface	Max. communication speed	Number of channels	Transmission distance (Overall distance)	Others
RS-232 adapter	L6ADP-R2	RS-232	115200 bps Maximum data transmission speed	1 ch	15 m	GOT(HMI) connection MELSOFT connection Communication protocol
RS-422/485 adapter	L6ADP-R4	RS-422/485	1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps	1 ch	1200 m	GOT(HMI) connection Communication protocol

Communication protocol Predefined protocol support function

I/O Module

Input Module



Our lineup of input modules covers various control situations.
Select the appropriate model according to voltage, input format, input points, wiring method, etc.

Type	Model	Points	Rated input voltage	Rated input current	Common terminal arrangement	Response time	External interface
AC input	LX10	16 points	100...120 V AC	8.2 mA (100 V AC, 60 Hz) 6.8 mA (100 V AC, 50 Hz)	16 points/common	20 ms	Screw terminal block
	LX28	8 points	100...240 V AC	16.4 mA (200 V AC, 60 Hz) 13.7 mA (200 V AC, 50 Hz) 8.2 mA (100 V AC, 60 Hz) 6.8 mA (100 V AC, 50 Hz)	8 points/common	20 ms	Screw terminal block
DC input (positive/negative shared common)	LX40C6	16 points	24 V DC	6.0 mA	16 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	Screw terminal block
	LX41C4	32 points	24 V DC	4.0 mA	32 points/common	1 ms 5 ms 10 ms 20 ms 70ms	40-pin C
	LX42C4	64 points	24 V DC	4.0 mA	32 points/common	1 ms 5 ms 10 ms 20 ms 70 ms	40-pin C × 2

40-pin C 40-pin connector 40-pin C × 2 40-pin connector × 2

Output Module



Our full lineup of transistor output, relay, and triac will meet your needs according to intended use and number of outputs.

Type	Model	Number of output points	Rated load voltage	Max. load current (Rated switching current)	Common terminal arrangement	Response time	External interface
Relay output	LY10R2	16 points	24 V DC/240 V AC	2 A/point 8 A/common	16 points/common	12 ms	Screw terminal block
	LY18R2A	8 points	24 V DC/240 V AC	2 A/point 8 A/module	All points independent	12 ms	Screw terminal block
Triac output	LY20S6	16 points	100...240 V AC	0.6 A/point 4.8 A/common	16 points/common	1 ms and 0.5 cycles	Screw terminal block
	LY28S1A	8 points	100...240 V AC	1 A/point 8 A/module	All points independent	1 ms and 0.5 cycles	Screw terminal block
Transistor output (Sink type)	LY40NT5P	16 points	12...24 V DC	0.5 A/point 5 A/common	16 points/common	1 ms	Screw terminal block
	LY41NT1P	32 points	12...24 V DC	0.1 A/point 2 A/common	32 points/common	1 ms	40-pin C
	LY42NT1P	64 points	12...24 V DC	0.1 A/point 2 A/common	32 points/common	1 ms	40-pin C × 2
Transistor output (Source type)	LY40PT5P	16 points	12...24 V DC	0.5 A/point 5 A/common	16 points/common	1 ms	Screw terminal block
	LY41PT1P	32 points	12...24 V DC	0.1 A/point 2 A/common	32 points/common	1 ms	40-pin C
	LY42PT1P	64 points	12...24 V DC	0.1 A/point 2 A/common	32 points/common	1 ms	40-pin C × 2

40-pin C 40-pin connector 40-pin C × 2 40-pin connector × 2

I/O Combined Module



I/O module that can control both input and output in one unit.

Type	Model	Points/ Number of output points	Rated input voltage/Rated load voltage	Rated input current	Max. load current	Common terminal arrangement	Response time	External interface
DC input/ Transistor output (Sink type)	LH42C4NT1P	Input 32 points	24 V DC	4.0 mA	–	32 points/common	1 ms, 5 ms, 10 ms, 20 ms, 70 ms	40-pin C × 2
		Output 32 points	12...24 V DC	–	0.1 A/point, 2 A/common	32 points/common	1 ms	
DC input/ Transistor output (Source type)	LH42C4PT1P	Input 32 points	24 V DC	4.0 mA	–	32 points/common	1 ms, 5 ms, 10 ms, 20 ms, 70 ms	40-pin C × 2
		Output 32 points	12...24 V DC	–	0.1 A/point, 2 A/common	32 points/common	1 ms	

40-pin C × 2 40-pin connector × 2

Analog I/O Module

Multiple Input (voltage/current/temperature) Module



Module that can handle various analog and temperature sensor signal inputs such as “voltage,” “current,” “micro voltage,” “thermocouple,” and “resistance temperature detector” in one unit. Its ability to handle various inputs can reduce the number of installed analog modules and save space.

Type	Model	Number of channels	Input	Conversion speed	Resolution	External interface	Others
Multiple input (voltage/current/ temperature)	L60MD4-G	4 ch	-10...10 V DC 0...20 mA DC -100...100 mV DC Thermocouple K,J,T,E,N,R,S,B,U,L,PLⅡ, W5Re/W26Re Resistive thermal device Pt1000,Pt100,JPt100,Pt50	50 ms/ch	0...20000 -20000...20000 0...20000 -20000...20000 Thermocouple B,R,S,N,PLⅡ,W5Re/W26Re:0.3°C K,E,J,T,U,L:0.1°C Resistive thermal device Pt100(-20...120°C),JPt100(-20...120°C):0.03°C Pt100(-200...850°C),JPt100(-200...600°C), Pt1000,Pt50:0.1°C	Screw terminal block	Channel isolated

Analog Input Module/Analog Output Module/Analog I/O Module



Our wide range of analog units is built with various functions to support the control needs of your site.

Type	Model	Number of channels	Input/Output	Conversion speed	Resolution	External interface	Others
Voltage input	L60ADVL8	8 ch	-10...10 V DC	1 ms/ch	-16000...16000	Screw terminal block	–
Current input	L60ADIL8	8 ch	0...20 mA DC	1 ms/ch	0...8000	Screw terminal block	–
Voltage, current input	L60AD4	4 ch	-10...10 V DC 0...20 mA DC	20 µs/ch 80 µs/ch 1 ms/ch	0...20000 -20000...20000	Screw terminal block	–
	L60AD4-2GH	4 ch	-10...10 V DC 0...20 mA DC	40 µs/2ch	0...32000 -32000...32000	Screw terminal block	Dual channel isolation
Voltage input	L60DAVL8	8 ch	-10...10 V DC	200 µs/ch	-16000...16000	Screw terminal block	–
Current input	L60DAIL8	8 ch	0...20 mA DC	200 µs/ch	0...8000	Screw terminal block	–
Voltage, current output	L60DA4	4 ch	-10...10 V DC 0...20 mA DC	20 µs/ch	0...20000 -20000...20000	Screw terminal block	–
Voltage, current I/O	L60AD2DA2	Input 2 channels	-10...10 V DC 0...20 mA DC	80 µs/ch	-16000...16000 0...12000	Screw terminal block	–
		Output 2 channels	-10...10 V DC 0...20 mA DC	80 µs/ch	-16000...16000 0...12000		

Temperature Input Module/Temperature Control Module

Available are a temperature input module compatible with various temperature sensors and a lineup of temperature controllers that ensure standard control, heating-cooling control and optimum temperature control by detecting heater disconnection.


Temperature input module


Temperature control module

Type		Model	Number of channels	Input/Output	Conversion speed (Sampling cycle)	External interface	Others
Temperature input	Resistive thermal device	L60RD8	8 ch	RTD Pt1000, Pt100, JPt100, Pt50, Ni500, Ni120, Ni100, Cu100, Cu50	40 ms/ch	SC terminal block	–
Temperature control	Thermocouple	L60TCTT4	4 ch	Thermocouple K,J,T,B,S,E,R,N,U,L,PL Ⅱ, W5Re/W26Re	250 ms/4ch 500 ms/4ch	Screw terminal block	Channel isolated Standard control Heating and cooling control *1
		L60TCTT4BW	4 ch	Thermocouple K,J,T,B,S,E,R,N,U,L,PL Ⅱ, W5Re/W26Re	250 ms/4ch 500 ms/4ch	Screw terminal block × 2	Channel isolated Standard control Heating and cooling control *1 Heater disconnection detection function
	Resistive thermal device	L60TCRT4	4 ch	Platinum type resistive temperature device Pt100,JPt100	250 ms/4ch 500 ms/4ch	Screw terminal block	Channel isolated Standard control Heating and cooling control *1
		L60TCRT4BW	4 ch	Platinum type resistive temperature device Pt100,JPt100	250 ms/4ch 500 ms/4ch	Screw terminal block × 2	Channel isolated Standard control Heating and cooling control *1 Heater disconnection detection function

SC terminal block: Spring clamp terminal block

*1: 4-channel (loop) heating/cooling can be controlled by using other output modules.

Simple Motion Module/Positioning Module

Simple Motion Module



Offers a wide variety of controls with an intuitive approach of a positioning module. Sequence program is all you need for simple setup of highly-advanced and wide range of motion controls including synchronous control, cam control, speed-torque control, and others. Essential functions such as synchronous encoder and mark detection are provided as standard features.

Type	Model	Maximum number of control axes	Control unit	Operation cycle	Positioning data
Servo amplifier connection system: SSCNETⅢ/H	LD77MS2	2 axes	mm inch degree pulse	0.88 ms 1.77 ms	600
	LD77MS4	4 axes	mm inch degree pulse	0.88 ms 1.77 ms	600
	LD77MS16	16 axes	mm inch degree pulse	0.88 ms 1.77 ms	600

600: 600 data/axis

Positioning Module



High-speed, high-precision positioning modules support various positioning controls, including 2 - 4-axis linear interpolation, 2-axis circular interpolation, 3-axis helical interpolation and trajectory control.

Type	Model	Maximum number of control axes	Control unit	Positioning data	Maximum output pulse	External interface
Open collector output	LD75P1	1 axis	mm inch degree pulse	600	200 kpulse/s	40-pin C
	LD75P2	2 axes	mm inch degree pulse	600	200 kpulse/s	40-pin C
	LD75P4	4 axes	mm inch degree pulse	600	200 kpulse/s	40-pin C × 2
Differential driver	LD75D1	1 axis	mm inch degree pulse	600	4 Mpulse/s	40-pin C
	LD75D2	2 axes	mm inch degree pulse	600	4 Mpulse/s	40-pin C
	LD75D4	4 axes	mm inch degree pulse	600	4 Mpulse/s	40-pin C × 2

600: 600 data/axis
40-pin C: 40-pin connector
40-pin C × 2: 40-pin connector × 2

High-Speed Counter Module/Flexible High-Speed I/O Control Module

High-Speed Counter Module

Inputs may be connected to a variety of devices for positioning control, precision measurement, etc. The maximum counting speed may be adjusted via parameter for more reliable counting at lower frequencies.



Model	Number of channels	Counting speed switch setting	Count input signal	External input	Coincidence output	External interface
LD62	2 ch	200 kpps 100 kpps 10 kpps	5 V DC 12 V DC 24 V DC	5 V DC 12 V DC 24 V DC	Transistor (Sink), 12/24 V DC, 0.5 A/point, 2 A/common	40-pin C
LD62D	2 ch	500 kpps 200 kpps 100 kpps 10 kpps	Differential line driver	5 V DC 12 V DC 24 V DC	Transistor (Sink), 12/24 V DC, 0.5 A/point, 2 A/common	40-pin C

40-pin C 40-pin connector

Flexible High-Speed I/O Control Module

Hardware processing enables high-speed response asynchronous to CPU and control bus, realizing stable input/output performance. FPGA setup can be performed easily by simply “selecting,” “linking” and “setting parameters” with the dedicated tool.



Model	Number of input points	Number of output points	Number of interrupts	I/O response time	Pulse input speed	Pulse output speed	Main blocks
LD40PD01	12 points 5/24 V DC/ differential	8 points DC / 6 points Differential	8 interrupts	≤ 1 µs	Max. 200 kpulse/s DC / Max. 8 Mpulse/s Differential	Max. 200 kpulse/s DC / Max. 8 Mpulse/s Differential	External input block, Parallel encoder block, SSI encoder block, Multi function counter block, Logical operation block, External output block

Network Module

Ethernet Interface Module



Ethernet interface module offers users to make the best choice for the system and target devices.

Model	Transmission interface	Number of channels	Max. communication speed	Others
LJ71E71-100	100 BASE-TX 10 BASE-T	1 ch	100 Mbps 10 Mbps	MELSOFT connection SLMP communication MC protocol communication Communication protocol

Communication protocol Predefined protocol support function

CC-Link IE Field Network Module



CC-Link IE Field Network master station/local station is an all-round field network that integrates the controller distributed control, I/O control, safety control, and motion control. High-speed (1Gbps) and enhanced communication responsiveness greatly reduces cycle time as well.

CC-Link IE

Model	Connection cable	Transmission speed	Network topology	Overall distance	Compatible station	Maximum connectable stations per network
LJ71GF11-T2	Ethernet cable of category 5e or higher (Double shielded cable) which satisfies 1000BASE-T standard	1 Gbps	Line topology Star topology Ring topology Coexistence of line topology and star topology is possible.	Line topology: 12 km (with 1 master and 120 slaves connected) Star topology: Depends on the system configuration. Ring topology: 12.1 km (with 1 master and 120 slaves connected)	Master station Local station	121 stations (1 master, 120 slaves)
LJ72GF15-T2	Ethernet cable of category 5e or higher (Double shielded cable) which satisfies 1000BASE-T standard	1 Gbps	Line topology Star topology Ring topology Coexistence of line topology and star topology is possible.	Line topology: 12 km (with 1 master and 120 slaves connected) Star topology: Depends on the system configuration. Ring topology: 12.1 km (with 1 master and 120 slaves connected)	Remote station	121 stations (1 master, 120 slaves)

CC-Link Master/Local Module



Field network module which delivers outstanding cost-performance in I/O control.
The LJ61BT11 module supports CC-Link version 1 and 2, and can be used as either a local or master station.

CC-Link

Model	Connection cable	Transmission speed	Network topology	Overall distance	Compatible station	Maximum connectable stations per network
LJ61BT11	CC-Link dedicated cables compatible with Ver.1.10	156 kbps 625 kbps 2.5 Mbps 5 Mbps 10 Mbps	Bus (RS-485)	1200 m 900 m 400 m 160 m 100 m	Ver.2.0 Master station Ver.2.0 Local station Ver.1.0 Master station Ver.1.0 Local station	65 stations (1 master, 64 slaves)

CC-Link/LT Master Module

CC-Link/LT is a wire-saving sensor level network which is designed for use in panels between simple discrete devices.



CC-Link/LT

Model	Connection cable	Transmission speed	Network topology	Length of trunk line	Max. length drop line	Overall length drop line	Compatible station	Maximum connectable stations per network
LJ61CL12	Dedicated flat cable (0.75 mm² × 4), VCTF cable, flexible cable	156 kbps	T-branch type	500 m	60 m	200 m	Master station	65 stations (Remote master station: 1, Remote I/O station: 64)
		625 kbps		100 m	16 m	50 m		
		2.5 Mbps		35 m	4 m	15 m		

AnyWireASLINK Master Module DB

This AnyWireASLINK master module links sensor I/O with programmable controller. It freely arranges ultra-compact sensors to control the 512 I/O points.



AnyWireASLINK

DB Co-developed with other companies

Model	Connection cable	Network topology	Overall distance	Number of connected modules
LJ51AW12AL	Universal 2-wire/4-wire cable, universal cable, dedicated flat cable	Bus type (multi-drop method, T-branch method, tree branch method)	200 m	Max. 128 modules

SSCNET Ⅲ/H Head Module

Compatible with high-speed synchronous SSCNET Ⅲ/H that accelerates the response speed of motion control system.



Model	Connection cable	Transmission speed	Connection method	Maximum station-to-station distance	Communication cycle	Maximum connectable stations per network
LJ72MS15	SSCNET Ⅲ cable (optical fiber cable)	150 Mbps	Daisy chain connection	POF type: 20 m H-PCF type: 50 m	222 μs	1 station
					444 μs	2 stations
					888 μs	4 stations

Serial Communication Module

Communicates with various external devices (PC, GOT(HMI), bar code reader, measuring instrument, etc.) for data sampling/change, monitoring/management, and measurement data sampling of the programmable controller.



Model	Interface	Number of channels	Max. communication speed	Overall distance	Others
LJ71C24	RS-232 RS-422/485	2 ch CH1:RS-232, CH2:RS-422/485	50 bps, 300 bps, 600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 14400 bps, 19200 bps, 28800 bps, 38400 bps, 57600 bps, 115200 bps, 230400 bps (2 channels total: 230.4kbps)	RS-232 Max. 15 m RS-422/485 Max. 1200 m	MELSOFT connection MC protocol communication Communication protocol
LJ71C24-R2	RS-232	2 ch	50 bps, 300 bps, 600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 14400 bps, 19200 bps, 28800 bps, 38400 bps, 57600 bps, 115200 bps, 230400 bps (2 channels total: 230.4kbps)	Max. 15 m	MELSOFT connection MC protocol communication Communication protocol

Communication protocol Predefined protocol support function

Specifications

CPU module specifications

Item			L02SCPU L02SCPU-P	L02CPU L02CPU-P	L06CPU L06CPU-P	L26CPU L26CPU-P	L26CPU-BT L26CPU-PBT
Control method			Stored program cyclic operation				
I/O control mode			Refresh mode (The direct access input/output is available by specifying the direct access input/output (DX, DY).)				
Programming language (sequence control language)			Function block, relay symbol language, MELSAP3 (SFC), MELSAP-L, structured text (ST), logic symbolic language				
Processing speed*1 (sequence instruction)	LD X0		60 ns	40 ns	9.5 ns		
	MOV D0 D1		120 ns	80 ns	19 ns		
Constant scan			0.5...2000 ms (Setting is available in increments of 0.5 ms by parameter.)				
Program size			20K steps (80K bytes)		60K steps (240K bytes)	260K steps (1040K bytes)	
Memory capacity	Program memory (drive 0)		80K bytes		240K bytes	1040K bytes	
	Memory card (RAM) (drive 1)		–				
	Memory card (ROM) (drive 2)		–	Depends on the SD/SDHC memory card used.*2			
	Standard RAM (drive 3)		128K bytes		768K bytes		
	Standard ROM (drive 4)		512K bytes		1024K bytes	2048K bytes	
Maximum number of files stored	Program memory		64 files		124 files	252 files	
	Memory card (RAM)		–				
	Memory card (ROM)	SD	–	Root directory: 511 files (maximum) Subdirectory: 65533 files (maximum)			
		SDHC	–	Root directory: 65534 files (maximum) Subdirectory: 65533 files (maximum)			
	Standard RAM		4 files (each one of the following files: file register file, local device file, sampling trace file, and module error collection file)				
	Standard ROM		128 files		256 files		
Maximum number of intelligent function module parameters		Initial setting	2048 parameters		4096 parameters		
		Refresh	1024 parameters		2048 parameters		
Maximum number of modules specification*3			30		40		
Built-in I/O function			○				
Data logging function			–	○			
Built-in Ethernet function			–	○			
Built-in serial communication function			○	–			
Built-in CC-Link function			–				○
Clock function	Displayed information		Year, month, date, hour, minute, second, and day of the week (automatic leap year detection)				
	Accuracy		0°C: -2.96...+3.74 s (TYP. +1.42 s) per day 25°C: -3.18...+3.74 s (TYP. +1.50 s) per day 55°C: -13.20...+2.12 s (TYP. -3.54 s) per day				

*1: Indexing devices does not delay processing time.
*2: Mitsubishi Electric shall not guarantee the operation of any non-Mitsubishi Electric products.
*3: The total number of modules that can be mounted to a CPU. Refer to the "Maximum number of modules specification" for each module. (Power supply modules, CPU module, display unit, extension module, RS-232 adapter, RS-422/485 adapter, END cover, and END cover with error terminal are not included. Note that only one CPU or head module per system is possible.)

CPU module device specifications

Item		L02SCPU L02SCPU-P	L02CPU L02CPU-P	L06CPU L06CPU-P	L26CPU L26CPU-P	L26CPU-BT L26CPU-PBT
Number of I/O device points (number of points available on a program)		8192 points (X/Y0...X/Y1FFF)				
Number of I/O points		1024 points (X/Y0...X/Y3FF)		4096 points (X/Y0...X/YFFF)		
Internal relay (M)		8192 points (M0...M8191) by default (changeable)				
Latch relay (L)		8192 points (L0...L8191) by default (changeable)				
Link relay (B)		8192 points (B0...B1FFF) by default (changeable)				
Timer (T)		2048 points (T0...T2047) by default (changeable) (Low-speed and high-speed timers available) (Low-speed timer: 1...1000 ms (in increments of 1 ms), default: 100 ms) (High-speed timer: 0.1...100 ms (in increments of 0.1 ms), default: 10 ms)				
Retentive timer (ST)		0 point by default (changeable)(Low-speed and high-speed retentive timers available) (Low-speed retentive timer: 1...1000 ms (in increments of 1 ms), default: 100 ms) (High-speed retentive timer: 0.1...100 ms (in increments of 0.1 ms), default: 10 ms)				
Counter (C)		Normal counter 1024 points (C0...C1023) by default (changeable)				
Data register (D)		12288 points (D0...D12287) by default (changeable)				
Extended data register (D)		32768 points (D12288...D45055) by default (changeable)		131072 points (D12288...D143359) by default (changeable)		
Link register (W)		8192 points (W0...W1FFF) by default (changeable)				
Extended link register (W)		0 point by default (changeable)				
Annunciator (F)		2048 points (F0...F2047) by default (changeable)				
Edge relay (V)		2048 points (V0...V2047) by default (changeable)				
Link special relay (SB)		2048 points (SB0...SB7FF) by default (changeable)				
Link special register (SW)		2048 points (SW0...SW7FF) by default (changeable)				
File register	(R)	32768 points (R0...R32767) (Maximum 65536 points are available by switching blocks.)		32768 points (R0...R32767) (Maximum 393216 points are available by switching blocks.)		
	(ZR)	65536 points (ZR0...ZR65535) (Blocks do not need to be switched.)		393216 points (ZR0...ZR393215) (Blocks do not need to be switched.)		
Step relay (S)		8192 points (S0...S8191) by default				
Index register/standard device register (Z)		20 point (Z0...Z19) (maximum)				
Index register (Z) (32-bit index modification of ZR device)		10 point (Z0...Z18) (maximum) (The index register is used as a double-word device.)				
Pointer (P)		4096 points (P0...P4095) (The local pointer range and the common pointer range can be set by parameter.)				
Interrupt pointer (I)		256 points (I0...I255) (The fixed scan interval for the system interrupt pointer I28 to I31 can be set by parameter.) 0.5...1000 ms (in increments of 0.5 ms) Default I28: 100 ms, I29: 40 ms, I30: 20 ms, I31: 10 ms				
Special relay (SM)		2048 points (SM0...SM2047) (The number of device points is fixed.)				
Special register (SD)		2048 points (SD0...SD2047) (The number of device points is fixed.)				
Function input (FX)		16 points (FX0...FX F) (The number of device points is fixed.)				
Function output (FY)		16 points (FY0...FY F) (The number of device points is fixed.)				
Function register (FD)		5 points (FD0...FD4) (The number of device points is fixed.)				
Intelligent function module device		Device that directly accesses the buffer memory of an intelligent function module Specification format: U□□/G□□				
Latch (data retention during power failure) range		8192 points (L0...L8191) by default (The latch range can be set for the devices, B, F, V, T, ST, C, D, W, and R by parameter.)				

MELSEC-F Series

Push the limits of control.

The Mitsubishi Electric FX PLC Family continues to be successful as a provider of customizable compact control solutions allowing customers to choose the best model to fit their applications.

Entry level Model

Simple and cost effective. Basic model that supports analog and communication expansion.
Perfect for simple automation tasks.



Space-saving and Cost Effective

Standard Model

From automation to network, to more advanced control.
Supports features required for basic control and a variety of applications.



High Speed, Highly Augmentable, Space-saving



High Speed, Space-saving and Cost Effective

High-end Model

Superior speed, power, and flexibility.
Realize high speed control, network support, data logging, and more.



High Speed, High Performance, Highly Augmentable

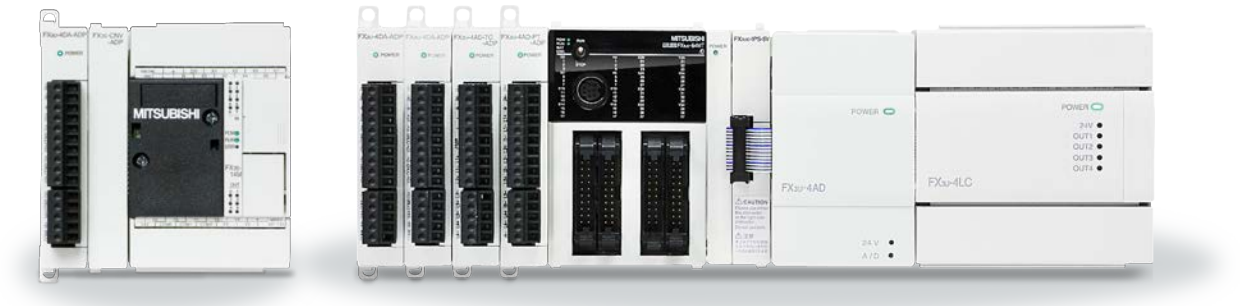


High speed, Wire-Saving, Space-Saving

Modules Plenty of Additional Equipment

Analog Control

From small-point analog control to PID controlled temperature, we offer various additional equipment.



Motor Control

From control via inverter to AC servo motor control, built-in functions, and options for additional equipment, you can have a wide variety of features, such as network communication.



Network

From RS-232C/RS-422/RS-485 serial communication to a CC-Link FA open-field network, Ethernet, or MODBUS®, additional equipment is available for various connections. Connect with numerous devices.



FX3U



Controllable I/O: 16 - 256 points
Max. 384 with CC-Link remote I/O
(Main Unit I/O: 16/32/48/64/80/128 points)

- 3rd generation compact PLC
- High efficiency with more speed, performance, memory, and new functions
- Built-in high speed processing and positioning
- The FX3U can control a maximum of 256 connected I/O, and up to 384 points with CC-Link remote I/O.

Expansion Boards

2



FX3U-422-BD

Communication
FX3U-232-BD
FX3U-422-BD
FX3U-485-BD
FX3U-USB-BD

OR

Interface Board
FX3U-CNV-BD

Analog Setpoint
FX3U-8AV-BD

FX3U Main Units

1



FX3U-32M

FX3U Main Units 16-128 I/O

FX3U-16MR/ES-A	AC D R	FX3U-48MR/ES-A	AC D R	FX3U-80MR/ES-A	AC D R
FX3U-16MT/ES-A	AC D T1	FX3U-48MT/ES-A	AC D T1	FX3U-80MT/ES-A	AC D T1
FX3U-16MT/ESS	AC D T2	FX3U-48MT/ESS	AC D T2	FX3U-80MT/ESS	AC D T2
FX3U-16MR/DS	DC D R	FX3U-48MR/DS	DC D R	FX3U-80MR/DS	DC D R
FX3U-16MT/DS	DC D T1	FX3U-48MT/DS	DC D T1	FX3U-80MT/DS	DC D T1
FX3U-16MT/DSS	DC D T2	FX3U-48MT/DSS	DC D T2	FX3U-80MT/DSS	DC D T2
FX3U-32MR/ES-A	AC D R	FX3U-64MR/ES-A	AC D R	FX3U-128MR/ES-A	AC D R
FX3U-32MT/ES-A	AC D T1	FX3U-64MT/ES-A	AC D T1	FX3U-128MT/ES-A	AC D T1
FX3U-32MT/ESS	AC D T2	FX3U-64MT/ESS	AC D T2	FX3U-128MT/ESS	AC D T2
FX3U-32MS/ES	AC D TR	FX3U-64MS/ES	AC D TR		
FX3U-32MR/DS	DC D R	FX3U-64MR/DS	DC D R		
FX3U-32MT/DS	DC D T1	FX3U-64MT/DS	DC D T1		
FX3U-32MT/DSS	DC D T2	FX3U-64MT/DSS	DC D T2		
FX3U-32MR/UA1	AC E R	FX3U-64MR/UA1	AC E R		

AC AC Power supply
DC DC Power supply
D DC Input (sink/source)
E AC Input
R Relay output
T1 Transistor (sink)
T2 Transistor (source)
TR Triac output

Special Adapters

5



FX3U-ENET-ADP

Communication
FX3U-232ADP-MB
FX3U-485ADP-MB

Network
FX3U-ENET-ADP*1

Data Logging
FX3U-CF-ADP*2

4



FX3U-4AD-PTW-ADP

Analog
FX3U-4AD-ADP
FX3U-4DA-ADP
FX3U-3A-ADP*2

Temperature
FX3U-4AD-PT-ADP
FX3U-4AD-TC-ADP
FX3U-4AD-PTW-ADP
FX3U-4AD-PNK-ADP

3



FX3U-4HSX-ADP

High Speed Counter
FX3U-4HSX-ADP

Positioning
FX3U-2HSY-ADP

*1: Firmware version 3.10 or later.
*2: Firmware version 2.61.

Optional Equipment and Software

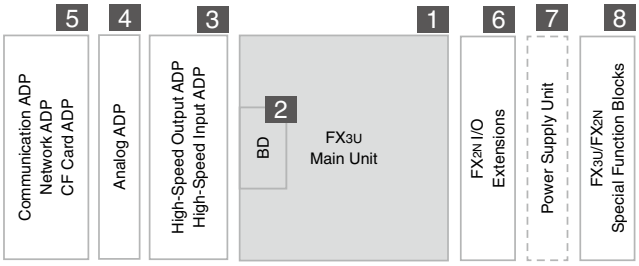


GT14

GOT
GOT1000
(GT10/GT12/GT14/GT16)

Interface Converters
FX-USB-AW
FX-232AWC-H

Software
GX Developer
GX Works2



Special Function Modules

I/O Extension Modules

6


FX2N-48ER

Powered Extension Units

Input/Output Extension Units

FX2N-32ER-ES/UL
FX2N-32ET-ESS/UL
FX2N-48ER-DS
FX2N-48ER-ES/UL
FX2N-48ER-UA1/UL
FX2N-48ET-DSS
FX2N-48ET-ESS/UL


FX2N-8EX


FX2N-16EYR

Unpowered Extension Blocks

Input Extension Blocks

FX2N-8EX-ES/UL
FX2N-8EX-UA1/UL
FX2N-16EX-ES/UL

Output Extension Blocks

FX2N-8EYR-ES/UL
FX2N-8EYT-ESS/UL
FX2N-16EYR-ES/UL
FX2N-16EYT-ESS/UL
FX2N-16EYS

Input/Output Extension Block

FX2N-8ER-ES/UL

Power Supply Unit

7


FX3U-1PSU-5V

Power Supply Unit

FX3U-1PSU-5V

Special Function Blocks

8


FX0N-3A


FX3U-20SSC-H


FX3U-64CCL

Analog

FX0N-3A
FX2N-2AD
FX3U-4AD
FX2N-2DA
FX3U-4DA
FX2N-5A
FX2N-8AD

Positioning

FX2N-1PG-E
FX3U-1PG
FX2N-10PG
FX3U-20SSC-H
FX2N-1RM-E-SET
FX2N-10GM
FX2N-20GM

Network

FX2N-32CCL
FX3U-16CCL-M*1
FX3U-64CCL
FX3U-ENET-L

Temperature

FX2N-2LC
FX3U-4LC
FX2N-4AD-TC
FX2N-4AD-PT

High Speed Counter

FX2N-1HC
FX3U-2HC

Communication

FX2N-232IF

Accessories


FX3U-FLROM-64L

Memory Cassettes

FX3U-FLROM-16
FX3U-FLROM-64
FX3U-FLROM-64L
FX3U-FLROM-1M*3


FX3U-7DM

Display Module

FX3U-7DM

Display Module Holder

FX3U-7DM-HLD


FX0N-65EC

Extension Cables

FX0N-30EC (30cm)
FX0N-65EC (65cm)

Battery

FX3U-32BL

PLC Bus Connector

FX2N-CNV-BC

*3: Firmware version 3.00 or later.

FX3G



Controllable I/O: 14 - 128 points
Max. 256 with CC-Link remote I/O
(Main Unit I/O: 14/24/40/60 points)

- 3rd generation compact PLC
- Highly flexible
- Dual system-bus architecture
- Control of up to 128 directly connected I/O, or up to 256 I/O with CC-Link remote I/O.

Special Adapters

5



FX3U-232ADP-MB



FX3U-485ADP-MB

Communication
FX3U-232ADP-MB
FX3U-485ADP-MB

Network
FX3U-ENET-ADP*

4



FX3U-4AD-ADP



FX3U-4AD-PNK-ADP

Analog
FX3U-4AD-ADP
FX3U-4DA-ADP
FX3U-3A-ADP

Temperature
FX3U-4AD-PT-ADP
FX3U-4AD-TC-ADP
FX3U-4AD-PTW-ADP
FX3U-4AD-PNK-ADP

3



FX3G-CNV-ADP

Interface Adapter
FX3G-CNV-ADP

*: Firmware version 2.00 or later.

FX3G Main Units

1



FX3G-24M



FX3G-40M

FX3G Main Units 14-60 I/O

FX3G-14MR/ES-A	AC	D	R
FX3G-14MT/ES-A	AC	D	T1
FX3G-14MT/ESS	AC	D	T2
FX3G-14MR/DS	DC	D	R
FX3G-14MT/DS	DC	D	T1
FX3G-14MT/DSS	DC	D	T2
FX3G-24MR/ES-A	AC	D	R
FX3G-24MT/ES-A	AC	D	T1
FX3G-24MT/ESS	AC	D	T2
FX3G-24MR/DS	DC	D	R
FX3G-24MT/DS	DC	D	T1
FX3G-24MT/DSS	DC	D	T2
FX3G-40MR/ES-A	AC	D	R
FX3G-40MT/ES-A	AC	D	T1
FX3G-40MT/ESS	AC	D	T2
FX3G-40MR/DS	DC	D	R
FX3G-40MT/DS	DC	D	T1
FX3G-40MT/DSS	DC	D	T2
FX3G-60MR/ES-A	AC	D	R
FX3G-60MT/ES-A	AC	D	T1
FX3G-60MT/ESS	AC	D	T2
FX3G-60MR/DS	DC	D	R
FX3G-60MT/DS	DC	D	T1
FX3G-60MT/DSS	DC	D	T2

AC AC Power supply
DC DC Power supply
D DC Input (sink/source)
R Relay output
T1 Transistor Output (sink)
T2 Transistor Output (source)

Optional Equipment and Software



GT14

GOT
GOT1000
(GT10/GT12/GT14/GT16)

Interface Converters
FX-232AWC-H

Software
GX Developer
GX Works2

Expansion Boards

2

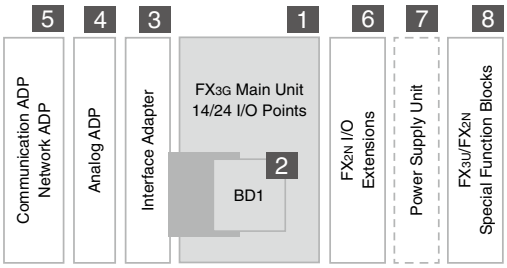


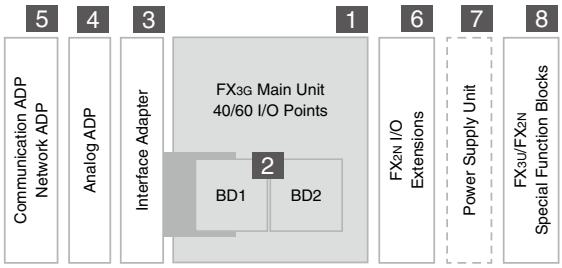
FX3G-232-BD

Communication
FX3G-232-BD
FX3G-422-BD
FX3G-485-BD

Analog
FX3G-2AD-BD
FX3G-1DA-BD

Analog Setpoint
FX3G-8AV-BD





Special Function Modules

I/O Extension Modules

6



FX2N-48ER

Powered Extension Units

Input/Output Extension Units

FX2N-32ER-ES/UL
FX2N-32ET-ESS/UL
FX2N-48ER-ES/UL
FX2N-48ER-DS
FX2N-48ET-DSS
FX2N-48ER-UA1/UL
FX2N-48ET-ESS/UL



FX2N-8EX

Unpowered Extension Blocks

Input Extension Blocks

FX2N-8EX-ES/UL
FX2N-8EX-UA1/UL
FX2N-16EX-ES/UL

Output Extension Blocks

FX2N-8EYR-ES/UL
FX2N-8EYT-ESS/UL
FX2N-16EYR-ES/UL
FX2N-16EYT-ESS/UL
FX2N-16EYS

Input/Output Extension Block

FX2N-8ER-ES/UL

Power Supply Unit

7



FX3U-1PSU-5V

Power Supply Unit

FX3U-1PSU-5V

Special Function Blocks

8



FX3U-4DA

Analog

FX2N-2AD
FX3U-4AD
FX2N-2DA
FX3U-4DA
FX2N-5A
FX2N-8AD

Temperature

FX2N-2LC
FX3U-4LC
FX2N-4AD-TC
FX2N-4AD-PT

Network

FX2N-32CCL
FX3U-16CCL-M*
FX3U-64CCL

Accessories



FX3G-EEPROM-32L

Memory Cassette

FX3G-EEPROM-32L



FX3G-5DM

Display Module

FX3G-5DM



FX0N-65EC

Extension Cables

FX0N-30EC (30cm)
FX0N-65EC (65cm)

PLC Bus Connector

FX2N-CNV-BC

Battery

FX3U-32BL

FX3GC

Controllable I/O: 32 - 128 points
Max. 256 with CC-Link remote I/O
(Main Unit I/O: 32 points)

- 3rd generation super-compact PLC
- Reduced size and wiring using connector-type I/O
- Dual system-bus architecture
- Control of up to 128 directly connected I/O, or up to 256 I/O with CC-Link remote I/O.



Special Adapters

3


FX3U-ENET-ADP


FX3U-232ADP-MB


FX3U-485ADP-MB

Network
FX3U-ENET-ADP*

Communication
FX3U-232ADP-MB
FX3U-485ADP-MB

2


FX3U-4AD-ADP


FX3U-4AD-PNK-ADP

Analog
FX3U-4AD-ADP
FX3U-4DA-ADP
FX3U-3A-ADP

Temperature
FX3U-4AD-PT-ADP
FX3U-4AD-TC-ADP
FX3U-4AD-PTW-ADP
FX3U-4AD-PNK-ADP

*: Firmware version 2.00 or later.

FX3GC Main Units

1


FX3GC-32M

FX3GC Main Units 32 I/O

FX3GC-32MT/D	DC	D	T1
FX3GC-32MT/DSS	DC	D	T2

DC DC Power supply
D DC Input (sink/source)
T1 Transistor Output (sink)
T2 Transistor Output (source)

Optional Equipment and Software


GT14

GOT
GOT1000
(GT10/GT12/GT14/GT16)

Interface Converters
FX-232AWC-H

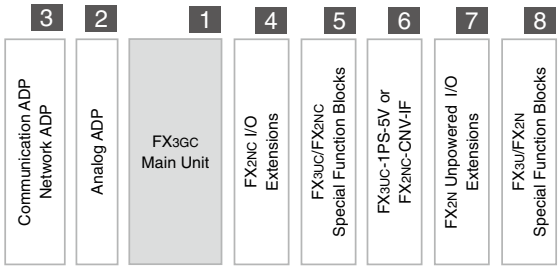
Software
GX Developer
GX Works2

Accessories

I/O Cables
General I/O cable
FX-16E-500CAB-S (5m)



Connecting to Terminal Blocks
FX-16E-150CAB (1.5m)
FX-16E-300CAB (3m)
FX-16E-500CAB (5m)
FX-16E-150CAB-R (1.5m)
FX-16E-300CAB-R (3m)
FX-16E-500CAB-R (5m)



Special Function Modules

I/O Extension Blocks

4


FX2NC-32EX


FX2NC-16EYR-T

Input Extension Blocks

FX2NC-16EX-T-DS
FX2NC-16EX-DS
FX2NC-32EX-DS

Output Extension Blocks

FX2NC-16EYR-T-DS
FX2NC-16EYT-DSS
FX2NC-32EYT-DSS

6


FX3UC-1PS-5V

Power Supply Unit

FX3UC-1PS-5V
OR

Interface Converter

FX2NC-CNV-IF

7


FX2N-8EX

Unpowered Extension Blocks

Input Extension Blocks

FX2N-8EX-ES/UL
FX2N-8EX-UA1/UL
FX2N-16EX-ES/UL

Output Extension Blocks

FX2N-8EYR-ES/UL
FX2N-8EYT-ESS/UL
FX2N-16EYR-ES/UL
FX2N-16EYT-ESS/UL
FX2N-16EYS

Input/Output Extension Blocks

FX2N-8ER-ES/UL

Special Function Blocks

5


FX3UC-4AD

Analog

FX3UC-4AD
FX2NC-4DA

8


FX3U-4DA

Analog

FX2N-2AD
FX3U-4AD
FX2N-2DA
FX3U-4DA
FX2N-5A
FX2N-8AD

Temperature

FX2N-2LC
FX3U-4LC
FX2N-4AD-TC
FX2N-4AD-PT

Network

FX2N-32CCL
FX3U-16CCL-M*
FX3U-64CCL

Connector Parts

FX2C-I/O-CON
FX2C-I/O-CON-S
FX2C-I/O-CON-SA


FX-16E-TB

Terminal Blocks

FX-16E-TB/UL
FX-16EYR-ES-TB/UL
FX-16EYS-ES-TB/UL
FX-16EYT-ESS-TB/UL
FX-32E-TB/UL

Input Switches

FX2C-16SW-C
FX2C-16SW-TB

Battery

FX3U-32BL


FX0N-65EC

Extension Cables

FX0N-30EC (30cm)
FX0N-65EC (65cm)

PLC Bus Connector

FX2N-CNV-BC

Power Supply Cables

FX2NC-100MPCB (1m)
FX2NC-100BPCB (1m)
FX2NC-10BPCB1 (0.1m)

FX3S

Controllable I/O: 10 - 30 points
(Main Unit I/O: 10/14/20/30 points)

- **Basic controller for general applications**
- **High performance with minimal size**



Special Adapters

5



FX3U-ENET-ADP

Network

FX3U-ENET-ADP



FX3U-232ADP-MB

Communication

FX3U-232ADP-MB
FX3U-485ADP-MB

4



FX3U-4AD-ADP

Analog

FX3U-4AD-ADP
FX3U-4DA-ADP
FX3U-3A-ADP



FX3U-4AD-PNK-ADP

Temperature

FX3U-4AD-PT-ADP
FX3U-4AD-TC-ADP
FX3U-4AD-PTW-ADP
FX3U-4AD-PNK-ADP

3



FX3S-CNV-ADP

Interface Adapter

FX3S-CNV-ADP

Optional Equipment and Software



GT14

GOT

GOT1000
(GT10/GT12/GT14/GT16)

Software

GX Works2

Interface Converters

FX-232AWC-H

Expansion Boards

2



FX3G-232-BD

Communication

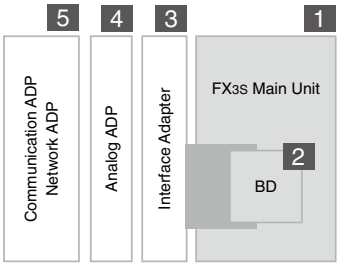
FX3G-232-BD
FX3G-422-BD
FX3G-485-BD

Analog

FX3G-2AD-BD
FX3G-1DA-BD

Analog Setpoint

FX3G-8AV-BD



FX3S Main Units

1



FX3S-10M

■FX3S Main Units 10-30 I/O

FX3S-10MR/ES	AC D R	FX3S-20MR/ES	AC D R
FX3S-10MT/ES	AC D T1	FX3S-20MT/ES	AC D T1
FX3S-10MT/ESS	AC D T2	FX3S-20MT/ESS	AC D T2
FX3S-14MR/ES	AC D R	FX3S-30MR/ES	AC D R
FX3S-14MT/ES	AC D T1	FX3S-30MT/ES	AC D T1
FX3S-14MT/ESS	AC D T2	FX3S-30MT/ESS	AC D T2

- AC AC Power supply
- D DC Input (sink/source)
- R Relay Output
- T1 Transistor Output (sink)
- T2 Transistor Output (source)

Accessories



■Memory Cassette

FX3G-EEPROM-32L

FX3G-EEPROM-32L

FX3UC



Controllable I/O: 16 - 256 points
Max. 384 with CC-Link remote I/O
(Main Unit I/O: 16/32/64/96 points)

- 3rd generation super-compact PLC
- Reduced size and wiring using connector-type I/O
- Built-in high speed processing and positioning
- Even with its ultra-compact size, the FX3UC can be expanded to locally control up to 256 I/O, and up to 384 points with CC-Link remote I/O.

Special Adapters

3



FX3U-ENET-ADP



FX3U-232ADP-MB

Network

FX3U-ENET-ADP*1

Communication

FX3U-232ADP-MB
FX3U-485ADP-MB



FX3U-CF-ADP

Data Logging

FX3U-CF-ADP*2

2



FX3U-4AD-ADP



FX3U-4AD-PNK-ADP

Analog

FX3U-4AD-ADP
FX3U-4DA-ADP
FX3U-3A-ADP*2

Temperature

FX3U-4AD-PT-ADP
FX3U-4AD-TC-ADP
FX3U-4AD-PTW-ADP
FX3U-4AD-PNK-ADP

FX3UC Main Units

1



FX3UC-64M

FX3UC Main Units 16-96 I/O

FX3UC-16MT/D*	DC	D1 T1
FX3UC-16MT/DSS	DC	D2 T2
FX3UC-16MR/D-T*	DC	D1 R
FX3UC-16MR/DS-T	DC	D2 R
FX3UC-32MT/D*	DC	D1 T1
FX3UC-32MT/DSS	DC	D2 T2
FX3UC-64MT/D*	DC	D1 T1
FX3UC-64MT/DSS	DC	D2 T2
FX3UC-96MT/D*	DC	D1 T1
FX3UC-96MT/DSS	DC	D2 T2

DC DC Power supply
D1 DC Input (sink)
D2 DC Input (sink/source)
R Relay Output
T1 Transistor Output (sink)
T2 Transistor Output (source)

*Refer to the HARDWARE MANUAL for system configuration.

Optional Equipment and Software



GT14

GOT

GOT1000
(GT10/GT12/GT14/GT16)

Software

GX Developer
GX Works2

Interface Converters

FX-USB AW
FX-232AWC-H

Accessories



FX3U-FLROM-64L

Memory Cassettes

FX3U-FLROM-16
FX3U-FLROM-64
FX3U-FLROM-64L
FX3U-FLROM-1M*3



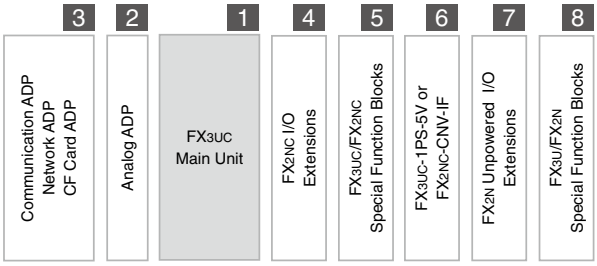
I/O Cables

General I/O cable
FX-16E-500CAB-S (5m)

Connecting to Terminal Blocks

FX-16E-150CAB (1.5m)
FX-16E-300CAB (3m)
FX-16E-500CAB (5m)
FX-16E-150CAB-R (1.5m)
FX-16E-300CAB-R (3m)
FX-16E-500CAB-R (5m)

*1: Firmware version 3.10 or later. *2: Firmware version 2.61. *3: Firmware version 3.00 or later.



Special Function Modules*

I/O Extension Blocks

* The special function Modules of FX3UC-****/DS(S)[].

4


FX2NC-32EX
FX2NC-16EYR-T

Input Extension Blocks
FX2NC-16EX-T-DS
FX2NC-16EX-DS
FX2NC-32EX-DS

Output Extension Blocks
FX2NC-16EYR-T-DS
FX2NC-16EYT-DSS
FX2NC-32EYT-DSS

6


FX3UC-1PS-5V

Power Supply Unit
FX3UC-1PS-5V
OR

Interface Converter
FX2NC-CNV-IF

Unpowered Extension Blocks

7


FX2N-8EX
FX2N-16EYR

Input/Output Extension Block
FX2N-8ER-ES/UL

Input Extension Blocks
FX2N-8EX-ES/UL
FX2N-8EX-UA1/UL
FX2N-16EX-ES/UL

Output Extension Blocks
FX2N-8EYR-ES/UL
FX2N-8EYT-ESS/UL
FX2N-16EYR-ES/UL
FX2N-16EYT-ESS/UL
FX2N-16EYS

Special Function Blocks

5


FX3UC-4AD

Analog
FX3UC-4AD
FX2NC-4DA

High Speed Counter
FX2NC-1HC

8


FX3U-4DA
FX3U-20SSC-H
FX3U-64CCL

Analog
FX0N-3A
FX2N-2AD
FX3U-4AD
FX2N-2DA
FX3U-4DA
FX2N-5A
FX2N-8AD

Positioning
FX2N-1PG-E
FX3U-1PG
FX2N-10PG
FX2N-10GM
FX2N-1RM-E-SET
FX3U-20SSC-H
FX2N-20GM

Network
FX2N-32CCL
FX3U-16CCL-M*1
FX3U-64CCL
FX3U-ENET-L

Temperature
FX2N-2LC
FX3U-4LC
FX2N-4AD-TC
FX2N-4AD-PT

High Speed Counter
FX2N-1HC
FX3U-2HC

Communication
FX2N-232IF

Connector Parts

FX2C-I/O-CON
FX2C-I/O-CON-S
FX2C-I/O-CON-SA


FX-16E-TB

Terminal Blocks

FX-16E-TB/UL
FX-16EYR-ES-TB/UL
FX-16EYS-ES-TB/UL
FX-16EYT-ESS-TB/UL
FX-32E-TB/UL

Input Switches

FX2C-16SW-C
FX2C-16SW-TB

Battery

FX3U-32BL


FX0N-65EC

Extension Cables

FX0N-30EC (30cm)
FX0N-65EC (65cm)

PLC Bus Connector

FX2N-CNV-BC

Power Supply Cables

FX2NC-100MPCB (1m)
FX2NC-100BPCB (1m)
FX2NC-10BPCB1 (0.1m)

Programming Specifications

Programming

System specifications	FX3S	FX3G/FX3GC	FX3U/FX3UC
I/O points	30 total	256 total (combined local and CC-Link remote I/O)	384 total (combined local and CC-Link remote I/O)
Address range	Max. 30 direct addressing	Max. 128 direct addressing and Max. 128 remote I/O	Max. 256 direct addressing and Max. 256 remote I/O
Program memory	16,000 steps EEPROM (Program capacity is 4,000 steps.)	32,000 steps EEPROM (internal), exchangeable EEPROM memory cassette**	64,000 steps RAM (internal), exchangeable FLROM memory cassette
Instruction Time	0.21 µs or 0.5 µs / contact instruction	0.21 µs or 0.42 µs / contact instruction	0.065 µs / contact instruction
Number of instructions	29 sequence instructions, 2 steps ladder instructions, 116 applied instructions	29 sequence instructions, 2 steps ladder instructions, 124 applied instructions	29 sequence instructions, 2 steps ladder instructions, 218 applied instructions
Programming language	Step ladder, instruction list, SFC Step ladder		
Program execution	Cyclical execution, refresh mode processing		
Program protection	2 different keywords, Max password length 16 characters		

* 8-character keyword protection level depends on the keyword registered; 16-character keyword protection level is set within GX-Developer.
** Not for FX3GC

Devices

System specifications	FX3S	FX3G/FX3GC	FX3U/FX3UC
Auxiliary relays	1,536 total, with 1,408 general (M0 - M383 and M512 - M1535) and 128 EEPROM latched (M384 - M511)	7,680 total, with 384 general (M0 - M383), 1,152 EEPROM latched (M384 - M1535), and 6,144 general/optional latched (M1536 - M7679)	7,680 total, with 500 general (M0 - M499), 524 optional latched (M500 - M1023), and 6,656 latched (M1024 - M7679)
Special auxiliary relays	512(M8000 - M8511)		
State relays	256 total, with 128 EEPROM latched (S0 - S127) and 128 general (S128 - S255)	4,096 total, with 1,000 EEPROM latched (S0 - S999) and 3,096 general/optional latched (S1000 - S4095)	4,096 total, with 1,000 optional latched (S0 - S999) and 3,096 latched (S1000 - S4095)
Timers	169 total, with 69 100 ms(T0 - T62 and T132 - T137), 31 100/10 ms (T32 - T62), and 69 1 ms (T63 - T131)	320 total, with 206 100 ms (T0 - T199 and T250 - T255), 46 10 ms (T200 - T245), and 68 1 ms (T246 - T249 and T256 - T319)	512 total, with 206 100 ms (T0 - T191, T192 - T199 and T250 - T255), 46 10 ms (T200 - T245), and 260 1 ms (T246 - T249 and T256 - T511)
External setpoint entry via potentiometer	2*		—
Counters	67 total (16 bit and 32 bit), with 51 general (C0 - C15 and C200 - C234) and 16 EEPROM latched (C16 - C31)	235 total (16 bit and 32 bit), with 36 general (C0 - C15 and C200 - C219) and 199 EEPROM latched (C16 - C199 and C220 - C234)	235 total (16 bit and 32 bit), with 120 general (C0 - C99 and C200 - C219) and 115 latched (C100 - C199 and C220 - C234)
High-speed counters	21 total, with 16 1-phase (C235 - C250) and 5 2-phase (C251 - C255)		
High-speed counter speed	1-phase, 6 points max: 60 kHz / 2 points, 10 kHz / 4 points ; 2-phase, 2 points max: 30 kHz / 1 point, 5 kHz / 1 point	1-phase, 6 points max: 60 kHz / 4 points, 10 kHz / 2 points 2-phase, 3 points max: 30 kHz / 2 points, 5 kHz/1 point	1-phase, 8 points max: 100 kHz / 6 points, 10 kHz / 2 points 2-phase, 2 points max: 50 kHz / 2 points
Real-time clock	Year, month, day, hour, minute, second, day of the week		
Data registers	3,000 total, with 2,872 general (D0 - D127 and D256 - D2999) and 128 EEPROM latched (D128 - D255)	8,000 total, with 128 general (D0 - D127), 972 EEPROM latched (D128 - D1099), and 6,900 general/optional latched (D1100 - D7999)	8,000 total, with 200 general (D0 - D199), 312 optional latched (D200 - D511), and 7,488 latched (D512 - D7999)
Extension registers	—	24,000 (R0 - R23999)	32,768 (R0 - R32767)
Extension file registers	—	24,000 (ER0 - R23999) internal/optional memory	32,768 (ER0 - R32767) optional memory
Index registers	16		
Special data registers	512 (D8000 - D8511)		
Pointers	256	2,048	4,096
Nestings	8		
Interrupt inputs	6		
Constants	16 bit: K: -32,768 to +32,767; H: 0 to FFFF; 32 bit: K: -2,147,483,648 to +2,147,483,647; H: 0 to FFFF FFFF		

* Not for FX3GC

Instruction

FNC No.	Mnemonic	Function	Applicable PLC FX3S	FX3G/FX3GC	FX3U/FX3UC
Program Flow					
0	CJ	Conditional Jump	●	●	●
1	CALL	Call Subroutine	●	●	●
2	SRET	Subroutine Return	●	●	●
3	IRET	Interrupt Return	●	●	●
4	EI	Enable Interrupt	●	●	●
5	DI	Disable Interrupt	●	●	●
6	FEND	Main Routine Program End	●	●	●
7	WDT	Watchdog Timer Refresh	●	●	●
8	FOR	Start a FOR/NEXT Loop	●	●	●
9	NEXT	End a FOR/NEXT Loop	●	●	●
Move and Compare					
10	CMP	Compare	●	●	●
11	ZCP	Zone Compare	●	●	●
12	MOV	Move	●	●	●
13	SMOV	Shift Move	●	●	●
14	CML	Complement	●	●	●
15	BMOV	Block Move	●	●	●
16	FMOV	Fill Move	●	●	●
17	XCH	Exchange	–	–	●
18	BCD	Conversion to Binary Coded Decimal	●	●	●
19	BIN	Conversion to Binary	●	●	●
Arithmetic and Logical Operation (+, –, ×, ÷)					
20	ADD	Addition	●	●	●
21	SUB	Subtraction	●	●	●
22	MUL	Multiplication	●	●	●
23	DIV	Division	●	●	●
24	INC	Increment	●	●	●
25	DEC	Decrement	●	●	●
26	WAND	Logical Word AND	●	●	●
27	WOR	Logical Word OR	●	●	●
28	WXOR	Logical Exclusive OR	●	●	●
29	NEG	Negation	–	–	●
Rotation and Shift Operation					
30	ROR	Rotation Right	●	●	●
31	ROL	Rotation Left	●	●	●
32	RCR	Rotation Right with Carry	–	–	●
33	RCL	Rotation Left with Carry	–	–	●
34	SFTR	Bit Shift Right	●	●	●
35	SFTL	Bit Shift Left	●	●	●
36	WSFR	Word Shift Right	●	●	●
37	WSFL	Word Shift Left	●	●	●
38	SFWR	Shift Write [FIFO/FILO Control]	●	●	●
39	SFRD	Shift Read [FIFO Control]	●	●	●
Data Operation					
40	ZRST	Zone Reset	●	●	●
41	DECO	Decode	●	●	●
42	ENCO	Encode	●	●	●
43	SUM	Sum of Active Bits	●	●	●
44	BON	Check Specified Bit Status	●	●	●
45	MEAN	Mean	●	●	●
46	ANS	Timed Annunciator Set	–	●	●
47	ANR	Annunciator Reset	–	●	●
48	SQR	Square Root	–	–	●
49	FLT	Conversion to Floating Point	●	●	●
High-Speed Processing					
50	REF	Refresh	●	●	●
51	REFF	Refresh and Filter Adjust	–	–	●
52	MTR	Input Matrix	●	●	●
53	HSCS	High-Speed Counter Set	●	●	●
54	HSCR	High-Speed Counter Reset	●	●	●
55	HSZ	High-Speed Counter Zone Compare	●	●	●
56	SPD	Speed Detection	●	●	●
57	PLSY	Pulse Y Output	●	●	●
58	PWM	Pulse Width Modulation	●	●	●
59	PLSR	Acceleration/Deceleration Setup	●	●	●
Handy Instruction					
60	IST	Initial State	●	●	●
61	SER	Search a Data Stack	●	●	●
62	ABSD	Absolute Drum Sequencer	●	●	●
63	INCD	Incremental Drum Sequencer	●	●	●
64	TTMR	Teaching Timer	–	–	●
65	STMR	Special Timer	–	–	●
66	ALT	Alternate State	●	●	●
67	RAMP	Ramp Variable Value	●	●	●
68	ROTC	Rotary Table Control	–	–	●
69	SORT	Sort Tabulated Data	–	–	●
External FX I/O Device					
70	TKY	Ten Key Input	–	–	●
71	HKY	Hexadecimal Input	–	–	●
72	DSW	Digital Switch (Thumbwheel Input)	●	●	●
73	SEGD	Seven Segment Decoder	–	–	●
74	SEGL	Seven Segment With Latch	●	●	●
75	ARWS	Arrow Switch	–	–	●
76	ASC	ASCII Code Data Input	–	–	●
77	PR	Print (ASCII Code)	–	–	●
78	FROM	Read From a Special Function Block	–	●	●
79	TO	Write To a Special Function Block	–	●	●
External FX Device					
80	RS	Serial Communication	●	●	●
81	PRUN	Parallel Run (Octal Mode)	●	●	●
82	ASCI	Hexadecimal to ASCII Conversion	●	●	●
83	HEX	ASCII to Hexadecimal Conversion	●	●	●
84	CCD	Check Code	●	●	●
85	VRRD	Volume Read	●	●*	●
86	VRSC	Volume Scale	●	●*	●
87	RS2	Serial Communication 2	●	●	●
88	PID	PID Control Loop	●	●	●

* Not for FX3GC

FNC No.	Mnemonic	Function	Applicable PLC		
			FX3s	FX3G/FX3GC	FX3U/FX3UC
Data Transfer 2					
102	ZPUSH	Batch Store of Index Register	–	–	●
103	ZPOP	Batch POP of Index Register	–	–	●
Floating Point					
110	ECMP	Floating Point Compare	●	●	●
111	EZCP	Floating Point Zone Compare	–	–	●
112	EMOV	Floating Point Move	●	●	●
116	ESTR	Floating Point to Character String Conversion	–	–	●
117	EVAL	Character String to Floating Point Conversion	–	–	●
118	EBCD	Floating Point to Scientific Notation Conversion	–	–	●
119	EBIN	Scientific Notation to Floating Point Conversion	–	–	●
120	EADD	Floating Point Addition	●	●	●
121	ESUB	Floating Point Subtraction	●	●	●
122	EMUL	Floating Point Multiplication	●	●	●
123	EDIV	Floating Point Division	●	●	●
124	EXP	Floating Point Exponent	–	–	●
125	LOGE	Floating Point Natural Logarithm	–	–	●
126	LOG10	Floating Point Common Logarithm	–	–	●
127	ESQR	Floating Point Square Root	●	●	●
128	ENEG	Floating Point Negation	–	–	●
129	INT	Floating Point to Integer Conversion	●	●	●
130	SIN	Floating Point Sine	–	–	●
131	COS	Floating Point Cosine	–	–	●
132	TAN	Floating Point Tangent	–	–	●
133	ASIN	Floating Point Arc Sine	–	–	●
134	ACOS	Floating Point Arc Cosine	–	–	●
135	ATAN	Floating Point Arc Tangent	–	–	●
136	RAD	Floating Point Degrees to Radian Conversion	–	–	●
137	DEG	Floating Point Radian to Degrees Conversion	–	–	●
Data Operation 2					
140	WSUM	Sum of Word Data	–	–	●
141	WTOB	WORD to BYTE	–	–	●
142	BTOW	BYTE to WORD	–	–	●
143	UNI	4-bit Linking of Word Data	–	–	●
144	DIS	4-bit Grouping of Word Data	–	–	●
147	SWAP	Byte Swap	–	–	●
149	SORT2	Sort Tabulated Data 2	–	–	●
Positioning Control					
150	DSZR	DOG Search Zero Return	●	●	●
151	DVIT	Interrupt Positioning	–	–	●
152	TBL	Batch Data Positioning Mode	–	●	●
155	ABS	Absolute Current Value Read	●	●	●
156	ZRN	Zero Return	●	●	●
157	PLSV	Variable Speed Pulse Output	●	●	●
158	DRVI	Drive to Increment	●	●	●
159	DRVA	Drive to Absolute	●	●	●
Real Time Clock Control					
160	TCMP	RTC Data Compare	●	●	●
161	TZCP	RTC Data Zone Compare	●	●	●
162	TADD	RTC Data Addition	●	●	●

FNC No.	Mnemonic	Function	Applicable PLC		
			FX3s	FX3G/FX3GC	FX3U/FX3UC
163	TSUB	RTC Data Subtraction	●	●	●
164	HTOS	Hour to Second Conversion	–	–	●
165	STOH	Second to Hour Conversion	–	–	●
166	TRD	Read RTC Data	●	●	●
167	TWR	Set RTC Data	●	●	●
169	HOUR	Hour Meter	●	●	●
External Device					
170	GRY	Decimal to Gray Code Conversion	●	●	●
171	GBIN	Gray Code to Decimal Conversion	●	●	●
176	RD3A	Read form Dedicated Analog Block	–	●	●
177	WR3A	Write to Dedicated Analog Block	–	●	●
Other					
182	COMRD	Read Device Comment Data	–	–	●
184	RND	Random Number Generation	–	–	●
186	DUTY	Timing Pulse Generation	–	–	●
188	CRC	Cyclic Redundancy Check	–	–	●
189	HCMOV	High-Speed Counter Move	–	–	●
Block Data Operation					
192	BK+	Block Data Addition	–	–	●
193	BK-	Block Data Subtraction	–	–	●
194	BKCMP=	Block Data Compare (S1) = (S2)	–	–	●
195	BKCMP>	Block Data Compare (S1) > (S2)	–	–	●
196	BKCMP<	Block Data Compare (S1) < (S2)	–	–	●
197	BKCMP< >	Block Data Compare (S1) ≠ (S2)	–	–	●
198	BKCMP<=	Block Data Compare (S1) ≤ (S2)	–	–	●
199	BKCMP>=	Block Data Compare (S1) ≥ (S2)	–	–	●
Character String Control					
200	STR	BIN to Character String Conversion	–	–	●
201	VAL	Character String to BIN Conversion	–	–	●
202	$+	Link Character Strings	–	–	●
203	LEN	Character String Length Detection	–	–	●
204	RIGHT	Extracting Character String Data From the Right	–	–	●
205	LEFT	Extracting Character String Data from the Left	–	–	●
206	MIDR	Random Selection of Character Strings	–	–	●
207	MIDW	Random Replacement of Character Strings	–	–	●
208	INSTR	Character String Search	–	–	●
209	$MOV	Character String Transfer	–	–	●
Data Operation 3					
210	FDEL	Deleting Data from Tables	–	–	●
211	FINS	Inserting Data to Tables	–	–	●
212	POP	Shift Last Data Read [FILO Control]	–	–	●
213	SFR	Bit Shift Right with Carry	–	–	●
214	SFL	Bit Shift Left with Carry	–	–	●
Data Comparison					
224	LD=	Load Compare (S1)=(S2)	●	●	●
225	LD>	Load Compare (S1)>(S2)	●	●	●
226	LD<	Load Compare (S1)<(S2)	●	●	●
228	LD<>	Load Compare (S1)≠(S2)	●	●	●
229	LD<=	Load Compare (S1)≤(S2)	●	●	●
230	LD>=	Load Compare (S1)≥(S2)	●	●	●

FNC No.	Mnemonic	Function	Applicable PLC		
			FX3S	FX3G/FX3GC	FX3U/FX3UC
232	AND=	AND Compare (S1)=(S2)	●	●	●
233	AND>	AND Compare (S1)>(S2)	●	●	●
234	AND<	AND Compare (S1)<(S2)	●	●	●
236	AND<>	AND Compare (S1)≠(S2)	●	●	●
237	AND<=	AND Compare (S1)≤(S2)	●	●	●
238	AND>=	AND Compare (S1)≥(S2)	●	●	●
240	OR=	OR Compare (S1)=(S2)	●	●	●
241	OR>	OR Compare (S1)>(S2)	●	●	●
242	OR<	OR Compare (S1)<(S2)	●	●	●
244	OR<>	OR Compare (S1)≠(S2)	●	●	●
245	OR<=	OR Compare (S1)≤(S2)	●	●	●
246	OR>=	OR Compare (S1)≥(S2)	●	●	●
Data Table Operation					
256	LIMIT	Limit Control	–	–	●
257	BAND	Dead Band Control	–	–	●
258	ZONE	Zone Control	–	–	●
259	SCL	Scaling (Coordinate by Point Data)	–	–	●
260	DABIN	Decimal ASCII to BIN Conversion	–	–	●
261	BINDA	BIN to Decimal ASCII Conversion	–	–	●
269	SCL2	Scaling 2 (Coordinate by X/Y Data)	–	–	●
External Device Communication (Inverter Communication)					
270	IVCK	Inverter Status Check	●	●	●
271	IVDR	Inverter Drive	●	●	●
272	IVRD	Inverter Parameter Read	●	●	●
273	IVWR	Inverter Parameter Write	●	●	●
274	IVBWR	Inverter Parameter Block Write	–	–	●
275	IVMC	Inverter Multi Command	●	●	●
Data Transfer 3					
276	ADPRW	Modbus Read/Write	●	●	●
278	RBFM	Divided BFM Read	–	–	●
279	WBFM	Divided BFM Write	–	–	●
High-Speed Processing 2					
280	HSCT	High-Speed Counter Compare With Data Table	–	–	●
Extension File Register Control					
290	LOADR	Load From ER	–	●	●
291	SAVER	Save to ER	–	–	●
292	INITR	Initialize R and ER	–	–	●
293	LOGR	Logging R and ER	–	–	●
294	RWER	Rewrite to ER	–	●	●
295	INITER	Initialize ER	–	–	●
Data Logging					
300	FLCRT	File Create / Check	–	–	●
301	FLDEL	File Delete / CF Card Format	–	–	●
302	FLWR	Data Write	–	–	●
303	FLRD	Data Read	–	–	●
304	FLCMD	FX3U-CF-ADP Command	–	–	●
305	FLSTRD	FX3U-CF-ADP Status Read	–	–	●

MELSEC-QS/WS Series

The concept of safety is shifting from “zero accidents” to “zero risk.”

“MELSEC Safety,” the total safety solution from Mitsubishi realizes “visualization” for optimized safety control and enhanced productivity. With our wide range of products, we provide safety equipment that suits your system configuration needs.

MELSEC Safety
MITSUBISHI SAFETY FA SOLUTION

Safety Programmable Controller

CC-Link IE Field and CC-Link Safety enable distributed safety control for medium to large-scale systems.
Ladder programs and function blocks offer flexible programming for safety control.



Safety Controller

Best suited for small and medium safety systems.
A compact new solution featuring easy to use settings.



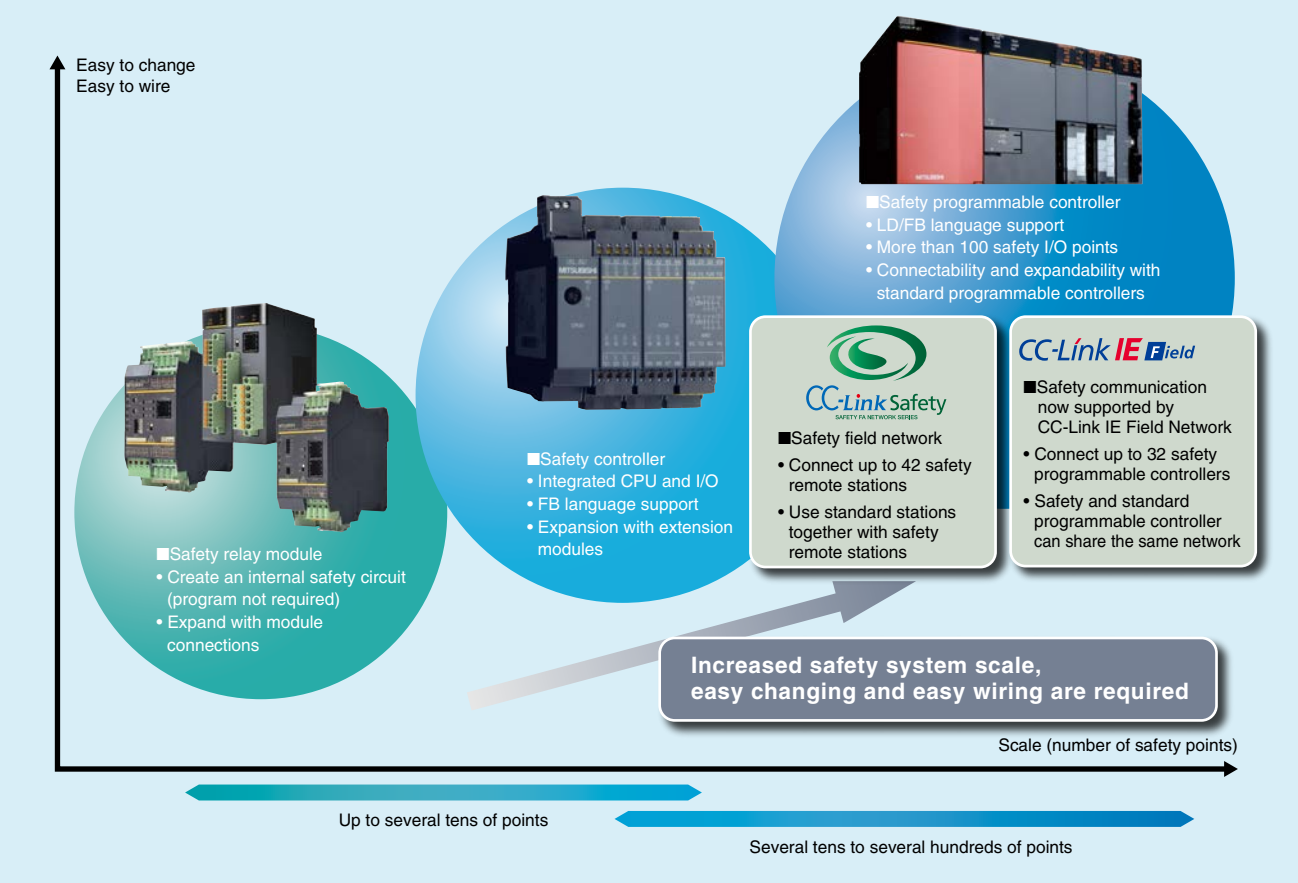
Safety Relay Module

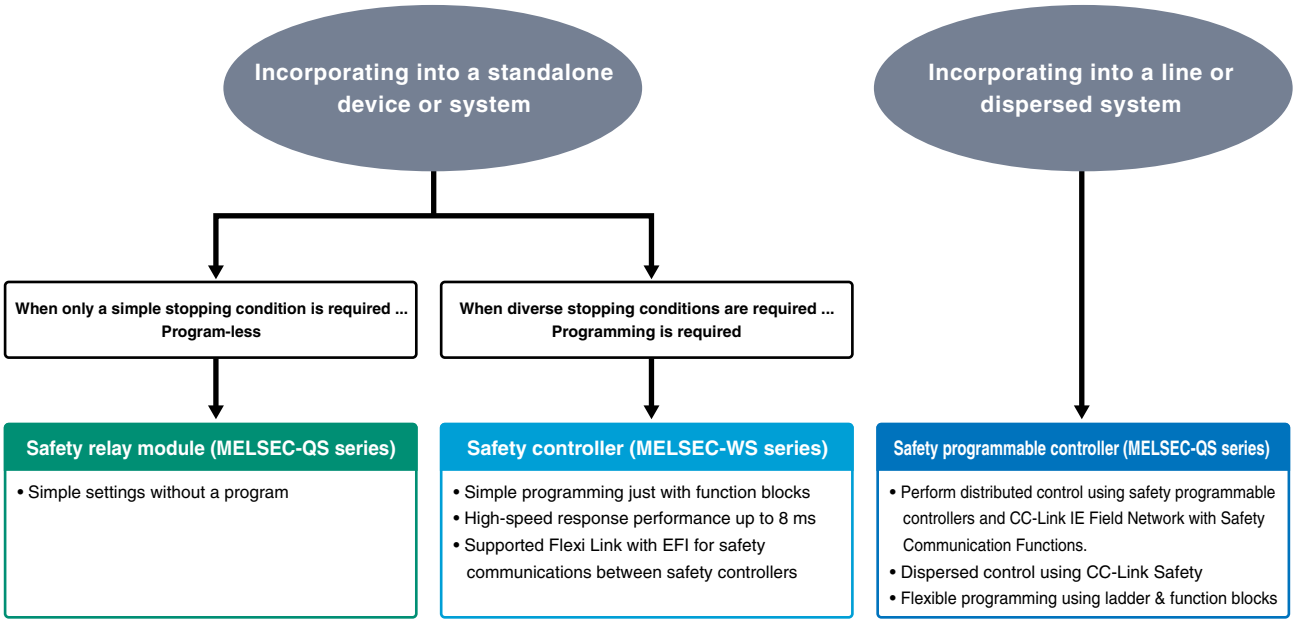
These safety relay modules are easy to install and require no programing for delivering a small-scale safety control.



Points for selection

Select the safety control devices most suitable for your system configuration from the diverse lineup of MELSEC Safety devices.

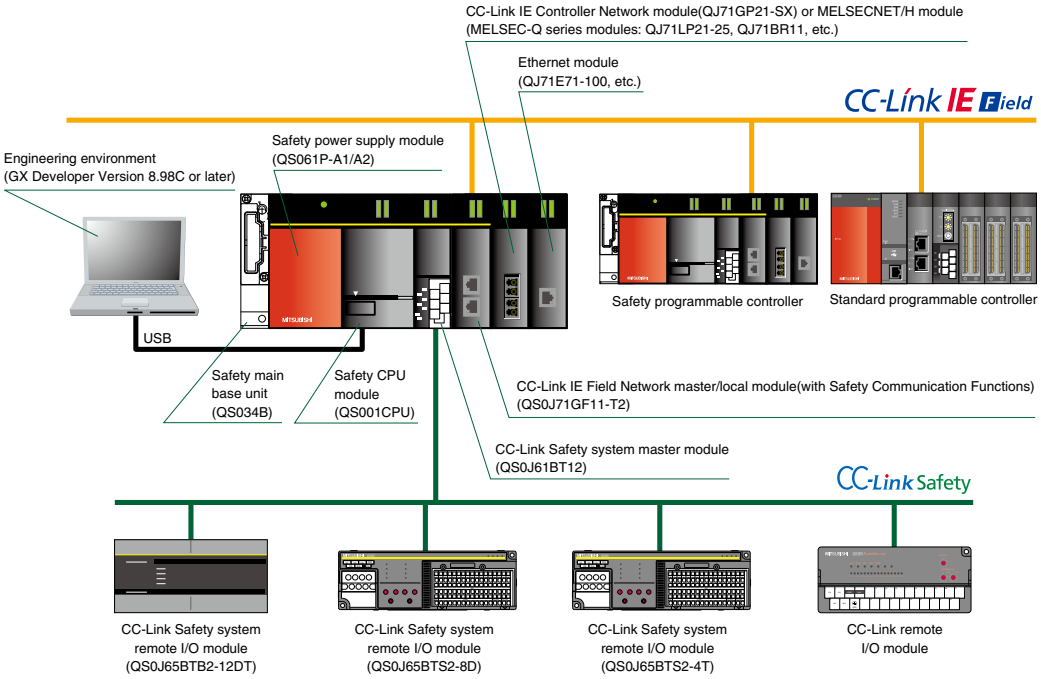




MELSEC-QS Safety programmable controller

The safety programmable controller is an International Safety Standard certified PLC for safety control. When connected with a safety device, such as an emergency stop switch or light curtain, this programmable controller executes safety control by turning the safety output OFF with a user-created sequence program to stop movement toward a source of hazard, such as a robot. With their enhanced connectivity and scalability to general PLC, the MELSEC-QS series are the best choice for factory line and dispersion system installations.

MELSEC-QS Safety programmable controller system configuration



CPU Module

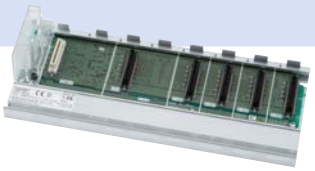


Dedicated CPU unit for the safety system “MELSEC-QS” series.

Model	Basic arithmetic processing speed (LD command)	Program capacity	Number of I/O points [X/Y]	Peripheral device connection port
QS001CPU(-K*1)	0.1 µs	14 K steps	1024 points	USB RS-232

*1: Products that complies to Korea’s KOSHA S-Mark system ends with “-K”.

Safety Nain Base Unit



Dedicated base unit for the safety system “MELSEC-QS” series.

Model	Number of unit mounting slots	Power supply module
QS034B(-K*1)	CPU + 4 slots	Mounting required

*1: Products that complies to Korea’s KOSHA S-Mark system ends with “-K”.

Safety Power Supply Module



Dedicated power supply unit for the safety system “MELSEC-QS” series.

Model	Input voltage	Output voltage	Output current
QS061P-A1(-K*1)	100 to 120 V AC	5 V	6 A
QS061P-A2(-K*1)	200 to 240 V AC	5 V	6 A

*1: Products that complies to Korea’s KOSHA S-Mark system ends with “-K”.

Safety Network Unit



These network units are designed to connect the safety PLC to CC-Link IE field or CC-Link network.

CC-Link IE Field Network master/local module

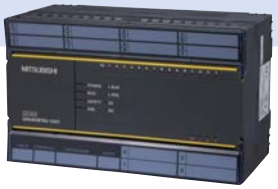
Model	Connection cable	Communication speed	Network topology	Overall cable distance	Compatible station	Maximum number of connectable stations per network
QS0J71GF11-T2	An Ethernet cable that meets the 1000BASE-T standard: Category 5e or higher (double shielded, STP), straight cable	1 Gbps	Line topology star topology ring topology (Coexistence of line topology and star topology is possible.)	Line topology: 12000 m (when cables are connected to 1 master station and 120 slave stations) Star topology: Depends on the system configuration. Ring topology: 12100 m (when cables are connected to 1 master station and 120 slave stations)	Master station (safety station) Local station (safety station)	121 stations (1 master plus 120 slave stations)

CC-Link Safety system master module

Model	Connection cable	Communication speed	Network topology	Overall cable distance	Compatible station	Maximum number of connectable stations per network
QS0J61BT12(-K*1)	CC-Link dedicated cable (Ver. 1.10 compatible)	156 kbps	Bus (RS-485)	1200 m	Master station	65 stations (1 master plus 84 slave stations)
		625 kbps		900 m		
		2.5 Mbps		400 m		
		5 Mbps		160 m		
		10 Mbps		100 m		

*1: Products that complies to Korea's KOSHA S-Mark system ends with "-K".

CC-Link Safety System Remote I/O Module



These safety input, safety output, and safety input/output mixed-units can be used in the CC-Link Safety system.

Type	Model	Safety input/output points	Rated input voltage/Rated load voltage	Rated input current	Maximum load current	Wiring method for common	Response time	External connection system
DC input (Negative common)	QS0J65BTS2-8D	Input 8 points Double input Input 16 points Single input	24 V DC	5.9 mA	–	16 points/common	0.4 ms	Two-piece SC terminal block
Transistor output	QS0J65BTS2-4T	Output 4 points Source + sink type Output 2 points Source + source type	24 V DC	–	0.5 A/point	4 points/common	0.4 ms	Two-piece SC terminal block
DC input (Negative common)/ Transistor output	QS0J65BTB2-12DT(-K*1)	Input 8 points Double input Input 16 points Single input	24 V DC	4.6 mA	–	16 points/common	0.4 ms	18-point two-piece terminal block
		Output 4 points Source + sink type Output 2 points Source + source type	24 V DC	–	0.5 A/point	4 points/common	0.4 ms	

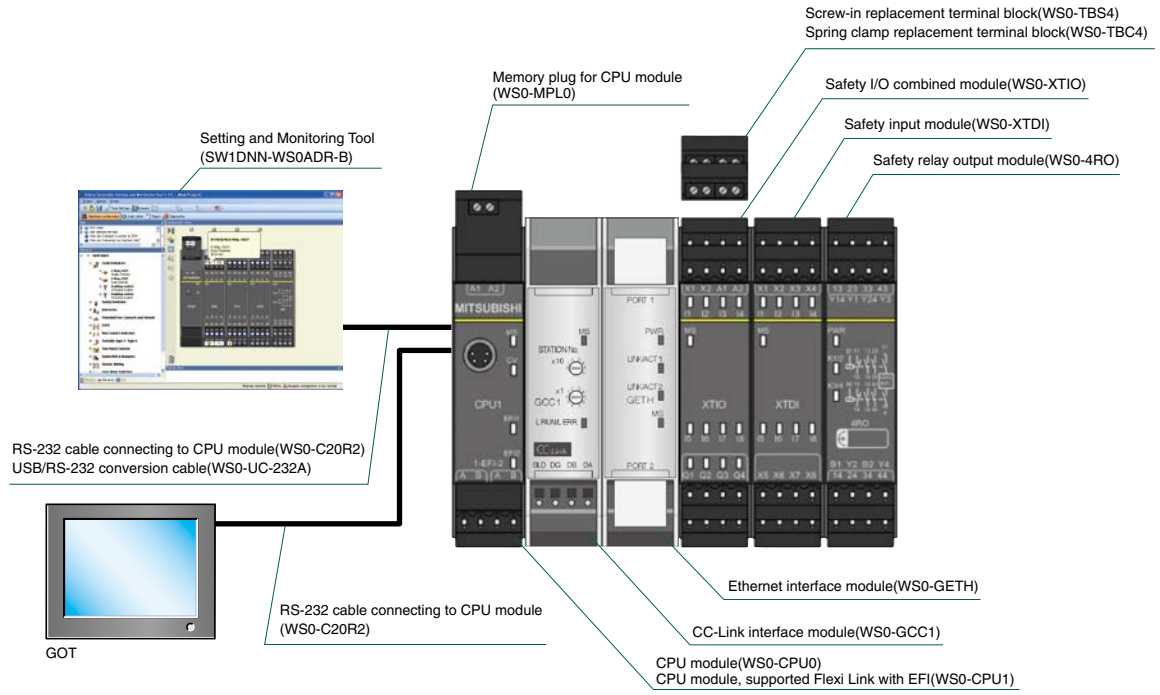
Two-piece SC terminal block Two-piece spring clamp terminal block

*1: Products that complies to Korea's KOSHA S-Mark system ends with "-K".

MELSEC-WS Series-A New Safety Controller

The safety controller MELSEC-WS series are perfect for small-to-mid scale safety controls. The function blocks are all you need for a simple safety circuit programming. Perfect for safety control of stand-alone devices and systems, these can be expanded up to 144 safety input/output points based on system configuration.

MELSEC-WS basic configuration



Powered by SICK

The MELSEC-WS series is jointly developed and manufactured by Mitsubishi Electric and SICK

SICK AG a German company, is a supplier of safety solutions.
SICK designs and manufactures a broad range of safety products including industrial-use sensors and automatic identification systems.

*1: Please note that warranty conditions are different from the MELSEC-Q/QS series.

Safety Controller CPU Module

These CPU modules are designed for the safety controller “MELSEC-WS” series.



Model	Scan cycle	Program capacity	Interfaces	Others
WS0-CPU000200	4 ms	255 FBs	RS-232	–
WS0-CPU130202	4 ms	255 FBs	RS-232	Flexi Link with EFI EFI is the communication interface for setting SICK's safety products.
WS0-CPU320202	4 ms	255 FBs	USB RS-232	Flexi Link Flexi Link with EFI EFI is the communication interface for setting SICK's safety products.

Network Module



These network modules are designed for the safety controller “MELSEC-WS” series.

Ethernet interface module

Type	Model	Transmission interface	Number of channels	Transmission speed
For Ethernet/TCP connection (standard communication)	WS0-GETH00200	100BASE-TX 10BASE-T	2 ch	100 Mbps 10 Mbps

CC-Link interface module

Type	Model	Connection cable	Communication speed	Station type	Number of occupied stations	CC-Link compatible version
For CC-Link communication (standard communication)	WS0-GCC100202	Ver. 1.10 compatible, CC-Link dedicated cable	156kbps 625kbps 2.5Mbps 5Mbps 10Mbps	Remote device station	1 to 4 stations	CC-Link Ver. 1.10

Safety Input Module/Safety I/O Module/Safety Relay Output Module



These safety input, safety input/output, and safety relay output modules are designed for the safety controller “MELSEC-WS” series.

Type	Model	Safety input/ Output points	Rated input voltage/ Rated load voltage	Rated input current	Load current	External connection system	Others
DC input	WS0-XTDI80202	Input 8 points Single input Input 4 points Double input	ON: 13 to 30 V DC OFF: -5 to +5 V DC	ON: 2.4 to 3.8 mA OFF: -2.5 to +2.1 mA	–	SC terminal block	–
DC input/ Transistor output	WS0-XTIO84202	Input 8 points Single input Input 4 points Double input	ON: 13 to 30 V DC OFF: -5 to +5 V DC	ON: 2.4 to 3.8 mA OFF: -2.5 to +2.1 mA	–	SC terminal block	Fast shut off
		Output 4 points Single input Output 2 points Double input	16 to 30 V DC	–	2 A/point Total 3.2 A		
Relay output	WS0-4RO4002	Safety relay output 2 points 2 output EDM contacts 2 points/diagnostic output 2 points	230 V AC 5 to 253 V AC 230 V DC 5 to 253 V DC	–	10 mA to 6 A/point Total 8 A	SC terminal block	–

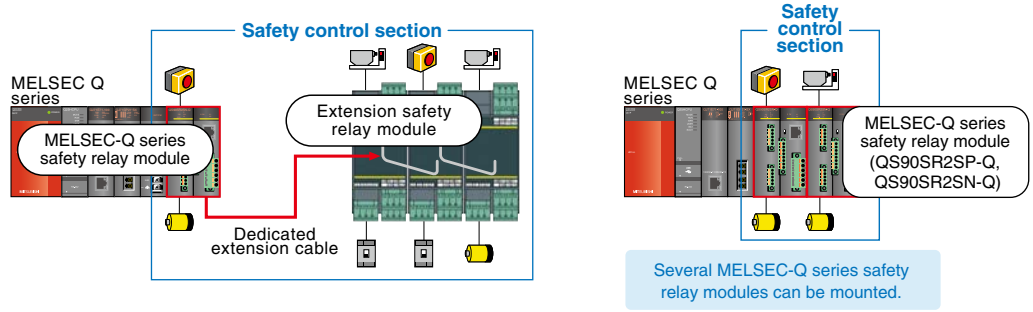
SC terminal block Spring clamp terminal block

Safety Relay Module The MELSEC-QS Series

Small-scale safety control! Easily add safety circuit to the MELSEC-Q series without a program!

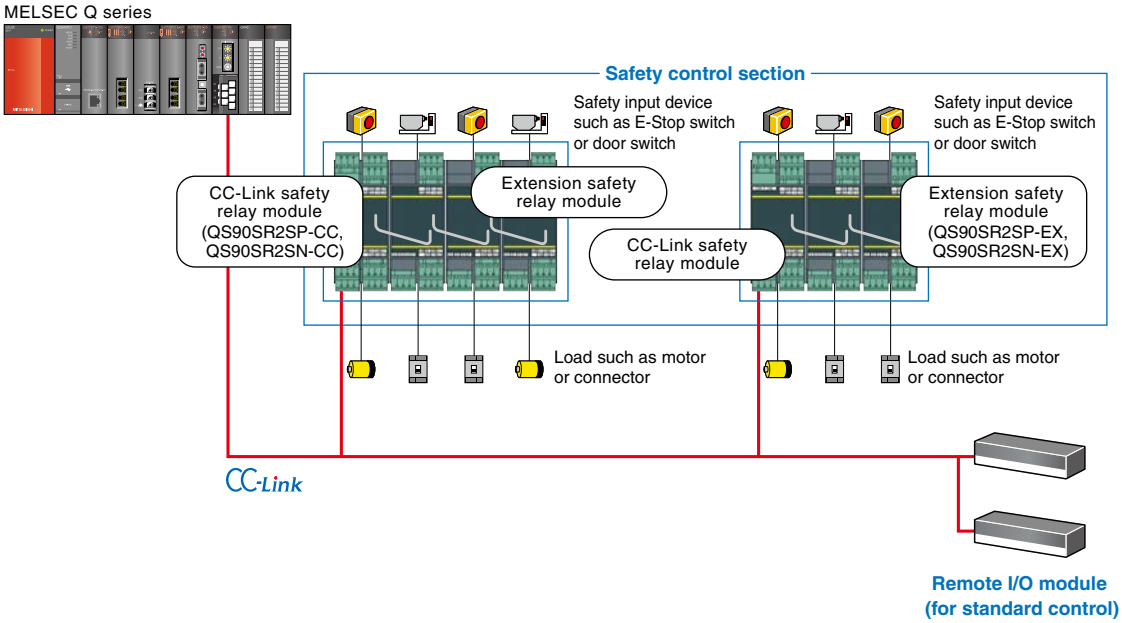
■Safety relay module system configuration drawing

●Mounting on MELSEC-Q series base unit



Several MELSEC-Q series safety relay modules can be mounted.

●Connecting to field network "CC-Link"



Remote I/O module (for standard control)

Q Series Safety Relay Module



These safety relay unit types are mounted to the base unit of the MELSEC-Q series.

Type	Model	Safety input/ Output points	Rated input voltage/ Contact maximum allowable voltage	Rated input current	Rated load current	Number of extension modules	External connection system
P type (dual input with positive commons)	QS90SR2SP-Q	Input 1 point 2 inputs	24 V DC	4.6 mA	–	Max. 3	Two-piece SC terminal block
		Output 1 point 3 outputs	250 V AC 30 V DC	–	5.0 A/point or less Category 3 3.6 A/point or less Category 4		
N type (dual input with positive common and negative common)	QS90SR2SN-Q	Input 1 point 2 inputs	24 V DC	4.6 mA	–	Max. 3	Two-piece SC terminal block
		Output 1 point 3 outputs	250 V AC 30 V DC	–	5.0 A/point or less Category 3 3.6 A/point or less Category 4		

Two-piece SC terminal block Two-piece spring clamp terminal block

CC-Link Safety Relay Module



A safety system can be built by using these CC-Link safety relay units through the CC-Link.

Type	Model	Safety input/ Output points	Rated input voltage/ Contact maximum allowable voltage	Rated input current	Rated load current	Number of extension modules	External connection system
P type (dual input with positive commons)	QS90SR2SP-CC	Input 1 point 2 inputs	24 V DC	4.6 mA	–	Max. 3	Two-piece SC terminal block
		Output 1 point 3 outputs	250 V AC 30 V DC	–	5.0 A/point or less Category 3 3.6 A/point or less Category 4		
N type (dual input with positive common and negative common)	QS90SR2SN-CC	Input 1 point 2 inputs	24 V DC	4.6 mA	–	Max. 3	Two-piece SC terminal block
		Output 1 point 3 outputs	250 V AC 30 V DC	–	5.0 A/point or less Category 3 3.6 A/point or less Category 4		

Two-piece SC terminal block Two-piece spring clamp terminal block

Extension Safety Relay Module



An expansion of up to three units can be configured to MELSEC-Q series or CC-Link basic safety relay unit.

Type	Model	Safety input/ Output points	Rated input voltage/ Contact maximum allowable voltage	Rated input current	Rated load current	External connection system
P type (dual input with positive commons)	QS90SR2SP-EX	1 point 2 inputs	24 V DC	4.6 mA	–	Two-piece SC terminal block
		1 point 3 outputs	250 V AC 30 V DC	–	5.0 A/point or less Category 3 3.6 A/point or less Category 4	
N type (dual input with positive common and negative common)	QS90SR2SN-EX	1 point 2 inputs	24 V DC	4.6 mA	–	Two-piece SC terminal block
		1 point 3 outputs	250 V AC 30 V DC	–	5.0 A/point or less Category 3 3.6 A/point or less Category 4	

Two-piece SC terminal block Two-piece spring clamp terminal block

Programmable Controller CPU Module Specifications

Safety CPU module specifications

Item			QS001CPU
Control method			Repetitive operation of stored program
I/O control mode			Refresh
Program language		Sequence control language	Relay symbol language, function block
Processing speed (sequence instruction)		LD X0	0.10 μs
		MOV D0 D1	0.35 μs
Constant scan (function that keeps scan time constant)			1 to 2,000 ms (setting unit: 1 ms)
Program capacity*1			14 k steps (56 KB)
Memory capacity		Program memory (Drive 0)	128 KB
		Standard ROM (Drive 4)	128 KB
Max. number of stored files		Program memory	3 *2
		Standard ROM	3 *2
Number of writes to standard ROM			Max. 100,000 times
Number of I/O device points			6144 points (X/Y0 to 17FF)
Number of I/O points			1024 points (X/Y0 to 3FF)
Number of device points	Internal relay [M]		Default: 6144 points (M0 to 6143) (changeable)
	Link relay [B]		Default: 2048 points (B0 to 7FF) (changeable)
	Timer [T]		Default: 512 points (T0 to 511) (changeable) (for low-/high-speed timer)
			Low-/high-speed timer is specified by instructions. The low-/high-speed timer measurement unit is set by parameters. (Low-speed timer: 1 to 1000 ms, in increments of 1 ms; default: 100 ms) (High-speed timer: 0.1 to 100 ms, in increments of 0.1 ms; default: 10 ms)
	Retentive timer [ST]		Default: 0 points (for low-/high-speed retentive timer) (changeable) Low-/high-speed retentive timer is specified by instructions. The low-/high-speed retentive timer measurement unit is set by parameters. (Low-speed retentive timer: 1 to 1000 ms, in increments of 1 ms; default: 100 ms) (High-speed retentive timer: 0.1 to 100 ms, in increments of 0.1 ms; default: 10 ms)
	Counter [C]		Normal counter default: 512 points (C0 to 511) (changeable)
	Data register [D]		Default: 6144 points (D0 to 6143) (changeable)
	Link register [W]		Default: 2048 points (W0 to 7FF) (changeable)
	Annunciator [F]		Default: 1024 points (F0 to 1023) (changeable)
	Edge relay [V]		Default: 1024 points (V0 to 1023) (changeable)
	Link special relay [SB]		1536 points (SB0 to 5FF)
	Link special register [SW]		1536 points (SW0 to 5FF)
	Special relay [SM]		5120 points (SM0 to 5119)
	Special register [SD]		5120 points (SD0 to 5119)
RUN/PAUSE contact			RUN contact: 1 point can be set in the range of X0 to 17FF, PAUSE contact: None
Clock function			Year, month, date, hour, minute, second, day (automatic leap-year detection) Accuracy: -3.18 to +5.25 s (TYP. +2.14 s)/d at 0°C Accuracy: -3.18 to +2.59 s (TYP. +2.07 s)/d at 25°C Accuracy: -12.97 to +3.63 s (TYP. +3.16 s)/d at 55°C

*1: The maximum number of executable sequence steps is calculated using the following formula:
(Program capacity) - (File header size [default: 34 steps])
For details of program capacity and file, refer to the following manual.
☞QSCPU User's Manual (Function Explanations, Program Fundamentals).
*2: The memory stores 1 file for each of parameter, sequence program, and device comment.

CPU module specifications

Item		WS0-CPU0	WS0-CPU1	WS0-CPU3 NEW
Category		Category 4 (EN/ISO 13849-1)		
Safety Integrity Level (SIL)		SIL3 (IEC 61508) SILCL3 (IEC 62061)		
Performance level (PL)		PLe (EN/ISO 13849-1)		
PFHd (mean probability of a dangerous failure per hour)		1.07×10^{-9}	1.69×10^{-9}	
Enclosure rating (EN/IEC 60529)		Terminals: IP20, Housing: IP40		
EMC		IEC61131-2(ZONE B), IEC61000-6-2, EN55011(Class A)		
Protection class		Ⅲ		
Number of EFI interfaces		0	2	
EFI connection		By spring clamp terminal block		
Data interface		Backplane bus (FLEX BUS+)		
Configuration interface		RS-232		
Cross-section of connecting wires		Single-core or finely stranded: 1 × 0.14 to 2.5 mm^2 or 2 × 0.14 to 0.75 mm^2 Finely stranded with ferrules to DIN 46228: 1 × 0.25 to 2.5 mm^2 or 2 × 0.25 to 0.5 mm^2		
Weight		0.11 kg	0.12 kg	0.13 kg
External power specs	Supply voltage	24 V DC (16.8 to 30 V DC)		
	Type of supply voltage	PELV or SELV (The current of the power supply unit for the main module has to be limited to a maximum of 4 A - either by the power supply unit itself or by a fuse.)		
	Power consumption	Max. 2.5 W		
	Switch-on time	Max. 18 seconds		

Safety relay module specifications

Item		MELSEC-Q safety relay module QS90SR2SP-Q/QS90SR2SN-Q	CC-Link safety relay module QS90SR2SP-CC/QS90SR2SN-CC	Extension safety relay module QS90SR2SP-EX/QS90SR2SN-EX
Applicable safety standard		EN954-1 Category 4, ISO13849-1 PL e		
Number of safety input points		1 point (2 inputs)		
Number of start-up input points		1 point		
Number of safety output points		1 point (3 outputs)		
Rated load current		Category 4: 3.6 A/point or less, Category 3: 5.0 A/point or less (250 V AC/30 V DC)		
Response time	Time until output OFF	20 ms or less (safety input OFF to safety output OFF)		
	Time until output ON	50 ms or less (safety input ON to safety output ON)		
Module power supply		20.4 to 26.4 V DC (ripple ratio: 5% or less)	20.4 to 26.4 V DC (ripple ratio: 5% or less)	Supplied from MELSEC-Q safety relay module or CC-Link safety relay module.
Safety power supply		20.4 to 26.4 V DC (ripple ratio: 5% or less)	20.4 to 26.4 V DC (ripple ratio: 5% or less)	Supplied from MELSEC-Q safety relay module or CC-Link safety relay module.
Number of extension modules		Max. 3 extension safety relay modules	Max. 3 extension safety relay modules	–
External connections		Two-piece spring clamp terminal block		
Relay life	Mechanical	5,000,000 times or more		
	Electrical	100,000 times or more		

Network Related Products

Seamless connectivity within all levels of automation

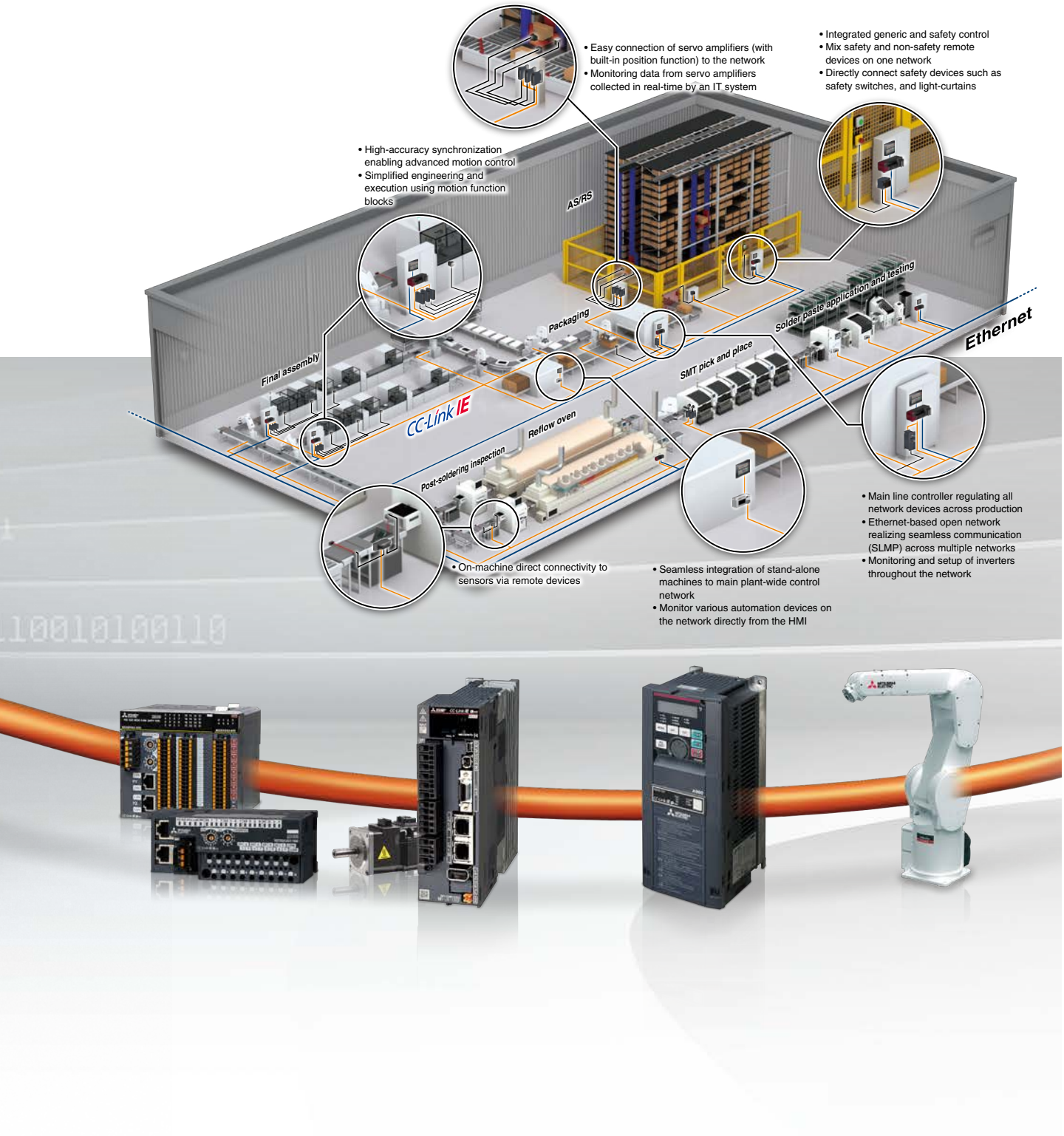
The backbone of e-F@ctory, leveraging connectivity between the shop floor and IT



Extensive visualization with advanced data connectivity

Big Data analytics requires deterministic data collection, which can be realized by incorporating two key features: SLMP*1 that enables seamless connectivity between devices in the IT layer and on the shop floor; and a high-speed, large-capacity 1 Gbps communications network that enables the handling of large-data, such as production, quality and control data between different production processes.

*1: Seamless Message Protocol



General, motion and safety control integrated into one network

CC-Link IE incorporates generic distributed control, synchronous motion control, and safety control enabling safety communications across multiple safety devices, all on the same network. The topology is quite versatile, based on twisted-pair cables, which enables flexibility in system configuration while helping to keep installation cost low.

Comprehensive diagnosis realizing higher reliability

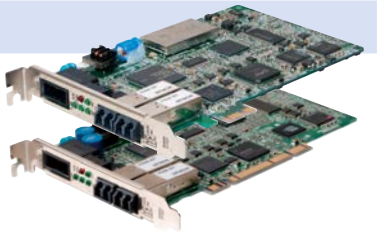
Disruptions to the control system are kept to a minimum via comprehensive diagnostics functions, high communications integrity owing to the noise-resistant characteristics of the optical cable, and communication re-routing capabilities made possible as the result of using a ring topology. Also, network errors can be rectified quickly by visualizing the network system image using the engineering software*2, and remotely from a GOT (HMI) directly on the machine or production line.

*2: MELSEC iQ-R Series is supported by GX Works3.
MELSEC-Q Series and MELSEC-L Series are supported by GX Works2

CC-Link IE Controller Network Compatible Products

CC-Link IE

Network Interface Board



Using these PCI Express®/PCI/PCI-X bus interface boards, PC control systems can be directly connected to CC-Link IE Control Network. This interface board can be used as either a control station or normal station of CC-Link IE Controller Network.

Model	Connection cable	Bus standard	Communication speed	Transmission path	Overall cable distance	Compatible station	Maximum stations per network	Others
Q81BD-J71GP21-SX	Optical fiber cable (Multi-mode fiber)	PCI Express® bus	1 Gbps	Dual loop	66000 m (When 120 stations are connected)	Control station / Normal station	120 stations	–
Q81BD-J71GP21S-SX	Optical fiber cable (Multi-mode fiber)	PCI Express® bus	1 Gbps	Dual loop	66000 m (When 120 stations are connected)	Control station / Normal station	120 stations	With external power supply function
Q80BD-J71GP21-SX	Optical fiber cable (Multi-mode fiber)	PCI bus / PCIX-bus	1 Gbps	Dual loop	66000 m (When 120 stations are connected)	Control station / Normal station	120 stations	–
Q80BD-J71GP21S-SX	Optical fiber cable (Multi-mode fiber)	PCI bus / PCIX-bus	1 Gbps	Dual loop	66000 m (When 120 stations are connected)	Control station / Normal station	120 stations	With external power supply function

CC-Link IE Field Network Compatible Products

CC-Link IE

Remote I/O Module



This I/O module is designed for the CC-Link IE field network. Easily disperse and layout the remote input/output modules to match your equipment.

Screw terminal block type

Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Max. extension modules	Others
DC input (positive/negative shared common)	NZ2GF2B1N1-16D	16 points	24 V DC	6 mA	16 points/common	0 ms / 0.2 ms / 1 ms / 1.5 ms / 5 ms / 10 ms / 20 ms / 70 ms	1-wire	3	Synchronous communication
	NZ2GF2B1N-16D	16 points	24 V DC	6 mA	16 points/common	0 ms / 0.2 ms / 1 ms / 1.5 ms / 5 ms / 10 ms / 20 ms / 70 ms	1-wire	1	Synchronous communication

Output module

Type	Model	Output points	Rated load voltage	Rated load current	Common type	Response time	Wiring method	Max. extension modules	Others
Transistor (sink) output	NZ2GF2B1N1-16T	16 points	12/24 V DC	0.5 A/point 4 A/common	16 points/common	1.5 ms	1-wire	3	Synchronous communication
	NZ2GF2B1N-16T	16 points	12/24 V DC	0.5 A/point 4 A/common	16 points/common	1.5 ms	1-wire	1	Synchronous communication
Transistor (source) output	NZ2GF2B1N1-16TE	16 points	12/24 V DC	0.5 A/point 4 A/common	16 points/common	1.5 ms	1-wire	3	Synchronous communication
	NZ2GF2B1N-16TE	16 points	12/24 V DC	0.5 A/point 4 A/common	16 points/common	1.5 ms	1-wire	1	Synchronous communication

Spring clamp terminal block type

Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Max. extension modules	Others
DC input (positive/negative shared common)	NZ2GF2S1-16D	16 points	24 V DC	6 mA	16 points/common	0 ms / 0.2 ms / 1 ms / 1.5 ms / 5 ms / 10 ms / 20 ms / 70 ms	1-wire	1	Synchronous communication

Output module

Type	Model	Output points	Rated load voltage	Rated load current	Common type	Response time	Wiring method	Max. extension modules	Others
Transistor (sink) output	NZ2GF2S1-16T	16 points	12/24 V DC	0.5 A/point 4 A/common	16 points/common	1.5 ms	1-wire	1	Synchronous communication
Transistor (source) output	NZ2GF2S1-16TE	16 points	12/24 V DC	0.5 A/point 4 A/common	16 points/common	1.5 ms	1-wire	1	Synchronous communication

Sensor connector (e-CON) type

Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Max. extension modules	Others
DC input (positive common)	NZ2GFCE3-16D	16 points	24 V DC	4 mA	16 points/common	0 ms 0.2 ms 1 ms 1.5 ms 5 ms 10 ms 20 ms 70 ms	3-wire	1	Synchronous communication
	NZ2GFCE3-32D	32 points	24 V DC	4 mA	32 points/common	0 ms 0.2 ms 1 ms 1.5 ms 5 ms 10 ms 20 ms 70 ms	3-wire	1	Synchronous communication
DC input (negative common)	NZ2GFCE3-16DE	16 points	24 V DC	4 mA	16 points/common	0 ms 0.2 ms 1 ms 1.5 ms 5 ms 10 ms 20 ms 70 ms	3-wire	1	Synchronous communication

Output module

Type	Model	Output points	Rated load voltage	Rated load current	Common type	Response time	Wiring method	Max. extension modules	Others
Transistor (sink) output	NZ2GFCE3-16T	16 points	12/24 V DC	0.5 A/point 4 A/common	16 points/common	1.5 ms	3-wire	1	Synchronous communication
	NZ2GFCE3-32T	32 points	12/24 V DC	0.5 A/point 6 A/common	32 points/common	1.5 ms	3-wire	1	Synchronous communication
Transistor (source) output	NZ2GFCE3-16TE	16 points	12/24 V DC	0.5 A/point 4 A/common	16 points/common	1.5 ms	3-wire	1	Synchronous communication

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Wiring method	Max. extension modules	Others
DC input/ Transistor output	NZ2GFCE3-32DT	Input 16 points	24 V DC	4 mA	–	32 points/common	0 ms 0.2 ms 1 ms 1.5 ms 5 ms 10 ms 20 ms 70 ms	3-wire	1	Synchronous communication
		Output 16 points	12/24 V DC	–	0.5 A/point 4 A/common	32 points/common	1.5 ms	3-wire	1	Synchronous communication

MIL connector type

Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Max. extension modules	Others
DC input (positive common)	NZ2GFCM1-16D	16 points	24 V DC	4 mA	16 points/common	0 ms 0.2 ms 1 ms 1.5 ms 5 ms 10 ms 20 ms 70 ms	1-wire	1	Synchronous communication
DC input (negative common)	NZ2GFCM1-16DE	16 points	24 V DC	4 mA	16 points/common	0 ms 0.2 ms 1 ms 1.5 ms 5 ms 10 ms 20 ms 70 ms	1-wire	1	Synchronous communication

Output module

Type	Model	Output points	Rated load voltage	Rated load current	Common type	Response time	Wiring method	Max. extension modules	Others
Transistor (sink) output	NZ2GFCM1-16T	16 points	12/24 V DC	0.5 A/point 2 A/common	16 points/common	1.5 ms	1-wire	1	Synchronous communication
Transistor (source) output	NZ2GFCM1-16TE	16 points	12/24 V DC	0.5 A/point 2 A/common	16 points/common	1.5 ms	1-wire	1	Synchronous communication

40-pin connector type

Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Max. extension modules	Others
DC input (positive/negative shared common)	NZ2GFCF1-32D	32 points	24 V DC	4 mA	32 points/common	0 ms, 0.2 ms, 1 ms, 1.5 ms, 5 ms, 10 ms, 20 ms, 70 ms	1-wire	1	Synchronous communication

Output module

Type	Model	Output points	Rated load voltage	Rated load current	Common type	Response time	Wiring method	Max. extension modules	Others
Transistor (sink) output	NZ2GFCF1-32T	32 points	12/24 V DC	0.1 A/point, 3.2 A/common	32 points/common	1.5 ms	1-wire	1	Synchronous communication

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Wiring method	Max. extension modules	Others
DC input/ Transistor output	NZ2GFCF1-32DT	Input 16 points	24 V DC	4 mA	–	16 points/common	0 ms, 0.2 ms, 1 ms, 1.5 ms, 5 ms, 10 ms, 20 ms, 70 ms	1-wire	1	Synchronous communication
		Output 16 points	12/24 V DC	–	0.1 A/point, 1.6 A/common	16 points/common	1.5 ms	1-wire	1	Synchronous communication

Analog Input/Output Module



The conversion speed of analog input modules can be selected from 100 µs/channel, 400 µs/channel and 1 ms/channel. The conversion speed of analog output modules is 100 µs/channel. By connecting an extension DC input module to the analog input module, it enables more precise A/D conversion speed control. (with the Trigger Conversion Function)

Type	Model	Number of channels	Input/Output	Resolution	Conversion speed	Max. extension modules	Others
Voltage, current input	NZ2GF2BN-60AD4	4 ch	-10 to 10 V DC, 0 to 20 mA DC	0 to 16000, -16000 to 16000	100 µs/ch, 400 µs/ch, 1 ms/ch	1	Synchronous communication
Voltage, current output	NZ2GF2BN-60DA4	4 ch	-10 to 10 V DC, 0 to 20 mA DC	0 to 12000, -16000 to 16000	100 µs/ch	1	Synchronous communication

Temperature Control Module



Operates at the sampling cycle of 250 ms/4 channels. Mixed control mode of standard control and heating/cooling control is equipped. The Simultaneous temperature rise, Peak current suppression, Self-tuning, and Heating/cooling control functions are available.
It can be used as a temperature input module as well.

Model	Number of channels	Input	Sampling cycle	Max. extension modules	Others
NZ2GF2B-60TCTT4	4 ch	Thermocouple R,K,J,T,S,B,E,N,U,L,PLⅡ W5Re/W26Re	250 ms/4 ch, 500 ms/4 ch	–	Channel isolated, Standard control, Heating/cooling control *1
NZ2GF2B-60TCRT4	4 ch	Platinum RTD Pt100,JPt100	250 ms/4 ch, 500 ms/4 ch	–	Channel isolated, Standard control, Heating/cooling control *1

*1: 4-channel (loop) heating/cooling control can be made by using other output modules.

High-Speed Counter Module



Built-in PWM output function of 200 kHz maximum. The Pulse measurement function with 100 ns measurement resolution enables highly accurate pulse width measurement.

Model	Number of channels	Counting speed switch	Count input signal	External input	Coincidence output	Max. extension modules	Others
NZ2GFCF-D62PD2	2 ch	10 kpps, 100 kpps, 200 kpps, 500 kpps, 1 Mpps, 2 Mpps, 4 Mpps, 8 Mpps	Differential line driver	5/24 V DC	Transistor (sink type), 5 to 24 V DC, 0.1 A/point, 0.4 A/common	1	Synchronous communication
	2 ch	10 kpps, 100 kpps, 200 kpps	5 V DC	5/24 V DC		1	Synchronous communication

Extension Input/Output Module



16-point inputs/outputs can be added easily for the remote I/O, analog, and high-speed counter modules. Extend the analog input module, the input signal from an external source with the Trigger conversion function controls the analog-digital conversion value's sampling timing. Extend to the high-speed counter module, the Cam switch function provides ON/OFF control at an accurate cycle.

Screw terminal block type

Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Multiple modules connectable
DC input (positive/negative shared common)	NZ2EX2B1N-16D	16 points	24 V DC	6 mA	16 points/common	0 ms, 0.2 ms, 1 ms, 1.5 ms, 5 ms, 10 ms, 20 ms, 70 ms	1-wire	Available
	NZ2EX2B1-16D	16 points	24 V DC	6 mA	16 points/common	0 ms, 0.2 ms, 1 ms, 1.5 ms, 5 ms, 10 ms, 20 ms, 70 ms	1-wire	Unavailable

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Wiring method	Multiple modules connectable
Transistor (sink) output	NZ2EX2B1N-16T	16 points	12/24 V DC	0.5 A/points, 4 A/common	16 points/common	1.5 ms	1-wire	Available
	NZ2EX2B1-16T	16 points	12/24 V DC	0.5 A/points, 4 A/common	16 points/common	1.5 ms	1-wire	Unavailable
Transistor (source) output	NZ2EX2B1N-16TE	16 points	12/24 V DC	0.5 A/points, 4 A/common	16 points/common	1.5 ms	1-wire	Available
	NZ2EX2B1-16TE	16 points	12/24 V DC	0.5 A/points, 4 A/common	16 points/common	1.5 ms	1-wire	Unavailable

Spring clamp terminal block type

Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Multiple modules connectable
DC input (positive/negative shared common)	NZ2EX2S1-16D	16 points	24 V DC	6 mA	16 points/common	0 ms, 0.2 ms, 1 ms, 1.5 ms, 5 ms, 10 ms, 20 ms, 70 ms	1-wire	Unavailable

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Wiring method	Multiple modules connectable
Transistor (sink) output	NZ2EX2S1-16T	16 points	12/24 V DC	0.5 A/points, 4 A/common	16 points/common	1.5 ms	1-wire	Unavailable
Transistor (source) output	NZ2EX2S1-16TE	16 points	12/24 V DC	0.5 A/points, 4 A/common	16 points/common	1.5 ms	1-wire	Unavailable

Extension Analog Input/Output Modules



Extends the number of analog channels without any changes required to the network configuration. Enables connection with analog I/O modules.

Input module

Type	Model	Number of channels	Input/Output	Resolution	Conversion speed	Multiple modules connectable
Voltage, current input	NZ2EX2B-60AD4	4 ch	-10 to 10 V DC 0 to 20 mA DC	0 to 16000 -16000 to 16000	100 µs/ch 400 µs/ch 1 ms/ch	Unavailable

Output module

Type	Model	Number of channels	Input/Output	Resolution	Conversion speed	Multiple modules connectable
Voltage, current output	NZ2EX2Bz-60DA4	4 ch	-10 to 10 V DC 0 to 20 mA DC	0 to 12000 -16000 to 16000	100 µs/ch	Unavailable

Safety Remote I/O Module



Remote I/O modules that support safety functions of CC-Link IE Field Network.
Performs safety control when used together with the MELSEC iQ-R Series Safety CPU.

Spring clamp terminal block type

Main safety input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method
DC input (negative common)	NZ2GFSS2-32D	32 points Single wiring 16 points Double wiring	24 V DC	6 mA	32 points/common	0.4 ms	2-wire

Extension safety output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Wiring method
Transistor (source + source) output	NZ2EXSS2-8TE	8 points Single wiring 4 points Double wiring	24 V DC	0.5 A/points 4 A/common	8 points/common	0.4 ms	2-wire

Ethernet Adapter Module



Using Seamless Message Protocol (SLMP), a variety of Ethernet devices such as vision sensors and RFID controllers can be connected to CC-Link IE Field Network. Use a web browser to set station numbers, Ethernet options, and view error history. Compatible with 100 Mbps/1 Gbps transmission rates.

Model	Communication speed	Transmission path	Overall cable distance	Max. simultaneous connections
NZ2GF-ETB	100 Mbps 1 Gbps	Line topology Star topology Ring topology (Coexistence of line topology and star topology is possible.)	Line topology: 12,000 m (Master station: 1, slave station: 120) Star topology: Depends on the system configuration Ring topology: 12,100 m (Master station: 1, slave station: 120)	Max. 32 stations

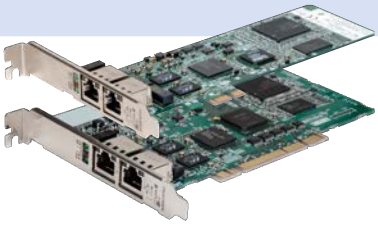
Bridge Module



CC-Link and AnyWireASLINK products can be seamlessly connected to CC-Link IE Field Network.

Type	Model	Others
For CC-Link IE Field Network – CC-Link connection	NZ2GF-CCB	CC-Link master station function
For CC-Link IE Field Network – AnyWireASLINK connection	NZ2AW1GFAL	AnyWireASLINK master station function

Network Interface Board



PCI-X/PCI Express®/ Using these PCI bus interface boards, PC control systems can be directly connected to CC-Link IE Field Network. This interface board can be used as either a master station or local stations of CC-Link IE Field Network.

Model	Bus standard	Communication speed	Transmission path	Overall cable distance	Compatible station	Maximum stations per network
Q81BD-J71GF11-T2	PCI Express® bus	1 Gbps	Line topology Star topology Ring topology (Coexistence of line topology and star topology is possible.)	Line topology: 12,000 m (Master station: 1, slave station: 120) Star topology: Depends on the system configuration Ring topology: 12,100 m (Master station: 1, slave station: 120)	Master station Local station	121 stations (Master station: 1, Slave station: 120)
Q80BD-J71GF11-T2	PCI bus PCI-X bus	1 Gbps	Line topology Star topology Ring topology (Coexistence of line topology and star topology is possible.)	Line topology: 12,000 m (Master station: 1, slave station: 120) Star topology: Depends on the system configuration Ring topology: 12,100 m (Master station: 1, slave station: 120)	Master station Local station	121 stations (Master station: 1, Slave station: 120)

CC-Link Compatible Products

Remote I/O Module

Screw terminal block type

Our extensive product lineup fit your various needs of external connection mode and I/O specifications of external devices. A finger-protection design of the terminal block prevents anyone from touching a live part and gives you the option to mount the terminal block type remote I/O module directly to the machine.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Station type	Occupied station
AC input	AJ65SBTB2N-8A	8 points	100 to 120 V AC	7 mA	8 points/common	20 ms	2-wire	Remote I/O station	1 station
	AJ65SBTB2N-16A	16 points	100 to 120 V AC	7 mA	16 points/common	20 ms	2-wire	Remote I/O station	1 station
DC input (positive/negative shared common)	AJ65SBTB1-8D	8 points	24 V DC	7 mA	8 points/common	1.5 ms	1-wire	Remote I/O station	1 station
	AJ65SBTB3-8D	8 points	24 V DC	7 mA	8 points/common	1.5 ms	3-wire	Remote I/O station	1 station
	AJ65SBTB1-16D	16 points	24 V DC	7 mA	16 points/common	1.5 ms	1-wire	Remote I/O station	1 station
	AJ65SBTB1-16D1	16 points	24 V DC	5 mA	16 points/common	0.2 ms	1-wire	Remote I/O station	1 station
	AJ65SBTB3-16D	16 points	24 V DC	7 mA	16 points/common	1.5 ms	3-wire	Remote I/O station	1 station
	AJ65SBTB3-16D5	16 points	5 V DC	4 mA	16 points/common	1.5 ms	3-wire	Remote I/O station	1 station
	AJ65SBTB3-16KD	16 points	24 V DC	7 mA	16 points/common	0.2 ms 1.5 ms 5 ms 10 ms	3-wire	Remote I/O station	1 station
	AJ65SBTB1-32D	32 points	24 V DC	7 mA	32 points/common	1.5 ms	1-wire	Remote I/O station	1 station
	AJ65SBTB1-32D1	32 points	24 V DC	5 mA	32 points/common	0.2 ms	1-wire	Remote I/O station	1 station
	AJ65SBTB1-32D5	32 points	5 V DC	4 mA	32 points/common	1.5 ms	1-wire	Remote I/O station	1 station
	AJ65SBTB1-32KD	32 points	24 V DC	7 mA	32 points/common	0.2 ms 1.5 ms 5 ms 10 ms	1-wire	Remote I/O station	1 station

Output module

Type	Model	Output points	Rated load voltage	Maximum load current (Rated switching current)	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
Transistor (sink) output	AJ65SBTB1-8T	8 points	12/24 V DC	0.5 A/points 2.4 A/common	8 points/common	1.5 ms	Yes	1-wire	Remote I/O station	1 station
	AJ65SBTB1-8T1	8 points	12/24 V DC	0.5 A/points 2.4 A/common	8 points/common	1.5 ms	No	1-wire	Remote I/O station	1 station
	AJ65SBTB2-8T	8 points	12/24 V DC	0.5 A/points 2.4 A/common	8 points/common	1.5 ms	Yes	2-wire	Remote I/O station	1 station
	AJ65SBTB2-8T1	8 points	12/24 V DC	0.5 A/points 2.4 A/common	8 points/common	1.5 ms	No	2-wire	Remote I/O station	1 station
	AJ65SBTB1-16T	16 points	12/24 V DC	0.5 A/points 3.6 A/common	16 points/common	1.5 ms	Yes	1-wire	Remote I/O station	1 station
	AJ65SBTB1-16T1	16 points	12/24 V DC	0.5 A/points 3.6 A/common	16 points/common	1.5 ms	No	1-wire	Remote I/O station	1 station
	AJ65SBTB2-16T	16 points	12/24 V DC	0.5 A/points 3.6 A/common	16 points/common	1.5 ms	Yes	2-wire	Remote I/O station	1 station
	AJ65SBTB2-16T1	16 points	12/24 V DC	0.5 A/points 3.6 A/common	16 points/common	1.5 ms	No	2-wire	Remote I/O station	1 station
	AJ65SBTB1-32T	32 points	12/24 V DC	0.5 A/points 4.8 A/common	32 points/common	1.5 ms	Yes	1-wire	Remote I/O station	1 station
	AJ65SBTB1-32T1	32 points	12/24 V DC	0.5 A/points 4.8 A/common	32 points/common	1.5 ms	No	1-wire	Remote I/O station	1 station
Transistor (source) output	AJ65SBTB1-8TE	8 points	12/24 V DC	0.1 A/points 0.8 A/common	8 points/common	1.5 ms	Yes	1-wire	Remote I/O station	1 station
	AJ65SBTB1-16TE	16 points	12/24 V DC	0.1 A/points 1.6 A/common	16 points/common	1.5 ms	Yes	1-wire	Remote I/O station	1 station
	AJ65SBTB1B-16TE1	16 points	12/24 V DC	0.5 A/points 4 A/common	8 points/common	1.5 ms	No	1-wire	Remote I/O station	1 station
	AJ65SBTB1-32TE1	16 points	12/24 V DC	0.5 A/points 4.8 A/common	32 points/common	1.5 ms	No	1-wire	Remote I/O station	1 station
Relay output	AJ65SBTB2N-8R	8 points	24 V DC 240 V AC	2 A/points 4 A/common	8 points/common	12 ms	No	2-wire	Remote I/O station	1 station
	AJ65SBTB2N-16R	16 points	24 V DC 240 V AC	2 A/points 8 A/common	16 points/common	12 ms	No	2-wire	Remote I/O station	1 station
Triac output	AJ65SBTB2N-8S	8 points	100 to 240 V AC	0.6 A/points 2.4 A/common	8 points/common	1 ms +0.5 cycle	No	2-wire	Remote I/O station	1 station
	AJ65SBTB2N-16S	16 points	100 to 240 V AC	0.6 A/points 4.8 A/common	16 points/common	1 ms +0.5 cycle	No	2-wire	Remote I/O station	1 station

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/ Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
DC input (positive common)/ Transistor (sink) output	AJ65SBTB32-8DT	Input 4 points	24 V DC	7 mA	–	8 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 4 points	24 V DC	–	0.5 A/points 1.2 A/common		1.5 ms	Yes	2-wire		
	AJ65SBTB32-8DT2	Input 4 points	24 V DC	7 mA	–	8 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 4 points	24 V DC	–	0.5 A/points 1.2 A/common		1.5 ms	No	2-wire		
	AJ65SBTB1-16DT	Input 8 points	24 V DC	7 mA	–	16 points/common	1.5 ms	–	1-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	Yes	1-wire		
	AJ65SBTB1-16DT1	Input 8 points	24 V DC	5 mA	–	16 points/common	0.2 ms	–	1-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	Yes	1-wire		
	AJ65SBTB1-16DT2	Input 8 points	24 V DC	7 mA	–	16 points/common	1.5 ms	–	1-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	No	1-wire		
	AJ65SBTB1-16DT3	Input 8 points	24 V DC	5 mA	–	16 points/common	0.2 ms	–	1-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	No	1-wire		
	AJ65SBTB32-16DT	Input 8 points	24 V DC	7 mA	–	16 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	Yes	2-wire		
	AJ65SBTB32-16DT2	Input 8 points	24 V DC	7 mA	–	16 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	No	2-wire		
	AJ65SBTB32-16KDT2	Input 8 points	24 V DC	7 mA	–	16 points/common	0.2 ms 1.5 ms 5 ms 10 ms	–	3-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	No	2-wire		
	AJ65SBTB32-16KDT8	Input 8 points	12 V DC	11 mA	–	16 points/common	0.2 ms 1.5 ms 5 ms 10 ms	–	3-wire	Remote I/O station	1 station
		Output 8 points	12 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	No	2-wire		
	AJ65SBTB1-32DT	Input 16 points	24 V DC	7 mA	–	32 points/common	1.5 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.5 A/points 3.6 A/common		1.5 ms	Yes	1-wire		
	AJ65SBTB1-32DT1	Input 16 points	24 V DC	5 mA	–	32 points/common	0.2 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.5 A/points 3.6 A/common		1.5 ms	Yes	1-wire		
	AJ65SBTB1-32DT2	Input 16 points	24 V DC	7 mA	–	32 points/common	1.5 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.5 A/points 3.6 A/common		1.5 ms	No	1-wire		
	AJ65SBTB1-32DT3	Input 16 points	24 V DC	5 mA	–	32 points/common	0.2 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.5 A/points 3.6 A/common		1.5 ms	No	1-wire		
	AJ65SBTB1-32KDT2	Input 16 points	24 V DC	7 mA	–	32 points/common	0.2 ms 1.5 ms 5 ms 10 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.5 A/points 3.6 A/common		1.5 ms	No	1-wire		
	AJ65SBTB1-32KDT8	Input 16 points	12 V DC	11 mA	–	32 points/common	0.2 ms 1.5 ms 5 ms 10 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	12 V DC	–	0.5 A/points 3.6 A/common		1.5 ms	No	1-wire		
DC input (negative common)/ Transistor (source) output	AJ65SBTB1-32DTE1	Input 16 points	24 V DC	7 mA	–	32 points/common	1.5 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.5 A/points 3.6 A/common		1.5 ms	No	1-wire		
DC input (positive/negative shared common)/ Relay output	AJ65SBTB32-16DR	Input 8 points	24 V DC	7 mA	–	8 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 8 points	24 V DC 240 V AC	–	2 A/points 4 A/common	4 points/common	12 ms	No	2-wire		
	AJ65SBTB32-16KDR	Input 8 points	24 V DC	7 mA	–	8 points/common	0.2 ms 1.5 ms 5 ms 10 ms	–	3-wire	Remote I/O station	1 station
		Output 8 points	24 V DC 240 V AC	–	2 A/points 4 A/common	4 points/common	12 ms	No	2-wire		

Two-piece screw terminal block type

Removable I/O terminal block type. This two-piece structure terminal block allows easy maintenance of replacing modules without rewiring.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Station type	Occupied station
DC input (positive/negative shared common)	AJ65BTB1-16D	16 points	24 V DC	7 mA	16 points/common	10 ms	1-wire	Remote I/O station	1 station
	AJ65BTB2-16D	16 points	24 V DC	7 mA	16 points/common	10 ms	2-wire	Remote I/O station	1 station

Output module

Type	Model	Output points	Rated load voltage	Maximum load current (Rated switching current)	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
Transistor (sink) output	AJ65BTB1-16T	16 points	12/24 V DC	0.5 A/points 2.8 A/common	8 points/common	2 ms	No	1-wire	Remote I/O station	1 station
	AJ65BTB2-16T	16 points	12/24 V DC	0.5 A/points 4 A/common	8 points/common	2 ms	No	2-wire	Remote I/O station	1 station
Relay output	AJ65BTB2-16R	16 points	24 V DC 240 V AC	2 A/points 8 A/common	8 points/common	12 ms	No	2-wire	Remote I/O station	1 station

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
DC input (positive common)/ Transistor (sink) output	AJ65BTB1-16DT	Input 8 points	24 V DC	7 mA	–	8 points/common	10 ms	–	1-wire	Remote I/O station	1 station
		Output 8 points	12/24 V DC	–	0.5 A/points 4 A/common	8 points/common	2 ms	No	1-wire		
	AJ65BTB2-16DT	Input 8 points	24 V DC	7 mA	–	8 points/common	10 ms	–	2-wire	Remote I/O station	1 station
		Output 8 points	12/24 V DC	–	0.5 A/points 4 A/common	8 points/common	2 ms	No	2-wire		
DC input (positive/negative shared common)/ Relay output	AJ65BTB2-16DR	Input 8 points	24 V DC	7 mA	–	8 points/common	10 ms	–	2-wire	Remote I/O station	1 station
		Output 8 points	24 V DC 240 V AC	–	2 A/points 8 A/common	8 points/common	12 ms	No	2-wire		

A2C shape terminal block type

These removable I/O terminal block type modules have the same shape (installation dimensions) as the A2C I/O modules, and it eliminates to make drill mounting holes.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Station type	Occupied station
DC input (positive/negative shared common)	AJ65DBTB1-32D	32 points	24 V DC	5 mA	16 points/common	10 ms	1-wire	Remote I/O station	1 station

Output module

Type	Model	Output points	Rated load voltage	Maximum load current (Rated switching current)	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
Transistor (sink) output	AJ65DBTB1-32T1	32 points	12/24 V DC	0.5 A/points 8 A/common	32 points/common	1.5 ms	No	1-wire	Remote I/O station	1 station
Relay output	AJ65DBTB1-32R	32 points	24 V DC 240 V AC	2 A/points 4 A/common	8 points/common	12 ms	No	1-wire	Remote I/O station	1 station

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
DC input (positive common)/ Transistor (sink) output	AJ65DBTB1-32DT1	Input 16 points	24 V DC	5 mA	–	16 points/common	10 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	12/24 V DC	–	0.5 A/points 4 A/common	16 points/common	1.5ms	No	1-wire		
DC input (positive/negative shared common)/ Relay output	AJ65DBTB1-32DR	Input 16 points	24 V DC	5 mA	–	16 points/common	10 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC 240 V AC	–	2 A/points 4 A/common	8 points/common	12 ms	No	1-wire		

Spring clamp terminal block push-in type

These push-in type modules can reduce wiring work, detect disconnection and short circuit of individual input wiring, and check wiring abnormality of external power supply.



Input modules with diagnostic function

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Station type	Occupied station
DC input (positive common)	AJ65ABTP3-16D	16 points	24 V DC	6 mA	16 points/common	1.5 ms	3-wire	Remote device station	1 station
DC input (negative common)	AJ65ABTP3-16DE	16 points	24 V DC	6 mA	16 points/common	1.5 ms	3-wire	Remote device station	1 station

Spring clamp terminal block type

No need for screw tightening or additional tightening saves wiring work hours. Available in both DIN rail and screw installation for module mounting. Supports 3-wire sensor input wiring.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Station type	Occupied station
DC input (positive common)	AJ65VBTS3-16D	16 points	24 V DC	5 mA	16 points/common	1.5 ms	3-wire	Remote I/O station	1 station
	AJ65VBTS3-32D	32 points	24 V DC	5 mA	16 points/common	1.5 ms	3-wire	Remote I/O station	1 station

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
Transistor (sink) output	AJ65VBTS2-16T	16 points	12/24 V DC	0.5 A/points 4 A/common	16 points/common	1 ms	No	2-wire	Remote I/O station	1 station
	AJ65VBTS2-32T	32 points	12/24 V DC	0.5 A/points 4 A/common	16 points/common	1 ms	No	2-wire	Remote I/O station	1 station

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
DC input (positive common)/ Transistor (sink) output	AJ65VBTS32-16DT	Input 8 points	24 V DC	5 mA	–	16 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 4 A/common		1 ms	No	2-wire		
	AJ65VBTS32-32DT	Input 16 points	24 V DC	5 mA	–	16 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 16 points	12/24 V DC	–	0.5 A/points 4 A/common	16 points/common	1 ms	No	2-wire		

Sensor connector (e-CON) type

Industry standard e-CON is adopted in the sensor connectors for easy wiring. Available in both DIN rail and screw installation for module mounting. Supports 3-wire sensor input wiring.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Station type	Occupied station
DC input (positive common)	AJ65VBTCE3-8D	8 points	24 V DC	5 mA	8 points/common	1.5 ms	3-wire	Remote I/O station	1 station
	AJ65VBTCE3-16D	16 points	24 V DC	5 mA	16 points/common	1.5 ms	3-wire	Remote I/O station	1 station
	AJ65VBTCE3-32D	32 points	24 V DC	5 mA	32 points/common	1.5 ms	3-wire	Remote I/O station	1 station
DC input (negative common)	AJ65VBTCE3-16DE	16 points	24 V DC	5 mA	16 points/common	1.5 ms	3-wire	Remote I/O station	1 station
	AJ65VBTCE3-32DE	32 points	24 V DC	5 mA	32 points/common	1.5 ms	3-wire	Remote I/O station	1 station

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
Transistor (sink) output	AJ65VBTCE2-8T	8 points	12/24 V DC	0.1 A/points 0.8 A/common	8 points/common	1 ms	Yes	2-wire	Remote I/O station	1 station
	AJ65VBTCE2-16T	16 points	12/24 V DC	0.1 A/points 1.6 A/common	16 points/common	1 ms	Yes	2-wire	Remote I/O station	1 station
Transistor (source) output	AJ65VBTCE3-16TE	16 points	12/24 V DC	0.1 A/points 1.6 A/common	16 points/common	1 ms	Yes	3-wire	Remote I/O station	1 station

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
DC input (positive common)/ Transistor (sink) output	AJ65VBTCE32-16DT	Input 8 points	24 V DC	5 mA	–	16 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.1 A/points 0.8 A/common		1 ms	Yes	2-wire		
	AJ65VBTCE32-32DT	Input 16 points	24 V DC	5 mA	–	32 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.1 A/points 1.6 A/common		1 ms	Yes	2-wire		
DC input (negative common)/ Transistor (source) output	AJ65VBTCE3-16DTE	Input 8 points	24 V DC	5 mA	–	16 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.1 A/points 0.8 A/common		1 ms	Yes	3-wire		
	AJ65VBTCE3-32DTE	Input 16 points	24 V DC	5 mA	–	32 points/common	1.5 ms	–	3-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.1 A/points 1.6 A/common		1 ms	Yes	3-wire		

One-touch connector type

The one-touch connector simplifies the wiring, and can be mounted in six different directions.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Station type	Occupied station
DC input (positive common)	AJ65VBTCU3-8D1	8 points	24 V DC	5 mA	8 points/common	0.2 ms	3-wire	Remote I/O station	1 station
	AJ65VBTCU3-16D1	16 points	24 V DC	5 mA	16 points/common	0.2 ms	3-wire	Remote I/O station	1 station
	AJ65SBTC4-16DN	16 points	24 V DC	5 mA	16 points/common	1.5ms	4-wire	Remote I/O station	1 station
DC input (negative common)	AJ65SBTC4-16DE	16 points	24 V DC	5 mA	16 points/common	1.5ms	4-wire	Remote I/O station	1 station
DC input (positive/negative shared common)	AJ65SBTC1-32D	32 points	24 V DC	5 mA	32 points/common	1.5ms	1-wire	Remote I/O station	1 station
	AJ65SBTC1-32D1	32 points	24 V DC	5 mA	32 points/common	0.2 ms	1-wire	Remote I/O station	1 station

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
Transistor (sink) output	AJ65VBTCU2-8T	8 points	12/24 V DC	0.1 A/points 0.8 A/common	8 points/common	1 ms	Yes	2-wire	Remote I/O station	1 station
	AJ65VBTCU2-16T	16 points	12/24 V DC	0.1 A/points 1.6 A/common	16 points/common	1 ms	Yes	2-wire	Remote I/O station	1 station
	AJ65SBTC1-32T	32 points	12/24 V DC	0.1 A/points 3.2 A/common	32 points/common	1.5 ms	Yes	1-wire	Remote I/O station	1 station
	AJ65SBTC1-32T1	32 points	12/24 V DC	0.1 A/points 3.2 A/common	32 points/common	1.5 ms	No	1-wire	Remote I/O station	1 station

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
DC input (positive common)/ Transistor (sink) output	AJ65SBTC4-16DT	Input 8 points	24 V DC	5 mA	–	16 points/common	1.5 ms	–	4-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	Yes			
	AJ65SBTC4-16DT2	Input 8 points	24 V DC	5 mA	–	16 points/common	1.5 ms	–	4-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	No			
	AJ65SBTC1-32DT	Input 16 points	24 V DC	5 mA	–	32 points/common	1.5 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.1 A/points 1.6 A/common		1.5 ms	Yes	1-wire		
	AJ65SBTC1-32DT1	Input 16 points	24 V DC	5 mA	–	32 points/common	0.2 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.1 A/points 1.6 A/common		1.5 ms	Yes	1-wire		
	AJ65SBTC1-32DT2	Input 16 points	24 V DC	5 mA	–	32 points/common	1.5 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.1 A/points 1.6 A/common		1.5 ms	No	1-wire		
	AJ65SBTC1-32DT3	Input 16 points	24 V DC	5 mA	–	32 points/common	0.2 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.1 A/points 1.6 A/common		1.5 ms	No	1-wire		

40 pins connector type

The 40-pin connector enables connection to wide variety of devices, and can be mounted in six different directions.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Station type	Occupied station
DC input (positive/negative shared common)	AJ65SBTCF1-32D	32 points	24 V DC	5 mA	32 points/common	1.5 ms	1-wire	Remote I/O station	1 station
	AJ65BTC1-32D	32 points	24 V DC	7 mA	32 points/common	10 ms	1-wire	Remote I/O station	1 station

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
Transistor (sink) output	AJ65SBTCF1-32T	32 points	12/24 V DC	0.1 A/points 3.2 A/common	32 points/common	1.5 ms	Yes	1-wire	Remote I/O station	1 station
	AJ65BTC1-32T	32 points	12/24 V DC	0.1 A/points 2 A/common	32 points/common	2 ms	No	1-wire	Remote I/O station	1 station

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
DC input (positive/negative shared common)/ Transistor (sink) output	AJ65SBTCF1-32DT	Input 16 points	24 V DC	5 mA	–	16 points/common	1.5 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	12/24 V DC	–	0.1 A/points 1.6 A/common	16 points/common	1.5 ms	Yes	1-wire		
	AJ65VBTCF1-32DT1	Input 16 points	24 V DC	5 mA	–	16 points/common	0.2 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	12/24 V DC	–	0.1 A/points 1.6 A/common	16 points/common	1 ms	Yes	1-wire		
DC input (positive common)/ Transistor (sink) output	AJ65VBTCFJ1-32DT1	Input 16 points	24 V DC	5 mA	–	32 points/common	0.2 ms	–	1-wire	Remote I/O station	1 station
		Output 16 points	24 V DC	–	0.1 A/points 1.6 A/common		1 ms	Yes	1-wire		

Water proof connector type

IP-67 certified high water resistance. Modules can be replaced without system shutdown.
Simple connection without any tools.
Built-in with termination resistor (110Ω/130Ω switch), and can be mounted in six different directions.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Station type	Occupied station
DC input (positive common)	AJ65FBTA4-16D	16 points	24 V DC	7 mA	16 points/common	1.5 ms	2 to 4-wire	Remote I/O station	1 station
DC input (negative common)	AJ65FBTA4-16DE	16 points	24 V DC	7 mA	16 points/common	1.5 ms	2 to 4-wire	Remote I/O station	1 station

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
Transistor (sink) output	AJ65FBTA2-16T	16 points	12/24 V DC	0.5 A/points 4 A/common	16 points/common	1.5 ms	Yes	2-wire	Remote I/O station	1 station
Transistor (source) output	AJ65FBTA2-16TE	16 points	12/24 V DC	1 A/points 4 A/common	16 points/common	1.5 ms	Yes	2-wire	Remote I/O station	1 station

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Output protection function	Wiring method	Station type	Occupied station
DC input (positive common)/ Transistor (sink) output	AJ65FBTA42-16DT	Input 8 points	24 V DC	7 mA	–	16 points/common	1.5 ms	–	2 to 4-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	0.5 A/points 2.4 A/common		1.5 ms	Yes	2-wire		
DC input (negative common)/ Transistor (source) output	AJ65FBTA42-16DTE	Input 8 points	24 V DC	7 mA	–	16 points/common	1.5 ms	–	2 to 4-wire	Remote I/O station	1 station
		Output 8 points	24 V DC	–	1 A/points 4 A/common		1.5 ms	Yes	2-wire		

Analog Module



Analog input/output module

One-touch connector type

The one-touch connector simplifies the wiring process.

Type	Model	Number of channels	Input/Output	Resolution	Conversion speed	Station type	Occupied station
Voltage input	AJ65VBTCU-68ADVN	8 ch	-10 to 10 V DC	0 to 4000 / -4000 to 4000	1 ms/ch	Remote device station	1 station (Ver.2) / 3 stations (Ver.1)
Current input	AJ65VBTCU-68ADIN	8 ch	0 to 20 mA DC	0 to 4000	1 ms/ch	Remote device station	1 station (Ver.2) / 3 stations (Ver.1)
Voltage output	AJ65VBTCU-68DAVN	8 ch	-10 to 10 V DC	0 to 4000 / -4000 to 4000	1 ms/ch	Remote device station	1 station (Ver.2) / 3 stations (Ver.1)

Screw terminal block type

The two-piece terminal bock with removable terminal block, and the terminal block type with the use of captive screws save wiring work.





Type	Model	Number of channels	Input/Output	Resolution	Conversion speed	Station type	Occupied station
Voltage/current input	AJ65SBT2B-64AD	4 ch	-10 to 10 V DC / 0 to 20 mA	0 to 16000 / -16000 to 16000	200 µs/ch	Remote device station	1 station
	AJ65SBT-64AD	4 ch	-10 to 10 V DC / 0 to 20 mA	0 to 4000 / -4000 to 4000	1 ms/ch	Remote device station	1 station
	AJ65BT-64AD	4 ch	-10 to 10 V DC / -20 to 20 mA	0 to 4000 / -2000 to 2000	1 ms/ch	Remote device station	2 stations
Voltage/current output	AJ65SBT2B-64DA	4 ch	-10 to 10 V DC / 0 to 20 mA	0 to 12000 / -16000 to 16000	200 µs/ch	Remote device station	1 station
	AJ65SBT-62DA	2 ch	-10 to 10 V DC / 0 to 20 mA	0 to 4000 / -4000 to 4000	1 ms/ch	Remote device station	1 station
Voltage output	AJ65BT-64DAV	4 ch	-10 to 10 V DC	-2000 to 2000	1 ms/ch	Remote device station	2 stations
Current output	AJ65BT-64DAI	4 ch	4 to 20 mA DC	0 to 4000	1 ms/ch	Remote device station	2 stations

Temperature input module

Standards compliant thermocouple and resistance temperature detector can be used.
Two-piece terminal block is used for simple maintenance.



Type	Model	Number of channels	Input	Conversion speed	Station type	Occupied station
Thermocouple	AJ65SBT2B-64TD	4 ch	Thermocouple B,R,S,K,E,J,T,N	640 ms/4 ch	Remote device station	1 station
	AJ65BT-68TD	8ch	Thermocouple B,R,S,K,E,J,T	45 ms/ch	Remote device station	4 stations
RTD	AJ65SBT2B-64RD3	4 ch	3-wire platinum resistance temperature detector Pt100, JPt100 / 3-wire nickel resistance temperature detector Ni100	40 ms/ch	Remote device station	1 station
	AJ65BT-64RD3	4 ch	3-wire platinum resistance temperature detector Pt100, JPt100	40 ms/ch	Remote device station	4 stations
	AJ65BT-64RD4	4 ch	4-wire platinum resistance temperature detector Pt100, JPt100	40 ms/ch	Remote device station	4 stations

High-Speed Counter Module



These modules can capture and count pulses from pulse generation devices and other equipment that cannot be captured by programmable controller CPU.

Model	Number of channels	Counting speed switch	Count input signal	External input	Coincidence output	Station type	Occupied station
AJ65BT-D62	2 ch	200/10 kpps (1-phase input) 200/7 kpps (2-phase input)	5 V DC 12 V DC 24 V DC	5 V DC 12 V DC 24 V DC	Transistor (open collector), 12/24 V DC, 0.5 A/points, 2 A/common	Remote device station	4 stations
AJ65BT-D62D	2 ch	400/10 kpps (1-phase input) 300/7 kpps (2-phase input)	Differential line driver	5 V DC 12 V DC 24 V DC	Transistor (open collector), 12/24 V DC, 0.5 A/points, 2 A/common	Remote device station	4 stations
AJ65BT-D62D-S1	2 ch	400/10 kpps (1-phase input) 300/7 kpps (2-phase input)	Differential line driver	Differential line driver (Preset input) 5 V DC DC12V 24 V DC Function/Start	Transistor (open collector), 12/24 V DC, 0.5 A/points, 2 A/common	Remote device station	4 stations

Positioning Module



Positioning control can be executed through external input including startup, shutdown, speed/position switch, etc. without the use of a sequence program.

Model	Maximum number of control axes	Control unit	No. of positioning data	Maximum output pulse	Station type	Occupied station
AJ65BT-D75P2-S3	2 axes	mm inch degree pulse	600	400 kpps (Differential driver) 200 kpps (Open collector)	Intelligent device station	4 stations

600 600 data/axis

RS-232 Interface Module



Two separate general-purpose input and output are included as standard, to make direct input and output of synchronization signal with a bar code reader or D controller without the use of a separate remote I/O module.

Model	Interface	Transmission speed	Number of channels	Transmission distance	Station type	Occupied station
AJ65BT-R2N	RS-232	300 bps 600 bps 1200 bps 2400 bps 4800 bps 9600 bps 19200 bps 38400 bps 57600 bps 115200 bps	1 ch	Max. 15 m	Intelligent device station	1 station

Repeater Module



These repeater hubs can be used to extend the trunk cable length.
Available in five types for each use.

Type	Model	Description	Station type	Occupied station
Thin waterproof type Repeater hub module	AJ65FBTA-RPH	Up to 8 star-wiring branch lines individually capable of max. wiring length based on transmission speed; waterproof (IP67) structure	–	–
Spring clamp Terminal block type Repeater hub module	AJ65BTS-RPH	Up to 8 star-wiring branch lines individually capable of max. wiring length based on transmission speed	–	–
Repeater (T-branch) module	AJ65SBT-RPT	Max. connection steps: 10 steps, T-branch wiring ready	–	–
Optic repeater module	AJ65SBT-RPS	For SI/QSI type optical fiber cable (two modules can be combined), max. connection steps: 3 steps, maximum transmission distance: 500 m (SI) / 1000 m (QSI)	–	–
	AJ65SBT-RPG	For GI type optical fiber cable (two modules can be combined), max. connection steps: 2 steps, maximum transmission distance: 2000 m	–	–
Spatial optical repeater module	AJ65BT-RPI-10A	Set use of AJ65BT-RPI-10A and AJ65BT-RPT-10B; 156 k/625 k/2.5 Mbps ready; infrared spatial transmission of 0 to 100 m; optical communication state monitor function	Remote I/O station (When using monitor functions)	– / 1 station
	AJ65BT-RPI-10B			

Bridge Module



CC-Link/LT, AnyWire Bitty, AnyWire DB A20, and AnyWireASLINK products can be seamlessly connected to CC-Link Network.

Type	Model	Station type	Occupied station	Others
For CC-Link – CC-Link/LT connection	AJ65SBT-CLB	Remote device station	2 to 8 stations	CC-Link/LT master station function
For CC-Link – AnyWireASLINK connection	NZ2AW1C2AL	Remote device station	1 to 4 stations	AnyWireASLINK master station function
For CC-Link – AnyWire Bitty connection	NZ2AW1C1BY	Remote device station	1 to 4 stations	AnyWire Bitty master station function
For CC-Link – AnyWire DB A20 connection	NZ2AW1C2D2	Remote device station (CC-Link Ver.2 only)	4 stations	AnyWire DB A20 master station function

Network Interface Board



PCI Express®/ Using these PCI bus interface boards, PC control systems can be directly connected to CC-Link IE Control Network. This interface board can be used as either a master station or local stations of CC-Link.

Model	Connection cable	Bus standard	Communication speed	Transmission path	Maximum cable distance (CC-Link Ver. 1.10-compatible cable)	Compatible station	Maximum stations per network
Q81BD-J61BT11	CC-Link Ver. 1.00/1.10-compatible cable	PCI Express® bus	156 kbps 625 kbps 2.5 Mbps 5 Mbps 10 Mbps	Bus (RS-485)	1200 m 900 m 400 m 160 m 100 m	Ver.2 Master station Ver.2 Local station Ver.1 Master station Ver.1 Local station	65 stations (Master station: 1, Slave station: 64)
Q80BD-J61BT11N	CC-Link Ver. 1.00/1.10-compatible cable	PCI bus	156 kbps 625 kbps 2.5 Mbps 5 Mbps 10 Mbps	Bus (RS-485)	1200 m 900 m 400 m 160 m 100 m	Ver.2 Master station Ver.2 Local station Ver.1 Master station Ver.1 Local station	65 stations (Master station: 1, Slave station: 64)

CC-Link/LT Compatible Products

CC-Link/LT

Remote I/O Module



Screw terminal block type

The smallest and compact design. Built with a terminal structure for direct connection of 2-wire sensor and load.

Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Occupied station
DC input (positive/negative shared common)	CL1X4-D1B2	4 points	24 V DC	4 mA	4 points/common	0.5 ms 1.5 ms	2-wire	1 station During 4,8,16 points mode
	CL2X8-D1B2	8 points	24 V DC	4 mA	8 points/common	0.5 ms 1.5 ms	2-wire	2 stations During 4 points mode / 1 station During 8,16 points mode

Output module

Type	Model	Output points	Rated load voltage	Maximum load current (Rated switching current)	Common type	Response time	Wiring method	Occupied station
Transistor (sink) output	CL1Y4-T1B2	4 points	12/24 V DC	0.1 A/points 0.4 A/common	4 points/common	1 ms	2-wire	1 station During 4,8,16 points mode
	CL2Y8-TP1B2	8 points	12/24 V DC	0.1 A/points 0.8 A/common	8 points/common	0.5 ms	2-wire	2 stations During 4 points mode / 1 station During 8,16 points mode
Relay output	CL1Y4-R1B2	4 points	30 V DC/250 V AC	2 A/points 4 A/common	4 points/common	10 ms	2-wire	1 station During 4,8,16 points mode
	CL1Y4-R1B1	4 points	30 V DC/250 V AC	2 A/points 2 A/common	1 point/common	10 ms	1-wire	1 station During 4,8,16 points mode

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/ Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Wiring method	Occupied station
DC input (positive/negative shared common)/ Transistor (sink) output	CL1XY4-DT1B2	Input 2 points	24 V DC	4 mA	–	2 points/common	1.5 ms	2-wire	1 station During 4,8,16 points mode
		Output 2 points	12/24 V DC	–	0.1 A/points 0.2 A/common	2 points/common	1 ms	2-wire	
	CL1XY8-DT1B2	Input 4 points	24 V DC	4 mA	–	4 points/common	1.5 ms	2-wire	1 station During 4,8,16 points mode
		Output 4 points	12/24 V DC	–	0.1 A/points 0.4 A/common	4 points/common	1 ms	2-wire	
DC input (positive/negative shared common)/ Relay output	CL1XY4-DR1B2	Input 2 points	24 V DC	4 mA	–	2 points/common	1.5 ms	2-wire	1 station During 4,8,16 points mode
		Output 2 points	30 V DC/250 V AC	–	2 A/points 4 A/common	2 points/common	10 ms	2-wire	
	CL1XY8-DR1B2	Input 4 points	24 V DC	4 mA	–	4 points/common	1.5 ms	2-wire	1 station During 4,8,16 points mode
		Output 4 points	30 V DC/250 V AC	–	2 A/points 4 A/common	4 points/common	10 ms	2-wire	

Spring clamp terminal block type



Additional tightening not required; applicable wire size is 0.3 to 1.5mm² (AWG22 to 16).
Two-piece structure terminal block for easy removal.

Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Occupied station
DC input (positive/negative shared common)	CL1X4-D1S2	4 points	24 V DC	4 mA	4 points/common	0.5 ms 1.5 ms	2-wire	1 station During 4,8,16 points mode
	CL2X8-D1S2	8 points	24 V DC	4 mA	8 points/common	0.5 ms 1.5 ms	2-wire	2 stations During 4 points mode / 1 station During 8,16 points mode

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Wiring method	Occupied station
Transistor (sink) output	CL1Y4-T1S2	4 points	12/24 V DC	0.1 A/points 0.4 A/common	4 points/common	1 ms	2-wire	1 station During 4,8,16 points mode
	CL2Y8-TP1S2	8 points	12/24 V DC	0.1 A/points 0.8 A/common	8 points/common	0.5 ms	2-wire	2 stations During 4 points mode / 1 station During 8,16 points mode
Transistor (source) output	CL2Y8-TPE1S2	8 points	12/24 V DC	0.1 A/points 0.8 A/common	8 points/common	1 ms	2-wire	2 stations During 4 points mode / 1 station During 8,16 points mode

Sensor connector (e-CON) type

The smallest and compact design. Available in both DIN rail and screw installation for module mounting. Supports 3-wire sensor input.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Occupied station
DC input (positive common)	CL1X4-D1C3	4 points	24 V DC	4 mA	4 points/common	0.5 ms 1.5 ms	3-wire	1 station During 4,8,16 points mode
	CL2X8-D1C3V	8 points	24 V DC	4 mA	8 points/common	0.5 ms 1.5 ms	3-wire	2 stations During 4 points mode / 1 station During 8,16 points mode
	CL2X16-D1C3V	16 points	24 V DC	4 mA	16 points/common	0.5 ms 1.5 ms	3-wire	4 stations During 4 points mode / 2 stations During 8 points mode / 1 station During 16 points mode

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Wiring method	Occupied station
Transistor (sink) output	CL1Y4-T1C2	4 points	24 V DC	0.1 A/points 0.4 A/common	4 points/common	1 ms	2-wire	1 station During 4,8,16 points mode
	CL2Y8-TP1C2V	8 points	24 V DC	0.1 A/points 0.8 A/common	8 points/common	0.5 ms	2-wire	2 stations During 4 points mode / 1 station During 8,16 points mode
	CL2Y16-TP1C2V	16 points	24 V DC	0.1 A/points 1.6 A/common	16 points/common	0.5 ms	2-wire	4 stations During 4 points mode / 2 stations During 8 points mode / 1 station During 16 points mode

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/ Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Wiring method	Occupied station
DC input (positive common)/ Transistor (sink) output	CL2XY16-DTP1C5V	Input 8 points	24 V DC	4 mA	–	8 points/common	0.5 ms 1.5 ms	3-wire	2 stations During 4 points mode / 1 station During 8,16 points mode
		Output 8 points	24 V DC	–	0.1 A/points 0.8 A/common	8 points/common	0.5 ms	2-wire	

MIL connector type

These MIL connector type modules are designed for easy connection to relay terminal, terminal block conversion module and solenoid valve. Simply remove the connector for easy module replacement.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Occupied station	Others
DC input (positive common)	CL2X16-D1M1V	16 points	24 V DC	4 mA	16 points/common	0.5 ms 1.5 ms	1-wire	4 stations During 4 points mode / 2 stations During 8 points mode / 1 station During 16 points mode	–
	CL2X16-D1MJ1V	16 points	24 V DC	4 mA	16 points/common	0.5 ms 1.5 ms	1-wire	4 stations During 4 points mode / 2 stations During 8 points mode / 1 station During 16 points mode	Common power supply

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Wiring method	Occupied station	Others
Transistor (sink) output	CL2Y16-TP1M1V	16 points	12/24 V DC	0.1 A/points 1.6 A/common	16 points/common	0.5 ms	1-wire	4 stations During 4 points mode / 2 stations During 8 points mode / 1 station During 16 points mode	–
	CL2Y16-TP1MJ1V	16 points	24 V DC	0.1 A/points 1.6 A/common	16 points/common	0.5 ms	1-wire	4 stations During 4 points mode / 2 stations During 8 points mode / 1 station During 16 points mode	Common power supply
Transistor (source) output	CL2Y16-TPE1M1V	16 points	12/24 V DC	0.1 A/points 1.6 A/common	16 points/common	1 ms	1-wire	4 stations During 4 points mode / 2 stations During 8 points mode / 1 station During 16 points mode	–

Cable type

These modules can be stored inside the duct like cables. Communication cable and external device connection cable are integrated for easy wiring.



Input module

Type	Model	Input points	Rated input voltage	Rated input current	Common type	Response time	Wiring method	Occupied station
DC input (positive common)	CL1X2-D1D3S	2 points	24 V DC	4 mA	2 points/common	0.5 ms 1.5 ms	3-wire	1 station During 4,8,16 points mode

Output module

Type	Model	Output points	Rated load voltage	Maximum load current	Common type	Response time	Wiring method	Occupied station
Transistor (sink) output	CL1Y2-T1D2S	2 points	24 V DC	0.1 A/points 0.2 A/common	2 points/common	1 ms	2-wire	1 station During 4,8,16 points mode

I/O composite module

Type	Model	Number of I/O points	Rated input voltage/ Rated load voltage	Rated input current	Maximum load current	Common type	Response time	Wiring method	Occupied station
DC input (positive common)/ Transistor (sink) output	CL1XY2-DT1D5S	Input 1 point	24 V DC	4 mA	–	1 point/common	1.5 ms	3-wire	1 station During 4,8,16 points mode
		Output 1 point	24 V DC	–	0.1 A/points 0.2 A/common	1 point/common	1 ms	2-wire	

Analog Module

Screw terminal block type



Analog input/output module

I/O points (number of occupied stations) are saved through change in number by the conversion permitted final channel.

Type	Model	Number of channels	Input/Output	Resolution	Conversion speed	Occupied station
Voltage/current input	CL2AD4-B	4 ch	-10 to 10 V DC 0 to 20 mA	0 to 4000 -4000 to 4000	200 µs/4 ch	4 stations During 16 points mode
Voltage/current output	CL2DA2-B	2 ch	-10 to 10 V DC 0 to 20 mA	0 to 4000 -4000 to 4000	200 µs/2 ch	2 stations During 16 points mode

Power Supply

Exclusive power supply

CC-Link/LT system exclusive use with a built-in 2A power supply.



Model	Input voltage	Output voltage	Output current
CL1PSU-2A	100 V AC, 120 V AC, 200 V AC, 230 V AC, 240 V AC	24 V DC	0.01 A to 2 A

Power supply adapter

Provides stable power supply to the overall system when power is supplied to the CC-Link/LT system from an external power source (arranged by a customer).



Model	Voltage input range	Maximum rated current
CL1PAD1	Max. 28.8 V DC	5 A *1

*1: In steady-state, use within the range that does not exceed the maximum rated current.

MELSECNET/H Compatible Products

Network Interface Board

Systems controlled by a PC compatible with PCI Express® bus and PCI bus can be incorporated into the MELSECNET/H network.



MELSECNET/H

Model	Connection cable	Bus standard	Communication speed	Transmission path	Overall cable distance	Compatible station	Maximum stations per network	Others
Q81BD-J71LP21-25	SI/QSI/H-PCF/broadband H-PCF fiber optic cable	PCI Express® bus	25 Mbps, 10 Mbps	Dual loop	30 km	Control network (control station), Control network (normal station)	64 stations (Control station: 1, Normal station: 63)	–
Q80BD-J71LP21-25	SI/QSI/H-PCF/broadband H-PCF fiber optic cable	PCI bus	25 Mbps, 10 Mbps	Dual loop	30 km	Control network (control station), Control network (normal station)	64 stations (Control station: 1, Normal station: 63)	–
Q80BD-J71LP21S-25	SI/QSI/H-PCF/broadband H-PCF fiber optic cable	PCI bus	25 Mbps, 10 Mbps	Dual loop	30 km	Control network (control station), Control network (normal station)	64 stations (Control station: 1, Normal station: 63)	With external power supply function
Q80BD-J71LP21G	GI fiber optic cable	PCI bus	10 Mbps	Dual loop	30 km	Control network (control station), Control network (normal station)	64 stations (Control station: 1, Normal station: 63)	–
Q80BD-J71BR11	3C-2V/5C-2V coaxial cable	PCI bus	10 Mbps	Single bus	300 m 3C-2V, 500 m 5C-2V/5C-FB	Control network (control station), Control network (normal station)	64 stations (Control station: 1, Normal station: 31)	–

Ethernet Compatible Products

Wireless LAN Adapter DB

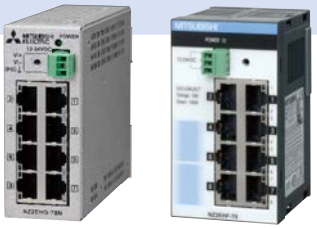


Wireless LAN (Ethernet) in the factory provides flexibility in installing new line or alteration layouts. Wireless saves your wiring costs. Simply installing wireless LAN adapters makes existing FA equipment wireless. Compatible with the latest security standards of WPA2/WPA. The security prevents unauthorized access from outside.

Powered by CONTEC
DB Co-developed with other companies

Type	Model	Wireless LAN standard	Number of port	Wired transmission speed	Rated input voltage
Access point only	NZ2WL-JPA	IEEE802.11a standards, IEEE802.11b standards, IEEE802.11g standards	1	10 Mbps, 100 Mbps	12 to 24 V DC
Station only	NZ2WL-JPS	IEEE802.11a standards, IEEE802.11b standards, IEEE802.11g standards	1	10 Mbps, 100 Mbps	12 to 24 V DC

Industrial Switching HUB DB



This 8-port industrial switching hub operates in ambient temperatures of 0 to 50°C in a fanless configuration. Compatible with DIN rail installation, enabling the hub to be installed in various orientations.

Powered by CONTEC
DB Co-developed with other companies

Model	Number of port	Transmission speed	Rated input voltage
NZ2EHG-T8N	8	10 Mbps, 100 Mbps, 1 Gbps	12 to 24 V DC
NZ2EHF-T8	8	10 Mbps, 100 Mbps	12 to 24 V DC

Managed CC-Link IE Switch



The managed CC-Link IE switch allows both CC-Link IE devices and Ethernet devices to co-exist in the same network. Support of ERP and LA functions and redundant network paths between switches enable routes to be switched to ensure that communications can be continued even if a network failure such as a cable disconnection occurs. The hub can also be used in systems requiring facility-to-facility landline communication since an SFP transceiver allows long-distance optical cable to be used.

Model	Number of port	Transmission speed	Rated input voltage	Others
NZ2MHG-T8F2	8 including 2 fiber-optic compatible ports	10 Mbps, 100 Mbps, 1 Gbps	24 V DC	ERP function, LA function, VLAN function, Optical fiber port compatible, Loop detection function, Port mirroring function, SNMP supported

MEMO

Engineering and Programming Software

MELSEC engineering and programming software is the best choice of the times!

A variety of MELSEC software applications are designed to achieve “enhanced design efficiency,” “shorter debugging time,” “less down time,” “data retention,” and other TCO reduction in engineering environment.

MELSOFT iQ Works

A software package combined with PLC, motion controller, GOT (HMI), and various programming software



GX Works3

Next-generation programming software with an intuitive programming environment contributes to a development cost reduction



GX Works2

A PLC programming software built on program assets acquired through GX Developer, pursuing a comfortable operability



PX Developer

This software offers a simple drag-and-drop operation to create loop control programs with ease



C language controller tools

Engineering tools, simulator and setup/monitoring tools for C language controller



MX Component

The Active X® control and .NET control libraries enable easy communication process from PC to a PLC without the need to consider protocols



MX Sheet

Software that utilizes Excel® to monitor, perform logging, collect alarm information, and change setting values for the PLC system



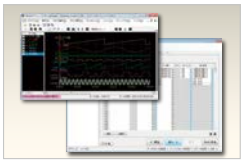
MX Component for iOS/Android™

A communication library that enables reading and writing of the values of sequencer devices and labels from a tablet



Peripheral device development support tools (free download)

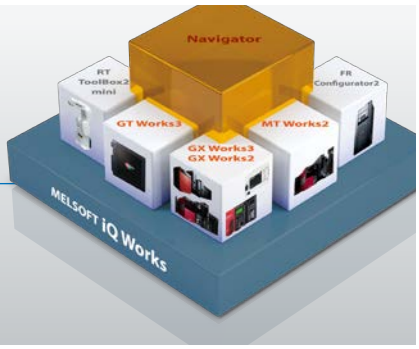
Lineup of free tools that support the development of PLC peripheral devices



MELSOFT iQ Works

Programmable controller engineering software

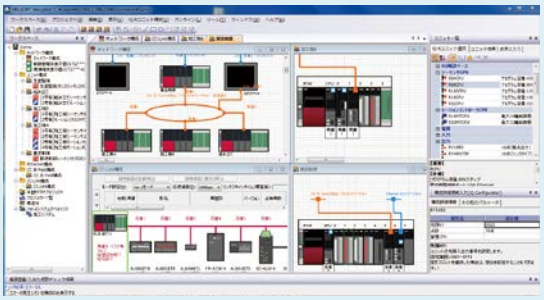
Here's a more interactive and visible engineering style.
Revolutionizing everything from the way you design system specifications and develop programs, to the way you perform field adjustments, operations, and maintenance.



System Management Software

MELSOFT Navigator

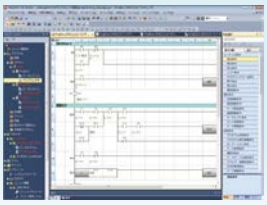
MELSOFT Navigator, along with GX Works3, MT Works2, GT Works3, RT ToolBox2 mini and FR Configurator2, facilitates system level design and acts as the interface between each software. Useful functions include design of system configuration, parameter batch setting, system labels, and batch read.



Redefining engineering with + MELSOFT Navigator

Programmable Controller Engineering Software

MELSOFT GX Works3



Helps reduce engineering costs by providing a graphical interface with intuitive operations, simple programming by selecting options, and diagnostic functions that simplify troubleshooting.

Programmable Controller Engineering Software

MELSOFT GX Works2



Incorporating legacy support of programs created with GX Developer, further improving its functionality resulting in reduced engineering costs.

Motion Controller Engineering Software

MELSOFT MT Works2



The motion control design and maintenance software includes intuitive graphic based programming together with a digital oscilloscope simulator, further helping to reduce a motion systems TCO.

HMI/GOT Screen Design Software

MELSOFT GT Works3



The GOT (Graphic Operation Terminal) screen creation software has been designed with 3 main features; Simplicity, Graphic Design, and Easy Usability, further helping to create graphic screens in fewer steps.

Robot Engineering Software

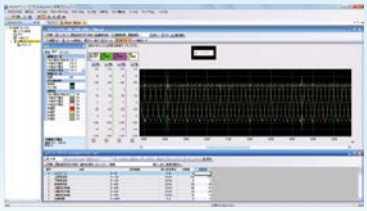
MELSOFT RT ToolBox2 mini



The robot setup software supports various steps from programming, to commissioning, evaluation, and maintenance. In addition to improving preventative maintenance by using the integrated 3D evaluation simulator to visualize parameterization and connected devices.

Inverter setup software

MELSOFT FR Configurator2



This software lets you handle everything from inverter startup to maintenance by making simple settings on a PC. You can manage parameter settings on a PC, make sequence function settings, and easily transfer parameter settings from existing inverter series.

GX Works3

The new-generation programming software with intuitive programming brings development cost reduction

The programming software is sometimes considered a fundamental part of the control system in addition to the hardware components. The core of the system, it includes various steps of the product life cycle, from the design stage all the way to commissioning and maintenance of the control system. Today, intuitive, easy to use software suites are expected as a standard for modern manufacturing needs. GX Works3 is the latest generation of programming and maintenance software offered by Mitsubishi Electric specifically designed for the MELSEC iQ-R and MELSEC iQ-F Series control system. It includes many new features and technologies to ensure a trouble-free engineering environment solution.

Intuitive programming software covering the product development cycle

Graphic-based configuration realizing easier programming

Various intuitive features such as graphic-based system configuration and an extensive module library (module label/FB) provided as standard.

Integrated motion-control system configuration

From setting simple motion module parameters and positioning data setup to servo amplifier configuration, everything is packaged into an easy-to-use programming environment.

Conforms to IEC 61131-3

GX Works3 realizes structured programming such as ladder and ST, making project standardization across multiple users even easier.

Simple point and click programming architecture

System design | Programming | Debug/maintenance

Straightforward graphic based system configuration design

- Simply drag and drop from the module list to easily create system configuration
- Directly setup parameters for each module
- Automatically reflect changes in the layout to the module parameters

System design | **Programming** | Debug/maintenance

MELSOFT library enables efficient programming through "Module Label/FB"

- Assign convenient label names to internal devices, rather than manually entering a device name every time.
- Simply drag & drop module FBs from the MELSOFT Library directly into the ladder program, making programming even easier.

System design | Programming | **Debug/maintenance**

Extensive version control features

- Flexibly register program change (historical) save points
- Easily visualize and confirm program changes

Navigation window

Easily access project components
Organize program file list.

Module configuration

Easily parameterize each module directly from the configuration editor.

Module list

Simply drag & drop modules directly into the module configuration.

One Software, Many Possibilities

Reduce programming time by 60%*1

Global realization by multi-language support

To adhere to today's global production needs, GX Works3 supports multi-language features at various levels, from the multiple language software menu to the device comment language switching feature.

Tab view multiple editors

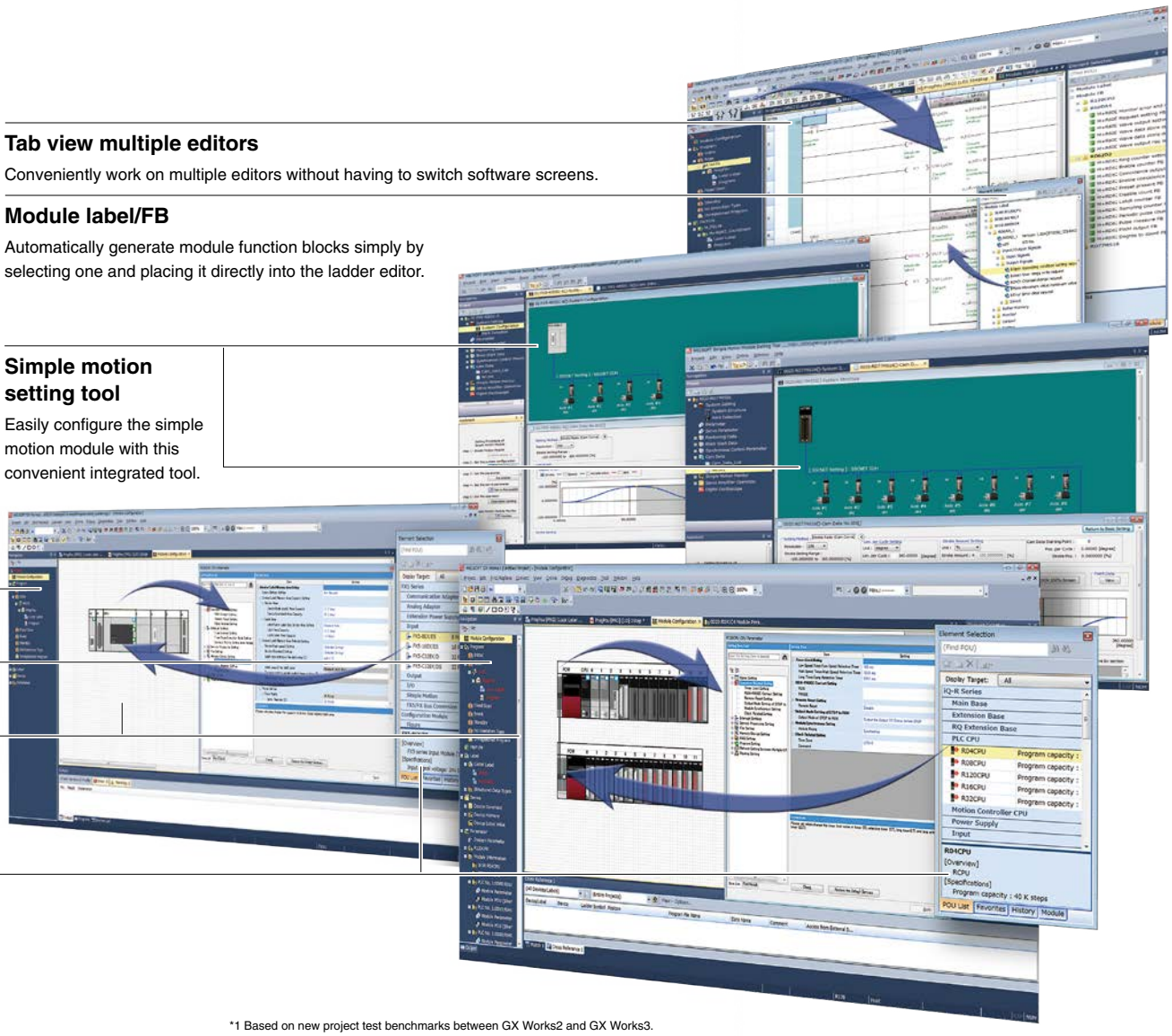
Conveniently work on multiple editors without having to switch software screens.

Module label/FB

Automatically generate module function blocks simply by selecting one and placing it directly into the ladder editor.

Simple motion setting tool

Easily configure the simple motion module with this convenient integrated tool.

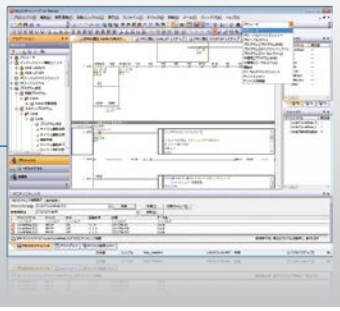


*1 Based on new project test benchmarks between GX Works2 and GX Works3.

GX Works2

World-Class PLC Programming Software

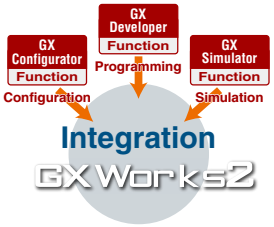
Now an easy-to-use programming software is no surprise.
In addition to its sophisticated usability, the programming software GX Works2 deploys the global mainstream concepts of “segmenting” and “structuring” for fundamental improvement of programming efficiency.
The world-standard engineering style begins with GX Works2.



Concept

All-in-one package

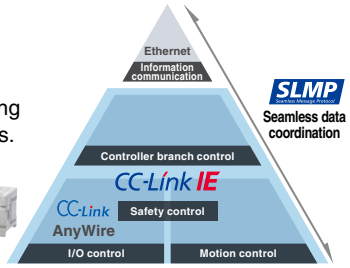
All capabilities required for PLC engineering including the configuration function of the intelligent function module and simulation function are integrated in a single package.
The all-in-one GX Works2 package supports entire engineering such as system design, programming, debug and maintenance.



Make full use of MELSEC PLC modules

GX Works2 enables you to easily make a full use of high-function and high-performance CPUs and modules.
New updates are available for free download from the Mitsubishi FA website, so you can always use the latest GX Works2 supporting new products and functions.





Inherits customer assets

Your legacy GX Developer programs can be used in GX Works2 without any modification.
Also, programs written by GX Works2 to the programmable controller can be read using GX Developer. For example, even if GX Developer is installed in a production site’s PC, the data created and read with GX Developer can be used with GX Works2 installed in a development office’s PC.



Sophisticated usability

The favorable GX Developer functions have been incorporated to GX Works2 and the usability furthermore improved.
The performance has also been refined thus improving each operation to perform smoothly with a high response.
The usability will continue to advance.



International Standard IEC61131-3 compliant

GX Works2 conforms to the engineering tool international standard IEC 61131-3, and supports segmented and structured programming.
Programming languages including SFC, ST and ladders, can be used according to each application.
In addition, several languages including SFC, ST and ladders can be used together in one program.



Ultimate “Easy-to-use” user interface

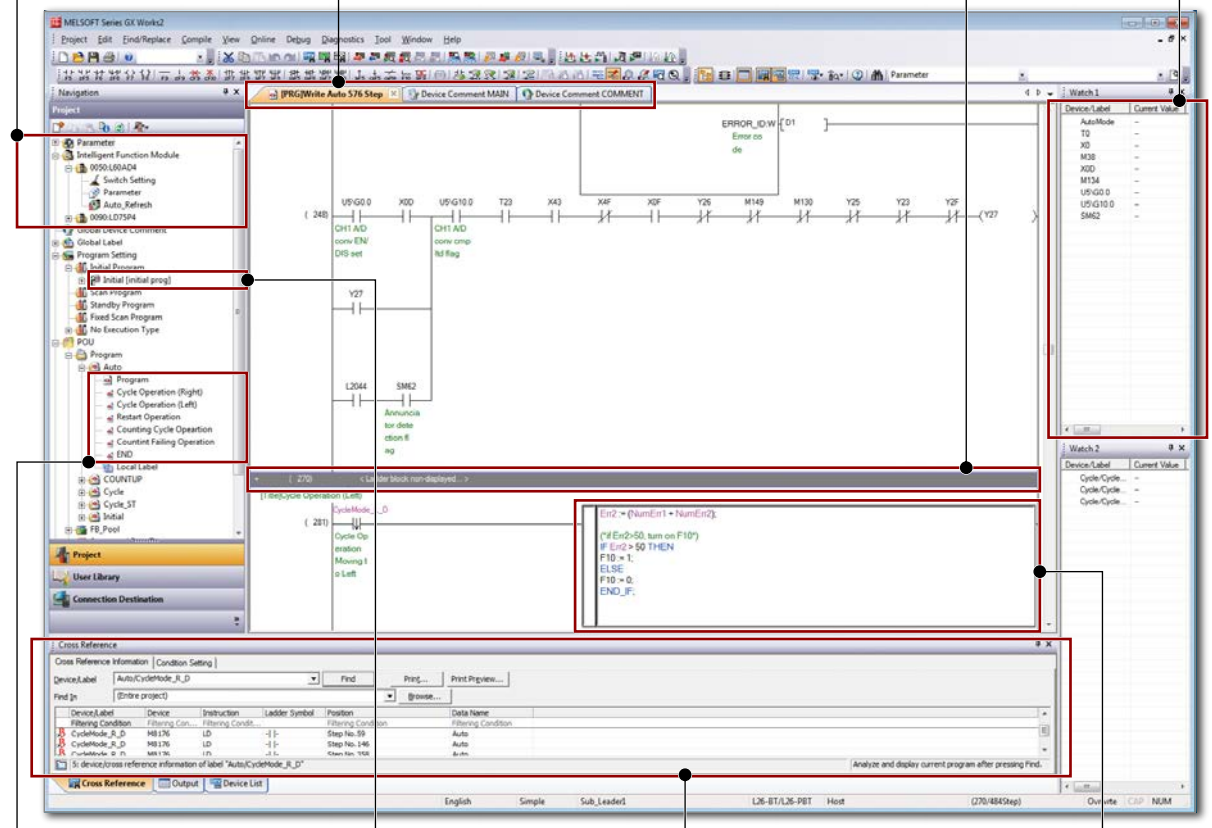
The GX Works2 engineering software enables anyone to perform programming, debugging, and maintenance by means of intuitive operations. Its comfortable operation environment will further enhance the design efficiency.

Integrated intelligent functional unit setting function (GX Configurator)

Use of “Tabs” for simple switching between the program/parameter editing screens

Better operability and readability with the circuit block Folding Display

Watch window for quickly monitoring specific devices/labels



Project tree that shows the processing flow at a glance

Display of program title to prevent confusion

Cross reference linked to circuit display

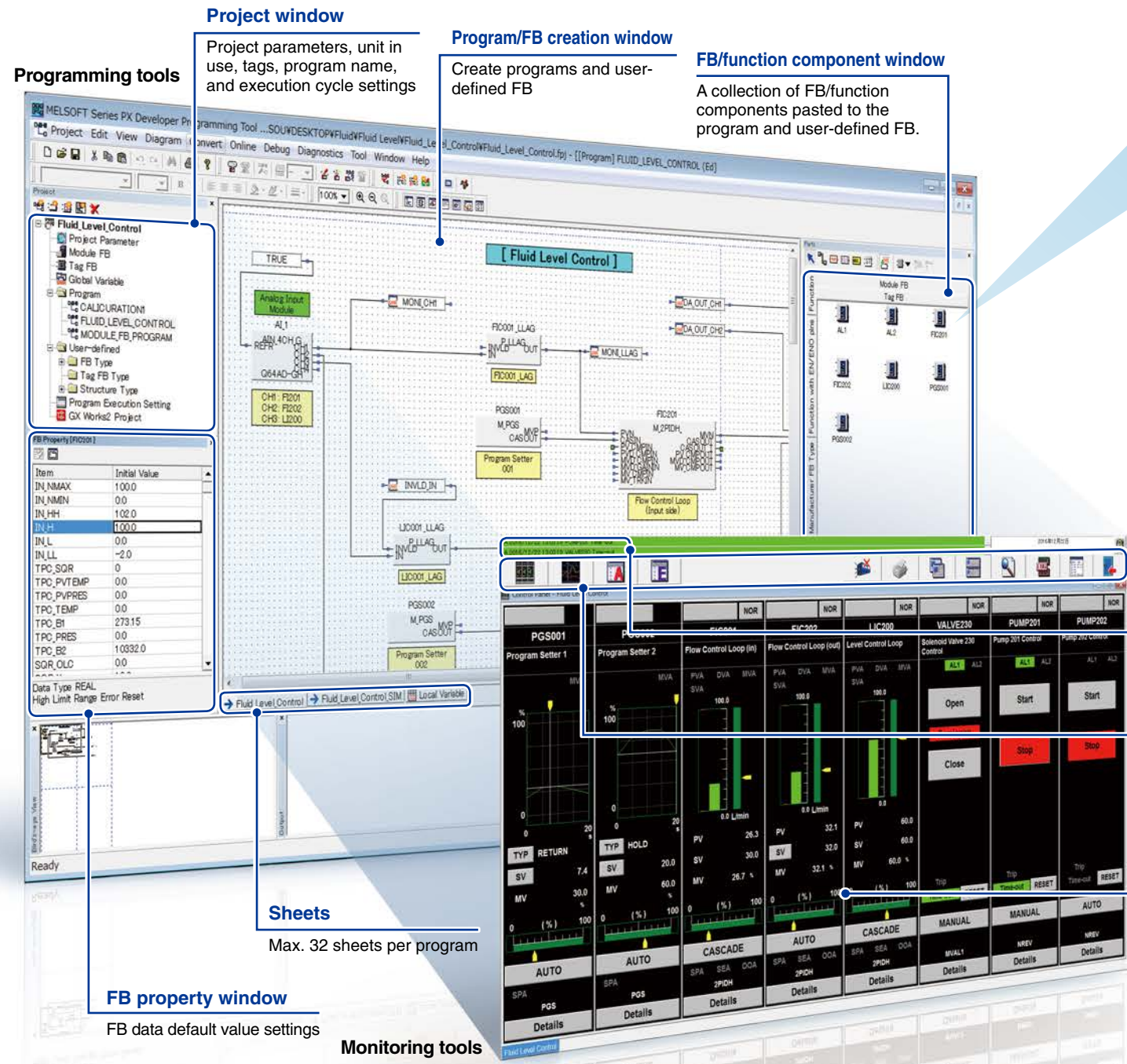
In-line ST allowing direct notation of calculations in ladder*1

*1: In-line ST is available only with a project using labels.

PX Developer

Improving productivity of process control design and maintenance tasks Simple engineering of PID loop control

By using FBD language (IEC61131- 3 compliant) loop control program can be created easily. This incorporates pasting and connecting FBs, also drag & drop functions. (No ladder program needed.) The control loops can be easily tuned and monitored by utilizing tags, using the standard monitor screen.



Function blocks (FBs) and functions needed for loop control are standard

FBs compatible with loop control commands provided by the process CPU, in addition to other easy-to-use FBs that can be combined with them, are provided. The FBs and functions include the basic FBs and functions of the IEC 61131-3 standard (logical operations, arithmetic operations, etc.), making it easy to describe sequence control on the FBD.

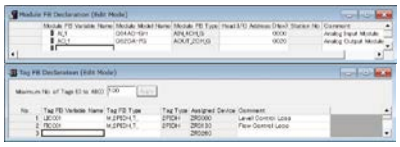
Support for larger-scale systems. Easily build a system at low cost

A monitoring system consisting of servers and clients can be used to share monitoring information and link monitoring operations. With a configuration consisting of servers and clients, it is possible to increase the number of PCs used for monitoring while keeping the communication load on the sequencer low and maintaining monitoring operability. Two servers and up to 16 clients are supported.

STEP.1

System configuration definitions
(DI/O and AI/O units, instrumentation tags)

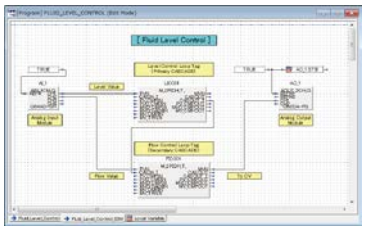
In the unit FBs of the I/O units, define the loop tags in the tag FBs.



STEP.2

FBD program creation

Connect the unit FBs and tag FBs.



STEP.3

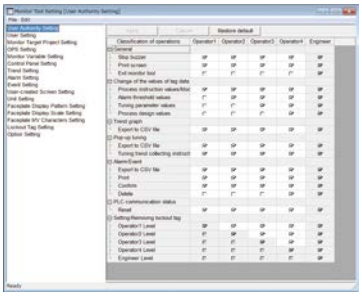
Control parameter settings

Set the tag FB parameters (FB properties).



Security

For each user authorization level, set restrictions for operations requiring security as part of monitoring control.



Warning/event display bar

Displays the two latest warnings/ event messages

Tool bar

A set of icons to open monitoring functions

Simulation function

You can simulate display and manipulation of the loop control program monitoring screen on the PC.



Monitoring function display area

Monitoring functions are displayed in this area (Control Panel/trend graph/ faceplate/ tuning panel/event list/ warning list)

Simple standardization and reuse of programs

Conformance to the IEC611-3 standard allows for program hierarchy and componentization (with the ability to create FBs unique to each user), enabling programs to easily be standardized and reused.

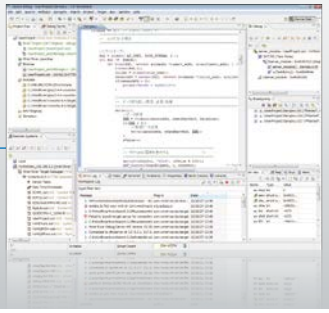
Programming components in text format

Programming components are created in a text format that takes advantage of arithmetic expressions and conditional statements. Arithmetic expressions and condition determination, which are difficult to describe in FBD language, can easily be described as in-line ST components.

C-language controller engineering tool

An easy way to develop user applications

A lineup of C-language controller tools, including various engineering tools, simulator, setup and monitoring tools

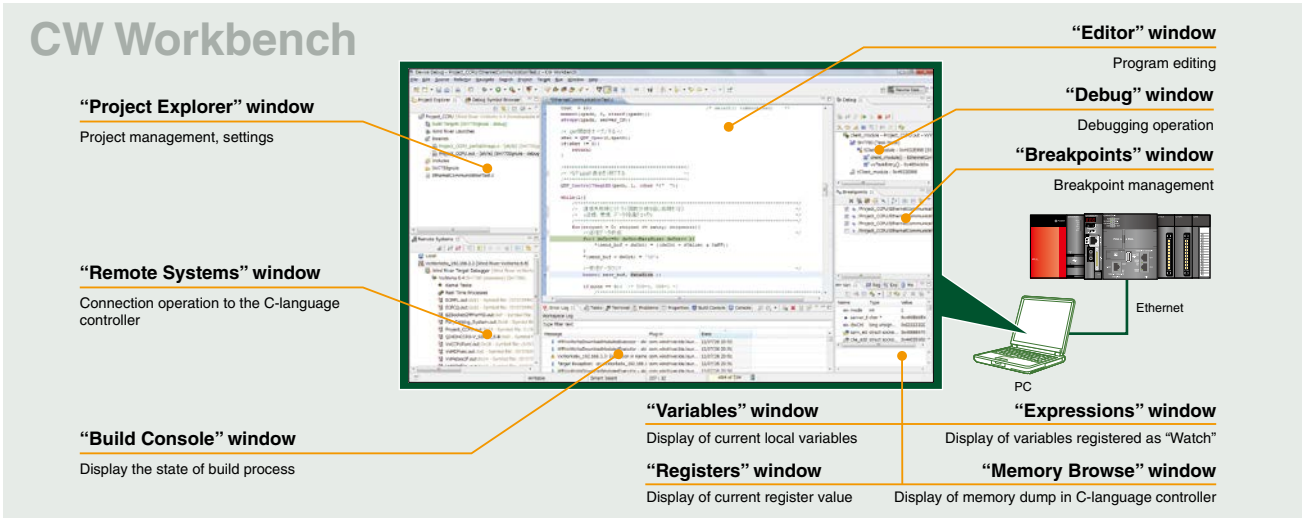


C-language controller engineering tool

CW Workbench

SW1DND-CWWR-E R12-V RD55-V SW1DND-CWWLQ24-E Q24-V Q24-VG SW1DND-CWWLQ12-E Q12-V

This tool allows you to develop a low-cost, yet full-scale embedded software. Equipped with basic features from program editing to debug via Ethernet (step/break execution, variable/memory watch), applications for C-language controller can be easily developed.



VxWorks® Simulator

CW-Sim

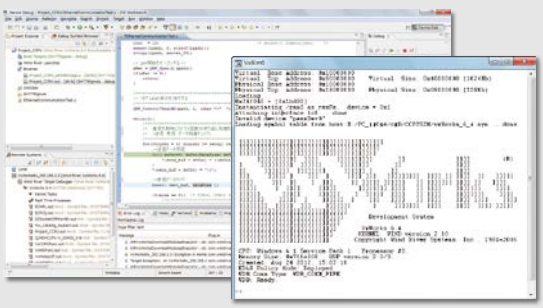
SW1DND-CWSIMR-EZ R12-V RD55-V SW1DNC-CWSIM-E*1 Q12-V Q24-V Q24-VG

VxWorks® can be simulated on PC without the C-language controller unit.
Program simulation and debugging can be performed on PC installed with CW Workbench.

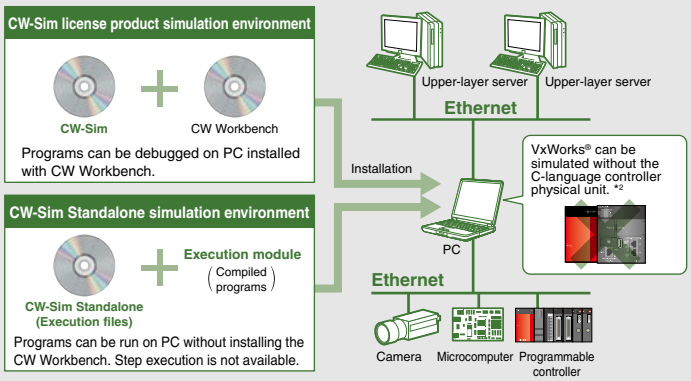
CW-Sim Standalone

SW1DNC-CWSIMSAR-E R12-V RD55-V SW1DNC-CWSIMSA-E Q12-V Q24-V Q24-VG

VxWorks® can be simulated on PC without the C-language controller unit.
Program simulation can be performed even on PC without installing the CW Workbench, but the debugging option is not available.



- VxWorks® can be simulated on PC without the C-language controller unit.*2
- Program quality and unit safety are enhanced before the actual run.
- Can be used for the debugging and training of systems composed of multiple C-language controllers.

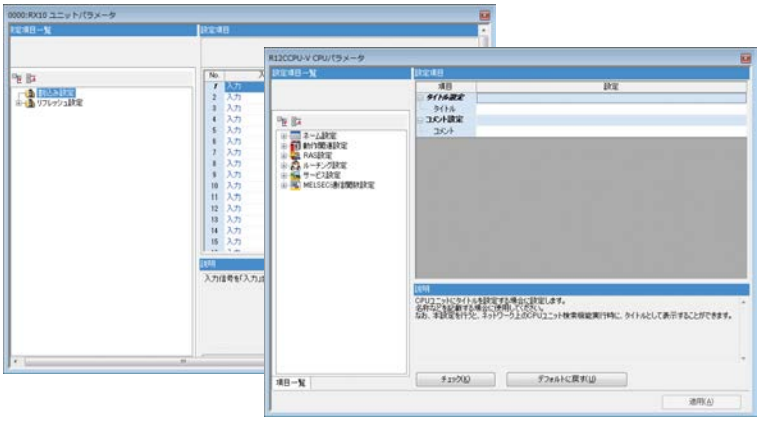


*1: Additional license products (SW1DNC-CWSIM-EZ) are also available.
*2: CW-Sim and CW-Sim Standalone are mounted with minimum necessary functions of the Wind River VxWorks® Simulator.

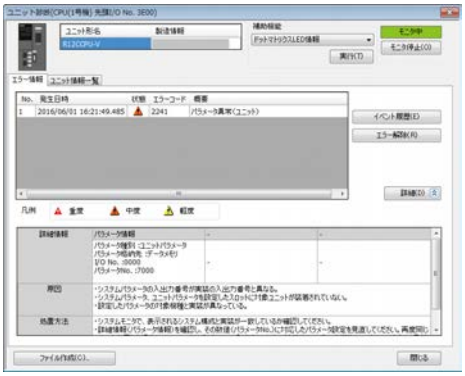
CW Configurator

SW1DND-RCCPU R12 -V

CW Configurator is software specifically for setting and monitoring C language controller unit parameters.
It provides superior functionality, operability, and ease of use in comparison with conventional C language controller setting and monitoring tools.
The software manages unit configuration data and parameters on a per-project basis for each C language controller unit.



Program-less, easy parameter settings



Program-less, easy diagnostics

C-language controller setup and monitoring tools

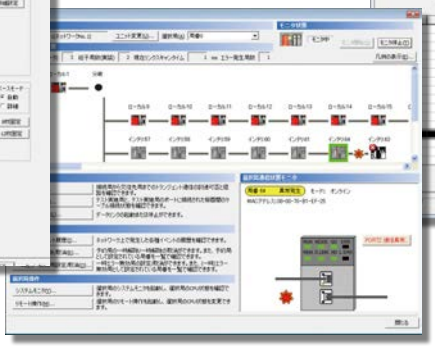
SW4PVC-CCPU Q12 -V *1 Q24 -V Q24 -VG Q24 -LS Q26 -LS SW3PVC-CCPU Q12 -V *2

Features include C-language controller settings and diagnosis, base-mounted intelligent function units*3, network unit parameter setup and monitoring, as well as device value monitoring and testing.

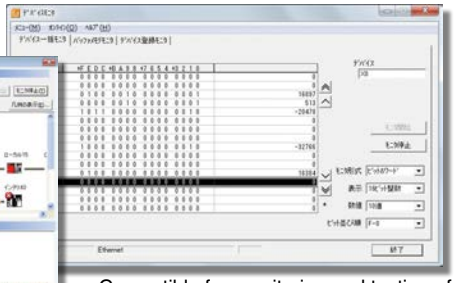
*1: Available only with function extension mode
*2: Available only with basic function mode
*3: Available only with SW4PVC-CCPU



A program-less, easy parameter setup



A program-less, easy diagnosis



Compatible for monitoring and testing of the mounted units

Supports all phases of the application development

Wind River Workbench

WIND RIVER products

3.3 R12-V RD55-V

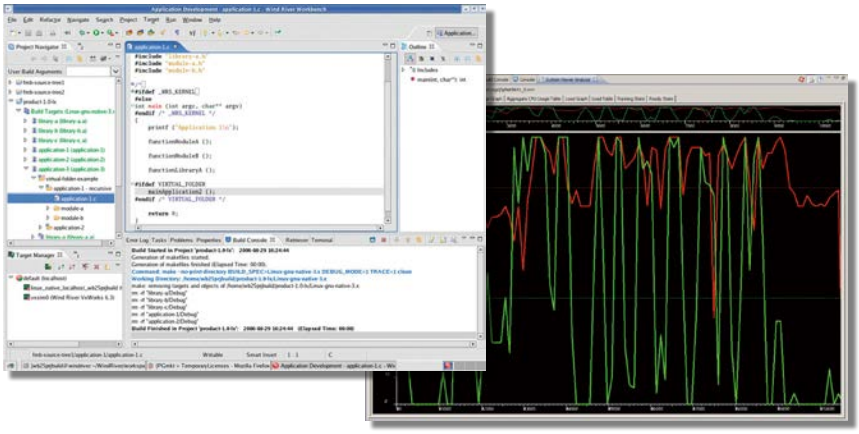
3.2 Q12-V*1 Q24-V Q24-VG

2.6.1 Q12-V*2

WIND RIVER

The software can edit and debug programs (step/break execution, variable/memory watch) via Ethernet.
Other features include task transition, memory usage analysis, variables, and real-time monitoring of the data structure using runtime analysis tools such as the System Viewer.

*1: Available only with function extension mode
*2: Available only with basic function mode



Embedded Linux® development environment

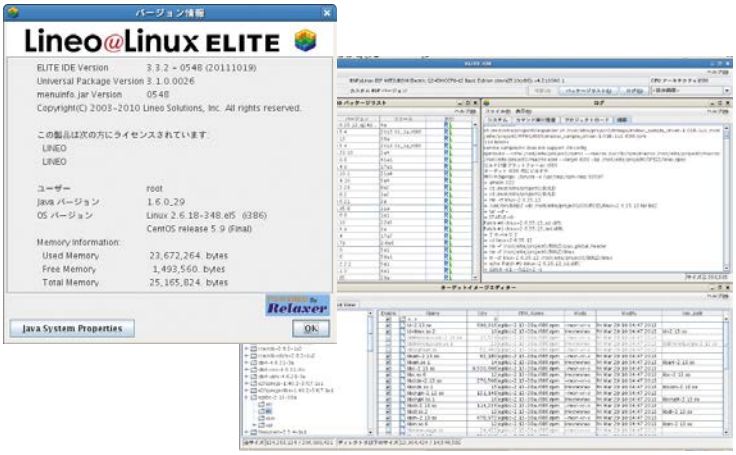
Lineo uLinux ELITE

Q24-LS Q26-LS

Lineo@Linux ELITE

Lineo Solutions product

This software is equipped with features of building Linux® systems optimized for the Q24DHCCPU-LS and Q26DHCCPU-LS, forwarding to the Q24DHCCPU-LS and Q26DHCCPU-LS, as well as source code editing and debugging.



MX Component

Enables easy-connection between PC and PLC

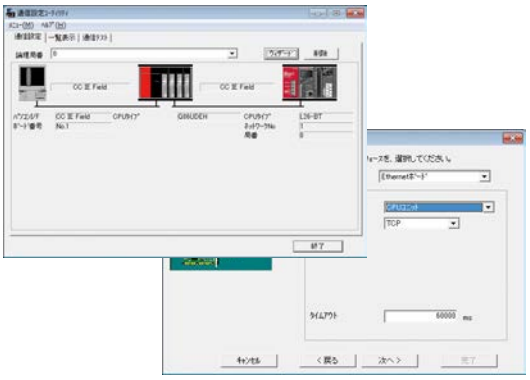


This Active X® Control with .NET Control libraries offer easy steps to perform the communication process from PC to PLC and motion controller, without being mindful of the protocols.
The MX Component makes the troublesome and complicated program developments of serial and Ethernet communications into a very easy task.

Easy communication setup with Wizard format

Communication setup utility includes Wizard format settings to access the PLC CPU. In addition, once you set the logic station of the PLC CPU, the communication setup utility stores its settings. To access again, simply specify the stored logic station.

Follow the communication setup wizard.
(A setup control that uses only the program is also available.)

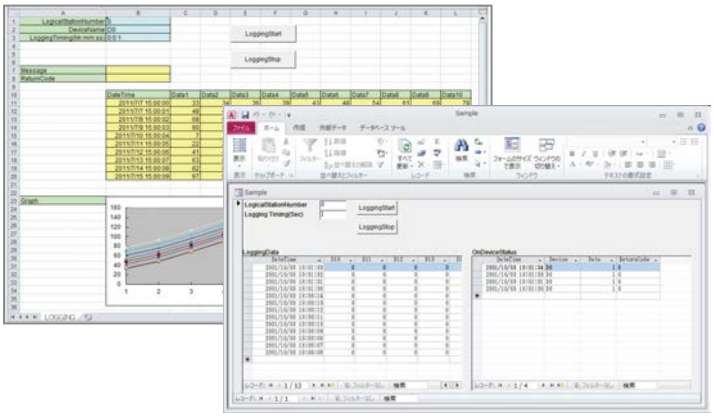


Paste the MX Component control icon on the form. Set the configured communication path number in the control property you pasted. After performing the communication path number setup, describe a program to read the device.



VBA data collection enabled

VBA programming allows you to create applications for real-time graph display by utilizing Excel® and Access® functions.
In addition, real-time device data can be collected and saved through logging of PLC device data.



Reduce man-hours by developing programs with use of labels

Device settings can be made with use of labels.
Labels are used in programs and MX Sheets for intuitive creation of programs and setup.
No change is required with programs and MX Sheets when switching the device.

MX Sheet

Easy data collection with the use of Excel®

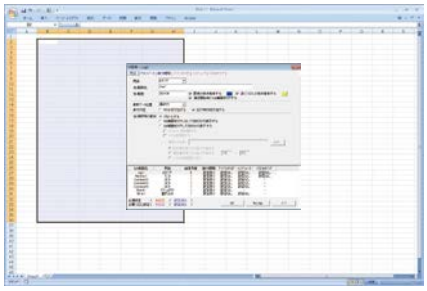
This software allows you to use the familiar Excel® for PLC and motion controller monitoring, logging, collection of warning information, and change of settings.



Easy and program-less setup

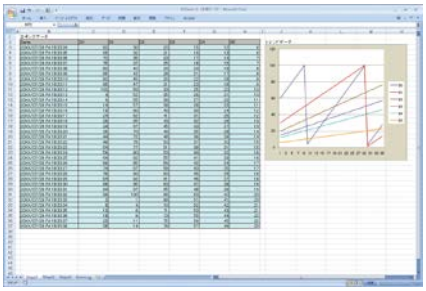
All operation settings for the MX Sheet can be performed easily from the Excel® menus, realizing a program-less communication between PLC and Excel®.

[Step1]



Open the setting utility screen and set conditions for function selection and target devices.

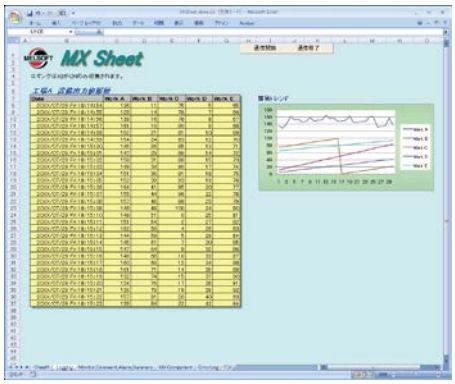
[Step2]

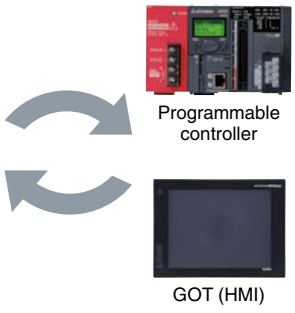


Then, simply arrange the screen and execute to initiate data collection.

Direct connection between office and site

Delivers real-time monitoring and logging of PLC device data and writing to Excel®. Recipe data and others can be forwarded to PLC as well.



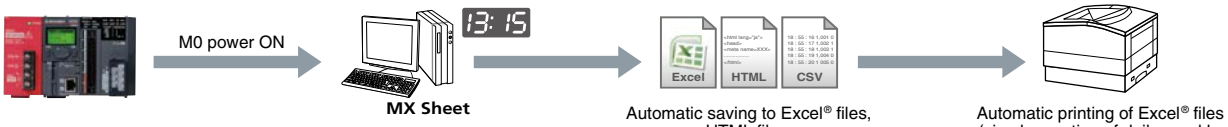


Programmable controller

GOT (HMI)

Automatic creation of daily reports and ledgers

Automatically saves and prints data displayed on Excel® at specified timing or based on PLC trigger condition. Preparing a list of daily reports and test results can be automated.



Automatic saving to Excel® files, HTML files, CSV files

Automatic printing of Excel® files (simple creation of daily, weekly, monthly reports)

Automatic saving and printing of daily and monthly reports are also possible (based on several conditions)

MX Component for iOS/Android™

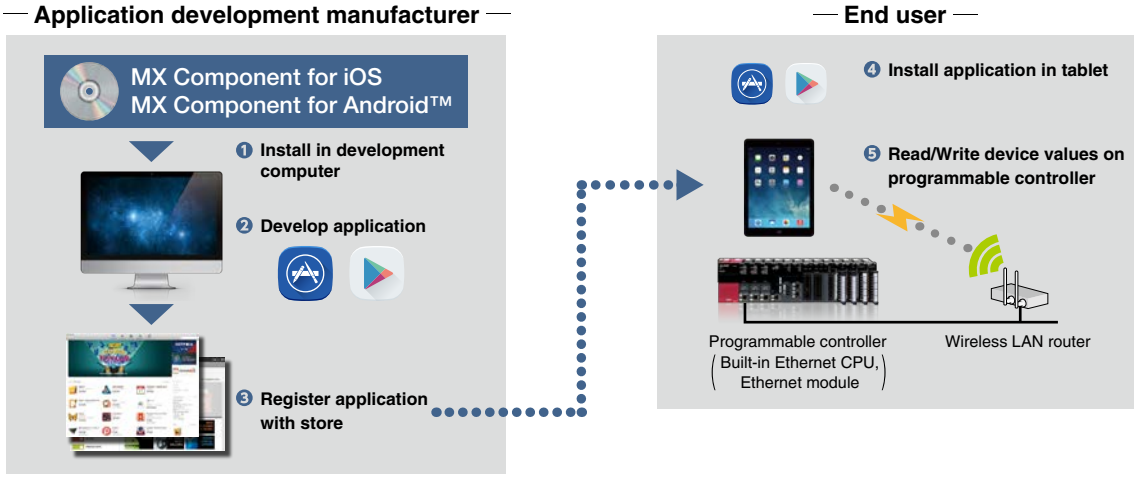
Easily develop applications for iOS/Android™ smart terminals.

MX Component for iOS/Android™ is a communication middleware that reads and writes the values of devices and labels in programmable controllers from a tablet.
It can be used when creating user applications that communicate with programmable controllers from iPad®, iPhone® and Android™ terminals.



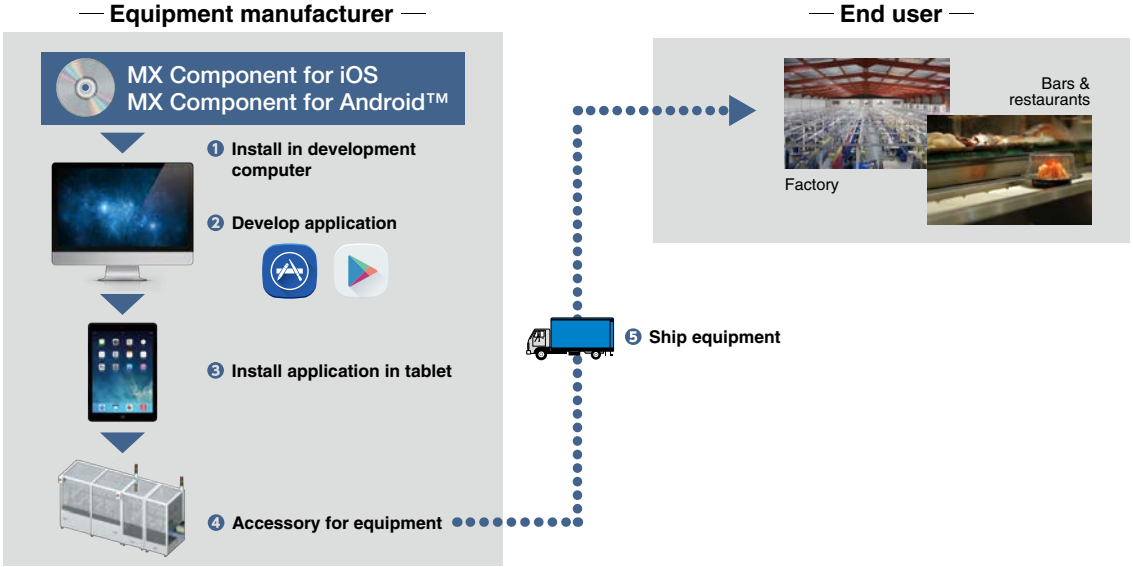
Distribution via App Store/Google Play

The application development manufacturer can provide applications developed to end users via App store/Google Play.



Delivery bundled with your company's equipment

Applications developed can be used for your equipment and delivered to end users.



Create tablet applications

Easily create applications for tablets that can read/write the values of devices and labels on programmable controllers without knowing the communication format of the programmable controller.

[Previous] Create communication procedure as a program

Create packet | Send packet | Wait for response | Receive response packet | Analyze packet

Entire program in a single line!

[MX Component for iOS/Android™]

```
[ Int result = mxcomm.readDeviceBlock("D100",1,readdata); ]
```

Peripheral device development support tool Free download

GX LogViewer

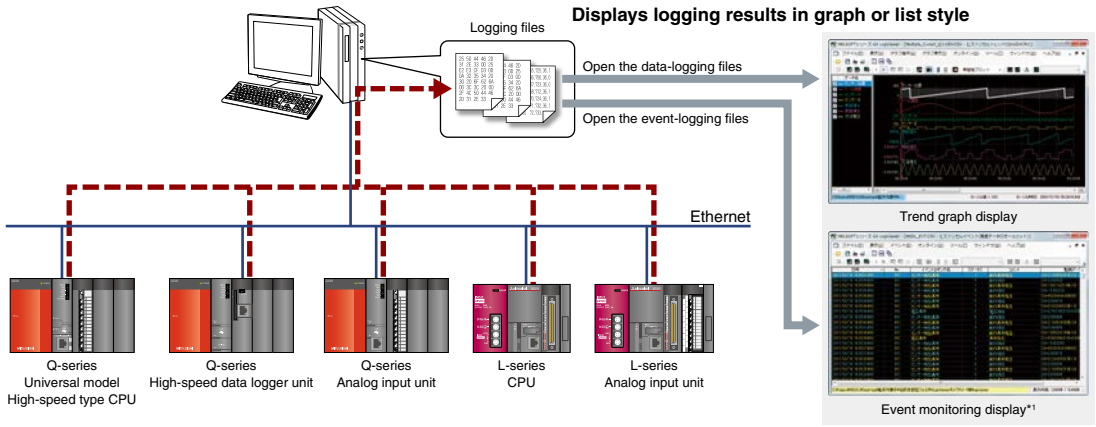
Displays and analyzes logging data with easy operation



This tool offers easy-to-understand operation to display and analyze mass data, which are collected by units and BOX data-logger with logging functions of MELSEC-Q or MELSEC-L series.
This tool can be downloaded (free of charge) from the Mitsubishi Electric FA website.

Easy steps to display and analyze mass logging data collections

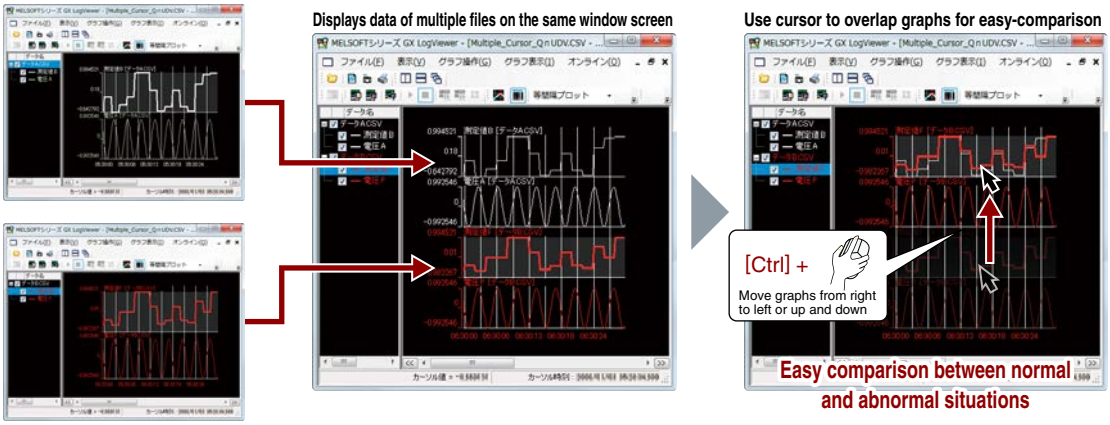
This tool offers easy-to-understand operation to display and analyze mass data, which are collected by units with logging functions of MELSEC-Q or MELSEC-L series. Target device setup can be performed in the same way as individual unit setup tools and GX Works2 for quick & easy confirmation of logging files.



*1: Event monitoring display is available only with Q-series High-speed data logger unit.

Displays data of multiple files in a single graph area for a quick comparison

The tool displays data of multiple files in the same graph area at identical time interval. Moving individual files to another display position is easy, enabling confirmation of data-gap among multiple files.



Peripheral device development support tool Free download

Safety controller setup and monitoring tools

Exclusive "setup and monitoring tool" for intuitive configuration

This tool is designed to perform settings and monitor safety controllers (MELSEC-WS series). Equipped with connections to safety sensor/switch and safety-exclusive function block, building of a safety system can be performed in easy steps.

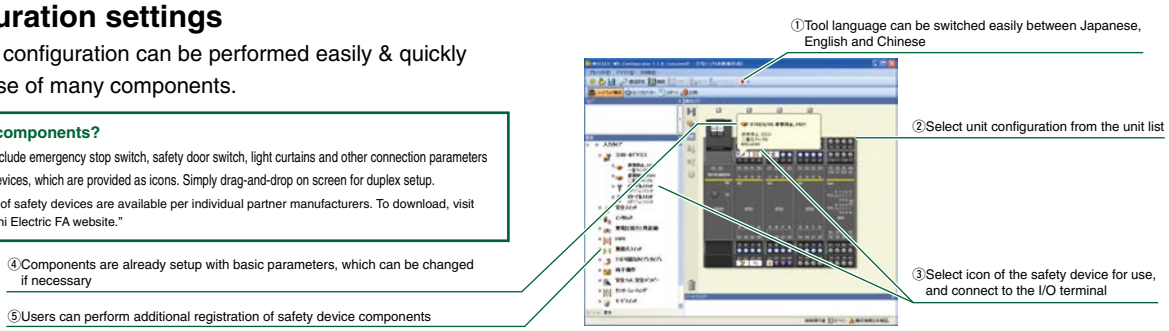
Configuration settings

Hardware configuration can be performed easily & quickly with the use of many components.

What are components?

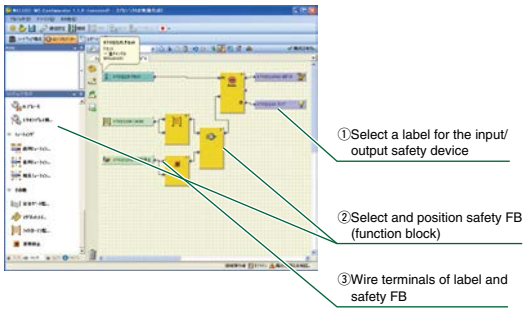
Components include emergency stop switch, safety door switch, light curtains and other connection parameters of key safety devices, which are provided as icons. Simply drag-and-drop on screen for duplex setup.

*Components of safety devices are available per individual partner manufacturers. To download, visit the "Mitsubishi Electric FA website."



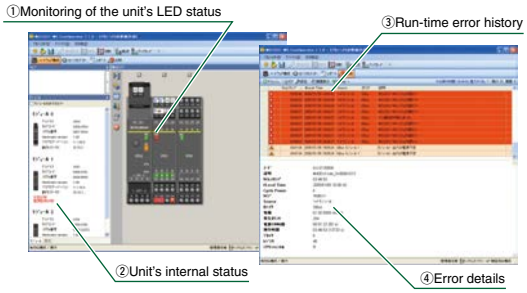
Logic creation

Creating logics is a simple task with FB (function block), using labels that are automatically generated for safety devices.



Diagnosis and monitoring

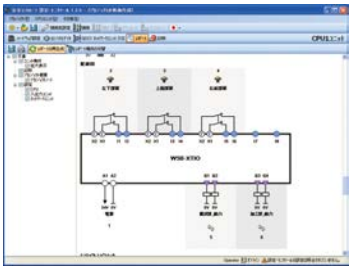
Confirms internal status and error history of units.



Improved report function

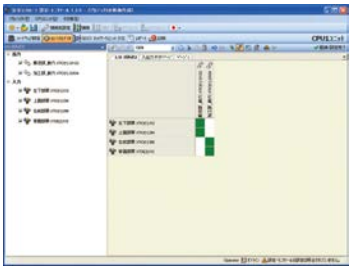
Detailed wiring diagram

Wiring diagram of I/O unit can be automatically generated.



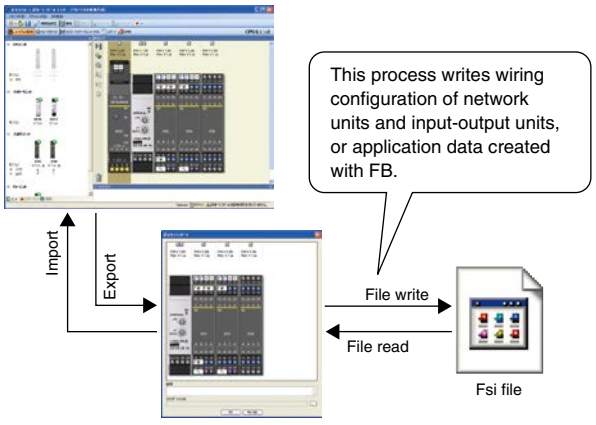
I/O matrix

Correlation between input and output can be displayed as matrix.



Logics import and export

You can now store only the application logics created with function block as a single configuration file, including connection settings to the input-output units, or even read from the stored configuration file. The conventional tasks of creating a new project or redoing hardware settings are no longer required when changing the CPU unit model (CPU0 → CPU1 or CPU1 → CPU0) or using a CPU unit with a new firmware version.



Access below to download free settings and monitoring tools

Mitsubishi FA device technical information service Mitsubishi Electric FA website

www.MitsubishiElectric.co.jp/fa/

List of software products

Software	Model name	Language compatibility			Description	Free of charge	MELSEC iQ-R Series				
		Multi-languages	Japanese	English			RnCPU RnENCPU	RnP(R)CPU	RnSFCPU	R12CCPU-V RD55UP06-V	
GX Works3	SW1DND-GXW3-J	○	○	○	Programmable Controller Engineering Software (Consolidated edition for programming, simulation, units settings, monitoring tool functions)	-	○	○	○	○	
	SW1DND-GXW3-E	○	○	○							
GX Works2	SW1DNC-GXW2-J	-	○	-	Programmable Controller Engineering Software (Consolidated edition for programming, simulation, units settings, monitoring tool functions)	-	-	-	-	-	
	SW1DNC-GXW2-E	-	-	○							
GX Developer	SW8D5C-GPPW-J	-	○	-	Programmable Controller Programming Software	-	-	-	-	-	
	SW8D5C-GPPW-E	-	-	○							
GX Simulator	SW7D5C-LLT-J	-	○	-	Programmable Controller Simulation Software GX Developer add-in software	-	-	-	-	-	
	SW7D5C-LLT-E	-	-	○							
GX LogViewer	SW1DNN-VIEWER-M	○	○	○	Logging data display and analysis tool	○	○	○	○	-	
PX Developer	SW1D5C-FBDQ-J	-	○	-	FBD software for instrumentation control	-	-	-	-	-	
	SW1D5C-FBDQ-E	-	-	○							
PX Developer monitoring tool	SW1DNC-FBDQMON-J	-	○	-	FBD software for instrumentation control (Designed exclusively for the monitoring tool)	-	-	-	-	-	
	SW1DNC-FBDQMON-E	-	-	○							
MX Component	SW4DNC-ACT-J	-	○	-	ActiveX® library for communication, .NET control library	-	○	○	○	○ (R12CCPU-V only)	
	SW4DNC-ACT-E	-	-	○							
MX Sheet	SW2DNC-SHEET-J	-	○	-	Excel® communication support tool Supported software: Microsoft® Excel® 2003, Microsoft® Excel® 2007, Microsoft® Excel® 2010 (32 bit), Microsoft® Excel® 2013 (32 bit)	-	○	○	○	○ (R12CCPU-V only)	
	SW2DNC-SHEET-E	-	-	○							
MX Component for iOS	SW1MIC-ACTIOS-B	-	○	○	A library that enables reading and writing of the values of sequencer devices and labels from a tablet	-	○	-	-	○ (R12CCPU-V only)	
MX Component for Android™	SW1DNC-ACTAND-B	-	○	○		-	○	-	-	○ (R12CCPU-V only)	
MX MESInterface-R	SW1DND-RMESIF-J	-	○	-	MES interface module information linkage tool for RD81MES96	-	-	-	-	-	
	SW1DND-RMESIF-E	-	-	○							
MX MESInterface	SW1DNC-MESIF-J	-	○	-	MES interface module information linkage tool for QJ71MES96	-	-	-	-	-	
	SW1DNC-MESIF-E	-	-	○							
CW Configurator	SW1DND-RCCPU-J	-	○	-	Setup and monitoring tool for C-language controller	-	-	-	-	○ (R12CCPU-V only)	
	SW1DND-RCCPU-E	-	-	○		-	-	-	-	○ (R12CCPU-V only)	
C-language controller setup and monitoring tools	SW4PVC-CCPU-J	-	○	-	Parameter setup and monitoring tool for C-language controller	-	-	-	-	-	
	SW4PVC-CCPU-E	-	-	○							
	SW3PVC-CCPU-J	-	○	-	Parameter setup and monitoring tool for C-language controller	-	-	-	-	-	
	SW3PVC-CCPU-E	-	-	○							
Safety controller setup and monitoring tools	SW1DNN-WS0ADR-B	○	○	○	Setup and monitoring tools for safety controller	○	-	-	-	-	
FX Configurator-FP	SW1D5C-FXSSC-J	-	○	-	Setup & monitoring tool for FX3U-20SSC-H	-	-	-	-	-	
	SW1D5C-FXSSC-E	-	-	○							
FX3U-ENET-L setup tool	SW1D5-FXENETL-J	-	○	-	Setup tool for FX3U-ENET-L	○	-	-	-	-	
	SW1D5-FXENETL-E	-	-	○							
Tool for high-speed data logger unit	SW1DNN-RDLUTL-J	-	○	-	High-speed data logger unit setup tool for RD81DL96	○	-	-	-	-	
	SW1DNN-RDLUTL-E	-	-	○							
	SW1DNN-DLUTL-J	-	○	-	High-speed data logger unit setup tool for QD81DL96	○	-	-	-	-	
	SW1DNN-DLUTL-E	-	-	○							
CPU unit logging setup tool	SW1DNN-LLUTL-M	○	○	○	CPU unit logging setup tool for RCPU, QnUDVCPU and LCPU	○	○	○	○	-	
High-speed data communication unit tool	SW1DNN-DCUTL-J	-	○	-	High-speed data communication unit setup tool for QJ71DC96	○	-	-	-	-	
	SW1DNN-DCUTL-E	-	-	○							
BOX data logger setup tool	SW1DNN-NLUTL-J	-	○	-	BOX data logger setup tool for NZ2DL	○	-	-	-	-	
	SW1DNN-NLUTL-E	-	-	○							

Note: Please refer to individual software products and relevant manuals for details on compatibility with CPU unit, CPU unit version, supported OS, supported unit name, etc.
△: Supports Japanese OS; please refer to the Japanese manual for details.

○: supported △: supports only a few selected types -: not supported

Supported CPU															
	MELSEC iQ-F Series	MELSEC-Q Series										MELSEC-L Series	MELSEC-QS Series	MELSEC-WS Series	MELSEC-F Series
	FX5U	Universal model QCPU		High-performance model QCPU	Basic model QCPU	Universal model process CPU	Process CPU	Redundant CPU	C-language CPU			LCPU	Safety CPU	Safety controller	FXCPU
		QnUDV	QnU/ QnUD(E)						Q12DC CPU-V	Q24DHC CPU-V/VG	Q24/26DHC CPU-LS				
	○	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	○	○	△	-	○ -	○	○	-	-	-	○	-	-	○
	-	-	△	○	○	-	○	○	-	-	-	△	-	-	○
	-	-	△	○	○	-	○	○	-	-	-	-	-	-	○
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	○	○	○	○	○	○ -	○	○	○	○	○	○	○	-	○
	○	○	○	○	○	○	○	○	○	○ (Q24DHCCPU-V only)	○ (Q24DHCCPU-LS only)	○	-	-	-
	○	○	○	○	○	○	○	○	○	○ (Q24DHCCPU-V only)	○ (Q24DHCCPU-LS only)	○	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	○ (Function extension mode)	○	○	-	-	-	-
	-	-	-	-	-	-	-	-	○ (Basic function mode)	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	○	-
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iQ Sensor Solution

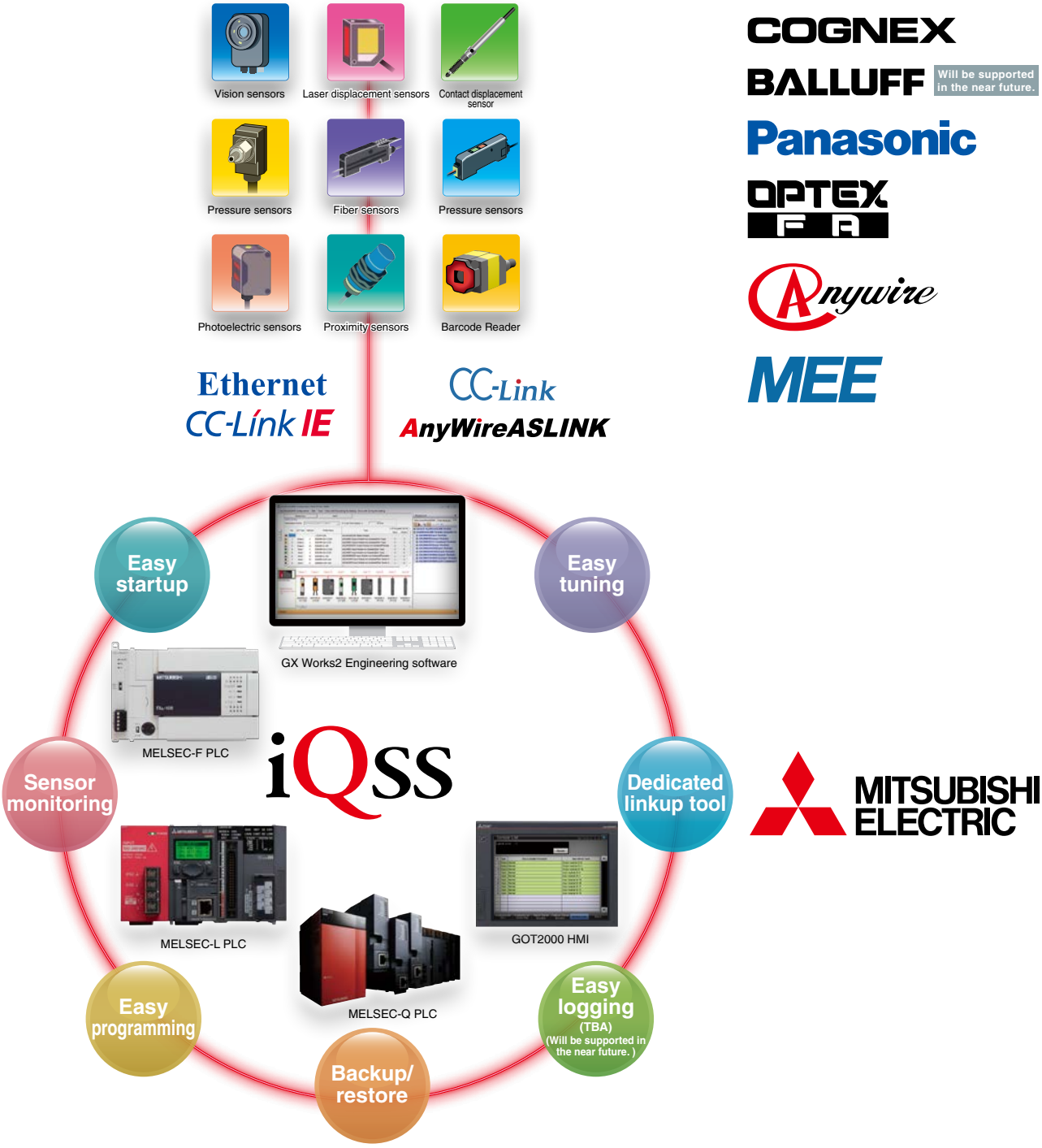
A tool for connecting! Visualizing!
For a more seamless sensor control!

Sensors used on the manufacturing floor are becoming more advanced and complex.
Managing your sensor configuration tools, and maintaining and starting up your equipment can be costly and hugely time consuming. Through a collaboration with partner manufacturers, Mitsubishi Electric offers an engineering tool that enables intuitive configuration and maintenance of sensors. This tool provides a solution that enhances the interaction between sensors and PLCs, HMIs and engineering softwares, which effectively reduces the customer's TCO*. The solution is iQ Sensor Solution (iQss).

*TCO: Total Cost of Ownership

iQss

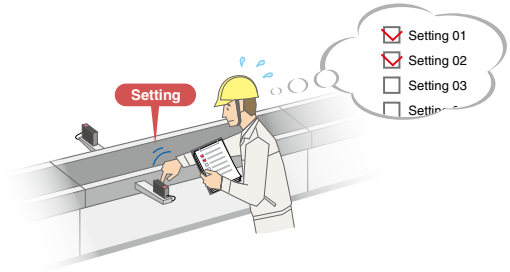
iQss supports all kinds of sensors, from standard type all the way up to full advanced sensors.



Do you have problems to solve at your production site?

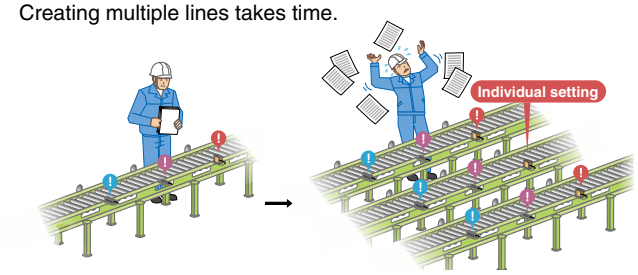
Sensor setting

Complex sensors require many setting items, increasing setup and maintenance time.



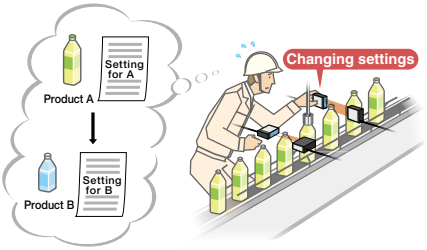
Duplicating lines

When you reorganize your factory space, the parameters for each sensor on your existing lines must be individually set.
Creating multiple lines takes time.



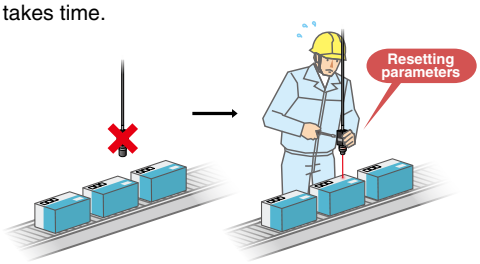
Changing the set-up

When you manufacture multiple products on a single line, sensor parameters have to be changed every time the product changes.
Changing the set-up takes time.



Replacing sensors

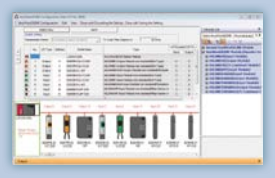
When sensors fail, they don't just have to be replaced. It is also necessary to reset the parameters for the new sensor. System recovery takes time.



Enhanced linkups between third party partners sensors and Mitsubishi PLCs, HMIs and engineering software reduces customers' TCO.

System design

To manage projects simply, we provide a workspace tree that enables projects to be managed in a single location, and a system configuration chart that depicts the entire system graphically.



System configuration management

Testing & startup

Functions are provided that allow monitoring from a single screen based on the system configuration chart so that the causes of problems can be identified quickly. This also shortens the time taken to adjust sections involving multiple devices.

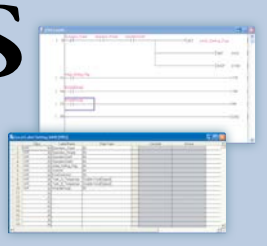


Monitoring

iQSS

Programming

The labels used by PLCs can also be used by HMIs and sensors. This takes all the bother out of label setting. GOT sample screen libraries, sample ladders and function blocks, etc. are supported.



Label programming

Operation & maintenance

To make backups less laborious, batch read/write functions are provided for PLC, HMI and sensor settings.



Sensor configuration read/write

Lower TCO

Lower development costs

- Easy startup
- Easy programming
- Dedicated linkup tool

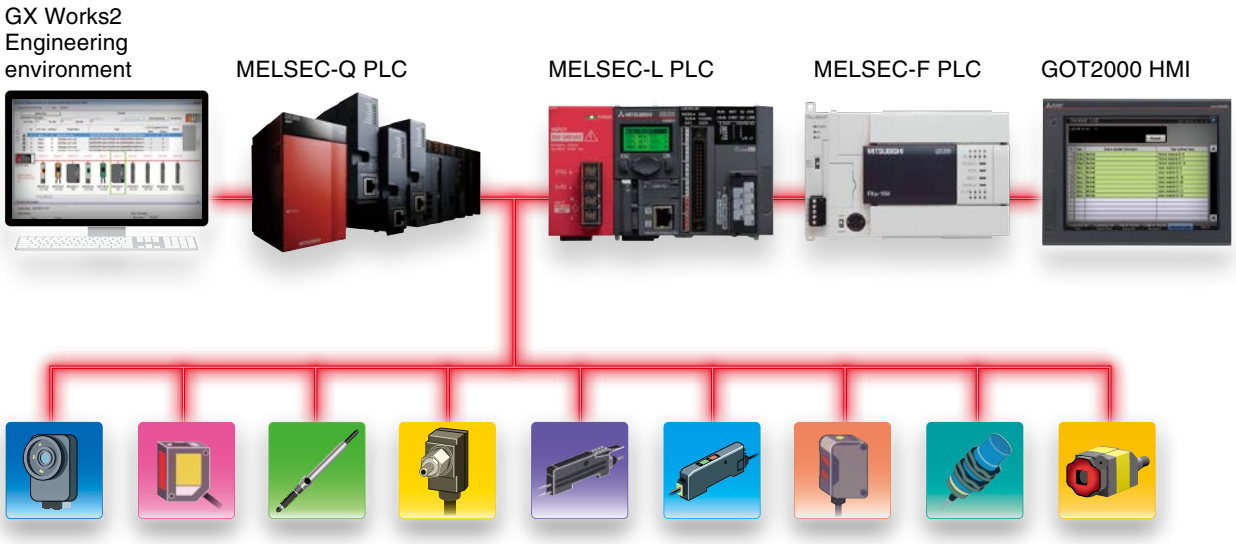
Lower production costs

- Easy tuning

Lower maintenance costs

- Sensor monitoring
- Backup/ restore
- Easy logging (TBA) (Will be supported in the near future.)

iQSS Configuration Chart



List of compatible models

○: Compatible －: Incompatible

Product	Manufacturer	Series/Model	Connection method				
			AnyWire ASLINK	CC-Link	CC-Link IE Field Network	Ethernet	Bus connection*1
Vision system	Cognex Corporation	In-Sight EZ-700, EZ-100 series In-Sight 7000, Micro, 5000 series * Supports In-Sight firmware version 4.9 and onwards * In-Sight EZ-700 and EZ-100 series are only sold in certain countries and areas.	－	－	－	○	－
	OPTEX FA CO., LTD.	HVS-OCR	－	－	－	○	－
Laser displacement sensors	Panasonic Industrial Devices SUNX Co., Ltd.	Sensor controller HL-C21C(E) series HL-C21C(E) (NPN type), HL-C21C(E)-P (PNP type)	－	－	－	○	－
		Sensor head for HL-C2(E) series HL-C201A(E)(-MK), HL-C201A(E)-SP2(M), HL-C201A(E)-SP3(M), HL-C203B(E)(-MK), HL-C205B(E)(-MK), HL-C205C(E)(-MK), HL-C211B(E)(-MK), HL-C211C(E)(-MK), HL-C235B(E)(-MK), HL-C235C(E)(-MK), HL-C235CE-W(MK)					
	OPTEX FA CO., LTD.	Control unit UQ1 series UQ 1-01 (Dedicated unit for CD5 series), UQ 1-02 (Dedicated unit for CD33 series)	－	－	－	－	○
		Sensor head CD5 series CD5-L25, CD5-LW25, CD5-30, CD5-W30, CD5-85, CD5-W85, CD5-150, CD5-W150, CD5-W350, CD5-W500, CD5-W2000					
		Sensor head CD33 series CD33-30 series, CD33-50 series, CD33-85 series, CD33-120 series, CD33-250 series, CD33-L30 series, CD33-L50 series, CD33-L85 series					
Fiber sensors	Panasonic Industrial Devices SUNX Co., Ltd.	CC-Link communication unit*2 SC-GU3-01 * Uses separate sensor head	－	○	－	－	－
		Digital fiber sensor amplifier FX-300 series FX-301, FX-305					
		Digital fiber sensor amplifier FX-500 series FX-501, FX-502					
	OPTEX FA CO., LTD.	CC-Link communication unit UC1-CL11 * Uses separate sensor head	－	○	－	－	－
		High-speed digital fiber amplifier D3RF series					
	Anywire Corporation	ASLINKAMP main unit B289SB-01AF-CAM20, B289SB-01AF-CAM20-V	○	－	－	－	－
		ASLINKAMP sub units B289SB-01AF-CAS, B289SB-01AF-CAS-V					
		ASLINKAMP main unit (With 7-segment display) LA-F1011					
		ASLINKAMP sub units (With 7-segment display) LB-F1011					
		AFT-4 M4 (Radius R30), AFT-1 M3 (Radius R20) AFT-2 M3 (Radius R25), AFT-1-1 M3 (Radius R20, Heat resistance 100°C)					

○: Compatible －: Incompatible

Product	Manufacturer	Series/Model	Connection method				
			AnyWire ASLINK	CC-Link	CC-Link IE Field Network	Ethernet	Bus connection*1
 Laser sensors	Panasonic Industrial Devices SUNX Co., Ltd	CC-Link communication unit*2 SC-GU3-01 * Uses separate sensor head (choice of three models)	－	○	－	－	－
		Digital laser amplifier LS series LS-500 series, LS-403					
 Pressure sensors	Panasonic Industrial Devices SUNX Co., Ltd.	CC-Link communication unit*2 SC-GU3-01 * Uses separate sensor head (Choice of three models)	－	○	－	－	－
		Digital pressure sensor DPS-400 series DPS-401, DPS-402					
	Anywire Corporation	ASLINKSENSOR (Positive pressure sensor) B284SB-01-1KPP30, B284SB-02-1KPP30	○	－	－	－	－
		ASLINKSENSOR (Negative pressure sensor) B284SB-01-1KNP30, B284SB-02-1KNP30					
		ASLINKSENSOR (Compound pressure sensor) B284SB-01-1KLP30, B284SB-02-1KLP30					
		ASLINKSENSOR (Low Positive Pressure sensor) B284SB-01-1KPLP30,B284SB-02-1KPLP30					
		ASLINKSENSOR (Low Positive Pressure sensor, Analog Level 10bit) B284SB-J1-1KPLP30					
		ASLINKSENSOR (Positive Pressure sensor, Analog Level 10bit) B284SB-J1-1KPP30					
		ASLINKSENSOR (Negative Pressure sensor, Analog Level 10bit) B284SB-J1-1KNP30					
		ASLINKSENSOR (Compound Pressure sensor, Analog Level 10bit) B284SB-J1-1KLP30					
 Photoelectric sensors	Anywire Corporation	ASLINKAMP main unit B289SB-01AP-CAM20	○	－	－	－	－
		ASLINKAMP sub units B289SB-01AP-CAS					
		ASLINKSENSOR (Transmission type) B283SB-PC-SET (P, C set type), B283SB-01-1KP (Light-projecting) B283SB-01-1KC (Light-receptive)					
		ASLINKSENSOR (Recurrent reflection type) B283SB-01-1KR-V					
		ASLINKSENSOR (Diffuse reflection type) B283SB-01-1KS					
		ASLINKSENSOR (IP67, Transmission Type) BS-H0117-1KP(Light-projecting), BS-H0117-1KC (Light-receptive)					
		ASLINKSENSOR (IP67, Recurrent reflection Type) BS-H0217-1K					
		ASLINKSENSOR (IP67, Diffuse reflection Type) BS-H0317-1K					
 Proximity sensors	Anywire Corporation	ASLINKAMP main Unit B289SB-01AK-CAM20	○	－	－	－	－
		ASLINKAMP sub units B289SB-01AK-CAS					
		ASLINKSENSOR (No coatings) BS-K1117-M8-1K (M8 Full thread), BS-K1117-M12-1K (M12 Full thread), BS-K1117-M18-1K (M18 Full thread), BS-K1117-M30-1K (M30 Full thread)					
		ASLINKSENSOR (Fluorine resin coatings) BS-K1117S-M12-1K (M12 Full thread), BS-K1117S-M18-1K (M18 Full thread), BS-K1117S-M30-1K (M30 Full thread)					
 Photo-interrupters	Anywire Corporation	ASLINKSENSOR B297SB-01-1K40 (Standard model)	○	－	－	－	－
 RFID	Mitsubishi Electric Engineering Company Ltd.	Interface unit ECL2-V680D1	－	○	－	－	－
	OMRON Corporation	Head unit V680 series					

*1: Used loaded into the I/O slot in a MELSEC-Q series base unit.
*2: Additionally use a cascading connector unit (SC-71), an end unit (SC-GU3-EC), and the computer software (SC-PC1).

- Refer to the iQ Sensor Solution Reference Manual (SH-081133ENG) for information on the supported versions of each product.
- Refer to the manual for each product for detailed product specifications.

Product List

Please refer to the product user manuals for information about compatible modules, restrictions, etc., before using the products.
Please visit the Mitsubishi Electric FA site or contact your nearest branch for the latest information on the MELSOFT versions and compatible OS.

MELSEC iQ-R Series

●CPU module

Type	Model	Outline
Programmable controller CPU	R04CPU	Program capacity, 40K steps; basic operation processing speed (LD instruction), 0.98 ns
	R08CPU	Program capacity, 80K steps; basic operation processing speed (LD instruction), 0.98 ns
	R16CPU	Program capacity, 160K steps; basic operation processing speed (LD instruction), 0.98 ns
	R32CPU	Program capacity, 320K steps; basic operation processing speed (LD instruction), 0.98 ns
	R120CPU	Program capacity, 1200K steps; basic operation processing speed (LD instruction), 0.98 ns
	R04ENCPU	CC-Link IE embedded; program capacity, 40K steps; basic operation processing speed (LD instruction), 0.98 ns
	R08ENCPU	CC-Link IE embedded; program capacity, 80K steps; basic operation processing speed (LD instruction), 0.98 ns
	R16ENCPU	CC-Link IE embedded; program capacity, 160K steps; basic operation processing speed (LD instruction), 0.98 ns
	R32ENCPU	CC-Link IE embedded; program capacity, 320K steps; basic operation processing speed (LD instruction), 0.98 ns
	R120ENCPU	CC-Link IE embedded; program capacity, 1200K steps; basic operation processing speed (LD instruction), 0.98 ns
Motion CPU	R16MTCPU	Up to 16-axis control; operation cycle, ≤0.222 ms; SSCNET Ⅲ/H connectivity
	R32MTCPU	Up to 32-axis control; operation cycle, ≤0.222 ms; SSCNET Ⅲ/H connectivity
	R64MTCPU	Up to 64-axis control; operation cycle, ≤0.222 ms; SSCNET Ⅲ/H connectivity
Safety CPU	R08SFCPU-SET	Program capacity, 80K steps (40K steps for safety programs); basic operation processing speed (LD instruction), 0.98 ns
	R16SFCPU-SET	Program capacity, 160K steps (40K steps for safety programs); basic operation processing speed (LD instruction), 0.98 ns
	R32SFCPU-SET	Program capacity, 320K steps (40K steps for safety programs); basic operation processing speed (LD instruction), 0.98 ns
	R120SFCPU-SET	Program capacity, 1200K steps (40K steps for safety programs); basic operation processing speed (LD instruction), 0.98 ns
Process CPU	R08PCPU	Program capacity, 80K steps; basic operation processing speed (LD instruction), 0.98 ns
	R16PCPU	Program capacity, 160K steps; basic operation processing speed (LD instruction), 0.98 ns
	R32PCPU	Program capacity, 320K steps; basic operation processing speed (LD instruction), 0.98 ns
	R120PCPU	Program capacity, 1200K steps; basic operation processing speed (LD instruction), 0.98 ns
Redundant function module	R6RFM	By combining with a process CPU a redundant control system can be realized.
C Controller	R12CCPU-V	Endian format, little endian; OS, VxWorks® Version 6.9
SD memory card*1	NZ1MEM-2GBSD	SD memory card, 2G bytes
	NZ1MEM-4GBSD	SDHC memory card, 4G bytes
	NZ1MEM-8GBSD	SDHC memory card, 8G bytes
	NZ1MEM-16GBSD	SDHC memory card, 16G bytes
Extended SRAM cassette	NZ2MC-1MBS	1M bytes
	NZ2MC-2MBS	2M bytes
	NZ2MC-4MBS	4M bytes
	NZ2MC-8MBS	8M bytes
	NZ2MC-8MBSE*2	8M bytes
	NZ2MC-16MBS	16M bytes
Battery	Q6BAT	Replacement battery
	Q7BAT	Replacement large-capacity battery
	Q7BAT-SET	Large-capacity battery with holder for mounting CPU

*1: Mitsubishi Electric shall not guarantee the operation of any third party products.
*2: ECC type for safety CPU and process CPU modules.

Base unit

Type	Model	Outline
Main base	R35B	5 slots, for MELSEC iQ-R Series modules
	R38B	8 slots, for MELSEC iQ-R Series modules
	R312B	12 slots, for MELSEC iQ-R Series modules
Redundant power supply main base	R310RB	10 slots, for MELSEC iQ-R Series modules
Extended temperature range main base	R310B-HT	10 slots, for MELSEC iQ-R Series modules
Extended temperature range redundant power supply main base	R38RB-HT	8 slots, for MELSEC iQ-R Series modules
Extension base	R65B	5 slots, for MELSEC iQ-R Series modules
	R68B	8 slots, for MELSEC iQ-R Series modules
	R612B	12 slots, for MELSEC iQ-R Series modules
Redundant power supply extension base	R610RB	10 slots, for MELSEC iQ-R Series modules
Extended temperature range extension base	R610B-HT	10 slots, for MELSEC iQ-R Series modules
Extended temperature range redundant power supply extension base	R68RB-HT	8 slots, for MELSEC iQ-R Series modules
RQ extension base	RQ65B	5 slots, for MELSEC-Q Series modules
	RQ68B	8 slots, for MELSEC-Q Series modules
	RQ612B	12 slots, for MELSEC-Q Series modules
Extension cable	RC06B	0.6 m cable for extension and RQ extension base units
	RC12B	1.2 m cable for extension and RQ extension base units
	RC30B	3 m cable for extension and RQ extension base units
	RC50B	5 m cable for extension and RQ extension base units
DIN rail mounting adapter	R6DIN1	For main and extension base units
	Q6DIN1	For RQ68B/RQ612B
	Q6DIN2	For RQ65B
	Q6DIN1A	For RQ extension base units (with vibration-proofing bracket sets)
Blank cover	RG60	For I/O slots of main and extension base units
	QG60	For I/O slots of RQ extension base units

Power supply module

Power supply	R61P	AC power supply; input, 100...240 V AC; output, 5 V DC/6.5 A
	R62P	AC power supply; input, 100...240 V AC; output, 5 V DC/3.5 A, 24 V DC/0.6 A
	R64P	AC power supply; input, 100...240 V AC; output, 5 V DC/9 A
	R63P	DC power supply; input, 24 V DC; output, 5 V DC/6.5 A
	R64RP	AC power supply; input, 100...240 V AC; output, 5 V DC/9 A, Redundant power supply function support

I/O module

Input	RX10	AC input, 16 points; 100...120 V AC (50/60 Hz)
	RX40C7	DC input, 16 points; 24 V DC, 7.0 mA
	RX41C4	DC input, 32 points; 24 V DC, 4.0 mA
	RX42C4	DC input, 64 points; 24 V DC, 4.0 mA
High-speed input	RX40PC6H	Positive common type DC input, 16 points; 24 V DC, 6.0 mA; minimum response time 5 µs
	RX40NC6H	Negative common type DC input, 16 points; 24 V DC, 6.0 mA; minimum response time 5 µs
	RX41C6HS	Positive/negative common type DC input, 32 points; 24 V DC, 6.0 mA; minimum response time 1 µs
	RX61C6HS	Positive/negative common type DC input, 32 points; 5 V DC, 6.0 mA; minimum response time 1 µs
Input (with diagnostic functions)	RX40NC6B	Negative common type DC input, 16 points; 24 V DC, 6.0 mA
Output	RY10R2	Relay output, 16 points; 24 V DC/2 A, 240 V AC/2 A
	RY40NT5P	Transistor (sink) output, 16 points; 12...24 V DC, 0.5 A
	RY41NT2P	Transistor (sink) output, 32 points; 12...24 V DC, 0.2 A
	RY42NT2P	Transistor (sink) output, 64 points; 12...24 V DC, 0.2 A
	RY40PT5P	Transistor (source) output, 16 points; 12...24 V DC, 0.5 A
	RY41PT1P	Transistor (source) output, 32 points; 12...24 V DC, 0.1 A
	RY42PT1P	Transistor (source) output, 64 points; 12...24 V DC, 0.1 A
High-speed output	RY41NT2H	Transistor (sink) output, 32 points; 5...24 V DC, 0.2 A; minimum response time 2 µs
	RY41PT2H	Transistor (source) output, 32 points; 5...24 V DC, 0.2 A; minimum response time 2 µs
Output (with diagnostic functions)	RY40PT5B	Transistor (source) output, 16 points; 24 V DC, 0.5 A
I/O combined	RH42C4NT2P	DC input, 32 points; 24 V DC, 4.0 mA Transistor (sink) output, 32 points; 12...24 V DC, 0.2 A

Analog module

Type	Model	Outline
Analog input	R60AD4	4 channels for voltage/current inputs -10...10 V DC, -32000...32000; 0...20 mA DC, 0...32000; 80 µs/CH
	R60ADH4	4 channels for voltage/current inputs -10...10 V DC, -32000...32000; 0...20 mA DC, 0...32000; 5 µs/4CH
	R60ADV8	8 channels for voltage inputs -10...10 V DC, -32000...32000; 80 µs/CH
	R60ADI8	8 channels for current inputs 0...20 mA DC/0...32000; 80 µs/CH
	R60AD8-G	8 channels for voltage/current input, channel isolated -10...10 V DC/-32000...32000, 0...20 mA DC/0...32000, 10 ms/CH
	R60AD16-G	16 channels for voltage/current input, channel isolated -10...10 V DC/-32000...32000, 0...20 mA DC/0...32000, 10 ms/CH
Temperature input	R60TD8-G	Thermocouple (B, R, S, K, E, J, T, N), 8 channels for input, channel isolated, 30 ms/CH
	R60RD8-G	RTD (Pt100, JPt100, Ni100, Pt50), 8 channels for input, channel isolated, 10 ms/CH
Temperature control	R60TCTRT2TT2	Thermocouple (B, R, S, K, E, J, T, N, U, L, PLⅡ, W5Re/W26Re), 4 channels for input (2 channels can also be used for RTD input)
	R60TCRT4	RTD (Pt100, JPt100), 4 channels for input
	R60TCTRT2TT2BW	Thermocouple (B, R, S, K, E, J, T, N, U, L, PLⅡ, W5Re/W26Re), 4 channels for input (2 channels can also be used for RTD input), heater disconnection detection
	R60TCRT4BW	RTD (Pt100, JPt100), 4 channels for input, heater disconnection detection
Analog output	R60DA4	4 channels for voltage/current outputs -32000...32000, -10...10 V DC; 0...32000, 0...20 mA DC; 80 µs/CH
	R60DAV8	8 channels for voltage outputs -32000...32000, -10...10 V DC; 80 µs/CH
	R60DAI8	8 channels for current outputs 0...32000, 0...20 mA DC; 80 µs/CH
	R60DA8-G	8 channels for voltage/current output, channel isolated -32000...32000/-12...12 V DC, 0...32000/0...20 mA DC, 1 ms/CH
	R60DA16-G	16 channels for voltage/current output, channel isolated -32000...32000/-12...12 V DC, 0...32000/0...20 mA DC, 1 ms/CH

Motion/Positioning/High-speed counter module

Simple motion	RD77GF4	4 axes, linear/circular interpolation, advanced synchronous control, CC-Link IE Field network compatible
	RD77GF8	8 axes, linear/circular interpolation, advanced synchronous control, CC-Link IE Field network compatible
	RD77GF16	16 axes, linear/circular interpolation, advanced synchronous control, CC-Link IE Field network compatible
	RD77MS2	2 axes, linear/circular interpolation, advanced synchronous control, SSCNETⅢ/H compatible
	RD77MS4	4 axes, linear/circular interpolation, advanced synchronous control, SSCNETⅢ/H compatible
	RD77MS8	8 axes, linear/circular interpolation, advanced synchronous control, SSCNETⅢ/H compatible
	RD77MS16	16 axes, linear/circular interpolation, advanced synchronous control, SSCNETⅢ/H compatible
Positioning	RD75P2	Transistor output, 2 axes; max. output, 200k pulse/s; linear/circular interpolation
	RD75P4	Transistor output, 4 axes; max. output, 200k pulse/s; linear/circular/helical interpolation
	RD75D2	Differential driver output, 2 axes; max. output, 5M pulse/s; linear/circular interpolation
	RD75D4	Differential driver output, 4 axes; max. output, 5M pulse/s; linear/circular/helical interpolation
High-speed counter	RD62P2	5/12/24 V DC input, 2 channels; counting speed, max. 200k pulse/s; external output, transistor (sink type)
	RD62P2E	5/12/24 V DC input, 2 channels; counting speed, max. 200k pulse/s; external output, transistor (source type)
	RD62D2	Differential input, 2 channels; max. counting speed, 8M pulse/s; external output, transistor (sink type)

Network module

Ethernet (built-in CC-Link IE)	RJ71EN71	1 Gbps/100 Mbps/10 Mbps, 2 ports Multi-network connectivity (Ethernet/CC-Link IE)
CC-Link IE Control	RJ71GP21-SX	1 Gbps, fiber-optic cable, control/normal station
CC-Link IE Field	RJ71GF11-T2	1 Gbps, master/local station
CC-Link IE Field Network remote head	RJ72GF15-T2	1 Gbps, remote station
CC-Link	RJ61BT11	Max. 10 Mbps, master/local station, CC-Link Ver.2 supported
AnyWireASLINK	RJ51AW12AL	DigitalLinkSensor AnyWireASLINK system compatible, master station
Serial communication	RJ71C24	Max. 230.4 kbps; RS-232, 1 channel; RS-422/485, 1 channel
	RJ71C24-R2	Max. 230.4 kbps; RS-232, 2 channels
	RJ71C24-R4	Max. 230.4 kbps; RS-422/485, 2 channels

Advanced information module

MES Interface	RD81MES96	Database connection (MX MESInterface-R is required)
High-speed data logger	RD81DL96	Data collection (High-speed data logger module tool "SW1DNN-RDLUTL-E" is required)*1
C intelligent function module	RD55UP06-V	C/C++ program execution (Setting and monitoring tool is integrated within GX Works3)

*1: For information on how to obtain the software, please contact your local Mitsubishi Electric sales office or representative.

MELSEC iQ-F Series

■CPU & I/O module

●CPU module

Model	Specification				
	Rated voltage	Input		Output	
◆FX5U CPU modules					
FX5U-32MR/ES	100...240 V AC 50/60 Hz	16 points	24 V DC sink/source	16 points	Relay
FX5U-32MT/ES					Transistor/sink
FX5U-32MT/ESS					Transistor/source
FX5U-64MR/ES		32 points		32 points	Relay
FX5U-64MT/ES					Transistor/sink
FX5U-64MT/ESS					Transistor/source
FX5U-80MR/ES		40 points		40 points	Relay
FX5U-80MT/ES					Transistor/sink
FX5U-80MT/ESS					Transistor/source
FX5U-32MR/DS	24 V DC	16 points	24 V DC sink/source	16 points	Relay
FX5U-32MT/DS					Transistor/sink
FX5U-32MT/DSS					Transistor/source
◆FX5UC CPU modules					
FX5UC-32MT/D	24 V DC	16 points	24 V DC sink	16 points	Transistor/sink
FX5UC-32MT/DSS			24 V DC sink/source		Transistor/source
FX5UC-64MT/D		32 points	24 V DC sink	32 points	Transistor/sink
FX5UC-64MT/DSS			24 V DC sink/source		Transistor/source
FX5UC-96MT/D		48 points	24 V DC sink	48 points	Transistor/sink
FX5UC-96MT/DSS			24 V DC sink/source		Transistor/source

●I/O module

Model	Specification				
	Rated voltage	Input		Output	
■■■Extension cable type■■■					
◆Input module					
FX5-8EX/ES	Supplied from CPU module	8 points	24 V DC sink/source	—	—
FX5-16EX/ES		16 points		—	—
◆Output module					
FX5-8EYR/ES	Supplied from CPU module	—	—	8 points	Relay
FX5-8EYT/ES					Transistor/sink
FX5-8EYT/ESS					Transistor/source
FX5-16EYR/ES		—	—	16 points	Relay
FX5-16EYT/ES					Transistor/sink
FX5-16EYT/ESS					Transistor/source
◆High-speed pulse input/output module					
FX5-16ET/ES-H	Supplied from CPU module	8 points	24 V DC sink/source	8 points	Transistor/sink
FX5-16ET/ESS-H					Transistor/source
◆Powered input/output module					
FX5-32ER/ES	100...240 V AC 50/60 Hz	16 points	24 V DC sink/source	16 points	Relay
FX5-32ET/ES					Transistor/sink
FX5-32ET/ESS					Transistor/source
FX5-32ER/DS	24 V DC	16 points	24 V DC sink/source	16 points	Relay
FX5-32ET/DS					Transistor/sink
FX5-32ET/DSS					Transistor/source
■■■Extension connector type■■■					
◆Input module					
FX5-C16EX/D	Supplied from CPU module	16 points	24 V DC sink	—	—
FX5-C16EX/DS			24 V DC sink/source		
FX5-C32EX/D		32 points	24 V DC sink	—	—
FX5-C32EX/DS			24 V DC sink/source		
◆Output module					
FX5-C16EYT/D	Supplied from CPU module	—	—	16 points	Transistor/sink
FX5-C16EYT/DSS					Transistor/source
FX5-C32EYT/D		—	—	32 points	Transistor/sink
FX5-C32EYT/DSS					Transistor/source
◆Input/output module					
FX5-C32ET/D	Supplied from CPU module	16 points	24 V DC sink	16 points	Transistor/sink
FX5-C32ET/DSS			24 V DC sink/source		Transistor/source

Expansion boards & Expansion adapter

Model	Specification
FX5-232-BD	For RS-232C communication
FX5-485-BD	For RS-485 communication
FX5-422-BD-GOT	For GOT connection RS-422 communication
FX5-232ADP	For RS-232C communication
FX5-485ADP	For RS-485 communication
FX5-4AD-ADP	4 ch analog input adapter
FX5-4DA-ADP	4 ch analog output adapter

FX5 extension power supply module, bus conversion module, connector conversion module

FX5-1PSU-5V	FX5U extension power supply
FX5-C1PS-5V	FX5UC extension power supply
FX5-CNV-BUS	Bus conversion FX5 (extension cable type)→FX3
FX5-CNV-BUSC	Bus conversion FX5 (extension connector type)→FX3
FX5-CNV-IF	Connector conversion FX5 (extension cable type)→FX5 (extension connector type)
FX5-CNV-IFC	Connector conversion FX5 (extension connector type)→FX5 (extension cable type)

FX5 intelligent function module

FX5-40SSC-S	Simple motion 4-axis control
FX5-CCLIEF	Intelligent device station for CC-Link IE Field network

FX3 extension power supply module

FX3U-1PSU-5V	FX3 extension power supply

FX3 intelligent function module

FX3U-4AD	4 ch analog input
FX3U-4DA	4 ch analog output
FX3U-4LC	4 ch temperature control
FX3U-1PG	Positioning pulse output 200 kpps
FX3U-2HC	2 ch 200 kHz high-speed counter
FX3U-16CCL-M	Master for CC-Link V2
FX3U-64CCL	Interface for CC-Link V2
FX3U-128ASL-M	Master for AnyWireASLINK

Software package

Type	Model	Specification
MELSOFT iQ Works (DVD-ROM)	SW2DND-IQWK-E*1	FA engineering software (English)*2
MELSOFT GX Works3 (DVD-ROM)	SW1DND-GXW3-E	PLC engineering software*2 ((English) includes GX Works2, GX Developer)

*1: Purchase the upgraded version separately if your software is the conventional model (SW1DND-IQWK-E). Contact our sales section.
*2: For the models corresponding to software, refer to manuals of each product.

Communication cable

Model		Specification
FX-232CAB-1	3 m	9-pin D-sub (female)⇔9-pin D-sub (female) (for DOS/V, etc.)

Input/output cable

FX-16E-150CAB	1.5 m	For connection between terminal module and FX5 PLC (Flat cable with connectors at both ends)
FX-16E-300CAB	3.0 m	
FX-16E-500CAB	5.0 m	
FX-16E-500CAB-S	5.0 m	Loose wire with connector on one end
FX-16E-150CAB-R	1.5 m	For connection between terminal module and FX5 PLC (Multi-core round cable with connectors at both ends)
FX-16E-300CAB-R	3.0 m	
FX-16E-500CAB-R	5.0 m	

Input/output connector

Model	Specification
FX2C-I/O-CON	20-pin connector and 10 pressure connectors for flat cable
FX2C-I/O-CON-S	20-pin connector and 5 sets of housing for loose wire and crimp contact (for 0.3 mm²)
FX2C-I/O-CON-SA	20-pin connector and 5 sets of housing for loose wire and crimp contact (for 0.5 mm²)
FX-I/O-CON2-S	40-pin connector, 2 sets of loose wire, AWG22 (0.3 mm²)
FX-I/O-CON2-SA	40-pin connector, 2 sets of loose wire, AWG20 (0.5 mm²)

Terminal module

FX-16E-TB	16 input or output points
FX-32E-TB	32 input or output points
FX-16E-TB/UL	16 input or output points
FX-32E-TB/UL	32 input or output points
FX-16EYR-TB	16 relay output points 2 A/1 point (8 A/4 points)
FX-16EYS-TB	16 triac output points, 0.3 A/1 point (0.8 A/4 points)
FX-16EYT-TB	16 transistor output points, 0.5 A/1 point (0.8 A/4 points) (sink output)
FX-16EYR-ES-TB/UL	16 relay output points 2 A/1 point (8 A/4 points)
FX-16EYS-ES-TB/UL	16 triac output points, 0.3 A/1 point (0.8 A/4 points)
FX-16EYT-ES-TB/UL	16 transistor output points, 0.5 A/1 point (0.8 A/4 points) (sink output)
FX-16EYT-ESS-TB/UL	16 transistor output points, 0.5 A/1 point (0.8 A/4 points) (source output)

Power cable

FX2NC-100MPCB	FX5UC CPU module, for 24 V DC power supply
FX2NC-100BPCB	Extension module (extension connector type), for 24 V DC input power supply
FX2NC-10BPCB1	Extension module (extension connector type), for 24 V DC input power supply connection wiring

Extended cable/connector conversion adapter

FX5-30EC	30 cm	For the extension of FX5 extension module
FX5-65EC	65 cm	
FX5-CNV-BC	For the connection between an extended extension cable and an FX5 input/output module (extension cable type), a high-speed pulse input/output module, or an FX5 intelligent function module	

SD memory card & battery

NZ1MEM-2GBSD	SD memory card (2 GB)
NZ1MEM-4GBSD	SDHC memory card (4 GB)
FX3U-32BL	Battery

MELSEC-Q Series

●CPU module

Type		Model	Outline
High-speed Universal model QCPU		Q03UDVCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 30K steps, basic operation processing speed (LD instruction): 1.9 ns, program memory capacity: 120 KB, peripheral connection ports: USB, Ethernet (Predefined protocol support function), memory card I/F: SD memory card and extended SRAM cassette
		Q04UDVCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 40K steps, basic operation processing speed (LD instruction): 1.9 ns, program memory capacity: 160 KB, peripheral connection ports: USB, Ethernet (Predefined protocol support function), memory card I/F: SD memory card and extended SRAM cassette
		Q06UDVCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 60K steps, basic operation processing speed (LD instruction): 1.9 ns, program memory capacity: 240 KB, peripheral connection ports: USB, Ethernet (Predefined protocol support function), memory card I/F: SD memory card and extended SRAM cassette
		Q13UDVCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 130K steps, basic operation processing speed (LD instruction): 1.9 ns, program memory capacity: 520 KB, peripheral connection ports: USB, Ethernet (Predefined protocol support function), memory card I/F: SD memory card and extended SRAM cassette
		Q26UDVCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 260K steps, basic operation processing speed (LD instruction): 1.9 ns, program memory capacity: 1040 KB, peripheral connection ports: USB, Ethernet (Predefined protocol support function), memory card I/F: SD memory card and extended SRAM cassette
Universal model QCPU		Q00UJCPU	No. of I/O points: 256 points, no. of I/O device points: 8192 points, program capacity: 10K steps, basic operation processing speed (LD instruction): 120 ns, program memory capacity: 40 KB, peripheral connection ports: USB and RS-232, no memory card I/F, 5-slot base, with 100…240 V AC input/5 V DC/3 A output power supply
		Q00UCPU	No. of I/O points: 1024 points, no. of I/O device points: 8192 points, program capacity: 10K steps, basic operation processing speed (LD instruction): 80 ns, program memory capacity: 40 KB, peripheral connection ports: USB and RS-232, no memory card I/F
		Q01UCPU	No. of I/O points: 1024 points, no. of I/O device points: 8192 points, program capacity: 15K steps, basic operation processing speed (LD instruction): 60 ns, program memory capacity: 60 KB, peripheral connection ports: USB and RS-232, no memory card I/F
		Q02UCPU	No. of I/O points: 2048 points, no. of I/O device points: 8192 points, program capacity: 20K steps, basic operation processing speed (LD instruction): 40 ns, program memory capacity: 80 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q03UDCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 30K steps, basic operation processing speed (LD instruction): 20 ns, program memory capacity: 120 KB, multiple CPU high-speed communication, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q04UDHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 40K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 160 KB, multiple CPU high-speed communication, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q06UDHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 60K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 240 KB, multiple CPU high-speed communication, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q10UDHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 100K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 400 KB, multiple CPU high-speed communication, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q13UDHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 130K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 520 KB, multiple CPU high-speed communication, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q20UDHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 200K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 800 KB, multiple CPU high-speed communication, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q26UDHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 260K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 1040 KB, multiple CPU high-speed communication, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
	Built-in Ethernet type	Q03UDECPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 30K steps, basic operation processing speed (LD instruction): 20 ns, program memory capacity: 120 KB, multiple CPU high-speed communication, peripheral connection ports: USB and Ethernet, memory card IF: SRAM card, FLASH card, and ATA card
		Q04UDEHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 40K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 160 KB, multiple CPU high-speed communication, peripheral connection ports: USB and Ethernet, memory card IF: SRAM card, FLASH card, and ATA card
		Q06UDEHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 60K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 240 KB, multiple CPU high-speed communication, peripheral connection ports: USB and Ethernet, memory card IF: SRAM card, FLASH card, and ATA card
		Q10UDEHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 100K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 400 KB, multiple CPU high-speed communication, peripheral connection ports: USB and Ethernet, memory card IF: SRAM card, FLASH card, and ATA card
		Q13UDEHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 130K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 520 KB, multiple CPU high-speed communication, peripheral connection ports: USB and Ethernet, memory card IF: SRAM card, FLASH card, and ATA card
		Q20UDEHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 200K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 800 KB, multiple CPU high-speed communication, peripheral connection ports: USB and Ethernet, memory card IF: SRAM card, FLASH card, and ATA card
		Q26UDEHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 260K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 1040 KB, multiple CPU high-speed communication, peripheral connection ports: USB and Ethernet, memory card IF: SRAM card, FLASH card, and ATA card
		Q50UDEHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 500K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 2000 KB, multiple CPU high-speed communication, peripheral connection ports: USB and Ethernet, memory card IF: SRAM card, FLASH card, and ATA card
		Q100UDEHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 1000K steps, basic operation processing speed (LD instruction): 9.5 ns, program memory capacity: 4000 KB, multiple CPU high-speed communication, peripheral connection ports: USB and Ethernet, memory card IF: SRAM card, FLASH card, and ATA card

●CPU module

Type		Model	Outline
Basic model QCPU		Q00JCPU	No. of I/O points: 256 points, no. of I/O device points: 2048 points, program capacity: 8K steps, basic operation processing speed (LD instruction): 200 ns, program memory capacity: 58 KB, peripheral connection ports: RS-232, no memory card I/F, 5-slot base, with 100…240 V AC input/5 V DC/3 A output power supply
		Q00CPU	No. of I/O points: 1024 points, no. of I/O device points: 2048 points, program capacity: 8K steps, basic operation processing speed (LD instruction): 160 ns, program memory capacity: 94 KB, peripheral connection ports: RS-232, no memory card I/F
		Q01CPU	No. of I/O points: 1024 points, no. of I/O device points: 2048 points, program capacity: 14K steps, basic operation processing speed (LD instruction): 100 ns, program memory capacity: 94 KB, peripheral connection ports: RS-232, no memory card I/F
High Performance model QCPU		Q02CPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 28K steps, basic operation processing speed (LD instruction): 79 ns, program memory capacity: 112 KB, peripheral connection ports: RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q02HCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 28K steps, basic operation processing speed (LD instruction): 34 ns, program memory capacity: 112 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q06HCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 60K steps, basic operation processing speed (LD instruction): 34 ns, program memory capacity: 240 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q12HCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 124K steps, basic operation processing speed (LD instruction): 34 ns, program memory capacity: 496 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q25HCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 252K steps, basic operation processing speed (LD instruction): 34 ns, program memory capacity: 1008 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
Process CPU		Q02PHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 28K steps, basic operation processing speed (LD instruction): 34 ns, program memory capacity: 112 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q06PHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 60K steps, basic operation processing speed (LD instruction): 34 ns, program memory capacity: 240 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q12PHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 124K steps, basic operation processing speed (LD instruction): 34 ns, program memory capacity: 496 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q25PHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 252K steps, basic operation processing speed (LD instruction): 34 ns, program memory capacity: 1008 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
Redundant CPU		Q12PRHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 124K steps, basic operation processing speed (LD instruction): 34 ns, program memory capacity: 496 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
		Q25PRHCPU	No. of I/O points: 4096 points, no. of I/O device points: 8192 points, program capacity: 252K steps, basic operation processing speed (LD instruction): 34 ns, program memory capacity: 1008 KB, peripheral connection ports: USB and RS-232, memory card IF: SRAM card, FLASH card, and ATA card
	Tracking cable	QC10TR	Tracking cable 1 m
		QC30TR	Tracking cable 3 m
C Controller CPU		Q24DHCCPU-V	No. of I/O points: 4096 points, endian format: little endian, removable storage: SD memory card, OS: VxWorks® Version 6.8.1
		Q24DHCCPU-LS	No. of I/O points: 4096 points, endian format: little endian, removable storage: SD memory card, OS: No pre-installed operating system (Operating system installed by user)
		Q12DCCPU-V	No. of I/O points: 4096 points, endian format: little endian, removable storage: CompactFlash card, OS: VxWorks® Version 6.4
		Q06CCPU-V	No. of I/O points: 4096 points, endian format: little endian, removable storage: CompactFlash card, OS: VxWorks® Version 5.4
	Bundled product	Q24DHCCPU-V-B019	C Controller (Q24DHCCPU-V) bundled with CIMSNIPER Q24 E, data collection package for EES/FDC/APC (equipped with Simple MES functionality)
		Q24DHCCPU-V-B01D	C Controller (Q24DHCCPU-V) bundled with DNA Designer Q24 E, model based development support tool
		Q24DHCCPU-VG-B000	C Controller (Q24DHCCPU-VG) bundled with GENWARE®3-VG Runtime License Version, runtime library is pre-installed
		Q24DHCCPU-VG-B002	C Controller (Q24DHCCPU-VG) bundled with GENWARE®3-VG Tool License Version, GUI development environment (CI SKETCH-E) is bundled into the Runtime License version
		Q24DHCCPU-LS-B030	C Controller (Q24DHCCPU-LS) bundled with Lineo uLinux and uLinux Station, web-based application that enables basic Linux system configuration
		Q12DCCPU-V-B011	C Controller (Q12DCCPU-V) bundled with CIMOPERATOR® SECS+ for ADVANCED E, supports SECS-I (SEMI E4), HSMS (SEMI E37)
		Q12DCCPU-V-B013	C Controller (Q12DCCPU-V) bundled with CIMOPERATOR® SECS+ for GEM ADVANCED E, middle kit version that supports GEM (E30) (does not support Trace data collection, Limit monitoring, Document file output)
		Q12DCCPU-V-B015	C Controller (Q12DCCPU-V) bundled with CIMOPERATOR® SECS+ for GEM ADVANCED (Option Pack) E, full kit version that supports GEM (E30) (supports Trace data collection, Limit monitoring, Document file output)
		Q12DCCPU-V-B019	C Controller (Q12DCCPU-V) bundled with CIMSNIPER E, data collection package for EES/FDC/APC (equipped with Simple MES functionality)
		Q12DCCPU-V-B01B	C Controller (Q12DCCPU-V) bundled with CIMSNIPER Light E, data collection package for EES/FDC/APC (not equipped with Simple MES functionality)
		Q12DCCPU-V-B01D	C Controller (Q12DCCPU-V) bundled with DNA Designer E, model based development support tool
	Cable	Q12DCCPU-CBL*1*2*3	RS-232 connection converter cable (custom mini-DIN to 9-pin D-sub connector)

*1: For use with Q24DHCCPU-V, Q24DHCCPU-VG.
*2: For use with Q24DHCCPU-LS.
*3: For use with Q12DCCPU-V.

●CPU module

Type	Model	Outline
Battery	Q6BAT	Replacement battery
	Q7BAT	Replacement large-capacity battery
	Q7BAT-SET	Large-capacity battery with holder for installing CPU
	Q8BAT	Replacement large-capacity battery module
	Q8BAT-SET	Large-capacity battery module with CPU connection cable
Extended SRAM cassette	Q4MCA-1MBS*1	Extended SRAM cassette, capacity: 1 MB
	Q4MCA-2MBS*1	Extended SRAM cassette, capacity: 2 MB
	Q4MCA-4MBS*1	Extended SRAM cassette, capacity: 4 MB
	Q4MCA-8MBS*1	Extended SRAM cassette, capacity: 8 MB
SD memory card	NZ1MEM-2GBSD*1*2*3*4	SD memory card, capacity: 2 GB
	NZ1MEM-4GBSD*1*2*3*4	SDHC memory card, capacity: 4 GB
	NZ1MEM-8GBSD*1*2*3*4	SDHC memory card, capacity: 8 GB
	NZ1MEM-16GBSD*1*2*3*4	SDHC memory card, capacity: 16 GB
Memory card	Q2MEM-1MBS*5	SRAM memory card, capacity: 1 MB
	Q2MEM-2MBS*5	SRAM memory card, capacity: 2 MB
	Q3MEM-4MBS*5	SRAM memory card, capacity: 4 MB
	Q3MEM-4MBS-SET*5	SRAM memory card with cover, capacity: 4 MB
	Q3MEM-8MBS*6	SRAM memory card, capacity: 8 MB
	Q3MEM-8MBS-SET*6	SRAM memory card with cover, capacity: 8 MB
	Q3MEM-CV	Memory card protective cover for the Universal model QCPU (comes with Q3MEM-4MBS-SET/Q3MEM-8MBS-SET)
	Q3MEM-CV-H	Memory card protective cover for the High Performance model, Process, and Redundant CPUs (comes with Q3MEM-4MBS-SET)
	Q2MEM-8MBA*5	ATA card, capacity: 8 MB, to be discontinued (December 2016)
	Q2MEM-16MBA*5	ATA card, capacity: 16 MB
	Q2MEM-32MBA*5	ATA card, capacity: 32 MB
CompactFlash card	GT05-MEM-128MC*4*7	CompactFlash card, capacity: 128 MB
	GT05-MEM-256MC*4*7	CompactFlash card, capacity: 256 MB
	QD81MEM-512MBC*4*7*8	CompactFlash card, capacity: 512 MB
	QD81MEM-1GBC*4*8	CompactFlash card, capacity: 1 GB
	QD81MEM-2GBC*4*8	CompactFlash card, capacity: 2 GB
	QD81MEM-4GBC*4*8	CompactFlash card, capacity: 4 GB
	QD81MEM-8GBC*4*8	CompactFlash card, capacity: 8 GB
Memory card adapter	Q2MEM-ADP	Adapter for Q2MEM memory card's standard PCMCIA slot
SRAM card battery	Q2MEM-BAT	Replacement battery for Q2MEM-1MBS and Q2MEM-2MBS
	Q3MEM-BAT	Replacement battery for Q3MEM-4MBS and Q3MEM-8MBS
Connection cable	QC30R2	RS-232 cable for connecting PC and CPU, 3 m (between mini-DIN6P and Dsub9P)
Cable disconnection prevention holder	Q6HLD-R2	Holder for preventing RS-232 cable (Programmable Controller CPU connection) disconnection

*1: For use with QnUDVCPU.
*2: For use with Q24DHCCPU-V, Q24DHCCPU-VG.
*3: For use with Q24DHCCPU-LS.
*4: Mitsubishi Electric shall not guarantee the operation of any non-Mitsubishi Electric products.
*5: For use with the Universal model QCPUs (except QnUDV), High Performance model QCPUs, process CPUs, and redundant CPUs that are equipped with the memory card interface.
*6: For use with the Universal model QCPUs (except QnUDV) that are equipped with the memory card interface.
*7: For use with Q06CCPU-V.
*8: For use with Q12DCCPU-V.

Base unit

Type	Model	Outline
Main base	Q33B	3 slots, 1 power supply module required, for Q Series modules
	Q35B	5 slots, 1 power supply module required, for Q Series modules
	Q38B	8 slots, 1 power supply module required, for Q Series modules
	Q312B	12 slots, 1 power supply module required, for Q Series modules
Multiple CPU high speed main base	Q35DB	5 slots, power supply module required, for Q Series modules
	Q38DB	8 slots, 1 power supply module required, for Q Series modules
	Q312DB	12 slots, 1 power supply module required, for Q Series modules
Slim type main base	Q32SB	2 slots, 1 slim type power supply module required, for Q Series modules
	Q33SB	3 slots, 1 slim type power supply module required, for Q Series modules
	Q35SB	5 slots, 1 slim type power supply module required, for Q Series modules
Redundant power main base	Q38RB	8 slots, 2 redundant power supply modules required, for Q Series modules
Extension base	Q63B	3 slots, 1 power supply module required, for Q Series modules
	Q65B	5 slots, 1 power supply module required, for Q Series modules
	Q68B	8 slots, 1 power supply module required, for Q Series modules
	Q612B	12 slots, 1 power supply module required, for Q Series modules
	Q52B	2 slots, power supply module not required, for Q Series modules
	Q55B	5 slots, power supply module not required, for Q Series modules
Redundant power extension base	Q68RB	8 slots, 2 redundant power supply modules required, for Q Series modules
Redundant type extension base	Q65WRB*1	5 slots, 2 redundant power supply modules required, for Q Series modules
Extension cable	QC05B	0.45 m cable for connecting extension base unit
	QC06B	0.6 m cable for connecting extension base unit
	QC12B	1.2 m cable for connecting extension base unit
	QC30B	3 m cable for connecting extension base unit
	QC50B	5 m cable for connecting extension base unit
	QC100B	10 m cable for connecting extension base unit
DIN rail mounting adapter	Q6DIN1	DIN rail mounting adapter for Q38B, Q312B, Q68B, Q612B, Q38RB, Q68RB, Q65WRB, Q38DB, and Q312DB
	Q6DIN2	DIN rail mounting adapter for Q35B, Q65B, Q00JCPU, and Q00UJCPU
	Q6DIN3	DIN rail mounting adapter for Q32SB, Q33SB, Q35SB, Q33B, Q52B, Q55B, and Q63B
	Q6DIN1A	DIN rail mounting adapter (with vibration-proofing bracket set) for Q3□B, Q5□B, Q6□B, Q38RB, Q68RB, and Q65WRB
Blank cover	QG60	Blank cover for I/O slot

*1: Only compatible with redundant CPU system.

Power supply module

Power supply	Q61P	Input voltage: 100…240 V AC, output voltage: 5 V DC, output current: 6 A
	Q62P	Input voltage: 100…240 V AC, output voltage: 5/24 V DC, output current: 3/0.6 A
	Q63P	Input voltage: 24 V DC, output voltage: 5 V DC, output current: 6 A
	Q64PN	Input voltage: 100…240 V AC, output voltage: 5 V DC, output current: 8.5 A
Power supply with life detection	Q61P-D	Input voltage: 100…240 V AC, output voltage: 5 V DC, output current: 6 A
Slim type power supply	Q61SP	Input voltage: 100…240 V AC, output voltage: 5 V DC, output current: 2 A
Redundant power supply	Q63RP	Input voltage: 24 V DC, output voltage: 5 V DC, output current: 8.5 A
	Q64RPN	Input voltage: 100…240 V AC, output voltage: 5 V DC, output current: 8.5 A

●I/O module

Type		Model	Outline
Input	AC	QX10	16 points, 100…120 V AC, response time: 20 ms, 16 points/common, 18-point terminal block
		QX10-TS	16 points, 100…120 V AC, response time: 20 ms, 16 points/common, 18-point spring clamp terminal block
		QX28	8 points, 100…240 V AC, response time: 20 ms, 8 points/common, 18-point terminal block
	DC (Positive common)*1	QX40	16 points, 24 V DC, response time: 1/5/10/20/70 ms, 16 points/common, positive common, 18-point terminal block
		QX40-TS	16 points, 24 V DC, response time: 1/5/10/20/70 ms, 16 points/common, positive common, 18-point spring clamp terminal block
		QX40-S1	16 points, 24 V DC, response time: 0.1/0.2/0.4/0.6/1 ms, 16 points/common, positive common, 18-point terminal block
		QX40H	16 points, 24 V DC, response time: 0/0.1/0.2/0.4/0.6/1 ms, 8 points/common, positive common, 18-point terminal block
		QX41*2 *3	32 points, 24 V DC, response time: 1/5/10/20/70 ms, 32 points/common, positive common, 40-pin connector
		QX41-S1*2	32 points, 24 V DC, response time: 0.1/0.2/0.4/0.6/1 ms, 32 points/common, positive common, 40-pin connector
		QX41-S2*2 *3	32 points, 24 V DC, response time: 1/5/10/20/70 ms, 32 points/common, positive common, 40-pin connector
		QX42*2	64 points, 24 V DC, response time: 1/5/10/20/70 ms, 32 points/common, positive common, 40-pin connector
		QX42-S1*2	64 points, 24 V DC, response time: 0.1/0.2/0.4/0.6/1 ms, 32 points/common, positive common, 40-pin connector
	AC/DC	QX50	16 points, 48 V AC/DC, response time: 20 ms, 16 points/common, positive/negative common, 18-point terminal block
	DC sensor	QX70	16 points, 5/12 V DC, response time: 1/5/10/20/70 ms, 16 points/common, positive/negative common, 18-point terminal block
		QX70H	16 points, 5 V DC, response time: 0/0.1/0.2/0.4/0.6/1 ms, 8 points/common, positive common, 18-point terminal block
		QX71*2	32 points, 5/12 V DC, response time: 1/5/10/20/70 ms, 32 points/common, positive/negative common, 40-pin connector
		QX72*2	64 points, 5/12 V DC, response time: 1/5/10/20/70 ms, 32 points/common, positive/negative common, 40-pin connector
	DC (Negative common) *1	QX80	16 points, 24 V DC, response time: 1/5/10/20/70 ms, 16 points/common, negative common, 18-point terminal block
		QX80-TS	16 points, 24 V DC, response time: 1/5/10/20/70 ms, 16 points/common, negative common, 18-point spring clamp terminal block
		QX80H	16 points, 24 V DC, response time: 0/0.1/0.2/0.4/0.6/1 ms, 8 points/common, negative common, 18-point terminal block
		QX81*3 *4	32 points, 24 V DC, response time: 1/5/10/20/70 ms, 32 points/common, negative common, 37-pin D-sub connector
		QX81-S2*3 *4	32 points, 24 V DC, response time: 1/5/10/20/70 ms, 32 points/common, negative common, 37-pin D-sub connector
		QX82*2	64 points, 24 V DC, response time: 1/5/10/20/70 ms, 32 points/common, negative common, 40-pin connector
		QX82-S1*2	64 points, 24 V DC, response time: 0.1/0.2/0.4/0.6/1 ms, 32 points/common, negative common, 40-pin connector
		QX90H	16 points, 5 V DC, response time: 0/0.1/0.2/0.4/0.6/1 ms, 8 points/common, negative common, 18-point terminal block
Output	Relay	QY10	16 points, 24 V DC/240 V AC, 2 A/point, 8 A/common, response time: 12 ms, 16 points/common, 18-point terminal block
		QY10-TS	16 points, 24 V DC/240 V AC, 2 A/point, 8 A/common, response time: 12 ms, 16 points/common, 18-point spring clamp terminal block
		QY18A	8 points, 24 V DC/240 V AC, 2 A/point, response time: 12 ms, 18-point terminal block, all points independent
	Triac	QY22	16 points, 100…240 V AC, 0.6 A/point, 4.8 A/common, response time: 1 ms + 0.5 cycle, 16 points/common, 18-point terminal block, with surge suppression
	Transistor (Sink)	QY40P	16 points, 12…24 V DC, 0.1 A/point, 1.6 A/common, response time: 1 ms, 16 points/common, sink type, 18-point terminal block, overload protection function, overheat protection function, surge suppression
		QY40P-TS	16 points, 12…24 V DC, 0.1 A/point, 1.6 A/common, response time: 1 ms, 16 points/common, sink type, 18-point spring clamp terminal block, overload protection function, overheat protection function, surge suppression
		QY41H	32 points, 5…24 V DC, 0.2 A/point, 2 A/common, response time: 2 us, 32 points/common, sink type, 40-pin connector, with surge suppression
		QY41P*2	32 points, 12…24 V DC, 0.1 A/point, 2 A/common, response time: 1 ms, 32 points/common, sink type, 40-pin connector, overload protection function, overheat protection function, surge suppression
		QY42P*2	64 points, 12…24 V DC, 0.1 A/point, 2 A/common, response time: 1 ms, 32 points/common, sink type, 40-pin connector, overload protection function, overheat protection function, surge suppression
		QY50	16 points, 12…24 V DC, 0.5 A/point, 4 A/common, response time: 1 ms, 16 points/common, sink type, 18-point terminal block, with surge suppression and fuse
	Transistor (Independent)	QY68A	8 points, 5…24 V DC, 2 A/point, 8 A/module, response time: 10 ms, sink/source type, 18-point terminal block, with surge suppression, all points independent
	TTL CMOS	QY70	16 points, 5…12 V DC, 16 mA/point, 256 mA/common, response time: 0.5 ms, 16 points/common, sink type, 18-point terminal block, with fuse
		QY71*2	32 points, 5…12 V DC, 16 mA/point, 512 mA/common, response time: 0.5 ms, 32 points/common, sink type, 40-pin connector, with fuse
	Transistor (Source)	QY80	16 points, 12…24 V DC, 0.5 A/point, 4 A/common, response time: 1 ms, 16 points/common, source type, 18-point terminal block, with surge suppression and fuse
		QY80-TS	16 points, 12…24 V DC, 0.5 A/point, 4 A/common, response time: 1 ms, 16 points/common, source type, 18-point spring clamp terminal block, with surge suppression and fuse
		QY81P*4	32 points, 12…24 V DC, 0.1 A/point, 2 A/common, response time: 1 ms, 32 points/common, source type, 37-pin D-sub connector, overload protection function, overheat protection function, surge suppression
		QY82P*2	64 points, 12…24 V DC, 0.1 A/point, 2 A/common, response time: 1 ms, 32 points/common, source type, 40-pin connector, overload protection function, overheat protection function, surge suppression
I/O	DC input/ transistor output	QH42P*2 *5	Input: 32 points, 24 V DC, response time: 1/5/10/20/70 ms, 32 points/common, positive common, output: 32 points, 12…24 V DC, 0.1 A/point, 2 A/common, response time: 1 ms, 32 points/common, sink type, 40-pin connector, overload protection function, overheat protection function, surge suppression
		QX48Y57	Input: 8 points, 24 V DC, response time: 1/5/10/20/70 ms, 8 points/common, positive common, output: 7 points, 12…24 V DC, 0.5 A/point, 2 A/common, response time: 1 ms, 7 points/common, sink type, 18-point terminal block, with surge suppression and fuse
		QX41Y41P*2 *5	Input: 32 points, 24 V DC, response time: 1/5/10/20/70 ms, 32 points/common, positive common, output: 32 points, 12…24 V DC, 0.1 A/point, 2 A/common, response time: 1 ms, 32 points/common, sink type, 40-pin connector, overload protection function, overheat protection function, surge suppression
Interrupt module		QI60	16 points, 24 V DC, response time: 0.1/0.2/0.4/0.6/1 ms, 16 points/common, 18-point terminal block
Connector		A6CON1	32-point connector soldering type (40-pin connector)
		A6CON2	32-point connector crimp-contact type (40-pin connector)
		A6CON3	32-point connector pressure-displacement (flat cable) type (40-pin connector)
		A6CON4	32-point connector soldering type (40-pin connector, cable connectable in bidirection)
		A6CON1E	32-point connector soldering type (37-pin D-sub connector)
		A6CON2E	32-point connector crimp-contact type (37-pin D-sub connector)
		A6CON3E	32-point connector pressure-displacement (flat cable) type (37-pin D-sub connector)

●I/O module

Type		Model	Outline
Spring clamp terminal block		Q6TE-18SN	For 16-point I/O modules, 0.3…1.5 mm² (22…16 AWG)
Terminal block adapter		Q6TA32	For 32-point I/O modules, 0.5 mm² (20 AWG)
		Q6TA32-TOL	Q6TA32 dedicated tool
Connector/terminal block conversion module		A6TBXY36	For positive common input modules and sink output modules (standard type)
		A6TBXY54	For positive common input modules and sink output modules (2-wire type)
		A6TBX70	For positive common input modules (3-wire type)
		A6TBX36-E	For negative common input modules (standard type)
		A6TBX54-E	For negative common input modules (2-wire type)
		A6TBX70-E	For negative common input modules (3-wire type)
		A6TBY36-E	For source output modules (standard type)
		A6TBY54-E	For source output modules (2-wire type)
	Cable	AC05TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 0.5 m
		AC10TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 1 m
		AC20TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 2 m
		AC30TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 3 m
		AC50TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 5 m
		AC80TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 8 m *Common current 0.5 A or lower
		AC100TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 10 m *Common current 0.5 A or lower
		AC05TB-E	For A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, and A6TBX70-E (negative common/source type), 0.5 m
		AC10TB-E	For A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, and A6TBX70-E (negative common/source type), 1 m
		AC20TB-E	For A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, and A6TBX70-E (negative common/source type), 2 m
		AC30TB-E	For A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, and A6TBX70-E (negative common/source type), 3 m
		AC50TB-E	For A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, and A6TBX70-E (negative common/source type), 5 m
Relay terminal module		A6TE2-16SRN	For 40-pin connector 24 V DC transistor output modules (sink type)
	Cable	AC06TE	For A6TE2-16SRN, 0.6 m
		AC10TE	For A6TE2-16SRN, 1 m
		AC30TE	For A6TE2-16SRN, 3 m
		AC50TE	For A6TE2-16SRN, 5 m
		AC100TE	For A6TE2-16SRN, 10 m

*1: "Positive common" indicates that the positive lead of a DC power supply must be connected to the common terminal.
Accordingly, "Negative common" indicates that the negative lead must be connected to the common terminal.
*2: Connector is not provided. Separately order one of the following: A6CON1/A6CON2/A6CON3/A6CON4.
*3: The rated input currents are different. [QX41: approx. 4 mA, QX41-S2: approx. 6 mA, QX81: approx. 4 mA, QX81-S2: approx. 6 mA]
*4: Connector is not provided. Separately order one of the following: A6CON1E/A6CON2E/A6CON3E.
*5: The number of occupied input/output points is different. [QH42P: 32 points; QX41Y41P: 64 points (first 32 points: input/second 32 points: output)]

●Analog I/O module

Type		Model	Outline
Analog input	Voltage input	Q68ADV	8 channels, input: -10…10 V DC, output (resolution): 0…4000, -4000…4000, 0…12000, -12000…12000, 0…16000, -16000…16000, conversion speed: 80 μs/channel, 18-point terminal block
	Current input	Q62AD-DGH	2 channels; input, 4…20 mA DC, output (resolution): 0…32000, 0…64000, conversion speed: 10 ms/2 channels, 18-point terminal block, channel isolated, supplies power to 2-wire transmitter
		Q66AD-DG*1	6 channels, input: 4…20 mA DC (when 2-wire transmitter is connected), 0…20 mA DC, output (resolution): 0…4000, 0…12000, conversion speed: 10 ms/channel, 40-pin connector, channel isolated, supplies power to 2-wire transmitter
		Q68ADI	8 channels, input: 0…20 mA DC, output (resolution): 0…4000, -4000…4000, 0…12000, -12000…12000, 0…16000, -16000…16000 conversion speed: 80 μs/channel, 18-point terminal block
	Voltage/current input	Q64AD	4 channels; input -10…10 V DC, 0…20 mA DC, output (resolution): 0…4000, -4000…4000, 0…12000, -12000…12000, 0…16000, -16000…16000, conversion speed: 80 μs/channel, 18-point terminal block
		Q64ADH	4 channels; input -10…10 V DC, 0…20 mA DC, output (resolution): 0…20000, -20000…20000, -5000…22500, conversion speed: 20 μs/channel, 18-point terminal block
		Q64AD-GH	4 channels, input: -10…10 V DC, 0…20 mA DC, output (resolution): 0…32000, -32000…32000, 0…64000, -64000…64000, conversion speed: 10 ms/4 channels, 18-point terminal block, channel isolated
		Q68AD-G*1	8 channels, input: -10…10 V DC, 0…20 mA DC, output (resolution): 0…4000, -4000…4000, 0…12000, -12000…12000, 0…16000, -16000…16000, conversion speed: 10 ms/channel, 40-pin connector, channel isolated
Analog output	Voltage output	Q68DAVN	8 channels, input (resolution): 0…4000, -4000…4000, 0…12000, -12000…12000, -16000…16000, output: -10…10 V DC, conversion speed: 80 μs/channel, 18-point terminal block
	Current output	Q68DAIN	8 channels, input (resolution): 0…4000, -4000…4000, 0…12000, -12000…12000; output: 0…20 mA DC, conversion speed: 80 μs/channel, 18-point terminal block
	Voltage/current output	Q64DAH	4 channels, input (resolution): 0…20000, -20000…20000 output: -10…10 V DC, 0…20 mA DC, conversion speed: 20 μs/channel, 18-point terminal block
		Q62DAN	2 channels, input (resolution): 0…4000, -4000…4000, 0…12000, -12000…12000, -16000…16000, output: -10…10 V DC, 0…20 mA DC, conversion speed: 80 μs/channel, 18-point terminal block
		Q62DA-FG	2 channels, input (resolution): 0…12000, -12000…12000, -16000…16000, output: -12…12 V DC, 0…22 mA DC, conversion speed: 10 ms/2 channels, 18-point terminal block, channel isolated
		Q64DAN	4 channels, input (resolution): 0…4000, -4000…4000, 0…12000, -12000…12000, -16000…16000, output: -10…10 V DC, 0…20 mA DC, conversion speed: 80 μs/channel, 18-point terminal block
		Q66DA-G*1	6 channels, input (resolution): 0…4000, -4000…4000, 0…12000, -12000…12000, -16000…16000, output: -12…12 V DC, 0…22 mA DC, conversion speed: 6 ms/channel, 40-pin connector, channel isolated
Analog input/ output	Voltage and current input/ output	Q64AD2DA	Input: 4 channels, input: -10…10 V DC, 0…20 mA DC » output (resolution): 0…4000, -4000…4000, 0…12000, 0…16000, -16000…16000 » conversion speed: 500 μs/channel output: 2 channels input (resolution): 0…4000, -4000…4000, 0…12000, -16000…16000 » output: -10…10 V DC, 0…20 mA DC » conversion speed: 500 μs/channel 18-point terminal block
Load cell input		Q61LD	1 channel, input (load cell output): 0.0…3.3 mV/V, output (resolution): 0…10000, conversion speed: 10 ms, 18-point terminal block
CT input module		Q68CT	8 channels, input: CT 0…5 A AC, 0…50 A AC, 0…100 A AC, 0…200 A AC, 0…400 A AC, 0…600 A AC, output: 0…10000, 18-point terminal block
Temperature input	Thermocouple	Q64TD	4 channels, thermocouple (B, R, S, K, E, J, T, N), disconnection detection function, conversion speed: 40 ms/channel, channel isolated, 18-point terminal block
		Q64TDV-GH	4 channels, thermocouple (B, R, S, K, E, J, T, N), disconnection detection function, conversion speed: sampling cycle × 3, sampling cycle: 20 ms/channel, channel isolated, 18-point terminal block
		Q68TD-G-H01*1*2	8 channels, thermocouple (B, R, S, K, E, J, T, N), disconnection detection function, conversion speed: 320 ms/8 channels, channel isolated, 40-pin connector
		Q68TD-G-H02*1	8 channels, thermocouple (B, R, S, K, E, J, T, N), disconnection detection function, conversion speed: 640 ms/8 channels, channel isolated, 40-pin connector
	RTD	Q64RD	4 channels, platinum RTD (Pt100, JPt100), disconnection detection function, conversion speed: 40 ms/channel, 18-point terminal block
		Q64RD-G	4 channels, platinum RTD (Pt100, JPt100), nickel RTD (Ni100), disconnection detection function, conversion speed: 40 ms/channel, channel isolated, 18-point terminal block
		Q68RD3-G*1	8 channels, platinum RTD (Pt100, JPt100), nickel RTD (Ni100), disconnection detection function, conversion speed: 320 ms/8 channels, channel isolated, 40-pin connector
Temperature control	Thermocouple	Q64TCTTN	4 channels, thermocouple (K, J, T, B, S, E, R, N, U, L, PLⅡ, W5Re/W26Re), heating control/cooling control/heating-cooling control, sampling cycle: 500 ms/4 channels, channel isolated, 18-point terminal block
		Q64TCTTBWN	4 channels, thermocouple (K, J, T, B, S, E, R, N, U, L, PLⅡ, W5Re/W26Re), heating control/cooling control/heating-cooling control, heater disconnection detection function, sampling cycle: 500 ms/4 channels, channel isolated, two 18-point terminal blocks
	RTD	Q64TCRTN	4 channels, platinum RTD (Pt100, JPt100), heating control/cooling control/heating-cooling control, sampling cycle: 500 ms/4 channels, channel isolated, 18-point terminal block
		Q64TCRTBWN	4 channels, platinum RTD (Pt100, JPt100), heating control/cooling control/heating-cooling control, heater disconnection detection function, sampling cycle: 500 ms/4 channels, channel isolated, two 18-point terminal blocks
Loop control		Q62HLC	2 channels, input: thermocouple/micro voltage/voltage/current, conversion speed (input): 25 ms/2 channels, sampling cycle: 25 ms/2 channels, output: 4…20 mA DC, conversion speed (output): 25 ms/2 channels, 18-point terminal block, with 5 PID control modes

*1: A connector is not provided. The A6CON4 connector must be ordered separately.
*2: Depending on the combination of power source module and base unit, the installable slot position may be limited.

●Simple motion and Positioning module

Type		Model	Outline
Simple motion	With SSCNET Ⅲ/H connectivity	QD77MS2*1	2-axes, 2-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, 40-pin connector, with SSCNET Ⅲ/H connectivity
		QD77MS4*1	4-axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, 40-pin connector, with SSCNET Ⅲ/H connectivity
		QD77MS16*1	16-axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, 40-pin connector, with SSCNET Ⅲ/H connectivity
	With CC-Link IE Field Network connectivity	QD77GF16*2	16-axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, 26-pin connector, with CC-Link IE Field Network connectivity
Positioning	Open collector output	QD75P1N*1	1-axis, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 200 kpps, 40-pin connector
		QD75P1*1	1-axis, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 200 kpps, 40-pin connector
		QD75P2N*1	2-axes, 2-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 200 kpps, 40-pin connector
		QD75P2*1	2-axes, 2-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 200 kpps, 40-pin connector
		QD75P4N*1	4-axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 200 kpps, 40-pin connector
		QD75P4*1	4-axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 200 kpps, 40-pin connector
		QD70P4*1	4-axes, control unit: pulse, no. of positioning data: 10/axis, max. output pulse: 200 kpps, 40-pin connector
		QD70P8*1	8-axes, control unit: pulse, no. of positioning data: 10/axis, max. output pulse: 200 kpps, 40-pin connector
	Differential output	QD75D1N*1	1-axis, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 4 Mpps, 40-pin connector
		QD75D1*1	1-axis, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 1 Mpps, 40-pin connector
		QD75D2N*1	2-axes, 2-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 4 Mpps, 40-pin connector
		QD75D2*1	2-axes, 2-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 1 Mpps, 40-pin connector
		QD75D4N*1	4-axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 4 Mpps, 40-pin connector
		QD75D4*1	4-axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, max. output pulse: 1 Mpps, 40-pin connector
		QD70D4*1	4-axes, control unit: pulse, no. of positioning data: 10/axis, max. output pulse: 4 Mpps, 40-pin connector
		QD70D8*1	8-axes, control unit: pulse, no. of positioning data: 10/axis, max. output pulse: 4 Mpps, 40-pin connector
	With SSCNET connectivity	QD75M1*3	1-axis, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, 40-pin connector, with SSCNET connectivity
		QD75M2*3	2-axes, 2-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, 40-pin connector, with SSCNET connectivity
		QD75M4*3	4-axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, 40-pin connector, with SSCNET connectivity
	With SSCNET Ⅲ connectivity	QD75MH1*3	1-axis, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, 40-pin connector, with SSCNET Ⅲ connectivity
		QD75MH2*3	2-axes, 2-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, 40-pin connector, with SSCNET Ⅲ connectivity
		QD75MH4*3	4-axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, control unit: mm, inch, degree, pulse, no. of positioning data: 600/axis, 40-pin connector, with SSCNET Ⅲ connectivity
		QD74MH8	8-axes, control unit: pulse, no. of positioning data: 32/axis, with SSCNET Ⅲ connectivity
		QD74MH16	16-axes, control unit: pulse, no. of positioning data: 32/axis, with SSCNET Ⅲ connectivity
	Open collector output with built-in counter function	QD72P3C3*1	Positioning: 3-axes, control unit: pulse, no. of positioning data: 1/axis, max. output pulse: 100 kpps, counter: 3 channels, 100 kpps, count input signal: 5/24 V DC, 40-pin connector
High-speed counter		QD62*2	2 channels, 200/100/10 kpps, count input signal: 5/12/24 V DC, external input: 5/12/24 V DC, coincidence output: transistor (sink), 12/24 V DC, 0.5 A/point, 2 A/common, 40-pin connector
		QD62E*2	2 channels, 200/100/10 kpps, count input signal: 5/12/24 V DC, external input: 5/12/24 V DC, coincidence output: transistor (source), 12/24 V DC, 0.1 A/point, 0.4 A/common, 40-pin connector
		QD62D*2	2 channels, 500/200/100/10 kpps, count input signal: EIA standards RS-422-A (differential line driver), external input: 5/12/24 V DC; coincidence output: transistor (sink), 12/24 V DC, 0.5 A/point, 2 A/common, 40-pin connector
		QD63P6*1	6 channels, 200/100/10 kpps, count input signal: 5 V DC, 40-pin connector
		QD64D2*1	2 channels, 4 Mpps, count input signal: EIA standards RS-422-A (differential line driver), external input: 24 V DC, coincidence output: transistor (sink), 12/24 V DC, 0.5 A/point, 2 A/common, 40-pin connector
		QD65PD2*1	2 Channels Differential input: 40 kpps/400 kpps/800 kpps/2 Mpps/4 Mpps/8 Mpps » Count input signal level: EIA Standards RS-422-A, differential line driver level DC Input: 10 kpps/100 kpps/200 kpps » Count input signal level: 5/12/24 V DC, 7…10 mA external outputs: Transistor (sink type) output, 12/24 V DC 0.1 A/point, 0.8 A/common, 40-pin connector
Channel isolated pulse input		QD60P8-G	8 channels, 30 kpps/10 kpps/1 kpps/100 pps/50 pps/10 pps/1 pps/0.1 pps, count input signal: 5/12…24 V DC

*1: A connector is not provided. The A6CON1/A6CON2/A6CON4 connector must be ordered separately.
*2: A connector is not provided. The LD77MHIOCON connector must be ordered separately.
*3: A connector is not provided. The A6CON1/A6CON2/A6CON3/A6CON4 connector must be ordered separately.

Energy measuring module

Type		Model	Outline
Energy measuring		QE81WH*1	Three-phase 3-wire type, Number of measurement circuits: 1 circuit, Measured items: power rate (consumption, regenerative), current, voltage, power, power factor, etc.
		QE84WH*1*2	Three-phase 3-wire type, Number of measurement circuits: 4 circuits, Measured items: power rate (consumption, regenerative), current, voltage, power, power factor, etc.
		QE81WH4W*1*3	Three-phase 4-wire type, Number of measurement circuits: 1 circuit, Measured items: power rate (consumption, regenerative), current, voltage, power, power factor, etc.
		QE83WH4W*1*2*3	Three-phase 4-wire type, Number of measurement circuits: 3 circuits, Measured items: power rate (consumption, regenerative), current, voltage, power, power factor, etc.
	Option	QE8WH4VT	QE81WH4W, QE83WH4W dedicated voltage transformer (63.5/110 V AC…227/480 V AC)
Isolation monitoring		QE82LG*4	Measured items: leakage current (Io), resistive component leakage current (Ior), number of measured circuits: 2 circuits

*1: Dedicated current sensors are required for operation.
*2: Current measurement mode is provided. Up to eight circuits can be measured when measuring only the current value.
*3: The separate voltage transformer (QE8WH4VT) is required for the three-phase 4-wire compatible products.
*4: Dedicated residual current transformers are required for operation.

Information module

MES interface		QJ71MES96	MES interface module (MX MESInterface and CompactFlash card are required)
	Option	GT05-MEM-128MC	CompactFlash card, capacity: 128 MB
		GT05-MEM-256MC	CompactFlash card, capacity: 256 MB
		QD81MEM-512MBC	CompactFlash card, capacity: 512 MB
		QD81MEM-1GBC	CompactFlash card, capacity: 1 GB
High-speed data logger		QD81DL96	High-speed data logger module 10BASE-T/100BASE-TX (CompactFlash card is required)
	Option	QD81MEM-512MBC	CompactFlash card, capacity: 512 MB
		QD81MEM-1GBC	CompactFlash card, capacity: 1 GB
		QD81MEM-2GBC	CompactFlash card, capacity: 2 GB
		QD81MEM-4GBC	CompactFlash card, capacity: 4 GB
		QD81MEM-8GBC	CompactFlash card, capacity: 8 GB
High-speed data communication		QJ71DC96	High-speed data communication module 10BASE-T/100BASE-TX (CompactFlash card is required)
	Option	QD81MEM-512MBC	CompactFlash card, capacity: 512 MB
		QD81MEM-1GBC	CompactFlash card, capacity: 1 GB
		QD81MEM-2GBC	CompactFlash card, capacity: 2 GB
		QD81MEM-4GBC	CompactFlash card, capacity: 4 GB
		QD81MEM-8GBC	CompactFlash card, capacity: 8 GB
Ethernet		QJ71E71-100	10BASE-T/100BASE-TX BACnet™ client function, MODBUS® TCP master function (using predefined protocol support function)
		QJ71E71-B2	10BASE2
		QJ71E71-B5	10BASE5
Serial communication		QJ71C24N	RS-232: 1 channel, RS-422/485: 1 channel, total transmission speed of 2 channels: 230.4 kbps MODBUS® RTU master function (using predefined protocol support function)
		QJ71C24N-R2	RS-232: 2 channels, total transmission speed of 2 channels: 230.4 kbps MODBUS® RTU master function (using predefined protocol support function)
		QJ71C24N-R4	RS-422/485: 2 channels, total transmission speed of 2 channels: 230.4 kbps MODBUS® RTU master function (using predefined protocol support function)
Intelligent communication		QD51	BASIC program execution module, RS-232: 2 channels
		QD51-R24	BASIC program execution module, RS-232: 1 channel, RS-422/485: 1 channel
		SW1IVD-AD51HP*5	Software package for QD51, AD51H-S3, and A1SD51S

*5: The program is run in Windows® command prompt.

●Control network module

[Legend] DB : Double brand product (Note)

Type		Model	Outline
CC-Link IE Control Network		QJ71GP21-SX	Multi-mode fiber optic cable, dual loop, control network (control/normal station)
		QJ71GP21S-SX	Multi-mode fiber optic cable, dual loop, control network (control/normal station), with external power supply function
MELSECNET/H	Optical loop (SI)	QJ71LP21-25	SI/QSI/H-PCF/broadband H-PCF fiber optic cable, dual loop, control network (control/normal station) or remote I/O network (remote mater station)
		QJ71LP21S-25	SI/QSI/H-PCF/broadband H-PCF fiber optic cable, dual loop, control network (control/normal station) or remote I/O network (remote mater station), with external power supply function
		QJ72LP25-25	SI/QSI/H-PCF/broadband H-PCF fiber optic cable, dual loop, remote I/O network (remote I/O station)
	Optical loop (GI)	QJ71LP21G	GI-50/125 fiber optic cable, dual loop, control network (control/normal station) or remote I/O network (remote master station)
		QJ72LP25G	GI-50/125 fiber optic cable, dual loop, remote I/O network (remote I/O station)
	Coaxial bus	QJ71BR11	3C-2V/5C-2V coaxial cable, single bus, control network (control/normal station) or remote I/O network (remote master station)
		QJ72BR15	3C-2V/5C-2V coaxial cable, single bus, remote I/O network (remote I/O station)
	Twist bus	QJ71NT11B	Twisted pair cable, single bus, control network (control/normal station)
CC-Link IE Field Network		QJ71GF11-T2	Master/local station, CC-Link IE Field Network compatible
CC-Link		QJ61BT11N	Master/local station, CC-Link Ver. 2 compatible
CC-Link/LT		QJ61CL12	Master station
FL-net (OPCN-2)	Ver. 2.00	QJ71FL71-T-F01	10BASE-T, 100BASE-TX
		QJ71FL71-B2-F01	10BASE2
		QJ71FL71-B5-F01	10BASE5
	Ver. 1.00	QJ71FL71-T	10BASE-T
		QJ71FL71-B2	10BASE2
		QJ71FL71-B5	10BASE5
MODBUS®		QJ71MB91	MODBUS® RTU/ASCII, RS-232, RS-422/485 configurable as master or slave
		QJ71MT91	MODBUS®/TCP 10BASE-T/100BASE-TX configurable as master or slave
AS-i		QJ71AS92	Master station, AS-Interface Specification Version 2.11 compatible

●Digital link sensor

AnyWireASLINK	QJ51AW12AL DB	AnyWireASLINK master module

●Compatible module for each protocol

Compatible protocol	Compatible modules	Model	Outline
SLMP (MC protocol)	High-speed Universal model (Built-in Ethernet)	QnUDVCPU	SLMP server function (only MC protocol QnA compatible 3E frame) SLMP client function (using predefined protocol support function)
	Universal model QCPU (Built-in Ethernet)	QnUDE(H)CPU	
	Ethernet interface module	QJ71E71-100	SLMP server function (including MC protocol) SLMP client function (using predefined protocol support function)
BACnet™	High-speed Universal model (Built-in Ethernet)	QnUDVCPU	Compatible BACnet™ object: Analog Input (AI), Binary Input (BI), Binary Output (BO), Accumulator (AC) (using predefined protocol support function)
	Ethernet interface module	QJ71E71-100	
	BACnet™ interface module (3rd party products)	BAQ08V	Compatible BACnet™ object: Analog Input (AI), Analog Output (AO), Analog Value (AV), Binary Input (BI), Binary Output (BO), Binary Value (BV), Multi-state Input (MI), Multi-state Output (MO), Multi-state Value (MV), Accumulator (AC), Calendar (CA), EventEnrollment (EE), Group Object (GR), Notification Class (NC), Schedule (SC), TrendLog (TL), Device (DV), Measurement object (measure)*1, Power demand monitoring (monitor power)*2, Power demand control (control power)*2, Generator load control (generator)*2
MODBUS®/TCP	High-speed Universal model (Built-in Ethernet)	QnUDVCPU	MODBUS®/TCP communication master function (using predefined protocol support function)
	Ethernet interface module	QJ71E71-100	
	MODBUS®/TCP interface module	QJ71MT91	MODBUS®/TCP communication master function/slave function
MODBUS®	Serial communication module	QJ71C24N (-R2/R4)	MODBUS®RTU communication master function (using predefined protocol support function)
	MODBUS® interface module	QJ71MB91	MODBUS® RTU/ASCII communication master function/slave function

*1: ANSI/ASHRAE 2004 and IEIEJ 2006 standards are not supported.
*2: ANSI/ASHRAE 2004 standard is not supported.

Note: General specifications and product guarantee conditions of jointly developed products are different from those of MELSEC products.
For more information, please refer to the product manuals or contact your local Mitsubishi representative for details.

MELSEC-L Series

MELSEC-L Series

Type		Model	Outline
CPU		L02SCPU	Number of I/O points: 1024 points, Number of I/O device points: 8192 points, Program capacity: 20K steps, Basic operation processing speed (LD instruction): 60 ns, Program memory capacity: 80 KB, Peripheral connection ports: USB and RS-232 (Predefined protocol support function), Memory card I/F: None, Built-in I/O functions (General-purpose input: 16 points, General purpose output (Sink type): 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), END cover included
		L02SCPU-P	Number of I/O points: 1024 points, Number of I/O device points: 8192 points, Program capacity: 20K steps, Basic operation processing speed (LD instruction): 60 ns, Program memory capacity: 80 KB, Peripheral connection ports: USB and RS-232 (Predefined protocol support function), Memory card I/F: None, Built-in I/O functions (General-purpose input: 16 points, General-purpose output (Source type): 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), END cover included
		L02CPU	Number of I/O points: 1024 points, Number of I/O device points: 8192 points, Program capacity: 20K steps, Basic operation processing speed (LD instruction): 40 ns, Program memory capacity: 80 KB, Peripheral connection ports: USB and Ethernet (Predefined protocol support function), Memory card I/F: SD Memory Card, Built-in I/O functions (General-purpose input: 16 points, General-purpose output (Sink type): 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), END cover included
		L02CPU-P	Number of I/O points: 1024 points, Number of I/O device points: 8192 points, Program capacity: 20K steps, Basic operation processing speed (LD instruction): 40 ns, Program memory capacity: 80 KB, Peripheral connection ports: USB and Ethernet (Predefined protocol support function), Memory card I/F: SD Memory Card, Built-in I/O functions (General-purpose input: 16 points, General-purpose output (Source type): 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), END cover included
		L06CPU	Number of I/O points: 4096 points, Number of I/O device points: 8192 points, Program capacity: 60K steps, Basic operation processing speed (LD instruction): 9.5 ns, Program memory capacity: 240 KB, Peripheral connection ports: USB and Ethernet (Predefined protocol support function), Memory card I/F: SD Memory Card, Built-in I/O functions (General-purpose input: 16 points, General-purpose output (Sink type): 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), END cover included
		L06CPU-P	Number of I/O points: 4096 points, Number of I/O device points: 8192 points, Program capacity: 60K steps, Basic operation processing speed (LD instruction): 9.5 ns, Program memory capacity: 240 KB, Peripheral connection ports: USB and Ethernet (Predefined protocol support function), Memory card I/F: SD Memory Card, Built-in I/O functions (General-purpose input: 16 points, General-purpose output (Source type): 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), END cover included
		L26CPU	Number of I/O points: 4096 points, Number of I/O device points: 8192 points, Program capacity: 260K steps, Basic operation processing speed (LD instruction): 9.5 ns, Program memory capacity: 1040 KB, Peripheral connection ports: USB and Ethernet (Predefined protocol support function), Memory card I/F: SD Memory Card, Built-in I/O functions (General-purpose input: 16 points, General-purpose output (Sink type): 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), END cover included
		L26CPU-P	Number of I/O points: 4096 points, Number of I/O device points: 8192 points, Program capacity: 260K steps, Basic operation processing speed (LD instruction): 9.5 ns, Program memory capacity: 1040 KB, Peripheral connection ports: USB and Ethernet (Predefined protocol support function), Memory card I/F: SD Memory Card, Built-in I/O functions (General-purpose input: 16 points, General-purpose output (Source type): 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), END cover included
		L26CPU-BT	Number of I/O points: 4096 points, Number of I/O device points: 8192 points, Program capacity: 260K steps, Basic operation processing speed (LD instruction): 9.5 ns, Program memory capacity: 1040 KB, Peripheral connection ports: USB and Ethernet (Predefined protocol support function), Memory card I/F: SD Memory Card, Built-in I/O functions (General-purpose input: 16 points, General-purpose output (Sink type): 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), CC-Link master/local station function, END cover included
		L26CPU-PBT	Number of I/O points: 4096 points, Number of I/O device points: 8192 points, Program capacity: 260K steps, Basic operation processing speed (LD instruction): 9.5 ns, Program memory capacity: 1040 KB, Peripheral connection ports: USB and Ethernet (Predefined protocol support function), Memory card I/F: SD Memory Card, Built-in I/O functions (General-purpose input: 16 points, General-purpose output (Source type): 8 points, Interrupt input, Pulse catch, Positioning, High-speed counter), CC-Link master/local station function, END cover included
CPU packages		L02CPU-SET	CPU module (L02CPU), Display unit (L6DSPU), and Power supply module (L61P) set
		L02CPU-P-SET	CPU module (L02CPU-P), Display unit (L6DSPU), and Power supply module (L61P) set
		L06CPU-SET	CPU module (L06CPU), Display unit (L6DSPU), and Power supply module (L61P) set
		L06CPU-P-SET	CPU module (L06CPU-P), Display unit (L6DSPU), and Power supply module (L61P) set
		L26CPU-SET	CPU module (L26CPU), Display unit (L6DSPU), and Power supply module (L61P) set
		L26CPU-P-SET	CPU module (L26CPU-P), Display unit (L6DSPU), and Power supply module (L61P) set
		L26CPU-BT-SET	CPU module (L26CPU-BT), Display unit (L6DSPU), and Power supply module (L61P) set
		L26CPU-PBT-SET	CPU module (L26CPU-PBT), Display unit (L6DSPU), and Power supply module (L61P) set
CPU options	Display unit	L6DSPU	STN black-and-white LCD, 16 characters x4 lines
	Battery	Q6BAT	Replacement battery
		Q7BAT-SET	High capacity battery with a battery holder for CPU installation
		Q7BAT	High capacity replacement battery
	SD Memory Card	NZ1MEM-2GBSD*1	SD memory card, capacity: 2 GB
		NZ1MEM-4GBSD*1	SDHC memory card, capacity: 4 GB
		NZ1MEM-8GBSD*1	SDHC memory card, capacity: 8 GB
		NZ1MEM-16GBSD*1	SDHC memory card, capacity: 16 GB
	RS-232 adapter	L6ADP-R2	For GOT(HMI) connection, 1 x RS-232 channel, maximum transmission speed: 115.2Kpbs, MELSOFT connectable MODBUS® RTU master function (using predefined protocol support function)
	RS-422/485 adapter	L6ADP-R4	For GOT(HMI) connection, 1 x RS-422/485 channel, maximum transmission speed: 115.2Kpbs MODBUS® RTU master function (using predefined protocol support function)
END cover with error terminal		L6EC-ET	END cover with error terminal

*1: Mitsubishi Electric does not guarantee the operation of non-Mitsubishi Electric products.

MELSEC-L Series

Type			Model	Outline
Power supply			L61P	Input voltage: 100…240 V AC, Output voltage: 5 V DC, Output current: 5 A
			L63P	Input voltage: 24 V DC, Output voltage: 5 V DC, Output current: 5 A
	Slim type Power supply		L63SP	Input voltage: 24 V DC, Output voltage: 5 V DC, Output current: 5 A, No isolation
Branch / Extension module			L6EXB	Branch module
			L6EXE	Extension module with END cover
	Extension cable		LC06E	0.6-m cable for connecting branch and extension modules
			LC10E	1.0-m cable for connecting branch and extension modules
			LC30E	3.0-m cable for connecting branch and extension modules
I/O module	Input	AC input	LX10	16 points, 100…120 V AC, Response time: 20 ms or less, 16 points/common, 18-point terminal block
			LX28	8 points, 100…240 V AC, Response time: 20 ms or less, 8 points/common, 18-point terminal block
		DC input	LX40C6	16 points, 24 V DC, Response time: 1/5/10/20/70 ms or less, 16 points/common, Positive/Negative common, 18-point terminal block
			LX41C4	32 points, 24 V DC, Response time: 1/5/10/20/70 ms or less, 32 points/common, Positive/Negative common, 40-pin connector
			LX42C4	64 points, 24 V DC, Response time: 1/5/10/20/70 ms or less, 32 points/common, Positive/Negative common, 40-pin connector x2
	Output	Relay	LY10R2	16 points, 24 V DC/240 V AC, 2 A/point, 8 A/common, Response time: 12 ms or less, 16 points/common, 18-point terminal block
			LY18R2A	8 points, 24 V DC/240 V AC, 2 A/point, 8 A/module, Response time: 12 ms or less, No common (all points independent), 18-point terminal block
		Triac	LY20S6	16 points, 100…240 V AC, 0.6 A/point, 4.8 A/common, Response time: 1 ms + 0.5 cycles or less, 16 points/common, 18-point terminal block
			LY28S1A	8 points, 100…240 V DC, 1 A/point, 8 A/module, Response time: 1 ms + 0.5 cycles or less, No common (all points independent), 18-point terminal block
		Transistor (Sink)	LY40NT5P	16 points, 12…24 V DC, 0.5 A/point, 5 A/common, Response time: 1 ms or less, 16 points/common, 18-point terminal block, overload protection function, overheat protection function, surge suppression
			LY41NT1P	32 points, 12…24 V DC, 0.1 A/point, 2 A/common, Response time: 1 ms or less, 32 points/common, Sink type, 40-pin connector, overload protection function, overheat protection function, surge suppression
			LY42NT1P	64 points, 12…24 V DC, 0.1 A/point, 2 A/common, Response time: 1 ms or less, 32 points/common, Sink type, 40-pin connector x2, overload protection function, overheat protection function, surge suppression
		Transistor (Source)	LY40PT5P	16 points, 12…24 V DC, 0.5 A/point, 5 A/common, Response time: 1 ms or less, 16 points/common, 18-point terminal block, overload protection function, overheat protection function, surge suppression
			LY41PT1P	32 points, 12…24 V DC, 0.1 A/point, 2 A/common, Response time: 1 ms or less, 32 points/common, 40-pin connector, overload protection function, overheat protection function, surge suppression
			LY42PT1P	64 points, 12…24 V DC, 0.1 A/point, 2 A/common, Response time: 1 ms or less, 32 points/common, 40-pin connector x2, overload protection function, overheat protection function, surge suppression
	I/O combined	DC input/transistor output (sink)	LH42C4NT1P	Input specifications : 32 points, 24 V DC, Response time: 1/5/10/20/70 ms or less, 32 points/common, Positive/Negative common Output specifications : 32 points, 12…24 V DC, 0.1 A/point, 2 A/common, Response time: 1 ms or less, 32 points/common, overload protection function, overheat protection function, surge suppression 40-pin connector x2
		DC input/transistor output (source)	LH42C4PT1P	Input specifications : 32 points, 24 V DC, Response time: 1/5/10/20/70 ms or less, 32 points/common, Positive/Negative common Output specifications : 32 points, 12…24 V DC, 0.1 A/point, 2 A/common, Response time: 1 ms or less, 32 points/common, overload protection function, overheat protection function, surge suppression 40-pin connector x2
Space module			LG69	Space module for AnS module replacement
Spring clamp terminal block			L6TE-18S	Alternative to a 18-point screw terminal block, 0.3…1.0 mm² (AWG22…18), push-in type

MELSEC-L Series

[Legend] DB : Double brand product (Note)

Type		Model	Outline
Multiple input (voltage/current/temperature) modules		L60MD4-G	4 channels, Input: -10…10 V DC, 0…20 mA DC, micro voltage-100…100 mV DC, Thermocouple (K, J, T, E, N, R, S, B, U, L, PLⅡ, W5Re/W26Re), RTD (Pt1000, Pt100, JPt100, Pt50), Output (resolution): 0…20000, -20000…20000, (with voltage, current, micro voltage input) Conversion speed: 50 ms/channels, 18-point terminal block, Channel isolated
Analog I/O module	Analog input	L60AD4	4 channels, Input: -10…10 V DC, 0…20 mA DC, Output (resolution): 0…20000, -20000…20000, Conversion speed: 20 µs, 80 µs, 1 ms/channel, 18-point terminal block
		L60ADVL8	8 channels, Input: -10…10 V, Output (resolution)-16000…16000, Conversion speed: 1 ms/channels 18-point terminal block
		L60ADIL8	8 channels, Input: 0…20 mA DC, Output (resolution): 0…8000, Conversion speed: 1 ms/channels 18-point terminal block
		L60AD4-2GH	4 channels, Input: -10…10 V DC, 0…20 mA DC, Output (resolution): 0…32000, -32000…32000, Conversion speed: 40 µs/2 channels, 18-point terminal block, Dual channel isolation
	Analog output	L60DA4	4 channels, Input (resolution): 0…20000, -20000…20000, Output: -10…10 V DC, 0…20 mA DC, Conversion speed: 20 µs/channel, 18-point terminal block
		L60DAVL8	8 channels, Input (resolution): -16000…16000, Output: -10…10 V DC, Conversion speed: 200 µs/channel, 18-point terminal block
		L60DAIL8	8 channels, Input (resolution): 0…8000, Output: 0…20 mA DC, Conversion speed: 200 µs/channel, 18-point terminal block
	Analog I/O	L60AD2DA2	Input specifications : 2 channels, Input: -10…10 V DC, 0…20 mA DC, Output (resolution): 0…12000, -16000…16000, Conversion speed: 80 µs/channel, Output specifications : 2 channels, Input (resolution): 0…12000, -16000…16000, Output: -10…10 V DC, 0…20 mA DC, Conversion speed: 80 µs/channel, 18-point terminal block
Temperature input module	RTD input	L60RD8	8 channels, RTD (Pt1000, Pt100, JPt100, Pt50, Ni500, Ni120, Ni100, Cu100, Cu50) Resolution: 0.1°C, Conversion speed: 40 ms/ch, 24-point spring clamp terminal block
Temperature control module	Thermocouple input	L60TCTT4	4 channels (normal mode) /2 channels (heating-cooling control), Thermocouple (K, J, T, B, S, E, R, N, U, L, PLⅡ, W5Re/W26Re), No Heater disconnection detection function, sampling cycle: 250 ms/4 channels, 500 ms/4 channels, Channel isolated, 18 point terminal block
		L60TCTT4BW	4 channels (normal mode) /2 channels (heating-cooling control), Thermocouple (K, J, T, B, S, E, R, N, U, L, PLⅡ,W5Re/W26Re), Heater disconnection detection function, Sampling cycle: 250 ms/4 channels, 500 ms/4 channels, Channel isolated, 18 point terminal block x2
	RTD input	L60TCRT4	4 channels (normal mode) /2 channels (heating-cooling control), Platinum type resistive temperature device(Pt100, JPt100), No Heater disconnection detection function, Sampling cycle: 250 ms/4 channels, 500 ms/4 channels, Channel isolated, 18 point terminal block
		L60TCRT4BW	4 channels (normal mode) /2 channels (heating-cooling control), Platinum type resistive temperature device (Pt100, JPt100), Heater disconnection detection function, Sampling cycle: 250 ms/4 channels, 500 ms/4 channels, Channel isolated, 18 point terminal block x2
Simple motion module	SSCNET Ⅲ/H	LD77MS2*1	2 axes, 2-axis linear interpolation, 2-axis circular interpolation, synchronous control, Control unit: mm, inch, degree, pulse, Number of positioning data: 600 data/axis, SSCNET Ⅲ/H connectivity
		LD77MS4*1	4 axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, synchronous control, Control unit: mm, inch, degree, pulse, Number of positioning data: 600 data/axis, SSCNET Ⅲ/H connectivity
		LD77MS16*1	16 axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, synchronous control, Control unit: mm, inch, degree, pulse, Number of positioning data: 600 data/axis, SSCNET Ⅲ/H connectivity
Positioning module	Open collector	LD75P1	1 axis, Control unit: mm, inch, degree, pulse, Number of positioning data: 600 data/axis, Maximum output pulse: 200 kpps, 40-pin connector
		LD75P2	2 axes, 2-axis linear interpolation, 2-axis circular interpolation, Control unit: mm, inch, degree, pulse, Number of positioning data: 600 data/axis, Maximum output pulse: 200 kpps, 40-pin connector
		LD75P4	4 axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, 3-axis helical interpolation, Control unit: mm, inch, degree, pulse, Number of positioning data: 600 data/axis, Maximum output pulse: 200 kpps, 40-pin connector x2
	Differential driver	LD75D1	1 axis, Control unit: mm, inch, degree, pulse, Number of positioning data: 600 data/axis, Maximum output pulse: 4 Mpps, 40-pin connector
		LD75D2	2 axes, 2-axis linear interpolation, 2-axis circular interpolation, Control unit: mm, inch, degree, pulse, Number of positioning data: 600 data/axis, Maximum output pulse: 4 Mpps, 40-pin connector
		LD75D4	4 axes, 2-/3-/4-axis linear interpolation, 2-axis circular interpolation, 3-axis helical interpolation, Control unit: mm, inch, degree, pulse, Number of positioning data: 600 data/axis, Maximum output pulse: 4 Mpps, 40-pin connector x2
Flexible high-speed I/O control module		LD40PD01	12 input points (all for 5 V DC/24 V DC/differential) 14 output points (8 points for DC (5 V DC...24 V), 6 points for differential)
High-speed counter module		LD62	2 channels, 200/100/10 kpps, Count input signal: 5/12/24 V DC, External input: 5/12/24 V DC, Coincidence output: transistor (sink), 12/24 V DC, 0.5 A/point, 2 A/common, 40-pin connector
		LD62D	2 channels, 500/200/100/10 kpps, Count input signal: EIA standards RS-422-A (Differential line driver level), External input: 5/12/24 V DC, Coincidence output: transistor (sink), 12/24 V DC, 0.5 A/point, 2 A/common, 40-pin connector
Network module	CC-Link IE Field Network	LJ71GF11-T2	Master/Local station
		LJ72GF15-T2*2	Remote station (Head module with END cover)
	CC-Link	LJ61BT11	Master/Local station, CC-Link Ver.2.0 compatible
	CC-Link/LT	LJ61CL12	Master station, CC-Link/LT system compatible
	AnyWireASLINK	LJ51AW12AL DB	AnyWireASLINK system compatible master module
	SSCNET Ⅲ/H	LJ72MS15*3	Remote station (Head module with END cover)
	Ethernet interface	LJ71E71-100	10BASE-T/100BASE-TX BACnet™ client function, MODBUS® TCP master function (using predefined protocol support function)
	Serial communication	LJ71C24	RS-232: 1 channel, RS-422/485: 1 channel, Total transmission speed of 2 channels: 230.4 kbps MODBUS® RTU master function (using predefined protocol support function)
		LJ71C24-R2	RS-232: 2 channels, Total transmission speed of 2 channels: 230.4 kbps MODBUS® RTU master function (using predefined protocol support function)

*1: The connector is not appended. Please obtain an LD77MHIOCON separately.
*2: The CPU module, branch and extension module, display unit, RS-232 adapter, CC-Link IE Field Network master/local module and Ethernet interface module cannot be mounted on a system using LJ72GF-T2.
*3: The CPU module, branch and extension module, display unit, RS-232 adapter, temperature control module, simple motion module, positioning module, CC-Link IE Field Network master/local module, CC-Link IE Field network head module, CC-Link master/local module, CC-Link/LT master module, AnyWireASLINK master module, Ethernet interface module, and serial communication module cannot be mounted on a system using LJ72MS15.

Note: General specifications and product guarantee conditions of jointly developed products are different from those of MELSEC products.
For more information, please refer to the product manuals or contact your local Mitsubishi representative for details.

MELSEC-F Series

Model Name	CE		UL	KC	Ship approvals							
	EMC	LVD	cUL		ABS	DNV	LR	GL	BV	RINA	NK	KR
α2 Main Units												
AL2-10MR-A	●	●	●	—	—	—	—	—	—	—	—	—
AL2-10MR-D	●	●	●	—	—	—	—	—	—	—	—	—
AL2-14MR-A	●	●	●	—	—	●	—	—	—	—	—	—
AL2-14MR-D	●	●	●	—	—	●	—	—	—	—	—	—
AL2-24MR-A	●	●	●	—	—	●	—	—	—	—	—	—
AL2-24MR-D	●	●	●	—	—	●	—	—	—	—	—	—
α Extension Modules												
AL2-2DA	●	●	●	—	—	—	—	—	—	—	—	—
AL2-2PT-ADP	●	—	●	—	—	—	—	—	—	—	—	—
AL2-2TC-ADP	●	—	●	—	—	—	—	—	—	—	—	—
AL2-4EX-A2	●	●	●	—	—	●	—	—	—	—	—	—
AL2-4EX	●	●	●	—	—	●	—	—	—	—	—	—
AL2-4EYR	●	●	●	—	—	●	—	—	—	—	—	—
AL2-4EYT	●	●	●	—	—	●	—	—	—	—	—	—
AL2-ASI-BD	●	●	●	—	—	●	—	—	—	—	—	—
FX3S Main Units												
FX3S-10MR/ES	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-10MT/ES	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-10MT/ESS	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-14MR/ES	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-14MT/ES	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-14MT/ESS	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-20MR/ES	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-20MT/ES	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-20MT/ESS	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-30MR/ES	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-30MT/ES	●	●	●	●	—	—	—	—	—	—	—	—
FX3S-30MT/ESS	●	●	●	●	—	—	—	—	—	—	—	—
FX3G Main Units												
FX3G-14MR/DS	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-14MR/ES-A	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-14MT/DS	●	○	●	●	●	●	●	●	●	●	●	—
FX3G-14MT/DSS	●	○	●	●	●	●	●	●	●	●	●	—
FX3G-14MT/ES-A	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-14MT/ESS	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-24MR/DS	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-24MR/ES-A	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-24MT/DS	●	○	●	●	●	●	●	●	●	●	●	—
FX3G-24MT/DSS	●	○	●	●	●	●	●	●	●	●	●	—
FX3G-24MT/ES-A	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-24MT/ESS	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-40MR/DS	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-40MR/ES-A	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-40MT/DS	●	○	●	●	●	●	●	●	●	●	●	—
FX3G-40MT/DSS	●	○	●	●	●	●	●	●	●	●	●	—
FX3G-40MT/ES-A	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-40MT/ESS	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-60MR/DS	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-60MR/ES-A	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-60MT/DS	●	○	●	●	●	●	●	●	●	●	●	—
FX3G-60MT/DSS	●	○	●	●	●	●	●	●	●	●	●	—
FX3G-60MT/ES-A	●	●	●	●	●	●	●	●	●	●	●	—
FX3G-60MT/ESS	●	●	●	●	●	●	●	●	●	●	●	—
FX3GC Main Units												
FX3GC-32MT/D	●	○	●	●	—	—	—	—	—	—	—	—
FX3GC-32MT/DSS	●	○	●	●	—	—	—	—	—	—	—	—

Model Name	CE		UL	KC	Ship approvals							
	EMC	LVD	cUL		ABS	DNV	LR	GL	BV	RINA	NK	KR
FX3U Main Units												
FX3U-16MR/DS	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-16MR/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-16MT/DS	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-16MT/DSS	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-16MT/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-16MT/ESS	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-32MR/DS	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-32MR/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-32MR/UA1	●	●	●	●	—	—	—	—	—	—	—	—
FX3U-32MS/ES	●	●	●	●	—	—	—	—	—	—	—	—
FX3U-32MT/DS	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-32MT/DSS	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-32MT/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-32MT/ESS	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-48MR/DS	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-48MR/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-48MT/DS	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-48MT/DSS	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-48MT/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-48MT/ESS	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-64MR/DS	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-64MR/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-64MR/UA1	●	●	●	●	—	—	—	—	—	—	—	—
FX3U-64MS/ES	●	●	●	●	—	—	—	—	—	—	—	—
FX3U-64MT/DS	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-64MT/DSS	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-64MT/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-64MT/ESS	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-80MR/DS	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-80MR/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-80MT/DS	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-80MT/DSS	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-80MT/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-80MT/ESS	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-128MR/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-128MT/ES-A	●	●	●	●	●	●	●	●	●	●	●	●
FX3U-128MT/ESS	●	●	●	●	●	●	●	●	●	●	●	●
FX3UC Main Units												
FX3UC-16MR/D-T	●	●	●	●	—	—	—	—	—	—	—	—
FX3UC-16MR/DS-T	●	●	●	●	—	—	—	—	—	—	—	—
FX3UC-16MT/D	●	○	●	●	●	●	●	●	●	●	—	—
FX3UC-16MT/DSS	●	○	●	●	●	●	●	●	●	●	—	—
FX3UC-32MT/D	●	○	●	●	●	●	●	●	●	●	—	—
FX3UC-32MT/DSS	●	○	●	●	●	●	●	●	●	●	—	—
FX3UC-64MT/D	●	○	●	●	●	●	●	●	●	●	—	—
FX3UC-64MT/DSS	●	○	●	●	●	●	●	●	●	●	—	—
FX3UC-96MT/D	●	○	●	●	●	●	●	●	●	●	—	—
FX3UC-96MT/DSS	●	○	●	●	●	●	●	●	●	●	—	—
FX2N Extension Units												
FX2N-32ER-ES/UL	●	●	●	●	●	●	●	●	●	●	—	●
FX2N-32ET-ESS/UL	●	●	●	●	●	●	●	●	●	●	—	●
FX2N-48ER-DS	●	●	●	●	●	●	—	—	—	—	—	●
FX2N-48ER-ES/UL	●	●	●	●	●	●	●	●	●	●	—	●
FX2N-48ER-UA1/UL	●	●	●	—	●	—	—	—	—	—	—	●
FX2N-48ET-DSS	●	○	●	●	●	●	—	—	—	—	—	●
FX2N-48ET-ESS/UL	●	●	●	●	●	●	●	●	●	●	—	●

● = comply, ○ = no need to comply

Model Name	CE		UL	KC	Ship approvals							
	EMC	LVD	cUL		ABS	DNV	LR	GL	BV	RINA	NK	KR
FX2N Extension Blocks												
FX2N-8ER-ES/UL	●	●	●	○	—	●	—	●	—	—	—	—
FX2N-8EX-ES/UL	●	○	●	○	—	●	—	●	—	—	—	—
FX2N-8EX-UA1/UL	—	—	●	○	—	—	—	—	—	—	—	—
FX2N-8EYR-ES/UL	●	●	●	○	—	●	—	●	—	—	—	—
FX2N-8EYT-ESS/UL	●	○	●	○	—	●	—	●	—	—	—	—
FX2N-16EX-ES/UL	●	○	●	○	●	●	●	●	●	●	●	●
FX2N-16EYR-ES/UL	●	●	●	○	●	●	●	●	●	●	●	●
FX2N-16EYT-ESS/UL	●	○	●	○	●	●	●	●	●	●	●	●
FX2N-16EYS	—	—	●	○	—	—	—	—	—	—	—	—
FX2NC Extension Blocks												
FX2NC-16EX-DS	●	○	●	○	●	●	●	—	—	—	—	—
FX2NC-16EX-T-DS	●	○	●	○	●	●	●	—	—	—	—	—
FX2NC-16EYR-T-DS	●	●	●	○	●	●	●	—	—	—	—	—
FX2NC-16EYT-DSS	●	○	●	○	●	●	●	—	—	—	—	—
FX2NC-32EX-DS	●	○	●	○	●	●	●	—	—	—	—	—
FX2NC-32EYT-DSS	●	○	●	○	●	●	●	—	—	—	—	—
FX0N/FX2N Special Function Blocks												
FX0N-3A	●	○	—	●	—	—	—	●	—	—	—	—
FX2N-1HC	●	○	●	●	●	●	●	●	●	●	—	●
FX2N-1PG-E	●	○	●	●	●	●	●	●	●	●	—	●
FX2N-1RM-E-SET	●	○	—	●	●	—	—	—	—	—	—	●
FX2N-2AD	●	○	●	●	●	—	—	●	—	—	●	●
FX2N-2DA	●	○	●	●	●	—	—	●	—	—	●	●
FX2N-2LC	●	○	●	●	—	—	—	—	—	—	—	—
FX2N-4AD	●	○	●	●	●	●	●	●	●	●	—	●
FX2N-4AD-PT	●	○	●	●	●	●	●	●	●	●	—	●
FX2N-4AD-TC	●	○	●	●	●	●	●	●	●	●	—	●
FX2N-4DA	●	○	●	●	●	●	●	●	●	●	●	●
FX2N-5A	●	○	●	●	—	—	—	●	●	●	—	—
FX2N-8AD	●	○	●	●	—	—	—	●	●	●	●	—
FX2N-10GM	●	○	●	●	—	—	—	—	—	—	—	—
FX2N-10PG	●	○	●	●	—	—	—	—	—	—	—	—
FX2N-20GM	●	○	●	●	—	—	—	—	—	—	—	—
FX2N-32CCL	●	○	—	●	—	—	—	—	—	—	—	—
FX2N-64CL-M	●	○	●	●	—	—	—	—	—	—	—	—
FX2N-232IF	●	○	—	●	●	●	●	●	●	●	—	—
FX2NC Special Adapters & Special Function Blocks												
FX2NC-1HC	●	○	●	●	—	—	—	—	—	—	—	—
FX2NC-4AD	●	○	●	●	—	●	●	—	—	—	—	—
FX2NC-4DA	●	○	●	●	—	●	●	—	—	—	—	—
FX2NC-232ADP	●	○	●	●	—	●	●	—	—	—	—	—
FX2NC-485ADP	●	○	●	●	—	●	●	—	—	—	—	—
FX2NC-CNV-IF	—	—	—	—	—	—	●	—	—	—	—	—
FX3U Special Function Blocks												
FX3U-1PG	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-1PSU-5V	●	●	●	●	—	—	—	—	—	—	—	—
FX3U-2HC	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-4AD	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-4DA	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-4LC	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-20SSC-H	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-16CCL-M	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-64CCL	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-ENET-L	●	○	●	●	—	—	—	—	—	—	—	—
FX3U Special Adapters												
FX3U-2HSY-ADP	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-3A-ADP	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-4AD-ADP	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-4AD-PNK-ADP	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-4AD-PT-ADP	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-4AD-PTW-ADP	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-4AD-TC-ADP	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-4DA-ADP	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-4HSX-ADP	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-232ADP-MB	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-485ADP-MB	●	○	●	●	●	●	●	●	●	●	●	●
FX3U-CF-ADP	●	○	●	●	—	—	—	—	—	—	—	—
FX3U-ENET-ADP	●	○	●	—	—	—	—	—	—	—	—	—

Model Name	CE		UL	KC	Ship approvals							
	EMC	LVD	cUL		ABS	DNV	LR	GL	BV	RINA	NK	KR
FX3G Interface Adapter												
FX3G-CNV-ADP	●	○	●	○	●	●	●	●	●	●	●	—
FX3S Interface Adapter												
FX3S-CNV-ADP	●	○	●	○	—	—	—	—	—	—	—	—
FX3UC Special Function Blocks												
FX3UC-1PS-5V	●	○	●	●	●	●	●	●	●	●	—	—
FX3UC-4AD	●	○	●	●	—	—	—	—	—	—	—	—
Expansion Boards												
FX1N-1DA-BD	●	○	—	●	●	●	●	●	●	●	●	●
FX1N-2AD-BD	●	○	—	●	●	●	●	●	●	●	●	●
FX1N-2EYT-BD	●	○	—	○	●	●	●	●	●	●	●	●
FX1N-4EX-BD	●	○	—	○	●	●	●	●	●	●	●	●
FX1N-8AV-BD	●	○	—	○	●	●	●	●	●	●	●	●
FX1N-232-BD	●	○	—	●	●	●	●	●	●	●	●	●
FX1N-422-BD	●	○	—	○	●	●	●	●	●	●	●	●
FX1N-485-BD	●	○	—	○	●	●	●	●	●	●	●	●
FX1N-CNV-BD	●	○	—	○	●	●	●	—	—	—	●	●
FX3G-1DA-BD	●	○	—	●	●	●	●	●	●	●	●	—
FX3G-2AD-BD	●	○	—	●	●	●	●	●	●	●	●	—
FX3G-8AV-BD	●	○	—	○	●	●	●	●	●	●	●	—
FX3G-232-BD	●	○	—	●	●	●	●	●	●	●	●	●
FX3G-422-BD	●	○	—	○	●	●	●	●	●	●	●	●
FX3G-485-BD	●	○	—	○	●	●	●	●	●	●	●	●
FX3U-8AV-BD	●	○	—	○	—	—	—	—	—	—	—	—
FX3U-232-BD	●	○	—	●	●	●	●	●	●	●	●	●
FX3U-422-BD	●	○	—	●	●	●	●	●	●	●	●	●
FX3U-485-BD	●	○	—	●	●	●	●	●	●	●	●	●
FX3U-CNV-BD	●	○	—	○	●	●	●	●	●	●	●	●
FX3U-USB-BD	●	○	—	●	●	●	●	●	●	●	●	●
Terminal Blocks												
FX-16E-TB/UL	—	—	●	○	—	—	—	—	—	—	—	—
FX-16EYR-ES-TB/UL	—	—	●	○	—	—	—	—	—	—	—	—
FX-16EYS-ES-TB/UL	—	—	●	○	—	—	—	—	—	—	—	—
FX-16EYT-ES-TB/UL	—	—	●	○	—	—	—	—	—	—	—	—
FX-16EYT-ESS-TB/UL	—	—	●	○	—	—	—	—	—	—	—	—
FX-32E-TB/UL	—	—	●	○	—	—	—	—	—	—	—	—
Accessories												
FX-10DM-E	●	○	—	●	—	—	—	—	—	—	—	—
FX-30P	●	○	●	●	—	—	—	—	—	—	—	—
FX-232AWC-H	●	○	—	●	—	—	—	—	—	—	—	—
FX-485PC-IF	●	○	—	○	—	—	—	—	—	—	—	—
FX-USB-AW	●	○	—	●	—	—	—	—	—	—	—	—
FX1N-5DM	●	○	—	○	●	●	●	●	●	●	●	●
FX1N-BAT	●	○	●	○	—	—	—	—	—	—	—	—
FX2N-20PSU	●	●	●	●	—	—	—	—	—	—	—	—
FX2N-CNV-BC	●	○	—	○	—	—	—	—	—	—	—	—
FX3G-5DM	●	○	—	●	●	●	●	●	●	●	●	—
FX3U-7DM	●	○	—	●	●	●	●	●	●	●	●	●
FX3U-7DM-HLD	—	○	—	○	—	—	—	—	—	—	—	—
Memory Cassettes												
FX1N-EEPROM-8L	●	○	—	○	●	●	●	—	—	—	●	●
FX3G-EEPROM-32L	●	○	—	○	●	●	●	●	●	●	●	—
FX3U-FLROM-16	●	○	—	○	●	●	●	●	●	●	●	●
FX3U-FLROM-64	●	○	—	○	●	●	●	●	●	●	●	●
FX3U-FLROM-64L	●	○	—	○	●	●	●	●	●	●	●	●
FX3U-FLROM-1M	●	○	—	○	—	—	—	—	—	—	—	—

● = comply, ○ = no need to comply

MELSEC-QS/WS Series

Safety Programmable Controller

Product name	Model*1	Outline
Safety CPU module	QS001CPU(-K)	Program capacity: 14 k steps, number of I/O device points: 6144 points, operation/error history: 3,000 records
Safety main base unit	QS034B(-K)	4 slots; for QS series, MELSECNET/H, CC-Link IE, and Ethernet modules
Safety power supply module	QS061P-A1(-K)	Input: 100...120 V AC, 50/60 Hz; output: 5 V 6 A; with overvoltage/overcurrent protection and shutdown circuit diagnostics
	QS061P-A2(-K)	Input: 200...240 V AC, 50/60 Hz; output: 5 V 6 A; with overvoltage/overcurrent protection and shutdown circuit diagnostics
CC-Link IE Field Network master/local module (with Safety Communication Functions)	QS0J71GF11-T2	Max. number of stations per network: 121 (32 for safety stations) Safety CPU module QS001CPU whose first five serial number digits are 13042 or later
CC-Link Safety system master module	QS0J61BT12(-K)	Max. number of connectable modules: 64 (42 for safety stations)
CC-Link Safety system remote I/O module	QS0J65BTB2-12DT(-K)	No. of input points: 8 points (double input), 16 points (single input) No. of output points: 4 points(source + sink type), 2 points(source + source type)
	QS0J65BTS2-8D	No. of input points: 8 points (double input), 16 points (single input)
	QS0J65BTS2-4T	No. of output points: 4 points (source + sink type), 2 points (source + source type)

*1: S-mark compatible part models are indicated in parentheses.

Safety Controller

CPU module	WS0-CPU000200 (WS0-CPU0)*1	Program size: 255 FBs, Scan cycle: 4 ms, Interface: RS-232
CPU module (with EFI)	WS0-CPU130202 (WS0-CPU1)*1	EFI-equipped (EFI is the communication interface for setting SICK's safety products.) Flexi Link with EFI
CPU module memory plug	WS0-MPL00201 (WS0-MPL)*1	For storing CPU parameters and programs (required)
Safety input module	WS0-XTDI80202 (WS0-XTDI)*1	Safety input: 8 points (single input), Spring clamp terminal block, Fast shut off function (response of 8 ms)
Safety I/O module	WS0-XTIO84202 (WS0-XTIO)*1	Safety input: 8 points (single input), Safety output: 4 points (single output) Output current: max. 2 A, Spring clamp terminal block, Fast shut off function (response of 8 ms)
Safety relay output module	WS0-4RO4002 (WS0-4RO)*1	Safety output: safety relay output 4 points (single input), Output current: max. 6 A
RS-232 cable connecting to CPU module	WS0-C20R2	RS-232 cable for PC-CPU connection
USB/RS-232 conversion cable	WS0-UC-232A	USB/RS-232 conversion cable
CC-Link interface module	WS0-GCC100202 (WS0-GCC1)*1	For CC-Link communication (standard communication)
Ethernet interface module	WS0-GETH00200 (WS0-GETH)*1	For Ethernet/TCP connection (standard communication)
Screw-in replacement terminal block	WS0-TBS4	Screw-in replacement terminal block
Spring clamp replacement terminal block	WS0-TBC4	Spring clamp replacement terminal block
Setting and Monitor Tool	SW1DNN-WS0ADR-B*2	Setting and Monitor Tool for safety controller

*1: Abbreviated product model name is shown in ( ) for this catalog. Please let us know the exact product model in the upper product list when you contact local Mitsubishi sales office or representative.
*2: For the acquisition of Setting and Monitor Tool, please contact your local Mitsubishi sales office or representative.

Safety Relay Module

Q series safety relay module	QS90SR2SP-Q	For MELSEC-Q series safety input: 1 point (2 inputs), P type (dual input with positive commons); safety output: 1 point (3 outputs)
	QS90SR2SN-Q	For MELSEC-Q series safety input: 1 point (2 inputs), N type (dual input with positive common and negative common); safety output: 1 point (3 outputs)
CC-Link safety relay module	QS90SR2SP-CC	For CC-Link; safety input: 1 point (2 inputs), P type (dual input with positive commons); safety output: 1 point (3 outputs)
	QS90SR2SN-CC	For CC-Link; safety input: 1 point (2 inputs), N type (dual input with positive common and negative common); safety output: 1 point (3 outputs)
Extension safety relay module	QS90SR2SP-EX	For extension; safety input: 1 point (2 inputs), P type (dual input with positive commons); safety output: 1 point (3 outputs)
	QS90SR2SN-EX	For extension; safety input: 1 point (2 inputs), N type (dual input with positive common and negative common); safety output: 1 point (3 outputs)
Safety circuit part extension cable	QS90CBL-SE01	0.1 m cable for adding safety part
	QS90CBL-SE15	1.5 m cable for adding safety part

Network Related Products

CC-Link IE Control Network Compatible Products

Type		Model	Outline
CC-Link IE embedded CPU module		R04ENCPU	MELSEC iQ-R Series CC-Link IE Field Network master/local station CC-Link IE Control Network control/normal station
		R08ENCPU	MELSEC iQ-R Series CC-Link IE Field Network master/local station CC-Link IE Control Network control/normal station
		R16ENCPU	MELSEC iQ-R Series CC-Link IE Field Network master/local station CC-Link IE Control Network control/normal station
		R32ENCPU	MELSEC iQ-R Series CC-Link IE Field Network master/local station CC-Link IE Control Network control/normal station
		R120ENCPU	MELSEC iQ-R Series CC-Link IE Field Network master/local station CC-Link IE Control Network control/normal station
Multi-network supporting Ethernet module		RJ71EN71	MELSEC iQ-R Series multi-network supported (Ethernet/CC-Link IE)
Control network module		RJ71GP21-SX	CC-Link IE Control Network control/normal station for MELSEC iQ-R Series
		QJ71GP21-SX	CC-Link IE Control Network control/normal station for MELSEC-Q Series
		QJ71GP21S-SX	CC-Link IE Control Network control/normal station (with the External power supply function) for MELSEC-Q Series
Network interface board		Q81BD-J71GP21-SX	CC-Link IE Control Network control/normal station, compatible with PCI Express® bus
		Q81BD-J71GP21S-SX	CC-Link IE Control Network control/normal station (with the External power supply function), compatible with PCI Express® bus
		Q80BD-J71GP21-SX	CC-Link IE Control Network control/normal station, compatible with PCI/PCI X bus
		Q80BD-J71GP21S-SX	CC-Link IE Control Network control/normal station (with the External power supply function), compatible with PCI/PCI X bus

CC-Link IE Field Network Compatible Products

CC-Link IE embedded CPU module		R04ENCPU	MELSEC iQ-R Series CC-Link IE Field Network master/local station CC-Link IE Control Network control/normal station
		R08ENCPU	MELSEC iQ-R Series CC-Link IE Field Network master/local station CC-Link IE Control Network control/normal station
		R16ENCPU	MELSEC iQ-R Series CC-Link IE Field Network master/local station CC-Link IE Control Network control/normal station
		R32ENCPU	MELSEC iQ-R Series CC-Link IE Field Network master/local station CC-Link IE Control Network control/normal station
		R120ENCPU	MELSEC iQ-R Series CC-Link IE Field Network master/local station CC-Link IE Control Network control/normal station
Multi-network supporting Ethernet module		RJ71EN71	MELSEC iQ-R Series multi-network supported (Ethernet/CC-Link IE)
Master/local module		RJ71GF11-T2	CC-Link IE Field Network master/local station for MELSEC iQ-R Series
		QJ71GF11-T2	CC-Link IE Field Network master/local station for MELSEC-Q Series
		LJ71GF11-T2	CC-Link IE Field Network master/local station for MELSEC-L Series
		QS0J71GF11-T2	CC-Link IE Field Network safety master/local station for MELSEC-QS Series
Simple motion module		RD77GF4	CC-Link IE Field Network master station for MELSEC iQ-R Series Up to 4-axis control, linear interpolation, 2-axis circular interpolation, synchronous control, speed-torque control
		RD77GF8	CC-Link IE Field Network master station for MELSEC iQ-R Series Up to 8-axis control, linear interpolation, 2-axis circular interpolation, synchronous control, speed-torque control
		RD77GF16	CC-Link IE Field Network master station for MELSEC iQ-R Series Up to 16-axis control, linear interpolation, 2-axis circular interpolation, synchronous control, speed-torque control
		QD77GF4	CC-Link IE Field Network master station for MELSEC-Q Series Up to 4-axis control, linear interpolation, 2-axis circular interpolation, synchronous control, speed-torque control
		QD77GF8	CC-Link IE Field Network master station for MELSEC-Q Series Up to 8-axis control, linear interpolation, 2-axis circular interpolation, synchronous control, speed-torque control
		QD77GF16	CC-Link IE Field Network master station for MELSEC-Q Series Up to 16-axis control, linear interpolation, 2-axis circular interpolation, synchronous control, speed-torque control
Head module		RJ72GF15-T2	MELSEC iQ-R Series CC-Link IE Field Network compatible remote head module
		LJ72GF15-T2	MELSEC-L Series CC-Link IE Field Network compatible head module (END cover enclosed)
Intelligent device station module		FX5-CCLIEF	MELSEC iQ-F Series CC-Link IE Field Network intelligent device station module
Block type remote module	DC input	NZ2GF2B1N1-16D	16 points, 24 V DC, response time 0…70 ms, positive/negative common shared, screw terminal block, 1-wire, max. extension modules: 3
		NZ2GF2B1N-16D	16 points, 24 V DC, response time 0…70 ms, positive/negative common shared, screw terminal block, 1-wire
		NZ2GF2S1-16D	16 points, 24 V DC, response time 0…70 ms, positive/negative common shared, spring clamp terminal block, 1-wire
		NZ2GFCE3-16D*1*2	16 points, 24 V DC, response time 0…70 ms, positive common (sink type), sensor connector (e-CON), 3-wire
		NZ2GFCE3-16DE*1*2	16 points, 24 V DC, response time 0…70 ms, negative common (source type), sensor connector (e-CON), 3-wire
		NZ2GFCE3-32D	32 points, 24 V DC, response time 0…70 ms, positive common (sink type), sensor connector (e-CON), 3-wire
		NZ2GFCM1-16D*1	16 points, 24 V DC, response time 0…70 ms, positive common (sink type), MIL connector (20 pin), 1-wire
		NZ2GFCM1-16DE*1	16 points, 24 V DC, response time 0…70 ms, negative common (source type), MIL connector (20 pin), 1-wire
		NZ2GFCF1-32D	32 points, 24 V DC, response time 0…70 ms, positive/negative common shared, 40-pin connector, 1-wire

CC-Link IE Field Network Compatible Products

Type		Model	Outline
Block type remote module	Transistor output	NZ2GF2B1N1-16T	16 points, 12/24 V DC (0.5 A), sink type, screw terminal block, 1-wire max. extension modules: 3
		NZ2GF2B1N1-16TE	16 points, 12/24 V DC (0.5 A), sink type, screw terminal block, 1-wire max. extension modules: 3
		NZ2GF2B1N-16T	16 points, 12/24 V DC (0.5 A), sink type, screw terminal block, 1-wire
		NZ2GF2B1N-16TE	16 points, 12/24 V DC (0.5 A), source type, screw terminal block, 1-wire
		NZ2GF2S1-16T	16 points, 12/24 V DC (0.5 A), sink type, spring clamp terminal block, 1-wire
		NZ2GF2S1-16TE	16 points, 12/24 V DC (0.5 A), source type, spring clamp terminal block, 1-wire
		NZ2GFCE3-16T*1*2	16 points, 12/24 V DC (0.5 A), sink type, sensor connector (e-CON), 3-wire
		NZ2GFCE3-16TE*1*2	16 points, 12/24 V DC (0.5 A), source type, sensor connector (e-CON), 3-wire
		NZ2GFCE3-32T	32 points, 12/24 V DC (0.5 A), sink type, sensor connector (e-CON), 3-wire
		NZ2GFCM1-16T*1	16 points, 12/24 V DC (0.5 A), sink type, MIL connector (20 pin), 1-wire
		NZ2GFCM1-16TE*1	16 points, 12/24 V DC (0.5 A), source type, MIL connector (20 pin), 1-wire
		NZ2GFCF1-32T	32 points, 12/24 V DC (0.1 A), sink type, 40-pin connector, 1-wire
	I/O combined	NZ2GFCE3-32DT	Input 16 points, 24 V DC, response time 0…70 ms, positive common (sink type) Output 16 points, 12/24 V DC (0.5 A), sink type, sensor connector (e-CON), 3-wire
		NZ2GFCF1-32DT	Input 16 points, 24 V DC, response time 0...70 ms, positive/negative common shared Output 16 points, 12/24 V DC (0.1 A), sink type, 40-pin connector, 1-wire
	Analog input	NZ2GF2BN-60AD4	4 channels, -10…10 V DC, 0…20 mA DC; conversion speed, 100 µs/ch; screw terminal block
	Analog output	NZ2GF2BN-60DA4	4 channels, -10…10 V DC, 0…20 mA DC; conversion speed, 100 µs/ch, screw terminal block
	Temperature control	NZ2GF2B-60TCTT4	4 channels, thermocouple input, transistor output, screw terminal block
		NZ2GF2B-60TCRT4	4 channels, RTD input, transistor output, screw terminal block
	High-speed counter	NZ2GFCF-D62PD2	2 channels Differential input Counting speed, 10 kpps/100 kpps/200 kpps/500 kpps/1 Mpps/2 Mpps/4 Mpps/8 Mpps; count input signal, EIA Standard RS-422-A (Differential line driver) DC input Counting speed, 10 kpps/100 kpps/200 kpps; count input signal, 5/24 V DC 4…8 mA; coincidence output, transistor (sink type); 5…24 V DC (0.1 A); 40-pin connector
Extension module for Block type remote module	DC input	NZ2EX2B1N-16D	16 points, 24 V DC, response time 0…70 ms, positive/negative common shared, screw terminal block, 1-wire, multiple modules connectable
		NZ2EX2B1-16D	16 points, 24 V DC, response time 0…70 ms, positive/negative common shared, screw terminal block, 1-wire
		NZ2EX2S1-16D	16 points, 24 V DC, response time 0…70 ms, positive/negative common shared, spring clamp terminal block, 1-wire
	Transistor output	NZ2EX2B1N-16T	16 points, 12/24 V DC (0.5 A), sink type, screw terminal block, 1-wire, multiple modules connectable
		NZ2EX2B1N-16TE	16 points, 12/24 V DC (0.5 A), source type, screw terminal block, 1-wire, multiple modules connectable
		NZ2EX2B1-16T	16 points, 12/24 V DC (0.5 A), sink type, screw terminal block, 1-wire
		NZ2EX2B1-16TE	16 points, 12/24 V DC (0.5 A), source type, screw terminal block, 1-wire
		NZ2EX2S1-16T	16 points, 12/24 V DC (0.5 A), sink type, spring clamp terminal block, 1-wire
		NZ2EX2S1-16TE	16 points, 12/24 V DC (0.5 A), source type, spring clamp terminal block, 1-wire
	Analog input	NZ2EX2B-60AD4	4 channels, Input: -10…10 V DC, 0…20 mA DC, Conversion speed: 100 µs/ch, screw terminal block
	Analog output	NZ2EX2B-60DA4	4 channels, Output: -10…10 V DC, 0…20 mA DC, Conversion speed: 100 µs/ch, screw terminal block
Safety Remote I/O module	Main safety input	NZ2GFSS2-32D	32 points with single wiring/16 points with double wiring, 24 V DC, response time 0.4 ms, negative common, spring clamp terminal block, 2-wire
	Extension safety output	NZ2EXSS2-8TE	8 points with single wiring/4 points with double wiring, 24 V DC (0.5 A), source + source type, spring clamp terminal block, 2-wire
Network interface board		Q81BD-J71GF11-T2	CC-Link IE Field Network master/local station, compatible with PCI Express® bus
		Q80BD-J71GF11-T2	CC-Link IE Field Network master/local station, compatible with PCI/PCI X bus
Ethernet adapter module		NZ2GF-ETB	Compatible with Ethernet devices, transmission rate 100 Mbps/1 Gbps
Network bridge module		NZ2GF-CCB	CC-Link IE Field Network - CC-Link bridge module
		NZ2AW1GFAL	CC-Link IE Field Network - AnyWireASLINK bridge module

*1: A connector for Power supply and FG is required with e-CON and MIL connector type remote I/O module. Please refer to the sale parts list below.
*2: A sensor connector is required with e-CON connector type remote I/O module.

CC-Link Related Products

Type		Model	Specifications	Protection level
Master/local module		RJ61BT11	Master/local module for MELSEC iQ-R Series CC-Link Ver.2-compatible	-
		QJ61BT11N	Master/local module for MELSEC-Q Series CC-Link Ver.2-compatible	-
		L26CPU-BT	CPU with master/local function for MELSEC-L Series CC-Link Ver.2-compatible Sink output type	-
		L26CPU-PBT	CPU with master/local function for MELSEC-L Series CC-Link Ver.2-compatible Source output type	-
		LJ61BT11	Master/local module for MELSEC-L Series CC-Link Ver.2-compatible	-
		FX3U-16CCL-M	Master block for MELSEC-FX Series (FX3G/FX3U/FX3GC/FX3UC) CC-Link Ver.2-compatible	-
Bridge module		NZ2GF-CCB	CC-Link IE Field Network-CC-Link bridge module	-
		NZ2AW1C1BY	CC-Link-AnyWire Bitty bridge module	IP2X
		NZ2AW1C2D2	CC-Link-AnyWire DB A20bridge module Only for CC-Link Ver.2 use	IP2X
		NZ2AW1C2AL	CC-Link-AnyWireASLINK bridge module CC-Link Ver.2 compatible	IP2X
Remote I/O module	Screw terminal block type	AJ65SBTB2N-8A	Input 8 points: 100...120 V AC 2-wire type Response time 20 ms Terminal block type	IP1X
		AJ65SBTB2N-16A	Input 16 points: 100...120 V AC 2-wire type Response time 20 ms Terminal block type	IP1X
		AJ65SBTB1-8D	Input 8 points: 24 V DC (positive/negative common shared) 1-wire type Terminal block type Response time 1.5 ms	IP2X
		AJ65SBTB3-8D	Input 8 points: 24 V DC (positive/negative common shared) 3-wire type Terminal block type Response time 1.5 ms	IP2X
		AJ65SBTB1-16D	Input 16 points: 24 V DC (positive/negative common shared) 1-wire type Terminal block type Response time 1.5 ms	IP2X
		AJ65SBTB1-16D1	Input 16 points: 24 V DC (positive/negative common shared) 1-wire type High-speed response Terminal block type Response time 0.2 ms	IP2X
		AJ65SBTB3-16D	Input 16 points: 24 V DC (positive/negative common shared) 3-wire type Terminal block type Response time 1.5 ms	IP2X
		AJ65SBTB3-16D5	Input 16 points: 5 V DC (positive/negative common shared) 3-wire type Terminal block type Response time 1.5 ms	IP2X
		AJ65SBTB3-16KD	Input 16 points: 24 V DC (positive/negative common shared) 3-wire type Terminal block type Response time 0.2/1.5/5/10 ms switching type	IP2X
		AJ65SBTB1-32D	Input 32 points: 24 V DC (positive/negative common shared) 1-wire type Terminal block type Response time 1.5 ms	IP2X
		AJ65SBTB1-32D1	Input 32 points: 24 V DC (positive/negative common shared) 1-wire type High-speed response Terminal block type Response time 0.2 ms	IP2X
		AJ65SBTB1-32D5	Input 32 points: 5 V DC (positive/negative common shared) 1-wire type Terminal block type Response time 1.5 ms	IP2X
		AJ65SBTB1-32KD	Input 32 points: 24 V DC (positive/negative common shared) 1-wire type Terminal block type Response time 0.2/1.5/5/10 ms switching type	IP2X
		AJ65SBTB1-8T	Output 8 points: 12/24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type	IP2X
		AJ65SBTB1-8T1	Output 8 points: 12/24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB2-8T	Output 8 points: 12/24 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type	IP2X
		AJ65SBTB2-8T1	Output 8 points: 12/24 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB1-16T	Output 16 points: 12/24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type	IP2X
		AJ65SBTB1-16T1	Output 16 points: 12/24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB2-16T	Output 16 points: 12/24 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type	IP2X
		AJ65SBTB2-16T1	Output 16 points: 12/24 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB1-32T	Output 32 points: 12/24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type	IP2X
		AJ65SBTB1-32T1	Output 32 points: 12/24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB1-8TE	Output 8 points: 12/24 V DC (0.1 A) Transistor output (source type) 1-wire type Terminal block type	IP2X
		AJ65SBTB1-16TE	Output 16 points: 12/24 V DC (0.1 A) Transistor output (source type) 1-wire type Terminal block type	IP2X
		AJ65SBTB1B-16TE1	Output 16 points: 12/24 V DC (0.5 A) Transistor output (source type) 1-wire type Terminal block type	IP2X
		AJ65SBTB1-32TE1	Output 32 points: 12/24 V DC (0.5 A) Transistor output (source type) 1-wire type Terminal block type	IP2X
		AJ65SBTB2N-8R	Output 8 points: 24 V DC/240 V AC (2 A) Relay output 2-wire type Terminal block type	IP1X
		AJ65SBTB2N-16R	Output 16 points: 24 V DC/240 V AC (2 A) Relay output 2-wire type Terminal block type	IP1X
		AJ65SBTB2N-8S	Output 8 points: 100...240 V AC (0.6 A) Triac output 2-wire type Terminal block type	IP1X
		AJ65SBTB2N-16S	Output 16 points: 100...240 V AC (0.6 A) Triac output 2-wire type Terminal block type	IP1X
		AJ65SBTB32-8DT	Input 4 points: 24 V DC (positive common) 3-wire type Response time 1.5 ms Output 4 points: 24 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type	IP2X
		AJ65SBTB32-8DT2	Input 4 points: 24 V DC (positive common) 3-wire type Response time 1.5 ms Output 4 points: 24 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB1-16DT	Input 8 points: 24 V DC (positive common)1-wire type Response time 1.5 ms Output 8 points: 24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type	IP2X
		AJ65SBTB1-16DT1	Input 8 points: 24 V DC (positive common)1-wire type High-speed response Response time 0.2 ms Output 8 points: 24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type	IP2X
		AJ65SBTB1-16DT2	Input 8 points: 24 V DC (positive common) 1-wire type Response time 1.5 ms Output 8 points: 24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB1-16DT3	Input 8 points: 24 V DC (positive common) 1-wire type High-speed response Response time 0.2 ms Output 8 points: 24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB32-16DT	Input 8 points: 24 V DC (positive common) 3-wire type Response time 1.5 ms Output 8 points: 24 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type	IP2X
		AJ65SBTB32-16DT2	Input 8 points: 24 V DC (positive common) 3-wire type Response time 1.5 ms Output 8 points: 24 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB32-16KDT2	Input 8 points: 24 V DC (positive common) 3-wire type Response time 0.2/1.5/5/10 ms switching type Output 8 points: 24 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB32-16KDT8	Input 8 points: 24 V DC (positive common) 3-wire type Response time 0.2/1.5/5/10 ms switching type Output 8 points: 12 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB32-16KDR	Input 8 points: 24 V DC (positive/negative common shared) 3-wire type Response time 0.2/1.5/5/10 ms switching type Output 8 points: 24 V DC/240 V AC (2 A) Relay output 2-wire type Terminal block type	IP1X
		AJ65SBTB1-32DT	Input 16 points: 24 V DC (positive common) 1-wire type Response time 1.5 ms Output16 points: 24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type	IP2X
		AJ65SBTB1-32DT1	Input 16 points: 24 V DC (positive common) 1-wire type High-speed response Response time 0.2 ms Output16 points: 24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type	IP2X
		AJ65SBTB1-32DT2	Input 16 points: 24 V DC (positive common) 1-wire type Response time 1.5 ms Output16 points: 24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB1-32DT3	Input 16 points: 24 V DC (positive common) 1-wire type High-speed response Response time 0.2 ms Output16 points: 24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB1-32DTE1	Input 16 points: 24 V DC (negative common) 1-wire type Response time 1.5 ms Output16 points: 24 V DC (0.5 A) Transistor output (source type) 1-wire type Terminal block type	IP2X
		AJ65SBTB32-16DR	Input 8 points: 24 V DC (positive/negative common shared) 3-wire type Response time 1.5 ms Output 8 points: 24 V DC/240 V AC (2 A) Relay output 2-wire type Terminal block type	IP1X
		AJ65SBTB1-32KDT2	Input 16 points: 24 V DC (positive common) 1-wire type Response time 0.2/1.5/5/10 ms switching type Output16 points: 24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65SBTB1-32KDT8	Input 16 points: 12 V DC (positive common) 1-wire type Response time 0.2/1.5/5/10 ms switching type Output16 points: 12 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type (low-leakage current type)	IP2X

CC-Link Related Products

Type		Model	Specifications	Protection level
Remote I/O module	Screw/2-piece terminal block type	AJ65BTB1-16D	Input 16 points: 24 V DC (positive/negative common shared) 1-wire type Terminal block type Response time 10 ms	IP2X
		AJ65BTB2-16D	Input 16 points: 24 V DC (positive/negative common shared) 2-wire type Terminal block type Response time 10 ms	IP2X
		AJ65BTB1-16T	Output 16 points: 12/24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type	IP2X
		AJ65BTB2-16T	Output 16 points: 12/24 V DC (0.5 A) Transistor output (sink type) 2-wire type Terminal block type	IP2X
		AJ65BTB2-16R	Output 16 points: 24 V DC/240 V AC (2 A) Relay output 2-wire type Terminal block type	IP1X
		AJ65BTB1-16DT	Input 8 points: 24 V DC (positive common) Response time 10 ms Output 8 points: 12/24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type	IP2X
		AJ65BTB2-16DT	Input 8 points: 24 V DC (positive common) Response time 10 ms Output 8 points: 12/24 V DC (0.5 A)Transistor output (sink type) 2-wire type Terminal block type	IP2X
		AJ65BTB2-16DR	Input 8 points: 24 V DC (positive/negative common shared) Response time 10 ms Output 8 points: 24 V DC/240 V AC (2 A) Relay output 2-wire type Terminal block type	IP1X
	A2C form terminal block type	AJ65DBTB1-32D	Input 32 points: 24 V DC (positive/negative common shared) 1-wire type Terminal block type Response time 10 ms	IP2X
		AJ65DBTB1-32T1	Output 32 points: 12/24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type (low-leakage current type)	IP2X
		AJ65DBTB1-32R	Output 32 points: 24 V DC/240 V AC (2 A) Relay output 1-wire type Terminal block type	IP1X
		AJ65DBTB1-32DT1	Input 16 points: 24 V DC (positive common) Response time 10 ms Output 16 points: 12/24 V DC (0.5 A) Transistor output (sink type) 1-wire type Terminal block type	IP2X
		AJ65DBTB1-32DR	Input 16 points: 24 V DC (positive/negative common shared) Response time 10 ms Output 16 points: 24 V DC/240 V AC (2 A) Relay output 1-wire type Terminal block type	IP1X
	Spring clamp terminal block push-in type	AJ65ABTP3-16D	Input 16 points: 24 V DC/6 mA (positive common) 3-wire type Response time 1.5 ms	IP1XB
		AJ65ABTP3-16DE	Input 16 points: 24 V DC/6 mA (negative common) 3-wire type Response time 1.5 ms	IP1XB
	Spring clamp terminal block type	AJ65VBTS3-16D	Input 16 points: 24 V DC/5 mA (negative common) 3-wire type Response time 1.5 ms	IP1XB
		AJ65VBTS3-32D	Input 32 points: 24 V DC/5 mA (negative common) 3-wire type Response time 1.5 ms	IP1XB
		AJ65VBTS2-16T	Output 16 points: 12/24 V DC (0.5 A) Transistor output (sink type) 2-wire type	IP1XB
		AJ65VBTS2-32T	Output 32 points: 12/24 V DC (0.5 A) Transistor output (sink type) 2-wire type	IP1XB
		AJ65VBTS32-16DT	Input 8 points: 24 V DC/5 mA (positive common) 3-wire type Response time 1.5 ms Output 8 points: 24 V DC (0.5 A) Transistor output (sink type) 2-wire type	IP1XB
		AJ65VBTS32-32DT	Input 16 points: 24 V DC/5 mA (positive common) 32-wire type Response time 1.5 ms Output 16 points: 12/24 V DC (0.5 A) Transistor output (sink type) 2-wire type	IP1XB
	Sensor connector type	AJ65VBTCE3-8D	Input 8 points: 24 V DC/5 mA (positive common) 3-wire type Response time 1.5 ms	IP1XB
		AJ65VBTCE3-16D	Input 16 points: 24 V DC/5 mA (positive common) 3-wire type Response time 1.5 ms	IP1XB
		AJ65VBTCE3-32D	Input 32 points: 24 V DC/5 mA (positive common) 3-wire type Response time 1.5 ms	IP1XB
		AJ65VBTCE3-16DE	Input 16 points: 24 V DC/5 mA (negative common) 3-wire type Response time 1.5 ms	IP1XB
		AJ65VBTCE3-32DE	Input 32 points: 24 V DC/5 mA (negative common) 3-wire type Response time 1.5 ms	IP1XB
		AJ65VBTCE2-8T	Output 8 points: 12/24 V DC (0.1 A) Transistor output (sink type) 2-wire type	IP1XB
		AJ65VBTCE2-16T	Output 16 points: 12/24 V DC (0.1 A) Transistor output (sink type) 2-wire type	IP1XB
		AJ65VBTCE3-16TE	Output 16 points: 12/24 V DC (0.1 A) Transistor output (source type) 3-wire type	IP1XB
		AJ65VBTCE32-16DT	Input 8 points: 24 V DC/5 mA (positive common) 3-wire type Response time 1.5 ms Output 8 points: 24 V DC (0.1 A) Transistor output (sink type) 2-wire type	IP1XB
		AJ65VBTCE3-16DTE	Input 8 points: 24 V DC/5 mA (negative common) 3-wire type Response time 1.5 ms Output 8 points: 24 V DC (0.1 A) Transistor output (source type) 3-wire type	IP1XB
		AJ65VBTCE32-32DT	Input 16 points: 24 V DC/5 mA (positive common) 3-wire type Response time 1.5 ms Output 16 points: 24 V DC (0.1 A) Transistor output (sink type) 2-wire type	IP1XB
		AJ65VBTCE3-32DTE	Input 16 points: 24 V DC/5 mA (negative common) 3-wire type Response time 1.5 ms Output 16 points: 24 V DC (0.1 A) Transistor output (source type) 3-wire type	IP1XB
	One-touch connector type	AJ65VBTCU3-8D1	Input 8 points: 24 V DC (positive common) 3-wire type Response time 0.2 ms One-touch connector type	IP1XB
		AJ65VBTCU3-16D1	Input 16 points: 24 V DC (positive common) 3-wire type Response time 0.2 ms One-touch connector type	IP1XB
		AJ65SBTC4-16DN	Input 16 points: 24 V DC (positive common) 4-wire type Response time 1.5 ms One-touch connector type	IP2X
		AJ65SBTC4-16DE	Input 16 points: 24 V DC (negative common) 4-wire type Response time 1.5 ms One-touch connector type	IP2X
		AJ65SBTC1-32D	Input 32 points: 24 V DC (positive/negative common shared) 1-wire type One-touch connector type (plug: sold separately) Response time 1.5 ms	IP2X
		AJ65SBTC1-32D1	Input 32 points: 24 V DC (positive/negative common shared) 1-wire type High-speed response One-touch connector type (plug: sold separately) Response time 0.2 ms	IP2X
		AJ65VBTCU2-8T	Output 8 points: 12/24 V DC (0.1 A) Transistor output (sink type) 2-wire type One-touch connector type	IP1XB
		AJ65VBTCU2-16T	Output 16 points: 12/24 V DC (0.1 A) Transistor output (sink type) 2-wire type One-touch connector type	IP1XB
		AJ65SBTC1-32T	Output 32 points: 12/24 V DC (0.1 A) Transistor output (sink type) 1-wire type One-touch connector type (plug: sold separately)	IP2X
		AJ65SBTC1-32T1	Output 32 points: 12/24 V DC (0.1 A) Transistor output (sink type) 1-wire type One-touch connector type (low-leakage current type)	IP2X
		AJ65SBTC4-16DT	Input 8 points: 24 V DC (positive common) 4-wire type (for 8 sensors) Response time 1.5 ms Output 8 points: 24 V DC (0.5 A) Transistor output (sink type) 4-wire type One-touch connector type (plug: sold separately)	IP2X
		AJ65SBTC4-16DT2	Input 8 points: 24 V DC (positive common) 4-wire type Response time 1.5 ms Output 8 points: 24 V DC (0.5 A) Transistor output (sink type) 4-wire type One-touch connector type (plug: sold separately) (low-leakage current type)	IP2X
		AJ65SBTC1-32DT	Input 16 points: 24 V DC (positive common) 1-wire type Response time 1.5 ms Output 16 points: 24 V DC (0.1 A) Transistor output (sink type) 1-wire type One-touch connector type (plug: sold separately)	IP2X
		AJ65SBTC1-32DT1	Input 16 points: 24 V DC (positive common) 1-wire type High-speed response Response time 0.2 ms Output 16 points: 24 V DC (0.1 A) Transistor output (sink type) 1-wire type One-touch connector type (plug: sold separately)	IP2X
		AJ65SBTC1-32DT2	Input 16 points: 24 V DC (positive common) 1-wire type Response time 1.5 ms Output 16 points: 24 V DC (0.1 A) Transistor output (sink type) 1-wire type One-touch connector type (plug: sold separately) (low-leakage current type)	IP2X
		AJ65SBTC1-32DT3	Input 16 points: 24 V DC (positive common) 1-wire type High-speed response Response time 0.2 ms Output 16 points: 24 V DC (0.1 A) Transistor output (sink type) 1-wire type One-touch connector type (plug: sold separately) (low-leakage current type)	IP2X
	40-pin connector type (FCN connector type)	AJ65SBTCF1-32D	Input 32 points: 24 V DC (positive/negative common shared) 1-wire type Response time 1.5 ms FCN connector type (40-pin connector)	IP2X
		AJ65BTC1-32D	Input 32 points: 24 V DC (positive/negative common shared) 1-wire type Response time 10 ms FCN connector type (40-pin connector)	IP2X
		AJ65SBTCF1-32T	Output 32 points: 12/24 V DC (0.1 A) Transistor output (sink type) 1-wire type FCN connector type (40-pin connector)	IP2X
		AJ65BTC1-32T	Output 32 points: 12/24 V DC (0.1 A) Transistor output (sink type) 1-wire type FCN connector type (40-pin connector)	IP2X
		AJ65SBTCF1-32DT	Input 16 points: 24 V DC (positive/negative common shared) 1-wire type Response time 1.5 ms Output 16 points: 12/24 V DC (0.1 A) Transistor output (sink type) 1-wire type FCN connector type (40-pin connector)	IP2X
		AJ65VBTCF1-32DT1	Input 16 points: 24 V DC (positive/negative common shared) 1-wire type Response time 0.2 ms Output 16 points: 12/24 V DC (0.1 A) Transistor output (sink type) 1-wire type FCN connector type	IP1XB
		AJ65VBTCFJ1-32DT1	Input 16 points: 24 V DC (positive common) 1-wire type Response time 0.2 ms Shared power supply for module and I/O parts Output 16 points: 24 V DC (0.1 A) Transistor output (sink type) 1-wire type FCN connector type	IP1XB

* Positive common: sink type, negative common: source type

CC-Link Related Products

Type			Model	Specifications	Protection level
Remote I/O module	Waterproof connector type		AJ65FBTA4-16D	Input 24 V DC (positive common) 4-wire type Low profile waterproof type Response time 1.5 ms	IP67
			AJ65FBTA4-16DE	Input 24 V DC (negative common) 4-wire type Low profile waterproof type Response time 1.5 ms	IP67
			AJ65FBTA2-16T	Output 16 points: 12/24 V DC (0.5 A) Transistor output (sink type) 2-wire type Low profile type	IP67
			AJ65FBTA2-16TE	Output 16 points: 12/24 V DC (1.0 A) Transistor output (source type) 2-wire type Low profile waterproof type	IP67
			AJ65FBTA42-16DT	Input 8 points: 24 V DC (positive common) 4-wire type Response time 1.5 ms Output 8 points: 24 V DC (0.5 A)Transistor output sink type 2-wire type Low profile waterproof type	IP67
			AJ65FBTA42-16DTE	Input 8 points: 24 V DC (negative common) 4-wire type Response time 1.5 ms Output 8 points: 24 V DC (1.0 A) Transistor output (source type) 2-wire type Low profile waterproof type	IP67
Safety relay module	Spring clamp terminal block type		QS90SR2SP-CC	For CC-Link Safety input: 1 point (2 inputs) P type (positive common/positive common input) Safety output: 1 point (3 outputs)	IP1X
			QS90SR2SN-CC	For CC-Link Safety input: 1 point (2 inputs) N type (positive common/negative common input) Safety output: 1 point (3 outputs)	IP1X
Safety controller	Spring clamp terminal block type		WS0-GCC100202	CC-Link interface module for WS series	-
Analog module	Screw terminal block type	Voltage/ current input	AJ65SBT-64AD	4-channel voltage/current input A/D conversion module (analog input module)	IP2X
			AJ65SBT2B-64AD	4-channel voltage/current input A/D conversion module (analog input module) High accuracy, high resolution, high speed	IP2X
			AJ65BT-64AD	4-channel voltage/current input A/D conversion module (analog input module) Screw/2-Piece terminal block type	IP2X
		Temperature input	AJ65BT-64RD3	4-channel Pt100 (3-wire type) input Platinum RTD Pt100 temperature input	IP2X
			AJ65BT-64RD4	4-channel Pt100 (4-wire type) input Platinum RTD Pt100 temperature input	IP2X
			AJ65SBT2B-64TD	4-channel thermocouple input Thermocouple temperature input module	IP2X
			AJ65BT-68TD	8-channel thermocouple input Thermocouple temperature input module	IP2X
			AJ65SBT2B-64RD3	4-channel RTD input module	IP2X
		Voltage/current output	AJ65SBT-62DA	2-channel voltage/current output D/A conversion module (analog output module)	IP2X
			AJ65SBT2B-64DA	4-channel voltage/current output D/A conversion module (analog output module)	IP2X
		Voltage output	AJ65BT-64DAV	4-channel voltage output D/A conversion module (analog output module)	IP2X
		Current output	AJ65BT-64DAI	4-channel current output D/A conversion module (analog output module)	IP2X
	One-touch connector type	Voltage input	AJ65VBTCU-68ADVN	8-channel voltage input A/D conversion module (analog input module) CC-Link Ver.2-compatible	IP1XB
		Current input	AJ65VBTCU-68ADIN	8-channel current input A/D conversion module (analog input module) CC-Link Ver.2-compatible	IP1XB
		Voltage output	AJ65VBTCU-68DAVN	8-channel voltage output D/A conversion module (analog output module) CC-Link Ver.2-compatible	IP1XB
High-speed counter module			AJ65BT-D62	DC input Preset DC input	IP2X
			AJ65BT-D62D	Differential input Preset DC input	IP2X
			AJ65BT-D62D-S1	Differential input Preset differential input	IP2X
Positioning module			AJ65BT-D75P2-S3	2 axes (independent, with/ linear and circular interpolation)	IP2X
RS-232 interface module			AJ65BT-R2N	RS-232 1-channel, with/ DC input 2 points Transistor output 2 points	IP2X
Network interface board			Q81BD-J61BT11	CC-Link interface board for an IBM PC/AT compatible PC (for PCI Express bus slot: master station, standby master station or local station)	-
			Q80BD-J61BT11N	CC-Link interface board for an IBM PC/AT compatible PC (for PCI bus slot: master station, standby master station or local station)	-
FX Series interface block			FX_{3U}-64CCL	Interface block for FX_{3G}, FX_{3U}, FX_{3GC}, FX_{3UC} Series	-
			FX_{2N}-32CCL	Interface block for FX_{3G}, FX_{3U}, FX_{3GC}, FX_{3UC} Series	-
Repeater module	Low profile waterproof type repeater hub module		AJ65FBTA-RPH	8-port star wiring hub module with repeater function, IP67-compatible	IP67
	Spring clamp terminal block type repeater hub module		AJ65BTS-RPH	8-port star wiring hub module with repeater function, spring clamp terminal block type	IP2X
	Repeater module (T-branch)		AJ65SBT-RPT	T-branch module with repeater function	IP2X
	Optical repeater module		AJ65SBT-RPS	For SI/QSI type fiber cable (Use 2 modules as a set)	IP2X
			AJ65SBT-RPG	For GI type fiber cable (Use 2 modules as a set)	IP2X
	Space optical repeater module		AJ65BT-RPI-10A	AJ65BT-RPI-10A and AJ65BT-RPI-10B used as a pair, 156 k/625 k/2.5 Mbps supported	IP2X
			AJ65BT-RPI-10B		IP2X
Embedded type I/O module			AJ65MBTL1N-16D	Input 16 points : 24 V DC (positive common) Pin header type 44-pin (2 rows) Embedded type Response time 1.5 ms	-
			AJ65MBTL1N-16T	Output 16 points : 12/24 V DC (0.1 A) Transistor output (sink type) Pin header type 44-pin (2 rows) Embedded type	-
			AJ65MBTL1N-16DT	Input 8 points : 24 V DC (positive common) Response time 1.5 ms Output 8 points : 24 V DC (0.1 A) Transistor output (sink type) Pin header type 44-pin (2 rows) Embedded type	-
			AJ65MBTL1N-32D	Input 32 points : 24 V DC (positive common) Pin head type 62-pin (2 rows) Embedded type Response time 1.5 ms	-
			AJ65MBTL1N-32T	Output 32 points : 12/24 V DC (0.1 A) Transistor output (sink type) Pin head type 62-pin (2 rows) Embedded type	-
Embedded type interface board			Q50BD-CCV2	Master/local/intelligent device station CC-Link Ver.2 compatible	-
Object development	MFP1N		A6GA-CCMFP1NN60F	Communication LSI for lead-free/RoHS compatible master/local/intelligent device station (60 pcs)	-
			A6GA-CCMFP1NN300F	Communication LSI for lead-free/RoHS compatible master/local/intelligent device station (300 pcs)	-
	Device kit		Q6KT-NPC2OG51	For network circuit (Flash ROM x 1pc, SPLD x 2 pcs)	-
Dedicated communication LSI	MFP2AN		A6GA-CCMFP2ANN 60F	Communication LSI for lead-free/RoHS compatible remote I/O station (16 points) (60 pcs)	-
			A6GA-CCMFP2ANN 300F	Communication LSI for lead-free/RoHS compatible remote I/O station (16 points) (300 pcs)	-
	MFP2N		A6GA-CCMFP2NN 60F	Communication LSI for lead-free/RoHS compatible remote I/O station (32 points) (60 pcs)	-
			A6GA-CCMFP2NN 300F	Communication LSI for lead-free/RoHS compatible remote I/O station (32 points) (300 pcs)	-
	MFP3N		A6GA-CCMFP3NN 60F	Communication LSI for lead-free/RoHS compatible remote device station (60 pcs)	-
			A6GA-CCMFP3NN 300F	Communication LSI for lead-free/RoHS compatible remote device station (300 pcs)	-

* Positive common: sink type, negative common: source type

CC-Link Related Products

Type			Model	Specifications	Protection level
Master module			QJ61CL12	CC-Link/LT master module for MELSEC-Q Series	-
			LJ61CL12	CC-Link/LT master module for MELSEC-L Series	-
			FX_{2N}-64CL-M	CC-Link/LT master module for MELSEC-FX_{3N} and FX_{3NUC}	-
			FX_{3UC}-32MT-LT (-2)*1	MELSEC-FX_{3UC} series CC-Link/LT programmable controller (built-in master function)	-
Bridge module			AJ65SBT-CLB	CC-Link - CC-Link/LT bridge module	IP2X
Remote I/O module	Screw terminal block type		CL1X4-D1B2	Input 4 points: 24 V DC (positive/negative common shared)	IP2X
			CL2X8-D1B2	Input 8 points: 24 V DC (positive/negative common shared)	IP2X
			CL1Y4-T1B2	Output 4 points: 12/24 V DC (sink type) 0.1 A Transistor output	IP2X
			CL2Y8-TP1B2	Output 8 points: 12/24 V DC (sink type) 0.1 A Transistor module (with output protection function)	IP2X
			CL1Y4-R1B2	Output 4 points: 30 V DC, ≤ 250 V AC 2 A Relay output	IP1X
			CL1Y4-R1B1	Output 4 points: 30 V DC, ≤ 250 V AC 2 A Relay output 1 point 1 common (independent)	IP1X
			CL1XY4-DT1B2	Input 2 points: 24 V DC (positive/negative common shared) Output 2 points: 12/24 V DC (sink type) 0.1 A Transistor output	IP2X
			CL1XY8-DT1B2	Input 4 points: 24 V DC (positive/negative common shared) Output 4 points: 12/24 V DC (sink type) 0.1 A Transistor output	IP2X
			CL1XY4-DR1B2	Input 2 points: 24 V DC (positive/negative common shared) Output 2 points: 30 V DC, ≤ 250 V AC (sink type) 2 A Relay output	IP1X
			CL1XY8-DR1B2	Input 4 points: 24 V DC (positive/negative common shared) Output 4 points: 30 V DC, ≤ 250 V AC 2 A Relay output	IP1X
	Spring clamp terminal block type		CL1X4-D1S2	Input 4 points: 24 V DC (positive/negative common shared)	IP2X
			CL2X8-D1S2	Input 8 points: 24 V DC (positive/negative common shared)	IP2X
			CL1Y4-T1S2	Output 4 points: 12/24 V DC (sink type) 0.1 A Transistor output	IP2X
			CL2Y8-TP1S2	Output 8 points: 12/24 V DC (sink type) 0.1 A Transistor output (output protection function)	IP2X
			CL2Y8-TPE1S2	Output 8 points: 12/24 V DC (source type) 0.1 A Transistor output (output protection function)	IP2X
	Sensor connector type (e-CON)		CL1X4-D1C3	Input 4 points: 24 V DC (positive common)	IP2X
			CL2X8-D1C3V	Input 8 points: 24 V DC (positive common)	IP2X
			CL2X16-D1C3V	Input 16 points: 24 V DC (positive common)	IP2X
			CL1Y4-T1C2	Output 4 points: 24 V DC (sink type) 0.1 A Transistor output	IP2X
			CL2Y8-TP1C2V	Output 8 points: 24 V DC (sink type) 0.1 A Transistor module (output protection function)	IP2X
			CL2Y16-TP1C2V	Output 16 points: 24 V DC (sink type) 0.1 A Transistor module (output protection function)	IP2X
			CL2XY16-DTP1C5V	Input 8 points: 24 V DC (positive common) Output 8 points: 24 V DC (sink type) 0.1 A Transistor module (output protection function)	IP2X
	MIL connector type		CL2X16-D1M1V	Input 16 points: 24 V DC (positive common)	IP2X
			CL2X16-D1MJ1V	Input 16 points: 24 V DC (positive common) Shared power supply for module and I/O parts	IP2X
			CL2Y16-TP1M1V	Output 16 points: 12/24 V DC (sink type) 0.1 A Transistor module (output protection function)	IP2X
			CL2Y16-TP1MJ1V	Output 16 points: 24 V DC (sink type) 0.1 A Transistor module (output protection function) Shared power supply for module and I/O parts	IP2X
			CL2Y16-TPE1M1V	Output 16 points: 12/24 V DC (source type) 0.1 A Transistor module (output protection function)	IP2X
	Cable type		CL1X2-D1D3S	Input 2 points: 24 V DC (positive common)	IP2X
			CL1Y2-T1D2S	Output 2 points: 24 V DC (sink type) 0.1 A Transistor output	IP2X
			CL1XY2-DT1D5S	Input 1 points: 24 V DC (positive common) Output 1 points: 24 V DC (sink type) 0.1 A Transistor output	IP2X
Analog module	Screw terminal block type	Voltage/current input	CL2AD4-B	4-channel voltage/current input A/D conversion module (analog input module)	IP2X
		Voltage/current output	CL2DA2-B	2-channel voltage/current output D/A conversion module (analog output module)	IP2X
Dedicated power supply			CL1PSU-2A	CC-Link/LT dedicated power supply (2 A)	IP1X
Power supply adapter			CL1PAD1	Power adapter (5 A) for CL1PAD1 CC-Link/LT	-
Communication LSI for master station	CLC13		CL2GA13-60	Communication LSI for lead-free/RoHS compatible master station (60 pcs)	-
Communication LSI for remote I/O station	CLC21		CL2GA21-60	Communication LSI for lead-free/RoHS compatible remote I/O station (60 pcs)	-
			CL2GA21-300	Communication LSI for lead-free/RoHS compatible remote I/O station (300 pcs)	-
Communication LSI for remote device station	CLC31		CL2GA31-60	Communication LSI for remote device station (60 pcs)	-
Accessories	Common terminal block		CL2TE-5	Common terminal block for screw terminal block type modules (applicable model: CL2X8-D1B2, CL2Y8-TP1B2, CL2AD4-B)	-
			CL2TE-10S	Common terminal block for spring clamp terminal block type modules (applicable model : CL2X8-D1S2)	-
	Holder		CL1-HLD	Holder for cable type installation (5 pcs)	-

*1: CC-Link/LT parameters for FX_{3UC}-32MT-LT-2 can be configured with GX Works2, GX Developer or display modules.

MELSECNET/H Related Product

[Legend] DB : Double brand product (Note)

Type		Model	Outline
MELSECNET/H (10)	Optical loop (SI)	Q81BD-J71LP21-25	PCI Express bus, Japanese/English OS compatible, SI/QSI/H-PCF/broadband H-PCF fiber optic cable, dual loop, control network (control/normal station)
		Q80BD-J71LP21-25	PCI bus, Japanese/English OS compatible, SI/QSI/H-PCF/broadband H-PCF fiber optic cable, dual loop, control network (control/normal station)
		Q80BD-J71LP21S-25	PCI bus, Japanese/English OS compatible, SI/QSI/H-PCF/broadband H-PCF fiber optic cable, dual loop, control network (control/normal station), with external power supply function
	Optical loop (GI)	Q80BD-J71LP21G	PCI bus, Japanese/English OS compatible, GI-50/125 fiber optic cable, dual loop, control network (control/normal station)
	Coaxial bus	Q80BD-J71BR11	PCI bus, Japanese/English OS compatible, 3C-2V/5C-2V coaxial cable, single bus, control network (control/normal station)

Ethernet Related Product

Wireless LAN Adapter	U.S.A.	NZ2WL-US*1*2 DB	Conforms to IEEE 802.11a, IEEE 802.11b, IEEE 802.11g standards
	Europe	NZ2WL-EU*1*2 DB	Conforms to IEEE 802.11a, IEEE 802.11b, IEEE 802.11g standards
	China	NZ2WL-CN*1*2 DB	Conforms to IEEE 802.11a, IEEE 802.11b, IEEE 802.11g standards
	Korea	NZ2WL-KR*1*2 DB	Conforms to IEEE 802.11a, IEEE 802.11b, IEEE 802.11g standards
	Taiwan	NZ2WL-TW*1*2 DB	Conforms to IEEE 802.11a, IEEE 802.11b, IEEE 802.11g standards
Industrial switching HUB		NZ2EHG-T8 DB	10 Mbps/100 Mbps/1 Gbps AUTO-MDIX, DIN rail supported, 8 ports
		NZ2EHF-T8 DB	10 Mbps/100 Mbps AUTO-MDIX, DIN rail supported, 8 ports
CC-Link IE Field Network Ethernet Adapter		NZ2GF-ETB	Compatible with Ethernet devices, transmission rate: 100 Mbps/1 Gbps

*1: Each product is usable only in the respective country.
*2: Both access points and stations are supported, and can be switched with the settings.

Note: General specifications and product guarantee conditions of jointly developed products are different from those of MELSEC products.
For more information, please refer to the product manuals or contact your local Mitsubishi representative for details.

MELSEC Common Options

Connector, Connector/terminal block conversion module, Relay terminal module

Type		Model	Outline
Connector		A6CON1	32-point connector soldering type (40-pin connector)
		A6CON2	32-point connector crimp-contact type (40-pin connector)
		A6CON3	32-point connector pressure-displacement (flat cable) type (40-pin connector)
		A6CON4	32-point connector soldering type (40-pin connector, cable connectable in bidirection) (Straight-out/diagonal-out type)
		A6CON1E	32-point connector soldering type (37-pin D-sub connector)
		A6CON2E	32-point connector crimp-contact type (37-pin D-sub connector)
		A6CON3E	32-point connector pressure-displacement (flat cable) type (37-pin D-sub connector)
Connector/terminal block conversion module		A6TBXY36	For positive common input modules and sink output modules (standard type)
		A6TBXY54	For positive common input modules and sink output modules (2-wire type)
		A6TBX70	For positive common input modules (3-wire type)
		A6TBX36-E	For negative common input modules (standard type)
		A6TBX54-E	For negative common input modules (2-wire type)
		A6TBX70-E	For negative common input modules (3-wire type)
		A6TBY36-E	For source output modules (standard type)
		A6TBY54-E	For source output modules (2-wire type)
	Cable	AC05TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 0.5 m
		AC10TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 1 m
		AC20TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 2 m
		AC30TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 3 m
		AC50TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 5 m
		AC80TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 8 m *Common current 0.5 A or lower
		AC100TB	For A6TBXY36, A6TBXY54, and A6TBX70 (positive common/sink type), 10 m *Common current 0.5 A or lower
		AC05TB-E	For A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, and A6TBX70-E (negative common/source type), 0.5 m
		AC10TB-E	For A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, and A6TBX70-E (negative common/source type), 1 m
		AC20TB-E	For A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, and A6TBX70-E (negative common/source type), 2 m
		AC30TB-E	For A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, and A6TBX70-E (negative common/source type), 3 m
		AC50TB-E	For A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, and A6TBX70-E (negative common/source type), 5 m
Relay terminal module		A6TE2-16SRN	For 40-pin connector 24 V DC transistor output modules (sink type)
	Cable	AC06TE	For A6TE2-16SRN, 0.6 m
		AC10TE	For A6TE2-16SRN, 1 m
		AC30TE	For A6TE2-16SRN, 3 m
		AC50TE	For A6TE2-16SRN, 5 m
		AC100TE	For A6TE2-16SRN, 10 m

One-touch connector plugs

Type	Model	Specifications		
		Core wire size of applicable cable	Core wire size of applicable cable	Maximum rated curren
One-touch connector plug (20 pcs)	A6CON-P214 (33104-6000FL*1)	0.14...0.2 mm² (26...24 AWG)	ϕ1.0...1.4 mm	2 A*2
	A6CON-P220 (33104-6100FL*1)		ϕ1.4...2.0 mm	
	A6CON-P514 (33104-6200FL*1)	0.3...0.5 mm² (22...20 AWG)	ϕ1.0...1.4 mm	3 A*2
	A6CON-P520 (33104-6300FL*1)		ϕ1.4...2.0 mm	
One-touch connector plug for communication (10 pcs)	A6CON-L5P (35505-6000-B0M GF*1)	Communication line: 0.5 mm², 20 AWG, Shielded cable: 0.5 mm², 20 AWG Applicable cable size (diameter): ϕ2.2...3.0 mm		
One-touch connector plug for power supply and FG (10 pcs)	A6CON-PW5P (35505-6080-A00 GF*1)	Core wire size of applicable cable: 0.75 mm² (0.66...0.98 mm²), 18 AWG, 0.16 mm or larger for strand diameter, Insulating coating material PVC (heat resistant vinyl), Outer diameter of applicable cable: ϕ2.2...3.0mm, Maximum rated current: 7 A*2		
	A6CON-PW5P-SOD (35505-6180-A00 GF*1)	Core wire size of applicable cable: 0.75 mm² (0.66...0.98 mm²), 18 AWG, 0.16 mm or larger for strand diameter, Insulating coating material PVC (heat resistant vinyl), Outer diameter of applicable cable: ϕ2.0...2.3 mm, Maximum rated current: 7 A*2		
One-touch connector plug with terminating resistor (1 pc)*3	A6CON-TR11N	One-touch connector plug for communication with terminating resistor (110 W) (built-in type)		

*1: Model name by plug manufacturer 3M company.
*2: Keep the current within the allowable of the connected cable.
*3: When the connector type remote I/O is used for the end station, be sure to use this.

Online connector

Online connector for communication (5 pcs)	A6CON-LJ5P (35720-L200-B00 AK*1)	Online connector for communication, 5-pole (10-pin)
Online connector for power supply and FG (5 pcs)	A6CON-PWJ5P (35720-L200-A00 AK*1)	Online connector for power supply, FG 5-pole (10-pin)

*1: Model name by plug manufacturer 3M company.

Protective cover for remote I/O module

Protective cover for 8-point module (10 pcs)	A6CVR-8	AJ65SBTB1-8D, AJ65SBTB1-8T, AJ65SBTB1-8TE, AJ65SBT-RPT, AJ65SBTB1-8T1
	A6CVR-VCE8	AJ65VBTCE3-8D, AJ65VBTCE2-8T
Protective cover for 16-point module (10 pcs)	A6CVR-16	AJ65SBTB1-16D, AJ65SBTB1-16D1, AJ65SBTC1-32D, AJ65SBTC1-32D1, AJ65SBTB3-8D, AJ65SBTB2-8A, AJ65SBTB2N-8A, AJ65SBTB1-16T, AJ65SBTB1-16T1, AJ65SBTC1-32T, AJ65SBTB2-8T, AJ65SBTB1-16TE, AJ65SBTB2-8R, AJ65SBTB2N-8R, AJ65SBTB2-8S, AJ65SBTB2N-8S, AJ65SBTC1-32DT, AJ65SBTC1-32DT1, AJ65SBTC4-16D, AJ65SBTC4-16DT, AJ65SBTB1-16DT, AJ65SBTB1-16DT1, AJ65SBTB32-8DT, AJ65SBT-RPG, AJ65SBT-RPS, AJ65SBTC4-16DN, AJ65SBTC4-16DE, AJ65SBTB2-8T1, AJ65SBTB1-16DT2, AJ65SBTC1-32DT2, AJ65SBTC1-32DT3, AJ65SBTC4-16DT2, AJ65SBTB1-16DT3, AJ65SBTB32-8DT2
	A6CVR-VCE16	AJ65VBTCE3-16D, AJ65VBTCE2-16T, AJ65VBTCE32-16DT, AJ65VBTCE3-16DE, AJ65VBTCE3-16TE, AJ65VBTCE3-16DTE
Protective cover for 32-point module (10 pcs)	A6CVR-32	AJ65SBTB1-32D, AJ65SBTB1-32D1, AJ65SBTB3-16D, AJ65SBTB2-16A, AJ65SBTB2N-16A, AJ65SBTB1-32T, AJ65SBTB1-32T1, AJ65SBTB2-16T, AJ65SBTB2N-16R, AJ65SBTB2-16S, AJ65SBTB2N-16S, AJ65SBTB1-32DT, AJ65SBTB1-32DT1, AJ65SBTB32-16DT, AJ65SBTB2N-16R, AJ65SBTB2-16T1, AJ65SBTB1-32DT3, AJ65SBTB32-16DT2, AJ65SBTB1-32DT2

Protective cap for unused connector

Waterproof cap (20 pcs)	A6CAP-WP2	For protective cover for unused connector, waterproof protective structure: IP67-compatible, applicable for AJ65FBTA□-□ I/O module

Software

MELSOFT iQ Works

* Refer to the "Compatible CPUs" table for individual part names.

Type	Model	Outline
MELSOFT iQ Works	SW1DNC-IQWK-E	Mitsubishi Electric iQ Platform compatible FA Integrated Engineering Software suite with Additional Integrated Functions, CD-ROM Version Mitsubishi Electric iQ Platform compatible System Management Software [MELSOFT Navigator] + Mitsubishi Electric iQ Platform compatible Programmable Controller Engineering Software [MELSOFT GX Works2] + Mitsubishi Electric iQ Platform compatible Motion Controller Engineering Software [MELSOFT MT Works2] + Mitsubishi Electric iQ Platform compatible Screen Design Software [MELSOFT GT Works 3] + Mitsubishi Electric iQ Platform compatible Robot Engineering Software [MELSOFT RT ToolBox2 mini]
	SW1DND-IQWK-E	Mitsubishi Electric iQ Platform compatible FA Integrated Engineering Software suite with Additional Integrated Functions, DVD-ROM Version Mitsubishi Electric iQ Platform compatible System Management Software [MELSOFT Navigator] + Mitsubishi Electric iQ Platform compatible Programmable Controller Engineering Software [MELSOFT GX Works2] + Mitsubishi Electric iQ Platform compatible Motion Controller Engineering Software [MELSOFT MT Works2] + Mitsubishi Electric iQ Platform compatible Screen Design Software [MELSOFT GT Works 3] + Mitsubishi Electric iQ Platform compatible Robot Engineering Software [MELSOFT RT ToolBox2 mini]
MELSOFT GX Works2	SW1DNC-GXW2-E	MELSEC Programmable Controller Programming SW Programming Function + Intelligent Module Function + Simulator Function
MELSOFT MT Works2	SW1DNC-MTW2-E	Mitsubishi Electric iQ Platform compatible Motion Controller Engineering Software
MELSOFT GT Works3	SW1DNC-GTWK3-E	Screen Design Software for GOT + Simple Data Conversion Function + GT SoftGOT 1000 Function + Simulator Function
MELSOFT RT ToolBox2	3D-11C-WINE	Robot Engineering Software with Simulation Function CD-ROM Version
	3D-12C-WINE	Robot Engineering Software mini Simple Version CD-ROM Version

MELSOFT GX Series

Type	Model	Outline	Compatible CPU*						
			Universal model			High Performance model	Basic model	Process CPU	Redundant CPU
			QnUDV	QnU	QnUD(E)				
MELSOFT GX Works3	SW1DND-GXW3-E	Programmable controller engineering software (integrated software for programming, simulating, and setting/monitoring modules) Comes with GX Works2 and GX Developer	Supported by GX Works2 or GX Developer (both come with GX Works3)						
MELSOFT GX Works2	SW1DNC-GXW2-E	Programmable controller engineering software (integrated software for programming, simulating, and setting/monitoring modules) Comes with GX Developer	●	●	●	●	●	●	●
MELSOFT GX Developer	SW8D5C-GPPW-E	MELSEC programmable controller programming software	—	●	●*1	●	●	●	●
	SW8D5C-GPPW-EV	MELSEC programmable controller programming software (upgrade)	—	●	●*1	●	●	●	●
MELSOFT GX Simulator*3	SW7D5C-LLT-E	MELSEC programmable controller simulation software	—	●	●*1	●	●	●	●
	SW7D5C-LLT-EV	MELSEC programmable controller simulation software (upgrade)	—	●	●*1	●	●	●	●
MELSOFT GX Converter*3	SW0D5C-CNVW-E	Excel®/text data converter	—	—	—	●	●	●	●
MELSOFT GX Configurator-AD*3	SW2D5C-QADU-E	Analog to digital conversion module setting/monitoring tool	—	●	●*1	●	●	●	●
MELSOFT GX Configurator-DA*3	SW2D5C-QDAU-E	Digital to analog conversion module setting/monitoring tool	—	●	●*1	●	●	●	●
MELSOFT GX Configurator-SC*3	SW2D5C-QSCU-E	MELSEC-Q dedicated serial communication module setting/monitoring tool	—	●	●*1	●	●	●	●
MELSOFT GX Configurator-CT*3	SW0D5C-QCTU-E	MELSEC-Q dedicated high-speed counter module setting/monitoring tool	—	●	●*1	●	●	●	●
MELSOFT GX Configurator-TC*3	SW0D5C-QTCU-E	MELSEC-Q dedicated temperature control module setting/monitoring tool	—	●	●*1	●	●	●	●
MELSOFT GX Configurator-TI*3	SW1D5C-QTIU-E	MELSEC-Q dedicated temperature input module setting/monitoring tool	—	●	●*1	●	●	●	●
MELSOFT GX Configurator-FL*3	SW0D5C-QFLU-E	MELSEC-Q dedicated FL-net module setting/monitoring tool	—	●	●*1	●	●	●	●
MELSOFT GX Configurator-PT*3	SW1D5C-QPTU-E	MELSEC-Q dedicated positioning module QD70 setting/monitoring tool	—	●	●*1	●	●	●	●
MELSOFT GX Configurator-MB*3	SW1D5C-QMBU-E	MODBUS master module setting/monitoring tool	—	●	●*1	●	●	●	●
MELSOFT GX Configurator-AS*3	SW1D5C-QASU-E	AS-i master module setting/monitoring tool	—	●	●*1	●	●	●	●
MELSOFT GX Configurator-QP	SW2D5C-QD75P-E	Positioning module QD75P/D/M setting/monitoring tool	—	●	●*1	●	●	●	●

Note: General specifications and product guarantee conditions of jointly developed products are different from those of MELSEC products.
For more information, please refer to the product manuals or contact your local Mitsubishi representative for details.

MELSOFT GX Series

* Refer to the "Compatible CPUs" table for individual part names.

Type	Model	Outline	Compatible CPU*						
			Universal model			High Performance model	Basic model	Process CPU	Redundant CPU
			QnUDV	QnU	QnUD(E)				
MELSOFT GX Explorer	SW2D5C-EXP-E	Maintenance tool	—	—	—	●	●	●*2	—
MELSOFT GX RemoteService- I	SW2D5C-RAS-E	Remote access tool	—	—	—	●	●	●*2	—
MELSOFT GX Works	SW4D5C-QSET-E	Set type products (7 in total): GX Developer, GX Simulator, GX Explorer, GX Configurator-AD, DA, SC, CT	*4						
	SW8D5C-GPPLLT-E	GX Developer, GX Simulator, GX Explorer	*4						

*1: Not compatible with Q50UDEHCPU, Q100UDEHCPU, and QJ71GF11-T2.
*2: Not compatible with Q02PHCPU and Q06PHCPU.
*3: This operates as add-in software for GX Developer. GX Developer is required separately.
*4: To determine which CPUs are supported, refer to the individual products above.

MELSOFT PX Series

MELSOFT PX Developer	SW1D5C-FBDQ-E	Process control FBD software package	—	—	—	—	—	●	●
	SW1DNC-FBDQMON-E	Process control FBD software package monitoring tool	—	—	—	—	—	●	●
MELSOFT PX Works	SW3D5C-FBDGPP-E	Set type products (6 in total): PX Developer, GX Developer, GX Configurator-AD, DA, CT, TI	*1						

*1: To determine which CPUs are supported, refer to the individual products.

MELSOFT MX Series

MELSOFT MX Component	SW4DNC-ACT-E	ActiveX® library for communication	●	●	●	●	●	●	●
MELSOFT MX Sheet	SW2DNC-SHEET-E*1	Excel® communication support tool	●	●	●	●	●	●	●
MELSOFT MX Works	SW2DNC-SHEETSET-E	A set of two products: MX Component, MX Sheet	*2						
MELSOFT MX MESInterface	SW1DNC-MESIF-E	MES interface module QJ71MES96 dedicated information linkage tool	*3						

*1: To use MX Sheet, MX Component is required.
*2: To determine which CPUs are supported, refer to the individual products.
*3: Required when using the MES interface module.

Note: General specifications and product guarantee conditions of jointly developed products are different from those of MELSEC products.
For more information, please refer to the product manuals or contact your local Mitsubishi representative for details.

Engineering tool for C Controller module

Product	Model	Outline
CW Workbench *1	SW1DND-CWWLQ24-E	C Controller engineering tool software package, product with license for Q24DHCCPU-V
	SW1DND-CWWLQ24-EZ	Additional license product for Q24DHCCPU-V
	SW1DND-CWWLQ24-EVZ	Update license product for Q24DHCCPU-V
	SW1DND-CWWLQ12-E	C Controller engineering tool software package, product with license for Q12DCCPU-V
	SW1DND-CWWLQ12-EZ	Additional license product for Q12DCCPU-V
	SW1DND-CWWLQ12-EVZ	Update license product for Q12DCCPU-V
CW-Sim *2	SW1DNC-CWSIM-E	CW Worbench simulation evironment, license product
	SW1DNC-CWSIM-EZ	CW Workbench simulation environment, additional license product*3
	SW1DNC-CWSIMSA-E	CW Workbench simulation environment, standalone product

*1: CW Workbench is available as a one month trial version. For more information, please contact your local Mitsubishi Electric office or sales representative.
*2: CW-Sim standalone does not require a license file.
*3: This product is an additional license for SW1DNC-CWSIM-E.

Setting/monitoring tools for C Controller module

Setting/monitoring tools for C Controller module	SW4PVC-CCPU-E	A tool for setting/monitoring C Controller module, CC-Link, MELSECNET/H, CC-Link IE Controller network, CC-Link IE Field network
	SW3PVC-CCPU-E	A tool for setting/monitoring C Controller module, CC-Link, MELSECNET/H, CC-Link IE Controller network

MELSEC-A/AnS/QnA/QnAS List of Products Used for Upgrade

Type		Model	Outline
Q Series large type base unit	Main base unit	Q35BL	5 slots, 1 power supply module required, for the Q Series large type I/O modules
		Q38BL	8 slots, 1 power supply module required, for the Q Series large type I/O modules
	Extension base unit	Q65BL	5 slots, 1 power supply module required, for the Q Series large type I/O modules
		Q68BL	8 slots, 1 power supply module required, for the Q Series large type I/O modules
		Q55BL	5 slots, power supply module not required, for the Q Series large type I/O modules
	large type blank cover	QG69L	Blank cover for installing the existing Q Series module on the Q Series large type base unit
Q Series large type base unit (AnS Series size)	Main base unit	Q35BLS	5 slots, for Q Series modules, panel installation type
		Q38BLS	8 slots, for Q Series modules, panel installation type
		Q35BLS-D	5 slots, for Q Series modules, DIN rail installation type
		Q38BLS-D	8 slots, for Q Series modules, DIN rail installation type
	Extension base unit	Q65BLS	5 slots, for Q Series modules, panel installation type
		Q68BLS	8 slots, for Q Series modules, panel installation type
		Q65BLS-D	5 slots, for Q Series modules, DIN rail installation type
		Q68BLS-D	8 slots, for Q Series modules, DIN rail installation type
		Q55BLS	5 slots, for Q Series modules, panel installation type, power supply module not required
		Q55BLS-D	5 slots, for Q Series modules, DIN rail installation type, power supply module not required
	Q Series large type blank cover (AnS Series size)	QG69LS	Blank cover for the Q Series module on the Q Series large type base unit (AnS Series size)
Q Series large type I/O module	Input module	QX11L	32 points, 100...120 V AC, rated input current: 10 mA (100 V AC, 60 Hz), response time: 15 ms or less (OFF to ON), 25 ms or less (ON to OFF), 32 points/common, 38-point terminal block
		QX21L	32 points, 200...240 V AC, rated input current: 10 mA (220 V AC, 60 Hz), response time: 15 ms or less (OFF to ON), 25 ms or less (ON to OFF), 32 points/common, 38-point terminal block
	Output module	QY11AL	16-point contact output, 24 V DC/240 V AC, 2 A/point, 16 A/all points, all points independent, 38-point terminal block, surge suppressor (varistor 387...473 V)
		QY13L	32-point contact output, 24 V DC/240 V AC, 2 A/point, 5 A/common, 8 points/common, 38-point terminal block
		QY23L	32-point triac output, 100...240 V AC, 0.6 A/point, 2.4 A/common, 8 points/common, 38-point terminal block
		QY51PL	32-point transistor output (Sink), 12/24 V DC, 0.5 A/point, 4 A/common, 16 points/common, 38-point terminal block
High-speed counter module		QD62-H01	High-speed counter module for replacing the AD61 (with the same input filtering system and counting speed)
		QD62-H02	High-speed counter module for replacing the AD61-S1 (with the same input filtering system and counting speed)
Positioning module		QD73A1	1-axis analog output type Position control mode (positioning control, two-phase trapezoidal positioning control) Velocity/position control switchover mode
Extension base unit	QA1S extension base unit	QA1S51B	1 slot, for AnS Series modules (power supply module not required)
		QA1S65B	5 slots, for AnS Series modules
		QA1S68B	8 slots, for AnS Series modules
	QA extension base unit	QA65B	5 slots, for A Series modules
		QA68B	8 slots, for A Series modules
Base conversion adapter	Q-AnS base conversion adapter	QA1S6ADP	Conversion adapter to connect AnS/QnAS Series extension base unit with Q Series system
	QA conversion adapter	QA6ADP	Adapter for connecting large type A/QnA extension base unit as QCPU extension base unit
AnS-Q module conversion adapter		A1SADP-Q-SET1	1 slot: Adapter to install devices such as Q Series module and intelligent function module on AnS Series base unit.
		A1SADP-Q-SET2	2 slots: Adapter to install devices such as Q Series module and intelligent function module on AnS Series base unit.
MELSECNET(Ⅱ) local station data link module		A1SJ71AP23Q	MELSECNET (Ⅱ) local station data link module for SI optical fiber cable
		A1SJ71AR23Q	MELSECNET (Ⅱ) local station data link module for coaxial cable
MELSECNET/B local station data link module		A1SJ71AT23BQ	MELSECNET/B local station data link module for shielded twisted pair cable
L Series Space Module		LG69	Module for ensuring wiring space when upgrading AnS/QnAS Series module to L Series

Servo System Controller

Servo system controllers designed to provide the best total performance of the system

Optimized to deliver high-speed and high-precision drive control of various industrial machines, our controllers include lineup of motion controller and simple motion unit to meet your control needs.

Features of Motion Controller

Advanced Motion control

The Motion controller is a CPU module used with PLC CPU for Motion control.

- Using Motion SFC program, the Motion CPU separately operates the controls from the PLC CPU.
- CPU loads are distributed by sharing tasks between Motion CPU and PLC CPU for advanced Motion control.
- Advanced Motion control is achieved, such as position follow-up and tandem operation.
- High-speed input and output are possible with direct management of various modules, such as I/O, analog, and high-speed counter.

Q173DSCPU
Q172DSCPU



SSCNET III/H compatible MELSEC-Q series

- For a large or medium scale system
- Maximum number of controlled axes: 32 axes (Q173DSCPU), 16 axes (Q172DSCPU)
- A PLC CPU or a C Controller is selectable according to your application
- Up to 96 axes can be controlled by use of three modules of the Q173DSCPU
- Supports the safety observation function and the vision system

Specifications P.246 Device configuration P.254

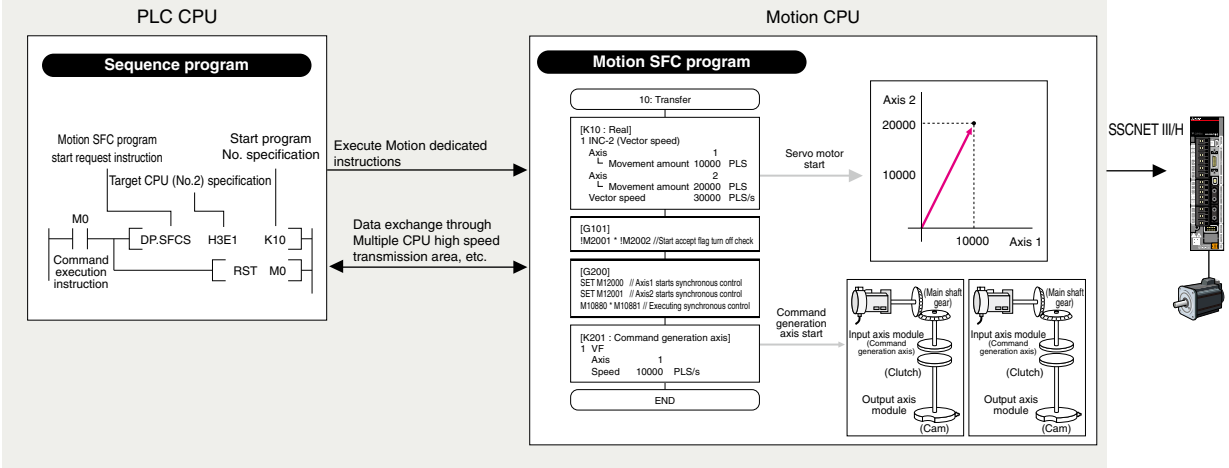
Q170MSCPU
Q170MSCPU-S1

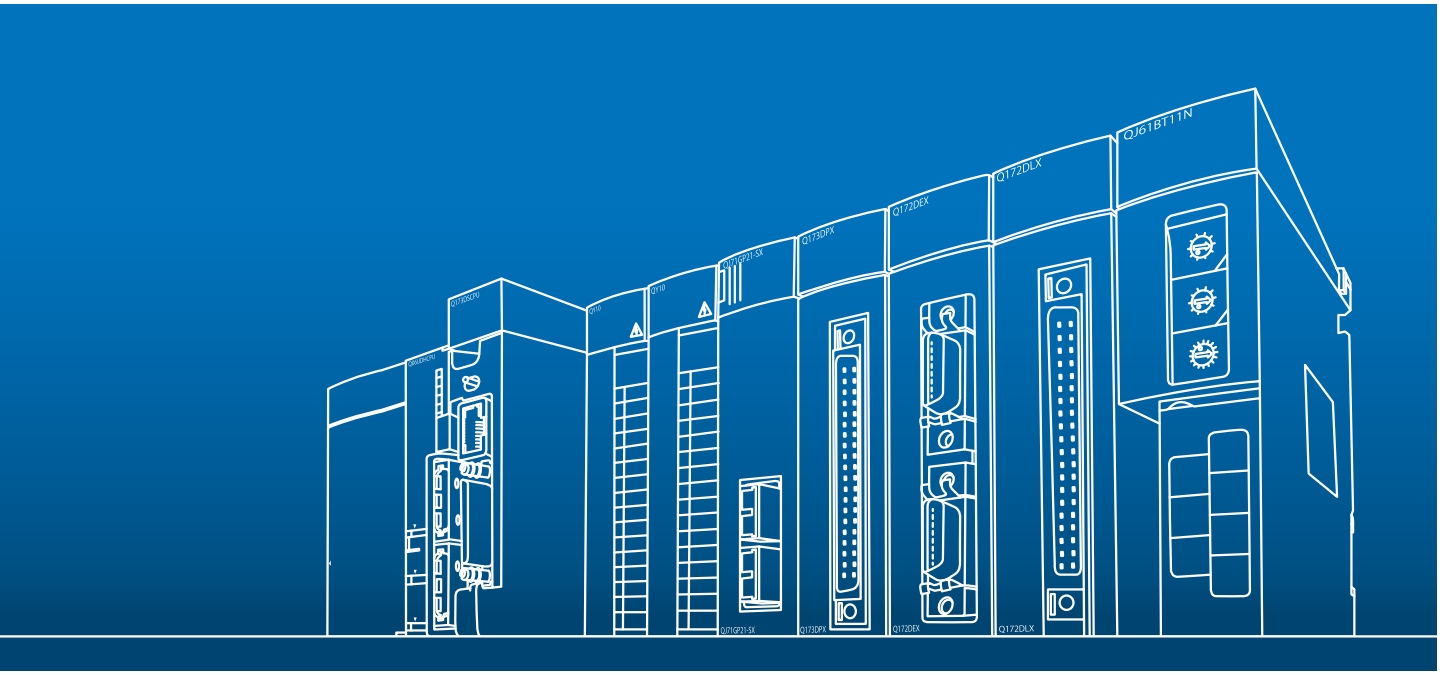


SSCNET III/H compatible MELSEC-Q series

- Highly cost-effective product for a small scale system
- Integrates a power supply, a PLC, and a Motion controller
- Maximum number of controlled axes: 16 axes
- The program capacity: 60k steps (Q170MSCPU-S1), 30k steps (Q170MSCPU)
- Supports the vision system

Specifications P.246 Device configuration P.254





Simple Motion Module

Advanced control but simple to use just like Positioning modules

The Simple Motion module is an intelligent function module which performs positioning control by following the instructions of PLC CPU.

- The positioning functions are used in the same manner as those of the Positioning module.
- Linear interpolation control and other controls can be achieved easily just by writing positioning data to the buffer memory with sequence programs.
- Positioning/advanced synchronous/cam controls are performed with simple parameter setting and a start from a sequence program.
- Supports only MELSOFT GX Works2 as an engineering software.

QD77MS16 / QD77MS4 / QD77MS2

SSCNET III/H



SSCNET III/H compatible MELSEC-Q series

- For customers who need a module allowing user to use a wide-range of Motion controls - advanced synchronous control, cam control, speed-torque control (tightening & press-fit control), etc. - more easily just with the sequence programs.
- Maximum number of controlled axes:
  16 axes (QD77MS16),
  4 axes (QD77MS4),
  and 2 axes (QD77MS2)
- Equipped with all the functions of the QD75MH Positioning module

Specifications P.258 Device configuration P.261

LD77MS16 / LD77MS4 / LD77MS2

SSCNET III/H



SSCNET III/H compatible MELSEC-L series

- For customers who need more compact and lower cost products
- Maximum number of controlled axes:
  16 axes (LD77MS16),
  4 axes (LD77MS4),
  and 2 axes (LD77MS2)
- Equipped with all the functions of the QD75MH Positioning module

Specifications P.258 Device configuration P.261

QD77GF16

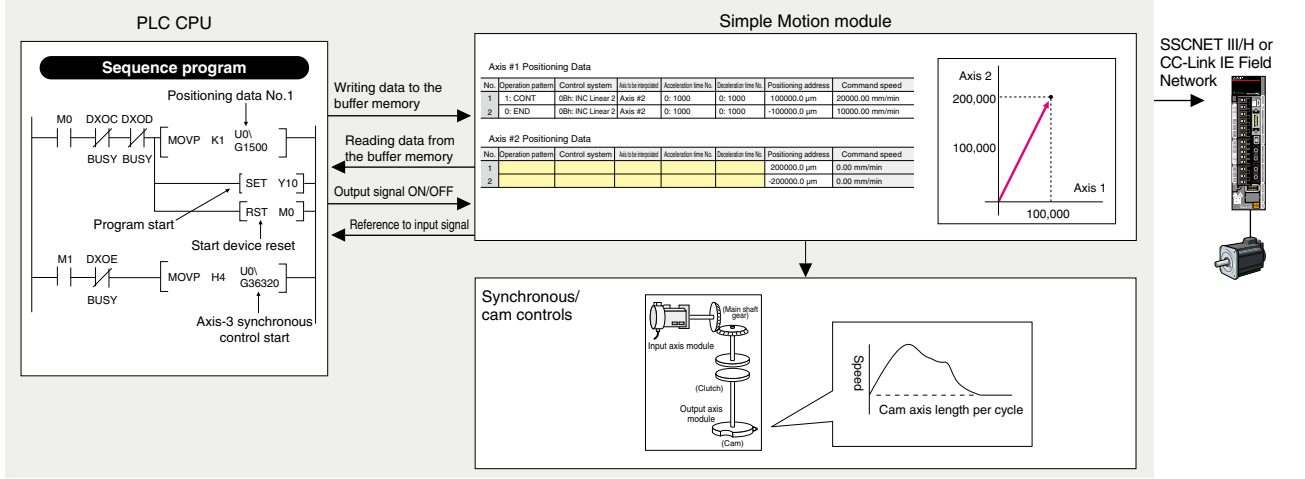
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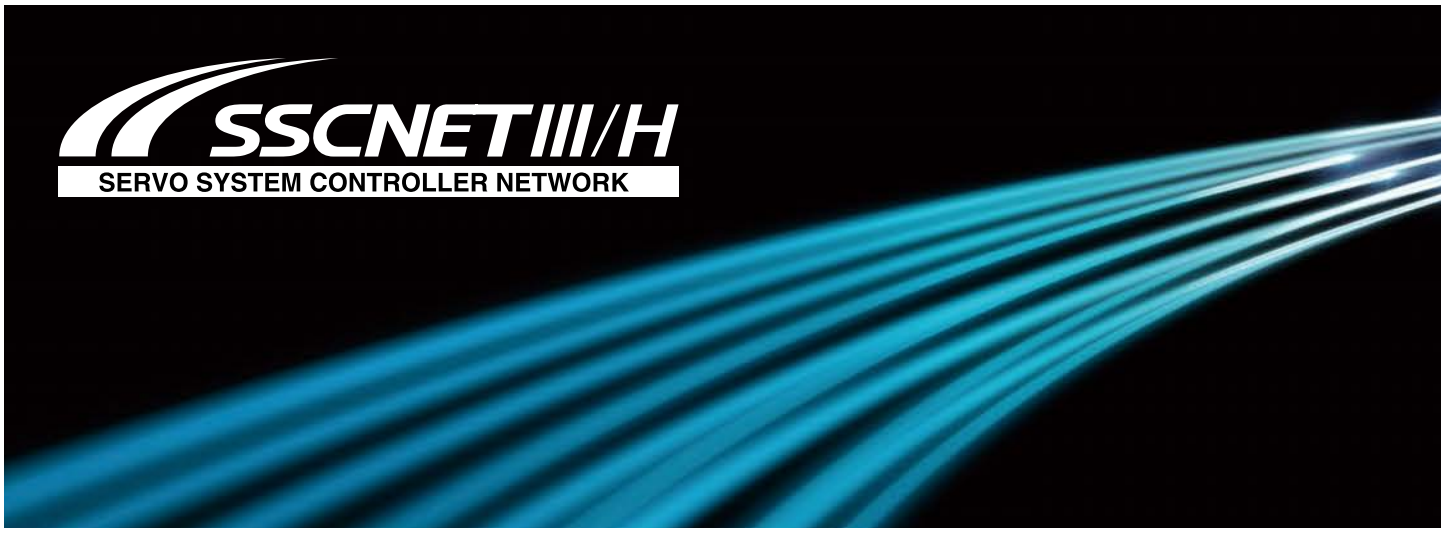
CC-Link IE Field Network compatible MELSEC-Q series

- For customers who prefer to use open network
- Maximum number of controlled axes: 16 axes

Specifications P.258 Device configuration P.261



"SSCNETⅢ/H" Servo System High-Speed Synchronous Network

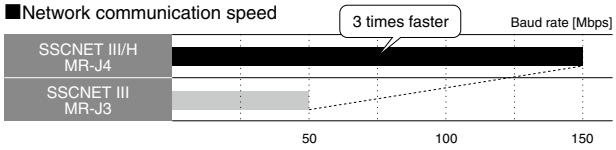


Three Times Faster Communication Speed

Industry-leading levels

Communication speed is increased to 150 Mbps full duplex (equivalent to 300 Mbps half duplex), three times faster than the conventional speed. System response is dramatically improved.

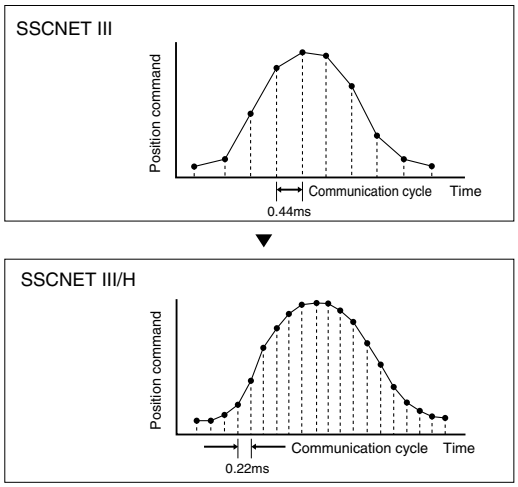
■Network communication speed



Cycle Times as Fast as 0.22 ms

Industry-leading levels

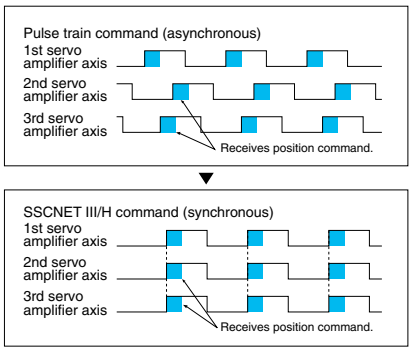
Smooth control of machine is possible using high-speed serial communication with cycle times of 0.22 ms.



Deterministic and Synchronized Communication

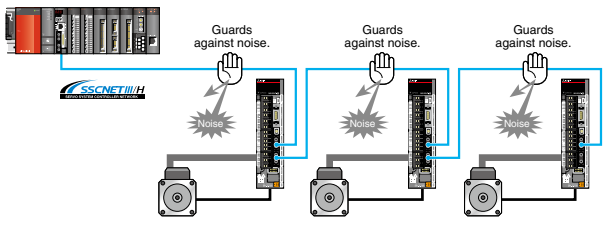
Complete deterministic and synchronized communication is achieved with SSCNET III/H, offering technical advantages in machines such as printing and food processing machines that require synchronous accuracy.

■Timing of servo amplifier processing



No Transmission Collision

The fiber-optic cables thoroughly shut out noise that enters from the power cable or external devices. Noise tolerance is dramatically improved as compared to metal cables.

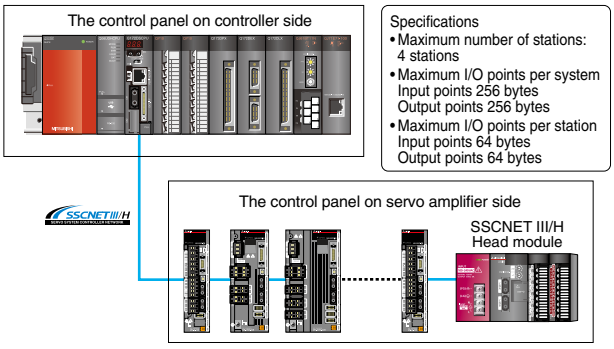


The blazingly fast speed and response of 150 Mbps full-duplex baud rate SSCNET III/H optical networking

"SSCNETⅢ/H" is a high-speed and high-performance servo system controller network using a fiber-optic cable.
Its high-speed serial communication with cycle times of 0.22 ms enhances system responsiveness and reduces cycle time. The dedicated fiber-optic cable connection offers strong noise-resistance and enables long-distance wiring. No more complicated wiring; a single cable connection reduces the wiring installation time and simplifies wiring.

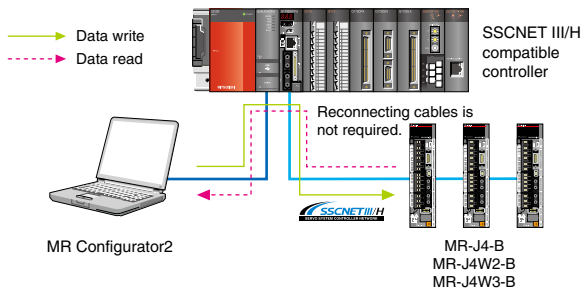
Dramatically Reduced Wiring

The SSCNET III/H Head module allows the controller to connect remotely with various modules (I/O, analog, high-speed counter, etc.) via SSCNET III/H. This results in reduced wiring since the Motion controller receives the I/O and analog I/O signals directly from the servo amplifier side.



Central Control with Network

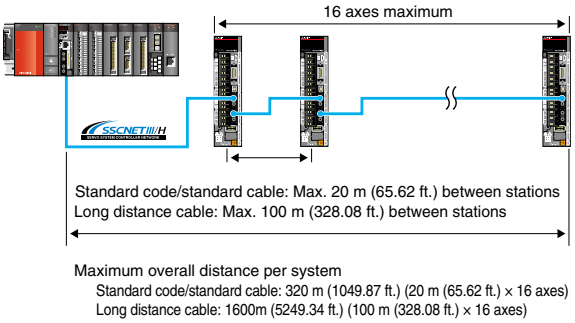
Large amounts of servo data are exchanged in real-time between the controller and the servo amplifier.
Using MELSOFT MR Configurator2 on a personal computer that is connected to the Motion controller or the Simple Motion module helps consolidate information such as parameter settings and monitoring for the multiple servo amplifiers.



Long Distance Wiring up to 1600 m (5249.34 ft.) Enhanced performance

Long distance wiring is possible up to 1600 m (5249.34 ft.) per system (maximum of 100 m (328.08 ft.) between stations × 16 axes). Thus, it is suitable for large-scale systems.

* This is when all axes are connected via SSCNET III/H.

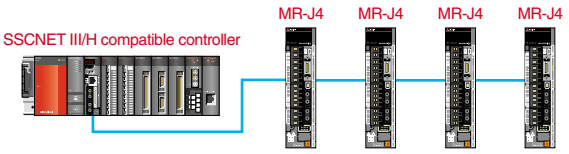


SSCNET III/H Compatible and SSCNET III Compatible Products Connected in a Same System

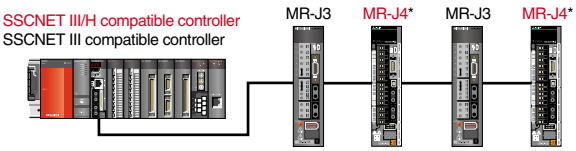
SSCNET III/H and SSCNET III compatible controllers support the use of SSCNET III/H and SSCNET III compatible servo amplifiers together in a same system.

* When the SSCNET III compatible products are in the system, the communication speed is 50 Mbps, and the function and the performance are equivalent to those of MR-J3.

■Communication speed: 150 Mbps



■Communication speed: 50 Mbps



Motion Controller

SSCNET III/H compatible
MELSEC-Q series Motion controller

Q173DSCPU/Q172DSCPU

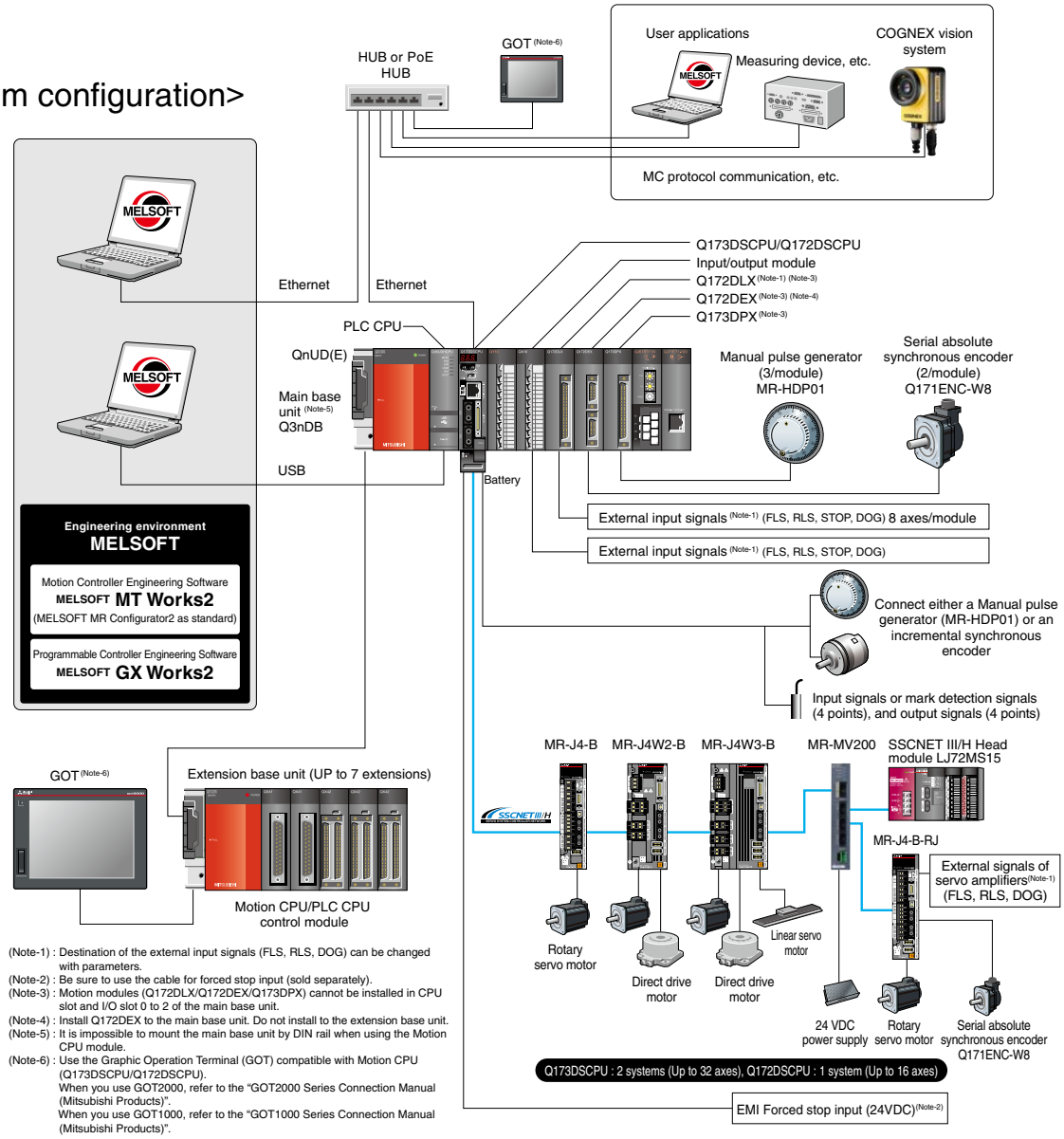
iQ Platform



Multiple CPU System for High-speed Motion Control

- The Q-series Motion controllers can configure a Multiple CPU system with Programmable controllers.
- Over 100 types of Q series modules are available, which enhances system scalability.
- Up to 96 axes of servo motors can be controlled by using three modules of the Q173DSCPU.
- Position/speed/torque/advanced synchronous controls, etc. are available.
- The safety observation function is available as standard.
- The COGNEX vision system can be connected directly with Ethernet connection.
- The MELSEC-L series I/O modules, analog I/O module, and high-speed counter module can be used when the SSCNETIII/H Head module LJ72MS15 is connected in the system.

<System configuration>



(Note-1) : Destination of the external input signals (FLS, RLS, DOG) can be changed with parameters.
(Note-2) : Be sure to use the cable for forced stop input (sold separately).
(Note-3) : Motion modules (Q172DLX/Q172DEX/Q173DPX) cannot be installed in CPU slot and I/O slot 0 to 2 of the main base unit.
(Note-4) : Install Q172DEX to the main base unit. Do not install to the extension base unit.
(Note-5) : It is impossible to mount the main base unit by DIN rail when using the Motion CPU module.
(Note-6) : Use the Graphic Operation Terminal (GOT) compatible with Motion CPU (Q173DSCPU/Q172DSCPU).
When you use GOT2000, refer to the "GOT2000 Series Connection Manual (Mitsubishi Products)".
When you use GOT1000, refer to the "GOT1000 Series Connection Manual (Mitsubishi Products)".

SSCNET III/H compatible

MELSEC-Q series Motion controller

Q170MSCPU/Q170MSCPU-S1

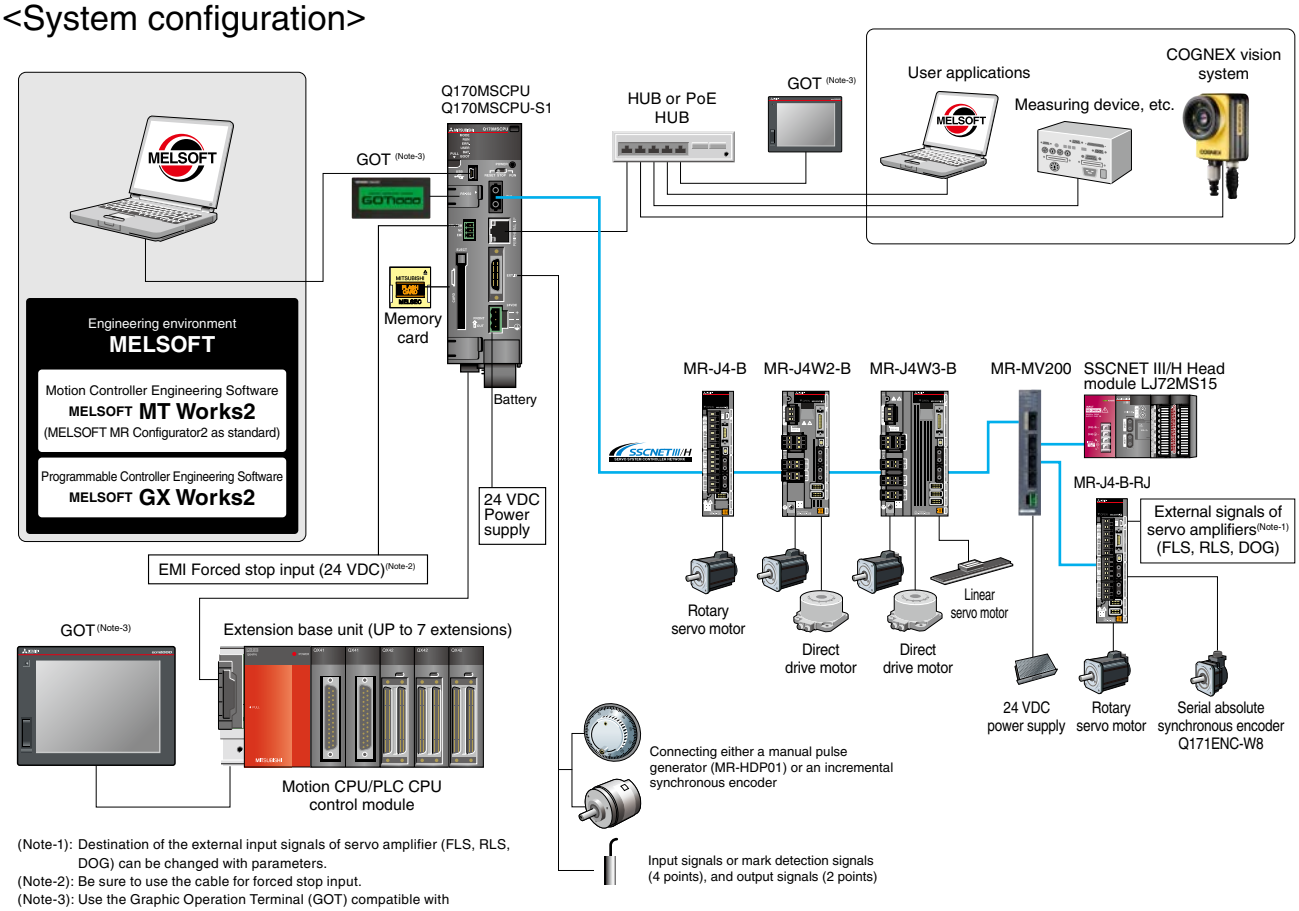
iQ Platform



Power Supply, PLC, and Motion Controller All in One

- Up to 16 axes can be controlled.
- Position/speed/torque/advanced synchronous controls, etc. are available.
- Incremental synchronous encoder interface and Mark detection interface are integrated.
- PLC capacity is increased to 60k steps (Q170MSCPU-S1), and up to 7 extension base units can be used.
- STO (Safe torque off) is achieved by combining the servo amplifier
- The COGNEX vision system can be connected directly with Ethernet connection.
- The MELSEC-L series I/O modules, analog I/O module, and high-speed counter module can be used when the SSCNETIII/H Head module LJ72MS15 is connected in the system.

<System configuration>



(Note-1): Destination of the external input signals of servo amplifier (FLS, RLS, DOG) can be changed with parameters.
(Note-2): Be sure to use the cable for forced stop input.
(Note-3): Use the Graphic Operation Terminal (GOT) compatible with Q170MSCPU(-S1).
When you use GOT2000, refer to the "GOT2000 Series Connection Manual (Mitsubishi Products)".

■Motion controller specifications

● Control specification

Item		Specifications			
		Q173DSCPU	Q172DSCPU	Q170MSCPU-S1	Q170MSCPU
Number of control axes		Up to 32 axes (16 axes/system)	Up to 16 axes		
Operation cycle (Operation cycle setting)		0.22 ms, 0.44 ms, 0.88 ms, 1.77 ms, 3.55 ms, 7.11 ms			
Interpolation function		Linear interpolation (Up to 4 axes), Circular interpolation (2 axes), Helical interpolation (3 axes)			
Control modes		PTP (Point to Point) control, Speed control, Speed-position switching control, Fixed-pitch feed control, Constant speed control, Position follow-up control, Speed control with fixed position stop, Speed switching control, High-speed oscillation control, Cam control (SV22), Speed-torque control, Synchronous control (SV22(Advanced synchronous control method/Virtual mode switching method))			
Acceleration/deceleration control		Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration, Advanced S-curve acceleration/deceleration			
Compensation function		Backlash compensation, Electronic gear, Phase compensation (SV22)			
Programming language		Motion SFC, Dedicated instruction, Mechanical support language (SV22)			
Servo program capacity		16k steps			
Number of positioning points		3200 points (Positioning data can be set indirectly)			
Peripheral interface	Motion CPU (area)	PERIPHERAL I/F			
	PLC CPU (area)	USB, RS-232, Ethernet		USB, RS-232	
Home position return function		Proximity dog type (2 types), Count type (3 types), Data set type (2 types), Dog cradle type, Stopper type (2 types), Limit switch combined type, Scale home position signal detection type, Dogless home position signal reference type (Home position return re-try function provided, home position shift function provided)			
JOG operation function		Provided			
Manual pulse generator operation function		Possible to connect 3 modules (Q173DPX use) Possible to connect 1 module (Internal I/F use) (Note-5)			
Speed-torque control		Speed control without positioning loops, Torque control, Tightening & press-fit control			
Multiple CPU synchronous control		Up to 96 axes (by use of three modules of Q173DSCPU)		–	
Synchronous encoder operation function		12 modules connectable (SV22) (via Q173DPX+Q172DEX+ internal I/F+ device (Note-6)+ servo amplifier (Note-6))		12 modules connectable (SV22) (via Q173DPX+ internal I/F+ device (Note-6)+ servo amplifier (Note-6))	
M-code function		M-code output function provided, M-code completion wait function provided			
Limit switch output function		Number of output points: 64 points (Advanced synchronous control method), 32 points (Virtual mode switching method (SV13)) Watch data: Motion control data, Word device			
ROM operation function		Provided			
External input signal		Q172DLX (FLS, RLS, STOP, DOG) , External input signals (FLS, RLS, DOG) of servo amplifier, Internal I/F(DI), Bit device			
High-speed reading function (Note-6)		Available (Via built-in interface in Motion CPU, input module, tracking of Q172DEX/Q173DPX)		Available (Via built-in interface in Motion CPU, input module, tracking of Q173DPX)	
Mark detection function		Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode			
	Mark detection signal	4 points (Via Internal I/F), Bit device, Q172DLX (DOG)			
	Mark detection setting	32			
Torque limit value change function		Positive direction torque limit value, Negative direction torque limit value			
Target position change function		Provided			
Servo parameter change function		Provided			
Servo amplifier control mode switching function		Gain switching function, PI-PID control, Control loop changing (semi closed loop control, fully closed loop control)			
Optional data monitor function		Up to 6 data/axis (MR-J4-B with SSCNET III/H use)			
Forced stop		Motion controller forced stop (EMI terminal, System setting), Forced stop terminal of servo amplifier			
Number of input/output points		Total of 256 points (Internal I/F (4 input points) + I/O module+ Intelligent function module)		Total of 256 points (Internal I/F (4 input points + 2 output points) + I/O module+ Intelligent function module)	
Clock function		Provided			
Security function		Password registration, Password for every Motion SFC program, Software security key function			
All clear function		Delete all user data in Motion CPU			
Remote operation		Remote RUN/STOP, Remote latch clear			
Digital oscilloscope function		Bit data: 16 channels, Word data: 16 channels (Note-4)			
Driver communication function		Provided			
Amplifier-less operation function		Provided			
Absolute position system		Made compatible by setting battery to servo amplifier. (Possible to select the absolute data method or incremental method for each axis)			
Number of SSCNETIII/H systems (Note-1)		2 systems	1 system	1 system	
Number of Motion modules		Q172DLX 4 modules usable Q172DEX 6 modules usable (Note-2) Q173DPX 4 modules usable (Note-3)	Q172DLX 2 modules usable Q172DEX 6 modules usable (Note-2) Q173DPX 4 modules usable (Note-3)	Q172DLX 2 modules usable Q173DPX 4 modules usable (Note-3)	

(Note-1): The SSCNETIII compatible servo amplifier can be used, but the SSCNET compatible servo amplifier cannot be used.
(Note-2): Q172DEX cannot be used in SV13.
(Note-3): This is the case of using an incremental synchronous encoder (SV22 used). When using a manual pulse generator, only one module are allowed to use.
(Note-4): 8CH word data and 8CH bit data can be displayed in real time.
(Note-5): The Q173DPX and internal interface can not be used simultaneously.
(Note-6): Advanced synchronous control only.

● Motion SFC performance specification

Item				Specifications			
				Q173DSCPU	Q172DSCPU	Q170MSCPU-S1	Q170MSCPU
Motion SFC program capacity	Code total (Motion SFC chart + Operation control +Transition)			652k bytes			
	Text total (Operation control + Transition)			668k bytes			
Motion SFC program	Number of Motion SFC programs			256 (No.0 to 255)			
	Motion SFC chart size/program			Up to 64k bytes (Included Motion SFC chart comments)			
	Number of Motion SFC steps/program			Up to 4094 steps			
	Number of selective branches/branch			255			
	Number of parallel branches/branch			255			
	Parallel branch nesting			Up to 4 levels			
Operation control program (F/FS) / Transition program (G)	Number of operation control programs			4096 with F (Once execution type) and FS (Scan execution type) combined (F/FS0 to F/FS4095)			
	Number of transition programs			4096 (G0 to G4095)			
	Code size/program			Up to approx. 64k bytes (32766 steps)			
	Number of blocks(line)/program			Up to 8192 blocks (In the case of 4 steps (min)/block)			
	Number of characters/block			Up to 128 (Comment included)			
	Number of operand/block			Up to 64 (Operand: Constants, Word devices, Bit devices)			
	( ) nesting/block			Up to 32 levels			
	Descriptive expression	Operation control program		Calculation expression, Bit conditional expression and branches, Repetition process IF ~ ELSE ~ IEND, SELECT ~ CASE ~ SEND, FOR ~ NEXT			
		Transition program		Calculation expression, bit conditional expression, comparison conditional expression			
Execute specification	Number of multi executed programs			Up to 256			
	Number of multi active steps			Up to 256 steps per all programs			
	Executed task	Normal task		Executed in Motion main cycle			
		Event task (Execution can be masked.)	Fixed cycle	Executed in fixed cycle (0.22 ms, 0.44 ms, 0.88 ms, 1.77 ms, 3.55 ms, 7.11 ms, 14.2 ms)			
			External interrupt	Executed when input ON is set among the input 16 points of interrupt module QI60			
			PLC interrupt	Executed with interrupt instruction (D (P).GINT) from PLC CPU			
		NMI task		Executed when input ON is set among the input 16 points of interrupt module QI60			
Number of I/O points (X/Y)				8192 points			
Number of real I/O points (PX/PY)				256 points			
Number of devices	Internal relays (M)			12288 points			
	Link relays (B)			8192 points			
	Annunciators (F)			2048 points			
	Special relays (SM)			2256 points			
	Data registers (D)			19824 points (advanced synchronous control method), 8192 points (Virtual mode switching control method (SV13))			
	Link registers (W)			8192 points			
	Special registers (SD)			2256 points			
	Motion registers (#)			12288 points			
	Coasting timers (FT)			1 point (888μs)			
	Multiple CPU shared device (U□\G)			Up to 14336 points (Note-1)			

(Note-1): The number of usable points will differ depending on the system settings.

Advanced synchronous control specifications

Synchronous control

Item		Number of settable axes			
		Q173DSCPU	Q172DSCPU	Q170MSCPU-S1	Q170MSCPU
Input axis	Servo input axis	32 axes/module	16 axes/module		
	Command generation axis	32 axes/module	16 axes/module		
	Synchronous encoder axis	12 axes/module			
Composite main shaft gear		1/output axis			
Main shaft main input axis		1/output axis			
Main shaft sub input axis		1/output axis			
Main shaft gear		1/output axis			
Main shaft clutch		1/output axis			
Auxiliary shaft		1/output axis			
Auxiliary shaft gear		1/output axis			
Auxiliary shaft clutch		1/output axis			
Auxiliary shaft composite gear		1/output axis			
Speed change gear		2/output axis			
Output axis (Cam axis)		32 axes/module	16 axes/module		

Cam control

Item			Specifications			
			Q173DSCPU	Q172DSCPU	Q170MSCPU-S1	Q170MSCPU
Memory capacity	Storage area for cam data		256k bytes			
	Working area for cam data		1024k bytes			
Number of registration			Up to 256 program items (depending on memory capacity, cam resolution and number of coordinates)			
Comment			Up to 32 characters for each cam data			
Cam data	Stroke ratio data type	Cam resolution	256, 512, 1024, 2048, 4096, 8192, 16384, 32768			
		Stroke ratio	-214.7483648 to 214.7483647 [%]			
	Coordinate data type	Coordinate number	2 to 16384			
		Coordinate data	Input value : 0 to 2147483647 Output value : -2147483648 to 2147483647			
Cam auto-generation			Cam for rotary cutter, Easy stroke ratio cam			

Mechanical system program (SV22)

Item			Specifications							
			Q173DSCPU		Q172DSCPU		Q170MSCPU-S1		Q170MSCPU	
Control unit	Drive module	Virtual servo motor	pulse							
		Synchronous encoder								
	Output module	Roller	mm, inch							
		Ball screw								
		Rotary table	Fixed as “degree”							
		Cam	mm, inch, degree, pulse							
Mechanical system program	Drive module	Virtual servo motor	32	Total 44	16	Total 28	16	Total 28	16	Total 28
		Synchronous encoder	12		12		12		12	
	Virtual axis	Virtual main shaft	32	Total 64	16	Total 32	16	Total 32	16	Total 32
		Virtual auxiliary input axis	32		16		16		16	
	Transmission module	Gear (Note-1)	64		32					
		Clutch (Note-1)	64		32					
		Speed change gear (Note-1)	64		32					
		Differential gear (Note-1)	32		16					
		Differential gear (Connect to the virtual main shaft) (Note-2)	32		16					
	Output module	Roller	32	Total 32	16	Total 16	16	Total 16	16	Total 16
		Ball screw	32		16		16		16	
		Rotary table	32		16		16		16	
		Cam	32		16		16		16	
Cam	Types		Up to 256							
	Resolution per cycle		256, 512, 1024, 2048							
	Memory capacity		132k bytes							
	Stroke resolution		32767							
	Control mode		Two-way cam, Feed cam							

(Note-1): Use only one module for one output module. (one gear, clutch, speed change gear or differential gear module for one output module).
(Note-2): The differential gears connected to the virtual main shaft can be used only one module per one main shaft.

Performance specification of PLC CPU control area (Q170MSCPU(-S1))

Item		Specifications	
		Q170MSCPU-S1	Q170MSCPU
PLC CPU area		Q06UDHCPU or equivalent	Q03UDCPU or equivalent
Control method		Stored program repeat operation	
I/O control mode		Refresh mode	
Sequence control language		Relay symbol language (ladder), Logic symbolic language (list), MELSAP3 (SFC), MELSAP-L, Structured text (ST)	
Processing speed (Sequence instruction)	LD instruction	9.5ns	20ns
	MOV instruction	19ns	40ns
	PC MIX value (instruction/μs)	60	28
	Floating point addition	0.057μs	0.12μs
Total number of instructions		858	
Operation (floating point operation) instruction		Yes	
Character string processing instruction		Yes	
PID instruction		Yes	
Special function instruction (Trigonometric function, square root, exponential operation, etc.)		Yes	
Constant scan		0.5 to 2000ms (setting available in units of 0.5ms)	
Program capacity		60k steps (240 kbytes)	30k steps (120 kbytes)
CPU shared memory	QCPU standard memory	8k bytes	
	Multiple CPU high speed transmission area	32k bytes	
Number of I/O device points [X/Y]		8192 points	
Number of I/O points [X/Y]		4096 points	
Internal relay [M]	Points by default (Changeable by parameter)	8192 points	
Latch relay [L]		8192 points	
Link relay [B]		8192 points	
Timer [T]		2048 points	
Retentive timer [ST]		0 points	
Counter [C]		1024 points	
Data register [D]		12288 points	
Link register [W]		8192 points	
Annunciator [F]		2048 points	
Edge relay [V]		2048 points	
Link special relay [SB]		2048 points	
Link special register [SW]		2048 points	
File register [R, ZR]		393216 points	98304 points
Step relay [S]		8192 points	
Index register/Standard device register [Z]		20 points	
Index register [Z] (32-bit modification specification of ZR indexing)		Up to 10 points (Z0 to Z18) (Index register [Z] is used in double words.)	
Pointer [P]		4096 points	
Interrupt pointer [I]		256 points	
Special relay [SM]		2048 points	
Special register [SD]		2048 points	
Function input [FX]		16 points	
Function output [FY]		16 points	
Function register [FD]		5 points	
Local device		Yes	
Device initial values		Yes	
Extension base unit		Up to 7 (up to 64 slots)	
PC type when program is made by GX Works2		Q06UDHCPU	Q03UDCPU

Module specification

● Motion CPU module Q173DSCPU/Q172DSCPU



Item		Specifications	
		Q173DSCPU	Q172DSCPU
Number of control axes		Up to 32 axes	Up to 16 axes
Servo amplifier connection system		SSCNET III/H (2 systems)	SSCNET III/H (1 system)
Maximum overall cable distance [m(ft.)]		SSCNET III/H : 1600 (5249.34), SSCNET III : 800 (2624.67)	
Maximum distance between stations [m(ft.)]		SSCNET III/H : 100 (328.08), SSCNET III : 50 (164.04)	
Peripheral I/F		PERIPHERAL I/F (Motion CPU), USB/RS-232/Ethernet (Via PLC CPU)	
Manual pulse generator operation function		Possible to connect 3 modules	
Synchronous encoder operation function		Possible to connect 12 modules (Note-1) (SV22 use)	
Controllable modules	Q172DLX	Up to 4 modules per CPU	Up to 2 modules per CPU
	Q172DEX	Up to 6 modules per CPU (SV22 use)	
	Q173DPX	Up to 4 modules per CPU (Incremental synchronous encoder use in SV22)	
		Up to 1 module per CPU (Only manual pulse generator use)	
	Q173DSXY	Up to 3 modules	
	Input/output module	Total : Up to 256 points per CPU	
	Analogue module		
	QI60	Up to 1 module per CPU	
Input signal	Number of input points	4 points	
	Input method	Positive Common/ Negative Common Shared Type (Photocoupler isolation)	
	Rated input voltage/ current	24VDC/Approx. 5 mA	
	Operating voltage range	21.6 to 26.4VDC (24VDC ±10%, ripple ratio 5% or less)	
	ON voltage/current	17.5VDC or more/3.5mA or more	
	OFF voltage/current	5VDC or less/0.9mA or less	
	Input resistance	Approx. 5.6kΩ	
	Response time	1ms or less (OFF→ON, ON→OFF)	
	Recommended wire size	AWG18 to AWG22	
Forced stop input signal	Number of input points	1 point	
	Input method	Sink/ Source (Photocoupler isolation)	
	Rated input voltage/ current	24VDC/Approx. 2.4 mA	
	Operating voltage range	20.4 to 26.4 VDC (+10/-15 %, ripple ratio 5 % or less)	
	ON voltage/current	17.5 VDC or more/ 2.0 m A or more	
	OFF voltage/current	1.8 VDC or less/ 0.18m A or less	
	Input resistance	Approximately 10kΩ	
	Response time	1ms or less (OFF→ON, ON→OFF)	
	Recommended wire size	AWG22	
Manual pulse generator/ incremental synchronous encoder signal	Signal input form	Phase A/ Phase B (magnification by 4)	
	Input frequency	Up to 1Mpps (After magnification by 4, up to 4Mpps) (Differential-output type) Up to 200kpps (After magnification by 4, up to 800kpps) (Voltage-output/Open-collector type)	
Extension base unit		Up to 7	
5VDC internal current consumption [A]		1.75	1.44
Mass [kg]		0.38	
Exterior dimensions [mm(inch)]		120.5 (4.74)(H) × 27.4 (1.08)(W) × 120.3 (4.74)(D)	

(Note-1): Up to 12 of manual pulse generators and synchronous encoders can be used in total.

● Stand-alone Motion controller Q170MSCPU/Q170MSCPU-S1



Item		Specifications	
		Q170MSCPU-S1	Q170MSCPU
Number of control axes		Up to 16 axes	
Servo amplifier connection system		SSCNET III/H (1 system)	
Maximum overall cable distance [m(ft.)]		SSCNET III/H : 1600 (5249.34), SSCNET III : 800 (2624.67)	
Maximum distance between stations [m(ft.)]		SSCNET III/H : 100 (328.08), SSCNET III : 50 (164.04)	
Peripheral I/F		PERIPHERAL I/F (Motion CPU control area), USB/RS-232 (PLC CPU control area)	
Manual pulse generator operation function		Possible to connect 3 modules	
Synchronous encoder operation function		Possible to connect 12 modules (Note-1) (SV22 use)	
Controllable modules	Q172DLX	Up to 2 modules per CPU	
	Q173DPX	Up to 4 modules per CPU (Incremental synchronous encoder use in SV22)	
		Up to 1 module per CPU (Only manual pulse generator use)	
	Input/output module	Total : Up to 256 points per CPU	
	Analogue module		
	QI60	Up to 1 module per CPU	
Input signal	Number of input points	4 points	
	Input method	Positive Common/ Negative Common Shared Type (Photocoupler isolation)	
	Rated input voltage/ current	24VDC/ Approx. 5mA	
	Operating voltage range	21.6 to 26.4VDC (24VDC ±10%, ripple ratio 5% or less)	
	ON voltage/current	17.5VDC or more/3.5mA or more	
	OFF voltage/current	5VDC or less/0.9mA or less	
	Input resistance	Approx. 5.6kΩ	
	Response time	1ms or less (OFF→ON, ON→OFF)	
	Recommended wire size	AWG18 to AWG22	
Forced stop input signal	Number of input points	1 point	
	Input method	Sink/ Source (Photocouple isolation)	
	Rated input voltage/ current	24VDC/Approx. 2.4mA	
	Operating voltage range	20.4 to 26.4 VDC (+10/-15 %, ripple ratio 5 % or less)	
	ON voltage/current	17.5 VDC or more/ 2.0 mA or more	
	OFF voltage/current	1.8 VDC or less/ 0.18m A or less	
	Input resistance	Approximately 10kΩ	
	Response time	1ms or less (OFF→ON, ON→OFF)	
	Recommended wire size	AWG16 to AWG22	
Manual pulse generator/ incremental synchronous encoder signal	Signal input form	Phase A/ Phase B (magnification by 4)	
	Input frequency	Up to 1Mpps (After magnification by 4, up to 4Mpps) (Differential-output type) Up to 200kpps (After magnification by 4, up to 800kpps) (Voltage-output/Open-collector type)	
Memory card interface		Internal interface	
Extension base unit		Up to 7	
24VDC internal current consumption [A]		1.4	
Mass [kg]		0.8	
Exterior dimensions [mm(inch)]		186(7.32)(H) × 52(2.05)(W) × 135(5.31)(D)	

(Note-1): Up to 12 of manual pulse generators and synchronous encoders can be used in total.

● Servo external signals interface module Q172DLX



Item			Specifications
External input signal (FLS, RLS, STOP, DOG)	Number of input points		Servo external control signals : 32 points, 8 axes
	Input method		Positive Common/ Negative Common Shared Type (Photocoupler isolation)
	Rated input voltage/current		12VDC/2mA, 24VDC/4mA
	Operating voltage range		10.2 to 26.4 VDC (Ripple ratio 5% or less)
	ON voltage/current		10VDC or more/2.0mA or more
	OFF voltage/current		1.8VDC or less/0.18mA or less
	Response time	FLS, RLS, STOP	1ms (OFF to ON, ON to OFF)
		DOG	0.4ms, 0.6ms, 1ms (OFF to ON, ON to OFF) CPU parameter setting, default 0.4ms
Number of I/O occupying points			32 points (I/O allocation: Intelligent function module, 32 points)
5VDC internal current consumption [A]			0.06
Mass [kg]			0.15
Exterior dimensions [mm (inch)]			98 (3.86)(H) × 27.4 (1.08)(W) × 90 (3.54)(D)

Note) Motion modules (Q172DLX) cannot be installed in CPU slot and I/O slot 0 to 2 of the main base unit.

● Synchronous encoder interface module Q172DEX



Item		Specifications
Serial absolute synchronous encoder input	Number of modules	2 per module
	Applicable encoder	Q171ENC-W8
	Position detection method	Absolute (ABS) data method
	Transmission method	Serial communications (2.5Mbps)
	Back up battery	A6BAT/MR-BAT
	Maximum cable length [m(ft.)]	50(164.04)
Tracking enable input	Number of input points	2 points
	Input method	Positive Common/Negative Common Shared Type (Photocoupler isolation)
	Rated input voltage/current	12VDC/2mA, 24VDC/4mA
	Operating voltage range	10.2 to 26.4 VDC (Ripple ratio 5% or less)
	ON voltage/current	10VDC or more/2.0mA or more
	OFF voltage/current	1.8VDC or less/0.18mA or less
	Response time	0.4ms, 0.6ms, 1ms (OFF to ON, ON to OFF) CPU parameter setting, default 0.4ms
Number of I/O occupying points		32 points (I/O allocation: Intelligent function module, 32 points)
5VDC internal current consumption [A]		0.19
Mass [kg]		0.15
Exterior dimensions [mm (inch)]		98 (3.86)(H) × 27.4 (1.08)(W) × 90 (3.54)(D)

(Note-1) Motion modules (Q172DEX) cannot be installed in CPU slot and I/O slot 0 to 2 of the main base unit.
(Note-2) Install Q172DEX to the main base unit. Do not install to the extension base unit.

● Manual pulse generator interface module Q173DPX



Item			Specifications
Manual pulse generator/ incremental synchronous encoder input	Number of modules		3 per module
	Voltage-output/ Open-collector type	High-voltage	3.0 to 5.25 VDC
		Low-voltage	0 to 1.0 VDC
	Differential-output type	High-voltage	2.0 to 5.25 VDC
		Low-voltage	0 to 0.8 VDC
	Input frequency		50kpps (Up to 200kpps after magnification by 4)
	Applicable types		Voltage-output/Open-collector type (5VDC), (Recommended product: MR-HDP01) Differential-output type (26C31 or equivalent)
	Maximum cable length [m(ft.)]		Voltage-output type: 10(32.79) Differential-output type: 30(98.36)
Tracking enable input	Number of input points		3 points
	Input method		Positive Common/Negative Common Shared Type (Photocoupler isolation)
	Rated input voltage/current		12VDC/2mA, 24VDC/4mA
	Operating voltage range		10.2 to 26.4 VDC (Ripple ratio 5% or less)
	ON voltage/current		10VDC or more/2.0mA or more
	OFF voltage/current		1.8VDC or less/0.18mA or less
	Response time		0.4ms, 0.6ms, 1ms (OFF to ON, ON to OFF) CPU parameter setting, default 0.4ms
Number of I/O occupying points			32 points (I/O allocation: Intelligent function module, 32 points)
5VDC internal current consumption [A]			0.38
Mass [kg]			0.15
Exterior dimensions [mm (inch)]			98(3.86)(H) × 27.4(1.08)(W) × 90(3.54)(D)

Note) Motion modules (Q173DPX) cannot be installed in CPU slot and I/O slot 0 to 2 of the main base unit.

● Safety signal module Q173DSXY



Item		Specifications
		Q173DSXY
Input signals	Number of input points	32 points × 2 systems (PLC CPU control 32 points + Motion CPU control 32 points, Safety input 20 points × 2 systems, Feedback inputs for outputs 12 points × 2 systems)
	Input isolation method	Photocoupler
	Rated input voltage	24VDC (+10/-10%), Negative Common Type
	Max. input current	Approx. 4mA
	Input resistance	Approx. 8.2kΩ
	Input ON voltage/current	20VDC or more/3mA or more
	Input OFF voltage/current	5VDC or less/1.7mA or less
	Input response time	PLC CPU control I/O: 10ms (digital filter's default value) Motion CPU control I/O: 15ms (CR filter)
	Input common method	32 points/common (separate commons for the PLC CPU control I/O and the Motion CPU control I/O)
	Input operation indicator LED	32 points (indication for PLC CPU control)
Output signals	Number of output points	12 points × 2 systems (PLC CPU control 12 points + Motion CPU control 12 points)
	Output isolation method	Photocoupler
	Rated output voltage	24VDC (+10/-10%), Source type
	Max. load current	(0.1A × 8 points, 0.2A × 4 points) × 2 systems, common current: each connector 1.6A or less
	Max. inrush current	0.7A 10ms or less (1.4A, 10ms or less for 0.2A output pin)
	Response time	1ms or less
	Output common method	12 points/common (separate commons for the PLC CPU control I/O and the Motion CPU control I/O)
	Output operation indicator LED	Shared with inputs
Safety specifications (Note-1)	Functions according to IEC61800-5-2	STO, SS1, SS2, SOS, SLS, SBC, SSM (IEC61800-5-2 : 2007) and Safety I/Os
	Safety performance	EN ISO 13849-1 Category3 PL d, EN 61800-5-2/IEC 61508 Part 1-7 : 1998/2000, EN 62061 SIL CL 2
	Mean time to dangerous failure (MTTFd)	169 years or more (theoretical value)
	Diagnostic converge (DCavq)	Low
	Probability of dangerous Failure per Hour (PFH)	2.17E-8 (1/h)
Number of I/O occupying points		32 points
Communication between PLC CPUs		Parallel bus communication (via main base unit)
Communication between Motion CPUs		Serial communication (RS-485), RIO cable
Number of installed modules		Up to 3 modules (Max. number of input points: 60 points × 2 systems; Max. number of output points: 36 points × 2 systems)
5VDC internal current consumption		0.20A (TYP. all points ON)
Mass [kg]		0.15
Exterior dimensions [mm(inch)]		98 (3.86)(H) × 27.4 (1.08)(W) × 90 (3.54)(D)

Note) Install Q173DSXY to the main base unit. Do not install to the extension base unit.
(Note-1): These functions are certified by Certification Body only for the combination of Q173DSXY and "QnUD(E)(H)CPU", the following PLC CPU modules.
QnUD (E)(H) CPU : Q03UDCPU, Q03UDECPU, Q04UDHCPU, Q04UDEHCPU, Q06UDHCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU

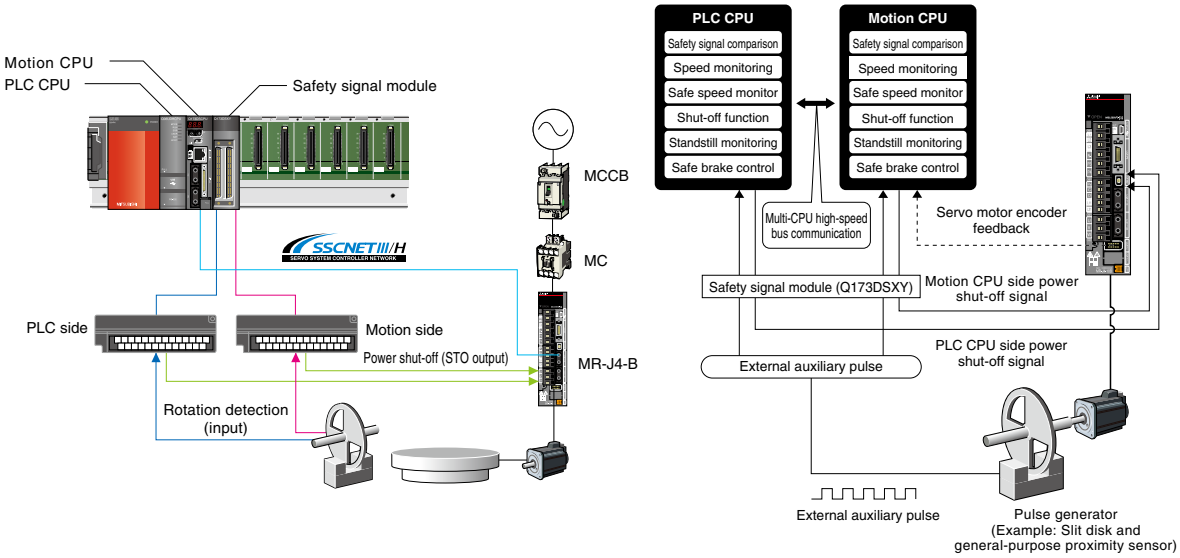
Safety System

Q17nDSCPU

The safety system is compliant with “EN ISO13849-1:2008 Category 3 PLd” and “EN62061 SIL CL2” (these standards are harmonized with European Machine Directives). Functional safety (STO, SS1, SS2, SOS, SSM, SBC, SLS) according to IEC61800-5-2 are available as standard, as well as the safety signal comparison function, which confirms the status of the input/output signals by the Motion CPU and the PLC CPU. The operating conditions for these functions are freely programmed by using the PLC CPU and Motion CPU ladder circuits.

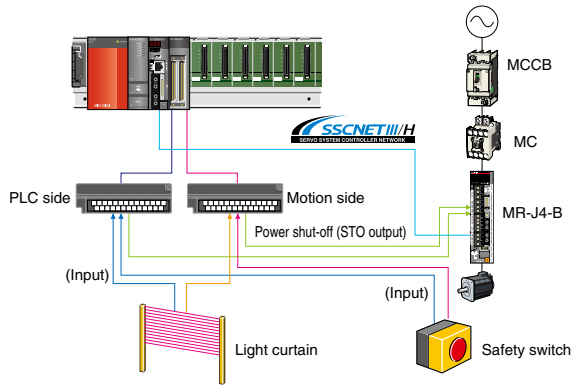
Speed monitoring function

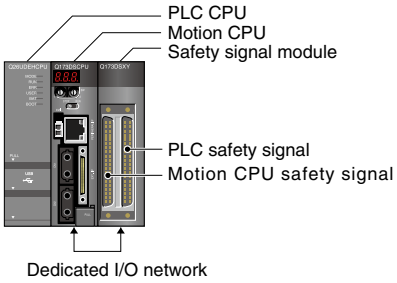
The motor speed is monitored not to exceed the "Safety Speed" by the Motion CPU and the PLC CPU.



Safety signal comparison function

The safety input signals are monitored using the Motion CPU, PLC CPU and safety signal module.





PLC CPU	QnUD(E)(H)CPU (Note-1)
Motion CPU	Q173DSCPU/Q172DSCPU
Safety signal module	Q173DSXY (up to 3 modules can be installed) (Note-2)
Number of input points	Up to 60 points × 2 systems
Number of output points	Up to 36 points × 2 systems

(Note-1): The safety system is certified by Certification Body only for the combination of Q173DSXY and "QnUD(E)(H)CPU"
(Note-2): All output signal points at the 2nd and 3rd modules can be used as user safety signals.

	No. of points	Signal description
Input	20	User safety signals
Output	1	Power shut-off signal (Note-3)
	11	User safety signals

(Note-3): Power shut-off signal turns: ON when safety signal comparison function status is normal. OFF when error is detected.

Motion controller Product Line-up

Part	Model	Description			Standards
Motion CPU module	Q173DSCPU	Up to 32 axes, Operation cycle 0.22 ms or more (Attachment: battery (Q6BAT))			CE, UL, KC
	Q172DSCPU	Up to 16 axes, Operation cycle 0.22 ms or more (Attachment: battery (Q6BAT))			CE, UL, KC
Stand-alone Motion controller	Q170MSCPU	Integrated with power supply, PLC CPU, and Motion CPU			CE, UL, KC
	Q170MSCPU-S1	Attachment: battery (Q6BAT), 24VDC power supply connector, emergency stop input cable connector (Note-1)			CE, UL, KC
Cable for forced stop input (Note-1)	Q170DEMICBL05M	Forced stop input (Be sure to order with Motion CPU modules)		0.5m (1.64ft.)	—
	Q170DEMICBL1M			1m (3.28ft.)	—
	Q170DEMICBL3M			3m (9.84ft.)	—
	Q170DEMICBL5M			5m (16.40ft.)	—
	Q170DEMICBL10M			10m (32.81ft.)	—
	Q170DEMICBL15M			15m (49.21ft.)	—
	Q170DEMICBL20M			20m (65.62ft.)	—
	Q170DEMICBL25M			25m (82.02ft)	—
	Q170DEMICBL30M			30m (98.43ft.)	—
Connector for forced stop input cable	Q170DEMICON	Connector for forced stop input cable production (Be sure to order when you make the forced stop input cable)			—
SSCNET III cable (Note-3)	MR-J3BUS_M	Q17nDSCPU⇔MR-J4-B Q170MSCPU(-S1)⇔MR-J4-B MR-J4-B⇔MR-J4-B	Standard cord for inside panel	0.15m (0.49ft.), 0.3m (0.98ft.), 0.5m (1.64ft.), 1m (3,28ft.), 3m (9.84ft.)	—
	MR-J3BUS_M-A		Standard cable for outside panel	5m (16.40ft.), 10m (32.81ft.), 20m (65.62ft.)	—
	MR-J3BUS_M-B (Note-2)		Long distance cable	30m (98.43ft.), 40m (131.23ft.), 50m (164.04ft.)	—
Servo external signals interface module	Q172DLX	Servo external signal inputs for 8 axes (FLS, RLS, STOP, DOG × 8)			CE, UL, KC
Synchronous encoder interface module	Q172DEX	Serial absolute synchronous encoder Q171ENC-W8 interface × 2, Tracking input 2 points, with A6BAT			CE, UL, KC
Manual pulse generator interface module	Q173DPX	Manual pulse generator MR-HDP01/Incremental synchronous encoder interface × 3, Tracking input 3 points			CE, UL, KC
Safety signal module	Q173DSXY	Input: 20 points (2 systems), Output: 12 points (2 systems), Attachment RIO cable (Q173DSXYCBL01M)			CE, UL, KC
Optical hub unit	MR-MV200	Three branches/unit, DC power supply connector enclosed			CE, UL, KC
Serial absolute synchronous encoder	Q171ENC-W8	Resolution: 4,194,304pulse/rev, Permitted speed: 3600r/min			CE, UL, KC
Serial absolute synchronous encoder cable	Q170ENCCBL2M	Serial absolute synchronous encoder Q171ENC-W8⇔Q172DEX		2m (6.56ft.)	—
	Q170ENCCBL5M			5m (16.40ft.)	—
	Q170ENCCBL10M			10m (32.81ft.)	—
	Q170ENCCBL20M			20m (65.62ft.)	—
	Q170ENCCBL30M			30m (98.43ft.)	—
	Q170ENCCBL50M			50m (164.04ft.)	—
	Q170ENCCBL2M-A	Serial absolute synchronous encoder Q171ENC-W8⇔MR-J4-RJ		2m (6.56ft.)	—
	Q170ENCCBL5M-A			5m (16.40ft.)	—
	Q170ENCCBL10M-A			10m (32.81ft.)	—
	Q170ENCCBL20M-A			20m (65.62ft.)	—
	Q170ENCCBL30M-A			30m (98.43ft.)	—
	Q170ENCCBL50M-A			50m (164.04ft.)	—
Internal I/F connector set	Q170DSIOCON	Manual pulse generator/incremental synchronous encoder interface, external command signal/interface for switching signals, With ferrite core (This set is not included with the Motion CPU module.)			—
	LD77MHIOCON	Manual pulse generator/Incremental synchronous encoder interface, external command signal/Switching signal interface (This set is not included with the Q170MSCPU(-S1).)			—
RIO cable	Q173DSXYCBL01M	Q17nDSCPU⇔Q173DSXY		0.1m (0.44ft.)	—
	Q173DSXYCBL05M	Q173DSXY⇔Q173DSXY		0.5m (1.64ft.)	—
Battery	Q6BAT	For memory data backup of SRAM built-in Motion CPU (program, parameter, absolute position data, latch data)			—
	A6BAT	For data backup of Q171ENC-W8			—
Large capacity battery	Q7BAT	For memory data backup of SRAM built-in Motion controller (program, parameter, absolute position data, latch data)			—
Battery holder	Q170MSBAT-SET	Battery holder for Q7BAT (included with the battery)			—
Manual pulse generator	MR-HDP01	Number of pulses per revolution: 25pulse/rev (100pulse/rev after magnification by 4) Permitted speed: 200r/min (Normal rotation)			—

(Note-1): Be sure to use the cable for forced stop input . The forced stop cannot be released without using it.
(Note-2): For long distance cable up to 100m (328.08ft.) and ultra-long bending life cable, contact Mitsubishi Electric System & Service Co., Ltd.
[Sales office] FA PRODUCT DIVISION mail: osb.webmaster@melsc.jp
(Note-3): "_" indicates cable length (015: 0.15m (0.49ft.), 03: 0.3m (0.98ft.), 05: 0.5m (1.64ft.), 1: 1m (3.28ft.), 3: 3m (9.84ft.), 5: 5m (16.40ft.), 10: 10m (32.81ft.), 20: 20m (65.62ft.), 30: 30m (98.43ft.), 40: 40m (131.23ft.), 50: 50m (164.04ft.))

Software for Motion controller

[Operating system software] (Note-1)

Application	Model name			
	Q173DSCPU	Q172DSCPU	Q170MSCPU-S1	Q170MSCPU
Conveyor assembly use SV13	SW8DNC-SV13QJ	SW8DNC-SV13QL	SW8DNC-SV13QN	
Automatic machinery use SV22	SW8DNC-SV22QJ	SW8DNC-SV22QL	SW8DNC-SV22QN	

Product	Model name	Description
Operating system software set for Q17nDSCPU/Q170MSCPU	SW8DNC-SV1322QJLSET	SW8DNC-SV13QJ, SW8DNC-SV13QL, SW8DNC-SV13QN, SW8DNC-SV22QJ, SW8DNC-SV22QL, SW8DNC-SV22QN

(Note-1): Operating system software (SV22) is Pre-installed into Motion controller before shipment
SW8DNC-SV1322QJLSET [CD-ROM] that includes all operating system softwares in the table above is also available.

Simple Motion Module

SSCNET III/H compatible

MELSEC-Q series Simple Motion module

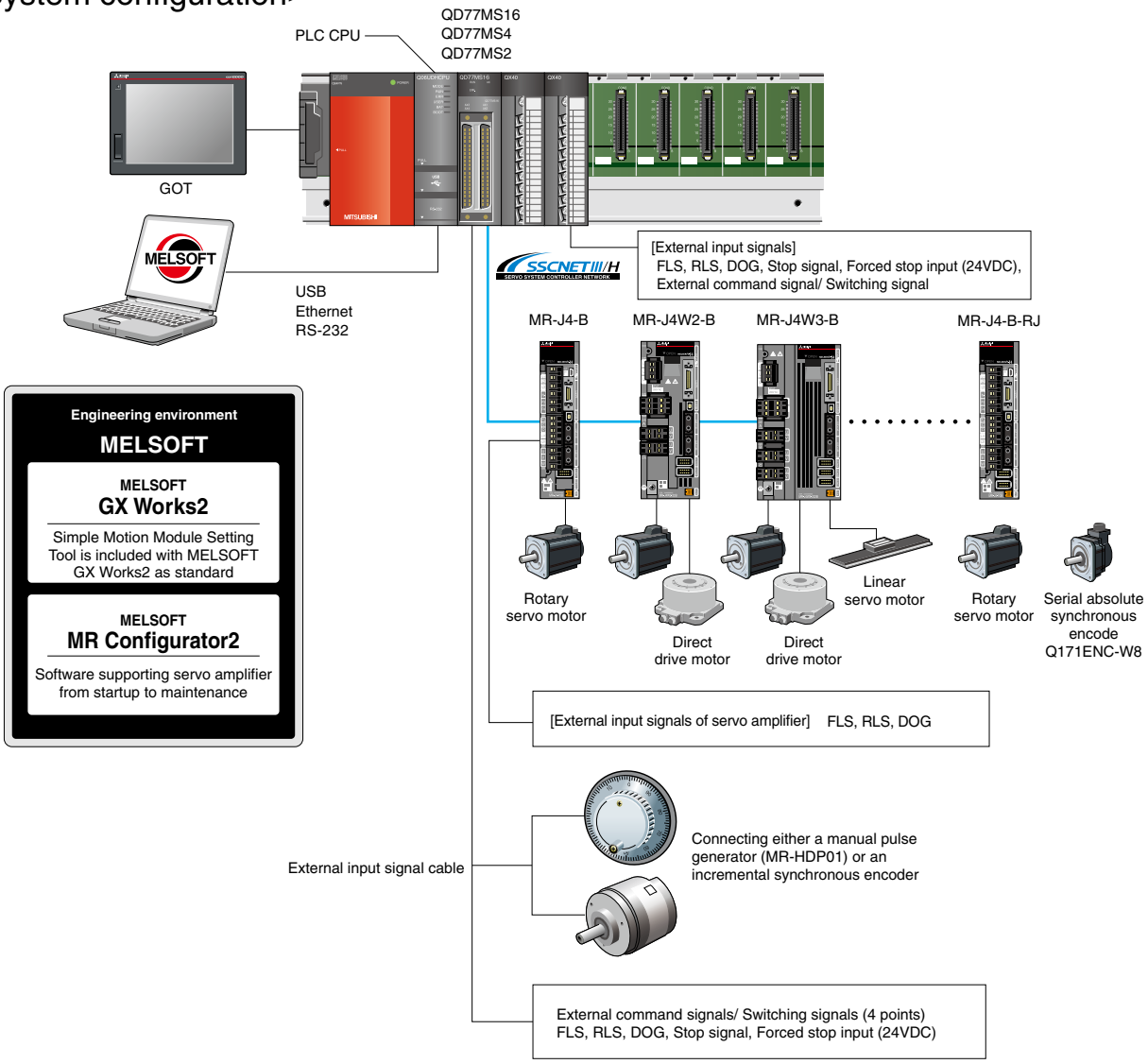
QD77MS16/QD77MS4/QD77MS2



Achieving Various Controls While Being Simple to Use Just Like Positioning Modules

- Advanced and wide-range Motion controls can be easily performed just with a sequence program, such as advanced synchronous control, cam control, and speed-torque control (tightening & press-fit control).
- Equipped with the synchronous encoder input and mark detection function as standard.
- Simple settings without programming are achieved with Mitsubishi's MELSOFT series Engineering environment.
- QD75MH existing project assets can be diverted to QD77MS.

<System configuration>



SSCNET III/H compatible

MELSEC-L series Simple Motion module

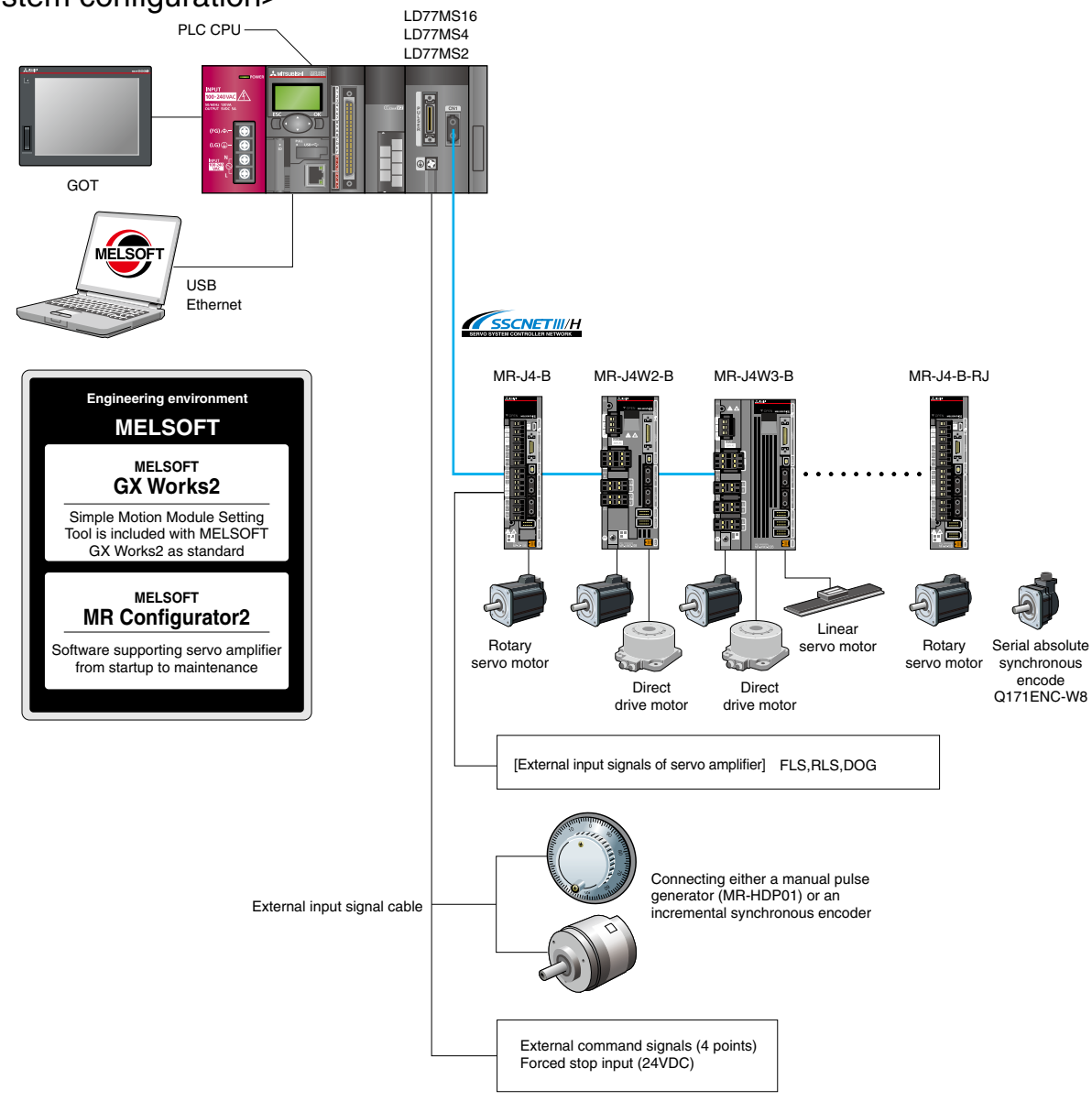
LD77MS16/LD77MS4/LD77MS2



Motion Control Made Simpler

- Advanced and wide-range Motion controls can be easily performed just with a sequence program, such as advanced synchronous control, cam control, and speed-torque control (tightening & press-fit control).
- Equipped with the synchronous encoder input and mark detection function as standard.
- Simple settings without programming are achieved with Mitsubishi's MELSOFT series Engineering environment.
- LD77MH existing project assets can be diverted to LD77MS.

<System configuration>



CC-Link IE Field Network

MELSEC-Q series Simple Motion module

QD77GF16

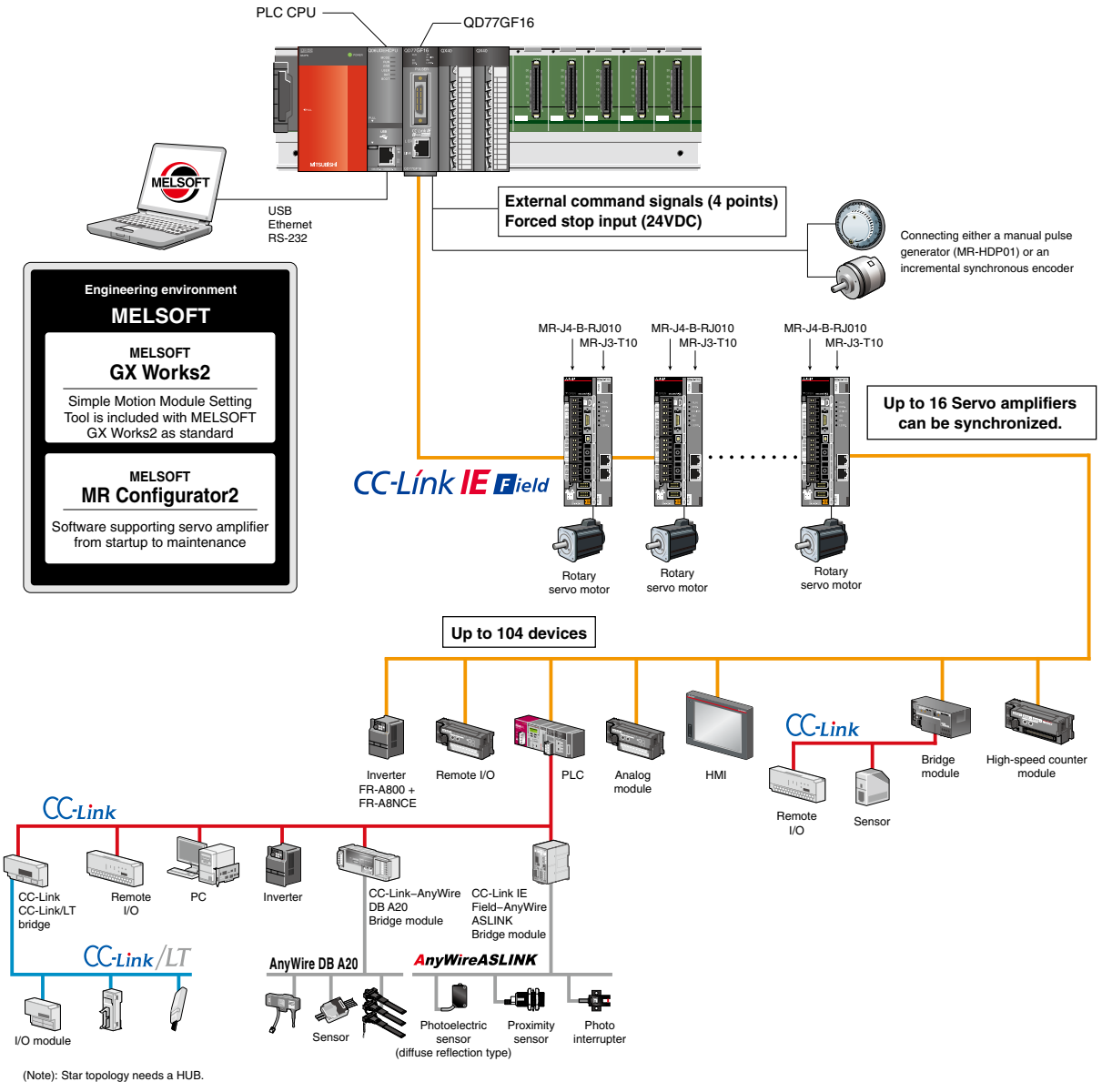


Superior Motion Performance Now Available for CC-Link IE Field Network

- Positioning/advanced synchronous/cam controls are easily performed with simple parameter setting and a start from a sequence program.
- QD77GF16 can be used as the master station of CC-Link IE Field Network. (equivalent to QJ71GF11-T2) (Note-1)
- Within one network, QD77GF16 can communicate with servo amplifiers and field devices (Remote I/O, Sensor, etc.).

(Note-1): QD77GF can be used only as the master station. Line and star topologies are available. Up to 104 slave devices can be connected in one network.

<System configuration>



(Note): Star topology needs a HUB.

Simple motion module specifications

Control specification

Item		Specifications						
		QD77MS16	QD77MS4	QD77MS2 (Note-3)	LD77MS16	LD77MS4	LD77MS2 (Note-3)	QD77GF16
Number of control axes (Virtual servo amplifier axis included)		Up to 16 axes	Up to 4 axes	Up to 2 axes	Up to 16 axes	Up to 4 axes	Up to 2 axes	Up to 16 axes
Operation cycle (Operation cycle settings) (Note-1)		0.88ms, 1.77ms						0.88ms, 1.77ms, 3.55ms
Interpolation function		Linear interpolation (Up to 4 axes), Circular interpolation (2 axes)						
Control modes		PTP (Point To Point) control, Trajectory control (both linear and arc can be set), Speed control, Speed-position switching control, Position-speed switching control, Speed-torque control						
Acceleration/deceleration process		Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration						
Compensation function		Backlash compensation, Electronic gear, Near pass function						
Synchronous control		Synchronous encoder input, Cam, Phase Compensation, Cam auto-generation						
Control unit		mm, inch, degree, pulse						
Positioning data		600 data (positioning data No. 1 to 600)/axis (Can be set with MELSOFT GX Works2 or Sequence program.)						
Backup		Parameters, positioning data, and block start data can be saved on flash ROM (battery-less backup)						
OPR control	OPR method	Near-point dog method, Count method 1, Count method 2,Data set method, Scale home position signal detection method						
	Fast OPR control	Provided						
	Sub functions	OPR retry, OP shift						
Positioning control	Linear control	1-axis linear control, 2-axis linear interpolation control, 3-axis linear interpolation control, 4-axis linear interpolation control (Note-4) (Composite speed, Reference axis speed)						
	Fixed-pitch feed control	1-axis fixed-pitch feed, 2-axis fixed-pitch feed, 3-axis fixed-pitch feed, 4-axis fixed-pitch feed						
	2-axis circular interpolation	Sub point designation, center point designation						
	Speed control	1-axis speed control, 2-axis speed control, 3-axis speed control, 4-axis speed control						
	Speed-position switching control	INC mode, ABS mode						
	Position-speed switching control	INC mode						
	Current value change	Positioning data, Start No. for a current value changing						
	NOP instruction	Provided						
	JUMP instruction	Unconditional JUMP, Conditional JUMP						
	LOOP, LEND	Provided						
	High-level positioning control	Block start, Condition start, Wait start, Simultaneous start, Repeated start						
Manual control	JOG operation	Provided						
	Inching operation	Provided						
	Manual pulse generator operation	Possible to connect 1 module (Incremental) Unit magnification (1 to 10000 times)						
Expansion control	Speed-torque control	Speed control without positioning loops, Torque control, Tightening & press-fit control (Note-5)						
Absolute position system		Made compatible by setting battery to servo amplifier						
Synchronous encoder interface		Up to 4 channels (Total of the internal interface , via PLC CPU interface, and servo amplifier interface (Note-5))						
	Internal interface	1 channel (Incremental)						
Functions that limit control	Speed limit function	Speed limit value, JOG speed limit value						
	Torque limit function	Torque limit value_same setting, torque limit value_individual setting						
	Forced stop	Valid/Invalid setting						
	Software stroke limit function	Movable range check with current feed value, movable range check with machine feed value						
	Hardware stroke limit function	Provided						
Functions that change control details	Speed change function	Provided						
	Override function	Provided						
	Acceleration/deceleration time change function	Provided						
	Torque change function	Provided						
	Target position change function	Target position address and speed to target position are changeable						
Other functions	M code output function	Provided						
	Step function	Deceleration unit step, Data No. unit step						
	Skip function	Via PLC CPU, Via external command signal						
	Teaching function	Provided						
Mark detection function		Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode						
	Mark detection signal	4 points		2 points	4 points		2 points	4 points
	Mark detection setting	16 settings	4 settings		16 settings	4 settings		16 settings
Optional data monitor function		4 points/axis						—
Driver communication function		Provided						—
Amplifier-less operation function		Provided						—
Digital oscilloscope function (Note-2)	Bit data	16ch	8ch		16ch	8ch		16ch
	Word data	16ch	4ch		16ch	4ch		16ch

(Note-1): Default value is 1.77 ms. If necessary, check the operation time and change to 0.88 ms.
(Note-2): 8CH word data and 8CH bit data can be displayed in real time.
(Note-3): The maximum number of control axes for QD77MS2 and LD77MS2 is two axes. Use QD77MS4, QD77MS16, LD77MS4, or LD77MS16 to control three or more axes.
(Note-4): 4-axis linear interpolation control is enabled only at the reference axis speed.
(Note-5): QD77MS and LD77MS only.

● Synchronous control specification

Synchronous control

Item		Number of settable axes						
		QD77MS16	QD77MS4	QD77MS2	LD77MS16	LD77MS4	LD77MS2	QD77GF16
Input axis	Servo input axis	16 axes/module	4 axes/module	2 axes/module	16 axes/module	4 axes/module	2 axes/module	16 axes/module
	Synchronous encoder axis	4 axes/module						
Composite main shaft gear		1/output axis						
Main shaft main input axis		1/output axis						
Main shaft sub input axis		1/output axis						
Main shaft gear		1/output axis						
Main shaft clutch		1/output axis						
Auxiliary shaft		1/output axis						
Auxiliary shaft gear		1/output axis						
Auxiliary shaft clutch		1/output axis						
Auxiliary shaft composite gear		1/output axis						
Speed change gear		1/output axis						
Output axis (Cam axis)		16 axes/module	4 axes/module	2 axes/module	16 axes/module	4 axes/module	2 axes/module	16 axes/module

Cam control

Item			Specifications						
			QD77MS16	QD77MS4	QD77MS2	LD77MS16	LD77MS4	LD77MS2	QD77GF16
Memory capacity	Storage area for cam data		256k bytes						
	Working area for cam data		1024k bytes						
Number of registration			Max. 256 (depending on memory capacity, cam resolution and number of coordinates)						
Comment			Up to 32 characters for each cam data						
Cam data	Stroke ratio data type	Cam resolution	256, 512, 1024, 2048, 4096, 8192, 16384, 32768						
		Stroke ratio	–214.7483648 to 214.7483647 [%]						
	Coordinate data type	Coordinate number	2 to 16384						
		Coordinate data	Input value: 0 to 2147483647 Output value: -2147483648 to 2147483647						
Cam auto-generation			Cam auto-generation for rotary cutter						

■Module specification

●Simple Motion module QD77MS16/QD77MS4/QD77MS2



Item		Specifications		
		QD77MS16	QD77MS4	QD77MS2
Number of control axes (Virtual servo amplifier axis included)		Up to 16 axes	Up to 4 axes	Up to 2 axes
Servo amplifier connection system		SSCNET III/H		
Maximum overall cable distance [m(ft.)]		SSCNET III/H: 1600 (5249.34), SSCNET III: 800 (2624.67)		
Maximum distance between stations [m(ft.)]		SSCNET III/H: 100 (328.08), SSCNET III: 50 (164.04)		
Peripheral I/F		Via CPU module (USB, RS-232, Ethernet)		
Manual pulse generator operation function		Possible to connect 1 module		
Synchronous encoder operation function		Possible to connect 4 modules (Total of the internal interface , via PLC CPU interface, and servo amplifier interface)		
Near-point dog signal (DOG) External command signal/ Switching signal (CHG)	Number of input points	4 points		2 points
	Input method	Positive common/ Negative common shared (Photocoupler isolation)		
	Rated input voltage/current	24 VDC/ Approx. 5 mA		
	Operating voltage range	19.2 to 26.4 VDC (24 VDC +10%/-20%, ripple ratio 5% or less)		
	ON voltage/current	17.5 VDC or more/ 3.5 mA or more		
	OFF voltage/current	7 VDC or less/ 1.0 mA or less		
	Input resistance	Approx 6.8 kΩ		
	Response time	1 ms or less (OFF→ON, ON→OFF)		
	Recommended wire size	AWG24 (0.2 mm^2)		
Forced stop input signal (EMI) Upper limit signal (FLS) Lower limit signal (RLS) Stop signal (STOP)	Number of input points	4 points, 1 point (EMI)		2 points, 1 point (EMI)
	Input method	Positive common/ Negative common shared (Photocoupler isolation)		
	Rated input voltage/current	24 VDC/ Approx. 5 mA		
	Operating voltage range	19.2 to 26.4VDC (24VDC +10%/-20%, ripple ratio 5% or less)		
	ON voltage/current	17.5 VDC or more/ 3.5 mA or more		
	OFF voltage/current	7 VDC or less/ 1.0 mA or less		
	Input resistance	Approx 6.8 kΩ		
	Response time	4 ms or less (OFF→ON, ON→OFF)		
	Recommended wire size	AWG24 (0.2 mm^2)		
Manual pulse generator/ Incremental synchronous encoder signal	Signal input form	Phase A/Phase B (magnification by 4/magnification by 2/magnification by 1), PULSE/SIGN		
	Input frequency	1Mpps (After magnification by 4, up to 4 Mpps) (Differentialoutput type) 200 kpps (After magnification by 4, up to 800 kpps) (Voltage-output/Open-collector type)		
	Cable length	Up to 30 m (98.43ft.) (Differentialoutput type) Up to 10 m (32.81ft.) (Voltage-output/Open-collector type)		
Number of I/O occupying points		32 points (I/O allocation: Intelligent function module, 32 points)		
Number of module occupied slots		1		
5VDC internal current consumption [A]		0.75	0.6	
Mass [kg]		0.16		0.15
Exterior dimensions [mm(inch)]		98.0 (3.86) (H) × 27.4 (1.08) (W) × 90.0 (3.54) (D)		

●Simple Motion module LD77MS16/LD77MS4/LD77MS2



Item		Specifications		
		LD77MS16	LD77MS4	LD77MS2
Number of control axes (Virtual servo amplifier axis included)		Up to 16 axes	Up to 4 axes	Up to 2 axes
Servo amplifier connection system		SSCNET III/H (1 system)		
Maximum distance between stations [m(ft.)]		SSCNET III/H: 1600 (5249.34), SSCNET III: 800 (2624.67)		
Maximum distance between stations [m(ft.)]		SSCNET III/H: 100 (328.08), SSCNET III: 50 (164.04)		
Peripheral I/F		Via CPU module (USB, Ethernet)		
External command signal/ Switching signal (CHG)	Number of input points	4 points		2 points
	Input method	Positive common/Negative common shared (Photocoupler isolation)		
	Rated input voltage/current	24 VDC/Approx. 5 mA		
	Operating voltage range	21.6 to 26.4 VDC (24 VDC ±10 %, ripple ratio 5 % or less)		
	ON voltage/current	17.5 VDC or more/3.5 mA or more		
	OFF voltage/current	5 VDC or less/0.9 mA or less		
	Input resistance	Approx. 5.6 kΩ		
	Response time	1 ms or less (OFF→ON, ON→OFF)		
	Recommended wire size	AWG24 (0.2 mm^2)		
Forced stop input signal (EMI)	Number of input points	1 point (EMI)		
	Input method	Positive common/Negative common shared (Photocoupler isolation)		
	Rated input voltage/current	24 VDC/Approx. 2.4 mA		
	Operating voltage range	20.4 to 26.4 VDC (24 VDC +10 %/-15 %, ripple ratio 5 % or less)		
	ON voltage/current	17.5 VDC or more/2.0 mA or more		
	OFF voltage/current	1.8 VDC or less/0.18 mA or less		
	Input resistance	Approx. 10 kΩ		
	Response time	1 ms or less (OFF→ON, ON→OFF)		
	Recommended wire size	AWG24 (0.2mm^2)		
Manual pulse generator/ Incremental synchronous encoder signal	Signal input form	Phase A/Phase B (magnification by 4/magnification by 2/magnification by 1), PULSE/SIGN		
	Input frequency	1Mpps (After magnification by 4, up to 4 Mpps) (Differentialoutput type) 200 kpps (After magnification by 4, up to 800 kpps) (Voltage-output/Open-collector type)		
	Cable length	Up to 30 m (98.43ft.) (Differentialoutput type) Up to 10 m (32.81ft.) (Voltage-output/Open-collector type)		
Number of I/O occupying points		32 points (I/O allocation: Intelligent function module, 32 points)		
Number of module occupied slots		2		
5VDC internal current consumption [A]		0.7	0.55	
Mass [kg]		0.22		
Exterior dimensions [mm(inch)]		90.0 (3.54) (H) × 45.0 (1.77) (W) × 95.0 (3.74) (D)		

● Simple Motion module QD77GF16



Item		Specifications QD77GF16
Number of control axes (Virtual servo amplifier axis included)		Up to 16 axes
Servo amplifier connection system		CC-Link IE Field Network
Maximum distance between stations [m(ft.)]		100 (328.08)
Peripheral I/F		Via CPU module (USB, RS-232, Ethernet)
Manual pulse generator operation function		Possible to connect 1 module
External command signal	Number of input points	4 points
	Input method	Positive common/ Negative common shared (Photocoupler isolation)
	Rated input voltage/ current	24 VDC/ Approx. 5 mA
	Operating voltage range	21.6 to 26.4 VDC (24 VDC ±10%, ripple ratio 5% or less)
	ON voltage/current	17.5 VDC or more/ 3.5 mA or more
	OFF voltage/current	5 VDC or less/ 0.9 mA or less
	Input resistance	Approx 5.6 kΩ
	Response time	1 ms or less (OFF→ON, ON→OFF)
	Recommended wire size	AWG24 (0.2 mm^2)
Forced stop input signal (EMI)	Number of input points	1 point
	Input method	Positive common/ Negative common shared (Photocoupler isolation)
	Rated input voltage/ current	24 VDC/ Approx. 2.4 mA
	Operating voltage range	20.4 to 26.4VDC (24VDC +10%/-15%, ripple ratio 5% or less)
	ON voltage/current	17.5 VDC or more/ 2 mA or more
	OFF voltage/current	1.8 VDC or less/ 0.18 mA or less
	Input resistance	Approx. 10 kΩ
	Response time	1 ms or less (OFF→ON, ON→OFF)
	Recommended wire size	AWG24 (0.2 mm^2)
Manual pulse generator/ Incremental synchronous encoder signal	Signal input form	Phase A/Phase B (magnification by 4/magnification by 2/magnification by 1), PULSE/SIGN
	Input frequency	1Mpps (After magnification by 4, up to 4 Mpps) (Differential output type) 200 kpps (After magnification by 4, up to 800 kpps) (Voltage-output/Open-collector type)
	Cable length	Up to 30 m (98.43ft.) (Differential output type) Up to 10 m (32.81ft.) (Voltage-output/Open-collector type)
Number of I/O occupying points		32 points (I/O allocation: Intelligent function module, 32 points)
Number of module occupied slots		1
5VDC internal current consumption [A]		0.8
Mass [kg]		0.26
Exterior dimensions [mm(inch)]		98.0 (3.86) (H) ×27.4 (1.08) (W) ×115 (4.53) (D)

■Simple Motion module Component

Part	Model	Description			Standards
Simple Motion Module	QD77MS16 (Note-1)	Up to 16 axes			CE, UL, KC
	QD77MS4 (Note-1)	Up to 4 axes			CE, UL, KC
	QD77MS2 (Note-1)	Up to 2 axes			CE, UL, KC
	LD77MS16 (Note-2)	Up to 16 axes			CE, UL, KC
	LD77MS4 (Note-2)	Up to 4 axes			CE, UL, KC
	LD77MS2 (Note-2)	Up to 2 axes			CE, UL, KC
	QD77GF16 (Note-2)	Up to 16 axes			CE, UL, KC
SSCNETIII cable (Note-3)	MR-J3BUS_M	・Simple Motion module ⇔MR-J4-B ・MR-J4-B⇔MR-J4-B	Standard code for inside panel	0.15m (0.49ft.), 0.3m (0.98ft.), 0.5m (1.64ft.), 1m (3.28ft.), 3m (9.84ft)	—
	MR-J3BUS_M-A		Standard code for outside panel	5m (16.40ft.), 10m (32.81ft.), 20m (65.62ft.)	—
	MR-J3BUS_M-B (Note-4)		Long distance cable	30m (98.43ft.), 40m (131.23ft.), 50m (164.04ft.)	—
Manual pulse generator	MR-HDP01	Number of pulses per revolution: 25pulse/rev (100pulse/rev after magnification by 4), Permitted speed: 200r/min (Normal rotation)			—
Connector for external input signal cable	LD77MHIOCON	Manual pulse generator/Incremental synchronous encoder interface, Interface for forced stop input, External command signal/Switching signal interface			—

(Note-1): Order the A6CON1, A6CON2, and A6CON4 separately because the connectors are not included in the package.
(Note-2): Order the LD77MHICON separately because the connector is not included in the package.
(Note-3): "_" indicates cable length (015: 0.15m (0.49ft.), 03: 0.3m (0.98ft.), 05: 0.5m (1.64ft.), 1: 1m (3.28ft.), 3: 3m (9.84ft.), 5: 5m (16.40ft.), 10: 10m (32.81ft.), 20: 20m (65.62ft.), 30: 30m (98.43ft.), 40: 40m (131.23ft.), 50: 50m (164.04ft))
(Note-4): For long distance cable up to 100m (328.08ft.) and ultra-long bending life cable, contact Mitsubishi Electric System & Service Co., Ltd.
[Sales office] FA PRODUCT DIVISION mail: osb.webmaster@melsc.jp

Engineering Software MELSOFT

iQ Platform MELSOFT

◎Comprehensibly supporting Motion controller design and maintenance

Motion Controller Engineering Software — MELSOFT MT Works2

Motion SFC programming, parameter setting, digital oscilloscope function, and simulation function are available. This software supports all necessary steps including system configuration, programming, debugging, and maintenance of Motion controllers.

◎Supporting settings of Simple Motion modules as well as sequence program creation

Programmable Controller Engineering Software — MELSOFT GX Works2

This software supports sequence program creation and the necessary setup steps for use of Simple Motion modules, such as the creation, startup, debugging, and maintenance of parameters, positioning data, and cam data.

◎Startup support tool for a suitable machine system, optimum control and short setup time

Servo Setup Software — MELSOFT MR Configurator2

Tuning, monitor display, diagnosis, reading/writing parameters, and test operations are easily performed on a personal computer. This startup support tool achieves a stable machine system, optimum control, and short setup time.

Easy to Use | Various "easy-to-use" features

System design

MT Works2 GX Works2

♦ System design

Servo amplifiers and modules can be set easily with a graphical system setting screen.



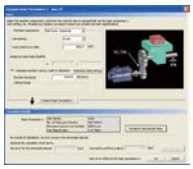
♦ Parameter setting

One-point help allows parameters to be set without a manual.



♦ Electronic gear setting

The electronic gear can be set easily just by inputting the machine specifications (reduction ratio, ball screw pitch, etc.).

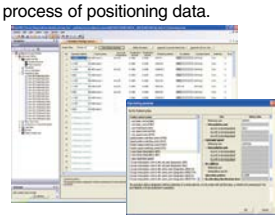


Programming

♦ Positioning data setting

Functions such as Data setting assistant, and Automatic calculation of auxiliary arc simplify the setting input process of positioning data.

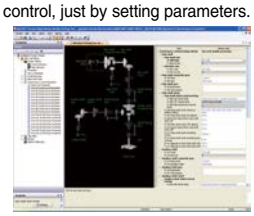
GX Works2



♦ Synchronous control parameter

Using software to replace machine mechanisms, such as the gear, shaft, speed change gear and cam achieves synchronous control, just by setting parameters.

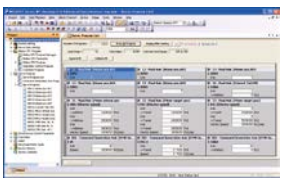
MT Works2 GX Works2



♦ Programming

User-friendly functions facilitate Motion controller program development.

MT Works2

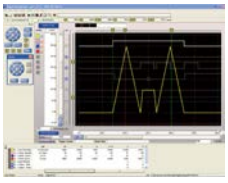


Startup and adjustment

♦ Digital oscilloscope

Operation check and troubleshooting are powerfully supported with data collection and wave displays which are synchronized to the Motion operation cycle.

MT Works2 GX Works2



♦ Monitor

The items and axes to be displayed can be selected from various monitored information.

MT Works2 GX Works2



♦ Simulator

Program debugging can be executed without using a Motion controller, which improves designing efficiency.

MT Works2

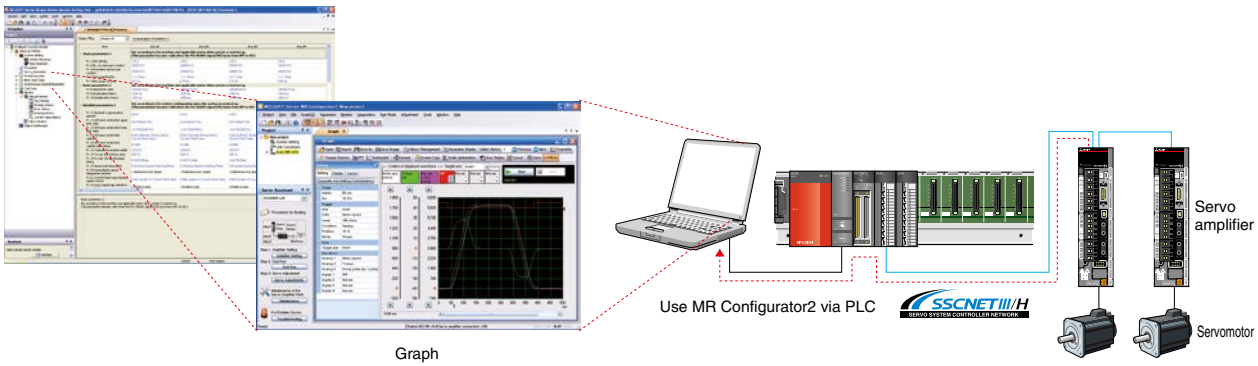


Easy to Use | Simplifies servo amplifier setup and tuning

♦ Adjustment of Servo Amplifier Parameters

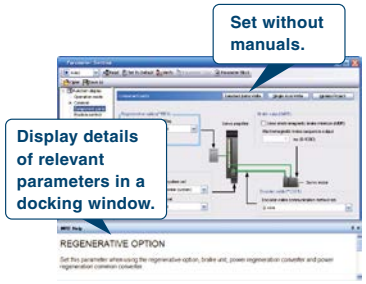
MR Configurator2

Coordination with the MELSOFT MR Configurator2 increases the ease of servo installation.
You can set and adjust servo amplifier parameters with the MELSOFT MR Configurator2, the software created with Mitsubishi servo know-how.



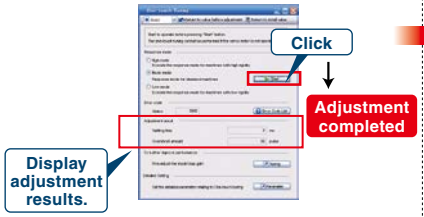
♦ Parameter setting function

Display parameter setting in list or visual formats, and set parameters by selecting from the drop down list.



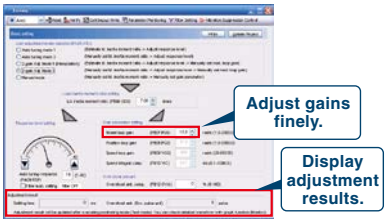
♦ One-touch tuning function

Adjustments including estimating load to motor inertia ratio, adjusting gain, and suppressing machine resonance are automatically performed for the maximum servo performance just by clicking the start button.



♦ Tuning function

Adjust control gain finely on the [Tuning] window manually for further performance after the one-touch tuning.



■Motion controller software

<Engineering environment MELSOFT series>

Product	Model name	Description
MELSOFT MT Works2	SW1DND-MTW2-E	Parameter setting and program creation of Motion CPU
MELSOFT GX Works2	SW1DND-GXW2-E	Sequence program creation
MELSOFT IQ Works (Note-1)	SW1DNC-IQWK-E	License product (1 license in CD-ROM)
	SW1DND-IQWK-E	License product (1 license in DVD-ROM)

(Note-1): This product includes the following software.
- System Management Software [MELSOFT Navigator]
- Programmable Controller Engineering Software [MELSOFT GX Works2]
- Motion Controller Engineering Software [MELSOFT MT Works2]
- Screen Design Software [MELSOFT GT Works3]
- Robot Total Engineering Support Software [MELSOFT RT ToolBox2 mini]

DRIVE PRODUCTS

AC Servos-MELSERVO

Inverters-FREQROL

Designed to enhance the overall manufacturing and production system capabilities

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO

AC Servos-MELSERVO

From rotary servo motors to liner servo motors and to direct-drive motors, we have a wide range of products to meet various needs and to significantly enhance the equipment performance.



Product details P.268

FREQROL

Inverters-FREQROL

Our inverters with adjustable frequency power supply are designed to easily change the rotation speed of the three-phase induction motor.

Product details P.436



AC Servo

Leading the World with the industry's Top Class Technology.
"MELSERVO" products are playing critical role in the success of manufacturers all over the world.
Welcome to the world's leading-edge drive platform.

MR-J4 Series

100VAC/200VAC/400VAC specifications
48VDC/24VDC specifications

The latest MELSERVO design brings harmony among machine, people, and environment.
Built with advanced features of industry-leading basic performance, safety standards, Easy-to-Use designs, energy saving functions, and much more.

P.270



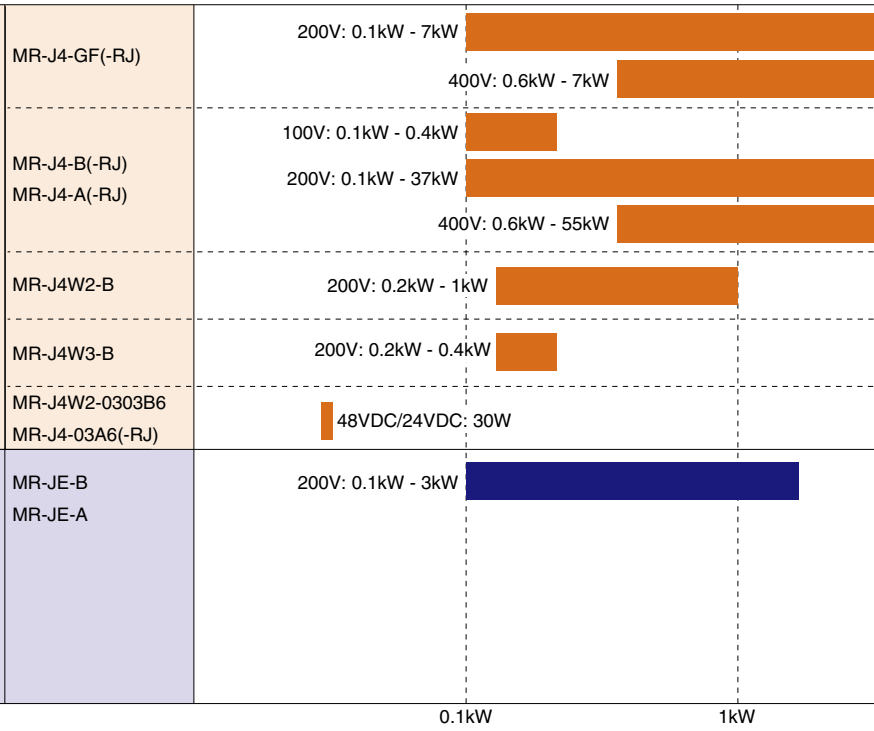
MR-JE Series

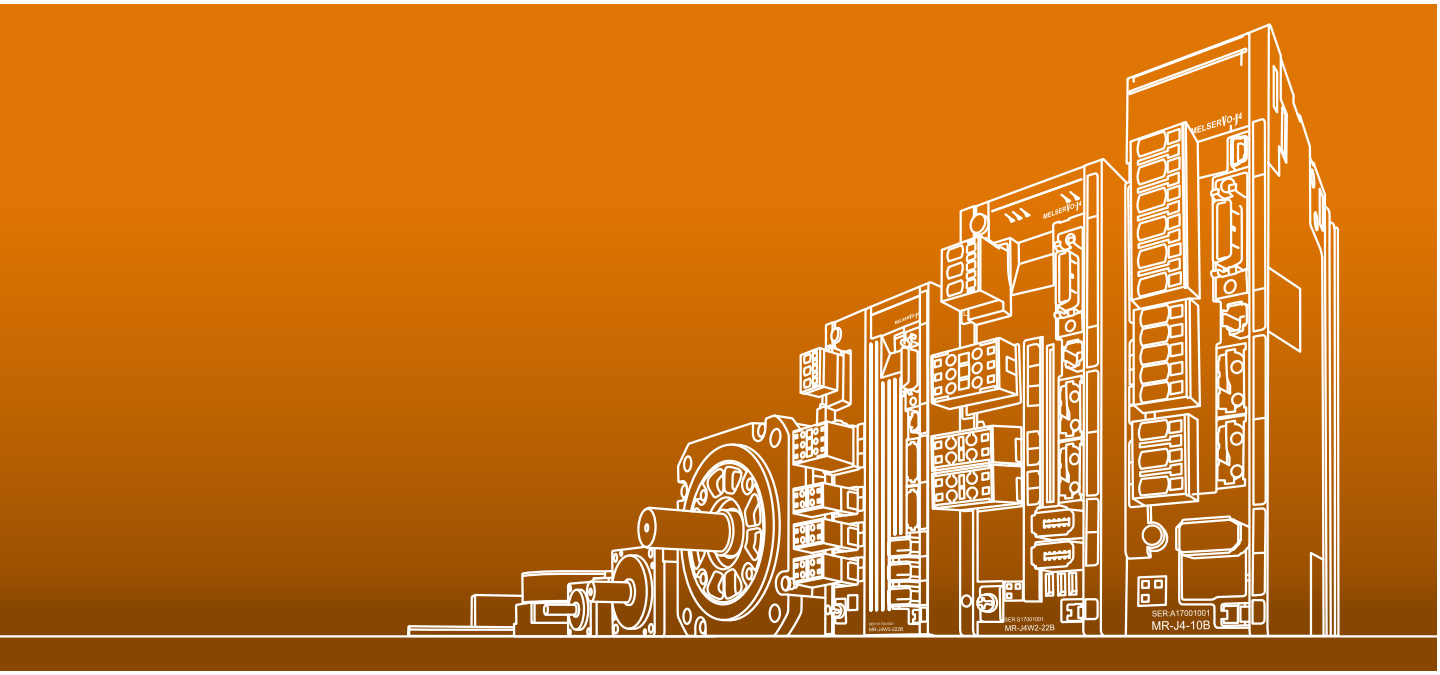
200VAC specifications

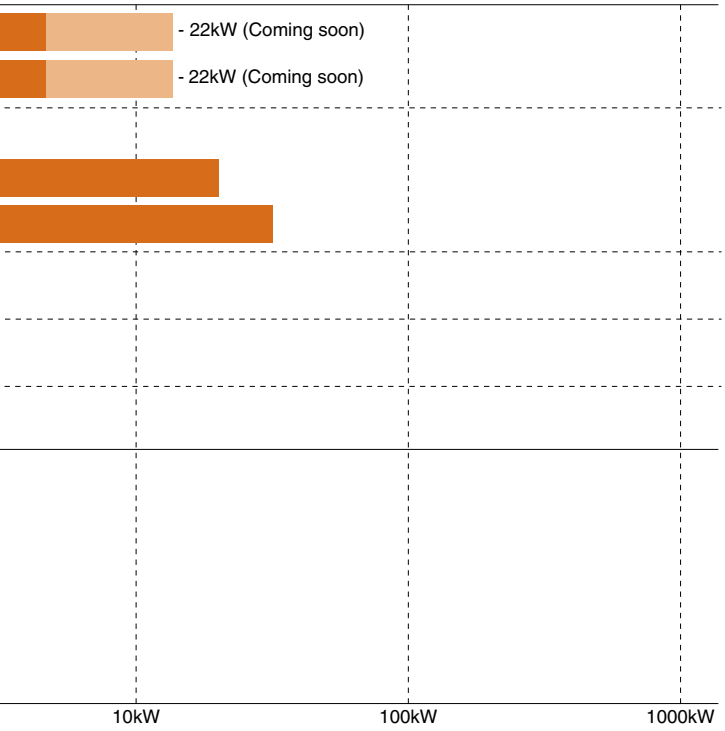
Operation has never been easier with features including the built-in one touch adjustment and positioning function.
In addition, other cutting edge functions will further enhance your production lines with optimized drive.

P.408









Rotary Servo Motor



High speed and high torque deliver shorter positioning time and faster performance.

J4 P.336

JE P.426

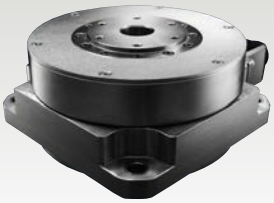
Linear Servo Motor



Optimized for linear motion system with high-speed and high-precision demands.

J4 P.378

Direct Drive Motor



With downsized and simplified rotating and driving parts, this device is a perfect choice for high-precision control.

J4 P.400

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-J4

MELSERVO-J4 — trusted technology makes an evolutionary leap forward

Introducing the MELSERVO-J4 series. Offering more than just improved performance, these servos are designed to drive the industries of tomorrow. Backed by Mitsubishi leadership in all-digital technology, MELSERVO has become one of the most globally respected names in factory automation. And now — with safety, ease of use, and energy-efficient design of the new MELSERVO-J4 series — man, machine and environment can at last work together in perfect harmony.



The leading edge in drive control, with unrivaled accuracy and response for next-generation machine performance.

Backed by Mitsubishi MELSERVO's global track record of proven reliability, the new MR-J4 takes machine performance to the highest level.



The leading edge in safety and convenience, designed to harmonize with the way you work.

The easy-to-use MR-J4 was created with human needs in mind. It meets world-class safety standards and is exceptionally simple to maintain, ensuring optimum setup and operating ease for both design and manufacturing personnel.



The new MR-J4 series: an evolution in eco-friendly design that's winning acclaim worldwide.

The MR-J4 series was designed with the environment in mind. In addition to helping you reduce your energy consumption, MR-J4 servos have a small footprint and simple wiring requirements that help save space and valuable resources.



A heritage of trust and continuity — the hallmark of every MELSERVO product.

The MR-J4 series integrates seamlessly with your existing manufacturing assets, ensuring a smooth transition to the speed and cost benefits of leading-edge MELSERVO technology.

Please refer to the catalog for details on the MELSERVO-J4 series.

SERVO AMPLIFIERS & MOTORS
MELSERVO-J4
L(NA)03058



Mitsubishi Servo System Family Catalog
L(NA)03055

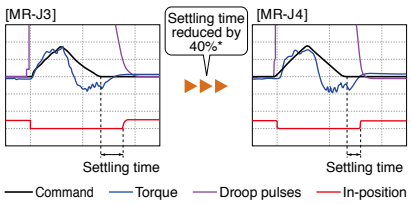


Machine

Industry-Leading Level of Servo Amplifier Basic Performance

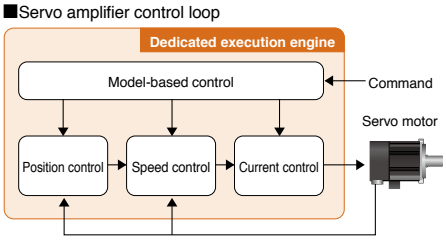
Our original high-speed servo control architecture is evolved from the conventional two-degrees-of-freedom model adaptive control and applied to the dedicated execution engine. **Speed frequency response is increased to 2.5 kHz.** Compatible servo motors are equipped with **a high-resolution absolute position encoder of 4,194,304 pulses/rev (22-bit)**, enabling high-speed and high-accuracy operation. The performance of the high-end machine is utilized to the fullest.

[Settling time comparison with the prior model]



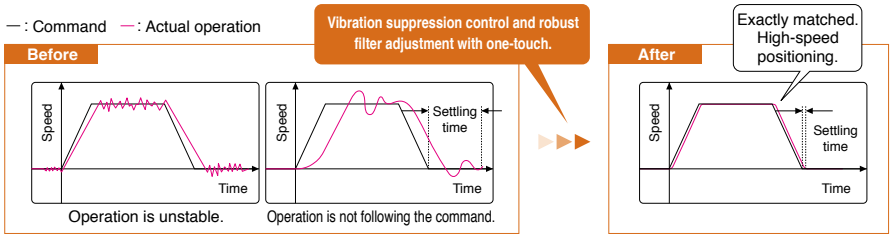
* The result is based on our evaluation condition.

[Dedicated execution engine]



One-touch Tuning

Servo gain adjustment is complete just by turning on the one-touch tuning function. With this function, machine resonance filter, advanced vibration suppression control II*, and robust filter are automatically adjusted to maximize your machine performance. This function also sets responsivity automatically while the real-time auto tuning requires manual setting.

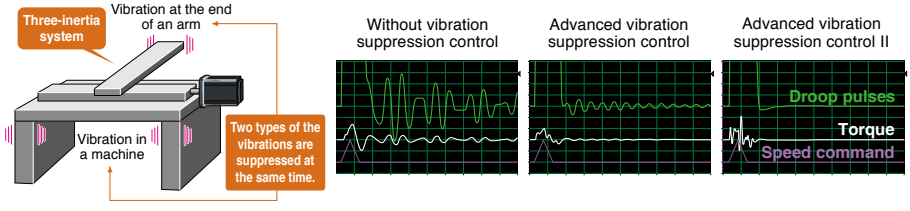


* The advanced vibration suppression control II automatically adjusts one frequency.

Advanced Vibration Suppression Control II

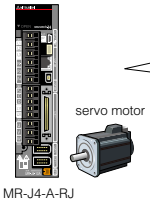
Patented

The advanced vibration suppression control II suppresses two types of low frequency vibrations owing to vibration suppression algorithm which supports three-inertia system. This function is effective in suppressing residual vibration with relatively low frequency of approximately 100 Hz or less generated at the end of an arm and in a machine, enabling a shorter settling time. Adjustment is easily performed on MR Configurator2.



Built-in positioning function

The MR-J4-A-RJ with a built-in positioning function (point table mode, program mode, indexer positioning operation) brings simple & easy a positioning system without the use of other controllers such as a positioning unit.



Built-in positioning function! No need for other controllers such as a positioning unit!

Point table mode

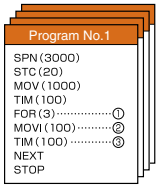
Point table No.	Position data	Rotation speed	Acceleration time constant	Deceleration time constant	Dwell time	Auxiliary function
1	1000	2000	200	200	0	1
2	2000	1600	100	100	0	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮

Settings for positioning data (target position), motor rotation speed, acceleration and deceleration times can be made in the point table, just like when handling parameters.

Indexer (turret) method

Determines positioning by specifying the station position.

Program mode



Positioning operation is made according to the preprogrammed details.

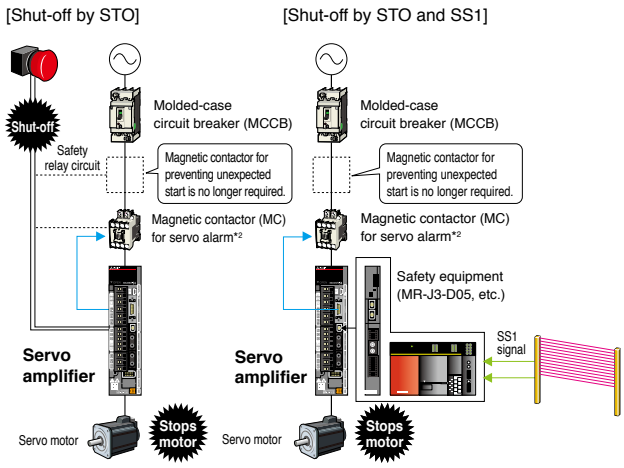
Man

Functions According to IEC/EN 61800-5-2

STO (Safe torque off) and SS1[*1] (Safe stop 1) are integrated as standard, enabling the safety system to be configured easily in the machine.

- Turning off the control power of servo amplifier is not required, cutting out the time for restart. Additionally, home position return is not required.
- Magnetic contactor for preventing unexpected motor start is not required.[*2]

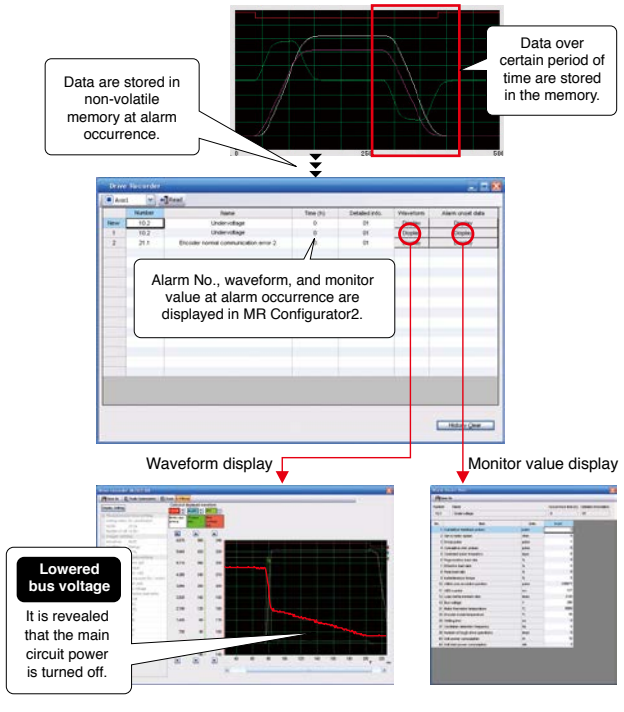
*1. Safety equipment (MR-J3-D05, etc.) is required.
*2. For MR-J4 series servo amplifier, magnetic contactors are not required to meet the STO requirements. However this figure has a magnetic contactor installed to prevent the short circuit of servo amplifier or electric shock.



Large Capacity Drive Recorder

Patent pending

- Servo data such as motor current and position command before and after the alarm occurrence are stored in non-volatile memory of the servo amplifier. Reading the servo data on MELSOFT MR Configurator2 helps you analyze the cause of the alarm.
- Check the waveform ((analog 16 bits × 7 channels + digital 8 channels) × 256 points) and the monitor values of 16 alarms in the alarm history.

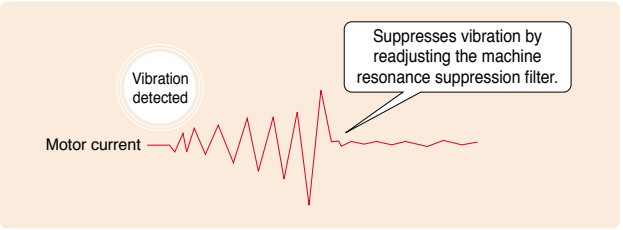


Tough Drive Function

Detects changes in use environment and automatically adjusts the servo control status.

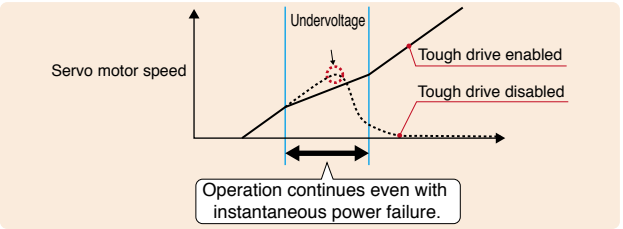
- Vibration tough drive

The servo amplifier detects changes in the machine resonant frequency and automatically readjusts the machine resonant suppression filter during oscillation. This will reduce losses from device halt due to aging and degradation.



- Instantaneous power failure tough drive

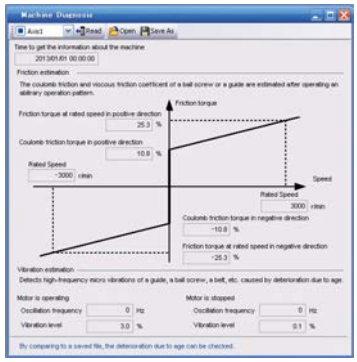
Detects instantaneous power failure to reduce device halt due to undervoltage.



Machine Diagnosis Function

Patent pending

This function detects changes of machine parts (ball screw, guide, bearing, belt, etc.) by analyzing machine friction, load moment of inertia, unbalanced torque, and changes in vibration component from the data inside the servo amplifier, supporting timely maintenance of the driving parts.



Machine diagnosis function window on MR Configurator2

Servo setup software
MELSOFT MR Configurator2

Tuning, monitor display, diagnosis, reading/writing parameters, and test operations are easily performed on a personal computer. This startup support tool achieves a stable machine system, optimum control, and short setup time.

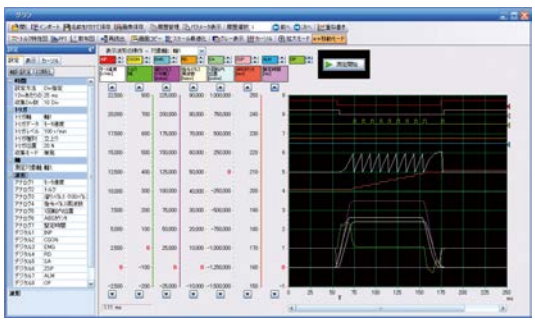


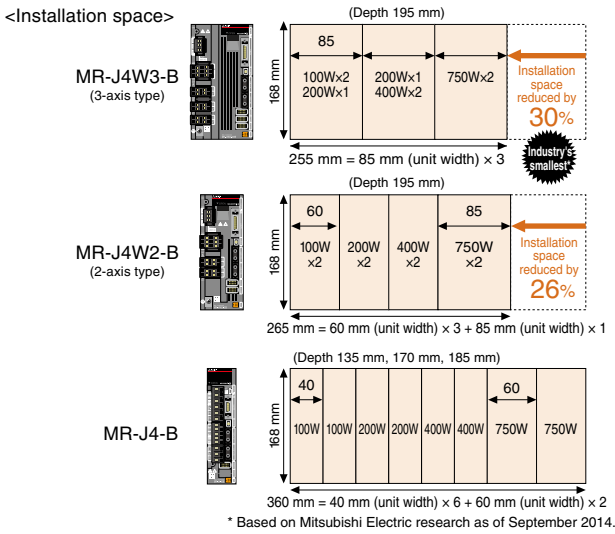
Chart screen

The Environment

Space-saving with Industry's Smallest* 3-axis Type

2-axis servo amplifier MR-J4W2-B requires 26% less installation space than two units of MR-J4-B. 3-axis servo amplifier MR-J4W3-B requires 30% less installation space than three units of MR-J4-B.

<Installation space>

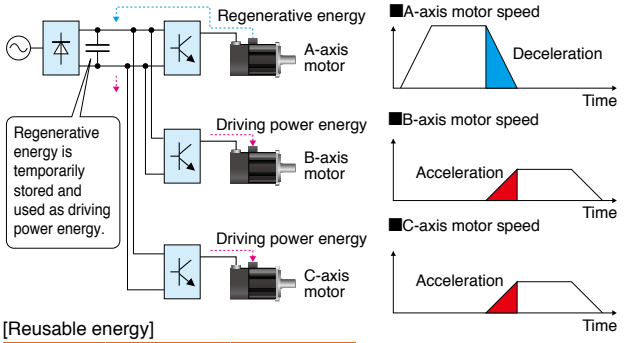


* Based on Mitsubishi Electric research as of September 2014.

Supporting Energy-conservative Machine Using Regenerative Energy

In the multi-axis servo amplifier, the regenerative energy of an axis is used as driving power energy for the other axes, contributing to energy-conservation of machine. Reusable regenerative energy stored in the capacitor is increased for MR-J4W2-B/MR-J4W3-B as compared to the prior model. Regenerative option is no longer required*1.

*1. Regenerative option may be required depending on the conditions.



[Reusable energy]

	MR-J4W3	MR-J3
200 W	21 J	9 J
400 W	30 J	11 J

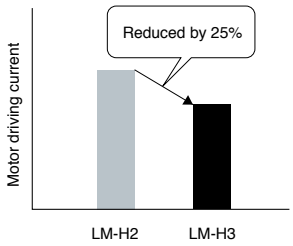
* In the multi-axis servo amplifier, the amount of temporarily stored regenerative energy can be increased by using a capacitor bank. (Available in the future) Contact your local sales office for more details.

Energy-conservation Achieved by LM-H3 Linear Servo Motor Series

●Reduced motor driving power

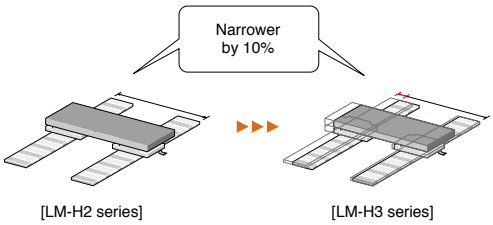
LM-H3 has achieved a reduction of 25% in motor driving current due to a new magnetic design with optimized magnet form, contributing to power conservation for machines. The motor coil is lighter as compared to the prior model, which also contributes to saving energy for driving the moving part.

* For 720 N rated linear servo motor.



●Space saving

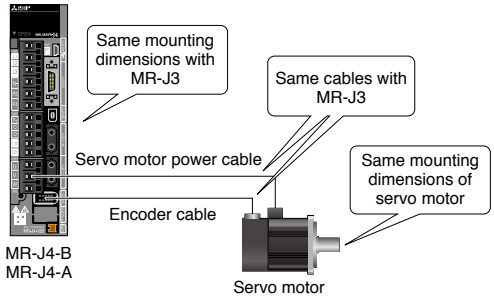
For LM-H3, widths of the motor coil and the magnet are reduced by 10% from the prior model. Increased thrust to current ratio results in using the servo amplifier in smaller capacity, contributing to more compact machine (the reduction of materials).



Heritage

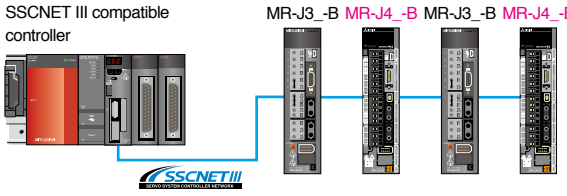
●MR-J4-B/MR-J4-A has the same mounting dimensions*1 with MR-J3-B/MR-J3-A. HG rotary servo motor series has the same mounting dimensions*2 and uses the same optional cables for the power, the encoder*3, and the electromagnetic brake as HF series or HC-RP/HC-UP series.

*1. Mounting dimensions are smaller for 200 V 5 kW, 400 V 3.5 kW, 200 V/400 V 11 kW, and 200 V/400 V 15 kW servo amplifiers.
*2. For replacing HA-LP series to HG-JR series, contact your local sales office for more detail.
*3. HG-JR series of 11 kW ,15 kW uses a different encoder cable from HF-JP series.



●When not changing the controller to SSCNET III/H controller

* When the SSCNET III compatible products are in the system, the communication speed is 50 Mbps, and the function and the performance are equivalent to those of MR-J3.



●Parameters are automatically converted by changing MR-J3-B to MR-J4-B with MELSOFT MT Works2

Our total solution for your satisfaction

The servo system controller brings out peak performance and functionality from servo amplifier, rotary servo motor, linear servo motor, and direct drive motor.
Mitsubishi Electric offer total solution to site issues.

Introducing the MELSERVO solutions for problems in production sites.
We offer the optimal solutions for various problems in various production sites.

Vertical Form, Fill & Seal For food/beverage bag filling and packing

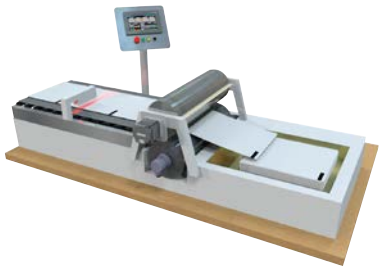


Solution 01 — Stabilizing the packing quality
Synchronous Control

Solution 02 — Shorter tact time without increasing shock to a machine
Cam Control

Solution 03 — Creating a safety system
Safety Observation Function

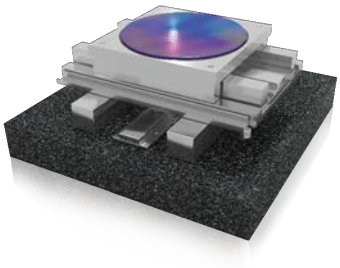
Rotary Knife For steel & paper cutting, stamping and labeling



Solution 01 — Cam creation on HMI screen
Cam Auto-generation Function

Solution 02 — Cutting the sheet using the registration mark as a reference
Mark Detection Function

Motion Alignment(X-Y-Θ) For equipment requiring more accurate positioning

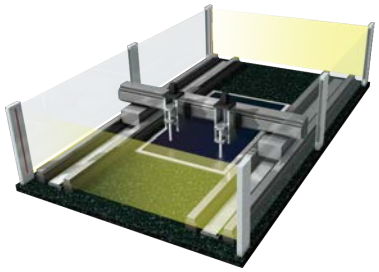


Solution 01 — More accurate positioning
COGNEX Vision System

Solution 02 — More precise drive operation
Direct Drive Motor

Solution 03 — Shorter tact time
Target Position Change Function

Gantry Application For material handling, automatic assembly and scanning



Solution 01 — Suppression of the machine vibration
Vibration Suppression Functions

Solution 02 — Simpler multi-head configuration
Linear Servo Motor

Solution 03 — Synchronized movement of axis-1 and axis-2
Tandem Configuration

Pick and Place Robot For material loading/unloading and sealing



Solution 01 — Suppression of the machine vibration
Advanced Vibration Suppression Control II

Solution 02 — Simpler setting of the suppression function
Machine Analyzer and Machine Resonance Suppression Filter

Solution 03 — Smaller size machine
3-axis Type Servo Amplifier

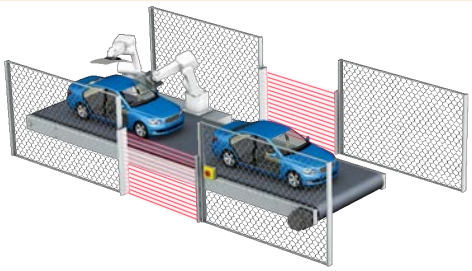
Press-fit Machine For pressing, bonding, clamping, and cap tightening



Solution 01 Pressing of the material with less shock to a machine
Tightening & Press-fit Control

Solution 02 Monitoring of the machine movement
Safety Signal Comparison Function

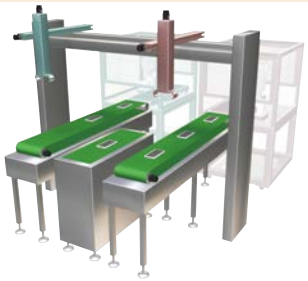
Conveyor System Utilizing Safety Observation Function For safety observation of printing, packing, and other lines



Solution 01 Safety measures in case of a person entering in a restricted area
Shut-off Function

Solution 02 Ensuring safe speed for manned assembly line
Speed Monitoring Function (SLS)

Eco-friendly Conveyors and Product Handling Equipment For conveyors, Motion alignment, packing, and robots

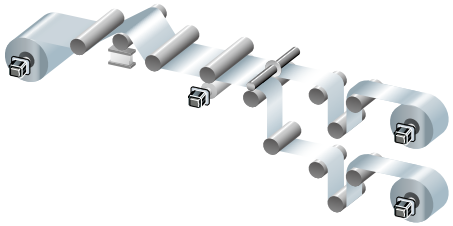


Solution 01 Managing of total power consumption
Power Monitor Function

Solution 02 Reduction of power consumption
Multi-axis Servo Amplifier

Solution 03 Minimizing waste of power
Capacity Selection Software

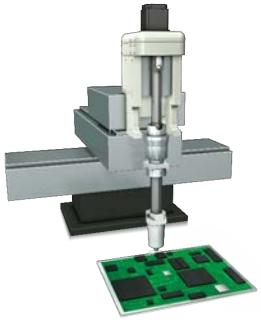
Film Slitting Machine For equipment with rollers



Solution 01 Sending film with a constant speed or tension
Speed Control, Torque Control

Solution 02 Utilizing regenerative energy
PN Bus Voltage Connection + Power Regeneration Common Converter

Screw Tightening Machine For tightening, pressing, and clamping



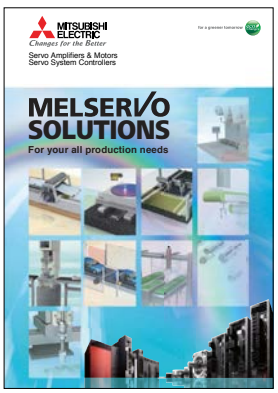
Solution 01 Tightening screws without using a torque sensor
Tightening & Press-fit Control

Solution 02 Repeated accuracy in screw tightening operation
Reduced Torque Ripple During Conduction

Every production site has unique problems that require unique and innovative solutions. MELSERVO offers the best solutions you have been looking for.

Exceptional Solutions for All of Your Production Needs

Refer to "MELSERVO SOLUTIONS catalog (L(NA)03094)" for details.



Product Line-up

Servo Amplifier



CC-Link IE Field

MR-J4-GF

CC-Link IE Field Network compatible servo amplifier

The command interface is the CC-Link IE Field Network. This supports point table method positioning control and motion control on Ethernet-based open networks.



SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

MR-J4-B

SSCNET III/H compatible servo amplifier

SSCNET III/H is the command I/F. Enables building of a full-synchronization system with the use of a high-speed serial optical communication. Brings peak performance and functionality of the servo system by combining with the servo system controller.

MR-J4-GF-RJ/MR-J4-B-RJ This is a special specification MR-J4-GF/MR-J4-B / MR-J4-A product. MR-J4-GF-RJ/MR-J4-B-RJ/MR-J4-A-RJ are required when using a 4-wire serial or A/B/Z-phase differential output type external encoder in a fully closed loop control or a scale measurement function. Also, MR-J4-GF-RJ/MR-J4-B-RJ/MR-J4-A-RJ are required when using an A/B/Z-phase differential output type external encoder for a linear servo system.

MR-J4-A-RJ

Servo Motor



HG-KR/HG-MR series

Small capacity, low inertia/small capacity, ultra-low inertia
Suitable for general industrial machines/high-frequency operation.



HG-SR series

Medium capacity, medium inertia
Compatible with devices having a large load inertia.



HG-JR series

Medium/large capacity, low inertia
Ideal for high-frequency positioning and high acceleration and deceleration operations.

Linear Servo Motor



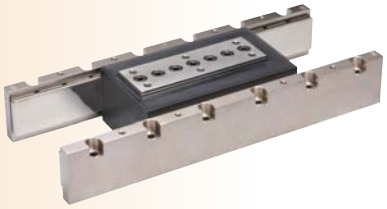
LM-H3 series

Capable of 3 m/s maximum speed.
Core type with magnetic attraction saves space and comes with high-rigidity.



LM-F series

Delivers two times more continuous thrust with liquid cooling and reduced in size. A core type with magnetic attraction and high-rigidity.



LM-K2 series

An offset type with a core delivers improved thrust density. The magnetic attraction offset structure prolongs service life of the linear guide. Low noise design.

Compatible with various standards around the world

Complies with EN, UL, CSA (c-UL) standards.





SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

MR-J4W2-B

SSCNET III/H compatible
2-axis servo amplifier

MR-J4W3-B

SSCNET III/H compatible
3-axis servo amplifier

SSCNET III/H is the command I/F. These multi-axis integrated servo amplifiers can drive multiple servo motors with a single unit, and come with the same high-performance, high-functionality, and ease-of-use of the MR-J4-B. Use less energy, space, wiring, and realize cost reduction.



MR-J4-A

General-purpose interface
compatible servo amplifier

Built with a general purpose pulse train and analog voltage input as command I/F. Enables position control by pulse train command and speed/torque control by analog voltage command.



HG-AK series

Ultra-compact servo motor with the flange size of 25 mm × 25 mm is suitable for small machines and machine heads.



HG-RR series

Medium capacity, ultra-low inertia
Suitable for high-frequency operation.



HG-UR series

Medium capacity, flat type
Ideal use for restricted mounting spaces.

Direct Drive Motor



LM-U2 series

A coreless type with no cogging and minimum speed variation. No magnetic attraction prolongs the linear guide service life.



TM-RFM series

Smaller and simplified device rotary drive is suitable for high precision control needs. Realized high-torque density by using the latest magnetic design technology and winding technology. Delivers a very smooth rotation by miniaturizing the torque ripple. Without the need for transmission mechanism component, it can be built with less number of parts.

MELSERVO-J4 series conforms to global standards.
* This product is not subject to China Compulsory Certification (CCC).
* Refer to "Servo Amplifier Instruction Manual" and "EMC Installation Guidelines" when your system needs to meet the EMC directive.
* For corresponding standards and models, contact your local sales office.

Product Line-up

Wide selection of power supply capacity lineup are also designed to drive rotary, linear, and direct drive motors.
The standard servo amplifiers are compatible with various controlled drive systems.

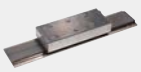
■Servo amplifier

●: Compatible –: Not compatible

	Servo amplifier (Note 7)	Number of control axes	Power supply specifications	Rated output [kW] (Note 1, 4)	Command interface: CC-Link IE Field	Command interface: SSCNET III/H	Command interface: Pulse train	Command interface: Analog voltage	Command interface: RS-422/MODBUS®-RTU	Control mode: Position	Control mode: Speed	Control mode: Torque	Control mode: Positioning function	Control mode: Fully closed loop control (Note 2)	Compatible servo motor series: HG-KR	HG-MR	HG-SR	HG-JR	HG-AK	HG-RR	HG-UR	LM-H3	LM-F	LM-K2	LM-U2	TM-RFM
																						(Note 5)				
CC-Link IE Field Network	MR-J4-GF(-RJ) (Note 6) 	1 axis	3-phase 200 V AC	0.1, 0.2, 0.4, 0.6, 0.75, 1, 2, 3.5, 5, 7	●	–	–	–	–	●	●	●	●	●	●	●	●	●	–	●	●	●	●	●	●	●
			3-phase 400 V AC	0.6, 1, 2, 3.5, 5, 7	●	–	–	–	–	●	●	●	●	●	–	–	●	●	–	–	–	–	–	–	–	–	–
SSCNET III/H	MR-J4-B(-RJ) 	1 axis	1-phase 100 V AC	0.1, 0.2, 0.4	–	●	–	–	–	●	●	●	–	●	●	●	–	–	–	–	–	●	–	●	●	●
			3-phase 200 V AC	0.1, 0.2, 0.4, 0.6, 0.75, 1, 2, 3.5, 5, 7, 11, 15, 22, 30, 37	–	●	–	–	–	●	●	●	–	●	●	●	●	●	–	●	●	●	●	●	●	●
			3-phase 400 V AC	0.6, 1, 2, 3.5, 5, 7, 11, 15, 22, 30, 37, 45, 55	–	●	–	–	–	●	●	●	–	●	–	–	●	●	–	–	–	–	●	–	–	–
	MR-J4W2-B 	2 axes	3-phase 200 V AC	0.2, 0.4, 0.75, 1	–	●	–	–	–	●	●	●	–	●	●	●	●	●	–	–	●	●	–	●	●	●
			48 V DC 24 V DC	0.03	–	●	–	–	–	●	●	●	–	–	–	–	–	–	●	–	–	–	–	–	–	–
	MR-J4W3-B 	3 axes	3-phase 200 V AC	0.2, 0.4	–	●	–	–	–	●	●	●	–	–	●	●	–	–	–	–	–	●	–	●	●	●
General-purpose interface	MR-J4-A(-RJ) 	1 axis	1-phase 100 V AC	0.1, 0.2, 0.4	–	–	●	●	● (Note 3)	●	●	●	● (Note 3)	●	●	●	–	–	–	–	–	●	–	●	●	●
			3-phase 200 V AC	0.1, 0.2, 0.4, 0.6, 0.75, 1, 2, 3.5, 5, 7, 11, 15, 22, 30, 37	–	–	●	●	● (Note 3)	●	●	●	● (Note 3)	●	●	●	●	●	–	●	●	●	●	●	●	●
			3-phase 400 V AC	0.6, 1, 2, 3.5, 5, 7, 11, 15, 22, 30, 37, 45, 55	–	–	●	●	● (Note 3)	●	●	●	● (Note 3)	●	–	–	●	●	–	–	–	–	●	–	–	–
			48 V DC 24 V DC	0.03	–	–	●	●	● (Note 3)	●	●	●	● (Note 3)	–	–	–	–	–	●	–	–	–	–	–	–	–	–

Notes: 1. The listed are the rated output of the servo amplifier. For the compatible servo motor capacities, refer to p. 244 to 285 in this catalog.
2. MR-J4-GF/B/A servo amplifier is compatible with two-wire type serial linear encoder. For four-wire type serial and pulse train interface (A/B/Z-phase differential output type) linear encoders, use MR-J4-GF-RJ/B-RJ/A-RJ servo amplifier.
3. Only MR-J4-A-RJ is compatible with positioning function and MODBUS®-RTU. MR-J4-03A6-RJ is not compatible with MODBUS®-RTU.
4. Capacity of 30 kW or larger is available with drive unit. One unit of converter unit is required for each drive unit.
5. MR-J4-GF/B/A servo amplifier is compatible with two-wire type and four-wire type serial linear encoders. For pulse train interface (A/B/Z-phase differential output type) linear encoder, use MR-J4-GF-RJ/B-RJ/A-RJ servo amplifier.
6. MR-J4-GF(-RJ) servo amplifiers of 11 kW or larger will be available in the future.
7. Some functions are available only with the servo amplifier with specific versions. Refer to relevant Servo Amplifier Instruction Manual for details.

■Linear servo motor

	Linear servo motor series	Maximum speed [m/s]	Continuous thrust [N]	Maximum thrust [N]	Cooling method	Features	Application examples
Core type	LM-H3 series 	3.0	9 types 70, 120, 240, 360, 480, 720, 960	175, 300, 600, 900, 1200, 1800, 2400	Natural cooling	Suitable for space-saving. Compact size and high thrust. Maximum speed: 3 m/s.	•Semiconductor mounting systems •Wafer cleaning systems •LCD assembly machines •Material handlings
	LM-F series 	2.0	8 types 300, 600, 900, 1200, 1800, 2400, 3000	1800, 3600, 5400, 7200, 10800, 14400, 18000	Natural cooling	Compact size. The integrated liquid-cooling system doubles the continuous thrust.	•Press feeders •NC machine tools •Material handlings
		2.0	8 types 600, 1200, 1800, 2400, 3600, 4800, 6000	1800, 3600, 5400, 7200, 10800, 14400, 18000	Liquid cooling		
	LM-K2 series 	2.0	7 types 120, 240, 360, 720, 1200, 1440, 2400	300, 600, 900, 1800, 3000, 3600, 6000	Natural cooling	High thrust density. Magnetic attraction counter-force structure enables longer life of the linear guides and lower audible noise.	•Semiconductor mounting systems •Wafer cleaning systems •LCD assembly machines
Coreless type	LM-U2 series 	2.0	9 types 50, 75, 100, 150, 225, 400, 600, 800	150, 225, 300, 450, 675, 1600, 2400, 3200	Natural cooling	No cogging and small speed fluctuation. No magnetic attraction force structure extends life of the linear guides.	•Screen printing systems •Scanning exposure systems •Inspection systems •Material handlings

Note: 1. : For 400 V.

■Rotary servo motor

●: Available –: Not available

	Rotary servo motor series	Rated speed (maximum speed) [r/min]	Rated output [kW] (Note 1)	Servo motor type: With electro-magnetic brake (B)	Servo motor type: With reducer (G1) (Note 2)	Servo motor type: With reducer (G5, G7) (Note 2)	IP rating (Note 3)	Replaceable series	Features	Application examples
Small capacity	**HG-KR series** 	3000 (6000)	5 types 0.05, 0.1, 0.2, 0.4, 0.75	●	●	●	IP65	HF-KP series	Low inertia Perfect for general industrial machines.	•Belt drives •Robots •Mounters •Sewing machines •X-Y tables •Food processing machines •Semiconductor manufacturing equipment •Knitting and embroidery machines
	HG-MR series 	3000 (6000)	5 types 0.05, 0.1, 0.2, 0.4, 0.75	●	–	–	IP65	HF-MP series	Ultra-low inertia Well suited for high-throughput operations.	•Inserters •Mounters
Medium capacity	**HG-SR series** 	1000 (1500)	6 types 0.5, 0.85, 1.2, 2.0, 3.0, 4.2	●	–	–	IP67	HF-SP series	Medium inertia This series is available with two rated speeds.	•Material handling systems •Robots •X-Y tables
		2000 (3000)	14 types 0.5, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0 0.5, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0	●	●	●	IP67			
Medium/large capacity	**HG-JR series** 	3000 (6000: 0.5 to 5 kW, 5000: 7, 9 kW)	18 types 0.5, 0.75, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0, 9.0 0.5, 0.75, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0, 9.0	●	–	–	IP67	HF-JP series	Low inertia Well suited for high-throughput and high-acceleration/ deceleration operations.	•Food packaging machines •Printing machines
		1500 (3000: 7 to 15 kW, 2500: 22 to 55 kW)	14 types 7.0, 11, 15, 22, 30, 37 7.0, 11, 15, 22, 30, 37, 45, 55	● (Note 5)	–	–	IP67/ IP44 (Note 4)	HF-JP HA-LP series		•Injection molding machines •Press machines
		1000 (2000: 6 to 12 kW, 1500: 15 to 37 kW)	16 types 6.0, 8.0, 12, 15, 20, 25, 30, 37 6.0, 8.0, 12, 15, 20, 25, 30, 37	● (Note 5)	–	–	IP67/ IP44 (Note 4)	HA-LP series		
Ultra-small capacity	**HG-AK series** 	3000 (6000)	3 types 0.01, 0.02, 0.03	●	–	–	IP55	HC-AQ series	Ultra-compact size Suitable for small machines.	•Mounters •Semiconductor manufacturing equipment •Compact robot •Electric component manufacturing machines •Compact actuators •Screw tightening system
Medium capacity	**HG-RR series** 	3000 (4500)	5 types 1.0, 1.5, 2.0, 3.5, 5.0	●	–	–	IP65	HC-RP series	Ultra-low inertia Well suited for high-throughput operations.	•Ultra-high-throughput material handling systems
Medium capacity, flat type	**HG-UR series** 	2000 (3000: 0.75 to 2 kW, 2500: 3.5, 5 kW)	5 types 0.75, 1.5, 2.0, 3.5, 5.0	●	–	–	IP65	HC-UP series	Flat type The flat design makes this unit well suited for situations where the installation space is limited.	•Robots •Food processing machines

Notes: 1. : For 400 V.
2. G1 for general industrial machines. G5 and G7 for high precision applications.
3. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion. For geared servo motor, IP rating of the reducer portion is equivalent to IP44.
4. For HG-JR1500 r/min series, 15 kW or smaller is rated IP67, and 22 kW or larger is rated IP44. For HG-JR 1000 r/min series, 12 kW or smaller is rated IP67, and 15 kW or lager is rated IP44.
5. The servo motor with electromagnetic brake is not available for HG-JR 1500 r/min series 22 kW or larger, and 1000 r/min series 15 kW or larger.

■Direct drive motor

Direct drive motor series	Motor outer diameter [mm]	Hollow shaft diameter [mm]	Rated speed [r/min]	Maximum speed [r/min]	Rated torque [N·m]	Maximum torque [N·m]	IP rating (Note 1)	Features	Application examples
TM-RFM series 	ø130	ø20	200	500	3 types 2, 4, 6	6, 12, 18	IP42	•Suitable for low-speed and high-torque operations. •Smooth operation with less audible noise. •The motor's low profile design contributes to compact construction and a low center of gravity for enhanced machine stability. •Clean room compatible.	•Semiconductor manufacturing devices •Liquid crystal manufacturing devices •Machine tools
	ø180	ø47	200	500	3 types 6, 12, 18	18, 36, 54	IP42		
	ø230	ø62	200	500	3 types 12, 48, 72	36, 144, 216	IP42		
	ø330	ø104	100	200	3 types 40, 120, 240	120, 360, 720	IP42		

Note: 1. Connectors and gap between rotor and stator are excluded.

MELSERVO-J4

● Servo Amplifiers

1-Axis Servo Amplifier Model Designation

GF GF-RJ B B-RJ A A-RJ

M R - J 4 - 1 0 G F _ - _ _

Mitsubishi general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Interface
GF	CC-Link IE Field

Symbol	Rated output [kW]
10	0.1
20	0.2
40	0.4
60	0.6
70	0.75
100	1
200	2
350	3.5
500	5
700	7

Symbol	Power supply
None	3-phase 200 V AC or 1-phase 200 V AC (Note 2)
4	3-phase 400 V AC (Note 3)

Symbol	Special specification
None	Standard
RJ	Fully closed loop control four-wire type/ load-side encoder A/B/Z-phase input compatible/ DC power input type (Note 11)
ED	Without a dynamic brake (Note 1)
RU	MR-J4-_GF_-RJ without a dynamic brake (Note 1)
EB	Special coating specification (3C2) (Note12)
KS	MR-J4-_-RJ with a special coating specification (3C2) (Note12)

M R - J 4 - 1 0 B _ - _ _

Mitsubishi general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Interface
B	SSCNET III/H
A	General-purpose

Symbol	Rated output [kW]
03	0.03
10	0.1
20	0.2
40	0.4
60	0.6
70	0.75
100	1
200	2
350	3.5
500	5
700	7
11K	11
15K	15
22K	22

Symbol	Power supply
None	3-phase 200 V AC or 1-phase 200 V AC (Note 2)
1	1-phase 100 V AC (Note 5)
4	3-phase 400 V AC (Note 3)
6	48 V DC/24 V DC (Note 9)

Symbol	Special specification
None	Standard
RJ (Note 10)	Fully closed loop control four-wire type/ load-side encoder A/B/Z-phase input compatible/ Functional safety unit compatible (Note 7)/ Positioning mode compatible (Note 8)/ DC power input type (Note 11)
RU	MR-J4-_-RJ without a dynamic brake (Note 1)
ED	Without a dynamic brake (Note 1)
PX	Without an enclosed regenerative resistor (Note 4)
RZ	MR-J4-_-RJ without an enclosed regenerative resistor (Note 4)
EG	DC power input type
LL	Pressure control type (Note 6)
EB	Special coating specification (3C2) (Note12)
KS	MR-J4-_-RJ with a special coating specification (3C2) (Note12)

Notes: 1. Dynamic brake which is built in 7 kW or smaller servo amplifiers is removed. When using the servo amplifier without a dynamic brake, the servo motor does not stop immediately at alarm occurrence or power failure. Take measures to ensure safety on the entire system. Refer to relevant Servo Amplifier Instruction Manual for details.
2. Servo amplifiers of 2 kW or smaller are available for 1-phase 200 V AC.
3. Servo amplifiers of 0.6 kW, and 1 kW or larger are available.
4. Available in 11 kW to 22 kW servo amplifiers. A regenerative resistor (standard accessory) is not enclosed. Refer to relevant Servo Amplifier Instruction Manual for details.
5. Servo amplifiers of 0.4 kW or smaller are available.
6. MR-J4-_B_-LL is available. Contact your local sales office for the pressure control compatible servo amplifiers.
7. When using MR-D30 functional safety unit, use MR-J4-B-RJ servo amplifier with software version B3 or later, or MR-J4-A-RJ servo amplifier with software version B5 or later.
8. The positioning mode is available with MR-J4-A-RJ servo amplifiers. Use MR-J4-A-RJ servo amplifiers with software version B3 or later.
9. Servo amplifiers of 0.03 kW are available for 48 V DC/24 V DC.
10. MR-J4-03A6-RJ is compatible only with positioning mode. It is not compatible with fully closed loop control, load-side encoder A/B/Z-phase input, and the functional safety unit.
11. Only 200 V is available. For MR-J4-B-RJ/MR-J4-A-RJ, servo amplifiers with software version C2 or later are compatible with DC power supply input.
12. The special coating (JIS C60721-3-3/IEC 60721-3-3 classification 3C2) is applied to the circuit board. Refer to relevant Servo Amplifier Instruction Manual for details.

GF MR-J4-GF GF-RJ MR-J4-GF-RJ B MR-J4-B/MR-J4-DU_B B-RJ MR-J4-B-RJ/MR-J4-DU_B-RJ WB MR-J4W2-B/MR-J4W3-B
A MR-J4-A/MR-J4-DU_A A-RJ MR-J4-A-RJ/MR-J4-DU_A-RJ

Multi-Axis Servo Amplifier Model Designation WB

MR-J4W2-22B__-____

Mitsubishi general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Number of axes
W2	2 axes
W3	3 axes

Symbol	Rated output [kW]		
	A-axis (Note 2)	B-axis (Note 2)	C-axis (Note 2)
0303	0.03	0.03	-
22	0.2	0.2	-
44	0.4	0.4	-
77	0.75	0.75	-
1010	1	1	-
222	0.2	0.2	0.2
444	0.4	0.4	0.4

Symbol	Interface
B	SSCNET III/H

Symbol	Main circuit power supply
None	3-phase 200 V AC or 1-phase 200 V AC (Note 10)
6	48 V DC/24 V DC (Note 3)

Symbol	Special specification
None	Standard
ED	Without a dynamic brake (Note 1)
EG	DC power input type
EB	Special coating specification (3C2) (Note4)

Drive Unit Model Designation (Note 8) B B-RJ A A-RJ

MR-J4-DU30KB__-____

Mitsubishi general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Rated output [kW]
30K	30
37K	37
45K	45
55K	55

Symbol	Interface
B	SSCNET III/H
A	General-purpose

Symbol	Power supply
None	3-phase 200 V AC (Note 5)
4	3-phase 400 V AC

Symbol	Special specification
None	Standard
RJ (Note 6)	Fully closed loop control four-wire type/ load-side encoder A/B/Z-phase input compatible/ Positioning mode compatible (Note 7)
LL	Pressure control type (Note 9)
EB	Special coating specification (3C2) (Note4)
KS	MR-J4-DU_-RJ with a special coating specification (3C2) (Note 4)

Converter Unit Model Designation (Note 8) B B-RJ A A-RJ

MR-CR55K__-____

Symbol	Rated output [kW]
55K	55

Symbol	Power supply
None	3-phase 200 V AC
4	3-phase 400 V AC

Symbol	Special specification
EB	Special coating specification (3C2) (Note4)

Notes: 1. Dynamic brake which is built in servo amplifiers is removed. When using the servo amplifier without a dynamic brake, the servo motor does not stop immediately at alarm occurrence or power failure. Take measures to ensure safety on the entire system. Refer to relevant Servo Amplifier Instruction Manual for details.
2. A-axis, B-axis, and C-axis indicate names of axes of the multi-axis servo amplifier. The C-axis is available for the 3-axis servo amplifier.
3. Servo amplifiers of 0.03 kW are available for 48 V DC/24 V DC.
4. The special coating (JIS C60721-3-3/IEC 60721-3-3 classification 3C2) is applied to the circuit board. Refer to relevant Servo Amplifier Instruction Manual for details.
5. Drive units of 37 kW or smaller are available in 3-phase 200 V AC.
6. MR-D30 functional safety unit is not compatible with the drive unit.
7. Positioning mode is available with MR-J4-DU_A_-RJ drive unit.
8. One unit of converter unit is required for each drive unit.
9. MR-J4-DU_B_-LL is available. Contact your local sales office for the pressure control compatible drive units.
10. Servo amplifiers of 0.75 kW or smaller are available for 1-phase 200 V AC.

Combinations of 1-Axis Servo Amplifier and Servo Motor

GF GF-RJ B B-RJ A A-RJ

MR-J4-GF/MR-J4-GF-RJ/MR-J4-B/MR-J4-B-RJ/MR-J4-A/MR-J4-A-RJ (200 V)

Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4-10GF(-RJ) MR-J4-10B(-RJ) MR-J4-10A(-RJ)	HG-KR053, 13 HG-MR053, 13	-	-
MR-J4-20GF(-RJ) MR-J4-20B(-RJ) MR-J4-20A(-RJ)	HG-KR23 HG-MR23	LM-U2PAB-05M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20
MR-J4-40GF(-RJ) MR-J4-40B(-RJ) MR-J4-40A(-RJ)	HG-KR43 HG-MR43	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-K2P1A-01M-2SS1 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0	TM-RFM004C20
MR-J4-60GF(-RJ) MR-J4-60B(-RJ) MR-J4-60A(-RJ)	HG-SR51, 52 HG-JR53	LM-U2PBD-15M-1SS0	TM-RFM006C20 TM-RFM006E20
MR-J4-70GF(-RJ) MR-J4-70B(-RJ) MR-J4-70A(-RJ)	HG-KR73 HG-MR73 HG-JR73 HG-UR72	LM-H3P3B-24P-CSS0 LM-H3P3C-36P-CSS0 LM-H3P7A-24P-ASS0 LM-K2P2A-02M-1SS1 LM-U2PBF-22M-1SS0	TM-RFM012E20 TM-RFM012G20 TM-RFM040J10
MR-J4-100GF(-RJ) MR-J4-100B(-RJ) MR-J4-100A(-RJ)	HG-SR81, 102 HG-JR53 (Note 2, 3), 103	-	TM-RFM018E20
MR-J4-200GF(-RJ) MR-J4-200B(-RJ) MR-J4-200A(-RJ)	HG-SR121, 201, 152, 202 HG-JR73 (Note 2, 3), 103 (Note 2, 3), 153, 203 HG-RR103, 153 HG-UR152	LM-H3P3D-48P-CSS0 LM-H3P7B-48P-ASS0 LM-H3P7C-72P-ASS0 LM-FP2B-06M-1SS0 LM-K2P1C-03M-2SS1 LM-U2P2B-40M-2SS0	-
MR-J4-350GF(-RJ) MR-J4-350B(-RJ) MR-J4-350A(-RJ)	HG-SR301, 352 HG-JR153 (Note 2), 203 (Note 2), 353 HG-RR203 HG-UR202	LM-H3P7D-96P-ASS0 LM-K2P2C-07M-1SS1 LM-K2P3C-14M-1SS1 LM-U2P2C-60M-2SS0	TM-RFM048G20 TM-RFM072G20 TM-RFM120J10
MR-J4-500GF(-RJ) MR-J4-500B(-RJ) MR-J4-500A(-RJ)	HG-SR421, 502 HG-JR353 (Note 2), 503 HG-RR353, 503 HG-UR352, 502	LM-FP2D-12M-1SS0 LM-FP4B-12M-1SS0 LM-K2P2E-12M-1SS1 LM-K2P3E-24M-1SS1 LM-U2P2D-80M-2SS0	TM-RFM240J10
MR-J4-700GF(-RJ) MR-J4-700B(-RJ) MR-J4-700A(-RJ)	HG-SR702 HG-JR503 (Note 2), 703, 601, 701M	LM-FP2F-18M-1SS0 LM-FP4D-24M-1SS0	-
MR-J4-11KB(-RJ) MR-J4-11KA(-RJ)	HG-JR903, 801, 12K1, 11K1M	LM-FP4F-36M-1SS0	-
MR-J4-15KB(-RJ) MR-J4-15KA(-RJ)	HG-JR15K1, 15K1M	LM-FP4H-48M-1SS0	-
MR-J4-22KB(-RJ) MR-J4-22KA(-RJ)	HG-JR20K1, 25K1, 22K1M	-	-

MR-J4-DU_B/MR-J4-DU_B-RJ/MR-J4-DU_A/MR-J4-DU_A-RJ (200 V)

Drive unit	Rotary servo motor	Linear servo motor (primary side)	Direct drive motor
MR-J4-DU30KB(-RJ) MR-J4-DU30KA(-RJ)	HG-JR30K1 HG-JR30K1M	-	-
MR-J4-DU37KB(-RJ) MR-J4-DU37KA(-RJ)	HG-JR37K1 HG-JR37K1M	-	-

Notes: 1. Models of the linear servo motor primary side are listed in this page. For compatible models of the secondary side, refer to "Combinations of Linear Servo Motor and Servo Amplifier" under section 3 Linear Servo Motor in this catalog.
2. The maximum torque can be increased from 300% to 400% of the rated torque with this combination.
3. When 1-phase 200 V AC input is used, increasing the maximum torque to 400% is not possible with HG-JR servo motor series.

Combinations of 1-Axis Servo Amplifier and Servo Motor

GF | GF-RJ | B | B-RJ | A | A-RJ

MR-J4-B1/MR-J4-B1-RJ/MR-J4-A1/MR-J4-A1-RJ (100 V)

Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4-10B1(-RJ) MR-J4-10A1(-RJ)	HG-KR053, 13 HG-MR053, 13	-	-
MR-J4-20B1(-RJ) MR-J4-20A1(-RJ)	HG-KR23 HG-MR23	LM-U2PAB-05M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20
MR-J4-40B1(-RJ) MR-J4-40A1(-RJ)	HG-KR43 HG-MR43	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-K2P1A-01M-2SS1 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0	TM-RFM004C20

MR-J4-GF4/MR-J4-GF4-RJ/MR-J4-B4/MR-J4-B4-RJ/MR-J4-A4/MR-J4-A4-RJ (400 V)

Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4-60GF4(-RJ) MR-J4-60B4(-RJ) MR-J4-60A4(-RJ)	HG-SR524 HG-JR534	-	-
MR-J4-100GF4(-RJ) MR-J4-100B4(-RJ) MR-J4-100A4(-RJ)	HG-SR1024 HG-JR534 (Note 2), 734, 1034	-	-
MR-J4-200GF4(-RJ) MR-J4-200B4(-RJ) MR-J4-200A4(-RJ)	HG-SR1524, 2024 HG-JR734 (Note 2), 1034 (Note 2), 1534, 2034	-	-
MR-J4-350GF4(-RJ) MR-J4-350B4(-RJ) MR-J4-350A4(-RJ)	HG-SR3524 HG-JR1534 (Note 2), 2034 (Note 2), 3534	-	-
MR-J4-500GF4(-RJ) MR-J4-500B4(-RJ) MR-J4-500A4(-RJ)	HG-SR5024 HG-JR3534 (Note 2), 5034	-	-
MR-J4-700GF4(-RJ) MR-J4-700B4(-RJ) MR-J4-700A4(-RJ)	HG-SR7024 HG-JR5034 (Note 2), 7034, 6014, 701M4	-	-
MR-J4-11KB4(-RJ) MR-J4-11KA4(-RJ)	HG-JR9034, 8014, 12K14, 11K1M4	-	-
MR-J4-15KB4(-RJ) MR-J4-15KA4(-RJ)	HG-JR15K14, 15K1M4	-	-
MR-J4-22KB4(-RJ) MR-J4-22KA4(-RJ)	HG-JR20K14, 25K14, 22K1M4	LM-FP5H-60M-1SS0	-

MR-J4-DU_B4/MR-J4-DU_B4-RJ/MR-J4-DU_A4/MR-J4-DU_A4-RJ (400 V)

Drive unit	Rotary servo motor	Linear servo motor (primary side)	Direct drive motor
MR-J4-DU30KB4(-RJ) MR-J4-DU30KA4(-RJ)	HG-JR30K14 HG-JR30K1M4	-	-
MR-J4-DU37KB4(-RJ) MR-J4-DU37KA4(-RJ)	HG-JR37K14 HG-JR37K1M4	-	-
MR-J4-DU45KB4(-RJ) MR-J4-DU45KA4(-RJ)	HG-JR45K1M4	-	-
MR-J4-DU55KB4(-RJ) MR-J4-DU55KA4(-RJ)	HG-JR55K1M4	-	-

MR-J4-03A6 (48 V/24 V)

Servo amplifier	Rotary servo motor	Linear servo motor (primary side)	Direct drive motor
MR-J4-03A6(-RJ)	HG-AK0136, 0236, 0336	-	-

Notes: 1. Models of the linear servo motor primary side are listed in this page. For compatible models of the secondary side, refer to "Combinations of Linear Servo Motor and Servo Amplifier" under section 3 Linear Servo Motor in this catalog.
2. The maximum torque can be increased from 300% to 400% of the rated torque with this combination.

Combinations of 1-Axis Servo Amplifier and Servo Motor with Functional Safety B-RJ A-RJ

The safety observation function can be expanded with a combination of the servo motor with functional safety, MR-J4-B-RJ/ MR-J4-A-RJ servo amplifiers, and MR-D30 functional safety unit.

MR-J4-B-RJ/MR-J4-A-RJ (200 V)

Servo amplifier	Servo motor with functional safety
MR-J4-10B-RJ MR-J4-10A-RJ	HG-KR053W0C, 13W0C
MR-J4-20B-RJ MR-J4-20A-RJ	HG-KR23W0C
MR-J4-40B-RJ MR-J4-40A-RJ	HG-KR43W0C
MR-J4-60B-RJ MR-J4-60A-RJ	HG-SR51W0C, 52W0C HG-JR53W0C
MR-J4-70B-RJ MR-J4-70A-RJ	HG-KR73W0C HG-JR73W0C
MR-J4-100B-RJ MR-J4-100A-RJ	HG-SR81W0C, 102W0C HG-JR53W0C (Note 1), 103W0C
MR-J4-200B-RJ MR-J4-200A-RJ	HG-SR121W0C, 201W0C, 152W0C, 202W0C HG-JR73W0C (Note 1), 103W0C (Note 1), 153W0C, 203W0C
MR-J4-350B-RJ MR-J4-350A-RJ	HG-SR301W0C, 352W0C HG-JR153W0C (Note 1), 203W0C (Note 1), 353W0C
MR-J4-500B-RJ MR-J4-500A-RJ	HG-SR421W0C, 502W0C HG-JR353W0C (Note 1), 503W0C
MR-J4-700B-RJ MR-J4-700A-RJ	HG-SR702W0C HG-JR503W0C (Note 1), 703W0C, 701MW0C
MR-J4-11KB-RJ MR-J4-11KA-RJ	HG-JR903W0C, 11K1MW0C
MR-J4-15KB-RJ MR-J4-15KA-RJ	HG-JR15K1MW0C
MR-J4-22KB-RJ MR-J4-22KA-RJ	HG-JR22K1MW0C

MR-J4-B1-RJ/MR-J4-A1-RJ (100 V)

Servo amplifier	Servo motor with functional safety
MR-J4-10B1-RJ MR-J4-10A1-RJ	HG-KR053W0C, 13W0C
MR-J4-20B1-RJ MR-J4-20A1-RJ	HG-KR23W0C
MR-J4-40B1-RJ MR-J4-40A1-RJ	HG-KR43W0C

MR-J4-B4-RJ/MR-J4-A4-RJ (400 V)

Servo amplifier	Servo motor with functional safety
MR-J4-60B4-RJ MR-J4-60A4-RJ	HG-SR524W0C HG-JR534W0C
MR-J4-100B4-RJ MR-J4-100A4-RJ	HG-SR1024W0C HG-JR534W0C (Note 1), 734W0C, 1034W0C
MR-J4-200B4-RJ MR-J4-200A4-RJ	HG-SR1524W0C, 2024W0C HG-JR734W0C (Note 1), 1034W0C (Note 1), 1534W0C, 2034W0C
MR-J4-350B4-RJ MR-J4-350A4-RJ	HG-SR3524W0C HG-JR1534W0C (Note 1), 2034W0C (Note 1), 3534W0C
MR-J4-500B4-RJ MR-J4-500A4-RJ	HG-SR5024W0C HG-JR3534W0C (Note 1), 5034W0C
MR-J4-700B4-RJ MR-J4-700A4-RJ	HG-SR7024W0C HG-JR5034W0C (Note 1), 7034W0C, 701M4W0C
MR-J4-11KB4-RJ MR-J4-11KA4-RJ	HG-JR9034W0C, 11K1M4W0C
MR-J4-15KB4-RJ MR-J4-15KA4-RJ	HG-JR15K1M4W0C
MR-J4-22KB4-RJ MR-J4-22KA4-RJ	HG-JR22K1M4W0C

Notes: 1. The maximum torque can be increased from 300% to 400% of the rated torque with this combination.

Combinations of Multi-Axis Servo Amplifier and Servo Motors WB

MR-J4W2-B

Any combination of the servo motors with different series and capacities is possible as long as the servo motors are compatible with the servo amplifier.

Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4W2-22B	HG-KR053, 13, 23 HG-MR053, 13, 23	LM-U2PAB-05M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20
MR-J4W2-44B	HG-KR053, 13, 23, 43 HG-MR053, 13, 23, 43	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-K2P1A-01M-2SS1 LM-U2PAB-05M-0SS0 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20 TM-RFM004C20
MR-J4W2-77B	HG-KR43, 73 HG-MR43, 73 HG-SR51, 52 HG-JR53, 73 HG-UR72	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-H3P3B-24P-CSS0 LM-H3P3C-36P-CSS0 LM-H3P7A-24P-ASS0 LM-K2P1A-01M-2SS1 LM-K2P2A-02M-1SS1 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0 LM-U2PBD-15M-1SS0 LM-U2PBF-22M-1SS0	TM-RFM004C20 TM-RFM006C20 TM-RFM006E20 TM-RFM012E20 TM-RFM012G20 TM-RFM040J10
MR-J4W2-1010B	HG-KR43, 73 HG-MR43, 73 HG-SR51, 81, 52, 102 HG-JR53 (Note 2), 73, 103 HG-UR72	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-H3P3B-24P-CSS0 LM-H3P3C-36P-CSS0 LM-H3P7A-24P-ASS0 LM-K2P1A-01M-2SS1 LM-K2P2A-02M-1SS1 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0 LM-U2PBD-15M-1SS0 LM-U2PBF-22M-1SS0	TM-RFM004C20 TM-RFM006C20 TM-RFM006E20 TM-RFM012E20 TM-RFM018E20 TM-RFM012G20 TM-RFM040J10
MR-J4W2-0303B6	HG-AK0136, 0236, 0336	-	-

MR-J4W3-B

Any combination of the servo motors with different series and capacities is possible as long as the servo motors are compatible with the servo amplifier.

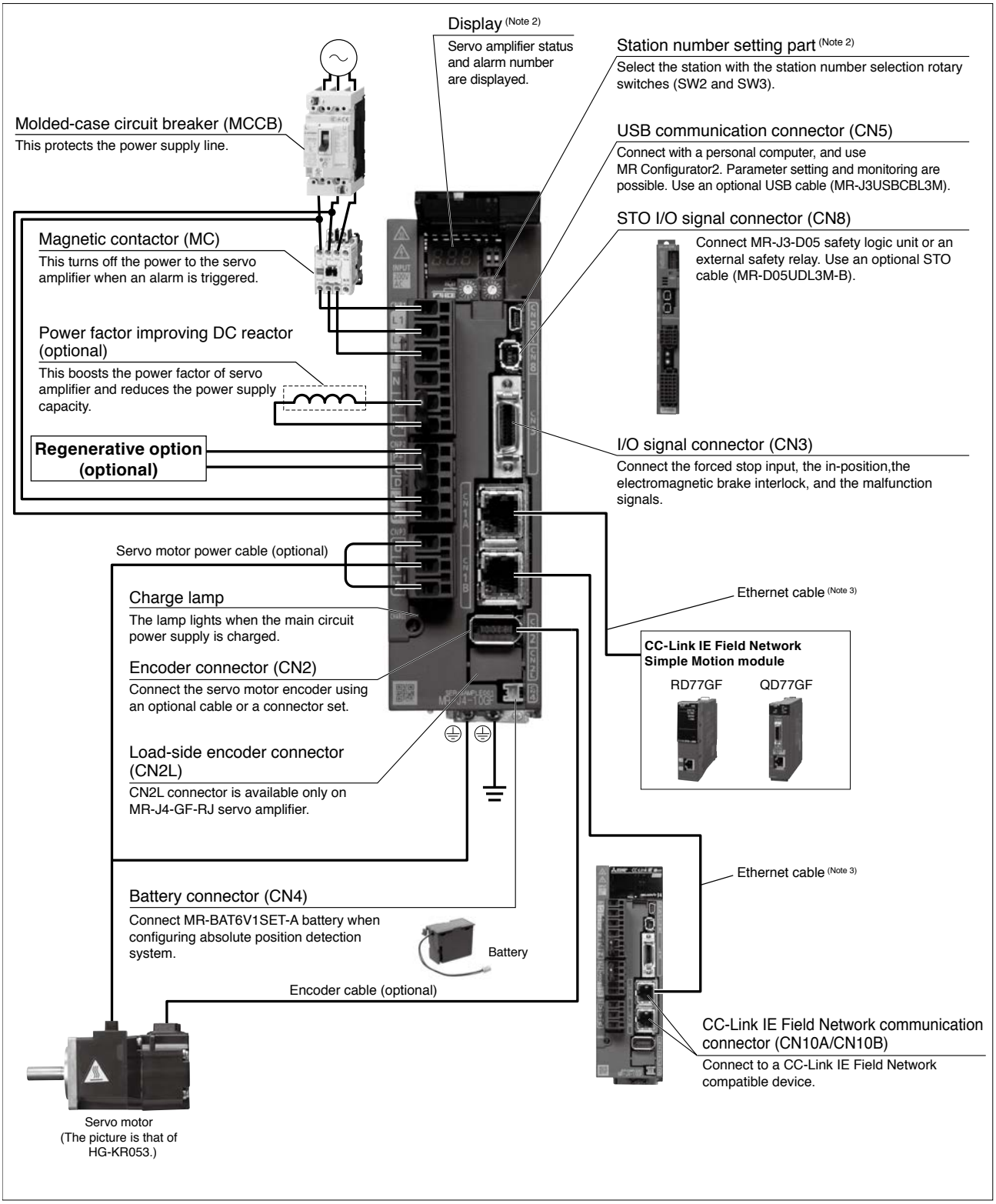
Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4W3-222B	HG-KR053, 13, 23 HG-MR053, 13, 23	LM-U2PAB-05M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20
MR-J4W3-444B	HG-KR053, 13, 23, 43 HG-MR053, 13, 23, 43	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-K2P1A-01M-2SS1 LM-U2PAB-05M-0SS0 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20 TM-RFM004C20

Notes: 1. Models of the linear servo motor primary side are listed in this page. For compatible models of the secondary side, refer to "Combinations of Linear Servo Motor and Servo Amplifier" under section 3 Linear Servo Motor in this catalog.
2. The maximum torque can be increased from 300% to 400% of the rated torque with this combination.

MR-J4-GF/MR-J4-GF-RJ Connections with Peripheral Equipment (Note 1)

GF GF-RJ

Peripheral equipment is connected to MR-J4-GF/MR-J4-GF-RJ as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



Notes: 1. The connection with the peripheral equipment is an example for MR-J4-350GF/MR-J4-350GF-RJ or smaller servo amplifiers. Refer to "MR-J4-_GF Servo Amplifier Instruction Manual (Motion Mode)" for the actual connections.
2. This picture shows when the display cover is open.
3. For specifications of the Ethernet cable, refer to "Ethernet Cable Specifications" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.

MR-J4-GF/MR-J4-GF-RJ (CC-Link IE Field Network Interface) Specifications (200 V) GF GF-RJ

Servo amplifier model MR-J4-_(-RJ)			10GF	20GF	40GF	60GF	70GF	100GF	200GF	350GF	500GF	700GF
Output	Rated voltage		3-phase 170 V AC									
	Rated current	[A]	1.1	1.5	2.8	3.2	5.8	6.0	11.0	17.0	28.0	37.0
Main circuit power supply input	Voltage/ frequency (Note 1)	AC input	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz					3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 10)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz		
		DC input (Note 12)	283 V DC to 340 V DC									
	Rated current (Note 9)	[A]	0.9	1.5	2.6	3.2 (Note 8)	3.8	5.0	10.5	16.0	21.7	28.9
	Permissible voltage fluctuation	AC input	3-phase or 1-phase 170 V AC to 264 V AC					3-phase or 1-phase 170 V AC to 264 V AC (Note 10)		3-phase 170 V AC to 264 V AC		
		DC input (Note 12)	241 V DC to 374 V DC									
	Permissible frequency fluctuation		±5% maximum									
Control circuit power supply input	Voltage/ frequency	AC input	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz									
		DC input (Note 12)	283 V DC to 340 V DC									
	Rated current	[A]	0.2								0.3	
	Permissible voltage fluctuation	AC input	1-phase 170 V AC to 264 V AC									
		DC input (Note 12)	241 V DC to 374 V DC									
	Permissible frequency fluctuation		±5% maximum									
	Power consumption	[W]	30								45	
Interface power supply			24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))									
Control method			Sine-wave PWM control/current control method									
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3)	[W]	-	10	10	10	20	20	100	100	130	170
Dynamic brake			Built-in (Note 4)									
CC-Link IE Field communication cycle (Note 14)			0.5 ms, 1.0 ms, 2.0 ms, 4.0 ms									
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)									
Encoder output pulse			Compatible (A/B/Z-phase pulse)									
Analog monitor			2 channels									
Positioning mode			Point table method									
Fully closed loop control		MR-J4-GF	Two-wire type communication method									
		MR-J4-GF-RJ	Two-wire/four-wire type communication method									
Load-side encoder interface		MR-J4-GF	Mitsubishi high-speed serial communication									
		MR-J4-GF-RJ	Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal									
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, scale measurement function, super trace control, lost motion compensation									
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, magnetic pole detection protection, linear servo control fault protection									

MR-J4-GF/MR-J4-GF-RJ (CC-Link IE Field Network Interface) Specifications (200 V) GF GF-RJ

Servo amplifier model MR-J4-_(-RJ)		10GF	20GF	40GF	60GF	70GF	100GF	200GF	350GF	500GF	700GF
Functional safety		STO (IEC/EN 61800-5-2)									
Safety performance	Standards certified by CB (Note 13)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2									
	Response performance	8 ms or less (STO input OFF → energy shut-off)									
	Test pulse input (STO) (Note 7)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum									
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)									
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]									
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]									
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.									
Structure (IP rating)		Natural cooling, open (IP20)				Force cooling, open (IP20)				Force cooling, open (IP20) (Note 5)	
Close mounting	3-phase power input	Possible (Note 6)								Not possible	
	1-phase power input	Possible (Note 6)					Not possible		-		
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)									
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)									
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust									
	Altitude	2000 m or less above sea level (Note 11)									
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)									
Mass	[kg]	1.0	1.0	1.0	1.0	1.4	1.4	2.1	2.3	4.0	6.2

Notes: 1. Rated output and speed of a rotary servo motor and a direct drive motor; and continuous thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_GF_(-RJ) Servo Amplifier Instruction Manual (Motion Mode)" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Terminal blocks are excluded.
6. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C, or use the servo amplifiers with 75% or less of the effective load ratio.
7. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
8. The rated current is 2.9 A when the servo amplifier is used with UL or CSA compliant servo motor.
9. This value is applicable when a 3-phase power supply is used.
10. Use the servo amplifier with 75% or less of the effective load ratio when a 1-phase 200 V AC to 240 V AC power supply is used.
11. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
12. MR-J4-_GF-RJ servo amplifiers are available for DC power input. For a connection example of power circuit with DC input, refer to relevant Servo Amplifier Instruction Manual.
13. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.
14. The command communication cycle depends on the controller specifications and the number of axes connected.

MR-J4-GF4/MR-J4-GF4-RJ (CC-Link IE Field Network Interface) Specifications (400 V) GF GF-RJ

Servo amplifier model MR-J4-_(-RJ)			60GF4	100GF4	200GF4	350GF4	500GF4	700GF4
Output	Rated voltage		3-phase 323 V AC					
	Rated current	[A]	1.5	2.8	5.4	8.6	14.0	17.0
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz					
	Rated current	[A]	1.4	2.5	5.1	7.9	10.8	14.4
	Permissible voltage fluctuation		3-phase 323 V AC to 528 V AC					
	Permissible frequency fluctuation		±5% maximum					
Control circuit power supply input	Voltage/frequency		1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz					
	Rated current	[A]	0.1			0.2		
	Permissible voltage fluctuation		1-phase 323 V AC to 528 V AC					
	Permissible frequency fluctuation		±5% maximum					
	Power consumption	[W]	30			45		
Interface power supply			24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))					
Control method			Sine-wave PWM control/current control method					
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3)	[W]	15	15	100	100	130 (Note 7)	170 (Note 7)
Dynamic brake			Built-in (Note 4)					
CC-Link IE Field communication cycle (Note 10)			0.5 ms, 1.0 ms, 2.0 ms, 4.0 ms					
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)					
Encoder output pulse			Compatible (A/B/Z-phase pulse)					
Analog monitor			2 channels					
Positioning mode			Point table method					
Fully closed loop control	MR-J4-GF4		Two-wire type communication method					
	MR-J4-GF4-RJ		Two-wire/four-wire type communication method					
Load-side encoder interface	MR-J4-GF4		Mitsubishi high-speed serial communication					
	MR-J4-GF4-RJ		Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal					
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, scale measurement function, super trace control, lost motion compensation					
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, magnetic pole detection protection, linear servo control fault protection					
Functional safety			STO (IEC/EN 61800-5-2)					
Safety performance	Standards certified by CB (Note 9)		EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2					
	Response performance		8 ms or less (STO input OFF → energy shut-off)					
	Test pulse input (STO) (Note 6)		Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum					
	Mean time to dangerous failure (MTTFd)		MTTFd ≥ 100 [years] (314a)					
	Diagnostic coverage (DC)		DC = Medium, 97.6 [%]					
	Probability of dangerous Failure per Hour (PFH)		PFH = 6.4 × 10^{-9} [1/h]					
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
Structure (IP rating)			Natural cooling, open (IP20)		Force cooling, open (IP20)		Force cooling, open (IP20) (Note 5)	
Close mounting			Not possible					
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)					
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)					
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust					
	Altitude		2000 m or less above sea level (Note 8)					
	Vibration resistance		5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)					
Mass		[kg]	1.7	1.7	2.1	3.6	4.3	6.5

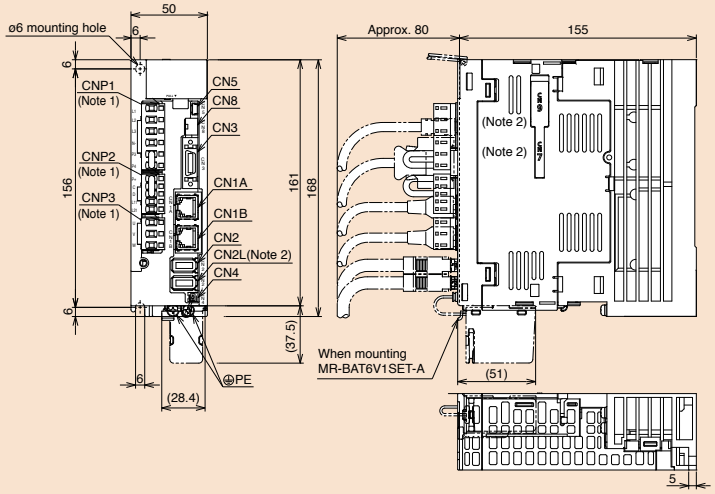
MR-J4-GF4/MR-J4-GF4-RJ (CC-Link IE Field Network interface) Specifications (400 V) GF GF-RJ

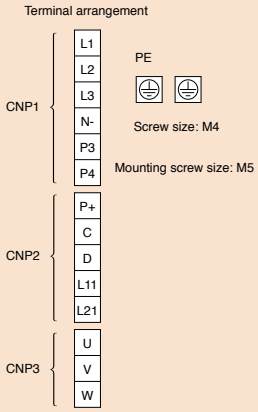
Notes: 1. Rated output and speed of a rotary servo motor; and continuous thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_GF_(-RJ) Servo Amplifier Instruction Manual (Motion Mode)" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Terminal blocks are excluded.
6. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
7. The servo amplifier built-in regenerative resistor is compatible with the maximum torque deceleration when the servo motor is used within the rated speed and the recommended load to motor inertia ratio. Contact your local sales office if the operating motor speed or the load to motor inertia ratio exceeds the rated speed or the recommended ratio.
8. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
9. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.
10. The command communication cycle depends on the controller specifications and the number of axes connected.

MR-J4-GF/MR-J4-GF-RJ Dimensions

GF GF-RJ

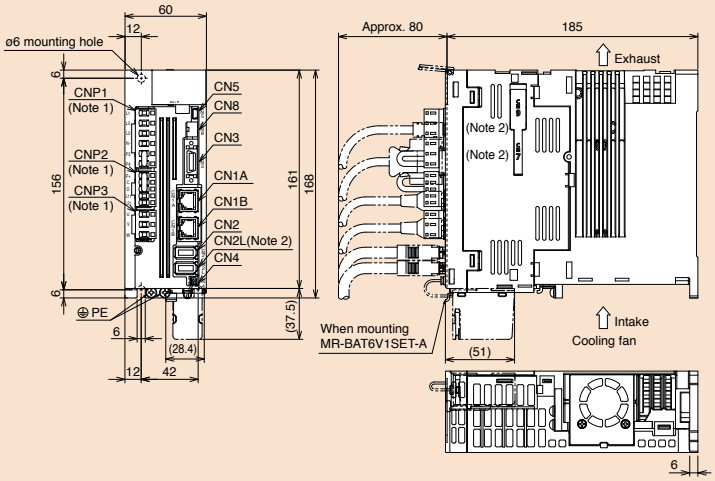
- MR-J4-10GF, MR-J4-10GF-RJ
- MR-J4-20GF, MR-J4-20GF-RJ
- MR-J4-40GF, MR-J4-40GF-RJ
- MR-J4-60GF, MR-J4-60GF-RJ

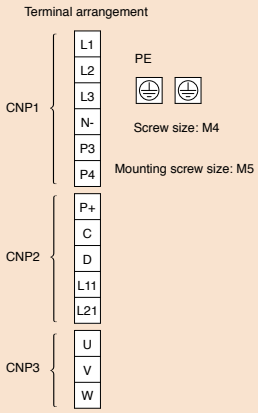




[Unit: mm]

- MR-J4-70GF, MR-J4-70GF-RJ
- MR-J4-100GF, MR-J4-100GF-RJ





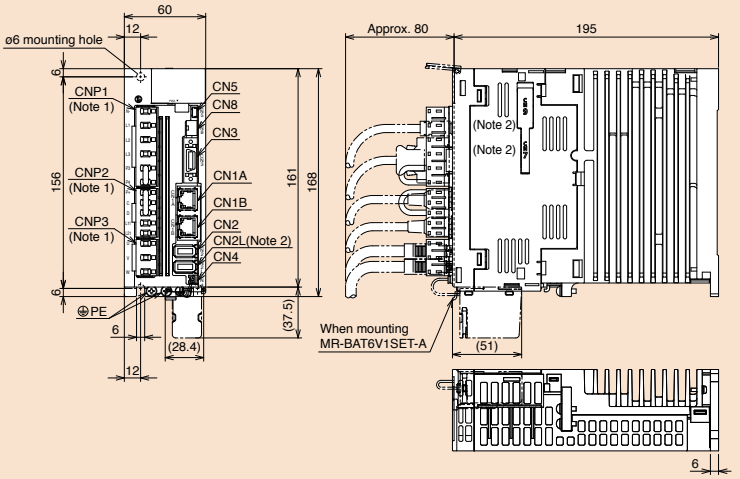
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-GF servo amplifier.

MR-J4-GF/MR-J4-GF-RJ Dimensions

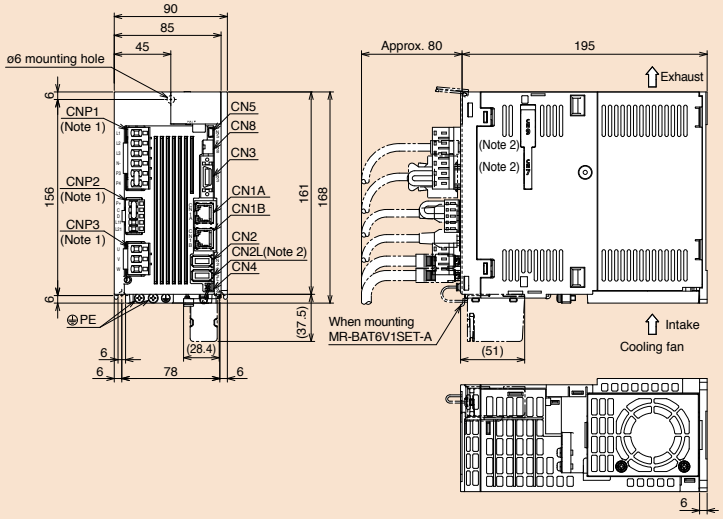
GF GF-RJ

●MR-J4-60GF4, MR-J4-60GF4-RJ
●MR-J4-100GF4, MR-J4-100GF4-RJ



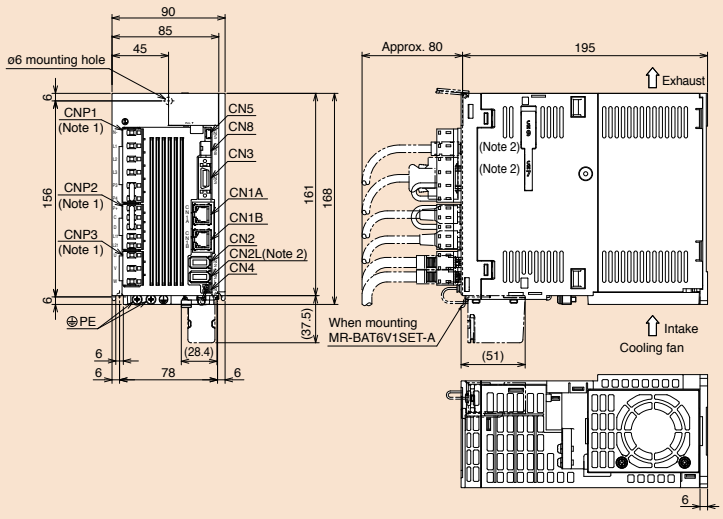
[Unit: mm]

●MR-J4-200GF, MR-J4-200GF-RJ



[Unit: mm]

●MR-J4-200GF4, MR-J4-200GF4-RJ



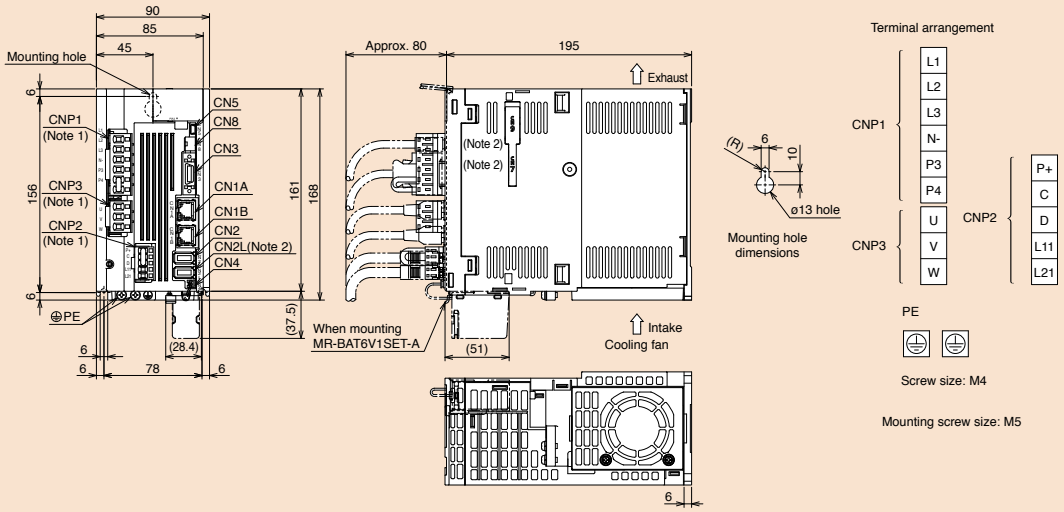
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-GF servo amplifier.

MR-J4-GF/MR-J4-GF-RJ Dimensions

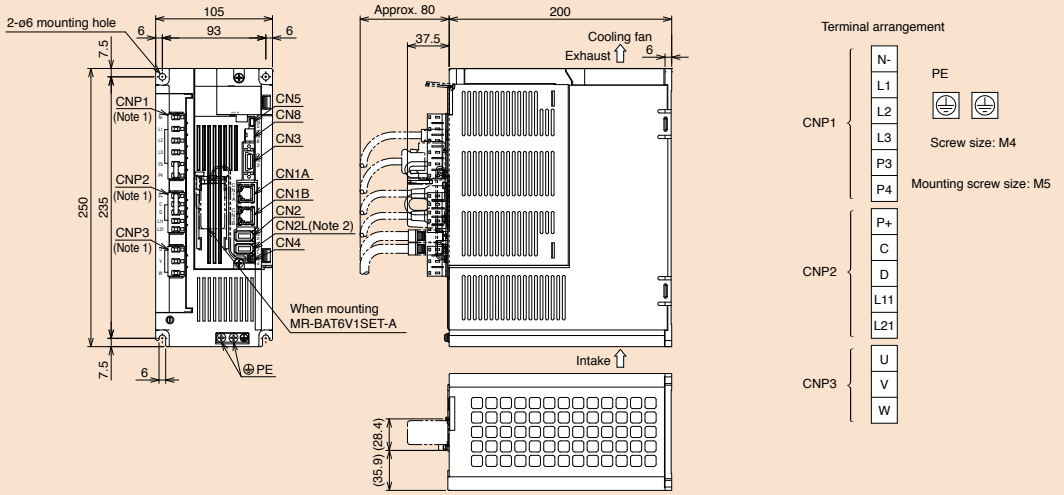
GF GF-RJ

●MR-J4-350GF, MR-J4-350GF-RJ



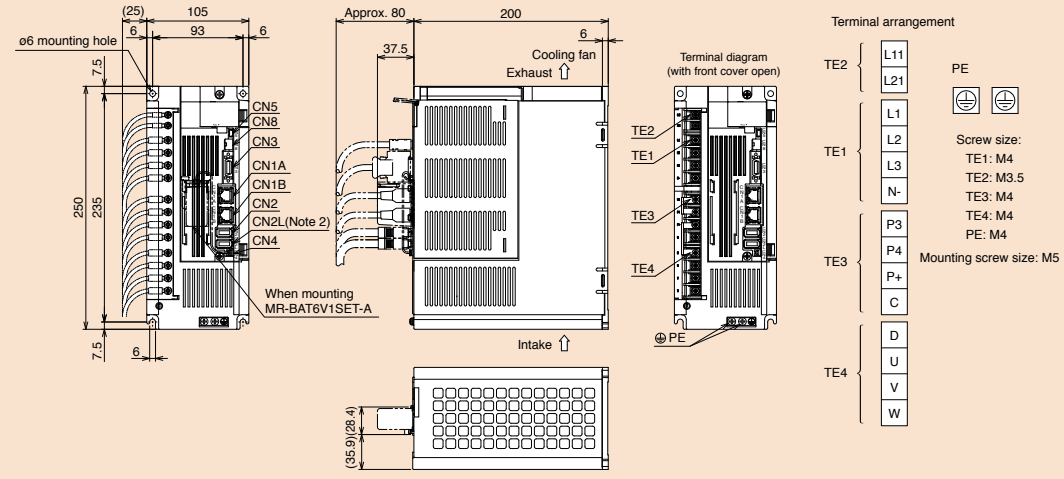
[Unit: mm]

●MR-J4-350GF4, MR-J4-350GF4-RJ



[Unit: mm]

●MR-J4-500GF, MR-J4-500GF-RJ



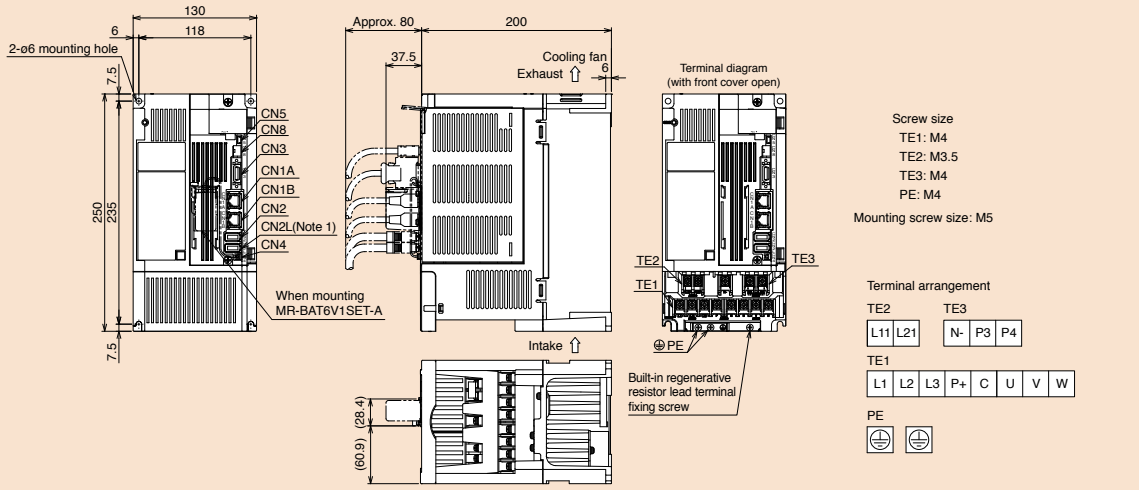
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-GF servo amplifier.

MR-J4-GF/MR-J4-GF-RJ Dimensions

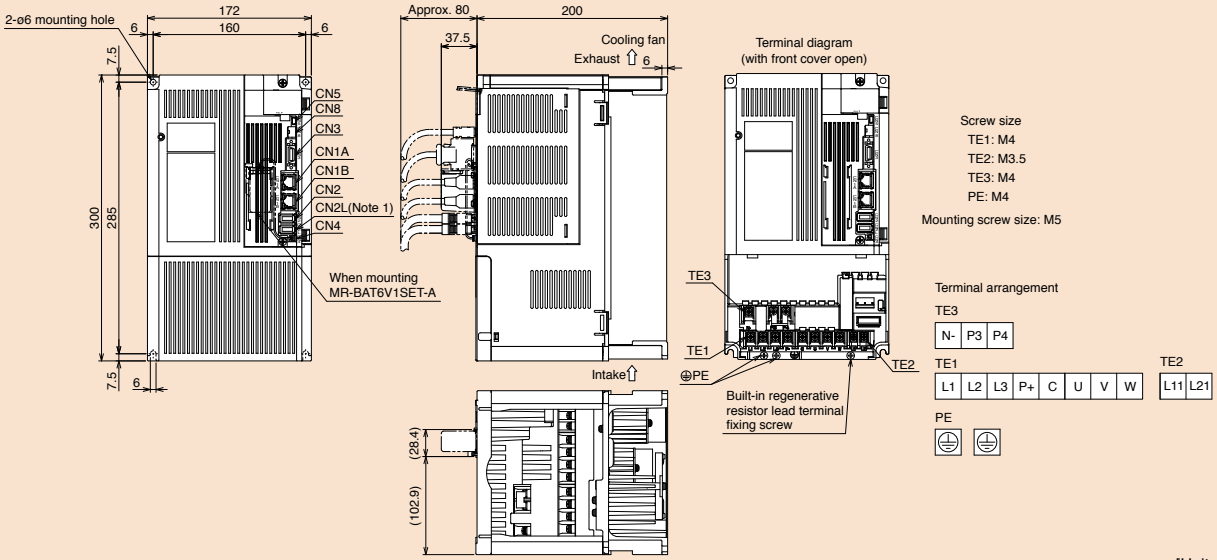
GF GF-RJ

●MR-J4-500GF4, MR-J4-500GF4-RJ



[Unit: mm]

●MR-J4-700GF, MR-J4-700GF4-RJ
●MR-J4-700GF4, MR-J4-700GF4-RJ



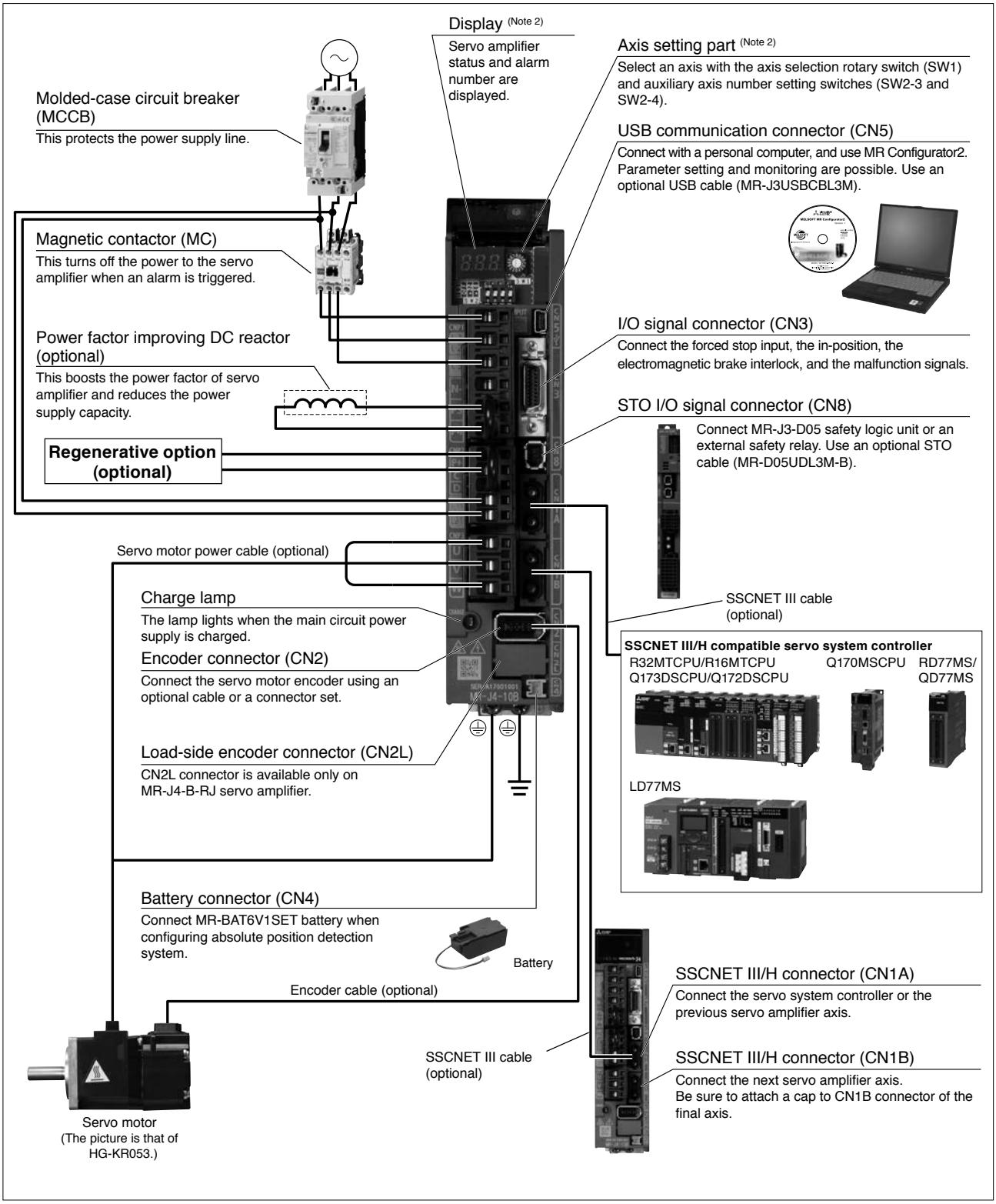
[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-GF servo amplifier.

MR-J4-B/MR-J4-B-RJ Connections with Peripheral Equipment (Note 1)

B B-RJ

Peripheral equipment is connected to MR-J4-B/MR-J4-B-RJ as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



Notes: 1. The connection with the peripheral equipment is an example for MR-J4-350B/MR-J4-350B-RJ or smaller servo amplifiers. Refer to "MR-J4-_B_(-RJ) Servo Amplifier Instruction Manual" for the actual connections.
2. This picture shows when the display cover is open.

MR-J4-B(1)/MR-J4-B(1)-RJ (SSCNET III/H Interface) Specifications (200 V/100 V)

B B-RJ

Servo amplifier model MR-J4-_(-RJ)			10B	20B	40B	60B	70B	100B	200B	350B	500B	700B	11KB	15KB	22KB	10B1	20B1	40B1
Output	Rated voltage		3-phase 170 V AC															
	Rated current	[A]	1.1	1.5	2.8	3.2	5.8	6.0	11.0	17.0	28.0	37.0	68.0	87.0	126.0	1.1	1.5	2.8
Main circuit power supply input	Voltage/ frequency (Note 1)	AC input	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz					3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 17)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz						1-phase 100 V AC to 120 V AC, 50 Hz/60 Hz		
		DC input (Note 19)	283 V DC to 340 V DC															
	Rated current (Note 15)	[A]	0.9	1.5	2.6	3.2 (Note 8)	3.8	5.0	10.5	16.0	21.7	28.9	46.0	64.0	95.0	3.0	5.0	9.0
	Permissible voltage fluctuation	AC input	3-phase or 1-phase 170 V AC to 264 V AC					3-phase or 1-phase 170 V AC to 264 V AC (Note 17)		3-phase 170 V AC to 264 V AC						1-phase 85 V AC to 132 V AC		
		DC input (Note 19)	241 V DC to 374 V DC															
	Permissible frequency fluctuation		±5% maximum															
Control circuit power supply input	Voltage/ frequency	AC input	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz													1-phase 100 V AC to 120 V AC, 50 Hz/60 Hz		
		DC input (Note 19)	283 V DC to 340 V DC															
	Rated current	[A]	0.2								0.3					0.4		
	Permissible voltage fluctuation	AC input	1-phase 170 V AC to 264 V AC													1-phase 85 V AC to 132 V AC		
		DC input (Note 19)	241 V DC to 374 V DC															
	Permissible frequency fluctuation		±5% maximum															
	Power consumption	[W]	30								45					30		
Interface power supply			24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))															
Control method			Sine-wave PWM control/current control method															
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3)	[W]	-	10	10	10	20	20	100	100	130	170	-	-	-	-	10	10
	External regenerative resistor (standard accessory) (Note 2, 3, 11, 12)	[W]	-	-	-	-	-	-	-	-	-	-	500 (800)	850 (1300)	850 (1300)	-	-	-
Dynamic brake			Built-in (Note 4)										External option (Note 13)			Built-in (Note 4)		
SSCNET III/H command communication cycle (Note 10)			0.222 ms, 0.444 ms, 0.888 ms															
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)															
Encoder output pulse			Compatible (A/B/Z-phase pulse)															
Analog monitor			2 channels															
Fully closed loop control	MR-J4-B(1) (Note 9)		Two-wire type communication method															
	MR-J4-B(1)-RJ		Two-wire/four-wire type communication method															
Load-side encoder interface	MR-J4-B(1)		Mitsubishi high-speed serial communication															
	MR-J4-B(1)-RJ		Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal															
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, master-slave operation function (Note 14), scale measurement function (Note 14), J3 compatibility mode, super trace control (Note 16), lost motion compensation (Note 16)															
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, magnetic pole detection protection, linear servo control fault protection															

MR-J4-B(1)/MR-J4-B(1)-RJ (SSCNET III/H Interface) Specifications (200 V/100 V) B B-RJ

Servo amplifier model MR-J4-_(-RJ)		10B	20B	40B	60B	70B	100B	200B	350B	500B	700B	11KB	15KB	22KB	10B1	20B1	40B1
Functional safety		STO (IEC/EN 61800-5-2)															
Safety performance	Standards certified by CB (Note 20)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2															
	Response performance	8 ms or less (STO input OFF → energy shut-off)															
	Test pulse input (STO) (Note 7)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum															
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)															
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]															
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]															
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.															
Structure (IP rating)		Natural cooling, open (IP20)				Force cooling, open (IP20)				Force cooling, open (IP20) (Note 5)					Natural cooling, open (IP20)		
Close mounting	3-phase power input	Possible (Note 6)								Not possible					-		
	1-phase power input	Possible (Note 6)					Not possible		-						Possible (Note 6)		
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)															
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)															
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust															
	Altitude	2000 m or less above sea level (Note 18)															
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)															
Mass	[kg]	0.8	0.8	1.0	1.0	1.4	1.4	2.1	2.3	4.0	6.2	13.4	13.4	18.2	0.8	0.8	1.0

Notes: 1. Rated output and speed of a rotary servo motor and a direct drive motor; and continuous thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_B_(-RJ) Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Terminal blocks are excluded.
6. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C, or use the servo amplifiers with 75% or less of the effective load ratio.
7. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
8. The rated current is 2.9 A when the servo amplifier is used with UL or CSA compliant servo motor.
9. Fully closed loop control is available with the servo amplifiers with software version A3 or later.
10. The command communication cycle depends on the controller specifications and the number of axes connected.
11. The value in brackets is applicable when cooling fans (two units of 92 mm × 92 mm, minimum air flow: 1.0 m^3/min) are installed, and then [Pr. PA02] is changed.
12. Servo amplifiers without an enclosed regenerative resistor are also available. Refer to "1-Axis Servo Amplifier Model Designation" in this catalog for details.
13. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
14. This function is available with the servo amplifiers with software version A8 or later.
15. This value is applicable when a 3-phase power supply is used.
16. This function is available with the servo amplifiers with software version B4 or later.
17. Use the servo amplifier with 75% or less of the effective load ratio when a 1-phase 200 V AC to 240 V AC power supply is used.
18. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
19. MR-J4-_B-RJ and MR-J4-_B-EG servo amplifiers are available for DC power input. For a connection example of power circuit with DC input, refer to relevant Servo Amplifier Instruction Manual.
20. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4-DU_B/MR-J4-DU_B-RJ (SSCNET III/H Interface) Specifications (200 V) B B-RJ

Drive unit model MR-J4-_(-RJ)			DU30KB	DU37KB
Compatible converter unit model			MR-CR55K (Note 5)	
Output	Rated voltage		3-phase 170 V AC	
	Rated current	[A]	174	204
Main circuit power supply input			Main circuit power is supplied from the converter unit to the drive unit. (Note 5)	
Control circuit power supply input	Voltage/frequency		1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	
	Rated current	[A]	0.3	
	Permissible voltage fluctuation		1-phase 170 V AC to 264 V AC	
	Permissible frequency fluctuation		±5% maximum	
	Power consumption	[W]	45	
Interface power supply			24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))	
Control method			Sine-wave PWM control/current control method	
Dynamic brake			External option (Note 4)	
SSCNET III/H command communication cycle (Note 3)			0.222 ms, 0.444 ms, 0.888 ms	
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)	
Encoder output pulse			Compatible (A/B/Z-phase pulse)	
Analog monitor			2 channels	
Fully closed loop control		MR-J4-DU_B	Two-wire type communication method	
		MR-J4-DU_B-RJ	Two-wire/four-wire type communication method	
Load-side encoder interface		MR-J4-DU_B	Mitsubishi high-speed serial communication	
		MR-J4-DU_B-RJ	Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal	
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, master-slave operation function, scale measurement function, J3 compatibility mode, super trace control, lost motion compensation	
Protective functions			Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection,	
Functional safety			STO (IEC/EN 61800-5-2)	
Safety performance	Standards certified by CB (Note 7)		EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2	
	Response performance		8 ms or less (STO input OFF → energy shut-off)	
	Test pulse input (STO) (Note 2)		Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum	
	Mean time to dangerous failure (MTTFd)		MTTFd ≥ 100 [years] (314a)	
	Diagnostic coverage (DC)		DC = Medium, 97.6 [%]	
	Probability of dangerous Failure per Hour (PFH)		PFH = 6.4 × 10^{-9} [1/h]	
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.	
Structure (IP rating)			Force cooling, open (IP20) (Note 1)	
Close mounting			Not possible	
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)	
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)	
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude		2000 m or less above sea level (Note 6)	
	Vibration resistance		5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)	
Mass		[kg]	21	

Notes: 1. Terminal blocks are excluded.
2. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the drive unit instantaneously at regular intervals.
3. The command communication cycle depends on the controller specifications and the number of axes connected.
4. Use an optional external dynamic brake with the drive unit. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
5. One unit of converter unit is required for each drive unit. Refer to "MR-CR Converter Unit Specifications (200 V/400 V)" on p. 302 in this catalog for the specifications of the converter unit.
6. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
7. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4-B4/MR-J4-B4-RJ (SSCNET III/H Interface) Specifications (400 V) B B-RJ

Servo amplifier model MR-J4-_(-RJ)			60B4	100B4	200B4	350B4	500B4	700B4	11KB4	15KB4	22KB4
Output	Rated voltage		3-phase 323 V AC								
	Rated current	[A]	1.5	2.8	5.4	8.6	14.0	17.0	32.0	41.0	63.0
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz								
	Rated current	[A]	1.4	2.5	5.1	7.9	10.8	14.4	23.1	31.8	47.6
	Permissible voltage fluctuation		3-phase 323 V AC to 528 V AC								
	Permissible frequency fluctuation		±5% maximum								
Control circuit power supply input	Voltage/frequency		1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz								
	Rated current	[A]	0.1			0.2					
	Permissible voltage fluctuation		1-phase 323 V AC to 528 V AC								
	Permissible frequency fluctuation		±5% maximum								
	Power consumption	[W]	30			45					
Interface power supply			24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))								
Control method			Sine-wave PWM control/current control method								
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3)	[W]	15	15	100	100	130 (Note 11)	170 (Note 11)	-	-	-
	External regenerative resistor (standard accessory) (Note 2, 3, 8, 9)	[W]	-	-	-	-	-	-	500 (800)	850 (1300)	850 (1300)
Dynamic brake			Built-in (Note 4)						External option (Note 10)		
SSCNET III/H command communication cycle (Note 7)			0.222 ms, 0.444 ms, 0.888 ms								
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)								
Encoder output pulse			Compatible (A/B/Z-phase pulse)								
Analog monitor			2 channels								
Fully closed loop control	MR-J4-B4		Two-wire type communication method								
	MR-J4-B4-RJ		Two-wire/four-wire type communication method								
Load-side encoder interface	MR-J4-B4		Mitsubishi high-speed serial communication								
	MR-J4-B4-RJ		Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal								
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, master-slave operation function (Note 12), scale measurement function (Note 12), J3 compatibility mode, super trace control (Note 13), lost motion compensation (Note 13)								
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, magnetic pole detection protection, linear servo control fault protection								
Functional safety			STO (IEC/EN 61800-5-2)								
Safety performance	Standards certified by CB (Note 15)		EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2								
	Response performance		8 ms or less (STO input OFF → energy shut-off)								
	Test pulse input (STO) (Note 6)		Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum								
	Mean time to dangerous failure (MTTFd)		MTTFd ≥ 100 [years] (314a)								
	Diagnostic coverage (DC)		DC = Medium, 97.6 [%]								
	Probability of dangerous Failure per Hour (PFH)		PFH = 6.4 × 10^{-9} [1/h]								
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Structure (IP rating)			Natural cooling, open (IP20)		Force cooling, open (IP20)		Force cooling, open (IP20) (Note 5)				
Close mounting			Not possible								
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)								
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)								
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude		2000 m or less above sea level (Note 14)								
	Vibration resistance		5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)								
Mass		[kg]	1.7	1.7	2.1	3.6	4.3	6.5	13.4	13.4	18.2

MR-J4-B4/MR-J4-B4-RJ (SSCNET III/H Interface) Specifications (400 V)

B B-RJ

Notes: 1. Rated output and speed of a rotary servo motor, and continuous thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_B_(-RJ) Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Terminal blocks are excluded.
6. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
7. The command communication cycle depends on the controller specifications and the number of axes connected.
8. The value in brackets is applicable when cooling fans (two units of 92 mm × 92 mm, minimum air flow: 1.0 m^3/min) are installed, and then [Pr. PA02] is changed.
9. Servo amplifiers without an enclosed regenerative resistor are also available. Refer to "1-Axis Servo Amplifier Model Designation" in this catalog for details.
10. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
11. The servo amplifier built-in regenerative resistor is compatible with the maximum torque deceleration when the servo motor is used within the rated speed and the recommended load to motor inertia ratio. Contact your local sales office if the operating motor speed or the load to motor inertia ratio exceeds the rated speed or the recommended ratio.
12. This function is available with the servo amplifiers with software version A8 or later.
13. This function is available with the servo amplifiers with software version B4 or later.
14. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
15. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4-DU_B4/MR-J4-DU_B4-RJ (SSCNET III/H Interface) Specifications (400 V) B B-RJ

Drive unit model MR-J4-_(-RJ)			DU30KB4	DU37KB4	DU45KB4	DU55KB4
Compatible converter unit model			MR-CR55K4 (Note 5)			
Output	Rated voltage		3-phase 323 V AC			
	Rated current	[A]	87	102	131	143
Main circuit power supply input			Main circuit power is supplied from the converter unit to the drive unit. (Note 5)			
Control circuit power supply input	Voltage/frequency		1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz			
	Rated current	[A]	0.2			
	Permissible voltage fluctuation		1-phase 323 V AC to 528 V AC			
	Permissible frequency fluctuation		±5% maximum			
	Power consumption	[W]	45			
Interface power supply			24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))			
Control method			Sine-wave PWM control/current control method			
Dynamic brake			External option (Note 4)			
SSCNET III/H command communication cycle (Note 3)			0.222 ms, 0.444 ms, 0.888 ms			
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)			
Encoder output pulse			Compatible (A/B/Z-phase pulse)			
Analog monitor			2 channels			
Fully closed loop control	MR-J4-DU_B4		Two-wire type communication method			
	MR-J4-DU_B4-RJ		Two-wire/four-wire type communication method			
Load-side encoder interface	MR-J4-DU_B4		Mitsubishi high-speed serial communication			
	MR-J4-DU_B4-RJ		Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal			
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, master-slave operation function, scale measurement function, J3 compatibility mode, super trace control, lost motion compensation			
Protective functions			Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection,			
Functional safety			STO (IEC/EN 61800-5-2)			
Safety performance	Standards certified by CB (Note 7)		EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2			
	Response performance		8 ms or less (STO input OFF → energy shut-off)			
	Test pulse input (STO) (Note 2)		Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum			
	Mean time to dangerous failure (MTTFd)		MTTFd ≥ 100 [years] (314a)			
	Diagnostic coverage (DC)		DC = Medium, 97.6 [%]			
	Probability of dangerous Failure per Hour (PFH)		PFH = 6.4 × 10^{-9} [1/h]			
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.			
Structure (IP rating)			Force cooling, open (IP20) (Note 1)			
Close mounting			Not possible			
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)			
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)			
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
	Altitude		2000 m or less above sea level (Note 6)			
	Vibration resistance		5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)			
Mass		[kg]	16		21	

Notes: 1. Terminal blocks are excluded.
2. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the drive unit instantaneously at regular intervals.
3. The command communication cycle depends on the controller specifications and the number of axes connected.
4. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
5. One unit of converter unit is required for each drive unit. Refer to "MR-CR Converter Unit Specifications (200 V/400 V)" on p. 302 in this catalog for the specifications of the converter unit.
6. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
7. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-CR Converter Unit Specifications (200 V/400 V)

B B-RJ A A-RJ

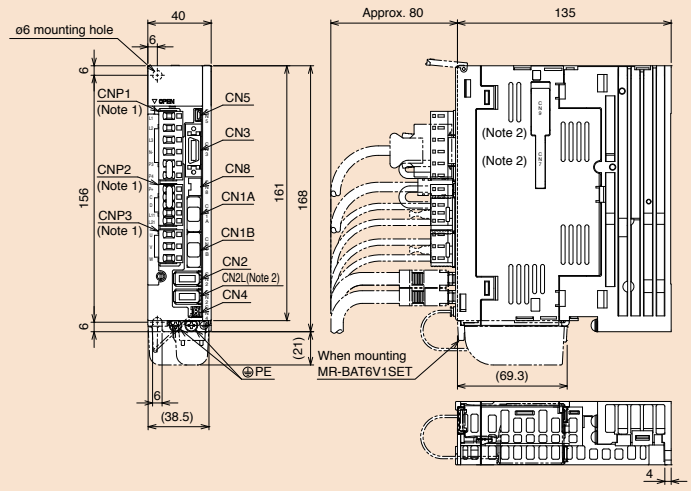
Converter unit model			MR-CR55K	MR-CR55K4
Output	Rated voltage		270 V DC to 324 V DC	513V DC to 648 V DC
	Rated current	[A]	215.9	113.8
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz
	Rated current	[A]	191.3	100.7
	Permissible voltage fluctuation		3-phase 170 V AC to 264 V AC	3-phase 323 V AC to 528 V AC
	Permissible frequency fluctuation		±5% maximum	
Control circuit power supply input	Voltage/frequency		1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz
	Rated current	[A]	0.3	0.2
	Permissible voltage fluctuation		1-phase 170 V AC to 264 V AC	1-phase 323 V AC to 528 V AC
	Permissible frequency fluctuation		±5% maximum	
	Power consumption	[W]	45	
Interface power supply			24 V DC ± 10% (required current capacity: 0.15 A)	
Rated output		[kW]	55	
Regenerative power (when regenerative option is used)			1300 W (one unit of MR-RB139) 3900 W (three units of MR-RB137)	1300 W (one unit of MR-RB137-4) 3900 W (three units of MR-RB13V-4)
Protective functions			Regenerative overvoltage shut-off, overload shut-off (electronic thermal), regenerative error protection, undervoltage protection, instantaneous power failure protection	
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.	
Structure (IP rating)			Force cooling, open (IP20) (Note 2)	
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)	
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)	
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude		2000 m or less above sea level (Note 3)	
	Vibration resistance		5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)	
Mass		[kg]	22	

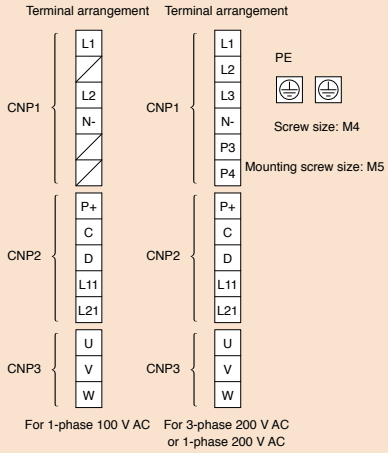
Notes: 1. Rated output and speed of a rotary servo motor are applicable when the servo amplifier, combined with the rotary servo motor, is operated within the specified power supply voltage and frequency.
2. Terminal blocks are excluded.
3. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.

MR-J4-B/MR-J4-B-RJ Dimensions

B B-RJ

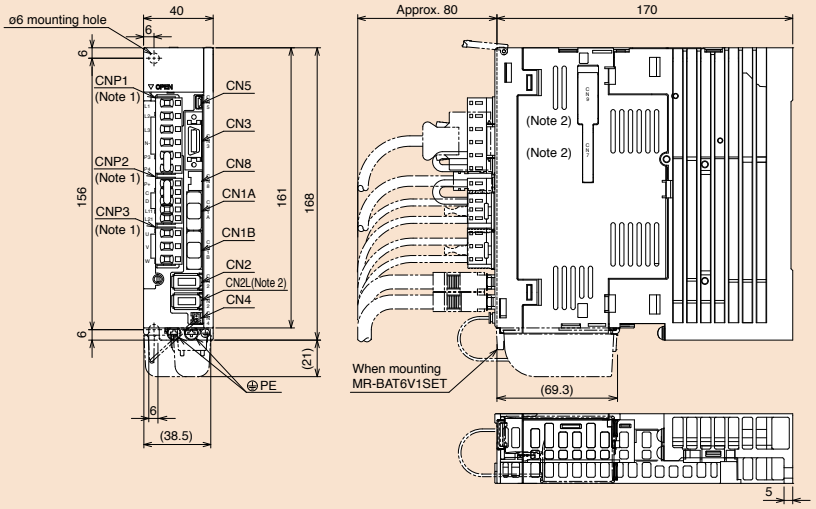
●MR-J4-10B, MR-J4-10B-RJ, MR-J4-10B1, MR-J4-10B1-RJ
●MR-J4-20B, MR-J4-20B-RJ, MR-J4-20B1, MR-J4-20B1-RJ

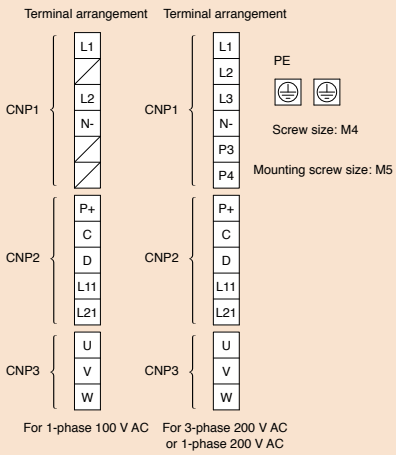




[Unit: mm]

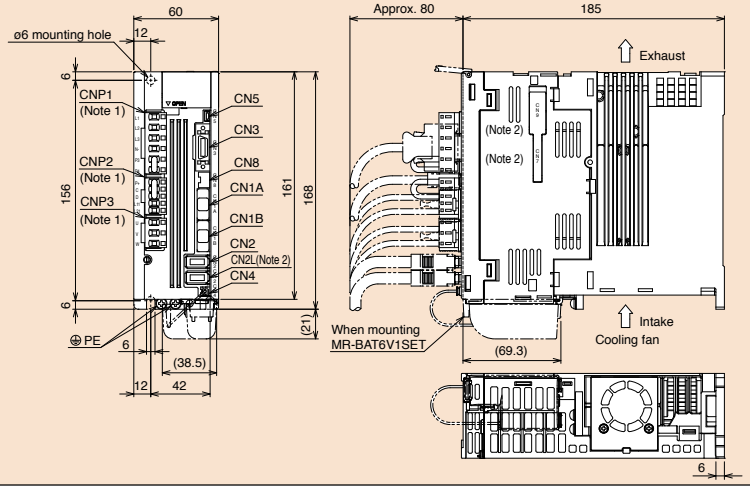
●MR-J4-40B, MR-J4-40B-RJ, MR-J4-40B1, MR-J4-40B1-RJ
●MR-J4-60B, MR-J4-60B-RJ

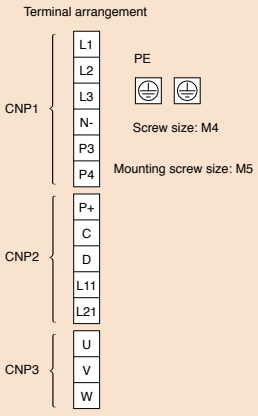




[Unit: mm]

●MR-J4-70B, MR-J4-70B-RJ
●MR-J4-100B, MR-J4-100B-RJ





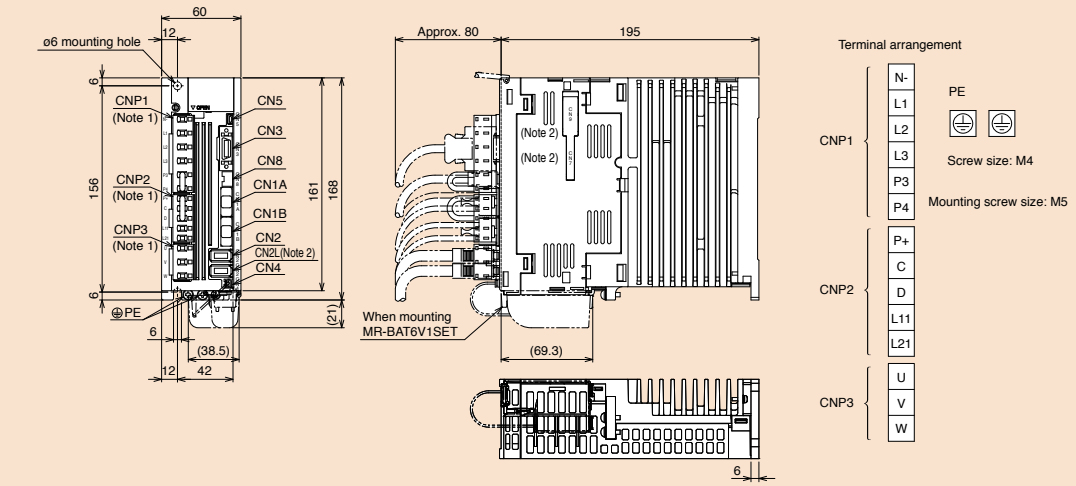
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-B servo amplifier.

MR-J4-B/MR-J4-B-RJ Dimensions

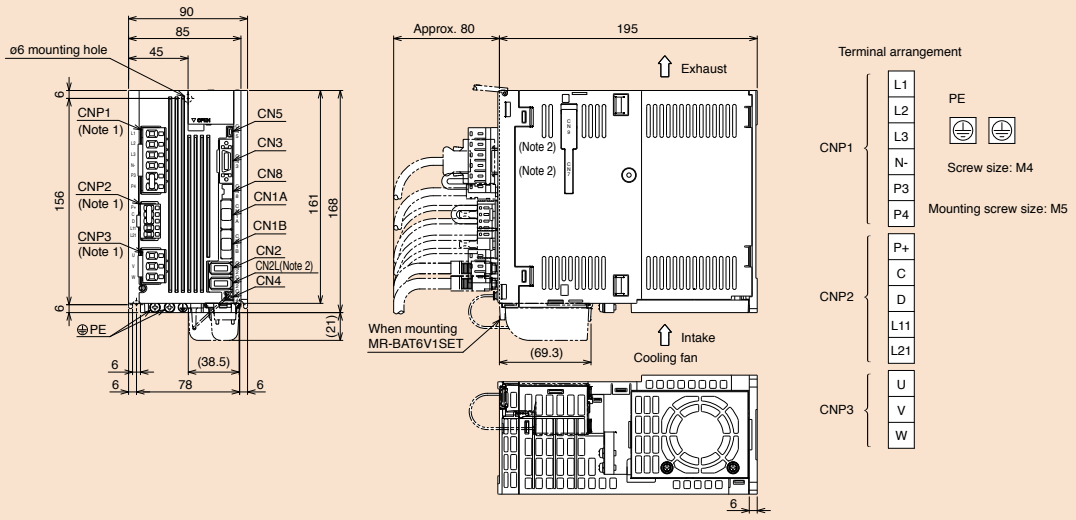
B B-RJ

●MR-J4-60B4, MR-J4-60B4-RJ
●MR-J4-100B4, MR-J4-100B4-RJ



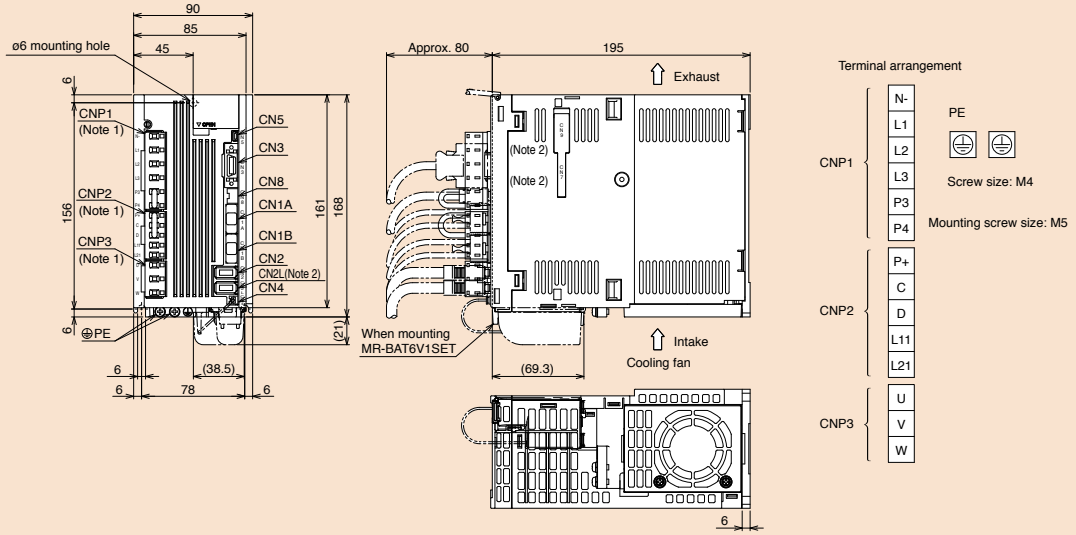
[Unit: mm]

●MR-J4-200B, MR-J4-200B-RJ



[Unit: mm]

●MR-J4-200B4, MR-J4-200B4-RJ



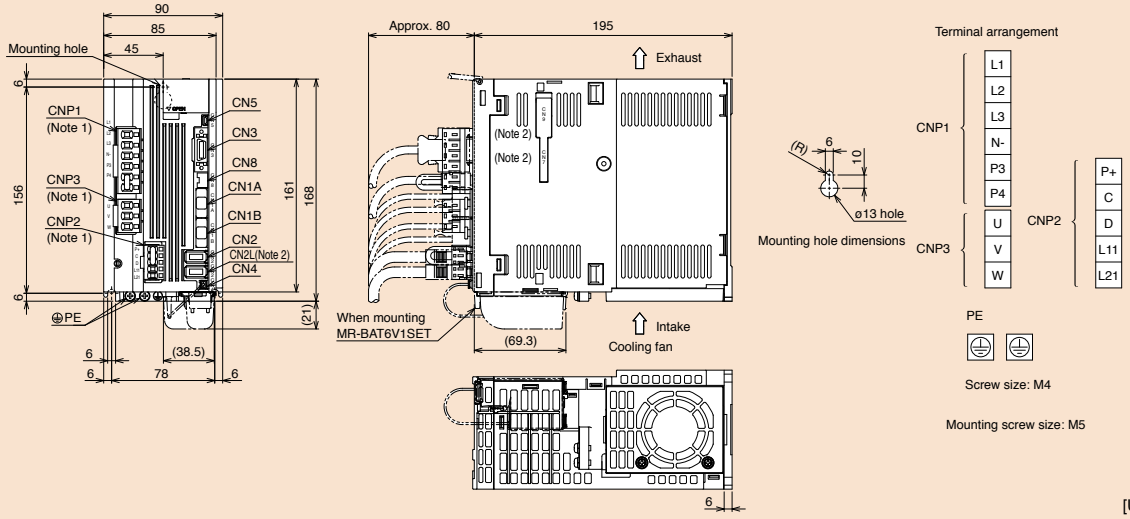
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-B servo amplifier.

MR-J4-B/MR-J4-B-RJ Dimensions

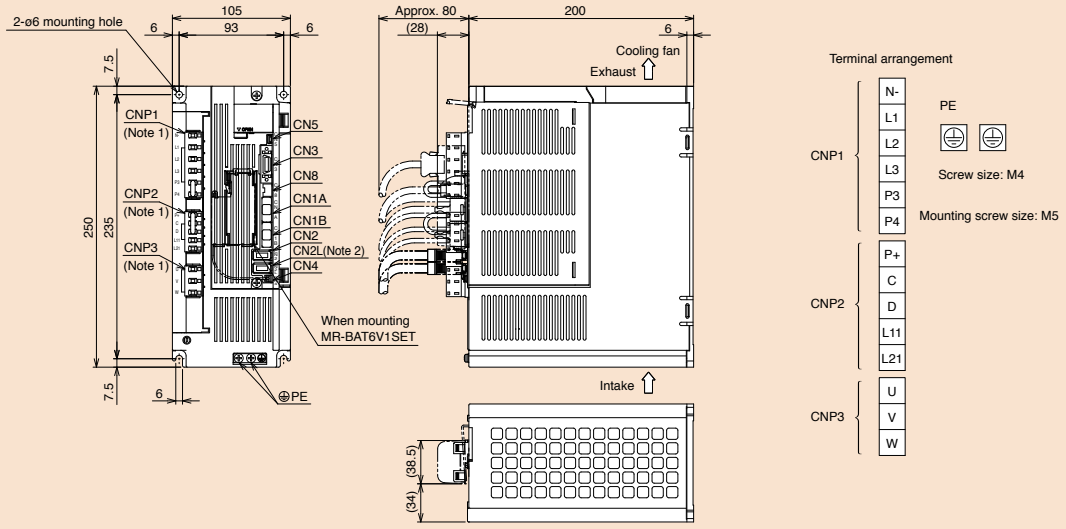
B B-RJ

●MR-J4-350B, MR-J4-350B-RJ



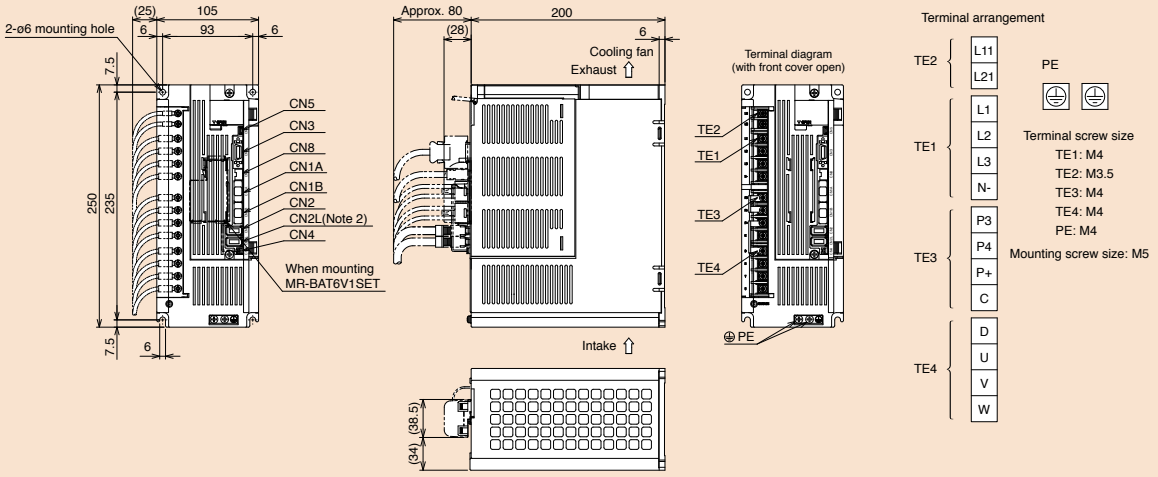
[Unit: mm]

●MR-J4-350B4, MR-J4-350B4-RJ



[Unit: mm]

●MR-J4-500B, MR-J4-500B-RJ



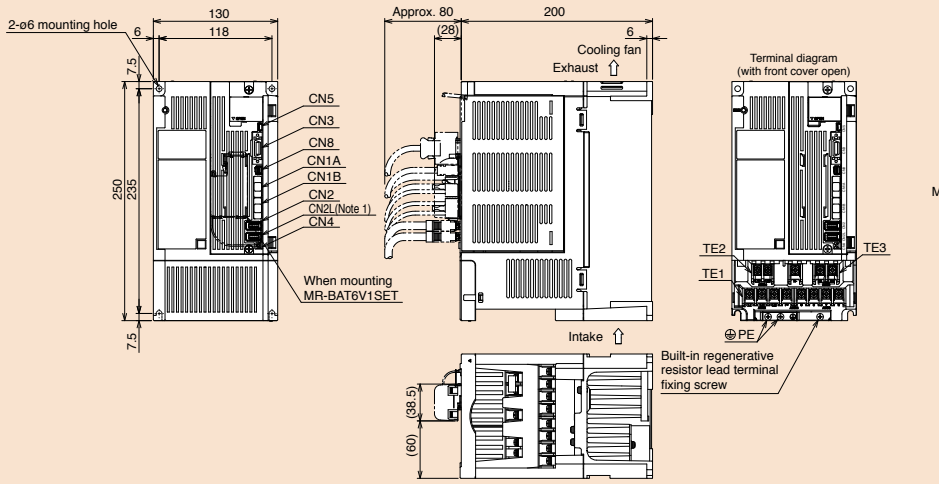
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-B servo amplifier.

MR-J4-B/MR-J4-B-RJ Dimensions

B B-RJ

●MR-J4-500B4, MR-J4-500B4-RJ



Terminal screw size
TE1: M4
TE2: M3.5
TE3: M4
PE: M4
Mounting screw size: M5

Terminal arrangement

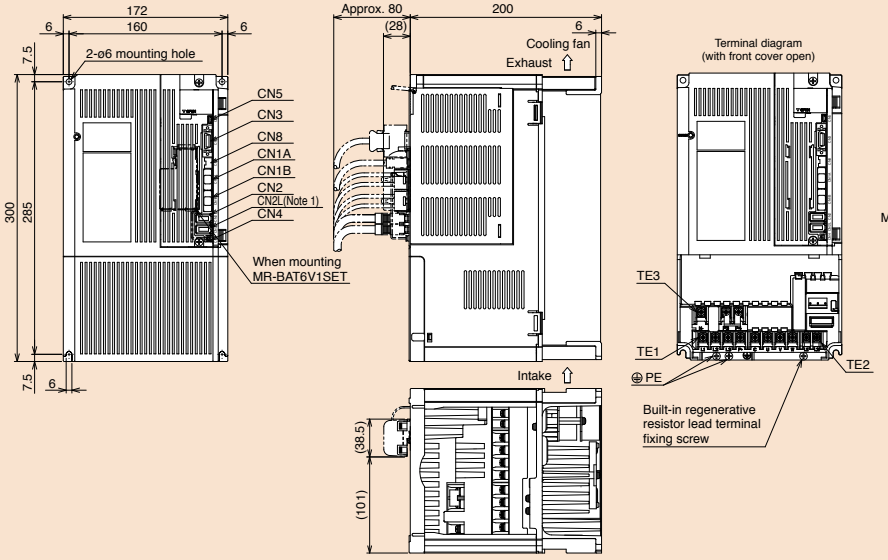
TE2		TE3		
L11	L21	N-	P3	P4

TE1								
L1	L2	L3	P+	C	U	V	W

PE

[Unit: mm]

●MR-J4-700B, MR-J4-700B-RJ, MR-J4-700B4, MR-J4-700B4-RJ



Terminal screw size
TE1: M4
TE2: M3.5
TE3: M4
PE: M4
Mounting screw size: M5

Terminal arrangement

TE3		
N-	P3	P4

TE1								TE2	
L1	L2	L3	P+	C	U	V	W	L11	L21

PE

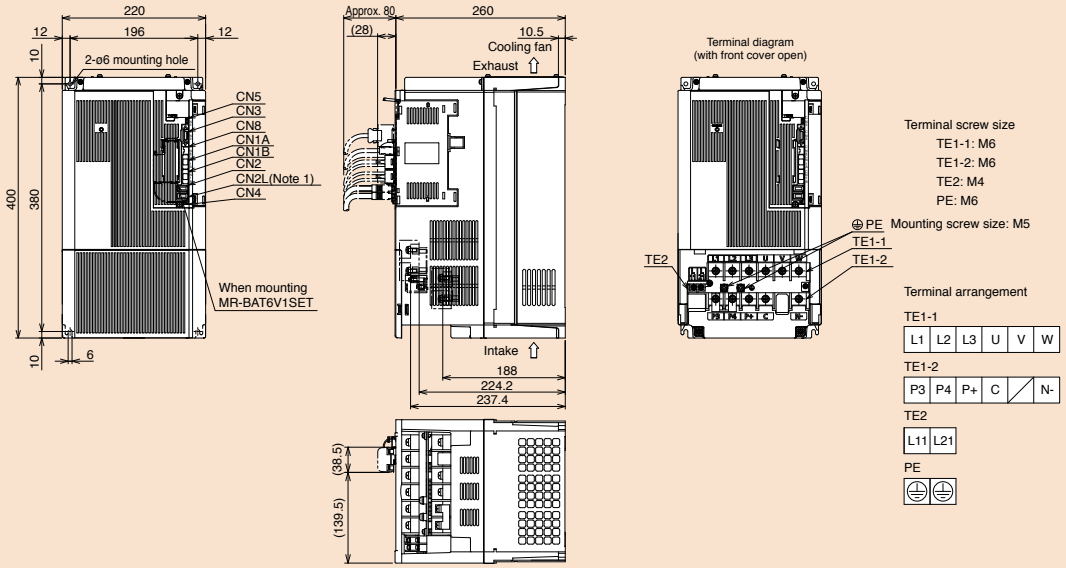
[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-B servo amplifier.

MR-J4-B/MR-J4-B-RJ Dimensions

B B-RJ

●MR-J4-11KB, MR-J4-11KB-RJ, MR-J4-11KB4, MR-J4-11KB4-RJ
●MR-J4-15KB, MR-J4-15KB-RJ, MR-J4-15KB4, MR-J4-15KB4-RJ



Terminal screw size
TE1-1: M6
TE1-2: M6
TE2: M4
PE: M6
Mounting screw size: M5

Terminal arrangement

TE1-1

L1	L2	L3	U	V	W

TE1-2

P3	P4	P+	C		N-

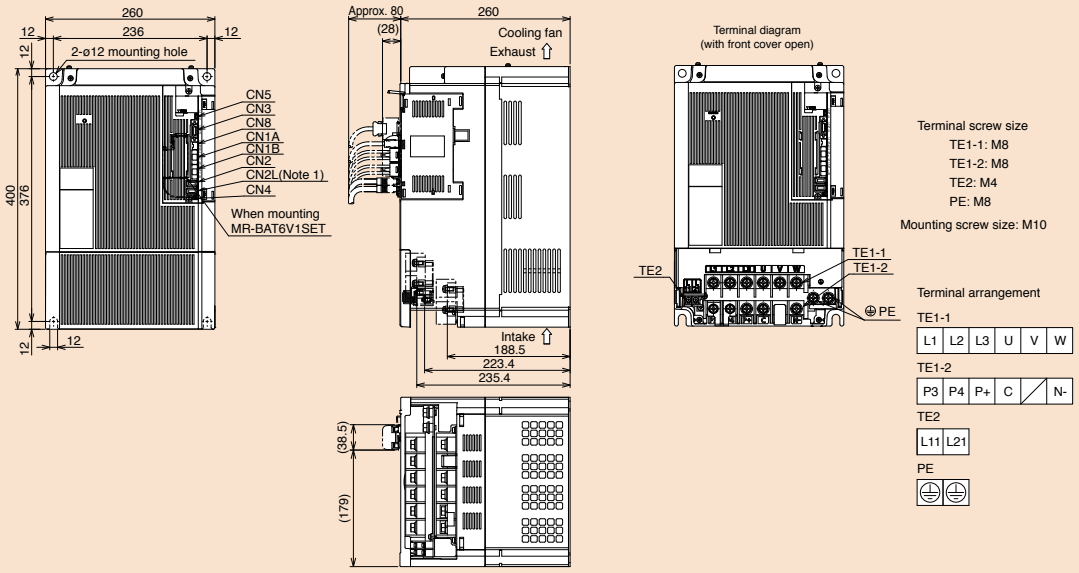
TE2

L11	L21

PE

[Unit: mm]

●MR-J4-22KB, MR-J4-22KB-RJ, MR-J4-22KB4, MR-J4-22KB4-RJ



Terminal screw size
TE1-1: M8
TE1-2: M8
TE2: M4
PE: M8
Mounting screw size: M10

Terminal arrangement

TE1-1

L1	L2	L3	U	V	W

TE1-2

P3	P4	P+	C		N-

TE2

L11	L21

PE

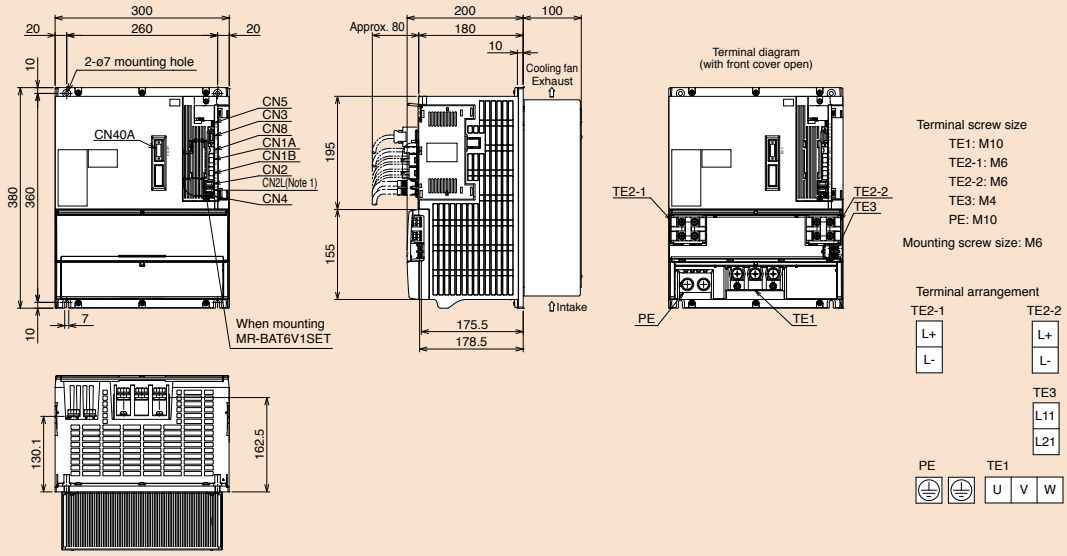
[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-B servo amplifier.

MR-J4-DU_B/MR-J4-DU_B-RJ Dimensions

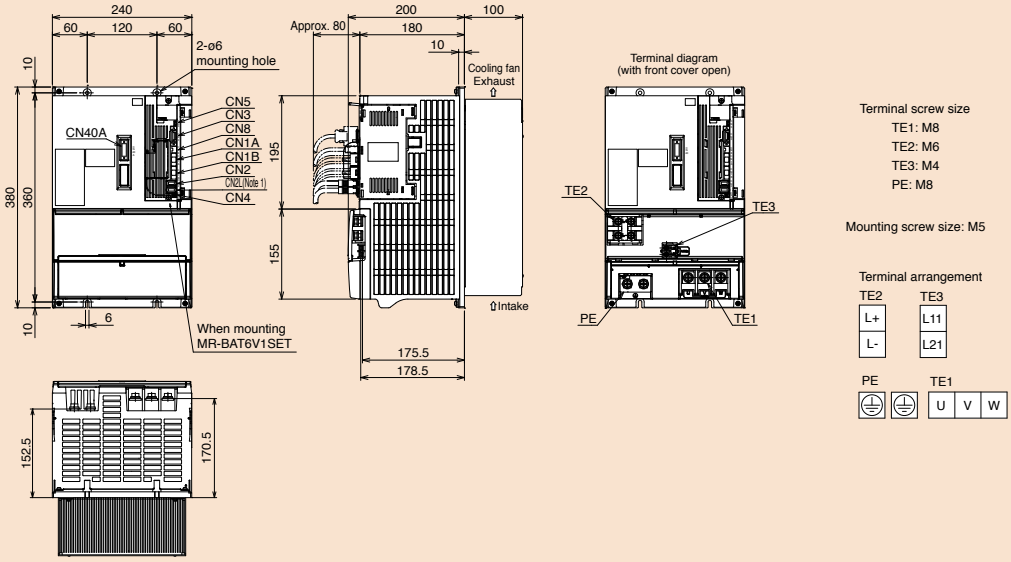
B B-RJ

- MR-J4-DU30KB, MR-J4-DU30KB-RJ
- MR-J4-DU37KB, MR-J4-DU37KB-RJ
- MR-J4-DU45KB4, MR-J4-DU45KB4-RJ
- MR-J4-DU55KB4, MR-J4-DU55KB4-RJ



[Unit: mm]

- MR-J4-DU30KB4, MR-J4-DU30KB4-RJ
- MR-J4-DU37KB4, MR-J4-DU37KB4-RJ



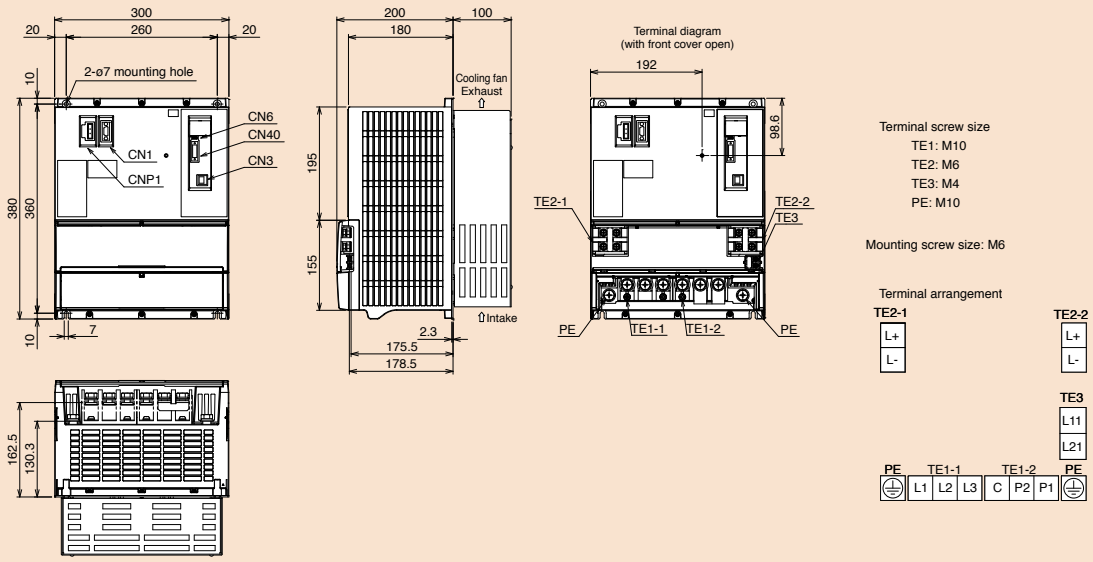
[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-DU_B_ drive unit. MR-J4-DU-B_-RJ is equipped with CN7 and CN9 connectors; however, these connectors are not for use.

MR-CR Dimensions

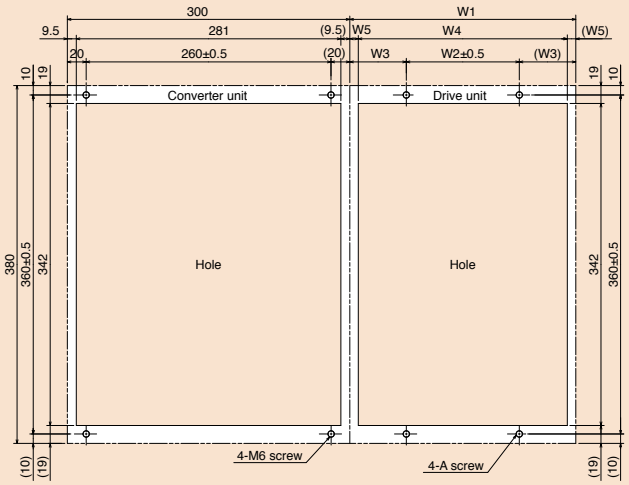
B B-RJ A A-RJ

●MR-CR55K, MR-CR55K4



[Unit: mm]

Panel Cut Dimensions for Converter Unit and Drive Unit (Note 1)



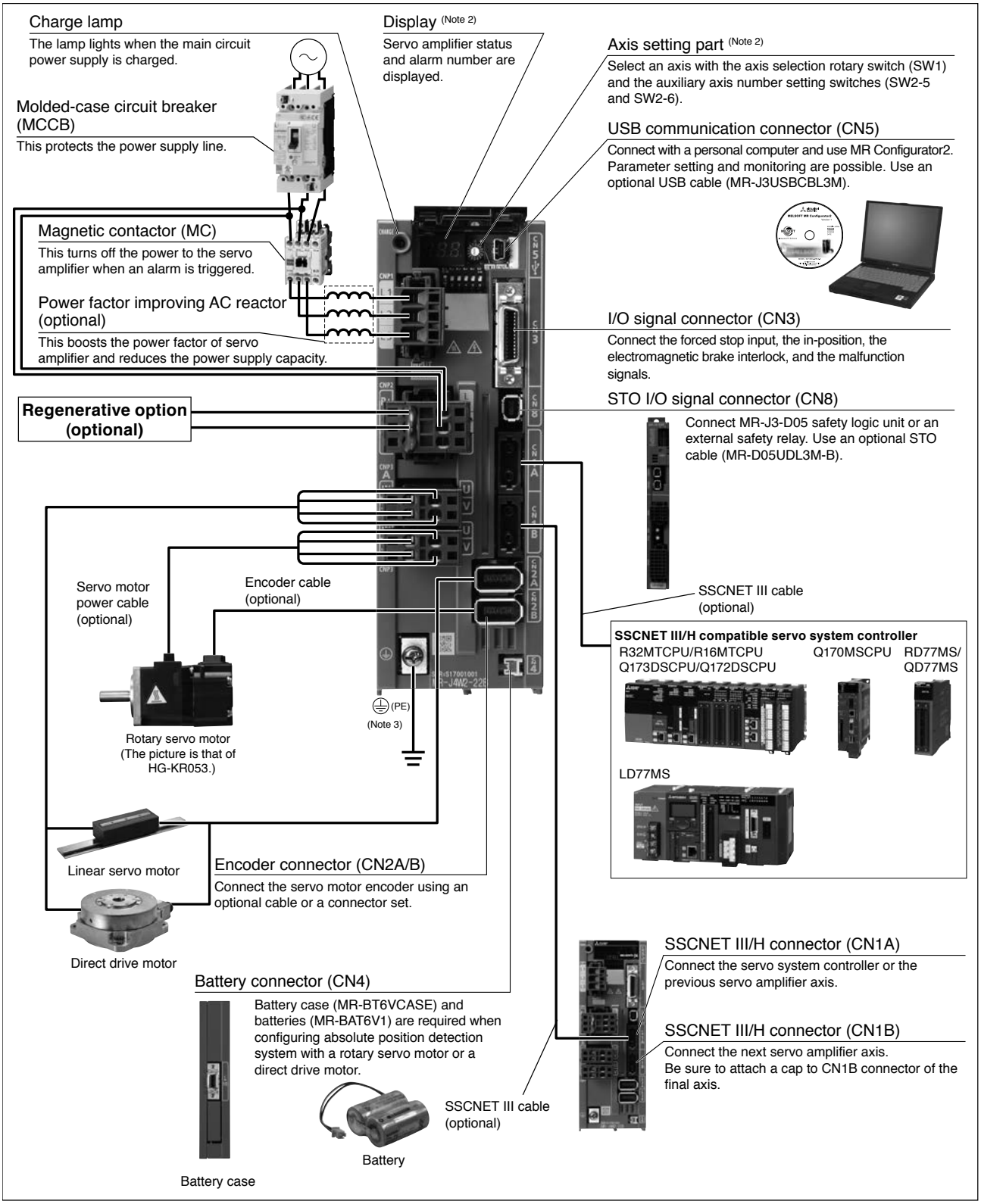
Drive unit model	Variable dimensions					
	W1	W2	W3	W4	W5	A
MR-J4-DU30KB/A, 37KB/A, 45KB4/A4, 55KB4/A4	300	260	20	281	9.5	M6
MR-J4-DU30KB4/A4, 37KB4/A4	240	120	60	222	9	M5

[Unit: mm]

Notes:1. The panel cut dimensions for converter unit and drive unit are applicable for MR-J4-DU_B_/MR-J4-DU_B_-RJ/MR-J4-DU_A_/MR-J4-DU_A_-RJ.

MR-J4W2-B/MR-J4W3-B Connections with Peripheral Equipment (Note 1) WB

Peripheral equipment is connected to MR-J4W2-B/MR-J4W3-B as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



Notes: 1. The connection with the peripheral equipment is an example for MR-J4W2-22B. CNP3C and CN2C connectors are available for MR-J4W3-B servo amplifier. Refer to "MR-J4W2-_B MR-J4W3-_B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for the actual connections of the multi-axis servo amplifier.
2. This picture shows when the display cover is open.
3. Connect the grounding terminal of the servo motor to ⏚ of CNP3A, CNP3B, and CNP3C. Connect the protective earth (PE) terminal (⏚) located on the lower front of the servo amplifier to the cabinet protective earth (PE).

MR-J4W2-B (2-axis, SSCNET III/H Interface) Specifications WB

Servo amplifier model MR-J4W2-			22B	44B	77B	1010B
Output	Rated voltage		3-phase 170 V AC			
	Rated current (each axis)	[A]	1.5	2.8	5.8	6.0
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz			3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz
	Rated current (Note 15)	[A]	2.9	5.2	7.5	9.8
	Permissible voltage fluctuation		3-phase or 1-phase 170 V AC to 264 V AC			3-phase 170 V AC to 264 V AC
	Permissible frequency fluctuation		±5% maximum			
Control circuit power supply input	Voltage/frequency		1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz			
	Rated current	[A]	0.4			
	Permissible voltage fluctuation		1-phase 170 V AC to 264 V AC			
	Permissible frequency fluctuation		±5% maximum			
	Power consumption	[W]	55			
Interface power supply			24 V DC ± 10% (required current capacity: 0.35 A (including CN8 connector signals))			
Control method			Sine-wave PWM control/current control method			
Capacitor regeneration	Reusable regenerative energy (Note 5)	[J]	17	21	44	
	Moment of inertia (J) equivalent to permissible charging amount (Note 6)	[× 10^{-4} kg•m^2]	3.45	4.26	8.92	
	Mass equivalent to permissible charging amount (Note 7)	LM-H3 [kg]	3.8	4.7	9.8	
		LM-K2 LM-U2 [kg]	8.5	10.5	22.0	
Permissible regenerative power of the built-in regenerative resistor (Note 2, 3)		[W]	20		100	
Dynamic brake			Built-in (Note 4)			
SSCNET III/H command communication cycle (Note 13)			0.222 ms, 0.444 ms, 0.888 ms			
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)			
Encoder output pulse			Compatible (A/B-phase pulse)			
Analog monitor			None			
Fully closed loop control (Note 12)			Available (Note 11)			
Load-side encoder interface (Note 9)			Mitsubishi high-speed serial communication			
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, scale measurement function (Note 14), J3 compatibility mode			
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, magnetic pole detection protection, linear servo control fault protection			

MR-J4W2-B (2-axis, SSCNET III/H Interface) Specifications

WB

Servo amplifier model MR-J4W2-		22B	44B	77B	1010B
Functional safety		STO (IEC/EN 61800-5-2) (Note 10)			
Safety performance	Standards certified by CB (Note 17)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2			
	Response performance	8 ms or less (STO input OFF → energy shut-off)			
	Test pulse input (STO) (Note 8)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum			
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)			
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]			
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]			
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.			
Structure (IP rating)		Natural cooling, open (IP20)	Force cooling, open (IP20)		
Close mounting		Possible			
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)			
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)			
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
	Altitude	2000 m or less above sea level (Note 16)			
	Vibration resistance	5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)			
Mass [kg]		1.5	1.5	2.0	2.0

Notes:
1. Rated output and speed of a rotary servo motor and a direct drive motor; and continuous thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4W2-_B MR-J4W3-_B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Reusable regenerative energy is equivalent to the energy generated under the following conditions.
   For rotary servo motor: the energy that is generated when the machine, whose moment of inertia is equivalent to the permissible charging amount, decelerates from the rated speed to a stop.
   For linear servo motor: the energy that is generated when the machine, whose mass is equivalent to the permissible charging amount, decelerates from the maximum speed to a stop.
   For direct drive motor: the energy that is generated when the machine, whose moment of inertia is equivalent to the permissible charging amount, decelerates from the rated speed to a stop.
6. This value is the moment of inertia when the rotary servo motor decelerates from the rated speed to a stop. When two axes are simultaneously decelerated, the permissible charging amount is equivalent to the total moments of inertia of the two axes. Otherwise, the permissible charging amount is equivalent to the moment of inertia of each axis. The value also applies to the direct drive motor.
7. This value is the mass when the linear servo motor decelerates from maximum speed to a stop. Mass of primary side (coil) is included. When two axes are simultaneously decelerated, the permissible charging amount is equivalent to the total masses of the two axes. Otherwise, the permissible charging amount is equivalent to the mass of each axis.
8. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
9. Not compatible with pulse train interface (A/B/Z-phase differential output type).
10. STO is common for all axes.
11. The load-side encoder and the servo motor encoder are compatible only with two-wire type communication method.
12. Fully closed loop control is available with the servo amplifiers with software version A3 or later.
13. The command communication cycle depends on the controller specifications and the number of axes connected.
14. This function is available with the servo amplifiers with software version A8 or later.
15. This value is applicable when a 3-phase power supply is used.
16. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
17. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4W3-B (3-axis, SSCNET III/H Interface) Specifications WB

Servo amplifier model MR-J4W3-			222B	444B
Output	Rated voltage		3-phase 170 V AC	
	Rated current (each axis)	[A]	1.5	2.8
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	
	Rated current (Note 12)	[A]	4.3	7.8
	Permissible voltage fluctuation		3-phase or 1-phase 170 V AC to 264 V AC	
	Permissible frequency fluctuation		±5% maximum	
Control circuit power supply input	Voltage/frequency		1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	
	Rated current	[A]	0.4	
	Permissible voltage fluctuation		1-phase 170 V AC to 264 V AC	
	Permissible frequency fluctuation		±5% maximum	
	Power consumption	[W]	55	
Interface power supply			24 V DC ± 10% (required current capacity: 0.45 A (including CN8 connector signals))	
Control method			Sine-wave PWM control/current control method	
Capacitor regeneration	Reusable regenerative energy (Note 5)	[J]	21	30
	Moment of inertia (J) equivalent to permissible charging amount (Note 6)	[× 10^{-4} kg•m^2]	4.26	6.08
	Mass equivalent to permissible charging amount (Note 7)	LM-H3 [kg]	4.7	6.7
		LM-K2 LM-U2 [kg]	10.5	15.0
Permissible regenerative power of the built-in regenerative resistor (Note 2, 3)		[W]	30	
Dynamic brake			Built-in (Note 4)	
SSCNET III/H command communication cycle (Note 10)			0.222 ms (Note 11), 0.444 ms, 0.888 ms	
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)	
Encoder output pulse			Not compatible	
Analog monitor			None	
Fully closed loop control			Not available	
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, J3 compatibility mode	
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, magnetic pole detection protection, linear servo control fault protection	

MR-J4W3-B (3-axis, SSCNET III/H Interface) Specifications WB

Servo amplifier model MR-J4W3-		222B	444B
Functional safety		STO (IEC/EN 61800-5-2) (Note 9)	
Safety performance	Standards certified by CB (Note 14)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2	
	Response performance	8 ms or less (STO input OFF → energy shut-off)	
	Test pulse input (STO) (Note 8)	Test pulse interval: 1 Hz to 25 Hz Test pulse off time: 1 ms maximum	
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)	
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]	
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]	
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.	
Structure (IP rating)		Force cooling, open (IP20)	
Close mounting		Possible	
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)	
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)	
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude	2000 m or less above sea level (Note 13)	
	Vibration resistance	5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)	
Mass [kg]		1.9	1.9

Notes:1. Rated output and speed of a rotary servo motor and a direct drive motor; and continuous thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4W2-_B MR-J4W3-_B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Reusable regenerative energy is equivalent to the energy generated under the following conditions.
For rotary servo motor: the energy that is generated when the machine, whose moment of inertia is equivalent to the permissible charging amount, decelerates from the rated speed to a stop.
For linear servo motor: the energy that is generated when the machine, whose mass is equivalent to the permissible charging amount, decelerates from the maximum speed to a stop.
For direct drive motor: the energy that is generated when the machine, whose moment of inertia is equivalent to the permissible charging amount, decelerates from the rated speed to a stop.
6. This value is the moment of inertia when the rotary servo motor decelerates from the rated speed to a stop. When three axes are simultaneously decelerated, the permissible charging amount is equivalent to the total moments of inertia of the three axes. Otherwise, the permissible charging amount is equivalent to the moment of inertia of each axis. The value also applies to the direct drive motor.
7. This value is the mass when the linear servo motor decelerates from maximum speed to a stop. Mass of primary side (coil) is included. When three axes are simultaneously decelerated, the permissible charging amount is equivalent to the total masses of the three axes. Otherwise, the permissible charging amount is equivalent to the mass of each axis.
8. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
9. STO is common for all axes.
10. The command communication cycle depends on the controller specifications and the number of axes connected.
11. Servo amplifier with software version A3 or later is compatible with the command communication cycle of 0.222 ms. However, note that the following functions are not available when 0.222 ms is used: auto tuning (real time, one-touch, and vibration suppression control), adaptive filter II, vibration tough drive, and power monitoring.
12. This value is applicable when a 3-phase power supply is used.
13. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
14. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4W2-0303B6 (2-axis, SSCNET III/H Interface) Specifications

WB

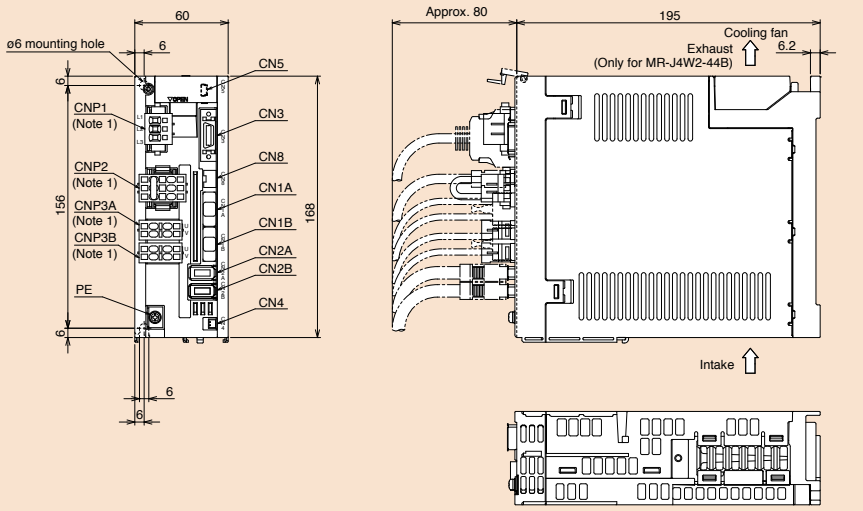
Servo amplifier model		MR-J4W2-0303B6
Output	Rated voltage	3-phase 13 V AC
	Rated current (each axis) [A]	2.4
Main circuit power supply input	Voltage (Note 1)	48 V DC/24 V DC (Note 4)
	Rated current [A]	For 48 V DC: 2.4 A For 24 V DC: 4.8 A
	Permissible voltage fluctuation	For 48 V DC: 40.8 V DC to 55.2 V DC For 24 V DC: 21.6 V DC to 26.4 V DC
Control circuit power supply input	Voltage	24 V DC
	Rated current [A]	0.5
	Permissible voltage fluctuation	21.6 V DC to 26.4 V DC
	Power consumption [W]	10
Interface power supply		24 V DC ± 10% (required current capacity: 0.25 A)
Control method		Sine-wave PWM control/current control method
Capacitor regeneration	Reusable regenerative energy (Note 2) [J]	0.9
	Moment of inertia (J) equivalent to permissible charging amount (Note 3) [× 10^{-4} kg•m^2]	0.18
Permissible regenerative power of the built-in regenerative resistor [W]		1.3
Dynamic brake		Built-in (Note 5, 6)
SSCNET III/H command communication cycle (Note 8)		0.222 ms, 0.444 ms, 0.888 ms
Communication function		USB: Connect a personal computer (MR Configurator2 compatible)
Encoder output pulse		Compatible (A/B-phase pulse)
Analog monitor		2 channels
Fully closed loop control		Not compatible
Servo functions		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, vibration tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, J3 compatibility mode
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.
Structure (IP rating)		Natural cooling, open (IP20)
Close mounting		Possible (Note 7)
DIN rail mounting (35 mm wide)		Possible
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust
	Altitude	1000 m or less above sea level
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)
Mass [kg]		0.3

Notes: 1. Rated output and speed of a servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage.
2. Reusable regenerative energy is equivalent to the energy that is generated when the machine, whose moment of inertia is equivalent to the permissible charging amount, decelerates from the rated speed to a stop.
3. This value is the moment of inertia when the rotary servo motor decelerates from the rated speed to a stop. When two axes are simultaneously decelerated, the permissible charging amount is equivalent to the total moments of inertia of the two axes. Otherwise, the permissible charging amount is equivalent to the moment of inertia of each axis.
4. Initial value is 48 V DC. For 24 V DC, set [Pr. PC05] to "_ 1 _ _." Servo motor characteristics vary depending whether the voltage is 48 V DC or 24 V DC. Refer to "HG-AK Series (Ultra-compact Size, Ultra-small Capacity) Specifications" and "HG-AK Series Torque Characteristics" in this catalog.
5. The dynamic brake is electronic. The electronic dynamic brake does not operate when the control circuit power is off. It may not operate depending on alarms and warnings. Refer to "MR-J4W2-_B MR-J4W3-_B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for details.
6. When using the built-in dynamic brake, refer to "MR-J4W2-_B MR-J4W3-_B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio.
7. When the servo amplifiers are closely mounted, keep the ambient temperature at 45 °C or lower, or keep the total load of the two axes at 45 W or lower.
8. The command communication cycle depends on the controller specifications and the number of axes connected.

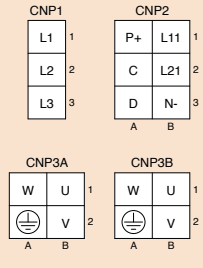
MR-J4W2-B Dimensions

WB

- MR-J4W2-22B
- MR-J4W2-44B



Terminal arrangement



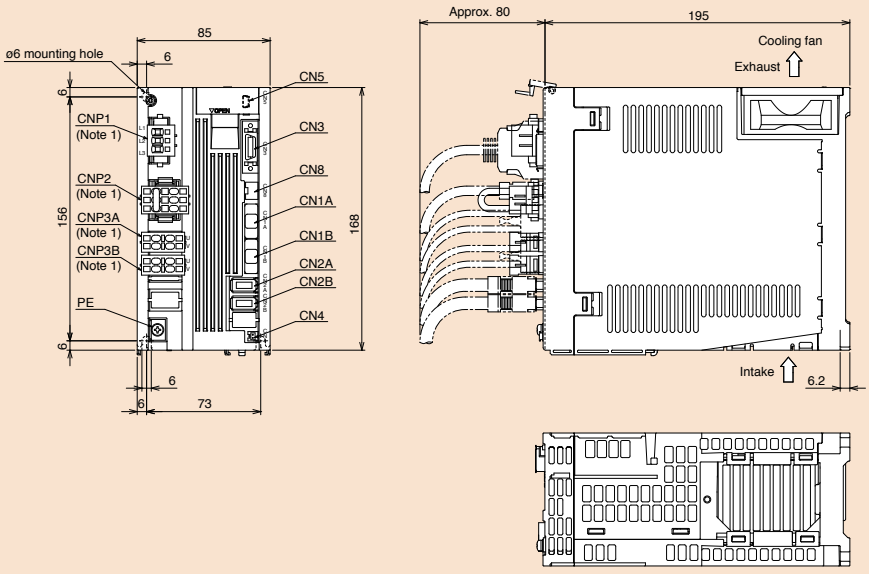


Screw size: M4

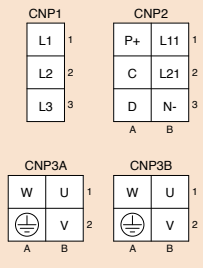
Mounting screw size: M5

[Unit: mm]

- MR-J4W2-77B
- MR-J4W2-1010B



Terminal arrangement





Screw size: M4

Mounting screw size: M5

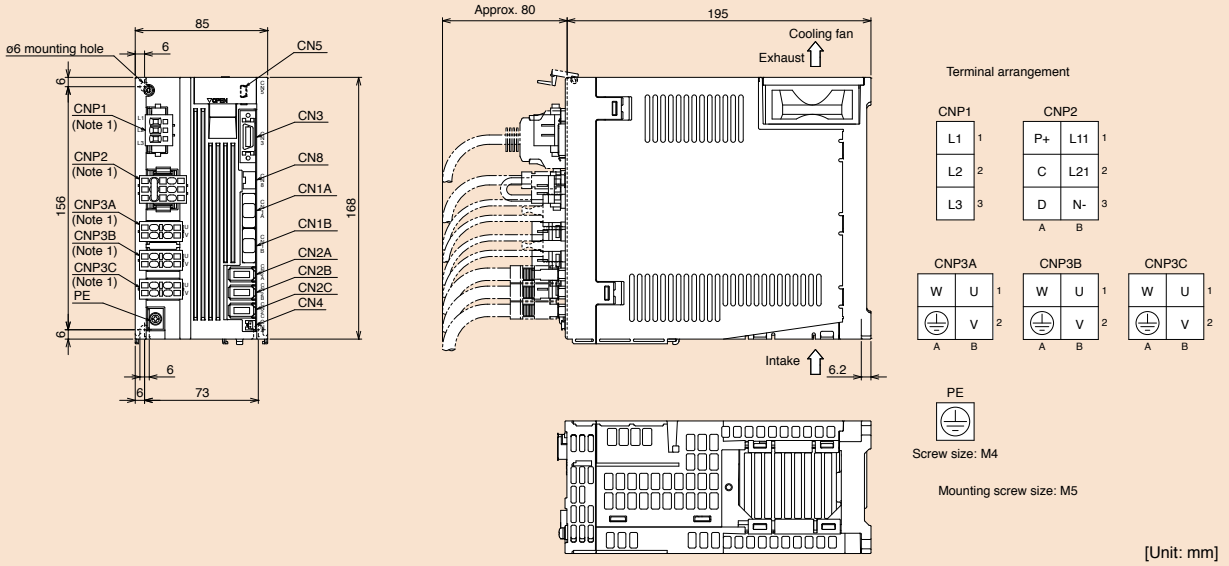
[Unit: mm]

Notes: 1. CNP1, CNP2, CNP3A and CNP3B connectors (insertion type) are supplied with the servo amplifier.

MR-J4W3-B Dimensions

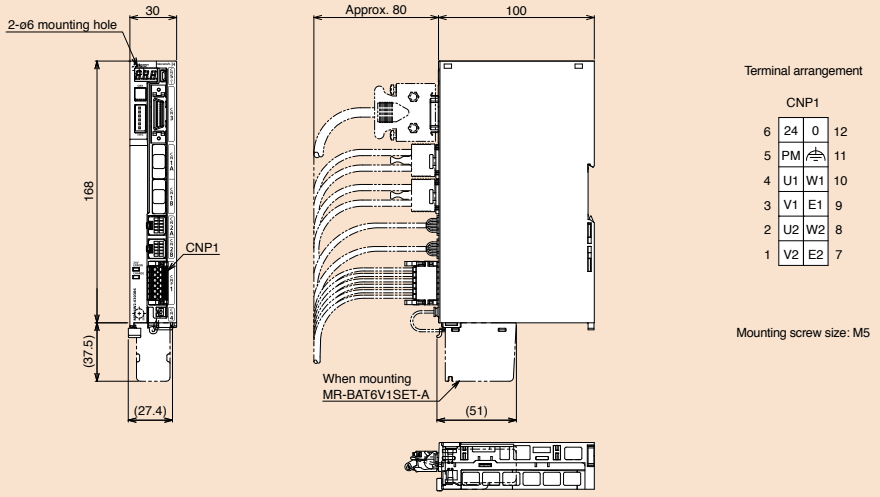
WB

- MR-J4W3-222B
- MR-J4W3-444B



[Unit: mm]

MR-J4W2-0303B6 Dimensions



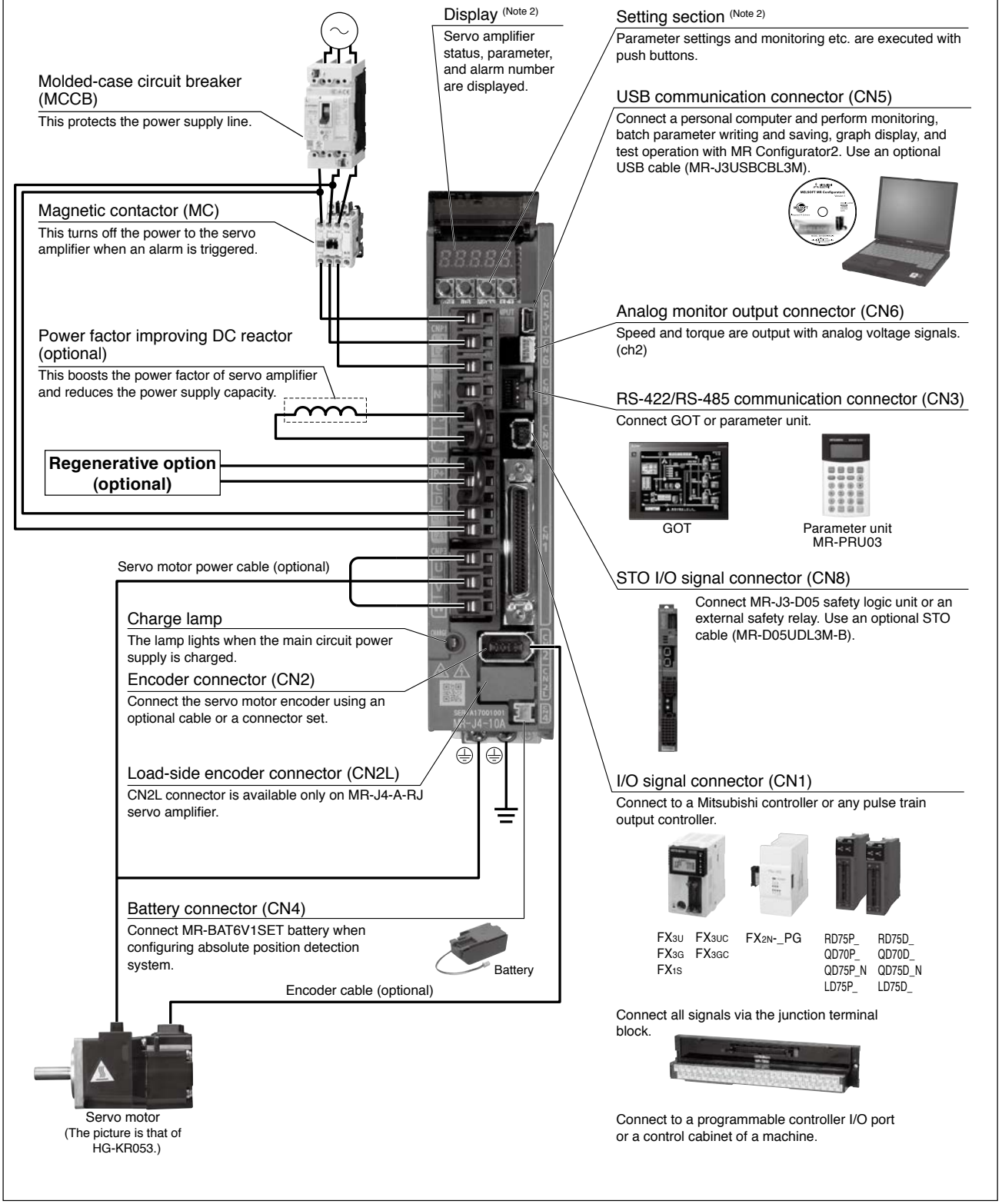
[Unit: mm]

Notes: 1. CNP1, CNP2, CNP3A, CNP3B and CNP3C connectors (insertion type) are supplied with the servo amplifier.

MR-J4-A/MR-J4-A-RJ Connections with Peripheral Equipment (Note 1)

A A-RJ

Peripheral equipment is connected to MR-J4-A/MR-J4-A-RJ as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



Notes: 1. The connection with the peripheral equipment is an example for MR-J4-350A/MR-J4-350A-RJ or smaller servo amplifiers. Refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) Servo Amplifier Instruction Manual" for the actual connections.
2. This picture shows when the display cover is open.

MR-J4-A(1)/MR-J4-A(1)-RJ (General-purpose Interface) Specifications (200 V/100 V) A A-RJ

Servo amplifier model MR-J4-_(-RJ)			10A	20A	40A	60A	70A	100A	200A	350A	500A	700A	11KA	15KA	22KA	10A1	20A1	40A1
Output	Rated voltage		3-phase 170 V AC															
	Rated current	[A]	1.1	1.5	2.8	3.2	5.8	6.0	11.0	17.0	28.0	37.0	68.0	87.0	126.0	1.1	1.5	2.8
Main circuit power supply input	Voltage/ frequency (Note 1)	AC input	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz					3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 16)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz						1-phase 100 V AC to 120 V AC, 50 Hz/60 Hz		
		DC input (Note 19)	283 V DC to 340 V DC															
	Rated current (Note 14)	[A]	0.9	1.5	2.6	3.2 (Note 8)	3.8	5.0	10.5	16.0	21.7	28.9	46.0	64.0	95.0	3.0	5.0	9.0
	Permissible voltage fluctuation	AC input	3-phase or 1-phase 170 V AC to 264 V AC					3-phase or 1-phase 170 V AC to 264 V AC (Note 16)		3-phase 170 V AC to 264 V AC						1-phase 85 V AC to 132 V AC		
		DC input (Note 19)	241 V DC to 374 V DC															
	Permissible frequency fluctuation		±5% maximum															
Control circuit power supply input	Voltage/ frequency	AC input	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz													1-phase 100 V AC to 120 V AC, 50 Hz/60 Hz		
		DC input (Note 19)	283 V DC to 340 V DC															
	Rated current	[A]	0.2								0.3					0.4		
	Permissible voltage fluctuation	AC input	1-phase 170 V AC to 264 V AC													1-phase 85 V AC to 132 V AC		
		DC input (Note 19)	241 V DC to 374 V DC															
	Permissible frequency fluctuation		±5% maximum															
	Power consumption	[W]	30								45					30		
Interface power supply			24 V DC ± 10% (required current capacity: 0.5 A (including CN8 connector signals))															
Control method			Sine-wave PWM control/current control method															
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3)	[W]	-	10	10	10	20	20	100	100	130	170	-	-	-	-	10	10
	External regenerative resistor (standard accessory) (Note 2, 3, 11, 12)	[W]	-	-	-	-	-	-	-	-	-	-	500 (800)	850 (1300)	850 (1300)	-	-	-
Dynamic brake			Built-in (Note 4)										External option (Note 13)			Built-in (Note 4)		
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)															
			RS-422/RS-485: 1 : n communication (up to 32 axes) (Note 10)															
Encoder output pulse			Compatible (A/B/Z-phase pulse)															
Analog monitor			2 channels															
Position control mode	Maximum input pulse frequency		4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open collector)															
	Positioning feedback pulse		Encoder resolution: 22 bits															
	Command pulse multiplying factor		Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000															
	Positioning complete width setting		0 pulse to ±65535 pulses (command pulse unit)															
	Error excessive		±3 rotations															
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)															
Speed control mode	Speed control range		Analog speed command 1:2000, internal speed command 1:5000															
	Analog speed command input		0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)															
	Speed fluctuation rate		±0.01% maximum (load fluctuation: 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command															
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)															
Torque control mode	Analog torque command input		0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)															
	Speed limit		Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)															
Positioning mode (Note 17)		MR-J4-A(1)	Not available															
		MR-J4-A(1)-RJ	Point table method, program method, indexer (turret) method															
Fully closed loop control		MR-J4-A(1) (Note 9)	Two-wire type communication method															
		MR-J4-A(1)-RJ	Two-wire/four-wire type communication method															
Load-side encoder interface		MR-J4-A(1)	Mitsubishi high-speed serial communication															
		MR-J4-A(1)-RJ	Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal															
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, super trace control (Note 15), lost motion compensation (Note 15)															
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, magnetic pole detection protection, linear servo control fault protection															

MR-J4-A(1)/MR-J4-A(1)-RJ (General-purpose Interface) Specifications (200 V/100 V)

A A-RJ

Servo amplifier model MR-J4-_(-RJ)		10A	20A	40A	60A	70A	100A	200A	350A	500A	700A	11KA	15KA	22KA	10A1	20A1	40A1
Functional safety		STO (IEC/EN 61800-5-2)															
Safety performance	Standards certified by CB (Note 20)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2															
	Response performance	8 ms or less (STO input OFF → energy shut-off)															
	Test pulse input (STO) (Note 7)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum															
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)															
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]															
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]															
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.															
Structure (IP rating)		Natural cooling, open (IP20)				Force cooling, open (IP20)				Force cooling, open (IP20) (Note 5)					Natural cooling, open (IP20)		
Close mounting	3-phase power input	Possible (Note 6)								Not possible					-		
	1-phase power input	Possible (Note 6)				Not possible			-						Possible (Note 6)		
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)															
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)															
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust															
	Altitude	2000 m or less above sea level (Note 18)															
	Vibration resistance	5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)															
Mass	[kg]	0.8	0.8	1.0	1.0	1.4	1.4	2.1	2.3	4.0	6.2	13.4	13.4	18.2	0.8	0.8	1.0

Notes:
1. Rated output and speed of a rotary servo motor and a direct drive motor; and continuous thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Terminal blocks are excluded.
6. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C, or use the servo amplifier with 75% or less of the effective load ratio.
7. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
8. The rated current is 2.9 A when the servo amplifier is used with UL or CSA compliant servo motor.
9. Fully closed loop control is available with the servo amplifiers with software version A5 or later.
10. RS-422/RS-485 communication function is available with the servo amplifiers with software version A3 or later.
11. The value in brackets is applicable when cooling fans (two units of 92 mm × 92 mm, minimum air flow: 1.0 m^3/min) are installed, and then [Pr. PA02] is changed.
12. Servo amplifiers without an enclosed regenerative resistor are also available. Refer to "1-Axis Servo Amplifier Model Designation" in this catalog for details.
13. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
14. This value is applicable when a 3-phase power supply is used.
15. This function is available with the servo amplifiers with software version B4 or later.
16. Use the servo amplifier with 75% or less of the effective load ratio when servo amplifiers are used with a 1-phase 200 V AC to 240 V AC power supply.
17. The positioning mode is available with MR-J4-A-RJ servo amplifier with software version B3 or later.
18. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
19. MR-J4-_A-RJ and MR-J4-_A-EG servo amplifiers are available with DC power input. For a connection example of power circuit with DC input, refer to relevant Servo Amplifier Instruction Manual.
20. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4-DU_A/MR-J4-DU_A-RJ (General-purpose Interface) Specifications (200 V) A A-RJ

Drive unit model MR-J4-_(-RJ)			DU30KA	DU37KA
Compatible converter unit model			MR-CR55K (Note 4)	
Output	Rated voltage		3-phase 170 V AC	
	Rated current	[A]	174	204
Main circuit power supply input			Main circuit power is supplied from the converter unit to the drive unit. (Note 4)	
Control circuit power supply input	Voltage/frequency		1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	
	Rated current	[A]	0.3	
	Permissible voltage fluctuation		1-phase 170 V AC to 264 V AC	
	Permissible frequency fluctuation		±5% maximum	
	Power consumption	[W]	45	
Interface power supply			24 V DC ± 10% (required current capacity: 0.5 A (including CN8 connector signals))	
Control method			Sine-wave PWM control/current control method	
Dynamic brake			External option (Note 3)	
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)	
			RS-422/RS-485: 1 : n communication (up to 32 axes) (Note 5)	
Encoder output pulse			Compatible (A/B/Z-phase pulse)	
Analog monitor			2 channels	
Position control mode	Maximum input pulse frequency		4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open collector)	
	Positioning feedback pulse		Encoder resolution: 22 bits	
	Command pulse multiplying factor		Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000	
	Positioning complete width setting		0 pulse to ±65535 pulses (command pulse unit)	
	Error excessive		±3 rotations	
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)	
Speed control mode	Speed control range		Analog speed command 1:2000, internal speed command 1:5000	
	Analog speed command input		0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)	
	Speed fluctuation rate		±0.01% maximum (load fluctuation 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command	
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)	
Torque control mode	Analog torque command input		0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)	
	Speed limit		Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)	
Positioning mode (Note 6)		MR-J4-DU_A	Not available	
		MR-J4-DU_A-RJ	Point table method, program method, indexer (turret) method	
Fully closed loop control		MR-J4-DU_A	Two-wire type communication method	
		MR-J4-DU_A-RJ	Two-wire/four-wire type communication method	
Load-side encoder interface		MR-J4-DU_A	Mitsubishi high-speed serial communication	
		MR-J4-DU_A-RJ	Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal	
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, super trace control, lost motion compensation	
Protective functions			Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection	

MR-J4-DU_A/MR-J4-DU_A-RJ (General-purpose Interface) Specifications (200 V)

A A-RJ

Drive unit model MR-J4-_(-RJ)		DU30KA	DU37KA
Functional safety		STO (IEC/EN 61800-5-2)	
Safety performance	Standards certified by CB (Note 8)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2	
	Response performance	8 ms or less (STO input OFF → energy shut-off)	
	Test pulse input (STO) (Note 2)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum	
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)	
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]	
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]	
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.	
Structure (IP rating)		Force cooling, open (IP20) (Note 1)	
Close mounting		Not possible	
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)	
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)	
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude	2000 m or less above sea level (Note 7)	
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)	
Mass [kg]		21	

Notes: 1. Terminal blocks are excluded.
2. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the drive unit instantaneously at regular intervals.
3. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
4. One unit of converter unit is required for each drive unit. Refer to "MR-CR Converter Unit Specifications (200 V/400 V)" on p. 302 in this catalog for the specifications of the converter unit.
5. RS-485 communication function is available with the drive units manufactured in January 2015 or later. Refer to "MR-J4-DU_(-RJ) MR-CR-55K_Servo Amplifier Instruction Manual" for checking procedure of manufacture data.
6. The positioning mode is available with MR-J4-DU_A-RJ drive unit with software version B3 or later.
7. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
8. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4-A4/MR-J4-A4-RJ (General-purpose Interface) Specifications (400 V)

A A-RJ

Servo amplifier model MR-J4-_(-RJ)			60A4	100A4	200A4	350A4	500A4	700A4	11KA4	15KA4	22KA4
Output	Rated voltage		3-phase 323 V AC								
	Rated current	[A]	1.5	2.8	5.4	8.6	14.0	17.0	32.0	41.0	63.0
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz								
	Rated current	[A]	1.4	2.5	5.1	7.9	10.8	14.4	23.1	31.8	47.6
	Permissible voltage fluctuation		3-phase 323 V AC to 528 V AC								
	Permissible frequency fluctuation		±5% maximum								
Control circuit power supply input	Voltage/frequency		1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz								
	Rated current	[A]	0.1			0.2					
	Permissible voltage fluctuation		1-phase 323 V AC to 528 V AC								
	Permissible frequency fluctuation		±5% maximum								
	Power consumption	[W]	30			45					
Interface power supply			24 V DC ± 10% (required current capacity: 0.5 A (including CN8 connector signals))								
Control method			Sine-wave PWM control/current control method								
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3)	[W]	15	15	100	100	130 (Note 10)	170 (Note 10)	-	-	-
	External regenerative resistor (standard accessory) (Note 2, 3, 7, 8)	[W]	-	-	-	-	-	-	500 (800)	850 (1300)	850 (1300)
Dynamic brake			Built-in (Note 4)						External option (Note 9)		
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)								
			RS-422/RS-485: 1 : n communication (up to 32 axes) (Note 12)								
Encoder output pulse			Compatible (A/B/Z-phase pulse)								
Analog monitor			2 channels								
Position control mode	Maximum input pulse frequency		4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open collector)								
	Positioning feedback pulse		Encoder resolution: 22 bits								
	Command pulse multiplying factor		Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000								
	Positioning complete width setting		0 pulse to ±65535 pulses (command pulse unit)								
	Error excessive		±3 rotations								
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)								
Speed control mode	Speed control range		Analog speed command 1:2000, internal speed command 1:5000								
	Analog speed command input		0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)								
	Speed fluctuation rate		±0.01% maximum (load fluctuation 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command								
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)								
Torque control mode	Analog torque command input		0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)								
	Speed limit		Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)								
Positioning mode (Note 13)		MR-J4-A4	Not available								
		MR-J4-A4-RJ	Point table method, program method, indexer (turret) method								
Fully closed loop control		MR-J4-A4	Two-wire type communication method								
		MR-J4-A4-RJ	Two-wire/four-wire type communication method								
Load-side encoder interface		MR-J4-A4	Mitsubishi high-speed serial communication								
		MR-J4-A4-RJ	Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal								
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, super trace control (Note 11), lost motion compensation (Note 11)								
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, magnetic pole detection protection, linear servo control fault protection								

MR-J4-A4/MR-J4-A4-RJ (General-purpose Interface) Specifications (400 V)

A A-RJ

Servo amplifier model MR-J4-_(-RJ)		60A4	100A4	200A4	350A4	500A4	700A4	11KA4	15KA4	22KA4
Functional safety		STO (IEC/EN 61800-5-2)								
Safety performance	Standards certified by CB (Note 15)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2								
	Response performance	8 ms or less (STO input OFF → energy shut-off)								
	Test pulse input (STO) (Note 6)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum								
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)								
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]								
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]								
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Structure (IP rating)		Natural cooling, open (IP20)		Force cooling, open (IP20)		Force cooling, open (IP20) (Note 5)				
Close mounting		Not possible								
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)								
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)								
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude	2000 m or less above sea level (Note 14)								
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)								
Mass	[kg]	1.7	1.7	2.1	3.6	4.3	6.5	13.4	13.4	18.2

Notes: 1. Rated output and speed of a rotary servo motor, and continuous thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Terminal blocks are excluded.
6. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
7. The value in brackets is applicable when cooling fans (two units of 92 mm × 92 mm, minimum air flow: 1.0 m^3/min) are installed, and then [Pr. PA02] is changed.
8. Servo amplifiers without an enclosed regenerative resistor are also available. Refer to "1-Axis Servo Amplifier Model Designation" in this catalog for details.
9. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
10. The servo amplifier built-in regenerative resistor is compatible with the maximum torque deceleration when the servo motor is used within the rated speed and the recommended load to motor inertia ratio. Contact your local sales office if the operating motor speed or the load to motor inertia ratio exceeds the rated speed or the recommended ratio.
11. This function is available with the servo amplifiers with software version B4 or later.
12. RS-485 communication function is available with the servo amplifiers manufactured in November 2014 or later. Refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) Servo Amplifier Instruction Manual" for checking procedure of manufacture data.
13. The positioning mode is available with MR-J4-A4-RJ servo amplifier with software version B3 or later.
14. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
15. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4-DU_A4/MR-J4-DU_A4-RJ (General-purpose Interface) Specifications (400 V) A A-RJ

Drive unit model MR-J4-_(-RJ)			DU30KA4	DU37KA4	DU45KA4	DU55KA4
Compatible converter unit model			MR-CR55K4 (Note 4)			
Output	Rated voltage		3-phase 323 V AC			
	Rated current	[A]	87	102	131	143
Main circuit power supply input			Main circuit power is supplied from the converter unit to the drive unit. (Note 4)			
Control circuit power supply input	Voltage/frequency		1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz			
	Rated current	[A]	0.2			
	Permissible voltage fluctuation		1-phase 323 V AC to 528 V AC			
	Permissible frequency fluctuation		±5% maximum			
	Power consumption	[W]	45			
Interface power supply			24 V DC ± 10% (required current capacity: 0.5 A (including CN8 connector signals))			
Control method			Sine-wave PWM control/current control method			
Dynamic brake			External option (Note 3)			
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)			
			RS-422/RS-485: 1 : n communication (up to 32 axes) (Note 5)			
Encoder output pulse			Compatible (A/B/Z-phase pulse)			
Analog monitor			2 channels			
Position control mode	Maximum input pulse frequency		4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open collector)			
	Positioning feedback pulse		Encoder resolution: 22 bits			
	Command pulse multiplying factor		Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000			
	Positioning complete width setting		0 pulse to ±65535 pulses (command pulse unit)			
	Error excessive		±3 rotations			
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)			
Speed control mode	Speed control range		Analog speed command 1:2000, internal speed command 1:5000			
	Analog speed command input		0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)			
	Speed fluctuation rate		±0.01% maximum (load fluctuation 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command			
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)			
Torque control mode	Analog torque command input		0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)			
	Speed limit		Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)			
Positioning mode (Note 6)		MR-J4-DU_A4	Not available			
		MR-J4-DU_A4-RJ	Point table method, program method, indexer (turret) method			
Fully closed loop control		MR-J4-DU_A4	Two-wire type communication method			
		MR-J4-DU_A4-RJ	Two-wire/four-wire type communication method			
Load-side encoder interface		MR-J4-DU_A4	Mitsubishi high-speed serial communication			
		MR-J4-DU_A4-RJ	Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal			
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, super trace control, lost motion compensation			
Protective functions			Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection,			

MR-J4-DU_A4/MR-J4-DU_A4-RJ (General-purpose Interface) Specifications (400 V) A A-RJ

Drive unit model MR-J4-_(-RJ)		DU30KA4	DU37KA4	DU45KA4	DU55KA4
Functional safety		STO (IEC/EN 61800-5-2)			
Safety performance	Standards certified by CB (Note 8)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2			
	Response performance	8 ms or less (STO input OFF → energy shut-off)			
	Test pulse input (STO) (Note 2)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum			
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)			
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]			
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]			
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.			
Structure (IP rating)		Force cooling, open (IP20) (Note 1)			
Close mounting		Not possible			
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)			
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)			
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
	Altitude	2000 m or less above sea level (Note 7)			
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)			
Mass	[kg]	16		21	

Notes: 1. Terminal blocks are excluded.
2. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the drive unit instantaneously at regular intervals.
3. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
4. One unit of converter unit is required for each drive unit. Refer to "MR-CR Converter Unit Specifications (200 V/400 V)" on p. 302 in this catalog for the specifications of the converter unit.
5. RS-485 communication function is available with the drive units manufactured in January 2015 or later. Refer to "MR-J4-DU_(-RJ) MR-CR-55K_Servo Amplifier Instruction Manual" for checking procedure of manufacture data.
6. The positioning mode is available with MR-J4-DU_A4-RJ drive unit with software version B3 or later.
7. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
8. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4-03A6/MR-J4-03A6-RJ (General-purpose Interface) Specifications

A A-RJ

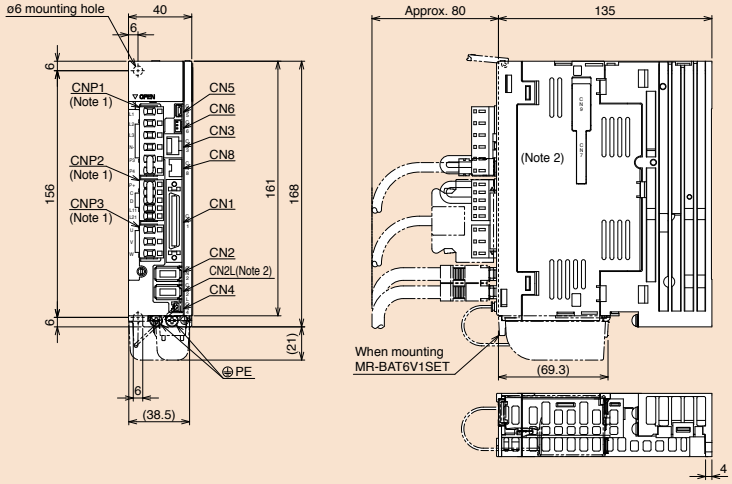
Servo amplifier model			MR-J4-03A6	MR-J4-03A6-RJ
Output	Rated voltage		3-phase 13 V AC	
	Rated current	[A]	2.4	
Main circuit power supply input	Voltage (Note 1)		48 V DC/24 V DC (Note 2)	
	Rated current	[A]	For 48 V DC: 1.2 A For 24 V DC: 2.4 A	
	Permissible voltage fluctuation		For 48 V DC: 40.8 V DC to 55.2 V DC For 24 V DC: 21.6 V DC to 26.4 V DC	
Control circuit power supply input	Voltage		24 V DC	
	Rated current	[A]	0.2	
	Permissible voltage fluctuation		21.6 V DC to 26.4 V DC	
	Power consumption	[W]	5.0	
Interface power supply			24 V DC ± 10% (required current capacity: 0.3 A)	
Control method			Sine-wave PWM control/current control method	
Permissible regenerative power of the built-in regenerative resistor		[W]	0.7	
Dynamic brake			Built-in (Note 3, 4)	
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)	
			RS-422: 1 : n communication (up to 32 axes)	
Encoder output pulse			Compatible (A/B/Z-phase pulse)	
Analog monitor			2 channels	
Position control mode	Maximum input pulse frequency		4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open collector)	
	Positioning feedback pulse		Encoder resolution: 18 bits	
	Command pulse multiplying factor		Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000	
	Positioning complete width setting		0 pulse to ±65535 pulses (command pulse unit)	
	Error excessive		±3 rotations	
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)	
Speed control mode	Speed control range		Analog speed command 1:2000, internal speed command 1:5000	
	Analog speed command input		0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)	
	Speed fluctuation rate		±0.01% maximum (load fluctuation: 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command	
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)	
Torque control mode	Analog torque command input		0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)	
	Speed limit		Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)	
Positioning mode			Not available	Point table method, program method, indexer (turret) method
Fully closed loop control			Not compatible	
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, vibration tough drive function, drive recorder function, machine diagnosis function, power monitoring function	
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection	
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.	
Structure (IP rating)			Natural cooling, open (IP20)	
Close mounting			Possible (Note 5)	
DIN rail mounting (35 mm wide)			Possible	
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)	
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)	
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude		1000 m or less above sea level	
	Vibration resistance		5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)	
Mass		[kg]	0.2	

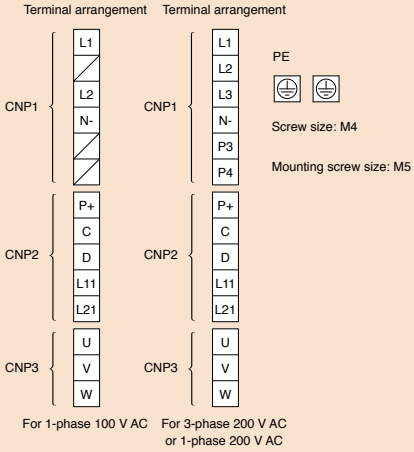
Notes: 1. Rated output and speed of a servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage.
2. Initial value is 48 V DC. For 24 V DC, set [Pr. PC27] to "_ _1 _." Servo motor characteristics vary depending on whether the voltage is 48 V DC or 24 V DC. Refer to "HG-AK Series (Ultra-compact Size, Ultra-small Capacity) Specifications" and "HG-AK Series Torque Characteristics" in this catalog.
3. The dynamic brake is electronic. The electronic dynamic brake does not operate when the control circuit power is off. It may not operate depending on alarms and warnings. Refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) Servo Amplifier Instruction Manual" for details.
4. When using the built-in dynamic brake, refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio.
5. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C.

MR-J4-A/MR-J4-A-RJ Dimensions

A A-RJ

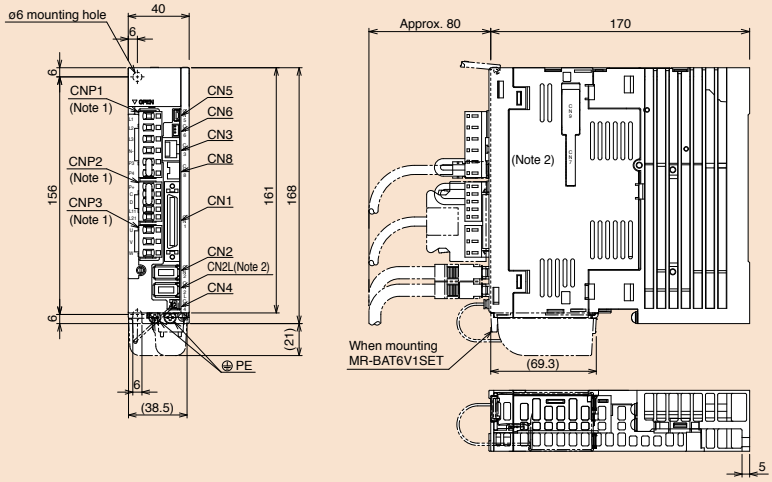
●MR-J4-10A, MR-J4-10A-RJ, MR-J4-10A1, MR-J4-10A1-RJ
●MR-J4-20A, MR-J4-20A-RJ, MR-J4-20A1, MR-J4-20A1-RJ

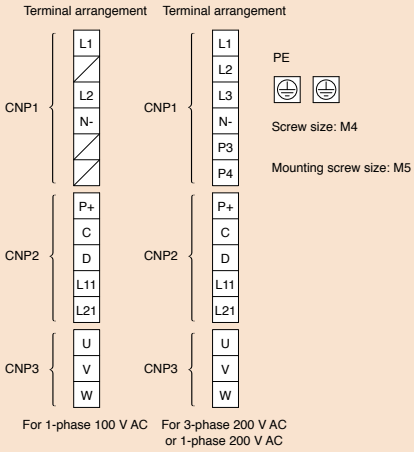




[Unit: mm]

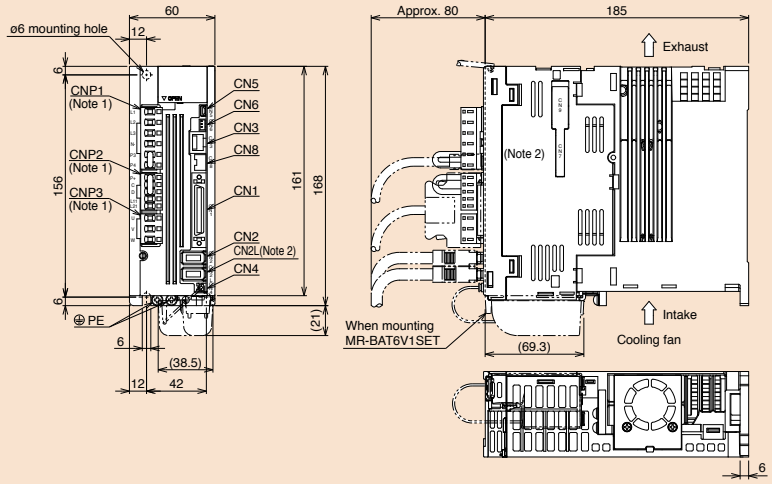
●MR-J4-40A, MR-J4-40A-RJ, MR-J4-40A1, MR-J4-40A1-RJ
●MR-J4-60A, MR-J4-60A-RJ

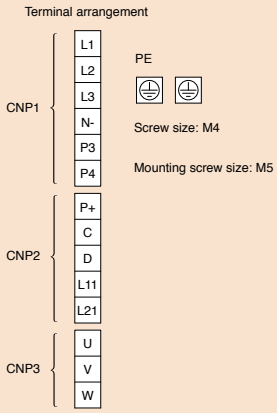




[Unit: mm]

●MR-J4-70A, MR-J4-70A-RJ
●MR-J4-100A, MR-J4-100A-RJ





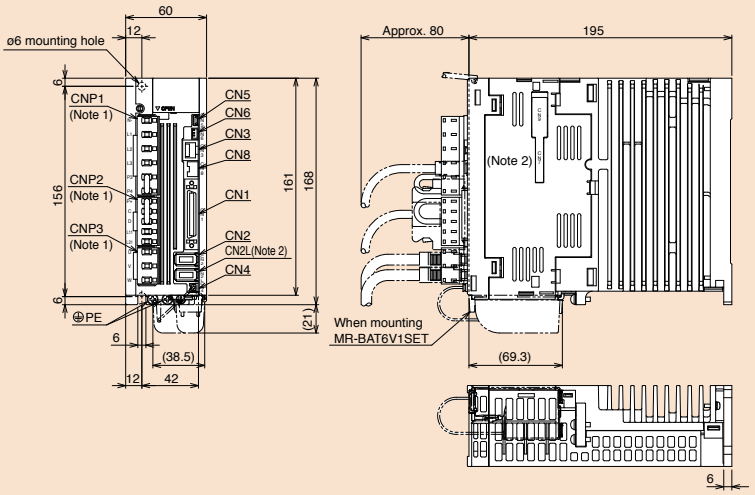
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-A servo amplifier. CN9 connector is available with MR-J4-A-RJ servo amplifiers manufactured in November 2014 or later.

MR-J4-A/MR-J4-A-RJ Dimensions

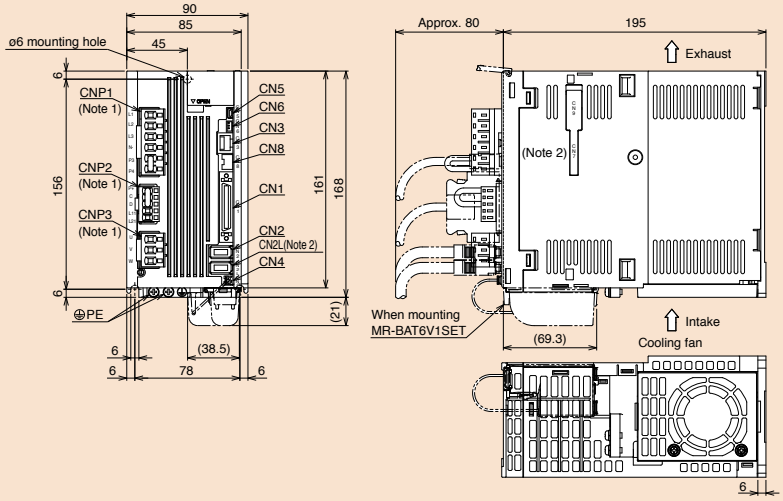
A A-RJ

●MR-J4-60A4, MR-J4-60A4-RJ
●MR-J4-100A4, MR-J4-100A4-RJ



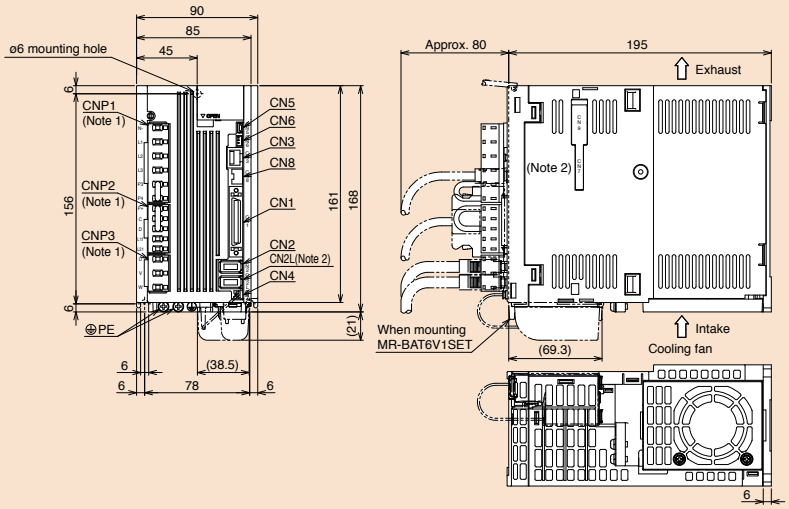
[Unit: mm]

●MR-J4-200A, MR-J4-200A-RJ



[Unit: mm]

●MR-J4-200A4, MR-J4-200A4-RJ



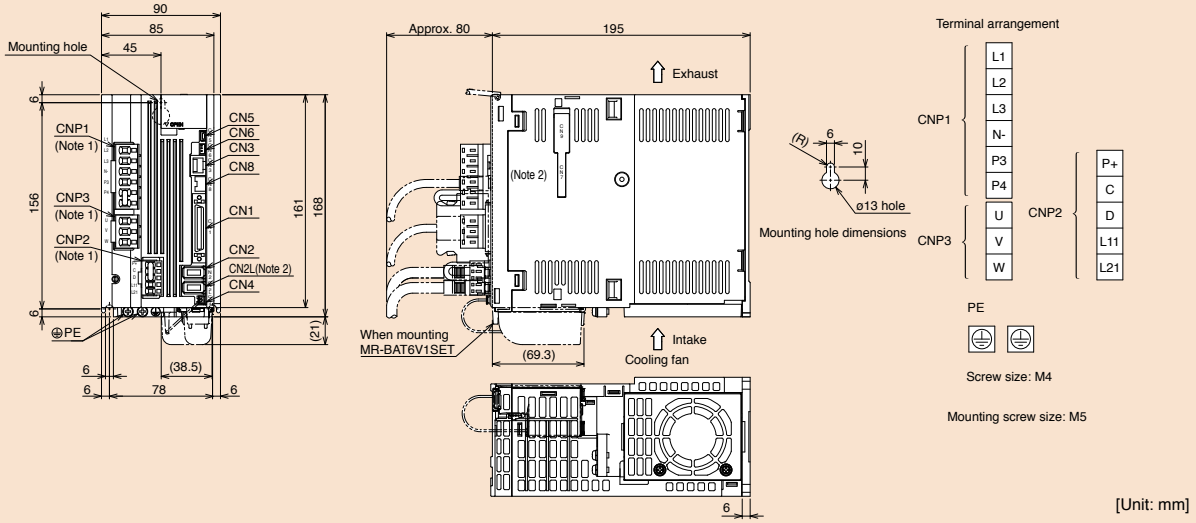
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-A servo amplifier. CN9 connector is available with MR-J4-A-RJ servo amplifiers manufactured in November 2014 or later.

MR-J4-A/MR-J4-A-RJ Dimensions

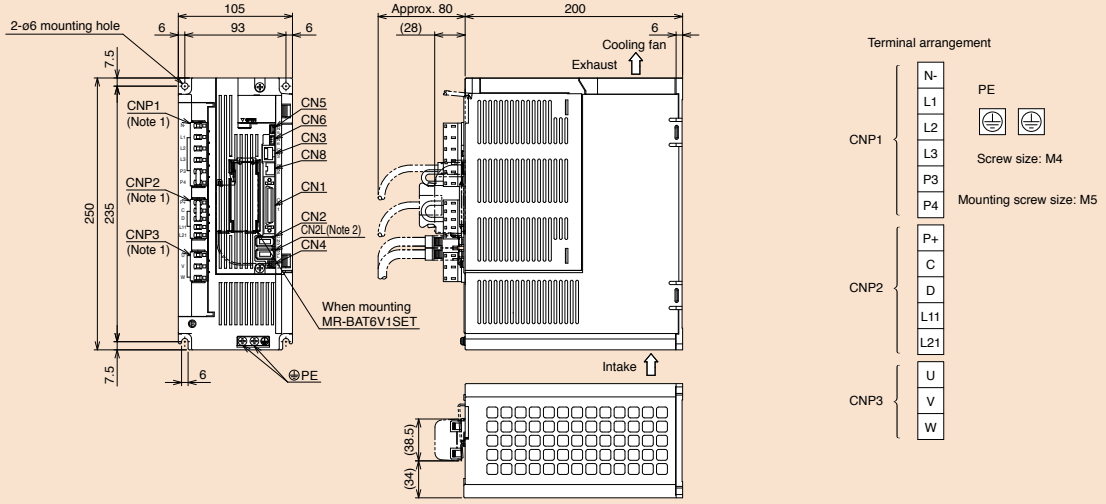
A A-RJ

●MR-J4-350A, MR-J4-350A-RJ



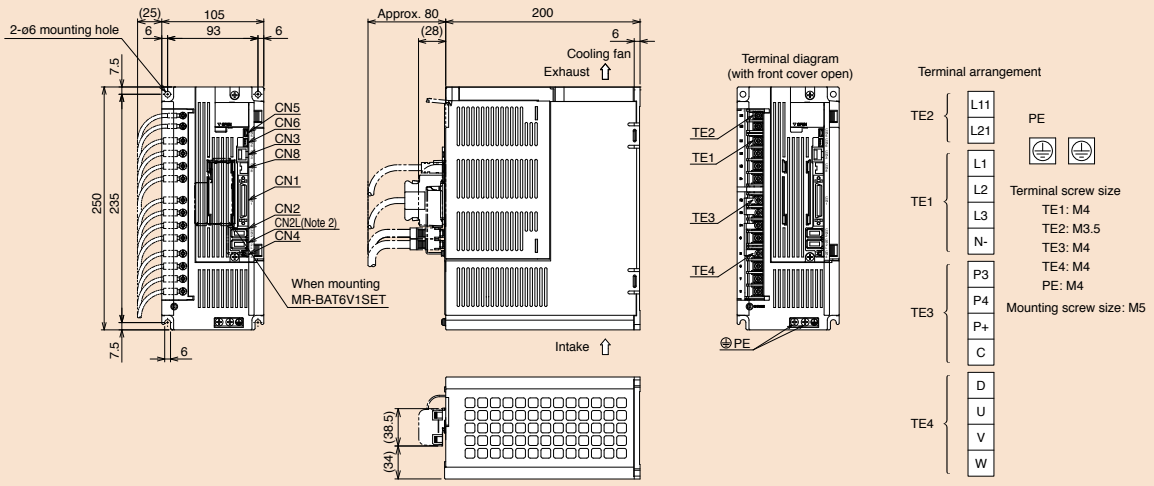
[Unit: mm]

●MR-J4-350A4, MR-J4-350A4-RJ



[Unit: mm]

●MR-J4-500A, MR-J4-500A-RJ



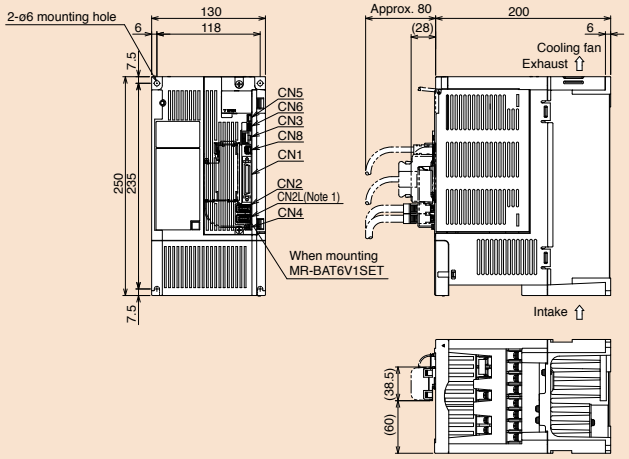
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-A servo amplifier. CN9 connector is available with MR-J4-A-RJ servo amplifiers manufactured in November 2014 or later.

MR-J4-A/MR-J4-A-RJ Dimensions

A A-RJ

●MR-J4-500A4, MR-J4-500A4-RJ



Terminal screw size
TE1: M4
TE2: M3.5
TE3: M4
PE: M4

Mounting screw size: M5

Terminal arrangement

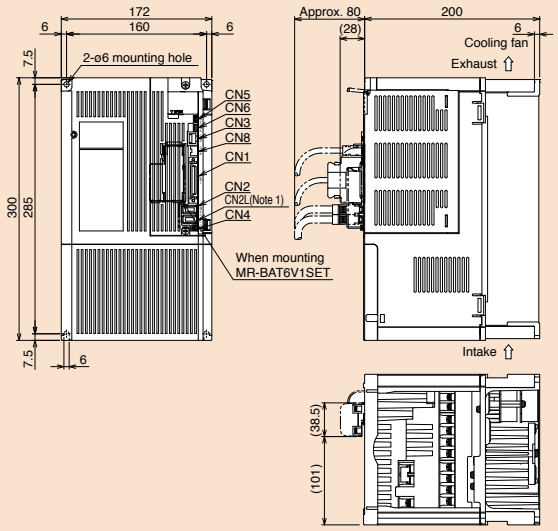
TE2		TE3		
L11	L21	N-	P3	P4

TE1								
L1	L2	L3	P+	C	U	V	W	

PE

[Unit: mm]

●MR-J4-700A, MR-J4-700A-RJ, MR-J4-700A4, MR-J4-700A4-RJ



Terminal screw size
TE1: M4
TE2: M3.5
TE3: M4
PE: M4

Mounting screw size: M5

Terminal arrangement

TE3			
N-	P3	P4	

TE1								
L1	L2	L3	P+	C	U	V	W	

TE2	
L11	L21

PE

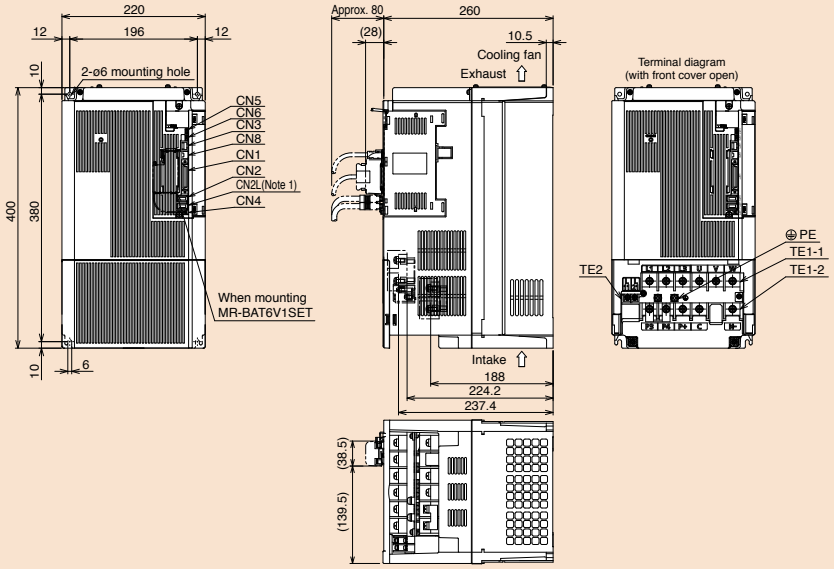
[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-A servo amplifier. CN9 connector is available with MR-J4-A-RJ servo amplifiers manufactured in November 2014 or later.

MR-J4-A/MR-J4-A-RJ Dimensions

A A-RJ

●MR-J4-11KA, MR-J4-11KA-RJ, MR-J4-11KA4, MR-J4-11KA4-RJ
●MR-J4-15KA, MR-J4-15KA-RJ, MR-J4-15KA4, MR-J4-15KA4-RJ



Terminal screw size
TE1-1: M6
TE1-2: M6
TE2: M4
PE: M6
Mounting screw size: M5

Terminal arrangement

TE1-1

L1	L2	L3	U	V	W

TE1-2

P3	P4	P+	C		N-

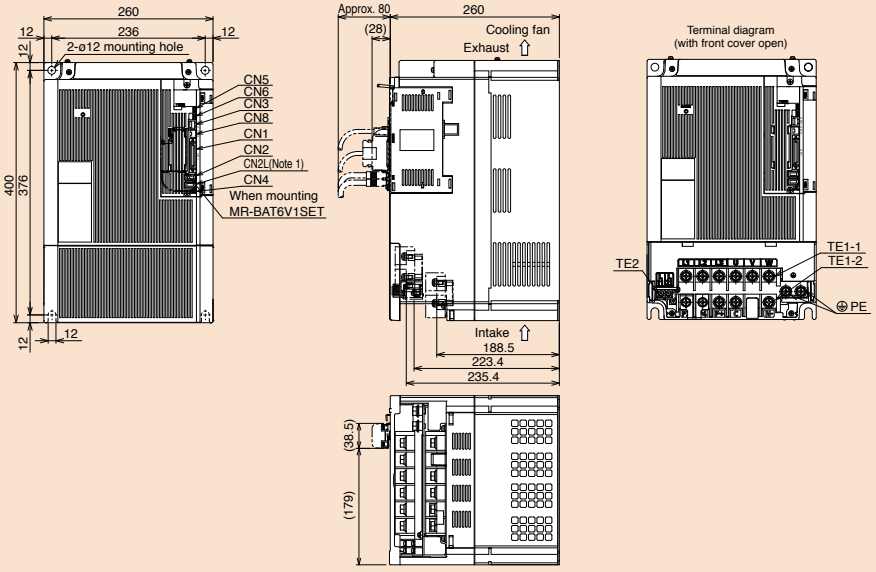
TE2

L11	L21

PE

[Unit: mm]

●MR-J4-22KA, MR-J4-22KA-RJ, MR-J4-22KA4, MR-J4-22KA4-RJ



Terminal screw size
TE1-1: M8
TE1-2: M8
TE2: M4
PE: M8
Mounting screw size: M10

Terminal arrangement

TE1-1

L1	L2	L3	U	V	W

TE1-2

P3	P4	P+	C		N-

TE2

L11	L21

PE

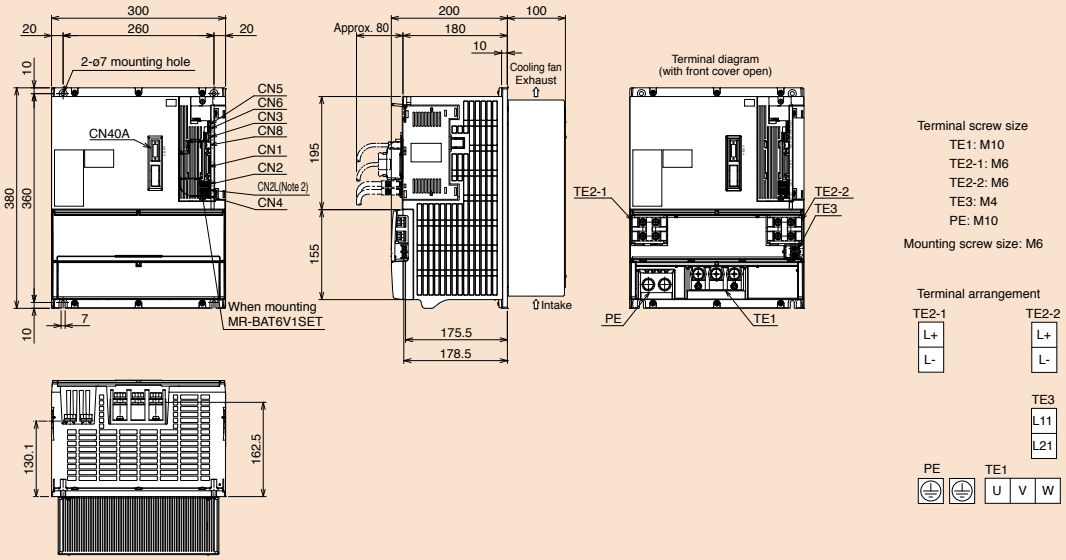
[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-A servo amplifier. CN9 connector is available with MR-J4-A-RJ servo amplifiers manufactured in November 2014 or later.

MR-J4-DU_A/MR-J4-DU_A-RJ Dimensions (Note 1)

A A-RJ

- MR-J4-DU30KA, MR-J4-DU30KA-RJ
- MR-J4-DU37KA, MR-J4-DU37KA-RJ
- MR-J4-DU45KA4, MR-J4-DU45KA4-RJ
- MR-J4-DU55KA4, MR-J4-DU55KA4-RJ



Terminal screw size
TE1: M10
TE2-1: M6
TE2-2: M6
TE3: M4
PE: M10

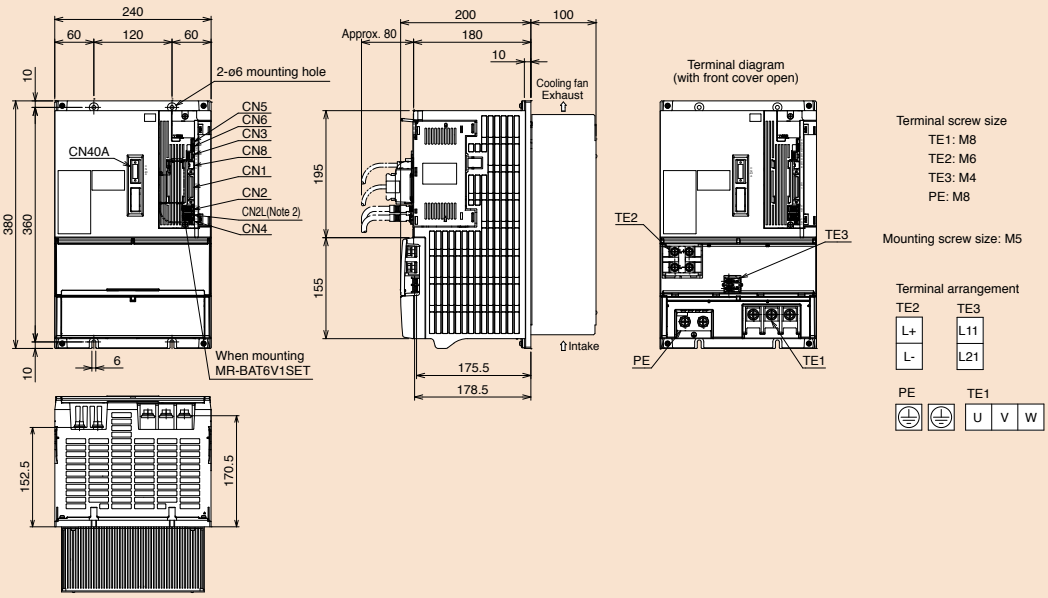
Mounting screw size: M6

Terminal arrangement

TE2-1	TE2-2	TE3	PE	TE1
L+	L+	L11	⏚ ⏚	U V W
L-	L-	L21		

[Unit: mm]

- MR-J4-DU30KA4, MR-J4-DU30KA4-RJ
- MR-J4-DU37KA4, MR-J4-DU37KA4-RJ



Terminal screw size
TE1: M8
TE2: M6
TE3: M4
PE: M8

Mounting screw size: M5

Terminal arrangement

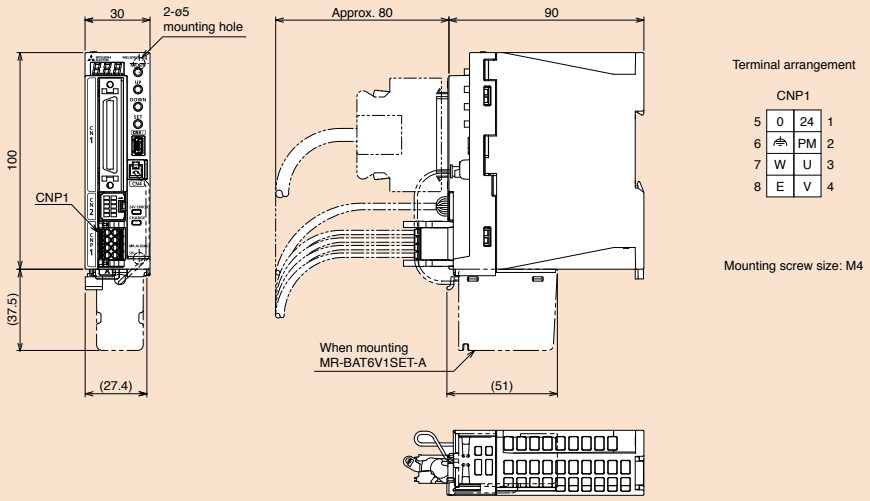
TE2	TE3	PE	TE1
L+	L11	⏚ ⏚	U V W
L-	L21		

[Unit: mm]

Notes: 1. For the panel cut dimensions, refer to "Panel Cut Dimensions for Converter Unit and Drive Unit" in this catalog.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-DU_A_ drive unit. MR-J4-DU_A_-RJ is equipped with CN7 and CN9 connectors; however, these connectors are not for use.

MR-J4-03A6/MR-J4-03A6-RJ Dimensions

A A-RJ



Terminal arrangement

CNP1

5	0	24	1
6	⏚	PM	2
7	W	U	3
8	E	V	4

Mounting screw size: M4

[Unit: mm]

MEMO

● Rotary Servo Motors

Model Designation

● For 200 V class

HG-KR 05 3 B

Symbol	Special specifications
None	Standard
W0C	Servo motors with functional safety

Symbol	Shaft end
None	Standard (Straight shaft) (Note 6)
K	Key shaft (with/without key) (Note 7)
D	D-cut shaft (Note 7)

Symbol	Reducer (Note 5)
None	None
G1	With reducer for general industrial machines, flange mounting
G1H	With reducer for general industrial machines, foot mounting
G5	With flange-output type reducer for high precision applications, flange mounting
G7	With shaft-output type reducer for high precision applications, flange mounting

Symbol	Oil seal
None	None (Note 8)
J	Installed (Note 2, 3, 4)

Symbol	Electromagnetic brake
None	None
B	Installed (Note 1)

Symbol	Rated speed [r/min]
1	1000
1M	1500
2	2000
3	3000

Symbol	Rated output [kW]	Symbol	Rated output [kW]
05	0.05	50	5.0
1	0.1	60	6.0
2	0.2	70	7.0
4	0.4	80	8.0
5	0.5	90	9.0
7	0.75	11K	11
8	0.85	12K	12
10	1.0	15K	15
12	1.2	20K	20
15	1.5	22K	22
20	2.0	25K	25
30	3.0	30K	30
35	3.5 (Note 9)	37K	37
42	4.2		

Symbol	Inertia/capacity
HG-KR	Low inertia, small capacity
HG-MR	Ultra-low inertia, small capacity
HG-SR	Medium inertia, medium capacity
HG-JR	Low inertia, medium-large capacity
HG-RR	Ultra-low inertia, medium capacity
HG-UR	Flat type, medium capacity

Notes: 1. Refer to electromagnetic brake specifications of each servo motor series in this catalog for the available models and detailed specifications.
2. Available in 0.1 kW or larger HG-KR/HG-MR series and all HG-SR series.
3. Oil seal is not installed in the geared servo motor.
4. Dimensions for HG-KR/HG-MR series with oil seal are different from those without oil seal. Contact your local sales office for more details. For HG-SR series, dimensions are the same regardless of whether or not oil seal is installed.
5. Refer to "Geared Servo Motor Specifications" in this catalog for the available models and detailed specifications.
6. Standard HG-SR G1/G1H has a key shaft (with key).
7. Refer to special shaft end specifications of each servo motor series in this catalog for the available models and detailed specifications.
8. Oil seal is installed in HG-JR, HG-RR, and HG-UR series as a standard.
9. For HG-JR353(B), the rated output varies depending on the servo amplifier to be combined. Refer to "HG-JR 3000 r/min Series (Low Inertia, Medium Capacity) (200 V Class) Specifications" for details.

Model Designation

● For 400 V class

H G - S R 5 2 4 B

Symbol	Special specifications
None	Standard
W0C	Servo motors with functional safety

Symbol	Shaft end
None	Standard (Straight shaft) (Note 6)
K	Key shaft (with/without key) (Note 7)

Symbol	Reducer (Note 5)
None	None
G1	With reducer for general industrial machines, flange mounting
G1H	With reducer for general industrial machines, foot mounting
G5	With flange-output type reducer for high precision applications, flange mounting
G7	With shaft-output type reducer for high precision applications, flange mounting

Symbol	Oil seal
None	None (Note 4)
J	Installed (Note 2, 3)

Symbol	Electromagnetic brake
None	None
B	Installed (Note 1)

400 V class

Symbol	Rated speed [r/min]
1	1000
1M	1500
2	2000
3	3000

Symbol	Rated output [kW]	Symbol	Rated output [kW]
5	0.5	11K	11
7	0.75	12K	12
10	1.0	15K	15
15	1.5	20K	20
20	2.0	22K	22
35	3.5 (Note 8)	25K	25
50	5.0	30K	30
60	6.0	37K	37
70	7.0	45K	45
80	8.0	55K	55
90	9.0		

Symbol	Inertia/capacity
HG-SR	Medium inertia, medium capacity
HG-JR	Low inertia, medium-large capacity

Notes: 1. Refer to electromagnetic brake specifications of each servo motor series in this catalog for the available models and detailed specifications.
2. Available in HG-SR series.
3. Oil seal is not installed in the geared servo motor.
4. Oil seal is installed in HG-JR series as a standard.
5. Refer to "Geared Servo Motor Specifications" in this catalog for the available models and detailed specifications.
6. Standard HG-SR G1/G1H has a key shaft (with key).
7. Refer to special shaft end specifications of each servo motor series in this catalog for the available models and detailed specifications.
8. For HG-JR3534(B), the rated output varies depending on the servo amplifier to be combined. Refer to "HG-JR 3000 r/min Series (Low Inertia, Medium Capacity) (400 V Class) Specifications" for details.

Model Designation

● For 48 V DC/24 V DC

H G - A K 0 1 3 6 B _ _ - _ _ _

Symbol	Special specification
None	Standard
S100	Vertical encoder cable lead

Symbol	Shaft end
None	Standard (Straight shaft)
D	D-cut shaft (Note 2)

Symbol	Electromagnetic brake
None	None
B	Installed (Note 1)

Symbol	Power supply
6	48 V DC/24 V DC

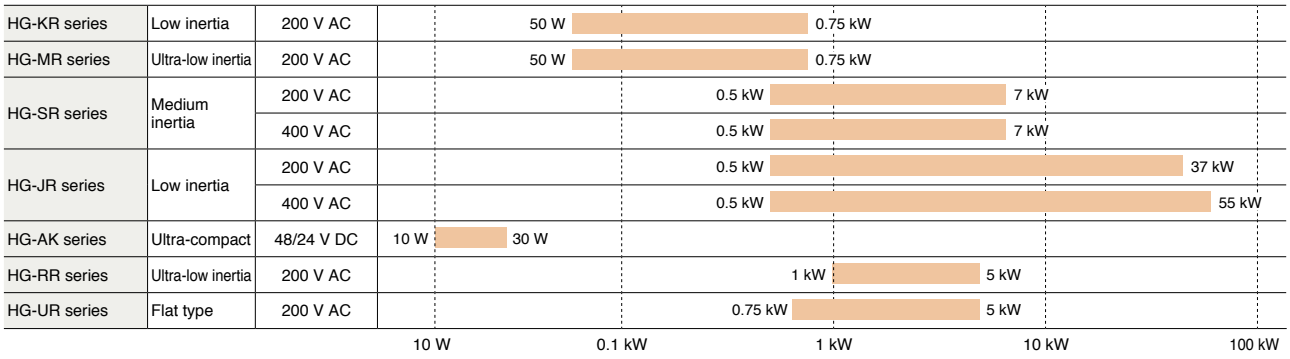
Symbol	Rated speed [r/min]
3	3000

Symbol	Rated output [W]
01	10
02	20
03	30

Symbol	Inertia/capacity
HG-AK	Ultra-compact size, ultra-small capacity

Notes: 1. Refer to "HG-AK Series Electromagnetic Brake Specifications" in this catalog for the available models and detailed specifications.
2. Refer to "HG-AK Series Special Shaft End Specifications" in this catalog for details.

Product Lines



Servo motor lineup with a reduction gear (Note 3)

Rotary servo motor series	Built-in reduction gear compatible with general industrial machineries (G1)										Flange-mounting output type with a built-in reduction gear for high precision applications (G5)						Flange-mounting shaft output type with a built-in reduction gear for high precision applications (G7)					
	1/6	1/11	1/17	1/29	1/35	1/43	1/59	1/5 (Note 1)	1/12 (Note 1)	1/20 (Note 1)	1/5	1/9	1/11	1/21	1/33	1/45	1/5	1/9	1/11	1/21	1/33	1/45
HG-KR	–	–	–	–	–	–	–	●	●	●	● (□40 (Note 2), □60 (Note 2))	●	●	●	●	●	● (□40 (Note 2), □60 (Note 2))	●	●	●	●	●
HG-MR	–										–						–					
HG-SR 1000 r/min series	–										–						–					
HG-SR 2000 r/min series	●	●	●	●	●	●	●	–	–	–	●	–	●	●	●	●	●	–	●	●	●	●
HG-JR	–										–						–					
HG-RR	–										–						–					
HG-UR	–										–						–					

Notes: 1. This reduction ratio is the nominal value and may differ slightly from the actual reduction ratio.
2. Indicate the flange dimensions.
3. Refer to the “MELSERVO-J4 Catalogue (L (NA) 03056)” for available capacity options.

HG-KR Series (Low Inertia, Small Capacity) Specifications

Rotary servo motor model			HG-KR	053(B)	13(B)	23(B)	43(B)	73(B)
Compatible servo amplifier model			MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
			MR-J4W_-					
Power supply capacity *1			[kVA]	0.3	0.3	0.5	0.9	1.3
Continuous running duty	Rated output		[W]	50	100	200	400	750
	Rated torque (Note 3)		[N•m]	0.16	0.32	0.64	1.3	2.4
Maximum torque			[N•m]	0.56	1.1	2.2	4.5	8.4
Rated speed			[r/min]	3000				
Maximum speed			[r/min]	6000				
Permissible instantaneous speed			[r/min]	6900				
Power rate at continuous rated torque	Standard		[kW/s]	5.63	13.0	18.3	43.7	45.2
	With electromagnetic brake		[kW/s]	5.37	12.1	16.7	41.3	41.6
Rated current			[A]	0.9	0.8	1.3	2.6	4.8
Maximum current			[A]	3.2	2.5	4.6	9.1	17
Regenerative braking frequency *2	MR-J4-		[times/min]	(Note 4)	(Note 4)	453	268	157
	MR-J4W_-		[times/min]	2500	1350	451	268	393
Moment of inertia J	Standard		[× 10^{-4} kg•m^2]	0.0450	0.0777	0.221	0.371	1.26
	With electromagnetic brake		[× 10^{-4} kg•m^2]	0.0472	0.0837	0.243	0.393	1.37
Recommended load to motor inertia ratio (Note 1)				17 times or less		26 times or less	25 times or less	17 times or less
Speed/position detector				Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)				
Oil seal				None	None (Servo motors with oil seal are available. (HG-KR_J))			
Insulation class				130 (B)				
Structure				Totally enclosed, natural cooling (IP rating: IP65) (Note 2)				
Environment *3	Ambient temperature			Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity			Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)				
	Ambience			Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude			2000 m or less above sea level (Note 5)				
	Vibration resistance *4			X: 49 m/s² Y: 49 m/s²				
Vibration rank				V10 *6				
Compliance to global standards				Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
Permissible load for the shaft *5	L		[mm]	25	25	30	30	40
	Radial		[N]	88	88	245	245	392
	Thrust		[N]	59	59	98	98	147
Mass	Standard		[kg]	0.34	0.54	0.91	1.4	2.8
	With electromagnetic brake		[kg]	0.54	0.74	1.3	1.8	3.8

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. For geared servo motor, IP rating of the reducer portion is equivalent to IP44. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. When the servo motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited if the effective torque is within the rated torque range. When the servo motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the following requirements are met.
• HG-KR053(B): The load to motor inertia ratio is 8 times or less, and the effective torque is within the rated torque range.
• HG-KR13(B): The load to motor inertia ratio is 4 times or less, and the effective torque is within the rated torque range.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

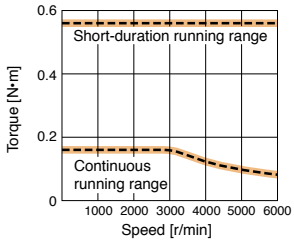
HG-KR Series Electromagnetic Brake Specifications (Note 1)

Model		HG-KR	053B	13B	23B	43B	73B
Type			Spring actuated type safety brake				
Rated voltage			24 V DC $^{0}_{-10}$%				
Power consumption		[W] at 20 °C	6.3	6.3	7.9	7.9	10
Electromagnetic brake static friction torque		[N•m]	0.32	0.32	1.3	1.3	2.4
Permissible braking work	Per braking	[J]	5.6	5.6	22	22	64
	Per hour	[J]	56	56	220	220	640
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	20000	20000	20000	20000	20000
	Work per braking	[J]	5.6	5.6	22	22	64

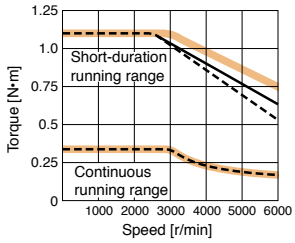
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-KR Series Torque Characteristics

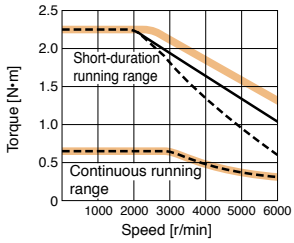
HG-KR053(B) (Note 1, 2, 3, 4)



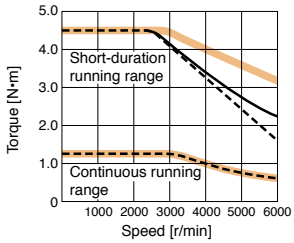
HG-KR13(B) (Note 1, 2, 3, 4)



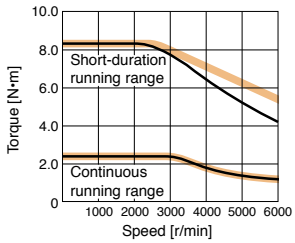
HG-KR23(B) (Note 1, 2, 3, 4)



HG-KR43(B) (Note 1, 2, 3, 4)



HG-KR73(B) (Note 1, 3, 4)

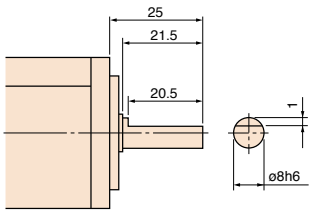


Notes: 1. ▬ : For 3-phase 200 V AC or 1-phase 230 V AC.
2. - - - : For 1-phase 100 V AC.
3. ▬ : For 1-phase 200 V AC. This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.

HG-KR Series Special Shaft End Specifications

Motors with the following specifications are also available.

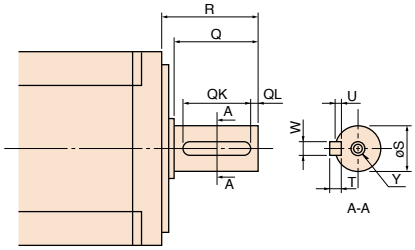
D-cut shaft (Note 1): 50 W and 100 W



[Unit: mm]

Key shaft (with key) (Note 1, 2): 200 W, 400 W, and 750 W

Model	Variable dimensions								
	T	S	R	Q	W	QK	QL	U	Y
HG-KR23(B)K, 43(B)K	5	14h6	30	26	5	20	3	3	M4 screw Depth: 15
HG-KR73(B)K	6	19h6	40	36	6	25	5	3.5	M5 screw Depth: 20



[Unit: mm]

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. 2 round end key is attached.

HG-MR Series (Ultra-low Inertia, Small Capacity) Specifications

Rotary servo motor model		HG-MR	053(B)	13(B)	23(B)	43(B)	73(B)
Compatible servo amplifier model		MR-J4- / MR-J4W_-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
Power supply capacity *1		[kVA]	0.3	0.3	0.5	0.9	1.3
Continuous running duty	Rated output	[W]	50	100	200	400	750
	Rated torque (Note 3)	[N•m]	0.16	0.32	0.64	1.3	2.4
Maximum torque		[N•m]	0.48	0.95	1.9	3.8	7.2
Rated speed		[r/min]	3000				
Maximum speed		[r/min]	6000				
Permissible instantaneous speed		[r/min]	6900				
Power rate at continuous rated torque	Standard	[kW/s]	15.6	33.8	46.9	114.2	97.3
	With electromagnetic brake	[kW/s]	11.3	28.0	37.2	98.8	82.1
Rated current		[A]	1.0	0.9	1.5	2.6	5.8
Maximum current		[A]	3.1	2.5	5.3	9.0	20
Regenerative braking frequency *2	MR-J4-	[times/min]	(Note 4)	(Note 4)	1180	713	338
	MR-J4W_-	[times/min]	7310	3620	1170	710	846
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	0.0162	0.0300	0.0865	0.142	0.586
	With electromagnetic brake	[× 10^{-4} kg•m^2]	0.0224	0.0362	0.109	0.164	0.694
Recommended load to motor inertia ratio (Note 1)			35 times or less	32 times or less			
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)				
Oil seal			None	None (Servo motors with oil seal are available. (HG-MR_J))			
Insulation class			130 (B)				
Structure			Totally enclosed, natural cooling (IP rating: IP65) (Note 2)				
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)				
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude		2000 m or less above sea level (Note 5)				
	Vibration resistance *4		X: 49 m/s^2 Y: 49 m/s^2				
Vibration rank			V10 *6				
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
Permissible load for the shaft *5	L	[mm]	25	25	30	30	40
	Radial	[N]	88	88	245	245	392
	Thrust	[N]	59	59	98	98	147
Mass	Standard	[kg]	0.34	0.54	0.91	1.4	2.8
	With electromagnetic brake	[kg]	0.54	0.74	1.3	1.8	3.8

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. When the servo motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited if the effective torque is within the rated torque range.
When the servo motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the following requirements are met.
• HG-MR053(B): The load to motor inertia ratio is 24 times or less, and the effective torque is within the rated torque range.
• HG-MR13(B): The load to motor inertia ratio is 12 times or less, and the effective torque is within the rated torque range.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

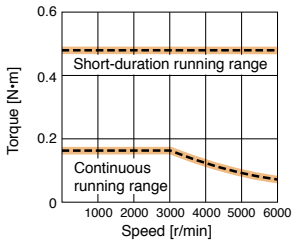
HG-MR Series Electromagnetic Brake Specifications (Note 1)

Model	HG-MR	053B	13B	23B	43B	73B
Type		Spring actuated type safety brake				
Rated voltage		24 V DC $^{0}_{-10}$%				
Power consumption	[W] at 20 °C	6.3	6.3	7.9	7.9	10
Electromagnetic brake static friction torque	[N•m]	0.32	0.32	1.3	1.3	2.4
Permissible braking work	Per braking [J]	5.6	5.6	22	22	64
	Per hour [J]	56	56	220	220	640
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000	20000	20000
	Work per braking [J]	5.6	5.6	22	22	64

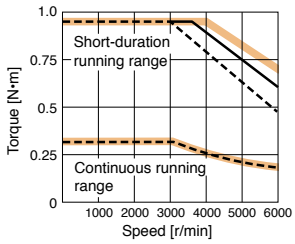
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-MR Series Torque Characteristics

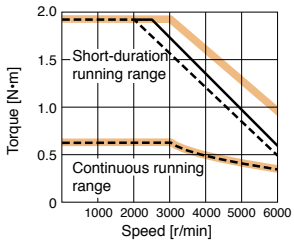
HG-MR053(B) (Note 1, 2, 3, 4)



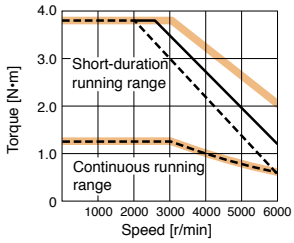
HG-MR13(B) (Note 1, 2, 3, 4)



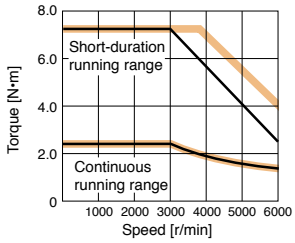
HG-MR23(B) (Note 1, 2, 3, 4)



HG-MR43(B) (Note 1, 2, 3, 4)



HG-MR73(B) (Note 1, 3, 4)

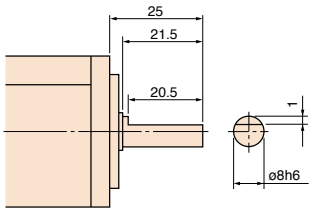


Notes: 1. ——— : For 3-phase 200 V AC or 1-phase 230 V AC.
2. - - - - : For 1-phase 100 V AC.
3. ——— : For 1-phase 200 V AC. This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.

HG-MR Series Special Shaft End Specifications

Motors with the following specifications are also available.

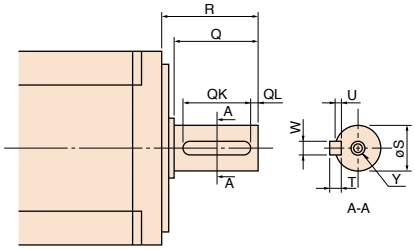
D-cut shaft (Note 1): 50 W and 100 W



[Unit: mm]

Key shaft (with key) (Note 1, 2): 200 W, 400 W, and 750 W

Model	Variable dimensions								
	T	S	R	Q	W	QK	QL	U	Y
HG-MR23(B)K, 43(B)K	5	14h6	30	26	5	20	3	3	M4 screw Depth: 15
HG-MR73(B)K	6	19h6	40	36	6	25	5	3.5	M5 screw Depth: 20



[Unit: mm]

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. 2 round end key is attached.

HG-SR 1000 r/min Series (Medium Inertia, Medium Capacity) Specifications

Rotary servo motor model			HG-SR	51(B)	81(B)	121(B)	201(B)	301(B)	421(B)
Compatible servo amplifier model			MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
			MR-J4W_-						
Power supply capacity *1			[kVA]	1.0	1.5	2.1	3.5	4.8	6.3
Continuous running duty	Rated output		[kW]	0.5	0.85	1.2	2.0	3.0	4.2
	Rated torque (Note 3)		[N•m]	4.8	8.1	11.5	19.1	28.6	40.1
Maximum torque			[N•m]	14.3	24.4	34.4	57.3	85.9	120
Rated speed			[r/min]	1000					
Maximum speed			[r/min]	1500					
Permissible instantaneous speed			[r/min]	1725					
Power rate at continuous rated torque	Standard		[kW/s]	19.7	41.2	28.1	46.4	82.3	107
	With electromagnetic brake		[kW/s]	16.5	36.2	23.2	41.4	75.3	99.9
Rated current			[A]	2.8	5.2	7.1	9.4	13	19
Maximum current			[A]	9.0	17	23	30	42	61
Regenerative braking frequency *2	MR-J4-		[times/min]	77	114	191	113	89	76
	MR-J4W_-		[times/min]	392	286	-	-	-	-
Moment of inertia J	Standard		[× 10^{-4} kg•m^2]	11.6	16.0	46.8	78.6	99.7	151
	With electromagnetic brake		[× 10^{-4} kg•m^2]	13.8	18.2	56.5	88.2	109	161
Recommended load to motor inertia ratio (Note 1)				17 times or less		15 times or less			
Speed/position detector				Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)					
Oil seal				None (Servo motors with oil seal are available. (HG-SR_J))					
Insulation class				155 (F)					
Structure				Totally enclosed, natural cooling (IP rating: IP67) (Note 2)					
Environment *3	Ambient temperature			Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity			Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)					
	Ambience			Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust					
	Altitude			2000 m or less above sea level (Note 4)					
	Vibration resistance *4			X: 24.5 m/s^2 Y: 24.5 m/s^2		X: 24.5 m/s^2 Y: 49 m/s^2		X: 24.5 m/s^2 Y: 29.4 m/s^2	
Vibration rank				V10 *6					
Compliance to global standards				Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
Permissible load for the shaft *5	L		[mm]	55	55	79	79	79	79
	Radial		[N]	980	980	2058	2058	2058	2058
	Thrust		[N]	490	490	980	980	980	980
Mass	Standard		[kg]	6.2	7.3	11	16	20	27
	With electromagnetic brake		[kg]	8.2	9.3	17	22	26	33

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. The servo motor with oil seal is rated IP67 as well (excluding the shaft-through portion). Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

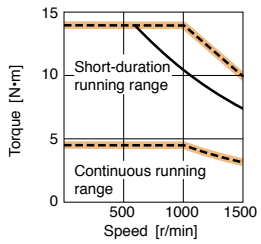
HG-SR 1000 r/min Series Electromagnetic Brake Specifications (Note 1)

Model		HG-SR	51B	81B	121B	201B	301B	421B
Type			Spring actuated type safety brake					
Rated voltage			24 V DC $^{0}_{-10}$%					
Power consumption		[W] at 20 °C	20	20	34	34	34	34
Electromagnetic brake static friction torque		[N•m]	8.5	8.5	44	44	44	44
Permissible braking work	Per braking	[J]	400	400	4500	4500	4500	4500
	Per hour	[J]	4000	4000	45000	45000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	20000	20000	20000	20000	20000	20000
	Work per braking	[J]	200	200	1000	1000	1000	1000

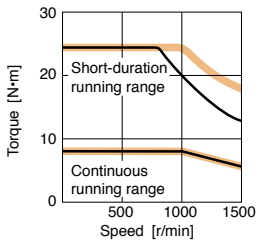
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-SR 1000 r/min Series Torque Characteristics

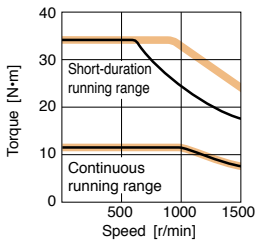
HG-SR51(B) (Note 1, 2, 3, 4)



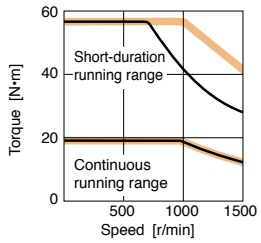
HG-SR81(B) (Note 1, 4)



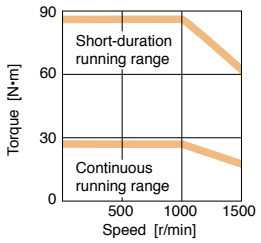
HG-SR121(B) (Note 1, 4)



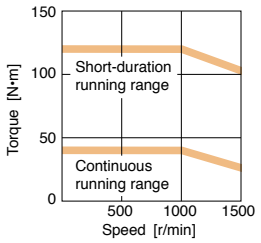
HG-SR201(B) (Note 1, 4)



HG-SR301(B) (Note 1, 4)



HG-SR421(B) (Note 1, 4)



Notes: 1. ▬▬ : For 3-phase 200 V AC.
2. - - - - : For 1-phase 230 V AC.
3. ——— : For 1-phase 200 V AC.
This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.

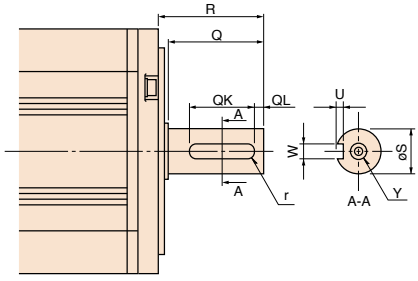
HG-SR 1000 r/min Series Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-SR51(B)K, 81(B)K	24h6	55	50	8 $^{0}_{-0.036}$	36	5	4 $^{+0.2}_{0}$	4	M8 screw Depth: 20
HG-SR121(B)K, 201(B)K, 301(B)K, 421(B)K	35 $^{+0.010}_{0}$	79	75	10 $^{0}_{-0.036}$	55	5	5 $^{+0.2}_{0}$	5	

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



[Unit: mm]

HG-SR 2000 r/min Series (Medium Inertia, Medium Capacity) (200 V Class) Specifications

Rotary servo motor model			HG-SR	52(B)	102(B)	152(B)	202(B)	352(B)	502(B)	702(B)
Compatible servo amplifier model			MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.						
			MR-J4W_-							
Power supply capacity *1			[kVA]	1.0	1.7	2.5	3.5	5.5	7.5	10
Continuous running duty	Rated output		[kW]	0.5	1.0	1.5	2.0	3.5	5.0	7.0
	Rated torque (Note 3)		[N•m]	2.4	4.8	7.2	9.5	16.7	23.9	33.4
Maximum torque			[N•m]	7.2	14.3	21.5	28.6	50.1	71.6	100
Rated speed			[r/min]	2000						
Maximum speed			[r/min]	3000						
Permissible instantaneous speed			[r/min]	3450						
Power rate at continuous rated torque	Standard		[kW/s]	7.85	19.7	32.1	19.5	35.5	57.2	74.0
	With electromagnetic brake		[kW/s]	6.01	16.5	28.2	16.1	31.7	52.3	69.4
Rated current			[A]	2.9	5.6	9.4	9.6	14	22	26
Maximum current			[A]	9.0	17	29	31	45	70	83
Regenerative braking frequency *2	MR-J4-		[times/min]	31	38	139	47	28	29	25
	MR-J4W_-		[times/min]	154	96	-	-	-	-	-
Moment of inertia J	Standard		[× 10^{-4} kg•m^2]	7.26	11.6	16.0	46.8	78.6	99.7	151
	With electromagnetic brake		[× 10^{-4} kg•m^2]	9.48	13.8	18.2	56.5	88.2	109	161
Recommended load to motor inertia ratio (Note 1)				15 times or less	17 times or less		15 times or less			
Speed/position detector				Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)						
Oil seal				None (Servo motors with oil seal are available. (HG-SR_J))						
Insulation class				155 (F)						
Structure				Totally enclosed, natural cooling (IP rating: IP67) (Note 2)						
Environment *3	Ambient temperature			Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)						
	Ambient humidity			Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)						
	Ambience			Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude			2000 m or less above sea level (Note 4)						
	Vibration resistance *4			X: 24.5 m/s^2 Y: 24.5 m/s^2			X: 24.5 m/s^2 Y: 49 m/s^2		X: 24.5 m/s^2 Y: 29.4 m/s^2	
Vibration rank				V10 *6						
Compliance to global standards				Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.						
Permissible load for the shaft *5	L		[mm]	55	55	55	79	79	79	79
	Radial		[N]	980	980	980	2058	2058	2058	2058
	Thrust		[N]	490	490	490	980	980	980	980
Mass	Standard		[kg]	4.8	6.2	7.3	11	16	20	27
	With electromagnetic brake		[kg]	6.7	8.2	9.3	17	22	26	33

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. The servo motor with oil seal is rated IP67 as well (excluding the shaft-through portion), and for geared servo motor, IP rating of the reducer portion is equivalent to IP44. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

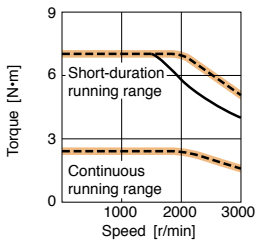
HG-SR 2000 r/min Series (200 V Class) Electromagnetic Brake Specifications (Note 1)

Model		HG-SR	52B	102B	152B	202B	352B	502B	702B
Type			Spring actuated type safety brake						
Rated voltage			24 V DC $^{0}_{-10}$%						
Power consumption		[W] at 20 °C	20	20	20	34	34	34	34
Electromagnetic brake static friction torque		[N•m]	8.5	8.5	8.5	44	44	44	44
Permissible braking work	Per braking	[J]	400	400	400	4500	4500	4500	4500
	Per hour	[J]	4000	4000	4000	45000	45000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	20000	20000	20000	20000	20000	20000	20000
	Work per braking	[J]	200	200	200	1000	1000	1000	1000

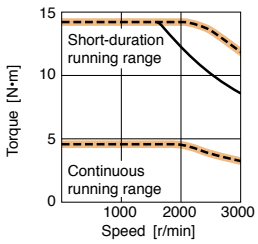
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-SR 2000 r/min Series (200 V Class) Torque Characteristics

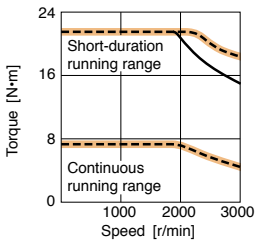
HG-SR52(B) (Note 1, 2, 3, 4)



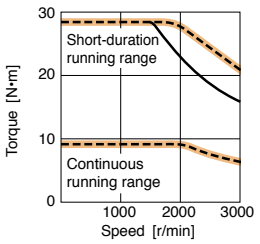
HG-SR102(B) (Note 1, 3, 4)



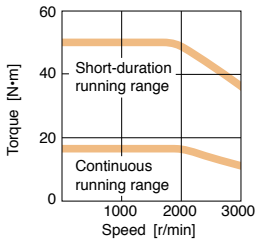
HG-SR152(B) (Note 1, 3, 4)



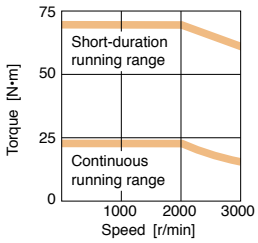
HG-SR202(B) (Note 1, 3, 4)



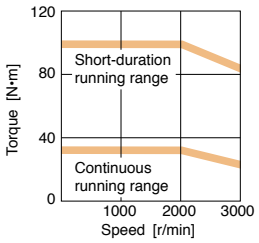
HG-SR352(B) (Note 1, 4)



HG-SR502(B) (Note 1, 4)



HG-SR702(B) (Note 1, 4)



Notes: 1. ▬▬ : For 3-phase 200 V AC.
2. - - - - : For 1-phase 230 V AC.
3. ——— : For 1-phase 200 V AC.
This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.

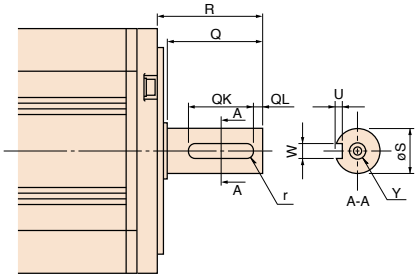
HG-SR 2000 r/min Series (200 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-SR52(B)K, 102(B)K, 152(B)K	24h6	55	50	8 $^{0}_{-0.036}$	36	5	4 $^{+0.2}_{0}$	4	M8 screw Depth: 20
HG-SR202(B)K, 352(B)K, 502(B)K, 702(B)K	35 $^{+0.010}_{0}$	79	75	10 $^{0}_{-0.036}$	55	5	5 $^{+0.2}_{0}$	5	

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



[Unit: mm]

HG-SR 2000 r/min Series (Medium Inertia, Medium Capacity) (400 V Class) Specifications

Rotary servo motor model		HG-SR	524(B)	1024(B)	1524(B)	2024(B)	3524(B)	5024(B)	7024(B)
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.						
Power supply capacity *1		[kVA]	1.0	1.7	2.5	3.5	5.5	7.5	10
Continuous running duty	Rated output	[kW]	0.5	1.0	1.5	2.0	3.5	5.0	7.0
	Rated torque (Note 3)	[N•m]	2.4	4.8	7.2	9.5	16.7	23.9	33.4
Maximum torque		[N•m]	7.2	14.3	21.5	28.6	50.1	71.6	100
Rated speed		[r/min]	2000						
Maximum speed		[r/min]	3000						
Permissible instantaneous speed		[r/min]	3450						
Power rate at continuous rated torque	Standard	[kW/s]	7.85	19.7	32.1	19.5	35.5	57.2	74.0
	With electromagnetic brake	[kW/s]	6.01	16.5	28.2	16.1	31.7	52.3	69.4
Rated current		[A]	1.5	2.8	4.7	4.9	7.0	11	13
Maximum current		[A]	4.5	8.9	17	17	27	42	59
Regenerative braking frequency *2	MR-J4-	[times/min]	46	29	139	47	34	29	25
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	7.26	11.6	16.0	46.8	78.6	99.7	151
	With electromagnetic brake	[× 10^{-4} kg•m^2]	9.48	13.8	18.2	56.5	88.2	109	161
Recommended load to motor inertia ratio (Note 1)			15 times or less	17 times or less		15 times or less			
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)						
Oil seal			None (Servo motors with oil seal are available. (HG-SR_J))						
Insulation class			155 (F)						
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)						
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)						
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)						
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude		2000 m or less above sea level (Note 4)						
	Vibration resistance *4		X: 24.5 m/s^2 Y: 24.5 m/s^2			X: 24.5 m/s^2 Y: 49 m/s^2		X: 24.5 m/s^2 Y: 29.4 m/s^2	
Vibration rank			V10 *6						
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.						
Permissible load for the shaft *5	L	[mm]	55	55	55	79	79	79	79
	Radial	[N]	980	980	980	2058	2058	2058	2058
	Thrust	[N]	490	490	490	980	980	980	980
Mass	Standard	[kg]	4.8	6.2	7.3	11	16	20	27
	With electromagnetic brake	[kg]	6.7	8.2	9.3	17	22	26	33

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. The servo motor with oil seal is rated IP67 as well (excluding the shaft-through portion), and for geared servo motor, IP rating of the reducer portion is equivalent to IP44. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

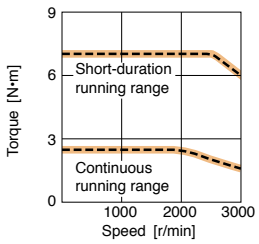
HG-SR 2000 r/min Series (400 V Class) Electromagnetic Brake Specifications (Note 1)

Model		HG-SR	524B	1024B	1524B	2024B	3524B	5024B	7024B
Type			Spring actuated type safety brake						
Rated voltage			24 V DC$^{0}_{-10}$%						
Power consumption		[W] at 20 °C	20	20	20	34	34	34	34
Electromagnetic brake static friction torque		[N•m]	8.5	8.5	8.5	44	44	44	44
Permissible braking work	Per braking	[J]	400	400	400	4500	4500	4500	4500
	Per hour	[J]	4000	4000	4000	45000	45000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	20000	20000	20000	20000	20000	20000	20000
	Work per braking	[J]	200	200	200	1000	1000	1000	1000

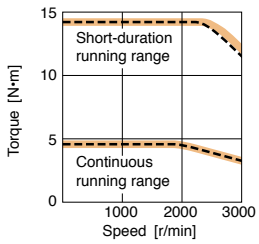
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-SR 2000 r/min Series (400 V Class) Torque Characteristics

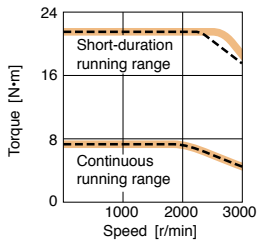
HG-SR524(B) (Note 1, 2, 3)



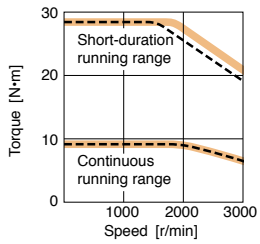
HG-SR1024(B) (Note 1, 2, 3)



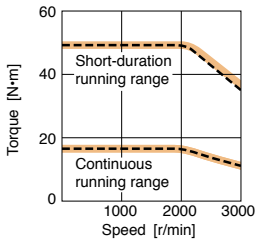
HG-SR1524(B) (Note 1, 2, 3)



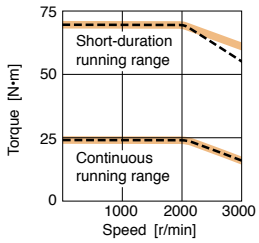
HG-SR2024(B) (Note 1, 2, 3)



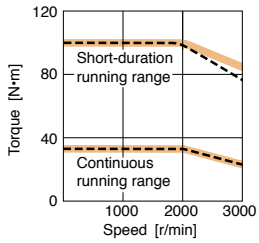
HG-SR3524(B) (Note 1, 2, 3)



HG-SR5024(B) (Note 1, 2, 3)



HG-SR7024(B) (Note 1, 2, 3)



Notes: 1. ▬ : For 3-phase 400 V AC.
2. - - - - : For 3-phase 380 V AC.
3. Torque drops when the power supply voltage is below the specified value.

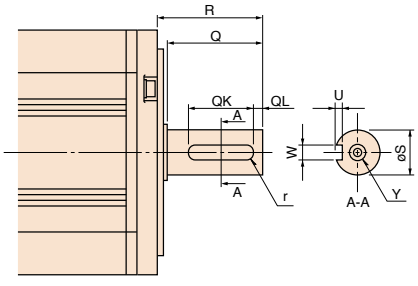
HG-SR 2000 r/min Series (400 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-SR524(B)K, 1024(B)K, 1524(B)K	24h6	55	50	8 $^{0}_{-0.036}$	36	5	4 $^{+0.2}_{0}$	4	M8 screw Depth: 20
HG-SR2024(B)K, 3524(B)K, 5024(B)K, 7024(B)K	35 $^{+0.010}_{0}$	79	75	10 $^{0}_{-0.036}$	55	5	5 $^{+0.2}_{0}$	5	

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



[Unit: mm]

HG-JR 3000 r/min Series (Low Inertia, Medium Capacity) (200 V Class) Specifications

Rotary servo motor model		HG-JR	53(B)	73(B)	103(B)	153(B)	203(B)	353(B)	503(B)	703(B)	903(B)
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
		MR-J4W_-									
Power supply capacity *1		[kVA]	1.0	1.3	1.7	2.5	3.5	5.5	7.5	10	13
Continuous running duty	Rated output	[kW]	0.5	0.75	1.0	1.5	2.0	3.3 <3.5> (Note 4)	5.0	7.0	9.0
	Rated torque (Note 3)	[N•m]	1.6	2.4	3.2	4.8	6.4	10.5 <11.1> (Note 4)	15.9	22.3	28.6
Maximum torque (Note 5)		[N•m]	4.8 <6.4>	7.2 <9.6>	9.6 <12.7>	14.3 <19.1>	19.1 <25.5>	32.0 <44.6>	47.7 <63.7>	66.8	85.8
Rated speed		[r/min]	3000								
Maximum speed		[r/min]	6000							5000	
Permissible instantaneous speed		[r/min]	6900							5750	
Power rate at continuous rated torque	Standard	[kW/s]	16.7	27.3	38.2	60.2	82.4	83.5	133	115	147
	With electromagnetic brake	[kW/s]	12.5	22.0	32.2	53.1	74.8	71.6	119	93.9	125
Rated current		[A]	3.0	5.6	5.6	11	11	17 <18> (Note 4)	27	34	41
Maximum current (Note 5)		[A]	9.0 <12>	17 <23>	17 <23>	32 <43>	32 <43>	51 <71>	81 <108>	103	134
Regenerative braking frequency *2 (Note 5)	MR-J4-	[times/min]	67 <137>	98 <511>	76 <396>	271 <271>	206 <206>	73 <98>	68 <89>	56	204 (Note 6)
	MR-J4W_-	[times/min]	328 <328>	237	186	-	-	-	-	-	-
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	1.52	2.09	2.65	3.79	4.92	13.2	19.0	43.3	55.8
	With electromagnetic brake	[× 10^{-4} kg•m^2]	2.02	2.59	3.15	4.29	5.42	15.4	21.2	52.9	65.4
Recommended load to motor inertia ratio (Note 1)			10 times or less								
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)								
Oil seal			Attached								
Insulation class			155 (F)								
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)								
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)								
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)								
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude		2000 m or less above sea level (Note 7)								
	Vibration resistance *4		X: 24.5 m/s² Y: 24.5 m/s²							X: 24.5 m/s² Y: 29.4 m/s²	
Vibration rank			V10 *6								
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Permissible load for the shaft *5	L	[mm]	40	40	40	40	40	55	55	79	79
	Radial	[N]	323	323	323	323	323	980	980	2450	2450
	Thrust	[N]	284	284	284	284	284	490	490	980	980
Mass	Standard	[kg]	3.0	3.7	4.5	5.9	7.5	13	18	29	36
	With electromagnetic brake	[kg]	4.4	5.1	5.9	7.3	8.9	15	20	35	42

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value in angle brackets is applicable when the servo motor is used with MR-J4-500GF/MR-J4-500GF-RJ/MR-J4-500B/MR-J4-500B-RJ/MR-J4-500A/MR-J4-500A-RJ.
5. The value in angle brackets is applicable when the maximum torque is increased. The maximum torque will be increased by changing the servo amplifier to be combined. Refer to "Combinations of HG-JR Servo Motor Series and Servo Amplifier (200 V Class) for Increasing the Maximum Torque to 400% of the Rated Torque" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog for the available combinations.
6. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m^3/min). Note that [Pr. PA02] must be changed.
7. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

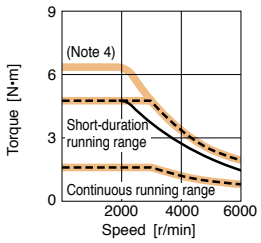
HG-JR 3000 r/min Series (200 V Class) Electromagnetic Brake Specifications (Note 1)

Model		HG-JR	53B	73B	103B	153B	203B	353B	503B	703B	903B
Type			Spring actuated type safety brake								
Rated voltage			24 V DC$^{0}_{-10}$%								
Power consumption		[W] at 20 °C	11.7	11.7	11.7	11.7	11.7	23	23	34	34
Electromagnetic brake static friction torque		[N•m]	6.6	6.6	6.6	6.6	6.6	16	16	44	44
Permissible braking work	Per braking	[J]	64	64	64	64	64	400	400	4500	4500
	Per hour	[J]	640	640	640	640	640	4000	4000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	5000	5000	5000	5000	5000	5000	5000	20000	20000
	Work per braking	[J]	64	64	64	64	64	400	400	1000	1000

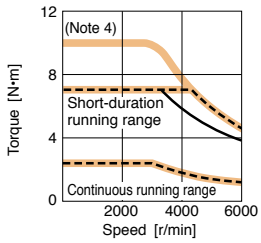
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-JR 3000 r/min Series (200 V Class) Torque Characteristics

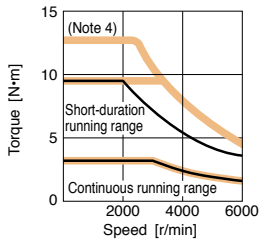
HG-JR53(B) (Note 1, 2, 3, 5, 6)



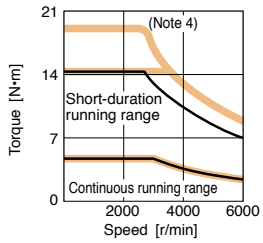
HG-JR73(B) (Note 1, 3, 5, 6)



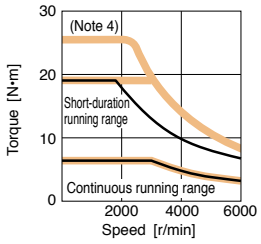
HG-JR103(B) (Note 1, 3, 5, 6, 7)



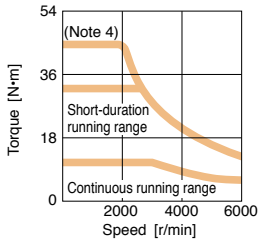
HG-JR153(B) (Note 1, 3, 5, 6, 7)



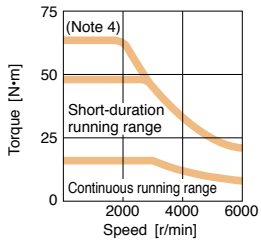
HG-JR203(B) (Note 1, 3, 5, 6, 7)



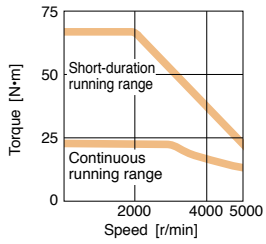
HG-JR353(B) (Note 1, 5)



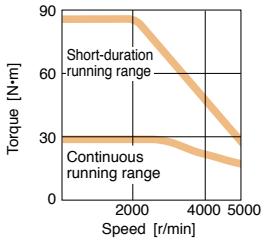
HG-JR503(B) (Note 1, 5)



HG-JR703(B) (Note 1, 5)



HG-JR903(B) (Note 1, 5)



Notes: 1. ——— : For 3-phase 200 V AC.
2. - - - - : For 1-phase 230 V AC.
3. ——— : For 1-phase 200 V AC.
This line is drawn only where differs from the other two lines.
4. This value is applicable when the torque is maximally increased. Refer to "Combinations of HG-JR Servo Motor Series and Servo Amplifier (200 V Class) for Increasing the Maximum Torque to 400% of the Rated Torque" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.
5. Torque drops when the power supply voltage is below the specified value.
6. When 1-phase 200 V AC input is used, increasing the maximum torque to 400% is not possible with HG-JR servo motor series.
7. Contact your local sales office for the torque characteristics when using the servo amplifier with 1-phase 200 V AC input.

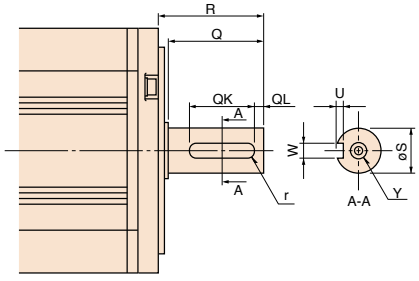
HG-JR 3000 r/min Series (200 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-JR53(B)K, 73(B)K, 103(B)K, 153(B)K, 203(B)K	16h6	40	30	5 $^{0}_{-0.030}$	25	2	3 $^{+0.1}_{0}$	2.5	M4 screw Depth: 15
HG-JR353(B)K, 503(B)K	28h6	55	50	8 $^{0}_{-0.036}$	36	5	4 $^{+0.2}_{0}$	4	M8 screw Depth: 20
HG-JR703(B)K, 903(B)K	35 $^{+0.010}_{0}$	79	75	10 $^{0}_{-0.036}$	55	5	5 $^{+0.2}_{0}$	5	

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



[Unit: mm]

HG-JR 3000 r/min Series (Low Inertia, Medium Capacity) (400 V Class) Specifications

Rotary servo motor model		HG-JR	534(B)	734(B)	1034(B)	1534(B)	2034(B)	3534(B)	5034(B)	7034(B)	9034(B)
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Power supply capacity *1		[kVA]	1.0	1.3	1.7	2.5	3.5	5.5	7.5	10	13
Continuous running duty	Rated output	[kW]	0.5	0.75	1.0	1.5	2.0	3.3 <3.5> (Note 4)	5.0	7.0	9.0
	Rated torque (Note 3)	[N•m]	1.6	2.4	3.2	4.8	6.4	10.5 <11.1> (Note 4)	15.9	22.3	28.6
Maximum torque (Note 5)		[N•m]	4.8 <6.4>	7.2 <9.6>	9.6 <12.7>	14.3 <19.1>	19.1 <25.5>	32.0 <44.6>	47.7 <63.7>	66.8	85.8
Rated speed		[r/min]	3000								
Maximum speed		[r/min]	6000							5000	
Permissible instantaneous speed		[r/min]	6900							5750	
Power rate at continuous rated torque	Standard	[kW/s]	16.7	27.3	38.2	60.2	82.4	83.5	133	115	147
	With electromagnetic brake	[kW/s]	12.5	22.0	32.2	53.1	74.8	71.6	119	93.9	125
Rated current		[A]	1.5	2.8	2.8	5.4	5.4	8.3 <8.8> (Note 4)	14	17	21
Maximum current (Note 5)		[A]	4.5 <6.0>	8.4 <12>	8.4 <12>	17 <22>	17 <22>	26 <36>	41 <54>	52	67
Regenerative braking frequency *2 (Note 5)	MR-J4-	[times/min]	99 <100>	72 <489>	56 <382>	265 <275>	203 <209>	75 <98>	68 <89>	56	205 (Note 6)
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	1.52	2.09	2.65	3.79	4.92	13.2	19.0	43.3	55.8
	With electromagnetic brake	[× 10^{-4} kg•m^2]	2.02	2.59	3.15	4.29	5.42	15.4	21.2	52.9	65.4
Recommended load to motor inertia ratio (Note 1)			10 times or less								
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)								
Oil seal			Attached								
Insulation class			155 (F)								
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)								
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)								
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)								
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude		2000 m or less above sea level (Note 7)								
	Vibration resistance *4		X: 24.5 m/s² Y: 24.5 m/s²							X: 24.5 m/s² Y: 29.4 m/s²	
Vibration rank			V10 *6								
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Permissible load for the shaft *5	L	[mm]	40	40	40	40	40	55	55	79	79
	Radial	[N]	323	323	323	323	323	980	980	2450	2450
	Thrust	[N]	284	284	284	284	284	490	490	980	980
Mass	Standard	[kg]	3.0	3.7	4.5	5.9	7.5	13	18	29	36
	With electromagnetic brake	[kg]	4.4	5.1	5.9	7.3	8.9	15	20	35	42

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value in angle brackets is applicable when the servo motor is used with MR-J4-500GF4/MR-J4-500GF4-RJ/MR-J4-500B4/MR-J4-500B4-RJ/MR-J4-500A4/MR-J4-500A4-RJ.
5. The value in angle brackets is applicable when the maximum torque is increased. The maximum torque will be increased by changing the servo amplifier to be combined. Refer to "Combinations of HG-JR Servo Motor Series and Servo Amplifier (400 V Class) for Increasing the Maximum Torque to 400% of the Rated Torque" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog for the available combinations.
6. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m^3/min). Note that [Pr. PA02] must be changed.
7. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

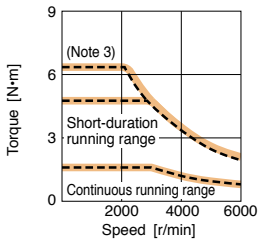
HG-JR 3000 r/min Series (400 V Class) Electromagnetic Brake Specifications (Note 1)

Model		HG-JR	534B	734B	1034B	1534B	2034B	3534B	5034B	7034B	9034B
Type			Spring actuated type safety brake								
Rated voltage			24 V DC$^{0}_{-10}$%								
Power consumption		[W] at 20 °C	11.7	11.7	11.7	11.7	11.7	23	23	34	34
Electromagnetic brake static friction torque		[N•m]	6.6	6.6	6.6	6.6	6.6	16	16	44	44
Permissible braking work	Per braking	[J]	64	64	64	64	64	400	400	4500	4500
	Per hour	[J]	640	640	640	640	640	4000	4000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	5000	5000	5000	5000	5000	5000	5000	20000	20000
	Work per braking	[J]	64	64	64	64	64	400	400	1000	1000

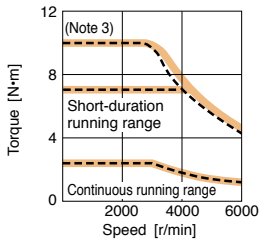
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-JR 3000 r/min Series (400 V Class) Torque Characteristics

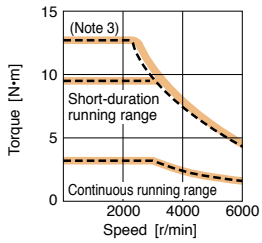
HG-JR534(B) (Note 1, 2, 4)



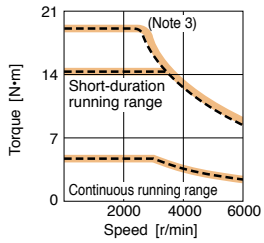
HG-JR734(B) (Note 1, 2, 4)



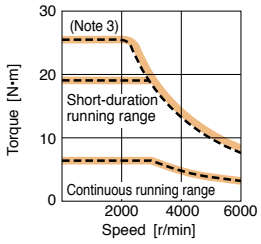
HG-JR1034(B) (Note 1, 2, 4)



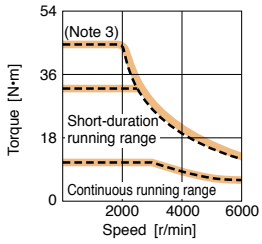
HG-JR1534(B) (Note 1, 2, 4)



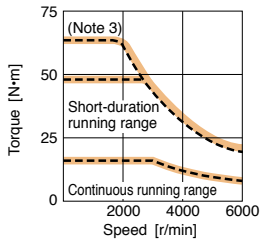
HG-JR2034(B) (Note 1, 2, 4)



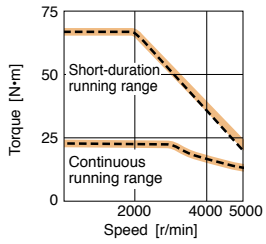
HG-JR3534(B) (Note 1, 2, 4)



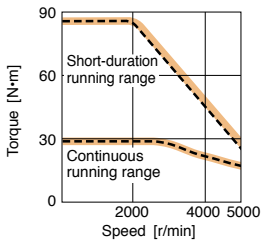
HG-JR5034(B) (Note 1, 2, 4)



HG-JR7034(B) (Note 1, 2, 4)



HG-JR9034(B) (Note 1, 2, 4)



Notes: 1. ——— : For 3-phase 400 V AC.
2. - - - - - : For 3-phase 380 V AC.
3. This value is applicable when the torque is maximally increased. Refer to "Combinations of HG-JR Servo Motor Series and Servo Amplifier (400 V Class) for Increasing the Maximum Torque to 400% of the Rated Torque" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.
4. Torque drops when the power supply voltage is below the specified value.

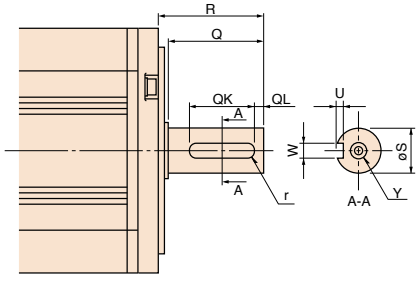
HG-JR 3000 r/min Series (400 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-JR534(B)K, 734(B)K, 1034(B)K, 1534(B)K, 2034(B)K	16h6	40	30	5 $^{0}_{-0.030}$	25	2	3 $^{+0.1}_{0}$	2.5	M4 screw Depth: 15
HG-JR3534(B)K, 5034(B)K	28h6	55	50	8 $^{0}_{-0.036}$	36	5	4 $^{+0.2}_{0}$	4	M8 screw Depth: 20
HG-JR7034(B)K, 9034(B)K	35 $^{+0.010}_{0}$	79	75	10 $^{0}_{-0.036}$	55	5	5 $^{+0.2}_{0}$	5	

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



[Unit: mm]

HG-JR 1000 r/min Series (Low Inertia, Medium/Large Capacity) (200 V Class) Specifications

Rotary servo motor model			HG-JR	601(B)	801(B)	12K1(B)	15K1	20K1	25K1	30K1	37K1
Compatible servo amplifier model			MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Power supply capacity *1			[kVA]	8.6	12	18	22	30	38	48	59
Continuous running duty	Rated output		[kW]	6.0	8.0	12	15	20	25	30	37
	Rated torque (Note 3)		[N•m]	57.3	76.4	115	143	191	239	286	353
Maximum torque			[N•m]	172	229	345	429	573	717	858	1059
Rated speed			[r/min]	1000							
Maximum speed			[r/min]	2000			1500				
Permissible instantaneous speed			[r/min]	2300			1725				
Power rate at continuous rated torque	Standard		[kW/s]	187	265	420	418	582	748	594	761
	With electromagnetic brake		[kW/s]	167	243	394	-	-	-	-	-
Rated current			[A]	31	47	60	67	94	95	121	152
Maximum current			[A]	108	165	208	231	318	313	399	495
Regenerative braking frequency *2	MR-J4-		[times/min]	82	322 (Note 4)	224 (Note 4)	234 (Note 4)	183 (Note 4)	150 (Note 4)	-	-
Moment of inertia J	Standard		[× 10^{-4} kg•m^2]	176	220	315	489	627	764	1377	1637
	With electromagnetic brake		[× 10^{-4} kg•m^2]	196	240	336	-	-	-	-	-
Recommended load to motor inertia ratio (Note 1)				10 times or less							
Speed/position detector				Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)							
Oil seal				Attached							
Insulation class				155 (F)							
Structure				Totally enclosed, natural cooling (IP rating: IP67) (Note 2)			Totally enclosed, force cooling (IP rating: IP44) (Note 2)				
Environment *3	Ambient temperature			Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)							
	Ambient humidity			Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)							
	Ambience			Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude			2000 m or less above sea level (Note 5)							
	Vibration resistance *4			X: 24.5 m/s^2 Y: 24.5 m/s^2						X: 9.8 m/s^2 Y: 9.8 m/s^2	
Vibration rank				V10 *6							
Compliance to global standards				Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Permissible load for the shaft *5	L		[mm]	85	116	116	140	140	140	140	140
	Radial		[N]	2450	2940	2940	3234	3234	3234	4900	4900
	Thrust		[N]	980	980	980	1470	1470	1470	1960	1960
Mass	Standard		[kg]	53	62	86	120	145	165	215	240
	With electromagnetic brake		[kg]	65	74	97	-	-	-	-	-
Cooling fan	Power supply	Voltage/ frequency		-	-	-	3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz				
		Input	[W]	-	-	-	65 (50 Hz)/85 (60 Hz)			120 (50 Hz)/175 (60 Hz)	
	Rated current		[A]	-	-	-	0.20 (50 Hz)/0.22 (60 Hz)			0.39 (50 Hz)/0.52 (60 Hz)	

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m^3/min). Note that [Pr. PA02] must be changed.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

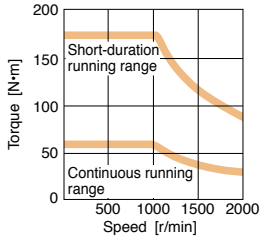
HG-JR 1000 r/min Series (200 V Class) Electromagnetic Brake Specifications (Note 1)

Model	HG-JR	601B	801B	12K1B
Type		Spring actuated type safety brake		
Rated voltage		24 V DC $^{0}_{-10}$%		
Power consumption	[W] at 20 °C	32	32	32
Electromagnetic brake static friction torque	[N•m]	126	126	126
Permissible braking work	Per braking [J]	5000	5000	5000
	Per hour [J]	45200	45200	45200
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000
	Work per braking [J]	400	400	400

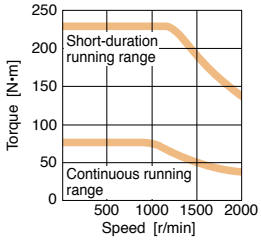
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-JR 1000 r/min Series (200 V Class) Torque Characteristics

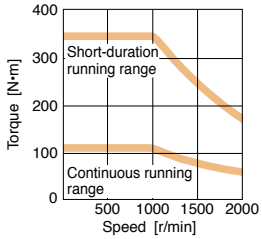
HG-JR601(B) (Note 1, 2)



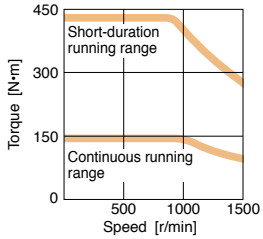
HG-JR801(B) (Note 1, 2)



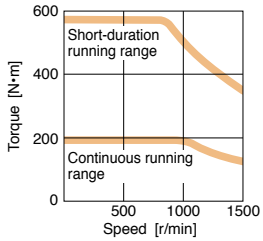
HG-JR12K1(B) (Note 1, 2)



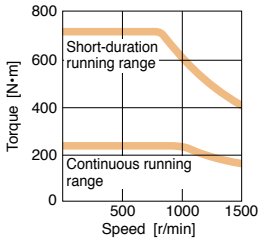
HG-JR15K1 (Note 1, 2)



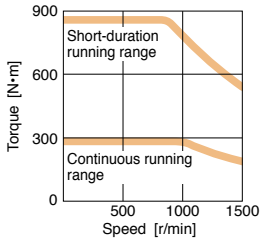
HG-JR20K1 (Note 1, 2)



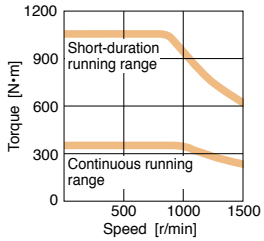
HG-JR25K1 (Note 1, 2)



HG-JR30K1 (Note 1, 2)



HG-JR37K1 (Note 1, 2)



Notes: 1. ▬ : For 3-phase 200 V AC.
2. Torque drops when the power supply voltage is below the specified value.

HG-JR 1000 r/min Series (200 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions S	R	Q	W	QK	QL	U	r	Y	Fig.
HG-JR601(B)K	42h6	85	79	12 $^{0}_{-0.040}$	70	5	5 $^{+0.2}_{0}$	6	M8 screw Depth: 19.8	A
HG-JR801(B)K, 12K1(B)K	55m6	116	110	16 $^{0}_{-0.040}$	90	5	6 $^{+0.2}_{0}$	8	M10 screw Depth: 27	
HG-JR15K1K, 20K1K, 25K1K	65m6	140	130	18 $^{0}_{-0.040}$	120	5	7 $^{+0.2}_{0}$	9	M12 screw Depth: 25	
HG-JR30K1K, 37K1K	80m6	140	140	22 $^{0}_{-0.040}$	132	7	9 $^{+0.2}_{0}$	11	M16 screw Depth: 30	B

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.

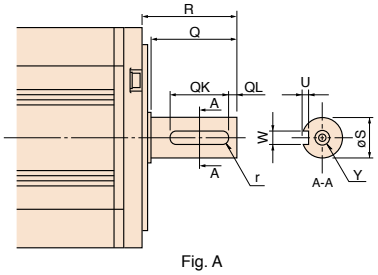


Fig. A

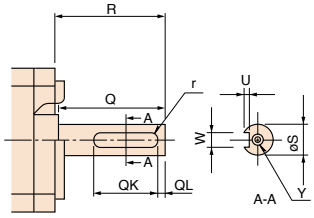


Fig. B [Unit: mm]

HG-JR 1000 r/min Series (Low Inertia, Medium/Large Capacity) (400 V Class) Specifications

Rotary servo motor model		HG-JR	6014(B)	8014(B)	12K14(B)	15K14	20K14	25K14	30K14	37K14
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Power supply capacity *1		[kVA]	8.6	12	18	22	30	38	48	59
Continuous running duty	Rated output	[kW]	6.0	8.0	12	15	20	25	30	37
	Rated torque (Note 3)	[N•m]	57.3	76.4	115	143	191	239	286	353
Maximum torque		[N•m]	172	229	345	429	573	717	858	1059
Rated speed		[r/min]	1000							
Maximum speed		[r/min]	2000			1500				
Permissible instantaneous speed		[r/min]	2300			1725				
Power rate at continuous rated torque	Standard	[kW/s]	187	265	420	418	582	748	594	761
	With electromagnetic brake	[kW/s]	167	243	394	-	-	-	-	-
Rated current		[A]	16	23	30	33	47	48	60	76
Maximum current		[A]	54	80	104	114	161	160	202	248
Regenerative braking frequency *2	MR-J4-	[times/min]	83	331 (Note 4)	229 (Note 4)	239 (Note 4)	187 (Note 4)	152 (Note 4)	-	-
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	176	220	315	489	627	764	1377	1637
	With electromagnetic brake	[× 10^{-4} kg•m^2]	196	240	336	-	-	-	-	-
Recommended load to motor inertia ratio (Note 1)			10 times or less							
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)							
Oil seal			Attached							
Insulation class			155 (F)							
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)			Totally enclosed, force cooling (IP rating: IP44) (Note 2)				
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)							
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)							
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude		2000 m or less above sea level (Note 5)							
	Vibration resistance *4		X: 24.5 m/s^2 Y: 24.5 m/s^2						X: 9.8 m/s^2 Y: 9.8 m/s^2	
Vibration rank			V10 *6							
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Permissible load for the shaft *5	L	[mm]	85	116	116	140	140	140	140	140
	Radial	[N]	2450	2940	2940	3234	3234	3234	4900	4900
	Thrust	[N]	980	980	980	1470	1470	1470	1960	1960
Mass	Standard	[kg]	53	62	86	120	145	165	215	240
	With electromagnetic brake	[kg]	65	74	97	-	-	-	-	-
Cooling fan	Power supply	Voltage/ frequency	-	-	-	3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz			3-phase 380 V AC to 460 V AC, 50 Hz/60 Hz	
		Input [W]	-	-	-	65 (50 Hz)/85 (60 Hz)			110 (50 Hz)/150 (60 Hz)	
	Rated current	[A]	-	-	-	0.12 (50 Hz)/0.14 (60 Hz)			0.20 (50 Hz)/0.22 (60 Hz)	

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m^3/min). Note that [Pr. PA02] must be changed.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

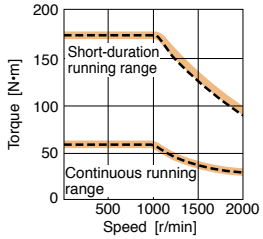
HG-JR 1000 r/min Series (400 V Class) Electromagnetic Brake Specifications (Note 1)

Model	HG-JR	6014B	8014B	12K14B
Type		Spring actuated type safety brake		
Rated voltage		24 V DC $^{0}_{-10}$%		
Power consumption	[W] at 20 °C	32	32	32
Electromagnetic brake static friction torque	[N•m]	126	126	126
Permissible braking work	Per braking [J]	5000	5000	5000
	Per hour [J]	45200	45200	45200
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000
	Work per braking [J]	400	400	400

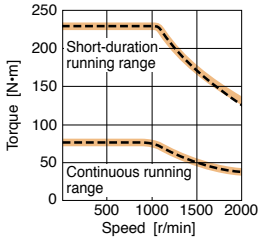
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-JR 1000 r/min Series (400 V Class) Torque Characteristics

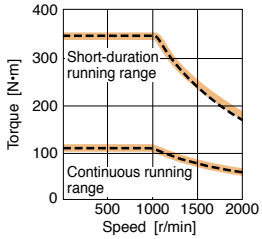
HG-JR6014(B) (Note 1, 2, 3)



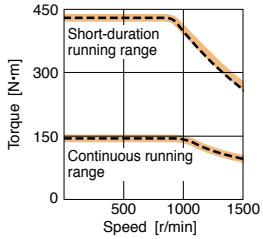
HG-JR8014(B) (Note 1, 2, 3)



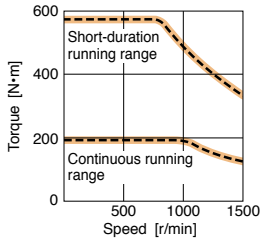
HG-JR12K14(B) (Note 1, 2, 3)



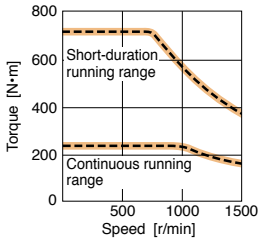
HG-JR15K14 (Note 1, 2, 3)



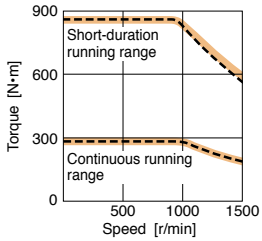
HG-JR20K14 (Note 1, 2, 3)



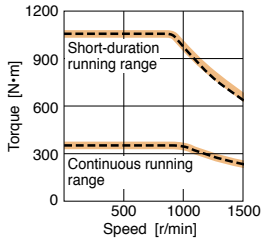
HG-JR25K14 (Note 1, 2, 3)



HG-JR30K14 (Note 1, 2, 3)



HG-JR37K14 (Note 1, 2, 3)



Notes: 1. ▬ : For 3-phase 400 V AC.
2. - - - - : For 3-phase 380 V AC.
3. Torque drops when the power supply voltage is below the specified value.

HG-JR 1000 r/min Series (400 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions S	R	Q	W	QK	QL	U	r	Y	Fig.
HG-JR6014(B)K	42h6	85	79	12 $^{0}_{-0.040}$	70	5	5 $^{+0.2}_{0}$	6	M8 screw Depth: 19.8	A
HG-JR8014(B)K, 12K14(B)K	55m6	116	110	16 $^{0}_{-0.040}$	90	5	6 $^{+0.2}_{0}$	8	M10 screw Depth: 27	
HG-JR15K14K, 20K14K, 25K14K	65m6	140	130	18 $^{0}_{-0.040}$	120	5	7 $^{+0.2}_{0}$	9	M12 screw Depth: 25	
HG-JR30K14K, 37K14K	80m6	140	140	22 $^{0}_{-0.040}$	132	7	9 $^{+0.2}_{0}$	11	M16 screw Depth: 30	B

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.

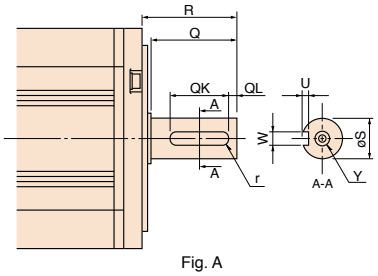


Fig. A

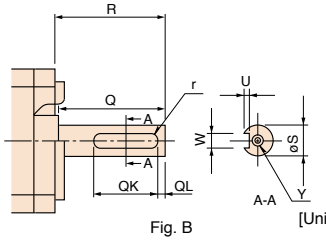


Fig. B

[Unit: mm]

HG-JR 1500 r/min Series (Low Inertia, Medium/Large Capacity) (200 V Class) Specifications

Rotary servo motor model			HG-JR	701M(B)	11K1M(B)	15K1M(B)	22K1M	30K1M	37K1M
Compatible servo amplifier model			MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
Power supply capacity *1			[kVA]	10	16	22	33	48	59
Continuous running duty	Rated output		[kW]	7.0	11	15	22	30	37
	Rated torque (Note 3)		[N•m]	44.6	70.0	95.5	140	191	236
Maximum torque			[N•m]	134	210	286	420	573	707
Rated speed			[r/min]	1500					
Maximum speed			[r/min]	3000			2500		
Permissible instantaneous speed			[r/min]	3450			2875		
Power rate at continuous rated torque	Standard		[kW/s]	113	223	289	401	582	726
	With electromagnetic brake		[kW/s]	101	204	271	-	-	-
Rated current			[A]	34	61	76	99	139	151
Maximum current			[A]	111	200	246	315	479	561
Regenerative braking frequency *2	MR-J4-		[times/min]	36	143 (Note 4)	162 (Note 4)	104 (Note 4)	-	-
Moment of inertia J	Standard		[× 10^{-4} kg•m^2]	176	220	315	489	627	764
	With electromagnetic brake		[× 10^{-4} kg•m^2]	196	240	336	-	-	-
Recommended load to motor inertia ratio (Note 1)				10 times or less					
Speed/position detector				Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)					
Oil seal				Attached					
Insulation class				155 (F)					
Structure				Totally enclosed, natural cooling (IP rating: IP67) (Note 2)			Totally enclosed, force cooling (IP rating: IP44) (Note 2)		
Environment *3	Ambient temperature			Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity			Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)					
	Ambience			Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust					
	Altitude			2000 m or less above sea level (Note 5)					
	Vibration resistance *4			X: 24.5 m/s^2 Y: 24.5 m/s^2					
Vibration rank				V10 *6					
Compliance to global standards				Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
Permissible load for the shaft *5	L		[mm]	85	116	116	140	140	140
	Radial		[N]	2450	2940	2940	3234	3234	3234
	Thrust		[N]	980	980	980	1470	1470	1470
Mass	Standard		[kg]	53	62	86	120	145	165
	With electromagnetic brake		[kg]	65	74	97	-	-	-
Cooling fan	Power supply	Voltage/ frequency		-	-	-	3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz		
		Input	[W]	-	-	-	65 (50 Hz)/85 (60 Hz)		
	Rated current		[A]	-	-	-	0.20 (50 Hz)/0.22 (60 Hz)		

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m^3/min). Note that [Pr. PA02] must be changed.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

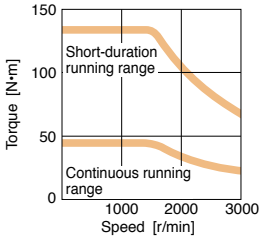
HG-JR 1500 r/min Series (200 V Class) Electromagnetic Brake Specifications (Note 1)

Model		HG-JR	701MB	11K1MB	15K1MB
Type			Spring actuated type safety brake		
Rated voltage			24 V DC$^{0}_{-10}$%		
Power consumption		[W] at 20 °C	32	32	32
Electromagnetic brake static friction torque		[N•m]	126	126	126
Permissible braking work	Per braking	[J]	5000	5000	5000
	Per hour	[J]	45200	45200	45200
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	20000	20000	20000
	Work per braking	[J]	400	400	400

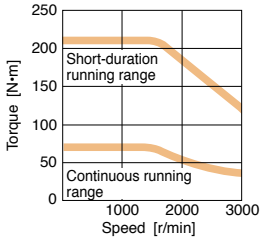
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-JR 1500 r/min Series (200 V Class) Torque Characteristics

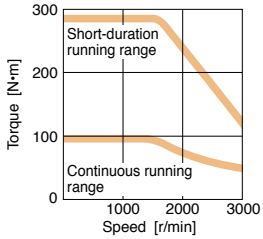
HG-JR701M(B) (Note 1, 2)



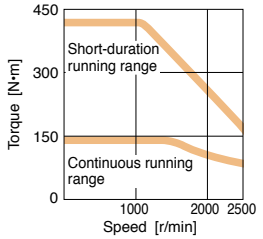
HG-JR11K1M(B) (Note 1, 2)



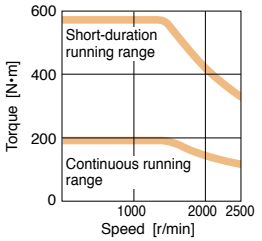
HG-JR15K1M(B) (Note 1, 2)



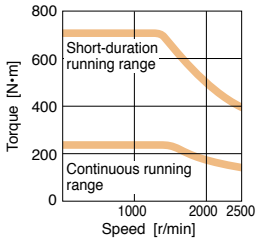
HG-JR22K1M (Note 1, 2)



HG-JR30K1M (Note 1, 2)



HG-JR37K1M (Note 1, 2)



Notes: 1. : For 3-phase 200 V AC.
2. Torque drops when the power supply voltage is below the specified value.

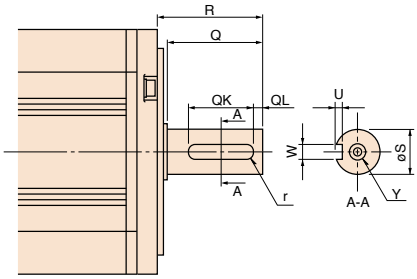
HG-JR 1500 r/min Series (200 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-JR701M(B)K	42h6	85	79	12 $^{0}_{-0.040}$	70	5	5 $^{+0.2}_{0}$	6	M8 screw Depth: 19.8
HG-JR11K1M(B)K, 15K1M(B)K	55m6	116	110	16 $^{0}_{-0.040}$	90	5	6 $^{+0.2}_{0}$	8	M10 screw Depth: 27
HG-JR22K1MK, 30K1MK, 37K1MK	65m6	140	130	18 $^{0}_{-0.040}$	120	5	7 $^{+0.2}_{0}$	9	M12 screw Depth: 25

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



[Unit: mm]

HG-JR 1500 r/min Series (Low Inertia, Medium/Large Capacity) (400 V Class) Specifications

Rotary servo motor model		HG-JR	701M4(B)	11K1M4(B)	15K1M4(B)	22K1M4	30K1M4	37K1M4	45K1M4	55K1M4
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Power supply capacity *1		[kVA]	10	16	22	33	48	59	71	80
Continuous running duty	Rated output	[kW]	7.0	11	15	22	30	37	45	55
	Rated torque (Note 3)	[N•m]	44.6	70.0	95.5	140	191	236	286	350
Maximum torque		[N•m]	134	210	286	420	573	707	859	1050
Rated speed		[r/min]	1500							
Maximum speed		[r/min]	3000			2500				
Permissible instantaneous speed		[r/min]	3450			2875				
Power rate at continuous rated torque	Standard	[kW/s]	113	223	289	401	582	726	596	749
	With electromagnetic brake	[kW/s]	101	204	271	-	-	-	-	-
Rated current		[A]	17	31	38	50	68	79	85	110
Maximum current		[A]	56	100	123	170	235	263	288	357
Regenerative braking frequency *2	MR-J4-	[times/min]	36	143 (Note 4)	162 (Note 4)	104 (Note 4)	-	-	-	-
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	176	220	315	489	627	764	1377	1637
	With electromagnetic brake	[× 10^{-4} kg•m^2]	196	240	336	-	-	-	-	-
Recommended load to motor inertia ratio (Note 1)			10 times or less							
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)							
Oil seal			Attached							
Insulation class			155 (F)							
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)			Totally enclosed, force cooling (IP rating: IP44) (Note 2)				
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)							
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)							
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude		2000 m or less above sea level (Note 5)							
	Vibration resistance *4		X: 24.5 m/s^2 Y: 24.5 m/s^2						X: 9.8 m/s^2 Y: 9.8 m/s^2	
Vibration rank			V10 *6							
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Permissible load for the shaft *5	L	[mm]	85	116	116	140	140	140	140	140
	Radial	[N]	2450	2940	2940	3234	3234	3234	4900	4900
	Thrust	[N]	980	980	980	1470	1470	1470	1960	1960
Mass	Standard	[kg]	53	62	86	120	145	165	215	240
	With electromagnetic brake	[kg]	65	74	97	-	-	-	-	-
Cooling fan	Power supply	Voltage/ frequency	-	-	-	3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz			3-phase 380 V AC to 460 V AC, 50 Hz/60 Hz	
		Input [W]	-	-	-	65 (50 Hz)/85 (60 Hz)			110 (50 Hz)/150 (60 Hz)	
	Rated current	[A]	-	-	-	0.12 (50 Hz)/0.14 (60 Hz)			0.20 (50 Hz)/0.22 (60 Hz)	

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m^3/min). Note that [Pr. PA02] must be changed.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

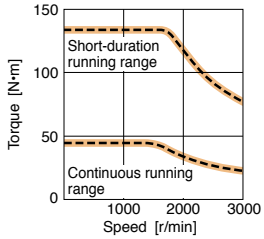
HG-JR 1500 r/min Series (400 V Class) Electromagnetic Brake Specifications (Note 1)

Model		HG-JR	701M4B	11K1M4B	15K1M4B
Type			Spring actuated type safety brake		
Rated voltage			24 V DC $^{0}_{-10}$%		
Power consumption		[W] at 20 °C	32	32	32
Electromagnetic brake static friction torque		[N•m]	126	126	126
Permissible braking work	Per braking	[J]	5000	5000	5000
	Per hour	[J]	45200	45200	45200
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	20000	20000	20000
	Work per braking	[J]	400	400	400

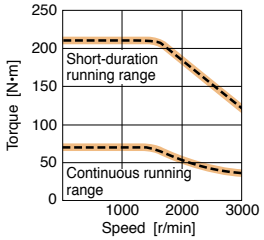
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-JR 1500 r/min Series (400 V Class) Torque Characteristics

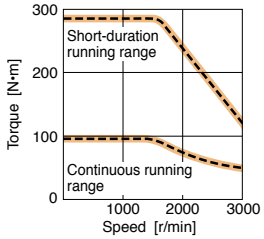
HG-JR701M4(B) (Note 1, 2, 3)



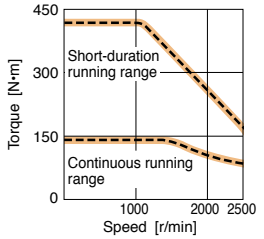
HG-JR11K1M4(B) (Note 1, 2, 3)



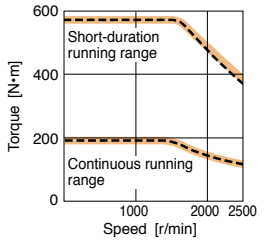
HG-JR15K1M4(B) (Note 1, 2, 3)



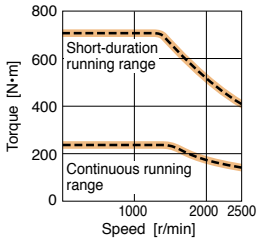
HG-JR22K1M4 (Note 1, 2, 3)



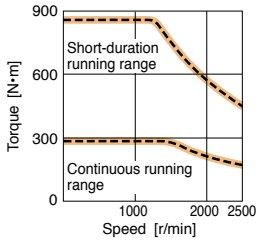
HG-JR30K1M4 (Note 1, 2, 3)



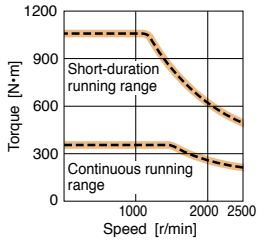
HG-JR37K1M4 (Note 1, 2, 3)



HG-JR45K1M4 (Note 1, 2, 3)



HG-JR55K1M4 (Note 1, 2, 3)



Notes: 1. ▬ : For 3-phase 400 V AC.
2. - - - - : For 3-phase 380 V AC.
3. Torque drops when the power supply voltage is below the specified value.

HG-JR 1500 r/min Series (400 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions									Fig.
	S	R	Q	W	QK	QL	U	r	Y	
HG-JR701M4(B)K	42h6	85	79	12 $^{0}_{-0.040}$	70	5	5 $^{+0.2}_{0}$	6	M8 screw Depth: 19.8	A
HG-JR11K1M4(B)K, 15K1M4(B)K	55m6	116	110	16 $^{0}_{-0.040}$	90	5	6 $^{+0.2}_{0}$	8	M10 screw Depth: 27	
HG-JR22K1M4K, 30K1M4K, 37K1M4K	65m6	140	130	18 $^{0}_{-0.040}$	120	5	7 $^{+0.2}_{0}$	9	M12 screw Depth: 25	
HG-JR45K1M4K, 55K1M4K	80m6	140	140	22 $^{0}_{-0.040}$	132	7	9 $^{+0.2}_{0}$	11	M16 screw Depth: 30	B

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.

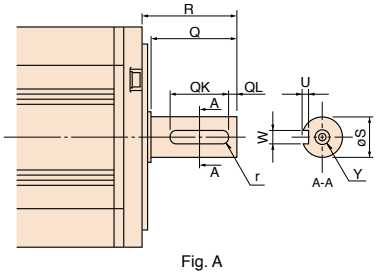


Fig. A

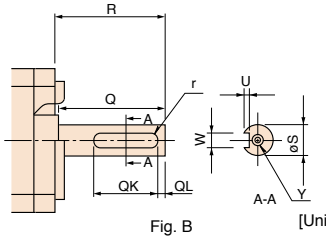


Fig. B

[Unit: mm]

HG-RR Series (Ultra-low Inertia, Medium Capacity) Specifications

Rotary servo motor model		HG-RR	103(B)	153(B)	203(B)	353(B)	503(B)
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
Power supply capacity *1		[kVA]	1.7	2.5	3.5	5.5	7.5
Continuous running duty	Rated output	[kW]	1.0	1.5	2.0	3.5	5.0
	Rated torque (Note 3)	[N•m]	3.2	4.8	6.4	11.1	15.9
Maximum torque		[N•m]	8.0	11.9	15.9	27.9	39.8
Rated speed		[r/min]	3000				
Maximum speed		[r/min]	4500				
Permissible instantaneous speed		[r/min]	5175				
Power rate at continuous rated torque	Standard	[kW/s]	67.4	120	176	150	211
	With electromagnetic brake	[kW/s]	54.8	101	153	105	163
Rated current		[A]	6.1	8.8	14	23	28
Maximum current		[A]	18	23	37	58	70
Regenerative braking frequency *2	MR-J4-	[times/min]	1090	860	710	174	125
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	1.50	1.90	2.30	8.30	12.0
	With electromagnetic brake	[× 10^{-4} kg•m^2]	1.85	2.25	2.65	11.8	15.5
Recommended load to motor inertia ratio (Note 1)			5 times or less				
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)				
Oil seal			Attached				
Insulation class			155 (F)				
Structure			Totally enclosed, natural cooling (IP rating: IP65) (Note 2)				
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)				
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude		2000 m or less above sea level (Note 4)				
	Vibration resistance *4		X: 24.5 m/s^2 Y: 24.5 m/s^2				
Vibration rank			V10 *6				
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
Permissible load for the shaft *5	L	[mm]	45	45	45	63	63
	Radial	[N]	686	686	686	980	980
	Thrust	[N]	196	196	196	392	392
Mass	Standard	[kg]	3.9	5.0	6.2	12	17
	With electromagnetic brake	[kg]	6.0	7.0	8.3	15	21

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

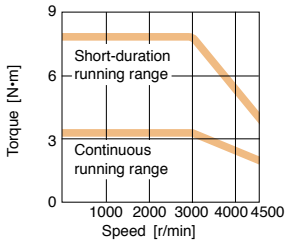
HG-RR Series Electromagnetic Brake Specifications (Note 1)

Model		HG-RR	103B	153B	203B	353B	503B
Type			Spring actuated type safety brake				
Rated voltage			24 V DC $^{0}_{-10}$%				
Power consumption		[W] at 20 °C	19	19	19	23	23
Electromagnetic brake static friction torque		[N•m]	7.0	7.0	7.0	17	17
Permissible braking work	Per braking	[J]	400	400	400	400	400
	Per hour	[J]	4000	4000	4000	4000	4000
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	20000	20000	20000	20000	20000
	Work per braking	[J]	200	200	200	200	200

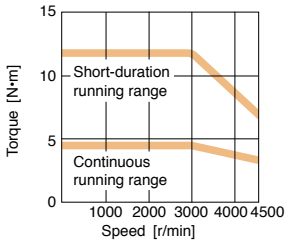
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-RR Series Torque Characteristics

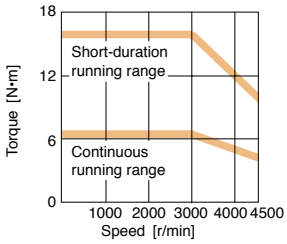
HG-RR103(B) (Note 1, 2, 3)



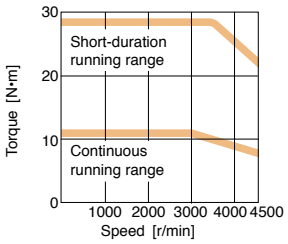
HG-RR153(B) (Note 1, 2, 3)



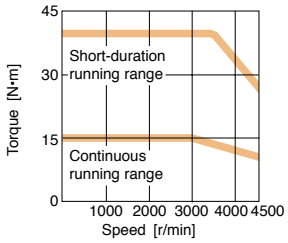
HG-RR203(B) (Note 1, 2)



HG-RR353(B) (Note 1, 2)



HG-RR503(B) (Note 1, 2)



Notes: 1. : For 3-phase 200 V AC.
2. Torque drops when the power supply voltage is below the specified value.
3. Contact your local sales office for the torque characteristics when using the servo amplifier with 1-phase 200 V AC input.

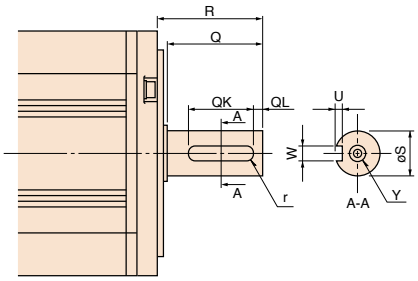
HG-RR Series Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-RR103(B)K, 153(B)K, 203(B)K	24h6	45	40	8 $^{0}_{-0.036}$	25	5	4 $^{+0.2}_{0}$	4	M8 screw Depth: 20
HG-RR353(B)K, 503(B)K	28h6	63	58	8 $^{0}_{-0.036}$	53	3	4 $^{+0.2}_{0}$	4	

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



[Unit: mm]

HG-UR Series (Flat Type, Medium Capacity) Specifications

Rotary servo motor model			HG-UR	72(B)	152(B)	202(B)	352(B)	502(B)
Compatible servo amplifier model			MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
			MR-J4W_-					
Power supply capacity *1			[kVA]	1.3	2.5	3.5	5.5	7.5
Continuous running duty	Rated output		[kW]	0.75	1.5	2.0	3.5	5.0
	Rated torque (Note 3)		[N•m]	3.6	7.2	9.5	16.7	23.9
Maximum torque			[N•m]	10.7	21.5	28.6	50.1	71.6
Rated speed			[r/min]	2000				
Maximum speed			[r/min]	3000			2500	
Permissible instantaneous speed			[r/min]	3450			2875	
Power rate at continuous rated torque	Standard		[kW/s]	12.3	23.2	23.9	36.5	49.6
	With electromagnetic brake		[kW/s]	10.3	21.2	19.5	32.8	46.0
Rated current			[A]	5.4	9.7	14	23	28
Maximum current			[A]	16	29	42	69	84
Regenerative braking frequency *2	MR-J4-		[times/min]	53	124	68	44	31
	MR-J4W_-		[times/min]	107	-	-	-	-
Moment of inertia J	Standard		[× 10^{-4} kg•m^2]	10.4	22.1	38.2	76.5	115
	With electromagnetic brake		[× 10^{-4} kg•m^2]	12.5	24.2	46.8	85.1	124
Recommended load to motor inertia ratio (Note 1)				15 times or less				
Speed/position detector				Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)				
Oil seal				Attached				
Insulation class				155 (F)				
Structure				Totally enclosed, natural cooling (IP rating: IP65) (Note 2)				
Environment *3	Ambient temperature			Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity			Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)				
	Ambience			Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude			2000 m or less above sea level (Note 4)				
	Vibration resistance *4			X: 24.5 m/s^2 Y: 24.5 m/s^2		X: 24.5 m/s^2 Y: 49 m/s^2		
Vibration rank				V10 *6				
Compliance to global standards				Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
Permissible load for the shaft *5	L		[mm]	55	55	65	65	65
	Radial		[N]	637	637	882	1176	1176
	Thrust		[N]	490	490	784	784	784
Mass	Standard		[kg]	8.0	11	16	20	24
	With electromagnetic brake		[kg]	10	13	22	26	30

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

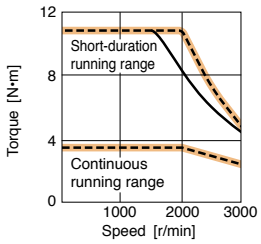
HG-UR Series Electromagnetic Brake Specifications (Note 1)

Model		HG-UR	72B	152B	202B	352B	502B
Type			Spring actuated type safety brake				
Rated voltage			24 V DC$^{0}_{-10}$%				
Power consumption		[W] at 20 °C	19	19	34	34	34
Electromagnetic brake static friction torque		[N•m]	8.5	8.5	44	44	44
Permissible braking work	Per braking	[J]	400	400	4500	4500	4500
	Per hour	[J]	4000	4000	45000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	20000	20000	20000	20000	20000
	Work per braking	[J]	200	200	1000	1000	1000

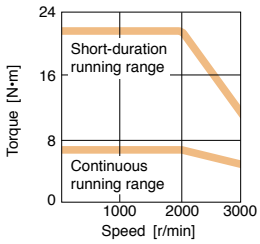
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-UR Series Torque Characteristics

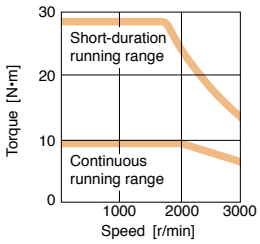
HG-UR72(B) (Note 1, 2, 3, 4)



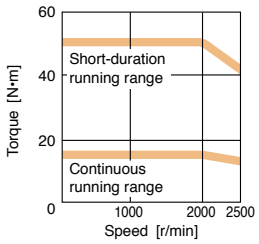
HG-UR152(B) (Note 1, 4, 5)



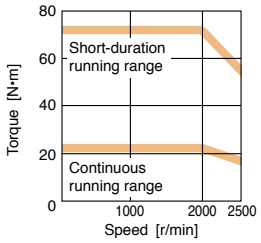
HG-UR202(B) (Note 1, 4)



HG-UR352(B) (Note 1, 4)



HG-UR502(B) (Note 1, 4)



Notes: 1. ——— : For 3-phase 200 V AC.
2. - - - - : For 1-phase 230 V AC.
3. ——— : For 1-phase 200 V AC.
This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.
5. Contact your local sales office for the torque characteristics when using the servo amplifier with 1-phase 200 V AC input.

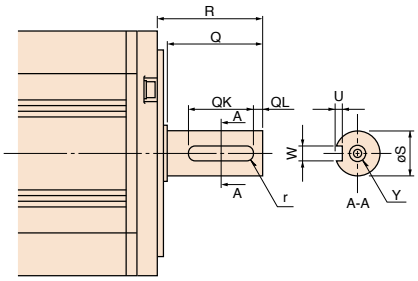
HG-UR Series Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-UR72(B)K	22h6	55	50	6 $^{0}_{-0.036}$	42	3	3.5 $^{+0.1}_{0}$	3	M8 screw Depth: 20
HG-UR152(B)K	28h6	55	50	8 $^{0}_{-0.036}$	40	3	4 $^{+0.2}_{0}$	4	
HG-UR202(B)K, 352(B)K, 502(B)K	35 $^{+0.010}_{0}$	65	60	10 $^{0}_{-0.036}$	50	5	5 $^{+0.2}_{0}$	5	

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



[Unit: mm]

HG-AK Series (Ultra-compact Size, Ultra-small Capacity) Specifications (Note 4)

Servo motor model		HG-AK	0136(B)	0236(B)	0336(B)
Compatible servo amplifier model			Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.		
Power supply capacity *8		[W]	230	360	480
Continuous running duty	Rated output	[W]	10	20	30
	Rated torque (Note 3)	[N•m]	0.032	0.064	0.095
Maximum torque		[N•m]	0.095	0.191	0.286
Rated speed		[r/min]	3000		
Maximum speed	48 V DC	[r/min]	6000		
	24 V DC	[r/min]	6000		5000
Permissible instantaneous speed	48 V DC	[r/min]	6900		
	24 V DC	[r/min]	6900		5750
Power rate at continuous rated torque	Standard	[kW/s]	3.54	9.01	14.95
	With electromagnetic brake	[kW/s]	2.41	6.99	12.32
Rated current		[A]	2.1	2.1	2.2
Maximum current		[A]	6.3	6.3	6.6
Regenerative braking frequency *2		[times/min]	1700	1200	900
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	0.0029	0.0045	0.0061
	With electromagnetic brake	[× 10^{-4} kg•m^2]	0.0042	0.0058	0.0074
Recommended load to motor inertia ratio (Note 1)			30 times or less		
Speed/position detector			Absolute/incremental 18-bit encoder (resolution: 262144 pulses/rev)		
Oil seal			None		
Insulation class			130 (B)		
Structure			Totally enclosed, natural cooling (IP rating: IP55) (Note 2)		
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)		
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)		
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust		
	Altitude		1000 m or less above sea level		
	Vibration resistance *4		X: 49 m/s^2 Y: 49 m/s^2		
Vibration rank			V10 *6		
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.		
Permissible load for the shaft *5	L	[mm]	16	16	16
	Radial	[N]	34	44	49
	Thrust	[N]	14	14	14
Mass	Standard	[kg]	0.12	0.14	0.16
	With electromagnetic brake	[kg]	0.22	0.24	0.26

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion, the connector, and the power cable leading part are excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Specifications of HG-AK_-S100 are the same as those of HG-AK_ except for the dimensions.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 2 to 6 and 8.

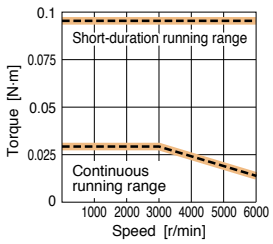
HG-AK Series Electromagnetic Brake Specifications (Note 1)

Model		HG-AK	0136B	0236B	0336B
Type			Spring actuated type safety brake		
Rated voltage			24 V DC$^{0}_{-10}$%		
Power consumption		[W] at 20 °C	1.8		
Electromagnetic brake static friction torque		[N•m]	0.095		
Permissible braking work	Per braking	[J]	4.6		
	Per hour	[J]	46		
Electromagnetic brake life (Note 2)	Number of brakings	[Times]	20000		
	Work per braking	[J]	1		

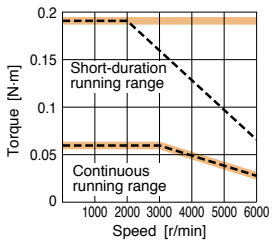
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-AK Series Torque Characteristics

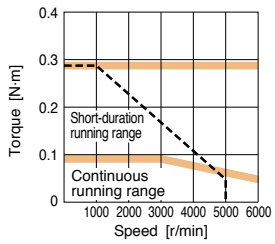
HG-AK0136(B) (Note 1, 2, 3, 4)



HG-AK0236(B) (Note 1, 2, 3, 4)



HG-AK0336(B) (Note 1, 2, 3, 4)

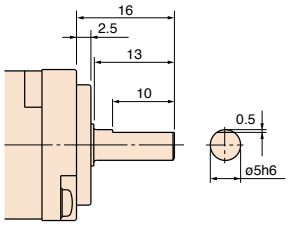


Notes: 1. ▬▬: For 48 V DC.
2. - - - -: For 24 V DC.
3. Torque drops when the power supply voltage is below the specified value.
4. The torque characteristics are applicable when optional MR-J4W03PWCBL5M-H or MR-J4W03PWBRCBL5M-H is used between the servo amplifier and the servo motor. When an option cable longer than 5 m is used, the torque characteristics in the short-duration running range may be lower because of voltage drop.

HG-AK Series Special Shaft End Specifications (Note 1)

Motors with the following specifications are also available.

D-cut shaft

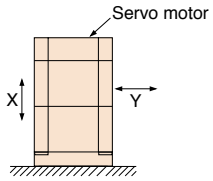


[Unit: mm]

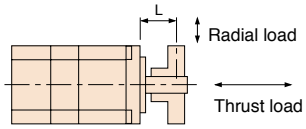
Notes: 1. Specifications of HG-AK_-S100 are the same as those of HG-AK_ except for the dimensions.

Annotations for Rotary Servo Motor Specifications

* 1. The power supply capacity varies depending on the power supply impedance.
* 2. The regenerative braking frequency shows the permissible frequency when the servo motor, without a load and a regenerative option, decelerates from the rated speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Moment of inertia of load/Moment of inertia of servo motor.
When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (operating speed/rated speed). Take measures to keep the regenerative power [W] during operation below the permissible regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software.
Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
* 3. In the environment where the servo motor is exposed to oil mist, oil and/or water, a standard specification servo motor may not be usable. Contact your local sales office for more details.
* 4. The vibration direction is shown in the diagram below. The numerical value indicates the maximum value of the component (commonly the bracket in the opposite direction of the servo motor shaft).
Fretting more likely occurs on the bearing when the servo motor stops. Thus, maintain vibration level at approximately one-half of the allowable value.

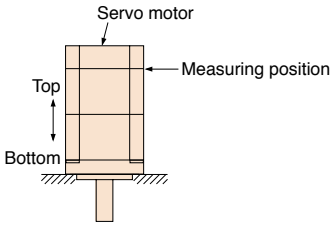


* 5. Refer to the diagram below for the permissible load for the shaft. Do not apply a load exceeding the value specified in the table on the shaft. The values in the table are applicable when each load is applied singly.

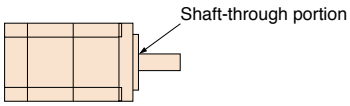


L: Distance between the flange mounting surface and the center of load

* 6. V10 indicates that the amplitude of the servo motor itself is 10 μm or less. The following shows mounting posture and measuring position of the servo motor during the measurement:



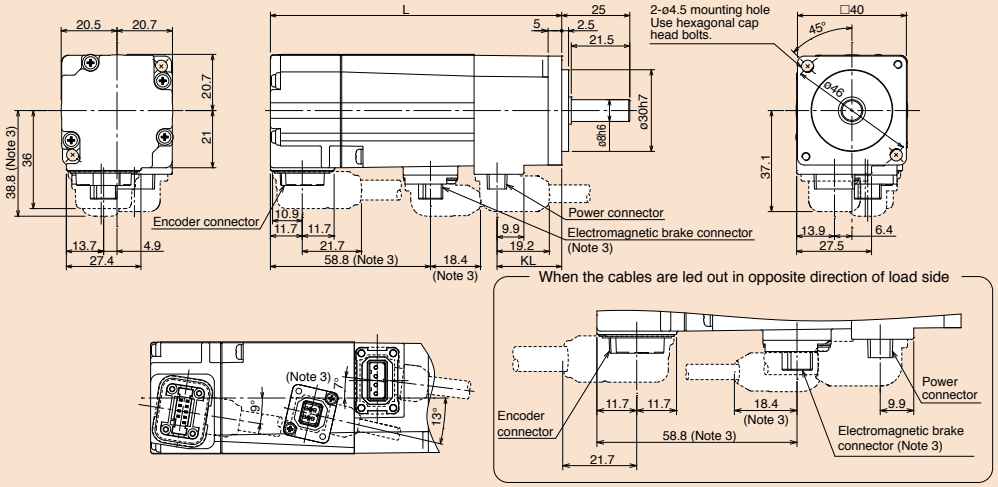
* 7. Refer to the diagram below for shaft-through portion.



* 8. The power supply capacity varies depending on the DC power supply and the wiring impedance.

HG-KR/HG-MR Series Dimensions (Note 1, 5, 6)

●HG-KR053(B), HG-KR13(B)
●HG-MR053(B), HG-MR13(B)



Power connector

Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

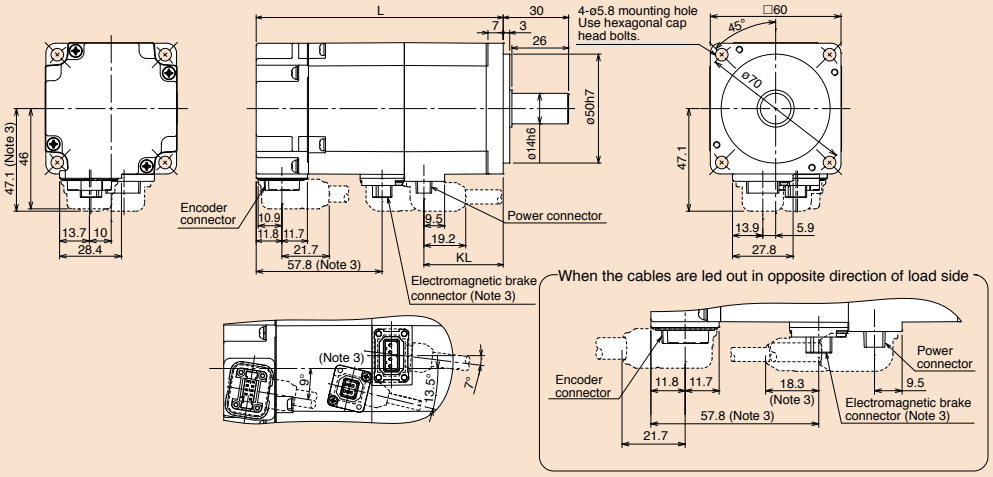
Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

Model	Variable dimensions (Note 4)	
	L	KL
HG-KR053(B) HG-MR053(B)	66.4 (107)	23.8
HG-KR13(B) HG-MR13(B)	82.4 (123)	39.8

[Unit: mm]

●HG-KR23(B), HG-KR43(B)
●HG-MR23(B), HG-MR43(B)



Power connector

Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

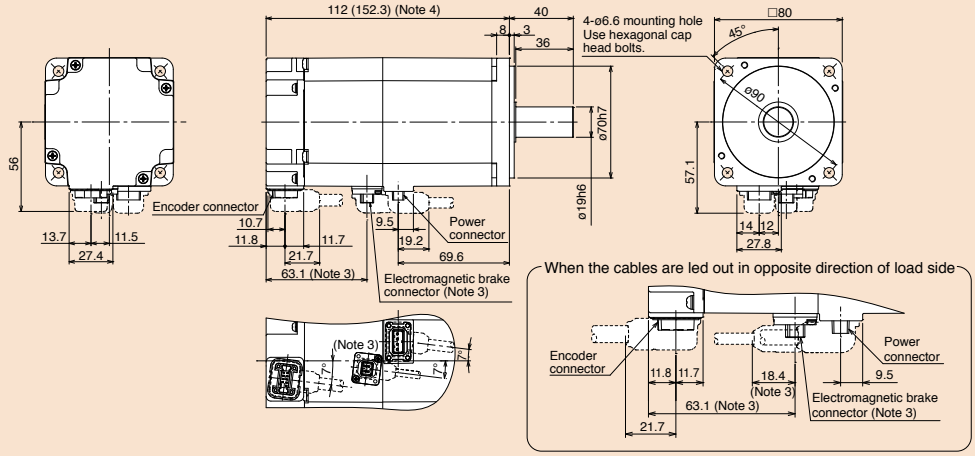
Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

Model	Variable dimensions (Note 4)	
	L	KL
HG-KR23(B) HG-MR23(B)	76.6 (113.4)	36.4
HG-KR43(B) HG-MR43(B)	98.3 (135.1)	58.1

[Unit: mm]

●HG-KR73(B)
●HG-MR73(B)



Power connector

Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

Electromagnetic brake connector (Note 2)

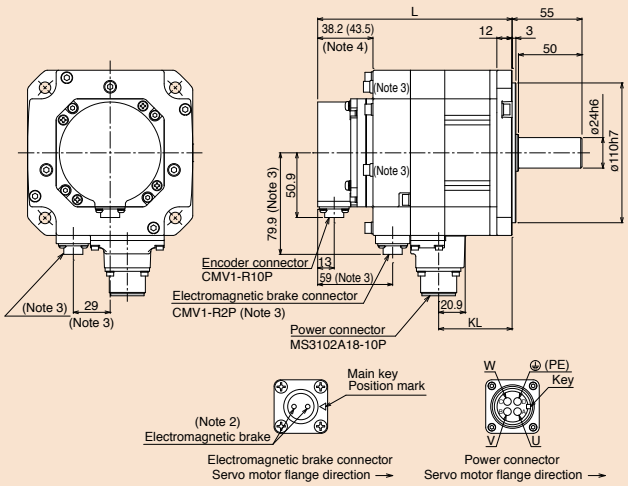
Pin No.	Signal name
1	B1
2	B2

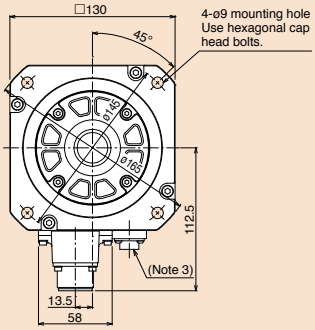
[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.
6. Servo motors with oil seal (HG-KR_J and HG-MR_J) have different dimensions. Contact your local sales office for more details.

HG-SR Series Dimensions (Note 1, 5)

●HG-SR51(B), HG-SR81(B)
●HG-SR52(B), HG-SR102(B), HG-SR152(B), HG-SR524(B), HG-SR1024(B), HG-SR1524(B)

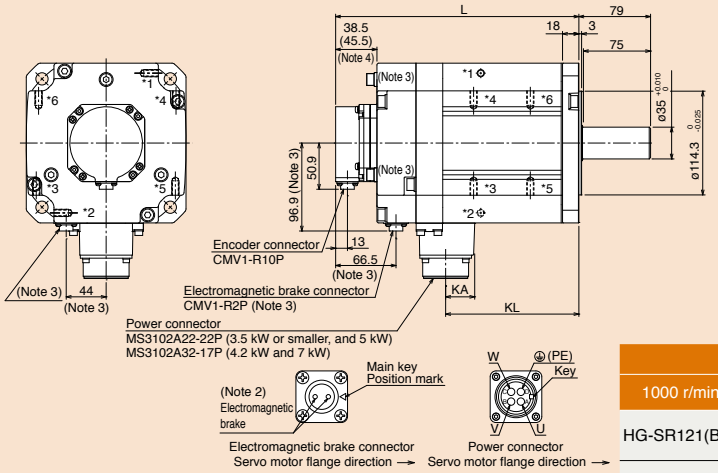


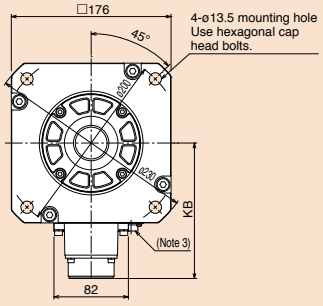


Model		Variable dimensions (Note 4)	
1000 r/min	2000 r/min	L	KL
-	HG-SR52(B) HG-SR524(B)	118.5 (153)	57.8
HG-SR51(B)	HG-SR102(B) HG-SR1024(B)	132.5 (167)	71.8
HG-SR81(B)	HG-SR152(B) HG-SR1524(B)	146.5 (181)	85.8

[Unit: mm]

●HG-SR121(B), HG-SR201(B), HG-SR301(B), HG-SR421(B)
●HG-SR202(B), HG-SR352(B), HG-SR502(B), HG-SR702(B), HG-SR2024(B), HG-SR3524(B), HG-SR5024(B), HG-SR7024(B)





Model		Variable dimensions (Note 4)			
1000 r/min	2000 r/min	L	KL	KA	KB
HG-SR121(B)	HG-SR202(B) HG-SR2024(B)	138.5 (188)	74.8	24.8	140.9
HG-SR201(B)	HG-SR352(B) HG-SR3524(B)	162.5 (212)	98.8		
HG-SR301(B)	HG-SR502(B) HG-SR5024(B)	178.5 (228)	114.8		
HG-SR421(B)	HG-SR702(B) HG-SR7024(B)	218.5 (268)	146.8	32	149.1

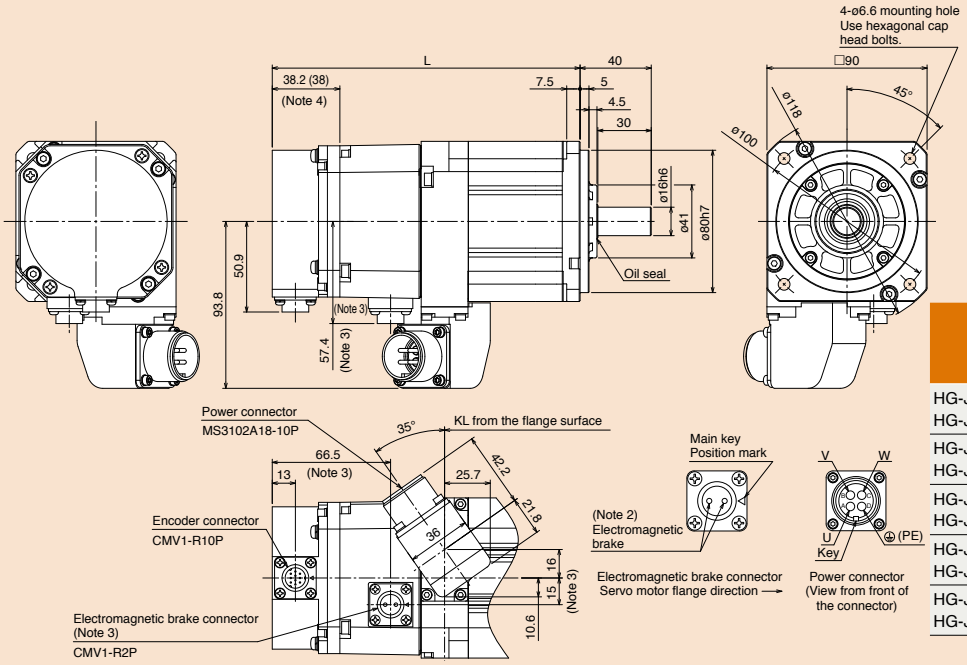
[Unit: mm]

*1, *2, *3, *4, *5 and *6 are screw holes (M8) for eyebolt.
•HG-SR201(B), 301(B), 352(4)(B), 502(4)(B): *1, *2
•HG-SR421(B), 702(4)(B): *3, *4, *5, *6

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-JR Series Dimensions (Note 1, 5)

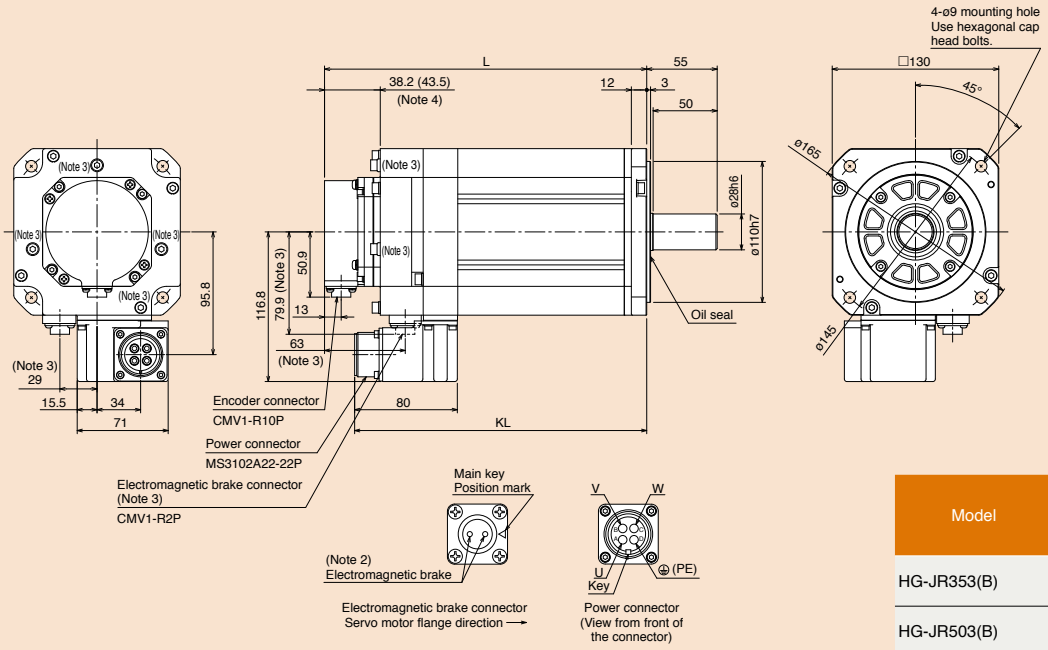
●HG-JR53(B), HG-JR73(B), HG-JR103(B), HG-JR153(B), HG-JR203(B), HG-JR534(B), HG-JR734(B), HG-JR1034(B), HG-JR1534(B), HG-JR2034(B)



Model	Variable dimensions (Note 4)	
	L	KL
HG-JR53(B) HG-JR534(B)	127.5 (173)	76
HG-JR73(B) HG-JR734(B)	145.5 (191)	94
HG-JR103(B) HG-JR1034(B)	163.5 (209)	112
HG-JR153(B) HG-JR1534(B)	199.5 (245)	148
HG-JR203(B) HG-JR2034(B)	235.5 (281)	184

[Unit: mm]

●HG-JR353(B), HG-JR503(B)



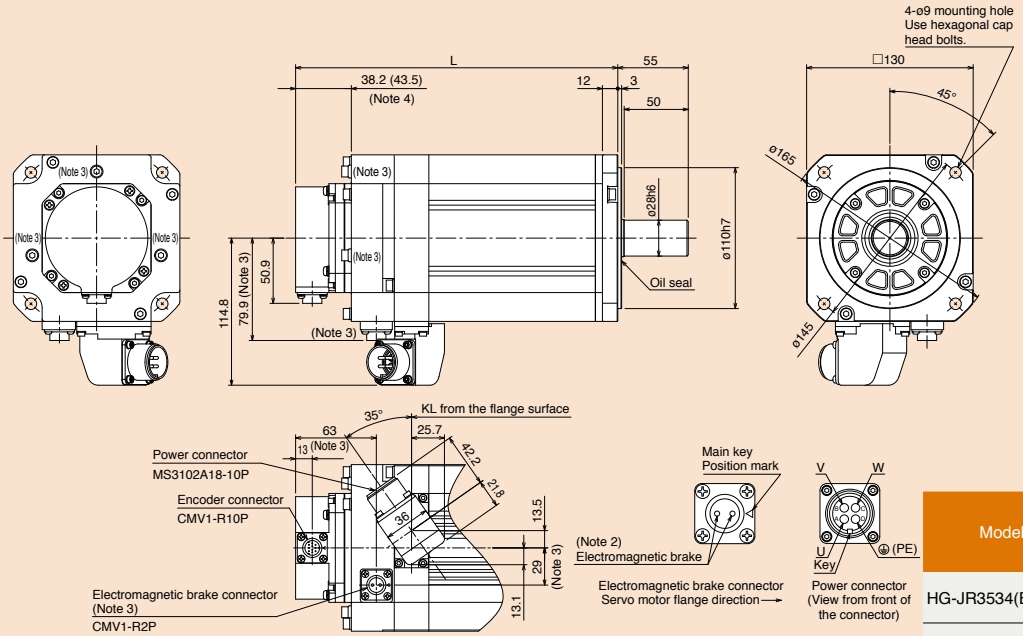
Model	Variable dimensions (Note 4)	
	L	KL
HG-JR353(B)	213 (251.5)	228
HG-JR503(B)	267 (305.5)	282

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-JR Series Dimensions (Note 1, 5)

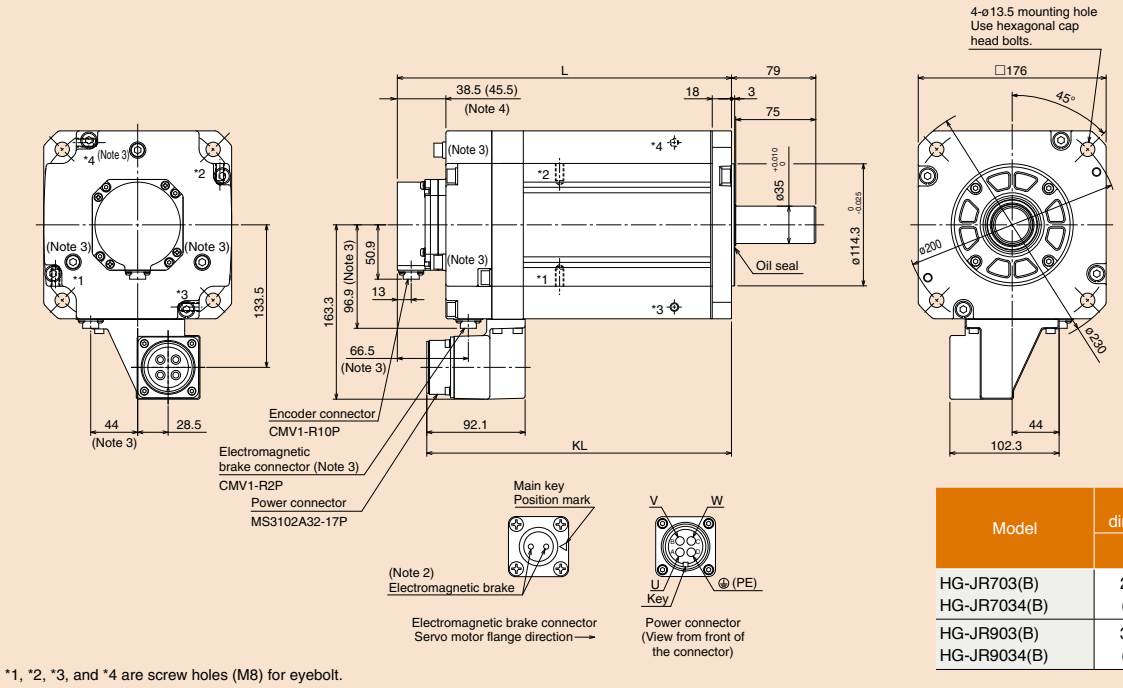
●HG-JR3534(B), HG-JR5034(B)



Model	Variable dimensions (Note 4)	
	L	KL
HG-JR3534(B)	213 (251.5)	161
HG-JR5034(B)	267 (305.5)	215

[Unit: mm]

●HG-JR703(B), HG-JR903(B), HG-JR7034(B), HG-JR9034(B)



Model	Variable dimensions (Note 4)	
	L	KL
HG-JR703(B) HG-JR7034(B)	263.5 (313)	285.4
HG-JR903(B) HG-JR9034(B)	303.5 (353)	325.4

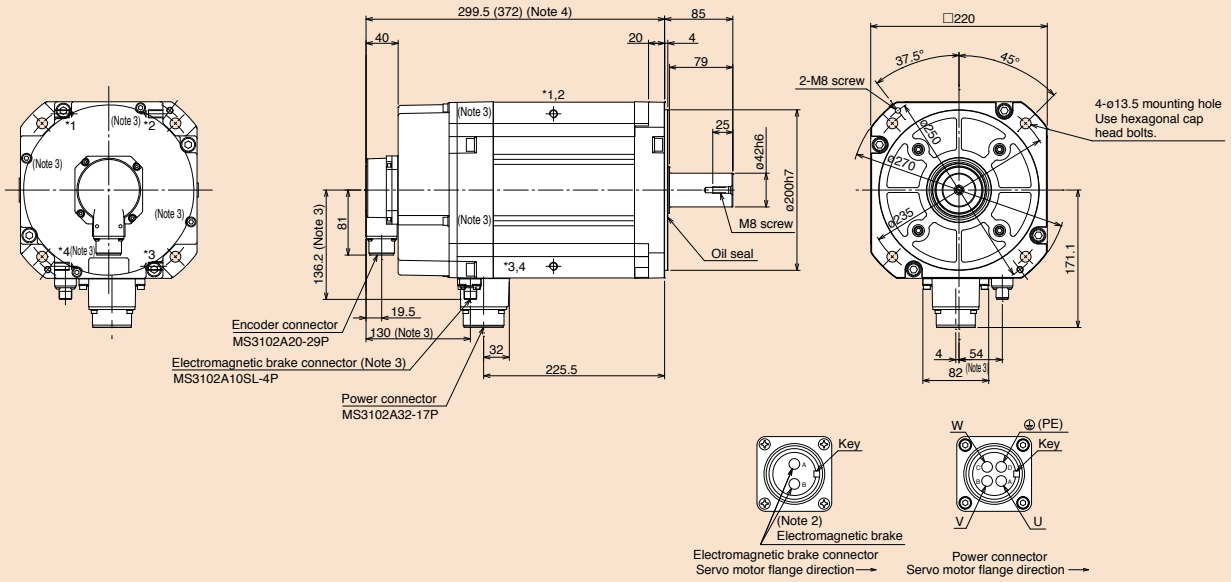
*1, *2, *3, and *4 are screw holes (M8) for eyebolt.

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-JR Series Dimensions (Note 1, 5)

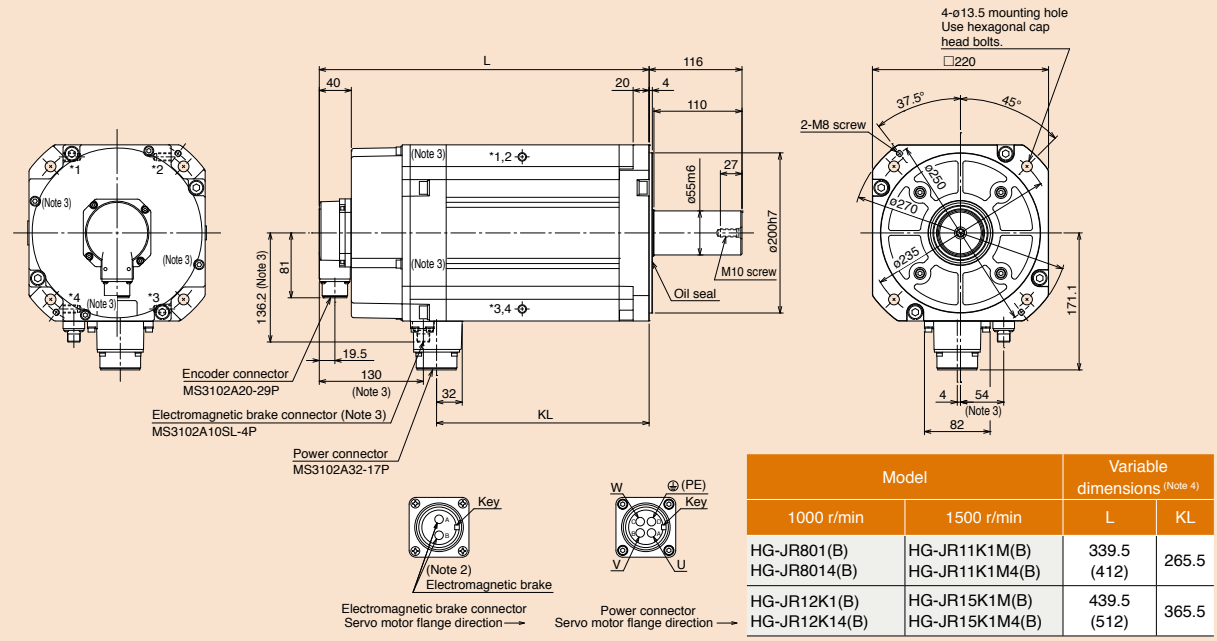
●HG-JR601(B), HG-JR701M(B), HG-JR6014(B), HG-JR701M4(B)



*1, *2, *3, and *4 are screw holes (M10) for eyebolt.

[Unit: mm]

●HG-JR801(B), HG-JR12K1(B), HG-JR8014(B), HG-JR12K14(B)
●HG-JR11K1M(B), HG-JR15K1M(B), HG-JR11K1M4(B), HG-JR15K1M4(B)



Model		Variable dimensions (Note 4)	
1000 r/min	1500 r/min	L	KL
HG-JR801(B) HG-JR8014(B)	HG-JR11K1M(B) HG-JR11K1M4(B)	339.5 (412)	265.5
HG-JR12K1(B) HG-JR12K14(B)	HG-JR15K1M(B) HG-JR15K1M4(B)	439.5 (512)	365.5

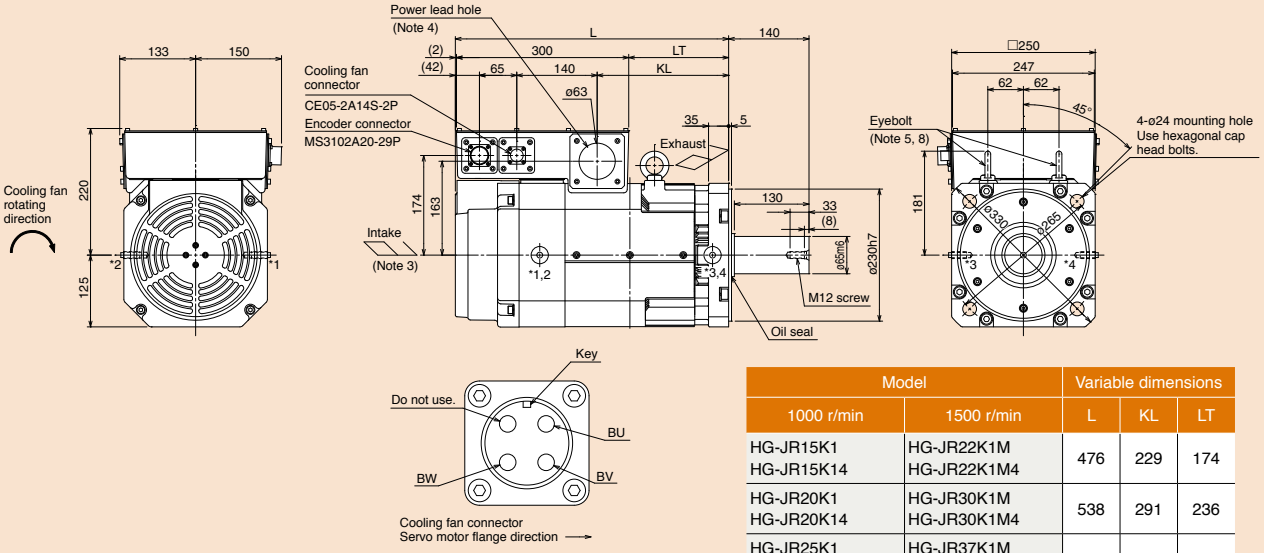
*1, *2, *3, and *4 are screw holes (M10) for eyebolt.

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-JR Series Dimensions (Note 1, 2, 6)

●HG-JR15K1, HG-JR20K1, HG-JR25K1, HG-JR15K14, HG-JR20K14, HG-JR25K14
●HG-JR22K1M (Note 7), HG-JR30K1M, HG-JR37K1M, HG-JR22K1M4 (Note 7), HG-JR30K1M4, HG-JR37K1M4

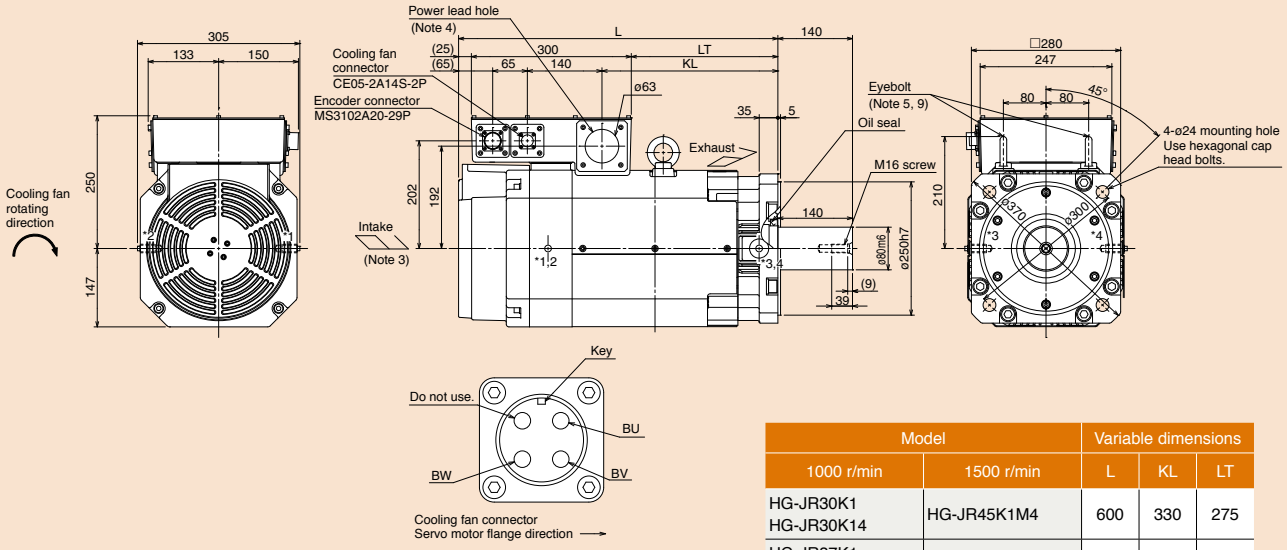


Model		Variable dimensions		
1000 r/min	1500 r/min	L	KL	LT
HG-JR15K1 HG-JR15K14	HG-JR22K1M HG-JR22K1M4	476	229	174
HG-JR20K1 HG-JR20K14	HG-JR30K1M HG-JR30K1M4	538	291	236
HG-JR25K1 HG-JR25K14	HG-JR37K1M HG-JR37K1M4	600	353	298

*1, *2, *3, and *4 are screw holes (M12) for eyebolt.

[Unit: mm]

●HG-JR30K1, HG-JR37K1, HG-JR30K14, HG-JR37K14
●HG-JR45K1M4, HG-JR55K1M4



Model		Variable dimensions		
1000 r/min	1500 r/min	L	KL	LT
HG-JR30K1 HG-JR30K14	HG-JR45K1M4	600	330	275
HG-JR37K1 HG-JR37K14	HG-JR55K1M4	664	394	339

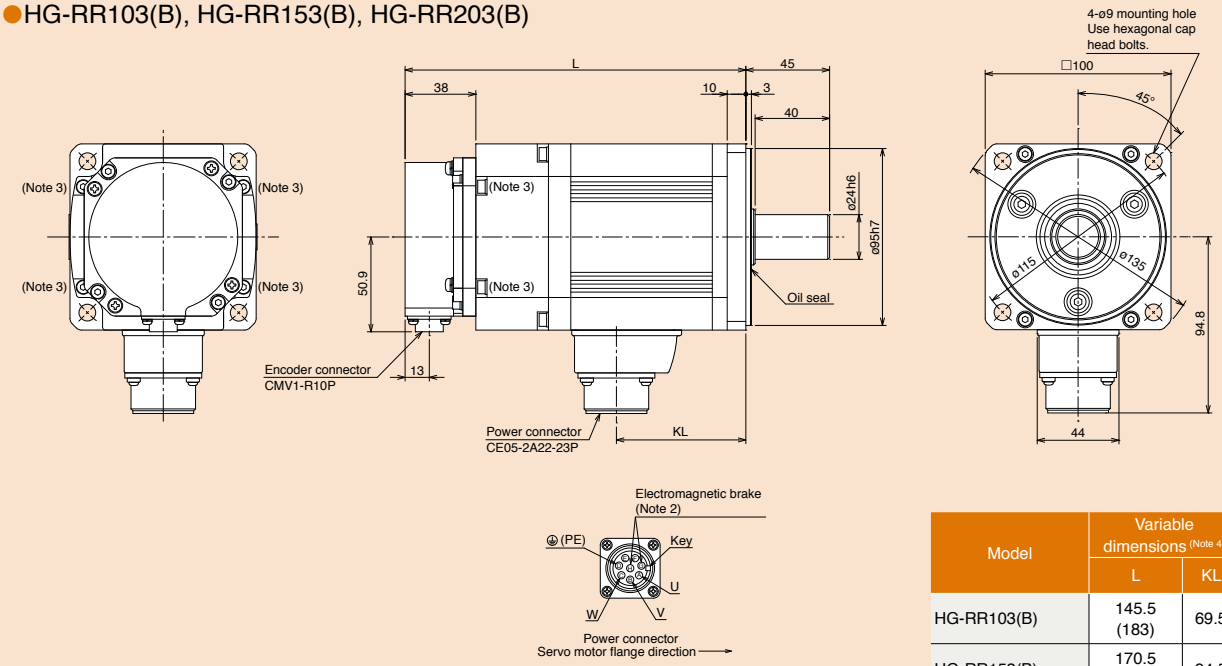
*1, *2, *3, and *4 are screw holes (M16) for eyebolt.

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. Use a friction coupling to fasten a load.
3. Leave a clearance of at least 150 mm between the intake side of the servo motor and wall.
4. Prevent oil, water, dust, and other foreign matter from entering the servo motor through the lead hole.
5. A washer is placed between the eyebolt and the servo motor to adjust the bolt angle.
6. The terminal block in the terminal box consists of M10 screws for the motor power input (U, V, and W).
7. HG-JR22K1M/HG-JR22K1M4 have been modified from September 2014 production. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the previous dimensions.
8. When using the servo motor without the eyebolt, plug the threaded hole with a bolt of M12 × 20 or shorter.
9. When using the servo motor without the eyebolt, plug the threaded hole with a bolt of M16 × 20 or shorter.

HG-RR Series Dimensions (Note 1, 5)

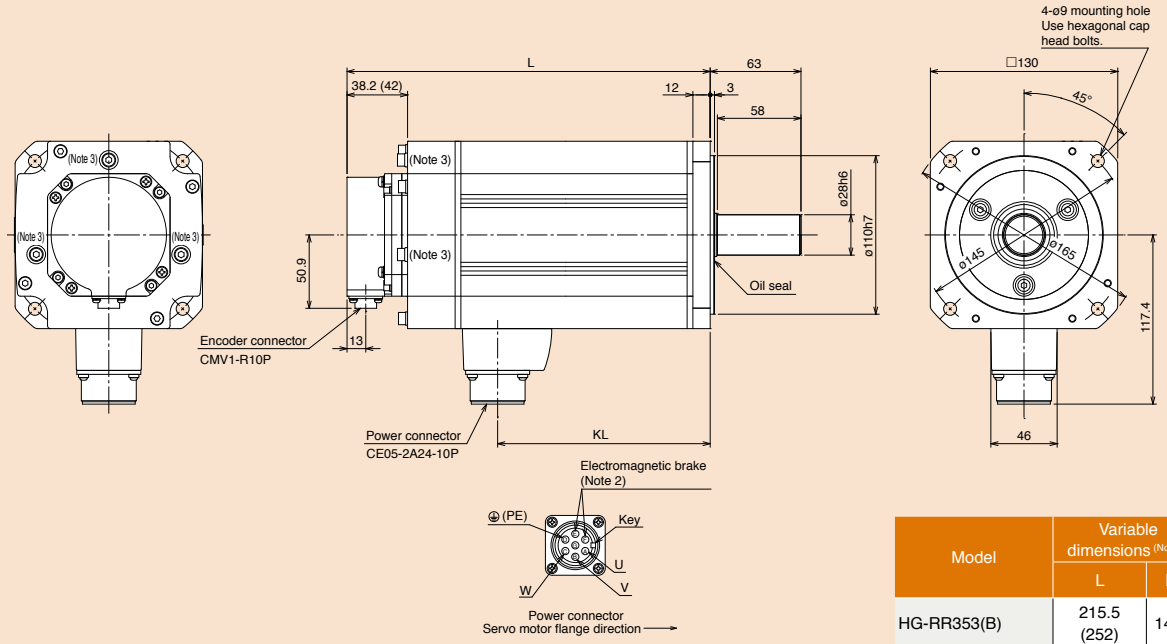
●HG-RR103(B), HG-RR153(B), HG-RR203(B)



Model	Variable dimensions (Note 4)	
	L	KL
HG-RR103(B)	145.5 (183)	69.5
HG-RR153(B)	170.5 (208)	94.5
HG-RR203(B)	195.5 (233)	119.5

[Unit: mm]

●HG-RR353(B), HG-RR503(B)



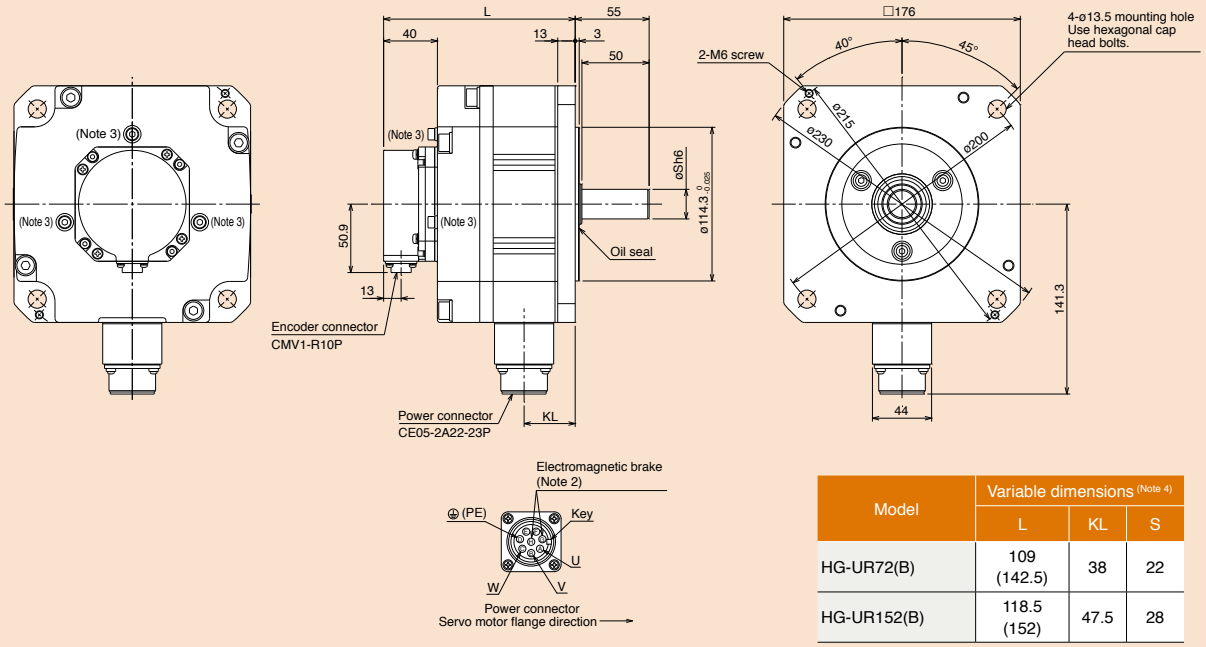
Model	Variable dimensions (Note 4)	
	L	KL
HG-RR353(B)	215.5 (252)	147.5
HG-RR503(B)	272.5 (309)	204.5

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-UR Series Dimensions (Note 1, 5)

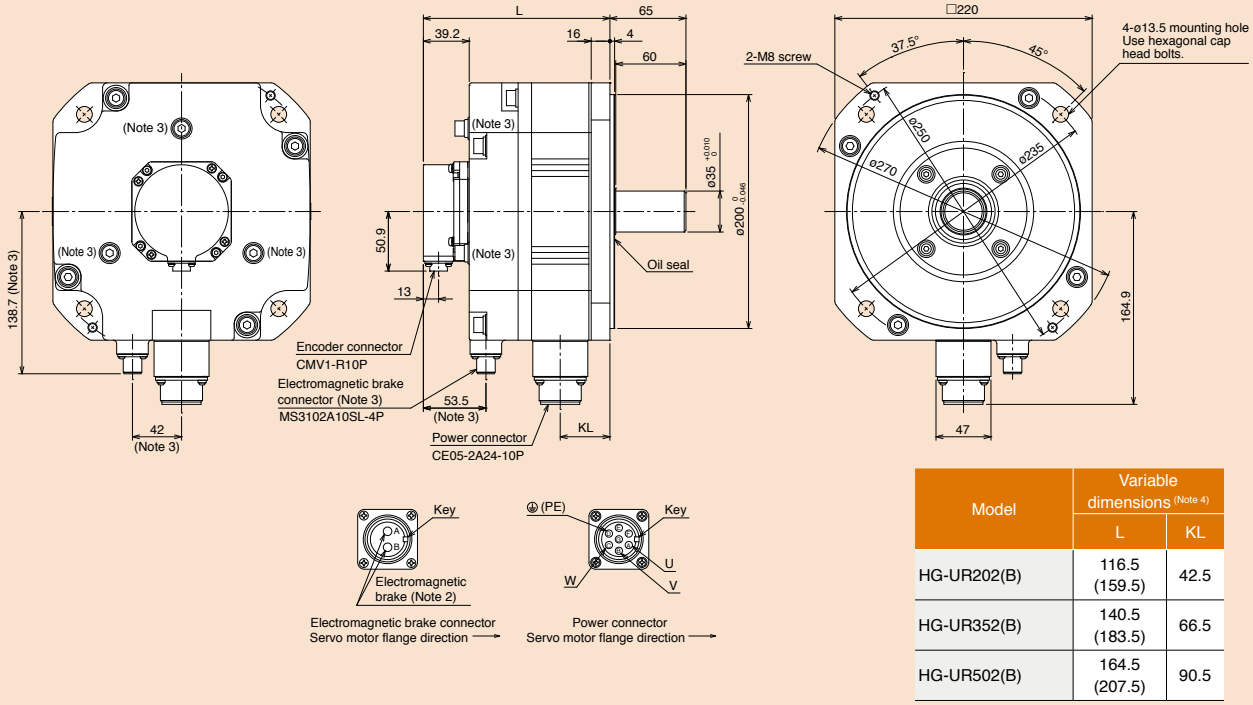
●HG-UR72(B), HG-UR152(B)



Model	Variable dimensions (Note 4)		
	L	KL	S
HG-UR72(B)	109 (142.5)	38	22
HG-UR152(B)	118.5 (152)	47.5	28

[Unit: mm]

●HG-UR202(B), HG-UR352(B), HG-UR502(B)



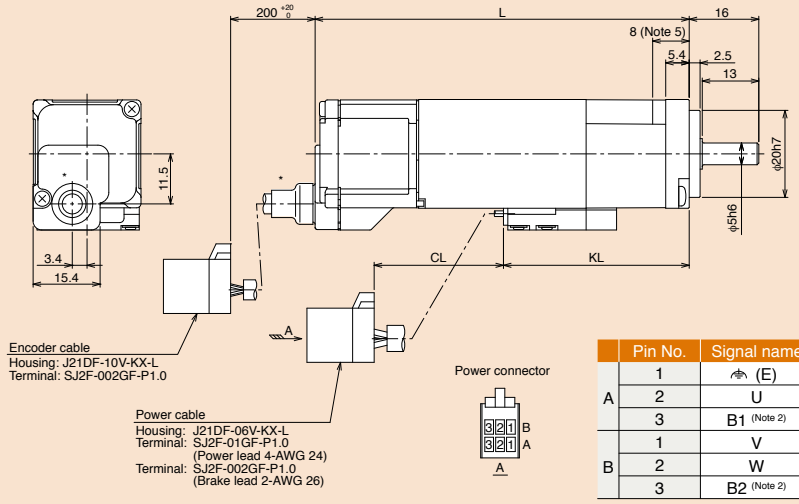
Model	Variable dimensions (Note 4)	
	L	KL
HG-UR202(B)	116.5 (159.5)	42.5
HG-UR352(B)	140.5 (183.5)	66.5
HG-UR502(B)	164.5 (207.5)	90.5

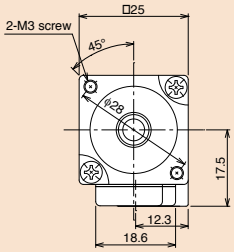
[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

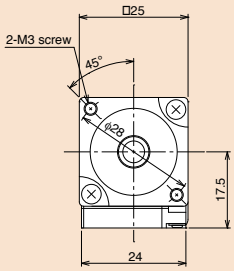
HG-AK Series Dimensions (Note 1, 4)

●HG-AK0136(B), HG-AK0236(B), HG-AK0336(B)





For servo motor without electromagnetic brake



For servo motor with electromagnetic brake

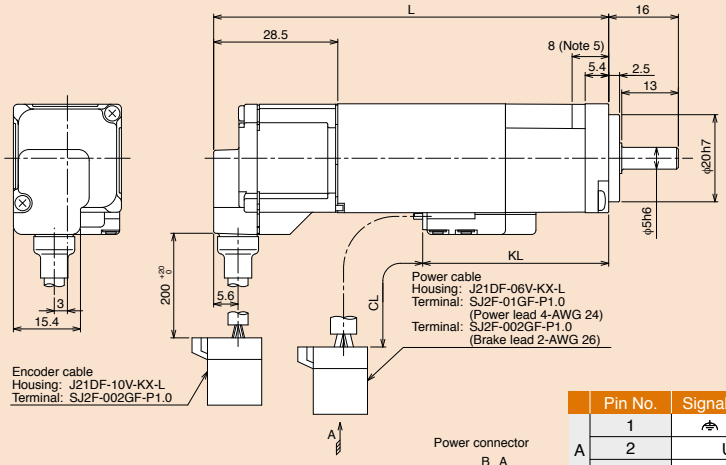
	Pin No.	Signal name
A	1	⏚ (E)
	2	U
	3	B1 (Note 2)
B	1	V
	2	W
	3	B2 (Note 2)

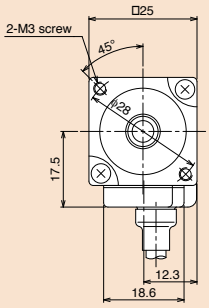
* The encoder cable leading portion has been modified from April 2013 production.

Model	Variable dimensions (Note 3)		
	L	KL	CL
HG-AK0136(B)	54 (86)	30.7 (42.7)	225^{+20}_{0} (245^{+20}_{0})
HG-AK0236(B)	61 (93)	37.7 (49.7)	
HG-AK0336(B)	68 (100)	44.7 (56.7)	

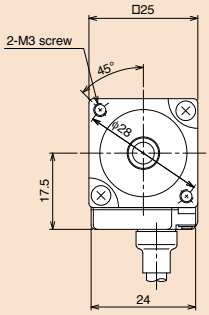
[Unit: mm]

●HG-AK0136(B)-S100, HG-AK0236(B)-S100, HG-AK0336(B)-S100





For servo motor without electromagnetic brake



For servo motor with electromagnetic brake

	Pin No.	Signal name
A	1	⏚ (E)
	2	U
	3	B1 (Note 2)
B	1	V
	2	W
	3	B2 (Note 2)

Model	Variable dimensions (Note 3)		
	L	KL	CL
HG-AK0136(B)-S100	58.7 (90.7)	30.7 (42.7)	225^{+20}_{0} (245^{+20}_{0})
HG-AK0236(B)-S100	65.7 (97.7)	37.7 (49.7)	
HG-AK0336(B)-S100	72.7 (104.7)	44.7 (56.7)	

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Dimensions in brackets are for the models with electromagnetic brake.
4. Use a friction coupling to fasten a load.
5. Select a mounting screw whose length is within this dimension.

● Linear Servo Motors

Model Designation

● LM-H3 series

L M - H 3 P 2 A - 0 7 P - □ (Primary side: coil)

Symbol	Length (nominal) [mm]
A	128
B	224
C	320
D	416

Symbol	Width (nominal) [mm]
2	50
3	65
7	100

Symbol	Maximum speed [m/s]
P	3.0

Symbol	Continuous thrust [N]
07	70
12	120
24	240
36	360
48	480
72	720
96	960

Symbol	Linear servo motor model
BSS0	LM-H3P2A-07P
CSS0	LM-H3P3A-12P
	LM-H3P3B-24P
	LM-H3P3C-36P
	LM-H3P3D-48P
ASS0	LM-H3P7A-24P
	LM-H3P7B-48P
	LM-H3P7C-72P
	LM-H3P7D-96P

Primary side (coil)

L M - H 3 S 2 0 - 2 8 8 - □ (Secondary side: magnet)

Symbol	Width (nominal) [mm]
2	42
3	60
7	95

Symbol	Length (nominal) [mm]
288	288
384	384
480	480
768	768

Symbol	Linear servo motor model
BSS0	LM-H3S20-288
	LM-H3S20-384
	LM-H3S20-480
	LM-H3S20-768
CSS0	LM-H3S30-288
	LM-H3S30-384
	LM-H3S30-480
	LM-H3S30-768
ASS0	LM-H3S70-288
	LM-H3S70-384
	LM-H3S70-480
	LM-H3S70-768

Secondary side (magnet)

Model Designation

●LM-F series

L M - F P 2 B - 0 6 M - □ (primary side: coil)

Symbol	Linear servo motor model
1SS0	LM-FP2B-06M
	LM-FP2D-12M
	LM-FP2F-18M
	LM-FP4B-12M
	LM-FP4D-24M
	LM-FP4F-36M
	LM-FP4H-48M
	LM-FP5H-60M

Symbol	Maximum speed [m/s]
M	2.0

Symbol	Continuous thrust [N]	
	Natural cooling	Liquid cooling
06	300	600
12	600	1200
18	900	1800
24	1200	2400
36	1800	3600
48	2400	4800
60	3000	6000

Symbol	Length (nominal) [mm]
B	290
D	530
F	770
H	1010

Symbol	Width (nominal) [mm]
2	120
4	200
5	240

Primary side (coil)

L M - F S 2 0 - 4 8 0 - □ (Secondary side: magnet)

Symbol	Linear servo motor model
1SS0	LM-FS20-480
	LM-FS20-576
	LM-FS40-480
	LM-FS40-576
	LM-FS50-480
	LM-FS50-576

Symbol	Length (nominal) [mm]
480	480
576	576

Symbol	Width (nominal) [mm]
2	120
4	200
5	240

Secondary side (magnet)

Model Designation

●LM-K2 series

L M - K 2 P 1 A - 0 1 M - □ (Primary side: coil)

Symbol	Length (nominal) [mm]
A	138
C	330
E	522

Symbol	Height (nominal) [mm]
1	54
2	74.5
3	114.5

Symbol	Maximum speed [m/s]
M	2.0

Symbol	Continuous thrust [N]
01	120
02	240
03	360
07	720
12	1200
14	1440
24	2400

Symbol	Linear servo motor model
2SS1	LM-K2P1A-01M
	LM-K2P1C-03M
1SS1	LM-K2P2A-02M
	LM-K2P2C-07M
	LM-K2P2E-12M
	LM-K2P3C-14M
	LM-K2P3E-24M

Primary side (coil)

L M - K 2 S 1 0 - 2 8 8 - □ (Secondary side: magnet)

Symbol	Width (nominal) [mm]
1	46
2	61
3	101

Symbol	Length (nominal) [mm]
288	288
384	384
480	480
768	768

Symbol	Linear servo motor model
2SS1	LM-K2S10-288
	LM-K2S10-384
	LM-K2S10-480
	LM-K2S10-768
1SS1	LM-K2S20-288
	LM-K2S20-384
	LM-K2S20-480
	LM-K2S20-768
	LM-K2S30-288
	LM-K2S30-384
	LM-K2S30-480
	LM-K2S30-768

Secondary side (magnet)

Model Designation

●LM-U2 (medium thrust) series

L M - U 2 P A B - 0 5 M - □ (Primary side: coil)

Symbol	Linear servo motor model
0SS0	LM-U2PAB-05M
	LM-U2PAD-10M
	LM-U2PAF-15M
1SS0	LM-U2PBB-07M
	LM-U2PBD-15M
	LM-U2PBF-22M

Symbol	Maximum speed [m/s]
M	2.0

Symbol	Continuous thrust [N]
05	50
07	75
10	100
15	150
22	225

Symbol	Length (nominal) [mm]
B	130
D	250
F	370

Symbol	Width (nominal) [mm]
A	66.5
B	86.5

Primary side (coil)

L M - U 2 S A 0 - 2 4 0 - □ (Secondary side: magnet)

Symbol	Linear servo motor model
0SS0	LM-U2SA0-240
	LM-U2SA0-300
	LM-U2SA0-420
1SS0	LM-U2SB0-240
	LM-U2SB0-300
	LM-U2SB0-420

Symbol	Length (nominal) [mm]
240	240
300	300
420	420

Symbol	Width (nominal) [mm]
A	62
B	82

Secondary side (magnet)

●LM-U2 (large thrust) series

L M - U 2 P 2 B - 4 0 M - □ (Primary side: coil)

Symbol	Linear servo motor model
2SS0	LM-U2P2B-40M
	LM-U2P2C-60M
	LM-U2P2D-80M

Symbol	Maximum speed [m/s]
M	2.0

Symbol	Continuous thrust [N]
40	400
60	600
80	800

Symbol	Length (nominal) [mm]
B	286
C	406
D	526

Primary side (coil)

L M - U 2 S 2 0 - 3 0 0 - □ (Secondary side: magnet)

Symbol	Linear servo motor model
2SS0	LM-U2S20-300
	LM-U2S20-480

Symbol	Length (nominal) [mm]
300	300
480	480

Secondary side (magnet)

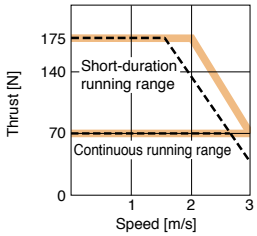
LM-H3 Series Specifications

Linear servo motor model	Primary side (coil) LM-H3		P2A-07P-BSS0	P3A-12P-CSS0	P3B-24P-CSS0	P3C-36P-CSS0	P3D-48P-CSS0	P7A-24P-ASS0	P7B-48P-ASS0	P7C-72P-ASS0	P7D-96P-ASS0
	Secondary side (magnet) LM-H3		S20-288-BSS0 S20-384-BSS0 S20-480-BSS0 S20-768-BSS0	S30-288-CSS0 S30-384-CSS0 S30-480-CSS0 S30-768-CSS0				S70-288-ASS0 S70-384-ASS0 S70-480-ASS0 S70-768-ASS0			
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
	MR-J4W_-										
Power supply capacity		[kVA]	0.9	0.9	1.3	1.9	3.5	1.3	3.5	3.8	5.5
Cooling method			Natural cooling								
Thrust	Continuous (Note 5)	[N]	70	120	240	360	480	240	480	720	960
	Maximum	[N]	175	300	600	900	1200	600	1200	1800	2400
Maximum speed (Note 1)		[m/s]	3.0								
Magnetic attraction force		[N]	630	1100	2200	3300	4400	2200	4400	6600	8800
Rated current		[A]	1.8	1.7	3.4	5.1	6.8	3.4	6.8	10.2	13.6
Maximum current		[A]	5.8	5.0	9.9	14.9	19.8	9.6	19.1	28.6	38.1
Regenerative braking frequency (Note 2)	MR-J4-	[times/min]	175	95	108	78	300	108	308	210	159
	MR-J4W_-	[times/min]	173 (Note 3)	95 (Note 4)	271	197	-	241	-	-	-
Recommended load to motor mass ratio			Maximum of 35 times the mass of the linear servo motor primary side								
Insulation class			155 (F)								
Structure			Open (IP rating: IP00)								
Environment	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)								
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)								
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude		1000 m or less above sea level								
	Vibration resistance		49 m/s^2								
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Mass	Primary side (coil)	[kg]	0.9	1.3	2.3	3.3	4.3	2.2	3.9	5.6	7.3
	Secondary side (magnet)	[kg]	288 mm/pc: 0.7 384 mm/pc: 0.9 480 mm/pc: 1.1 768 mm/pc: 1.8	288 mm/pc: 1.0 384 mm/pc: 1.4 480 mm/pc: 1.7 768 mm/pc: 2.7				288 mm/pc: 2.8 384 mm/pc: 3.7 480 mm/pc: 4.7 768 mm/pc: 7.4			

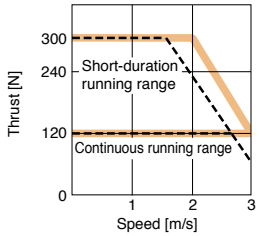
Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). Take measures to keep the regenerative power [W] during operation below the permissible regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
3. This value is applicable when MR-J4W2-44B or MR-J4W3-444B is used. The value is 942 for MR-J4W2-77B or MR-J4W2-1010B.
4. This value is applicable when MR-J4W2-44B or MR-J4W3-444B is used. The value is 497 for MR-J4W2-77B or MR-J4W2-1010B.
5. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.

LM-H3 Series Thrust Characteristics

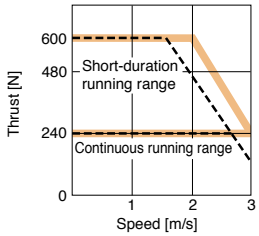
LM-H3P2A-07P-BSS0 (Note 1, 2, 4)



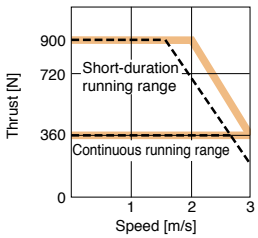
LM-H3P3A-12P-CSS0 (Note 1, 2, 4)



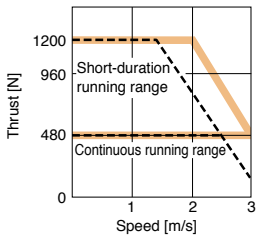
LM-H3P3B-24P-CSS0 (Note 1, 3, 4)



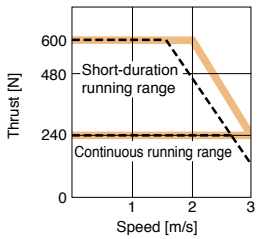
LM-H3P3C-36P-CSS0 (Note 1, 3, 4)



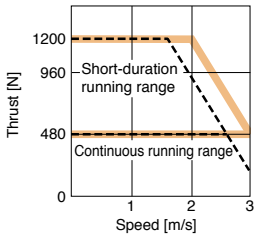
LM-H3P3D-48P-CSS0 (Note 1, 3, 4)



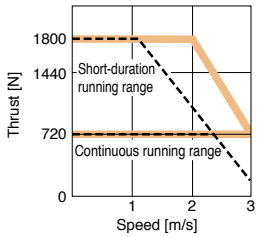
LM-H3P7A-24P-ASS0 (Note 1, 3, 4)



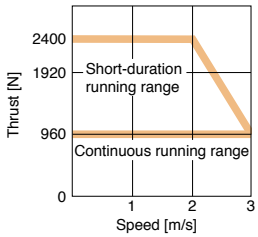
LM-H3P7B-48P-ASS0 (Note 1, 3, 4)



LM-H3P7C-72P-ASS0 (Note 1, 3, 4)



LM-H3P7D-96P-ASS0 (Note 1, 4)



Notes: 1. ▬ : For 3-phase 200 V AC.
2. - - - - : For 1-phase 200 V AC or 1-phase 100 V AC.
3. - - - - : For 1-phase 200 V AC.
4. Thrust drops when the power supply voltage is below the specified value.

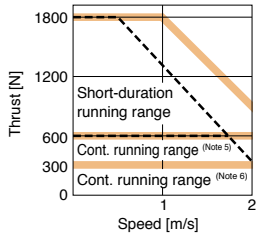
LM-F Series Specifications

Linear servo motor model	Primary side (coil) LM-F			P2B-06M-1SS0	P2D-12M-1SS0	P2F-18M-1SS0	P4B-12M-1SS0	P4D-24M-1SS0	P4F-36M-1SS0	P4H-48M-1SS0	P5H-60M-1SS0 (Note 3)
	Secondary side (magnet) LM-F			S20-480-1SS0 S20-576-1SS0			S40-480-1SS0 S40-576-1SS0				S50-480-1SS0 (Note 3) S50-576-1SS0 (Note 3)
Compatible servo amplifier model			MR-J4-	Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Power supply capacity			[kVA]	3.5	7.5	10	7.5	10	14	18	22
Cooling method				Natural cooling or liquid cooling							
Thrust	Continuous (natural cooling) (Note 4)		[N]	300	600	900	600	1200	1800	2400	3000
	Continuous (liquid cooling) (Note 4)		[N]	600	1200	1800	1200	2400	3600	4800	6000
	Maximum		[N]	1800	3600	5400	3600	7200	10800	14400	18000
Maximum speed (Note 1)			[m/s]	2.0							
Magnetic attraction force			[N]	4500	9000	13500	9000	18000	27000	36000	45000
Rated current		Natural cooling	[A]	4.0	7.8	12	7.8	15	21	28	22
		Liquid cooling	[A]	7.8	16	23	17	31	44	59	45
Maximum current			[A]	30	58	87	57	109	159	212	157
Regenerative braking frequency (Note 2)	MR-J4-	Natural cooling	[times/min]	348	264	318	393	169	577	715	4230
		Liquid cooling	[times/min]	671	396	No limit	366	224	859	1050	No limit
Recommended load to motor mass ratio				Maximum of 15 times the mass of the linear servo motor primary side							
Insulation class				155 (F)							
Structure				Open (IP rating: IP00)							
Environment	Ambient temperature			Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)							
	Ambient humidity			Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)							
	Ambience			Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude			1000 m or less above sea level							
	Vibration resistance			49 m/s^2							
Compliance to global standards				Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Mass	Primary side (coil)		[kg]	9.0	18	27	14	28	42	56	67
	Secondary side (magnet)		[kg]	480 mm/pc: 7.0 576 mm/pc: 9.0			480 mm/pc: 12 576 mm/pc: 15				480 mm/pc: 20 576 mm/pc: 24

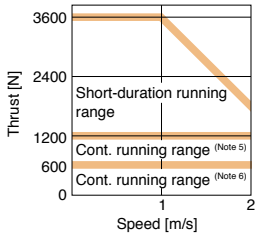
Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). Take measures to keep the regenerative power [W] during operation below the permissible regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
3. Use 400 V AC type servo amplifier for this linear servo motor.
4. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.

LM-F Series Thrust Characteristics

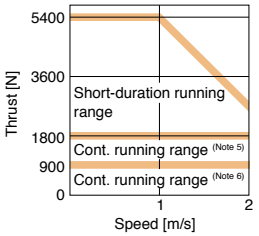
LM-FP2B-06M-1SS0 (Note 1, 3, 4)



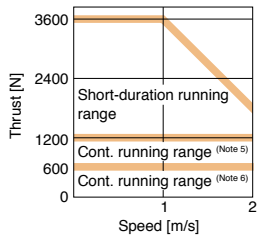
LM-FP2D-12M-1SS0 (Note 1, 4)



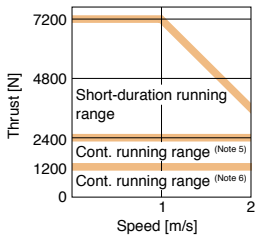
LM-FP2F-18M-1SS0 (Note 1, 4)



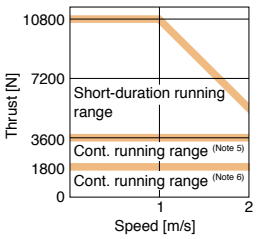
LM-FP4B-12M-1SS0 (Note 1, 4)



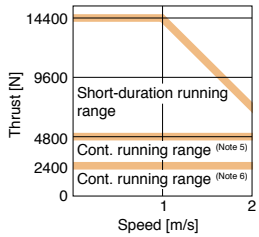
LM-FP4D-24M-1SS0 (Note 1, 4)



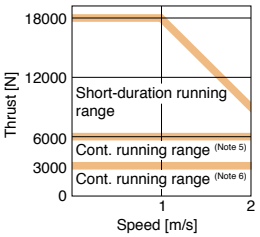
LM-FP4F-36M-1SS0 (Note 1, 4)



LM-FP4H-48M-1SS0 (Note 1, 4)



LM-FP5H-60M-1SS0 (Note 2, 4)



Notes: 1. ▬ : For 3-phase 200 V AC.
2. ▬ : For 3-phase 400 V AC.
3. - - - - : For 1-phase 200 V AC.
4. Thrust drops when the power supply voltage is below the specified value.
5. Continuous running range (liquid cooling)
6. Continuous running range (natural cooling)

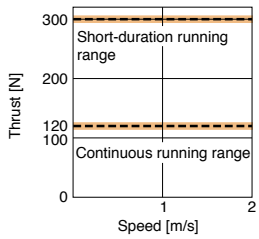
LM-K2 Series Specifications

Linear servo motor model	Primary side (coil) LM-K2		P1A-01M-2SS1	P1C-03M-2SS1	P2A-02M-1SS1	P2C-07M-1SS1	P2E-12M-1SS1	P3C-14M-1SS1	P3E-24M-1SS1
	Secondary side (magnet) (Note 4) LM-K2		S10-288-2SS1 S10-384-2SS1 S10-480-2SS1 S10-768-2SS1		S20-288-1SS1 S20-384-1SS1 S20-480-1SS1 S20-768-1SS1			S30-288-1SS1 S30-384-1SS1 S30-480-1SS1 S30-768-1SS1	
Compatible servo amplifier model		MR-J4- MR-J4W_-	Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.						
Power supply capacity		[kVA]	0.9	3.5	1.3	5.5	7.5	5.5	7.5
Cooling method			Natural cooling						
Thrust	Continuous (Note 5)	[N]	120	360	240	720	1200	1440	2400
	Maximum	[N]	300	900	600	1800	3000	3600	6000
Maximum speed (Note 1)		[m/s]	2.0						
Magnetic attraction force (Note 6)		[N]	0						
Magnetic attraction force (one side) (Note 7)			800	2400	1100	3200	5300	6400	10700
Rated current		[A]	2.3	6.8	3.7	12	19	15	25
Maximum current		[A]	7.6	23	13	39	65	47	79
Regenerative braking frequency (Note 2)	MR-J4-	[times/min]	111	427	142	281	226	152	124
	MR-J4W_-	[times/min]	110 (Note 3)	-	355	-	-	-	-
Recommended load to motor mass ratio			Maximum of 30 times the mass of the linear servo motor primary side						
Insulation class			155 (F)						
Structure			Open (IP rating: IP00)						
Environment	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)						
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)						
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude		1000 m or less above sea level						
	Vibration resistance		49 m/s^2						
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.						
Mass	Primary side (coil)	[kg]	2.5	6.5	4.0	10	16	18	27
	Secondary side (magnet)	[kg]	288 mm/pc: 1.5 384 mm/pc: 2.0 480 mm/pc: 2.5 768 mm/pc: 3.9		288 mm/pc: 1.9 384 mm/pc: 2.5 480 mm/pc: 3.2 768 mm/pc: 5.0			288 mm/pc: 5.5 384 mm/pc: 7.3 480 mm/pc: 9.2 768 mm/pc: 14.6	

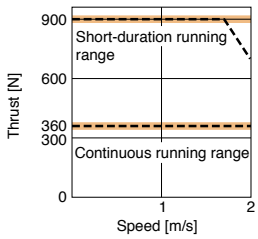
Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). Take measures to keep the regenerative power [W] during operation below the permissible regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
3. This value is applicable when MR-J4W2-44B or MR-J4W3-444B is used. The value is 584 for MR-J4W2-77B or MR-J4W2-1010B.
4. LM-K2 series has a structure of magnetic attraction counter-force and requires at least two blocks of identical secondary side (magnet).
5. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.
6. Magnetic attraction force is caused by assembly precision, etc.
7. Magnetic attraction force which occurs on one side of the secondary side is shown.

LM-K2 Series Thrust Characteristics

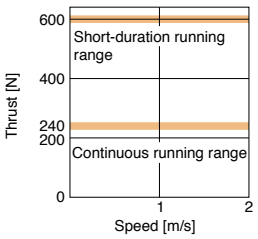
LM-K2P1A-01M-2SS1 (Note 1, 3, 5)



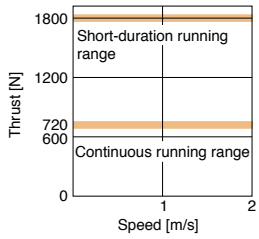
LM-K2P1C-03M-2SS1 (Note 2, 4, 5)



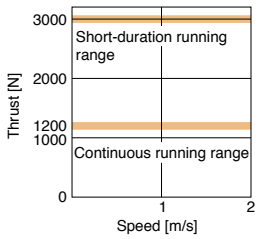
LM-K2P2A-02M-1SS1 (Note 1, 5)



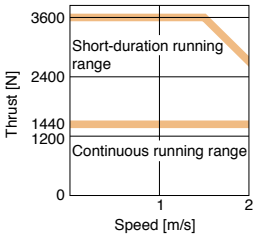
LM-K2P2C-07M-1SS1 (Note 2, 5)



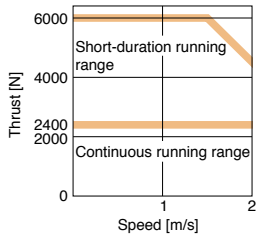
LM-K2P2E-12M-1SS1 (Note 2, 5)



LM-K2P3C-14M-1SS1 (Note 2, 5)



LM-K2P3E-24M-1SS1 (Note 2, 5)



Notes: 1. ▬ : For 3-phase 200 V AC or 1-phase 200 V AC.
2. ▬ : For 3-phase 200 V AC.
3. - - - - : For 1-phase 100 V AC.
4. - - - - : For 1-phase 200 V AC.
5. Thrust drops when the power supply voltage is below the specified value.

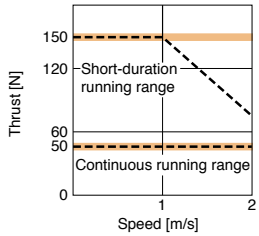
LM-U2 Series Specifications

Linear servo motor model			PAB-05M-0SS0	PAD-10M-0SS0	PAF-15M-0SS0	PBB-07M-1SS0	PBD-15M-1SS0	PBF-22M-1SS0	P2B-40M-2SS0	P2C-60M-2SS0	P2D-80M-2SS0
Primary side (coil) LM-U2											
Secondary side (magnet) LM-U2			SA0-240-0SS0 SA0-300-0SS0 SA0-420-0SS0			SB0-240-1SS0 SB0-300-1SS0 SB0-420-1SS0			S20-300-2SS0 S20-480-2SS0		
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
	MR-J4W_-										
Power supply capacity		[kVA]	0.5	0.9	0.9	0.5	1.0	1.3	3.5	5.5	7.5
Cooling method			Natural cooling								
Thrust	Continuous (Note 3)	[N]	50	100	150	75	150	225	400	600	800
	Maximum	[N]	150	300	450	225	450	675	1600	2400	3200
Maximum speed (Note 1)		[m/s]	2.0								
Magnetic attraction force		[N]	0								
Rated current		[A]	0.9	1.9	2.7	1.5	3.0	4.6	6.6	9.8	13.1
Maximum current		[A]	2.7	5.5	8.3	4.5	8.9	13.7	26.7	40.3	53.7
Regenerative braking frequency (Note 2)	MR-J4-	[times/min]	No limit	No limit	No limit	No limit	3480	No limit	1820	2800	1190
	MR-J4W_-	[times/min]	No limit	No limit	No limit	6030	No limit	No limit	-	-	-
Recommended load to motor mass ratio			Maximum of 30 times the mass of the linear servo motor primary side								
Insulation class			155 (F)								
Structure			Open (IP rating: IP00)								
Environment	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)								
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)								
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude		1000 m or less above sea level								
	Vibration resistance		49 m/s^2								
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Mass	Primary side (coil)	[kg]	0.3	0.6	0.8	0.4	0.8	1.1	2.9	4.2	5.5
	Secondary side (magnet)	[kg]	240 mm/pc: 2.0 300 mm/pc: 2.5 420 mm/pc: 3.5			240 mm/pc: 2.6 300 mm/pc: 3.2 420 mm/pc: 4.5			300 mm/pc: 9.6 480 mm/pc: 15.3		

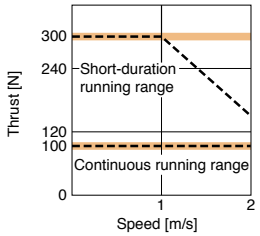
Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). Take measures to keep the regenerative power [W] during operation below the permissible regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
3. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.

LM-U2 Series Thrust Characteristics

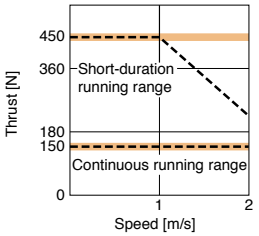
LM-U2PAB-05M-0SS0 (Note 1, 3, 5)



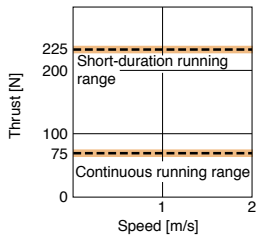
LM-U2PAD-10M-0SS0 (Note 1, 3, 5)



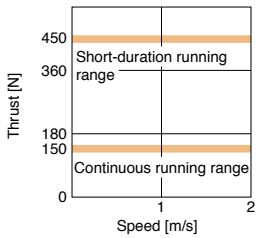
LM-U2PAF-15M-0SS0 (Note 1, 3, 5)



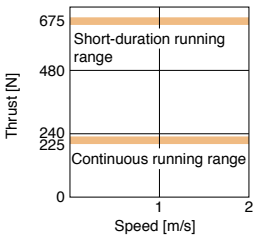
LM-U2PBB-07M-1SS0 (Note 1, 3, 5)



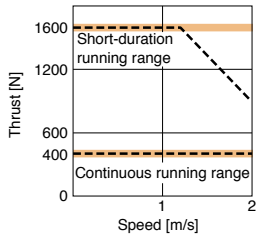
LM-U2PBD-15M-1SS0 (Note 1, 5)



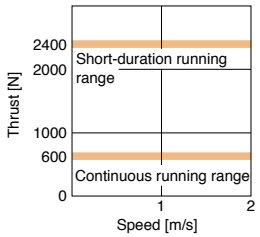
LM-U2PBF-22M-1SS0 (Note 1, 5)



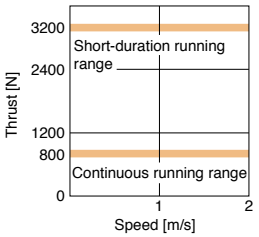
LM-U2P2B-40M-2SS0 (Note 2, 4, 5)



LM-U2P2C-60M-2SS0 (Note 2, 5)



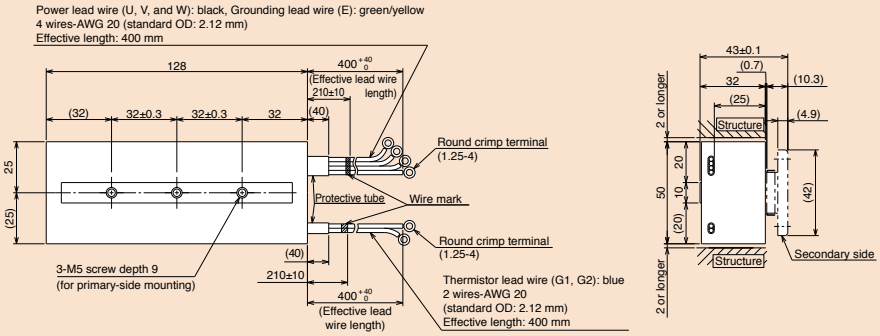
LM-U2P2D-80M-2SS0 (Note 2, 5)



Notes: 1. ▬ : For 3-phase 200 V AC or 1-phase 200 V AC.
2. ▬ : For 3-phase 200 V AC.
3. - - - - : For 1-phase 100 V AC.
4. - - - - : For 1-phase 200 V AC.
5. Thrust drops when the power supply voltage is below the specified value.

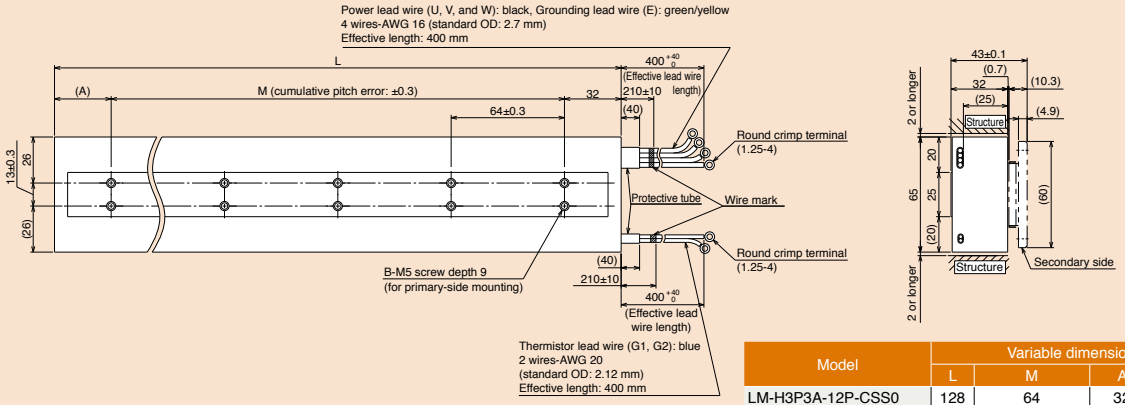
LM-H3 Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-H3P2A-07P-BSS0



[Unit: mm]

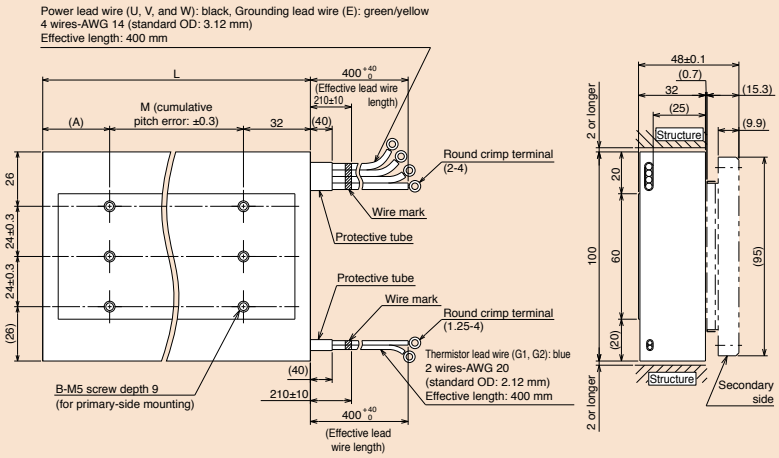
●LM-H3P3A-12P-CSS0 ●LM-H3P3B-24P-CSS0 ●LM-H3P3C-36P-CSS0 ●LM-H3P3D-48P-CSS0



[Unit: mm]

Model	Variable dimensions			
	L	M	A	B
LM-H3P3A-12P-CSS0	128	64	32	2 × 2
LM-H3P3B-24P-CSS0	224	2 × 64 = 128	64	2 × 3
LM-H3P3C-36P-CSS0	320	4 × 64 = 256	32	2 × 5
LM-H3P3D-48P-CSS0	416	5 × 64 = 320	64	2 × 6

●LM-H3P7A-24P-ASS0 ●LM-H3P7B-48P-ASS0 ●LM-H3P7C-72P-ASS0 ●LM-H3P7D-96P-ASS0



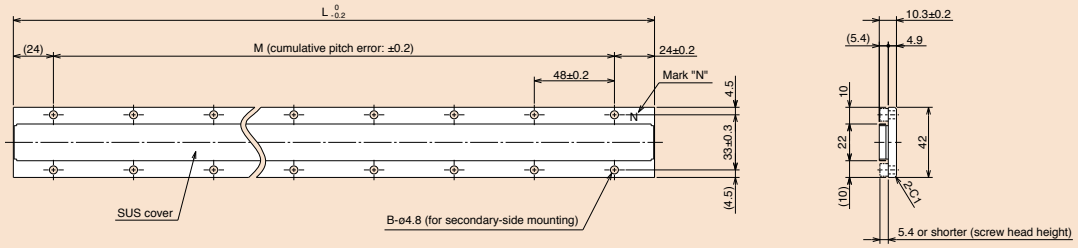
[Unit: mm]

Model	Variable dimensions			
	L	M	A	B
LM-H3P7A-24P-ASS0	128	64	32	3 × 2
LM-H3P7B-48P-ASS0	224	2 × 64 = 128	64	3 × 3
LM-H3P7C-72P-ASS0	320	4 × 64 = 256	32	3 × 5
LM-H3P7D-96P-ASS0	416	5 × 64 = 320	64	3 × 6

Notes: 1. Power, grounding and thermistor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to six times the standard overall diameter of the lead wire.

LM-H3 Series Secondary Side (Magnet) Dimensions

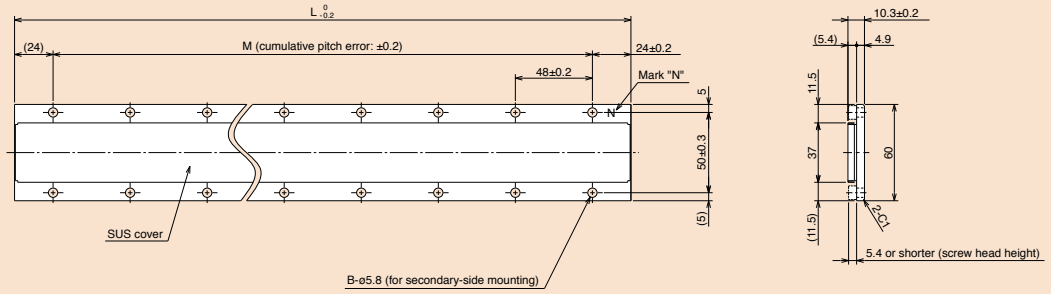
●LM-H3S20-288-BSS0 ●LM-H3S20-384-BSS0 ●LM-H3S20-480-BSS0
●LM-H3S20-768-BSS0



[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-H3S20-288-BSS0	288	5 × 48 = 240	2 × 6
LM-H3S20-384-BSS0	384	7 × 48 = 336	2 × 8
LM-H3S20-480-BSS0	480	9 × 48 = 432	2 × 10
LM-H3S20-768-BSS0	768	15 × 48 = 720	2 × 16

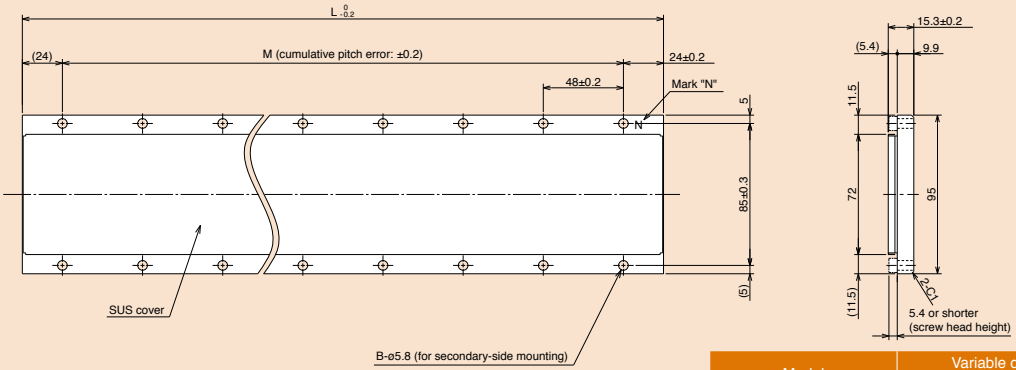
●LM-H3S30-288-CSS0 ●LM-H3S30-384-CSS0 ●LM-H3S30-480-CSS0
●LM-H3S30-768-CSS0



[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-H3S30-288-CSS0	288	5 × 48 = 240	2 × 6
LM-H3S30-384-CSS0	384	7 × 48 = 336	2 × 8
LM-H3S30-480-CSS0	480	9 × 48 = 432	2 × 10
LM-H3S30-768-CSS0	768	15 × 48 = 720	2 × 16

●LM-H3S70-288-ASS0 ●LM-H3S70-384-ASS0 ●LM-H3S70-480-ASS0
●LM-H3S70-768-ASS0

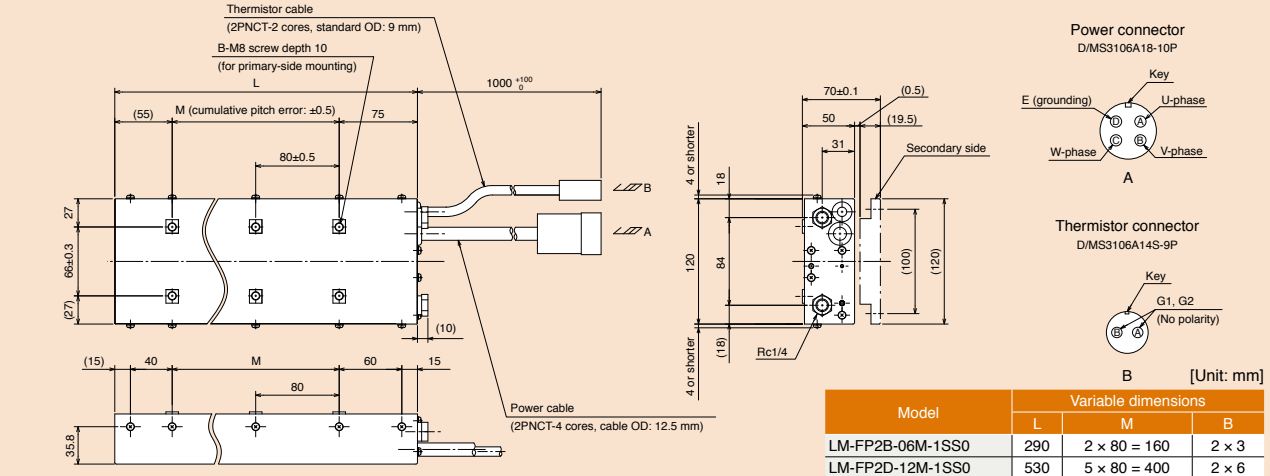


[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-H3S70-288-ASS0	288	5 × 48 = 240	2 × 6
LM-H3S70-384-ASS0	384	7 × 48 = 336	2 × 8
LM-H3S70-480-ASS0	480	9 × 48 = 432	2 × 10
LM-H3S70-768-ASS0	768	15 × 48 = 720	2 × 16

LM-F Series Primary Side (Coil) Dimensions (Note 1, 2)

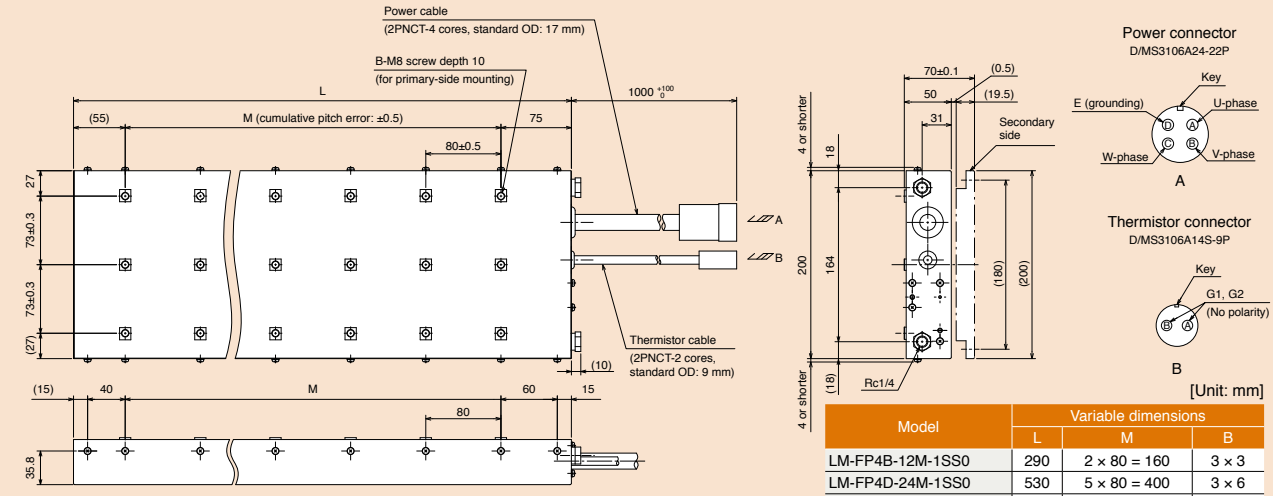
●LM-FP2B-06M-1SS0 ●LM-FP2D-12M-1SS0 ●LM-FP2F-18M-1SS0



[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-FP2B-06M-1SS0	290	2 × 80 = 160	2 × 3
LM-FP2D-12M-1SS0	530	5 × 80 = 400	2 × 6
LM-FP2F-18M-1SS0	770	8 × 80 = 640	2 × 9

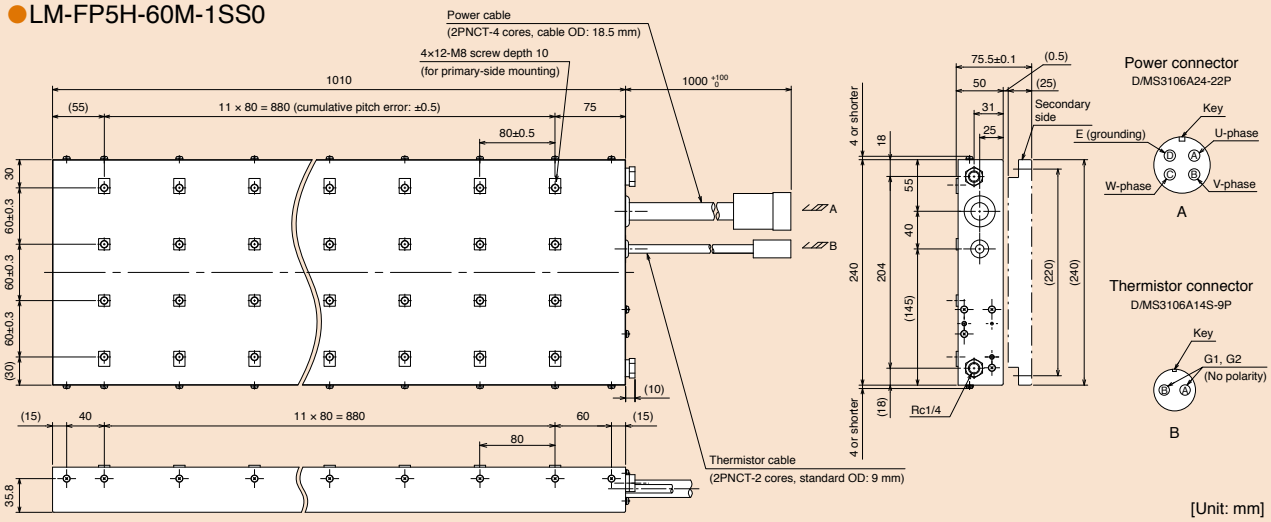
●LM-FP4B-12M-1SS0 ●LM-FP4D-24M-1SS0 ●LM-FP4F-36M-1SS0 ●LM-FP4H-48M-1SS0



[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-FP4B-12M-1SS0	290	2 × 80 = 160	3 × 3
LM-FP4D-24M-1SS0	530	5 × 80 = 400	3 × 6
LM-FP4F-36M-1SS0	770	8 × 80 = 640	3 × 9
LM-FP4H-48M-1SS0	1010	11 × 80 = 880	3 × 12

●LM-FP5H-60M-1SS0

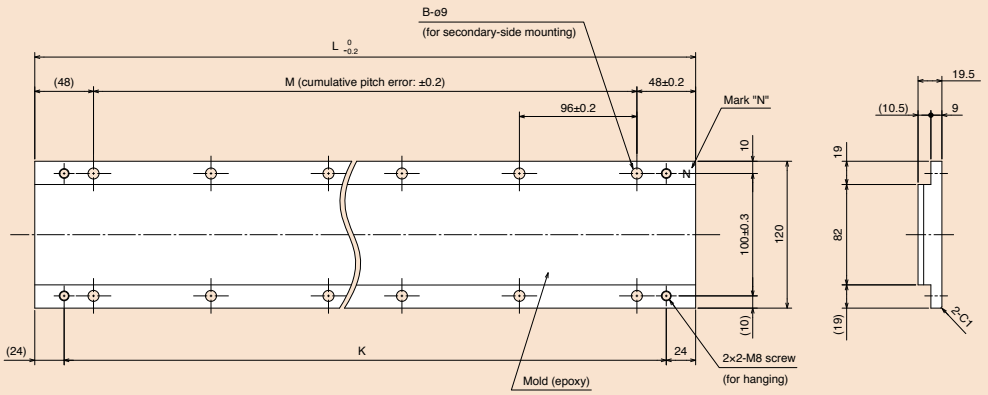


[Unit: mm]

Notes: 1. Power and thermistor cables do not have a long bending life. Fix the cables led from the primary side (coil) to a moving part to prevent the cables from repetitive bending.
2. Minimum bending radius of the cable equals to six times the standard overall diameter of the cable.

LM-F Series Secondary Side (Magnet) Dimensions

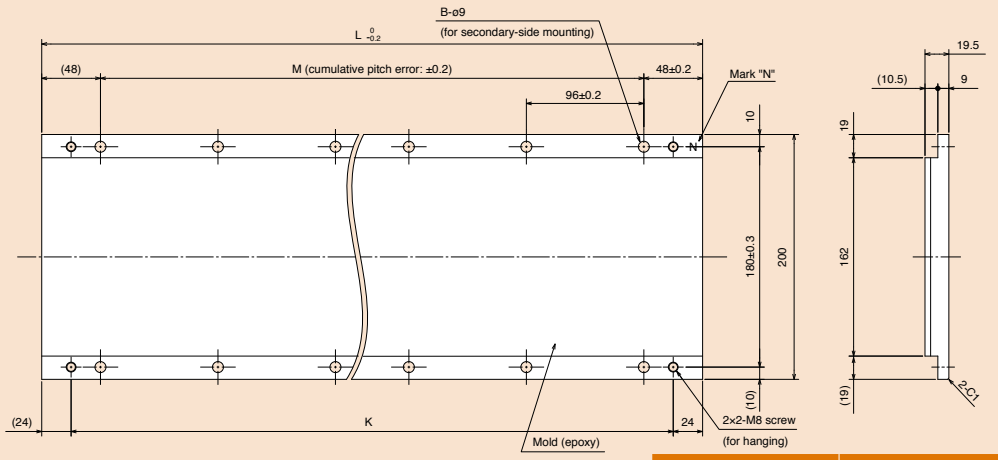
●LM-FS20-480-1SS0 ●LM-FS20-576-1SS0



[Unit: mm]

Model	Variable dimensions			
	L	M	B	K
LM-FS20-480-1SS0	480	4 × 96 = 384	2 × 5	432
LM-FS20-576-1SS0	576	5 × 96 = 480	2 × 6	528

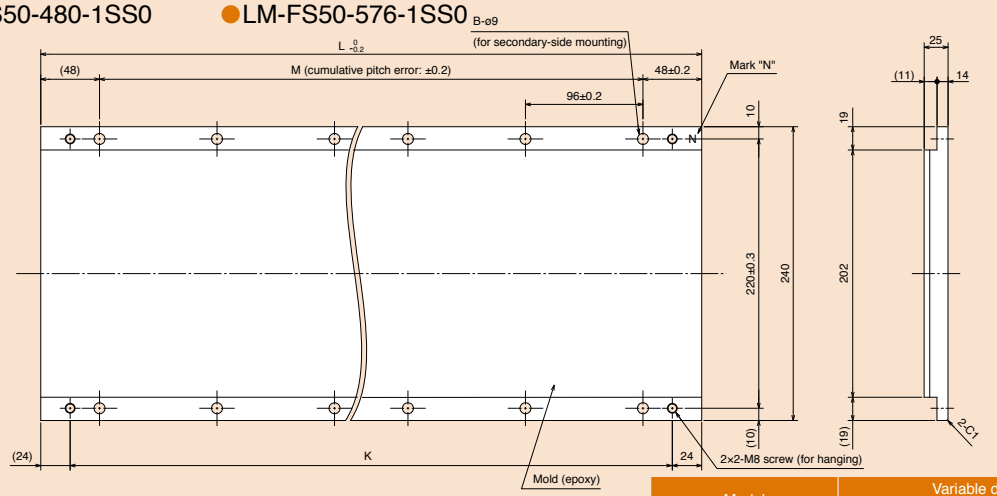
●LM-FS40-480-1SS0 ●LM-FS40-576-1SS0



[Unit: mm]

Model	Variable dimensions			
	L	M	B	K
LM-FS40-480-1SS0	480	4 × 96 = 384	2 × 5	432
LM-FS40-576-1SS0	576	5 × 96 = 480	2 × 6	528

●LM-FS50-480-1SS0 ●LM-FS50-576-1SS0

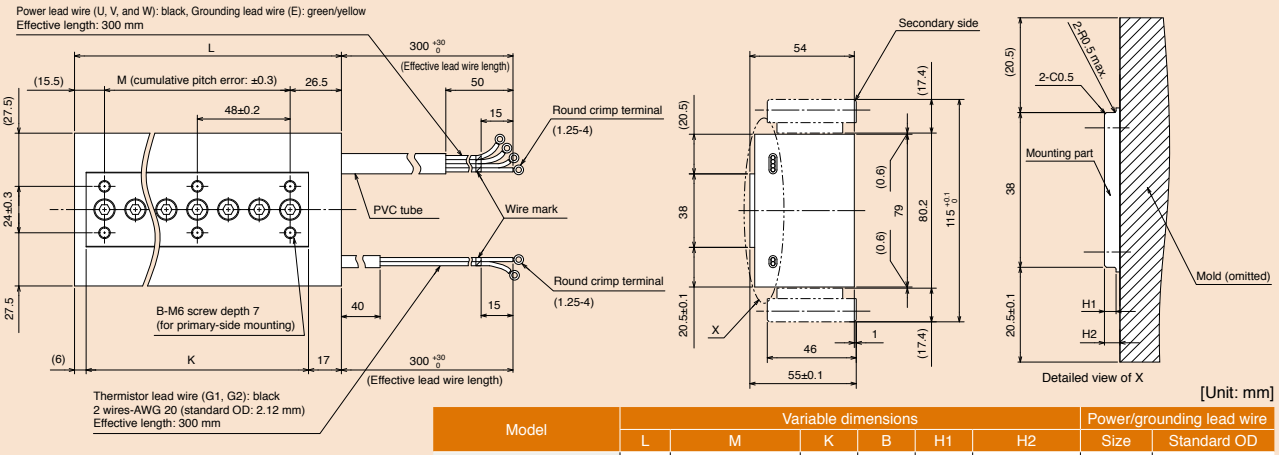


[Unit: mm]

Model	Variable dimensions			
	L	M	B	K
LM-FS50-480-1SS0	480	4 × 96 = 384	2 × 5	432
LM-FS50-576-1SS0	576	5 × 96 = 480	2 × 6	528

LM-K2 Series Primary Side (Coil) Dimensions (Note 1, 2)

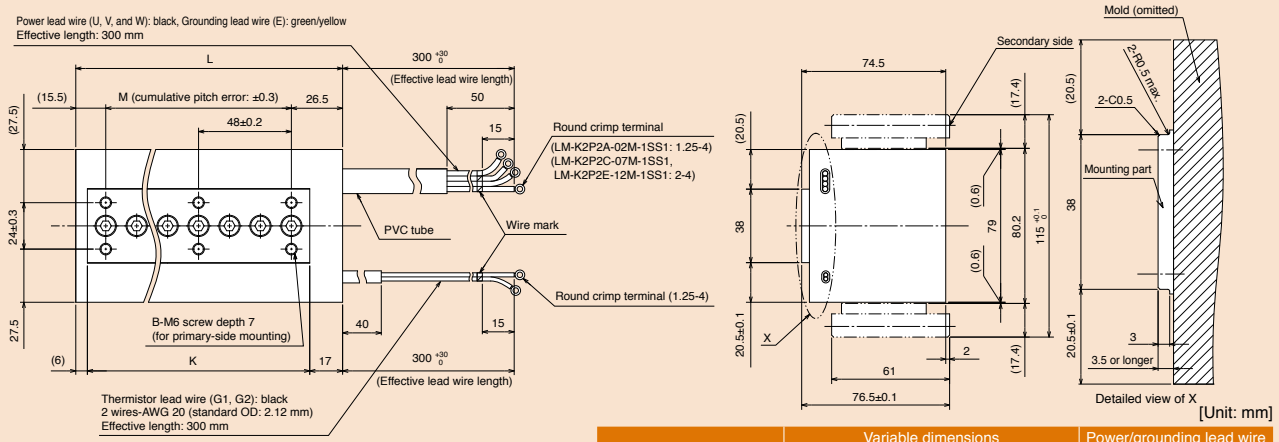
●LM-K2P1A-01M-2SS1 ●LM-K2P1C-03M-2SS1



[Unit: mm]

Model	Variable dimensions						Power/grounding lead wire	
	L	M	K	B	H1	H2	Size	Standard OD
LM-K2P1A-01M-2SS1	138	2 × 48 = 96	115	2 × 3	3	3.5 or longer	AWG 20	2.12
LM-K2P1C-03M-2SS1	330	6 × 48 = 288	307	2 × 7	1.5	2.5 or longer	AWG 16	2.7

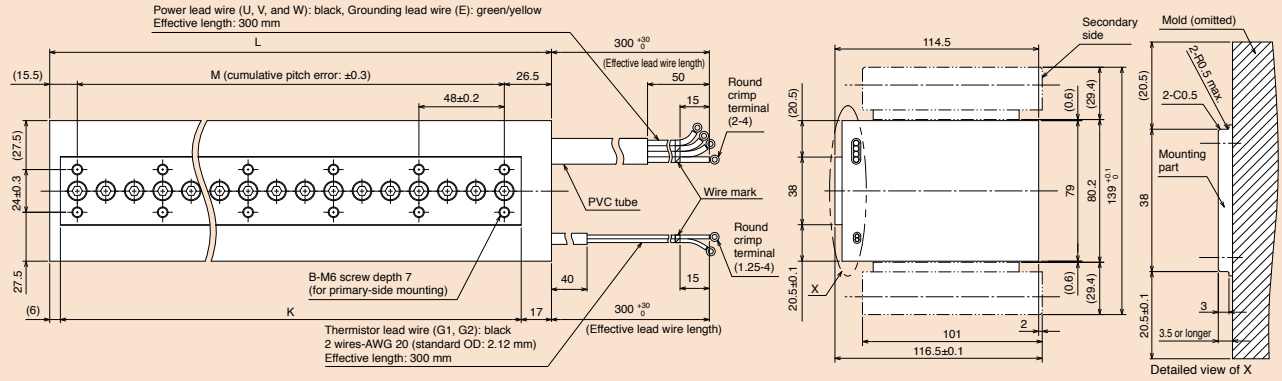
●LM-K2P2A-02M-1SS1 ●LM-K2P2C-07M-1SS1 ●LM-K2P2E-12M-1SS1



[Unit: mm]

Model	Variable dimensions				Power/grounding lead wire	
	L	M	K	B	Size	Standard OD
LM-K2P2A-02M-1SS1	138	2 × 48 = 96	115	2 × 3	AWG 16	2.7
LM-K2P2C-07M-1SS1	330	6 × 48 = 288	307	2 × 7	AWG 14	3.12
LM-K2P2E-12M-1SS1	522	10 × 48 = 480	499	2 × 11		

●LM-K2P3C-14M-1SS1 ●LM-K2P3E-24M-1SS1



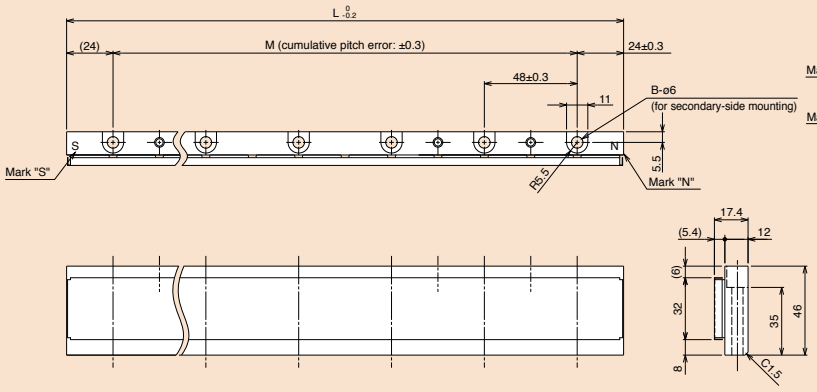
[Unit: mm]

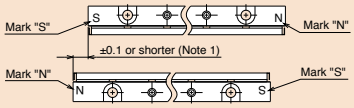
Model	Variable dimensions				Power/grounding lead wire	
	L	M	K	B	Size	Standard OD
LM-K2P3C-14M-1SS1	330	6 × 48 = 288	307	2 × 7	AWG 14	3.12
LM-K2P3E-24M-1SS1	522	10 × 48 = 480	499	2 × 11		

Notes: 1. Power, grounding and thermistor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to six times the standard overall diameter of the lead wire.

LM-K2 Series Secondary Side (Magnet) Dimensions

●LM-K2S10-288-2SS1 ●LM-K2S10-384-2SS1 ●LM-K2S10-480-2SS1
●LM-K2S10-768-2SS1



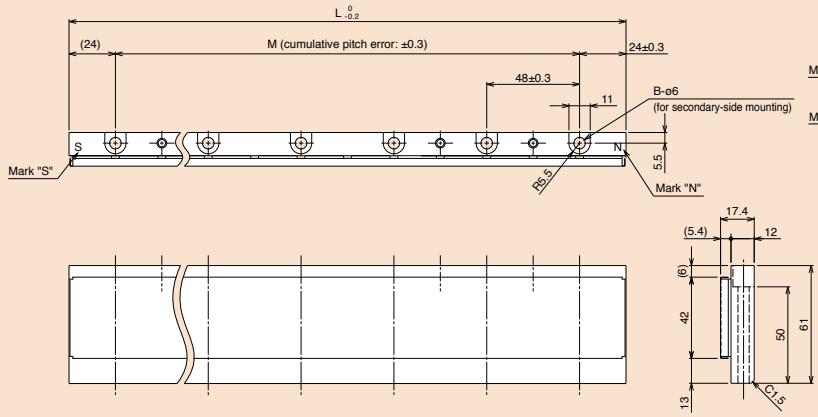


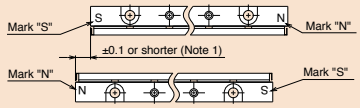
Detailed view of secondary-side ends

[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-K2S10-288-2SS1	288	5 × 48 = 240	6
LM-K2S10-384-2SS1	384	7 × 48 = 336	8
LM-K2S10-480-2SS1	480	9 × 48 = 432	10
LM-K2S10-768-2SS1	768	15 × 48 = 720	16

●LM-K2S20-288-1SS1 ●LM-K2S20-384-1SS1 ●LM-K2S20-480-1SS1
●LM-K2S20-768-1SS1



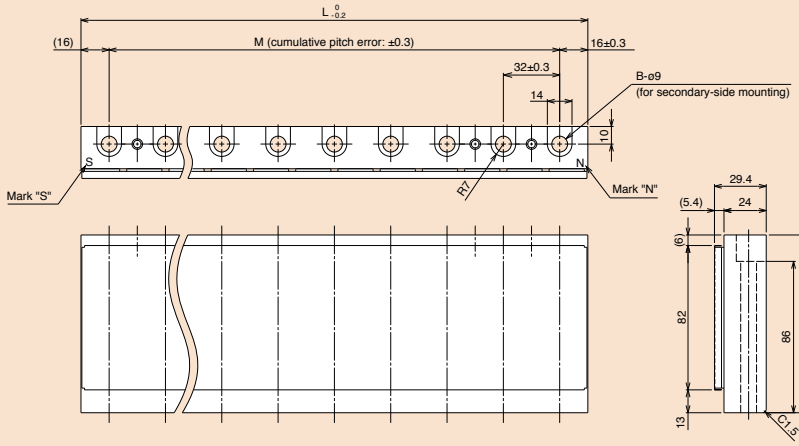


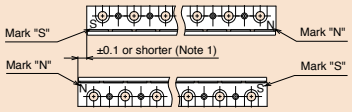
Detailed view of secondary-side ends

[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-K2S20-288-1SS1	288	5 × 48 = 240	6
LM-K2S20-384-1SS1	384	7 × 48 = 336	8
LM-K2S20-480-1SS1	480	9 × 48 = 432	10
LM-K2S20-768-1SS1	768	15 × 48 = 720	16

●LM-K2S30-288-1SS1 ●LM-K2S30-384-1SS1 ●LM-K2S30-480-1SS1
●LM-K2S30-768-1SS1





Detailed view of secondary-side ends

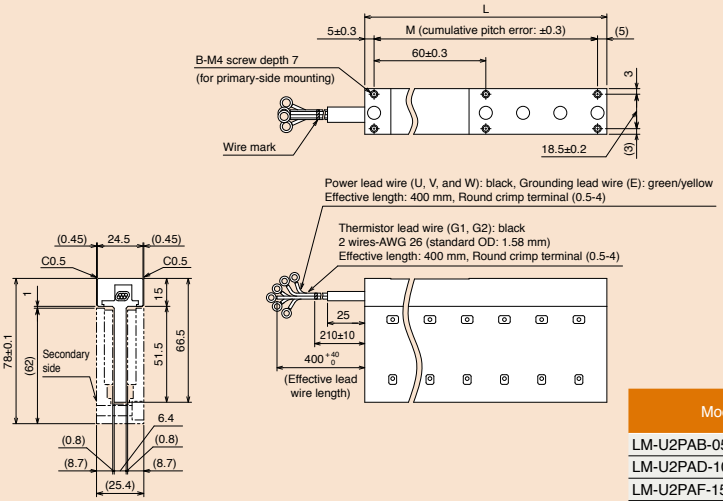
[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-K2S30-288-1SS1	288	8 × 32 = 256	9
LM-K2S30-384-1SS1	384	11 × 32 = 352	12
LM-K2S30-480-1SS1	480	14 × 32 = 448	15
LM-K2S30-768-1SS1	768	23 × 32 = 736	24

Notes: 1. Longitudinal deviation of the secondary side must be within ±0.1 mm.

LM-U2 Series Primary Side (Coil) Dimensions (Note 1, 2)

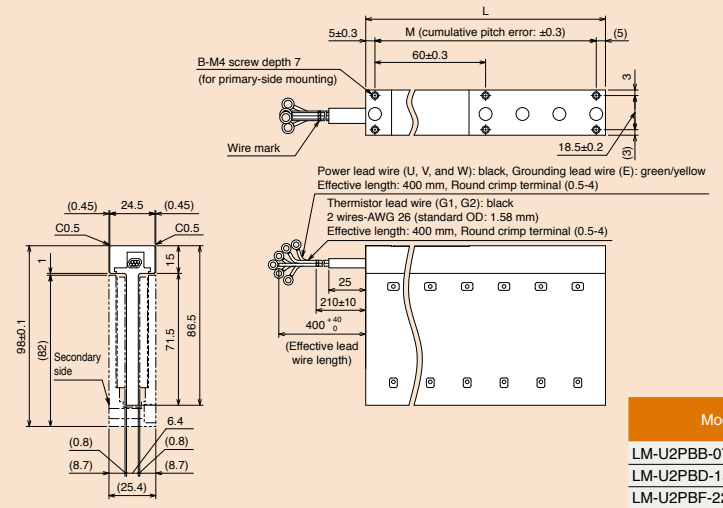
●LM-U2PAB-05M-0SS0 ●LM-U2PAD-10M-0SS0 ●LM-U2PAF-15M-0SS0



[Unit: mm]

Model	Variable dimensions			Power/grounding lead wire	
	L	M	B	Size	Standard OD
LM-U2PAB-05M-0SS0	130	2 × 60 = 120	2 × 3	AWG 26	1.58
LM-U2PAD-10M-0SS0	250	4 × 60 = 240	2 × 5		
LM-U2PAF-15M-0SS0	370	6 × 60 = 360	2 × 7		

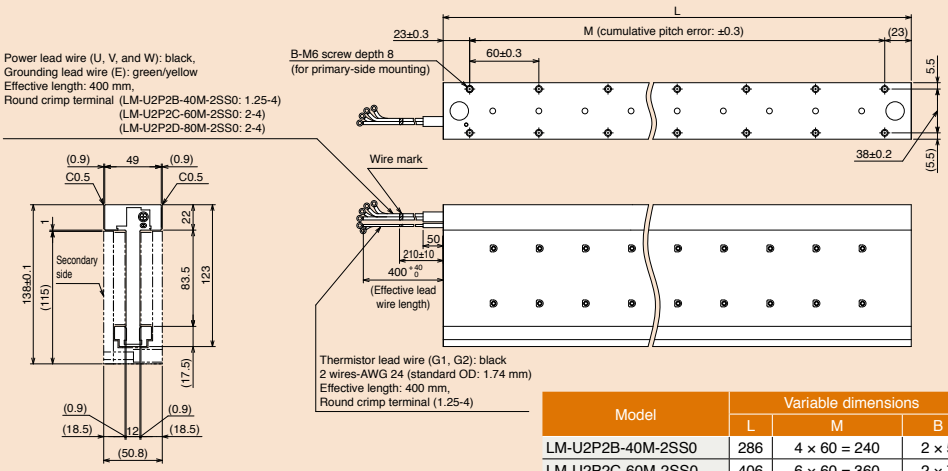
●LM-U2PBB-07M-1SS0 ●LM-U2PBD-15M-1SS0 ●LM-U2PBF-22M-1SS0



[Unit: mm]

Model	Variable dimensions			Power/grounding lead wire	
	L	M	B	Size	Standard OD
LM-U2PBB-07M-1SS0	130	2 × 60 = 120	2 × 3	AWG 26	1.58
LM-U2PBD-15M-1SS0	250	4 × 60 = 240	2 × 5		
LM-U2PBF-22M-1SS0	370	6 × 60 = 360	2 × 7		

●LM-U2P2B-40M-2SS0 ●LM-U2P2C-60M-2SS0 ●LM-U2P2D-80M-2SS0



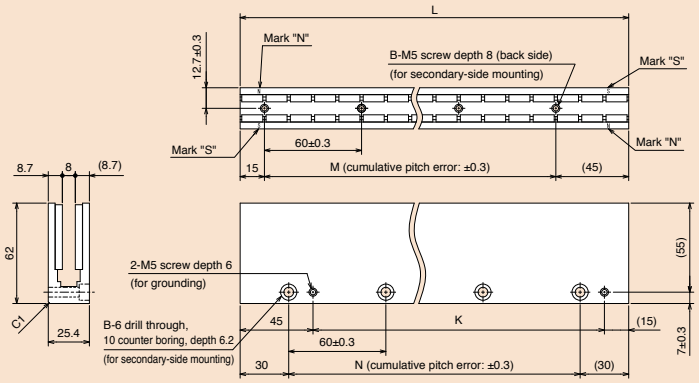
[Unit: mm]

Model	Variable dimensions			Power/grounding lead wire	
	L	M	B	Size	Standard OD
LM-U2P2B-40M-2SS0	286	4 × 60 = 240	2 × 5	AWG 16	2.7
LM-U2P2C-60M-2SS0	406	6 × 60 = 360	2 × 7	AWG 14	3.12
LM-U2P2D-80M-2SS0	526	8 × 60 = 480	2 × 9		

Notes: 1. Power, grounding and thermistor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to six times the standard overall diameter of the lead wire.

LM-U2 Series Secondary Side (Magnet) Dimensions

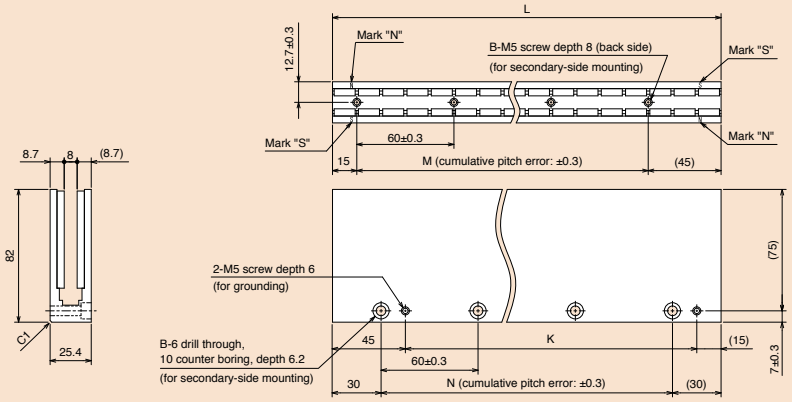
●LM-U2SA0-240-0SS0 ●LM-U2SA0-300-0SS0 ●LM-U2SA0-420-0SS0



[Unit: mm]

Model	Variable dimensions				
	L	M	B	K	N
LM-U2SA0-240-0SS0	240	3 × 60 = 180	4	180	3 × 60 = 180
LM-U2SA0-300-0SS0	300	4 × 60 = 240	5	240	4 × 60 = 240
LM-U2SA0-420-0SS0	420	6 × 60 = 360	7	360	6 × 60 = 360

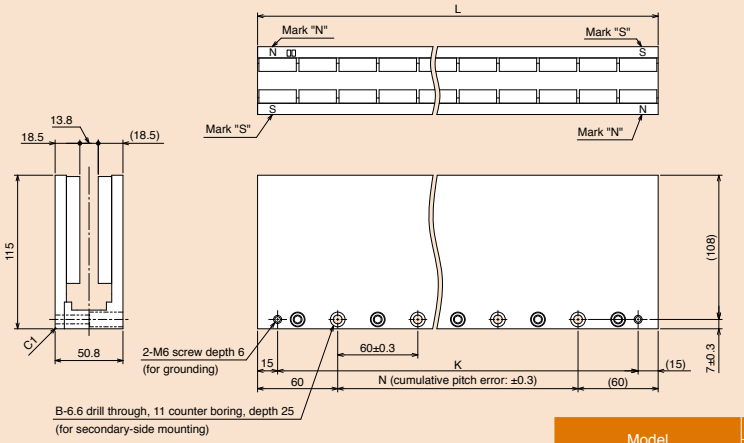
●LM-U2SB0-240-1SS0 ●LM-U2SB0-300-1SS0 ●LM-U2SB0-420-1SS0



[Unit: mm]

Model	Variable dimensions				
	L	M	B	K	N
LM-U2SB0-240-1SS0	240	3 × 60 = 180	4	180	3 × 60 = 180
LM-U2SB0-300-1SS0	300	4 × 60 = 240	5	240	4 × 60 = 240
LM-U2SB0-420-1SS0	420	6 × 60 = 360	7	360	6 × 60 = 360

●LM-U2S20-300-2SS0 ●LM-U2S20-480-2SS0



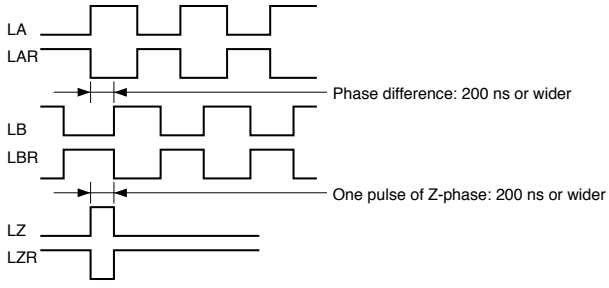
[Unit: mm]

Model	Variable dimensions			
	L	N	B	K
LM-U2S20-300-2SS0	300	3 × 60 = 180	4	270
LM-U2S20-480-2SS0	480	6 × 60 = 360	7	450

List of Linear Encoders (Note 1)

Linear encoder type		Manufacturer	Model		Resolution	Rated speed (Note 2)	Maximum effective measurement length (Note 3)	Communication method
Mitsubishi serial interface compatible	Absolute type	Magnescale Co., Ltd.	SR77		0.05 μm/0.01 μm	3.3 m/s	2040 mm	Two-wire type
			SR87				3040 mm	
		Mitutoyo Corporation	AT343A		0.05 μm	2.0 m/s	3000 mm	Two-wire type
			AT543A-SC			2.5 m/s	2200 mm	
			AT545A-SC		20 μm/4096 (Approx. 0.005 μm)	2.5 m/s	2200 mm	
			ST741A		0.5 μm	4.0 m/s	6000 mm	
			ST742A					
			ST743A		0.1 μm			
			ST744A					
			ST748A					
		Renishaw	RESOLUTE RL40M		1 nm/50 nm	4.0 m/s	10000 mm	Two-wire type
		Heidenhain	LC 493M		0.05 μm/0.01 μm	3.0 m/s	2040 mm	Four-wire type (Note 4)
			LC 193M				4240 mm	
			LIC 4193M		0.01 μm	4.0 m/s	3040 mm	Two-wire/ Four-wire type (Note 4)
			LIC 4195M				28440 mm	
			LIC 4197M				6040 mm	
			LIC 4199M				1020 mm	
	Incremental type	Magnescale Co., Ltd.	SR75		0.05 μm/0.01 μm	3.3 m/s	2040 mm	Two-wire type
			SR85				3040 mm	
			SL710 + PL101-RM/RHM		0.1 μm	4.0 m/s	100000 mm	
		Heidenhain	LIDA 483	+ EIB 392M (/16384)	20 μm/16384 (Approx. 1.22 nm)	4.0 m/s	3040 mm	Four-wire type (Note 4)
			LIDA 485				30040 mm	
			LIDA 487				6040 mm	
			LIDA 489				1020 mm	
			LIDA 287	+ EIB 392M (/16384)	200 μm/16384 (Approx. 12.2 nm)		10000 mm	
			LIDA 289					
			LIF 481	+ EIB 392M (/4096)	4 μm/4096 (Approx. 0.977 nm)	1.2 m/s	1020 mm	
			LIP 581				1440 mm	
		Nidec Sankyo Corporation	PSLH041 (Note 7)		0.1 μm	5.0 m/s	2400 mm	Two-wire type
A/B/Z-phase differential output type (Note 5, 8)		Not designated	-		0.001 μm to 5 μm (Note 6)	Depends on the linear encoder	Depends on the linear encoder	A/B/Z-phase differential output method

Notes: 1. Contact the relevant linear encoder manufacturer for details on operating environment and specifications of the linear encoder such as ambient temperature, vibration resistance and IP rating.
2. The rated speed of the linear encoder is applicable when the linear encoder is used with MR-J4 series servo amplifier. The values may differ from the manufacturers' specifications.
3. The length is specified by the linear encoder manufacturers. The maximum length of the encoder cable between linear encoder and servo amplifier is 30 m.
4. When using the four-wire type linear encoder in fully closed loop control system, use MR-J4-_B_-RJ or MR-J4-_A_-RJ servo amplifier. When using four-wire type linear encoder with the scale measurement function, use MR-J4-_B_-RJ servo amplifier.
5. When using the A/B/Z-phase differential output type linear encoder, use MR-J4-_B_-RJ or MR-J4-_A_-RJ servo amplifier.
6. Select the linear encoder within this range.
7. Use MR-J4-_B_(-RJ)/MR-J4W_-_B/MR-J4-_A_(-RJ) servo amplifier with software version B3 or later.
8. Output A-phase, B-phase, and Z-phase signals in the differential line driver. The phase difference of the A-phase pulse and the B-phase pulse, and the width of the Z-phase pulse must be 200 ns or wider. The output pulse of A-phase and B-phase of the A/B/Z-phase differential output linear encoder is in the multiply-by-four count method. Home position return is not possible with a linear encoder without Z-phase.



MEMO

● Direct Drive Motors

Model Designation

TM-RFM □ □ □

Direct drive motor series

Symbol	Rated torque [N•m]
002	2
004	4
006	6
012	12
018	18
040	40
048	48
072	72
120	120
240	240

Symbol	Motor outer diameter [mm] (Frame dimensions)
C	ø130
E	ø180
G	ø230
J	ø330

Symbol	Rated speed [r/min]
10	100
20	200

Combinations of Direct Drive Motor and Servo Amplifier

Direct drive motor		Servo amplifier		
		MR-J4	MR-J4W2 (Note 1)	MR-J4W3 (Note 1)
TM-RFM series	TM-RFM002C20	MR-J4-20GF(-RJ), MR-J4-20B(-RJ), MR-J4-20B1(-RJ), MR-J4-20A(-RJ), MR-J4-20A1(-RJ)	MR-J4W2-22B, MR-J4W2-44B	MR-J4W3-222B, MR-J4W3-444B
	TM-RFM004C20	MR-J4-40GF(-RJ), MR-J4-40B(-RJ), MR-J4-40B1(-RJ), MR-J4-40A(-RJ), MR-J4-40A1(-RJ)	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	MR-J4W3-444B
	TM-RFM006C20	MR-J4-60GF(-RJ), MR-J4-60B(-RJ), MR-J4-60A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	TM-RFM006E20	MR-J4-60GF(-RJ), MR-J4-60B(-RJ), MR-J4-60A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	TM-RFM012E20	MR-J4-70GF(-RJ), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	TM-RFM018E20	MR-J4-100GF(-RJ), MR-J4-100B(-RJ), MR-J4-100A(-RJ)	MR-J4W2-1010B	-
	TM-RFM012G20	MR-J4-70GF(-RJ), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	TM-RFM048G20	MR-J4-350GF(-RJ), MR-J4-350B(-RJ), MR-J4-350A(-RJ)	-	-
	TM-RFM072G20	MR-J4-350GF(-RJ), MR-J4-350B(-RJ), MR-J4-350A(-RJ)	-	-
	TM-RFM040J10	MR-J4-70GF(-RJ), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	TM-RFM120J10	MR-J4-350GF(-RJ), MR-J4-350B(-RJ), MR-J4-350A(-RJ)	-	-
	TM-RFM240J10	MR-J4-500GF(-RJ), MR-J4-500B(-RJ), MR-J4-500A(-RJ)	-	-

Notes: 1. Any combination of the servo motors is available. Refer to "Combinations of Multi-Axis Servo Amplifier and Servo Motors" on p. 285 in this catalog.

TM-RFM Series Specifications

Direct drive motor model		TM-RFM	002C20	004C20	006C20	006E20	012E20	018E20
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Direct Drive Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
		MR-J4W_-						
Motor outer diameter (frame dimensions)		[mm]	ø130			ø180		
Power supply capacity *1		[kVA]	0.25	0.38	0.53	0.46	0.81	1.3
Continuous running duty	Rated output	[W]	42	84	126	126	251	377
	Rated torque (Note 3)	[N•m]	2	4	6	6	12	18
Maximum torque		[N•m]	6	12	18	18	36	54
Rated speed		[r/min]	200					
Maximum speed		[r/min]	500					
Permissible instantaneous speed		[r/min]	575					
Power rate at continuous rated torque		[kW/s]	3.7	9.6	16.1	4.9	12.9	21.8
Rated current		[A]	1.3	2.1	3.2	3.2	3.8	5.9
Maximum current		[A]	3.9	6.3	9.6	9.6	12	18
Regenerative braking frequency *2	MR-J4-	[times/min]	No limit	5830	2950	464	572	421
	MR-J4W_-	[times/min]	No limit	5620	No limit	2370	1430	1050
Moment of inertia J		[× 10^{-4} kg•m^2]	10.9	16.6	22.4	74.0	111	149
Recommended load to motor inertia ratio (Note 1)			50 times or less					
Absolute accuracy		[s]	±15			±12.5		
Speed/position detector			Absolute/incremental 20-bit encoder *3 (resolution: 1048576 pulses/rev)					
Insulation class			155 (F)					
Structure			Totally enclosed, natural cooling (IP rating: IP42) (Note 2)					
Environment *4	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)					
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist, dust or splash of oil or water					
	Altitude		1000 m or less above sea level					
	Vibration resistance *5		X: 49 m/s^2 Y: 49 m/s^2					
Vibration rank			V10 *7					
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
Rotor permissible load *6	Moment load	[N•m]	22.5			70		
	Axial load	[N]	1100			3300		
Mass		[kg]	5.2	6.8	8.4	11	15	18

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. Connectors and gap between rotor and stator are excluded.
3. When unbalanced torque is generated, such as in a vertical lift machine, be sure to use the absolute position detection system, and keep the unbalanced torque under 70% of the servo motor rated torque.

Refer to "Annotations for Direct Drive Motor Specifications" on p. 404 in this catalog for the asterisks 1 to 7.

TM-RFM Series Specifications

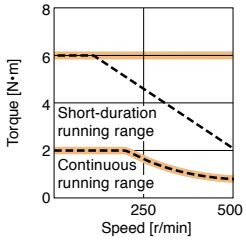
Direct drive motor model		TM-RFM	012G20	048G20	072G20	040J10	120J10	240J10
Compatible servo amplifier model		MR-J4- / MR-J4W_-	Refer to "Combinations of Direct Drive Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
Motor outer diameter (frame dimensions)		[mm]	ø230			ø330		
Power supply capacity *1		[kVA]	0.71	2.7	3.8	1.2	3.4	6.6
Continuous running duty	Rated output	[W]	251	1005	1508	419	1257	2513
	Rated torque (Note 3)	[N•m]	12	48	72	40	120	240
Maximum torque		[N•m]	36	144	216	120	360	720
Rated speed		[r/min]	200			100		
Maximum speed		[r/min]	500			200		
Permissible instantaneous speed		[r/min]	575			230		
Power rate at continuous rated torque		[kW/s]	6.0	37.5	59.3	9.4	40.9	91.4
Rated current		[A]	3.6	11	16	4.3	11	19
Maximum current		[A]	11	33	48	13	33	57
Regenerative braking frequency *2	MR-J4-	[times/min]	202	373	251	125	281	171
	MR-J4W_-	[times/min]	507	-	-	313	-	-
Moment of inertia J		[× 10^{-4} kg•m^2]	238	615	875	1694	3519	6303
Recommended load to motor inertia ratio (Note 1)			50 times or less					
Absolute accuracy		[s]	±12.5			±10		
Speed/position detector			Absolute/incremental 20-bit encoder *3 (resolution: 1048576 pulses/rev)					
Insulation class			155 (F)					
Structure			Totally enclosed, natural cooling (IP rating: IP42) (Note 2)					
Environment *4	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)					
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist, dust or splash of oil or water					
	Altitude		1000 m or less above sea level					
	Vibration resistance *5		X: 49 m/s² Y: 49 m/s²			X: 24.5 m/s² Y: 24.5 m/s²		
Vibration rank			V10 *7					
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
Rotor permissible load *6	Moment load	[N•m]	93			350		
	Axial load	[N]	5500			16000		
Mass		[kg]	17	38	52	48	85	150

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. Connectors and gap between rotor and stator are excluded.
3. When unbalanced torque is generated, such as in a vertical lift machine, be sure to use the absolute position detection system, and keep the unbalanced torque under 70% of the servo motor rated torque.

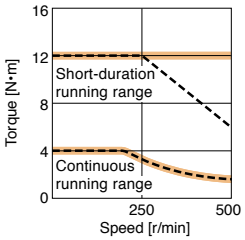
Refer to "Annotations for Direct Drive Motor Specifications" on p. 404 in this catalog for the asterisks 1 to 7.

TM-RFM Series Torque Characteristics

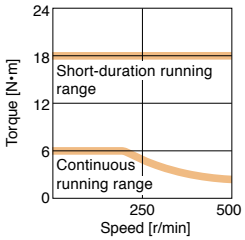
TM-RFM002C20 (Note 1, 2, 4)



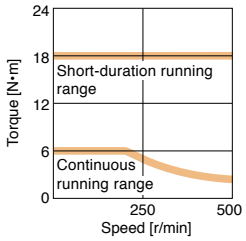
TM-RFM004C20 (Note 1, 2, 4)



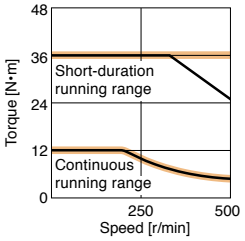
TM-RFM006C20 (Note 1, 3, 4)



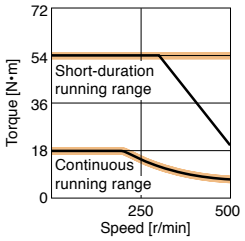
TM-RFM006E20 (Note 1, 3, 4)



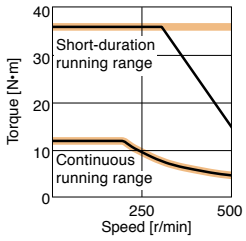
TM-RFM012E20 (Note 1, 3, 4)



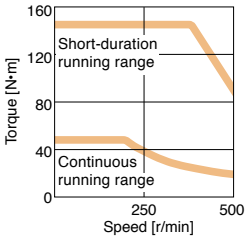
TM-RFM018E20 (Note 1, 3, 4)



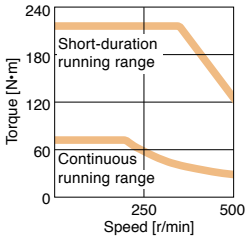
TM-RFM012G20 (Note 1, 3, 4)



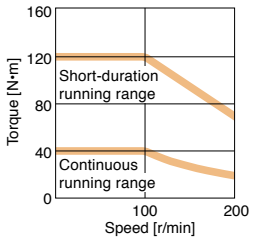
TM-RFM048G20 (Note 1, 4)



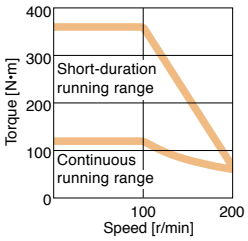
TM-RFM072G20 (Note 1, 4)



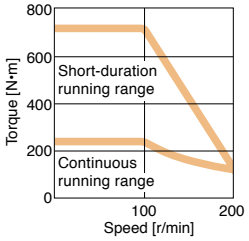
TM-RFM040J10 (Note 1, 3, 4)



TM-RFM120J10 (Note 1, 4)



TM-RFM240J10 (Note 1, 4)

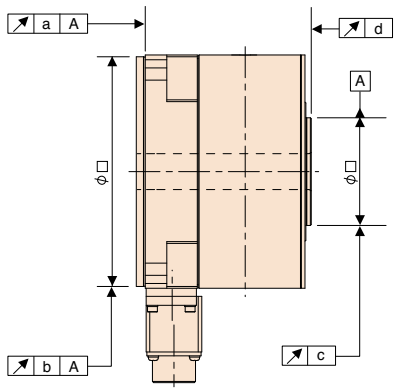


Notes: 1. ▬ : For 3-phase 200 V AC or 1-phase 230 V AC.
The following direct drive motors are compatible with 1-phase 230 V AC:
TM-RFM002C20, TM-RFM004C20, TM-RFM006C20, TM-RFM006E20, TM-RFM012E20, TM-RFM018E20, TM-RFM012G20, TM-RFM040J10
2. - - - - : For 1-phase 200 V AC or 1-phase 100 V AC.
3. ——— : For 1-phase 200 V AC.
This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.

Direct Drive Motor Machine Accuracy

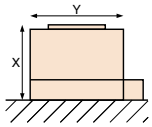
The machine accuracy related to the direct drive motor rotor (output shaft) and installation is indicated below:

Item	Measuring position	Accuracy [mm]
Runout of flange surface about rotor (output shaft)	a	0.05
Runout of fitting outer diameter of flange surface	b	0.07
Runout of rotor (output shaft)	c	0.04
Runout of rotor (output shaft) end	d	0.02

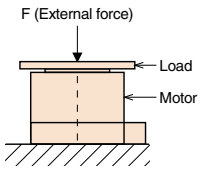


Annotations for Direct Drive Motor Specifications

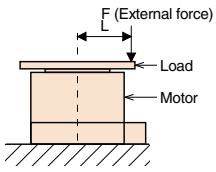
* 1. The power supply capacity varies depending on the power supply impedance.
* 2. The regenerative braking frequency shows the permissible frequency when the direct drive motor, without a load and a regenerative option, decelerates from the rated speed to a stop. When a load is connected; however, the value will be the table value/(m + 1), where m = Moment of inertia of load/Moment of inertia of direct drive motor. When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (operating speed/rated speed). Take measures to keep the regenerative power [W] during operation below the permissible regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
* 3. Be sure to connect the following options for absolute position detection system.
  • MR-J4: battery (MR-BAT6V1SET) and absolute position storage unit (MR-BTAS01).
  • MR-J4W_: battery case (MR-BT6VCASE), battery (MR-BAT6V1) × 5 pcs, and absolute position storage unit (MR-BTAS01).
  Refer to relevant Servo Amplifier Instruction Manual for details.
* 4. In the environment where the direct drive motor is exposed to oil mist, oil and/or water, a standard specification direct drive motor may not be usable. Contact your local sales office for more details.
* 5. The vibration direction is shown in the diagram below. The numerical value indicates the maximum value of the component.
  Fretting more likely occurs on the bearing when the direct drive motor stops. Thus, maintain vibration level at approximately one-half of the allowable value.



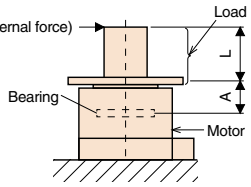
* 6. The following is calculation examples of axial and moment loads to the rotor (output shaft) of the direct drive motor. The axial and moment loads must be maintained equal to or below the permissible value.



Axial load
= F + Load mass



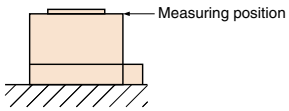
Axial load
= F + Load mass
Moment load
= F × L



Axial load = Load mass
Moment load = F × (L + A)

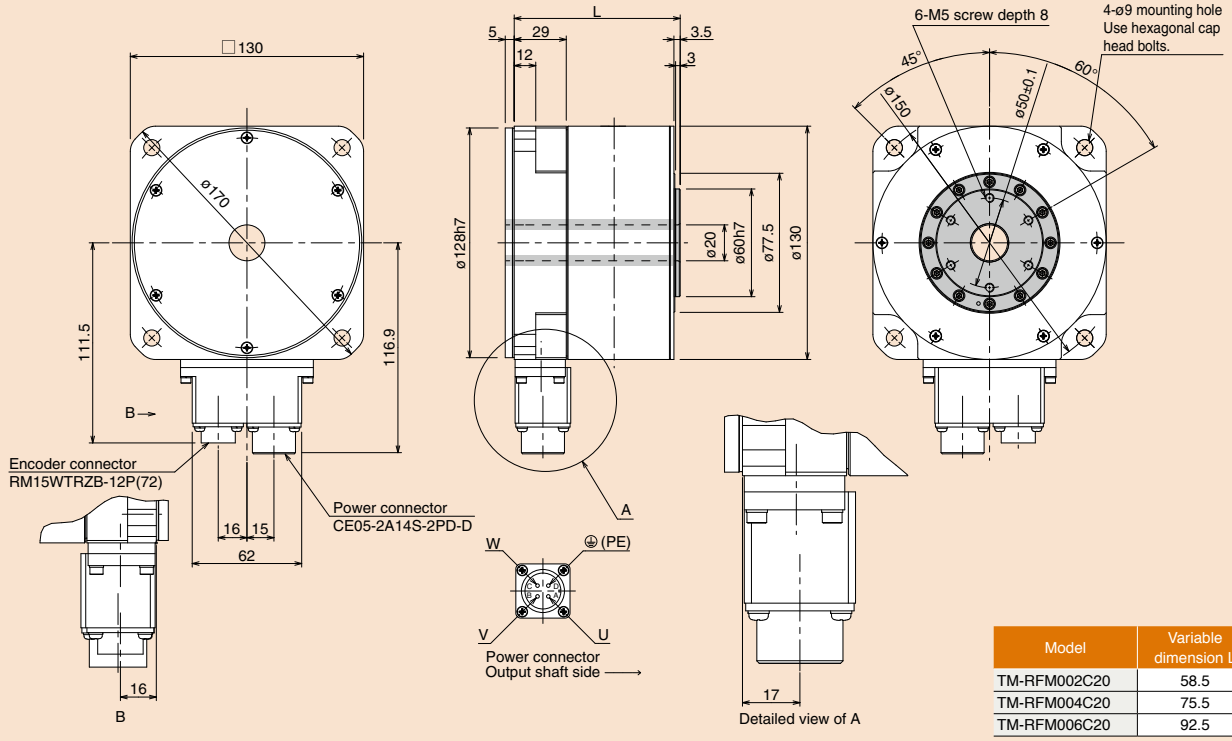
Motor outer diameter [mm] (Frame dimensions)	Dimension A [mm]
ø130	19.1
ø180	20.2
ø230	24.4
ø330	32.5

* 7. V10 indicates that the amplitude of the direct drive motor itself is 10 μm or less. The following shows mounting posture and measuring position of the direct drive motor during the measurement:



TM-RFM Series Dimensions (Note 1, 2)

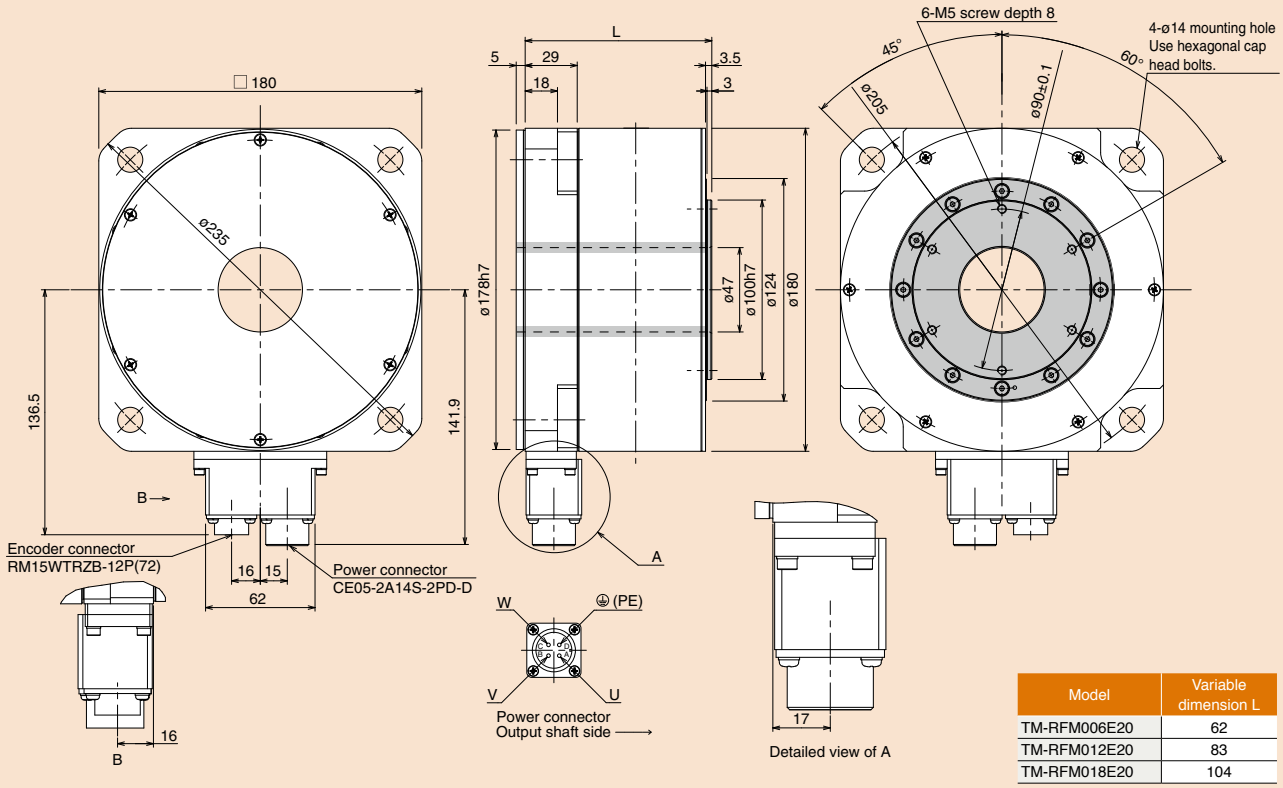
●TM-RFM002C20, TM-RFM004C20, TM-RFM006C20



Model	Variable dimension L
TM-RFM002C20	58.5
TM-RFM004C20	75.5
TM-RFM006C20	92.5

[Unit: mm]

●TM-RFM006E20, TM-RFM012E20, TM-RFM018E20



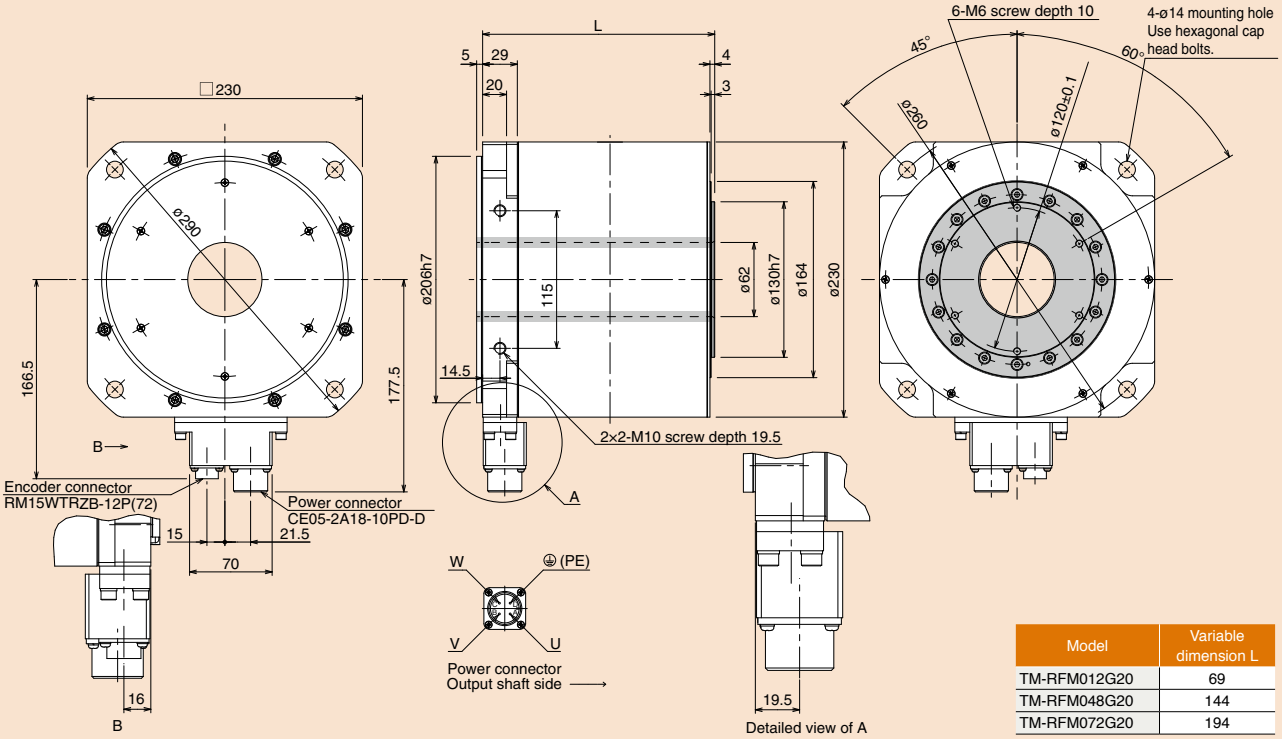
Model	Variable dimension L
TM-RFM006E20	62
TM-RFM012E20	83
TM-RFM018E20	104

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated. Make allowances for the tolerance when designing a machine.
2. ▭ indicates rotor.

TM-RFM Series Dimensions (Note 1, 2)

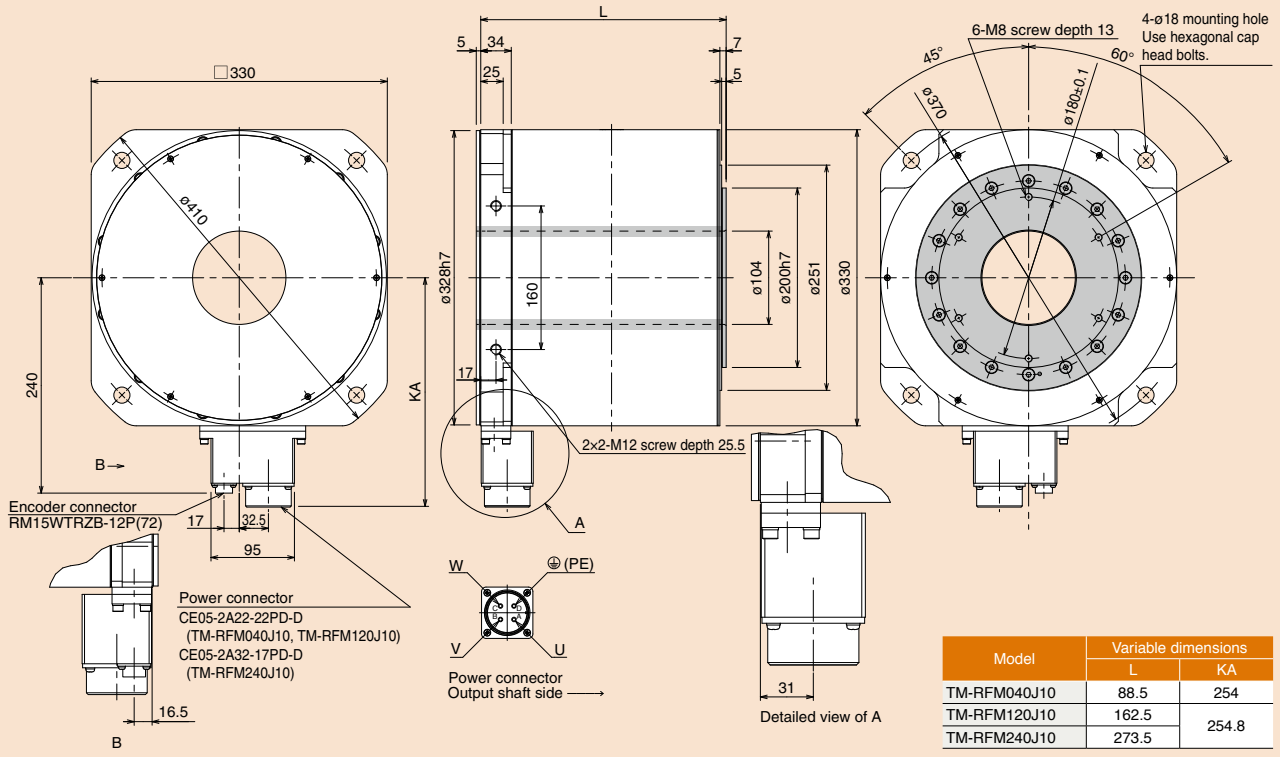
●TM-RFM012G20, TM-RFM048G20, TM-RFM072G20



Model	Variable dimension L
TM-RFM012G20	69
TM-RFM048G20	144
TM-RFM072G20	194

[Unit: mm]

●TM-RFM040J10, TM-RFM120J10, TM-RFM240J10



Model	Variable dimensions	
	L	KA
TM-RFM040J10	88.5	254
TM-RFM120J10	162.5	254.8
TM-RFM240J10	273.5	

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated. Make allowances for the tolerance when designing a machine.
2. ▭ indicates rotor.

MEMO

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-JE

Apply servos to all machines with reliable basic performance and advanced ease-of-use!

With Mitsubishi's commitment to total system solutions and global supports,
the MELSERVO-JE becomes the answer to the world-wide needs in driving control.

Fast, Trouble-Free Setup

Mitsubishi Electric's unique "Advanced one-touch tuning" enables servo gain adjustment with one-touch ease.
The increased tolerance against instantaneous power failure, the ease of maintenance, and the simple setup software would add further usability for all MELSERVO-JE users.

High-Precision Tuning

Servo gain adjustment with one-touch ease

JE-B JE-A

Advanced One-Touch Tuning Function

Servo gain adjustment is complete just by turning on the one-touch tuning function. With this function, machine resonance suppression filter, advanced vibration suppression control II*, and robust filter are automatically adjusted to maximize your machine performance.

* The advanced vibration suppression control II automatically adjusts one frequency.

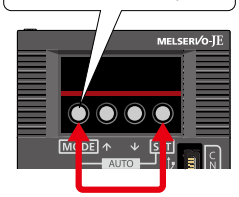
■MR-JE-B

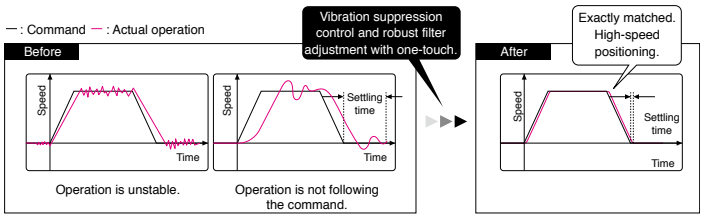
Adjust the servo gain just by pressing the "Start" button on one-touch tuning window of MR Configurator2.



■MR-JE-A

Adjust the servo gains just by pressing the buttons on the front of the servo amplifier.





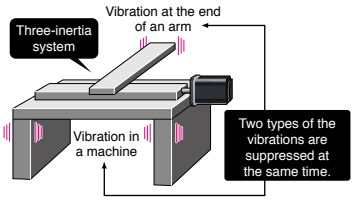
Suppress two types of low frequency vibrations at once

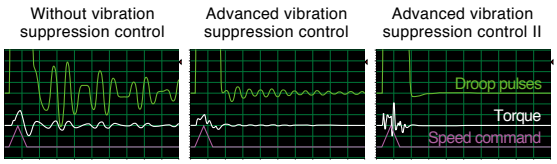
JE-B JE-A

Patent pending

Advanced Vibration Suppression Control II

The advanced vibration suppression control II suppresses two types of low frequency vibrations owing to vibration suppression algorithm which supports three-inertia system. This function is effective in suppressing residual vibration generated at the end of an arm and in a machine, enabling a shorter settling time. Adjustment is easily performed on MR Configurator2.

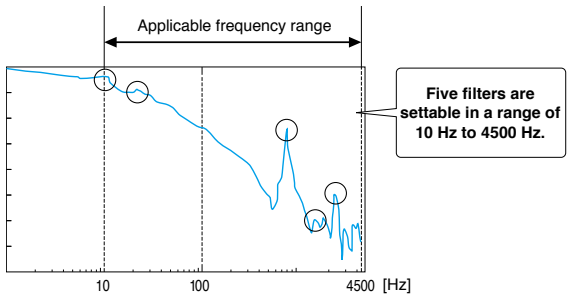




Wide frequency range JE-B JE-A

Machine Resonance Suppression Filter

With advanced filter structure, applicable frequency range is expanded to between 10 Hz and 4500 Hz. Additionally, the number of simultaneously applicable filters is increased to five, improving vibration suppression performance of a machine.

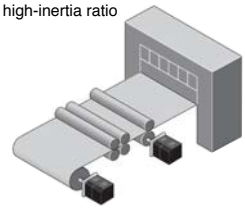


High responsivity and stability JE-B JE-A Patent pending

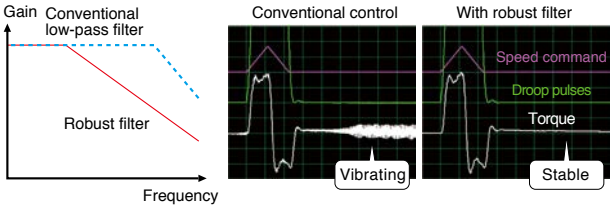
Robust Filter

Achieving both high responsivity and stability was difficult with the conventional control in high-inertia systems with belts and gears such as printing and packaging machines. Now, this function enables the high responsivity and the stability at the same time without adjustment. The robust filter gradually reduces the fluctuation of torque in wide frequency range and achieves more stability as compared to the prior model.

■ Machine with a high-inertia ratio



■ Robust filter

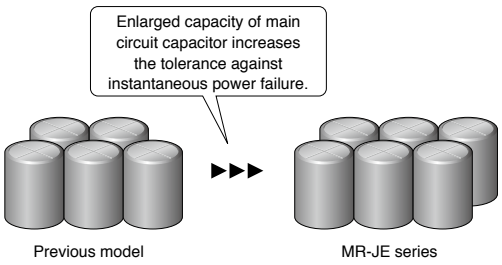


For Changes in Power Supply Environment

Reduce machine downtime JE-B JE-A

Large Capacity Main Circuit Capacitor

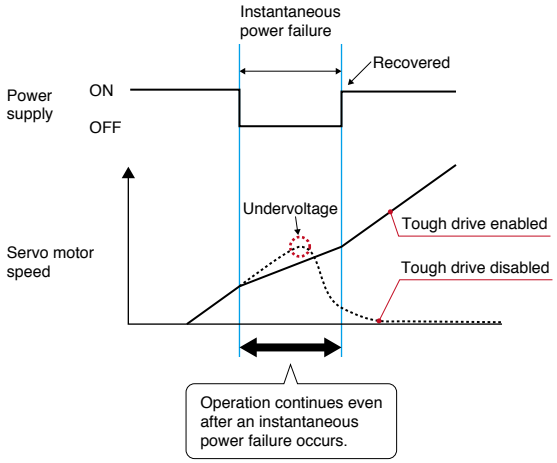
The capacity of main circuit capacitor is increased by 20% as compared to the previous model, increasing the tolerance against instantaneous power failure. The increased tolerance reduces machine downtime and then improves productivity.



Reduce undervoltage alarms JE-B JE-A

Instantaneous Power Failure Tough Drive

When an instantaneous power failure is detected, this function allows the servo amplifier to use the electric energy charged in the main circuit capacitor in the servo amplifier to avoid an alarm occurrence, increasing the machine availability even with an unstable power supply.

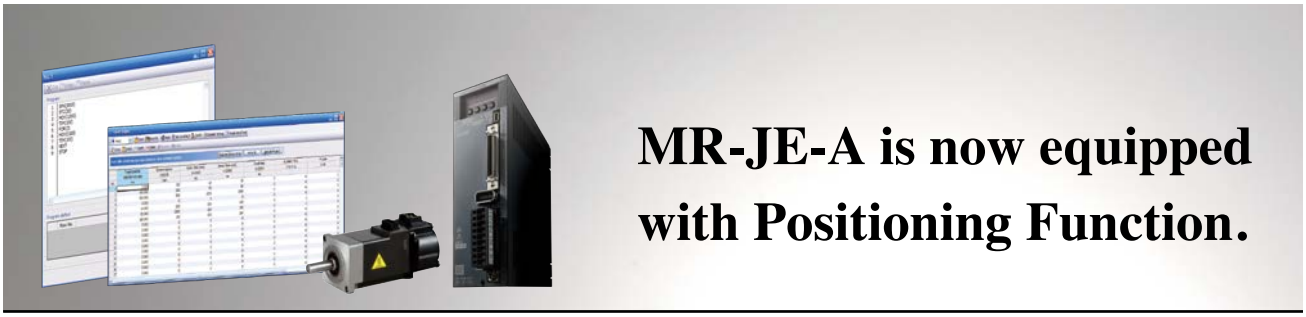


Wide power supply voltage input range JE-B JE-A

Compatible with 1-phase 200 to 240 V AC Input

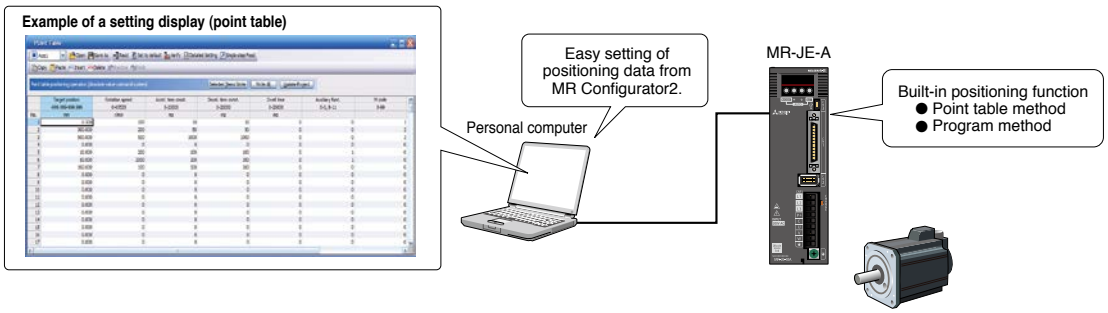
Servo amplifiers of 2 kW or smaller are compatible with power supply voltage of 1-phase 200 V AC to 240 V AC.

* When 1-phase 200 V AC to 240 V AC power supply is used with servo amplifiers of 1 kW and 2 kW, use the servo amplifiers with 75% or less of the effective load ratio. The servo amplifiers of 1 kW and 2 kW cannot be mounted closely when 1-phase power is input.



MR-JE-A is now equipped with Positioning Function.

Positioning operation with point table and program based methods became capable by built-in positioning function in MR-JE-A*1, allowing to configure positioning system without controller such as Positioning module.
Features:
- Equipped with simple cam, encoder following, and mark detection functions, making it possible to increase machine functionality.
- Command interface compatible with DIO or RS-422/RS-485 serial communication (maximum 32 axes)
- Easy setting of positioning data from MR Configurator2.



*1. Use MR-JE-A servo amplifiers with software version B7 or later when using the positioning function.

A Variety of Positioning Functions

Easy to set a positioning data

JE-A

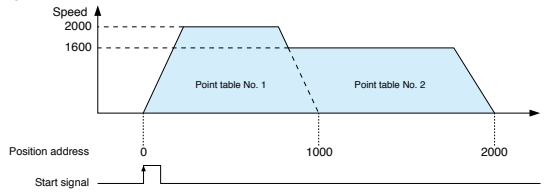
Point Table Method

Setting position data (target position), servo motor speed, and acceleration/deceleration time constants in point table is as easy as setting a parameter. Up to 31 points are settable for the point table. The positioning operation is performed with a start signal after selecting the point table No.

Point table example

Point table No.	Position data	Servo motor speed	Acceleration time constant	Deceleration time constant	Dwell	Sub function	M code
1	1000	2000	200	200	0	1	1
2	2000	1600	100	100	0	0	2
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
31	3000	3000	100	100	0	2	99

Operation



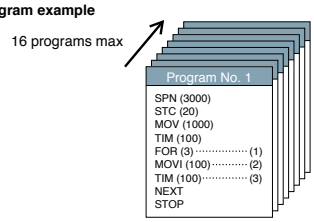
Easy operation by program

JE-A

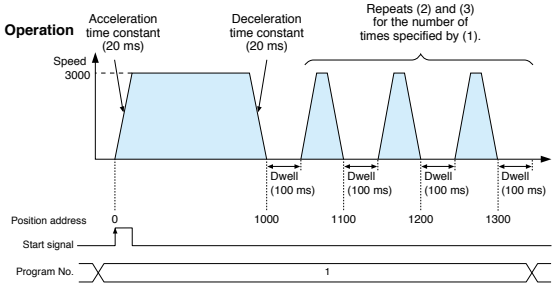
Program Method*

Create positioning programs with dedicated commands. The positioning operation is performed with a start signal after selecting the program No. The program method enables more complex positioning operation than the point table method. Maximum of 16 programs are settable. (The total number of steps of program: 480)

Program example



Operation



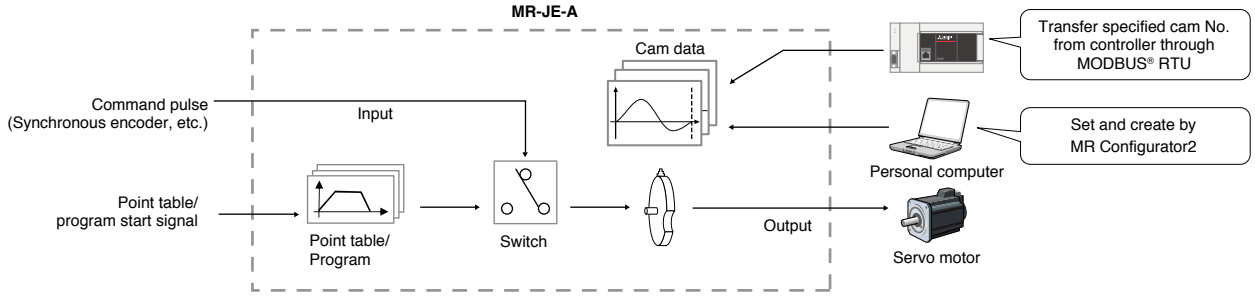
* MR Configurator2 is required to create programs.

Easy to create electronic cam

JE-A

Simple Cam Function

Various patterns of cam data* can be created easily by using MR Configurator2. Command pulse or point table/program start signal can be used as input to the simple cam. The input command will be outputted to the servo motor according to the cam data.



* Cam curve can be selected from 12 types (constant speed/constant acceleration/5th curve/single hypotenuse/cycloid/distorted trapezoid/distorted sine/distorted constant speed/trapecloid/reverse trapecloid/double hypotenuse/reverse double hypotenuse).

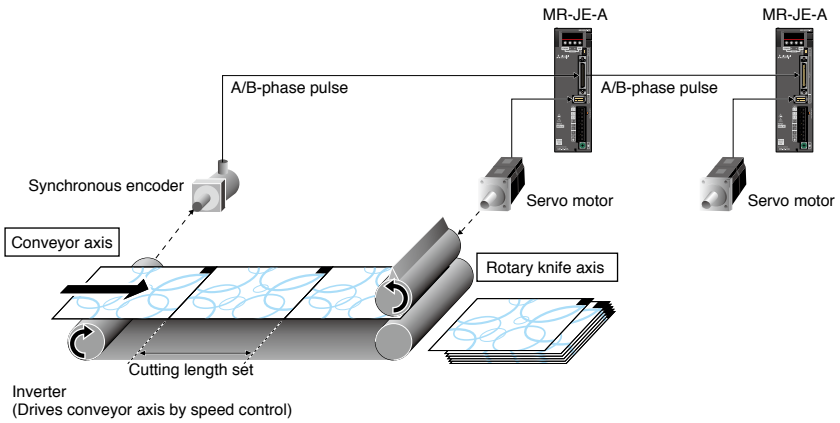
Synchronous operation by encoder signal input

JE-A

Encoder Following Function/Command Pulse Input Through Function

With the encoder following function, the servo amplifier receives A/B-phase output signal from the synchronous encoder as command pulse, and the input command will be outputted to the servo motor according to the cam data. By setting cam data that matches with sheet length, a diameter of the rotary knife axis, and synchronous section of the sheet; a system in which the conveyor axis and the rotary knife axis are synchronized can be configured. Up to 4 Mpulses/s of input from synchronous encoder is compatible with the servo amplifier.

The command pulse input through function allows the first axis to output A/B-phase pulse from the synchronous encoder to the next axis, enabling a system the second and later axes are synchronized with the synchronous encoder.

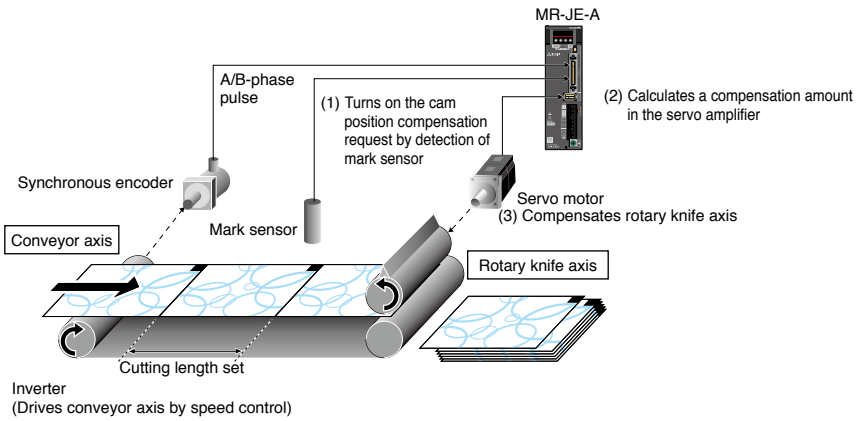


Compensating a position gap by sensor input

JE-A

Mark Sensor Input Compensation Function

The actual position of the servo motor can be obtained based on the inputs from the sensor that detects the registration marks printed on the high-speed moving film. The servo amplifier calculates compensation amounts and corrects position errors of the rotary knife axis based on those inputs from the sensor so that the film can be cut at the set position.



Positioning Using Communication Function

Compatible with MODBUS® protocol

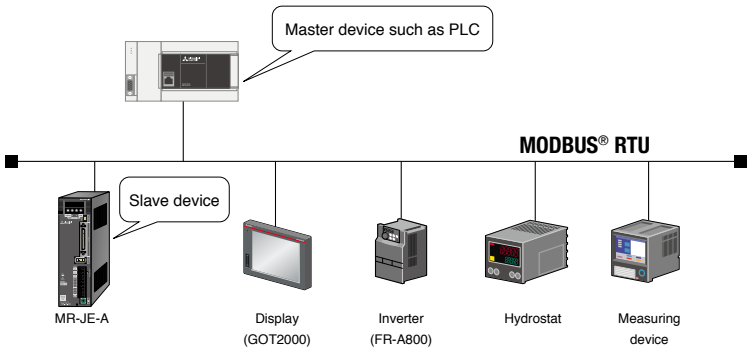
JE-A

Communication Function (MODBUS® RTU)

In addition to RS-422 communication (Mitsubishi general-purpose AC servo protocol), RS-485 communication (MODBUS® RTU protocol) is supported. MODBUS® RTU protocol is compatible with function code 03h (Read holding registers), etc. Controlling and monitoring the servo amplifier by external devices is possible.

Compatible function code

03h	Read holding registers
08h	Diagnostics
10h	Preset multiple registers



Point to Point positioning

While the point table is in operation, the next target position of the point table can be overwritten.

Current position latch

While the point table is in operation, the position data is latched by the mark detection function, and the current position latch function let the controller to obtain the latched data.

Easy Monitoring and Maintenance

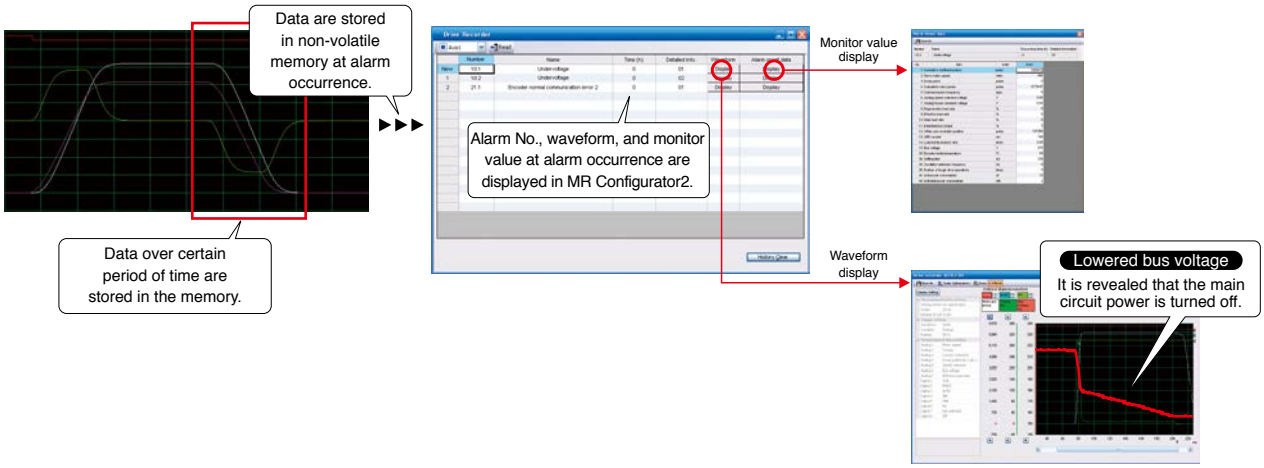
Analyze cause of alarm

JE-B JE-A

Patent pending

Large Capacity Drive Recorder

- Servo data such as motor current and position command before and after the alarm occurrence are stored in non-volatile memory of the servo amplifier. Reading the servo data on MELSOFT MR Configurator2 helps you analyze the cause of the alarm.
- Check the waveform ((analog 16 bits × 7 channels + digital 8 channels) × 256 points) and the monitor values of 16 alarms in the alarm history.

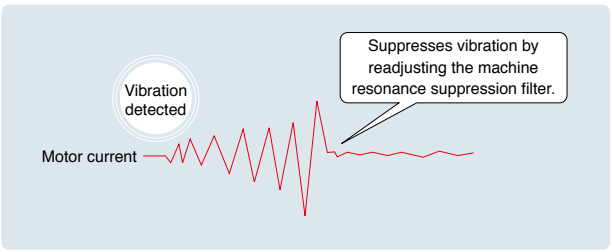


Reduce machine downtime incurred by age-related deterioration

JE-B JE-A

Vibration Tough Drive

Machine resonance suppression filter is automatically readjusted when a change in machine resonance frequency is detected by the servo amplifier. Losses from the machine stop due to age-related deterioration are reduced.



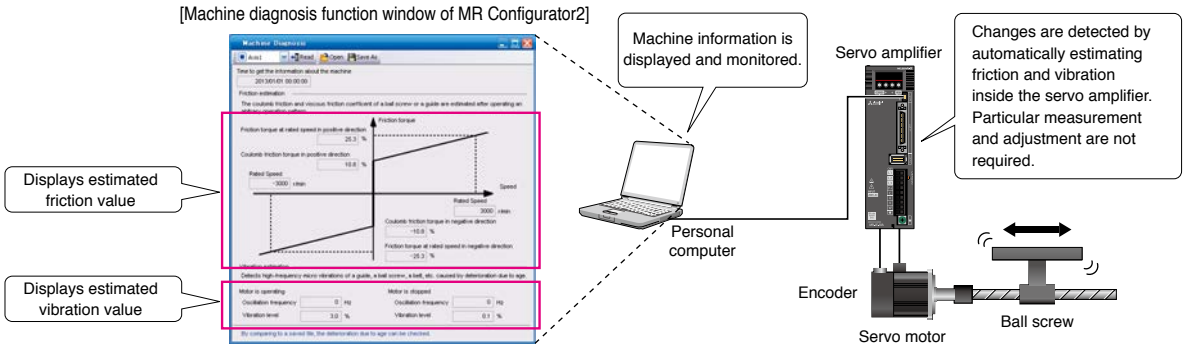
JE-B JE-A

Support optimal maintenance of driving parts

Machine Diagnosis Function

Patent pending

This function detects changes of machine parts (ball screw, guide, bearing, belt, etc.) by analyzing machine friction, load moment of inertia, unbalanced torque, and changes in vibration component from the data inside the servo amplifier, supporting timely maintenance of the driving parts.



JE-B JE-A

Easy troubleshooting

Three-Digit Alarm

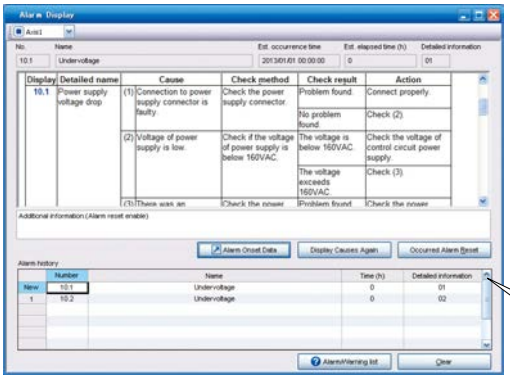
MR-JE series displays the alarm No. in three digits to show the servo alarm in more details, making troubleshooting easy.

[Three-digit alarm display]



This display is of MR-JE-A.

[Example of an alarm window on MR Configurator2]



The alarm No. shows whether the undervoltage alarm was caused by instantaneous power failure or by lowered bus voltage in the servo amplifier.

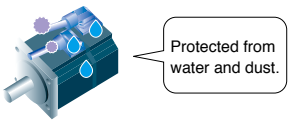
User-Friendly Motors

Even in severe environment

Improved Environment Safety

HG-KN series and HG-SN series are rated IP65 and IP67 respectively.

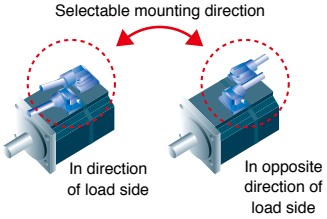
* The shaft-through portion is excluded.



Cable leading in both ways

Selectable Cable Leading Direction

The power cable, the encoder cable, and the electromagnetic brake cable are led out to either in direction of or in opposite direction of the load side, depending on the selected cables. (HG-KN series)



The easy-to-use design MR-JE series makes startup and adjustment that simple.



Servo setup software

MR Configurator2 (SW1DNC-MRC2-E)

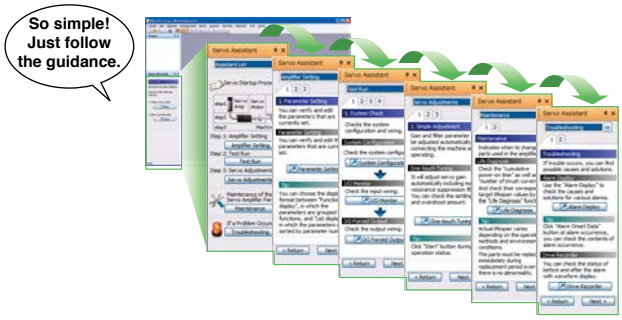
Tuning, monitor display, diagnosis, reading/writing parameters, and test operations are easily performed on a personal computer.
This startup support tool achieves a stable machine system, optimum control, and short setup time.

Preparation

Just follow the guidance, and setup is complete JE-B JE-A

Servo Assistant Function

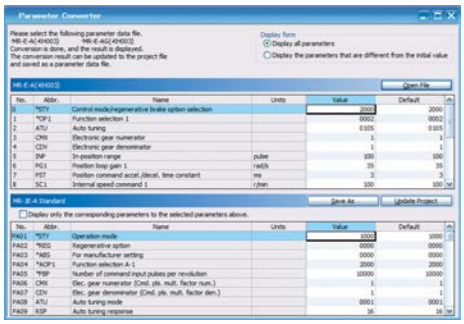
Complete setting up the servo amplifier just by following guidance displays. Setting parameters and tuning are easy since related functions are called up from shortcut buttons.



Supporting replacement from conventional system JE-A

Parameter Converter Function

With this function, parameter files for MR-E series or MR-E Super series are converted to those for MR-JE-A series.

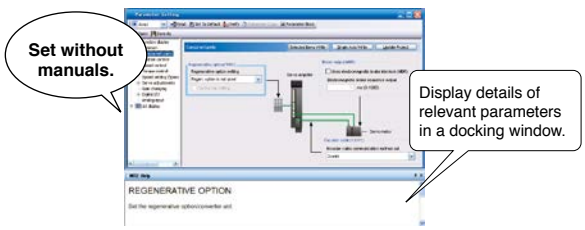


Setting and Start-up

Easy and fast parameter setting JE-B JE-A

Parameter Setting Function

Display parameter setting in list or visual formats, and set parameters by selecting from the drop down list. Set in-position range in mechanical system unit (e.g. μm). Parameter read/write time is approximately one tenth of the conventional time.

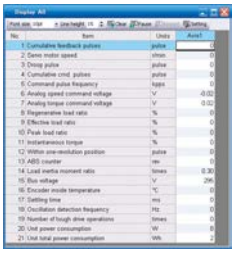


Visible operation and power status JE-B JE-A

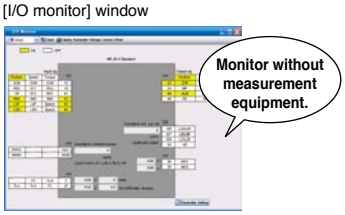
Monitor Function

Monitor operation status on the [Display all] window. Check power consumption without any measurement equipment such as electric power meter, assign input/output signals, and monitor ON/OFF status on the [I/O monitor] window.

[Display all] window



[I/O monitor] window

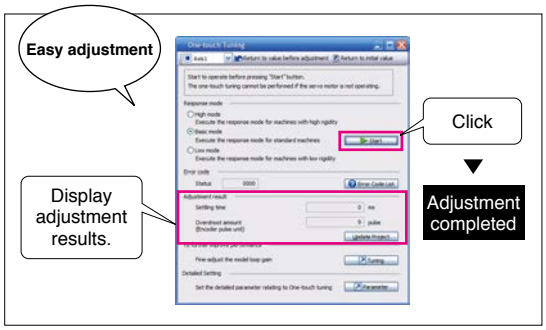


Servo Adjustment

Tuning is just one click away JE-B JE-A

One-Touch Tuning Function

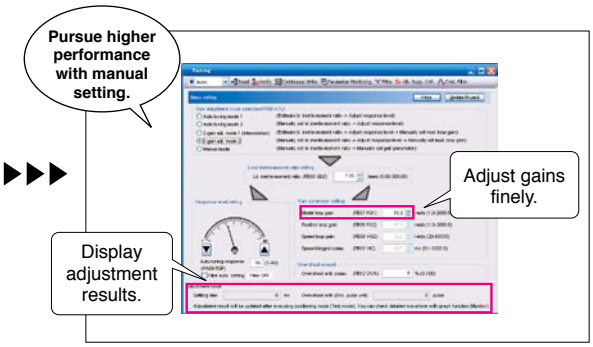
Adjustments including estimating load to motor inertia ratio, adjusting gain, and suppressing machine resonance are automatically performed for the maximum servo performance just by clicking the start button. Check the adjustment results of settling time and overshoot.



Fine tuning of loop gain JE-B JE-A

Tuning Function

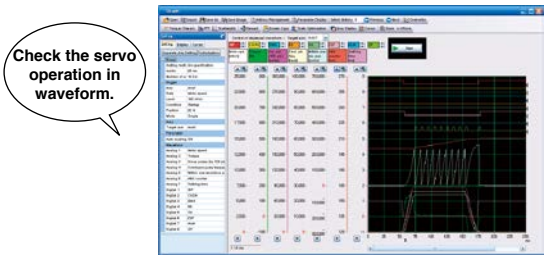
Adjust control gain finely on the [Tuning] window manually for further performance after the one-touch tuning.



Convenient with overwrite and graph history functions JE-B JE-A

Graph Function

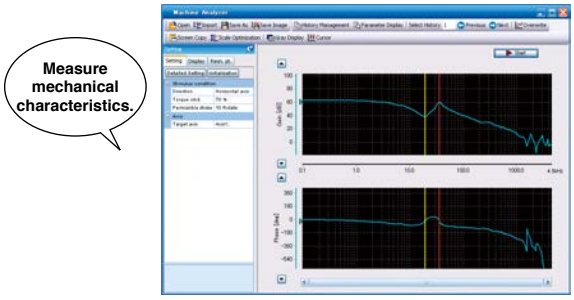
The number of measurement channels is increased to 7 channels for analog, and 8 channels for digital. Display various servo statuses in the waveform at one measurement, supporting setting and adjustment. Convenient functions such as [Overwrite] for overwriting multiple data and [Graph history] for displaying graph history are available.



Analyze the frequency characteristics JE-B JE-A

Machine Analyzer Function

Input random torque to the servo motor automatically and analyze frequency characteristics (0.1 Hz to 4.5 kHz) of a machine system just by clicking the [Start] button. This function supports setting of machine resonance suppression filter, etc.

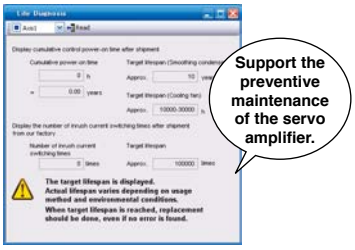


Maintenance

For timely parts replacement JE-B JE-A

Servo Amplifier Life Diagnosis Function

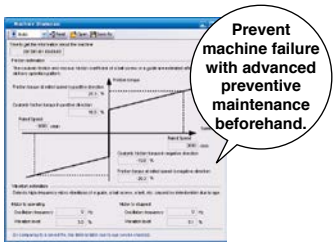
Check cumulative operation time and on/off times of inrush relay. This function provides an indication of replacement time for servo amplifier parts such as capacitor and relays.



Find out the aging deterioration of machines JE-B JE-A Patent pending

Machine Diagnosis Function

This function estimates and displays machine friction and vibration in normal operation without any special measurement. Comparing the data of the first operation and after years of operation helps to find out the aging deterioration of a machine and is beneficial for preventive maintenance.



Further Reduction of Cycle Time

Top-level basic performance is achieved, including speed frequency response of 2.0 kHz.
The MELSERVO-JE series that utilizes regenerative energy maximizes the machine performance and energy saving.

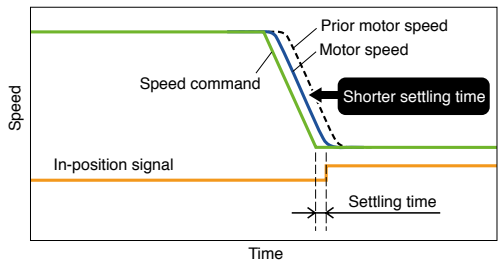
Fast and Accurate

Class top-level speed frequency response JE-B JE-A

2.0 kHz Speed Frequency Response

The top-level speed frequency response of 2.0 kHz shortens the settling time substantially, reducing the cycle time of a machine.

[Settling time comparison with the prior model]

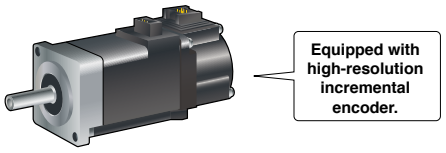


Exact positioning JE-B JE-A

High-Resolution Encoder

The servo motor equipped with an incremental encoder* of 131072 pulses/rev (17-bit) enables high-accuracy positioning and smooth rotation.

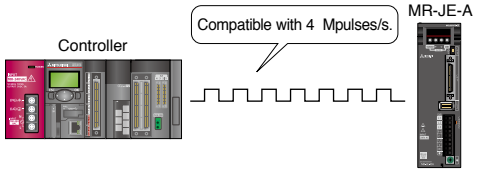
* MR-JE-A is not compatible with absolute position detection system.



Further smooth operation JE-A

Max Command Pulse Frequency of 4 Mpulses/s

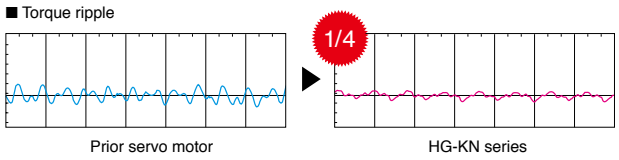
MR-JE-A having a general-purpose interface is compatible with the maximum command pulse frequency of 4 Mpulses/s, enabling smooth operation.



Smooth, constant-speed operation JE-B JE-A

Reduced Torque Ripple during Conduction

By optimizing the combination of the number of motor poles and the number of slots, torque ripple during conduction is greatly reduced. Smooth constant-velocity operation of a machine is achieved.



Compatible with pulse train and analog JE-A

Flexible Command Interface

The command interface of MR-JE-A is compatible with both pulse train command and analog voltage command. The MR-JE-A servo amplifier enables position control with pulse train command, and speed and torque control with analog voltage command.

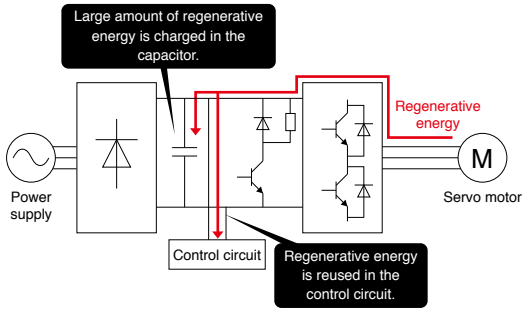
Eco-Friendly Performance

Reduce waste in energy consumption

JE-B JE-A

Efficient Utilization of Regenerative Energy

Capacity of the main circuit capacitor is increased by 20% as compared to that of the prior model, and thus the charging capacity is increased, enabling larger regenerative energy to be reused as driving power energy. Additionally, because the control circuit and the main circuit use a common power supply, the regenerative energy is also used for the control circuit, reducing waste in energy consumption.

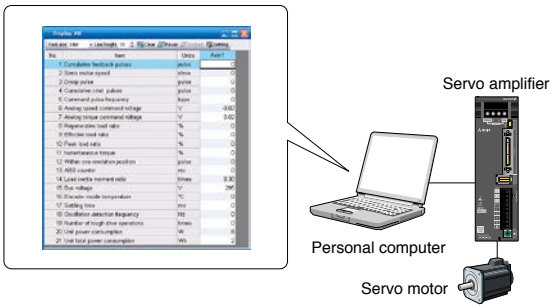


Visualize power consumption

JE-B JE-A

Power Monitor

Driving power and regenerative energy are calculated from the data in the servo amplifier such as speed and current, and the power consumption is monitored with MR Configurator2. Visualization of the power consumption helps to save energy.



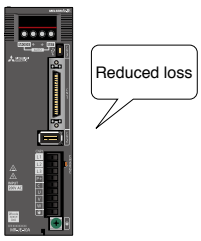
Achieve further energy saving

JE-B JE-A

Saving Energy with Advanced Technologies

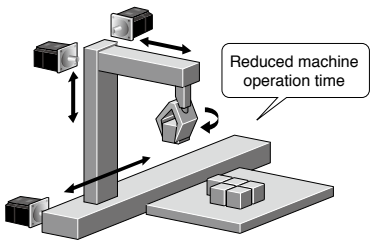
Reducing energy loss of the servo amplifier

Efficiency is increased by the use of a new power module. Energy loss of the servo amplifier itself is reduced.



Saving energy by improving machine performance

The servo amplifiers and the servo motors with the industry-leading level of high performance reduce machine cycle time and operation time, resulting less energy consumption.



Fully Compliant Worldwide

To satisfy growing needs in driving control throughout the world, the MR-JE series complies with global standards.
Command pulse input and digital input/output are compatible with both sink and source type connections.

Global Servo Meets Global Standards

Best quality all over the world

JE-B JE-A

Conformity with Global Standards and Regulations

Use the MR-JE series globally. The servo amplifiers and the servo motors conform to global standards as standard.

Conformity with global standards and regulations

		Servo amplifier	Servo motor
European EC directive	Low voltage directive	EN 61800-5-1	EN 60034-1
	EMC directive	EN 61800-3	EN 60034-1
	RoHS directive	Compliant	Compliant
UL standard		UL 508C	UL 1004-1 / UL 1004-6
CSA standard		CSA C22.2 No.14	CSA C22.2 No.100
Measures for Administration of the Pollution Control of Electronic Information Products (Chinese RoHS)		Compliant (optional cables and connectors)	Compliant (optional cables and connectors)
China Compulsory Certification (CCC)		N/A	N/A
Korea Radio Wave Law (KC)		Compliant	N/A

*1. Refer to "Servo Amplifier Instruction Manual" and "EMC Installation Guidelines" when your system needs to meet the EMC directive.
*2. When exporting the product, follow the local laws and regulations.

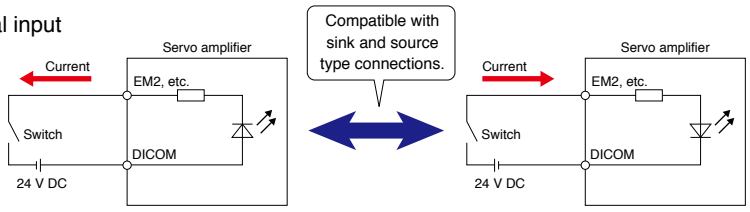
Flexible connections for the global use

JE-B JE-A

Sink and Source Connections

Command pulse input and digital input/output are compatible with both sink and source type connections.

■ Example of digital input



Sink input　　Source input

MELSERVO-JE

● Servo Amplifiers

Servo Amplifier Model Designation

B A

M R - J E - 1 0 B

Mitsubishi general-purpose AC servo amplifier MELSERVO-JE Series

Symbol	Rated output [kW]
10	0.1
20	0.2
40	0.4
70	0.75
100	1
200	2
300	3

Symbol	Interface
B	SSCNET III/H
A	General-purpose

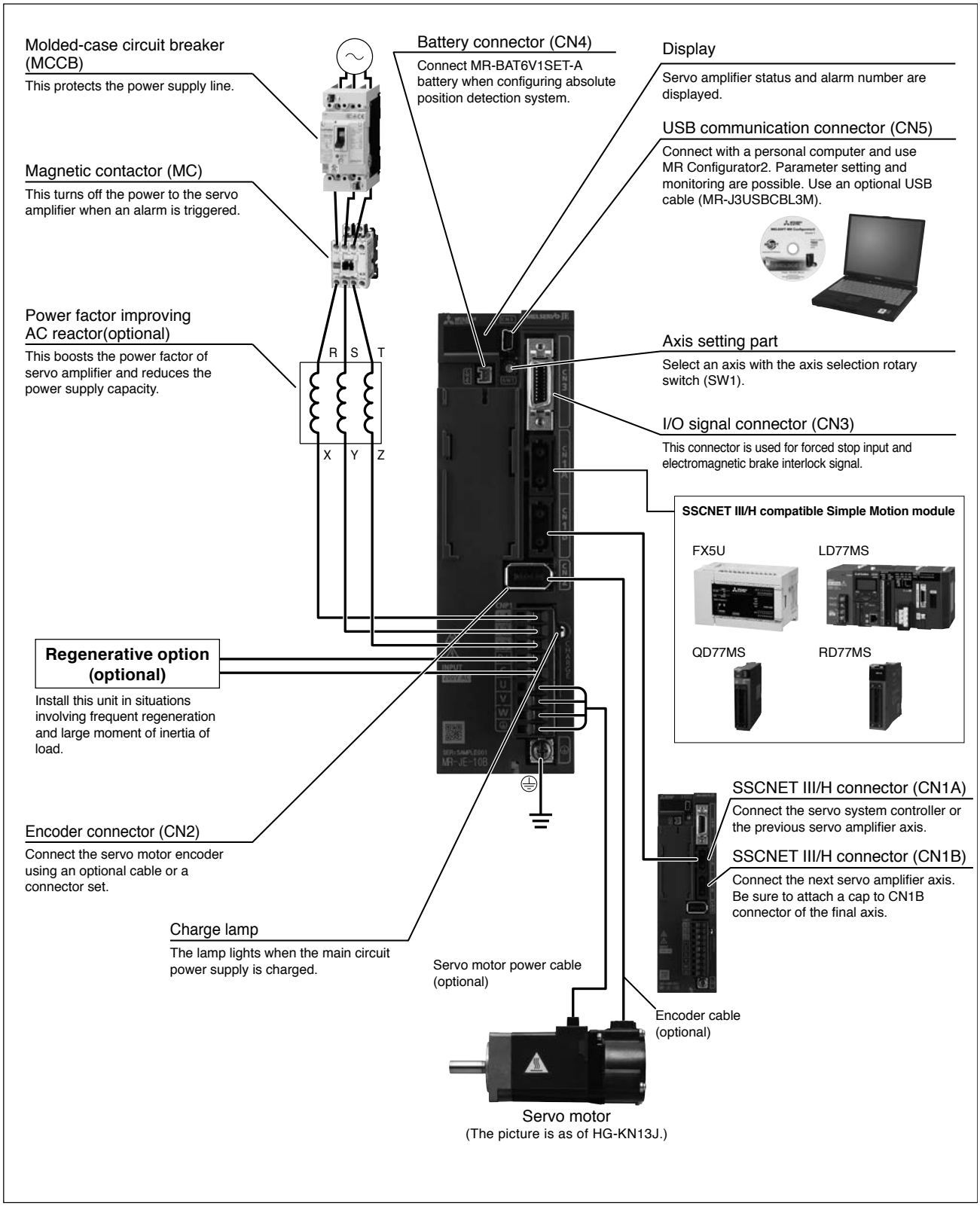
Combinations of Servo Amplifier and Servo Motor

B A

Servo amplifier	Servo motor	
	HG-KN series	HG-SN series
MR-JE-10B/MR-JE-10A	HG-KN13J	-
MR-JE-20B/MR-JE-20A	HG-KN23J	-
MR-JE-40B/MR-JE-40A	HG-KN43J	-
MR-JE-70B/MR-JE-70A	HG-KN73J	HG-SN52J
MR-JE-100B/MR-JE-100A	-	HG-SN102J
MR-JE-200B/MR-JE-200A	-	HG-SN152J, HG-SN202J
MR-JE-300B/MR-JE-300A	-	HG-SN302J

MR-JE-B Connections with Peripheral Equipment (Note 1) B

Peripheral equipment is connected to MR-JE-B as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



Notes: 1. The connection with the peripheral equipment is an example for MR-JE-100B or smaller servo amplifiers. Refer to "MR-JE-_B Servo Amplifier Instruction Manual" for the actual connections.

MR-JE-B (SSCNET III/H Interface) Specifications

B

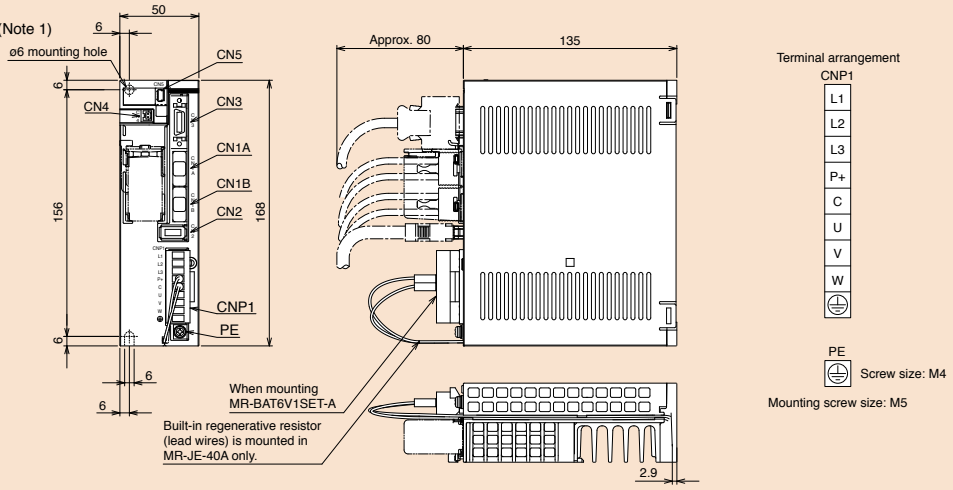
Servo amplifier model MR-JE-		10B	20B	40B	70B	100B	200B	300B
Output	Rated voltage	3-phase 170 V AC						
	Rated current [A]	1.1	1.5	2.8	5.8	6.0	11.0	11.0
Power supply input	Voltage/frequency (Note 1)	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz				3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 8)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz
	Rated current (Note 7) [A]	0.9	1.5	2.6	3.8	5.0	10.5	14.0
	Permissible voltage fluctuation	3-phase or 1-phase 170 V AC to 264 V AC				3-phase or 1-phase 170 V AC to 264 V AC (Note 8)		3-phase 170 V AC to 264 V AC
	Permissible frequency fluctuation	±5% maximum						
Interface power supply		24 V DC ± 10% (required current capacity: 0.1 A)						
Control method		Sine-wave PWM control/current control method						
Tolerable regenerative power of the built-in regenerative resistor (Note 2, 3) [W]		-	-	10	20	20	100	100
Dynamic brake		Built-in (Note 4)						
SSCNET III/H command communication cycle (Note 6)		0.444 ms, 0.888 ms						
Communication function		USB: Connect a personal computer (MR Configurator2 compatible)						
Servo function		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit function, machine diagnosis function, power monitoring function, lost motion compensation function						
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, hotline forced stop function (Note 9)						
Compliance to global standards		Refer to "Conformity with global standards and regulations" on p. 418 in this catalog.						
Structure (IP rating)		Natural cooling, open (IP20)					Force cooling, open (IP20)	
Close mounting (Note 5)	3-phase power supply input	Possible						
	1-phase power supply input	Possible				Not possible		-
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)						
	Ambient humidity	Operation/Storage: 90 %RH maximum (non-condensing)						
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude	1000 m or less above sea level						
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)						
Mass [kg]		0.8	0.8	0.8	1.5	1.5	2.1	2.1

Notes: 1. Rated output and speed of a servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the tolerable regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-JE-_B Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio.
5. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C, or use them with 75% or less of the effective load ratio.
6. The command communication cycle depends on the controller specifications and the number of axes connected.
7. This value is applicable when a 3-phase power supply is used.
8. When a 1-phase 200 V AC to 240 V AC power supply is used, use the servo amplifiers with 75% or less of the effective load ratio.
9. When an alarm occurs on MR-JE-B servo amplifier, the hot line forced stop signal will be sent to other servo amplifiers through a controller, and all the servo motors that are operated normally by MR-JE-B servo amplifiers decelerate to a stop. Refer to "MR-JE-_B Servo Amplifier Instruction Manual" for details.

MR-JE-B Dimensions

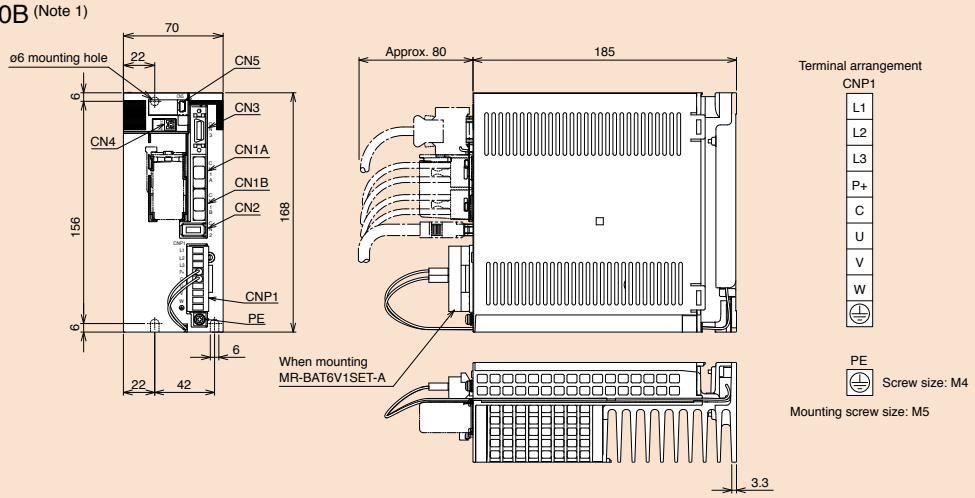
B

- MR-JE-10B (Note 1)
- MR-JE-20B (Note 1)
- MR-JE-40B (Note 1)



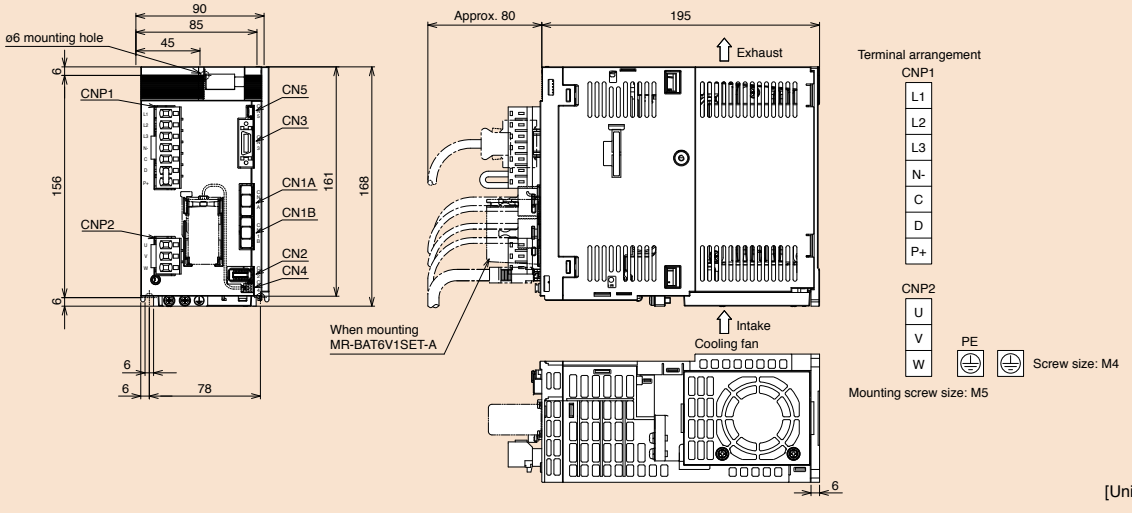
[Unit: mm]

- MR-JE-70B (Note 1)
- MR-JE-100B (Note 1)



[Unit: mm]

- MR-JE-200B (Note 2)
- MR-JE-300B (Note 2)

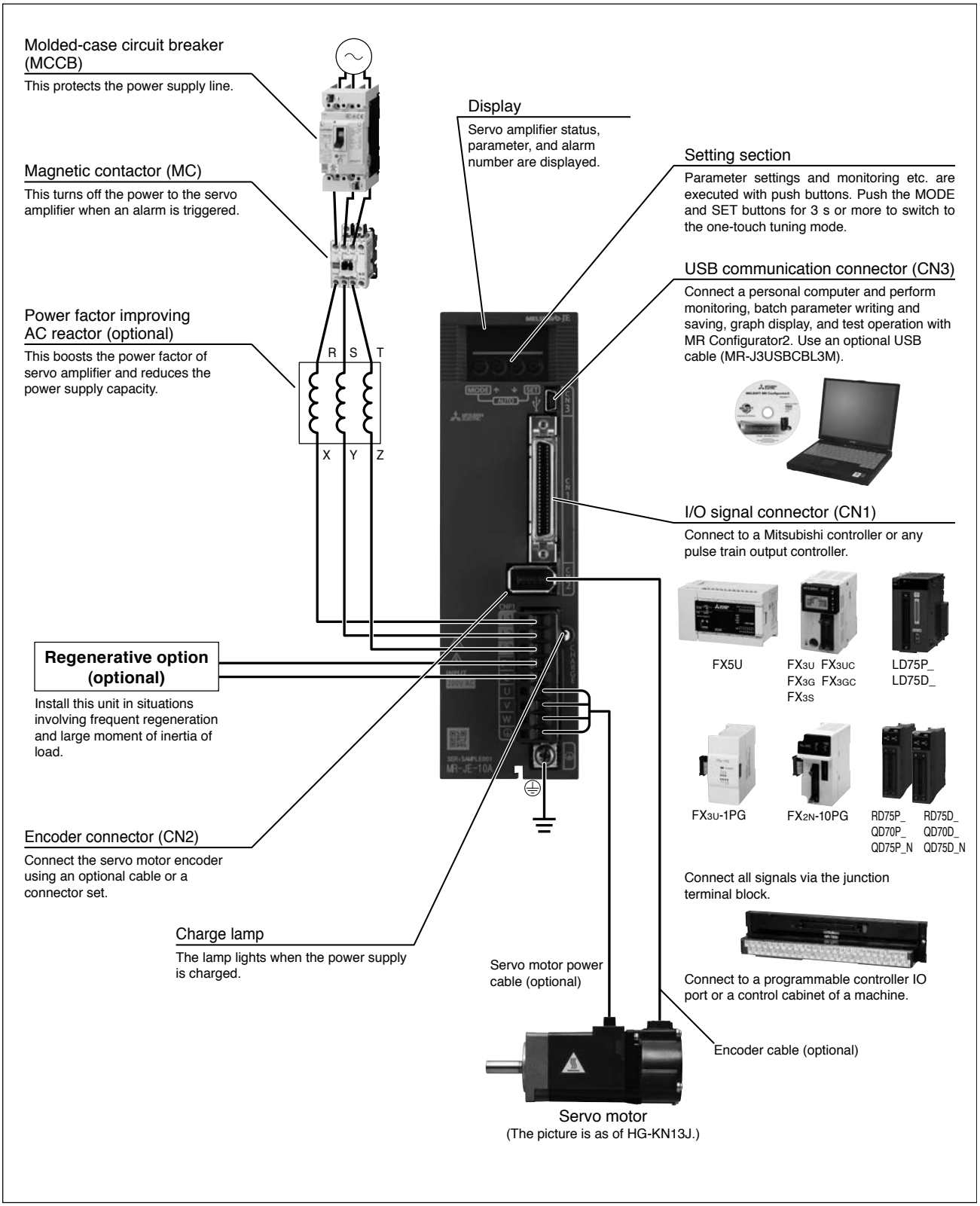


[Unit: mm]

Notes: 1. CNP1 connector (insertion type) is supplied with the servo amplifier.
2. CNP1 and CNP2 connectors (insertion type) are supplied with the servo amplifier.

MR-JE-A Connections with Peripheral Equipment (Note 1) A

Peripheral equipment is connected to MR-JE-A as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



Notes: 1. The connection with the peripheral equipment is an example for MR-JE-100A or smaller servo amplifiers. Refer to "MR-JE-_A Servo Amplifier Instruction Manual" for the actual connections.

MR-JE-A (General-purpose Interface) Specifications

A

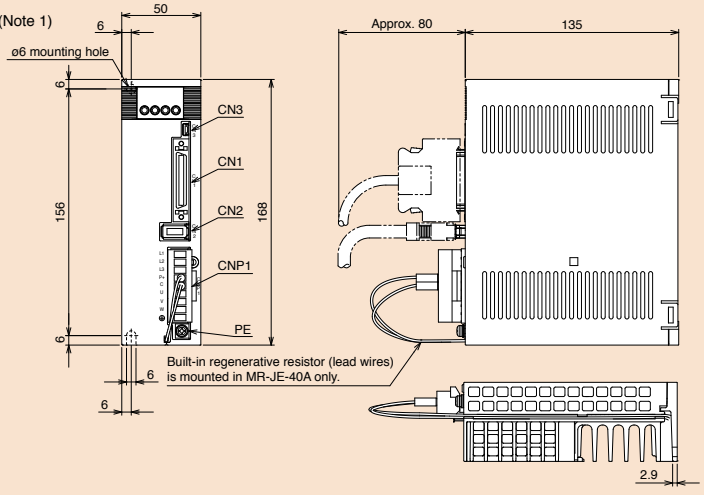
Servo amplifier model MR-JE-		10A	20A	40A	70A	100A	200A	300A
Output	Rated voltage	3-phase 170 V AC						
	Rated current [A]	1.1	1.5	2.8	5.8	6.0	11.0	11.0
Power supply input	Voltage/frequency (Note 1)	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz				3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 9)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz
	Rated current (Note 7) [A]	0.9	1.5	2.6	3.8	5.0	10.5	14.0
	Permissible voltage fluctuation	3-phase or 1-phase 170 V AC to 264 V AC				3-phase or 1-phase 170 V AC to 264 V AC (Note 9)		3-phase 170 V AC to 264 V AC
	Permissible frequency fluctuation	±5% maximum						
Interface power supply		24 V DC ± 10% (required current capacity: 0.3 A)						
Control method		Sine-wave PWM control/current control method						
Tolerable regenerative power of the built-in regenerative resistor (Note 2, 3) [W]		-	-	10	20	20	100	100
Dynamic brake		Built-in (Note 4, 8)						
Communication function		USB: Connect a personal computer (MR Configurator2 compatible) RS-422/RS-485 (Note 10): Connect a controller (1 : n communication up to 32 axes) (Note 6)						
Encoder output pulse		Compatible (A/B/Z-phase pulse)						
Analog monitor		2 channels						
Position control mode	Maximum input pulse frequency	4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open-collector)						
	Positioning feedback pulse	Encoder resolution: 131072 pulses/rev						
	Command pulse multiplying factor	Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000						
	Positioning complete width setting	0 pulse to ±65535 pulses (command pulse unit)						
	Error excessive	±3 rotations						
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)						
Speed control mode	Speed control range	Analog speed command 1:2000, internal speed command 1:5000						
	Analog speed command input	0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)						
	Speed fluctuation rate	±0.01% maximum (load fluctuation 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command						
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)						
Torque control mode	Analog torque command input	0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)						
	Speed limit	Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)						
Positioning mode		Point table method, program method						
Servo function		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function						
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection						
Compliance to global standards		Refer to "Conformity with global standards and regulations" on p. 418 in this catalog.						
Structure (IP rating)		Natural cooling, open (IP20)					Force cooling, open (IP20)	
Close mounting (Note 5)	3-phase power supply input	Possible						
	1-phase power supply input	Possible				Not possible		-
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)						
	Ambient humidity	Operation/Storage: 90 %RH maximum (non-condensing)						
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude	1000 m or less above sea level						
	Vibration resistance	5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)						
Mass [kg]		0.8	0.8	0.8	1.5	1.5	2.1	2.1

Notes: 1. Rated output and speed of a servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the tolerable regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-JE-_A Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio.
5. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C, or use them with 75% or less of the effective load ratio.
6. RS-422 communication function is available with the servo amplifiers manufactured on December 2013 or later. RS-485 communication function is available with the servo amplifiers manufactured on May 2015 or later. Refer to "MR-JE-_A Servo Amplifier Instruction Manual" for how to verify the manufacturing date of the products.
7. This value is applicable when a 3-phase power supply is used.
8. The coast distance by dynamic brake of HG-KN/HG-SN servo motor series may be different from prior HF-KN/HF-SN. Contact your local sales office for more details.
9. When 1-phase 200 V AC to 240 V AC power supply is used, use them with 75% or less of the effective load ratio.
10. Compatible with Mitsubishi general-purpose AC servo protocol (RS-422/RS-485 communication) and MODBUS® RTU protocol (RS-485 communication).

MR-JE-A Dimensions

A

- MR-JE-10A (Note 1)
- MR-JE-20A (Note 1)
- MR-JE-40A (Note 1)



Terminal arrangement

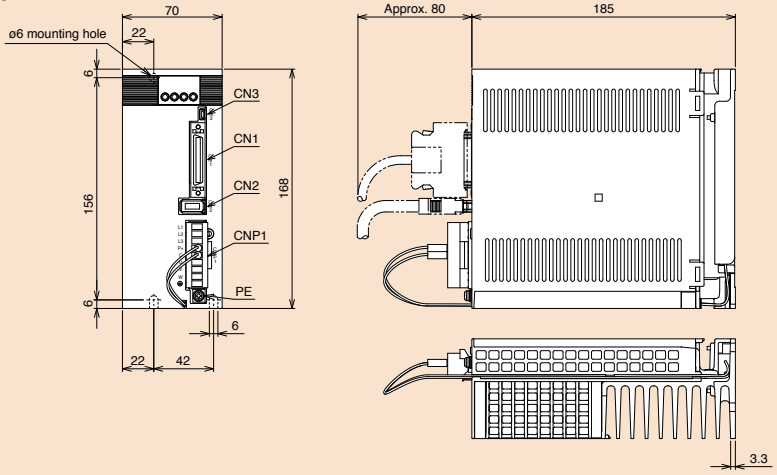
CNP1: L1, L2, L3, P+, C, U, V, W, ⏚

PE ⏚ Screw size: M4

Mounting screw size: M5

[Unit: mm]

- MR-JE-70A (Note 1)
- MR-JE-100A (Note 1)



Terminal arrangement

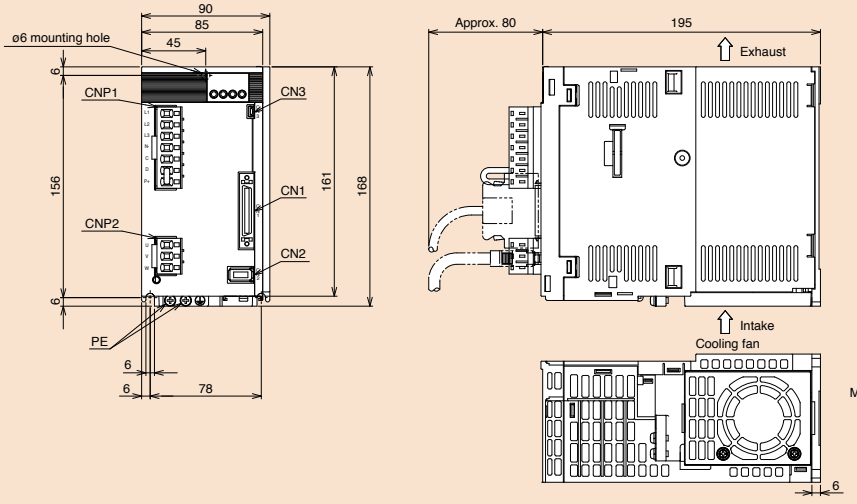
CNP1: L1, L2, L3, P+, C, U, V, W, ⏚

PE ⏚ Screw size: M4

Mounting screw size: M5

[Unit: mm]

- MR-JE-200A (Note 2)
- MR-JE-300A (Note 2)



Terminal arrangement

CNP1: L1, L2, L3, N-, C, D, P+

CNP2: U, V, W

PE ⏚ ⏚ Screw size: M4

Mounting screw size: M5

[Unit: mm]

Notes: 1. CNP1 connector (insertion type) is supplied with the servo amplifier.
2. CNP1 and CNP2 connectors (insertion type) are supplied with the servo amplifier.

● Servo Motors

Model Designation

H G - K N 1 3 B J □

Symbol	Shaft end
None	Standard (Straight shaft)
K	Key shaft (with/without key) (Note 4)
D	D-cut shaft (Note 4)

Symbol	Oil seal
J	Installed (Note 5)
None	None (Note 6)

Symbol	Electromagnetic brake
None	None
B	Installed (Note 1)

Symbol	Rated speed [r/min]
2	2000 (Note 2)
3	3000 (Note 3)

Symbol	Rated output [kW]
1	0.1
2	0.2
4	0.4
5	0.5
7	0.75
10	1.0
15	1.5
20	2.0
30	3.0

Symbol	Inertia/capacity
HG-KN	Low inertia, small capacity
HG-SN	Medium inertia, medium capacity

Notes: 1. Refer to electromagnetic brake specifications of each servo motor series in this catalog for the available models and detailed specifications.
2. 2000 r/min is for HG-SN series only.
3. 3000 r/min is for HG-KN series only.
4. Refer to special shaft end specifications of each servo motor series in this catalog for the available models and detailed specifications.
5. An oil seal is attached as a standard for all servo motors.
6. Available in HG-KN13 to HG-KN43.

Combinations of Servo Motor and Servo Amplifier

Servo motor		Servo amplifier
HG-KN series	HG-KN13(B)J	MR-JE-10B/MR-JE-10A
	HG-KN23(B)J	MR-JE-20B/MR-JE-20A
	HG-KN43(B)J	MR-JE-40B/MR-JE-40A
	HG-KN73(B)J	MR-JE-70B/MR-JE-70A
HG-SN series	HG-SN52(B)J	MR-JE-70B/MR-JE-70A
	HG-SN102(B)J	MR-JE-100B/MR-JE-100A
	HG-SN152(B)J	MR-JE-200B/MR-JE-200A
	HG-SN202(B)J	MR-JE-200B/MR-JE-200A
	HG-SN302(B)J	MR-JE-300B/MR-JE-300A

HG-KN Series (Low Inertia, Small Capacity) Specifications

Servo motor model		HG-KN	13(B)J	23(B)J	43(B)J	73(B)J
Compatible servo amplifier model			Refer to "Combinations of Servo Motor and Servo Amplifier" on p. 426 in this catalog.			
Power supply capacity *1		[kVA]	0.3	0.5	0.9	1.3
Continuous running duty	Rated output	[W]	100	200	400	750
	Rated torque (Note 3)	[N•m]	0.32	0.64	1.3	2.4
Maximum torque		[N•m]	0.95	1.9	3.8	7.2
Rated speed		[r/min]	3000			
Maximum speed		[r/min]	5000			
Permissible instantaneous speed		[r/min]	5750			
Power rate at continuous rated torque	Standard	[kW/s]	12.9	18.0	43.2	44.5
	With electromagnetic brake	[kW/s]	12.0	16.4	40.8	41.0
Rated current		[A]	0.8	1.3	2.6	4.8
Maximum current		[A]	2.4	3.9	7.8	14
Regenerative braking frequency *2, *3		[times/min]	(Note 4)	(Note 5)	276	159
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	0.0783	0.225	0.375	1.28
	With electromagnetic brake	[× 10^{-4} kg•m^2]	0.0843	0.247	0.397	1.39
Recommended load to motor inertia ratio (Note 1)			15 times or less			
Speed/position detector	Combination with MR-JE-B		Absolute/incremental 17-bit encoder (resolution: 131072 pulses/rev)			
	Combination with MR-JE-A		Incremental 17-bit encoder (resolution: 131072 pulses/rev)			
Oil seal			Installed. Without oil seal is also available.			Installed
Insulation class			130 (B)			
Structure			Totally enclosed, natural cooling (IP rating: IP65) (Note 2)			
Environment *4	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)			
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)			
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
	Altitude		1000 m or less above sea level			
	Vibration resistance *5		X: 49 m/s^2 Y: 49 m/s^2			
Vibration rank			V10 *7			
Compliance to global standards			Refer to "Conformity with global standards and regulations" on p. 418 in this catalog.			
Permissible load for the shaft *6	L	[mm]	25	30	30	40
	Radial	[N]	88	245	245	392
	Thrust	[N]	59	98	98	147
Mass	Standard	[kg]	0.6	0.98	1.5	3.0
	With electromagnetic brake	[kg]	0.8	1.4	1.9	4.0

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 8 of "Annotations for Servo Motor Specifications" on p. 431 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. When the servo motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited. When the servo motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the load to motor inertia ratio is 11 times or less.
5. When the servo motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited if the load to motor inertia ratio is 9 times or less. When the servo motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the load to motor inertia ratio is 3 times or less.

Refer to "Annotations for Servo Motor Specifications" on p. 431 in this catalog for the asterisks 1 to 7.

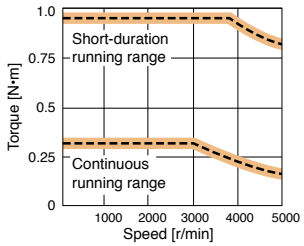
HG-KN Series Electromagnetic Brake Specifications (Note 1)

Servo motor model	HG-KN	13BJ	23BJ	43BJ	73BJ
Type		Spring actuated type safety brake			
Rated voltage		24 V DC $^{0}_{-10}$%			
Power consumption	[W] at 20 °C	6.3	7.9	7.9	10
Electromagnetic brake static friction torque	[N•m]	0.32	1.3	1.3	2.4
Permissible braking work	Per braking [J]	5.6	22	22	64
	Per hour [J]	56	220	220	640
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000	20000
	Work per braking[J]	5.6	22	22	64

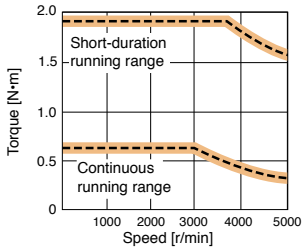
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-KN Series Torque Characteristics

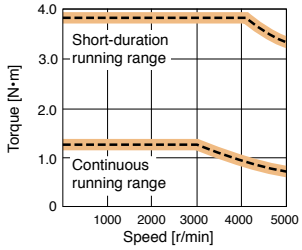
HG-KN13(B)J (Note 1, 2, 3)



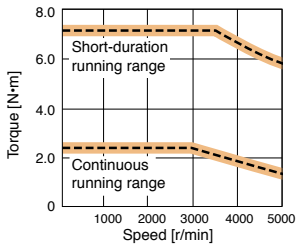
HG-KN23(B)J (Note 1, 2, 3)



HG-KN43(B)J (Note 1, 2, 3)



HG-KN73(B)J (Note 1, 2, 3)

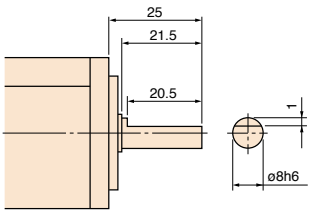


Notes: 1. ▬ : For 3-phase 200 V AC.
2. - - - - : For 1-phase 230 V AC.
3. Torque drops when the power supply voltage is below the specified value.

HG-KN Series Special Shaft End Specifications

Motors with the following specifications are also available.

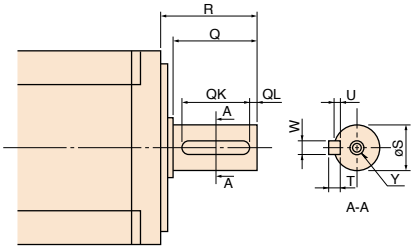
D-cut shaft (Note 1): 100 W



[Unit: mm]

Key shaft (with key) (Note 1, 2): 200 W, 400 W, and 750 W

Model	Variable dimensions								
	T	S	R	Q	W	QK	QL	U	Y
HG-KN23(B)JK, 43(B)JK	5	14h6	30	27	5	20	3	3	M4 screw Depth: 15
HG-KN73(B)JK	6	19h6	40	37	6	25	5	3.5	M5 screw Depth: 20



[Unit: mm]

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. 2 round end key is attached.

HG-SN Series (Medium Inertia, Medium Capacity) Specifications

Servo motor model	HG-SN	52(B)J	102(B)J	152(B)J	202(B)J	302(B)J
Compatible servo amplifier model		Refer to "Combinations of Servo Motor and Servo Amplifier" on p. 426 in this catalog.				
Power supply capacity *1	[kVA]	1.0	1.7	2.5	3.5	4.8
Continuous running duty	Rated output [kW]	0.5	1.0	1.5	2.0	3.0
	Rated torque (Note 3) [N•m]	2.39	4.77	7.16	9.55	14.3
Maximum torque	[N•m]	7.16	14.3	21.5	28.6	42.9
Rated speed	[r/min]	2000				
Maximum speed	[r/min]	3000				2500
Permissible instantaneous speed	[r/min]	3450				2875
Power rate at continuous rated torque	Standard [kW/s]	7.85	19.7	32.1	19.5	26.1
	With electromagnetic brake [kW/s]	6.01	16.5	28.2	16.1	23.3
Rated current	[A]	2.9	5.6	9.4	9.6	11
Maximum current	[A]	9.0	17	29	31	33
Regenerative braking frequency *2, *3	[times/min]	62	38	139	47	28
Moment of inertia J	Standard [× 10^{-4} kg•m^2]	7.26	11.6	16.0	46.8	78.6
	With electromagnetic brake [× 10^{-4} kg•m^2]	9.48	13.8	18.2	56.5	88.2
Recommended load to motor inertia ratio (Note 1)		15 times or less				
Speed/position detector	Combination with MR-JE-B	Absolute/incremental 17-bit encoder (resolution: 131072 pulses/rev)				
	Combination with MR-JE-A	Incremental 17-bit encoder (resolution: 131072 pulses/rev)				
Oil seal		Installed				
Insulation class		155 (F)				
Structure		Totally enclosed, natural cooling (IP rating: IP67) (Note 2)				
Environment *4	Ambient temperature	Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity	Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)				
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude	1000 m or less above sea level				
	Vibration resistance *5	X: 24.5 m/s^2 Y: 24.5 m/s^2			X: 24.5 m/s^2 Y: 49 m/s^2	
Vibration rank		V10 *7				
Compliance to global standards		Refer to "Conformity with global standards and regulations" on p. 418 in this catalog.				
Permissible load for the shaft *6	L [mm]	55	55	55	79	79
	Radial [N]	980	980	980	2058	2058
	Thrust [N]	490	490	490	980	980
Mass	Standard [kg]	4.8	6.2	7.3	11	16
	With electromagnetic brake [kg]	6.7	8.2	9.3	17	22

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 8 of "Annotations for Servo Motor Specifications" on p. 431 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.

Refer to "Annotations for Servo Motor Specifications" on p. 431 in this catalog for the asterisks 1 to 7.

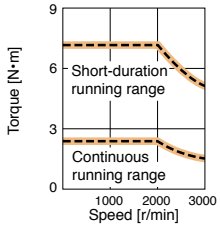
HG-SN Series Electromagnetic Brake Specifications (Note 1)

Servo motor model	HG-SN	52BJ	102BJ	152BJ	202BJ	302BJ
Type		Spring actuated type safety brake				
Rated voltage		24 V DC $^{0}_{-10}$%				
Power consumption	[W] at 20 °C	20	20	20	34	34
Electromagnetic brake static friction torque	[N•m]	8.5	8.5	8.5	44	44
Permissible braking work	Per braking [J]	400	400	400	4500	4500
	Per hour [J]	4000	4000	4000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000	20000	20000
	Work per braking [J]	200	200	200	1000	1000

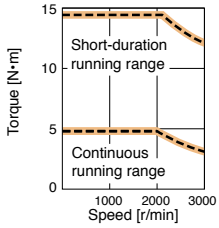
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-SN Series Torque Characteristics

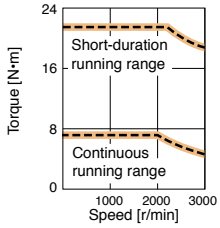
HG-SN52(B)J (Note 1, 2, 3)



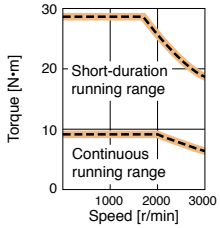
HG-SN102(B)J (Note 1, 2, 3)



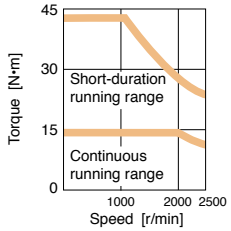
HG-SN152(B)J (Note 1, 2, 3)



HG-SN202(B)J (Note 1, 2, 3)



HG-SN302(B)J (Note 1, 3)



Notes: 1. ——— : For 3-phase 200 V AC.
2. - - - - : For 1-phase 230 V AC.
3. Torque drops when the power supply voltage is below the specified value.

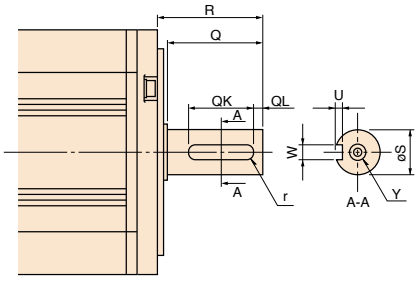
HG-SN Series Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-SN52(B)JK, 102(B)JK, 152(B)JK	24h6	55	50	8 $^{0}_{-0.036}$	36	5	4 $^{+0.2}_{0}$	4	M8 screw Depth: 20
HG-SN202(B)JK, 302(B)JK	35 $^{+0.010}_{0}$	79	75	10 $^{0}_{-0.036}$	55	5	5 $^{+0.2}_{0}$	5	

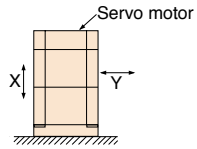
Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



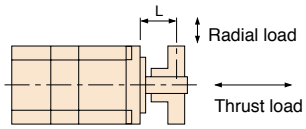
[Unit: mm]

Annotations for Servo Motor Specifications

*1. The power supply capacity varies depending on the power supply impedance.
*2. The regenerative braking frequency shows the permissible frequency when the servo motor, without a load and a regenerative option, decelerates from the rated speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Moment of inertia of load/Moment of inertia of servo motor.
When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (operating speed/rated speed). Take measures to keep the regenerative power [W] during operation below the tolerable regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software.
Refer to "Regenerative Option" in this catalog for the tolerable regenerative power [W] when regenerative option is used.
*3. For 400 W or smaller servo amplifiers, the regenerative braking frequency may change affected by the power supply voltage due to the large ratio of the energy charged into the electrolytic capacitor in the servo amplifier.
*4. In the environment where the servo motor is exposed to oil mist, oil and/or water, a standard specification servo motor may not be usable. Contact your local sales office for more details.
*5. The vibration direction is shown in the diagram below. The numerical value indicates the maximum value of the component (commonly the bracket in the opposite direction of the servo motor shaft).
Fretting more likely occurs on the bearing when the servo motor stops. Thus, maintain vibration level at approximately one-half of the allowable value.

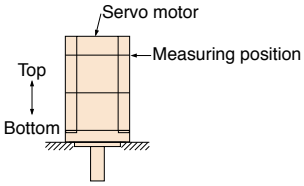


*6. Refer to the diagram below for the permissible load for the shaft. Do not apply a load exceeding the value specified in the table on the shaft. The values in the table are applicable when each load is applied singly.

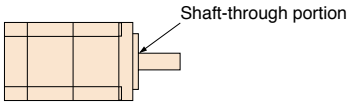


L: Distance between the flange mounting surface and the center of load

*7. V10 indicates that the amplitude of the servo motor itself is 10 μm or less. The following shows mounting posture and measuring position of the servo motor during the measurement:

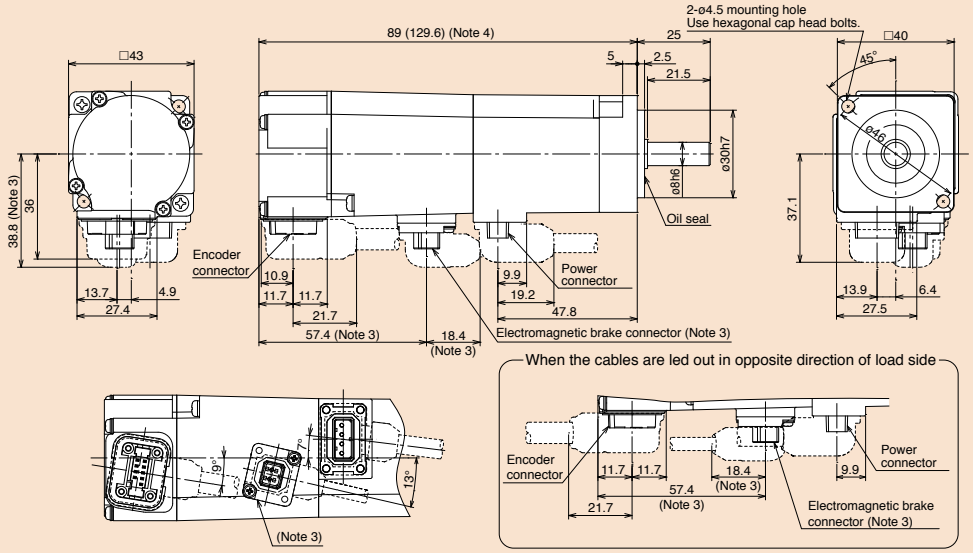


*8. Refer to the diagram below for shaft-through portion.



HG-KN Series Dimensions (Note 1, 5)

●HG-KN13(B)J



Power connector

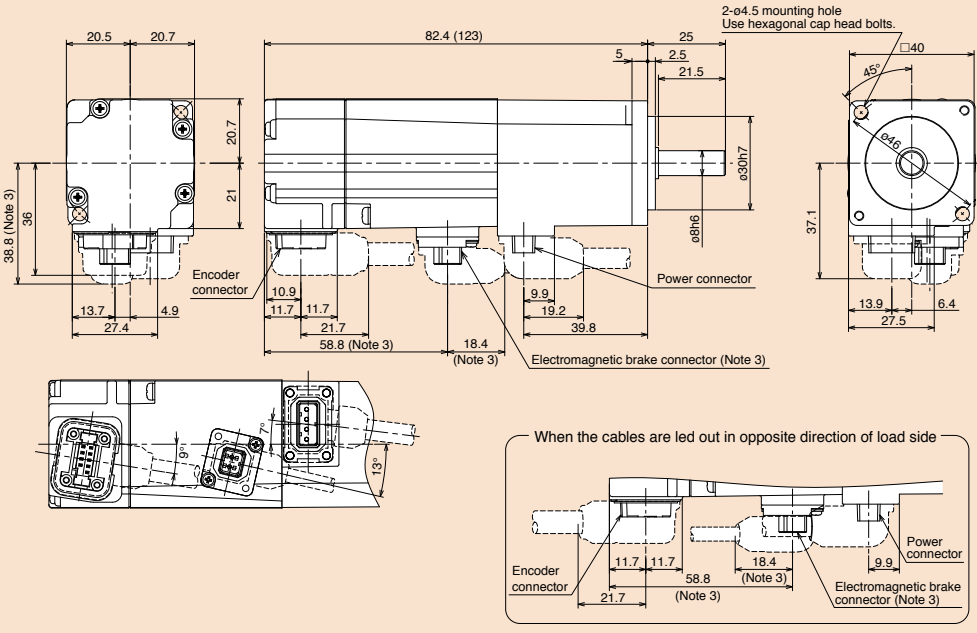
Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

●HG-KN13(B)



Power connector

Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

Electromagnetic brake connector (Note 2)

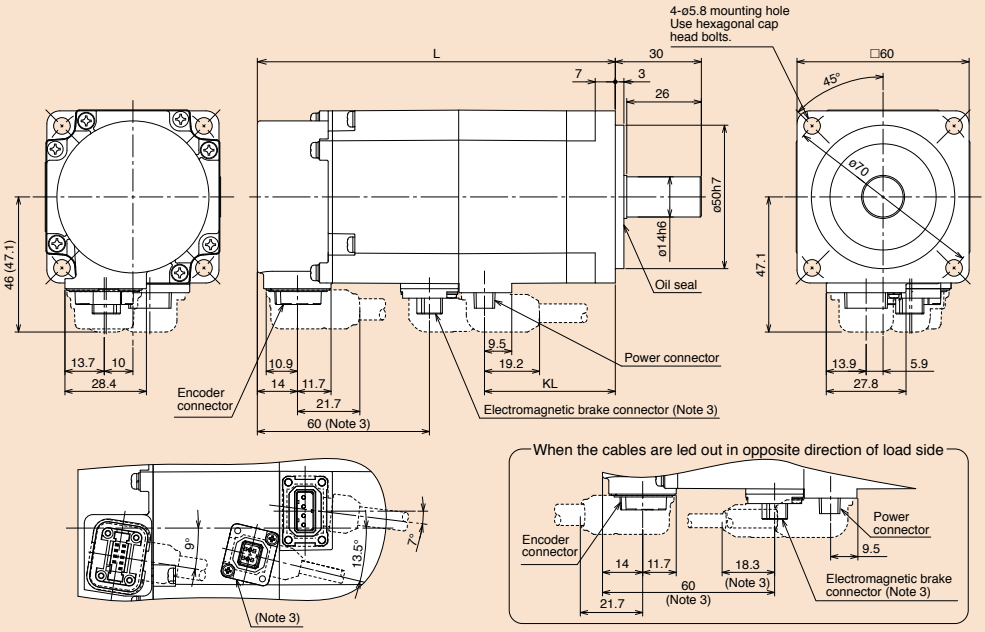
Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-KN Series Dimensions (Note 1, 5)

●HG-KN23(B)J, HG-KN43(B)J



Power connector



Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

Electromagnetic brake connector (Note 2)

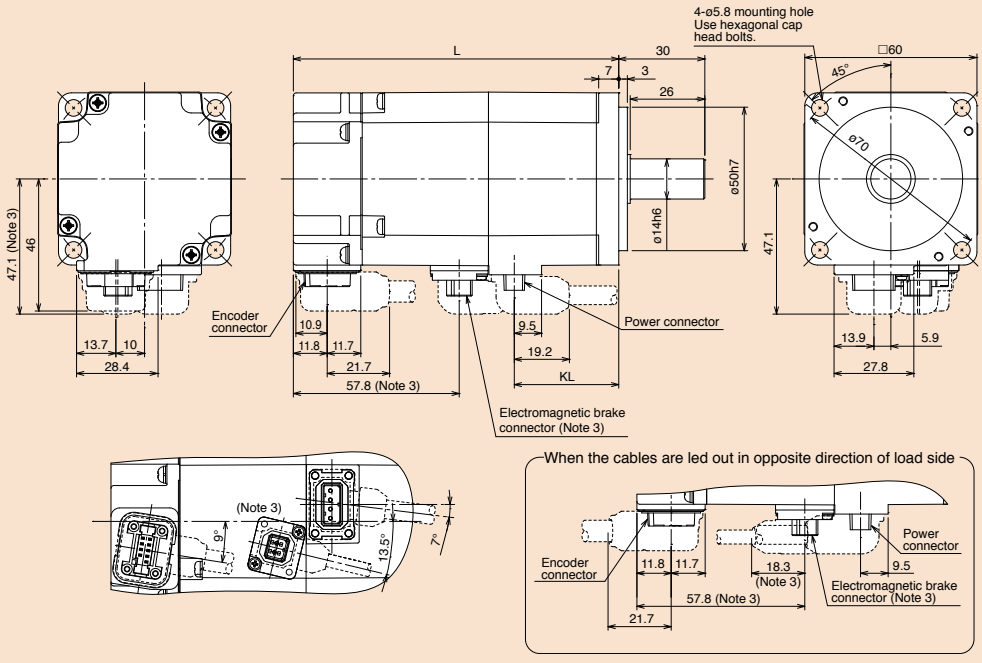


Pin No.	Signal name
1	B1
2	B2

Model	Variable dimensions (Note 4)	
	L	KL
HG-KN23(B)J	88 (124.8)	45.6
HG-KN43(B)J	109.7 (146.5)	67.3

[Unit: mm]

●HG-KN23(B), HG-KN43(B)



Power connector



Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

Electromagnetic brake connector (Note 2)



Pin No.	Signal name
1	B1
2	B2

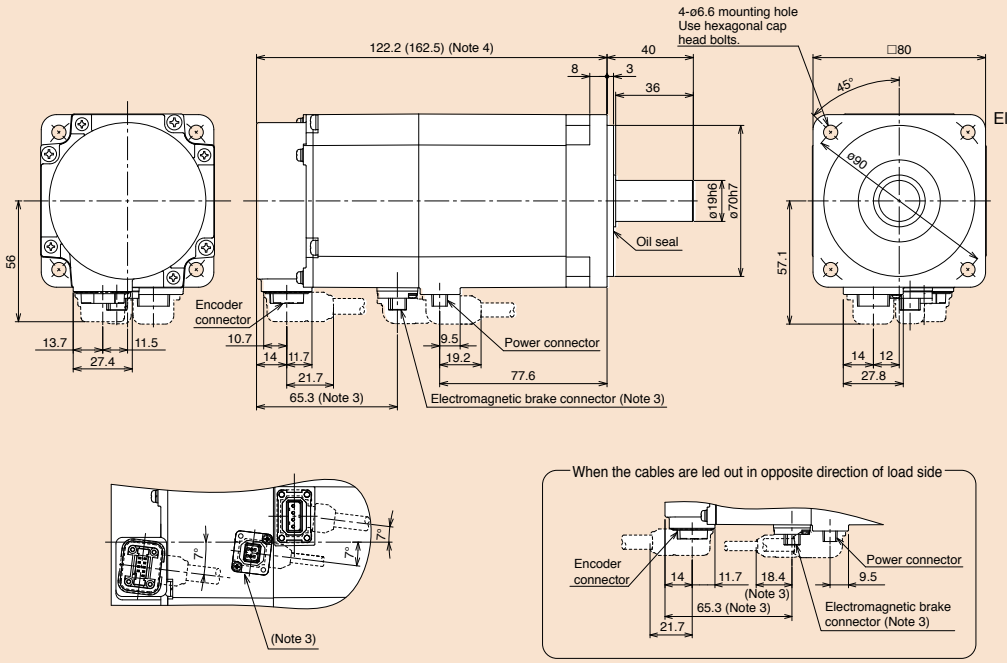
Model	Variable dimensions (Note 4)	
	L	KL
HG-KN23(B)	76.6 (113.4)	36.4
HG-KN43(B)	98.3 (135.1)	58.1

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-KN Series Dimensions (Note 1, 5)

●HG-KN73(B)J



Power connector

Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W



Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2



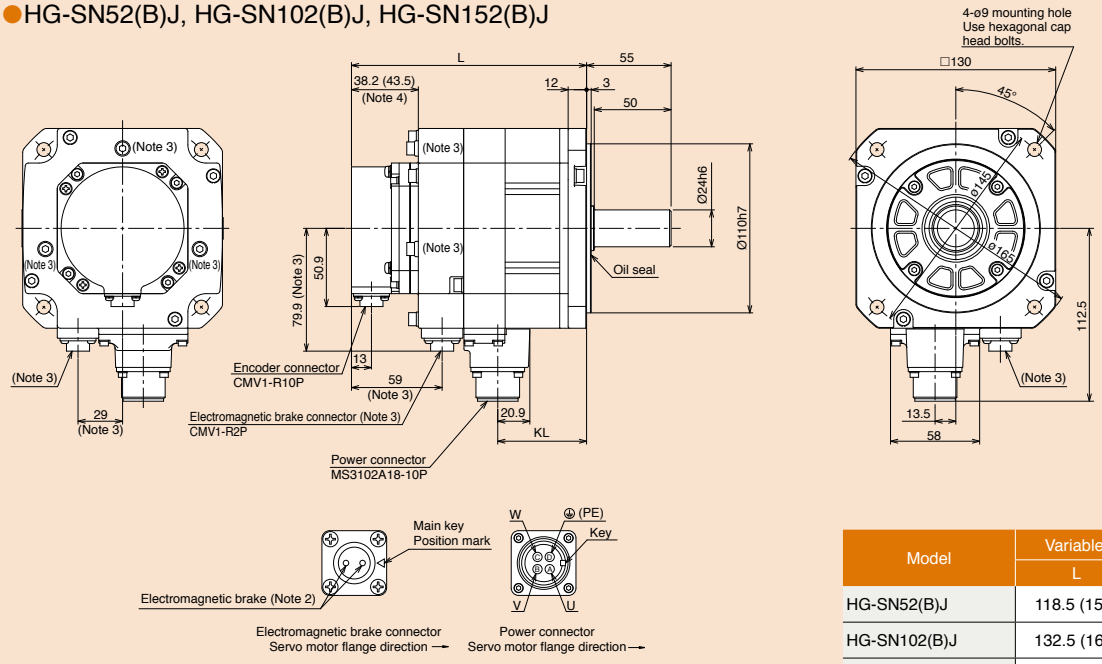
When the cables are led out in opposite direction of load side

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-SN Series Dimensions (Note 1, 5)

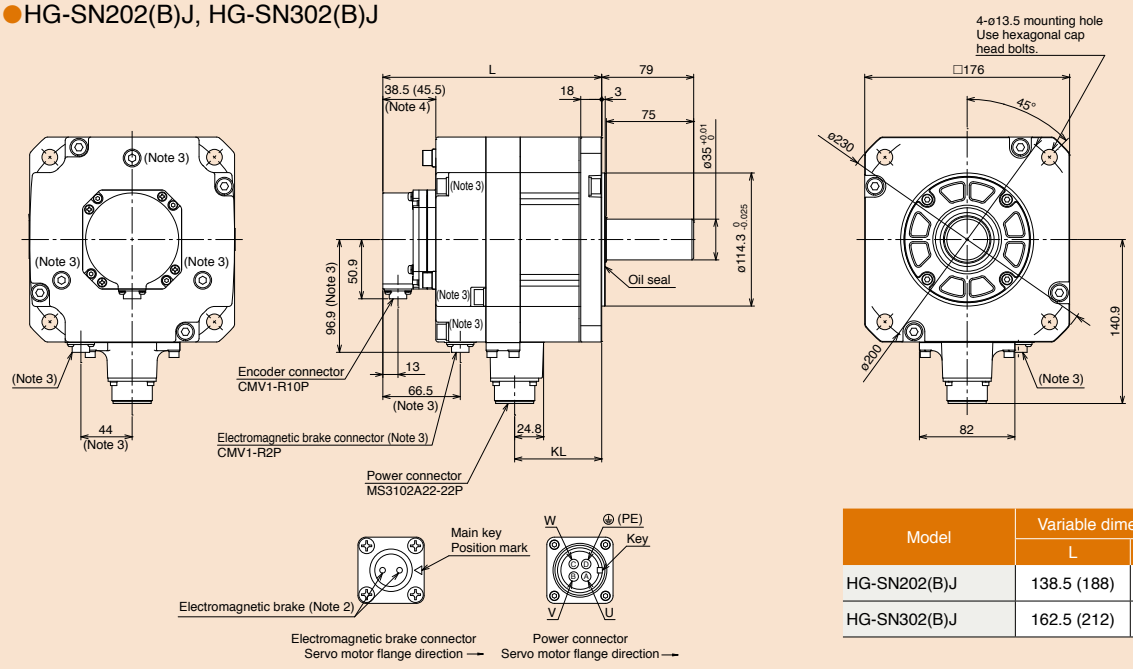
●HG-SN52(B)J, HG-SN102(B)J, HG-SN152(B)J



Model	Variable dimensions (Note 4)	
	L	KL
HG-SN52(B)J	118.5 (153)	57.8
HG-SN102(B)J	132.5 (167)	71.8
HG-SN152(B)J	146.5 (181)	85.8

[Unit: mm]

●HG-SN202(B)J, HG-SN302(B)J



Model	Variable dimensions (Note 4)	
	L	KL
HG-SN202(B)J	138.5 (188)	74.8
HG-SN302(B)J	162.5 (212)	98.8

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

Inverter

Offers best choices that cover all needs

Our inverters with adjustable frequency power supply are designed to easily change the rotation speed of three-phase induction motors.
High-performance, environmental friendly, and complies with global standards. Select from our product lineup for different applications.

Inverter FREQROL

A800 Series



New & high standard inverter with high-performance and high-quality. Enhanced drive performance and easy use while complying with safety standards.

Features P.438 | Line up P.444 | Specifications P.448

A800Plus Series



The FR-A800 advanced-function, high-performance inverter has been enhanced with features that make it ideal for use in special fields.

- A800 Plus Series for CRANES

Features P.466 | Line up P.468 | Specifications P.469

- A800 Plus Series for Roll to Roll

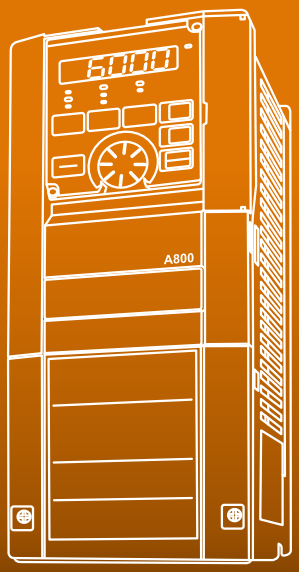
Features P.476 | Line up P.482 | Specifications P.483

F800 Series



Enhanced next-generation energy-saving inverter with functions ideal for fans and pumps.

Features P.490 | Line up P.498 | Specifications P.500



E700 Series



Top level performer among compact inverters with more persistence and power.

Features P.522 | Line up P.526 | Specifications P.528

F700PJ Series



Capable of operating both general-purpose and IPM motors, and built with various functions to fully meet the needs for fan and pumps.

Features P.542 | Line up P.547 | Specifications P.549

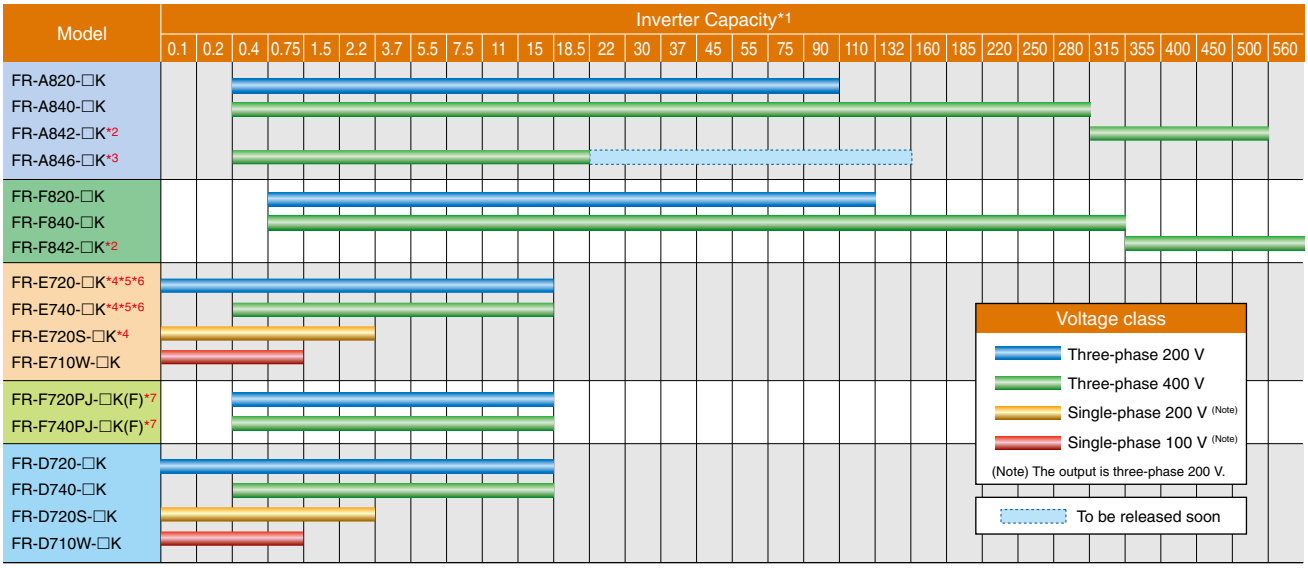
D700 Series



Enhanced reliability and integrity with simplified operation and stronger performance.

Features P.556 | Line up P.560 | Specifications P.562

Capacity table



*1 ND rated capacity for the FR-A800 series, and LD rated capacity for the FR-F800 series.
*2 Separated converter type. Always install the converter unit (FR-CC2).
(Not required when a high power factor converter (FR-HC2) is used.)
*3 IP55 compatible model.
*4 SC at the end of the model name indicates the safety stop function model.
*5 NF at the end of the model name indicates the FL remote communication model.
*6 NC at the end of the model name indicates the CC-Link communication model.
*7 Filterpack (FR-BFP2) is enclosed for the inverter with Filterpack.
("F" is marked at the end of its model names on the packaging box.)

Inverter FREQROL-A800 Series

Unparalleled high-performance; Promising high-quality

Approach to the Leading Drive Performance ——— Swift, Smooth, yet Robust

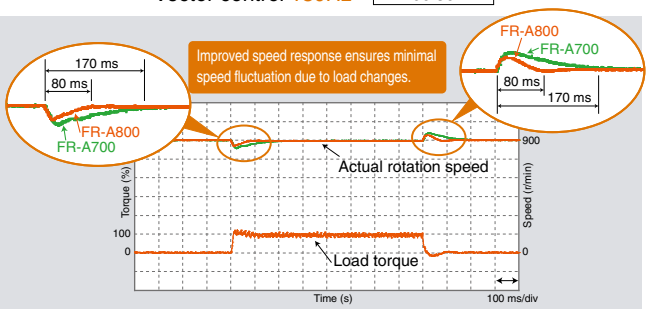
The enhanced Real sensorless vector control and vector control serve the needs for all machinery types.

The vector control is available when a vector control compatible option is installed.

High-Quality Products

High response

Response speed Real sensorless vector control 50Hz*1 A700:20Hz
Vector control 130Hz*2 A700:50Hz



[Example of changes in actual rotation speed with impact load]
(With Real sensorless vector control, SF-JR 4P motor (3.7 kW))

Fast response terminal
The response delay time is reduced.

- **Terminal response**
  A700: 5 to 20 ms ➡ A800: 2 to 3 ms

Line control

Line control is necessary for the machining of elongated products such as paper, thread, wires, all kinds of sheet, and tape. This will respond rapidly to changes in line speed and suppress the occurrences of winding unevenness. This contributes to a steady supply of high-quality products.

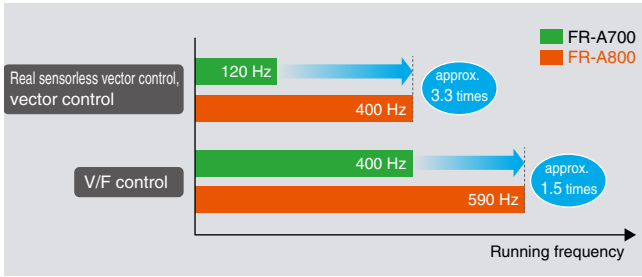


*1: At 3.7 kW with no load. Differs depending on the load conditions and motor capacity.
*2: The option (FR-A8AP, FR-A8AL, or FR-A8TP) is required.
Speed response: The speed response indicates how fast the inverter follows the change in the speed command. (The larger value indicates the better speed trackability.)

Ultra-Fine Processing

High-speed rotation

Operating frequency Real sensorless vector control and vector control 400Hz A700:120Hz
V/F control 590Hz*3 A700:400Hz



Machine tool

Cutting-edge machine tools are harder and thinner than ever before to be applicable to diverse new materials.
High-speed rotation is required more than ever before in order to be applicable for fine and precise cutting on hard and difficult-to-grind materials.



*3: According to the review result of the export control order about frequency changers, the upper limit of output frequency was determined to be 590 Hz for standard models.

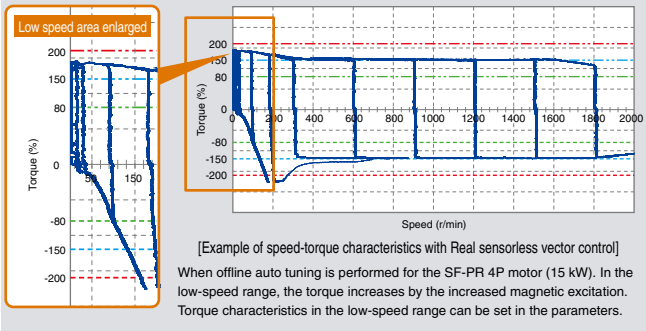
Swiftly Move Heavy Weights

High torque at low speed

Starting torque (When at 0.3 Hz)
Real sensorless vector control 200% (ND rating)*4,
Vector control 200% (ND rating)*4
(150% of initial setting for 5.5K and higher)

Zero-speed torque
Vector control 200%
(Select HD rating.)*4

Speed control range
V/F control 1:10 (6 to 60 Hz: Driving)
Advanced magnetic flux vector control 1:120 (0.5 to 60 Hz: Driving)
Real sensorless vector control 1:200 (0.3 to 60 Hz: Driving)
Vector control 1:1500 (1 to 1500 r/min: Both driving/regeneration)



[Example of speed-torque characteristics with Real sensorless vector control]
When offline auto tuning is performed for the SF-PR 4P motor (15 kW). In the low-speed range, the torque increases by the increased magnetic excitation. Torque characteristics in the low-speed range can be set in the parameters.

Cranes

Cranes are in operation daily at ports carrying fully-laden containers in response to strong demand from all over the world. Our new inverter realizes smooth cargo handling work at low speed and high torque for the slow and stable movements required for heavy objects.



*4: Refer to page 442 for the multiple rating setting.

For Accurate and Stable Transport between Machines

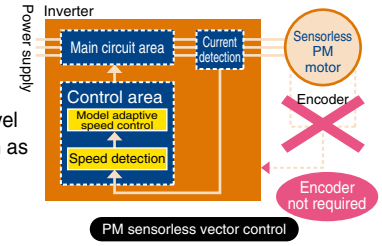
PM sensorless vector control

●What is a permanent magnet (PM) motor?

A PM motor is a synchronous motor with strong permanent magnets embedded in its rotor. The two major PM motor types are: the interior permanent magnet (IPM) motor with its magnets embedded inside the rotor, and the surface permanent magnet (SPM) motor with its permanent magnets attached on the rotor surface.

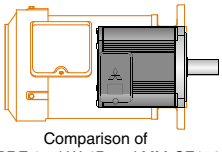
●What is PM sensorless vector control?

The speed and magnetic pole positions, the two essential bits of information to control a PM motor, are detected without a sensor (encoder). The speed detection internally-performed in an inverter enables highly accurate control of a PM motor, almost as accurate as an AC servo system, without the need of a sensor (encoder)*5. Combining with Mitsubishi MM-CF series IPM motors facilitates aspects of high-level control with no encoder such as "simple positioning"*6 and "zero speed torque".



●Easy maintenance for sensor (encoder)-less motor

- No additional cables means less wiring space required.
- Improved reliability is obtained in unfavorable operating environments. (e.g. high vibration)
- PM motors are usually smaller and lighter than induction motors.



Comparison of SF-PRF 1.5 kW 4P and MM-CF152

Transfer of circuit boards

The simple positioning control delivers a precision workpiece, such as a printed substrate, to a precise position.
Transfer of fragile glass substrates can be performed with a highly accurate driving system.



*5: Speed fluctuation ratio: ±0.05% (digital input)

$$\text{Speed fluctuation ratio} = \frac{\text{Speed under no load} - \text{Speed under rated load}}{\text{Rated speed}} \times 100(\%)$$

*6: Positional accuracy (with no load) of 1.5K and lower: ±1.8°, 2K and higher: ±3.6°

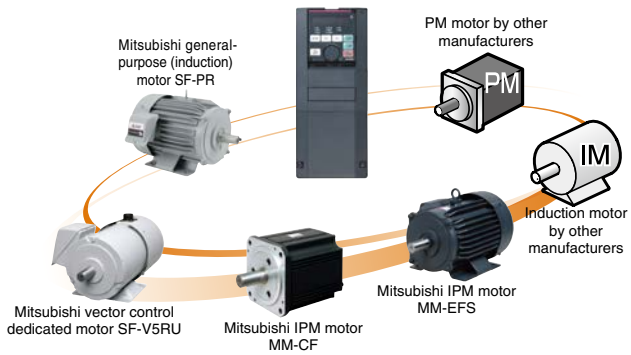
Taking Motor Performance to the Max

Induction motors and magnet motors can be combined freely

●The cutting-edge auto tuning function

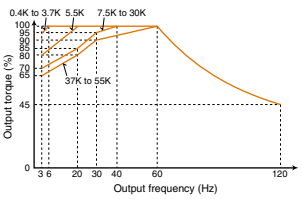
The PM motor auto tuning function, which has been newly developed, enables sensorless operation of other manufacturers' permanent magnet (PM) motors.
Operation with all Mitsubishi induction motors and PM motors, in addtion to induction motors and PM motors from other manufacturers*7, is possible. That means you need less motors for spare and stocks.
(With IPM motors other than MM-CF and PM motors manufactured by other companies, starting torque is limited to 50%, and simple positioning control and zero speed torque cannot be used even if tuned.)

*7: Tuning may not be available depending on its motor characteristics.

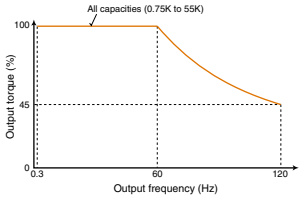


●Low speed, high torque realized with SF-PR motor

By combining with Mitsubishi's high-performance, energy-saving motor SF-PR, 100% continuous operation is possible from a low speed of 0.3 Hz for inverters of any capacity.
(when using Real sensorless vector control)



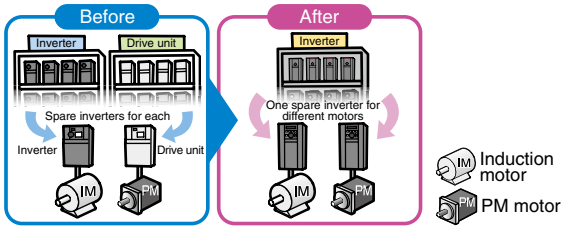
SF-JR continuous operation torque characteristics
(Motor input voltage: 200 V)



SF-PR continuous operation torque characteristics
(Motor input voltage: 200 V)

●Sharing the spare inverter

One spare inverter is enough for the two types of motors (IM and PM).



Security & Safety ——— For Improved Equipment Reliability

Rapid response is obtained when an unexpected trouble occurs.

Improved Safety System

Safety standards compliance NEW

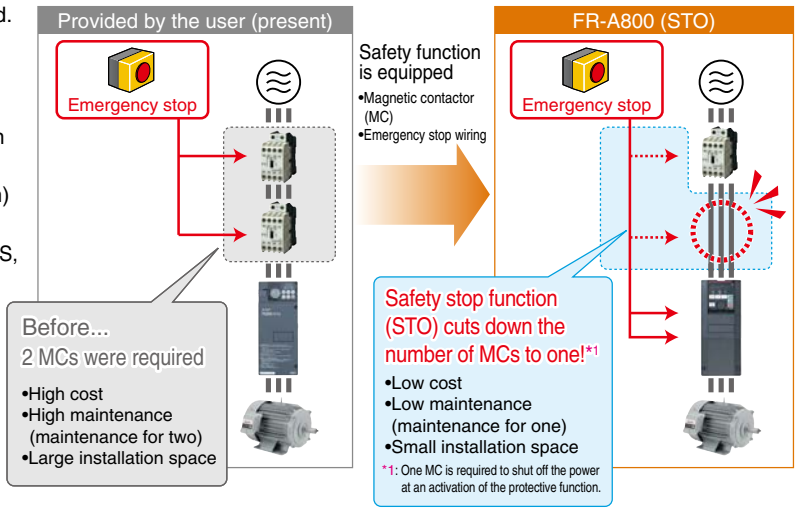
Controls with safety functions can be easily performed.

- PLd and SIL2 are supported as standard. (STO)
  - ・EN ISO 13849-1 PLd / Cat.3
  - ・EN 61508, EN61800-5-2 SIL2
- Compatible with PLe and SIL3 using a built-in option (to be released soon).
  - ・EN ISO 13849-1 PLe / Cat.4(to be supported soon)
  - ・EN 61508, EN61800-5-2 SIL3

  In addition to STO, also compatible with SS1, SS2, SLS, and SOS by using an option (to be released soon).

Functions for IEC/EN 61800-5-2:2007
STO (Safe Torque Off)
SS1 (Safe Stop 1)
SS2 (Safe Stop 2)
SOS (Safe Operating Stop)
SLS (Safely Limited Speed)

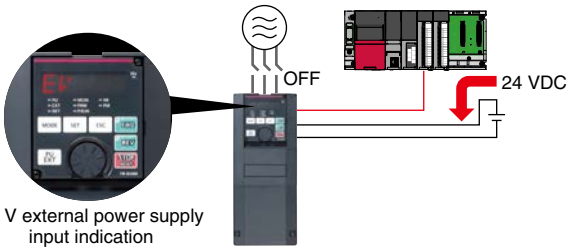
- Safety communication networks will be also supported by using an option (to be released soon)
  - ・CC-Link IE Safety communication function
  - ・PROFIsafe



Reliable and Secure Maintenance

Standard 24 VDC power supply for the control circuit NEW

In addition to the existing power supply input terminals (R1 and S1) of the control circuit, 24 VDC input is equipped as standard. The 24 VDC power supplied from outside can be fed to the control circuit locally, enabling the parameter settings, communication operation and safety maintenance without turning ON the main power.



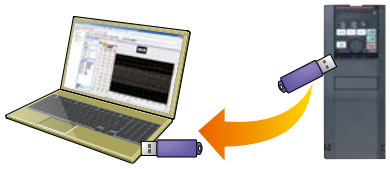
24 V external power supply input indication

Quick Reaction to Malfunction

Easy fault diagnosis NEW

- The operating status (output frequency, etc.) immediately before the protection function activates can be stored in the inverter built-in RAM with the trace function. Stored data (trace data) can be copied to a USB memory device, facilitating easy malfunction analysis at a separate location by reading into the Inverter Setup Software (FR Configurator2).

  Trace data stored in the built-in RAM is deleted when the power is turned OFF or the inverter is reset.



Renewal Assurance

Enhanced life diagnosis function

- An internal thermal sensor is equipped to all inverters as standard, which enables monitoring of the installation environment. Use this function as a guide for the life diagnosis. NEW
- Maintenance timers are available for up to three peripheral devices, such as motor and bearing.



"Maintenance 1 output" warning

Intercompatibility with existing models

- The inverter installation method is the same as that for the FR-A700 series, eliminating any concerns over replacement.
  Furthermore, FR-A700 series control circuit terminal blocks can be installed with the use of an option (FR-A8TAT).



- The terminal response adjustment function allows a user to adjust the response speed in accordance with the existing facility. NEW
- The conversion function of Inverter Setup Software (FR Configurator2) enables parameter copy from an FR-A700 and even from an FR-A500 (to be supported soon).

Easy Setup & Easy to Use ——— From Startup to Maintenance

Fully equipped with a variety of simple functions and equipment to improve work efficiency.

Streamlining the Startup Process

Parameter copying with USB memory NEW

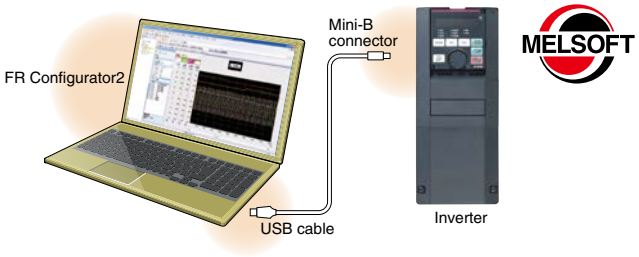
- A USB host connecter (A type), which allows external device connections, has been added.
  Parameters can be copied to commercial USB memory devices.



USB 2.0 (full speed) supported

Easy setup with the Inverter Setup Software (FR Configurator2)

- It is a software which is easy to use and has unity as Mitsubishi FA products with MELSOFT common design and good operability.
- Easy plug-and-play connection to USB terminal equipped as standard

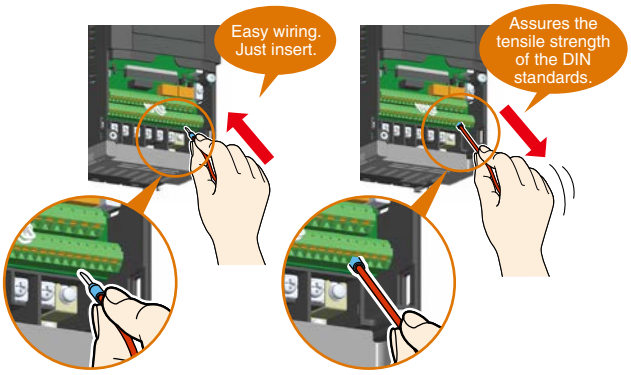


- Free trial version, which contains start-up functions, is available.
  It can be downloaded at Mitsubishi Electric FA Global Website.

For FR Configurator2, please refer to page 446.

Easy wiring to the control circuit NEW

Spring clamp terminals have been adopted for control circuit terminals. Wires can be protected against loosening under vibrations during transportation of the inverter. Ten additional terminals are used as compared to the FR-A700 series. Round crimping terminals can also be used by employing a control terminal option (FR-A8TR).



Easy-to-Follow Display Improves the Operability

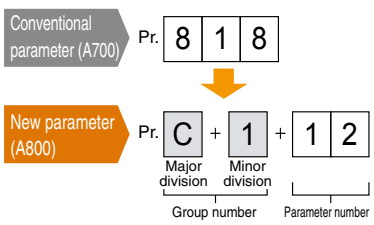
Easy operation with GOT NEW

- Automatic communication is possible without specifying any parameter settings simply by connecting to the GOT2000 series.
- The PLC function device monitor can be displayed at the GOT2000 series. Batch control of multiple inverter device monitors is possible with a single GOT unit.
- The sample screen data for the A800 can be found in the screen design software of the GOT2000 series. The newest version of the screen design software can be downloaded from the Mitsubishi Electric FA Global Website.



Easy-to-follow parameter configuration NEW

One of the selectable mode by the operation panel is the Group parameter mode, which provides intuitive and simple parameter settings.
(The conventional parameter setting mode is selected by default.)



Major division	Name
E	Environment
F	Acceleration/deceleration
D	Start and frequency commands
H	Protective function
M	Monitor
T	Multi function I/O terminal
C	Motor constant
A	Applications
B	Applications (position control)
N	Communication
G	Control

Easy-to-read operation panel NEW

A 5-digit, 12-seg display has been adopted for the operation panel (FR-DU08) for a more natural character display. Furthermore, an optional LCD operation panel (FR-LU08) adopting an LCD panel capable of displaying text and menus is also available.

FR-DU08 (12-segment type)



FR-LU08 (LCD type) (option)



Maintenance

Reduced wiring check time

Split-type covers are adapted for all capacity models.
Maintenance is now easy because all an operator has to do is to remove the cover for the target wiring area.



Maintenance and control of multiple inverters (Option) NEW

Serial number reading is possible using the optional LCD operation panel (FR-LU08) or the Inverter Setup Software (FR Configurator2). Administration of different inverters has become much more simple.

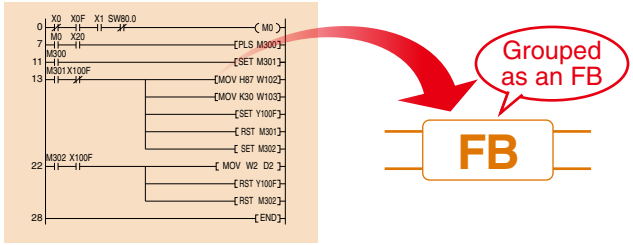
System Support (Function) —— High Equipment Functionality

Numerous functions and the extensive lineup of models are ready to support various systems.

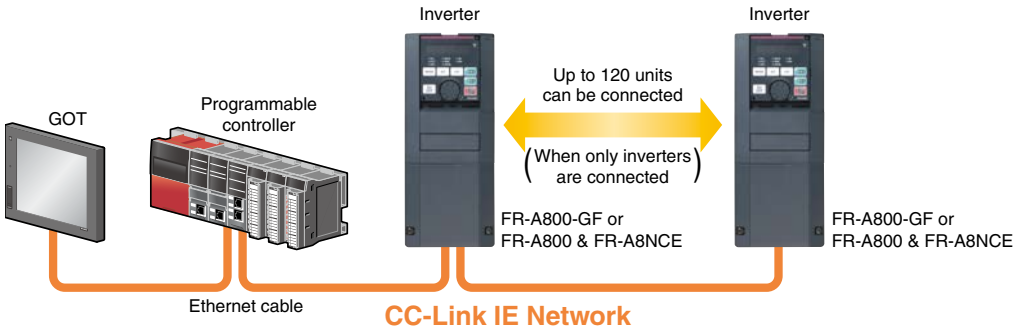
Various Network Compatibility Brings All the Control in Your Hand

Compatibility to various open networks

- A controller can control and monitor an inverter via networks. RS-485 communication (Mitsubishi inverter protocol, MODBUS®RTU protocol), which is supported as standard, conveys data up to 115200 bps.
- A function block (FB) programming for CC-Link communication is available for the MELSEC-Q/L series. Inverter control sequence programs can be created easily. (An FB library (FB part library) can be downloaded from the Mitsubishi Electric FA Global Website.)
- The FR-A800-GF series inverter has a built-in CC-Link IE Network communication function. The CC-Link IE Network communication is ready for immediate operation.



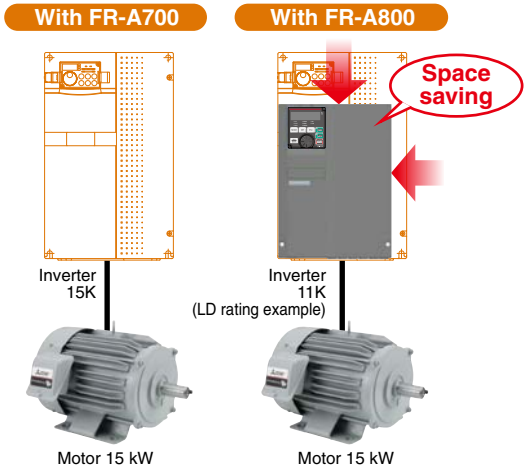
- Communication options are also available for the major network protocols such as CC-Link and SSCNET III(/H) as well as DeviceNet™, PROFIBUS-DPV0, and LonWorks® (to be supported soon). Other Ethernet networks are also supported.
  - ・CC-Link IE Field Network communication
  - ・FL remote communication



Selection of Optimum Capacity to Suit the Application

Multiple rating NEW

Rated current and four different overload capacity ratings (SLD rating (super light duty), LD rating (light duty), ND rating (normal duty), HD rating (heavy duty)) can be selected with parameters. The optimum inverter can be selected to suit the application, and by selecting an inverter with SLD or LD rating, equipment size can be reduced when compared with the FR-A700 series. The HD rating is best suited for applications requiring low speed and high torque.
If using an inverter with capacity of 75K or higher, or motor with capacity of 75 kW or higher, always select and install the inverter based on the capacity of the motor with DC reactor.



Rating	SLD	LD	ND	HD
	Super light duty	Light duty	Normal duty	Heavy duty
Application	Fan and Pump	Fan and Pump; Shield Machines, Winding and Unwinding, Printing Machines	Fan and Pump; Cranes, Press	Fan and Pump; Conveyor
Pr.570 (E301) setting	0	1	2 (Initial value)	3
Overload current rating (inverse-time characteristics)	110% 60 s, 120% 3 s	120% 60 s, 150% 3 s	150% 60 s, 200% 3 s	200% 60 s, 250% 3 s
Surrounding air temperature	40°C	50°C	50°C	50°C

System Support (Environment Adaptability) —— Installation Anywhere

Compliant with a variety of standards, our extensive range of the FR-A800 series inverter covers various applications.

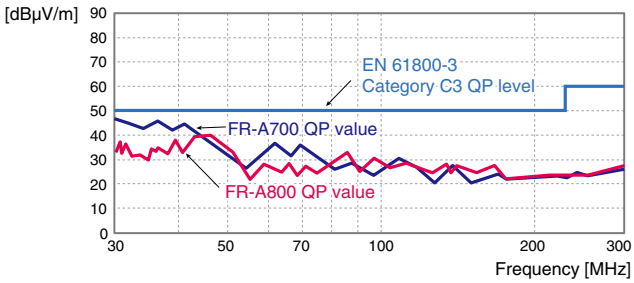
Comprehensive Noise Countermeasures

Compliance with EU EMC Directive with inverter alone

Troublesome acquisition of standards is unnecessary.

- The FR-A800 series is equipped with an EMC filter as standard for compliance with EMC Directive with the inverter alone. (EN 61800-3 2nd Environment Category C3)
- The newly developed drive technology and the power supply technology minimize the EMI emitted from inverters.

	Capacitive filter (radio noise filter)	Input-side common mode choke (line noise filter)	DC reactor
55K or lower	Standard (built-in)	Standard (built-in)	Option (sold separately)
75K or higher	Standard (built-in)	Option (sold separately)	Option (sold separately)



Global Compatibility

Compliance with a variety of standards

- Complies with UL, cUL, and EC Directives (CE marking), and the Radio Waves Act (South Korea) (KC marking). It is also certified as compliant with the Eurasian Conformity (EAC).
- Being RoHS compliant, the FR-A800 series inverters are friendly to people and to the environment.
- For the 400 V class*1, compliance with various countries ship classifications allows use on ship equipment. (A noise filter is required for the FR-A840 inverter and the FR-CC2 converter unit, and a ferrite core is required for the FR-A846 inverter.

Certification body	
NK	(Nippon Kaiji Kyokai)
ABS	(American Bureau of Shipping)
BV	(Bureau Veritas)
LR	(Lloyd's Register of British and Foreign Shipping)
DNV GL	(DNV GL AS)
CCS	(China Classification Society)*2
KR	(Korean Register of Shipping)*2

*1: The IP55 compatible model with a built-in C3 filter is not compliant with the ship classification standards.
*2: The IP55 compatible model will be certified as compliant with the ship classification standards soon.

Protected in Hazardous Environments

Circuit board coating

The inverters with PCB coating (IEC60721-3-3 3C2/3S2) and conductive plating are available for improved environmental resistance. ("-60" or "-06" is affixed to the end of the inverter model name.)

Wire Saving, Space Saving

Built-in brake transistor NEW

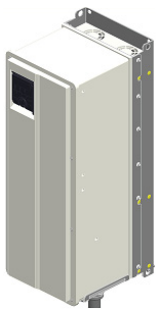
In addition to the 22K and lower, 400 V class 30 to 55K models have also been equipped with a built-in brake transistor. In an application where the motor is hardly decelerated, connecting a brake resistor can shorten the deceleration time; no brake unit or power regeneration converter is required. Wiring, space, and ultimately the cost will be all saved.

Direct Installation by the Machine

IP55 compatible NEW

- Inverters can be installed nearby the machine, minimizing cable length between the inverter and motor.
- Support is available for use even in high-humidity or dusty environments, facilitating a more flexible choice of installation locations.
- By enclosing a DC reactor, it requires less wiring and less space.
- Compatible with cable glands to meet the IP55 specification at the wiring section.





Extensive lineup

•Standard model

F R - A 8 [2] [0] - [0.4K] - [1] - [ ] [ ]

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure, functionality
0	Standard model

Symbol*1	Description
0.4K to 280K	Inverter ND rated capacity (kW)

Symbol	Type*2
1	FM
2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06*3	With	With

Symbol	Function
None	Standard type
GF	With built-in CC-Link IE Field Network function

Three-phase 200V class FR-A820-□*4	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Three-phase 400V class FR-A840-□*4	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	110K	132K	160K	185K	220K	250K	280K										
	03250	03610	04320	04810	05470	06100	06830										
	●	●	●	●	●	●	●										

•Separated converter type

[Inverter]

F R - A 8 [4] [2] - [315K] - [1] - [ ] [ ]

Symbol	Voltage class
4	400 V class

Symbol	Structure, functionality
2	Separated converter type

Symbol*1	Description
315K to 500K	Inverter ND rated capacity (kW)

Symbol	Type*2
1	FM
2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06	With	With

Symbol	Function
None	Standard type
GF	With built-in CC-Link IE Field Network function

Three-phase 400V class FR-A842-□*5	315K	355K	400K	450K	500K
	07700	08660	09620	10940	12120
	●	●	●	●	●

•Converter unit

F R - C C 2 - [H] [315K] - [60]

Symbol	Voltage class
H	400 V class

Symbol	Description
315K to 630K	Applicable motor capacity (kW)

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06	With	With

Three-phase 400V class FR-CC2-H□ (with a built-in DC reactor)	315K	355K	400K	450K	500K	560K	630K
	●	●	●	●	●	●	●

•IP55 compatible model

F R - A 8 [4] [6] - [7.5K] - [1] - [60] [C3]

Symbol	Voltage class
4	400 V class

Symbol*1	Description
0.4K to 132K	Inverter ND rated capacity (kW)

Symbol	Structure, functionality
6	IP55 compatible model

Symbol	Type*2
1	FM
2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06	With	With

Symbol	EMC filter
C2	Built-in C2 filter
C3	Built-in C3 filter

Three-phase 400V class FR-A846-□ (with a built-in DC reactor)	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	110K	132K															
	03250	03610															
	●	●															

*1: Models can be alternatively indicated with the rated inverter current (SLD rating).
(IP55 compatible models have LD and ND rating types only. However, the SLD rated current of standard models is used to represent the model.)

*2: Specification differs by the type as follows.

Type	Motor output	Initial setting			
		Built-in EMC filter	Control logic	Rated frequency	Pr.19 Base frequency voltage
FM (terminal FM equipped model)	Terminal FM (pulse train output) Terminal AM (analog voltage output (0 to ±10 VDC))	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)
CA (terminal CA equipped model)	Terminal CA (analog current output (0 to 20 mADC)) Terminal AM (analog voltage output (0 to ±10 VDC))	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)

*3: Available for the 5.5K or higher.

*4: For using the 75K or higher inverter and a 75 kW or higher motor, always install a DC reactor (FR-HEL), which is available as an option.

*5: Always install the converter unit (FR-CC2). (Not required when a high power factor converter (FR-HC2) is used.)

●: Released model

PLC function

Freely Control Machines

The PLC function will help you to provide the control sequence best suited for the machine specifications.

Inverter Operation Sequence Customized for the Machine

●A set of operations (operation at different signal inputs, signal and monitor outputs at different inverter status, etc.) can be freely programmed in accordance with the machine specifications. For example, a shutter opening/closing can be performed based on a signal from a sensor, or based on the opening/closing times.
Control programs can be created in sequence ladders using the inverter setup software (FR Configurator2).

Realizes the Decentralized Control

●The control of the whole system is decentralized to inverters that mange their subordinating devices individually.

●A group of dedicated sequence programs is created and saved in each inverter. The master controller no longer has to process all the sequence programs, and the decentralized system accepts program changes more flexibly.

Automatic Operation in Accordance with the Time

●With the real-time clock, automatic operation can be performed at certain times (when the optional LCD operation panel (FR-LU08) is used).

Parameter Setting, Protection, and Monitoring Functions can be Set

●User parameter
Up to 50 parameters, which are linked with the data registers, can be saved. The variables (data registers) used in the PLC function can be saved as inverter parameters. Furthermore, parameter settings can be saved in the EEPROM of inverter. When results of calculation using the PLC function are saved in the parameters, the data can be retained after the power is turned OFF.

●User initiated fault
Inverter output can be shut off under conditions other than those of the existing protective functions. Up to five specific fault-initiating conditions can be set to activate a protective function and shut off the inverter output.

●Monitored item for the user
Special register values can be displayed for monitoring on the operation panel. Arbitrary data designated by the user such as results of calculation using the PLC function can be displayed.

Useful Functions

●Inverter parameter read/write
Parameter settings can be changed using sequence programs. The acceleration/deceleration patterns can also be set with sequence programs to be changed at certain operation statuses. You can choose RAM or EEPROM to save the parameter settings.
When the settings are changed frequently, choose RAM.

●PID function
Two different loops of PID inverter operations can be preset, and those can be controlled using sequence programs.

●Inverter operation lock
The inverter operation can be restricted for the command sources other than the sequence programs.

PLC function

Item	Description
I/O	
General-purpose I/O	Sequence programs enable I/O signal transmission to/from the inverter and its plug-in options.
Analog I/O	Sequence programs enable reading of analog input values or analog output transmission by the inverter, and analog output transmission to the plug-in options.
Pulse train I/O	Sequence programs enable pulse train inputs (to terminal JOG) and pulse train outputs (from terminal F/C(FM)).
Inverter parameter read/write	Sequence programs enable inverter parameter write/read.
User parameter	Fifty user parameters (Pr.1150 to Pr.1199) are available and are linked with the data registers D206 to D255, which accept direct access by sequence programs.
CC-Link	A plug-in option (FR-A8NC) enables handling of remote registers as arbitrary data in the sequence programs.
Special function	
PID operation	Inverter's PID operations can be set (up to two loops).
User initiated fault	Up to five fault-initiating conditions can be set to activate a protective function.
Fault clear	The protective function occurring in the inverter can be reset.
Inverter operation lock	Inverters can start up while the PLC function is running.
Monitored item for the user	Desired data is displayable on the operation panel.

Inverter setup software

FR Configurator2 (SW1DND-FRC2)

Delivering a Comfortable Inverter Operating Environment

From inverter startup to maintenance, this versatile software allows the user to specify settings easily with the computer.

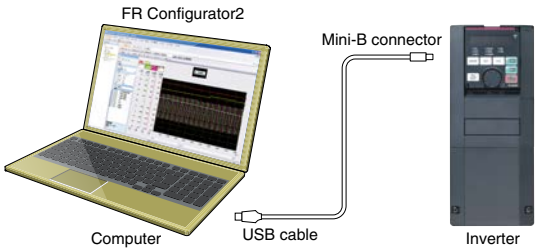
[Compatible operating systems]
Windows® 7, Windows® 8, Windows® 8.1/Pro/Enterprise (32-bit, 64-bit), Windows Vista® (32-bit), Windows® XP Professional SP3 or later, Windows® XP Home Edition SP3 or later

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.



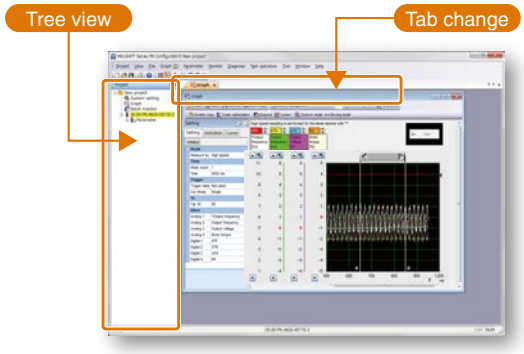
Easy connection with a USB cable

A USB connector (Mini-B connector) is provided as standard. Easy connection to the computer without the need for a converter.



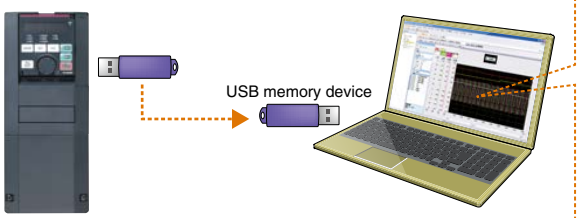
Intuitive user interface

Connected inverters are displayed in tree view format. Windows for each function can be accessed by changing the tab for maximum efficiency.

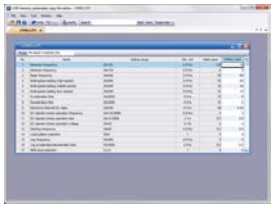


Work can be carried out away from the equipment using a USB memory device

By loading trace data and parameter settings copied to a USB memory device into FR Configurator2, analysis and adjustments can be carried out with ease away from the equipment.

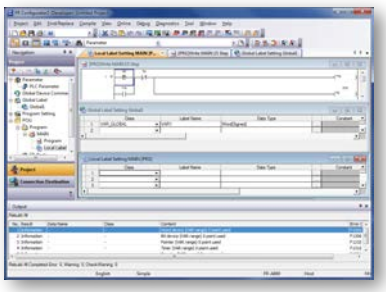



Graph function


USB parameter copy file editing

Sequence control (Developer function)

The Developer function is used for creating sequence programs and writing them to the inverter to enable the use of the PLC function of the inverter.



Free trial version Supported

The function with the marking above is available in the free trial version (usable free of charge with limited functions). It can be downloaded at Mitsubishi Electric FA Global Website.

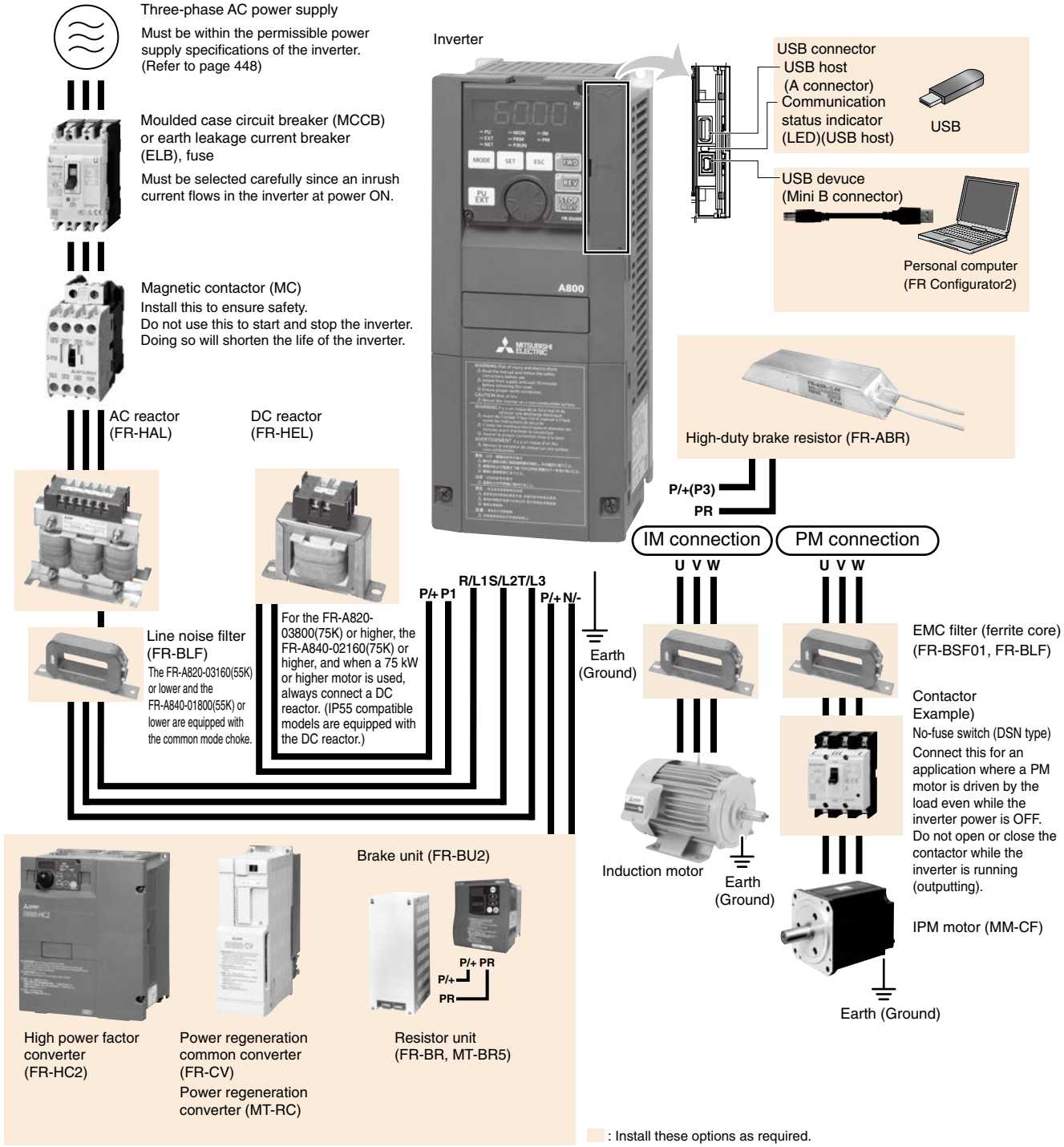
Function	Free trial version
Parameter list	○
Diagnosis	○
Graph	×
Batch monitor	×
Test operation	○
I/O terminal monitor	×

Function	Free trial version
Convert	○
Developer	×
USB memory parameter copy file edit	×
Help	○

○: Available, ×: Not available

The try-and-buy version (usable free of charge for a limited period of 20 days with the same functions as the release version) is also offered.

Installation Example



■Standard Specifications

●Rating (Standard model)

200 V class

Model FR-A820-[ ](GF)			00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
Applicable motor capacity (kW)*1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
		HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Rated capacity (kVA)*3	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
		ND (initial setting)	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110	132
		HD	0.6	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110
	Rated current (A)	SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
		LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
		ND (initial setting)	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288	346
		HD	1.5	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288
	Overload current rating*4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
	Rated voltage*5		Three-phase 200 to 240 V																
	Regenerative braking	Brake transistor	Built-in											FR-BU2 (Option)					
		Maximum brake torque*7	150% torque/ 3%ED*6			100% torque/ 3%ED*6		100% torque/ 2%ED*6		20% torque/continuous								10% torque/ continuous	
		FR-ABR (when the option is used)	150% torque/ 10%ED		100% torque/10%ED					100% torque/6%ED				–	–	–	–	–	–
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240 V 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current (A) *8	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
		LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
		ND (initial setting)	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	266	288	346
		HD	2.3	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	215	288
	Power supply capacity (kVA)*9	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
		ND (initial setting)	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	101	110	132
		HD	0.9	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	82	110
Protective structure (IEC 60529)*10			Enclose type (IP20)											Open type (IP00)					
Cooling system			Self-cooling		Forced air cooling														
Approx. mass (kg)			2.0	2.2	3.3	3.3	3.3	6.7	6.7	8.3	15	15	15	22	42	42	54	74	74

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The 0.2 kW motor capacity is applicable under V/F control only.
*3: The rated output capacity indicated assumes that the output voltage is 220 V for 200 V class.
*4: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6: Value for the built-in brake resistor
*7: Value for the ND rating
*8: The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*10: FR-DU08: IP40 (except for the PU connector section)

400 V class

Model FR-A840-[ ](GF)			00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K
Applicable motor capacity (kW)*1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280
		HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250
Output	Rated capacity (kVA)*3	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
		LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367	417
		HD	0.6	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367
	Rated current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93	116	180	216	260	325	361	432	481	547	610	683
		LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481	547
		HD	0.8	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481
	Overload current rating*4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																							
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	Rated voltage*5		Three-phase 380 to 500 V																							
	Regenerative braking	Brake transistor	Built-in															FR-BU2(Option)								
		Maximum brake torque*7	100% torque/2%ED*6									20% torque/continuous						10% torque/continuous								
		FR-ABR (when the option is used)	100% torque/10%ED									100% torque/6%ED		–*12				–	–	–	–	–	–	–	–	–
Power supply	Rated input AC voltage/frequency		Three-phase 380 to 500 V 50 Hz/60 Hz*11																							
	Permissible AC voltage fluctuation		323 to 550 V 50 Hz/60 Hz																							
	Permissible frequency fluctuation		±5%																							
	Rated input current (A)*8	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
		LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	134	144	180	216	260	325	361	432	481	547
		HD	1.4	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	110	144	180	216	260	325	361	432	481
	Power supply capacity (kVA)*9	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
		LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	102	110	137	165	198	248	275	329	367	417
		HD	1.1	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	84	110	137	165	198	248	275	329	367
Protective structure (IEC 60529)*10			Enclose type (IP20)											Open type (IP00)												
Cooling system			Self-cooling			Forced air cooling																				
Approx. mass (kg)			2.8	2.8	2.8	3.3	3.3	6.7	6.7	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The 0.2 kW motor capacity is applicable under V/F control only.
*3: The rated output capacity indicated assumes that the output voltage is 440 V for 400 V class.
*4: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6: Value for the built-in brake resistor
*7: Value for the ND rating
*8: The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*10: FR-DU08: IP40 (except for the PU connector section).
*11: For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.
*12: The braking capability of the inverter built-in brake can be improved with a commercial brake resistor. For the details, please contact your sales representative.

●Rating (separated converter types)

400 V class

• Inverter

Model FR-A842-[ ](GF)			07700	08660	09620	10940	12120
			315K	355K	400K	450K	500K
Applicable motor capacity (kW)*1		SLD	400	450	500	560	630
		LD	355	400	450	500	560
		ND (initial setting)	315	355	400	450	500
		HD	280	315	355	400	450
Output	Rated capacity (kVA)*2	SLD	587	660	733	834	924
		LD	521	587	660	733	834
		ND (initial setting)	465	521	587	660	733
		HD	417	465	521	587	660
	Rated current (A)	SLD	770	866	962	1094	1212
		LD	683	770	866	962	1094
		ND (initial setting)	610	683	770	866	962
		HD	547	610	683	770	866
	Overload current rating*3	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C				
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	Rated voltage*4		Three-phase 380 to 500 V				
	Regenerative braking torque*5 (When the converter unit (FR-CC2) is used)	Maximum brake torque	10% torque/continuous				
Input power	DC power supply voltage		430 to 780 VDC				
	Control power supply auxiliary input		Single phase 380 to 500 V 50 Hz/60 Hz*7				
	Permissible control power supply auxiliary input fluctuation		Frequency ±5%, voltage ±10%				
Protective structure (IEC 60529)*6			Open type (IP00)				
Cooling system			Forced air cooling				
Approx. mass (kg)			163	163	243	243	243

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 440 V.
*3: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5: ND rating reference value
*6: FR-DU08: IP40 (except for the PU connector section)
*7: For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.

• Converter unit (FR-CC2)

Model FR-CC2-H[ ]		315K	355K	400K	450K	500K	560K	630K
Applicable motor capacity (kW)		315	355	400	450	500	560	630
Output	Overload current rating*1	200% 60 s, 250% 3 s				150% 60 s, 200% 3 s	120% 60 s, 150% 3 s	110% 60 s, 120% 3 s
	Rated voltage*2	430 to 780 VDC*4						
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 500 V 50 Hz/60 Hz						
	Permissible AC voltage fluctuation	Three-phase 323 to 550 V 50 Hz/60 Hz						
	Permissible frequency fluctuation	±5%						
	Rated input current (A)	610	683	770	866	962	1094	1212
	Power supply capacity (kVA)*3	465	521	587	660	733	833	924
Protective structure (IEC 60529)		Open type (IP00)						
Cooling system		Forced air cooling						
DC reactor		Built-in						
Approx. mass (kg)		210	213	282	285	288	293	294

*1: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the converter unit and the inverter to return to or below the temperatures under 100% load.
*2: The converter unit output voltage varies according to the input power supply voltage and the load. The maximum point of the voltage waveform at the converter unit output side is approximately the power supply voltage multiplied by $\sqrt{2}$.
*3: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*4: The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines) / average voltage between three lines × 100)

●Rating (IP55 compatible model)

400 V class

Model FR-A846-[ ]			00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K
Applicable motor capacity (kW)*1		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132
Output	Rated capacity (kVA)*2	LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248
		ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198
	Rated current (A)	LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325
		ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260
	Overload current rating*3	LD	120% 60s, 150% 3s (inverse-time characteristics) at surrounding air temperature 40°C																		
		ND (initial setting)	150% 60s, 200% 3s (inverse-time characteristics) at surrounding air temperature 40°C																		
	Rated voltage*4		Three-phase 380 to 500V																		
	Regenerative braking torque	Maximum brake torque*5	10% torque/continuous																		
Power supply	Rated input AC voltage/frequency		Three-phase 380 to 500V 50Hz/60Hz*8																		
	Permissible AC voltage fluctuation		323 to 550V 50Hz/60Hz																		
	Permissible frequency fluctuation		±5%																		
	Rated input current (A)*6	LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325
		ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260
	Power supply capacity (kVA)*7	LD	1.6	2.7	3.7	5.8	9	12	18	22	27	33	43	53	65	81	110	137	165	198	248
		ND (initial setting)	1.1	1.9	3	4.6	6.9	9	13	18	24	29	34	43	54	66	102	110	137	165	198
Protective structure		IEC60529	Dust- and water-proof type (IP55)*10																		
		UL50	UL Type12*9																		
Cooling system			Self cooling + internal fan						Forced-air-cooling + internal fan												
DC reactor			Built-in																		
Approx. mass (kg)			15	15	15	15	16	17	26	26	27	27	59	60	63	64	147	150	153	189	193

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 440 V.
*3: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5: Value for the ND rating
*6: The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*7: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*8: For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.
*9: UL Type 12 Enclosure-Suitable for Installation in a Compartment Handling Conditioned Air (Plenum)
*10: For compliance with IP55, remove the protective bushes and install the recommended cable glands.

●Common specifications

Control specifications	Control method		Soft-PWM control, high carrier frequency PWM control (selectable among V/F control, Advanced magnetic flux vector control, Real sensorless vector control, Optimum excitation control), vector control*1, and PM sensorless vector control
	Output frequency range		0.2 to 590 Hz (The upper-limit frequency is 400 Hz under Advanced magnetic flux vector control, Real sensorless vector control, vector control*1, and PM sensorless vector control.)
	Frequency setting resolution	Analog input	0.015 Hz/60 Hz (0 to 10 V/12 bits for terminals 2 and 4) 0.03 Hz/60 Hz (0 to 5 V/11 bits or 0 to 20 mA/approx. 11 bits for terminals 2 and 4, 0 to ±10 V/12 bits for terminal 1) 0.06 Hz/60 Hz (0 to ±5 V/11 bits for terminal 1)
		Digital input	0.01Hz
	Frequency accuracy	Analog input	Within ±0.2% of the max. output frequency (25°C ± 10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 590 Hz. Constant-torque/variable-torque pattern or adjustable 5 points V/F can be selected.
	Starting torque*2		SLD Rating:120% 0.3 Hz, LD Rating:150% 0.3 Hz, ND Rating:200% 0.3 Hz*3, HD Rating:250% 0.3 Hz*3 (Real sensorless vector control, vector control*1)
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0 to 3600 s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash countermeasures acceleration/deceleration can be selected.
	DC injection brake (induction motor)		Operation frequency (0 to 120 Hz), operation time (0 to 10 s), operation voltage (0 to 30%) variable
	Stall prevention operation level		Activation range of stall prevention operation (SLD rating: 0 to 120%, LD rating: 0 to 150%, ND rating: 0 to 220%, HD rating: 0 to 280%). Whether to use the stall prevention or not can be selected. (V/F control, Advanced magnetic flux vector control)
	Torque limit level		Torque limit value can be set (0 to 400% variable). (Real sensorless vector control, vector control*1, PM sensorless vector control)
Operation specifications	Frequency setting signal	Analog input	Terminals 2 and 4: 0 to 10 V, 0 to 5 V, 4 to 20 mA (0 to 20 mA) are available. Terminal 1: -10 to +10 V, -5 to +5 V are available.
		Digital input	Input using the setting dial of the operation panel or parameter unit Four-digit BCD or 16-bit binary (when used with option FR-A8AX)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signals (twelve terminals)		Low-speed operation command, Middle-speed operation command, High-speed operation command, Second function selection, Terminal 4 input selection, Jog operation selection, Selection of automatic restart after instantaneous power failure, flying start, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command, Inverter reset
		Pulse train input	100kpps
	Operational functions		Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, increased magnetic excitation deceleration, DC feeding*4, frequency jump, rotation display, automatic restart after instantaneous power failure, electronic bypass sequence, remote setting, automatic acceleration/deceleration, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, droop control, load torque high-speed frequency control, speed smoothing control, traverse, auto tuning, applied motor selection, gain tuning, RS-485 communication, PID control, PID pre-charge function, easy dancer control, cooling fan operation selection, stop selection (deceleration stop/coasting), power-failure deceleration stop function, stop-on-contact control, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, orientation control*1, speed control, torque control, position control, pre-excitation, torque limit, test run, 24 V power supply input for control circuit, safety stop function, anti-sway control, CC-Link IE Field Network communication*11
	Output signal	Open collector output (five terminals) Relay output (two terminals)	Inverter running, Up to frequency, Instantaneous power failure/undervoltage, Overload warning, Output frequency detection, Fault Fault codes of the inverter can be output (4 bits) from the open collector.
		Pulse train output (FM type)	50kpps
Indication	For meter	Pulse train output (FM type)	Max. 2.4 kHz: one terminal (output frequency) The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.
		Current output (CA type)	Max. 20 mADC: one terminal (output current) The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.
		Voltage output	Max. 10 VDC: one terminal (output voltage) The monitored item can be changed using **Pr.158 AM terminal function selection**.
	Operation panel (FR-DU08)	Operating status	Output frequency, Output current, Output voltage, Frequency setting value The monitored item can be changed using **Pr.52 Operation panel main monitor selection**.
		Fault record	A fault record is displayed when a fault occurs. Past 8 fault records and the conditions immediately before the fault (output voltage/current/frequency/cumulative energization time/year/month/date/time) are saved.
Protective/warning function		Protective function	Overcurrent trip during acceleration, Overcurrent trip during constant speed, Overcurrent trip during deceleration or stop, Regenerative overvoltage trip during acceleration, Regenerative overvoltage trip during constant speed, Regenerative overvoltage trip during deceleration or stop, Inverter overload trip, Motor overload trip, Heatsink overheat, Instantaneous power failure*4, Undervoltage*4, Input phase loss*4*5, Stall prevention stop, Loss of synchronism detection*5, Brake transistor alarm detection*6, Output side earth (ground) fault overcurrent, Output short circuit, Output phase loss, External thermal relay operation*5, PTC thermistor operation*5, Option fault, Communication option fault, Parameter storage device fault, PU disconnection, Retry count excess*5, Parameter storage device fault, CPU fault, Operation panel power supply short circuit, 24 VDC power fault, Abnormal output current detection*5, Inrush current limit circuit fault*4, Communication fault (inverter), Analog input fault, USB communication fault, Safety circuit fault, Overspeed occurrence*5, Speed deviation excess detection*1*5, Signal loss detection*1*5, Excessive position fault*1*5, Brake sequence fault*5, Encoder phase fault*1*5, 4 mA input fault*5, Pre-charge fault*5, PID signal fault*5, Option fault, Opposite rotation deceleration fault*5, Internal circuit fault, Abnormal internal temperature*7, Magnetic pole position unknown*1
		Warning function	Fan alarm, Stall prevention (overcurrent), Stall prevention (overvoltage), Regenerative brake pre-alarm*5*6, Electronic thermal relay function pre-alarm, PU stop, Speed limit indication*5, Parameter copy, Safety stop, Maintenance signal output*5, USB host error, Home position return setting error*5, Home position return uncompleted*5, Home position return parameter setting error*5, Operation panel lock*5, Password locked*5, Parameter write error, Copy operation error, 24 V external power supply operation, Internal fan alarm*7

Environment	Surrounding air temperature	-10°C to +50°C (0°C to +50°C for the FR-A800-GF) (non-freezing) (LD, ND, HD ratings) -10°C to +40°C (0°C to +40°C for the FR-A800-GF) (non-freezing) (SLD rating, IP55 compatible model)
	Surrounding air humidity	95% RH or less (non-condensing) (With circuit board coating (conforming to IEC60721-3-3 3C2/3S2), IP55 compatible model) 90% RH or less (non-condensing) (Without circuit board coating)
	Storage temperature*8	-20°C to +65°C
	Atmosphere	Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration	Maximum 1000 m above sea level*9, 5.9 m/s²*10 or less at 10 to 55 Hz (directions of X, Y, Z axes)

*1: Available only when a vector control compatible option is installed.
*2: For PM sensorless vector control, refer to FREQROL-A800 catalog.
*3: In the initial setting of the FR-A820-00340(5.5K) or higher and the FR-A840-00170(5.5K) or higher, it is limited to 150% by the torque limit level.
*4: Enabled only for standard models and IP55 compatible models.
*5: This protective function is not available in the initial status.
*6: Enabled only for standard models.
*7: Available for the IP55 compatible model only.
*8: Temperature applicable for a short time, e.g. in transit.
*9: For the installation at an altitude above 1,000 m up to 2,500 m, derate the rated current 3% per 500 m.
*10: 2.9m/s² or less for the FR-A840-04320(160K) or higher.
*11: Available only for the FR-A800-GF series.

●PLC function specifications

Item			A800 PLC function specifications
Control method			Repeated operation (by stored program)
I/O control mode			Refresh
Programming language			Relay symbolic language (ladder) Function block
No. of instructions	Sequence instructions		25
	Basic instructions		84
	Application instructions		37
Processing speed			Sequence instructions 1.9 μs to 12 μs/step*1
Number of I/O device points			128 (input: 64 points, output: 64 points) 19 points built-in (input: 12 points, output: 7 points)*2 FR-A8AX (input: 16 points) FR-A8AY (output: 7 points) FR-A8AR (output: 3 points)
Number of analog I/O points			3 input points built-in (Terminals 1, 2, and 4), FR-A8AZ: 1 input point (Terminal 6) 2 output points built-in (Terminals F/C(FM/CA) and AM), FR-A8AY: 2 output points (Terminals AM0 and AM1), FR-A8AZ: 1 output point (Terminal DA1)
Pulse train I/O		Input	Terminal JOG maximum input pulse: 100k pulses/s*3
		Output	Terminal FM maximum output pulse: 50k pulses/s*3
Watchdog timer			10 to 2000 (ms)
Program capacity			6K steps (24k bytes) (0 to 6144 steps can be set) Contained in one program
Device	Internal relay (M)		128 (M0 to M127)
	Latch relay (L)		Not used (Can be set with parameters but will not latch)*4
	Timer (T)	Number of points	16 (T0 to T15)
		Specifications	100 ms timer: 0.1 to 3276.7 s can be set 10 ms timer: 0.01 to 327.67 s can be set
	Retentive timer (ST)	Number of points	0 (up to 16 by parameter assignment)
		Specifications	100 ms retentive timer: 0.1 to 3276.7 s can be set 10 ms retentive timer: 0.01 to 327.67 s can be set
	Counter (C)	Number of points	16 (C0 to C15)
		Specifications	Normal counter: Setting range 1 to 32767 Interrupt program counter: Not used
	Data register (D)		256 (D0 to D255)
	Special relay (SM)		2048 (SM0 to SM2047) with limited functions
	Special register (SD)		2048 (SD0 to SD2047) with limited functions

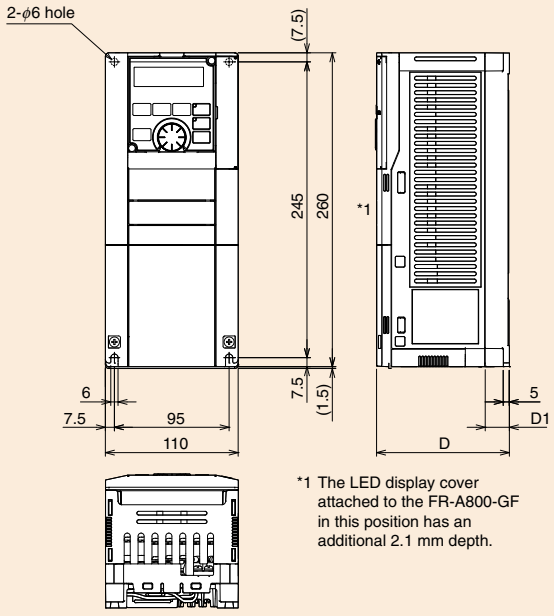
*1: The scan time is approximately 40 ms for 1K steps as inverter control is also performed in actual operations.
*2: The signals same as the ones assigned to the inverter I/O terminals are used.
One point is always required for a sequence start (RUN/STOP).
*3: **Pr.291 Pulse train I/O selection** must be set.
*4: There is no device latch function for power failures.
Use the **Pr.1150 to Pr.1199 PLC function user parameters 1 to 50** (D206 to D255) to store device values in the EEPROM.

There is no buffer memory.

■Standard model

Outline Dimension Drawings

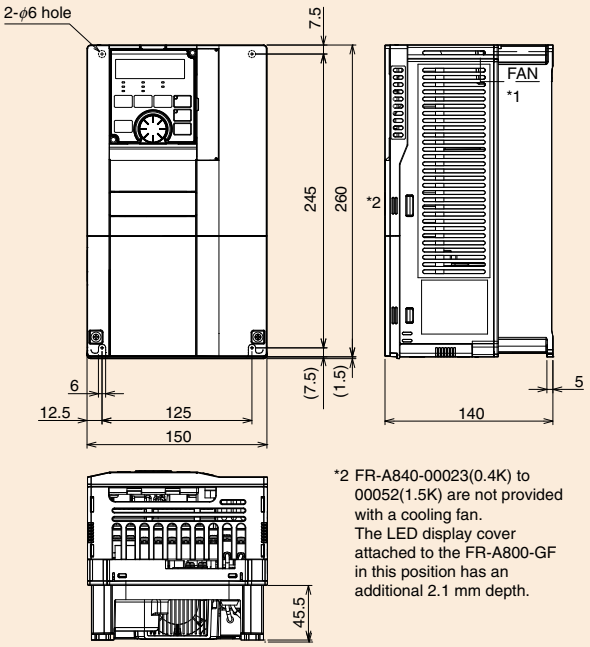
●FR-A820-00046(0.4K), FR-A820-00077(0.75K)(GF)



*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

Inverter Model	D	D1
FR-A820-00046(0.4K)	110	20
FR-A820-00077(0.75K)	125	35

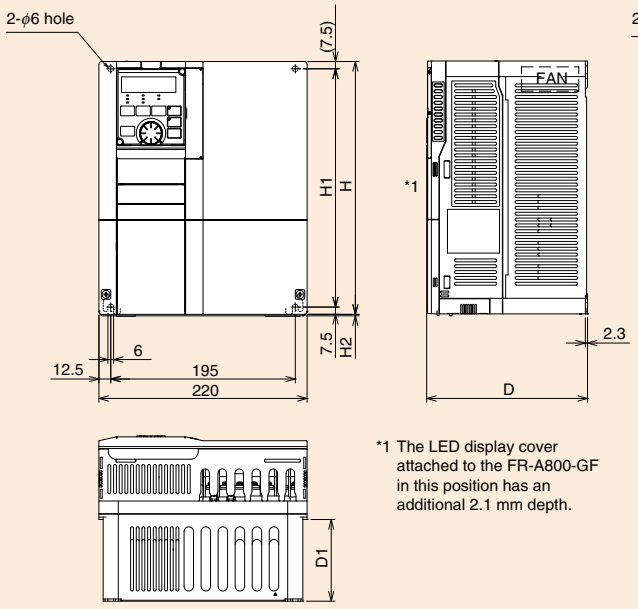
●FR-A820-00105(1.5K), 00167(2.2K), 00250(3.7K)(GF)
●FR-A840-00023(0.4K), 00038(0.75K), 00052(1.5K), 00083(2.2K), 00126(3.7K)(GF)



*2 FR-A840-00023(0.4K) to 00052(1.5K) are not provided with a cooling fan. The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

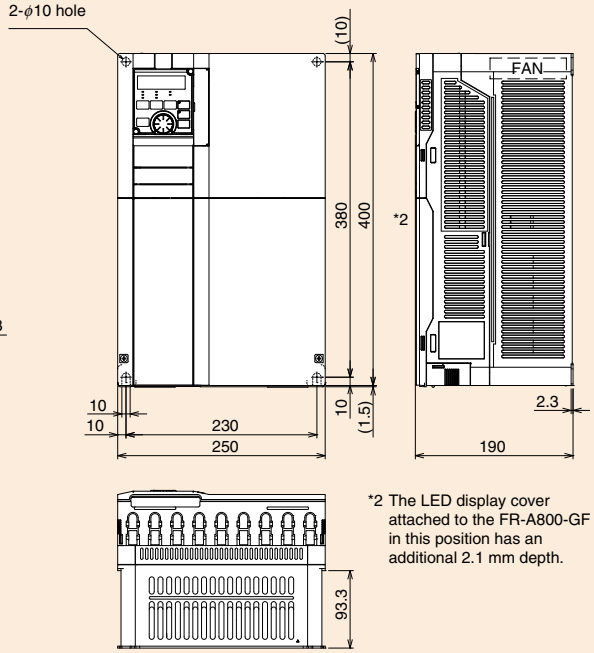
(Unit: mm)

●FR-A820-00340(5.5K), 00490(7.5K), 00630(11K)(GF)
●FR-A840-00170(5.5K), 00250(7.5K), 00310(11K), 00380(15K)(GF)



*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

●FR-A820-00770(15K), 00930(18.5K), 01250(22K)(GF)
●FR-A840-00470(18.5K), 00620(22K)(GF)



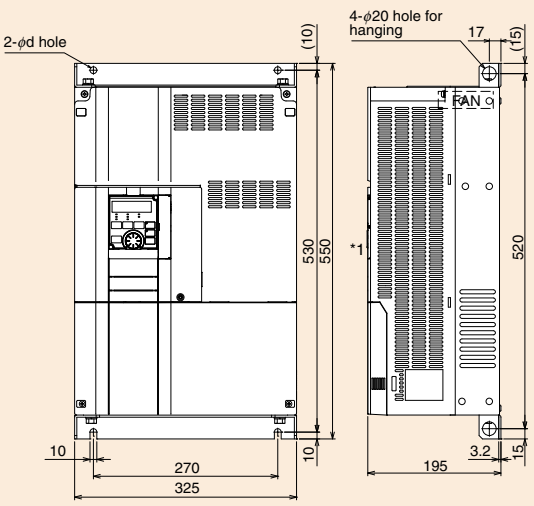
*2 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

Inverter Model	H	H1	H2	D	D1
FR-A820-00340(5.5K), 00490(7.5K) FR-A840-00170(5.5K), 00250(7.5K)	260	245	1.5	170	84
FR-A820-00630(11K) FR-A840-00310(11K), 00380(15K)	300	285	3	190	101.5

(Unit: mm)

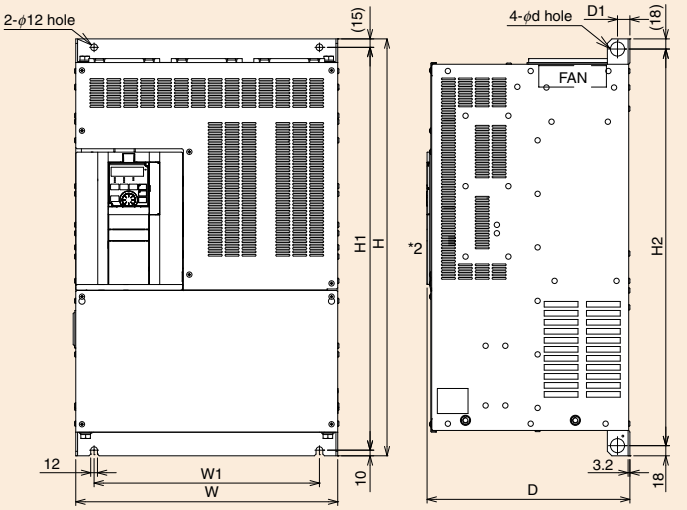
Outline Dimension Drawings

●FR-A820-01540(30K)(GF)
●FR-A840-00770(30K)(GF)



*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

●FR-A820-01870(37K), 02330(45K), 03160(55K), 03800(75K), 04750(90K)(GF)
●FR-A840-00930(37K), 01160(45K), 01800(55K), 02160(75K), 02600(90K), 03250(110K), 03610(132K)(GF)



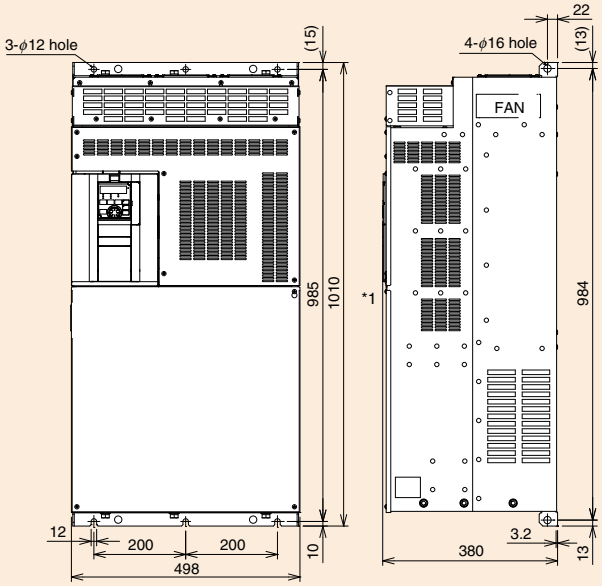
*2 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

(Unit: mm)

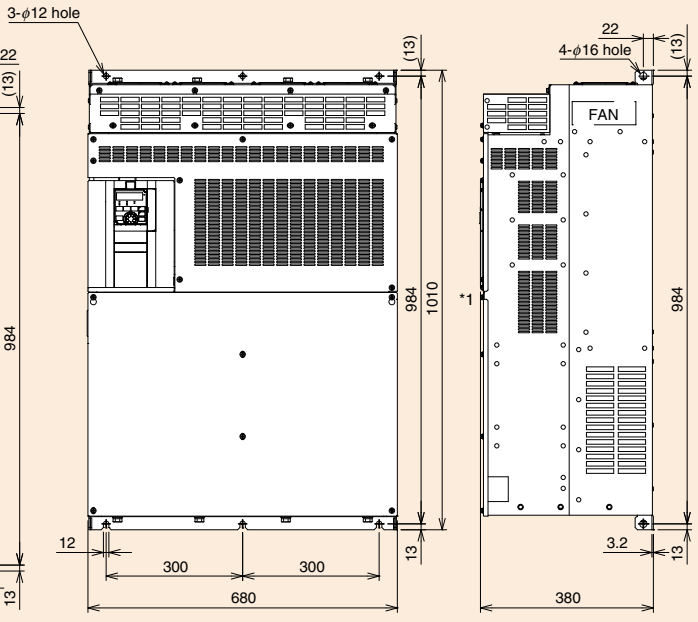
Inverter Model	W	W1	H	H1	H2	d	D	D1
FR-A820-01870(37K), 02330(45K) FR-A840-00930(37K), 01160(45K), 01800(55K)*3	435	380	550	525	514	25	250	24
FR-A820-03160(55K)*3	465	410	700	675	664	25	250	22
FR-A820-03800(75K)*3, 04750(90K)*3	465	400	740	715	704	24	360	22
FR-A840-02160(75K)*3, 02600(90K)*3	465	400	620	595	584	24	300	22
FR-A840-03250(110K)*3, 03610(132K)*3	465	400	740	715	704	25	360	22

*3: When using a motor with a capacity of 75 kW or higher, always connect a DC reactor (FR-HEL), which is available as an option.

●FR-A840-04320(160K), 04810(185K)(GF)



●FR-A840-05470(220K), 06100(250K), 06830(280K)(GF)



Always connect a DC reactor (FR-HEL), which is available as an option.

*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

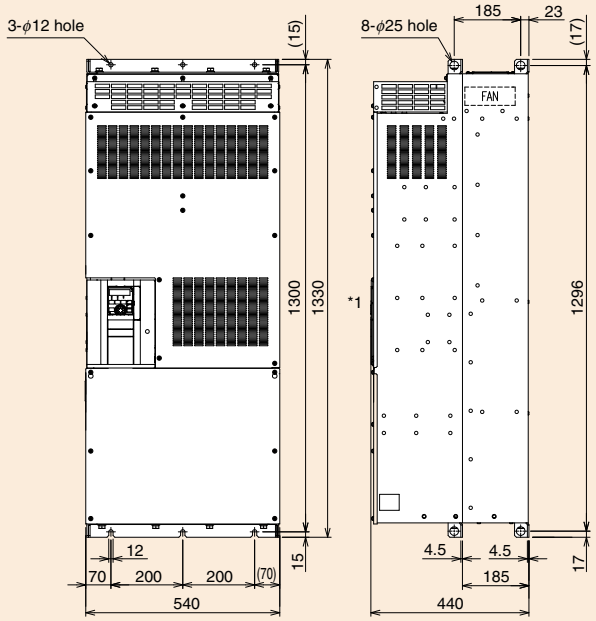
(Unit: mm)

Separated converter type

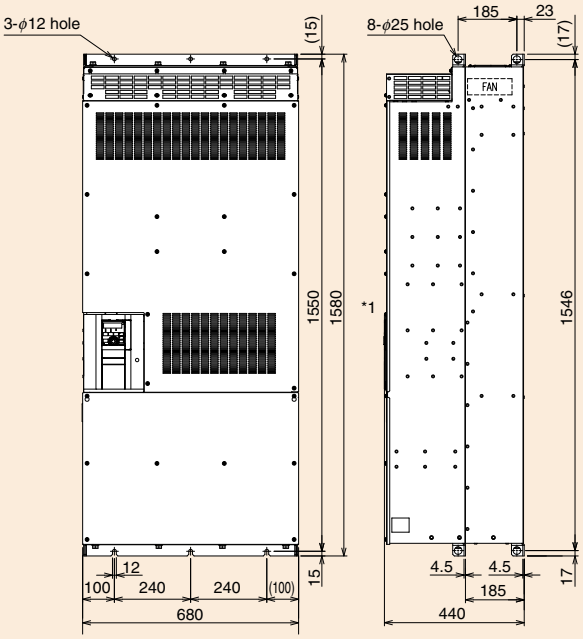
Outline Dimension Drawings

• Inverter

●FR-A842-07700(315K), 08660(355K)(GF)



●FR-A842-09620(400K), 10940(450K), 12120(500K)(GF)



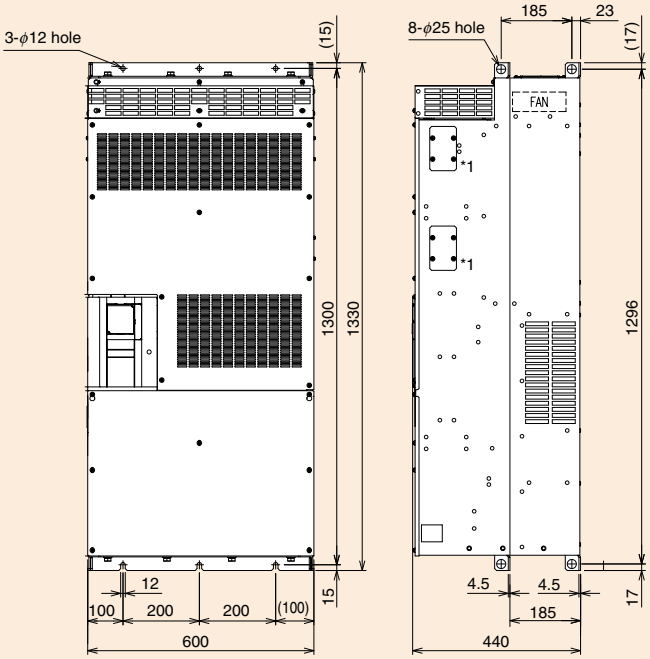
*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

(Unit: mm)

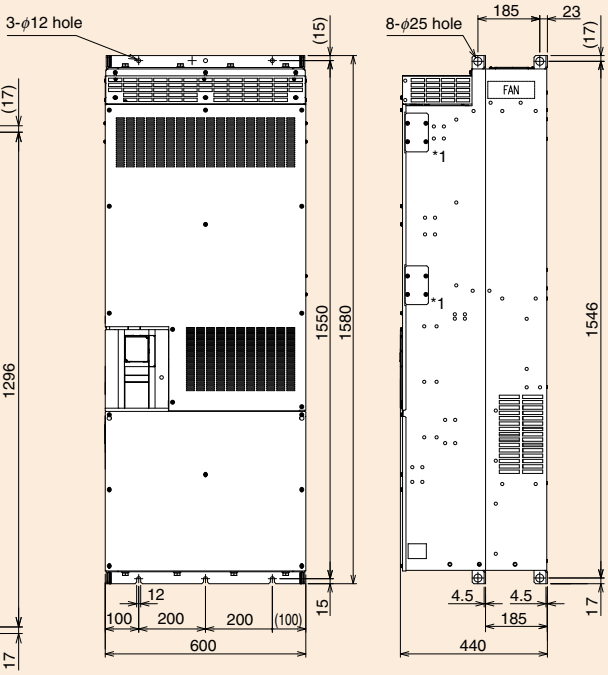
• Converter unit

Equipped with a DC reactor.

●FR-CC2-H315K, H355K



●FR-CC2-H400K, H450K, H500K, H560K, H630K



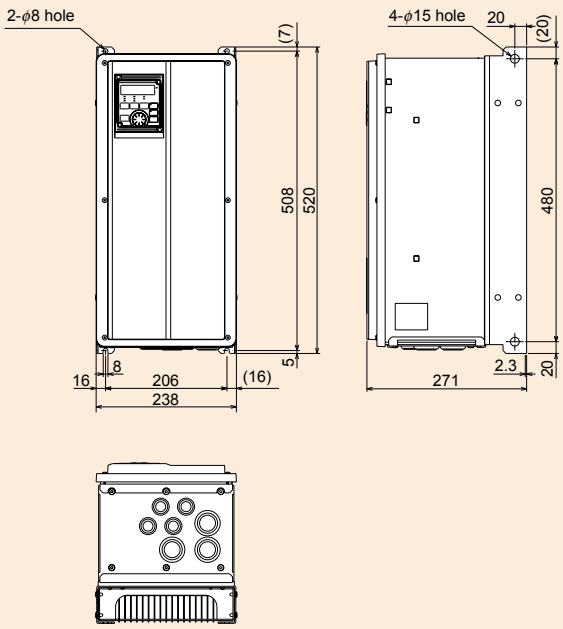
*1 Do not remove the cover on the side of the converter unit.

(Unit: mm)

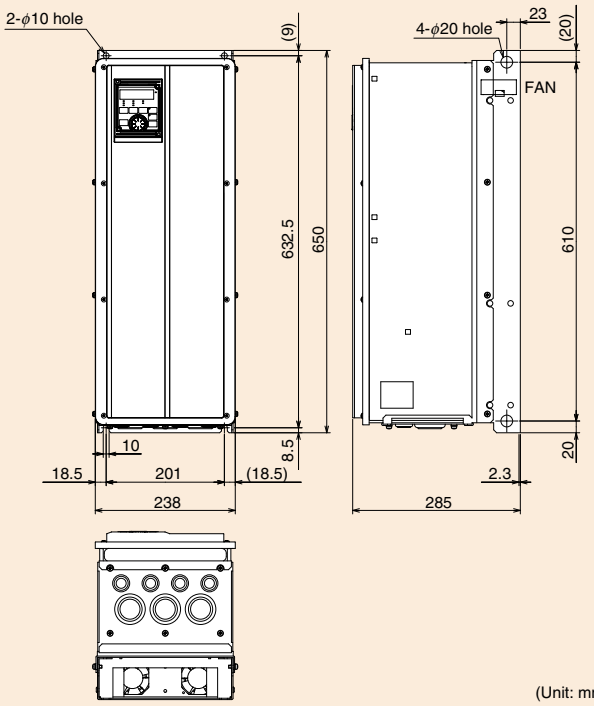
■IP55 compatible mode
Equipped with a DC reactor.

Outline Dimension Drawings

●FR-A846-00023(0.4K), 00038(0.75K), 00052(1.5K), 00083(2.2K), 00126(3.7K), 00170(5.5K)

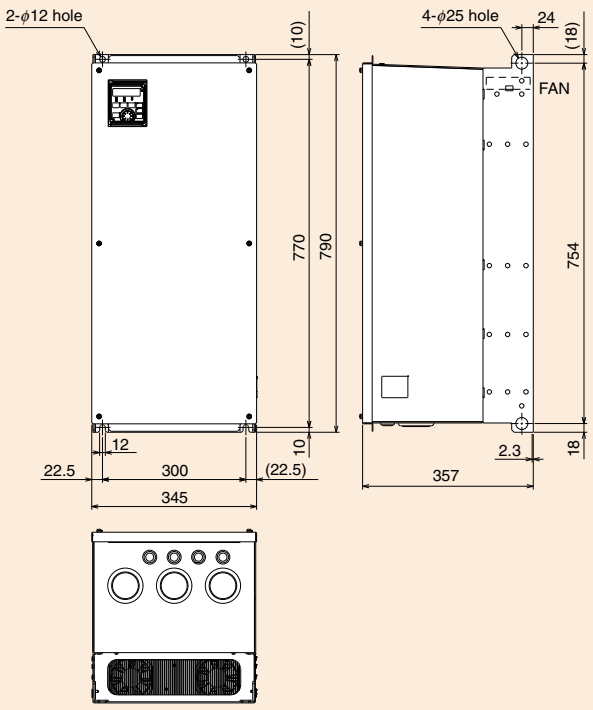


●FR-A846-00250(7.5K), 00310(11K), 00380(15K), 00470(18.5K)

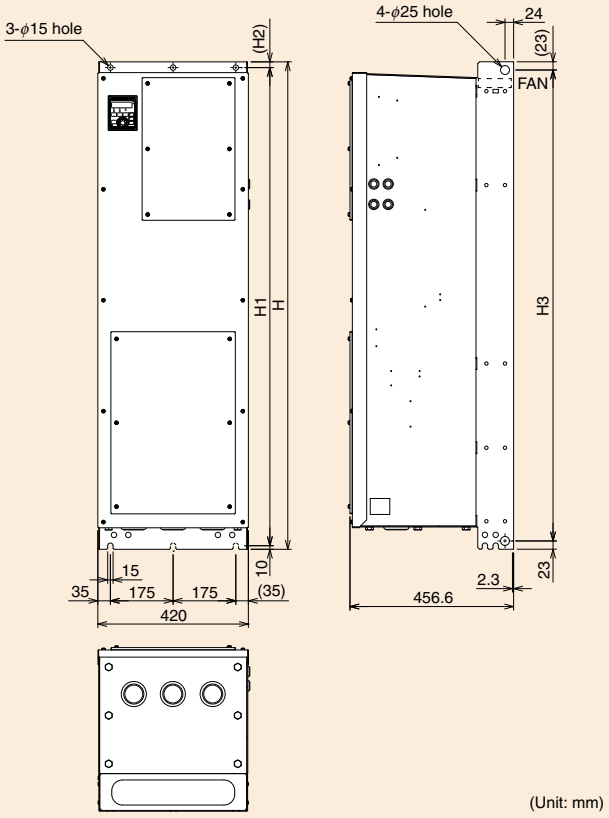


(Unit: mm)

●FR-A846-00620(22K), 00770(30K), 00930(37K), 01160(45K)



●FR-A846-01800(55K), 02160(75K), 02600(90K), 03250(110K), 03610(132K)



(Unit: mm)

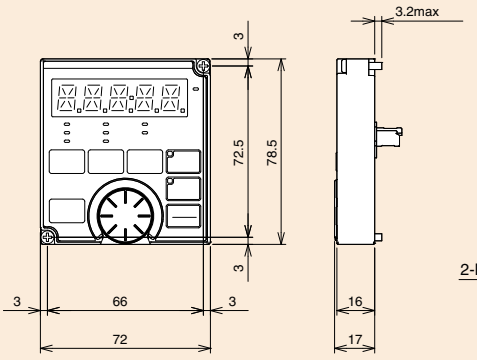
Inverter model	H	H1	H2	H3
FR-A846-01800(55K) to 02600(90K)	1360	1334	16	1314
FR-A846-03250(110K), 03610(132K)	1510	1482	18	1464

■IP55 compatible model

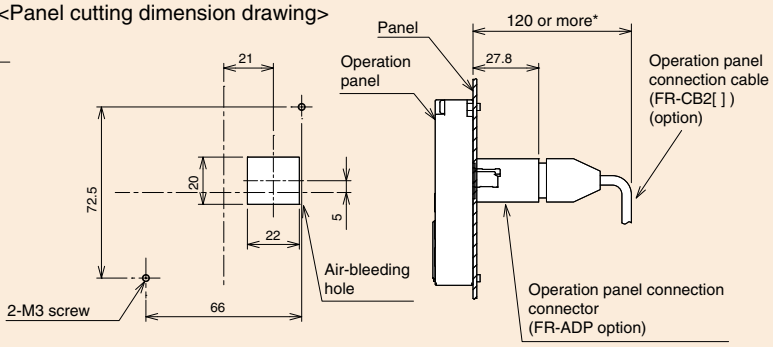
Outline Dimension Drawings

■Operation panel (FR-DU08, FR-LU08)

<Outline drawing>



<Panel cutting dimension drawing>

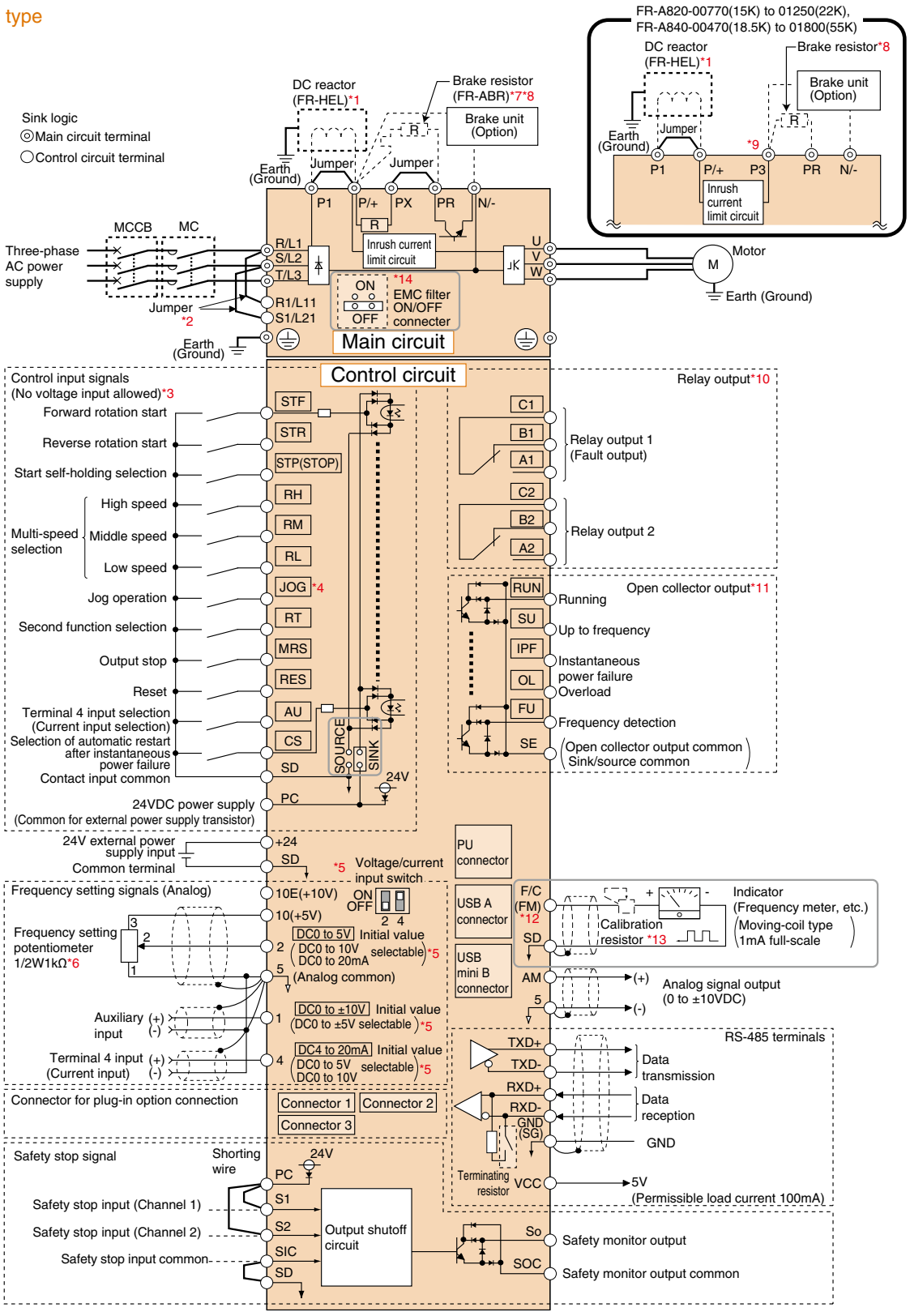


* Denotes the space required to connect an optional operation panel connection cable (FR-CB2[ ]). When using another cable, leave the space required for the cable specification.

(Unit: mm)

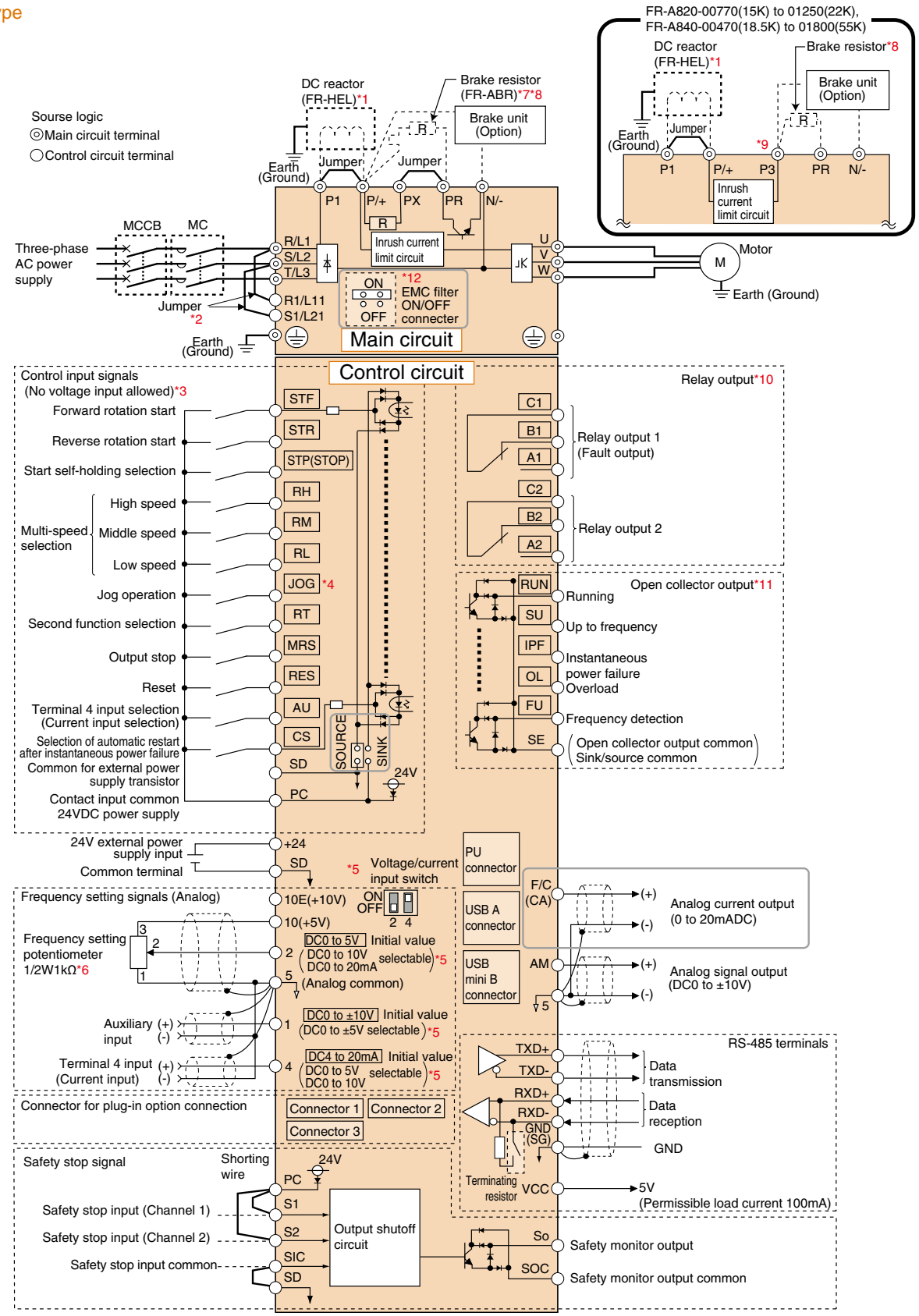
■Standard models and IP55 compatible models

●FM type



*1: For the FR-A820-03800(75K) or higher, the FR-A840-02160(75K) or higher, and when a 75 kW or higher motor is used, always connect a DC reactor (FR-HEL), which is available as an option. (To select a DC reactor, refer to **page 448**, and select one according to the applicable motor capacity.)
When connecting a DC reactor to the FR-A820-03160(55K) or lower or the FR-A840-01800(55K) or lower, remove the jumper across the terminals P1 and P/+ before connecting the DC reactor. The IP55 compatible model has a built-in DC reactor.
*2: When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21. IP55 compatible models do not have terminals R/L11, S/L21, and jumpers.
*3: The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**.
*4: Terminal JOG is also used as a pulse train input terminal. Use Pr.291 to choose JOG or pulse.
*5: Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267)**. To input a voltage, set the voltage/current input switch OFF. To input a current, set the voltage/current input switch ON.
*6: It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.
*7: If connecting a brake resistor, remove the jumper between PR and PX (FR-A820-00046(0.4K) to 00490(7.5K), FR-A840-00023(0.4K) to 00250(7.5K)).
*8: Connect a brake resistor across terminals P/+ (P3) and PR. (The terminal PR is equipped in FR-A820-00046(0.4K) to 01250(22K), FR-A840-00023(0.4K) to 01800(55K).) Install a thermal relay to prevent overheating and damage of discharging resistors. (Refer to the Instruction Manual (Detailed).)
*9: Do not connect the DC power supply (under DC feeding mode) to terminal P3.
*10: The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**.
*11: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*12: The terminal FM can be used to output pulse trains as open collector output by setting Pr.291.
*13: Not required when calibrating the scale with the operation panel.
*14: Do not change the initially set ON (enabled) position of the EMC filter ON/OFF connector in the case of the inverter with a built-in C2 filter (IP55 compatible model). The Class C2 compatibility condition is not satisfied with the EMC filter OFF. The FR-A846-00250(7.5K)-C2 to FR-A846-00470(18.5K)-C2 are not provided with the EMC filter ON/OFF connector. The EMC filter is always ON.

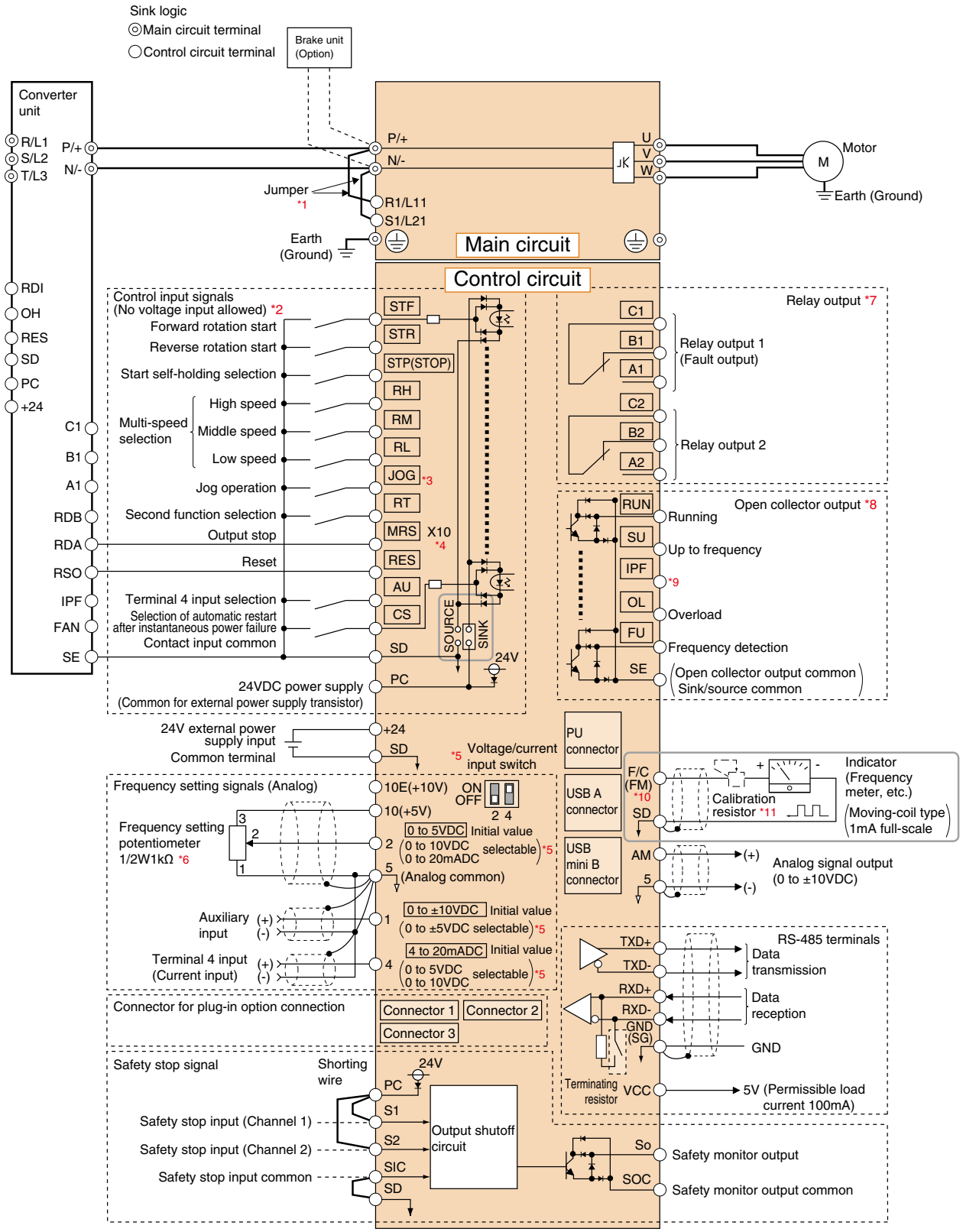
●CA type



*1: For the FR-A820-03800(75K) or higher, the FR-A840-02160(75K) or higher, and when a 75 kW or higher motor is used, always connect a DC reactor (FR-HEL), which is available as an option. (To select a DC reactor, refer to **page 448**, and select one according to the applicable motor capacity.)
When connecting a DC reactor to the FR-A820-03160(55K) or lower or the FR-A840-01800(55K) or lower, remove the jumper across the terminals P1 and P/+ before connecting the DC reactor.
The IP55 compatible model has a built-in DC reactor.
*2: When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21. IP55 compatible models do not have terminals R/L11, S/L21, and jumpers.
*3: The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**.
*4: Terminal JOG is also used as a pulse train input terminal. Use Pr.291 to choose JOG or pulse.
*5: Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267)**. To input a voltage, set the voltage/current input switch OFF. To input a current, set the voltage/current input switch ON.
*6: It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.
*7: If connecting a brake resistor, remove the jumper between PR and PX (FR-A820-00046(0.4K) to 00490(7.5K), FR-A840-00023(0.4K) to 00250(7.5K)).
*8: Connect a brake resistor across terminals P/+ (P3) and PR. (The terminal PR is equipped in FR-A820-00046(0.4K) to 01250(22K), FR-A840-00023(0.4K) to 01800(55K).) Install a thermal relay to prevent overheating and damage of discharging resistors. (Refer to the Instruction Manual (Detailed).)
*9: Do not connect the DC power supply (under DC feeding mode) to terminal P3.
*10: The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**.
*11: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*12: Do not change the initially set ON (enabled) position of the EMC filter ON/OFF connector in the case of the inverter with a built-in C2 filter (IP55 compatible model). The Class C2 compatibility condition is not satisfied with the EMC filter OFF. The FR-A846-00250(7.5K)-C2 to FR-A846-00470(18.5K)-C2 are not provided with the EMC filter ON/OFF connector. The EMC filter is always ON.

●Separated converter type

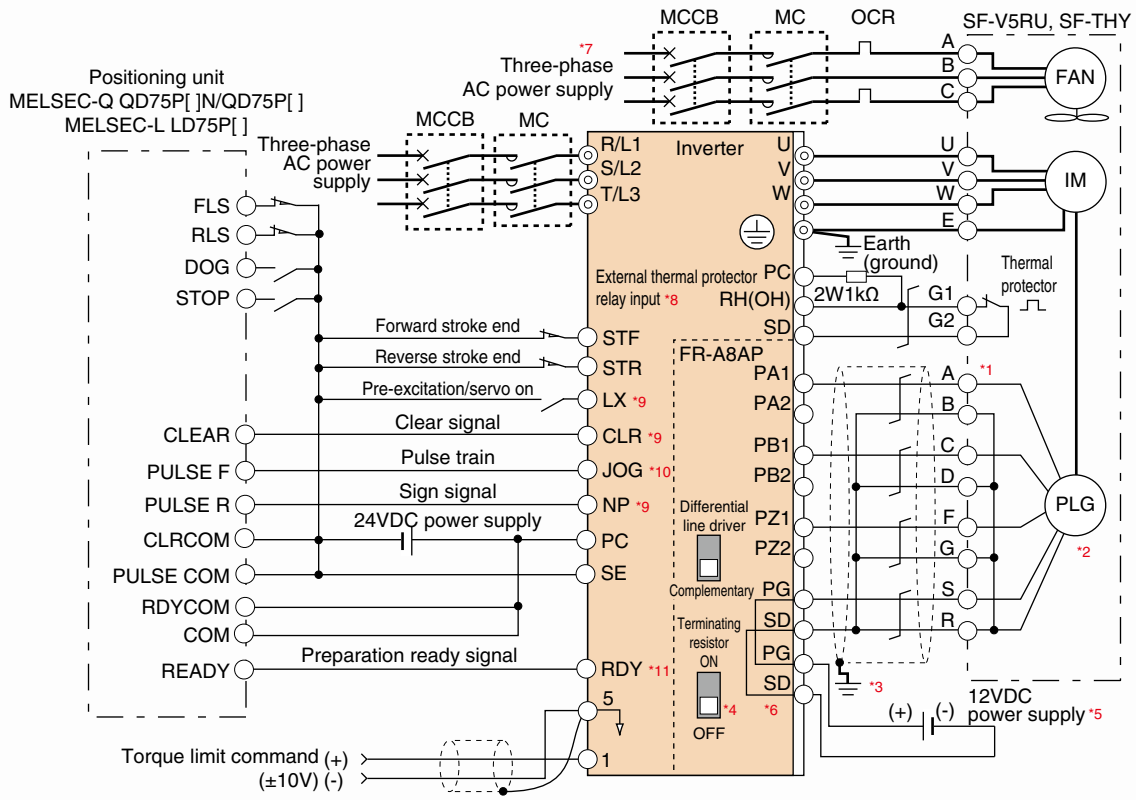
• Inverter (FM type)



*1: The terminals R1/L11 and S1/L21 are connected to the terminals P/+ and N/- with a jumper respectively. When using separate power supply for the control circuit, remove the jumpers from R1/L11 and S1/L21.
*2: The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**.
*3: Terminal JOG is also used as the pulse train input terminal. Use **Pr.291** to choose JOG or pulse.
*4: The X10 signal (NC contact input specification) is assigned to the terminal MRS in the initial setting. Set Pr.599 = "0" to change the input specification of the X10 signal to NO contact.
*5: Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267)**. To input a voltage, set the voltage/current input switch OFF. To input a current, set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. **(Pr.561)**
*6: It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.
*7: The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**.
*8: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*9: No function is assigned in the initial setting. Use **Pr.192** for function assignment.
*10: The terminal FM can be used to output pulse trains as open collector output by setting **Pr.291**.
*11: Not required when calibrating the scale with the operation panel.

Position control

Vector control dedicated motor (SF-V5RU, SF-THY), 12 V complementary



*1: The pin number differs according to the encoder used.
Speed, control, torque control, and position control by pulse train input are available with or without the Z-phase being connected.

*2: Connect the encoder so that there is no looseness between the motor and motor shaft. Speed ratio must be 1:1.

*3: Earth (ground) the shield of the encoder cable to the enclosure using a tool such as a P-clip. (Refer to the Instruction Manual (Detailed).)

*4: For the complementary, set the terminating resistor selection switch to OFF position. (Refer to the Instruction Manual (Detailed).)

*5: A separate power supply of 5 V/12 V/15 V/24 V is necessary according to the encoder power specification.
When the encoder output is the differential line driver type, only 5 V can be input.
Make the voltage of the external power supply the same as the encoder output voltage, and connect the external power supply across PG and SD.

*6: For terminal compatibility of the FR-JCBL, FR-V7CBL, and FR-A8AP, refer to the Instruction Manual (Detailed).

*7: For the fan of the 7.5 kW or lower dedicated motor, the power supply is single phase. (200 V/50 Hz, 200 to 230 V/60 Hz)

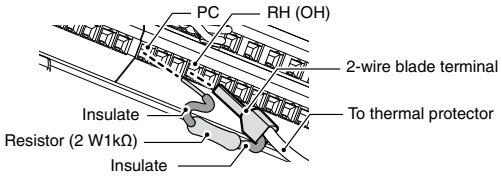
*8: Connect the recommended 2W1kΩ resistor between the terminal PC and OH. (Recommended product: MOS2C102J 2W1kΩ by KOA Corporation)
Insert the input line and the resistor to a 2-wire blade terminal, and connect the blade terminal to the terminal OH.
Insulate the lead wire of the resistor, for example by applying a contraction tube, and shape the wires so that the resistor and its lead wire will not touch other cables. Caulk the lead wire securely together with the thermal protector input line using a 2-wire blade terminal.
(Do not subject the lead wire's bottom area to an excessive pressure.)
To use a terminal as the terminal OH, assign the OH (external thermal O/L relay input) signal to an input terminal. (Set "7" in any of **Pr.178 to Pr.189**.)

*9: Assign the function using **Pr.178 to Pr.184, Pr.187 to Pr.189 (input terminal function selection)**.

*10: When position control is selected, terminal JOG function is invalid and simple position pulse train input terminal becomes valid.

*11: Assign the function using **Pr.190 to Pr.194 (output terminal function selection)**.

When OH signal is assigned to terminal RH
(**Pr.182** = "7")



Standard models, IP55 compatible models, and Separated converter type

Type		Terminal Symbol	Terminal Name	Description	
Main circuit		R/L1, S/L2, T/L3*1	AC power input	Connect to the commercial power supply.	
		U, V, W	Inverter output	Connect a three-phase squirrel-cage motor or PM motor.	
		R1/L11, S1/L21*2	Power supply for control circuit	Connected to the AC power supply terminals R/L1 and S/L2. To retain alarm display and alarm output, apply external power to this terminal.	
		P/+, PR*1*2	Brake resistor connection	Connect an optional brake resistor across the terminals P/+ and PR. Remove the jumper across the terminals PR and PX for the inverter capacity that has the terminal PX. (FR-A820-00630 (11K) or lower, FR-A840-00380 (15K) or lower)	
		P3, PR*1*2	Brake resistor connection	Connect an optional brake resistor across the terminals P3 and PR. (FR-A820-00770 (15K) to 01250 (22K), FR-A840-00470 (18.5K) to 01800 (55K))	
		P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV) or regeneration common converter (MT-RC) and high power factor converter (FR-HC2). Do not connect the DC power supply between terminals P3 and N/-. Use terminals P/+ and N/- for DC feeding. Connect the separated converter type to the terminals P/+ and N/- of the converter unit.	
		P3, N/-	Brake unit connection*3		
		P/+, P1*1	DC reactor connection	Remove the jumper across terminals P/+-P1 and connect a DC reactor. For the FR-A820-03800 (75K) or higher, the FR-A840-02160 (75K) or higher, and when a 75 kW or higher motor is used, always connect a DC reactor, which is available as an option.	
		PR, PX*1*2	Built-in brake circuit connection	When the jumper is connected across terminals PX and PR (initial status), the built-in brake circuit is valid. The built-in brake circuit is equipped in the FR-A820-00490 (7.5K) or lower and FR-A840-00250 (7.5K) or lower.	
		⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded).	
Control circuit/input signal	Contact input	STF	Forward rotation start	Turn on the STF signal to start forward rotation and turn it off to stop.	When the STF and STR signals are turned on simultaneously, the stop command is given.
		STR	Reverse rotation start	Turn on the STR signal to start reverse rotation and turn it off to stop.	
		STP (STOP)	Start self-holding selection	Turn on the STOP signal to self-hold the start signal.	
		RH, RM, RL	Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.	
		JOG	Jog mode selection	Turn on the JOG signal to select Jog operation (initial setting) and turn on the start signal (STF or STR) to start Jog operation.	
			Pulse train input	JOG terminal can be used as pulse train input terminal. To use as pulse train input terminal, the **Pr.291** setting needs to be changed. (maximum input pulse: 100kpulses/s)	
		RT	Second function selection	Turn on the RT signal to select second function selection When the second function such as "Second torque boost" and "Second V/F (base frequency)" are set, turning on the RT signal selects these functions.	
		MRS	Output stop	Turn on the MRS signal (2ms or more) to stop the inverter output. Use to shut off the inverter output when stopping the motor by electromagnetic brake.	
		MRS (X10)*8	Output stop (Inverter operation enable)	Connect to the terminal RDA of the converter unit (FR-CC2). When the RDA signal is turned OFF, the inverter output is shut off. The X10 signal (NC contact) is assigned to the terminal MRS in the initial setting. Use **Pr.599** to change the specification to NO contact.	
		RES	Reset	Used to reset alarm output provided when protective circuit is activated. Turn on the RES signal for more than 0.1s, then turn it off. Recover about 1s after reset is cancelled.	
		AU	Terminal 4 input selection	Terminal 4 is made valid only when the AU signal is turned on. Turning the AU signal on makes terminal 2 invalid	
		CS	Selection of automatic restart after instantaneous power failure	When the CS signal is left on, the inverter restarts automatically at power restoration. Note that restart setting is necessary for this operation. In the initial setting, a restart is disabled.	
		SD	Contact input common (sink)*4	Common terminal for the contact input terminal (sink logic) and terminal FM.	
			External transistor common (source)*5	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
			24 VDC power supply common	Common terminal for the 24 VDC power supply (terminal PC, terminal +24) Isolated from terminals 5 and SE.	
		PC	External transistor common (sink)*4	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the sink logic to avoid malfunction by undesirable currents.	
			Contact input common (source)*5	Common terminal for contact input terminal (source logic).	
			24 VDC power supply	Can be used as 24 VDC 0.1 A power supply.	
	Frequency setting	10E	Frequency setting power supply	When connecting a frequency setting potentiometer at an initial status, connect it to terminal 10. Change the input specifications of terminal 2 when connecting it to terminal 10E.	10 VDC, permissible load current 10 mA
		10			5 VDC, permissible load current 10 mA
		2	Frequency setting (voltage)	Inputting 0 to 5 VDC (or 0 to 10 V, 4 to 20 mA) provides the maximum output frequency at 5 V (10 V, 20 mA) and makes input and output proportional. Use **Pr.73** to switch from among input 0 to 5 VDC (initial setting), 0 to 10 VDC, and 4 to 20 mA. Set the voltage/current input switch in the ON position to select current input (0 to 20 mA).	Voltage input: Input resistance 10 kΩ ± 1 kΩ Maximum permissible voltage 20 VDC Current input: Input resistance 245 Ω ± 5 Ω Maximum permissible current 30 mA
		4	Frequency setting (current)	Inputting 4 to 20 mADC (or 0 to 5 V, 0 to 10 V) provides the maximum output frequency at 20 mA and makes input and output proportional. This input signal is valid only when the AU signal is on (terminal 2 input is invalid). Use **Pr.267** to switch from among input 4 to 20 mA (initial setting), 0 to 5 VDC, and 0 to 10 VDC. Set the voltage/current input switch in the OFF position to select voltage input (0 to 5 V/0 to 10 V). Use **Pr.858** to switch terminal functions.	
		1	Frequency setting auxiliary	Inputting 0 to ±5 VDC or 0 to ±10 VDC adds this signal to terminal 2 or 4 frequency setting signal. Use **Pr.73** to switch between input 0 to ±5 VDC and 0 to ±10 VDC (initial setting) input.	Input resistance 10 kΩ ±1 kΩ Maximum permissible voltage ±20 VDC
		5	Frequency setting common	Common terminal for frequency setting signal (terminal 2, 1 or 4) and analog output terminal AM, CA. Do not earth (ground).	
	Thermistor	10 2	PTC thermistor input	For receiving PTC thermistor outputs. When PTC thermistor is valid (**Pr.561** ≠ "9999"), the terminal 2 is not available for frequency setting.	Applicable PTC thermistor specification Overheat detection resistance:500 Ω to 30 kΩ (Set by **Pr.561**)

indicates that terminal functions can be selected from **Pr.178 to Pr.196 (I/O terminal function selection)**.
Terminal names and terminal functions are those of the factory set.

Type		Terminal Symbol	Terminal Name	Description		
Control circuit/output signal	Power supply input	+24	24 V external power supply input	For connecting 24 V external power supply. If the 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF.		Input voltage 23 to 25.5 VDC Input current 1.4 A or less
	Relay	A1, B1, C1	Relay output 1 (alarm output)	1 changeover contact output indicates that the inverter protective function has activated and the output stopped. Alarm: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C)		Contact capacity 230 VAC 0.3 A (power factor =0.4) 30 VDC 0.3 A
		A2, B2, C2	Relay output 2	1 changeover contact output		
	Open collector	RUN	Inverter running	Switched low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5 Hz). Switched high during stop or DC injection brake operation.		Permissible load 24 VDC maximum 27 VDC) 0.1 A (The voltage drop is 2.8 V at maximum while the signal is ON.) LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF not conducted).
		SU	Up to frequency	Switched low when the output frequency reaches within the range of ±10% (initial value) of the set frequency. Switched high during acceleration/deceleration and at a stop.	Alarm code (4bit) output	
		OL	Overload alarm	Switched low when stall prevention is activated by the stall prevention function. Switched high when stall prevention is cancelled.		
		IPF	Instantaneous power failure	Switched low when an instantaneous power failure and under voltage protections are activated.		
		IPF*8	Open collector output	No function is assigned in the initial setting. The function can be assigned setting **Pr.192**.		
		FU	Frequency detection	Switched low when the inverter output frequency is equal to or higher than the preset detected frequency and high when less than the preset detected frequency.		
		SE	Open collector output common	Common terminal for terminals RUN, SU, OL, IPF, FU		
	Pulse	FM*6	For meter	Select one e.g. output frequency from monitor items. (The signal is not output during an inverter reset.) The output signal is proportional to the magnitude of the corresponding monitoring item. The output signal is proportional to the magnitude of the corresponding monitoring item.Use **Pr.55**, **Pr.56**, and **Pr.866** to set full scales for the monitored output frequency, output current, and torque.	Output item: output frequency (initial setting), permissible load current 2 mA, For full scale1440 pulses/s	
			NPN open collector output		Signals can be output from the open collector terminals by setting **Pr.291**. (maximum output pulse: 50kpulses/s)	
	Analog	AM	Analog voltage output		Output item: output frequency (initial setting), output signal 0 to ±10 VDC, permissible load current 1 mA (load impedance 10 kΩ or more), resolution 8 bit	
		CA*7	Analog current output		Output item: output frequency (initial setting), Load impedance 200 Ω to 450 Ω Output signal 0 to 20 mADC	
Communication		–	PU connector	With the PU connector, communication can be made through RS-485. (1:1 connection only) •Conforming standard: EIA-485(RS-485) •Communication speed: 4800 to 115200bps •Transmission format: Multi-drop link •Wiring length: 500 m		
	RS-485 terminals	TXD+, TXD-	Inverter transmission terminal	With the RS-485 terminals, communication can be made through RS-485. •Conforming standard: EIA-485(RS-485) •Communication speed: 300 to 115200bps •Transmission format: Multi-drop link •Overall extension: 500 m		
		RXD+, RXD-	Inverter reception terminal			
		GND (SG)	Earth (Ground)			
	–		USB A connector	A connector (receptacle). A USB memory device enables parameter copies and the trace function.		Interface: Conforms to USB1.1 (USB2.0 full-speed compatible). Transmission speed: 12 Mbps
			USB B connector	Mini B connector (receptacle). Connected to a personal computer via USB to enable setting, monitoring, test operations of the inverter by FR Configurator2.		
Safety stop signal		S1	Safety stop input (Channel 1)	The terminals S1 and S2 are used for the safety stop input signal for the safety relay module. The terminals S1 and S2 are used at the same time (dual channel). Inverter output is shutoff by shortening/opening between terminals S1 and SIC, or between S2 and SIC. In the initial status, terminals S1 and S2 are shorted with the terminal PC by shorting wires. The terminal SIC is shorted with the terminal SD. Remove the shorting wires and connect the safety relay module when using the safety stop function.		Input resistance 4.7 kΩ Input current 4 to 6 mADC (with 24 VDC input)
		S2	Safety stop input (Channel 2)			
		SIC	Safety stop input terminal common	Common terminal for terminals S1 and S2.		–
		SO	Safety monitor output (open collector output)	Indicates the safety stop input signal status. Switched to LOW when the status is other than the internal safety circuit failure. Switched to HIGH during the internal safety circuit failure status. (LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).) Refer to the Safety stop function instruction manual (BCN-A23228-001) when the signal is switched to HIGH while both terminals S1 and S2 are open.		Permissible load 24 VDC (27 VDC at maximum), 0.1 A (The voltage drop is 3.4 V at maximum while the signal is ON.)
		SOC	Safety stop input terminal common	Common terminal for terminal SO.		–

*1: Terminals R/L1, S/L2, T/L3, PR, P3, P1, and PX are not provided in the separated converter type.
*2: Terminals R1/L11, S1/L21, PR, P3, and PX are not provided for the IP55 compatible model.
*3: Available for the FR-A820-00770(15K) to FR-A820-01250(22K), and the FR-A840-00470(18.5K) to FR-A840-01800(55K).
*4: The sink logic is initially set for the FM-type inverter.
*5: The source logic is initially set for the CA-type inverter.
*6: Terminal FM is provided in the FM-type inverter.
*7: Terminal CA is provided in the CA-type inverter.
*8: Function and name of the separated converter type.

■Major difference from and comparison with the FR-A700 series

Item		FR-A700	FR-A800
Control method		V/F control Advanced magnetic flux vector control Real sensorless vector control Vector control (with plug-in option) PM sensorless vector control (IPM motor)	V/F control Advanced magnetic flux vector control Real sensorless vector control Vector control (with plug-in option/control terminal option) PM sensorless vector control (IPM motor/SPM motor)
Added functions		–	USB host function Safety stop function PLC function etc.
Brake transistor (brake resistor usable)		Built in for the FR-A720-0.4K to 22K Built in for the FR-A740-0.4K to 22K	Built in for the FR-A820-00046(0.4K) to 01250(22K) Built in for the FR-A840-00023(0.4K) to 01800(55K)
Maximum output frequency	V/F control	400 Hz	590 Hz
	Advanced magnetic flux vector control	120 Hz	400 Hz
	Real sensorless vector control	120 Hz	400 Hz
	vector control	120 Hz	400 Hz
	PM sensorless vector control	300 Hz	400 Hz
PID control		Turn the X14 signal ON to enable PID control.	When the X14 signal is not assigned, just set a value other than "0" in **Pr.128** to enable PID control. When the X14 signal is assigned, turn the X14 signal ON while **Pr.128** ≠ "0" to enable PID control. The PID pre-charge function and dancer control are added.
Automatic restart after instantaneous power failure		Turn the CS signal ON to enable restart.	CS signal assignment not required. (Restart is enabled with the **Pr.57** setting only.)
Number of motor poles V/F control switching		The V/F switching signal (X18) is valid when **Pr.81** = "12 to 20 (2 to 10 poles)".	**Pr.81** = "12 (12 poles)" X18 is valid regardless of the **Pr.81** setting. (The Pr.81 settings "14 to 20" are not available.)
PTC thermistor input		Input from the terminal AU (The function of the terminal AU is switched by a switch.)	Input from the terminal 2. (The function of the terminal 2 is switched by the **Pr.561** setting.)
USB connector		B connector	Mini B connector
Control circuit terminal block		Removable terminal block (screw type)	Removable terminal block (spring clamp type)
Terminal response level		The FR-A800's I/O terminals have better response level than the FR-A700's terminals. By setting **Pr.289 Inverter output terminal filter and Pr.699 Input terminal filter**, the terminal response level can be compatible with that of FR-A700. Set to approximately 5 to 8 ms and adjust the setting according to the system.	
PU		FR-DU07 (4-digit LED) FR-PU07	FR-DU08 (5-digit LED) FR-LU08 (LCD operation panel) FR-PU07 (Some functions, such as parameter copy, are unavailable.) FR-DU07 is not supported.
Plug-in option		Dedicated plug-in options (not interchangeable)	
Communication option		Connected to the connector 3	Connected to the connector 1
Installation size		For standard models, installation size is compatible for all capacities. (Replacement between the same capacities does not require new mounting holes.) For separated converter types, installation size is not compatible. (New mounting holes are required.)	
Converter		Built-in for all capacities	An optional converter unit (FR-CC2) is required for separated converter types.
DC reactor		The 75K or higher comes with a DC reactor (FR-HEL).	For the FR-A820-03800(75K) or higher, the FR-A840-02160(75K) or higher, and when a 75 kW or higher motor is used, select a DC reactor suitable for the applicable motor capacity. (A DC reactor is not included.) Separated converter types (converter unit FR-CC2) and IP55 compatible models have a built-in DC reactor.
Brake unit (75 kW or higher)		FR-BU2, MT-BU5	FR-BU2

Inverter FREQROL-A800 Plus Series for CRANES

The optimum functions for cranes are added.

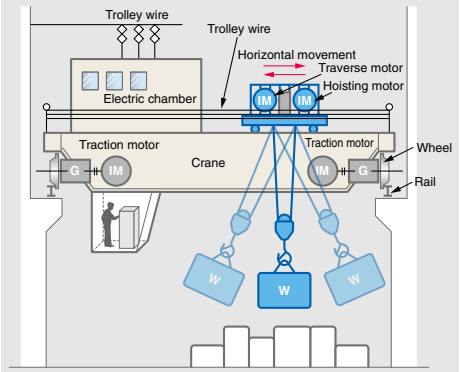
Suited for various cranes to achieve fast, robust, and smooth operations

Reduction in tact time

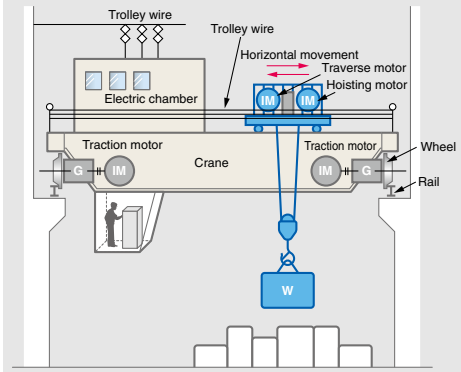
Anti-sway control

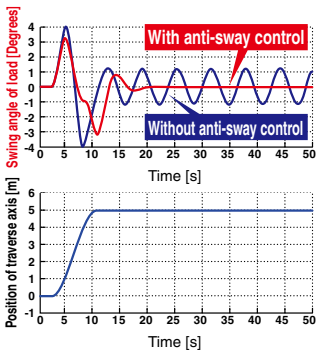
By using the Mitsubishi's original anti-sway control technology, the swinging of an object moved by a crane is suppressed at the time of stopping, even without operator's input adjustment.
This control cuts down the tact time and facilitates efficient operation.

Without anti-sway control



With anti-sway control





Load torque high-speed frequency control (mode 2)

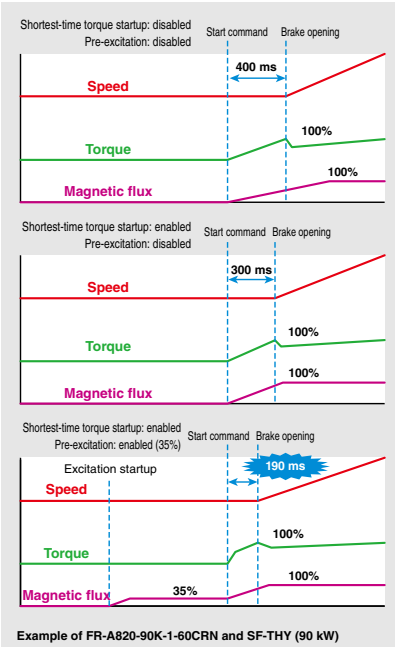
When there is a light-load (when light loads are moved up or down by a crane), the speed will automatically be increased. This reduces the tact time and facilitates efficient operation.
The possible operation speed is set automatically according to the load.
After starting the inverter, the inverter runs at high speed with a light load.

Shortest-time torque startup function

The time from the start command to when the brake opens is shortened.
This will contributes to reduction in tact time.

●Shortest-time torque startup function
The optimum distribution of the excitation current and torque current enables rapid startup of the torque.

●Magnetic flux command during pre-excitation
Decreasing the pre-excitation current during a motor stop reduces power consumption during standby, and enables rapid startup of the torque.



Example of FR-A820-90K-1-60CRN and SF-THY (90 kW)

Load slippage prevention

Brake sequence function

The highly scalable brake sequence function enables the output of a brake opening signal for the optimum brake operation calculated from the load torque or the speed.
The function enables setting of the brake opening level individually for forward rotation and reverse rotation.

Falling detection

Slippage during the start of a lift can be checked.

When the commanded direction differs from the actual motor rotation direction, the falling detection signal is output.

Low-speed range speed control P gain

When an inverter is connected to a lift, the inverter has a load immediately after the lift brake is released. Adjusting the speed control P gain in the low-speed range improves the response at low speed, and shortens the time from startup to brake opening.





Dedicated monitoring functions

Overload detection function

By outputting an overload detection signal when too much load (overload) is applied to a crane, this information can be transmitted to the superordinate controller.
During constant speed operation, when the motor torque is equal to or higher than the torque setting for the time setting or longer, the overload detection signal is turned ON.

Start count monitor

The inverter starting times can be counted.
Confirming the starting times can be used to determinate the timing of the maintenance, or can be used as a reference for system inspection or parts replacement.



Start count monitor

Wide range applications

Compliance with ship classification standards

Using the recommended noise filter in combination with the inverter supports compliance with various countries ship classifications, such as NK, LR, DNV, ABS, BV, CCS, and KR.
The FR-A800-CRN can be used for electric deck cranes on ship.



Lineup

●Standard model

F R - A 8 2 0 - 0.4K -1 - 60 CRN

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure/function
0	Standard model

Capacity*1	Description
00023 to 06830	Inverter SLD rated current (A)
0.4K to 280K	Inverter ND rated capacity (kW)

Symbol	Type
-1	FM
-2	CA*2

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06*3	With	With

Symbol	Dedicated function
CRN	Dedicated to crane

Three-phase 200 V class FR-A820-□ *4	00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Three-phase 400 V class FR-A840-□ *4	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	03250	03610	04320	04810	05470	06100	06830										
	110K	132K	160K	185K	220K	250K	280K										
	●	●	●	●	●	●	●										

●Separated converter type

F R - A 8 4 2 - 315K -1 - 60 CRN

Symbol	Voltage class
4	400 V class

Symbol	Structure/function
2	Separated converter type

Capacity*1	Description
07700 to 12120	Inverter SLD rated current (A)
315K to 500K	Inverter ND rated capacity (kW)

Symbol	Type
-1	FM
-2	CA*2

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06	With	With

Symbol	Dedicated function
CRN	Dedicated to crane

Three-phase 400 V class FR-A842-□	07700	08660	09620	10940	12120
	315K	355K	400K	450K	500K
	●	●	●	●	●

*1 Models can be alternatively indicated with the inverter rated current(SLD rating).
*2 Specification differs by the type as follows.

Symbol	Type	Motor output	Built-in EMC filter	Initial setting		
				Control logic	Rated frequency	Base frequency voltage (Pr.19)
-1	FM	Terminal FM (pulse train output) Terminal AM (analog voltage output (0 to 10 VDC))	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)
-2	CA	Terminal CA (analog current output (0 to 20 mA)) Terminal AM (analog voltage output (0 to 10 VDC))	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)

*3 Available for the 5.5K or higher.
*4 For the 75K or higher inverter, or whenever a 75 kW or higher motor is used, always connect a DC reactor (FR-HEL), which is available as an option.

■Standard specifications

●Rating (Standard model)

200 V class

Model FR-A820-□ CRN			00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
Applicable motor capacity (kW)*1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
		HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Rated capacity (kVA)*3	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
		ND (initial setting)	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110	132
		HD	0.6	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110
	Rated current (A)	SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
		LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
		ND (initial setting)	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288	346
		HD	1.5	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288
	Overload current rating*4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
	Rated voltage*5		Three-phase 200 to 240 V																
	Regenerative braking	Built-in brake transistor	Built-in											FR-BU2 (option)					
		Maximum brake torque*7	150% torque/ 3%ED*6			100% torque/ 3%ED*6		100% torque/ 2%ED*6		20% torque/continuous								10% torque/ continuous	
		FR-ABR (when the option is used)	150% torque/ 10%ED		100% torque/10%ED					100% torque/6%ED				–	–	–	–	–	–
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240 V, 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V, 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current (A)*8	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
		LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
		ND (initial setting)	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	266	288	346
		HD	2.3	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	215	288
	Power supply capacity (kVA)*9	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
		ND (initial setting)	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	101	110	132
		HD	0.9	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	82	110
Protective structure (IEC 60529)*10			Enclosed type (IP20)											Open type (IP00)					
Cooling system			Self-cooling		Forced air cooling														
Approx. mass (kg)			2.0	2.2	3.3	3.3	3.3	6.7	6.7	8.3	15	15	15	22	42	42	54	74	74

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 0.2 kW motors can be used only under V/F control.
*3 The rated output capacity indicated assumes that the output voltage is 220 V.
*4 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 With the built-in brake resistor
*7 ND rating reference value
*8 The rated input current is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9 The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the power supply capacity.
*10 FR-DU08: IP40 (except for the PU connector)

400 V class

Model FR-A840-☐ CRN			00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K
Applicable motor capacity (kW)*1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280
		HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250
Output	Rated capacity (kVA)*3	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
		LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367	417
		HD	0.6	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367
	Rated current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93	116	180	216	260	325	361	432	481	547	610	683
		LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481	547
		HD	0.8	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481
	Overload current rating*4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																							
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	Rated voltage*5		Three-phase 380 to 500 V																							
	Regenerative braking	Built-in brake transistor	Built-in															FR-BU2 (option)								
		Maximum brake torque*7	100% torque/ 2%ED*6							20% torque/continuous								10% torque/ continuous								
		FR-ABR (when the option is used)	100% torque/10%ED							100% torque/6%ED				–*12				–	–	–	–	–	–	–	–	–
Power supply	Rated input AC voltage/frequency		Three-phase 380 to 500 V, 50 Hz/60 Hz*11																							
	Permissible AC voltage fluctuation		323 to 550 V, 50 Hz/60 Hz																							
	Permissible frequency fluctuation		±5%																							
	Rated input current (A)*8	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
		LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	134	144	180	216	260	325	361	432	481	547
		HD	1.4	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	110	144	180	216	260	325	361	432	481
	Power supply capacity (kVA)*9	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
		LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	102	110	137	165	198	248	275	329	367	417
		HD	1.1	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	84	110	137	165	198	248	275	329	367
Protective structure (IEC 60529)*10			Enclosed type (IP20)											Open type (IP00)												
Cooling system			Self-cooling			Forced air cooling																				
Approx. mass (kg)			2.8	2.8	2.8	3.3	3.3	6.7	6.7	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 0.2 kW motors can be used only under V/F control.
*3 The rated output capacity indicated assumes that the output voltage is 440 V.
*4 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 With the built-in brake resistor
*7 ND rating reference value
*8 The rated input current is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9 The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the power supply capacity.
*10 FR-DU08: IP40 (except for the PU connector)
*11 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection.**
*12 A commercial brake resistor can be used to improve the braking capability of the inverter built-in brake. Please contact your sales representative for details.

●Rating (Separated converter type)

400 V class

• Inverter

Model FR-A842-☐ CRN			07700	08660	09620	10940	12120
			315K	355K	400K	450K	500K
Applicable motor capacity (kW)*1		SLD	400	450	500	560	630
		LD	355	400	450	500	560
		ND (initial setting)	315	355	400	450	500
		HD	280	315	355	400	450
Output	Rated capacity (kVA)*2	SLD	587	660	733	834	924
		LD	521	587	660	733	834
		ND (initial setting)	465	521	587	660	733
		HD	417	465	521	587	660
	Rated current (A)	SLD	770	866	962	1094	1212
		LD	683	770	866	962	1094
		ND (initial setting)	610	683	770	866	962
		HD	547	610	683	770	866
	Overload current rating*3	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C				
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	Rated voltage*4		Three-phase 380 to 500 V				
	Regenerative braking torque*5 (when the converter unit (FR-CC2) is used)	Maximum brake torque	10% torque/continuous				
Input Power	Power supply voltage		430 to 780 VDC				
	Control power supply auxiliary input		Single-phase 380 to 500 V, 50 Hz/60 Hz*7				
	Permissible control power supply auxiliary input fluctuation		Frequency ±5%, voltage ±10%				
Protective structure (IEC 60529)*6			Open type (IP00)				
Cooling system			Forced air cooling				
Approx. mass (kg)			163	163	243	243	243

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 440 V.
*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about √2.
*5 ND rating reference value
*6 FR-DU08: IP40 (except for the PU connector)
*7 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection.**

• Converter unit (FR-CC2)

Model FR-CC2-H☐		315K	355K	400K	450K	500K	560K	630K
Applicable motor capacity (kW)		315	355	400	450	500	560	630
Output	Overload current rating*1	200% 60 s, 250% 3 s				150% 60 s, 200% 3 s	120% 60 s, 150% 3 s	110% 60 s, 120% 3 s
	Rated voltage*2	430 to 780 VDC*4						
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 500 V, 50 Hz/60 Hz						
	Permissible AC voltage fluctuation	Three-phase 323 to 550 V, 50 Hz/60 Hz						
	Permissible frequency fluctuation	±5%						
	Rated input current (A)	610	683	770	866	962	1094	1212
	Power supply capacity (kVA)*3	465	521	587	660	733	833	924
Protective structure (IEC 60529)		Open type (IP00)						
Cooling system		Forced air cooling						
DC reactor		Built-in						
Approx. mass (kg)		210	213	282	285	288	293	294

*1 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the converter unit and the inverter to return to or below the temperatures under 100% load.
*2 The converter unit output voltage varies according to the input power supply voltage and the load. The maximum point of the voltage waveform at the converter unit output side is approximately the power supply voltage multiplied by √2.
*3 The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*4 The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines) / average voltage between three lines × 100)

●Common specifications

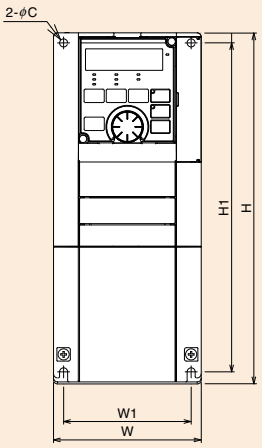
Control specifications	Control method		Soft-PWM control, high carrier frequency PWM control (selectable among V/F control, Advanced magnetic flux vector control, Real sensorless vector control), Optimum excitation control, vector control*1, and PM sensorless vector control
	Output frequency range		0.2 to 590 Hz (The upper frequency limit is 400 Hz under Advanced magnetic flux vector control, Real sensorless vector control, vector control*1, PM sensorless vector control.)
	Frequency setting resolution	Analog Input	0.015 Hz/60 Hz (0 to 10 V/12 bits for terminals 2 and 4) 0.03 Hz/60 Hz (0 to 5 V/11 bits or 0 to 20 mA/approx. 11 bits for terminals 2 and 4, 0 to ±10 V/12 bits for terminal 1) 0.06 Hz/60 Hz (0 to ±5 V/11 bits for terminal 1)
		Digital input	0.01 Hz
	Frequency accuracy	Analog Input	Within ±0.2% of the max. output frequency (25°C±10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 590 Hz. Constant-torque/variable-torque pattern or adjustable 5 points V/F can be selected.
	Starting torque		SLD rating: 120% 0.3 Hz, LD rating: 150% 0.3 Hz, ND rating: 200%*2 0.3 Hz, HD rating: 250%*2 0.3 Hz (under Real sensorless vector control or vector control*1)
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0 to 3600 s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash countermeasures acceleration/deceleration can be selected.
	DC injection brake (induction motor)		Operation frequency (0 to 120 Hz), operation time (0 to 10 s), operation voltage (0 to 30%) variable
	Stall prevention operation level		Activation range of stall prevention operation (SLD rating: 0 to 120%, LD rating: 0 to 150%, ND rating: 0 to 220%, HD rating: 0 to 280%). Whether to use the stall prevention or not can be selected (V/F control, Advanced magnetic flux vector control).
	Torque limit level		Torque limit value can be set (0 to 400% variable). (Real sensorless vector control / vector control*1 / PM sensorless vector control)
Operation specifications	Frequency setting signal	Analog Input	Terminals 2 and 4: 0 to 10 V, 0 to 5 V, 4 to 20 mA (0 to 20 mA) are available. Terminal 1: -10 to +10 V, -5 to +5 V are available.
		Digital input	Input using the setting dial of the operation panel or parameter unit Four-digit BCD or 16-bit binary (when used with option FR-A8AX)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signals (twelve terminals)		The following signals can be assigned to **Pr.178 to Pr.189 (input terminal function selection)**: Low-speed operation command, Middle-speed operation command, High-speed operation command, Second function selection, Terminal 4 input selection, Jog operation selection, Selection of automatic restart after instantaneous power failure, flying start, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command,Inverter reset
	Pulse train input		100 kpps
	Operational functions		Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, increased magnetic excitation deceleration, DC feeding*3, frequency jump, rotation display, automatic restart after instantaneous power failure, electronic bypass sequence, remote setting, automatic acceleration/deceleration, intelligent mode, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, droop control, load torque high-speed frequency control, speed smoothing control, traverse, auto tuning, applied motor selection, gain tuning, RS-485 communication, PID control, PID pre-charge function, easy dancer control, cooling fan operation selection, stop selection (deceleration stop/coasting), power failure time deceleration-to-stop function, stop-on-contact control, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, orientation control*1, speed control, torque control, position control, pre-excitation, torque limit, test run, 24 V power supply input for control circuit, safety stop function, anti-sway control, low-speed range speed control P gain, shortest-time torque startup, inching time adjustment function, brake sequence function
	Output signal	Open collector output (five terminals) Relay output (two terminals)	Inverter running, Up to frequency, Instantaneous power failure/undervoltage*3, Overload warning, Output frequency detection, Fault The output signal can be changed using **Pr.190 to Pr.196 (output terminal function selection).** Fault codes of the inverter can be output (4 bits) from the open collector.
		Pulse train output (FM type)	50 kpps
Indication	For meter	Pulse train output (FM type)	Max. 2.4 kHz: one terminal (output frequency) The monitored item can be changed using **Pr.54 FM/CA terminal function selection.**
		Current output (CA type)	Max. 20 mADC: one terminal (output frequency) The monitored item can be changed using **Pr.54 FM/CA terminal function selection.**
		Voltage output	Max. 10 VDC: one terminal (output frequency) The monitored item can be changed using **Pr.158 AM terminal function selection.**
	Operation panel (FR-DU08)	Operating status	Output frequency, Output current, Output voltage,Frequency setting value The monitored item can be changed using **Pr.52 Operation panel main monitor selection.**
		Fault record	Fault record is displayed when a protective function is activated. Past 8 fault records and output voltage/current/frequency/ cumulative energization time / year/month/date/time immediately before the protective function is activated are stored.
Protective/warning function		Protective function	Overcurrent trip during acceleration, Overcurrent trip during constant speed, Overcurrent trip during deceleration or stop, Regenerative overvoltage trip during acceleration, Regenerative overvoltage trip during constant speed, Regenerative overvoltage trip during deceleration or stop, Inverter overload trip, Motor overload trip, Heatsink overheat, Instantaneous power failure*3, Undervoltage*3, Input phase loss*3*4, Stall prevention stop, Loss of synchronism detection*4, Brake transistor alarm detection, Output side earth (ground) fault overcurrent, Output short circuit, Output phase loss, External thermal relay operation*4, PTC thermistor operation*4, Option fault, Communication option fault, Parameter storage device fault, PU disconnection, Retry count excess*4, Parameter storage device fault, CPU fault, Operation panel power supply short circuit/RS-485 terminals power supply short circuit, 24 VDC power fault, Abnormal output current detection*4, Inrush current limit circuit fault*3, Communication fault (inverter), Analog input fault, USB communication fault, Safety circuit fault, Overspeed occurrence*4, Speed deviation excess detection*1*4, Signal loss detection*1*4, Excessive position fault*1*4, Brake sequence fault*4, Encoder phase fault*1*4, 4 mA input fault*4, Pre-charge fault*4, PID signal fault*4, Option fault, Opposite rotation deceleration fault*4, Internal circuit fault, Magnetic pole position unknown*1
		Warning function	Fan alarm, Stall prevention (overcurrent), Stall prevention (overvoltage), Regenerative brake pre-alarm*3*4, Electronic thermal relay function pre-alarm, PU stop, Speed limit indication*4, Parameter copy, Safety stop, Maintenance signal output*4, USB host error, Home position return setting error*4, Home position return uncompleted*4, Home position return parameter setting error*4, Operation panel lock*4, Password locked*4, Parameter write error, Copy operation error, 24 V external power supply operation
Environment	Surrounding air temperature		-10°C to +50°C (non-freezing) (LD, ND, and HD ratings) -10°C to +40°C (non-freezing) (SLD rating)
	Surrounding air humidity		95% RH or less (non-condensing) (With circuit board coating (IEC60721-3-3 3C2/3S2 compatible)) 90% RH or less (non-condensing) (Without circuit board coating)
	Storage temperature*5		-20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration		Maximum 1000 m above sea level*6, 5.9 m/s² or less*7 at 10 to 55 Hz (directions of X, Y, Z axes)

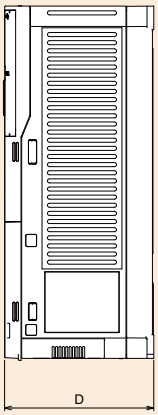
*1 The vector control is available only when a vector control compatible option is installed.
*2 In the initial setting for the FR-A820-00340(5.5K) or higher and the FR-A840-00170(5.5K) or higher, the starting torque is limited to 150% by the torque limit level.
*3 Available only for the standard model.
*4 This protective function is not available in the initial status.
*5 Temperature applicable for a short time, e.g. in transit.
*6 For the installation in an altitude above 1000 m (up to 2500 m), derate the rated current 3% per 500 m.
*7 2.9 m/s² or less for the FR-A840-160K(04320) or higher.

■Standard Model

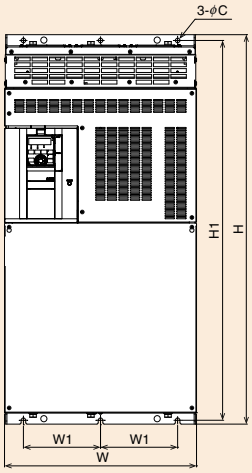
Outline Dimension Drawings

●**FR-A820-00046(0.4K) to 04750(90K)**
●**FR-A840-00023(0.4K) to 03610(132K)**





●**FR-A840-04320(160K) to 06830(280K)**



(Unit: mm)

200 V class

Inverter model	W	W1	H	H1	D	C
FR-A820-00046(0.4K)	110	95	260	245	110	6
FR-A820-00077(0.75K)					125	
FR-A820-00105(1.5K)	150	125			140	
FR-A820-00167(2.2K)						
FR-A820-00250(3.7K)						
FR-A820-00340(5.5K)	220	195			170	
FR-A820-00490(7.5K)						
FR-A820-00630(11K)			300	285	190	
FR-A820-00770(15K)	250	230	400	380		10
FR-A820-00930(18.5K)						
FR-A820-01250(22K)						
FR-A820-01540(30K)	325	270	550	530	195	12
FR-A820-01870(37K)	435	380		525	250	
FR-A820-02330(45K)						
FR-A820-03160(55K)	465	410	700	675		
FR-A820-03800(75K)		400	740	715	360	
FR-A820-04750(90K)						

400 V class

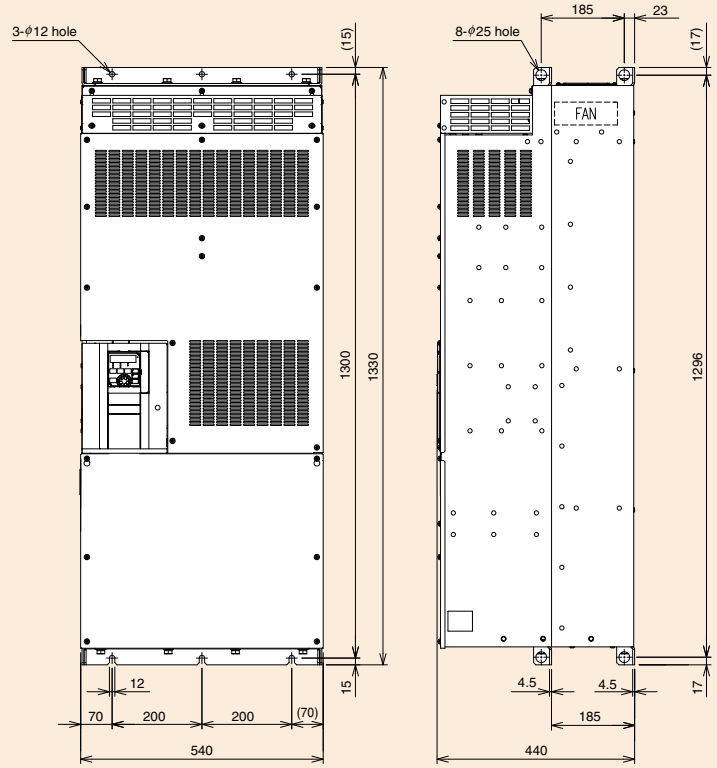
Inverter model	W	W1	H	H1	D	C
FR-A840-00023(0.4K)	150	125	260	245	140	6
FR-A840-00038(0.75K)						
FR-A840-00052(1.5K)						
FR-A840-00083(2.2K)						
FR-A840-00126(3.7K)						
FR-A840-00170(5.5K)	220	195			170	
FR-A840-00250(7.5K)						
FR-A840-00310(11K)			300	285	190	
FR-A840-00380(15K)						
FR-A840-00470(18.5K)	250	230	400	380		10
FR-A840-00620(22K)						
FR-A840-00770(30K)	325	270	550	530	195	12
FR-A840-00930(37K)	435	380		525	250	
FR-A840-01160(45K)						
FR-A840-01800(55K)						
FR-A840-02160(75K)	465	400	620	595	300	
FR-A840-02600(90K)						
FR-A840-03250(110K)			740	715	360	
FR-A840-03610(132K)						
FR-A840-04320(160K)	498	200	1010	985	380	
FR-A840-04810(185K)						
FR-A840-05470(220K)	680	300		984		
FR-A840-06100(250K)						
FR-A840-06830(280K)						

Inverter FREQROL-A800 Plus Series for CRANES

■Separated converter type

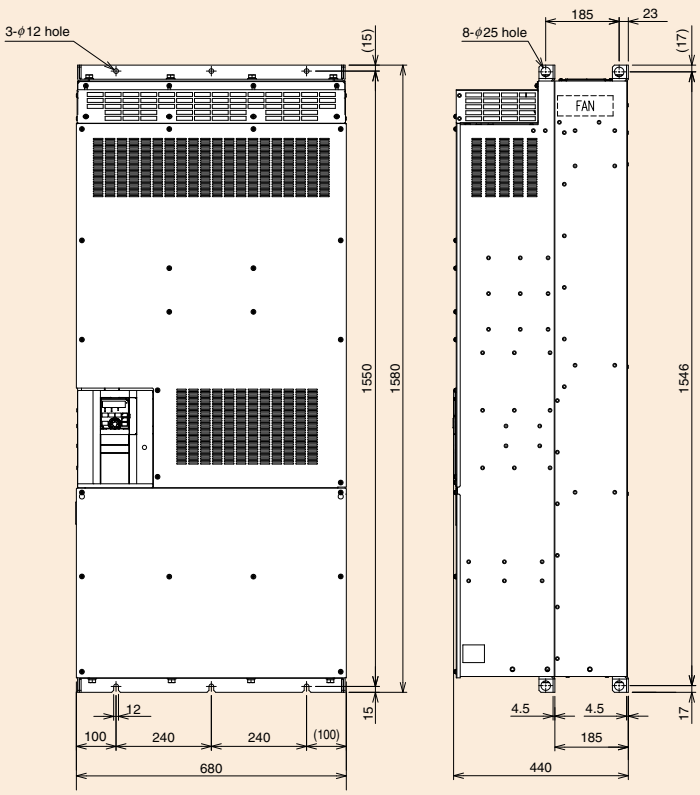
Outline Dimension Drawings

●FR-A842-07700(315K), 08660(355K)



(Unit: mm)

●FR-A842-09620(400K), 10940(450K), 12120(500K)



(Unit: mm)

MEMO

Inverter FREQROL-A800 Plus Series for Roll to Roll

The optimum functions for roll to roll applications are added.

Features

**In roll to roll applications, control is necessary for machining of elongated products such as paper, film, and thread. Processing types include printing, slitting, coating, and twisting. High productivity can be achieved by stable tension control.
The FR-A800-R2R inverter can be used in a wide variety of systems with various dedicated functions.**

Roll to roll dedicated model with functions optimum for winding/unwinding

System simplification

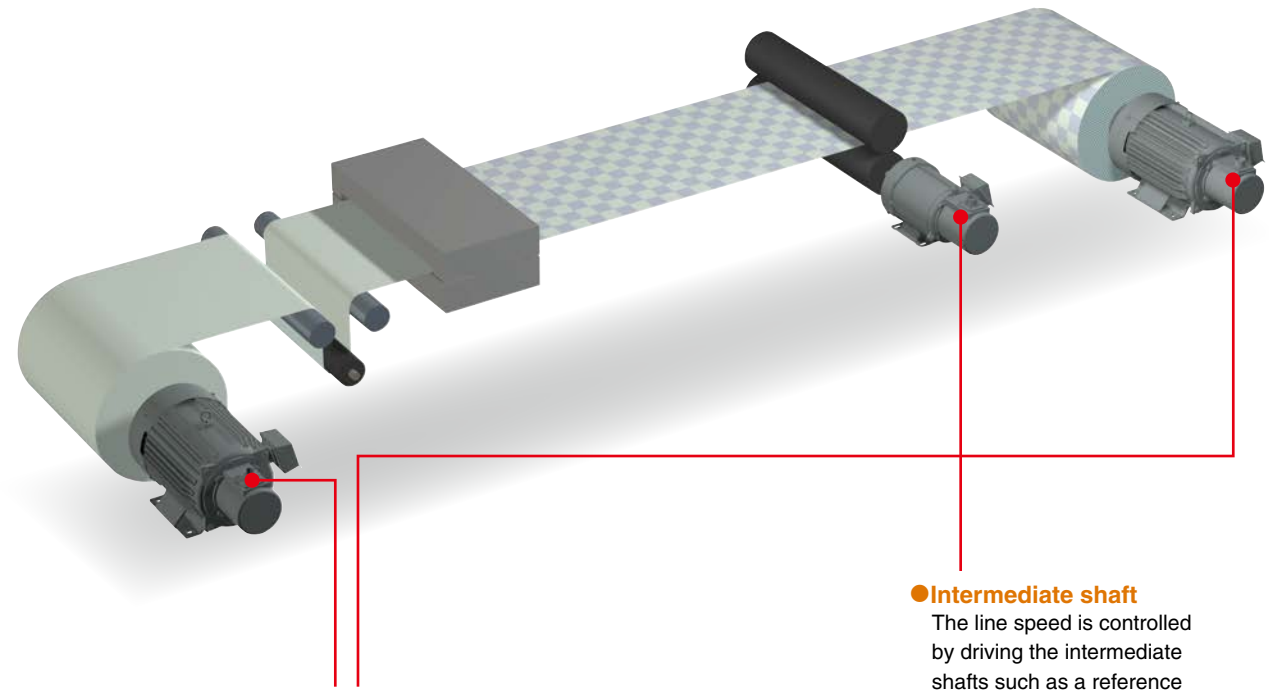
Stable winding/unwinding can be achieved by the inverter alone.

Wide range of applications

The FR-A800-R2R inverter enables the use in various system applications such as winding/unwinding in the wire drawing machines and printers.

Easy startup and adjustment

Parameters can be used for mechanical adjustment according to applications.



●Winding/unwinding shaft
Tension control (speed control / torque control) is enabled by inputting the dancer roll position or the feedback from the tension sensor.
Stable control can be achieved by winding diameter calculation, even with a large difference between the maximum and minimum diameters.

●Intermediate shaft
The line speed is controlled by driving the intermediate shafts such as a reference shaft with a constant winding diameter or the feeding shaft.

System simplification

The FR-A800-R2R inverter has various dedicated functions such as winding diameter calculation, providing stable winding/unwinding control independently.

Winding diameter calculation

The present winding diameter for the winding/unwinding shaft is calculated from the actual line speed or the actual motor speed.

Line speed command input selection / actual line speed input selection

The line speed command and actual line speed required for calculating the winding diameter can be input through the analog input terminal or plug-in option.

Winding diameter calculation function selection

The winding diameter calculation method can be selected in order to improve the tension control performance.

●Actual line speed calculation method

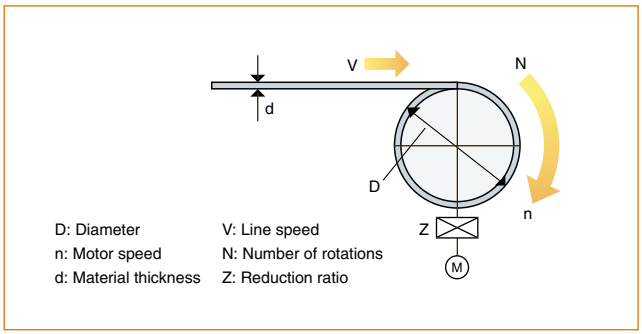
The winding diameter is calculated from the line speed and the main speed (actual motor speed).

$$D = \frac{V}{\pi \times n \times Z}$$

●Thickness calculation method

The material thickness is added up to find the overall winding diameter.

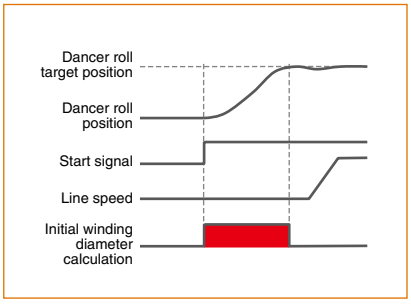
$$D = \text{Initial diameter} \pm 2 \times d \times N \times Z$$



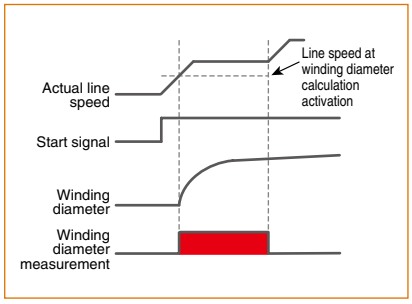
Initial winding diameter calculation

When the winding diameter changes after the material change or others, the present winding diameter is calculated in the following two ways.

●The present winding diameter is calculated based on the dancer roll movement at a start from the lower limit position to the target position.



●The present winding diameter is calculated from the line speed and the actual motor speed. (The system must be started at low speed.)



Winding diameter / winding length storage

The present value of winding diameter and winding/unwinding length can be stored.

The winding diameter and winding length values are stored in the inverter even during power-OFF.

Dancer feedback speed control / Tension sensor feedback speed control

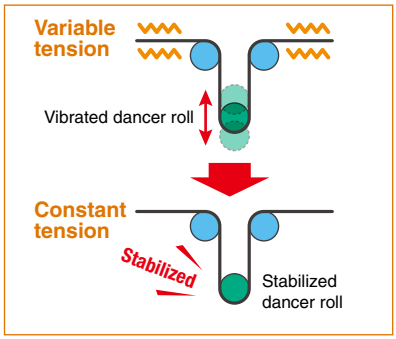
PID control is performed using feedback of the detected dancer roll position or feedback from the tension sensor.
Stable control can be achieved in combination with the winding diameter calculation.

Speed control proportional gain compensation

By adjusting the speed control proportional gain according to the winding diameter, the response level can be kept constant.

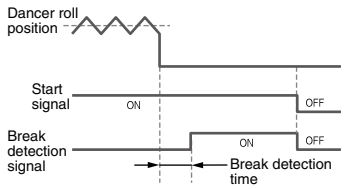
Tension PI gain tuning

By automatically adjusting the tension PI gain for PID control, time required for adjustment is significantly cut down. Anyone can start the system easily.



Dancer roll malposition detection

When material rupture (break) occurs and the sensor feedback value (dancer/ tension feedback) is held at the upper/ lower limit for a certain period of time, the break detection signal is output.



Example of dancer feedback control (winding)

Tension sensorless torque control / Tension sensor feedback torque control

The output torque of a motor is controlled so that the tension applied to a material is constant by calculating the winding diameter of a roll.

Mechanical loss compensation function

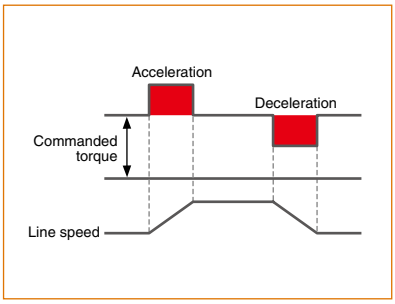
The tension applied to the material is maintained constant by raising a commanded torque to compensate mechanical loss caused by factors such as friction on the dancer roll or winding/ unwinding shaft.

Tension command cushion time

The cushion time is set for the tension command to avoid sudden change in tension.

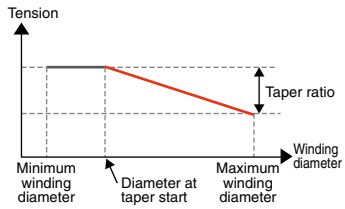
Inertia compensation function

During acceleration/deceleration, the tension applied to the material is maintained constant by adjusting the variable tension on the winding and unwinding sides.



Taper function

By adjusting the tension on the workpiece, it is possible to avoid imperfections such as wrinkles or deformation caused by the increase in diameter.

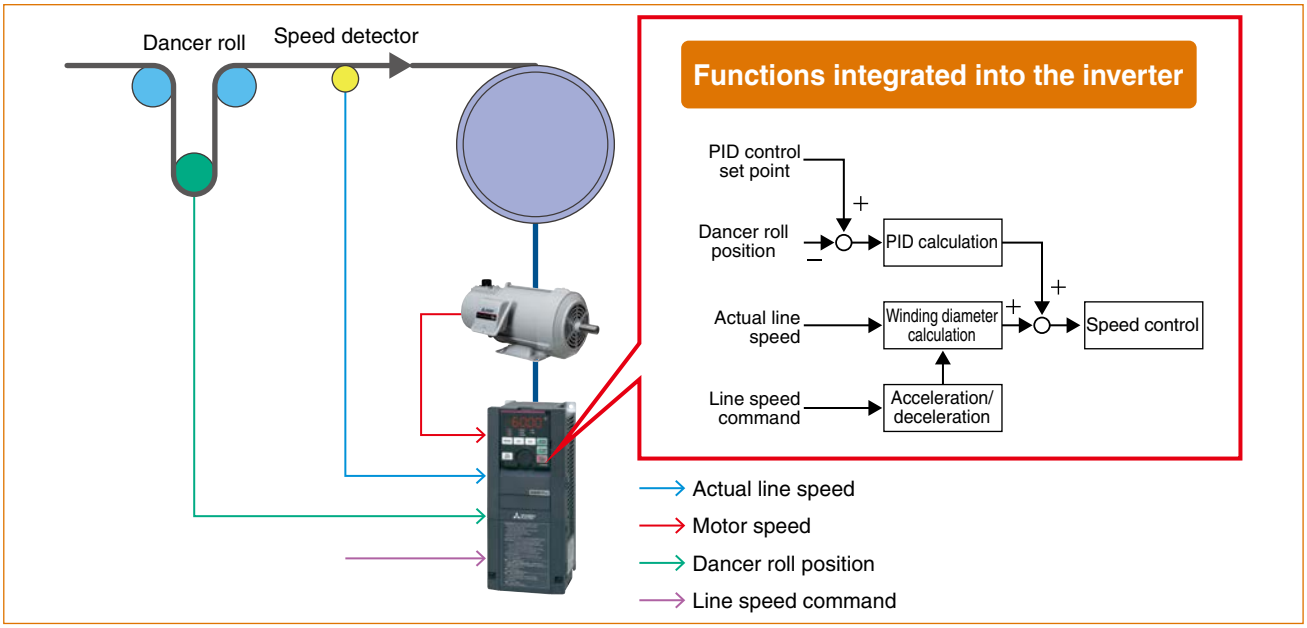


Wide range of applications

The FR-A800-R2R inverter offers four types of control functions which enable the use in various system applications such as winding/unwinding in the wire drawing machines and printers.

Dancer feedback speed control	Tension sensor feedback speed control	Tension sensorless torque control	Tension sensor feedback torque control

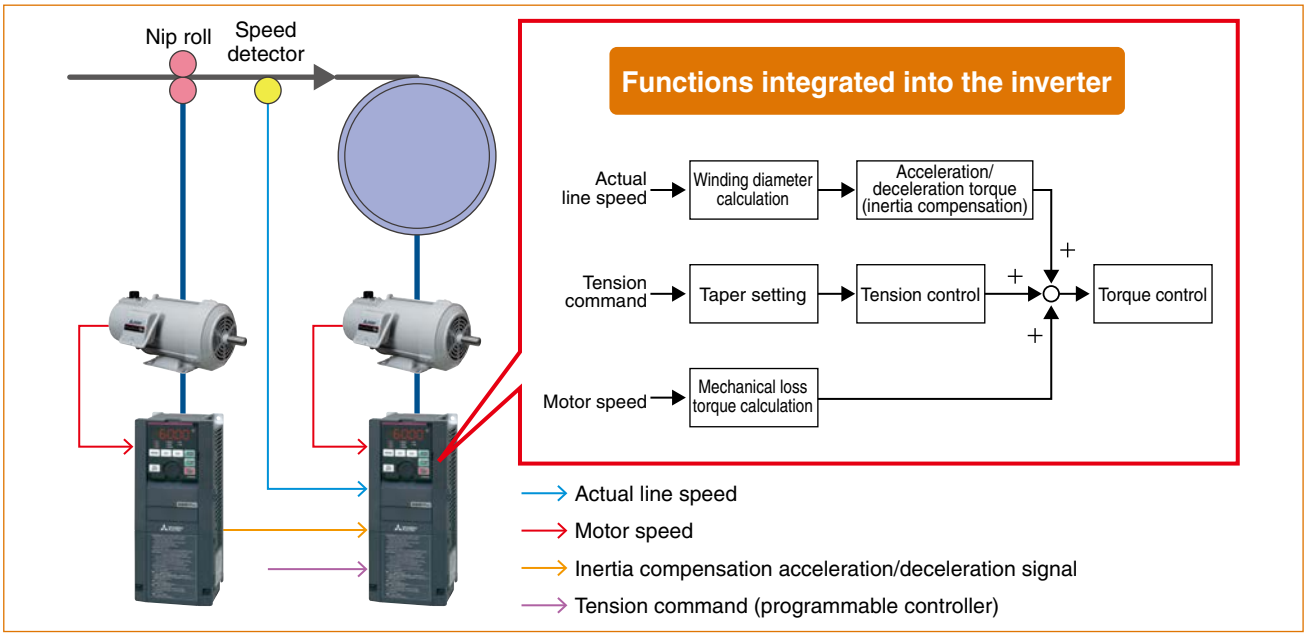
During dancer feedback speed control, speed is controlled for keeping a constant tension on the workpiece (winding/unwinding shaft) by using the dancer roll position and line speed data.
Further stable speed control is possible by performing PID control and winding diameter calculation in the inverter.
Tension sensor feedback speed control is a control function to keep the tension constant using feedback from the tension sensor, instead of the dancer roll position.



Example of dancer feedback speed control

Dancer feedback speed control	Tension sensor feedback speed control	Tension sensorless torque control	Tension sensor feedback torque control

The torque is controlled for keeping a constant tension on the workpiece (winding/unwinding shaft) by using the tension sensor and line speed information.
Further stable torque control is possible by changing the torque command according to the acceleration/deceleration torque calculation at a speed change (inertia compensation) and the mechanical loss torque compensation, as well as the compensation determined by the winding diameter calculation.
Tension sensor feedback torque control can be used when the PLC function is enabled.



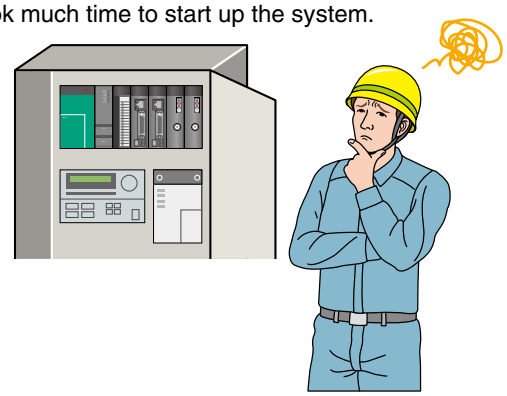
Example of tension sensorless torque control

Easy startup and adjustment

Parameters can be used for mechanical adjustment according to applications, useful for the startup and adjustment work of the system.

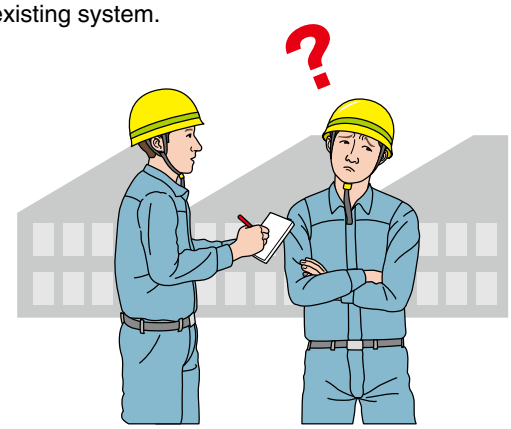
Before

Setting and adjusting multiple devices including controllers were required for dancer control, and it took much time to start up the system.



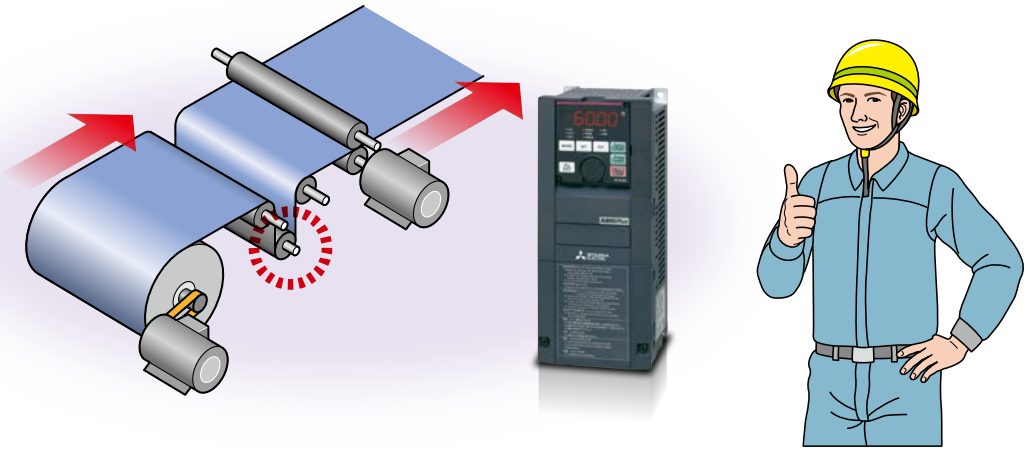
Before

There was a worry about the compatibility with the existing system.



After

- ○ Complex position control of the dancer roll can be achieved by the inverter alone by setting parameters.
- ○ By setting mechanical specifications, optimum control can be performed according to the system and the application.
- ○ Analog/pulse signal input method is selectable at the discretion of the customer. Input via communication is also available.
- ○ PID control enables and simplifies complex control using only the inverter.
- ○ Automatic tension PI gain adjustment enables easy startup. (Tension PI gain tuning)



Example of startup procedure

The following procedure shows the parameter setting example for the dancer feedback speed control.

STEP 1
Basic setting of the inverter

Perform setting according to the motor type and the control method.

STEP 2
Basic setting of mechanical specifications

Set the mechanical specifications.

STEP 3
Analog/pulse input method selection

Select the input method and the input terminal function for the line speed command.

STEP 4
PID control adjustment
(Dancer roll target position, tension PI gain tuning)

Set parameters to control the dancer roll and adjust the tension PI gain.

Basic parameter setting and control method selection

Set the value for each parameter according to the control method and the motor type.
(Speed control gain adjustment or offline auto tuning is required according to the control method.)

Item	Pr.	Item	Pr.	Item	Pr.
Applied motor	71	Rated motor frequency	84	Motor inertia (integer)*2	707
Electronic thermal O/L relay	9	Control method selection*1	800	Motor inertia (exponent)*2	724
Motor capacity	80	Torque limit input method selection	810	Encoder option selection	862
Number of motor poles	81	Encoder rotation direction	359		
Rated motor voltage	83	Number of encoder pulses	369		

*1: For the control method, vector control is recommended.
*2: Setting is required for a motor other than a Mitsubishi motor (the SF-PR, SF-JR, SF-HR, SF-JRCA, SF-HRCA, or SF-V5RU (1500 r/min series) motor).

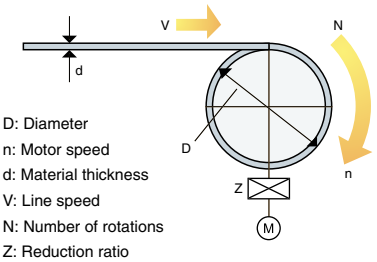
Mechanical specifications setting

Set the mechanical specifications according to application.

Pr.	Name	Intermediate shaft	Winding/unwinding shaft
1235	Maximum winding diameter 1	○	○
1236	Minimum winding diameter 1	○	○
1230	Winding/unwinding selection	—	○
645	Winding diameter storage selection	—	○
1247	Winding diameter change increment amount limit	○	○
1243	Gear ratio numerator (follower side)	○	○
1244	Gear ratio denominator (driver side)	○	○
7	Acceleration time	○	○
8	Deceleration time	○	○
394	First acceleration time for line speed command	○	○
395	First deceleration time for line speed command	○	○
101	Second deceleration time for line speed command	○	○
393	Line speed command acceleration/deceleration reference	○	○
1231	Material thickness d1	—	○
1252	Dancer lower limit position	—	○
1255	Accumulated amount	—	○

Control accuracy improvement by the winding diameter calculation

By calculating the winding diameter of the winding/unwinding shaft, the tension is always optimized even if it changes along with the winding diameter change.



D: Diameter
n: Motor speed
d: Material thickness
V: Line speed
N: Number of rotations
Z: Reduction ratio

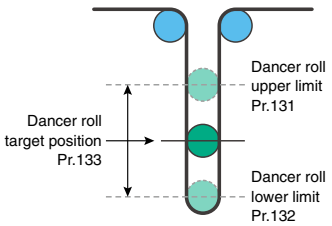
Input method selection for the line speed command, dancer signal, and actual line speed

The line speed command input method can be selected from the following: analog input through a terminal (2, 4, 1, 6, etc.), single-phase pulse train input, encoder pulse input, and input via communication (CC-Link IE Field Network communication, DeviceNet™, PROFIBUS-DPV0, etc.).

Dancer roll target position setting

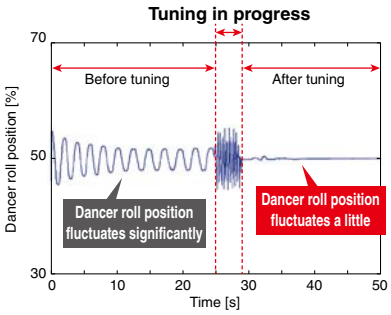
Set the target position, upper limit, and lower limit values for the dancer roll.

Item	Pr.
Set point	133
Upper limit	131
Lower limit	132
PID action selection	128



PI gain automatic adjustment

The PI gain is automatically adjusted by tension PI gain tuning. The time required for gain adjustment can be reduced.



Fluctuation of the dancer roll position before and after tension PI gain tuning

TEST RUN

Turn ON the X114 signal for using dancer feedback speed control and the winding diameter calculation function.

Lineup

●Standard model

F R - A 8 2 0 - 0.4K -1 - R2R

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure/function
0	Standard model

Capacity*1	Description
00023 to 06830	Inverter SLD rated current (A)
0.4K to 280K	Inverter ND rated capacity (kW)

Symbol	Type*2
-1	FM
-2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06*3	With	With

Symbol	Dedicated function
R2R	Roll to roll dedicated model

Three-phase 200 V class FR-A820-□ *4	00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Three-phase 400 V class FR-A840-□ *4	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	03250	03610	04320	04810	05470	06100	06830										
	110K	132K	160K	185K	220K	250K	280K										
	●	●	●	●	●	●	●										

●Separated converter type

F R - A 8 4 2 - 315K -1 - R2R

Symbol	Voltage class
4	400 V class

Symbol	Structure/function
2	Separated converter type

Capacity*1	Description
07700 to 12120	Inverter SLD rated current (A)
315K to 500K	Inverter ND rated capacity (kW)

Symbol	Type*2
-1	FM
-2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06	With	With

Symbol	Dedicated function
R2R	Roll to roll dedicated model

Three-phase 400 V class FR-A842-□	07700	08660	09620	10940	12120
	315K	355K	400K	450K	500K
	●	●	●	●	●

*1 Models can be alternatively indicated with the inverter rated current (SLD rating).
*2 Specification differs by the type as follows.
*3 Available for the 5.5K or higher.
*4 For the 75K or higher inverter, or whenever a 75 kW or higher motor is used, always connect a DC reactor (FR-HEL), which is available as an option.

Type	Motor output	Initial setting			
		Built-in EMC filter	Control logic	Rated frequency	Pr.19 Base frequency voltage
FM (terminal FM equipped model)	Terminal FM: pulse train output Terminal AM: analog voltage output (0 to ±10VDC)	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)
CA (terminal CA equipped model)	Terminal CA: analog current output (0 to 20mADC) Terminal AM: analog voltage output (0 to ±10VDC)	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)

■Standard specifications

●Rating (Standard model)

200 V class

Model FR-A820-□ R2R			00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
Applicable motor capacity (kW)*1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
		SND*2	0.75	1.5	2.2	3.7	5.5	7.5	7.5	15	18.5	22	22	30	45	45	55	90	90
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
		HD	0.2*3	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Rated capacity (kVA)*4	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
		SND*2	1.6	2.7	3.7	5.8	8.8	12	14	22	27	32	39	48	65	72	99	132	148
		ND (initial setting)	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110	132
		HD	0.6	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110
	Rated current (A)	SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
		LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
		SND*2	4.2	7	9.6	15.2	23	31	36	58	70.5	85	102	126	170	190	259	346	388
		ND (initial setting)	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288	346
		HD	1.5	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288
	Overload current rating*5	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		SND*2	150% 60 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
	Rated voltage*6		Three-phase 200 to 240 V																
	Regenerative braking	Brake transistor	Built-in											FR-BU2 (option)					
		Maximum brake torque*8	150% torque/ 3%ED*7			100% torque/ 3%ED*7		100% torque/ 2%ED*7		20% torque/continuous								10% torque/ continuous	
		FR-ABR (when the option is used)	150% torque/ 10%ED		100% torque/10%ED					100% torque/6%ED				–	–	–	–	–	–
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240 V, 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V, 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current (A)*9	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
		LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
		SND*2	5	8.3	12.2	18.3	28.5	41.6	49	74.8	90.9	106	130	166	207	233	304	346	388
		ND (initial setting)	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	266	288	346
		HD	2.3	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	215	288
	Power supply capacity (kVA)*10	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
		SND*2	1.9	3.2	4.7	7	11	16	19	29	35	41	50	63	79	89	116	132	148
		ND (initial setting)	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	101	110	132
		HD	0.9	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	82	110
Protective structure (IEC 60529)*11			Enclosed type (IP20)											Open type (IP00)					
Cooling system			Self-cooling		Forced air cooling														
Approx. mass (kg)			2.0	2.2	3.3	3.3	3.3	6.7	6.7	8.3	15	15	15	22	42	42	54	74	74

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 For the SND rating, the carrier frequency is always 2 kHz.
*3 The 0.2 kW motor capacity is applicable under V/F control only.
*4 The rated output capacity indicated assumes that the output voltage is 220 V for 200 V class.
*5 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*6 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*7 Value for the built-in brake resistor
*8 Value for the ND rating
*9 The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*10 The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*11 FR-DU08: IP40 (except for the PU connector section)

400 V class

Model FR-A840-□ R2R		00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
		0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K
Applicable motor capacity (kW)*1	SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
	LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
	SND*2	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	55	90	90	132	160	185	220	250	280	315
	ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280
	HD	0.2*3	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250
Output — Rated capacity (kVA)*4	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
	LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
	SND*2	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	98	137	148	198	248	275	329	367	417	465
	ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367	417
	HD	0.6	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367
Output — Rated current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93	116	180	216	260	325	361	432	481	547	610	683
	LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325	361	432	481	547	610
	SND*2	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	129	180	194	260	325	361	432	481	547	610
	ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481	547
	HD	0.8	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481
Output — Overload current rating*5	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																							
	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	SND*2	150% 60 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
Output — Rated voltage*6		Three-phase 380 to 500 V																							
Output — Regenerative braking — Brake transistor		Built-in															FR-BU2 (option)								
Output — Regenerative braking — Maximum brake torque*8		100% torque/ 2%ED*7							20% torque/continuous								10% torque/ continuous								
Output — Regenerative braking — FR-ABR (when the option is used)		100% torque/10%ED							100% torque/6%ED				–*13				–	–	–	–	–	–	–	–	–
Power supply — Rated input AC voltage/frequency		Three-phase 380 to 500 V, 50 Hz/60 Hz*12																							
Power supply — Permissible AC voltage fluctuation		323 to 550 V, 50 Hz/60 Hz																							
Power supply — Permissible frequency fluctuation		±5%																							
Power supply — Rated input current (A)*9	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
	LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
	SND*2	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	154	180	194	260	325	361	432	481	547	610
	ND (initial setting)	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	134	144	180	216	260	325	361	432	481	547
	HD	1.4	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	110	144	180	216	260	325	361	432	481
Power supply — Power supply capacity (kVA)*10	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
	LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
	SND*2	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	117	137	148	198	248	275	329	367	417	465
	ND (initial setting)	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	102	110	137	165	198	248	275	329	367	417
	HD	1.1	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	84	110	137	165	198	248	275	329	367
Protective structure (IEC 60529)*11		Enclosed type (IP20)											Open type (IP00)												
Cooling system		Self-cooling			Forced air cooling																				
Approx. mass (kg)		2.8	2.8	2.8	3.3	3.3	6.7	6.7	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 For the SND rating, the carrier frequency is always 2 kHz.
*3 The 0.2 kW motor capacity is applicable under V/F control only.
*4 The rated output capacity indicated assumes that the output voltage is 440 V for 400 V class.
*5 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*6 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*7 Value for the built-in brake resistor
*8 Value for the ND rating
*9 The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*10 The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*11 FR-DU08: IP40 (except for the PU connector section)
*12 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.
*13 The braking capability of the inverter built-in brake can be improved with a commercial brake resistor. For the details, please contact your sales representative.

●Rating (Separated converter type)

400 V class

• Inverter

Model FR-A842-☐ R2R			07700	08660	09620	10940	12120
			315K	355K	400K	450K	500K
Applicable motor capacity (kW)*1		SLD	400	450	500	560	630
		LD	355	400	450	500	560
		SND*2	355	400	450	500	560
		ND (initial setting)	315	355	400	450	500
		HD	280	315	355	400	450
Output	Rated capacity (kVA)*3	SLD	587	660	733	834	924
		LD	521	587	660	733	834
		SND*2	521	587	660	733	834
		ND (initial setting)	465	521	587	660	733
		HD	417	465	521	587	660
	Rated current (A)	SLD	770	866	962	1094	1212
		LD	683	770	866	962	1094
		SND*2	683	770	866	962	1094
		ND (initial setting)	610	683	770	866	962
		HD	547	610	683	770	866
	Overload current rating*4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C				
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
		SND*2	150% 60 s (inverse-time characteristics) at surrounding air temperature of 50°C				
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	Rated voltage*5		Three-phase 380 to 500 V				
	Regenerative brakingtorque*6 (When the converter unit (FR-CC2) is used)	Maximum brake torque	10% torque/continuous				
Input Power	DC power supply voltage		430 to 780 VDC				
	Control power supply auxiliary input		Single phase 380 to 500 V, 50 Hz/60 Hz*8				
	Permissible control power supply auxiliary input fluctuation		Frequency ±5%, voltage ±10%				
Protective structure (IEC 60529)*7			Open type (IP00)				
Cooling system			Forced air cooling				
Approx. mass (kg)			163	163	243	243	243

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 For the SND rating, the carrier frequency is always 2 kHz.
*3 The rated output capacity indicated assumes that the output voltage is 440 V.
*4 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 ND rating reference value
*7 FR-DU08: IP40 (except for the PU connector section)
*8 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.

• Converter unit (FR-CC2)

Model FR-CC2-H☐		315K	355K	400K	450K	500K	560K	630K
Applicable motor capacity (kW)		315	355	400	450	500	560	630
Output	Overload current rating*1	200% 60 s, 250% 3 s				150% 60 s, 200% 3 s	120% 60 s, 150% 3 s	110% 60 s, 120% 3 s
	Rated voltage*2	430 to 780 VDC*4						
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 500 V, 50 Hz/60 Hz						
	Permissible AC voltage fluctuation	Three-phase 323 to 550 V, 50 Hz/60 Hz						
	Permissible frequency fluctuation	±5%						
	Rated input current (A)	610	683	770	866	962	1094	1212
	Power supply capacity (kVA)*3	465	521	587	660	733	833	924
Protective structure (IEC 60529)		Open type (IP00)						
Cooling system		Forced air cooling						
DC reactor		Built-in						
Approx. mass (kg)		210	213	282	285	288	293	294

*1 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the converter unit and the inverter to return to or below the temperatures under 100% load.
*2 The converter unit output voltage varies according to the input power supply voltage and the load. The maximum point of the voltage waveform at the converter unit output side is approximately the power supply voltage multiplied by $\sqrt{2}$.
*3 The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*4 The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines) / average voltage between three lines × 100)

●Common specifications

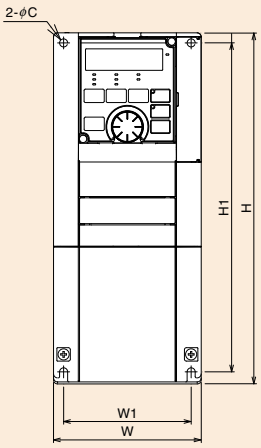
Control specifications	Control method		Soft-PWM control, high carrier frequency PWM control (selectable among V/F control, Advanced magnetic flux vector control, Real sensorless vector control), Optimum excitation control, and vector control[*1]
	Output frequency range		0.2 to 590 Hz (The upper-limit frequency is 400 Hz (200 Hz for the SND rating) under Advanced magnetic flux vector control, Real sensorless vector control, and vector control[*1].)
	Frequency setting resolution	Analog Input	0.015 Hz/60 Hz (0 to 10 V/12 bits for terminals 2 and 4) 0.03 Hz/60 Hz (0 to 5 V/11 bits or 0 to 20 mA/approx. 11 bits for terminals 2 and 4, 0 to ±10 V/12 bits for terminal 1) 0.06 Hz/60 Hz (0 to ±5 V/11 bits for terminal 1)
		Digital input	0.01 Hz
	Frequency accuracy	Analog Input	Within ±0.2% of the max. output frequency (25°C ± 10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 590 Hz. Constant-torque/variable-torque pattern or adjustable 5 points V/F can be selected.
	Starting torque		SLD Rating:120% 0.3 Hz, LD Rating:150% 0.3 Hz, SND Rating:150% 0.3 Hz, ND Rating:200% 0.3 Hz[*2], HD Rating:250% 0.3 Hz[*2] (Real sensorless vector control, vector control[*1])
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0 to 3600 s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash countermeasures acceleration/deceleration can be selected.
	DC injection brake (induction motor)		Operation frequency (0 to 120 Hz), operation time (0 to 10 s), operation voltage (0 to 30%) variable
	Stall prevention operation level		Activation range of stall prevention operation (SLD rating: 0 to 120%, LD rating: 0 to 150%, SND rating: 0 to 220%, ND rating: 0 to 220%, HD rating: 0 to 280%). Whether to use the stall prevention or not can be selected. (V/F control, Advanced magnetic flux vector control)
	Torque limit level		Torque limit value can be set (0 to 400% variable). (Real sensorless vector control, vector control[*1])
Operation specifications	Frequency setting signal	Analog Input	Terminals 2 and 4: 0 to 10 V, 0 to 5 V, 4 to 20 mA (0 to 20 mA) are available. Terminal 1: -10 to +10 V, -5 to +5 V are available.
		Digital input	Input using the setting dial of the operation panel or parameter unit Four-digit BCD or 16-bit binary (when used with option FR-A8AX)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signals (twelve terminals)		Low-speed operation command, Middle-speed operation command, High-speed operation command, Second function selection, Terminal 4 input selection, Jog operation selection, Selection of automatic restart after instantaneous power failure, Flying start, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command, Inverter reset The input signal can be changed using **Pr.178 to Pr.189 (input terminal function selection)**.
	Pulse train input		100 kpps
	Operational functions		Dancer feedback speed control, tension sensor feedback speed control, tension sensorless torque control, tension sensor feedback torque control, winding diameter calculation, initial winding diameter calculation, actual line speed detection, reduction ratio setting, maximum/minimum winding diameter setting, winding diameter / winding length storage, line speed acceleration/deceleration function, dancer roll break detection, tension PI gain tuning, speed control proportional gain compensation, reel change function, taper function, inertia compensation function, mechanical loss compensation function, maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, DC feeding[*4], frequency jump, rotation display, automatic restart after instantaneous power failure, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, droop control, speed smoothing control, auto tuning, applied motor selection, gain tuning, RS-485 communication, dancer control, cooling fan operation selection, stop selection (deceleration stop/coasting), power-failure deceleration stop function, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, speed control, torque control, pre-excitation, torque limit, test run, 24 V power supply input for control circuit, safety stop function
	Output signal	Open collector output (five terminals) Relay output (two terminals)	Inverter running, Up to frequency, Instantaneous power failure/undervoltage[*4], Overload warning, Output frequency detection, Fault The output signal can be changed using **Pr.190 to Pr.196 (output terminal function selection)**. Fault codes of the inverter can be output (4 bits) from the open collector.
		Pulse train output (FM type)	50 kpps
Indication	For meter	Pulse train output (FM type)	Max. 2.4 kHz: one terminal (output frequency) The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.
		Current output (CA type)	Max. 20 mADC: one terminal (output current) The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.
		Voltage output	Max. 10 VDC: one terminal (output voltage) The monitored item can be changed using **Pr.158 AM terminal function selection**.
	Operation panel (FR-DU08)	Operating status	Output frequency, Output current, Output voltage, Frequency setting value The monitored item can be changed using **Pr.52 Operation panel main monitor selection**.
		Fault record	A fault record is displayed when a fault occurs. Past 8 fault records and the conditions immediately before the fault (output voltage/ current/frequency/cumulative energization time/year/month/date/time) are saved.
Protective/warning function		Protective function	Overcurrent trip during acceleration, Overcurrent trip during constant speed, Overcurrent trip during deceleration or stop, Regenerative overvoltage trip during acceleration, Regenerative overvoltage trip during constant speed, Regenerative overvoltage trip during deceleration or stop, Inverter overload trip (electronic thermal relay function), Motor overload trip (electronic thermal relay function), Heatsink overheat, Instantaneous power failure[*4], Undervoltage[*4], Input phase loss[*3*4], Stall prevention stop, Brake transistor alarm detection[*4], Output side earth (ground) fault overcurrent, Output short circuit, Output phase loss, External thermal relay operation[*3], PTC thermistor operation[*3], Option fault, Communication option fault, Parameter storage device fault, PU disconnection, Retry count excess[*3], Parameter storage device fault, CPU fault, Operation panel power supply short circuit/ RS-485 terminals power supply short circuit, 24 VDC power fault, Abnormal output current detection[*3], Inrush current limit circuit fault[*4], Communication fault (inverter), Analog input fault, USB communication fault, Safety circuit fault, Overspeed occurrence[*3], Speed deviation excess detection[*3], Signal loss detection[*3], Encoder phase fault[*3], 4 mA input fault[*3], PID signal fault[*3], Option fault, Opposite rotation deceleration fault[*3], Internal circuit fault, Encoder pulse number setting error, Overload trip
		Warning function	Fan alarm, Stall prevention (overcurrent), Stall prevention (overvoltage), Regenerative brake pre-alarm[*3*4], Electronic thermal relay function pre-alarm, PU stop, Speed limit indication[*3], Parameter copy, Safety stop, Maintenance signal output[*3], USB host error, Operation panel lock[*3], Password locked[*3], Parameter write error, Copy operation error, 24 V external power supply operation
Environment	Surrounding air temperature		–10°C to +50°C (non-freezing) (LD, SND, ND, HD ratings) –10°C to +40°C (non-freezing) (SLD rating)
	Surrounding air humidity		95% RH or less (non-condensing) (With circuit board coating (conforming to IEC60721-3-3 3C2/3S2) 90% RH or less (non-condensing) (Without circuit board coating)
	Storage temperature[*5]		–20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration		Maximum 1000 m above sea level [*6], 5.9 m/s² [*7] or less at 10 to 55 Hz (directions of X, Y, Z axes)

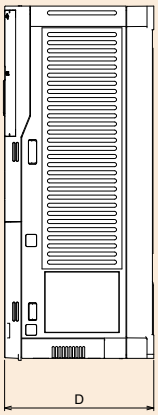
*1 Available only when a vector control compatible option is installed.
*2 In the initial setting of the FR-A820-00340(5.5K) or higher and the FR-A840-00170(5.5K) or higher, it is limited to 150% by the torque limit level.
*3 This protective function is not available in the initial status.
*4 Enabled only for standard models.
*5 Temperature applicable for a short time, e.g. in transit.
*6 For the installation at an altitude above 1,000 m up to 2,500 m, derate the rated current 3% per 500 m.
*7 2.9m/s² or less for the FR-A840-04320(160K) or higher.

■Standard Model

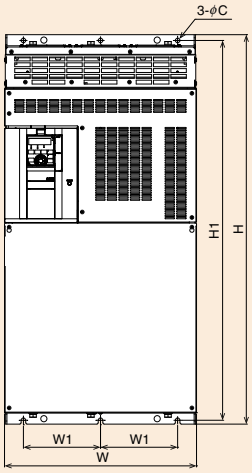
Outline Dimension Drawings

●FR-A820-00046(0.4K) to 04750(90K)-R2R
●FR-A840-00023(0.4K) to 03610(132K)-R2R





●FR-A840-04320(160K) to 06830(280K)-R2R



(Unit: mm)

200 V class

Inverter model	W	W1	H	H1	D	C
FR-A820-00046(0.4K)-R2R	110	95	260	245	110	6
FR-A820-00077(0.75K)-R2R					125	
FR-A820-00105(1.5K)-R2R	150	125			140	
FR-A820-00167(2.2K)-R2R						
FR-A820-00250(3.7K)-R2R						
FR-A820-00340(5.5K)-R2R	220	195			170	
FR-A820-00490(7.5K)-R2R						
FR-A820-00630(11K)-R2R			300	285	190	
FR-A820-00770(15K)-R2R	250	230	400	380		10
FR-A820-00930(18.5K)-R2R						
FR-A820-01250(22K)-R2R						
FR-A820-01540(30K)-R2R	325	270	550	530	195	12
FR-A820-01870(37K)-R2R	435	380		525	250	
FR-A820-02330(45K)-R2R						
FR-A820-03160(55K)-R2R	465	410	700	675		
FR-A820-03800(75K)-R2R		400	740	715	360	
FR-A820-04750(90K)-R2R						

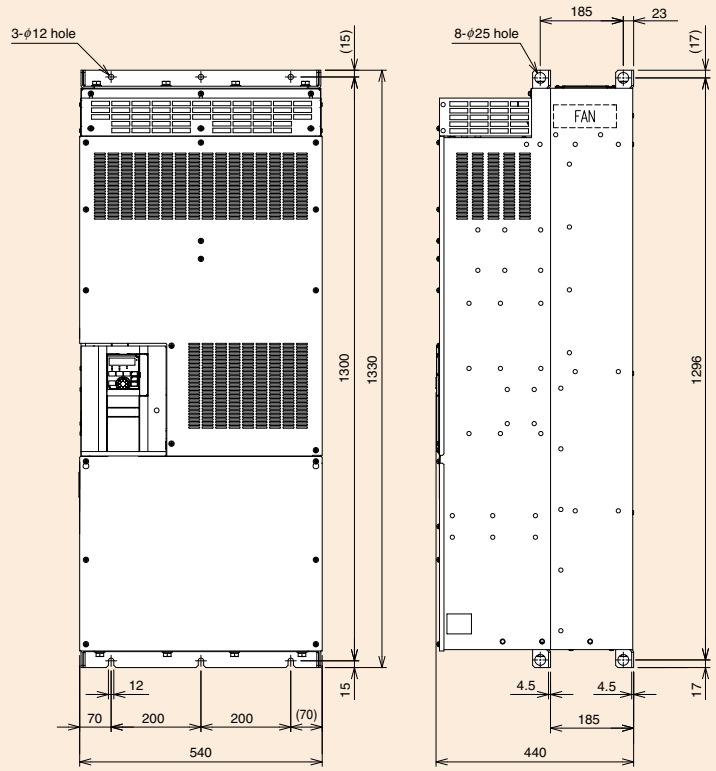
400 V class

Inverter model	W	W1	H	H1	D	C
FR-A840-00023(0.4K)-R2R	150	125	260	245	140	6
FR-A840-00038(0.75K)-R2R						
FR-A840-00052(1.5K)-R2R						
FR-A840-00083(2.2K)-R2R						
FR-A840-00126(3.7K)-R2R						
FR-A840-00170(5.5K)-R2R	220	195			170	
FR-A840-00250(7.5K)-R2R						
FR-A840-00310(11K)-R2R			300	285	190	
FR-A840-00380(15K)-R2R						
FR-A840-00470(18.5K)-R2R	250	230	400	380		10
FR-A840-00620(22K)-R2R						
FR-A840-00770(30K)-R2R	325	270	550	530	195	12
FR-A840-00930(37K)-R2R	435	380		525	250	
FR-A840-01160(45K)-R2R						
FR-A840-01800(55K)-R2R						
FR-A840-02160(75K)-R2R	465	400	620	595	300	
FR-A840-02600(90K)-R2R						
FR-A840-03250(110K)-R2R			740	715	360	
FR-A840-03610(132K)-R2R						
FR-A840-04320(160K)-R2R	498	200	1010	985	380	
FR-A840-04810(185K)-R2R						
FR-A840-05470(220K)-R2R	680	300		984		
FR-A840-06100(250K)-R2R						
FR-A840-06830(280K)-R2R						

■Separated converter type

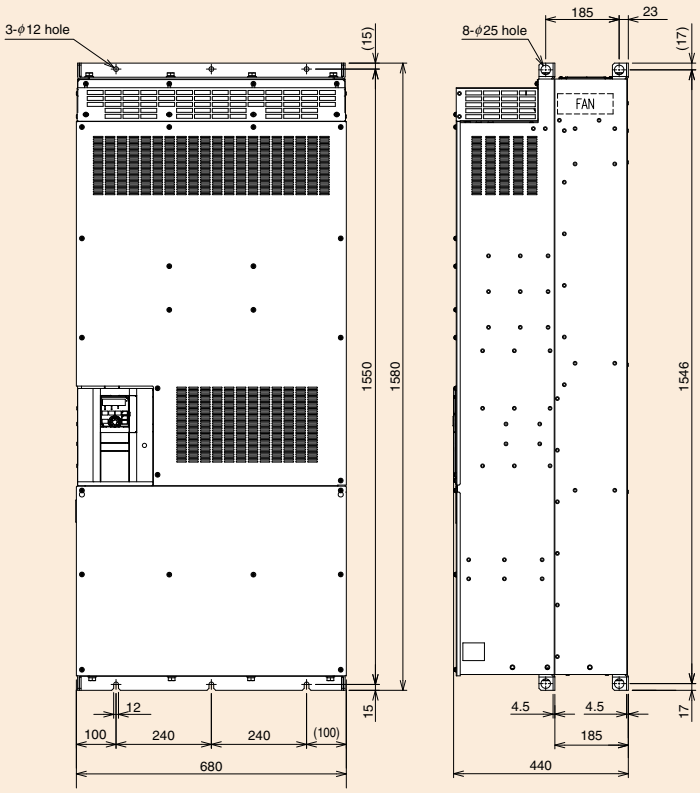
Outline Dimension Drawings

●FR-A842-07700(315K), 08660(355K)-R2R



(Unit: mm)

●FR-A842-09620(400K), 10940(450K), 12120(500K)-R2R



(Unit: mm)

MEMO

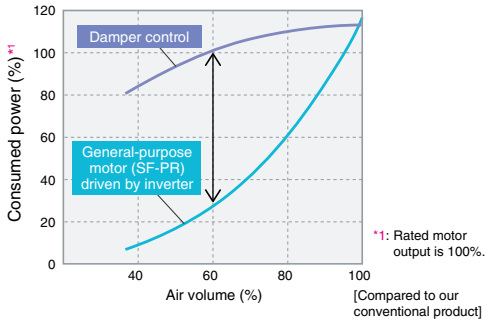
Inverter FREQROL-F800 Series

Energy Saving

Energy Saving with Inverters

The consumed power of a variable-torque load, such as fans, pumps, and blowers, is proportional to the cube of its rotation speed.
Adjusting the air volume by the inverter rotation speed control can lead to energy savings.

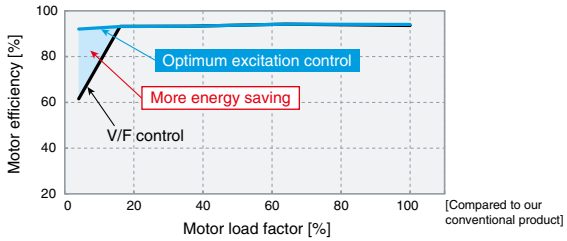
[Example of blower operation characteristic]



Utilizing the motor capability to the full

Optimum excitation control

- Optimum excitation control continuously adjusts the excitation current to an optimum level to provide the highest motor efficiency. With a small load torque, a substantial energy saving can be achieved.
  For example, at 4% motor load torque for a general-purpose motor, the motor efficiency under Optimum excitation control is about 30% higher than the motor efficiency under V/F control.



(When the inverter running frequency is 60 Hz and the SF-PR 4P motor (15 kW) is used)

Improving starting torque and saving energy at the same time NEW

Advanced optimum excitation control

Advanced optimum excitation control, which has been newly developed, provides a large starting torque while maintaining the motor efficiency under the conventional Optimum excitation control.
Without the need of troublesome adjustment of parameters (acceleration/ deceleration time, torque boost, etc.), acceleration is done in a short time.
Also, energy saving operation with the utmost improved motor efficiency is performed during constant-speed operation.

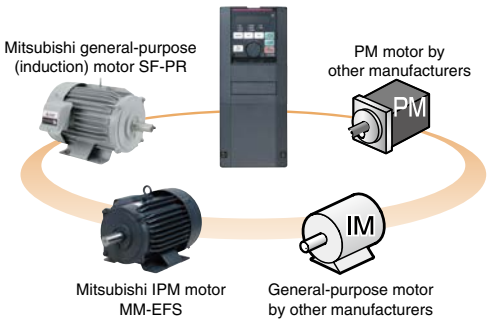


Supporting operations of various motors NEW

Offline auto tuning

The offline auto tuning function to measure circuit constants of the motor enables optimal operation of motors even when motor constants vary, when a motor of other manufacturers is used, or when the wiring distance is long.
As well as Mitsubishi general-purpose motors, Mitsubishi PM motors (MM-EFS, MM-THE4), sensorless operation can be performed for other manufacturers' general-purpose motors*2 and other manufacturers' permanent magnet (PM) motors*2.
The tuning function enables the Advanced optimum excitation control of other manufacturers' general-purpose motors*2, which increases the use in the energy saving applications.

*2: Depending on the motor characteristics, tuning may not be available.



Energy Saving with High-Efficiency Motor

In the international context of global warming prevention, many countries in the world have started to introduce laws and regulations to mandate manufacturing and sales of high-efficiency motors. With the use of high-efficiency motors, further energy saving is achieved.

[IE code]
As an international standard of the efficiency, IEC60034-30 (energy-efficiency classes for single-speed, three-phase, cage-induction motors) was formulated in October 2008. The efficiency is classified into four classes from IE1 to IE4. The larger number means the higher efficiency.

Efficiency class IEC 60034-30	Mitsubishi motor efficiency	
	General-purpose motor	IPM motor
IE4 (super premium efficiency)*3	—	Premium high-efficiency IPM (MM-EFS/MM-THE4)
IE3 (premium efficiency)	Superline premium series (SF-PR)	—
IE2 (high efficiency)	Superline eco series (SF-HR)	—
IE1 (standard efficiency)	Superline series (SF-JR)	—
Below the class		—

Efficiency: High / Low

*3: The details of IE4 are specified in IEC 60034-31.

Further energy saving with the premium high-efficiency IPM motor

MM-EFS / MM-THE4

- The IPM motor, with permanent magnets embedded in the rotor, achieves even higher efficiency as compared to the general-purpose motor (SF-PR/SF-THE3).
- The IM driving setting can be switched to IPM driving setting by only one setting. ("12" (MM-EFS/MM-THE4) in the parameter [IPM].)

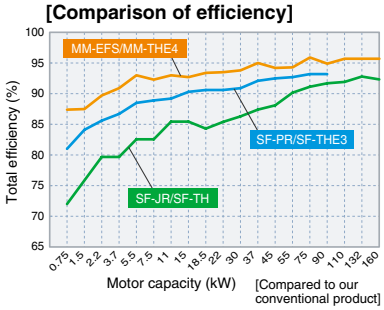
Do not drive an IPM motor in the induction motor control settings.

Why is an IPM motor more efficient?

- No current flows to the rotor (secondary side), and no secondary copper loss is generated.
- Magnetic flux is generated with permanent magnets, and less motor current is required.
- Embedded magnets provide reluctance torque*4, and the reluctance torque can be applied.

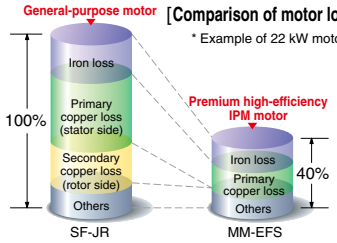
*4: Reluctance torque occurs due to magnetic imbalance on the rotor.

[Comparison of efficiency]



[Comparison of motor losses]

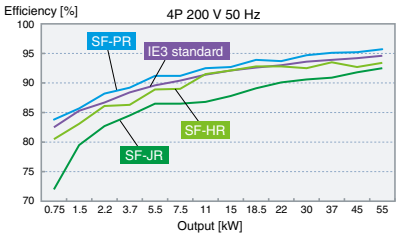
* Example of 22 kW motors



Excellent compatibility with the high-performance energy-saving motor

SF-PR

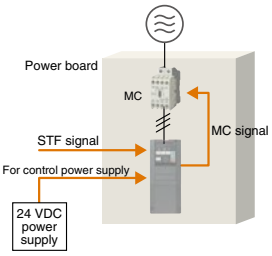
Motor constants are stored in the inverter. Energy-saving operation can be started just by setting parameters. The SF-PR motor conforms to the Japanese domestic Top Runner Standard (IE3 equivalent). Its energy-saving operation contributes reduction in the electricity charges, which in turn lowers the running cost.



Energy-Saving Functions Suitable for Various Systems

Standby power reduction NEW

- With the 24 VDC external power supply, the input MC signal can be turned OFF after the motor is stopped, and turned ON before activating the motor. The inverter enables self power management to reduce standby power.
- The inverter cooling fan can be controlled depending on the temperature of the inverter heatsink. Also, signals can be output in accordance with the inverter cooling fan operation. When the fan is installed on the enclosure, the enclosure fan can be synchronized with the inverter cooling fan. Extra power consumption when the motor is stopped can be reduced.



Energy saving at a glance

Energy saving monitor / Pulse train output of output power

- Energy saving monitor is available. The energy saving effect can be checked using an operation panel, output terminal, or network.
- The output power amount measured by the inverter can be output in pulses. The cumulative power amount can be easily checked.

(This function cannot be used as a meter to certify electricity billings.)



Furthermore With the Mitsubishi energy measuring module, the energy saving effect can be displayed, measured, and collected.

Effective use of the regenerative energy Option

FR-CV / FR-HC2

Multiple inverters can be connected to the power regeneration common converter (FR-CV) or the high power factor converter (FR-HC2) through a common PN bus. The regenerated energy is used by another inverter, and if there is still an excess, it is returned to the power supply, saving on the energy consumption. The 355K or higher models are inverter-converter separated types, which are suitable for power regeneration.



Functions Ideal for Fans and Pumps

Optimum Inverter Capacity Selection

Multiple rating NEW

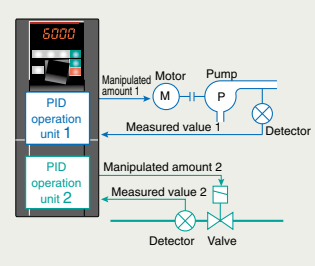
The rating can be selected between the two types (LD (light duty) or SLD (superlight duty)) depending on the load of the fan/pump to be used. The optimum inverter capacity can be selected suitable for the motor to be used.
For the 200 V class 90K or higher and the 400 V class 75K or higher, a motor with one-rank higher capacity can be combined.

Load	Rating	Overload current rating
Superlight duty	SLD rating	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40˚C
Light duty	LD rating	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50˚C

Further Enhanced PID Control

System cost reduction [PID multiple loops (two loops)] NEW

Two PID operation units are available in the inverter.
The inverter can perform PID control of the motor operation and control the external equipment at the same time.
The system cost can be reduced because no external PID controller is required for controlling the external equipment.



Direct setting of the PID set point

The PID set point can be set directly from the operation panel.
The setting can be easily changed at hand.

Visibility improvement Option NEW

With the optional LCD operation panel (FR-LU08), the unit can be changed from "%" to other easy-to-see units.
Maintenance and adjustment is facilitated by using a familiar unit of air volume, temperature, etc. for indication.

LCD operation panel (FR-LU08) (Option)

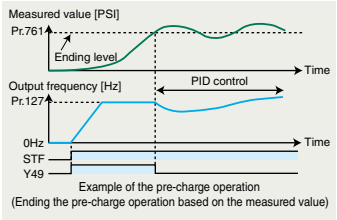


Unit conversion

Avoidance of rapid acceleration/deceleration using PID action NEW

PID pre-charge function

Before PID action, the water flow to the pipe is controlled by operating the motor at a constant speed until the measured value (pressure, etc.) reaches the set level. This function is used to avoid rapid acceleration/deceleration caused by starting the PID action while the pipe is empty, and prevent a water hammer action, etc.

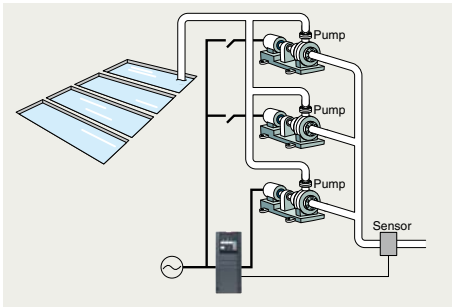


Example of the pre-charge operation
(Ending the pre-charge operation based on the measured value)

Water volume control with multiple pumps NEW

Multi-pump function

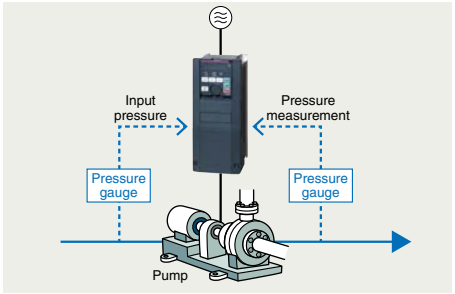
By controlling the pumps connected in parallel (up to four pumps) by the PID control by one inverter, water volume, etc. can be adjusted.
One of the connected pumps is driven by the inverter. Other pumps are driven by commercial power supply. The number of pumps to be driven by commercial power supply is automatically adjusted according to the water volume.



Pump water volume control NEW

PID input pressure control

In order to prevent air intake and cavitation inside the pump, the pump inlet pressure can be controlled so that there is no water shortage.

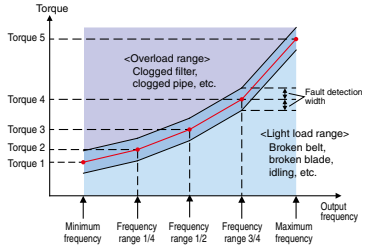


Operating Status Monitoring

Detection of mechanical faults NEW

Load characteristics measurement function

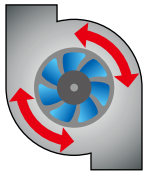
The speed/torque relationship is stored while no fault occurs. By comparing the present load status with the stored load characteristics, out-of-range warnings can be output if applicable. Mechanical faults such as clogging of the filter or breakage of the belt can be easily detected, and maintenance is facilitated.



Cleaning of fans and pumps NEW

Cleaning function

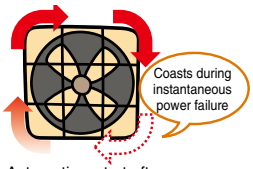
Foreign matter on the impellers or fans of pumps can be removed by repeating forward/reverse rotation and stopping of the motor. (Use this function when a back flush does not pose a problem.)
This function can be also automatically started when the result of load characteristics measurement is out of range (overload).



Smooth Restart

Automatic restart after instantaneous power failure / flying start function

After an instantaneous power failure, the operation is restartable from the coasting motor speed.
With the advanced flying start function, the operation can be smoothly started from low speed.



Automatic restart after instantaneous power failure function

Keep Running during Flying Start Operation

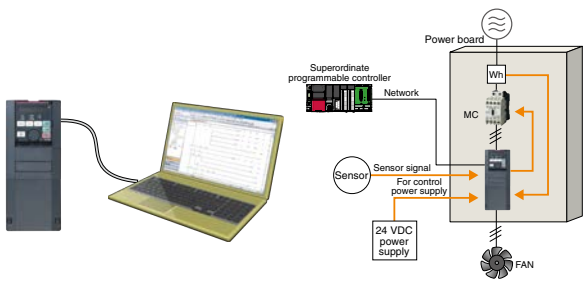
Regeneration avoidance function

The operation frequency is automatically increased to prevent the regenerative overvoltage fault from occurring. This function is useful when a load is forcibly rotated by another fan in the duct.

PLC Control with an Inverter

PLC function in the inverter NEW

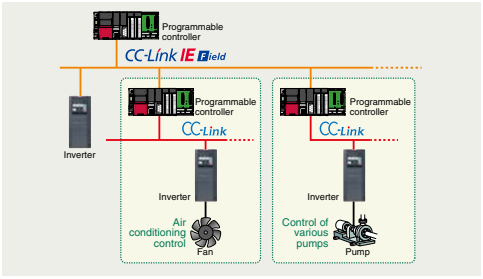
- Parameters and setting frequency can be changed at the program. Control programs can be created in sequence ladders using the inverter setup software (FR Configurator2).
- Inverter control such as inverter operations triggered by input signals, signal output based on inverter operation status, and monitor output can be freely customized based on the machine specifications.
- All machines can be controlled by the inverter alone, and control can also be dispersed.
- Time-based operation is possible by using in combination with the real-time clock function (when using an optional LCD operation panel (FR-LU08)).



Compatibility with Various Systems

Compatibility with various networks

It supports BACnet® MS/TP as standard, as well as Mitsubishi inverter protocol and MODBUS®RTU (binary) protocol. Communication options are also available for the major network protocols such as CC-Link, CC-Link IE Field, LONWORKS® (to be supported soon), FL-net remote I/O (to be supported soon), PROFIBUS-DPV0, and DeviceNet™.



Simplified external equipment

The CA-type inverters are available. For the CA type, the monitor output terminal FM/CA operates as terminal CA (analog current output 0 to 20 mA), not as terminal FM (pulse train output). An external converter is not required.
(The factory setting is different for the CA type and the FM type.)

Mechanical Resonance Suppression

Speed smoothing control

Vibration caused by mechanical resonance can be reduced. (Available with general-purpose motors)

Extended Functions

Support for up to three types of options NEW

Three types of plug-in options can be attached.
The functions of the inverter can be extended through network.
For example, additional I/O terminals can be used.

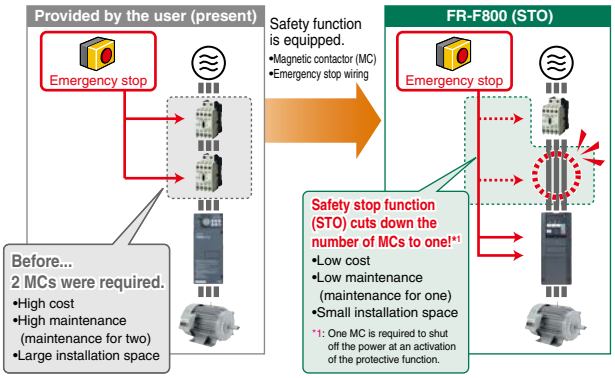
Security & Safety

Improved System Safety

Safety standards compliance NEW

Controls with safety functions can be easily performed.
PLd and SIL2 are supported as standard. (STO)

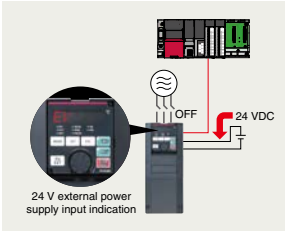
- EN ISO 13849-1 PLd / Cat.3
- EN 61508, EN61800-5-2 SIL2



Reliable and Secure Maintenance

Standard 24 VDC power supply for the control circuit NEW

In addition to the existing power supply input terminals (R1 and S1) of the control circuit, 24 VDC input is equipped as standard.
The 24 VDC power supplied from outside can be fed to the control circuit locally.
The parameter setting and communication operation can be done without turning ON the main power.



Prevention of trouble with temperature monitoring NEW

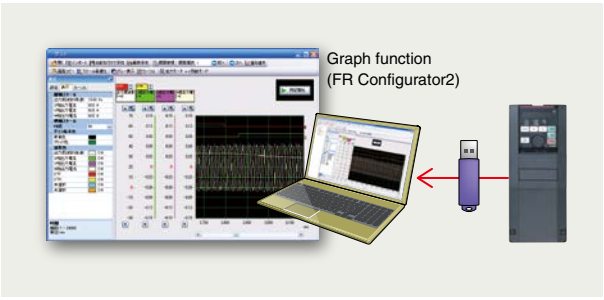
The inverter is equipped with an internal temperature sensor, which outputs a signal when the internal temperature is high. This facilitates the detection of rises in temperature inside the inverter following cooling fan malfunction, or rises in the surrounding air temperature due to inverter operating conditions.

Quick Reaction to Troubles

Easy fault diagnosis NEW

- The operating status (output frequency, etc.) immediately before the protection function activates can be stored in the inverter built-in RAM with the trace function. Stored data (trace data) can be copied to a USB memory device, facilitating easy trouble analysis at a separate location by reading into FR Configurator2.

Trace data stored in the built-in RAM is deleted when the power is turned OFF or the inverter is reset.



- Clock setting is now available in addition to the already-available cumulative energization time. The time and date at a protective function activation are easily identified.
(The clock is reset at power-OFF.) The date and time are also saved with the trace data, making the fault analysis easier.
By using the real-time clock function with the optional LCD operation panel (FR-LU08) (when using battery), the time is not reset even when the power supply is turned OFF.

FR-LU08 (LCD type)
(Option)



Protection of Critical Parameter Settings

Misoperation prevention by setting a password

- Setting a 4-digit password can restrict parameter reading/writing.



Long Life Components and Life Check Function

Long life components

- The service life of the cooling fans is now 10 years*1. The service life can be further extended by ON/OFF control of the cooling fan.
- Capacitors with a design life of 10 years*1*2 are adapted.
- Life indication of life components

Components	Estimated lifespan of the FR-F800 *1	Guideline of JEMA *3
Cooling fan	10 years	2 to 3 years
Main circuit smoothing capacitor	10 years*2	5 years
Printed board smoothing capacitor	10 years*2	5 years

*1: Surrounding air temperature: Annual average of 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt).
The design life is a calculated value from the LD rating and is not a guaranteed product life.
*2: Output current: 80% of the inverter rating
*3: Excerpts from "Periodic check of the transistorized inverter" of JEMA (Japan Electrical Manufacturer's Association).

Enhanced life check function NEW

- An internal thermal sensor is equipped to all inverters as standard, which enables monitoring of the installation environment. Use this function as a guide for the life diagnosis.
- Maintenance timers are available for up to three peripheral devices, such as a motor and bearings.



"Maintenance 1 output" warning

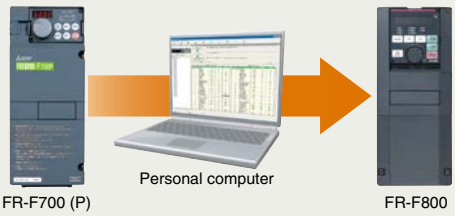
Renewal Assurance

Compatibility with existing models

- The inverter installation method is the same as that for the FR-F700(P) series, eliminating any concerns over replacement (except for some capacity models). Furthermore, the FR-F700(P) series control circuit terminal blocks can be installed with the use of an option (FR-A8TAT).

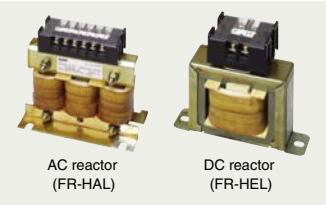


- The terminal response adjustment function allows a user to adjust the response speed in accordance with the existing facility. (The response time is shorter for the FR-F800 series.)
- In addition to the FR-F700(P) series' parameter settings, the FR-F500 series parameter settings (to be supported soon) can be easily copied to the FR-F800 series by using the conversion function of FR Configurator2. NEW



Compatibility with the Environment

Suppression of Outgoing Harmonic Current and EMI



AC reactor (FR-HAL) DC reactor (FR-HEL)

- Harmonic current may adversely affect the power supply. To suppress such harmonic current, the power-factor-improving compact AC reactor (FR-HAL) and the DC reactor (FR-HEL) are available. (For the 75K or higher inverter, always connect a DC reactor. Select a DC reactor according to the applied motor capacity.)
- By attaching the EMC filter connector to the ON or OFF position, the built-in EMC filter can be set enabled/disabled*1*2. When it is enabled, the inverter conforms to the EMC Directive (EN61800-3/2nd Environment Category C3*3) by itself.

*1: Enabling the EMC filter increases leakage current.
*2: The input side common mode choke, which is built in the 55K or lower inverter, is always enabled regardless of the EMC filter ON/OFF connector setting.
*3: Refer to the EMC Installation Guidelines for the required specifications.

	Capacitive filter	Common mode choke	DC reactor
55K or lower	Standard (built-in)	Standard (built-in)	Option (sold separately)
75K or higher	Standard (built-in)	Option (sold separately)	Option (sold separately)

- The F800 series inverters are equipped with built-in capacitive filters (capacitors) and common mode chokes (55K or lower). By installing a DC reactor (FR-HEL), which is available as an option, they can confirm to the Architectural Standard Specifications (Electric Installation) and the Architectural Standard Specifications (Machinery Installation) (2013 revision) supervised by the Ministry of Land, Infrastructure, Transport and Tourism of Japan.
- With a high power factor converter (FR-HC2), the inverter is equivalent to a self-excitation three-phase bridge circuit in the "Harmonic Suppression Guidelines for Specific Consumers" in Japan, and realizes the equivalent capacity conversion coefficient K5=0. For the 355K or higher, the converter is separated. Therefore, installation space can be saved when connecting the FR-HC2.



Protected in Hazardous Environments

Inverters with circuit board coating (IEC60721-3-3 3C2/3S2) and plated conductors are available for improved environmental resistance. ("-60" or "-06" is affixed to the end of the inverter model name.)

Global Compatibility

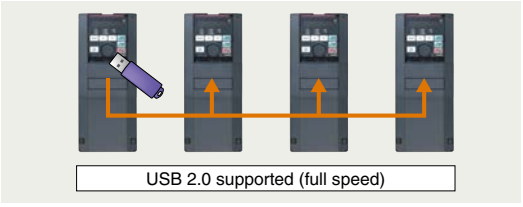
- Complies with UL, cUL, and EC Directives (CE marking), and the Radio Waves Act (South Korea) (KC marking).
- Being RoHS compliant, the FR-F800 inverters are friendly to people and the environment.

Easy Setup & Operation

Streamlining the Startup Process

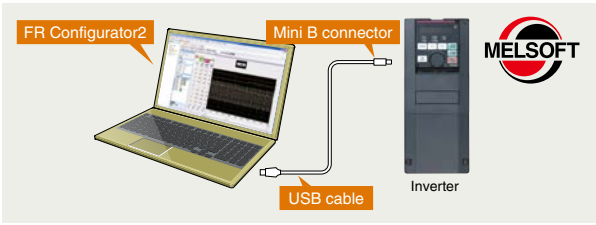
Parameter copy with a USB memory device NEW

A USB host connecter (A type), which allows external device connections, has been added.
Parameters can be copied to commercial USB memory devices.



Easy setup with FR Configurator2 NEW

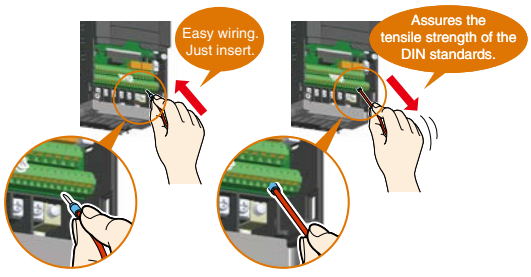
- With the sense of unity with other Mitsubishi FA products with common MELSOFT design and operability, the software is easy to use.
- Easy plug-and-play connection is available to the USB terminal equipped as standard.



- A free trial version, which contains start-up functions, is available. It can be downloaded at Mitsubishi Electric FA Global Website.

Easy wiring to the control circuit NEW

Spring clamp terminals have been adopted for control circuit terminals.
Wires can be protected against loosening under vibrations during transportation of the inverter. Ten additional terminals are used as compared to the FR-F700(P) series.
Round crimping terminals can also be used by employing a control terminal option (FR-A8TR).



Easy-to-follow Display Improves the Operability

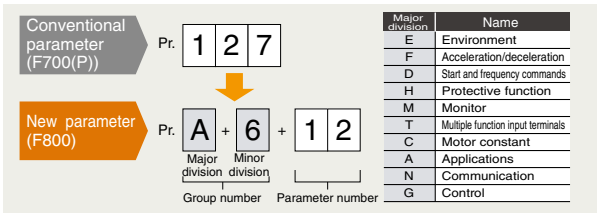
Easy operation with GOT NEW



- Automatic communication is possible without specifying any parameter settings simply by connecting to the GOT2000 series.
- The PLC function device monitor can be displayed at the GOT2000 series.
  Batch control of multiple inverter device monitors is possible with a single GOT unit.
- The sample screen data for the FR-F800 can be found in the screen design software of the GOT2000 series. For the latest version of the screen design software, please contact your local sales office.

Easy-to-follow parameter configuration NEW

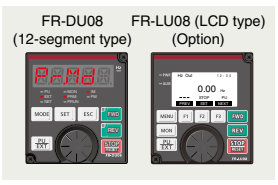
With the parameter setting mode selection of the operation panel, the group parameter mode can be selected to provide intuitive and simple parameter settings. (The conventional parameter setting mode is selected by default.)



Major division	Name
E	Environment
F	Acceleration/deceleration
D	Start and frequency commands
H	Protective function
M	Monitor
T	Multiple function input terminals
C	Motor constant
A	Applications
N	Communication
G	Control

Easy-to-read operation panel NEW

A5-digit, 12-segment display has been adopted for the operation panel (FR-DU08) for a more natural character display. Furthermore, an optional operation panel (FR-LU08) adopting an LCD panel capable of displaying text and menus is also available.



To Aid with Maintenance

Reduced wiring check time

Split-type covers are adapted for all capacity models. Maintenance is now easy because all an operator has to do is to remove the cover for the target wiring area.



Maintenance and control of multiple inverters Option NEW

Serial number reading is possible using the optional LCD operation panel (FR-LU08) or the inverter setup software (FR Configurator2). Administration of different inverters has become much more simple.

Wide range of lineup

•Standard model

F R - F 8 2 0 - 0.75K - 1 - ☐

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure, functionality
0	Standard model

Symbol*1	Description
0.75K to 315K	LD rated inverter capacity (kW)

Symbol	Type
1	FM
2	CA*2

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06*3	With	With

Three-phase 200 V class FR-F820-☐*4	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K
	00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Three-phase 400 V class FR-F840-☐*4	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K
	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	132K	160K	185K	220K	250K	280K	315K										
	03250	03610	04320	04810	05470	06100	06830										
	●	●	●	●	●	●	●										

•Separated converter type

F R - F 8 4 2 - 355K - 1 - ☐

Symbol	Voltage class
4	400 V class

Symbol	Structure, functionality
2	Separated converter type

Symbol*1	Description
355K to 560K	LD rated inverter capacity (kW)

Symbol	Type
1	FM
2	CA*2

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06	With	With

Three-phase 400 V class FR-F842-☐*5	355K	400K	450K	500K	560K
	07700	08660	09620	10940	12120
	●	●	●	●	●

*1: Models can be alternatively indicated with the inverter rated current (SLD rating).
*2: Specification differs by the type as follows.

Type	Motor output	Initial setting				
		Built-in EMC filter	Control logic	Rated frequency	Pr.19 Base frequency voltage	Pr.570 Multiple rating setting
FM (terminal FM equipped model)	Terminal FM (pulse train output) Terminal AM (analog voltage output (0 to ±10 VDC))	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)	1 (LD rating)
CA (terminal CA equipped model)	Terminal CA (analog current output (0 to 20 mADC)) Terminal AM (analog voltage output (0 to ±10 VDC))	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)	0 (SLD rating)

*3: Available for the 7.5K or higher.
*4: For the 75K or higher inverter, always connect a DC reactor (FR-HEL), which is available as an option.
Select a DC reactor according to the applied motor capacity.
*5: Always install the converter unit (FR-CC2). (Not required when a high power factor converter (FR-HC2) is used)

Converter unit

F R - C C 2 - H 355K - 60

Symbol	Voltage class
H	400 V class

Symbol	Description
355K to 630K	Applicable motor capacity (kW)

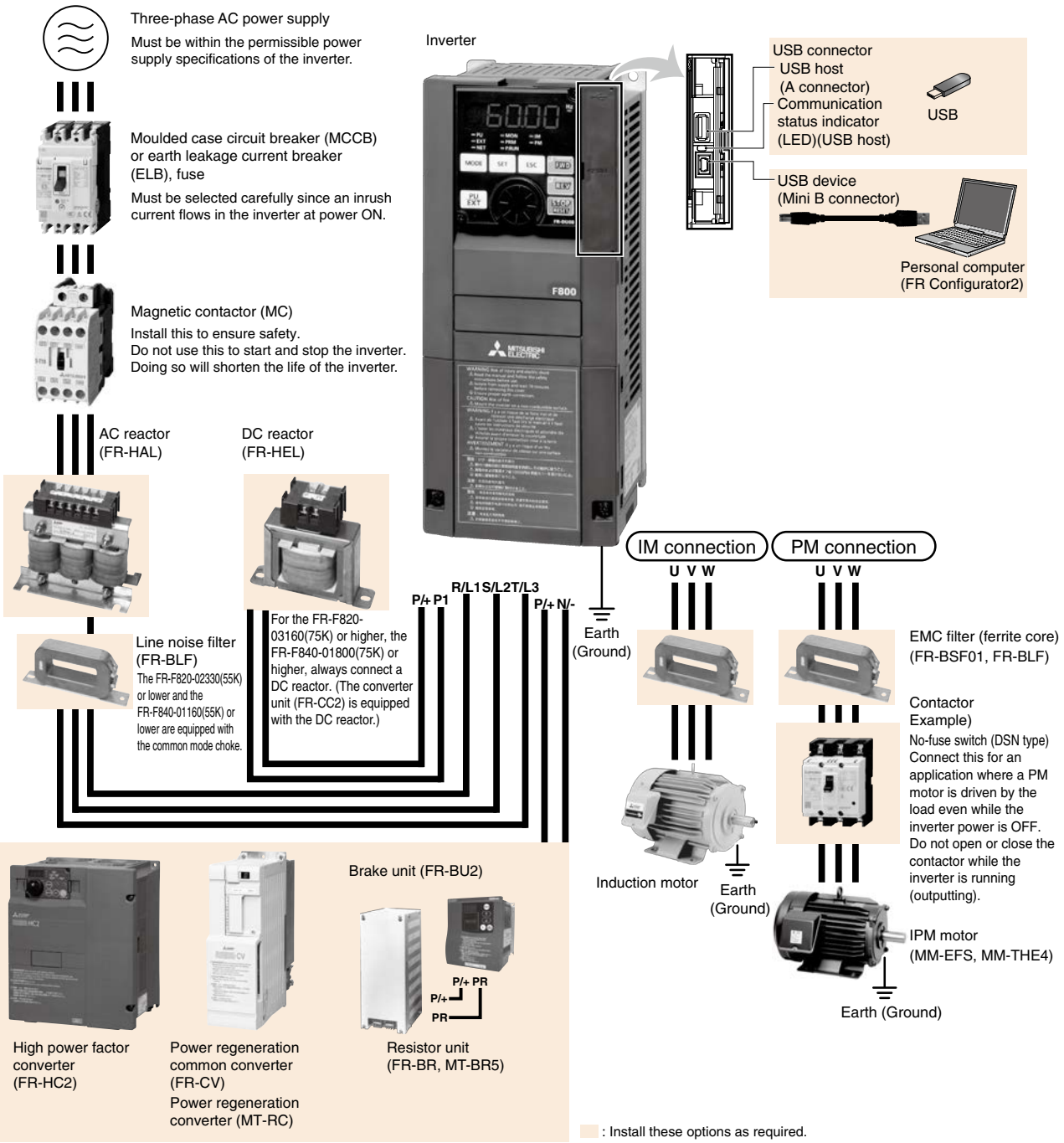
Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06	With	With

Three-phase 400 V class FR-CC2-H☐ (with the built-in DC reactor)	355K	400K	450K	500K	560K	630K
	●	●	●	●	●	●

●: Released model

Connection Example

• Connection example for standard models



■Standard Specifications

●Rating (Standard model)

200 V class

Model FR-F820-□			0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K
			00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
Applicable motor capacity (kW)*1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
Output	Rated capacity (kVA)*2	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
	Rated current (A)	SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
		LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
	Overload current rating*3	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
	Rated voltage*4		Three-phase 200 to 240 V																
Power supply	Rated input AC voltage/ frequency		Three-phase 200 to 240 V 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current (A)*5	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
		LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
	Power supply capacity (kVA)*6	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
Protective structure (IEC 60529)*7			Enclose type (IP20)										Open type (IP00)						
Cooling system			Self-cooling		Forced air cooling														
Approx. mass (kg)			1.9	2.1	3.0	3.0	3.0	6.3	6.3	8.3	15	15	15	22	42	42	54	74	74

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 220 V for 200 V class.
*3: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5: The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*6: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*7: FR-DU08: IP40 (except for the PU connector section)

400 V class

Model FR-F840-□			0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K	315K
			00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
Applicable motor capacity (kW)*1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
Output	Rated capacity (kVA)*2	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
		LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
	Rated current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93	116	180	216	260	325	361	432	481	547	610	683
		LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325	361	432	481	547	610
	Overload current rating*3	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																							
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	Rated voltage*4		Three-phase 380 to 500 V																							
Power supply	Rated input AC voltage/ frequency		Three-phase 380 to 500 V 50 Hz/60 Hz*8																							
	Permissible AC voltage fluctuation		323 to 550 V 50 Hz/60 Hz																							
	Permissible frequency fluctuation		±5%																							
	Rated input current (A)*5	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
		LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
	Power supply capacity (kVA)*6	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
		LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
Protective structure (IEC 60529)*7			Enclose type (IP20)											Open type (IP00)												
Cooling system			Self-cooling			Forced air cooling																				
Approx. mass (kg)			2.5	2.5	2.5	3.0	3.0	6.3	6.3	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 440 V for 400 V class.
*3: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5: The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*6: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*7: FR-DU08: IP40 (except for the PU connector section)
*8: For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.

●Rating (separated converter type)

400 V class

•Inverter

Model FR-F842-□			355K	400K	450K	500K	560K
			07700	08660	09620	10940	12120
Applicable motor capacity (kW)*1		SLD	400	450	500	560	630
		LD	355	400	450	500	560
Output	Rated capacity (kVA)*2	SLD	587	660	733	834	924
		LD	521	587	660	733	834
	Rated current (A)	SLD	770	866	962	1094	1212
		LD	683	770	866	962	1094
	Overload current rating*3	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C				
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	Rated voltage*4		Three-phase 380 to 500 V				
	Regenerative braking torque*5 (When the converter unit (FR-CC2) is used)	Maximum brake torque	10% torque/continuous				
Input power	DC power supply voltage		430 to 780 VDC				
	Control power supply auxiliary input		Single phase 380 to 500 V 50 Hz/60 Hz*7				
	Permissible control power supply auxiliary input fluctuation		Frequency ±5%, voltage ±10%				
Protective structure (IEC 60529)*6			Open type (IP00)				
Cooling system			Forced air cooling				
Approx. mass (kg)			163	163	243	243	243

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 440 V.
*3: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5: LD rating reference value
*6: FR-DU08: IP40 (except for the PU connector section)
*7: For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection.**

•Converter unit (FR-CC2)

Model FR-CC2-H□		355K	400K	450K	500K	560K	630K
Applicable motor capacity (kW)		355	400	450	500	560	630
Output	Overload current rating*1	200% 60 s, 250% 3 s			150% 60 s, 200% 3 s	120% 60 s, 150% 3 s	110% 60 s, 120% 3 s
	Rated voltage*2	430 to 780 VDC*4					
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 500 V 50 Hz/60 Hz					
	Permissible AC voltage fluctuation	Three-phase 323 to 550 V 50 Hz/60 Hz					
	Permissible frequency fluctuation	±5%					
	Rated input current (A)	683	770	866	962	1094	1212
	Power supply capacity (kVA)*3	521	587	660	733	833	924
Protective structure (IEC 60529)		Open type (IP00)					
Cooling system		Forced air cooling					
DC reactor		Built-in					
Approx. mass (kg)		213	282	285	288	293	294

*1: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the converter unit and the inverter to return to or below the temperatures under 100% load.
*2: The converter unit output voltage varies according to the input power supply voltage and the load. The maximum point of the voltage waveform at the converter unit output side is approximately the power supply voltage multiplied by $\sqrt{2}$.
*3: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*4: The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines) / average voltage between three lines × 100)

●Common specifications

Control specifications	Control method		Soft-PWM control, high carrier frequency PWM control (selectable among V/F control (Optimum excitation control), Advanced magnetic flux vector control (Advanced optimum excitation control) and PM motor control)
	Output frequency range		0.2 to 590 Hz (The upper-limit frequency is 400 Hz under Advanced magnetic flux vector control, and PM motor control.)
	Frequency setting resolution	Analog input	0.015 Hz/60 Hz (terminal 2, 4: 0 to 10 V/12 bits) 0.03 Hz/60 Hz (0 to 5 V/11 bits or 0 to 20 mA/approx. 11 bits for terminals 2 and 4, 0 to ±10 V/12 bits for terminal 1) 0.06 Hz/60 Hz (0 to ±5 V/11 bits for terminal 1)
		Digital input	0.01 Hz
	Frequency accuracy	Analog input	Within ±0.2% of the max. output frequency (25°C ± 10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 590 Hz. Constant-torque/variable-torque pattern or adjustable 5 points V/F can be selected.
	Starting torque	Induction motor	120% 0.5 Hz (Advanced magnetic flux vector control)
		IPM motor	50%
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0 to 3600 s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash countermeasures acceleration/deceleration can be selected.
	DC injection brake (induction motor)		Operation frequency (0 to 120 Hz), operation time (0 to 10 s), operation voltage (0 to 30%) variable
	Stall prevention operation level		Activation range of stall prevention operation (SLD rating: 0 to 120%, LD rating: 0 to 150%). Whether to use the stall prevention or not can be selected. (V/F control, Advanced magnetic flux vector control)
Operation specifications	Frequency setting signal	Analog input	Terminals 2 and 4: 0 to 10 V, 0 to 5 V, 4 to 20 mA (0 to 20 mA) are available. Terminal 1: -10 to +10 V, -5 to 5 V are available.
		Digital input	Input using the setting dial of the operation panel or the parameter unit Four-digit BCD or 16-bit binary (when used with option FR-A8AX)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signals (twelve terminals)		Low-speed operation command, Middle-speed operation command, High-speed operation command, Second function selection, Terminal 4 input selection, Jog operation selection, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command, Inverter reset The input signal can be changed using **Pr.178 to Pr.189 (input terminal function selection)**.
	Pulse train input		100 kpps
	Operational functions		Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, increased magnetic excitation deceleration, DC feeding*1, frequency jump, rotation display, automatic restart after instantaneous power failure, electronic bypass sequence, remote setting, retry function, carrier frequency selection, fast response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, speed smoothing control, traverse, auto tuning, applied motor selection, RS-485 communication, PID control, PID pre-charge function, cooling fan operation selection, stop selection (deceleration stop/coasting), power-failure deceleration stop function, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, test run, 24 V power supply input for control circuit, safety stop function, self power management, BACnet communication, PID gain tuning, cleaning, load characteristics storage, emergency drive*1
	Output signal	Open collector output (five terminals) Relay output (two terminals)	Inverter running, Up to frequency, Instantaneous power failure/undervoltage*1, Overload warning, Output frequency detection, Fault The output signal can be changed using **Pr.190 to Pr.196 (output terminal function selection)**. Fault codes of the inverter can be output (4 bits) from the open collector.
		Pulse train output (FM type)	50 kpps
Indication	For meter	Pulse train output (FM type)	Max. 2.4 kHz: one terminal (output frequency) The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.
		Current output (CA type)	Max. 20 mADC: one terminal (output current) The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.
		Voltage output	Max. 10 VDC: one terminal (output voltage) The monitored item can be changed using **Pr.158 AM terminal function selection**.
	Operation panel (FR-DU08)	Operating status	Output frequency, output current, output voltage, frequency setting value The monitored item can be changed using **Pr.52 Operation panel main monitor selection**.
		Fault record	Fault record is displayed when a fault occurs. Past 8 fault records and the conditions immediately before the fault (output voltage/current/frequency/cumulative energization time/year/month/date/time) are saved.
Protective/ warning function		Protective function	Overcurrent trip during acceleration, Overcurrent trip during constant speed, Overcurrent trip during deceleration or stop, Regenerative overvoltage trip during acceleration, Regenerative overvoltage trip during constant speed, Regenerative overvoltage trip during deceleration or stop, Inverter overload trip (electronic thermal relay function), Motor overload trip (electronic thermal relay function), Heatsink overheat, Instantaneous power failure*1, Undervoltage*1, Input phase loss*1*2, Stall prevention stop, Loss of synchronism detection*2, Upper limit fault detection, Lower limit fault detection, Output side earth (ground) fault overcurrent, Output short circuit, Output phase loss, External thermal relay operation*2, PTC thermistor operation*2, Option fault, Communication option fault, Parameter storage device fault, PU disconnection, Retry count excess*2, CPU fault, Operation panel power supply short circuit/RS-485 terminals power supply short circuit, 24 VDC power fault, Abnormal output current detection*2, Inrush current limit circuit fault*1, Communication fault (inverter), Analog input fault, USB communication fault, Safety circuit fault, Overspeed occurrence*2, 4 mA input fault*2, Pre-charge fault*2, PID signal fault*2, Internal circuit fault, User definition error in the PLC function
		Warning function	Fan alarm, Stall prevention (overcurrent), Stall prevention (overvoltage), Electronic thermal relay function pre-alarm, PU stop, Parameter copy, Safety stop, Maintenance timer 1 to 3*2, USB host error, Operation panel lock*2, Password locked*2, Parameter write error, Copy operation error, 24 V external power supply operation, Load fault warning, Emergency drive in operation*1
Environment	Surrounding air temperature		-10°C to +50°C (non-freezing) (LD rating) -10°C to +40°C (non-freezing) (SLD rating)
	Surrounding air humidity		With circuit board coating (conforming to IEC60721-3-3 3C2/3S2): 95% RH or less (non-condensing) Without circuit board coating: 90% RH or less (non-condensing)
	Storage temperature*3		-20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration		Maximum 1000 m above sea level*4, 5.9 m/s^2 or less*5 at 10 to 55 Hz (directions of X, Y, Z axes)

*1: Available only for the standard model.
*2: This protective function is not available in the initial status.
*3: Temperature applicable for a short time, e.g. in transit.
*4: For the installation at an altitude above 1,000 m (up to 2,500 m), derate the rated current 3% per 500 m.
*5: 2.9 m/s^2 or less for the FR-F840-04320(185K) or higher.

●PLC function specifications

Item			F800 PLC function specifications
Control method			Repeated operation (by stored program)
I/O control mode			Refresh
Programming language			Relay symbolic language (ladder) Function block
No. of instructions	Sequence instructions		25
	Basic instructions		84
	Application instructions		37
Processing speed			Sequence instructions 1.9 μs to 12 μs/step*1
Number of I/O device points			128 (input: 64 points, output: 64 points) 19 points built-in (input: 12 points, output: 7 points)*2 FR-A8AX (input: 16 points) FR-A8AY (output: 7 points) FR-A8AR (output: 3 points)
Number of analog I/O points			3 input points built-in (Terminals 1, 2, and 4) 2 output points built-in (Terminals FM/CA and AM), FR-A8AY: 2 output points (AM0 and AM1)
Pulse train I/O	Input		Terminal JOG maximum input pulse: 100k pulses/s*3
	Output		Terminal FM maximum output pulse: 50k pulses/s*3
Watchdog timer			10 to 2000 ms
Program capacity			6K steps (24k bytes) (0 to 6144 steps can be set) Contained in one program
Device	Internal relay (M)		128 (M0 to M127)
	Latch relay (L)		Not used (Can be set with parameters but will not latch)*4
	Timer (T)	Number of points	16 (T0 to T15)
		Specifications	100 ms timer: 0.1 to 3276.7 s can be set 10 ms timer: 0.01 to 327.67 s can be set 100 ms retentive timer: 0.1 to 3276.7 s can be set
	Counter (C)	Number of points	16 (C0 to C15)
		Specifications	Normal counter: Setting range 1 to 32767 Interrupt program counter: Not used
	Data register (D)		256 (D0 to D255)
	Special relay (SM)		2048 (SM0 to SM2047) with limited functions
	Special register (SD)		2048 (SD0 to SD2047) with limited functions

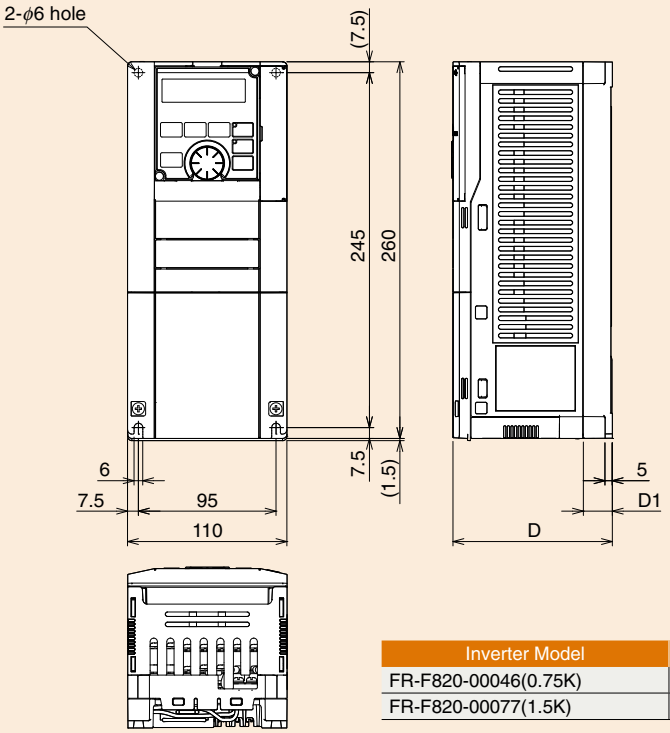
*1: The scan time is approximately 40 ms for 1K steps as inverter control is also performed in actual operations.
*2: The signals same as the ones assigned to the inverter I/O terminals are used.
One point is always required for a sequence start (RUN/STOP).
*3: **Pr.291 Pulse train I/O selection** must be set.
*4: There is no device latch function for power failures.
Use the **Pr.1150 to Pr.1199 PLC function user parameters 1 to 50** (D206 to D255) to store device values in the EEPROM.

[**NOTE**]
・ There is no buffer memory.

■Standard model

Outline Dimension Drawings

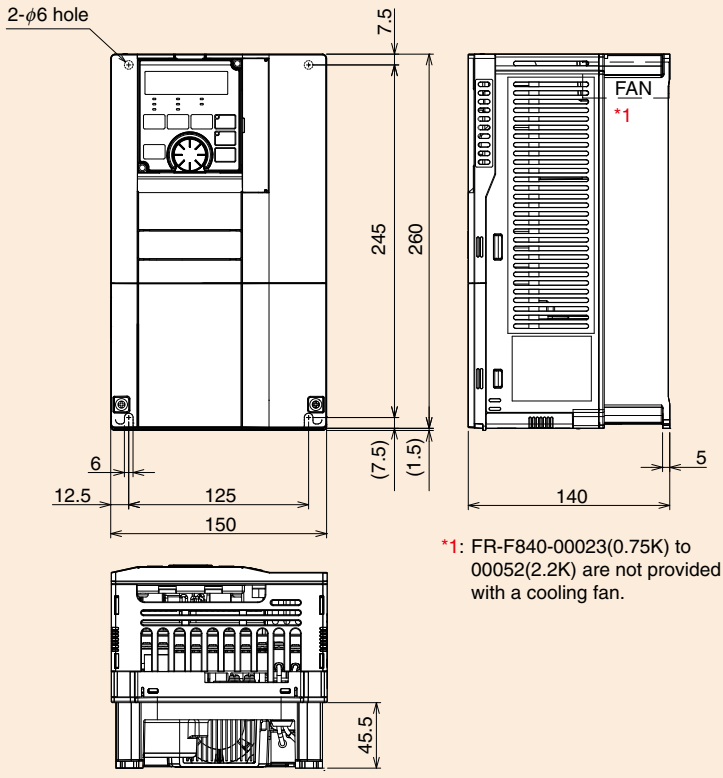
●FR-F820-00046(0.75K), FR-F820-00077(1.5K)



Inverter Model	D	D1
FR-F820-00046(0.75K)	110	20
FR-F820-00077(1.5K)	125	35

(Unit: mm)

●FR-F820-00105(2.2K), 00167(3.7K), 00250(5.5K)
●FR-F840-00023(0.75K), 00038(1.5K), 00052(2.2K), 00083(3.7K), 00126(5.5K)

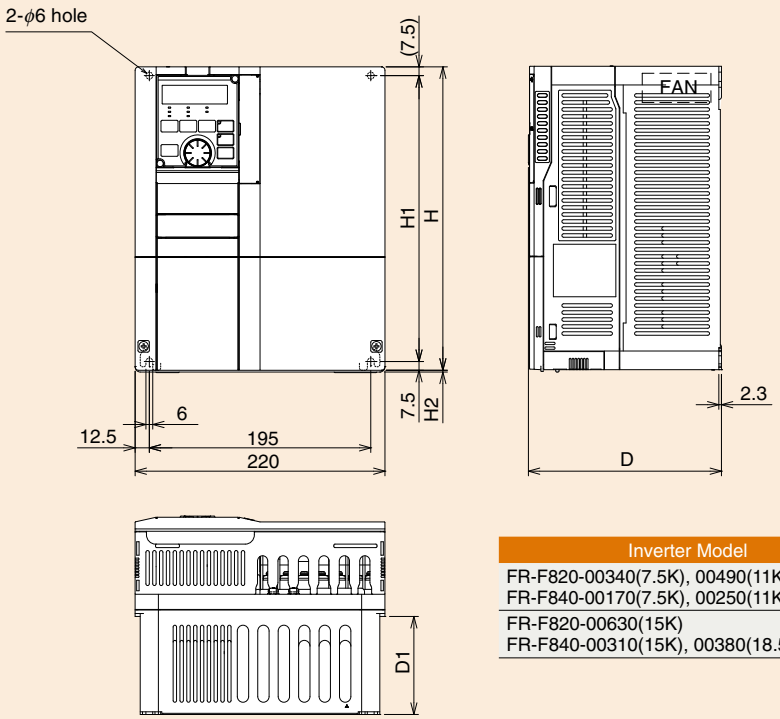


*1: FR-F840-00023(0.75K) to 00052(2.2K) are not provided with a cooling fan.

(Unit: mm)

Outline Dimension Drawings

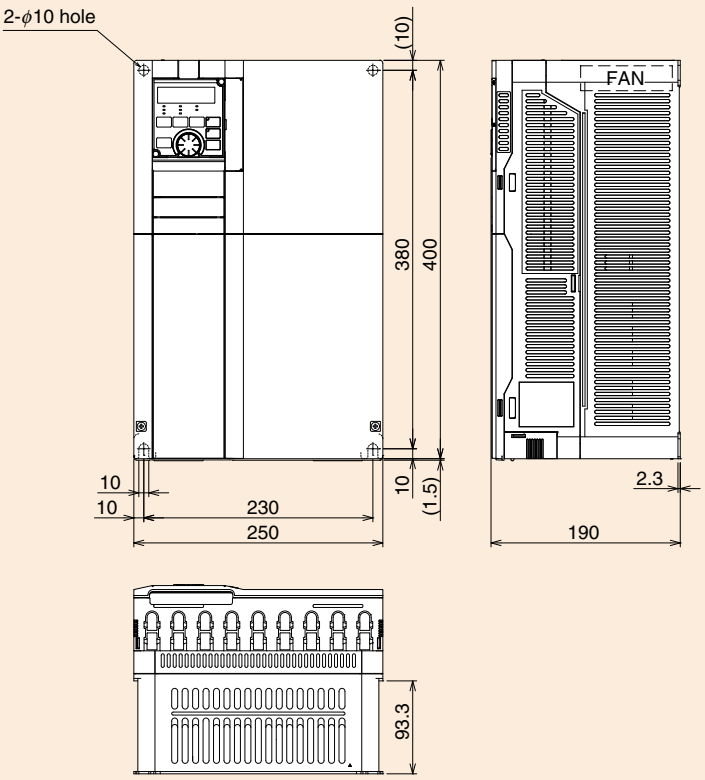
- FR-F820-00340(7.5K), 00490(11K), 00630(15K)
- FR-F840-00170(7.5K), 00250(11K), 00310(15K), 00380(18.5K)



Inverter Model	H	H1	H2	D	D1
FR-F820-00340(7.5K), 00490(11K) FR-F840-00170(7.5K), 00250(11K)	260	245	1.5	170	84
FR-F820-00630(15K) FR-F840-00310(15K), 00380(18.5K)	300	285	3	190	101.5

(Unit: mm)

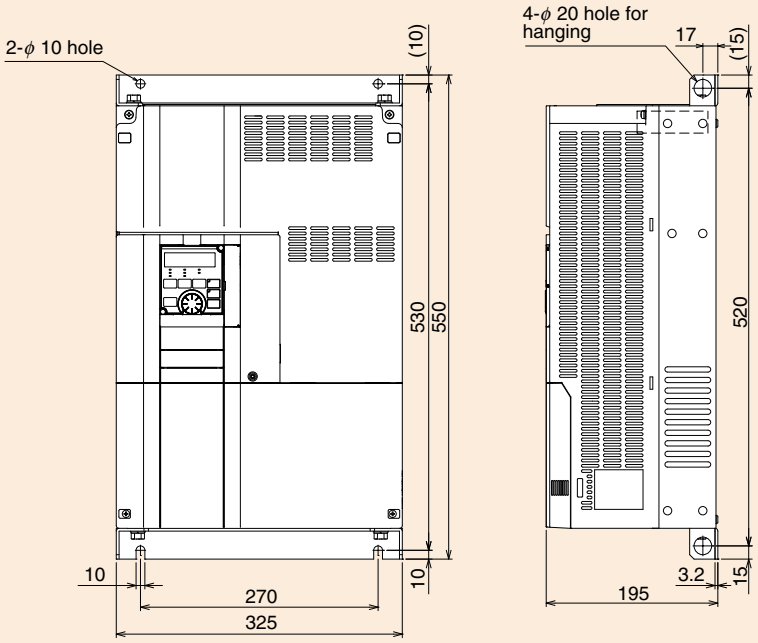
- FR-F820-00770(18.5K), 00930(22K), 01250(30K)
- FR-F840-00470(22K), 00620(30K)



(Unit: mm)

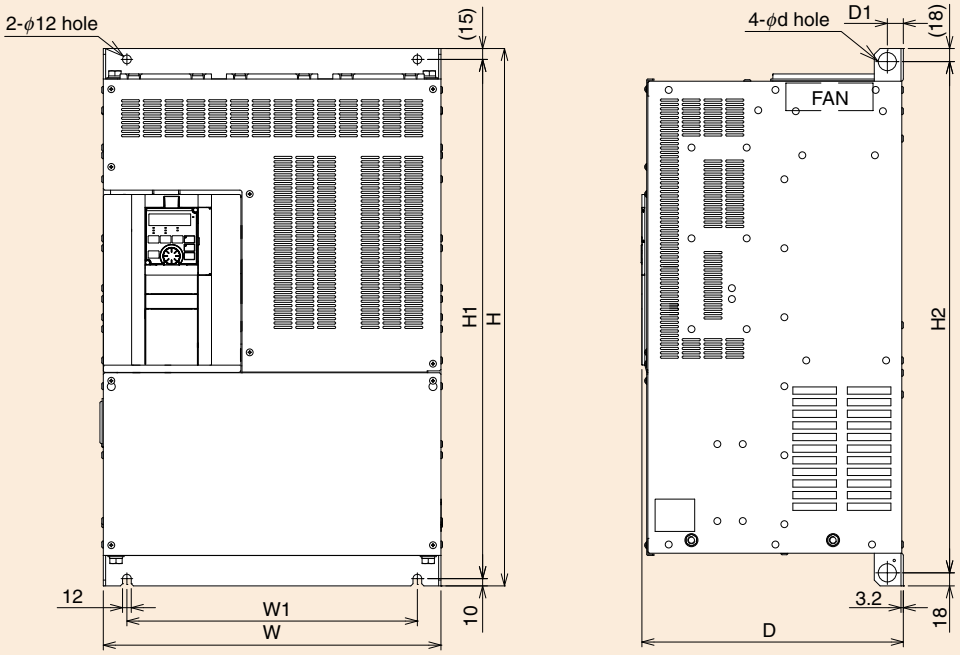
Outline Dimension Drawings

- FR-F820-01540(37K)
- FR-F840-00770(37K)



(Unit: mm)

- FR-F820-01870(45K), 02330(55K), 03160(75K), 03800(90K), 04750(110K)
- FR-F840-00930(45K), 01160(55K), 01800(75K), 02160(90K), 02600(110K), 03250(132K), 03610(160K)



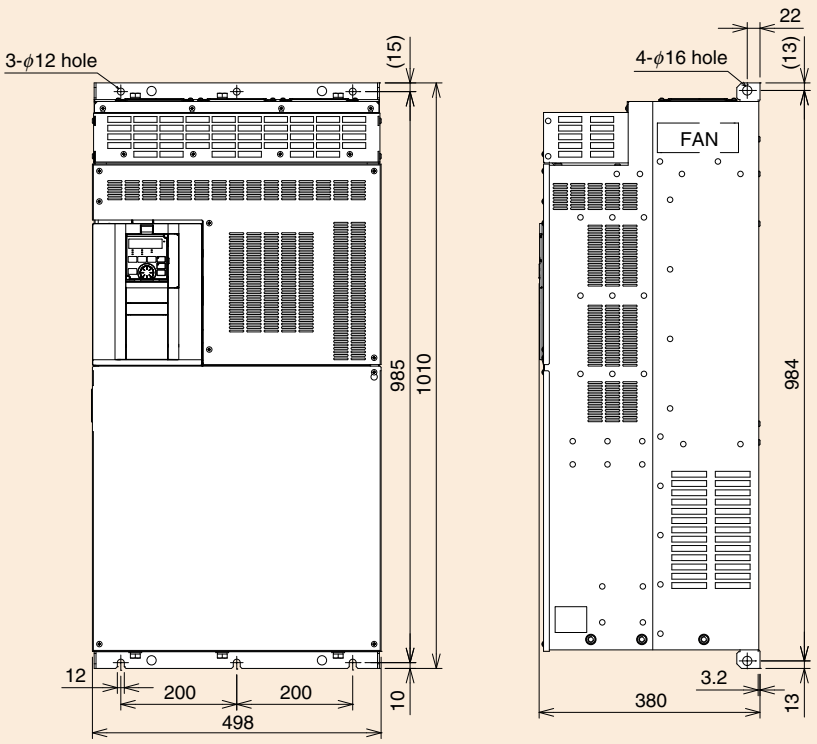
Inverter Model	W	W1	H	H1	H2	d	D	D1
FR-F820-01870(45K), 02330(55K) FR-F840-00930(45K), 01160(55K), 01800(75K)*2	435	380	550	525	514	25	250	24
FR-F820-03160(75K)*2	465	410	700	675	664	25	250	22
FR-F820-03800(90K)*2, 04750(110K)*2	465	400	740	715	704	24	360	22
FR-F840-02160(90K)*2, 02600(110K)*2	465	400	620	595	584	24	300	22
FR-F840-03250(132K)*2, 03610(160K)*2	465	400	740	715	704	25	360	22

*2: Always connect a DC reactor (FR-HEL), which is available as an option.

(Unit: mm)

Outline Dimension Drawings

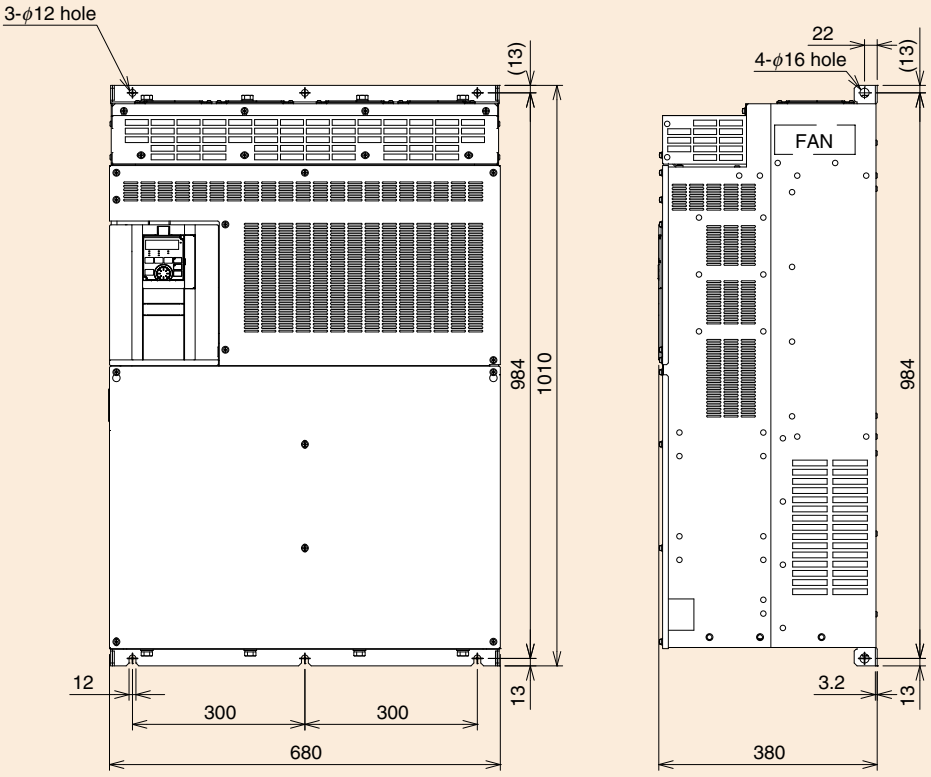
●FR-F840-04320(185K), 04810(220K)



Always connect a DC reactor (FR-HEL), which is available as an option.

(Unit: mm)

●FR-F840-05470(250K), 06100(280K), 06830(315K)



Always connect a DC reactor (FR-HEL), which is available as an option.

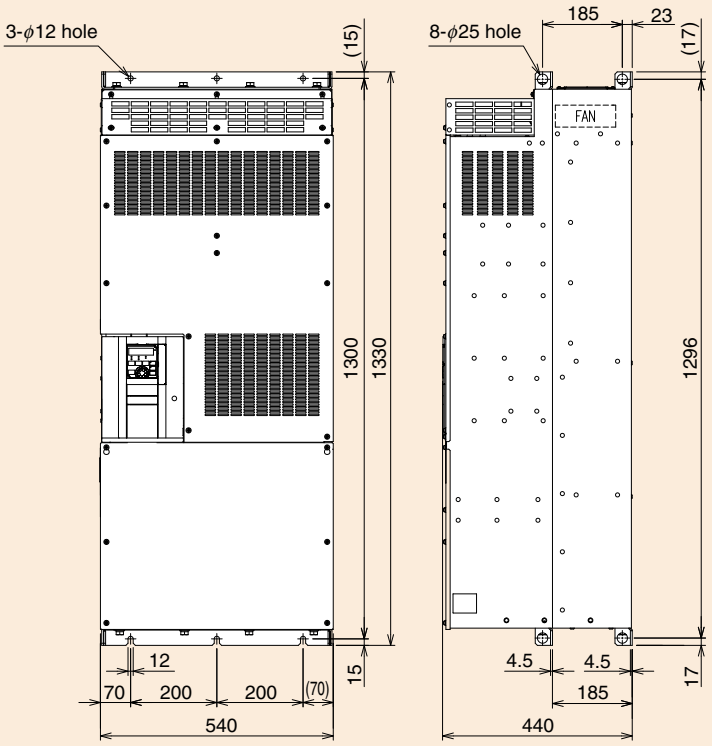
(Unit: mm)

■Separated converter type

Outline Dimension Drawings

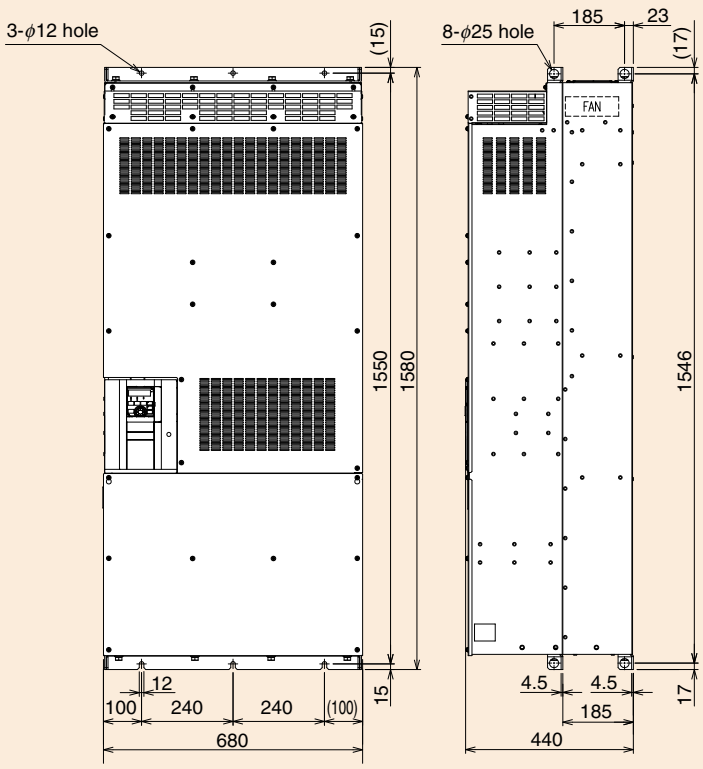
• Inverter

●FR-F842-07700(355K), 08660(400K)



(Unit: mm)

●FR-F842-09620(450K), 10940(500K), 12120(560K)

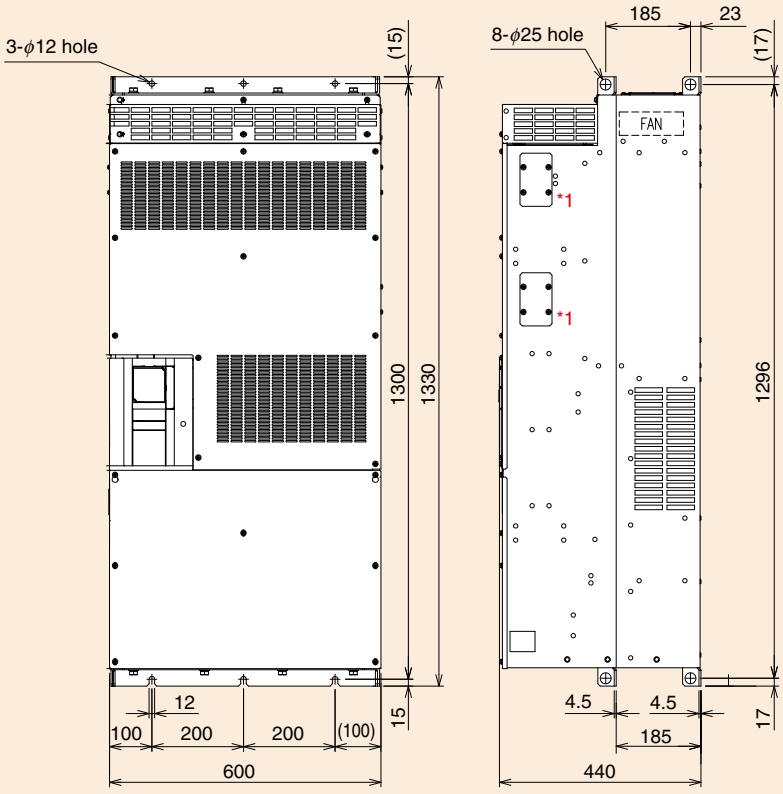


(Unit: mm)

Outline Dimension Drawings

• Converter unit

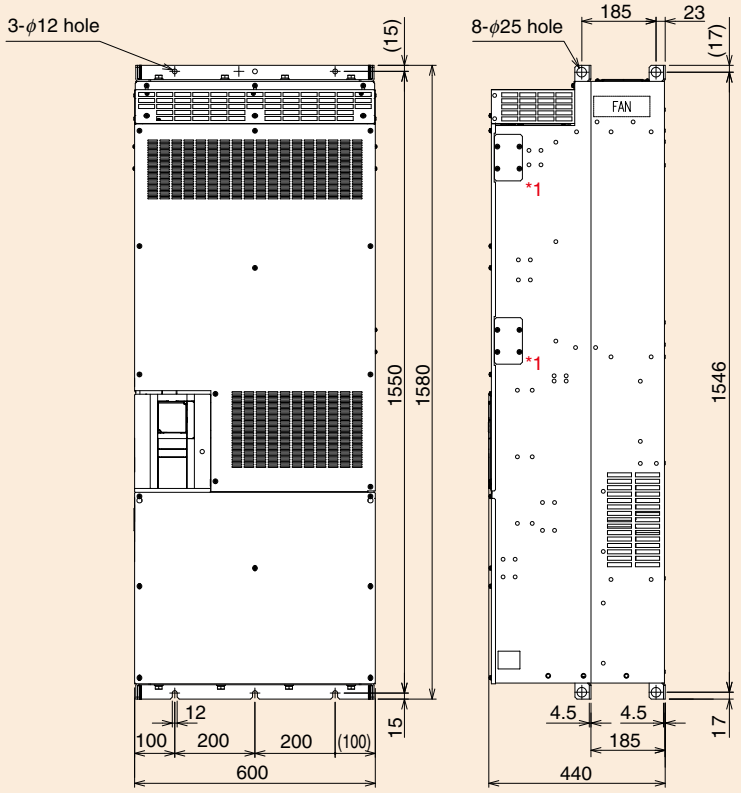
●FR-CC2-H355K



Equipped with a DC reactor.

(Unit: mm)

●FR-CC2-H400K, H450K, H500K, H560K, H630K



Equipped with a DC reactor.

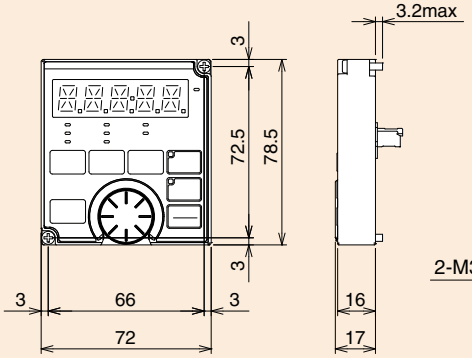
(Unit: mm)

*1: Do not remove the cover on the side of the converter unit.

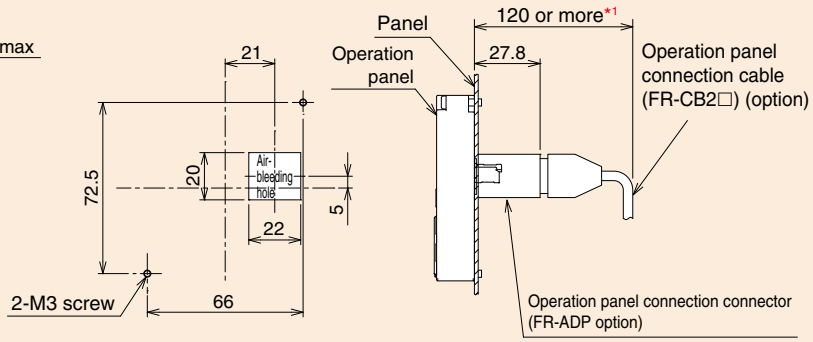
■Operation panel (FR-DU08, FR-LU08)

Outline Dimension Drawings

<Outline dimensions>



<Enclosure cut dimensions>



*1: Denotes the space required to connect an optional operation panel connection cable (FR-CB2□). When using another cable, leave the space required for the cable specification.

(Unit: mm)

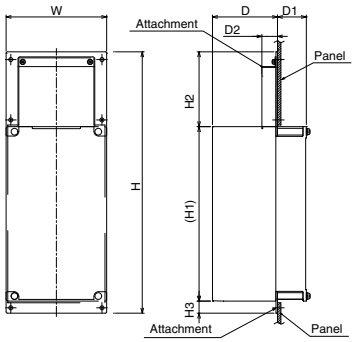
●Protruding the heatsink through the panel

When encasing the inverter or the converter unit in an enclosure, the heat generated in the enclosure can be greatly reduced by protruding the heatsink of the inverter or the converter unit. When installing the inverter in a compact enclosure, etc., this installation method is recommended. For the FR-F840-04320(185K) or higher, a heatsink can be protruded outside the enclosure without using an attachment.

◆When using a panel through attachment (FR-A8CN)

For the FR-F820-00105(2.2K) to FR-F820-04750(110K) and FR-F840-00023(0.75K) to FR-F840-03610(160K), a heatsink can be protruded outside the enclosure using a panel through attachment (FR-A8CN). Refer to the instruction manual of the panel through attachment (FR-A8CN) for details.

・Drawing after attachment installation (when used with the FR-A8CN)

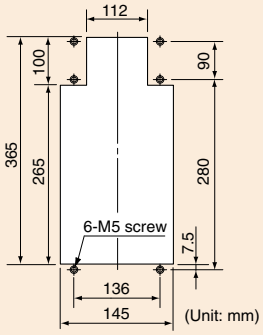


Type	W	H	H1	H2	H3	D	D1	D2
FR-A8CN01	150	389.5	260	111.5	18	97	43	24.3
FR-A8CN02	245	408.5	260	116.5	32	86	84	21.3
FR-A8CN03	245	448.5	300	116.5	32	89	101	21.3
FR-A8CN04	280	554	400	113.5	32	96.7	93.3	40.6
FR-A8CN05	357	654	480	130	44	130.8	64.2	105
FR-A8CN06	478.2	650	465	145	40	96	154	55
FR-A8CN07	510.2	805	610	150	45	130	120	105
FR-A8CN08	510.2	845	650	150	45	176.5	183.5	40
FR-A8CN09	510.2	725	530	150	45	152.3	147.7	65

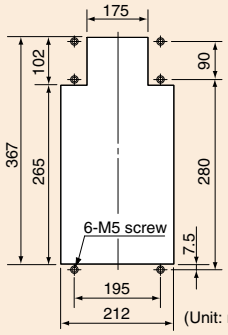
(Unit: mm)

■Enclosure cut dimensions (when used with the FR-A8CN)

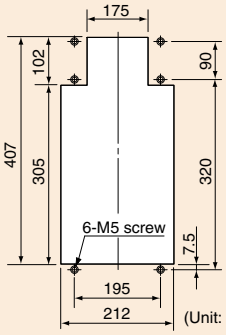
FR-A8CN01



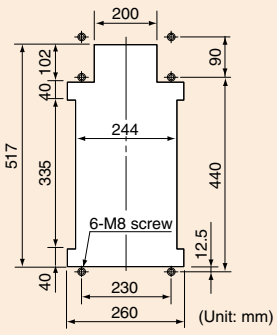
FR-A8CN02



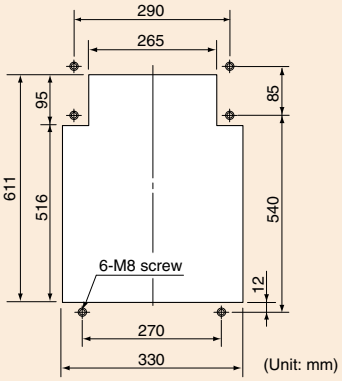
FR-A8CN03



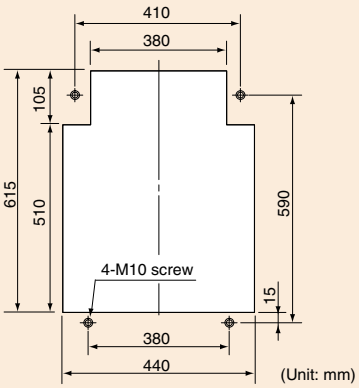
FR-A8CN04



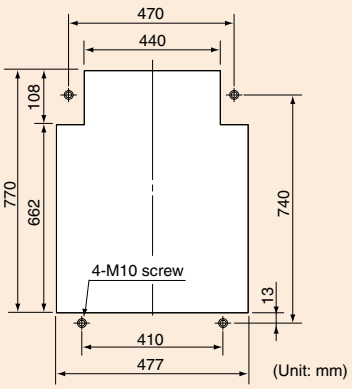
FR-A8CN05



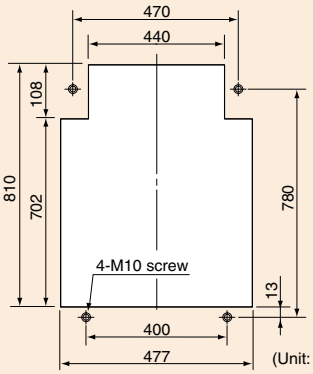
FR-A8CN06



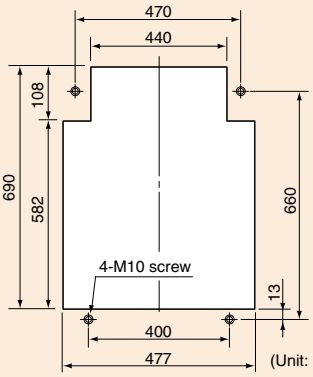
FR-A8CN07



FR-A8CN08



FR-A8CN09

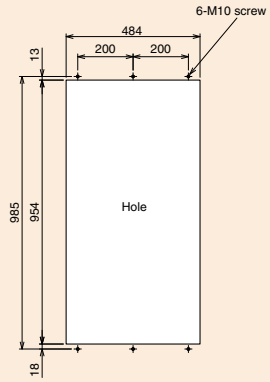


For a compatibility table between the attachment and the inverter.

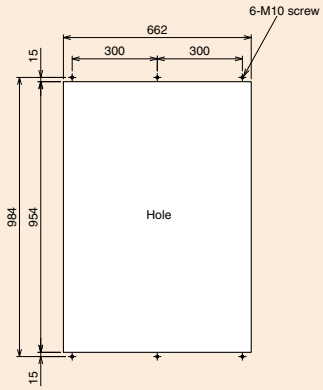
■Heatsink protrusion through the panel for the FR-F840-04320(185K) or higher

•Enclosure cutting
Cut an enclosure according to the capacity of the inverter or the converter unit.

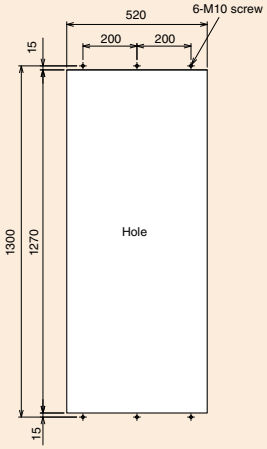
FR-F840-04320(185K)
FR-F840-04810(220K)



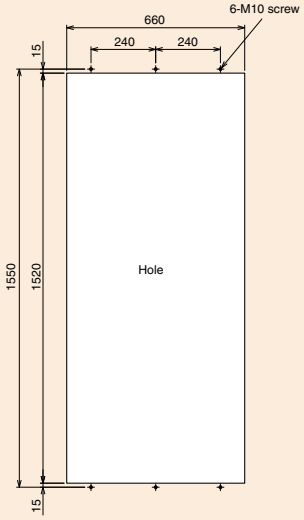
FR-F840-05470(250K)
FR-F840-06100(280K)
FR-F840-06830(315K)



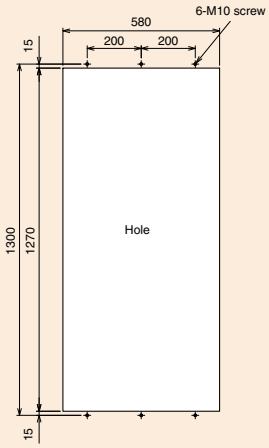
FR-F842-07700(355K)
FR-F842-08660(400K)



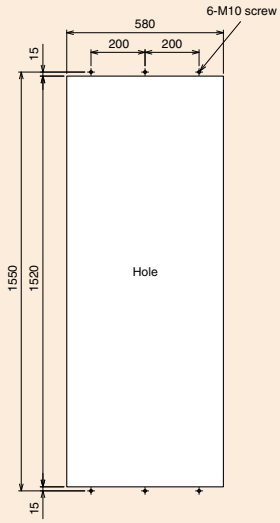
FR-F842-09620(450K)
FR-F842-10940(500K)
FR-F842-12120(560K)



FR-CC2-H355K



FR-CC2-H400K
FR-CC2-H450K
FR-CC2-H500K
FR-CC2-H560K
FR-CC2-H630K

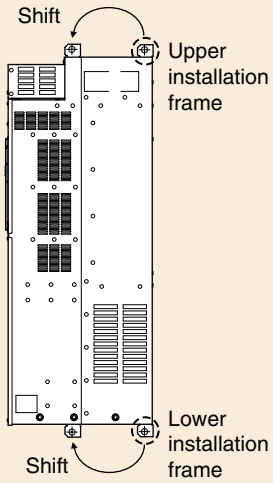


(Unit: mm)

・Shift and removal of a rear side installation frame

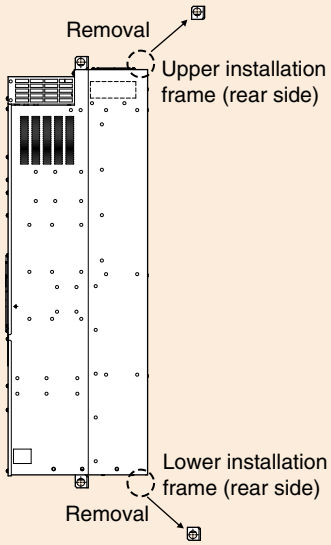
For the FR-F840-04320(185K) to FR-F840-06830(315K)

One installation frame is attached to each of the upper and lower parts of the inverter. Change the position of the rear side installation frame on the upper and lower sides of the inverter to the front side as shown below. When changing the installation frames, make sure that the installation orientation is correct.



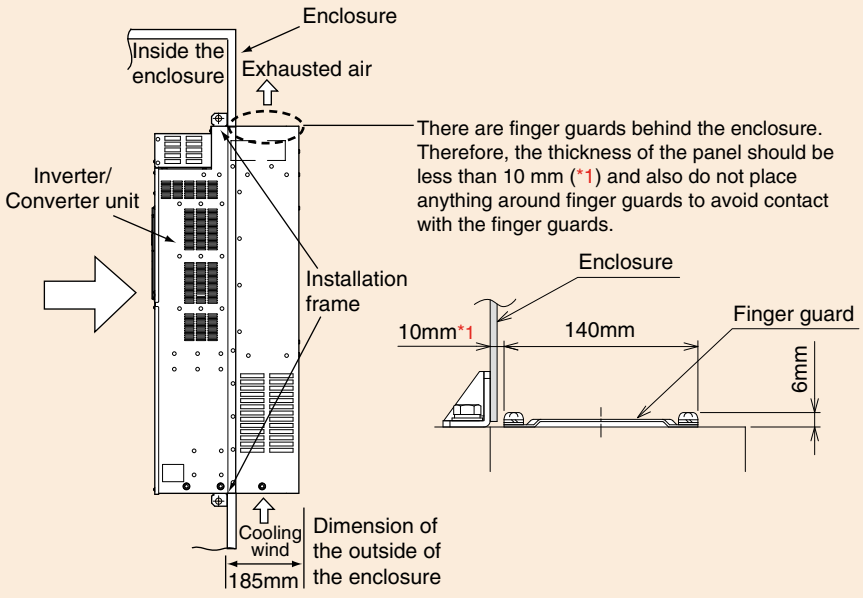
For the FR-F842-07700(355K) to FR-F842-12120(560K), FR-CC2-H355K to FR-CC2-H630K

Two installation frames are attached to each of the upper and lower parts of the inverter or the converter unit. Remove the rear side installation frame on the upper and lower sides of the inverter or the converter unit as shown below.



・Installation of the inverter or the converter unit

Push the inverter heatsink portion outside the enclosure and fix the enclosure and the inverter or the converter unit with upper and lower installation frame.

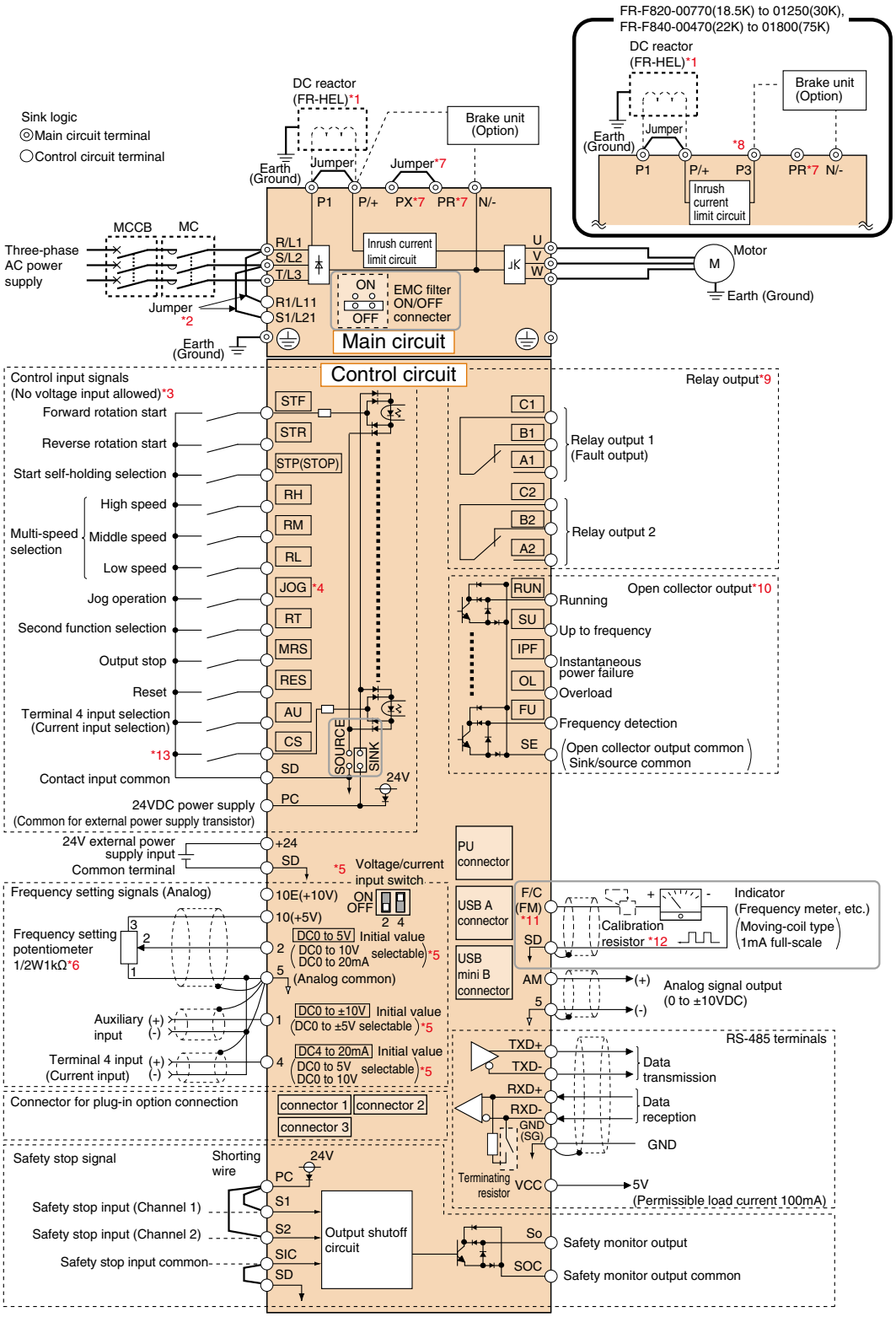


[**NOTE**]

・Having a cooling fan, the cooling section which comes out of the enclosure cannot be used in the environment of water drops, oil, mist, dust, etc.
・Be careful not to drop screws, dust etc. into the inverter or the converter unit and the cooling fan section.
・The FR-A7CN panel through attachment cannot be installed on the FR-F800 series.

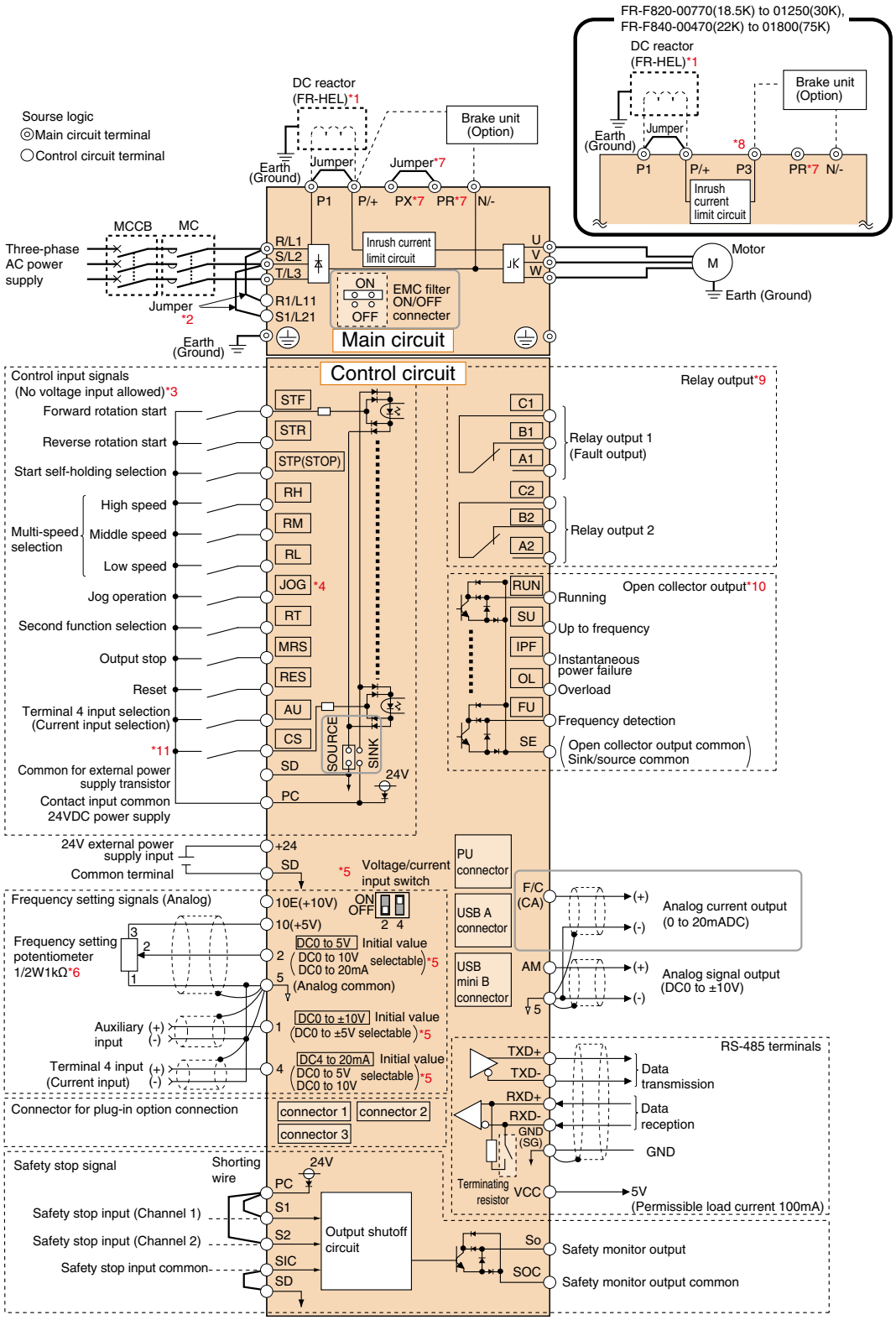
■Standard models

●FM type



*1: For the FR-F820-03160(75K) or higher, the FR-F840-01800(75K) or higher, always connect a DC reactor (FR-HEL), which is available as an option.
(To select a DC reactor and select one according to the applicable motor capacity.)
When a DC reactor is connected to the FR-F820-02330(55K) or lower or the FR-F840-01160(55K) or lower, if a jumper is installed across the terminals P1 and P/+, remove the jumper before installing the DC reactor.
*2: When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21.
*3: The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**.
*4: Terminal JOG is also used as the pulse train input terminal. Use **Pr.291** to choose JOG or pulse.
*5: Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267)**. To input a voltage, set the voltage/current input switch OFF.
To input a current, set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. **(Pr.561)**
*6: It is recommended to use 2 W 1 kΩ when the frequency setting signal is changed frequently.
*7: Do not use terminals PR and PX. The jumper may or may not be attached depending on the inverter. (Refer to the Instruction Manual (Startup).)
*8: Do not connect the DC power supply (under DC feeding mode) to terminal P3.
*9: The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**.
*10: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*11: The terminal F/C (FM) can be used to output pulse trains as open collector output by setting **Pr.291**.
*12: Not required when calibrating the scale with the operation panel.
*13: No function is assigned in the initial status. Assign the function using **Pr.186 CS terminal function selection**.

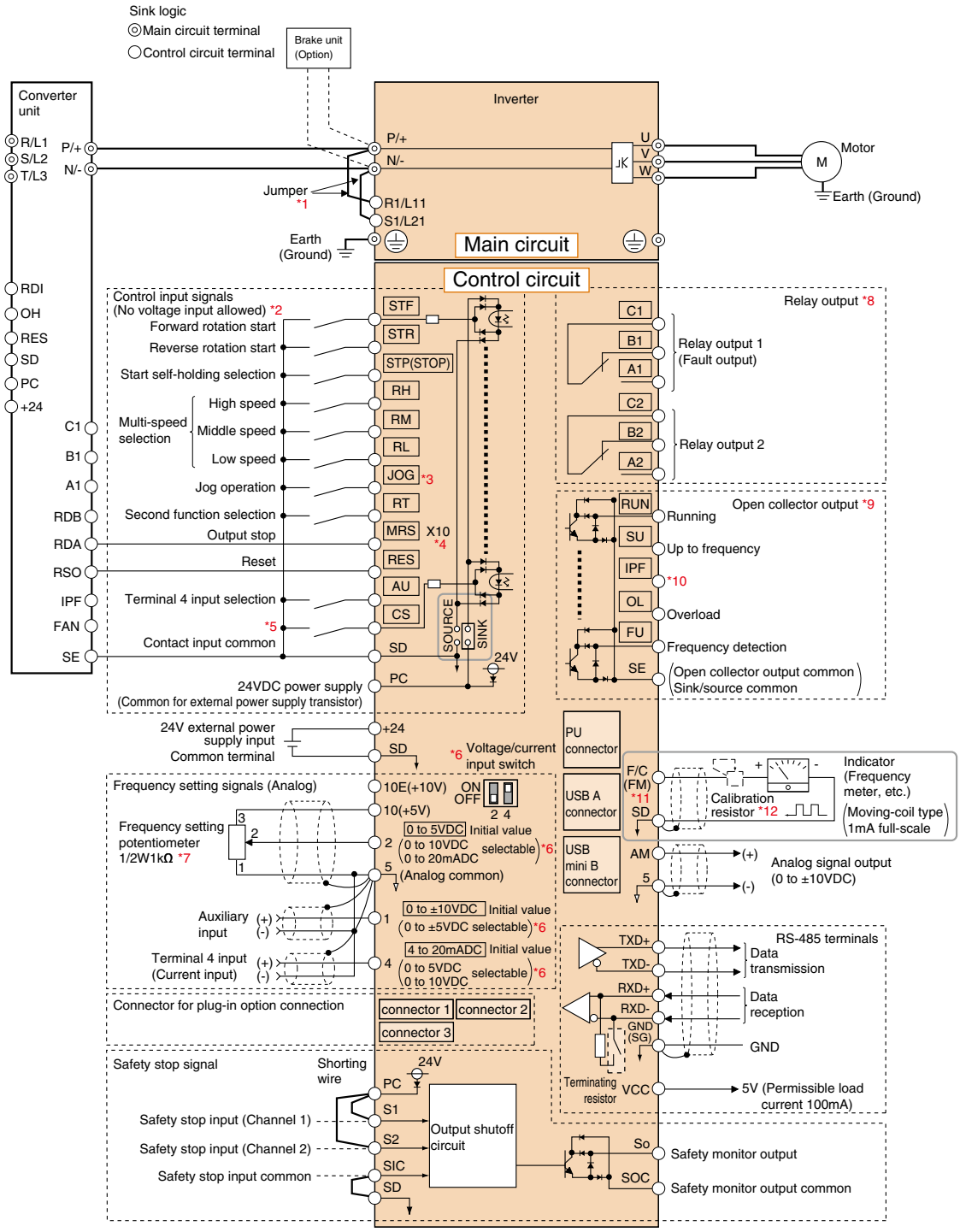
●CA type



*1: For the FR-F820-03160(75K) or higher, the FR-F840-01800(75K) or higher, always connect a DC reactor (FR-HEL), which is available as an option.
(To select a DC reactor and select one according to the applicable motor capacity.)
When a DC reactor is connected to the FR-F820-02330(55K) or lower or the FR-F840-01160(55K) or lower, if a jumper is installed across the terminals P1 and P/+, remove the jumper before installing the DC reactor.
*2: When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21.
*3: The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**.
*4: Terminal JOG is also used as the pulse train input terminal. Use **Pr.291** to choose JOG or pulse.
*5: Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267)**. To input a voltage, set the voltage/current input switch OFF. To input a current, set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. **(Pr.561)**
*6: It is recommended to use 2 W 1 kΩ when the frequency setting signal is changed frequently.
*7: Do not use terminals PR and PX. The jumper may or may not be attached depending on the inverter. (Refer to the Instruction Manual (Startup).)
*8: Do not connect the DC power supply (under DC feeding mode) to terminal P3.
*9: The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**.
*10: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*11: No function is assigned in the initial status. Assign the function using **Pr.186 CS terminal function selection**.

■Separated converter type

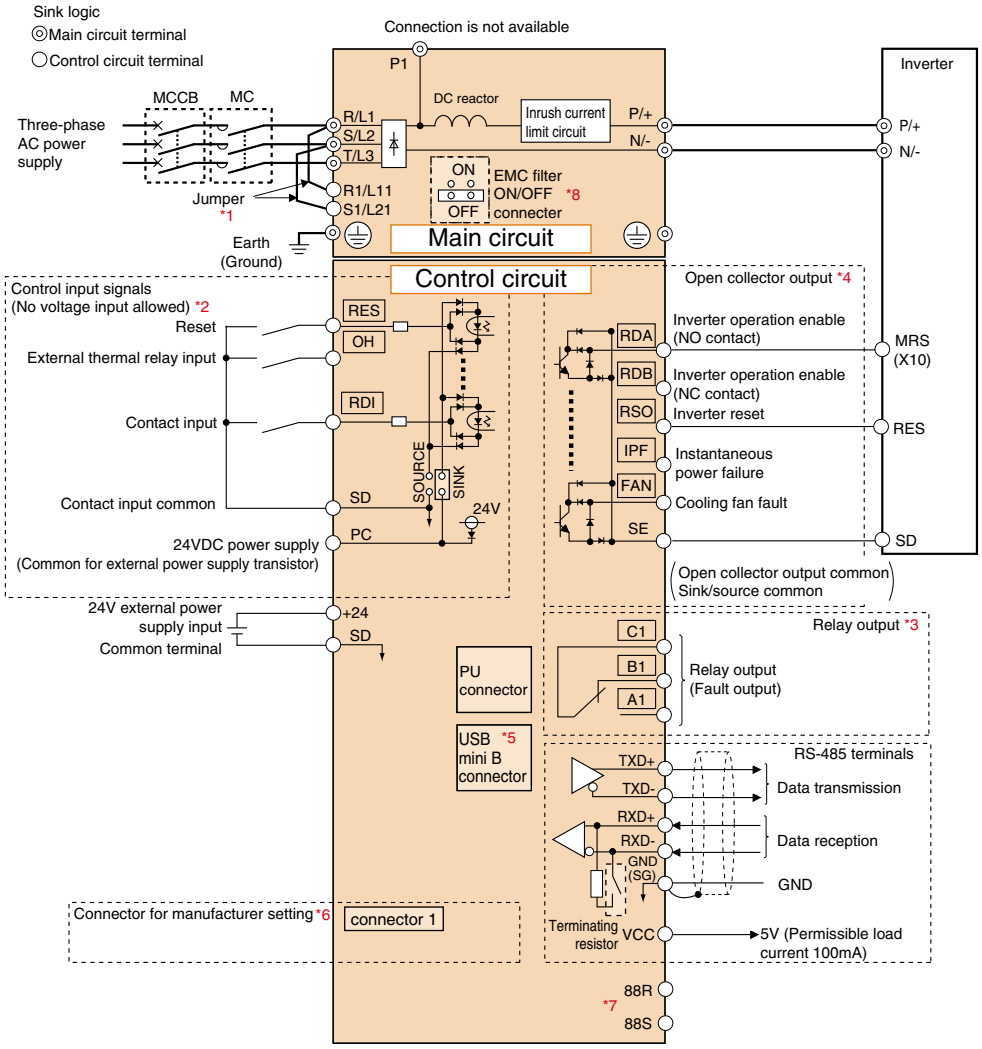
●Inverter (FM type)



*1: The terminals R1/L11 and S1/L21 are connected to the terminals P/+ and N/- with a jumper respectively. When using separate power supply for the control circuit, remove the jumpers from R1/L11 and S1/L21.
*2: The function of these terminals can be changed with the input terminal assignment (**Pr.178 to Pr.189**).
*3: Terminal JOG is also used as the pulse train input terminal. Use **Pr.291** to choose JOG or pulse.
*4: The X10 signal (NC contact input specification) is assigned to the terminal MRS in the initial setting. Set **Pr.599** = "0" to change the input specification of the X10 signal to NO contact.
*5: No function is assigned in the initial setting. Use **Pr.186** for function assignment.
*6: Terminal input specifications can be changed by analog input specification switchover (**Pr.73**, **Pr.267**). To input a voltage, set the voltage/current input switch OFF. To input a current, set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (**Pr.561**)
*7: It is recommended to use 2 W 1 kΩ when the frequency setting signal is changed frequently.
*8: The function of these terminals can be changed with the output terminal assignment (**Pr.195**, **Pr.196**).
*9: The function of these terminals can be changed with the output terminal assignment (**Pr.190 to Pr.194**).
*10: No function is assigned in the initial setting. Use **Pr.192** for function assignment.
*11: The terminal F/C (FM) can be used to output pulse trains as open collector output by setting **Pr.291**.
*12: Not required when calibrating the scale with the operation panel.

■Converter unit (FR-CC2)

●When the sink logic is selected



*1: When using separate power supply for the control circuit, remove the jumpers from R1/L11 and S1/L21.
*2: The function of these terminals can be changed with the input terminal assignment **(Pr.178, Pr.187, Pr.189)**.
*3: The function of these terminals can be changed with the output terminal assignment **(Pr.195)**.
*4: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*5: The connector is for manufacturer setting. Do not use.
*6: Plug-in options cannot be used.
*7: For manufacturer setting. Do not use.
*8: For the FR-CC2-H400K to H630K, two EMC filter ON/OFF connectors are provided.

Standard models, and separated converter type

Type		Terminal Symbol	Terminal Name	Description	
Main circuit		R/L1, S/L2, T/L3*1	AC power input	Connect to the commercial power supply.	
		U, V, W	Inverter output	Connect a three-phase squirrel-cage motor or PM motor.	
		R1/L11, S1/L21	Power supply for control circuit	Connected to the AC power supply terminals R/L1 and S/L2. To retain alarm display and alarm output, apply external power to this terminal.	
		P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV), power regeneration converter (MT-RC), high power factor converter (FR-HC2), or DC power supply (under DC feeding mode). Do not connect the DC power supply between terminals P3 and N/-. Use terminals P/+ and N/- for DC feeding. Connect the separated converter type to the terminals P/+ and N/- of the converter unit.	
		P3, N/-*1*2			
		P/+, P1*1	DC reactor connection	Remove the jumper across terminals P/+-P1 and connect a DC reactor. For the FR-F820-03160 (75K) or higher, the FR-F840-01800(75K) or higher, always connect a DC reactor, which is available as an option.	
		PR, PX*1	Do not use terminals PX and PR. The terminal PX is equipped in the FR-F820-00490(11K) or lower and the FR-F840-00250(11K) or lower. The terminal PR is equipped in the FR-F820-01250(30K) or lower and the FR-F840-01800(75K) or lower.		
		⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded).	
Control circuit/input signal	Contact input	STF	Forward rotation start	Turn ON the STF signal to start forward rotation and turn it OFF to stop.	When the STF and STR signals are turned ON simultaneously, the stop command is given.
		STR	Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.	
		STP (STOP)	Start self-holding selection	Turn ON the STOP signal to self-hold the start signal.	
		RH, RM, RL	Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.	
		JOG	Jog mode selection	Turn ON the JOG signal to select Jog operation (initial setting) and turn ON the start signal (STF or STR) to start Jog operation.	
			Pulse train input	JOG terminal can be used as pulse train input terminal. To use as pulse train input terminal, the **Pr.291** setting needs to be changed. (maximum input pulse: 100k pulses/s)	
		RT	Second function selection	Turn ON the RT signal to select second function selection When the second function such as "Second torque boost" and "Second V/F (base frequency)" are set, turning ON the RT signal selects these functions.	
		MRS	Output stop	Turn ON the MRS signal (2 ms or more) to stop the inverter output. Use to shut OFF the inverter output when stopping the motor by electromagnetic brake.	
		MRS (X10)*7	Output stop (Inverter operation enable)	Connect to the terminal RDA of the converter unit (FR-CC2). When the RDA signal is turned OFF, the inverter output is shut off. The X10 signal (NC contact) is assigned to the terminal MRS in the initial setting. Use **Pr.599** to change the specification to NO contact.	
		RES	Reset	Used to reset alarm output provided when protective circuit is activated. Turn ON the RES signal for more than 0.1 s, then turn it OFF. Recover about 1 s after reset is cancelled.	
		AU	Terminal 4 input selection	Terminal 4 is made valid only when the AU signal is turned ON. Turning the AU signal ON makes terminal 2 invalid	
		CS	No function	Use **Pr.186 CS terminal function selection** for function assignment.	
		SD	Contact input common (sink)*3	Common terminal for the contact input terminal (sink logic) and terminal FM.	
			External transistor common (source)*4	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
			24 VDC power supply common	Common output terminal for the 24 VDC 0.1 A power supply (terminal PC). Isolated from terminals 5 and SE.	
		PC	External transistor common (sink)*3	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the sink logic to avoid malfunction by undesirable currents.	
			Contact input common (source)*4	Common terminal for contact input terminal (source logic).	
			24 VDC power supply	Can be used as a 24 VDC 0.1 A power supply.	
	Frequency setting	10E	Frequency setting power supply	When connecting a frequency setting potentiometer at an initial status, connect it to terminal 10. Change the input specifications of terminal 2 when connecting it to terminal 10E.	10 VDC, permissible load current 10mA
		10			5 VDC, permissible load current 10mA
		2	Frequency setting (voltage)	Inputting 0 to 5 VDC (or 0 to 10 V, 4 to 20 mA) provides the maximum output frequency at 5 V (10 V, 20 mA) and makes input and output proportional. Use **Pr.73** to switch from among input 0 to 5 VDC (initial setting), 0 to 10 VDC, and 4 to 20 mA. Set the voltage/current input switch in the ON position to select current input (0 to 20 mA).	Voltage input: Input resistance 10 kΩ ± 1 kΩ Maximum permissible voltage 20 VDC Current input: Input resistance 245 Ω ± 5 Ω Maximum permissible current 30 mA
		4	Frequency setting (current)	Inputting 4 to 20 mADC (or 0 to 5 V, 0 to 10 V) provides the maximum output frequency at 20 mA and makes input and output proportional. This input signal is valid only when the AU signal is on (terminal 2 input is invalid). Use **Pr.267** to switch from among input 4 to 20 mA (initial setting), 0 to 5 VDC, and 0 to 10 VDC. Set the voltage/current input switch in the OFF position to select voltage input (0 to 5 V/0 to 10 V). Use **Pr.858** to switch terminal functions.	
		1	Frequency setting auxiliary	Inputting 0 to ±5 VDC or 0 to ±10 VDC adds this signal to terminal 2 or 4 frequency setting signal. Use **Pr.73** to switch between input 0 to ±5 VDC and 0 to ±10 VDC (initial setting) input.	Input resistance 10 kΩ ±1 kΩ Maximum permissible voltage ±20 VDC
		5	Frequency setting common	Common terminal for frequency setting signal (terminal 2, 1 or 4) and analog output terminal AM, CA. Do not earth (ground).	
	Thermistor	10 2	PTC thermistor input	For receiving PTC thermistor outputs. When PTC thermistor is valid (**Pr.561** ≠ "9999"), the terminal 2 is not available for frequency setting.	Applicable PTC thermistor specification Overheat detection resistance:500 Ω to 30 kΩ (Set by **Pr.561**)
	External power supply input	+24	24 V external power supply input	For connecting a 24 V external power supply. If a 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF.	Input voltage 23 to 25.5 VDC Input current 1.4 A or less

indicates that terminal functions can be selected from **Pr.178 to Pr.196 (I/O terminal function selection)**.
Terminal names and terminal functions are those of the factory set.

Type		Terminal Symbol	Terminal Name	Description		
Control circuit/output signal	Relay	A1, B1, C1	Relay output 1 (alarm output)	1 changeover contact output indicates that the inverter protective function has activated and the output stopped. Alarm: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C)		Contact capacity 230 VAC 0.3 A (power factor =0.4) 30 VDC 0.3 A
		A2, B2, C2	Relay output 2	1 changeover contact output		
	Open collector	RUN	Inverter running	Switched low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5Hz). Switched high during stop or DC injection brake operation.		Permissible load 24 VDC (maximum 27 VDC) 0.1 A (The voltage drop is 2.8 V at maximum while the signal is ON.) LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).
		SU	Up to frequency	Switched low when the output frequency reaches within the range of ±10% (initial value) of the set frequency. Switched high during acceleration/deceleration and at a stop.	Alarm code (4 bits) output	
		OL	Overload alarm	Switched low when stall prevention is activated by the stall prevention function. Switched high when stall prevention is cancelled.		
		IPF	Instantaneous power failure	Switched low when an instantaneous power failure and under voltage protections are activated.		
		IPF*7	Open collector output	No function is assigned in the initial setting. The function can be assigned setting **Pr.192**.		
		FU	Frequency detection	Switched low when the inverter output frequency is equal to or higher than the preset detected frequency and high when less than the preset detected frequency.		
		SE	Open collector output common	Common terminal for terminals RUN, SU, OL, IPF, FU		
	Pulse	FM*5	For meter	Select one e.g. output frequency from monitor items. (The signal is not output during an inverter reset.) The output signal is proportional to the magnitude of the corresponding monitoring item. The output signal is proportional to the magnitude of the corresponding monitoring item.Use **Pr.55**, **Pr.56**, and **Pr.866** to set full scales for the monitored output frequency, output current, and torque.	Output item: output frequency (initial setting), permissible load current 2 mA, For full scale1440 pulses/s	
			NPN open collector output		Signals can be output from the open collector terminals by setting **Pr.291**. (maximum output pulse: 50kpulses/s)	
	Analog	AM	Analog voltage output		Output item: output frequency (initial setting), output signal 0 to ±10 VDC, permissible load current 1 mA (load impedance 10 kΩ or more), resolution 8 bit	
		CA*6	Analog current output		Output item: output frequency (initial setting), Load impedance 200 Ω to 450 Ω Output signal 0 to 20 mADC	
Communication		–	PU connector	With the PU connector, communication can be made through RS-485. (1:1 connection only) • Conforming standard: EIA-485(RS-485) • Communication speed: 4800 to 115200 bps • Transmission format: Multi-drop link • Wiring length: 500 m		
	RS-485 terminals	TXD+, TXD-	Inverter transmission terminal	With the RS-485 terminals, communication can be made through RS-485. • Conforming standard: EIA-485(RS-485) • Communication speed: 300 to 115200 bps • Transmission format: Multi-drop link • Overall extension: 500 m		
		RXD+, RXD-	Inverter reception terminal			
		GND (SG)	Earth (Ground)			
	–		USB A connector	A connector (receptacle). A USB memory device enables parameter copies and the trace function.		Interface: Conforms to USB1.1 (USB2.0 full-speed compatible). Transmission speed: 12 Mbps
			USB B connector	Mini B connector (receptacle). Connected to a personal computer via USB to enable setting, monitoring, test operations of the inverter by FR Configurator2.		
Safety stop signal		S1	Safety stop input (Channel 1)	The terminals S1 and S2 are used for the safety stop input signal for the safety relay module. The terminals S1 and S2 are used at the same time (dual channel). Inverter output is shutoff by shortening/opening between terminals S1 and SIC, or between S2 and SIC. In the initial status, terminals S1 and S2 are shorted with the terminal PC by shorting wires. The terminal SIC is shorted with the terminal SD. Remove the shorting wires and connect the safety relay module when using the safety stop function.		Input resistance 4.7 kΩ Input current 4 to 6 mADC (with 24 VDC input)
		S2	Safety stop input (Channel 2)			
		SIC	Safety stop input terminal common	Common terminal for terminals S1 and S2.		–
		SO	Safety monitor output (open collector output)	Indicates the safety stop input signal status. Switched to LOW when the status is other than the internal safety circuit failure. Switched to HIGH during the internal safety circuit failure status. (LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).) Refer to the Safety stop function instruction manual (BCN-A23228-001) when the signal is switched to HIGH while both terminals S1 and S2 are open.		Permissible load 24 VDC (27 VDC at maximum), 0.1 A (A voltage drop is 3.4 V at maximum while the signal is ON.) (A voltage drop is 3.4 V at maximum while the signal is ON.)
		SOC	Safety stop input terminal common	Common terminal for terminal SO.		–

*1: Terminals R/L1, S/L2, T/L3, PR, P3, P1, and PX are not provided in the separated converter type.
*2: The terminal P3 is equipped in the FR-F820-00770(18.5K) to 01250(30K) and the FR-F840-00470(22K) to 01800(75K).
*3: Sink logic is initially set for the FM-type inverter.
*4: Source logic is initially set for the CA-type inverter.
*5: Terminal FM is provided in the FM-type inverter.
*6: Terminal CA is provided in the CA-type inverter.
*7: Function and name of the separated converter type.

Converter unit (FR-CC2)

Type		Terminal Symbol	Terminal Name	Description	
Main circuit		R/L1, S/L2, T/L3	AC power input	Connect these terminals to the commercial power supply.	
		R1/L11, S1/L21	Power supply for the control circuit	Connected to the AC power supply terminals R/L1 and S/L2. To retain the fault display and fault output, remove the jumpers across terminals R/L1 and R1/L11 and across S/L2 and S1/L21 and supply external power to these terminals.	
		P/+, N/-	Inverter connection	Connect to terminals P/+ and N/- of the inverter.	
		⏚	Earth (ground)	For earthing (grounding) the converter unit chassis. This must be earthed (grounded).	
Control circuit/input signal	Contact input	RES	Reset	Use this signal to reset a fault output provided when a protective function is activated. Turn ON the RES signal for 0.1 s or longer, then turn it OFF. In the initial setting, reset is always enabled. By setting **Pr.75**, reset can be set enabled only at fault occurrence of the converter unit. The inverter recovers about 1 s after the reset is released.	
		OH	External thermal relay input	The external thermal relay input (OH) signal is used when using an external thermal relay or a thermal protector built into the motor to protect the motor from overheating. When the thermal relay is activated, the inverter trips by the external thermal relay operation (E.OHT).	
		RDI	Contact input	The function can be assigned by setting **Pr.178**.	
		SD	Contact input common (sink) (Initial setting)	Common terminal for contact input terminal (sink logic).	
			External transistor common (source)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
			24 VDC power supply common	Common terminal for the 24 VDC power supply (terminal PC, terminal +24) Isolated from terminal SE.	
		PC	External transistor common (sink) (Initial setting)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
			Contact input common (source)	Common terminal for contact input terminal (source logic).	
			24 VDC power supply common	Can be used as a 24 VDC 0.1 A power supply.	
	External power supply input	+24	24 V external power supply input	For connecting a 24 V external power supply. If a 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF.	Input voltage 23 to 25.5 VDC Input current 1.4 A or less
Control circuit/output signal	Relay	A1, B1, C1	Relay output 1 (fault output)	1 changeover contact output that indicates that the protective function of the converter unit has been activated and the outputs are stopped. Fault: discontinuity across B and C (continuity across A and C), Normal: continuity across Band C (discontinuity across A and C)	Contact capacity 230 VAC 0.3 A (power factor = 0.4) 30 VDC 0.3 A
		88R, 88S	For manufacturer setting. Do not use.		
	Open collector	RDA	Inverter operation enable (NO contact)	Switched to LOW when the converter unit operation is ready. Assign the signal to the terminal MRS (X10) of the inverter. The inverter can be started when the RDA status is LOW.	Permissible load 24 VDC (maximum 27 VDC) 0.1 A (The voltage drop is 2.8 V at maximum while the signal is ON.) LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).
		RDB	Inverter operation enable (NC contact)	Switched to LOW when a converter unit fault occurs or the converter is reset. The inverter can be started when the RDB status is HIGH.	
		RSO	Inverter reset	Switched to LOW when the converter is reset (RES-ON). Assign the signal to the terminal RES of the inverter. The inverter is reset when it is connected with the RSO status LOW.	
		IPF	Instantaneous power failure	Switched to LOW when an instantaneous power failure is detected.	
		FAN	Cooling fan fault	Switched to LOW when a cooling fan fault occurs.	
		SE	Open collector output common	Common terminal for terminals RDA, RDB, RSO, IPF, FAN	
Communication		—	PU connector	With the PU connector, communication can be made through RS-485. (For connection on a 1:1 basis only) • Conforming standard: EIA-485 (RS-485) • Transmission format: Multidrop link • Communication speed: 4800 to 115200 bps • Wiring length: 500 m	
	RS-485 terminals	TXD+	Converter unit transmission terminal	The RS-485 terminals enable the communication by RS-485. • Conforming standard: EIA-485 (RS-485) • Transmission format: Multidrop link • Communication speed: 300 to 115200 bps • Overall length: 500 m	
		TXD-			
		RXD+	Converter unit reception terminal		
		RXD-			
		GND (SG)	Earthing (grounding)		

□ indicates that terminal functions can be selected from **Pr.178, Pr.187, Pr.189 to Pr.195 (I/O terminal function selection)**.
Terminal names and terminal functions are those of the factory set.

MEMO

Inverter FREQROL-E700 Series

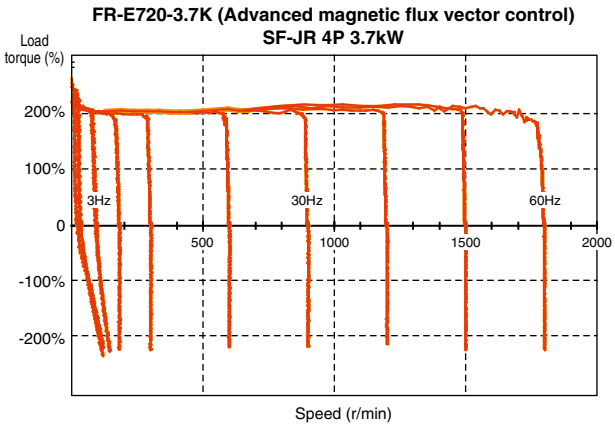
Compact body with easy use and High-class drive performance

Top Level of Driving Performance in Compact Body

High Torque 200%/0.5Hz is Realized by Advanced Magnetic Flux Vector Control (3.7K or less)

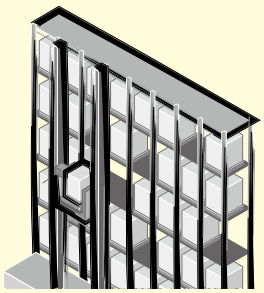
By the advancement of General-purpose magnetic flux vector control to Advanced magnetic flux vector control, top level of driving performance becomes possible.
Since V/F control and General-purpose magnetic flux vector control operations are available, operation after replacement of the conventional model (FR-E500 series) is ensured.
For the 5.5K to 15K, 150%/0.5Hz torque is realized.

■Speed/torque characteristics example



Advanced auto tuning

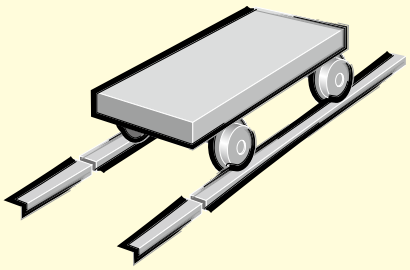
Many kinds of three phase induction motors can be optimally controlled with Mitsubishi's original "non-rotation" auto tuning function. High precision tuning is enabled even when a test operation of a machine cannot be performed at parameter adjustment.



Advanced magnetic flux vector control is ideal for a lift in an automated-storage system which requires high torque at low speed.

Short Time Overload Capacity is Increased (200% 3s)

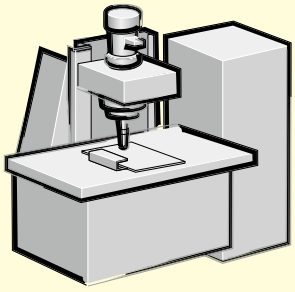
Short time overload capacity is increased to 200% 3s (200% 0.5s for the conventional model). Overcurrent trip is less likely to occur.



When a bogie runs over a bump, the impact can be beared by this function.

Torque Limit/Current Limit Function

Improved torque limit/current limit function provides a machine protection, load limit, and stop-on-contact operation.



Using the torque limit function, machine breakage from overload can be avoided.
For example, edge chipping of a tool can be avoided.

Improved Regeneration Capability

A brake transistor is built-in to the 0.4K to 15K.
Connecting an optional brake resistor increases regeneration capability.

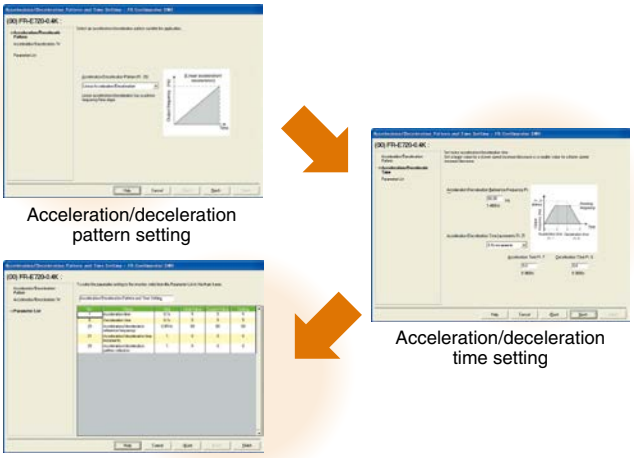
Enhanced Operability

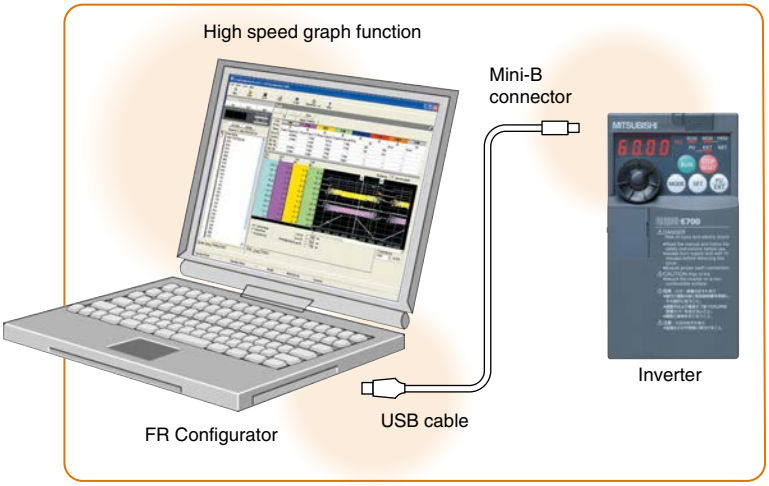
Usability was thoroughly pursued.

With a Provided USB Connector, Setting is Easily Done from a Personal Computer Using FR Configurator

An USB connector (mini-B connector) is provided as standard. The inverter can be easily connected without a USB-RS-485 converter.
Wizard (interactive) function of FR Configurator (inverter setup software) provides setting support.
In addition, a high-speed graph function with USB enables high speed sampling display.

Setting wizard function (example: acceleration/deceleration time setting)





Expanded advanced operability with USB and FR Configurator

Enclosure Surface Operation Panel FR-PA07 (Option)

Optional enclosure surface operation panel (FR-PA07) can be connected.
In addition, an operation panel for conventional model (FR-E500 series) can be connected.

The operation panel of the inverter cannot be removed.
A parameter unit connection cable (FR-CB20□) is separately required.



Parameter Unit FR-PU07/FR-PU07BB(-L) (Option)

The FR-PU07/FR-PU07BB(-L), an optional parameter unit, can be connected as well.

A parameter unit connection cable (FR-CB20□) is separately required. (Parameter unit connection cable FR-CB203 (3m) is enclosed with FR-PU07BB(-L).)



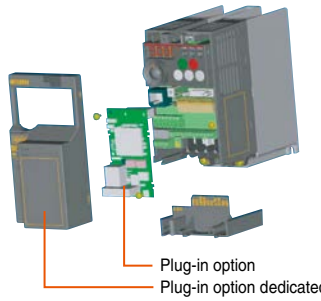
- Setting such as direct input method with a numeric keypad, operation status indication, and help function are useful.
  The display language can be selected from 8 languages.
- Parameter settings of maximum of three inverters can be stored.
- A battery pack type (FR-PU07BB(-L)) allows parameter setting and parameter copy without powering on the inverter.
  To use a parameter unit with battery pack (FR-PU07BB) outside of Japan, order a "FR-PU07BB-L" (parameter unit type indicated on the package has L at the end).

Enhanced Expandability

Mitsubishi inverters offer the expandability that answers to every need

A Variety of Plug-in Options are Mountable

Plug-in options supporting digital input, analog output extension, and a variety of communications provide extended functions which is almost equivalent to the FR-A700 series. (One type of plug-in option can be mounted.)
[For the FR-E700 series, use the "FR-A7 □□ E kit" which is a set of optional board and dedicated front cover.]



These plug-in options are supported by the standard control circuit terminal model.

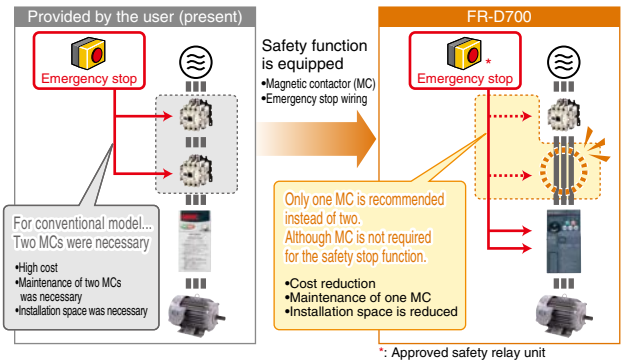
Compatible Plug-in Options

- FR-A7AX E kit ...16-bit digital input
- FR-A7AY E kit ...Digital output
  Extension analog output
- FFR-A7AR E kit ...Relay output
- FR-A7NC E kit ...CC-Link
- FR-A7ND E kit ...DeviceNet
- FR-A7NP E kit ...PROFIBUS-DP
- FR-A7NL E kit ...LonWorks

Safety Stop Function (FR-E700-SC)

- Spring clamp terminals are adopted as control circuit terminals.
  Spring clamp terminals are highly reliable and can be easily wired.
- The FR-E700-SC series is compliant to the EU Machinery Directive without the addition of previously required external devices.
  Operation of an external emergency stop device results in a highly reliable immediate shutoff of the D700's output to the motor.
  This safety stop function conforms to the following standards.

EN ISO 13849-1 Category 3 / PLd
EN62061 / IEC61508 SIL2



*: Approved safety relay unit

Control Terminals are Selectable According to Applications

Terminal cards other than standard terminal such as analog, plus train (available soon), two port RS-485 terminal are available as options.
A crimp ring terminal type is also available (to be released).
A terminal card is removable and can be easily replaced from a standard terminal card.



Various Kinds of Networks are Supported

- EIA-485 (RS-485), ModbusRTU (equipped as standard), CC-Link, PROFIBUS-DP, DeviceNet®, LonWorks® (option)

LonWorks® is a registered trademark of Echelon Corporation, DeviceNet® is of ODVA, and PROFIBUS is of PROFIBUS User Organization.
Other company and product names herein are the trademarks of their respective owners.

Compact and Space Saving

Compact design expands flexibility of enclosure design.

Compact Body with High Performance Function

Installation size is the same as the conventional model (FR-E500 series) in consideration of intercompatibility. (7.5K or less)



Side by Side Installation Saves Space

Space can be saved by side by side no clearance installation*.

*: Use the inverter at the surrounding air temperature of 40°C or less.



Peripheral device — Mitsubishi magnetic contactors

- Offer a selection of small frames
- Offer a line-up of safety contactors
- Support with low-level load (auxiliary contact)
- Support many international regulations as a standard model



Ensured Maintenance

700 series are the pioneer of long life and high reliability.

Long-life Design

- The design life of the cooling fan has been extended to 10 years*1. The life of the fan can be further extended utilizing the it's ON/OFF control.
- The design life of the capacitors has been extended to 10 years by adopting a capacitor that endures 5000 hours at 105°C surrounding air temperature*1, *2.

*1: Surrounding air temperature : annual average 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt) Since the design life is a calculated value, it is not a guaranteed value.
*2: Output current : 80% of the inverter rated current

- Life indication of life components

Components	Guideline of the FR-E700 Life	Guideline of JEMA*3
Cooling fan	10 years	2 to 3 years
Main circuit smoothing capacitor	10 years	5 years
Printed board smoothing capacitor	10 years	5 years

*3: Excerpts from "Periodic check of the transistorized inverter" of JEMA (Japan Electrical Manufacturer's Association)

Leading Life Check Function

- Degrees of deterioration of main circuit capacitor, control circuit capacitor, and inrush current limit circuit can be monitored.
- Trouble can be avoided with the self-diagnostic alarm*4 that is output when the life span is near.

*4: Any one of main circuit capacitor, control circuit capacitor, inrush current limit circuit or cooling fan reaches the output level, an alarm is output.
Capacity of the main circuit capacitor can be measured by setting parameter at a stop and turning the power from off to on. Measuring the capacity enables an alarm to be output.

Easy Replacement of Cooling Fan

- A cooling fan is provided on top of the inverter for all capacities requiring a cooling fan*.
  A cooling fan can be easily replaced without disconnecting main circuit wires.

*: Cooling fans are equipped with FR-E720-1.5K or more, FR-E740-1.5K or more, and FR-E720S-0.75K or more.



Combed Shaped Wiring Cover

Since a wiring cover can be installed after wiring, wiring work is easily done.



Removable Control Terminal Block

Wiring of the control circuit when replacing the same series inverter can be done by changing the terminal block.

Environment-Friendly

Human and environment-friendly inverter

Compliance with the EU Restriction of Hazardous Substances (RoHS)

- The inverter is human and environment-friendly by being compliance with the RoHS Directive.

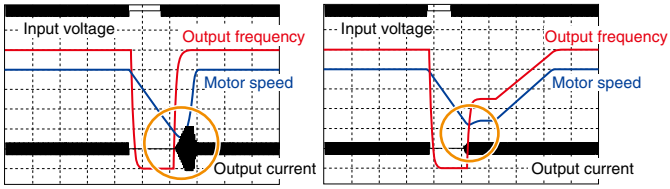
Filter Options

- The inverter with filterpack FR-BFP2 (a package of power factor improving DC reactor, common mode choke and capacitive filter) conforms to the Japanese harmonic suppression guideline.
- Noise filter option which is compatible with EMC Directive (EN61800-3 2nd Environment Category C3) is available.

Full of Useful Functions

Enhanced functions for all sorts of applications

- Automatic restart after instantaneous power failure function with frequency search



FR-E500 series FR-E700 series

Detection of coasting speed (frequency search function) prevents the motor speed from decreasing at a restart, starting the motor smoothly with less output current.

- Power-failure deceleration stop function/operation continuation at instantaneous power failure function
  The motor can be decelerated to a stop when a power failure or undervoltage occurs to prevent the motor from coasting.
  This function is useful to stop a motor at power failure as a fail safe of machine tool, etc.
  With the new operation continuation function at instantaneous power failure, the motor continues running without coasting even if an instantaneous power failure occurs during operation.

*: The inverter may trip and the motor may coast depending on the load condition.

- Brake sequence mode ····· is useful for mechanical brake control of a lift.
- Regeneration avoidance function ····· prevents regenerative overvoltage in a pressing machine.
- Optimum excitation control ····· can save more energy with the maximum motor efficiency control.
- Main circuit power supply DC input ····· can be connected to DC power supply.
- Enhanced I/O terminal function ····· supports switchover of analog input (voltage / current).
- Password function ····· is effective for parameter setting protection.

and so on

Energy saving design for fan/pump use

- Applicable load selection (Pr.14)
  Selecting the best output characteristics (V/F characteristics) according to use and load characteristics is possible.
- Optimum excitation control (Pr.60)
  Save more energy with control that maximizes motor efficiency.

Lineup

FR-E720 □ -0.1K □ -□

Symbol	Voltage
1	100V class
2	200V class
4	400V class

Symbol	Number of Power Phases
None	Three-phase input
S	Single-phase input
W	Single-phase input (double voltage output)

Symbol	Inverter Capacity
0.1K to 15K	Represents the inverter capacity "kW".

Symbol	Control circuit terminal specification
None	Standard control circuit terminal model (screw type)
SC	Safety stop function model
NF	FL remote communication compatible model
NC	CC-Link communication compatible model

Symbol	Protective Structure
None	Enclosed-type structure IP20
C	Totally enclosed structure IP40

Inverter Model \ Inverter capacity		0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K
Three-phase 200V FR-E720-□□	Enclosed-type structure (IP20)	●	●	●	●	●	●	●	●	●	●	●
	Totally enclosed structure (IP40)	○	○	○	○	○	○	○	○	○	○	○
Three-phase 400V FR-E740-□□	Enclosed-type structure (IP20)	—	—	●	●	●	●	●	●	●	●	●
	Totally enclosed structure (IP40)	—	—	○	○	○	○	○	○	○	○	○
Single-phase 200V FR-E720S-□□*	Enclosed-type structure (IP20)	●	●	●	●	●	●	—	—	—	—	—
Single-phase 100V FR-E710W-□□*	Enclosed-type structure (IP20)	●	●	●	●	—	—	—	—	—	—	—

*:Output of the single-phase 200V and single-phase 100V input specifications is three-phase 200V.

●:Available models ○:Models to be released —:Not available

Inverter type \ Inverter Capacity		0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K
3-phase 200V class	FR-E720-□□NF/NC	●	●	●	●	●	●	●	●	●	●	●
3-phase 400V class	FR-E740-□□NF/NC	—	—	●	●	●	●	●	●	●	●	●

●:Available models —:Not available



Complies with UL, cUL, EC Directives (CE marking) as a standard model

Single-phase 100V power input specification models are not in compliance with the EMC Directive.

Our inverters comply with RoHS Directive and are eco friendly to people and the environment.

Installation Example

AC power supply
Use within the permissible power supply specifications of the inverter.
To ensure safety, use a moulded case circuit breaker, earth leakage circuit breaker or magnetic contactor to switch power ON/OFF.

Moulded case circuit breaker (MCCB) or earth leakage current breaker (ELB), fuse
The breaker must be selected carefully since an in-rush current flows in the inverter at power on.

Magnetic contactor (MC)
Install the magnetic contactor to ensure safety. Do not use this magnetic contactor to start and stop the inverter. Doing so will cause the inverter life to be shorten.

Reactor (FR-HAL, FR-HEL option)
Install reactors to suppress harmonics and to improve the power factor.
A reactor (option) is required when installing the inverter near a large power supply system (500kVA or more).
The inverter may be damaged if you do not use reactors. Select the reactor according to the model. Remove the jumpers across terminals P/+ - P1 to connect the DC reactor.

Parameter unit (FR-PU07/FR-PU07BB(-L))

Enclosure surface operation panel (FR-PA07)
Connect a connection cable (FR-CB2) to the PU connector to use the FR-PA07, FR-PU07/FR-PU07BB(-L).

USB connector
A personal computer and an inverter can be connected with a USB (Ver1.1) cable.

Approved safety relay module
Required for compliance with safety standard.
S1
S2
PC

Brake resistor (FR-ABR, MRS, MYS)
Braking capability can be improved. (0.4K or more)
Always install a thermal relay when using a brake resistor whose capacity is 11K or more.
P/+
PR

AC reactor (FR-HAL)

DC reactor (FR-HEL)*

P/+ P1

R/L1 S/L2 T/L3

P/+ N/-

Earth (Ground)

U V W

EMC filter (ferrite core)* (FR-BSF01, FR-BLF)
Install a noise filter to reduce the electromagnetic noise generated from the inverter. Effective in the range from about 1MHz to 10MHz. When more wires are passed through, a more effective result can be obtained. A wire should be wound four turns or more.

EMC filter (capacitor)* (FR-BIF)
Reduces the radio noise.

EMC filter (ferrite core) (FR-BSF01, FR-BLF)
Install a noise filter to reduce the electromagnetic noise generated from the inverter. Effective in the range from about 1MHz to 10MHz. A wire should be wound four turns at a maximum.

Motor

Earth (Ground)

*Filterpack (FR-BFP2), which contains DC reactor and noise filter in one package, is also available.

Brake unit (FR-BU2)
P/+ PR
P/+
PR

High power factor converter (FR-HC)
Power supply harmonics can be greatly suppressed.
Install this as required.*2

Power regeneration common converter (FR-CV)
Great braking capability is obtained.
Install this as required.*2

Register unit (FR-BR) Discharging resistor (GZG, GRZG)
The regenerative braking capability of the inverter can be exhibited fully.
Install this as required.

Devices connected to the output
Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the output side of the inverter. When installing a moulded case circuit breaker on the output side of the inverter, contact each manufacturer for selection of the moulded case circuit breaker.

Earth (Ground)
To prevent an electric shock, always earth (ground) the motor and inverter. For reduction of induction noise from the power line of the inverter, it is recommended to wire the earth (ground) cable by returning it to the earth (ground) terminal of the inverter.

: Install these options as required.

*2 Can be used only with standard control circuit terminal specification models and safety-stop function models.

■Standard specifications

●Rating

Three-phase 200V power supply

Model FR-E720-□K*9(-C)*10		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	0.3	0.6	1.2	2.0	3.2	4.4	7.0	9.5	13.1	18.7	23.9
	Rated current (A)*7	0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)	8.0 (7.0)	11 (10)	17.5 (16.5)	24 (23)	33 (31)	47 (44)	60 (57)
	Overload current rating*3	150% 60s, 200% 3s (inverse-time characteristics)										
	Voltage*4	Three-phase 200 to 240V										
	Regenerative braking torque*5	150%		100%		50%	20%					
Power supply	Rated input AC (DC) voltage/ frequency	Three-phase 200 to 240V 50Hz/60Hz (283 to 339VDC*8)										
	Permissible AC (DC) voltage fluctuation	170 to 264V 50Hz/60Hz (240 to 373VDC*8)										
	Permissible frequency fluctuation	±5%										
	Power supply capacity (kVA)*6	0.4	0.8	1.5	2.5	4.5	5.5	9	12	17	20	28
Protective structure (JEM1030)		Enclosed type (IP20). IP40 for totally enclosed structure series.										
Cooling system		Self-cooling				Forced air cooling						
Approximate mass (kg)		0.5	0.5	0.7	1.0	1.4	1.4	1.7	4.3	4.3	6.5	6.5

Three-phase 400V power supply

Model FR-E740-□K*9(-C)*10		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)*1		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	1.2	2.0	3.0	4.6	7.2	9.1	13.0	17.5	23.0
	Rated current (A)*7	1.6 (1.4)	2.6 (2.2)	4.0 (3.8)	6.0 (5.4)	9.5 (8.7)	12	17	23	30
	Overload current rating*3	150% 60s, 200% 3s (inverse-time characteristics)								
	Voltage*4	Three-phase 380 to 480V								
	Regenerative braking torque*5	100%		50%	20%					
Power supply	Rated input voltage/frequency	Three-phase 380 to 480V 50Hz/60Hz								
	Permissible AC voltage fluctuation	325 to 528V 50Hz/60Hz								
	Permissible frequency fluctuation	±5%								
	Power supply capacity (kVA)*6	1.5	2.5	4.5	5.5	9.5	12	17	20	28
Protective structure (JEM1030)		Enclosed type (IP20). IP40 for totally enclosed structure series.								
Cooling system		Self-cooling		Forced air cooling						
Approximate mass (kg)		1.4	1.4	1.9	1.9	1.9	3.2	3.2	6.0	6.0

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 230V for three-phase 200V class and 440V for three-phase 400V class.
*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque. When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used. (Option brake resisitor cannot be used for 0.1K and 0.2K.)
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*7 Setting 2kHz or more in **Pr. 72 PWM frequency selection** to perform low acoustic noise operation in the surrounding air temperature exceeding 40°C (totallyenclosed structure is 30°C), the rated output current is the value in parenthesis.
*8 • Connect DC power supply to terminal P/+ and N/-. Connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-.
• Since the voltage between P/+ and N/- may increase due to the regeneration energy from the motor and exceeds 415V temporarily, select the DC power supply which can withstand the voltage/energy during regeneration. If using the power supply which can not withstand voltage/energy during regeneration, insert diodes in series for reverse current prevention.
• Although the FR-E700 series has the built-in inrush current limit circuit, select the DC power supply considering the inrush current at powering ON as the inrush current four times of the rated inverter flows at powering ON.
• Since the power supply capacity depends on the output impedance of the power, select the power supply capacity which has enough allowance according to the AC power supply system capacity.
*9 The safety stop function model is indicated with SC.
*10 FL remote communication compatible models are indicated with “NF”.
*11 CC-Link communication compatible models are indicated with “NC”.

Single-phase 200V power supply

Model FR-E720S-□K(SC)*10		0.1	0.2	0.4	0.75	1.5	2.2
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75	1.5	2.2
Output	Rated capacity (kVA)*2	0.3	0.6	1.2	2.0	3.2	4.4
	Rated current (A)*7	0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)	8.0 (7.0)	11.0 (10.0)
	Overload current rating*3	150% 60s, 200% 3s (inverse-time characteristics)					
	Rated output voltage*4	Three-phase 200 to 240V					
	Regenerative braking torque*5	150%		100%		50%	20%
Power supply	Rated input AC voltage/frequency	Single-phase 200 to 240V 50Hz/60Hz					
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz					
	Permissible frequency fluctuation	Within ±5%					
	Power supply capacity (kVA)*6	0.5	0.9	1.5	2.5	4.0	5.2
Protective structure (JEM1030)		Enclosed type (IP20)					
Cooling system		Self-cooling			Forced air cooling		
Approximate mass (kg)		0.6	0.6	0.9	1.4	1.5	2.0

Single-phase 100V power supply

Model FR-E710W-□K		0.1	0.2	0.4	0.75
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75
Output	Rated capacity (kVA)*2	0.3	0.6	1.2	2.0
	Rated current (A)*7	0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)
	Overload current rating*3	150% 60s, 200% 3s (inverse-time characteristics)			
	Rated output voltage*4	Three-phase 200 to 230V*8, *9			
	Regenerative braking torque*5	150%		100%	
Power supply	Rated input AC voltage/frequency	Single-phase 100 to 115V 50Hz/60Hz			
	Permissible AC voltage fluctuation	90 to 132V 50Hz/60Hz			
	Permissible frequency fluctuation	Within ±5%			
	Power supply capacity (kVA)*6	0.5	0.9	1.5	2.5
Protective structure (JEM1030)		Enclosed type (IP20)			
Cooling system		Self-cooling			
Approximate mass (kg)		0.6	0.7	0.9	1.5

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 230V.
*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load. If the automatic restart after instantaneous power failure function **(Pr. 57)** or power failure stop function **(Pr. 261)** is set and power supply voltage is low while load becomes bigger, the bus voltage decreases to power failure detection level and load of 100% or more may not be available.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque. When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used. (Option brake resisitor cannot be used for 0.1K and 0.2K.)
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*7 Setting 2kHz or more in **Pr. 72 PWM frequency selection** to perform low acoustic noise operation with the surrounding air temperature exceeding 40°C, the rated output current is the value in parenthesis.
*8 For single-phase 100V power input model, the maximum output voltage is twice the amount of the power supply voltage and cannot be exceeded.
*9 In a single-phase 100V power input model, the output voltage may fall down when the load is heavy, and larger output current may flow compared to a threephase input model. Use the motor with less load so that the output current is within the rated motor current range.
*10 The safety stop function model is indicated with SC.

●Common specifications

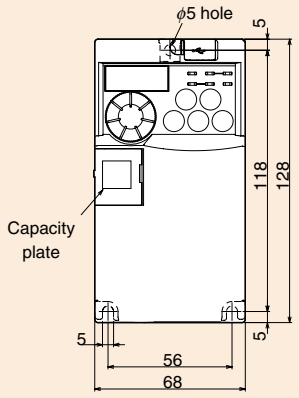
Control specifications	Control method		Soft-PWM control/high carrier frequency PWM control (V/F control, Advanced magnetic flux vector control, General-purpose magnetic flux vector control, Optimum excitation control are available)
	Output frequency range		0.2 to 400Hz
	Frequency setting resolution	Analog input	0.06Hz/60Hz (terminal2, 4: 0 to 10V/10bit) 0.12Hz/60Hz (terminal2, 4: 0 to 5V/9bit) 0.06Hz/60Hz (terminal4: 0 to 20mA/10bit)
		Digital input	0.01Hz
	Frequency accuracy	Analog input	Within ±0.5% of the max. output frequency (25°C ±10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 400Hz, Constant-torque/variable torque pattern can be selected
	Starting torque		200% or more (at 0.5Hz)...when Advanced magnetic flux vector control is set (3.7K or less)
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0.01 to 360s, 0.1 to 3600s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/ deceleration modes are available.
	DC injection brake		Operation frequency (0 to 120Hz), operation time (0 to 10s), operation voltage (0 to 30%) can be changed.
	Stall prevention operation level		Operation current level can be set (0 to 200% adjustable), whether to use the function or not can be selected
Operation specifications	Frequency setting signal	Analog input	Two terminals Terminal 2: 0 to 10V, 0 to 5V can be selected Terminal 4: 0 to 10V, 0 to 5V, 4 to 20mA can be selected
		Digital input	The signal is entered from the operation panel or parameter unit. Frequency setting increment can be set. 4 digit BCD or 16bit binary data (when the option FR-A7AX E kit is used)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signal (Standard control circuit terminal model:Seven terminals Safety stop function model: Six terminals)		The following signals can be assigned to **Pr. 178 to Pr.184 (input terminal function selection)**: multi-speed selection, remote setting, stop-on contact selection, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, brake opening completion signal, external thermal input, PU-External operation switchover, V/F switchover, output stop, start self-holding selection, forward rotation, reverse rotation command, inverter reset, PU-NET operation switchover, External-NET operation switchover, command source switchover, inverter operation enable signal, and PU operation external interlock
	Operational functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, brake sequence, second function, multi-speed operation, stop-on contact control, droop control, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS-485)
	Safety stop function*2		Safety shutoff signal can be input from terminals S1 and S2. (compliant with EN ISO 13849-1 Category 3 / PLd EN62061 / IEC61508 SIL2)
	Output signal Open collector output (Two terminals) Relay output (One terminal)	Operating status	The following signals can be assigned to **Pr.190 to Pr.192 (output terminal function selection)**: inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake prealarm, electronic thermal relay function prealarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, brake opening request, fan alarm*1, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, safety monitor output*2, safety monitor output2*2, during retry, life alarm, current average value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm
		For meter Pulse train output (Max. 2.4kHz: one terminal)	The following signals can be assigned to **Pr.54 FM terminal function selection**: output frequency, motor current (steady), output voltage, frequency setting, motor torque, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, reference voltage output, motor load factor, PID set point, PID measured value, output power Pulse train output (1440 pulses/s/full scale)
Indication	Operation panel Parameter unit (FR-PU07)	Operating status	The following operating status can be displayed: output frequency, motor current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, motor torque, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, I/O terminal option monitor, output power, cumulative power, motor thermal load factor, and inverter thermal load factor.
		Fault record	Fault record is displayed when a fault occurs. Past 8 fault records (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored
		Interactive guidance	Function (help) for operation guide*3
Protective/warning function		Protective functions	Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage during acceleration, overvoltage during constant speed, overvoltage during deceleration, inverter protection thermal operation, motor protection thermal operation, heatsink overheat, input phase failure*5, output side earth ground) fault overcurrent at start*4, output phase failure, external thermal relay operation*4, option fault*4, parameter error, internal board fault, PU disconnection, retry count excess*4, CPU fault, brake transistor alarm, inrush resistance overheat, communication error, analog input error, USB communication error, brake sequence error 4 to 7*4, safety circuit fault*2
		Warning functions	Fan alarm*1, overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake prealarm*4, electronic thermal relay function prealarm, maintenance output*4, undervoltage, operation panel lock, password locked, inverter reset, safety stop*2
Environment	Surrounding air temperature		-10°C to +50°C (non-freezing) (-10°C to +40°C for totally-enclosed structure feature)*6
	Ambient humidity		90%RH or less (non-condensing)
	Storage temperature*7		-20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt etc.)
	Altitude/vibration		Maximum 1000m above sea level, 5.9m/s² or less at 10 to 55Hz (directions of X, Y, Z axes)

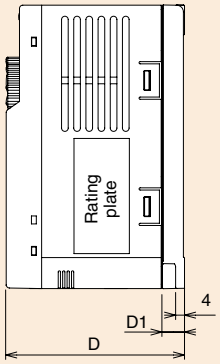
*1 As the FR-E720-0.1K(SC) to 0.75K(SC), FR-E740-0.4K(SC) and 0.75K(SC), FR-E720S-0.1K(SC) to 0.4K(SC), FR-E710W-0.1K to 0.75K are not provided with the cooling fan, this alarm does not function.
*2 This function is only available for the safety stop function model.
*3 This operation guide is only available with option parameter unit (FR-PU07).
*4 This protective function does not function in the initial status.
*5 This protective function is available with the three-phase power input model only.
*6 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0cm clearance).
*7 Temperatures applicable for a short time, e.g. in transit.

■Standard Model

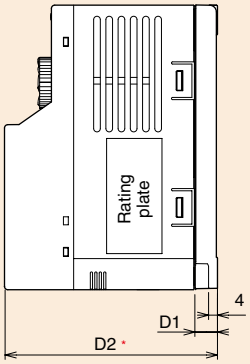
Outline Dimension Drawings

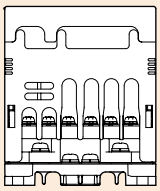
- FR-E720-0.1K(SC) to 0.75K(SC)
- FR-E720S-0.1K(SC) to 0.4K(SC)
- FR-E710W-0.1K to 0.4K





When used with the plug-in option





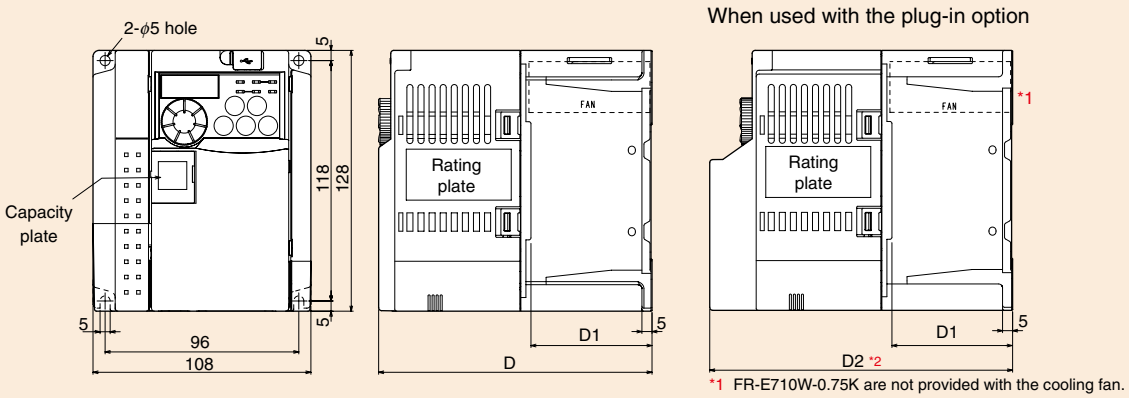
Inverter Model	D	D1	D2*
FR-E720-0.1K, 0.2K FR-E720S-0.1K, 0.2K FR-E710W-0.1K	80.5	10	95.6
FR-E720-0.1KSC, 0.2KSC FR-E720S-0.1KSC, 0.2KSC	86.5		108.1
FR-E710W-0.2K	110.5	10	125.6
FR-E720-0.4K	112.5	42	127.6
FR-E720-0.4KSC	118.5		140.1
FR-E720-0.75K	132.5	62	147.6
FR-E720-0.75KSC	138.5		160.1
FR-E720S-0.4K FR-E710W-0.4K	142.5	42	157.6
FR-E720S-0.4KSC	148.5		170.1

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

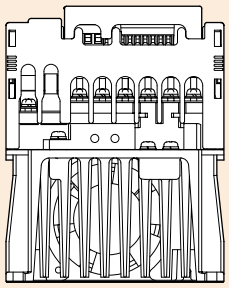
(Unit: mm)

Outline Dimension Drawings

- FR-E720-1.5K(SC), 2.2K(SC)
- FR-E720S-0.75K(SC), 1.5K(SC)
- FR-E710W-0.75K



*1 FR-E710W-0.75K are not provided with the cooling fan.

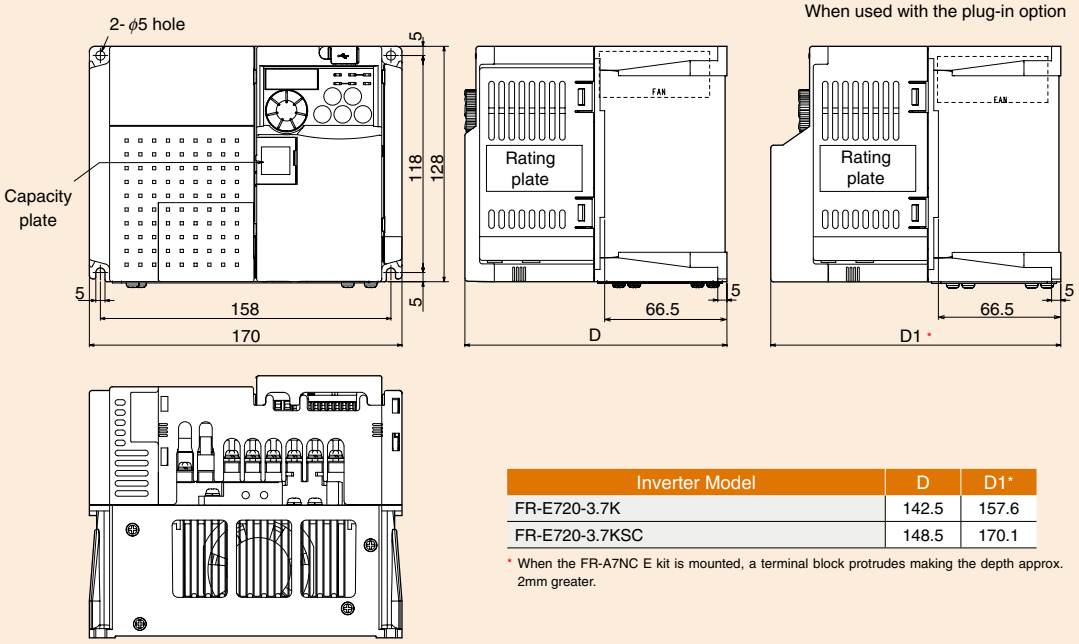


Inverter Model	D	D1	D2*2
FR-E720-1.5K, 2.2K FR-E720S-0.75K	135.5	60	150.6
FR-E720-1.5KSC, 2.2KSC FR-E720S-0.75KSC	141.5		163.1
FR-E720S-1.5K	161		176.1
FR-E720S-1.5KSC	167		188.6
FR-E710W-0.75K	155	54	170.1

*2 When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

- FR-E720-3.7K(SC)



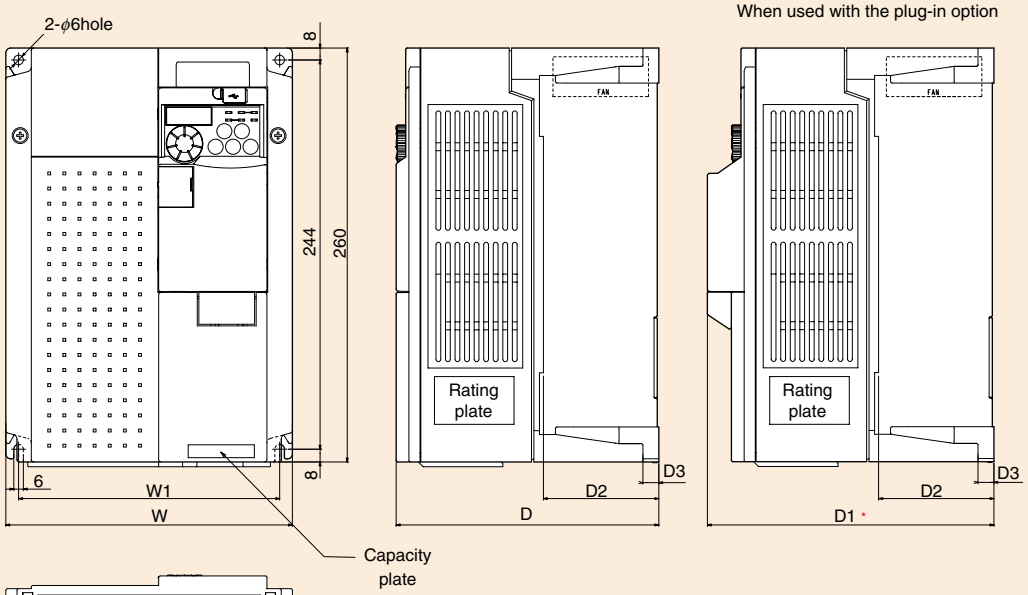
Inverter Model	D	D1*
FR-E720-3.7K	142.5	157.6
FR-E720-3.7KSC	148.5	170.1

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

Outline Dimension Drawings

●FR-E720-5.5K(SC) to 15K(SC)

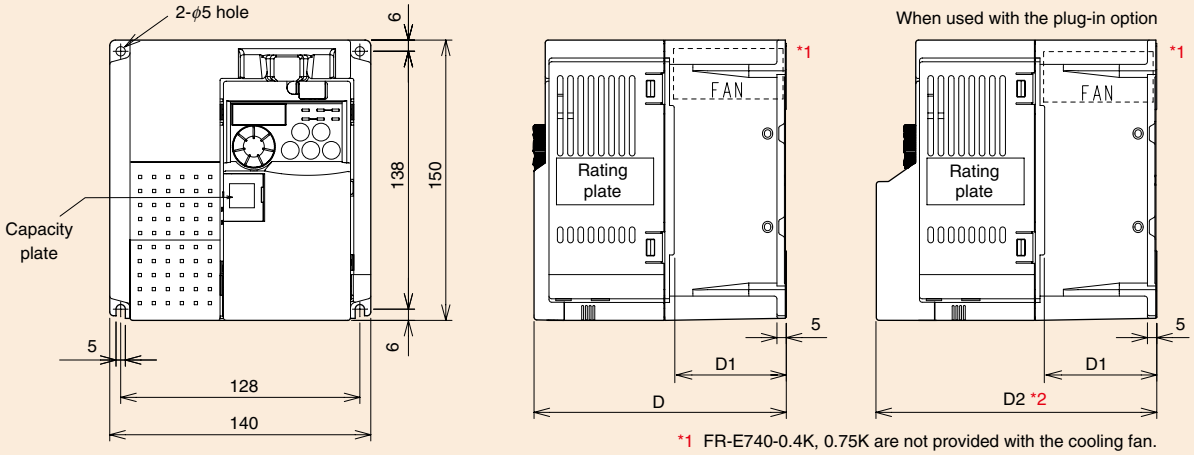


Inverter Model	W	W1	W2	D	D1*	D2	D3
FR-E720-5.5K, 7.5K	180	164	180	165	180.1	71.5	10
FR-E720-5.5KSC, 7.5KSC				171	192.6		
FR-E720-11K, 15K	220	195	211	190	205.1	84.5	10.5
FR-E720-11KSC, 15KSC				196	217.6		

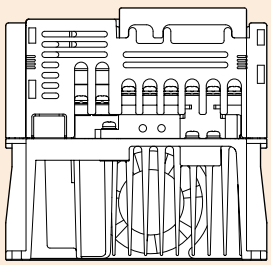
* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

●FR-E740-0.4K(SC) to 3.7K(SC)
●FR-E720S-2.2K(SC)



*1 FR-E740-0.4K, 0.75K are not provided with the cooling fan.



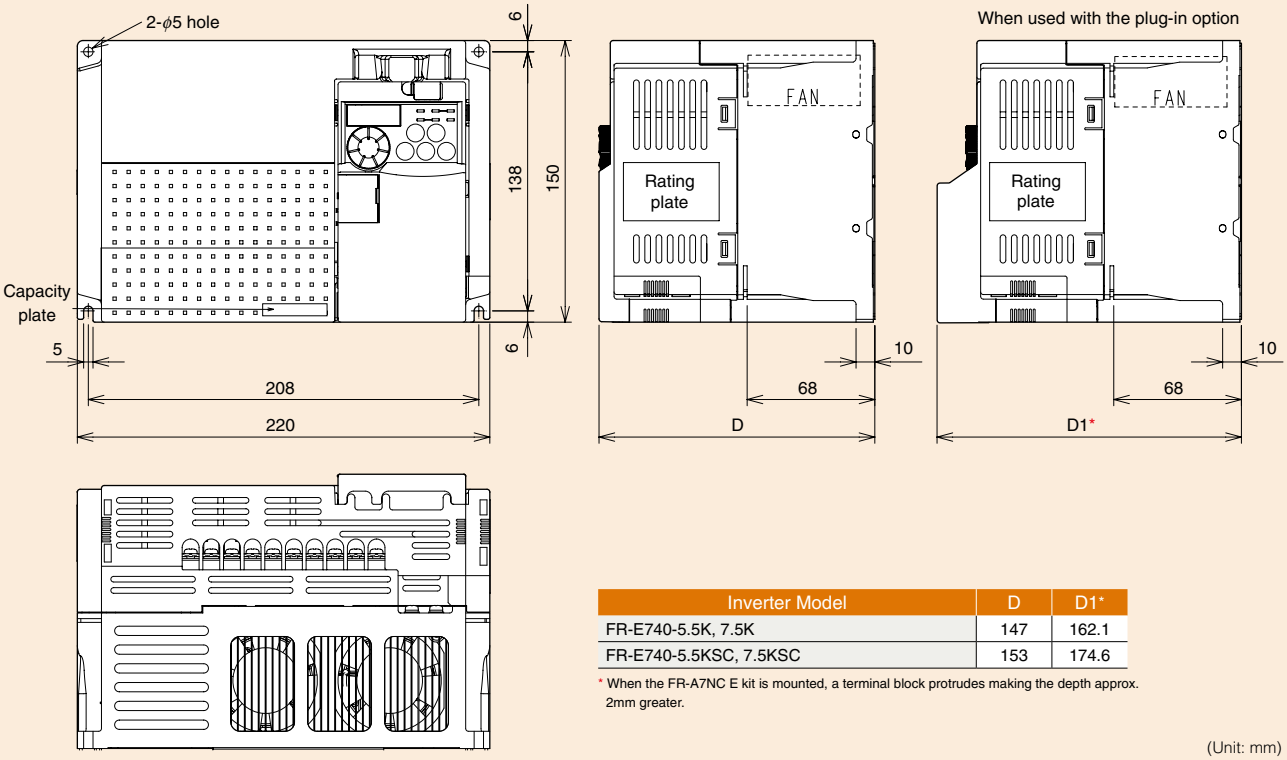
Inverter Model	D	D1	D2*2
FR-E740-0.4K, 0.75K	114	39	129.1
FR-E740-0.4KSC, 0.75KSC	120		141.6
FR-E740-1.5K, 2.2K, 3.7K	135	60	150.1
FR-E740-1.5KSC, 2.2KSC, 3.7KSC	141		162.6
FR-E720S-2.2K	155.5		170.6
FR-E720S-2.2KSC	161.5		183.1

*2 When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

Outline Dimension Drawings

●FR-E740-5.5K(SC), 7.5K(SC)

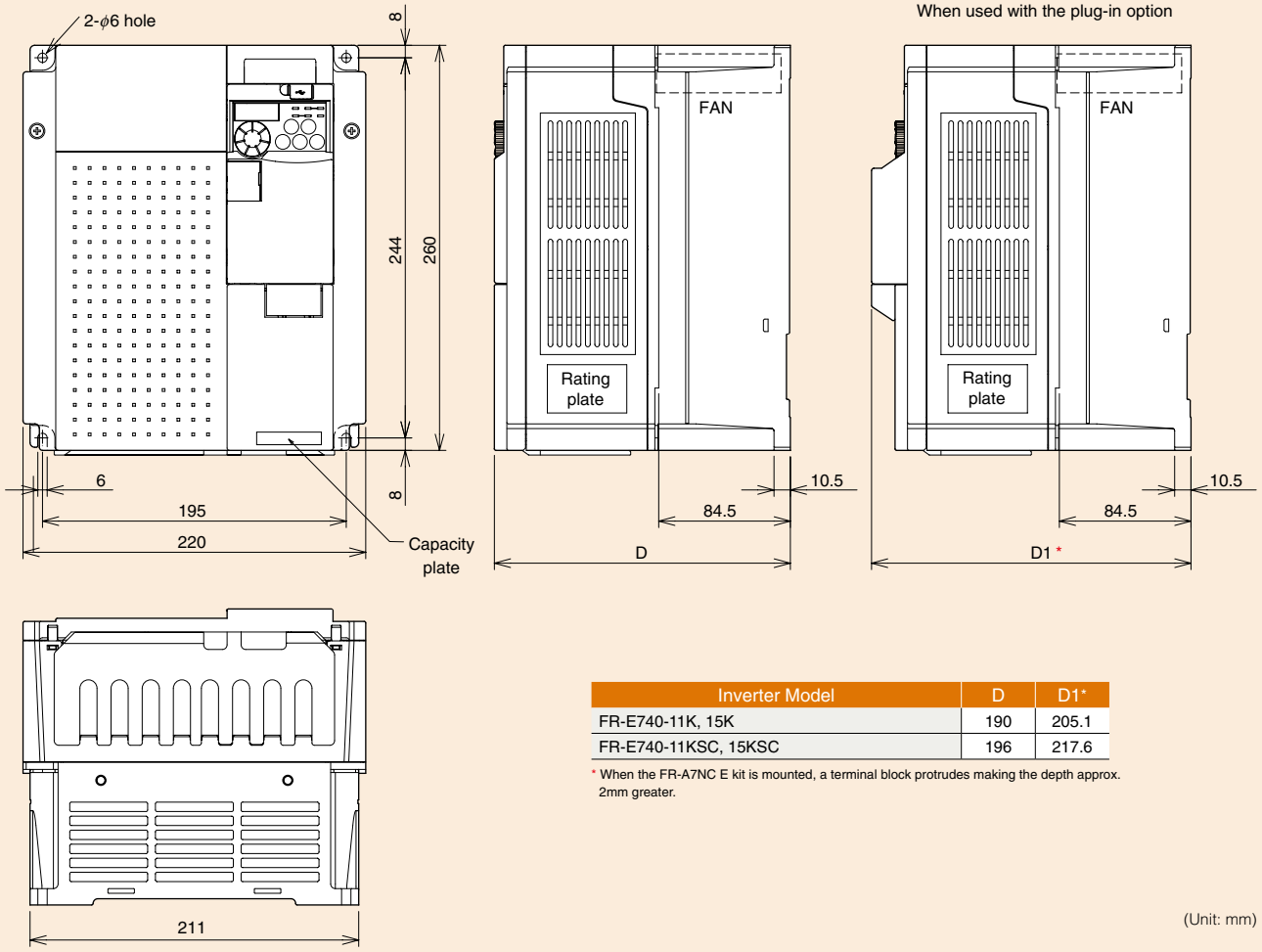


Inverter Model	D	D1*
FR-E740-5.5K, 7.5K	147	162.1
FR-E740-5.5KSC, 7.5KSC	153	174.6

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

●FR-E740-11K(SC), 15K(SC)



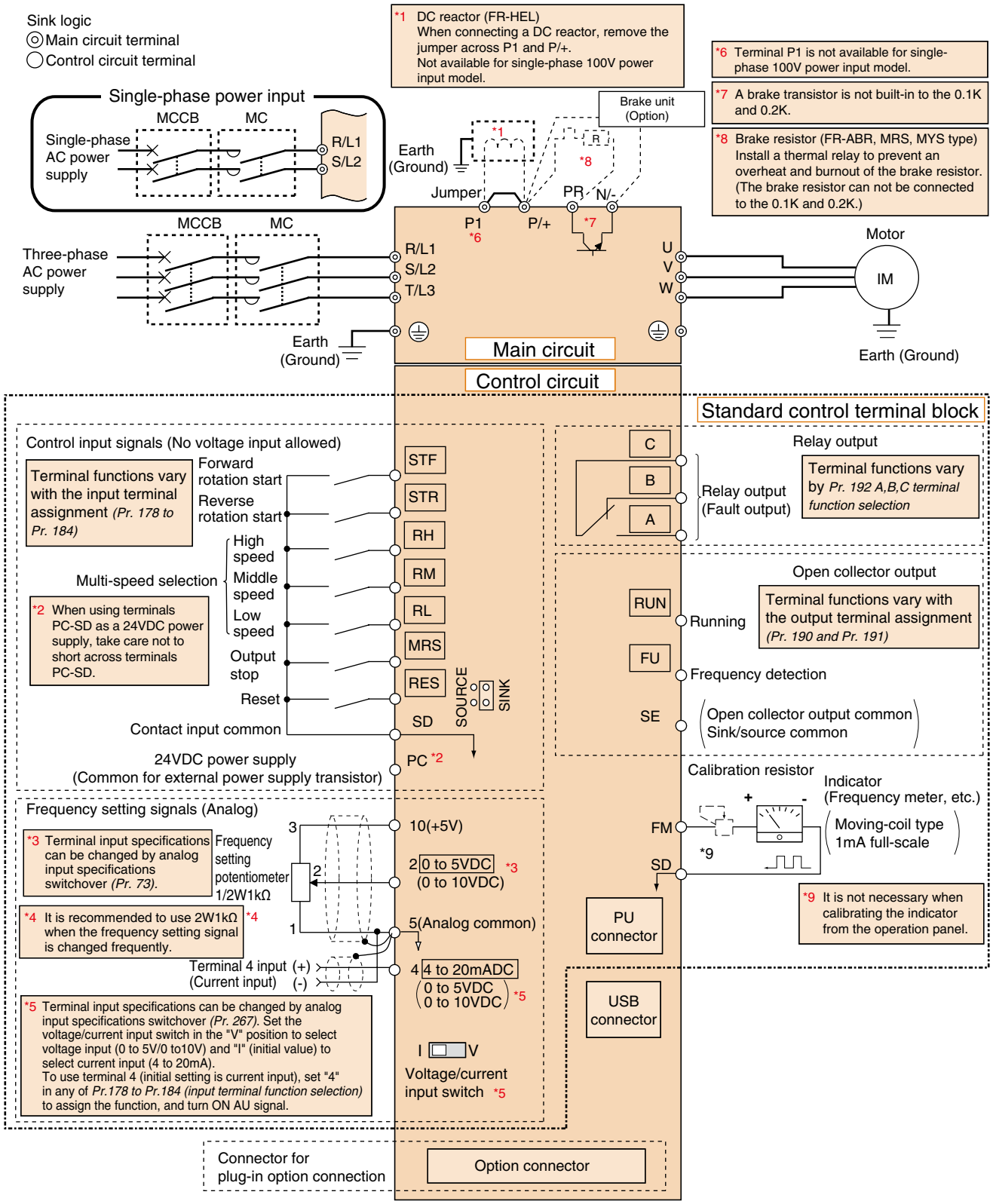
Inverter Model	D	D1*
FR-E740-11K, 15K	190	205.1
FR-E740-11KSC, 15KSC	196	217.6

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

Terminal Connection Diagram

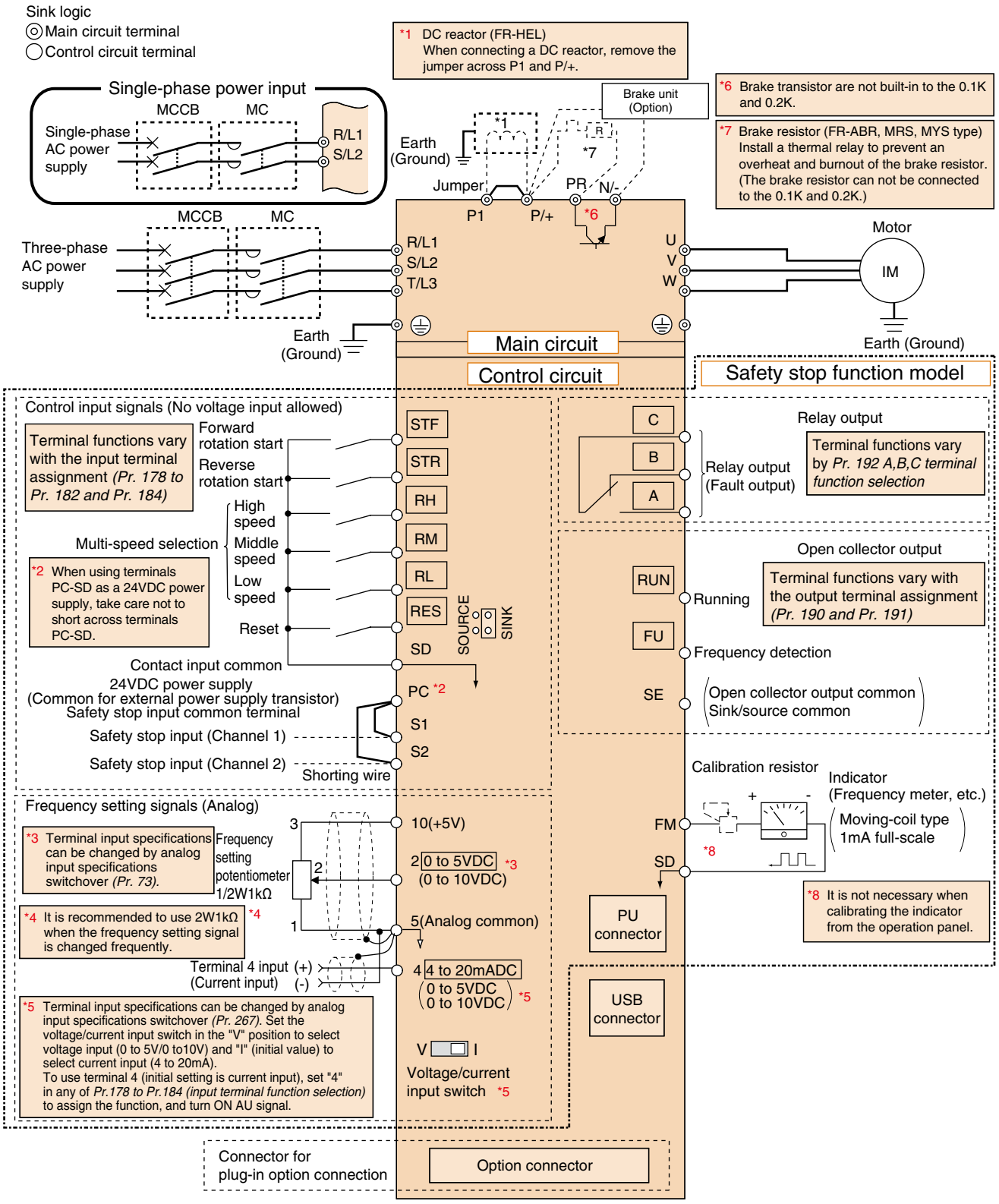
(1) Standard control circuit terminal model



[NOTE]

- To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
- The output of the single-phase power input model is three-phase 200V.

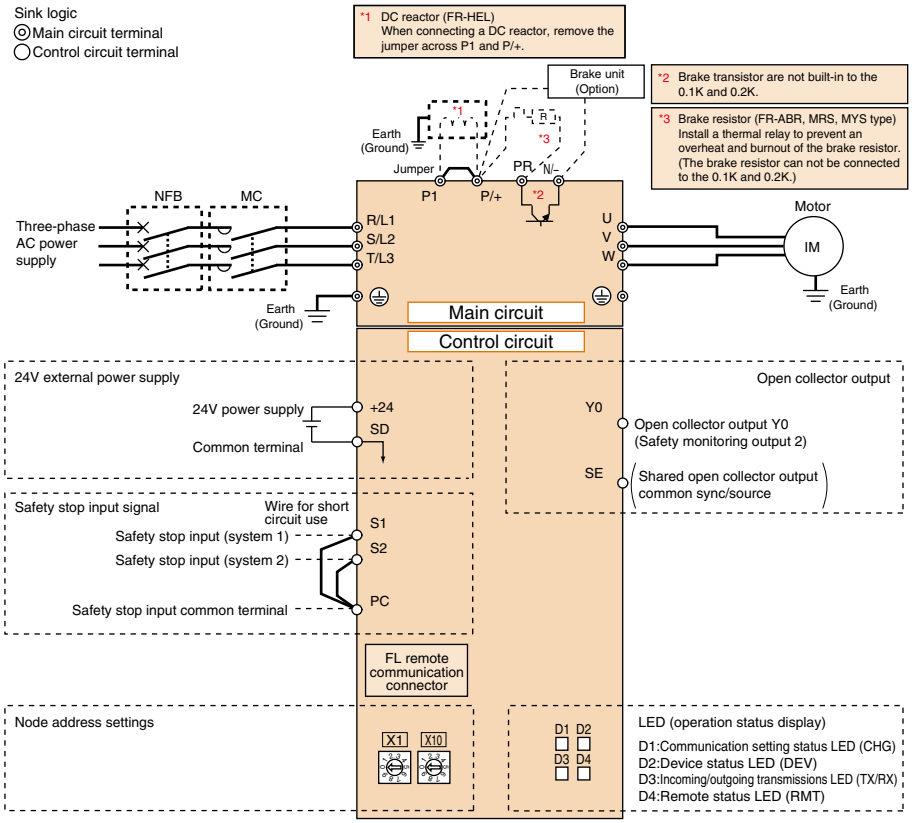
(2) Safety stop function model



[**NOTE**]

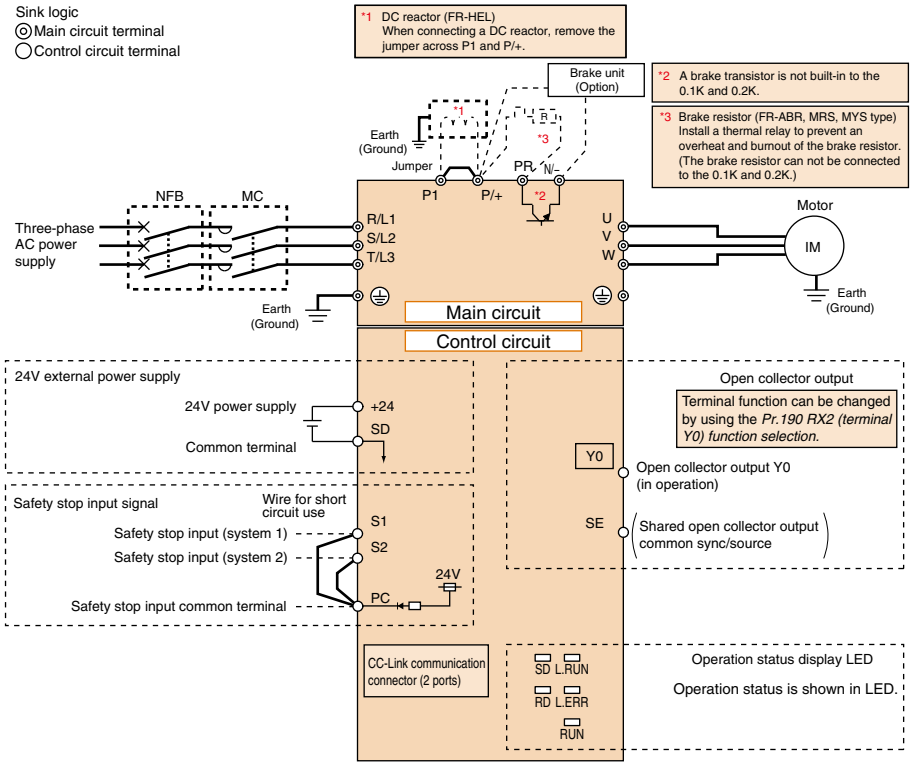
- To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
- The output of the single-phase power input model is three-phase 200V.

(3) FL remote communication compatible model (NF)



[**NOTE**]
- To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

(4) CC-Link communication compatible model (NC)



[**NOTE**]
- To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

■Terminal Specification Explanation

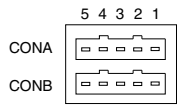
(1) Standard control circuit terminal specification model and safety-stop model (SC)

Type		Terminal Symbol	Terminal Name	Description	
Main circuit		R/L1, S/L2, T/L3*	AC power input	Connect to the commercial power supply. Keep these terminals open when using the high power factor converter (FR-HC) or power regeneration common converter (FR-CV). *When using single-phase power input, terminals are R/L1 and S/L2.	
		U, V, W	Inverter output	Connect a three-phase squirrel-cage motor.	
		P/+, PR	Brake resistor connection	Connect a brake transistor (MRS type, MYS type, FR-ABR) across terminals P/+-PR. (The brake resistor can not be connected to the 0.1K or 0.2K)	
		P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV) or high power factor converter (FR-HC).	
			DC power input	Connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-.	
		P/+, P1*	DC reactor connection	Remove the jumper across terminals P/+-P1 and connect a DC reactor. Single-phase 100V power input model is not compatible with DC reactor. *Terminal P1 is not available for single-phase 100V power input model.	
		⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded).	
Control circuit/input signal	Contact input	STF	Forward rotation start	Turn on the STF signal to start forward rotation and turn it off to stop.	When the STF and STR signals are turned on simultaneously, the stop command is given.
		STR	Reverse rotation start	Turn on the STR signal to start reverse rotation and turn it off to stop.	
		RH, RM, RL	Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.	
		MRS*	Output stop	Turn on the MRS signal (20ms or more) to stop the inverter output. Use to shut off the inverter output when stopping the motor by electromagnetic brake. *Terminal MRS is only available for the standard control circuit terminal model.	
		RES	Reset	Used to reset alarm output provided when protective circuit is activated. Turn on the RES signal for more than 0.1s, then turn it off. Initial setting is for reset always. By setting **Pr. 75**, reset can be set to enabled only at fault occurrence. Recover about 1s after reset is cancelled.	
		SD	Contact input common (sink) (initial setting)	Common terminal for contact input terminal (sink logic) and terminal FM.	
			External transistor common (source)	When connecting the transistor output (open collector output), such as a programmable controller, when source logic is selected, connect the external power supply common for transistor output to this terminal to prevent a malfunction caused by undesirable currents.	
			24VDC power supply common	Common output terminal for 24VDC 0.1A power supply (PC terminal). Isolated from terminals 5 and SE.	
		PC	External transistor common (sink) (initial setting)	When connecting the transistor output (open collector output), such as a programmable controller, when sink logic is selected, connect the external power supply common for transistor output to this terminal to prevent a malfunction caused by undesirable currents.	
			Contact input common (source)	Common terminal for contact input terminal (source logic).	
			24VDC power supply	Can be used as 24VDC 0.1A power supply.	
			Safety stop input terminal common*	Common terminal for safety stop input terminals S1 and S2. *Terminal S1 and S2 are only available for the safety stop function model.	
	Frequency setting	10	Frequency setting power supply	Used as power supply when connecting potentiometer for frequency setting (speed setting) from outside of the inverter.	5VDC permissible load current 10mA
		2	Frequency setting (voltage)	Inputting 0 to 5VDC (or 0 to 10V) provides the maximum output frequency at 5V (10V) and makes input and output proportional. Use **Pr. 73** to switch between input 0 to 5VDC (initial setting) and 0 to 10VDC input.	Input resistance 10kΩ ± 1kΩ Permissible maximum voltage 20VDC
		4	Frequency setting (current)	Inputting 0 to 20mADC (or 0 to 5V / 0 to 10V) provides the maximum output frequency at 20mA makes input and output proportional. This input signal is valid only when the AU signal is on (terminal 2 input is invalid). To use terminal 4 (initial setting is current input), set "4" to any of **Pr.178 to Pr.184 (input terminal function selection)**, and turn AU signal ON. Use Pr. 267 to switch from among input 4 to 20mA (initial setting), 0 to 5VDC and 0 to 10VDC. Set the voltage/current input switch in the "V" position to select voltage input (0 to 5V/0 to 10V). Standard control circuit terminal model: Current input (initial status) / Voltage input  Safety stop function model: Current input (initial status) / Voltage input 	Voltage input: Input resistance 10kΩ ± 1kΩ Permissible maximum voltage 20VDC Current input: Input resistance 233Ω ± 5Ω Maximum permissible current 30mA.
		5	Frequency setting common	Common terminal for the frequency setting signals (terminals 2 or 4). Do not earth (ground).	
Safety stop		S1	Safe stop input (Channel 1)*	S1/S2 are safe stop signals for use with in conjunction with an approved external safety unit. Both S1/S2 must be used in dual channel form. Inverter output is shutoff depending on shorting/opening between S1 and PC, S2 and PC. In the initial status, terminal S1 and S2 are shorted with terminal PC by shortening wire. Remove the shortening wire and connect the safety relay module when using the safety stop function. *Terminal S1 and S2 are only available for the safety stop function model.	Input resistance 4.7kW Voltage when contacts are open 21 to 26VDC When contacts are shortcircuited 4 to 6mADC
		S2	Safe stop input (Channel 2)*		

Type		Terminal Symbol	Terminal Name	Description	
Control circuit/output signal	Relay	A, B, C	Relay output (fault output)	1 changeover contact output indicates that the inverter fault occurs. Fault: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C) Contact capacity 230VAC 0.3A (power factor = 0.4) 30VDC 0.3A	
	Open collector	RUN	Inverter running	Switched low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5Hz). Switched high during stop or DC injection brake operation.*	Permissible load 24VDC (Maximum 27VDC) 0.1A (a voltage drop is 3.4V maximum when the signal is on) *Low is when the open collector output transistor is on (conducts). High is when the transistor is off (does not conduct).
		FU	Frequency detection	Switched low when the inverter output frequency is equal to or higher than the preset detected frequency and high when less than the preset detected frequency.*	
		SE	Open collector output common	Common terminal of terminal RUN and FU.	
	Pulse	FM	For meter	Select one e.g. output frequency from monitor items. (Not output during inverter reset.) The output signal is proportional to the magnitude of the corresponding monitoring item.	Permissible load current 1mA 1440 pulses/s at 60Hz
Communication		–	PU connector	With the PU connector, RS-485 communication can be made. ・Conforming standard: EIA-485 (RS-485) ・Transmission format: Multi-drop link ・Communication speed: 4800 to 38400bps ・Overall extension: 500m	
		–	USB connector	The FR Configurator can be operated by connecting the inverter to the personal computer through USB. ・Interface: conforms to USB1.1 ・Transmission Speed: 12Mbps ・Connector: USB mini B connector (receptacle mini B type)	

[**Note**]
・Set **Pr. 267** and a voltage/current input switch correctly, then input an analog signal in accordance with the setting. Applying a voltage with voltage/current input switch in "I" position (current input is selected) or a current with switch in "V" position (voltage input is selected) could cause component damage of the inverter or analog circuit of output devices.
・The inverter will be damaged if power is applied to the inverter output terminals (U, V, W). Never perform such wiring.
・ indicates that terminal functions can be selected using **Pr. 178 to Pr. 192 (I/O terminal function selection)**.
・Terminal names and terminal functions are those of the factory set.
・When connecting the DC power supply, be sure to connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-. Opposite polarity will damage the inverter.

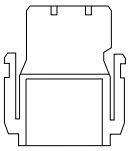
(2) Models compatible with FL remote communication (NF) and CC-Link communication (NC)

Type		Terminal symbol	Terminal name	Descriptions of terminal functions	
Main circuit		R/L1, S/L2, T/L3	Alternating current power input	Connects with commercial power supply.	
		U, V, W	Inverter output	Connects with 3-phase squirrel-cage motor.	
		P/+, PR	Brake resistor connection	Connects with optional brake resistor (MRS and MYS types, FR-ABR) between terminal P/+-PR. (Cannot be connected with 0.1K and 0.2K.)	
		P/+, N/-	Brake unit connection	Connects with a brake unit (FR-BU2).	
		P/+, P1	DC reactor connection	Remove the short-circuit piece between terminals P/+-P1, and connect the DC reactor.	
		⏚	Ground	For inverter chassis; make earth ground connection.	
Control circuit	24V external power supply	+24	24V external power supply	The 24V power input from an external source enables ongoing communication even when the main circuit power is OFF.	Input voltage 23.5 - 26.5VDC Input current 0.7A or lower
		SD	24V external power supply terminals common	Common terminal for positive terminal 24	
	Safety stop	S1	Safety stop input (system 1)	Terminals S1 and S2 are safety stop input signals and are used for the safety relay unit. Terminals S1 and S2 are used simultaneously (dual-channel). Short circuit release between S1 - PC and S2 - PC will shut off the inverter output. In initial state, terminals S1 and S2 are short-circuited with terminal PC with short-circuit wires. When using the safety stop function, remove the short-circuit wires and connect to the safety relay unit.	Input resistance 4.7kΩ Release voltage 21 - 26VDC Short-circuit DC4 - 6mA
		S2	Safety stop input (system 2)		
		PC	Safety stop input terminal common	Common terminals for safety stop input terminals S1 and S2.	
	Open collector output	Y0	FL remote communication compatible model (NF)		Allowable load 24VDC (Maximum 27VDC) 0.1A (Maximum voltage drop of 3.4V when ON) *L level means the open collector output transistor is ON (conduction state). H level means the open collector output transistor is OFF (non-conduction state).
			Open collector output Y0 (Safety monitoring output 2)	Indicates either the L level when safety stop function prevents occurrence of safety circuit fault (E.SAF), or the H level for other status.*	
			CC-Link communication compatible model (NC)		
			Open collector output Y0 (inverter in operation)	Indicates either the L level when the inverter output frequency is at or higher than the starting frequency level (initial value 0.5Hz), or the H level during stop or in DC braking stage. Terminal function can be selected by using the *Pr.190 RX2 (terminal Y0) function selection.*	
		SE	Open collector output common	Common terminal for terminal Y0.	
Communication		FL remote communication compatible model (NF)			
	FL-net	FL remote communication connector		The FL remote communication connector enables FL remote communication.	
		CC-Link communication compatible model (NC)			
	CC-Link	CONA CONB	CC-Link communication connector (2 ports)	Pin layout 	

Pin number	5	4	3	2	1
Signal name	SLD	NC	DG	DB	DA

CC-Link communication one-touch connector

Model	Manufacturer name
A6CON-L5P	Mitsubishi Electric Corporation
35505-6000-B0M GF	Sumitomo 3M Limited



[**Note**]
- The inverter will be damaged if power is applied to the inverter output terminals (U, V, W). Never perform such wiring.
- When connecting the DC power supply, be sure to connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-. Opposite polarity will damage the inverter.

Main Differences and Compatibilities with the FR-E500 series

Item	FR-E500	FR-E700
Control method	V/F control General-purpose magnetic flux vector control	V/F control General-purpose magnetic flux vector control Advanced magnetic flux vector control Optimum excitation control
Changed/cleared functions	Torque boost **(Pr. 0)** initial value FR-E520-1.5K to 7.5K: 6% FR-E540-1.5K to 3.7K: 6% FR-E540-5.5K, 7.5K: 4%	FR-E720-1.5K(SC) to 3.7K(SC): 4% FR-E720-5.5K(SC), 7.5K(SC): 3% FR-E740-1.5K(SC) to 3.7K(SC): 4% FR-E740-5.5K(SC), 7.5K(SC): 3%
	DC injection brake operation voltage **(Pr. 12)** initial value 0.4K to 7.5K: 6%	0.4K to 7.5K: 4%
	Frequency at 5V (10V) input **(Pr. 38)** Frequency at 20mA input frequency **(Pr. 39)** Second electronic thermal O/L relay **(Pr. 48)** Shortest acceleration/deceleration mode **(Pr. 60)**	Parameter number change **(Pr. 125 Terminal 2 frequency setting gain frequency)** **(Pr. 126 Terminal 4 frequency setting gain frequency)** **(Pr. 51 Second electronic thermal O/L relay)** **(Pr. 60 Energy saving control selection)** **(Pr. 292 Automatic acceleration/deceleration)**
	Reverse rotation from the inverter operation panel Press REV.	After setting "1" in **Pr. 40 RUN key rotation direction selection**, press RUN.
	FM terminal function selection **(Pr. 54)** setting 0: Output frequency (initial value), 1: Output current, 2: Output voltage	1: Output frequency (initial value), 2: Output current, 3: Output voltage
	Second applied motor **Pr. 71** = 100 to 123	**Pr. 450 Second applied motor**
	Terminal 2 0 to 5V, 0 to 10V selection **(Pr. 73)** setting 0: 0 to 5V (initial value), 1: 0 to 10V	**Pr. 73 Analog input selection** 0: 0 to 10V 1: 0 to 5V (initial value)
	Operation mode selection **(Pr. 79)** Initial value 1: PU operation mode Setting 8: Operation mode switching by external signal	Initial value 0: External operation mode is selected at power ON Setting 8: deleted (X16 signal is used instead)
	Setting General-purpose magnetic flux vector **Pr. 80** ≠ 9999	**Pr. 80** ≠ 9999, **Pr. 81** ≠ 9999, **Pr. 800** = 30
	User group 1 (16), user group 2 (16) **(Pr. 160, Pr. 173 to Pr. 175)**	User group (16) only, setting methods were partially changed **(Pr. 160, Pr. 172, Pr. 173)**
	Input terminal function selection **(Pr. 180 to Pr. 183)** setting 5: STOP signal (start self-holding selection) 6: MRS signal (output stop)	**Pr. 178 to Pr. 184 Input terminal function selection** setting 5: JOG signal (Jog operation selection) 6: None 24: MRS signal (output stop) 25: STOP signal (start self-holding selection)
	Long wiring mode **(Pr. 240 setting 10, 11)**	Setting is unnecessary (**Pr. 240** setting 0, 11 are deleted)
	Cooling fan operation selection **(Pr. 244)** initial setting 0: Cooling fan operates in power-on status.	11: Cooling fan on/off control valid
	Stop selection **(Pr. 250)** setting increments 1s	0.1s
	RS-485 communication control source from the PU connector PU operation mode	Network operation mode (PU operation mode as FR-E500 when **Pr. 551** = 2)
	Earth (ground) fault detection 400V class: Detects always	400V class: Detects only at a start
Inrush current limit circuit	Provided for the 200V class 2.2K or more and 400V class	Provided for the all capacity
Control terminal block	Fixed terminal block (can not be removed) Screw type terminal block (Phillips screw M2.5) Length of recommended bar terminal is 7mm.	Removable terminal block Standard control circuit terminal model: Screw type terminal block (Flathead screw M2 (M3 for terminal A, B, and C) Length of recommended blade terminal is 5mm (6mm for terminal A, B and C). Safety stop function model: Spring clamp terminal block (Fixes a wire with a pressure of inside spring) Length of recommended blade terminal is 10mm
Operation panel	Removable operation panel (PA02)	Integrated operation panel (can not be removed)
Parameter unit	FR-PU04	FR-PU07 FR-PU04 (some functions, such as parameter copy, are unavailable.)
Plug-in option	Dedicated plug-in option (installation is incompatible)	
	for 400V class only FR-E5NC : CC-Link communication FR-E5ND : DeviceNet communication FR-E5NL : LonWorks communication	FR-A7NC E kit : CC-Link communication FR-A7ND E kit : DeviceNet communication FR-A7NL E kit : LonWorks communication
Installation size	FR-E720-0.1K(SC) to 7.5K(SC), FR-E740-0.4K(SC) to 7.5K(SC), FR-E720S-0.1K(SC) to 0.75K(SC), FR-E710W-0.1K to 0.75K are compatible in mounting dimensions	

INVERTER FREQROL-F700PJ Series

GREAT ENERGY SAVING WITH A COMPACT BODY

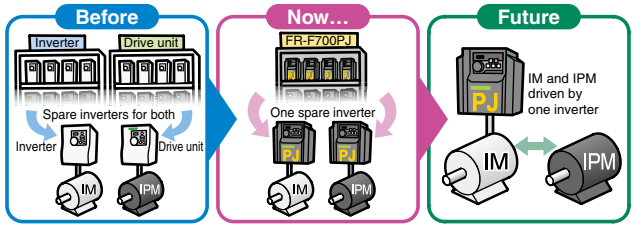
Easy and Compact | General-purpose Motor and IPM Motor Control | Energy Saving

Suitable for Both The General-Purpose Motor (Three-Phase Induction Motor) and The IPM Motor

The F700PJ Series for Both a General-Purpose Motor (IM) and an IPM Motor (IPM)

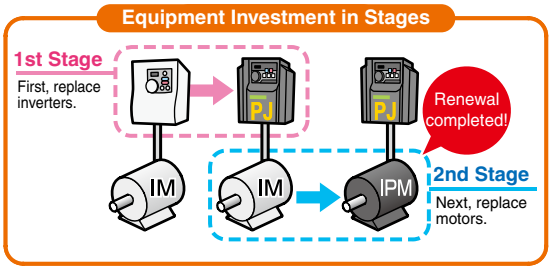
- The IM drive setting can be switched to IPM drive setting by only one setting "12" (MM-EFS) in the parameter 1PN.
  Never drive an IPM motor in the IM drive setting.
- One spare F700PJ inverter is enough for the two types of motors (IM and IPM); the number of required spare inverters is reduced by half.
- A push on the setting dial in the monitor mode brings up the control setting (IM, IPM).





Simple and Reliable Transition from IM to IPM

- There is no need to replace the whole system at once; replace the inverters first, then replace the motors.
  When the budget is limited, equipment investment can be made over several stages.



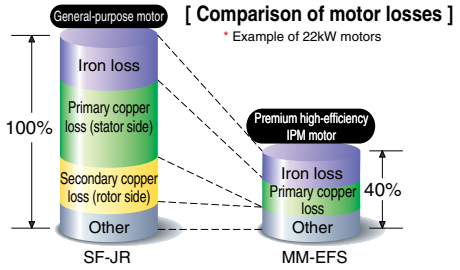
What is an IPM Motor?

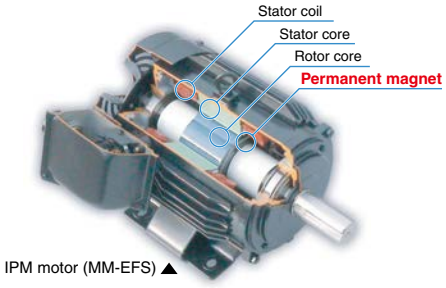
An IPM motor is a synchronous motor with strong permanent magnets embedded in its rotor.

Why is an IPM motor more efficient?

- No current flows to the rotor (secondary side), and no secondary copper loss is generated.
- Magnetic flux is generated with permanent magnets, and less motor current is required.
- Embedded magnets provide reluctance torque*, which can be used for driving.

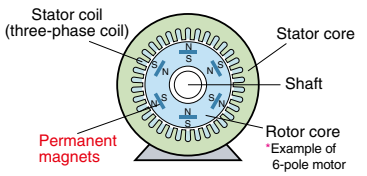
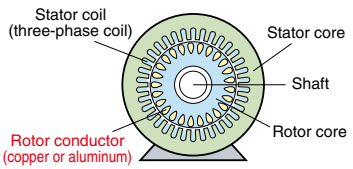
*: Reluctance torque occurs due to magnetic imbalance in the rotor.





IPM motor (MM-EFS) ▲

Motor structure (section view)

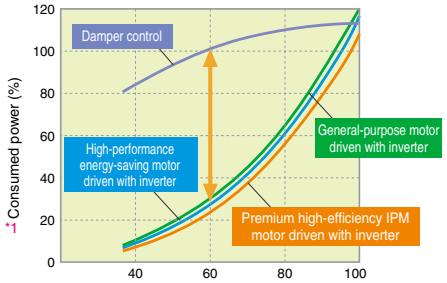
IPM motor (synchronous motor)	General-purpose motor (induction motor)
	

Inverter Control for Energy Saving

Energy Saving with Speed Control

●The consumed power of a variable-torque load, such as fans, pumps, and blowers, is proportional to the cube of its rotation speed.
This means that controlling the rotation speed to adjust the air volume can lead to energy saving.

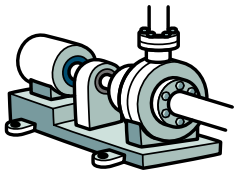
[Example of blower operation characteristic]

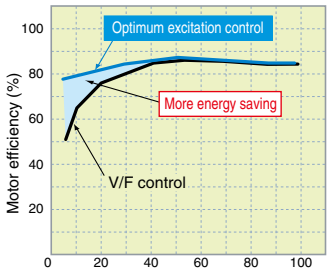


*1: Rated motor output is 100%.

Energy Saving with Optimum Excitation Control (General-Purpose Motors)

●The optimum excitation control achieves the highest motor efficiency. Further energy saving can be achieved for applications such as fans and pumps with variable load torque.


(Example: Pump)

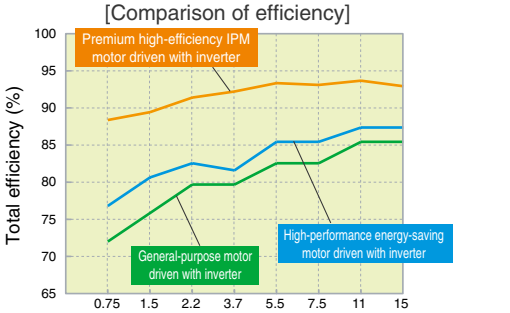


To Save More Energy – the IPM Motor Control (MM-EFS Series) is Now Available

High efficiency achieved with IPM motors

●The IPM motors that have permanent magnets embedded in their rotors are even more efficient than the high-performance energy-saving motors.

[Comparison of efficiency]



IE4-equivalent efficiency level

●The premium high-efficiency IPM motor "MM-EFS series" provides efficiency that is equivalent to IE4 (super premium efficiency), the highest efficiency class*2.

*2: As of October 2012

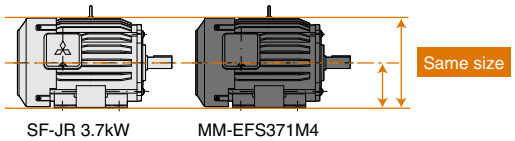
IEC 60034-30 Efficiency class	Efficiency of Mitsubishi motors	
	General-purpose motor	IPM motor
IE4 (super premium efficiency)*3	—	Premium high-efficiency IPM (MM-EFS)
IE3 (premium efficiency)	Super line premium series (SF-PR)	—
IE2 (high efficiency)	Super line eco series (SF-HR)	—
IE1 (standard efficiency)	Super line series (SF-JR)	—
Below the class		—

High / Efficiency / Low

*3: The details of IE4 can be found in IEC 60034-31.

Smooth replacement from a general-purpose motor (with the same installation size)

●The frame number of the MM-EFS is the same (same size) as the Mitsubishi general-purpose motors (4-pole SF-JR/SF-HR series). Replacement is easy as the installation sizes are compatible.



Check the Energy Saving Effect at a Glance

●Energy saving monitor is available. The energy saving effect can be checked using an operation panel, output terminal (terminal FM), or network.

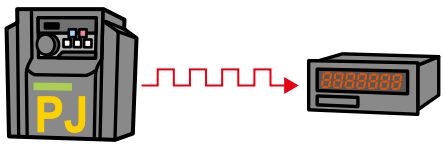

Example of the monitor display for power saving

[List of monitored items for energy saving]

Power saving monitor (kW)	Power saving rate average value (%)
Power saving rate (%)	Power cost saving average value (yen)
Power saving amount (kWh)	Annual power saving amount (kWh)
Power cost saving (yen)	Annual power saving amount (kWh)
Power saving average value (kW)	

●The output power amount measured by the inverter can be output in pulses. The cumulative power amount can be easily checked.*4

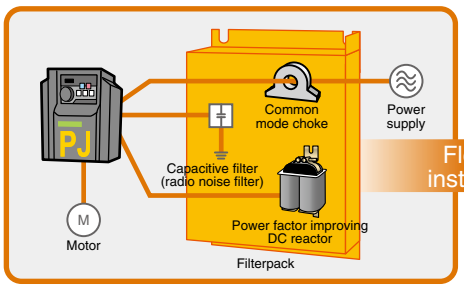
*4: This function cannot be used as a meter to certify billings.



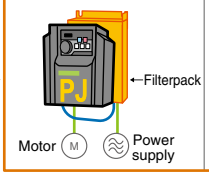
Wire and Space Saving

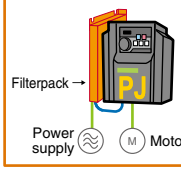
A Lineup of Filterpack Models Available

- The power factor improving DC reactor, common mode choke (line noise filter), and capacitive filter (radio noise filter) are all essential for air conditioning applications, and all of these are included in a Filterpack.
  The Filterpack inverter models (FR-F7□0PJ-□F) are also available.
  The option wiring, which was necessary in the past, is no longer required.
- A Filterpack allows flexible installation and various layouts in the enclosure. Smaller space is required for installation.
- Less wiring and smaller space also enable compliance with the Harmonic Suppression Guidelines, **the Architectural Standard Specifications (Electrical Installation)**, and **the Architectural StandardSpecifications (Machinery Installation) (2013 revisions)** in Japan.



Flexible installation

Back of the panel	Installation area reduced by*1
	Approx. 72% With FR-F740PJ-3.7KF

Side of the panel	Installation area reduced by*1
	Approx. 84% With FR-F740PJ-3.7KF 200 mm or less depth at all capacities

*1: The area required for the separate installation of power factor improving DC reactor, common mode choke (line noise filter), and capacitive filter (radio noise filter) with clearance around them.

Space Saving by Side-by-Side Installation

- Side-by-side installation is possible*2 and requires less space. A DIN rail installation attachment (FR-UDA□□) option can be installed.

*2: Keep the surrounding air temperature of the inverter at 40°C maximum. Side-by-side installation is not available for Filterpacks.



Easy Operation and Maintenance

Quick Setting Using the Setting Dial

- The adaptable scroll speed setting dial allows for quick jumps or precise increments based on turning speed.
- The non-slip treatment was applied to the setting dial for easier turning.



Automatic Parameter Setting for Specific Applications

- Simple parameter setting (Pr.79 Operation mode selection)
- Communication setting for Mitsubishi HMI (GOT)
- Rated frequency change (60Hz→50Hz)

Spring Clamp Terminals (Control Circuit Terminals)

- Spring clamp terminals*1 are adopted as control circuit terminals. Spring clamp terminals are highly reliable and can be easily wired.

*1: The control circuit terminals are screw terminals.



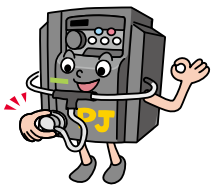
Longer Life Parts

- The service life of the cooling fans is now 10 years*2. The service life can be further extended by ON/OFF control of the cooling fan.
- Capacitors with a design life of 10 years*2*3 are adapted. (Surrounding air temperature of 105°C for 5000 hours). With these capacitors, the service life of the inverter is further extended.

*2: Surrounding air temperature: Annual average of 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt). The design life is a calculated value and is not a guaranteed product life.
*3: Output current: 80% of the inverter rating.

The Leading-Edge Life Diagnosis Function

- The degree of deterioration of the main circuit capacitor, control circuit capacitor, and inrush current limit circuit can be diagnosed on the monitor.
- Using the self-diagnosis function, the part life warning*4 can be output. With these warnings, the self-diagnosis function prevents troubles from occurring.



*4: A warning is output when any of the main circuit capacitor, control circuit capacitor, inrush current limit circuit, and cooling fan reaches its specified output level.

Enhanced Communication Function

- The Mitsubishi inverter protocol and Modbus-RTU are selectable.
- The speed of RS-485 communication has been improved. (Communication at 38.4kbps is available.)

Introducing the Mitsubishi magnetic contactor

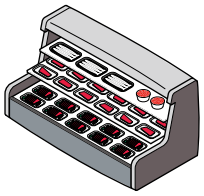
- Offers a selection of small frames
- Offers a line-up of safety contactors
- Supports small loads (auxiliary contact)
- Supports many international regulations as standard



Optimum for Fan and Pump Applications

Enhanced PID Control

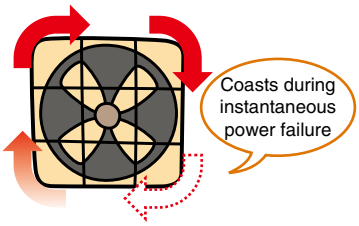
- To save energy in low-speed operation: PID output shutoff (sleep) function
- To shorten the start-up time of PID control: PID automatic switchover function
- For air conditioning applications: Forward/reverse rotation switching by external signals
- To use various types of detectors: PID set point and measured value outputs in voltage (0 to 5V / 0 to 10V) and current (4 to 20mA)



(Example: Water-cooling pump for a showcase)

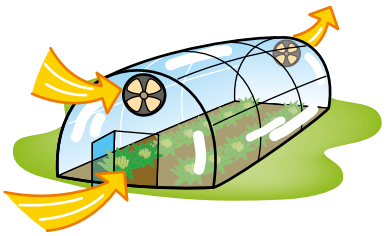
Automatic Restart After Instantaneous Power Failure / Flying Start Function

- After an instantaneous power failure, the operation is re-startable from the coasting motor speed. Even if the rotation direction has been forcibly reversed, the operation can be smoothly restarted in the original direction.



Regeneration Avoidance Function

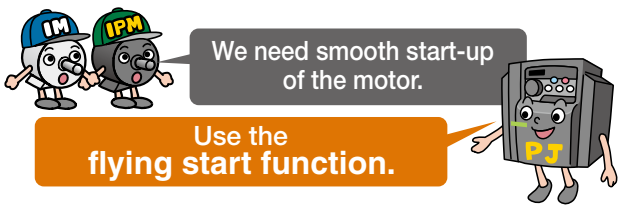
- The operation frequency is automatically increased to prevent the regenerative overvoltage fault from occurring. This function is useful when a load is forcibly rotated by another fan in the duct.



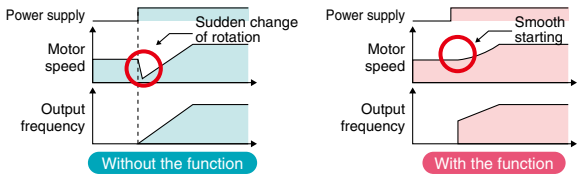


Example

The fan is rotated by the external force.



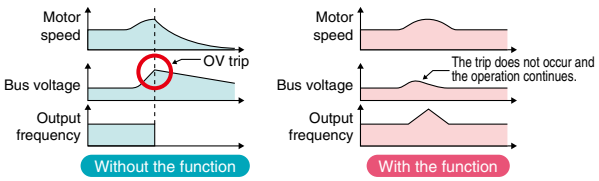
The motor can be started smoothly even after the motor was rotated by the external force (coasting).
This function can be set enabled by changing **Pr.57** setting.



Parameters to adjust the acceleration time at a restart **(Pr.611)**, to detect the fan rotation direction **(Pr.299)**, etc. are also available.



When the external force accelerates rotation of the running motor (regeneration), the motor may trip due to the overvoltage.
The regeneration avoidance function is available to increase the frequency and avoid the regenerative condition.
This function can be set enabled by changing **Pr.822** setting.

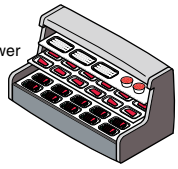
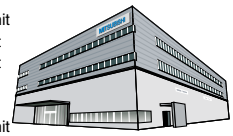
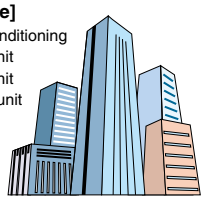
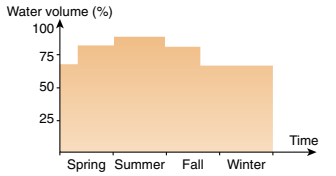
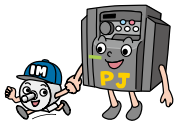
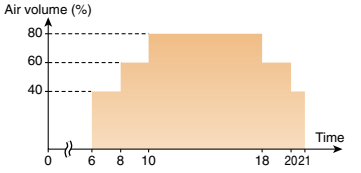
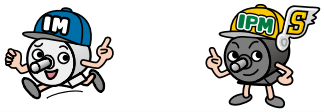
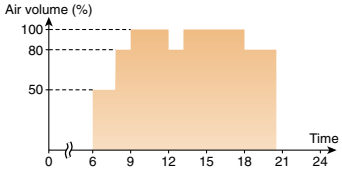


Parameters to start the regeneration avoidance operation **(Pr.883)** and to adjust the response level **(Pr.886)** are also available.

Application Example

Great energy saving effect obtained in medium airow

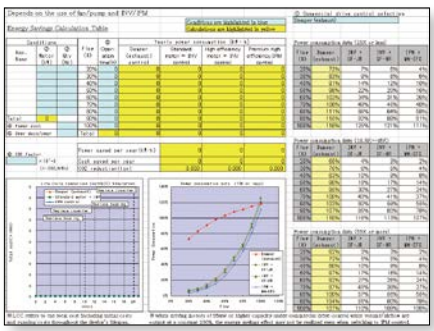
(When the electricity cost is 14 yen/kWh, and the CO_2 emission is [1,000 kWh 0.555 ton - CO_2 emission])

	Water-cooling pump for a showcase	Air conditioning in a Mitsubishi plant	Air conditioning in a building
	Commercial power supply (valve) + General-purpose motor (SF-JR) ▼ Inverter + General-purpose motor (SF-JR)	Inverter + General-purpose motor (SF-JR) ▼ Inverter + IPM motor (MM-EFS)	Inverter + General-purpose motor (SF-JR) ▼ Inverter + IPM motor (MM-EFS)
Condition	**[Units to drive]** ●Water-cooling pump 3.7 kW × 1 unit ●Fans for the cooling tower 1.5 kW × 1 unit ●Freezer 11 kW × 3 unit 5.5 kW × 2 unit 3.7 kW × 1 unit 3.0 kW × 1 unit 	**[Units to drive]** ●Ventilator 0.75 kW × 3 unit 1.5 kW × 1 unit 2.2 kW × 3 unit ●Air conditioner 15 kW × 1 unit 18.5 kW × 1 unit 30 kW × 2 unit 	**[Units to drive]** ●Fans for air conditioning 5.5 kW × 10 unit 7.5 kW × 10 unit 3.7 kW × 100 unit 
Operation patterns	 8760 hours/year ●**With commercial power supply** Approx. 0.15 million kWh Approx. 2.17 million yen ●**With inverter** Approx. 0.14 million kWh Approx. 1.9 million yen 	 5475 hours/year ●**With general-purpose motor** Approx. 0.25 million kWh Approx. 3.44 million yen ●**With IPM motor** Approx. 0.22 million kWh Approx. 3.02 million yen 	 4745 hours/year ●**With general-purpose motor** Approx. 2.39 million kWh Approx. 33.42 million yen ●**With IPM motor** Approx. 2.1 million kWh Approx. 29.43 million yen 
(Annual) energy saving effect produced by replacing to IPM motors driven with inverters	●**Annual energy saving effect** (differences in the amount and cost) Approx. 0.019 million kWh **Approx. 0.27 million yen** ●**Annual CO_2 emission reduction** Approx. 0.019 million kWh **10.7 tons**	●**Annual energy saving effect** Approx. 0.03 million kWh **Approx. 0.42 million yen** ●**Annual CO_2 emission reduction** Approx. 0.03 million kWh **16.7 tons**	●**Annual energy saving effect** Approx. 0.28 million kWh **Approx. 3.99 million yen** ●**Annual CO_2 emission reduction** Approx. 0.28 million kWh **158 tons**

Your best assistant — Mitsubishi inverter software

●IPM energy savings simulation file

The IPM energy savings simulation file calculates the energy saving effect and CO_2 reduction rate achieved by replacing commercial power supply (damper/valve control) operation with IPM motor operation by inverter. This file requires inputs of motor capacity, quantity, air volume, operating time, etc.



IPM energy savings simulation file

●FR Configurator (FR-SW3-SETUP-WE) (Option)

Support tool for the inverter operations from start-up to maintenance.



Lineup

●Inverter

F R - F 7 4 0 P J - 3 . 7 K □

Symbol	Inverter capacity
0.4K to 15K	Represents the capacity (kW).

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Filterpack
None	No
F	Yes*

*: The inverter with Filterpack consists of an inverter and a Filterpack. The inverter carries the rating plate, "FR-F7□0PJ-□KF," and the Filterpack carries the rating plate "FR-BFP2-□K".

Power supply specification	Inverter model	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Three-phase 200 V	FR-F720PJ-□K FR-F720PJ-□KF	●	●	●	●	●	●	●	●	●
Three-phase 400 V	FR-F740PJ-□K FR-F740PJ-□KF	●	●	●	●	●	●	●	●	●

●:To be released

■Precautions
- Never drive an IPM motor in the IM drive setting.
- Use the same IPM motor capacity as the inverter capacity.
- For IPM motor, use an MM-EFS or MM-EF series motor. Please contact us regarding a combination with other manufacturer's IPM motor.

c UL us LISTED

CE

Compatible with UL, cUL, EC Directives (CE marking)
- IPM motors and Filterpacks are not compatible with the above regulations and directives.

Being RoHS compliant, the FR-F700PJ series inverters are friendly to people and to the environment.

●Premium high-efficiency IPM motor

M M - E F S 7 1 M 4 □ □

Symbol	Output	Symbol	Output
7	0.75kW	55	5.5kW
15	1.5kW	75	7.5kW
22	2.2kW	11K	11kW
37	3.7kW	15K	15kW

Symbol	Voltage class
None	200V
4	400V

Symbol	Rated speed*1
1M	1500r/min

Symbol	Specification*2
Q	Class B

Symbol	Specification*2
P1	Outdoor-type

*1: Also applicable to an application with the rated speed of 1800r/min.
*2: The outdoor-type and class B are semi-standard models. Please contact your sales representative for a special specification such as the long-axis type, flange shape, and salt-proof type.

Rated output (kW)		0.75	1.5	2.2	3.7	5.5	7.5	11	15
Motor model		7	15	22	37	55	75	11K	15K
200 V class	MM-EFS□1M	●	●	●	●	●	●	●	●
400 V class	MM-EFS□1M4	●	●	●	●	●	●	●	●

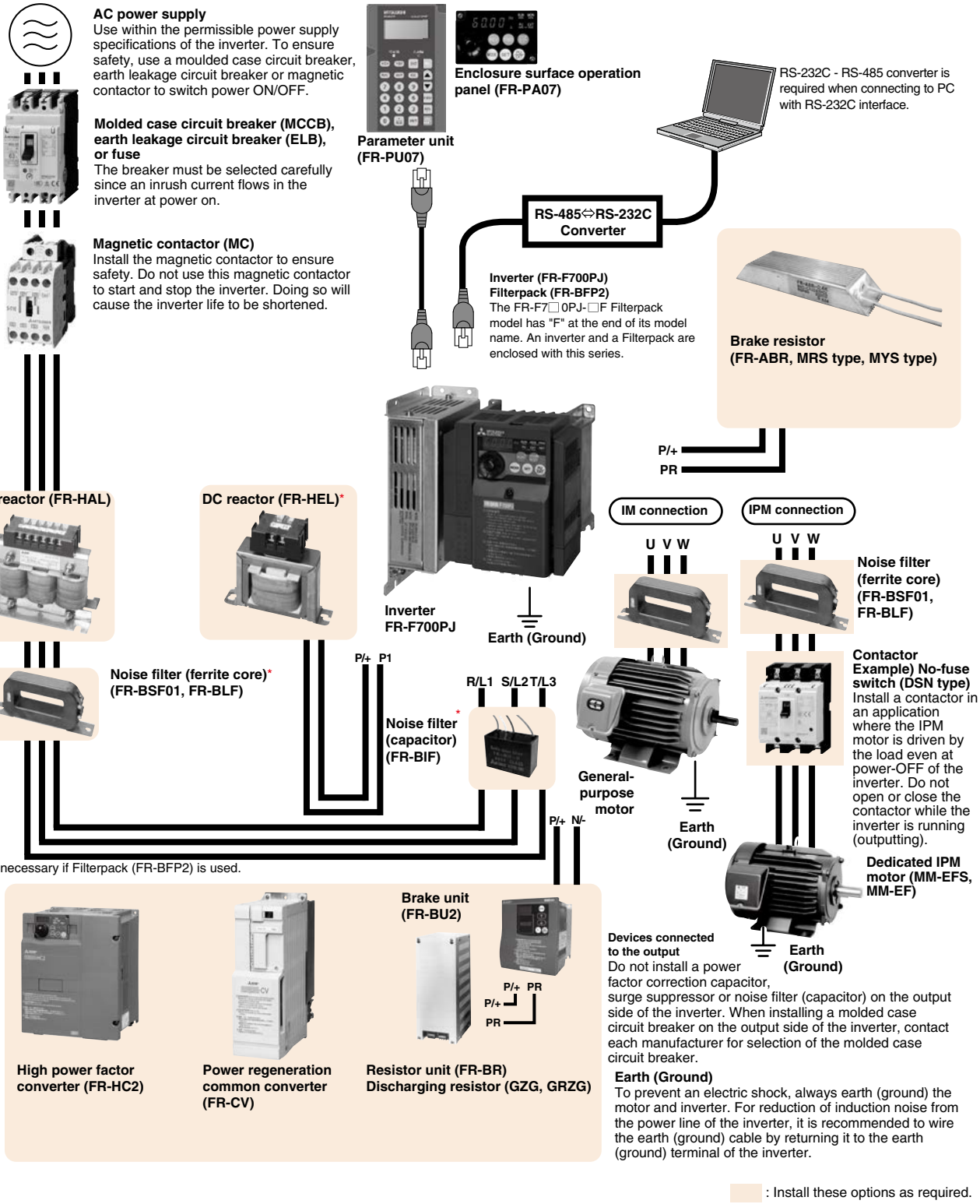
●:To be released

■Precautions
- MM-EFS series IPM motors cannot be driven with commercial power supply
- The total wiring length for an IPM motor should be 100 m or less.
- Only one IPM motor can be connected to an inverter.





Installation Example



Devices connected to the output
Do not install a power factor correction capacitor, surge suppressor or noise filter (capacitor) on the output side of the inverter. When installing a molded case circuit breaker on the output side of the inverter, contact each manufacturer for selection of the molded case circuit breaker.

Earth (Ground)
To prevent an electric shock, always earth (ground) the motor and inverter. For reduction of induction noise from the power line of the inverter, it is recommended to wire the earth (ground) cable by returning it to the earth (ground) terminal of the inverter.

: Install these options as required.

[NOTE]

- The life of the inverter is influenced by surrounding air temperature. Use the product within the permissible surrounding air temperature. This must be noted especially when the inverter is installed in an enclosure. (Refer to chapter 1 of the Instruction Manual (Applied))
- Wrong wiring might lead to damage of the inverter. The control signal lines must be kept fully away from the main circuit to protect them from noise.
- Do not install a power factor correction capacitor, surge suppressor or noise filter (capacitor) on the inverter output side. This will cause the inverter to trip or the capacitor and surge suppressor to be damaged. If any of the above devices are connected, immediately remove them.
- Electromagnetic wave interference
  The input/output (main circuit) of the inverter includes high frequency components, which may interfere with the communication devices (such as AM radios) used near the inverter. In this case, install the FR-BIF optional EMC filter (capacitor) (for use in the input side only) or FR-BSF01 or FR-BLF noise filter (ferrite core) to minimize interference. (Refer to chapter 3 of the Instruction Manual (Applied))
- Refer to the Instruction Manual of each option and peripheral devices for details of peripheral devices.
- An IPM motor cannot be driven by the commercial power supply.
- An IPM motor is a motor with permanent magnets embedded inside. High voltage is generated at the motor terminals while the motor is running. Before closing the contactor at the output side, make sure that the inverter power is ON and the motor is stopped.

■Standard Specifications

●Rating

Three-phase 200V power supply

Inverter										
Model FR-F720PJ-□K			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable general-purpose motor capacity (kW)*1			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2		1.0	1.6	2.7	3.8	6.3	9.1	12.1	17.1	22.1
	Rated current (A)		2.5	4.2	7.0	10.0	16.5	23.8	31.8	45	58
	Overload current rating*3		120% 60s, 150% 0.5s (inverse-time characteristics)								
	Rated voltage*4		Three-phase 200 to 240V								
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240V 50Hz/60Hz								
	Permissible AC voltage fluctuation		170 to 264V 50Hz/60Hz								
	Permissible frequency fluctuation		±5%								
	Power supply capacity (kVA)*5	Without Filterpack	1.2	2.1	4.0	5.0	8.8	12.0	17.0	20.0	27.0
		With Filterpack	0.8	1.2	2.6	3.4	5.5	8.4	11.0	16.0	19.0
Protective structure (JEM 1030)			Enclosed type (IP20)*6								
Cooling system			Self-cooling		Forced air cooling						
Approximate mass (kg)			0.8	1.0	1.4	1.4	1.8	3.6	3.6	6.5	6.5

Filterpack									
Model FR-BFP2-□K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Approximate mass (kg)		1.3	1.4	2.0	2.2	2.8	3.8	4.5	6.7	7.0
Power factor improving reactor		Install the DC reactor in the DC side. 93% to 95% of power supply power factor under 100% load (94.4% *7)								
EMC filter	Common mode choke	Install a ferrite core on the input side								
	Capacitive filter	About 4mA of capacitor leakage current*8								
Protective structure (JEM 1030)		Open type (IP00)								

Three-phase 400V power supply

Inverter										
Model FR-F740PJ-□K			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable general-purpose motor capacity (kW)*1			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2		0.9	1.7	2.8	3.8	6.2	9.1	12.4	17.5	22.5
	Rated current (A)		1.2	2.2	3.7	5.0	8.1	12.0	16.3	23.0	29.5
	Overload current rating*3		120%60s, 150% 0.5s (inverse-time characteristics)								
	Rated voltage*4		Three-phase 380 to 480V								
Power supply	Rated input AC voltage/frequency		Three-phase 380 to 480V 50Hz/60Hz								
	Permissible AC voltage fluctuation		325 to 528V 50Hz/60Hz								
	Permissible frequency fluctuation		±5%								
	Power supply capacity (kVA)*5	Without Filterpack	1.1	2.2	4.2	4.8	8.6	12.0	17.0	20.0	28.0
		With Filterpack	0.7	1.3	2.7	3.3	5.4	8.5	11.0	16.0	19.0
Protective structure (JEM 1030)			Enclosed type (IP20)*6								
Cooling system			Self-cooling		Forced air cooling						
Approximate mass (kg)			1.3	1.3	1.4	1.5	1.5	3.3	3.3	6.0	6.0

Filterpack									
Model FR-BFP2-H□K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Approximate mass (kg)		1.6	1.7	1.9	2.3	2.6	4.5	5.0	7.0	8.2
Power factor improving reactor		Install the DC reactor in the DC side. 93% to 95% of power supply power factor under 100% load (94.4%*7)								
EMC filter	Common mode choke	Install a ferrite core on the input side								
	Capacitive filter	About 8mA of capacitor leakage current*8								
Protective structure (JEM 1030)		Open type (IP00)								

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor. To use a dedicated IPM motor.
*2 The rated output capacity assumes the following output voltages: 220V for the three-phase 200V and 440V for the three-phase 400V class.
*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4 The maximum output voltage does not exceed the power supply voltage.The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*6 Open type (IP00) for Filterpack.
*7 The values in parentheses are calculated with 1 fundamental frequency power factor according to the Year 2013 Standard specification for public constructions (electric installation works), published by the Ministry of Land, Infrastructure, Transport and Tourism in Japan.
*8 The indicated leakage current is equivalent to one-phase of the three-phase three wire 人 connection cable.

●Common Specification

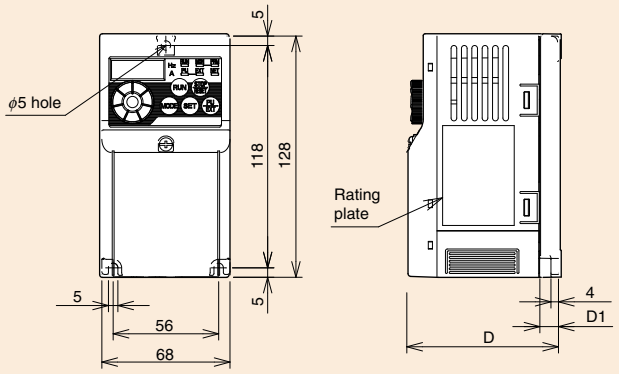
Control specifications	Control method		High carrier frequency PWM control (V/F control)/Optimum excitation control/General-purpose magnetic flux vector control/IPM motor control
	Output frequency range		0.2 to 400Hz
	Frequency setting resolution	Analog input	0.06Hz/60Hz (terminals 2 and 4: 0 to 10V/10-bit) 0.12Hz/60Hz (terminals 2 and 4: 0 to 5V/9-bit) 0.06Hz/60Hz (terminal 4: 0 to 20mA/10-bit)
		Digital input	0.01Hz
	Frequency accuracy	Analog input	Within ±1% of the max. output frequency (25°C ± 10°C)
		Digital input	Within 0.01% of the set output frequency
	Speed control range		V/F control 1:10, General-purpose magnetic flux vector control (during power driving) 1:60, IPM motor control 1:10
	Voltage/frequency characteristics		Base frequency can be set from 0 to 400Hz. Constant-torque/variable-torque pattern can be selected.
	Starting torque	General-purpose motor control	General-purpose motor control (General-purpose magnetic flux vector control or slip compensation): 120% (at 1Hz)
		IPM motor control	IPM motor control: 50%
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0.1 to 3600s (acceleration and deceleration can be set individually), linear and S-pattern acceleration/deceleration modes are available.
	Regenerative braking torque	General-purpose motor control	General-purpose motor control: 15%*1
		IPM motor control	IPM motor control: 5% (10% for 1.5kW or less)*1
	DC injection brake		General-purpose motor control: Operation frequency (0 to 120Hz), operation time (0 to 10s), operation voltage (0 to 30%) can be changed.
	Stall prevention operation level		Operation current level can be set (0 to 150% variable). Whether to use the function or not can be set.
Operation specifications	Frequency setting signal	Analog input	Two terminals Terminal 2: 0 to 10V and 0 to 5V are available Terminal 4: 0 to 10V, 0 to 5V, and 4 to 20mA are available
		Digital input	The signal is entered from the operation panel or parameter unit. Frequency setting increment can be set.
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signal (five terminals)		The following signals can be assigned to **Pr. 178 to Pr.182 (input terminal function selection)**: multi-speed selection, remote setting, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, external thermal input, PU-External operation switchover, V/F switchover, output stop, start self-holding selection, forward rotation, reverse rotation command, inverter reset, PID forward/reverse action switchover, PU-NET operation switchover, External-NET operation switchover, command source switchover, inverter operation enable signal, PU operation external interlock, PID integral value reset.
	Operational functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, second function, multi-speed operation, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS-485), Optimum excitation control, power failure stop, speed smoothing control, MODBUS RTU
	Output signal Open collector output (one terminal) Relay output (one terminal)	Operating status	The following signals can be assigned to **Pr.190 and Pr.192 (output terminal function selection)**: inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake prealarm, electronic thermal relay function prealarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, fan alarm.*2, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, PID deviation limit, IPM motor control*3, PID output interruption, pulse train output of output power, during retry, life alarm, average current value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm.
		For meter Pulse train output (MAX 2.4kHz: one terminal)	The following signals can be assigned to **Pr. 54 FM terminal function selection**: output frequency, output current (steady), output voltage, frequency setting, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, reference voltage output, motor load factor, PID set point, energy saving effect, cumulative energy saving, PID measured value, output power, PID deviation, motor thermal load factor, and inverter thermal load factor. Pulse train output (1440 pulses/s/ full scale)
Indication	Operation panel Parameter unit (FR-PU07)	Operating status	The following operating status can be displayed: output frequency, output current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, output power, cumulative power, motor thermal load factor, inverter thermal load factor, and PTC thermistor resistance.
		Fault record	Fault record is displayed when a fault occurs. Past 8 fault definitions (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored.
		Interactive guidance	Function (help) for operation guide*4
Protective/warning function		Protective function	Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage during acceleration, overvoltage during constant speed, overvoltage during deceleration, inverter protection thermal operation, motor protection thermal operation, heatsink overheat, undervoltage *3, input phase loss *5, output side earth (ground) fault overcurrent at start *5, output short circuit, output phase loss, external thermal relay operation *5, PTC thermistor operation *5, parameter error, PU disconnection, retry count excess *5, CPU fault, brake transistor alarm, inrush resistance overheat, analog input error, overspeed occurrence *3 ,PID signal fault *5, stall prevention operation, output current detection value exceeded *5, loss of synchronism detection *3
		Warning function	Fan alarm*2, overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake prealarm*5, electronic thermal relay function prealarm, maintenance output*5, undervoltage, operation panel lock, password locked, inverter reset
Environment	Surrounding air temperature		-10°C to +50°C (non-freezing)*6
	Ambient humidity		90% RH or less (non-condensing)
	Storage temperature*7		-20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration		Maximum 1000m above sea level, 5.9m/s^2 or less*8 at 10 to 55Hz (directions of X, Y, Z axes)

*1 The regenerative braking torque indicates the average short-time torque (which varies by the motor loss) that is generated when a motor decelerates in the shortest time by itself from the rated speed. It is not the continuous regenerative torque. When a motor decelerates from a speed higher than the rated speed, the average deceleration torque decreases. When the regenerative power is large, use an option brake unit.
*2 As the 0.75K or lower are not provided with the cooling fan, this alarm does not function.
*3 This function is available only when an IPM motor is connected.
*4 This operation guide is only available with option parameter unit (FR-PU07).
*5 This protective function is not available in the initial status.
*6 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0cm clearance). Side-by-side installation is not available for Filterpacks.
*7 Temperatures applicable for a short time, e.g. in transit.
*8 When installing Filterpack of 11K or 15K on the rear side of an inverter, do not install to a moving object or place where vibrates (exceeding 1.96m/s^2).

■Standard Model (Without a Filterpack)

Outline Dimension Drawings

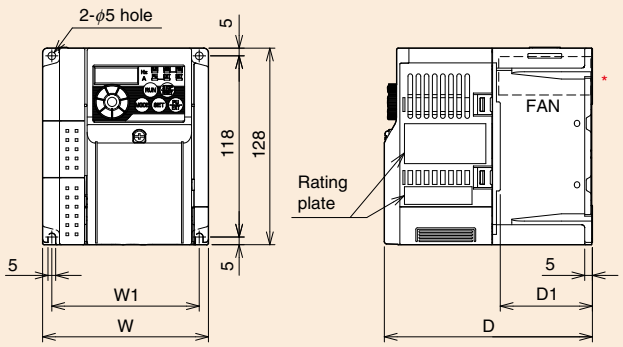
●FR-F720PJ-0.4K, 0.75K



Inverter Model	D	D1
FR-F720PJ-0.4K	112.5	42
FR-F720PJ-0.75K	132.5	62

(Unit: mm)

●FR-F720PJ-1.5K to 3.7K
●FR-F740PJ-0.4K to 3.7K

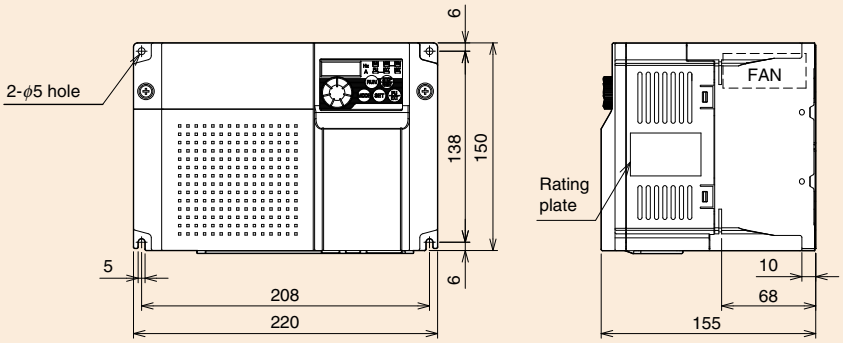


* FR-F740PJ-0.4K and 0.75K are not provided with the cooling fan.

Inverter Model	W	W1	D	D1
FR-F720PJ-1.5K, 2.2K FR-F740PJ-1.5K	108	96	135.5	60
FR-F740PJ-0.4K, 0.75K			129.5	54
FR-F740PJ-2.2K			155.5	60
FR-F740PJ-3.7K			165.5	
FR-F720PJ-3.7K	170	158	142.5	66.5

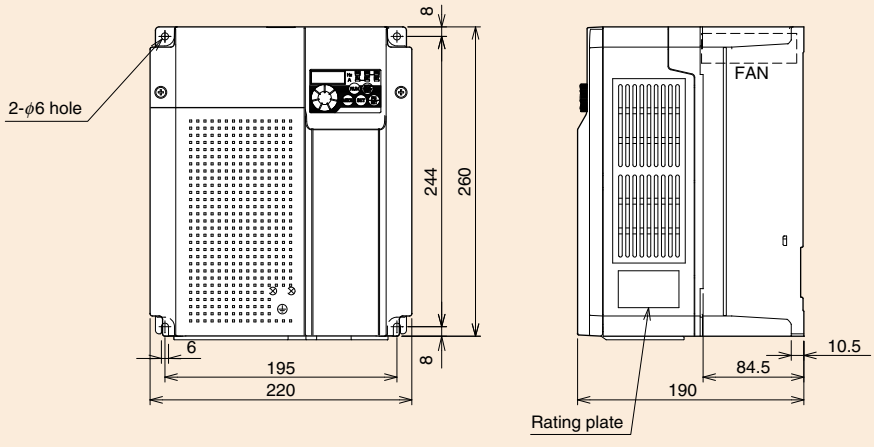
(Unit: mm)

●FR-F720PJ-5.5K, 7.5K
●FR-F740PJ-5.5K, 7.5K



(Unit: mm)

●FR-F720PJ-11K, 15K
●FR-F740PJ-11K, 15K



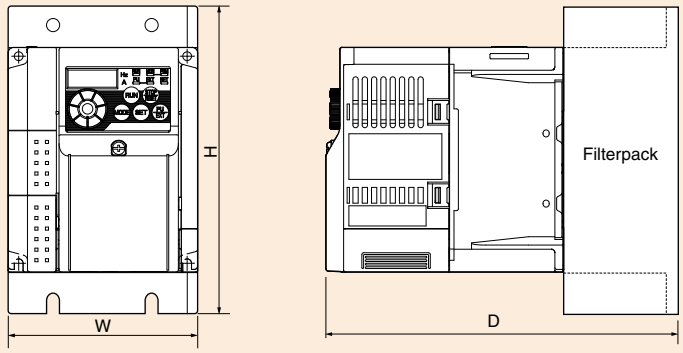
(Unit: mm)

■Standard Model (With a Filterpack)

A Filterpack can be installed on the side or rear panel of the inverter. This is a sample outline dimension drawing. The shape differs by the model.

Outline Dimension Drawings

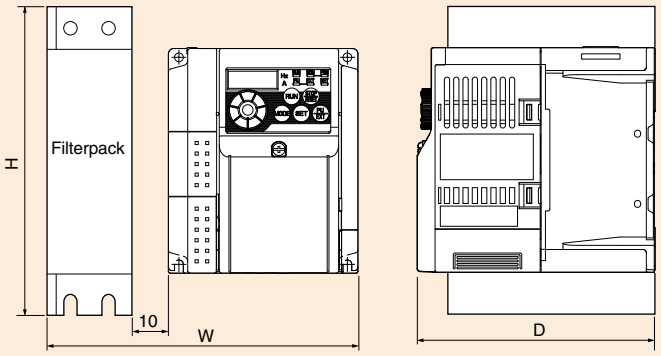
●Filterpack installed on the rear panel



Inverter Model	W	H	D
FR-F720PJ-0.4KF	68	218	172.5
FR-F720PJ-0.75KF	68	218	192.5
FR-F720PJ-1.5KF, 2.2KF	108	188	215.5
FR-F720PJ-3.7KF	170	188	207.5
FR-F720PJ-5.5KF, 7.5KF	220	210	230
FR-F720PJ-11KF, 15KF	220	320	275
FR-F740PJ-0.4KF, 0.75KF	108	188	184.5
FR-F740PJ-1.5KF	108	188	215.5
FR-F740PJ-2.2KF	108	188	235.5
FR-F740PJ-3.7KF	108	188	245.5
FR-F740PJ-5.5KF, 7.5KF	220	210	230
FR-F740PJ-11KF, 15KF	220	320	275

(Unit: mm)

●Filterpack installed on the side panel

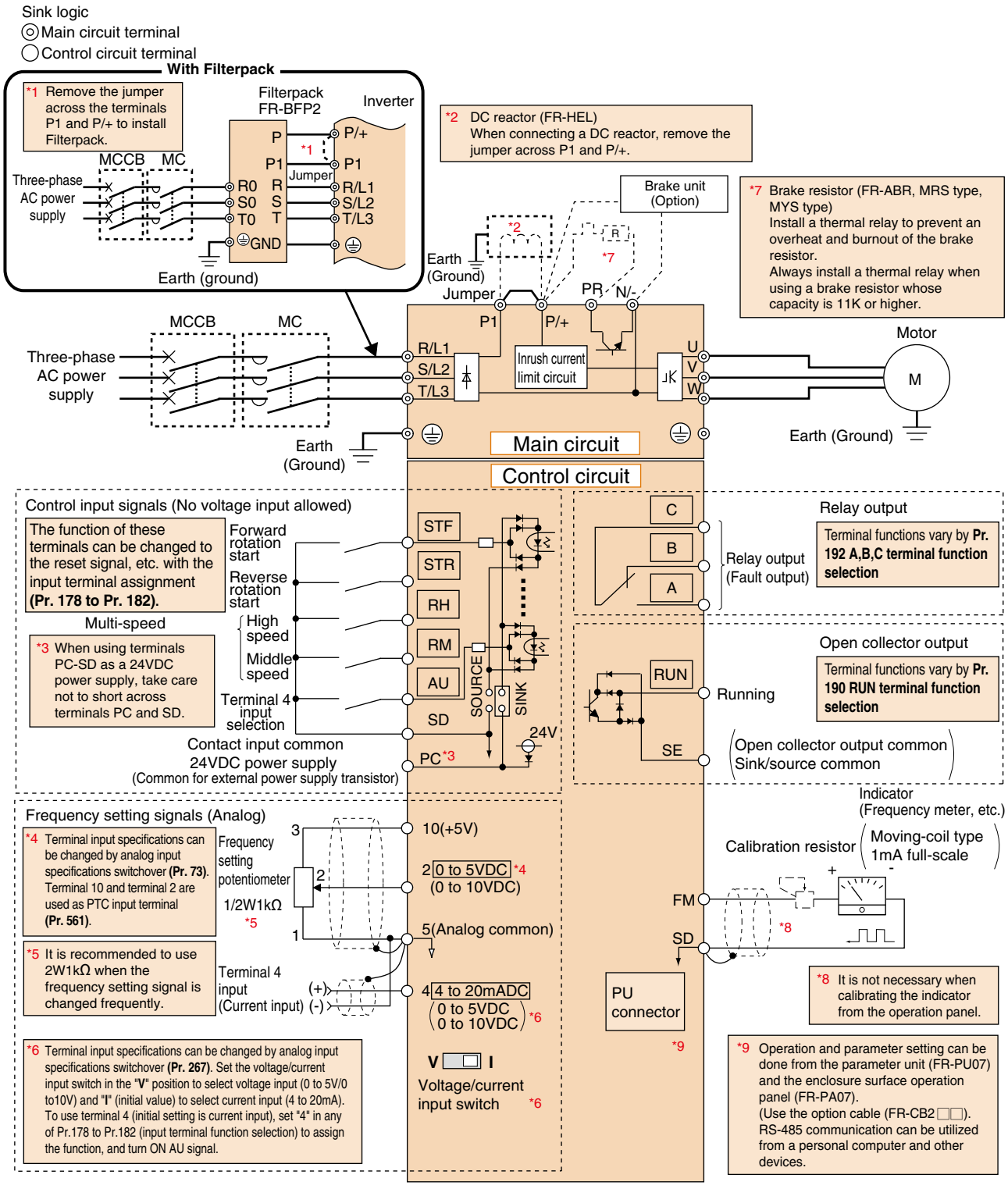


Inverter Model	W*	H	D
FR-F720PJ-0.4KF	138	218	112.5
FR-F720PJ-0.75KF	138	218	132.5
FR-F720PJ-1.5KF, 2.2KF	198	188	135.5
FR-F720PJ-3.7KF	245	188	170
FR-F720PJ-5.5KF, 7.5KF	305	210	195
FR-F720PJ-11KF, 15KF	315	320	195
FR-F740PJ-0.4KF, 0.75KF	173	188	129.5
FR-F740PJ-1.5KF	198	188	135.5
FR-F740PJ-2.2KF	198	188	155.5
FR-F740PJ-3.7KF	198	188	165.5
FR-F740PJ-5.5KF, 7.5KF	305	210	195
FR-F740PJ-11KF, 15KF	315	320	195

* The clearance between the inverter and the filter is 10mm.

(Unit: mm)

Terminal Connection Diagram



[NOTE]

- To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
- The terminals S1, S2, SC, and SO are for manufacturer setting. Do not remove the shortening wires across the terminals S1 and SC and the terminals S2 and SC.

Terminal Specification Explanation

Type		Terminal Symbol	Terminal Name	Terminal Specification	
Main circuit	Inverter	R/L1, S/L2, T/L3	AC power input	Connect to the commercial power supply. Do not connect anything to these terminals when using the high power factor converter (FR-HC2) or power regeneration common converter (FR-CV). To use Filterpack, connect the R, S, and T cables of Filterpack.	
		U, V, W	Inverter output	Connect a three-phase squirrel-cage motor or a dedicated IPM motor.	
		P/+, PR	Brake resistor connection	Connect a brake resistor (FR-ABR, MRS type, MYS type) across terminals P/+ and PR.	
		P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV) or high power factor converter (FR-HC2).	
		P/+, P1	DC reactor (Filterpack) connection	Remove the jumper across terminals P/+ and P1 and connect a DC reactor. To use Filterpack, remove the jumper across the terminals P/+ and P1, then connect the P and P1 cables of Filterpack.	
		⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded). To use Filterpack, connect the GND cable of Filterpack.	
	Filterpack	R0, S0, T0	Commercial power supply input	Connect to the commercial power supply.	
		⏚	Earth (Ground)	For earthing (grounding) the Filterpack. Must be earthed (grounded).	
		R, S, T	Inverter power supply	Connect to R/L1, S/L2, and T/L3 of the inverter.	
		P, P1	DC reactor terminal	Remove the jumper across terminals P/+ and P1, and connect to the terminals P/+ and P1 of the inverter.	
		GND	Inverter earth (ground) connection	Connect to the earth (ground) terminal of the inverter.	
Control circuit/Input signal	Contact input	STF	Forward rotation start	Turn ON the STF signal to start forward rotation and turn it OFF to stop.	When the STF and STR signals are turned ON simultaneously, the stop command is given.
		STR	Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.	
		RH, RM	Multi-speed selection	Multi-speed can be selected according to the combination of RH and RM signals.	
		AU	Terminal 4 input selection	The terminal 4 function is available only when the AU signal is ON. (the operation with the frequency setting signal of 4 to 20mA DC is available) Turning ON the AU signal disables the terminal 2 (voltage input) function.	
		SD	Contact input common (sink) (initial setting)	Common terminal for contact input terminal (sink logic) and terminal FM.	
			External transistor common (source)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
			24VDC power supply common	Common output terminal for 24VDC 0.1A power supply (PC terminal). Isolated from terminals 5 and SE.	
		PC	External transistor common (sink) (initial setting)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the sink logic to avoid malfunction by undesirable current.	
			Contact input common (source)	Common terminal for contact input terminal (source logic).	
			24VDC power supply	Can be used as 24VDC 0.1A power supply.	
	Frequency setting	10	Frequency setting power supply	Used as power supply when connecting potentiometer for frequency setting (speed setting) from outside of the inverter.	5VDC permissible load current 10mA
		2	Frequency setting (voltage)	Inputting 0 to 5VDC (or 0 to 10V) provides the maximum output frequency at 5V (10V) and makes input and output proportional. Use Pr. 73 to switch between input 0 to 5VDC input (initial setting) and 0 to 10VDC.	Input resistance10kΩ ± 1kΩ Permissible maximum voltage 20VDC
		4	Frequency setting (current)	Inputting 4 to 20mADC (or 0 to 5V, 0 to 10V) provides the maximum output frequency at 20mA and makes input and output proportional. The input signal to terminal 4 is valid only when the AU signal is ON (terminal 2 input is invalid). Use **Pr. 267** to switch from among input 4 to 20mA (initial setting), 0 to 5VDC and 0 to 10VDC. Set the voltage/current input switch in the "V" position to select voltage input (0 to 5V/0 to 10V).	Current input: Input resistance 249Ω ± 5Ω Maximum permissible current 30mA Voltage input: Input resistance10kΩ ± 1kΩ Permissible maximum voltage 20VDC
		5	Frequency setting common	Frequency setting signal (terminal 2 or 4) common terminal. Do not earth (ground).	
	Thermistor	10 2	PTC thermistor input	For connecting PTC thermistor output. When PTC thermistor protection is valid (**Pr. 561** ≠ "9999"), terminal 2 is not available for frequency setting.	Adaptive PTC thermistor specification Heat detection resistance: 500Ω to 30kΩ (Set by **Pr. 561**)

Type		Terminal Symbol	Terminal Name	Terminal Specification	
Control circuit terminal/Output signal	Relay	A, B, C	Relay output (fault output)	1 changeover contact output indicates that the inverter protective function has activated and the output stopped. Fault: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C) Contact capacity:230VAC 0.3A (power factor =0.4) 30VDC 0.3A	
	Open collector	RUN	Inverter running	Switched Low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5Hz). Switched High during stop or DC injection brake operation. (Low is when the open collector output transistor is ON (conducts). High is when the transistor is OFF (does not conduct).)	Permissible load 24VDC (maximum 27VDC) 0.1A (a voltage drop is 3.4V maximum when the signal is ON)
		SE	Open collector output common	Common terminal of terminal RUN.	
	Pulse	FM	For meter	Selected one e.g. output frequency from monitored items. (Not output during inverter reset.) The output signal is proportional to the magnitude of the corresponding monitored item.	Permissible load current 1mA 1440 pulses/s at full scale
Communication		–	PU connector	With the PU connector, communication can be established through RS-485. •Conforming standard: EIA-485 (RS-485) •Transmission format: Multidrop link •Communication speed: 4800 to 38400bps •Overall length: 500m	

[NOTE]

- To change the input specification for terminal 4, set **Pr. 267** and the voltage/current input switch correctly, then input the analog signal relevant to the setting. Applying a voltage with voltage/current input switch in "I" position (current input is selected) or a current with switch in "V" position (voltage input is selected) could cause component damage of the inverter or analog circuit of output devices.
- Connecting the power supply to the inverter output terminals (U, V, W) will damage the inverter. Do not perform such wiring.
- ☐ indicates that terminal functions can be selected using **Pr. 178 to Pr. 182, Pr. 190 and Pr. 192 (I/O terminal function selection)**.
- The terminal names and functions shown here are the initial settings.
- The terminals S1, S2, SC, and SO are for manufacturer setting. Do not connect anything to these.
  Doing so may cause an inverter failure. Do not remove the shortening wires across the terminals S1 and SC and the terminals S2 and SC. Removing either shortening wire disables the inverter operation.

INVERTER FREQROL-D700 Series

Simple and compact; the Mitsubishi standard

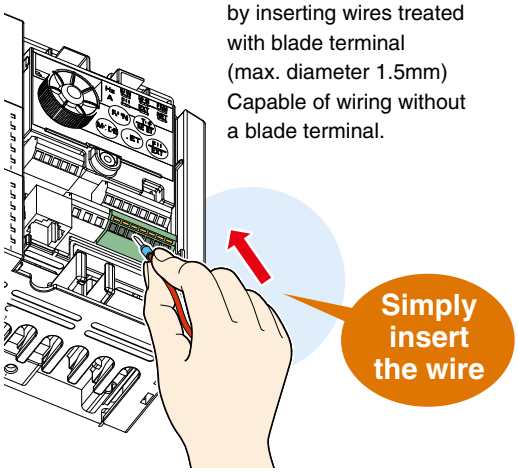
Mitsubishi Inverter Sets a New Standard ——— with More Reliability!!

Spring Clamp Terminal (Control Circuit Terminal)

With spring clamp terminals*, the wiring becomes easier and more secure.

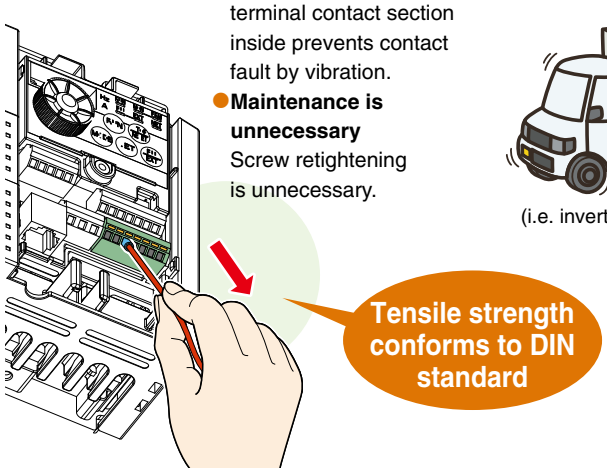
*: Main circuit terminal is screw terminal.

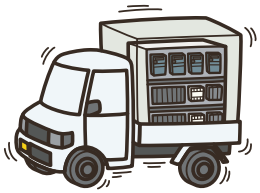
●**Easy wiring**
Wiring is completed only by inserting wires treated with blade terminal (max. diameter 1.5mm) Capable of wiring without a blade terminal.



●**High reliability**
Spring structure in terminal contact section inside prevents contact fault by vibration.

●**Maintenance is unnecessary**
Screw retightening is unnecessary.



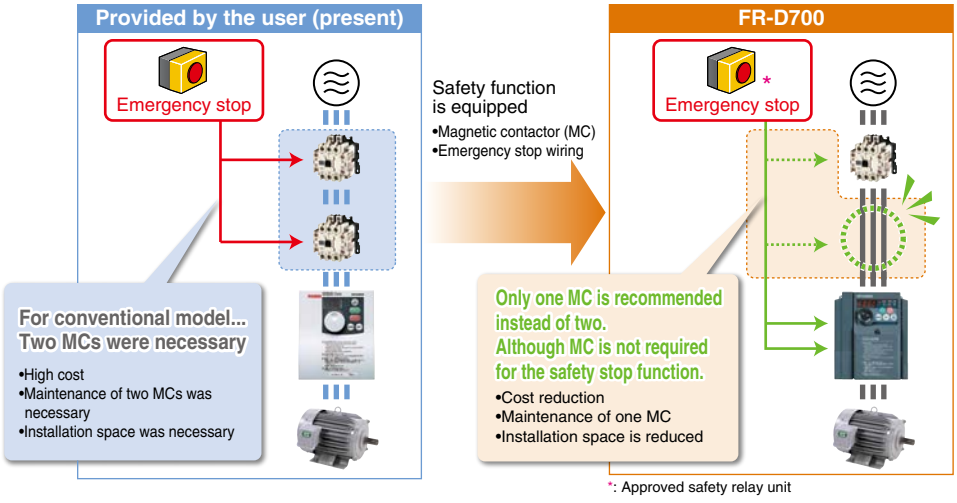


(i.e. inverter transportation)

Safety Stop Function

The FR-D700 series is compliant to the EU Machinery Directive without the addition of previously required external devices. Operation of an external Emergency Stop device results in a highly reliable immediate shutoff of the D700's output to the motor. This safety stop function conforms to the following standards.

EN ISO 13849-1 Category 3 / PLd
EN62061 / IEC61508 SIL2



*: Approved safety relay unit

Password Function

Registering 4-digit password can limit parameter read/write.

●It is effective for parameter setting protection.

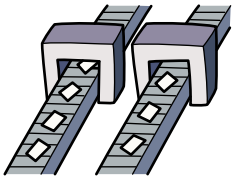


Equipped with High-Class Performance (as of April 2008)

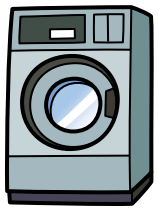
150%/1Hz High Starting Torque by General-Purpose Magnetic Flux Vector Control

General-purpose magnetic flux vector control and auto tuning function are available. It ensures operation that requires high starting torque, such as transfer machine including conveyer, hoist, lift, etc., washing machine, and agitators.

- High torque of 150%/1Hz and 200%/3Hz (3.7K or less) is realized (when the slip compensation function is valid).
- Auto tuning
  Many kinds of motors can be optimally controlled with Mitsubishi original "non-rotation" auto tuning function. (R1 constants tuning)



(example: conveyer)



(example: industrial washing machine)

Simple & Easy Operation

Quick Setup with the Setting Dial

Setting dial is the feature of Mitsubishi inverters.

- Displayed numbers can be jumped by turning the setting dial quickly, and numbers can be changed one by one by turning it slowly, enabling speedy parameter setting.
- The nonslip setting dial is easier to turn.



Easy Setting from a Personal Computer Using the FR Configurator (Option)

Connecting a personal computer and the inverter via RS-485 communication enables setting with wizard (interactive) function of the FR Configurator (inverter setup software).
In addition, a parameter setting can be converted from the FR-S500 series to the FR-D700 series by "Convert" function.
"Graph" function displays monitor data in waveform.

Enclosure Surface Operation Panel FR-PA07 (Option)

Optional enclosure surface operation panel (FR-PA07) can be connected. In addition, an operation panel for the FR-E500 series can be connected.

The operation panel of the inverter can not be removed.
A parameter unit connection cable (FR-CB20□) is separately necessary.



Parameter Unit FR-PU07 (Option)

An optional parameter unit (FR-PU07) can be connected as well.

A parameter unit connection cable (FR-CB20□) is separately necessary.

- Setting such as direct input method with a numeric keypad, operation status indication, and help function are usable. Eight languages can be displayed.
- Parameter setting values of maximum of three inverters can be stored.



Compact and Space Saving

Easily Replaceable Compact Body

Installation size is the same as that of the FR-S500 series which is the smallest model of the Mitsubishi inverter.



FR-D740-0.4K FR-S540E-0.4K

Side by Side Installation Saves Space

Space can be saved by side by side no clearance installation*.

*: Use the inverter at the surrounding air temperature of 40°C or less.



Long-Life and Easy Maitenance

Long-Life Design

- The design life of the cooling fan has been extended to 10 years*1. The life of the fan can be further extended utilizing the it's ON/OFF control.
- The design life of the capacitors has been extended to 10 years by the adoption of a capacitor endures 5000 hours at 105°C surrounding air temperature*1, *2.

*1: Surrounding air temperature : annual average 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt) Since the design life is a calculated value, it is not a guaranteed value.
*2: Output current : 80% of the inverter rated current

- Life indication of critical components

Components	Guideline of the FR-D700 Life	Guideline of JEMA*3
Cooling fan	10 years	2 to 3 years
Main circuit smoothing capacitor	10 years	5 years
Printed board smoothing capacitor	10 years	5 years

*3: Excerpts from "Periodic check of the transistorized inverter" of JEMA (Japan Electrical Manufacture's Association)

Leading Life Check Function

- Degrees of deterioration of main circuit capacitor, control circuit capacitor, and inrush current limit circuit can be monitored.
- Trouble can be avoided with the self-diagnostic alarm*4 that is output when the life span is near.

*4: If any one of main circuit capacitor, control circuit capacitor, inrush current restriction circuit or cooling fan reaches the output level, an alarm is output. Capacity of the main circuit capacitor can be measured by setting parameter at a stop and turning the power from off to on. Measuring the capacity enables alarm to be output.
The cooling fan outputs alarm by using fan speed detection.

Easy Replacement of Cooling Fan

A cooling fan is provided on top of the inverter of all capacities requiring a cooling fan (1.5K or more).
A cooling fan can be easily replaced without disconnecting main circuit wires.



Combed Shaped Wiring Cover

Since a cover can be fitted after wiring, wiring work is easily done.



Environment Consciousness in Global Standards

RoHS Directive Compliant

Human and environment-friendly inverter in compliant with RoHS Directive.

RoHS Directive requires member nations to guarantee that new electrical and electronic equipment sold in the market after July 1, 2006 do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants.
<G> mark indicating RoHS Directive compliance is printed on the package.

EMC Directive Compliant Noise Filter

Compliance to the EMC Directive of European Norm is easier.

- Noise filter option which is compatible with EMC Directive (EN61800-3 2nd Environment Category C3) is available.

Filterpack FR-BFP2 (Option)

Power factor improving DC reactor, zero phase reactor, and capacitative filter (radio noise filter), are frequently-used units for an air conditioning application. The filterpack combines those three units are available as an option.
Not only it uses less space and wiring, the filterpack is in compliance with the harmonic suppression guidelines, and conforms to the public building construction standard specifications (electrical equipment construction edition) as well as the public building construction standard specifications (machinery and equipment construction edition) (2010 edition) edited by the Ministry of Land, Infrastructure, Transport and Tourism.

Complies with UL, cUL, EC Directives (CE Marking) as a Standard Model

c UL us LISTED

CE

Single-phase 100V power input specification models are not in compliance with the EMC Directive.

Enhanced Functions

Built for Various Applications

Equipped with many useful functions for various applications

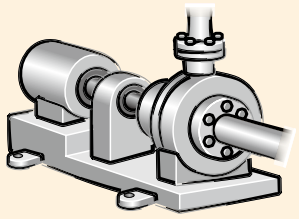
Fan and pump

Energy saving

- **Applicable load selection *(Pr.14)***
  Select the best output features (V/F features) according to use and load characteristics.
- **Optimum excitation control *(Pr.60)***
  This control maximizes motor efficiency, saving more energy especially during use of reduced load torque such as fan and pump applications.

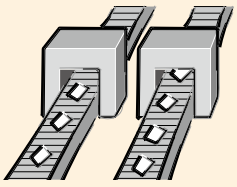
- **Regeneration avoidance function**
  This function automatically increases the frequency level during regeneration, for example, a dragging fan, to restrain tripping.
- **Deceleration and stop function upon power failure/continuous operation function upon instantaneous power failure**
- **PID control**
- **Auto-restart upon instantaneous power failure/drag retraction**

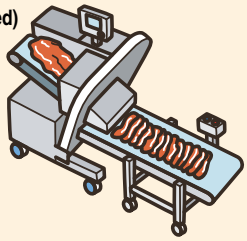

(i.e. A/C fan)


(i.e. pump)

Conveyor and food machineries

- **General-purpose magnetic flux vector control**
- **S-shaped acceleration and deceleration**
- **Multi-speed function (up to 15 speed)**
- **Brake resistor connection**

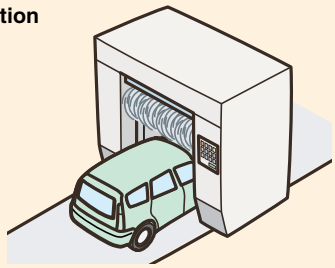

(i.e. conveyor)


(i.e. meat slicer)

Environmental and consumer-related machineries

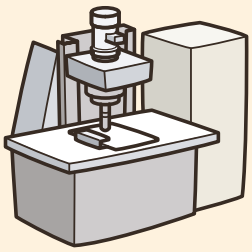
- **General-purpose magnetic flux vector control**
- **Brake resistor connection**


(i.e. Industrial washing machine)


(i.e. Car wash machine)

Machine tools

- **General-purpose magnetic flux vector control**
- **Deceleration and stop function upon power failure**
  In the event of a power failure or an undervoltage, the motor decelerates and stops to prevent a free-run state. This function is useful to prevent risks associated with machine tools, such as when stopping a motor upon power failure.


(i.e. Spindle)

Amusement machine

Packaging machinery

Textile machinery

Printing machinery

etc.

Enhanced Communication Function

- Mitsubishi inverter protocol and Modbus-RTU Faster communication speed with RS-485 models (enables 38.4kbps communication)
  Added the "Multi-Command Mode" to the Mitsubishi inverter protocol (reduces inverter data process time by 1/3 - 1/4)
  Compatible with Modbus-RTU

Brake Resistor Connection Possible

Built-in brake transistor for 0.4K and above.
Regenerative capacity can be increased by connecting the optional brake resistor.
The above function can also be used to reduce deceleration time of fans and other machineries with a large inertia as well as lifts.

Introducing the Mitsubishi magnetic contactor

- Offers a selection of small frames
- Offers a line-up of safety contactors
- Supports small loads (auxiliary contact)
- Supports many international regulations as standard



Lineup

The lineup of three phase 200V/400V class goes to 15K.

- For a use in harsh environment, special unit with board coating is also available. Please contact our sales representative.
- For the FR-D700 series, North American (NA), EU (EC), and Chinese (CHT) specifications also are supported.

*: This catalog explains based on the Japanese specifications.
Consult our sales office for specifications of each country.

FR-D7 4 0 □ - 0.4K

Symbol	Voltage
1	100V class
2	200V class
4	400V class

Symbol	Number of Power Phases
None	Three-phase input
S	Single-phase input
W	Single-phase input (double voltage output)

Symbol	Inverter Capacity
0.1K to 15K	Indicate capacity "kW".

Power Supply	Inverter Model	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Three phase 200V	FR-D720-□K	●	●	●	●	●	●	●	●	●	●	●
Three phase 400V	FR-D740-□K	—	—	●	●	●	●	●	●	●	●	●
Single phase 200V*	FR-D720S-□K	●	●	●	●	●	●	—	—	—	—	—
Single phase 100V*	FR-D710W-□K	●	●	●	●	—	—	—	—	—	—	—

*: Output of the single-phase 200V and single-phase 100V input models is three-phase 200V.

●:Available models —:Not available



Installation Example



AC power supply
Use within the permissible power supply specifications of the inverter.
To ensure safety, use a moulded case circuit breaker, earth leakage circuit breaker or magnetic contactor to switch power ON/OFF.



Moulded case circuit breaker (MCCB) or earth leakage current breaker (ELB), fuse
The breaker must be selected carefully since an in-rush current flows in the inverter at power on.



Magnetic contactor (MC)
Install the magnetic contactor to ensure safety. Do not use this magnetic contactor to start and stop the inverter. Doing so will cause the inverter life to be shorten.

Reactor (FR-HAL, FR-HEL option)
Install reactors to suppress harmonics and to improve the power factor.
A reactor (option) is required when installing the inverter near a large power supply system (500kVA or more).
The inverter may be damaged if you do not use reactors. Select the reactor according to the model. Remove the jumpers across terminals P/+ - P1 to connect the DC reactor.



Parameter unit (FR-PU07)



Enclosure surface operation panel (FR-PA07)
Connect a connection cable (FR-CB2) to the PU connector to use the FR-PA07, FR-PU07/FR-PU07BB(-L).



RS-232C - RS-485 converter is required when connecting to PC with RS-232C interface.

RS-485⇔RS-232C Converter



S1
S2
PC

Approved safety relay module
Required for compliance with safety standard.





Brake resistor (FR-ABR, MRS, MYS)
Braking capability can be improved. (0.4K or more)
Always install a thermal relay when using a brake resistor whose capacity is 11K or more.

P/+
PR

AC reactor (FR-HAL)



DC reactor (FR-HEL)*



P/+ P1

R/L1 S/L2 T/L3

P/+ N/-

Earth (Ground)

U V W



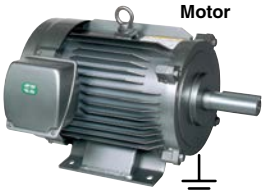
EMC filter (ferrite core)* (FR-BSF01, FR-BLF)
Install a noise filter to reduce the electromagnetic noise generated from the inverter. Effective in the range from about 1MHz to 10MHz. When more wires are passed through, a more effective result can be obtained. A wire should be wound four turns or more.



EMC filter (capacitor)* (FR-BIF)
Reduces the radio noise.



EMC filter (ferrite core) (FR-BSF01, FR-BLF)
Install a noise filter to reduce the electromagnetic noise generated from the inverter. Effective in the range from about 1MHz to 10MHz. A wire should be wound four turns at a maximum.



Motor

Earth (Ground)

*Filterpack (FR-BFP2), which contains DC reactor and noise filter in one package, is also available.

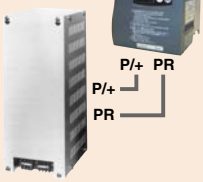


High power factor converter (FR-HC)
Power supply harmonics can be greatly suppressed.
Install this as required.



Power regeneration common converter (FR-CV)
Great braking capability is obtained.
Install this as required.

Brake unit (FR-BU2)



Register unit (FR-BR) Discharging resistor (GZG, GRZG)
The regenerative braking capability of the inverter can be exhibited fully.
Install this as required.

Devices connected to the output
Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the output side of the inverter. When installing a moulded case circuit breaker on the output side of the inverter, contact each manufacturer for selection of the moulded case circuit breaker.

Earth (Ground)
To prevent an electric shock, always earth (ground) the motor and inverter. For reduction of induction noise from the power line of the inverter, it is recommended to wire the earth (ground) cable by returning it to the earth (ground) terminal of the inverter.

: Install these options as required.

*2 Can be used only with standard control circuit terminal specification products and safety stop compatible models.

■Standard Specifications

●Rating

Three-phase 200V power supply

Model FR-D720-☐K		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	0.3	0.6	1.0	1.7	2.8	4.0	6.6	9.5	12.7	17.9	23.1
	Rated current (A)	0.8	1.4	2.5	4.2	7.0	10.0	16.5	23.8	31.8	45	58
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)										
	Voltage*4	Three-phase 200 to 240V										
	Regenerative braking torque*5	150%			100%		50%	20%				
Power supply	Rated input AC voltage/frequency	Three-phase 200 to 240V 50Hz/60Hz										
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz										
	Permissible frequency fluctuation	±5%										
	Power supply capacity (kVA)*6	0.4	0.7	1.2	2.1	4.0	5.5	9.0	12.0	17.0	20.0	27.0
Protective structure (JEM1030)		Enclosed type (IP20).										
Cooling system		Self-cooling				Forced air cooling						
Approximate mass (kg)		0.5	0.5	0.8	1.0	1.4	1.4	1.8	3.6	3.6	6.5	6.5

Three-phase 400V power supply

Model FR-D740-☐K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)*1		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	0.9	1.7	2.7	3.8	6.1	9.1	12.2	17.5	22.5
	Rated current (A)	1.2	2.2	3.6	5.0	8.0	12.0	16.0	23.0	29.5
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)								
	Voltage*4	Three-phase 380 to 480V								
	Regenerative braking torque*5	50%		100%	20%					
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 480V 50Hz/60Hz								
	Permissible AC voltage fluctuation	325 to 528V 50Hz/60Hz								
	Permissible frequency fluctuation	±5%								
	Power supply capacity (kVA)*6	1.5	2.5	4.5	5.5	9.5	12.0	17.0	20.0	28.0
Protective structure (JEM1030)		Enclosed type (IP20).								
Cooling system		Self-cooling		Forced air cooling						
Approximate mass (kg)		1.3	1.3	1.4	1.5	1.5	3.3	3.3	6.0	6.0

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 230V for three-phase 200V class and 440V for three-phase 400V class.
*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range.
However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque.
When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used.
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).

Single-phase 200V power supply

Model FR-D720S-☐K		0.1	0.2	0.4	0.75	1.5	2.2
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75	1.5	2.2
Output	Rated capacity (kVA)*2	0.3	0.6	1.0	1.7	2.8	4.0
	Rated current (A)	0.8	1.4	2.5	4.2	7.0	10.0
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)					
	Voltage*4	Three-phase 200 to 240V					
	Regenerative braking torque*5	150%		100%		50%	20%
Power supply	Rated input AC voltage/frequency	Single-phase 200 to 240V 50Hz/60Hz					
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz					
	Permissible frequency fluctuation	±5%					
	Power supply capacity (kVA)*6	0.5	0.9	1.5	2.3	4.0	5.2
Protective structure (JEM1030)		Enclosed type (IP20).					
Cooling system		Self-cooling				Forced air cooling	
Approximate mass (kg)		0.5	0.5	0.9	1.1	1.5	2.0

Single-phase 100V power supply

Model FR-D710W-☐K		0.1	0.2	0.4	0.75
Applicable motor capacity (kW)*1		0.1	0.2	0.4	0.75
Output	Rated capacity (kVA)*2	0.3	0.6	1.0	1.7
	Rated current (A)	0.8	1.4	2.5	4.2
	Overload current rating*3	150% 60s, 200% 0.5s (inverse-time characteristics)			
	Voltage	Three-phase 200 to 230V*7, *8			
	Regenerative braking torque*5	150%		100%	
Power supply	Rated input AC voltage/frequency	Single-phase 100 to 115V 50Hz/60Hz			
	Permissible AC voltage fluctuation	90 to 132V 50Hz/60Hz			
	Permissible frequency fluctuation	±5%			
	Power supply capacity (kVA)*6	0.5	0.9	1.5	2.5
Protective structure (JEM1030)		Enclosed type (IP20).			
Cooling system		Self-cooling			
Approximate mass (kg)		0.6	0.7	0.9	1.4

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 230V.
*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load. If the automatic restart after instantaneous power failure function **(Pr. 57)** or power failure stop function **(Pr. 261)** is set and power supply voltage is low while load becomes bigger, the bus voltage decreases to power failure detection level and load of 100% or more may not be available.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range.
However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque.
When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used.
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*7 For single-phase 100V power input model, the maximum output voltage is twice the amount of the power supply voltage and cannot be exceeded.
*8 In a single-phase 100V power input model, the output voltage may fall down when the load is heavy, and larger output current may flow compared to a three-phase input model.
Use the motor with less load so that the output current is within the rated motor current range.

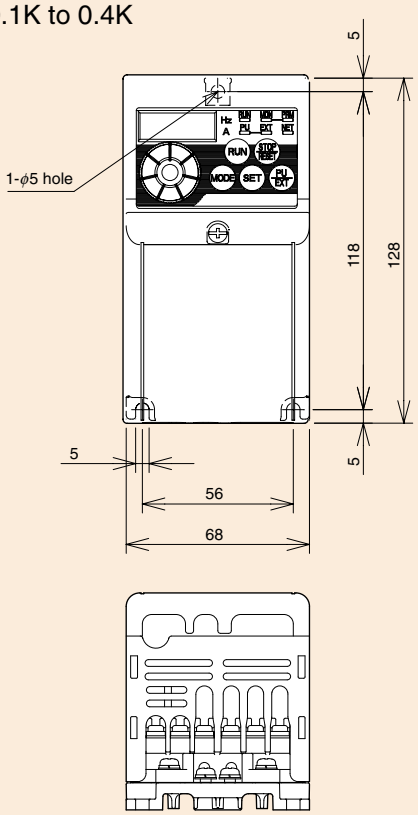
●Common Specifications

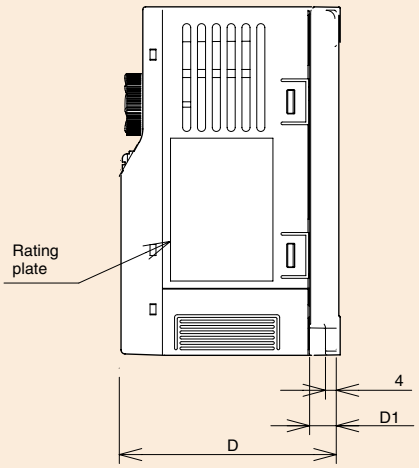
Control specifications	Control method		Soft-PWM control/high carrier frequency PWM control (V/F control, General-purpose magnetic flux vector control, and Optimum excitation control are available)
	Output frequency range		0.2 to 400Hz
	Frequency setting resolution	Analog input	0.06Hz/60Hz (terminal2, 4: 0 to 10V/10bit) 0.12Hz/60Hz (terminal2, 4: 0 to 5V/9bit) 0.06Hz/60Hz (terminal4: 0 to 20mA/10bit)
		Digital input	0.01Hz
	Frequency accuracy	Analog input	Within ±1% of the max. output frequency (25°C ±10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 400Hz. Constant-torque/variable torque pattern can be selected
	Starting torque		150% or more (at 1Hz)...when General-purpose magnetic flux vector control and slip compensation is set
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0.1 to 3600s (acceleration and deceleration can be set individually), Linear and S-pattern acceleration/deceleration modes are available.
	DC injection brake		Operation frequency (0 to 120Hz), operation time (0 to 10s), and operation voltage (0 to 30%) can be changed
	Stall prevention operation level		Operation current level (0 to 200%), and whether to use the function or not can be selected
Operation specifications	Frequency setting signal	Analog input	Two terminals Terminal 2: 0 to 10V and 0 to 5V are available Terminal 4: 0 to 10V, 0 to 5V, and 4 to 20mA are available
		Digital input	The signal is entered from the operation panel or parameter unit. Frequency setting increment can be set.
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signal (five terminals)		The following signals can be assigned to **Pr. 178 to Pr.182 (input terminal function selection)**: multi-speed selection, remote setting, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, external thermal input, PU-External operation switchover, V/F switchover, output stop, start self-holding selection, forward rotation, reverse rotation command, inverter reset, PU-NET operation switchover, External-NET operation switchover, command source switchover, inverter operation enable signal, and PU operation external interlock.
	Operational functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, second function, multi-speed operation, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS-485), Optimum excitation control, power failure stop, speed smoothing control, Modbus-RTU
	Output signal Open collector output (two terminals) Relay output (one terminal)	Operating status	The following signals can be assigned to **Pr.190, Pr.192 and Pr.197 (output terminal function selection)**: inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake prealarm, electronic thermal relay function prealarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, fan alarm*1, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, PID output interruption, safety monitor output, safety monitor output 2, during retry, life alarm, current average value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm.
		For meter Pulse train output (MAX 2.4kHz: one terminal)	The following signals can be assigned to **Pr.54 FM terminal function selection**: output frequency, output current (steady), output voltage, frequency setting, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, reference voltage output, motor load factor, PID set point, PID measured value, output power, PID deviation, motor thermal load factor, and inverter thermal load factor. Pulse train output (1440 pulses/s/full scale)
Indication	Operation panel Parameter unit (FR-PU07)	Operating status	The following operating status can be displayed: output frequency, output current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, output power, cumulative power, motor thermal load factor, inverter thermal load factor, and PTC thermistor resistance.
		Fault record	Fault definition is displayed when a fault occurs. Past 8 fault records (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored.
		Interactive guidance	Function (help) for operation guide*2
Protective/warning function		Protective function	Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage during acceleration, overvoltage during constant speed, overvoltage during deceleration, inverter protection thermal operation, motor protection thermal operation, heatsink overheat, input phase loss*3*4, output side earth (ground) fault overcurrent at start*3, output phase loss, external thermal relay operation*3, PTC thermistor operation*3, parameter error, PU disconnection, retry count excess*3, CPU fault, brake transistor alarm, inrush resistance overheat, analog input error, stall prevention operation, output current detection value exceeded*3, safety circuit fault
		Warning function	Fan alarm*1, overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake prealarm*3, electronic thermal relay function prealarm, maintenance output*3, undervoltage, operation panel lock, password locked, inverter reset, safety stop
Environment	Surrounding air temperature		-10°C to +50°C maximum (non-freezing)*5
	Ambient humidity		90%RH or less (non-condensing)
	Storage temperature*6		-20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt etc.)
	Altitude/vibration		Maximum 1000m above sea level, 5.9m/s^2 or less at 10 to 55Hz (directions of X, Y, Z axes)

*1 As the 0.75K or less are not provided with the cooling fan, this alarm does not function.
*2 This operation guide is only available with option parameter unit (FR-PU07).
*3 This protective function does not function in the initial status.
*4 This protective function is available with the three-phase power input specification model only.
*5 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0cm clearance).
*6 Temperatures applicable for a short time, e.g. in transit.

Outline Dimension Drawings

- FR-D720-0.1K to 0.75K
- FR-D720S-0.1K to 0.75K
- FR-D710W-0.1K to 0.4K

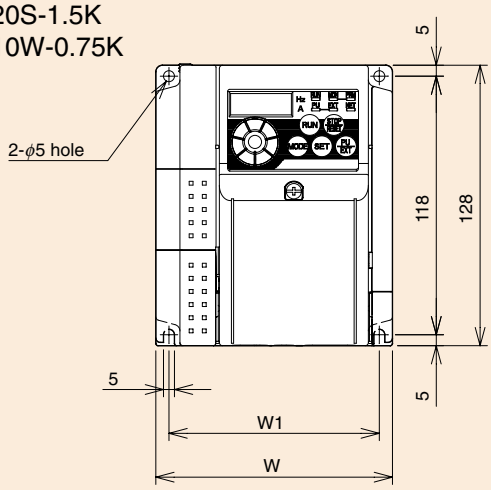


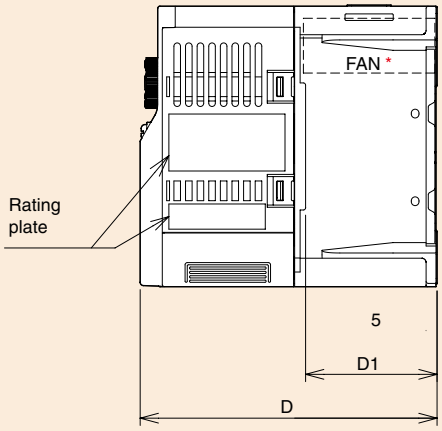


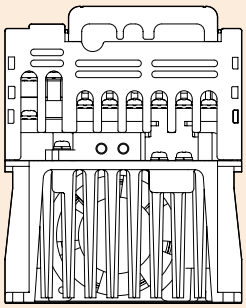
Inverter Model	D	D1
FR-D720-0.1K, 0.2K FR-D720S-0.1K, 0.2K FR-D710W-0.1K	80.5	10
FR-D710W-0.2K	110.5	10
FR-D720-0.4K	112.5	42
FR-D720-0.75K	132.5	62
FR-D720S-0.4K FR-D710W-0.4K	142.5	42
FR-D720S-0.75K	162.5	62

(Unit: mm)

- FR-D720-1.5K to 3.7K
- FR-D740-0.4K to 3.7K
- FR-D720S-1.5K
- FR-D710W-0.75K







* FR-D740-0.4K, 0.75K, FR-D710W-0.75K are not provided with the cooling fan.

Inverter Model	W	W1	D	D1
FR-D720-1.5K, 2.2K FR-D740-1.5K	108	96	135.5	60
FR-D740-0.4K, 0.75K			129.5	54
FR-D740-2.2K FR-D720S-1.5K			155.5	60
FR-D740-3.7K			165.5	
FR-D710W-0.75K			149.5	54
FR-D720-3.7K	170	158	142.5	66.5

(Unit: mm)

GRAPHIC OPERATION TERMINAL / SCADA

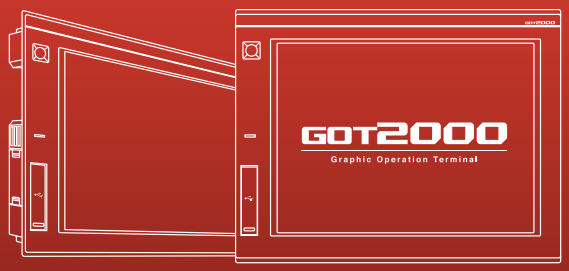
Graphic Operation Terminal

SCADA MC Works64

Graphic Operation Terminal

Craftsmanship mindset goes global

Full lineup to incorporate manufacturing needs.
Connections with FA equipment and advanced operability will reduce design man-hours and bring greater efficiency.



Graphic Operation Terminal

GOT2000 Series



GOT2000 with advanced high-functionality delivers the next-level basic performance.

Features P.570 Specifications P.582

GOT2000 Series Open frame model



The GOT2000 open frame model can be integrated into equipment.

Features P.572 Specifications P.584

GOT1000 Series



Full lineup to provide various site needs.

Specifications P.597

GOT SIMPLE



Simple, high functioning, and user friendly model for a reliable system.

Features P.608 Specifications P.615

SCADA

High-grade Integrated Monitoring System Achieved by Linking SCADA with FA Equipment.

The Mitsubishi SCADA software MC Works64 provides a highly functional monitoring control system that works with a wide range of FA equipment, thus helping to achieve solutions for ensuring visualization, analysis and continuous improvement.

HMI Software



GT SoftGOT2000 is an HMI software that allows GOT2000 functions to operate on a personal computer or panel computer.

Features P.578

GOT Screen Design Software



Its intuitive operability allows GOT design at-will, with improved drawing efficiency and effective use of on-screen assets.

Features P.616

SCADA

Mitsubishi SCADA software



e-F@ctory's SCADA software
Create an advanced, integrated monitoring system for FA equipment.

Features P.632

GOT2000 Lineup

The GOT2000 inherits all the features of our popular GOT1000 series, and introduces a more refined and advanced function set. The powerful and flexible lineup includes GOTs with various features and communication options to tackle any application you may encounter.

Concept movie

Lineup

GT27 model

Advanced model with multi-touch gesture functions

Ethernet | CC-Link | RS-232 | Bus | RS-422/485 | MELSECNET | CC-Link IE Controller | CC-Link IE Field*

* The CC-Link IE Field Network communication unit and GOT set is also available.

15 inch XGA



GT2715-XTBA
GT2715-XTBD
Resolution: 1024 × 768
Display color: 65536 colors

12.1 inch SVGA



GT2712-STBA
GT2712-STBD
GT2712-STWA [White model]
GT2712-STWD [White model]
Resolution: 800 × 600
Display color: 65536 colors

GT25 model

High performance, cost efficient, mid-range model

Ethernet | CC-Link | RS-232 | Bus | RS-422/485 | MELSECNET | CC-Link IE Controller | CC-Link IE Field*

* The CC-Link IE Field Network communication unit and GOT set is also available.

12.1 inch SVGA



GT2512-STBA
GT2512-STBD
Resolution: 800 × 600
Display color: 65536 colors

NEW



GT2512F-STNA [Open frame model]
GT2512F-STND [Open frame model]
Resolution: 800 × 600
Display color: 65536 colors

GT23 model

Unchallenged cost performance

Ethernet | RS-232 | RS-422/485

10.4 inch VGA



GT2310-VTBA
GT2310-VTBD
Resolution: 640 × 480
Display color: 65536 colors

8.4 inch VGA



GT2308-VTBA
GT2308-VTBD
Resolution: 640 × 480
Display color: 65536 colors

INTERNATIONAL DESIGN EXCELLENCE AWARDS '15 FINALIST
product design award 2014
GOOD DESIGN AWARD 2014

Compliant with safety standards including UL Standards, maritime certifications, and radio laws.
For inquiries relating to the status of GOTs conforming to various standards and laws (CE, ATEX [to be obtained soon], UL/cUL, Class I Division 2, EAC, KC, KCs [to be obtained soon], and maritime certifications [ABS/BV/DNV GL/LR/NK/RINA]), please refer to the specification list (page 582).
For the information about the other products and the latest conformity status, please contact your local sales office.

The release date varies depending on the product and your region. For details, please contact your local sales office.

Multi-touch gesture | Multimedia* | Video/RGB* | Sound output | External I/O
* Not supported by 5.7 inch model.

10.4 inch SVGA VGA



GT2710-STBA
GT2710-STBD
Resolution: 800 × 600
Display color: 65536 colors

GT2710-VTBA
GT2710-VTBD
GT2710-VTWA [White model]
GT2710-VTWD [White model]
Resolution: 640 × 480
Display color: 65536 colors

8.4 inch SVGA VGA



GT2708-STBA
GT2708-STBD
Resolution: 800 × 600
Display color: 65536 colors

GT2708-VTBA
GT2708-VTBD
Resolution: 640 × 480
Display color: 65536 colors

5.7 inch VGA



GT2705-VTBD
Resolution: 640 × 480
Display color: 65536 colors

Sound output | External I/O

10.4 inch VGA



GT2510-VTBA
GT2510-VTBD
GT2510-VTWA [White model]
GT2510-VTWD [White model]
Resolution: 640 × 480
Display color: 65536 colors

NEW



GT2510F-VTNA [Open frame model]
GT2510F-VTND [Open frame model]
Resolution: 640 × 480
Display color: 65536 colors

8.4 inch VGA



GT2508-VTBA
GT2508-VTBD
GT2508-VTWA [White model]
GT2508-VTWD [White model]
Resolution: 640 × 480
Display color: 65536 colors

NEW



GT2508F-VTNA [Open frame model]
GT2508F-VTND [Open frame model]
Resolution: 640 × 480
Display color: 65536 colors

GT21 model

Compact models with basic functions

Ethernet
RS-232
RS-422/485

4.3 inch Wide



GT2104-RTBD
[Ethernet, RS-232, RS-422/485]
Resolution: 480 × 272
Display color: 65536 colors

3.8 inch



GT2103-PMBD [Ethernet, RS-422/485]
GT2103-PMBDS [RS-232, RS-422/485]
GT2103-PMBDS2 [RS-232 × 2 channels]
GT2103-PMBLS [RS-422] 5 V DC type
Resolution: 320 × 128
Display color: Monochrome (black/white)
32 shade grayscale
Backlight: 5-color LED
(white, green, pink, orange, red)

SoftGOT

GOT2000 compatible HMI software
GT SoftGOT2000 Version1

GT SoftGOT2000 is an HMI software that allows GOT2000 functions to operate on a personal computer or panel computer. Various industrial devices can be connected and monitored.
Resolution: 640 to 1920 × 480 to 1200
Display color: 65536 colors
* A separate license key must be mounted during use.



USB port license key



GOT2000 Standard Model

The GOT2000 series continues to impress with solutions that fulfill all demands



GT27 model



Advanced model with multi-touch gesture functions

Communication interfaces such as Ethernet, RS-232, RS-422/485, USB host/device and SD memory card are standard features. High capacity data processing ensure smooth screen operation even when multiple tasks, such as logging, script, alarm, or device data transfer, are running.
In addition, image recording, image playback, video image input, and RGB output are available, thus all the functions of GOT2000 can be used on GT27 models. ∗ Excluding GT2705

Item	Specifications
Display	5.7", 8.4", 10.4", 12.1", and 15" size, 65536 colors TFT LCD display
Resolution	XGA, SVGA, VGA
Backlight	White LED
User memory	Memory for storage (ROM): 57 MB (GT2705 has 32 MB) Memory for operation (RAM): 128 MB (GT2705 has 80 MB)
Standard interface	Ethernet, RS-232, RS-422/485 USB host (USB-A) 2 channels* (High-Speed 480 Mbps) USB device (USB Mini-B) 1 channel (High-Speed 480 Mbps) ∗ White model has 1 channel
Extension interface	CC-Link IE Controller, CC-Link IE Field, CC-Link, bus, MELSECNET/H

GT25 model



High performance, cost efficient, mid-range model

Communication interfaces such as Ethernet, RS-232, RS-422/485, USB host/device and SD memory card are standard features. High capacity data processing ensure smooth screen operation even when multiple tasks, such as logging, script, alarm, or device data transfer, are running.

Item	Specifications
Display	8.4", 10.4", and 12.1" size, 65536 colors TFT LCD display
Resolution	SVGA, VGA
Backlight	White LED
User memory	Memory for storage (ROM): 32 MB Memory for operation (RAM): 80 MB
Standard interface	Ethernet, RS-232, RS-422/485 USB host (USB-A) 2 channels* (High-Speed 480 Mbps) USB device (USB Mini-B) 1 channel (High-Speed 480 Mbps) ∗ White model has 1 channel
Extension interface	CC-Link IE Controller, CC-Link IE Field, CC-Link, bus, MELSECNET/H

GT23 model



Unchallenged cost performance

Communication interfaces such as Ethernet, RS-232, RS-422/485, USB host/device and SD memory card are standard features. Advanced interactive features such as data logging, multi-channel communication, and FA transparent function are supported.

Item	Specifications
Display	8.4" and 10.4" size, 65536 colors TFT LCD display
Resolution	VGA
Backlight	White LED
User memory	Memory for storage (ROM): 9 MB Memory for operation (RAM): 9 MB
Standard interface	Ethernet, RS-232, RS-422/485 USB host (USB-A) 1 channel (Full-Speed 12 Mbps) USB device (USB Mini-B) 1 channel (Full-Speed 12 Mbps)

GT21 model

GT2104-R



Compact model with exciting possibilities

New widescreen type compact model!
65536 colors, TFT LCD display, 4.3-inch wide model is released. High resolution, 480 × 272 dot display realized in a compact body!

Item	Specifications
Display	4.3" Wide, 65536 colors TFT LCD display
Resolution	480 × 272 dots
Backlight	White LED
User memory	Memory for storage (ROM): 9 MB
Standard interface	Ethernet, RS-232, RS-422/485 USB device (USB Mini-B) 1 channel (Full-Speed 12 Mbps)

GT2103-P



Small screen, big possibilities

The intuitively understandable 5-color backlight offers choices of backlight color and backlight blink according to machine operation state. The backlight can also be controlled from the connected PLC (screen color change and backlight ON/OFF/blink).

Item	Specifications
Display	3.8" size, monochrome (black/white), 32 shade grayscale TFT LCD display
Resolution	320 × 128 dots
Backlight	5-color LED (white, green, pink, orange, red)
User memory	Memory for storage (ROM): 3 MB
Standard interface	GT2103-PMBD: Ethernet, RS-422/485 GT2103-PMBDS: RS-232, RS-422/485 GT2103-PMBDS2: RS-232 × 2 channels GT2103-PMBLS: RS-422 (dedicated to FX connection, 5 V DC power supply type) All models: USB device (USB Mini-B) 1 channel (Full-Speed 12 Mbps)

GOT2000 Open Frame Model



GT25 (Open frame model)

A new style of GOT2000

Installing the GOT2000 from the back side of the control panel complements the machine-design surface.

Item	Specifications
Display	8.4", 10.4", and 12.1" size, 65536 colors TFT LCD display
Resolution	SVGA, VGA
Backlight	White LED
User memory	Memory for storage (ROM): 32 MB Memory for operation (RAM): 80 MB
Standard interface	Ethernet, RS-232, RS-422/485 USB host (USB-A) 1 channel (High-Speed 480 Mbps) USB device (USB Mini-B) 1 channel (High-Speed 480 Mbps)
Extension interface	CC-Link IE Controller, CC-Link IE Field, CC-Link, bus, MELSECNET/H

GOT complements machine design

Using a stainless-look environmental protection sheet allows the touch panel to blend into the production machines for the pharmaceutical and food industries.



Environmental protection sheet



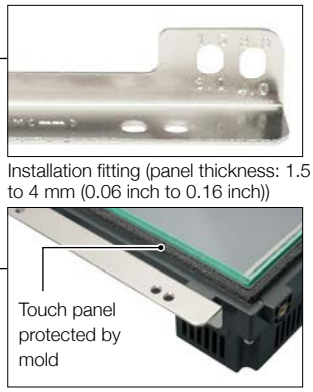
Adjustable to various panels

The installation fitting is adjustable from 1.5 mm to 4 mm of the control panel thickness. GOT can adjust the difference of the control panel thickness. Vertical installation is also available.



Designed for safe installation

The edge of the touch panel is protected to prevent damage to the touch panel or injury by touching the sharp edge. It is possible to safely install the GOT.



Installation fitting (panel thickness: 1.5 mm to 4 mm (0.06 inch to 0.16 inch))

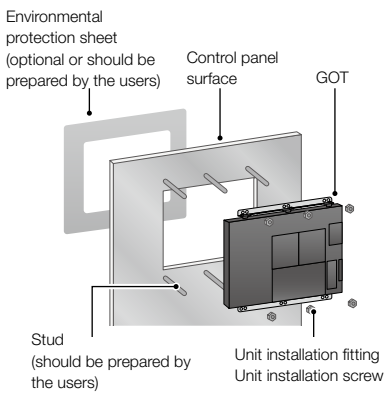
Designed for safe installation

Dedicated installation fittings

Installation fittings (vertical/horizontal) and screws are included with GOT. Attach appropriate installation fittings depending on the installation orientation.

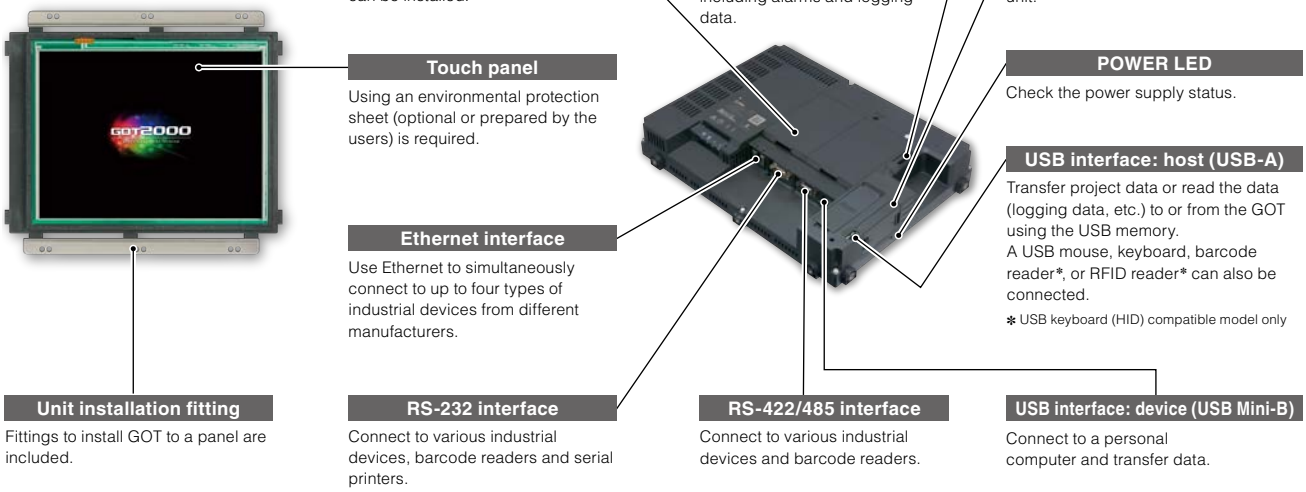
✻ Studs should be prepared by the users. (Not included)

Installation instructions





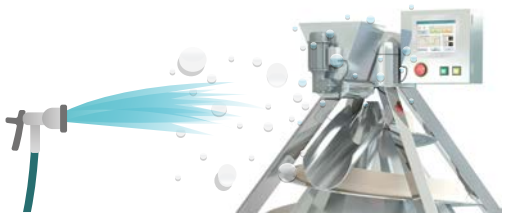
Appearance / Names of Each Part



IP67F protection

To conform to IP67F, attach an environmental protection sheet.*
GOT can be operated with wet hands, wiped with a damp cloth, and washed with water.

* Note that the structure does not guarantee protection in all users' environments. The GOT may not be used in certain environments where it is subjected to splashing oil or chemicals for a long period of time or soaked in oil mist.



Suitable for pharmaceutical and food industries

Flush surface without any gaps and grooves prevents dust, dirt, and debris from accumulated on the edge.



GOT Smart Web-based Remote Solutions

Monitor your worksite anytime, anywhere



GOT offers various remote monitoring and operation functions that can be used for various applications depending on your needs. The GOT remote solutions increase efficiency in various applications from startup, adjustment, to maintenance using mobile devices and personal computers. The GOT2000 improves visualization accessibility and reduces total cost of ownership.

Comparison of remote maintenance functions

Item		Monitor or operate GOT or connected devices from a personal computer or tablet			Monitor a personal computer from GOT
		GOT Mobile function	VNC server function	SoftGOT-GOT link function	Remote personal computer operation function (Ethernet)
Number of simultaneous connections from clients		○ Maximum 5	× Simultaneous connection prohibited (1 to 1 only)	○ Maximum 7 ✻1	–
Monitor a different screen on each client		○	× Always monitor the same screen as on GOT	△ ✻2	–
Drawing performance		○	△	○	–
Viewing application		Web browser (Google Chrome, Safari)	VNC viewer (freeware ✻3)	GT SoftGOT2000 (license key required separately)	–
Required options		License	License	License key	License
Authorization exclusive control		○	○	○	–
Screen display	Supported objects (touch switch, etc.)	△ Some functions are different from GOT	○ Same as GOT	○ Same as GOT	–
	Monitoring functions (sequence program monitor, etc.)	× Not supported	○ Same as GOT	× Not supported	–

✻1 When using the GOT network interaction function, multiple clients can be connected simultaneously. Note that restrictions exist depending on the connection type between GOT and the connected device.
✻2 When a GOT internal device is used as the screen switching device, each client can display a different screen.
✻3 For the VNC client software that can be used, please refer to the Technical Bulletin GOT-A-0069.

NEW

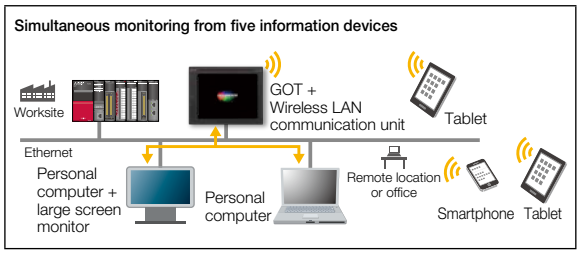
GOT Mobile function

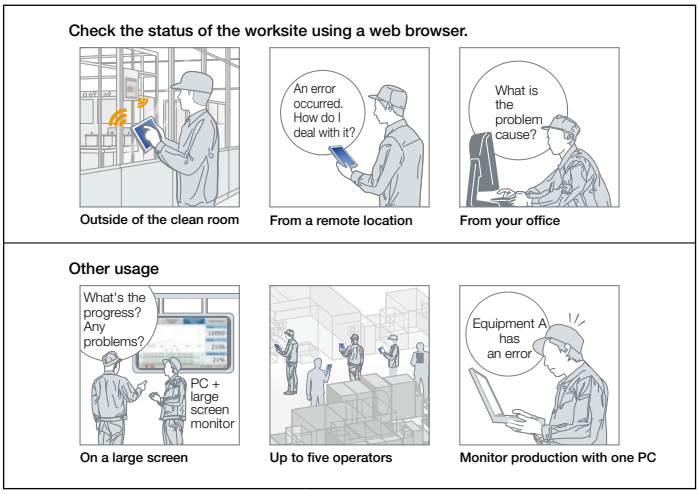
GOT Mobile

☑GT27 ☑GT25 ☐GT23 ☐GT21

Check the equipment status using a web browser on tablets from a remote location. Up to five information devices can simultaneously access a single GOT so that you can view and operate a different screen on each device.

✻ A separate license (GT25-WEBSKEY) is required.
✻ Up to five clients can connect to one GOT at the same time.





✻ Specification details and major restrictions
For the supported connection types and necessary option devices, please refer to the Mitsubishi Graphic Operation Terminal GOT2000 Series Catalog (L(NA)08270ENG) or appropriate manuals.

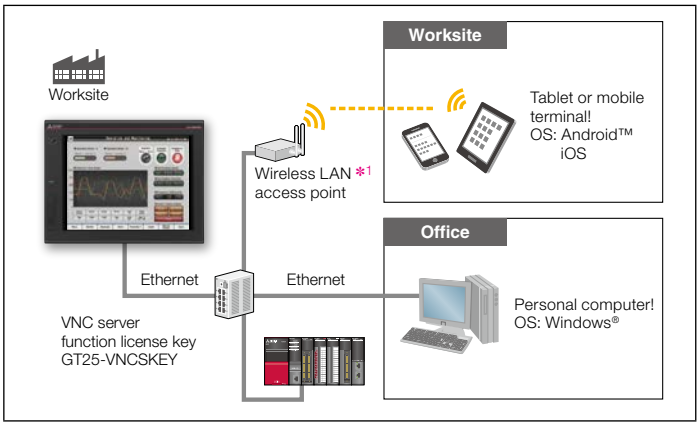
✻ Safety precautions
If any of the remote maintenance functions are used to perform remote control of control equipment, the field operator may not notice the remote control, possibly leading to an accident. In addition, a communication delay or interruption may occur depending on the network environment, and remote control of control equipment cannot be performed normally in some cases. Before using the functions to perform remote control, fully grasp the circumstances of the field site and ensure safety.

VNC server function

☑GT27 ☑GT25 ☐GT23 ☐GT21

Remotely view and operate the GOT screen from information devices such as a personal computer and tablet. No dedicated screens are required.

* A separate license (GT25-VNCSKEY) is required.
* One client can connect to one GOT at the same time.



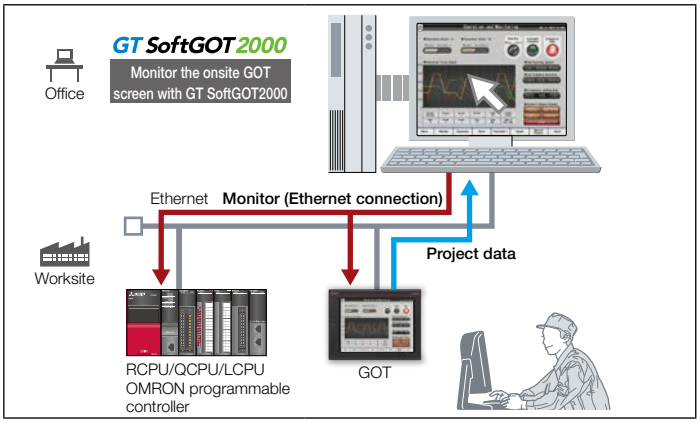
*1 No access point is required separately when installing the wireless LAN communication unit on the GOT. (Access point mode is supported by GT Works3 Ver.1.144A or later)

SoftGOT-GOT link function

☑GT27 ☑GT25 ☐GT23 ☐GT21

Read project data from the GOT connected to GT SoftGOT2000 via Ethernet, and you can monitor the devices that are connected to the GOT on different screens from the one shown on the GOT.

* A separate license key (GT27-SGTKEY-U) is required.

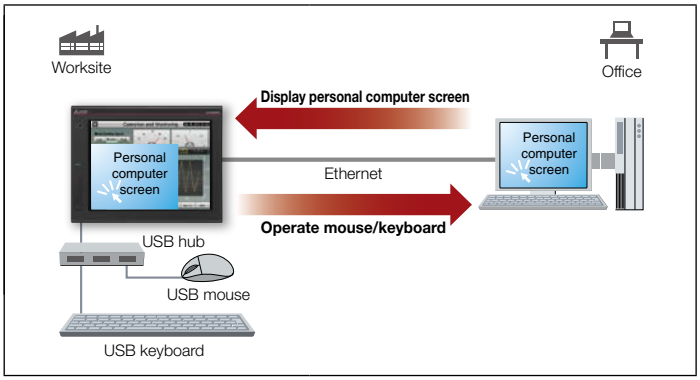


Remote personal computer operation function (Ethernet)

☑GT27 ☑GT25 ☐GT23 ☐GT21

Connect GOT at the worksite to a personal computer in a remote location via Ethernet. This allows you to remotely operate the personal computer and view manuals and access the web browser on the computer.
Connecting a USB mouse/keyboard to the front (or rear) USB interface makes it easier to operate the personal computer.

* A separate license (GT25-PCRAKEY) is required.



Monitor your worksite anytime, anywhere

For the details of the GOT2000 Series remote solution functions, please refer to the following catalogs.

- Mitsubishi Graphic Operation Terminal GOT2000 Series Catalog (L(NA)08270ENG)
- GOT Smart Web-based Remote Solutions Leaflet (L(NA)08399ENG)





* Specification details and major restrictions
  For the supported connection types and necessary option devices, please refer to the Mitsubishi Graphic Operation Terminal GOT2000 Series Catalog (L(NA)08270ENG) or appropriate manuals.
* Safety precautions
  If any of the remote maintenance functions are used to perform remote control of control equipment, the field operator may not notice the remote control, possibly leading to an accident. In addition, a communication delay or interruption may occur depending on the network environment, and remote control of control equipment cannot be performed normally in some cases. Before using the functions to perform remote control, fully grasp the circumstances of the field site and ensure safety.

GOT Easy Drive Control Interactive Solutions

Designed to suit your application and improve maintenance



The GOT2000 provides advanced functionality and improves connectivity with Mitsubishi servo systems. It provides some functions of MR Configurator2 (supporting MR-J4). The new GOT Drive enhanced functionality is designed to eliminate need for additional hardware, software and suits customers' applications to speed up system startup, improve maintenance and troubleshooting.

Drive control interactive functions, supported models, and GT Works3 versions

○: Supported ×: Not supported at this moment –: Not applicable

Function name	Supported model				System configuration				
					CASE 1	CASE 2/CASE 3	CASE 4	CASE 1	CASE 2
					MELSERVO-J4 Series			MELSERVO-JE Series	
	GT27	GT25	GT23	GT21	MR-J4-A(-RJ)	MR-J4-B(-RJ) MR-J4W2-B MR-J4W3-B	MR-J4-GF(-RJ)	MR-JE-A	MR-JE-B
Drive recorder function	○	○	×	×	–	○ Ver.1.155M or later ※2	×	–	Coming soon
Machine diagnosis function	○	○	○	○	○ Ver.1.126G or later ※1	○ Ver.1.155M or later ※1	Coming soon	×	○ Ver.1.150G or later ※1
Servo amplifier life diagnosis function	○	○	○	○	○ Ver.1.126G or later ※1	○ Ver.1.155M or later ※1	Coming soon	×	○ Ver.1.150G or later ※1
One-touch tuning function	○	○	○	○	○ Ver.1.126G or later ※1	○ Ver.1.155M or later ※1	Coming soon	×	○ Ver.1.150G or later ※1
Tuning function	○	○	○	○	○ Ver.1.126G or later ※1	○ Ver.1.155M or later ※1	Coming soon	×	○ Ver.1.150G or later ※1
Power monitor	○	○	○	○	○ Ver.1.126G or later ※1	○ Ver.1.155M or later ※1	Coming soon	×	○ Ver.1.150G or later ※1
Alarm display function	○	○	○	○	○ Ver.1.126G or later ※1	○ Ver.1.155M or later ※1	Coming soon	×	○ Ver.1.150G or later ※1
Servo amplifier monitor function	○	○	×	×	○ A: Ver.1.100E or later ※2 A-RJ: Ver.1.134Q or later ※2	–	–	×	–
Intelligent module monitor function ※4	○	○	×	×	○ ※3 Ver.1.100E or later ※2	○ Ver.1.100E or later ※2	Coming soon	×	×
R motion monitor function ※4	○	○	×	×	–	○ B: Ver.1.117X or later ※2 B-RJ: Ver.1.134Q or later ※2	–	–	–
Q motion monitor function ※4	○	○	×	×	–	○ B: Ver.1.100E or later ※2 B-RJ: Ver.1.134Q or later ※2	–	–	–
Motion SFC monitor function ※4	○	○	×	×	–	○ B: Ver.1.100E or later ※2	–	–	–

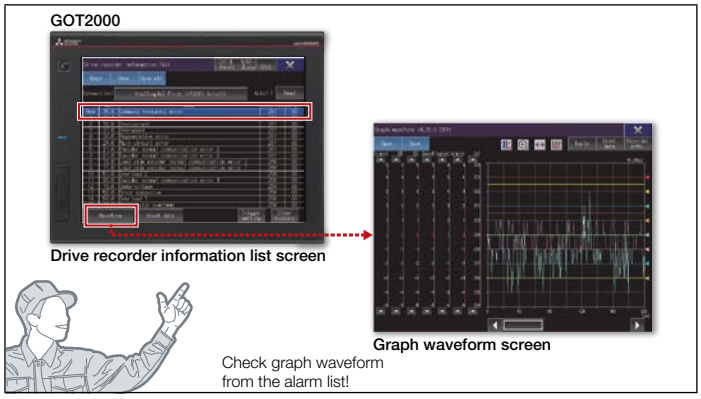
※1 Indicates the version of GT Works3 that was used to create the sample screen (as of June 2016). The sample screen is the screen data that is included with GT Works3.
※2 Indicates the version of GT Works3 that supports the dedicated screen. The dedicated screen is the screen that is provided as the extended function of GOT.
※3 The function can be used by connecting GOT and programmable controller.
※4 The supported version of GT Works3 differs depending on the type of connected device (CPU, intelligent function module).

NEW

Drive recorder function

☑GT27 ☑GT25 ☐GT23 ☐GT21

GOT can be used to display the screen equivalent to the drive recorder of MR Configurator2.
Easily check the servo data (motor current, position command, etc.) on GOT without using a personal computer.

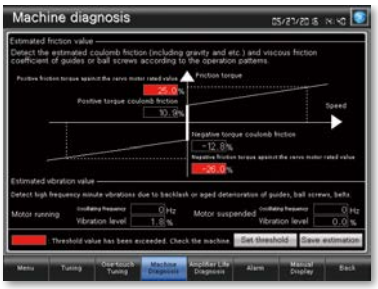


※ **Specification details and major restrictions**
For the supported connection types and necessary option devices, please refer to the Mitsubishi Graphic Operation Terminal GOT2000 Series Catalog (L(NA)08270ENG) or appropriate manuals.

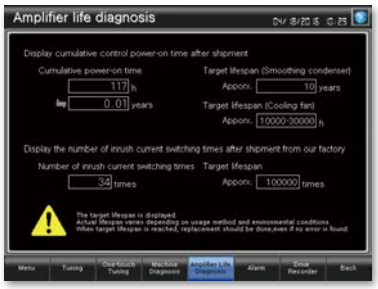
■Machine diagnosis function/Servo amplifier life diagnosis function

☑GT27 ☑GT25 ☑GT23 ☑GT21

GOT displays the diagnosis screen that is equivalent to the maintenance functions of MR Configurator2.
You can easily check the internal data of servo amplifiers on the GOT without a personal computer.
∗ Ready to use sample screens (VGA) are available.



Machine diagnosis screen*

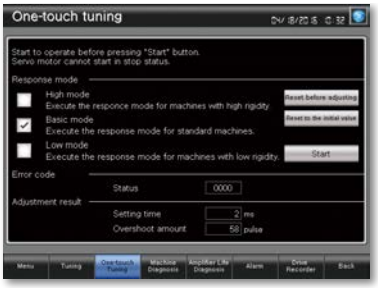


Servo amplifier life diagnosis screen*

■One-touch tuning function/Tuning function

☑GT27 ☑GT25 ☑GT23 ☑GT21

GOT displays the tuning screens that are equivalent to the adjustment functions of MR Configurator2.
You can easily adjust gain parameters of servo amplifiers on the GOT without a personal computer.
∗ Ready to use sample screens (VGA) are available.



One-touch tuning screen*

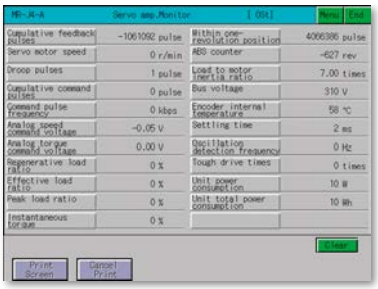


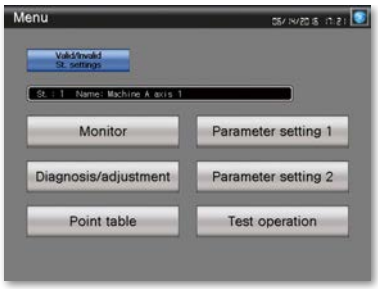
Tuning screen*

■Servo amplifier monitor function

☑GT27 ☑GT25 ☐GT23 ☐GT21

Various monitoring functions, changes to the parameter settings, and test operations can be performed on the servo amplifier connected to the GOT.


Dedicated screens



Sample screens (VGA)

■Connection samples [English, Japanese, Chinese (Simplified)]

☑GT27 ☑GT25 ☑GT23 ☐GT21

Sample screens are available for connection between GOT2000 and servo amplifiers.
You can change parameters, monitor servo amplifiers, and perform test operations.
Sample screens are included with GT Works3.

Advanced drive control connectivity provides additional value to your system

For the details of the GOT2000 Series drive control interactive functions, please refer to the following catalog.

● GOT2000 Series Drive Control Interactive Solutions Catalog (L(NA)08335ENG)



∗ **Specification details and major restrictions**
For the supported connection types and necessary option devices, please refer to the Mitsubishi Graphic Operation Terminal GOT2000 Series Catalog (L(NA)08270ENG) or appropriate manuals.

GT SoftGOT2000

GOT2000 compatible HMI software GT SoftGOT2000 Version1

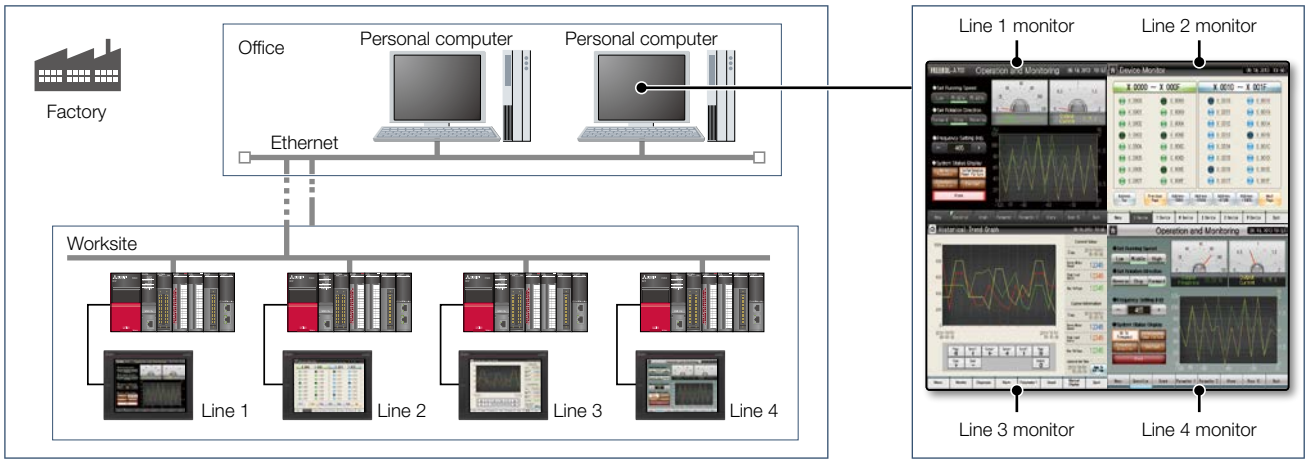
GT SoftGOT2000 Version1 is the software that has the same monitoring functions as the GOT2000 Series and is used on personal computers and panel controllers by connecting to various industrial devices.

* A separate license key must be mounted during use.



USB port license key

Monitor the production site from a remote location



Use GT SoftGOT2000 to monitor the production site from your office. You can collect information quickly when a problem occurs, taking necessary actions immediately. The GOT project file running at your production site can be reused as the GT SoftGOT2000 project file, greatly reducing your design costs.

Engage with MELSEC process control

Simplify design and maintenance of a process control system by connecting PX Developer's monitor tools with GT SoftGOT2000. This process control monitoring system can be easily used in various process control applications.



❶ **PX Developer face plates, etc.**
Monitor, operate or tune the loop control tags.
(The display position can be specified.)

❷ **GT SoftGOT2000 touch switch/object**
Click on touch switches and objects to open the various screens of the PX Developer monitor tool. (The display position can be specified.)

❸ **PX Developer monitor tool bar**
Click on buttons to execute various operations such as starting GT SoftGOT2000 or switching base screens.

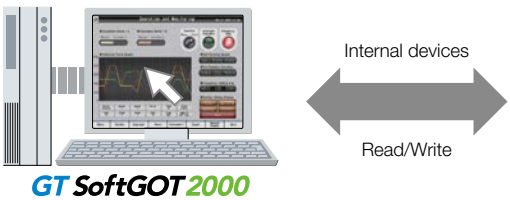
❹ **GT SoftGOT2000 base screen**
Turn your desktop into a graphic monitoring window with the full-screen and back-screen mode.

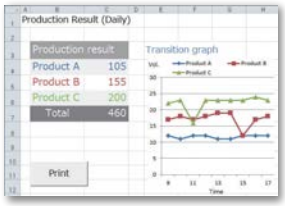
Security collaboration
The GT SoftGOT2000 security level is changed accordingly when the PX Developer monitor tool's mode is changed (engineer mode, operator mode, or lock mode). Authority can be set for operations requiring security.

Interaction with other applications

Read and write GT SoftGOT2000 internal devices using the user-created applications. Interaction with user-created applications makes it possible to build advanced systems.

* For the supported applications, please refer to an appropriate manual.





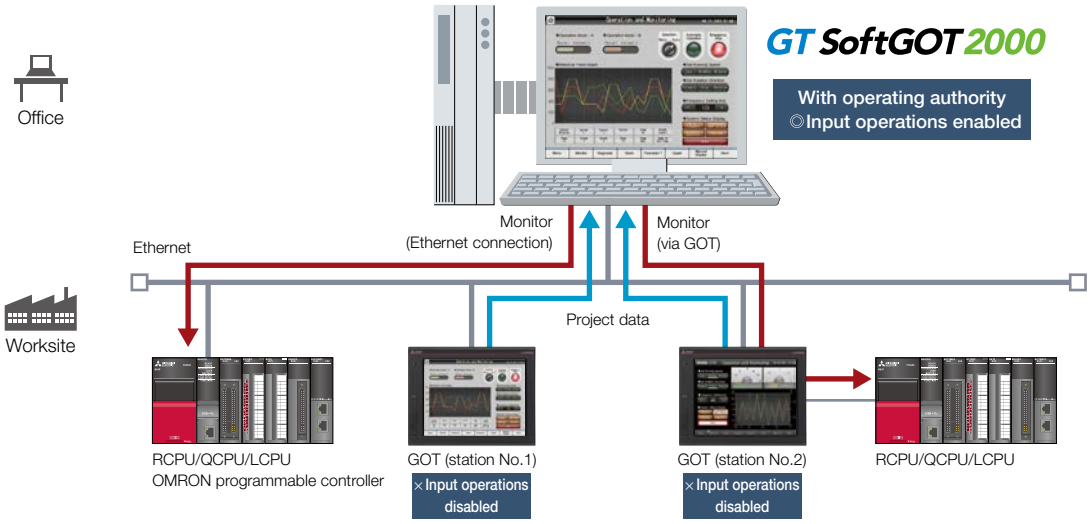
Microsoft® Excel® VBA screen example

Remote monitoring with SoftGOT

☑GT27 ☑GT25 ☐GT23 ☐GT21

■SoftGOT-GOT link function

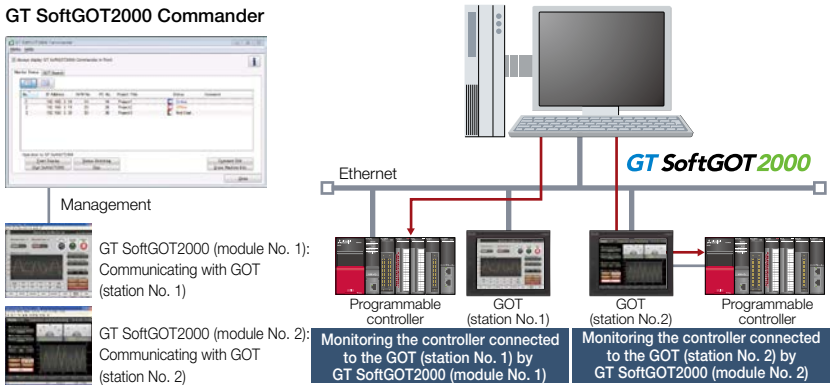
GT SoftGOT2000 allows remote monitoring of devices connected via Ethernet using the GOT project data. GT SoftGOT2000 and the GOT operate independently so that using a GOT internal device as the screen switching device enables GT SoftGOT2000 and the GOT to display different screens. Since GT SoftGOT2000 displays the GOT screen on the personal computer, the processing load on the GOT is reduced.



☑GT27 ☑GT25 ☐GT23 ☐GT21

■GT SoftGOT2000 Commander

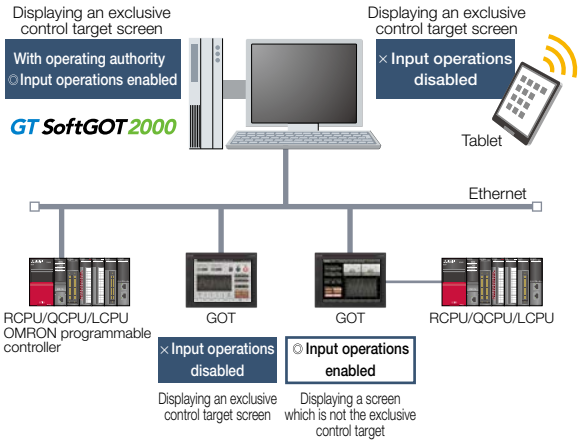
By using GT SoftGOT2000 Commander, multiple GT SoftGOT2000 modules using the SoftGOT-GOT link function can be efficiently managed, and the SoftGOT-GOT link function can be utilized easily.



☑GT27 ☑GT25 ☐GT23 ☐GT21

■Safe with exclusive authorization control

The exclusive authorization control prevents simultaneous operations from multiple clients that use GT SoftGOT2000, GOT, VNC server/GOT Mobile function in the same network. The exclusive control can be enabled/disabled for each screen. (GOT network interaction)



Function list

For details of functions, supported controllers, and connection types, please refer to the GOT2000 Series appropriate manuals or Help.

●: Supported —: Not supported

Category		Function name	Necessary devices *1	GT27	GT25	GT23	GT21	GT SoftGOT2000
Hardware specifications	Screen size	15"		●	—	—	—	
		12.1"		●	●	—	—	
		10.4"		●	●	●	—	
		8.4"		●	●	●	—	
		5.7"		●	—	—	—	
		4.3" Wide		—	—	—	●	
		3.8"		—	—	—	●	
	Resolution	XGA 1024 × 768		●	—	—	—	Flexible resolution 640 to 1920 × 480 to 1200
		SVGA 800 × 600		●	●	—	—	
		VGA 640 × 480		●	●	●	—	
		Other		—	—	—	GT2104-R: 480 × 272 GT2103: 320 × 128	
	Color	65536 colors		●	●	●	●	●
		Monochrome (black/white) 32 shade grayscale		—	—	—	●	—
	Touch panel simultaneous press (2 points)			●	—	—	—	—
	Human sensor			● *10	—	—	—	—
	Memory	Memory for storage (ROM)		Other than below: 57 MB GT2705: 32 MB	32 MB	9 MB	GT2104-R: 9 MB GT2103: 3 MB	57 MB
		Memory for operation (RAM)		Other than below: 128 MB GT2705: 80 MB	80 MB	9 MB	—	—
	Interface	RS-232		●	●	●	●	● *12
		RS-422/485		●	●	●	●	● *12
		Ethernet		●	●	●	●	● *11
		USB host		●	●	●	—	● *13
		USB device		●	●	●	●	
		SD memory card slot		●	●	●	● *14	● *13
		Extension interface, Side interface	Communication units, option units	● *11	● *11	—	—	● *11
Screen design	Figure/object functions	Figure		●	●	●	●	●
		Logo text		●	●	●	●	●
		Touch switch		●	●	●	●	●
		Lamp		●	●	●	●	●
		Numerical display, Numerical input		●	●	●	●	●
		Text display, Text input		●	●	●	●	●
		Date display, Time display	(Battery)	●	●	●	●	●
		Comment display		●	●	●	●	●
		Parts display	(SD memory card or USB memory)	●	●	●	● *16	●
		Parts movement	(SD memory card or USB memory)	●	●	●	● *16	●
		Historical data list display	(SD memory card or USB memory)	●	●	●	● *16	●
		Simple alarm display		●	●	●	●	●
		System alarm display		●	●	●	—	●
		Alarm display (user)	(SD memory card or USB memory, battery)	●	●	●	● *16	●
		Alarm display (system)	(SD memory card or USB memory, battery)	●	●	●	—	●
		Recipe display (record list) NEW		●	●	●	—	●
		Line graph		●	●	●	●	●
		Trend graph		●	●	●	●	●
		Bar graph		●	●	●	●	●
		Statistic bar graph		●	●	●	●	●
		Statistic pie graph		●	●	●	●	●
		Scatter graph		●	●	●	●	●
		Historical trend graph	(SD memory card or USB memory)	●	●	●	● *16	●
		Graphical meter NEW		●	●	●	—	●
		Level		●	●	●	●	●
		Panelmeter		●	●	●	●	●
		Slider		●	●	●	●	●
		Document display	SD memory card	●	●	—	—	●
	Functions performed on background of GOT	Logging	(SD memory card or USB memory, battery)	●	●	●	● *6	●
		Recipe	(SD memory card or USB memory)	●	●	●	● *16	●
		Device data transfer		●	●	●	●	●
		Trigger action		●	●	●	●	●
		Time action	(SD memory card or USB memory)	●	●	●	●	●
		Hard copy: File output	SD memory card or USB memory	●	●	●	● *6	●
		Hard copy: Serial printer output		●	●	●	● *6	● *2
		Hard copy: PictBridge printer output	Printer unit	●	●	—	—	● *2
		Project script, Screen script		●	●	●	●	●
		Object script		●	●	●	—	●
	Functions used with peripheral devices	Barcode function		●	●	●	● *6	●
		RFID function		●	●	●	● *6	●
		GOT Mobile function NEW	License, (SD memory card)	●	●	—	—	—
		VNC server function	License	●	●	—	—	—
		Remote personal computer operation function (Ethernet)	License	●	●	—	—	—
		Remote personal computer operation function (serial)	RGB input unit or Video/RGB input unit	● *8	—	—	—	—
		Video display function	Video input unit or Video/RGB input unit	● *8	—	—	—	—
		RGB display function	RGB input unit or Video/RGB input unit	● *8	—	—	—	—
		Multimedia function	Multimedia unit, CF card	● *8	—	—	—	—

For details of functions, supported controllers, and connection types, please refer to the GOT2000 Series appropriate manuals or Help.

●: Supported —: Not supported

Category	Function name	Necessary devices *1	GT27	GT25	GT23	GT21	GT SoftGOT2000
Screen design / Functions used with peripheral devices	External I/O function	External I/O unit	●	●	—	—	—
	Operation panel function	External I/O unit	●	●	—	—	●
	RGB output function	RGB output unit	● *8	—	—	—	—
	Report function: Serial printer output	(SD memory card or USB memory)	●	●	●	● *6	● *3
	Report function: PictBridge printer output	SD memory card or USB memory, printer unit	●	●	—	—	● *3
	Sound output function	Sound output unit	●	●	—	—	●
	Server function, Client function		●	●	—	—	—
	Mail send function		●	●	—	—	●
	FTP server function	(SD memory card or USB memory)	●	●	●	● *15 NEW	—
	File transfer function (FTP transfer)	SD memory card or USB memory	●	●	●	● *15 NEW	—
	File transfer function (GOT internal transfer) NEW	SD memory card or USB memory	●	●	●	—	—
	MES interface function	License, (SD memory card)	●	●	—	—	—
	Wireless LAN function	(Wireless LAN communication unit)	●	●	—	—	—
	USB mouse, USB keyboard		●	●	●	—	●
GOT functions	Base screen		●	●	●	●	●
	Overlap window		●	●	●	●	●
	Superimpose window		●	●	●	●	●
	Dialog window		●	●	●	●	●
	Mobile screen NEW		●	●	—	—	—
	Key window		●	●	●	●	●
	Language switching		●	●	●	●	●
	System information		●	●	●	●	●
	Operator authentication function	(SD memory card or USB memory)	●	●	●	● *16	●
	Operation log	SD memory card or USB memory	●	●	●	—	●
	Startup logo		●	●	●	●	●
	KANA KANJI conversion		●	●	—	—	●
	FA transparent		●	●	●	●	—
	SoftGOT-GOT link	License key	●	●	—	—	●
	Backup/Restoration	SD memory card or USB memory	●	●	●	● *6	—
	Multi-channel function		● *9 4 channels (Up to 3 units)	● 4 channels (Up to 3 units)	● 2 channels (No units can be mounted)	● *6 2 channels (No units can be mounted)	—
	Station No. switching		●	●	●	●	●
	GOT network interaction NEW		●	●	●	—	●
	Screen gesture function		●	—	—	—	—
	Object gesture function		●	—	—	—	—
	Security key authentication function		●	●	●	—	—
	IP filter function		●	●	●	—	—
	File manager NEW	(SD memory card or USB memory)	●	●	●	—	—
	Vertical display *5		● (Rotate 90 ° to left)	● (Rotate 90 ° to left)	● (Rotate 90 ° to left)	● (Rotate 90 ° to right)	—
Maintenance functions	Device monitor		●	●	●	●	—
	Sequence program monitor (Ladder)	SD memory card or USB memory	●	●	—	—	—
	Sequence program monitor (SFC)	SD memory card or USB memory	●	●	—	—	—
	Network monitor		●	●	—	—	—
	Intelligent module monitor		●	●	—	—	—
	Drive recorder NEW	(SD memory card or USB memory)	●	●	—	—	—
	Servo amplifier monitor		●	●	—	—	—
	R motion monitor		●	●	—	—	—
	Q motion monitor		●	●	—	—	—
	Motion SFC monitor	SD memory card or USB memory	●	●	—	—	—
	CNC monitor		● *4	● *4	—	—	—
	CNC data I/O	SD memory card or USB memory	● *4	● *4	—	—	—
	CNC machining program edit		● *4	● *4	—	—	—
	Log viewer	(SD memory card or USB memory)	●	●	—	—	—
	FX list editor		●	●	●	● *7	—
	FX ladder monitor		●	●	—	—	—
	iQSS utility	SD memory card or USB memory	●	●	—	—	—
	System launcher		●	●	●	—	—
	MELSEC-L troubleshooting		●	●	—	—	—

*1 Necessary units when using GT27, GT25, GT23, or GT21 are shown. Parenthesized devices are required depending on conditions of use.

*2 Data is output to the printer that is recognized by the personal computer.

*3 CSV files are saved in the virtual drive of the personal computer so that it is recommended to output the files to printers.

*4 Only the GOTs with SVGA or higher resolution are supported.

*5 Remote personal computer operation function (Ethernet) cannot be used.
The following screens are displayed horizontally:
Utility screen, monitor and data management screens that are displayed from the utility screen (sequence program monitor, etc.), video camera images in the multimedia and video display functions
For the details of other GOT operations when placed vertically, please refer to the appropriate manuals or the Help.

*6 Excluding GT2103-PMBLS.

*7 GT2104-RTBD only.

*8 Excluding GT2705.

*9 To use multiple units such as extension units, barcode readers, or RFID controllers with a GT2705, the total current consumption of the units should be less than the value that the GT2705 can provide. For the details, please refer to an appropriate GOT2000 series manual.

*10 GT2715, GT2712 only.

*11 For the applicable communication units and option units, please refer to the product list (page 620) and appropriate manuals.

*12 Use the standard interface of the personal computer.

*13 When using functions that require a USB memory or SD memory card, a virtual drive in the personal computer is used.

*14 GT2103 requires an SD memory card unit (GT21-03SDCD) separately. GT2103-PMBLS does not allow for SD memory cards.

*15 GT2104-R, GT2103-PMBD only.

*16 On GT2103-PMBLS, only the functions that do not require SD memory card can be used.

Specifications GOT2000 GT27 model

General specifications

Item	Specifications					
Operating ambient temperature *1	0 °C to 55 °C *2					
Storage ambient temperature	–20 °C to 60 °C					
Operating ambient humidity	10% RH to 90% RH, non-condensing					
Storage ambient humidity	10% RH to 90% RH, non-condensing					
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2		Frequency	Acceleration	Half amplitude	Sweep count
		Under intermittent vibration	5 to 8.4 Hz	—	3.5 mm	10 times in each X, Y, or Z direction
			8.4 to 150 Hz	9.8 m/s²	—	
		Under continuous vibration	5 to 8.4 Hz	—	1.75 mm	—
			8.4 to 150 Hz	4.9 m/s²	—	
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147 m/s² (15G), 3 times in each X, Y, or Z direction)					
Operating atmosphere *6	No greasy fumes, corrosive gas, flammable gas, excessive conductive dust, and direct sunlight (as well as at storage)					
Operating altitude *3	2000 m or less					
Installation location	Inside control panel					
Overvoltage category *4	II or less					
Pollution degree *5	2 or less					
Cooling method	Self-cooling					
Grounding	Grounding with a ground resistance of 100 Ω or less. If impossible, connect the ground cable to the control panel.					

Operate and store the GOT in environments without direct sunlight, high temperature, dust, humidity, and vibrations.

For inquiries relating to the status of conforming to various standards and laws (CE, ATEX [to be obtained soon], UL/cUL, Class I Division 2, EAC, KC, KCs [to be obtained soon], and maritime certifications [ABS/BV/DNV GL/LR/NK/RINA]), please contact your local sales office.

*1 The operating ambient temperature includes the temperature inside the enclosure of the control panel to which the GOT is installed.

*2 When any of the following units is mounted, the maximum operating ambient temperature must be 5 °C lower than the one described in the general specifications: multimedia unit (GT27-MMR-Z), MELSECNET/H communication unit (GT15-J71LP23-25, GT15-J71BR13), CC-Link communication unit (GT15-J61BT13).

*3 Do not use or store the GOT under a pressure higher than the atmospheric pressure at altitude 0 m. Doing so may cause a malfunction. Air purging by applying pressure to the control panel may create clearance between the surface sheet and the touch panel. This may cause the touch panel to be not sensitive enough or the sheet to come off.

*4 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within the premises. Category II applies to equipment that is supplied with power from fixed facilities. The withstand surge voltage for the equipment with the rated voltage up to 300 V is 2500 V.

*5 This indicates the occurrence rate of conductive material in an environment where a device is used. Pollution degree 2 indicates an environment where only non-conductive pollution occurs normally and a temporary conductivity caused by condensation shall be expected depending on the conditions.

*6 Some models have ANSI/ISA 12.12.01 approval for use in Class I, Division 2 (ANSI/ISA 12.12.01, C22.2 No.213-M1987) hazardous locations. For the details, please contact your local sales office.

Performance specifications

Item		Specifications			
		GT2715-XTBA GT2715-XTBD	GT2712-STBA GT2712-STBD	GT2712-STWA GT2712-STWD	GT2710-STBA GT2710-STBD
Display section *1 *2	Display device	TFT color LCD			
	Screen size	15"	12.1"		10.4"
	Resolution	XGA: 1024 × 768 dots	SVGA: 800 × 600 dots		
	Display size	304.1(11.97) (W) × 228.1(8.98) (H) mm(inch)	246(9.69) (W) × 184.5(7.26) (H) mm(inch)		211.2(8.31) (W) × 158.4(6.24) (H) mm(inch)
	Number of displayed characters	16-dot standard font: 64 characters × 48 lines (two-byte characters) 12-dot standard font: 85 characters × 64 lines (two-byte characters)	16-dot standard font: 50 characters × 37 lines (two-byte characters) 12-dot standard font: 66 characters × 50 lines (two-byte characters)		
	Display color	65536 colors			
	Brightness adjustment	32 levels			
	Backlight	LED (not replaceable)			
	Backlight life *4	Approx. 60000 h (operating ambient temperature: 25 °C, display intensity: 50%)			
Touch panel *3	Type	Analog resistive film			
	Key size	Minimum 2 × 2 dots *7 (per key)			
	Simultaneous press	Up to two points			
	Life	1 million touches or more (operating force: 0.98 N or less)			
Panel color		Black		White	Black
Human sensor	Detection length	1 m			—
	Detection temperature	Temperature difference between human body and ambient air: 4 °C or higher			—
User memory	User memory capacity	Memory for storage (ROM): 57 MB Memory for operation (RAM): 128 MB			
	Life (number of write times)	100000 times			
Built-in clock precision		±90 seconds/month (ambient temperature: 25 °C)			
Battery		GT11-50BAT lithium battery			
	Life	Approx. 5 years (ambient temperature: 25 °C)			
Built-in interface	RS-232	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: D-sub 9-pin (male)			
	RS-422/485	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: D-sub 9-pin (female)			
	Ethernet	1 channel Data transfer method: 10BASE-T, 100BASE-TX Connector shape: RJ-45 (modular jack)			
	USB (host)	2 channels (front face, rear face)		1 channel (rear face)	2 channels (front face, rear face)
		Maximum transfer rate: High-Speed 480 Mbps Connector shape: USB-A			
	USB (device)	1 channel (front face)		1 channel (rear face)	1 channel (front face)
		Maximum transfer rate: High-Speed 480 Mbps Connector shape: USB Mini-B			
	SD memory card	1 channel, SDHC compliant (maximum 32 GB)			
	Extension interface *6	For installing a communication unit or an option unit			
	Auxiliary extension interface	For installing an option unit			
	Side interface	For installing a communication unit			
Buzzer output		Single tone (tone and tone length adjustable)			
POWER LED		2 colors (blue and orange)			
Protective structure		Front: IP67F *5 *8 Inside control panel: IP2X			
External dimensions		397(15.63) (W) × 300(11.81) (H) × 60(2.36) (D) mm(inch)	316(12.44) (W) × 246(9.69) (H) × 52(2.05) (D) mm(inch)		303(11.93) (W) × 218(8.58) (H) × 52(2.05) (D) mm(inch)
Panel cut dimensions		383.5(15.10) (W) × 282.5(11.12) (H) mm(inch)	302(11.89) (W) × 228(8.98) (H) mm(inch)		289(11.38) (W) × 200(7.87) (H) mm(inch)
Weight (excluding a fitting)		4.5(9.9) kg(lb)	2.4(5.3) kg(lb)		2.1(4.6) kg(lb)
Compatible software package		GT Works3 Version1.155M or later			

*1 As a characteristic of liquid crystal display panels, bright dots (always lit) and dark dots (never lit) may appear on the panel. Since liquid crystal display panels comprise a great number of display elements, the appearance of bright and dark dots cannot be reduced to zero. Individual differences in liquid crystal display panels may cause differences in color, uneven brightness and flickering. Note that these phenomena are characteristics of liquid crystal display panels and it does not mean the products are defective or damaged.

*2 Flickering may occur due to vibration, shock, or the display colors.

*3 When a stylus is used, the touch panel has a life of 100 thousand touches. The stylus must satisfy the following specifications.
• Material: polyacetal resin • Tip radius: 0.8 mm or more

●Power supply specifications

Item		Specifications								
		GT2715-XTBA	GT2712-STBA GT2712-STWA	GT2710-STBA GT2710-VTBA GT2710-VTWA	GT2708-STBA GT2708-VTBA	GT2715-XTBD	GT2712-STBD GT2712-STWD	GT2710-STBD GT2710-VTBD GT2710-VTWD	GT2708-STBD GT2708-VTBD	GT2705-VTBD
Power supply voltage		100 V AC to 240 V AC (+10%, −15%)				24 V DC (+25%, −20%)				
Power supply frequency		50 Hz/60 Hz (±5%)				—				
Power consumption	Under the maximum load	51 W or less	44 W or less	41 W or less	41 W or less	48 W or less	45 W or less	42 W or less	39 W or less	30 W or less
	Main unit	25 W	19 W	17 W	15 W	23 W	18 W	15 W	13 W	7 W
	Main unit (backlight OFF)	10 W	10 W	10 W	10 W	8 W	8 W	8 W	8 W	5 W
Inrush current		40 A or less (3 ms, ambient temperature: 25 °C, under the maximum load)	60 A or less (2 ms, ambient temperature: 25 °C, under the maximum load)			5 A or less (20 ms, ambient temperature: 25 °C, under the maximum load)				69 A or less (1 ms, ambient temperature: 25 °C, under the maximum load)
Permissible instantaneous power failure time		20 ms or less (100 V AC or more)				10 ms or less				
Noise immunity		Noise voltage: 1500 Vp-p, noise width: 1 μs, measured by a noise simulator with noise frequency ranging from 25 Hz to 60 Hz				Noise voltage: 500 Vp-p, noise width: 1 μs, measured by a noise simulator with noise frequency ranging from 25 Hz to 60 Hz				
Withstand voltage		1500 V AC for 1 minute across power terminals and earth				350 V AC for 1 minute across power terminals and earth				
Insulation resistance		500 V DC across power terminals and earth, 10 MΩ or more by an insulation resistance tester								

Item		Specifications				
		GT2710-VTBA GT2710-VTBD	GT2710-VTWA GT2710-VTWD	GT2708-STBA GT2708-STBD	GT2708-VTBA GT2708-VTBD	GT2705-VTBD
Display section *1 *2	Display device	TFT color LCD				
	Screen size	10.4"		8.4"		5.7"
	Resolution	VGA: 640 × 480 dots		SVGA: 800 × 600 dots	VGA: 640 × 480 dots	
	Display size	211.2(8.31) (W) × 158.4(6.24) (H) mm(inch)		170.9(6.73) (W) × 128.2(5.05) (H) mm(inch)		115.2(4.54) (W) × 86.4(3.40) (H) mm(inch)
	Number of displayed characters	16-dot standard font: 40 characters × 30 lines (two-byte characters) 12-dot standard font: 53 characters × 40 lines (two-byte characters)		16-dot standard font: 50 characters × 37 lines (two-byte characters) 12-dot standard font: 66 characters × 50 lines (two-byte characters)	16-dot standard font: 40 characters × 30 lines (two-byte characters) 12-dot standard font: 53 characters × 40 lines (two-byte characters)	
	Display color	65536 colors				
	Brightness adjustment	32 levels				
	Backlight	LED (not replaceable)				
	Backlight life *4	Approx. 60000 h (operating ambient temperature: 25 °C, display intensity: 50%)				
Touch panel *3	Type	Analog resistive film				
	Key size	Minimum 2 × 2 dots *7 (per key)				
	Simultaneous press	Up to two points				
	Life	1 million touches or more (operating force: 0.98 N or less)				
Panel color		Black	White	Black		
Human sensor	Detection length	—				
	Detection temperature	—				
User memory	User memory capacity	Memory for storage (ROM): 57 MB Memory for operation (RAM): 128 MB				Memory for storage (ROM): 32 MB Memory for operation (RAM): 80 MB
	Life (number of write times)	100000 times				
Built-in clock precision		±90 seconds/month (ambient temperature: 25 °C)				
Battery		GT11-50BAT lithium battery				
	Life	Approx. 5 years (ambient temperature: 25 °C)				
Built-in interface	RS-232	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: D-sub 9-pin (male)				
	RS-422/485	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: D-sub 9-pin (female)				
	Ethernet	1 channel Data transfer method: 10BASE-T, 100BASE-TX Connector shape: RJ-45 (modular jack)				
	USB (host)	2 channels (front face, rear face)	1 channel (rear face)	2 channels (front face, rear face)		
		Maximum transfer rate: High-Speed 480 Mbps Connector shape: USB-A				
	USB (device)	1 channel (front face)	1 channel (rear face)	1 channel (front face)		
		Maximum transfer rate: High-Speed 480 Mbps Connector shape: USB Mini-B				
	SD memory card	1 channel, SDHC compliant (maximum 32 GB)				
	Extension interface *6	For installing a communication unit or an option unit				
	Auxiliary extension interface	For installing an option unit				—
	Side interface	For installing a communication unit				
Buzzer output		Single tone (tone and tone length adjustable)				
POWER LED		2 colors (blue and orange)				
Protective structure		Front: IP67F *5 *8 Inside control panel: IP2X				
External dimensions		303(11.93) (W) × 218(8.58) (H) × 52(2.05) (D) mm(inch)		241(9.49) (W) × 194(7.64) (H) × 52(2.05) (D) mm(inch)		167(6.57) (W) × 139(5.47) (H) × 60(2.36) (D) mm(inch)
Panel cut dimensions		289(11.38) (W) × 200(7.87) (H) mm(inch)		227(8.94) (W) × 176(6.93) (H) mm(inch)		153(6.02) (W) × 121(4.76) (H) mm(inch)
Weight (excluding a fitting)		2.1(4.6) kg(lb)		1.5(3.3) kg(lb)		1.0(2.2) kg(lb)
Compatible software package		GT Works3 Version1.155M or later				

*4 To prevent the display section from burning in and lengthen the backlight life, enable the screen save function and turn off the backlight.

*5 To conform to IP67F, close the USB environmental protection cover by pushing the [PUSH] mark firmly. (To conform to IP2X, open the USB environmental protection cover.)
Note that the structure does not guarantee protection in all users' environments. The GOT may not be used in certain environments where it is subjected to splashing oil or chemicals for a long period of time or soaked in oil mist.

*6 When using a GT2705 with multiple devices such as extension units, a barcode reader, and an RFID controller, the total amount of current must be within the maximum amount of current supplied by the GT2705.
For the details, please refer to an appropriate GOT2000 series manual.

*7 The minimum size of a key that can be arranged.
To ensure safe use of the product, the following settings are recommended.
• Key size: 16 × 16 dots or larger • Distance between keys: 16 dots or more

*8 The suffix "F" of IP67F is a symbol that indicates protection rate against oil. It is described in the Appendix of Japanese Industrial Standard JIS C 0920.

Specifications GOT2000 GT25 model

General specifications

Item	Specifications					
Operating ambient temperature *1	0 °C to 55 °C *2					
Storage ambient temperature	–20 °C to 60 °C					
Operating ambient humidity	10% RH to 90% RH, non-condensing					
Storage ambient humidity	10% RH to 90% RH, non-condensing					
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2		Frequency	Acceleration	Half amplitude	Sweep count
		Under intermittent vibration	5 to 8.4 Hz	—	3.5 mm	10 times in each X, Y, or Z direction
			8.4 to 150 Hz	9.8 m/s²	—	
		Under continuous vibration	5 to 8.4 Hz	—	1.75 mm	—
			8.4 to 150 Hz	4.9 m/s²	—	
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147 m/s² (15G), 3 times in each X, Y, or Z direction)					
Operating atmosphere *6	No greasy fumes, corrosive gas, flammable gas, excessive conductive dust, and direct sunlight (as well as at storage)					
Operating altitude *3	2000 m or less					
Installation location	Inside control panel					
Overvoltage category *4	II or less					
Pollution degree *5	2 or less					
Cooling method	Self-cooling					
Grounding	Grounding with a ground resistance of 100 Ω or less. If impossible, connect the ground cable to the control panel.					

Operate and store the GOT in environments without direct sunlight, high temperature, dust, humidity, and vibrations.

For inquiries relating to the status of conforming to various standards and laws (CE, ATEX [to be obtained soon], UL/cUL, Class I Division 2, EAC, KC, KCs [to be obtained soon], and maritime certifications [ABS/BV/DNV GL/LR/NK/RINA]), please contact your local sales office.

*1 The operating ambient temperature includes the temperature inside the enclosure of the control panel to which the GOT is installed.

*2 When any of the following units is mounted, the maximum operating ambient temperature must be 5 °C lower than the one described in the general specifications: MELSECNET/H communication unit (GT15-J71LP23-25, GT15-J71BR13), CC-Link communication unit (GT15-J61BT13).

*3 Do not use or store the GOT under a pressure higher than the atmospheric pressure at altitude 0 m. Doing so may cause a malfunction. Air purging by applying pressure to the control panel may create clearance between the surface sheet and the touch panel. This may cause the touch panel to be not sensitive enough or the sheet to come off.

*4 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within the premises. Category II applies to equipment that is supplied with power from fixed facilities. The withstand surge voltage for the equipment with the rated voltage up to 300 V is 2500 V.

*5 This indicates the occurrence rate of conductive material in an environment where a device is used. Pollution degree 2 indicates an environment where only non-conductive pollution occurs normally and a temporary conductivity caused by condensation shall be expected depending on the conditions.

*6 Some models have ANSI/ISA 12.12.01 approval for use in Class I, Division 2 (ANSI/ISA 12.12.01, C22.2 No.213-M1987) hazardous locations. For the details, please contact your local sales office.

Performance specifications

Item		Specifications				
		GT2512-STBA GT2512-STBD	GT2512F-STNA GT2512F-STND	GT2510-VTBA GT2510-VTBD	GT2510-VTWA GT2510-VTWD	GT2510F-VTNA GT2510F-VTND
Display section *1 *2	Display device	TFT color LCD				
	Screen size	12.1"		10.4"		
	Resolution	SVGA: 800 × 600 dots		VGA: 640 × 480 dots		
	Display size	246(9.69) (W) × 184.5(7.26) (H) mm(inch)		211.2(8.31) (W) × 158.4(6.24) (H) mm(inch)		
	Number of displayed characters	16-dot standard font: 50 characters × 37 lines (two-byte characters) 12-dot standard font: 66 characters × 50 lines (two-byte characters)		16-dot standard font: 40 characters × 30 lines (two-byte characters) 12-dot standard font: 53 characters × 40 lines (two-byte characters)		
	Display color	65536 colors				
	Brightness adjustment	32 levels				
	Backlight	LED (not replaceable)				
	Backlight life *4	Approx. 60000 h (operating ambient temperature: 25 °C, display intensity: 50%)				
Touch panel *3	Type	Analog resistive film				
	Key size	Minimum 2 × 2 dots *8 (per key)				
	Simultaneous press	Not available *5 (Only 1 point can be touched.)				
	Life	1 million touches or more (operating force: 0.98 N or less)				
Panel color		Black	—	Black	White	—
User memory	User memory capacity	Memory for storage (ROM): 32 MB Memory for operation (RAM): 80 MB				
	Life (number of write times)	100000 times				
Built-in clock precision		±90 seconds/month (ambient temperature: 25 °C)				
Battery		GT11-50BAT lithium battery				
	Life	Approx. 5 years (ambient temperature: 25 °C)				
Built-in interface	RS-232	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: D-sub 9-pin (male)				
	RS-422/485	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: D-sub 9-pin (female)				
	Ethernet	1 channel Data transfer method: 10BASE-T, 100BASE-TX Connector shape: RJ-45 (modular jack)				
	USB (host)	2 channels (front face, rear face)	1 channel (rear face)	2 channels (front face, rear face)	1 channel (rear face)	
		Maximum transfer rate: High-Speed 480 Mbps Connector shape: USB-A				
	USB (device)	1 channel (front face)	1 channel (rear face)	1 channel (front face)	1 channel (rear face)	
		Maximum transfer rate: High-Speed 480 Mbps Connector shape: USB Mini-B				
	SD memory card	1 channel, SDHC compliant (maximum 32 GB)				
	Extension interface	For installing a communication unit or an option unit				
	Side interface	For installing a communication unit				
Buzzer output		Single tone (tone and tone length adjustable)				
POWER LED		2 colors (blue and orange)				
Protective structure		Front: IP67F *6 *9 Inside control panel: IP2X	Front: IP67F *7 *9 Inside control panel: IP2X	Front: IP67F *6 *9 Inside control panel: IP2X		Front: IP67F *7 *9 Inside control panel: IP2X
External dimensions		316(12.44) (W) × 246(9.69) (H) × 52(2.05) (D) mm(inch)	311(12.24) (W) × 237(9.33) (H) × 54(2.13) (D) mm(inch)	303(11.93) (W) × 218(8.58) (H) × 52(2.05) (D) mm(inch)		298(11.73) (W) × 209(8.23) (H) × 54(2.13) (D) mm(inch)
Panel cut dimensions		302(11.89) (W) × 228(8.98) (H) mm(inch)	269(10.59) (W) × 214(8.43) (H) mm(inch)	289(11.38) (W) × 200(7.87) (H) mm(inch)		234(9.21) (W) × 187(7.36) (H) mm(inch)
Weight (excluding a fitting)		2.4(5.3) kg(lb)		2.1(4.6) kg(lb)		
Compatible software package		GT Works3 Version1.155M or later				

*1 As a characteristic of liquid crystal display panels, bright dots (always lit) and dark dots (never lit) may appear on the panel. Since liquid crystal display panels comprise a great number of display elements, the appearance of bright and dark dots cannot be reduced to zero. Individual differences in liquid crystal display panels may cause differences in color, uneven brightness and flickering. Note that these phenomena are characteristics of liquid crystal display panels and it does not mean the products are defective or damaged.

*2 Flickering may occur due to vibration, shock, or the display colors.

*3 When a stylus is used, the touch panel has a life of 100 thousand touches. The stylus must satisfy the following specifications.
• Material: polyacetal resin • Tip radius: 0.8 mm or more

*4 To prevent the display section from burning in and lengthen the backlight life, enable the screen save function and turn off the backlight.

●Power supply specifications

Item		Specifications					
		GT2512-STBA GT2512F-STNA	GT2510-VTBA GT2510-VTWA GT2510F-VTNA	GT2508-VTBA GT2508-VTWA GT2508F-VTNA	GT2512-STBD GT2512F-STND	GT2510-VTBD GT2510-VTWD GT2510F-VTND	GT2508-VTBD GT2508-VTWD GT2508F-VTND
Power supply voltage		100 V AC to 240 V AC (+10%, −15%)			24 V DC (+25%, −20%)		
Power supply frequency		50 Hz/60 Hz (±5%)			—		
Power consumption	Under the maximum load	35 W or less	34 W or less	31 W or less	37 W or less	33 W or less	31 W or less
	Main unit	14 W	12 W	11 W	13 W	10 W	8 W
	Main unit (backlight OFF)	7 W	7 W	7 W	6 W	6 W	6 W
Inrush current		60 A or less (2 ms, ambient temperature: 25 °C, under the maximum load)			5 A or less (20 ms, ambient temperature: 25 °C, under the maximum load)		
Permissible instantaneous power failure time		20 ms or less (100 V AC or more)			10 ms or less		
Noise immunity		Noise voltage: 1500 Vp-p, noise width: 1 μs, measured by a noise simulator with noise frequency ranging from 25 Hz to 60 Hz			Noise voltage: 500 Vp-p, noise width: 1 μs, measured by a noise simulator with noise frequency ranging from 25 Hz to 60 Hz		
Withstand voltage		1500 V AC for 1 minute across power terminals and earth			350 V AC for 1 minute across power terminals and earth		
Insulation resistance		500 V DC across power terminals and earth, 10 MΩ or more by an insulation resistance tester					

Item		Specifications		
		GT2508-VTBA GT2508-VTBD	GT2508-VTWA GT2508-VTWD	GT2508F-VTNA GT2508F-VTND
Display section *1 *2	Display device	TFT color LCD		
	Screen size	8.4"		
	Resolution	VGA: 640 × 480 dots		
	Display size	170.9(6.73) (W) × 128.2(5.05) (H) mm(inch)		
	Number of displayed characters	16-dot standard font: 40 characters × 30 lines (two-byte characters) 12-dot standard font: 53 characters × 40 lines (two-byte characters)		
	Display color	65536 colors		
	Brightness adjustment	32 levels		
	Backlight	LED (not replaceable)		
	Backlight life *4	Approx. 60000 h (operating ambient temperature: 25 °C, display intensity: 50%)		
Touch panel *3	Type	Analog resistive film		
	Key size	Minimum 2 × 2 dots *8 (per key)		
	Simultaneous press	Not available *5 (Only 1 point can be touched.)		
	Life	1 million touches or more (operating force: 0.98 N or less)		
Panel color		Black	White	—
User memory	User memory capacity	Memory for storage (ROM): 32 MB Memory for operation (RAM): 80 MB		
	Life (number of write times)	100000 times		
Built-in clock precision		±90 seconds/month (ambient temperature: 25 °C)		
Battery		GT11-50BAT lithium battery		
	Life	Approx. 5 years (ambient temperature: 25 °C)		
Built-in interface	RS-232	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: D-sub 9-pin (male)		
	RS-422/485	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: D-sub 9-pin (female)		
	Ethernet	1 channel Data transfer method: 10BASE-T, 100BASE-TX Connector shape: RJ-45 (modular jack)		
	USB (host)	2 channels (front face, rear face)	1 channel (rear face)	
		Maximum transfer rate: High-Speed 480 Mbps Connector shape: USB-A		
	USB (device)	1 channel (front face)	1 channel (rear face)	
		Maximum transfer rate: High-Speed 480 Mbps Connector shape: USB Mini-B		
	SD memory card	1 channel, SDHC compliant (maximum 32 GB)		
	Extension interface	For installing a communication unit or an option unit		
	Side interface	For installing a communication unit		
Buzzer output		Single tone (tone and tone length adjustable)		
POWER LED		2 colors (blue and orange)		
Protective structure		Front: IP67F *6 *9 Inside control panel: IP2X		Front: IP67F *7 *9 Inside control panel: IP2X
External dimensions		241(9.49) (W) × 194(7.64) (H) × 52(2.05) (D) mm(inch)		236(9.29) (W) × 185(7.28) (H) × 54(2.13) (D) mm(inch)
Panel cut dimensions		227(8.94) (W) × 176(6.93) (H) mm(inch)		194(7.64) (W) × 158(6.22) (H) mm(inch)
Weight (excluding a fitting)		1.5(3.3) kg(lb)		
Compatible software package		GT Works3 Version1.155M or later		

*5 If you touch two points or more simultaneously on the touch panel, a touch switch near the touched points may operate unexpectedly. Do not touch two points or more simultaneously on the touch panel.

*6 To conform to IP67F, close the USB environmental protection cover by pushing the [PUSH] mark firmly. (To conform to IP2X, open the USB environmental protection cover.)
Note that the structure does not guarantee protection in all users' environments. The GOT may not be used in certain environments where it is subjected to splashing oil or chemicals for a long period of time or soaked in oil mist.

*7 To conform to IP67F attach the environmental protection sheet.
Note that the structure does not guarantee protection in all users' environments. The GOT may not be used in certain environments where it is subjected to splashing oil or chemicals for a long period of time or soaked in oil mist.

*8 The minimum size of a key that can be arranged.
To ensure safe use of the product, the following settings are recommended.
• Key size: 16 × 16 dots or larger • Distance between keys: 16 dots or more

*9 The suffix "F" of IP67F is a symbol that indicates protection rate against oil. It is described in the Appendix of Japanese Industrial Standard JIS C 0920.

Specifications GOT2000 GT23 model

General specifications

Item	Specifications					
Operating ambient temperature *1	0 °C to 55 °C					
Storage ambient temperature	–20 °C to 60 °C					
Operating ambient humidity	10% RH to 90% RH, non-condensing *2					
Storage ambient humidity	10% RH to 90% RH, non-condensing *2					
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2		Frequency	Acceleration	Half amplitude	Sweep count
		Under intermittent vibration	5 to 8.4 Hz	—	3.5 mm	10 times in each X, Y, or Z direction
			8.4 to 150 Hz	9.8 m/s²	—	
		Under continuous vibration	5 to 8.4 Hz	—	1.75 mm	—
			8.4 to 150 Hz	4.9 m/s²	—	
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147 m/s² (15G), 3 times in each X, Y, or Z direction)					
Operating atmosphere	No greasy fumes, corrosive gas, flammable gas, excessive conductive dust, and direct sunlight (as well as at storage)					
Operating altitude *3	2000 m or less					
Installation location	Inside control panel					
Overvoltage category *4	II or less					
Pollution degree *5	2 or less					
Cooling method	Self-cooling					
Grounding	Grounding with a ground resistance of 100 Ω or less. If impossible, connect the ground cable to the control panel.					

Operate and store the GOT in environments without direct sunlight, high temperature, dust, humidity, and vibrations.

For inquiries relating to the status of conforming to various standards and laws (CE, ATEX [to be obtained soon], UL/cUL, Class I Division 2, EAC, KC, KCs [to be obtained soon], and maritime certifications [ABS/BV/DNV GL/LR/NK/RINA]), please contact your local sales office.

*1 The operating ambient temperature includes the temperature inside the enclosure of the control panel to which the GOT is installed.

*2 If the ambient temperature exceeds 40 °C, the absolute humidity must not exceed 90% RH at 40 °C.

*3 Do not use or store the GOT under a pressure higher than the atmospheric pressure at altitude 0 m. Doing so may cause a malfunction. Air purging by applying pressure to the control panel may create clearance between the surface sheet and the touch panel. This may cause the touch panel to be not sensitive enough or the sheet to come off.

*4 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within the premises. Category II applies to equipment that is supplied with power from fixed facilities. The withstand surge voltage for the equipment with the rated voltage up to 300 V is 2500 V.

*5 This indicates the occurrence rate of conductive material in an environment where a device is used. Pollution degree 2 indicates an environment where only non-conductive pollution occurs normally and a temporary conductivity caused by condensation shall be expected depending on the conditions.

Performance specifications

Item		Specifications	
		GT2310-VTBA GT2310-VTBD	GT2308-VTBA GT2308-VTBD
Display section *1 *2	Display device	TFT color LCD	
	Screen size	10.4"	8.4"
	Resolution	VGA: 640 × 480 dots	
	Display size	211.2(8.31) (W) × 158.4(6.24) (H) mm(inch)	170.9(6.73) (W) × 128.2(5.05) (H) mm(inch)
	Number of displayed characters	16-dot standard font: 40 characters × 30 lines (two-byte characters) 12-dot standard font: 53 characters × 40 lines (two-byte characters)	
	Display color	65536 colors	
	Brightness adjustment	16 levels	
	Backlight	LED (not replaceable)	
	Backlight life *4	Approx. 50000 h (operating ambient temperature: 25 °C, display intensity: 50%)	
Touch panel *3	Type	Analog resistive film	
	Key size	Minimum 2 × 2 dots *7 (per key)	
	Simultaneous press	Not available *5 (Only 1 point can be touched.)	
	Life	1 million touches or more (operating force: 0.98 N or less)	
Panel color		Black	
User memory	User memory capacity	Memory for storage (ROM): 9 MB Memory for operation (RAM): 9 MB	
	Life (number of write times)	100000 times	
Built-in clock precision		±90 seconds/month (ambient temperature: 25 °C)	
Battery		GT11-50BAT lithium battery	
	Life	Approx. 5 years (ambient temperature: 25 °C)	
Built-in interface	RS-232	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: D-sub 9-pin (male)	
	RS-422/485	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: D-sub 9-pin (female)	
	Ethernet	1 channel Data transfer method: 10BASE-T, 100BASE-TX Connector shape: RJ-45 (modular jack)	
	USB (host)	1 channel	
		Maximum transfer rate: Full-Speed 12 Mbps Connector shape: USB-A	
	USB (device)	1 channel	
		Maximum transfer rate: Full-Speed 12 Mbps Connector shape: USB Mini-B	
	SD memory card	1 channel, SDHC compliant (maximum 32 GB)	
Buzzer output		Single tone (tone length adjustable)	
POWER LED		2 colors (blue and orange)	
Protective structure		Front: IP67F *6 *8 Inside control panel: IP2X	
External dimensions		303(11.93) (W) × 218(8.58) (H) × 56(2.20) (D) mm(inch)	241(9.49) (W) × 194(7.64) (H) × 56(2.20) (D) mm(inch)
Panel cut dimensions		289(11.38) (W) × 200(7.87) (H) mm(inch)	227(8.94) (W) × 176(6.93) (H) mm(inch)
Weight (excluding a fitting)		1.9(4.2) kg(lb)	1.5(3.3) kg(lb)
Compatible software package		GT Works3 Version1.155M or later	

*1 As a characteristic of liquid crystal display panels, bright dots (always lit) and dark dots (never lit) may appear on the panel. Since liquid crystal display panels comprise a great number of display elements, the appearance of bright and dark dots cannot be reduced to zero. Individual differences in liquid crystal display panels may cause differences in color, uneven brightness and flickering. Note that these phenomena are characteristics of liquid crystal display panels and it does not mean the products are defective or damaged.

*2 Flickering may occur due to vibration, shock, or the display colors.

*3 When a stylus is used, the touch panel has a life of 100 thousand touches. The stylus must satisfy the following specifications.
• Material: polyacetal resin • Tip radius: 0.8 mm or more

*4 To prevent the display section from burning in and lengthen the backlight life, enable the screen save function and turn off the backlight.

*5 If you touch two points or more simultaneously on the touch panel, a touch switch near the touched points may operate unexpectedly. Do not touch two points or more simultaneously on the touch panel.

*6 Note that the structure does not guarantee protection in all users' environments. The GOT may not be used in certain environments where it is subjected to splashing oil or chemicals for a long period of time or soaked in oil mist.

*7 The minimum size of a key that can be arranged.
To ensure safe use of the product, the following settings are recommended.
• Key size: 16 × 16 dots or larger • Distance between keys: 16 dots or more

*8 The suffix "F" of IP67F is a symbol that indicates protection rate against oil. It is described in the Appendix of Japanese Industrial Standard JIS C 0920.

●Power supply specifications

Item		Specifications			
		GT2310-VTBA	GT2308-VTBA	GT2310-VTBD	GT2308-VTBD
Power supply voltage		100 V AC to 240 V AC (+10%, −15%)		24 V DC (+25%, −20%)	
Power supply frequency		50 Hz/60 Hz (±5%)		—	
Power consumption	Under the maximum load	18 W or less	11 W or less	16 W or less	11 W or less
	Main unit	15 W	9 W	13 W	8 W
	Main unit (backlight OFF)	8 W	6 W	7 W	6 W
Inrush current		40 A or less (4 ms, ambient temperature: 25 °C, under the maximum load)		40 A or less (2 ms, ambient temperature: 25 °C, under the maximum load)	
Permissible instantaneous power failure time		20 ms or less (100 V AC or more)		10 ms or less	
Noise immunity		Noise voltage: 1500 Vp-p, noise width: 1 μs, measured by a noise simulator with noise frequency ranging from 25 Hz to 60 Hz		Noise voltage: 500 Vp-p, noise width: 1 μs, measured by a noise simulator with noise frequency ranging from 25 Hz to 60 Hz	
Withstand voltage		1500 V AC for 1 minute across power terminals and earth		350 V AC for 1 minute across power terminals and earth	
Insulation resistance		500 V DC across power terminals and earth, 10 MΩ or more by an insulation resistance tester			

Specifications GOT2000 GT21 model

General specifications

Item	Specifications					
Operating ambient temperature *1	0 °C to 55 °C (horizontal installation), 0 °C to 50 °C (vertical installation)					
Storage ambient temperature	–20 °C to 60 °C					
Operating ambient humidity	10% RH to 90% RH, non-condensing *2					
Storage ambient humidity	10% RH to 90% RH, non-condensing *2					
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2		Frequency	Acceleration	Half amplitude	Sweep count
		Under intermittent vibration	5 to 8.4 Hz	—	3.5 mm	10 times in each X, Y, or Z direction
			8.4 to 150 Hz	9.8 m/s²	—	
		Under continuous vibration	5 to 8.4 Hz	—	1.75 mm	—
			8.4 to 150 Hz	4.9 m/s²	—	
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147 m/s² (15G), 3 times in each X, Y, or Z direction)					
Operating atmosphere	No greasy fumes, corrosive gas, flammable gas, excessive conductive dust, and direct sunlight (as well as at storage)					
Operating altitude *3	2000 m or less					
Installation location	Inside control panel					
Overvoltage category *4	II or less					
Pollution degree *5	2 or less					
Cooling method	Self-cooling					
Grounding	Grounding with a ground resistance of 100 Ω or less by using a ground cable that has a cross-sectional area of 0.14 to 1.5 mm² (single wire), 0.14 to 1.0 mm² (stranded wire), or 0.25 to 0.5 mm² (rod terminal with an insulation sleeve). If impossible, connect the ground cable to the control panel. *6					

Operate and store the GOT in environments without direct sunlight, high temperature, dust, humidity, and vibrations.

*1 The operating ambient temperature includes the temperature inside the enclosure of the control panel to which the GOT is installed.

*2 If the ambient temperature exceeds 40 °C, the absolute humidity must not exceed 90% RH at 40 °C.

*3 Do not use or store the GOT under a pressure higher than the atmospheric pressure at altitude 0 m. Doing so may cause a malfunction. Air purging by applying pressure to the control panel may create clearance between the surface sheet and the touch panel. This may cause the touch panel to be not sensitive enough or the sheet to come off.

*4 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within the premises. Category II applies to equipment that is supplied with power from fixed facilities. The withstand surge voltage for the equipment with the rated voltage up to 300 V is 2500 V.

*5 This indicates the occurrence rate of conductive material in an environment where a device is used. Pollution degree 2 indicates an environment where only non-conductive pollution occurs normally and a temporary conductivity caused by condensation shall be expected depending on the conditions.

*6 5 V DC type does not require grounding.

For inquiries relating to the status of conforming to various standards and laws (CE, ATEX [to be obtained soon], UL/cUL, Class I Division 2, EAC, KC, KCs [to be obtained soon], and maritime certifications [ABS/BV/DNV GL/LR/NK/RINA]), please contact your local sales office.

Performance specifications

Item		Specifications				
		GT2104-RTBD	GT2103-PMBD	GT2103-PMBDS	GT2103-PMBDS2	GT2103-PMBLS
Display section *1 *2	Display device	TFT color LCD	TFT monochrome LCD			
	Screen size	4.3" Wide	3.8"			
	Resolution	480 × 272 dots	320 × 128 dots			
	Display size	95.0(3.74) (W) × 53.8(2.12) (H) mm(inch)	89.0(3.50) (W) × 35.6(1.40) (H) mm(inch)			
	Number of displayed characters	16-dot standard font: 30 characters × 17 lines (two-byte characters) 12-dot standard font: 40 characters × 22 lines (two-byte characters)	16-dot standard font: 20 characters × 8 lines (two-byte characters) 12-dot standard font: 26 characters × 10 lines (two-byte characters)			
	Display color	65536 colors	Monochrome (black/white) 32 shade grayscale			
	Brightness adjustment	32 levels				
	Backlight	LED (not replaceable)	5-color LED (white, green, pink, orange, red) (not replaceable)			
	Backlight life *4	Approx. 50000 h (operating ambient temperature: 25 °C, display intensity: 50%)				
Touch panel *3	Type	Analog resistive film				
	Key size	Minimum 2 × 2 dots *9 (per key)				
	Simultaneous press	Not available *5 (Only 1 point can be touched.)				
	Life	1 million touches or more (operating force: 0.98 N or less)				
Panel color		Black				
User memory	User memory capacity	Memory for storage (ROM): 9 MB	Memory for storage (ROM): 3 MB			
	Life (number of write times)	100000 times				
Built-in interface	RS-232	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: 9-pin connector terminal block	—	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: MINI-DIN 6-pin (female)	2 channels Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: 9-pin connector terminal block, MINI-DIN 6-pin (female)	—
	RS-422/485	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: 9-pin connector terminal block	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: 5-pin connector terminal block	1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: 9-pin connector terminal block	—	—
	RS-422	—				1 channel Transmission speed: 115200, 57600, 38400, 19200, 9600, 4800 bps Connector shape: 9-pin connector terminal block
	Ethernet	1 channel Data transfer method: 10BASE-T, 100BASE-TX Connector shape: RJ-45 (modular jack)		—		
	USB (device)	1 channel				
		Maximum transfer rate: Full-Speed 12 Mbps Connector shape: USB Mini-B				
	SD memory card	1 channel, SDHC compliant (maximum 32 GB)	1 channel, SDHC compliant (maximum 32 GB) *6			—
Buzzer output		Single tone (tone length adjustable)				
Protective structure		Front: IP67F *7 *10 Inside control panel: IP2X				
External dimensions		128(5.04) (W) × 102(4.02) (H) × 40(1.57) (D) mm(inch)	113(4.45) (W) × 74(2.91) (H) × 32(1.26) (D) mm(inch)	113(4.45) (W) × 74(2.91) (H) × 27(1.06) (D) mm(inch) *8		113(4.45) (W) × 74(2.91) (H) × 27(1.06) (D) mm(inch)
Panel cut dimensions		118(4.65) (W) × 92(3.62) (H) mm(inch)	105(4.13) (W) × 66(2.60) (H) mm(inch)			
Weight (excluding a fitting)		0.4(0.88) kg(lb)	0.2(0.44) kg(lb)			0.18(0.40) kg(lb)
Compatible software package		GT Works3 Version1.155M or later				

*1 As a characteristic of liquid crystal display panels, bright dots (always lit) and dark dots (never lit) may appear on the panel. Since liquid crystal display panels comprise a great number of display elements, the appearance of bright and dark dots cannot be reduced to zero. Individual differences in liquid crystal display panels may cause differences in color, uneven brightness and flickering. Note that these phenomena are characteristics of liquid crystal display panels and it does not mean the products are defective or damaged.

*2 Flickering may occur due to vibration, shock, or the display colors.

*3 When a stylus is used, the touch panel has a life of 100 thousand touches. The stylus must satisfy the following specifications.
• Material: polyacetal resin • Tip radius: 0.8 mm or more

*4 To prevent the display section from burning in and lengthen the backlight life, enable the screen save function and turn off the backlight.

*5 If you touch two points or more simultaneously on the touch panel, a touch switch near the touched points may operate unexpectedly. Do not touch two points or more simultaneously on the touch panel.

*6 The SD memory card unit (GT21-03SDCD), sold separately, needs to be mounted.

*7 Note that the structure does not guarantee protection in all users' environments. The GOT may not be used in certain environments where it is subjected to splashing oil or chemicals for a long period of time or soaked in oil mist.

*8 The dimension when the SD memory card unit (GT21-03SDCD) is mounted is 113(4.45) (W) × 74(2.91) (H) × 32(1.26) (D) mm(inch).

*9 The minimum size of a key that can be arranged.
To ensure safe use of the product, the following settings are recommended.
• Key size: 16 × 16 dots or larger

*10 The suffix "F" of IP67F is a symbol that indicates protection rate against oil. It is described in the Appendix of Japanese Industrial Standard JIS C 0920.

●Power supply specifications

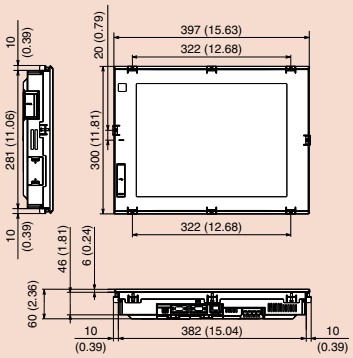
Item		Specifications				
		GT2104-RTBD	GT2103-PMBD	GT2103-PMBDS	GT2103-PMBDS2	GT2103-PMBLS
Power supply voltage		24 V DC (+10%, −15%)				5 V DC (+5%, −5%) Power from the PLC
Power supply frequency		—				
Power consumption	Under the maximum load	4.4 W or less	2.6 W or less	1.9 W or less	2.2 W or less	1.1 W or less
	Main unit (backlight OFF)	2.9 W	2.0 W	1.3 W	1.6 W	0.7 W
Inrush current		18 A or less (2 ms, ambient temperature: 25 °C, under the maximum load)	30 A or less (1 ms, ambient temperature: 25 °C, under the maximum load)			—
Permissible instantaneous power failure time		5 ms or less				—
Noise immunity		Noise voltage: 1000 Vp-p, noise width: 1 μs, measured by a noise simulator with noise frequency ranging from 30 Hz to 100 Hz				
Withstand voltage		500 V AC for 1 minute across power terminals and earth				—
Insulation resistance		500 V DC across power terminals and earth, 10 MΩ or more by an insulation resistance tester				—

GT27/GT25

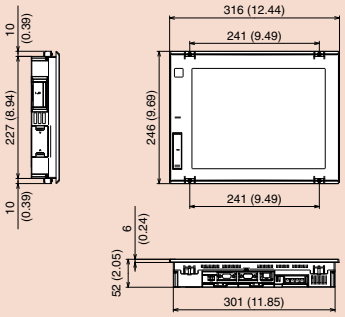
External dimensions

Unit: mm (inch)

GT2715

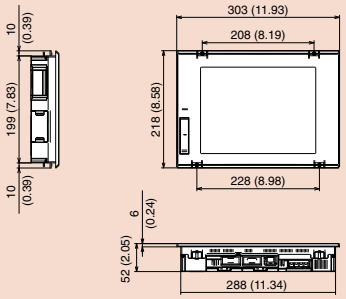


GT2712/GT2512

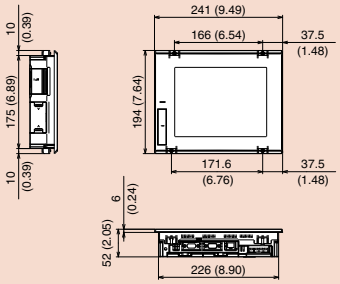


* Human sensor is on GT2712 only.

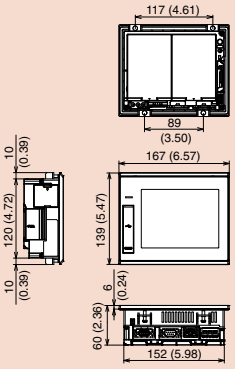
GT2710/GT2510



GT2708/GT2508



GT2705

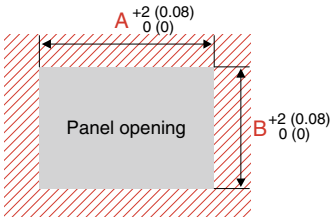


Panel cut dimensions

Unit: mm (inch)

Screen size	Model	A	B	Remarks
15"	GT2715	383.5 (15.10)	282.5 (11.12)	Same dimensions as GT1695, GT1595.
12.1"	GT2712 GT2512	302 (11.89)	228 (8.98)	Same dimensions as GT1685, GT1585, A985GOT.
10.4"	GT2710 GT2510	289 (11.38)	200 (7.87)	Same dimensions as GT167□, GT157□, GT1275, A97□GOT.
8.4"	GT2708 GT2508	227 (8.94)	176 (6.93)	Same dimensions as GT166□, GT156□, GT1265.
5.7"	GT2705	153 (6.02)	121 (4.76)	Same dimensions as GT1655, GT155□, GT145□, GT115□, GT105□, F940GOT.

GT27/GT25



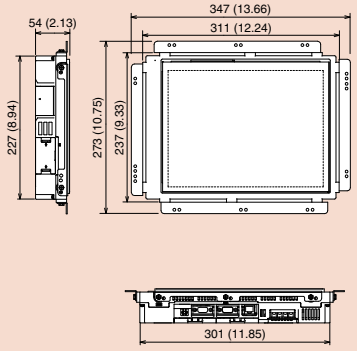
* Panel thickness: 1.6 mm to 4 mm (0.06 inch to 0.16 inch)

GT25 (open frame model)

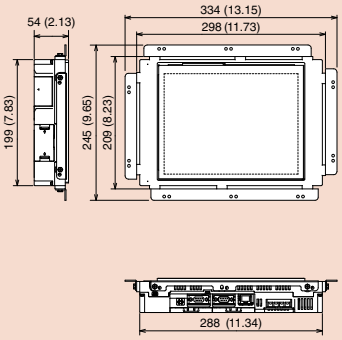
External dimensions

Unit: mm (inch)

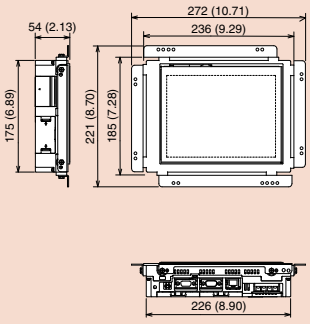
GT2512F



GT2510F



GT2508F



* Install the fittings on the top and bottom, or the right and left of the GOT.

●Panel cut dimensions/Measurements based on the screen center

Unit: mm (inch)

Screen size	Model	Panel cutting dimensions		Measurements based on the screen center			
		X	Y	X1	X2	Y1	Y2
12.1"	GT2512F	214(8.43) (+2(0.08), 0(0))	269(10.59) (+2(0.08), 0(0))	103(4.06) (+2(0.08), 0(0))	(111(4.37))	134.5(5.30) (+1(0.04), 0(0))	(134.5(5.30))
10.4"	GT2510F	187(7.36) (+2(0.08), 0(0))	234(9.21) (+2(0.08), 0(0))	89.5(3.52) (+1(0.04), 0(0))	(97.5(3.84))	117(4.61) (+1(0.04), 0(0))	(117(4.61))
8.4"	GT2508F	158(6.22) (+2(0.08), 0(0))	194(7.64) (+2(0.08), 0(0))	75.25(2.96) (+1(0.04), 0(0))	(82.75(3.26))	97.5(3.84) (+1(0.04), 0(0))	(96.5(3.80))

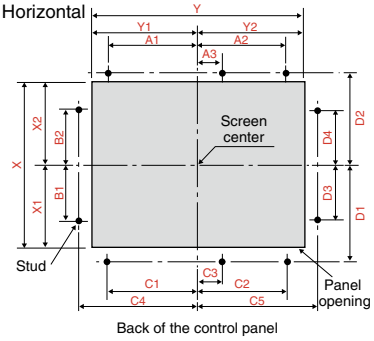
Screen size	Model	Distance between studs *				
		A1	A2	A3	B1	B2
12.1"	GT2512F	98(3.86)± 0.15(0.01)	113(4.45)± 0.15(0.01)	7.5(0.30)± 0.15(0.01)	75.5(2.97)± 0.15(0.01)	79.5(3.13)± 0.15(0.01)
10.4"	GT2510F	105.5(4.15)± 0.15(0.01)	105.5(4.15)± 0.15(0.01)	0(0)	58(2.28)± 0.15(0.01)	58(2.28)± 0.15(0.01)
8.4"	GT2508F	64.5(2.54)± 0.15(0.01)	74.5(2.93)± 0.15(0.01)	—	58(2.28)± 0.15(0.01)	58(2.28)± 0.15(0.01)

Screen size	Model	Distance between studs *				
		C1	C2	C3	C4	C5
12.1"	GT2512F	98(3.86)± 0.15(0.01)	113(4.45)± 0.15(0.01)	7.5(0.30)± 0.15(0.01)	160(6.30)± 0.15(0.01)	175(6.89)± 0.15(0.01)
10.4"	GT2510F	105.5(4.15)± 0.15(0.01)	105.5(4.15)± 0.15(0.01)	0(0)	161(6.34)± 0.15(0.01)	161(6.34)± 0.15(0.01)
8.4"	GT2508F	64.5(2.54)± 0.15(0.01)	74.5(2.93)± 0.15(0.01)	—	126(4.96)± 0.15(0.01)	134(5.28)± 0.15(0.01)

Screen size	Model	Distance between studs *			
		D1	D2	D3	D4
12.1"	GT2512F	128.5(5.06)± 0.15(0.01)	132.5(5.22)± 0.15(0.01)	75.5(2.97)± 0.15(0.01)	79.5(3.13)± 0.15(0.01)
10.4"	GT2510F	114.5(4.51)± 0.15(0.01)	118.5(4.67)± 0.15(0.01)	58(2.28)± 0.15(0.01)	58(2.28)± 0.15(0.01)
8.4"	GT2508F	104.5(4.11)± 0.15(0.01)	104.5(4.11)± 0.15(0.01)	58(2.28)± 0.15(0.01)	58(2.28)± 0.15(0.01)

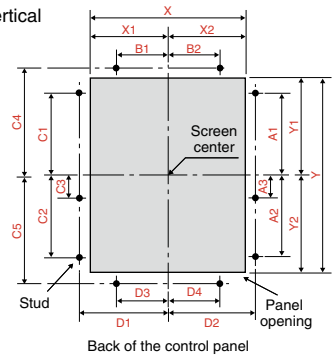
GT25 (open frame model)

· Horizontal



Back of the control panel

· Vertical



Back of the control panel

* Panel thickness: 1.5 mm to 4 mm (0.06 inch to 0.16 inch)

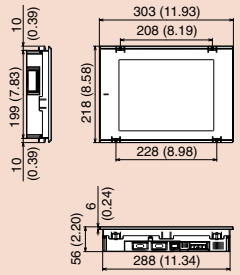
* To mount the GOT on the control panel, studs are necessary. Align the studs with the installation holes of the fittings, and install the studs.
The fittings must be installed on the top and bottom, or the right and left of the GOT. For GT2512F, you are recommended to install the fittings on the long sides of the GOT.

GT23

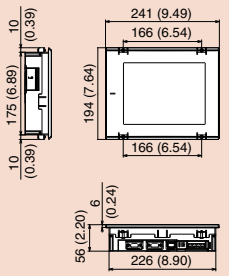
External dimensions

Unit: mm (inch)

GT2310



GT2308

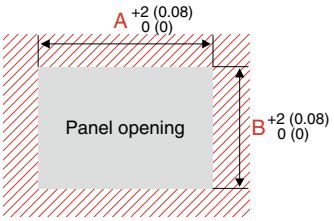


Panel cut dimensions

Unit: mm (inch)

Screen size	Model	A	B	Remarks
10.4"	GT2310	289 (11.38)	200 (7.87)	Same dimensions as GT167□, GT157□, GT1275, A97□GOT.
8.4"	GT2308	227 (8.94)	176 (6.93)	Same dimensions as GT166□, GT156□, GT1265.

GT23



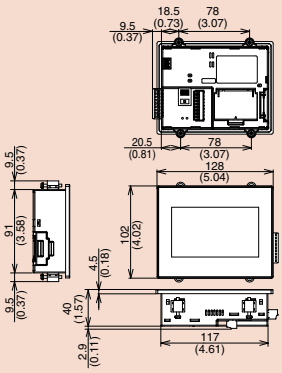
✻ Panel thickness: 1.6 mm to 4 mm (0.06 inch to 0.16 inch)

GT21

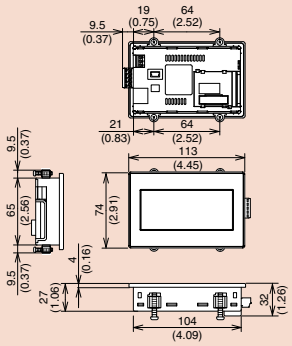
External dimensions

Unit: mm (inch)

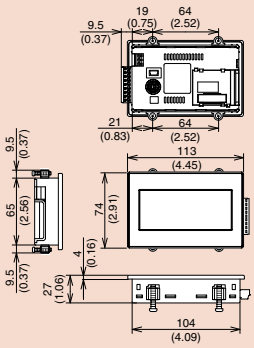
GT2104-RTBD



GT2103-PMBD



GT2103-PMBDS/GT2103-PMBDS2/GT2103-PMBLS

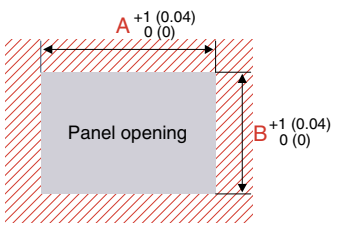


Panel cut dimensions

Unit: mm (inch)

Screen size	Model	A	B	Remarks
4.3" Wide	GT2104	118 (4.65)	92 (3.62)	—
3.8"	GT2103	105 (4.13)	66 (2.60)	Same dimensions as GT1020.

GT21

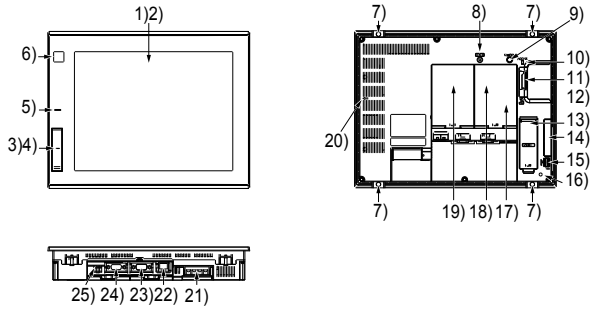


✻ Panel thickness: 1 mm to 4 mm (0.04 inch to 0.16 inch)

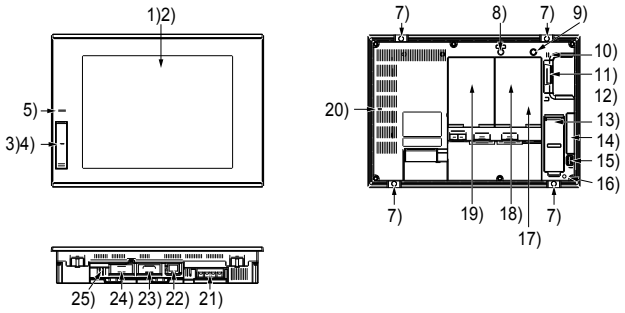
GT27

Components names

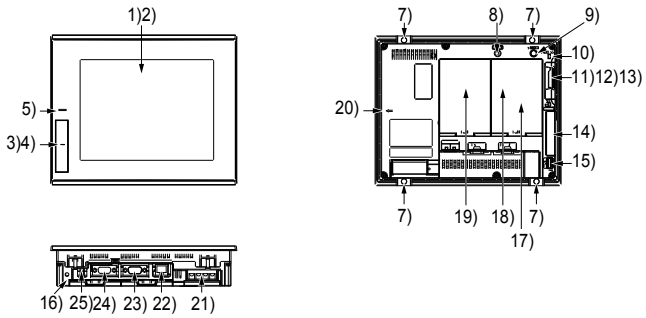
GT2715/GT2712



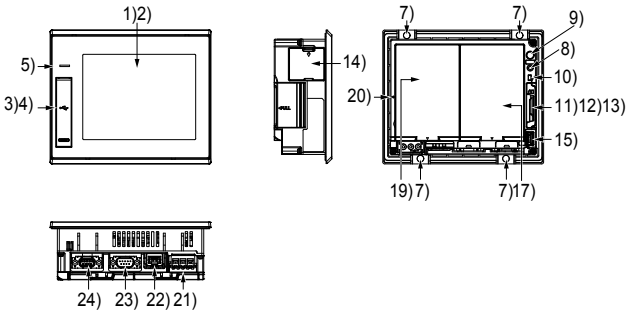
GT2710



GT2708



GT2705

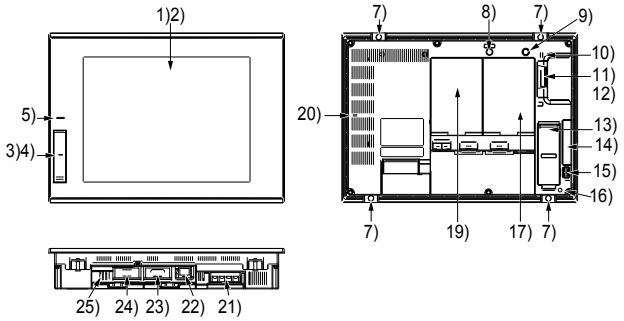


1) Display section
2) Touch panel
3) USB interface (host/front face)
   ✻ Excluding white model
4) USB interface (device/front face)
   ✻ Excluding white model
5) POWER LED
6) Human sensor
   ✻ GT2715, GT2712 only
7) Unit installation fitting
8) Reset switch
9) S.MODE switch
10) SD memory card access LED
11) SD memory card interface (inside the cover)
12) SD memory card cover
13) Battery (inside the cover)
14) Side interface (inside the cover)
15) USB interface (host/rear face)
16) Cable clamp mounting hole
17) Terminating resistor setting switch (inside the cover)
18) Auxiliary extension interface
   ✻ GT27 only (excluding GT2705)
19) Extension interface
20) Vertical installation arrow mark
21) Power terminal
22) Ethernet interface/ Ethernet communication status LED
23) RS-232 interface
24) RS-422/485 interface
25) USB interface (device/rear face)
   ✻ White model only

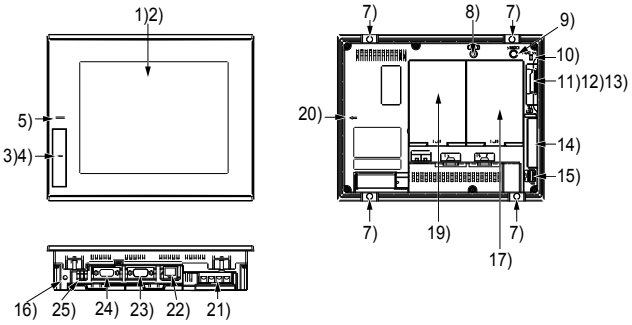
GT25

Components names

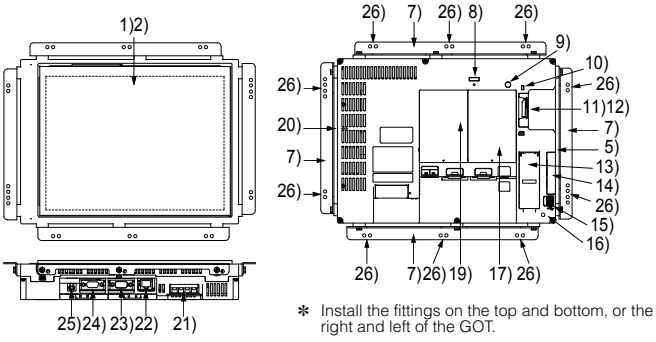
GT2512/GT2510



GT2508

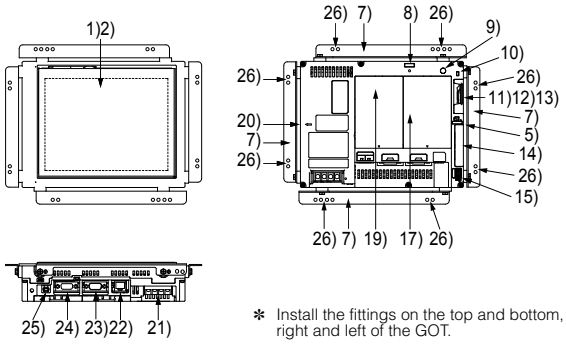


GT2512F/GT2510F



✻ Install the fittings on the top and bottom, or the right and left of the GOT.

GT2508F



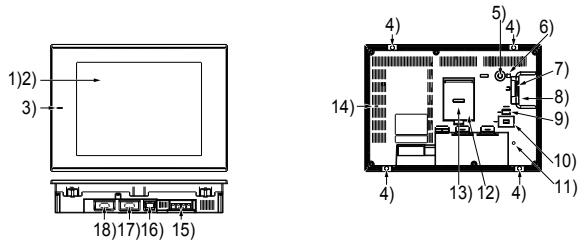
✻ Install the fittings on the top and bottom, or the right and left of the GOT.

1) Display section
2) Touch panel
3) USB interface (host/front face)
   ✻ Excluding white model, open frame model
4) USB interface (device/front face)
   ✻ Excluding white model, open frame model
5) POWER LED
6) Human sensor
   ✻ GT2715, GT2712 only
7) Unit installation fitting
8) Reset switch
9) S.MODE switch
10) SD memory card access LED
11) SD memory card interface (inside the cover)
12) SD memory card cover
13) Battery (inside the cover)
14) Side interface (inside the cover)
15) USB interface (host/rear face)
16) Cable clamp mounting hole
17) Terminating resistor setting switch (inside the cover)
18) Auxiliary extension interface
   ✻ GT27 only (excluding GT2705)
19) Extension interface
20) Vertical installation arrow mark
21) Power terminal
22) Ethernet interface/ Ethernet communication status LED
23) RS-232 interface
24) RS-422/485 interface
25) USB interface (device/rear face)
   ✻ White model, open frame model only
26) Fitting installation hole
   ✻ Open frame model only

GT23

Components names

GT2310/GT2308

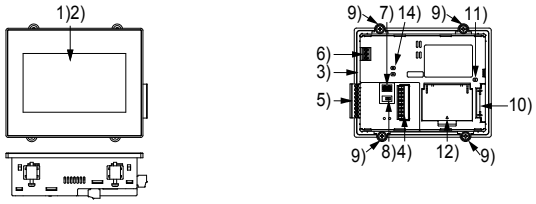


1) Display section
2) Touch panel
3) POWER LED
4) Unit installation fitting
5) S.MODE switch
6) SD memory card access LED
7) SD memory card interface (inside the cover)
8) SD memory card cover
9) USB interface (host)
10) USB interface (device)
11) Cable clamp mounting hole
12) Terminating resistor setting switch (inside the cover)
13) Battery (inside the cover)
14) Vertical installation arrow mark
15) Power terminal
16) Ethernet interface/ Ethernet communication status LED
17) RS-232 interface
18) RS-422/485 interface

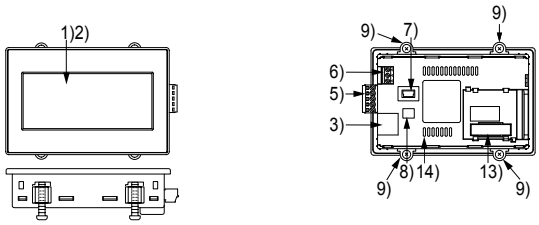
GT21

Components names

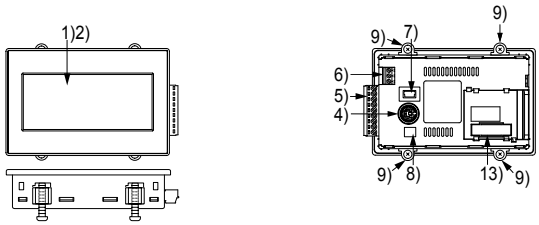
GT2104-RTBD



GT2103-PMBD



GT2103-PMBDS/GT2103-PMBDS2/GT2103-PMBLS



1) Display section
2) Touch panel
3) Ethernet interface
4) RS-232 interface
   ✻ Excluding GT2103-PMBLS
5) RS-422/485 interface
   ✻ RS-232 interface on GT2103-PMBDS2
   ✻ RS-422 interface on GT2103-PMBLS (dedicated to FX connection)
6) Power terminal
   ✻ Excluding GT2103-PMBLS
7) USB interface (device)
8) Terminating resistor setting switch
   ✻ Excluding GT2103-PMBDS2, GT2103-PMBLS
9) Unit installation fitting
10) SD memory card interface (inside the cover)
   ✻ Excluding GT2103
11) SD memory card access LED
12) Battery (inside the cover)
13) SD memory card unit connector (inside the cover)
   ✻ GT2103 only (excluding GT2103-PMBLS)
14) Ethernet communication status LED

GOT1000 Lineup

GT16

High performance models with multimedia and a host of features and functions including embedded communications

Multimedia | Video RGB | Network | Bus | Serial

15 inch



XGA **GT1695M-XTBA**
GT1695M-XTBD
Resolution: 1024×768
Display color: 65536 colors
Multimedia, video/RGB model

12.1 inch



SVGA **GT1685M-STBA**
GT1685M-STBD
Resolution: 800 × 600
Display color: 65536 colors
Multimedia, video/RGB model

10.4 inch



SVGA **GT1675M-STBA**
GT1675M-STBD
Resolution: 800 × 600
Display color: 65536 colors
Multimedia, video/RGB model

VGA **GT1675M-VTBA**
GT1675M-VTBD
Resolution: 640 × 480
Display color: 65536 colors
Multimedia, video/RGB model

GT1675-VNBA
GT1675-VNBD ✻
Resolution: 640 × 480
Display color: 4096 colors

GT1672-VNBA
GT1672-VNBD ✻
Resolution: 640 × 480
Display color: 16 colors

8.4 inch



SVGA **GT1665M-STBA**
GT1665M-STBD
Resolution: 800 × 600
Display color: 65536 colors
Multimedia, video/RGB model

VGA **GT1665M-VTBA**
GT1665M-VTBD
Resolution: 640 × 480
Display color: 65536 colors
Multimedia, video/RGB model

GT1662-VNBA
GT1662-VNBD ✻
Resolution: 640 × 480
Display color: 16 colors

5.7 inch



VGA **GT1655-VTBD** ✻
Resolution: 640 × 480
Display color: 65536 colors

6.5 inch Handy



VGA **GT1665HS-VTBD** ✻
Resolution: 640 × 480
Display color: 65536 colors

GT14

Standard model with advanced features and communication interfaces

Network | Serial

5.7 inch



QVGA **GT1455-QTBDE** ✻
Resolution: 320 × 240
Display color: 65536 colors



QVGA **GT1450-QMBDE** ✻
Resolution: 320 × 240
Display color: 16 gray scales

GT10

Compact models with basic functions

Serial

5.7 inch



QVGA **GT1055-QSBD**
Resolution: 320 × 240
Display color: 256 colors



QVGA **GT1050-QBBD**
Resolution: 320 × 240
Display color:
Monochrome (blue/white)
16 gray scales

4.5 inch



GT1030-HBD Black RS-422 connection
GT1030-HBD2 Black RS-232 connection
GT1030-HBL Black RS-422 connection
GT1030-HWD White RS-422 connection
GT1030-HWD2 White RS-232 connection
GT1030-HWL White RS-422 connection
✻
Resolution: 288 × 96
Display color: Monochrome (black/white)
(Tricolor LED (green/orange/red))



GT1030-HBDW Black RS-422 connection
GT1030-HBDW2 Black RS-232 connection
GT1030-HBLW Black RS-422 connection
GT1030-HWDW White RS-422 connection
GT1030-HWDW2 White RS-232 connection
GT1030-HWLW White RS-422 connection
✻
Resolution: 288 × 96
Display color: Monochrome (black/white)
(Tricolor LED (white/pink/red))

✻: The GT16□□-VNB□, GT1655-VTBD, GT1665HS-VTBD, GT145□, GT12□□-VNB□ and GT1030 high contrast products (GT1030-H□□□□) are not supported by the screen design software GT Works2/GT Designer2.

Specifications GOT1000 GT16 model

General specifications

Item		Specification				
Operating ambient temperature※1	Display	0°C to 50°C※5				
	Other than display	0°C to 55°C※5				
Storage ambient temperature		-20°C to 60°C				
Operating ambient humidity		10 to 90%RH, no condensation				
Storage ambient humidity		10 to 90%RH, no condensation				
Vibration resistance	Conforming to JIS B 3502 and IEC 61131-2		Frequency	Acceleration	Half amplitude	Sweep count
		Under intermittent vibration	5 to 8.4Hz	–	3.5mm	10 times each in X, Y and Z directions
			8.4 to 150Hz	9.8m/s^2	–	
		Under continuous vibration	5 to 8.4Hz	–	1.75mm	–
			8.4 to 150Hz	4.9m/s^2	–	
Impact resistance		Conforming to JIS B 3502 and IEC 61131-2 (147m/s^2, 3 times each in X, Y and Z directions)				
Operating atmosphere		No oily smoke, corrosive gas or combustible gas, less conductive dust, away from direct sunlight (the same in storage)				
Operating altitude※2		2000m or less				
Installation location		In control panel※6				
Overvoltage category※3		Ⅱ or lower				
Contamination level※4		2 or less				
Cooling method		Self-cooling				
Grounding		Type D grounding (100Ω or less). Connect to panel if unable to ground.				

※1 The maximum operating ambient temperature should be 5°C lower than that shown in the table on the left when connecting to a multimedia unit (GT16M-MMR), MELSECNET/H communication unit (GT15-J71LP23-25 or GT15-J71BR13) or CC-Link communication unit (GT15-J61BT13).
※2 Do not operate or store the GOT unit in pressurized environments where the pressure exceeds 0m elevation atmospheric pressure, as this could result in abnormal operation.
Do not pressurize inside the control panel for air purge cleaning. The pressure could raise the surface sheet, making the touch panel difficult to operate or causing the sheet to come off.
※3 Assuming that the device is connected at some point between a public power distribution network and local system equipment.
Category Ⅱ applies to devices that are supplied with power from fixed equipment. The surge withstand voltage is 2,500V for devices with ratings up to 300V.
※4 Index that indicates the level of foreign conductive matter in the operating environment of the device. Contamination level 2 denotes an environment contaminated only by non-conductive matter which may, under certain conditions, become temporarily conductive due to condensation.
※5 0 to 40°C for GT1665HS
※6 Excluding GT1665HS

Do not use or store the GOT under direct sun light or in an environment with excessively high temperature, dust, humidity or vibration.

For inquiries relating to products which conform to UL, cUL, and CE directives and shipping directives, please contact your local sales office.

Performance specifications

Item		Specification						
		GT1695M-XTBA GT1695M-XTBD	GT1685M-STBA GT1685M-STBD	GT1675M-STBA GT1675M-STBD	GT1675M-VTBA GT1675M-VTBD	GT1675-VNBA GT1675-VNBD	GT1672-VNBA GT1672-VNBD	GT1665M-STBA GT1665M-STBD
Display※1	Type	TFT color LCD (high-brightness, wide viewing angle)				TFT color LCD		TFT color LCD (high-brightness, wide viewing angle)
	Screen size	15"	12.1"	10.4"				8.4"
	Resolution	XGA: 1024 × 768 [dots]	SVGA: 800 × 600 [dots]	SVGA: 800 × 600 [dots]	VGA: 640 × 480 [dots]			SVGA: 800 × 600 [dots]
	Display size	304.1(W) × 228.1(H)[mm]	246(W) × 184.5(H)[mm]	211(W) × 158(H)[mm]				171(W) × 128(H)[mm]
	No. of displayed characters	16-dot standard font: 64 chars. × 48 lines (2-byte) 12-dot standard font: 85 chars. × 64 lines (2-byte)	16-dot standard font: 50 chars. × 37 lines (2-byte) 12-dot standard font: 66 chars. × 50 lines (2-byte)		16-dot standard font: 40 chars. × 30 lines (2-byte) 12-dot standard font: 53 chars. × 40 lines (2-byte)			16-dot standard font: 50 chars. × 37 lines (2-byte) 12-dot standard font: 66 chars. × 50 lines (2-byte)
	Display colors	65,536 colors				4,096 colors	16 colors	65,536 colors
	View angle※2	Right/left: 75°, Up: 50°, Down: 60°	Right/left: 80°, Up: 60°, Down: 80°	Right/left/up/down: 88°	Right/left: 80°, Up: 80°, Down: 60°※14	Right/left: 45°, Up: 30°, Down: 20°		Right/left: 80°, Up: 80°, Down: 60°
	Intensity	450 [cd/m^2]	470 [cd/m^2]	400 [cd/m^2]	500 [cd/m^2]※15	200 [cd/m^2]		400 [cd/m^2]
	Intensity adjustment	8-step adjustment				4-step adjustment		8-step adjustment
	Life	Approx. 52,000 hours (operating ambient temperature: 25°C)		Approx. 43,000 hours (operating ambient temperature: 25°C)		Approx. 52,000 hours (operating ambient temperature: 25°C)		Approx. 43,000 hours (operating ambient temperature: 25°C)
Backlight		Cold-cathode fluorescent tube (replaceable), with backlight OFF detection function. Backlight off time and screen save time can be set.						
	Life※3	Approx. 50,000 hours or more (Time for display intensity reaches 50% at operating ambient temperature of 25°C)						
Touch panel※10	Type	Analog resistive type						
	Key size	Min. 2 × 2 [dots] (per key)						
	No. of simultaneous touch points	Simultaneous touch prohibited※4 (If two or more points are pressed simultaneously, the switch may function near the center of the pressed points.)						
	Life※11	1,000,000 times or more (operating force 0.98N or less)						
Human sensor	Detection distance	1 [m]		–				
	Detection range	Right/left/up/down: 70°		–				
	Detection delay time	0 to 4 [sec]		–				
	Detection temperature	Temperature difference to be 4°C or more between human body and ambient air		–				
Memory※5	C drive	15MB built-in flash memory (for saving project data and OS)				11MB built-in flash memory (for saving project data and OS)		15MB built-in flash memory (for saving project data and OS)
	Life (No. of writings)	100,000 times						
Internal clock accuracy		3.47 to 8.38 secs/day (operating ambient temperature: 25°C)※12						
Battery		GT15-BAT type lithium battery						
	Backed up data	Clock data, maintenance time notification data, system log data and SRAM user area (500KB)						
	Life	Approx. 5 years (operating ambient temperature: 25°C)						
Built-in interface	RS-232※7	RS-232, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: D-sub 9-pin (male) Application: Communication with connected devices, connection to personal computer (project data read/write, OS installation, FA transparent function)						
	RS-422/485	RS-422/485, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: 14-pin (female) Application: Communication with connected devices						
	Ethernet	Data transfer system: 100BASE-TX, 10BASE-T, 1ch※8 Connector shape: RJ-45 (modular jack) Application: Communication with connected devices, gateway function, connection to personal computer (project data read/write, OS installation, FA transparent function, MES interface function)						
	USB	USB (full-speed 12Mbps), host 1ch Connector shape: TYPE-A Application: USB mouse/keyboard connection, USB memory data transfer and storage FAT16 format: max. 2GB, FAT32 format: max. 32GB※13						
		USB (full-speed 12Mbps), device 1ch Connector shape: Mini-B Application: Connection to personal computer (project data read/write, OS installation, FA transparent function)						
	CF card	Compact flash slot, 1ch Connector shape: TYPE Ⅰ Application: Data transfer, data storage, GOT startup FAT16 format: max. 2GB, FAT32 format: max. 32GB※13						
	Optional function board	1ch for optional function board installation						
	Extension unit※7	2ch for communication unit/optional unit installation						
Buzzer output		Single tone (tone length adjustable)						
Protective construction		Front: IP67f※6 In panel: IP2X						
External dimensions		397(W) × 296(H) × 61(D)[mm]	316(W) × 242(H) × 52(D)[mm]	303(W) × 214(H) × 49(D)[mm]				241(W) × 190(H) × 52(D)[mm]
Panel cut dimensions		383.5(W) × 282.5(H)[mm]	302(W) × 228(H)[mm]	289(W) × 200(H)[mm]				227(W) × 176(H)[mm]
Weight (excl. mounting brackets)		5.0[kg]	2.7[kg]	2.1[kg]	2.3[kg]※16	2.3[kg]		1.7[kg]
Applicable software packages		GT Works3 Version1.136S or later				GT Works3 Version1.136S or later (not supported by GT Works2/GT Designer2)		GT Works3 Version1.136S or later

●Power supply specifications

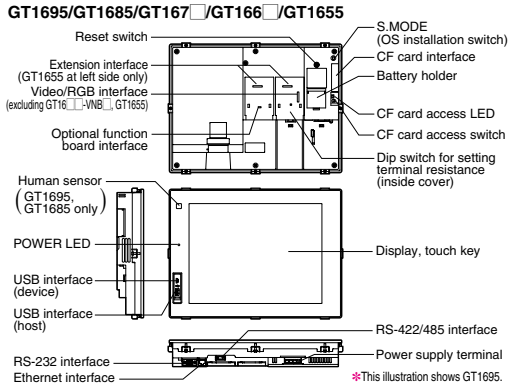
Item	Specification							
	GT1695M-XTBA	GT1685M-STBA	GT1675M-STBA GT1675M-VTBA GT1675-VNBA GT1672-VNBA GT1665M-STBA GT1665M-VTBA GT1662-VNBA	GT1695M-XTBD	GT1685M-STBD	GT1675M-STBD GT1675M-VTBD GT1675-VNBD GT1672-VNBD GT1665M-STBD GT1665M-VTBD GT1662-VNBD	GT1655-VTBD	GT1665HS-VTBD
Input power supply voltage	100 to 240VAC (+10%, -15%)			24VDC (+25%, -20%)				24VDC (+10%, -15%)
Input frequency	50/60Hz ±5%			–				
Input maximum apparent power	150VA (at max. load)	110VA (at max. load)	100VA (at max. load)	–				
Power consumption	64W or less	46W or less	39W or less	60W or less	40W or less	38W or less	16W or less	11.6W or less
With backlight off	38W or less	32W or less	30W or less	30W or less	26W or less	27W or less	14W or less	8.2W or less
Inrush current	28A or less (4ms, at max. load)			12A or less (75ms, at max. load)	12A or less (55ms, at max. load)		67A or less (1ms, at max. load)	30A or less (2ms, at max. load)
Permissible instantaneous failure time	Within 20ms (100VAC or more)			Within 10ms				Within 5ms
Noise resistance	Noise voltage 1500Vp-p, noise width 1µs by noise simulator with noise frequency 25 to 60Hz			Noise voltage 500Vp-p, noise width 1µs by noise simulator with noise frequency 25 to 60Hz				Noise voltage 1000Vp-p, noise width 1ms by noise simulator with noise frequency 30 to 100Hz
Withstand voltage	1500VAC for 1 minute between power supply terminal and ground			500VDC for 1 minute between power supply terminal and ground				
Insulation resistance	10MΩ or higher with an insulation resistance tester (500VDC between power supply terminal and ground)							
Applicable wire size	0.75 to 2 [mm²]							–
Clamp terminal	Clamp terminals for M3 screw RAV1.25-3, V2-S3.3, V2-N3A, FV2-N3A							–
Tightening torque (terminal block's terminal screws)	0.5 to 0.8 [N·m]							–

●Performance specifications

Item		Specification			
		GT1665M-VTBA GT1665M-VTBD	GT1662-VNBA GT1662-VNBD	GT1655-VTBD	GT1665HS-VTBD
Display ※1	Type	TFT color LCD (high-brightness, wide viewing angle)	TFT color LCD	TFT color LCD (high-brightness, wide viewing angle)	
	Screen size	8.4"		5.7"	6.5"
	Resolution	VGA: 640 × 480 [dots]			
	Display size	171(W) × 128(H)[mm]		115(W) × 86(H)[mm]	132.5(W) × 99.4(H)[mm]
	No. of displayed characters	16-dot standard font: 40 chars. × 30 lines (2-byte) 12-dot standard font: 53 chars. × 40 lines (2-byte)			
	Display colors	65,536 colors	16 colors	65,536 colors	
	View angle※2	Right/left: 80°, Up: 80°, Down: 60°	Right/left: 45°, Up/Down: 20°	Up/down/right/left: 80°	Right/left: 80°, Up: 60°, Down: 80°
	Intensity	600 [cd/m²]	200 [cd/m²]	350 [cd/m²]	550 [cd/m²]
	Intensity adjustment	8-step adjustment	4-step adjustment	8-step adjustment	
	Life	Approx. 43,000 hours (operating ambient temperature: 25°C)	Approx. 52,000 hours (operating ambient temperature: 25°C)	Approx. 50,000 hours (operating ambient temperature: 25°C)	Approx. 41,000 hours (operating ambient temperature: 25°C)
Backlight		Cold-cathode fluorescent tube (replaceable), with backlight OFF detection function. Backlight off time and screen save time can be set.		LED (not replaceable), with backlight OFF detection function. Backlight off and screen save time can be set.	
	Life※3	Approx. 50,000 hours or more (Time for display intensity reaches 50% at operating ambient temperature of 25°C)	Approx. 40,000 hours or more	Approx. 70,000 hours or more	– –
Touch panel ※10	Type	Analog resistive type			
	Key size	Min. 2 × 2 [dots] (per key)			
	No. of simultaneous touch points	Simultaneous touch prohibited※4 (If two or more points are pressed simultaneously, the switch may function near the center of the pressed points.)			
	Life※11	1,000,000 times or more (operating force 0.98N or less)			
Human sensor	Detection distance	–			
	Detection range	–			
	Detection delay time	–			
	Detection temperature	–			
Memory ※5	C drive	15MB built-in flash memory (for saving project data and OS)	11MB built-in flash memory (for saving project data and OS)	15MB built-in flash memory (for saving project data and OS)	
	Life (No. of writings)	100,000 times			
Internal clock accuracy		3.47 to 8.38 secs/day (operating ambient temperature: 25°C)※12		-3.61 to 2.16 secs/day (operating ambient temperature: 25°C)※12	3.47 to 8.38 secs/day (operating ambient temperature: 25°C)※12
Battery		GT15-BAT type lithium battery		GT11-50BAT type lithium battery	GT15-BAT type lithium battery
	Backed up data	Clock data, maintenance time notification data, system log data and SRAM user area (500KB)			
	Life	Approx. 5 years (operating ambient temperature: 25°C)			
Built-in interface	RS-232※7	RS-232, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: D-sub 9-pin (male) Application: Communication with connected devices, connection to personal computer (project data read/write, OS installation, FA transparent function)			RS-232, RS-422/485, 1ch, each (When using, select one of the channels.) Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: Square, 42-pin (male) Application: Communication with connected devices
	RS-422/485	RS-422/485, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: 14-pin (female) Application: Communication with connected devices			
	Ethernet	Data transfer system: 100BASE-TX, 10BASE-T, 1ch Connector shape: RJ-45 (modular jack) Application: Communication with connected devices, gateway function, connection to personal computer (project data read/write, OS installation, FA transparent function, MES interface function)			Data transfer system: 100BASE-TX, 10BASE-T, 1ch Connector shape: Square, 42-pin (male) Application: Communication with connected devices, gateway function, connection to personal computer (project data read/write, OS installation, FA transparent function)
	USB	USB (full-speed 12Mbps), host 1ch Connector shape: TYPE-A Application: USB mouse/keyboard connection, USB memory data transfer and storage FAT16 format: max. 2GB, FAT32 format: max. 32GB※13			USB (full-speed 12Mbps), host 1ch Connector shape: TYPE-A Application: USB memory data transferand storage FAT16 format: max. 2GB, FAT32 format: max. 32GB※13
		USB (full-speed 12Mbps), device 1ch Connector shape: Mini-B Application: Connection to personal computer (project data read/write, OS installation, FA transparent function)			
	CF card	Compact flash slot, 1ch Connector shape: TYPE Ⅰ Application: Data transfer, data storage, GOT startup FAT16 format: max. 2GB, FAT32 format: max. 32GB※13			
	Optional function board	1ch for optional function board installation			–
	Extension unit※7	2ch for communication unit/optional unit installation		1ch for communication unit/optional unit installation	–
Buzzer output		Single tone (tone length adjustable)			
Protective construction		Front: IP67f※6 In panel: IP2X			IP65f※9 (when external connection cable is connected)
External dimensions		241(W) × 190(H) × 52(D)[mm]		267(W) × 135(H) × 60(D)[mm]	201(W) × 230(H) × 97(D)[mm]
Panel cut dimensions		227(W) × 176(H)[mm]		153(W) × 121(H)[mm]	–
Weight (excl. mounting brackets)		1.7[kg]	1.8[kg]	1.0[kg]	1.2[kg] (main unit only)
Applicable software packages		GT Works3 Version1.136S or later	GT Works3 Version1.136S or later (not supported by GT Works2/GT Designer2)		

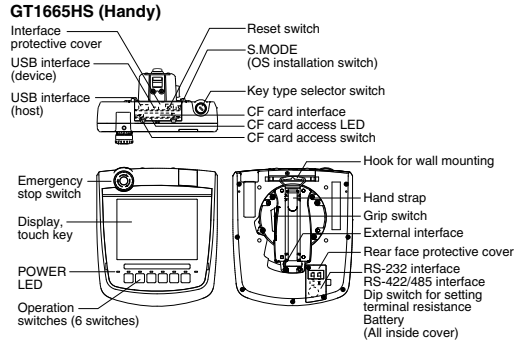
Components description

GT1695/GT1685/GT167□/GT166□/GT1655



※This illustration shows GT1695.

GT1665HS (Handy)



※1 On LCD panels, bright dots (permanently lit) and black dots (never lit) generally appear. Because the number of display elements that exist on an LCD panel is large, it is not possible to reduce appearance of the bright and black dots to zero. Individual differences in LCD panels may cause differences in color, uneven brightness and flickering. Note that this is a characteristic of LCD panels and it does not mean the products are defective or damaged.
※2 LCD panels have characteristics of tone reversal. Note that even within the indicated view angles, the screen display may not be clear enough depending on the display color.
※3 Using the GOT screen save/backlight OFF functions prevents screen burn-in and extends backlight life.
※4 An analog resistive touch display is used. When 2 points on the screen are touched simultaneously, if a switch is located the middle of the 2 points then the switch will be activated. Therefore, avoid touching 2 points on the screen simultaneously.
※5 The memory is ROM that permits overwriting of new data without having to delete the existing data.
※6 With the USB environmentally protective cover is on, pressing firmly the portion marked "△" makes it conform to IP67f. (The USB interface conforms to IP2X when a USB cable or a USB memory is connected.) However, this does not guarantee protection in all users' environments. The unit may not be used in an environment where it is exposed to splashing oil or chemicals for a long time or it is soaked with oil mist.
※7 Where more than one extension unit, barcode reader, and RFID controller are used, the sum of their current consumptions should be within the current level which the GOT can supply. For the currents which the extension units, barcode reader, and RFID controller consume and the current level which the GOT can supply, see "Notes for use" (GOT1000 Series Catalog).
※8 The function version A of GT1695/GT1685 is not compatible with 10BASE-T.
※9 The degree of protection is not guaranteed under all users' environmental conditions. If the interface protective cover or the rear face protective cover is removed, the specification does not apply.
※10 If necessary, use a stylus pen meeting the following specifications.
• Material: Polyacetal resin • Pen point radius: 0.8mm or more (The stylus pen cannot be used with the GT1665HS.)
※11 When using a stylus pen, it will be 100,000 times or more (operating force 0.98N max.). Since the touch panel is a consumable product structurally, it may not be used even fewer than above, depending on the usage method and environment.
※12 If the operating ambient temperature is other than 25°C, operation errors may increase.
※13 USB memory and CF cards that can store more than 2GB are available for the GT16 with the following versions of OSs installed.
• Boot OS version: 05.09.00AF or later
• Standard monitor OS version: 05.09.00 or later
With OSs earlier than the above versions, the GOT cannot correctly recognize the USB memory and the CF card that store more than 2GB.
If the above versions of OSs are not installed, install the OSs on the GOT by using GT Designer3 with version 1.17T or later. GT Designer2 version□ is not compatible with USB memory and CF cards that can store more than 2GB.
※14 88° in each direction for function version C or earlier.
※15 450 [cd/m²] for function version C or earlier.
※16 2.1 [kg] for function version C or earlier.

Specifications GOT1000 GT14 model

General specifications

Item		Specification				
Operating ambient temperature	Display	0°C to 50°C				
	Other than display	0°C to 55°C (horizontal installation), 0°C to 50°C (vertical installation)				
Storage ambient temperature		-20°C to 60°C				
Operating ambient humidity※1		10 to 90%RH, no condensation				
Storage ambient humidity※1		10 to 90%RH, no condensation				
Vibration resistance	Conforming to JIS B 3502 and IEC 61131-2		Frequency	Acceleration	Half amplitude	Sweep count
		Under intermittent vibration	5 to 8.4Hz	–	3.5mm	10 times each in X, Y and Z directions
			8.4 to 150Hz	9.8m/s²	–	
		Under continuous vibration	5 to 8.4Hz	–	1.75mm	–
			8.4 to 150Hz	4.9m/s²	–	
Impact resistance		Conforming to JIS B 3502 and IEC 61131-2 (147m/s², 3 times each in X, Y and Z directions)				
Operating atmosphere		Free from oil mist, corrosive gases, flammable gases and excessive conductive dusts or direct sun beams (The same applies to unit storage.)				
Operating altitude※2		2000m or less				
Installation location		In control panel				
Overvoltage category※3		Ⅱ or lower				
Contamination level※4		2 or less				
Cooling method		Self-cooling				
Grounding		Type D grounding (100Ω or less). Connect to panel if unable to ground.				

※1 Water bulb temperature for STN display type must be 39°C or lower.
※2 Do not operate or store the GOT unit in pressurized environments where the pressure exceeds 0m elevation atmospheric pressure, as this could result in abnormal operation. Do not pressurize inside the control panel for air purge cleaning. The pressure could raise the surface sheet, making the touch panel difficult to operate or causing the sheet to come off.
※3 Assuming that the device is connected at some point between a public power distribution network and local system equipment. Category Ⅱ applies to devices that are supplied with power from fixed equipment. The surge withstand voltage is 2500V for devices with ratings up to 300V.
※4 Index that indicates the level of foreign conductive matter in the operating environment of the device. Contamination level 2 denotes contamination by non-conductive matter only, though momentary conductivity may occur due to occasional condensation.

Do not use or store the GOT under direct sun light or in an environment with excessively high temperature, dust, humidity or vibration.

For inquiries relating to products which conform to UL, cUL, and CE directives and shipping directives, please contact your local sales office.

Performance specifications

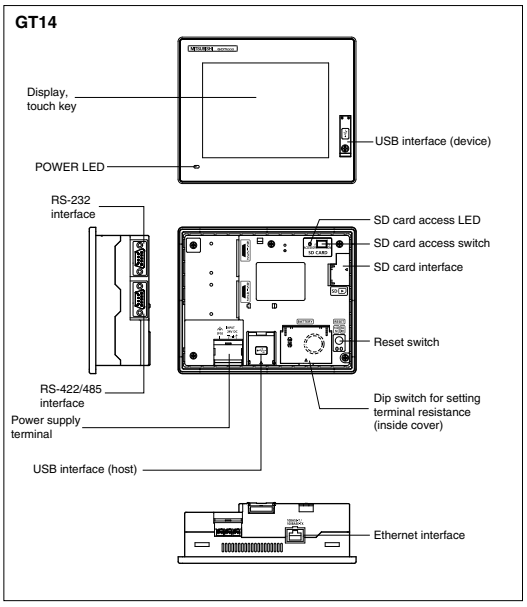
Item		Specification GT1455-QTBDE
Display※1	Type	TFT color LCD
	Screen size	5.7"
	Resolution	QVGA: 320 × 240 [dots]
	Display size	115(W) × 86(H) [mm] (in horizontal display mode)
	No. of displayed characters	16-dot standard font: 20 chars. × 15 lines (2-byte) (in horizontal display mode) 12-dot standard font: 26 chars. × 20 lines (2-byte) (in horizontal display mode)
	Display colors	65536 colors
	View angle※2	Right/left: 80°, Up: 80°, Down: 60° (in horizontal display mode)
	Contrast adjustment	–
	Intensity	400 [cd/m²]
	Intensity adjustment	8-step adjustment
	Life	Approx. 50,000 hours (Time for display contrast reaches 20% at operating ambient temperature of 25°C)
Backlight		LED (not replaceable) with backlight OFF detection function. Backlight off time and screen save time can be set.
	Life※3	Approx. 75,000 hours or more (Time for display intensity reaches 50% at operating ambient temperature of 25°C)
Touch panel	Type	Analog resistive type
	Key size	Min. 2 × 2 [dots] (per key)
	No. of simultaneous touch points	Simultaneous touch prohibited※4 (If two or more points are pressed simultaneously, the switch may function near the center of the pressed point.)
	Life	1,000,000 times or more (operating force 0.98N or less)
Memory	C drive※5	9MB built-in flash memory (for saving project data and OS)
	Life (No. of writings)	100,000 times
	D drive	512KB built-in SRAM (for battery backup)
Battery		GT11-50BAT type lithium battery
	Backed up data	Clock data, alarm history, recipe data, time action set values, advanced alarm, advanced recipe, logging, hardcopy, SRAM user area
	Life	Approx. 5 years (operating ambient temperature: 25°C)
Built-in interface	RS-422/485	RS-422/485, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: D-sub 9-pin (female) Application: Communication with connected devices Terminal resistance※6: OPEN/110Ω/330Ω (switching by terminal resistance transfer switch)
	RS-232	RS-232, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: D-sub 9-pin (male) Application: Communication with connected devices, connection to barcode reader/RFID, connection to personal computer (project data read/write, OS installation, FA transparent function)
	Ethernet	Data transfer system: 100BASE-TX, 10BASE-T, 1ch Connector shape: RJ-45 (modular jack) Application: Communication with connected devices, gateway function, connection to personal computer (project data read/write, OS installation, FA transparent function)
	USB	USB (full-speed 12Mbps), host 1ch Connector shape: TYPE-A Application: USB mouse/keyboard connection, USB memory data transfer and storage FAT16 format: max. 2GB, FAT32 format: max. 32GB
		USB (full-speed 12Mbps), device 1ch Connector shape: Mini-B Application: Connection to personal computer (project data read/write, OS installation, FA transparent function)
	SD card	Complied with SD standard, 1ch, Supported memory card: SDHC memory card, SD memory card Application: project data read/write, OS installation, logging data storage FAT16 format: max. 2GB, FAT32 format: max. 32GB
Buzzer output		Single tone (tone length adjustable)
Protective construction		Front: IP67f※7
External dimensions		164(W) × 135(H) × 55(D) [mm]
Panel cut dimensions		153(W) × 121(H) [mm]
Weight (excl. mounting brackets)		0.7kg
Applicable software packages		GT Works3 Version1.136S or later (not supported by GT Works2/GT Designer2)

※1 On LCD panels, bright dots (permanently lit) and black dots (never lit) generally appear. Because the number of display elements that exist on an LCD panel is large, it is not possible to reduce appearance of the bright and black dots to zero. Flickering may occur depending on the display colors.
Note that the existence of bright and black dots is a standard characteristic of LCD panels, and it does not mean that the products are defective or damaged.
Displaying one single screen for a long time can lead to burn-in, causing afterimages or image irregularities that could not disappear. Use the screen saver that is effective to prevent burn-in.
※2 LCD panels have characteristics of tone reversal. Note that even within the indicated view angles, the screen display may not be clear enough depending on the display color.
※3 Using the GOT screen save/backlight OFF functions prevents screen burn-in and extends the backlight life.
※4 An analog resistive touch display is used. When 2 points on the screen are touched simultaneously, if a switch is located the middle of the 2 points then the switch will be activated. Therefore, avoid touching 2 points on the screen simultaneously.
※5 The memory is ROM that permits overwriting of new data without having to delete the existing data.
※6 In the case of GOT multi-drop connection, set the terminal resistance transfer switch on the GOT main unit according to the connection configuration.
※7 This does not guarantee protection in all users' environments. The specification is not applied when the interface protective cover and rear face protective cover are removed. The unit may not be used in an environment where it is exposed to splashing oil or chemicals for a long time or soaked with oil mist.

Power supply specifications

Item	GT1455-QTBDE
Input power supply voltage	24VDC (+10%, -15%), ripple voltage of 200mV or less
Input frequency	–
Input maximum apparent power	–
Fuse (built-in, not replaceable)	1.6A
Power consumption	8.40W or less (350mA/24VDC)
With backlight off	7.44W or less (310mA/24VDC)
Inrush current	30A or less (2ms, at max. load)
Permissible instantaneous failure time	Within 5ms
Noise resistance	Noise voltage 1000Vp-p, noise width 1μs by noise simulator with noise frequency 30 to 100Hz
Withstand voltage	500VAC for 1 minute between power supply terminal and ground
Insulation resistance	10MΩ or higher with an insulation resistance tester (500VDC between power supply terminal and ground)
Applicable wire size	0.75 to 2 [mm²]
Clamp terminal	Clamp terminals for M3 screw RAV1.25-3, V2-N3A, FV2-N3A
Tightening torque (terminal block's terminal screws)	0.5 to 0.8 [N·m]

Components description



Specifications GOT1000 GT10 model

Power supply specifications

Item	Specification	
	GT1055-QSBD	GT1050-QBBD
Input power supply voltage	24VDC (+10%, -15%), ripple voltage of 200mV or less	
Input frequency	–	
Input maximum apparent power	–	
Power consumption	9.84W or less (410mA/24VDC)	9.36W or less (390mA/24VDC)
With backlight off	4.32W or less (180mA/24VDC)	
Inrush current	15A or less (26.4V) 2ms	
Permissible instantaneous failure time	Within 5ms	
Noise resistance	Noise voltage 1000Vp-p, noise width 1µs by noise simulator with noise frequency 30 to 100Hz	
Withstand voltage	500VAC for 1 minute between power supply terminal and ground	
Insulation resistance	10MΩ or higher with an insulation resistance tester (500VDC between power supply terminal and ground)	
Applicable wire size	0.75 to 2 [mm^2]	
Clamp terminal	Clamp terminals for M3 screw RAV1.25-3, V2-N3A, FV2-N3A	
Tightening torque (terminal block's terminal screws)	0.5 to 0.8 [N·m]	

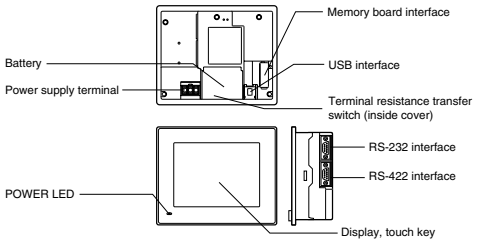
Performance specifications

Item		Specification	
		GT1055-QSBD	GT1050-QBBD
Display*1	Type	STN color LCD	STN monochrome (blue/white) LCD
	Screen size	5.7"	
	Resolution	QVGA: 320 × 240 [dots]	
	Display size	115(W) × 86(H) [mm] (in horizontal display mode)	
	No. of displayed characters	16-dot standard font: 20 chars. × 15 lines (2-byte), 12-dot standard font: 26 chars. × 20 lines (2-byte) (in horizontal display mode)	
	Display colors	256 colors	Monochrome (blue/white) 16 gray scale
	View angle	Right/left: 55°, Up: 65°, Down: 70° (in horizontal display mode)	Right/left: 45°, Up: 20°, Down: 40° (in horizontal display mode)
	Contrast adjustment	16-step adjustment	
	Intensity	380 [cd/m^2]	260 [cd/m^2]
	Life	Approx. 50,000 hours (Time for display contrast reaches 20% at operating ambient temperature of 25°C)	
Backlight		Cold-cathode fluorescent tube (not replaceable) with backlight OFF detection function. Backlight off time and screen save time can be set.	
	Life*2	Approx. 75,000 hours or more	Approx. 54,000 hours or more
		(Time for display intensity reaches 50% at operating ambient temperature of 25°C)	
Touch panel	Type	Matrix resistive type	
	No. of touch keys	Max. 50 keys/screen	
	Key size	Min. 16 × 16 [dots] (per key)	
	No. of simultaneous touch points	Max. 2 points	
	Life	1,000,000 times or more (operating force 0.98N or less)	
Memory	User memory*3	Built-in flash memory for saving project data (3 MB or less) and OS	
	Life (No. of writings)	100,000 times	
Battery		GT11-50BAT type lithium battery	
	Backed up data	Clock data, alarm history, recipe data, time action set values	
	Life	Replacement guideline approx. 5 years (operating ambient temperature: 25°C)	
Built-in interface	RS-422/485	RS-422/485, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: D-sub 9-pin (female) Application: Communication with PLCs Terminal resistance*5: OPEN/110Ω/330Ω (switched by terminal resistance transfer switch)	
	RS-232	RS-232, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: D-sub 9-pin (male) Application: Communication with PLCs, connection with barcode readers, communication with personal computers (project data read/write, OS installation, transparent function)	
	USB	USB (full-speed 12Mbps), device 1ch Connector shape: Mini-B Application: Communication with personal computer (project data read/write, OS installation, transparent function)	
	Memory board	For installing memory board (GT10-50FMB) 1ch	
Buzzer output		Single tone (tone length adjustable/none)	
Protective construction*4		Conforming to IP67f (front panel)	
External dimensions		164(W) × 135(H) × 56(D)[mm]	
Panel cut dimensions		153(W) × 121(H)[mm]	
Weight (excl. mounting brackets)		0.7[kg]	
Applicable software package		GT Works3 Version1.136S or later	

*1 On LCD panels, bright dots (permanently lit) and black dots (never lit) generally appear.
Because the number of display elements that exist on an LCD panel is large, it is not possible to reduce appearance of the bright and black dots to zero.
Flickering may occur depending on the display colors.
Note that the existence of bright and black dots is a standard characteristic of LCD panels, and it does not mean that the products are defective or damaged.
Displaying one single screen for a long time can lead to burn-in, causing afterimages or image irregularities that could not disappear. Use the screen saver that is effective to prevent burn-in.
*2 Using the GOT screen save/backlight OFF functions prevents screen burn-in and extends the backlight life.
*3 The memory is ROM that permits overwriting of new data without having to delete the existing data.
*4 This does not guarantee protection in all users' environments. The specification is not applied when the interface protective cover and rear face protective cover are removed. The unit may not be used in an environment where it is exposed to splashing oil or chemicals for a long time or it is soaked with oil mist.
*5 In the case of GOT multi-drop connection, set the terminal resistance transfer switch on the GOT main unit according to the connection configuration.

Components description

GT105□



●Power supply specifications

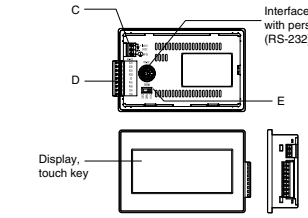
Item		Specification	
		GT1030-HBD GT1030-HBDW GT1030-HWD GT1030-HWDW GT1030-HBD2 GT1030-HBDW2 GT1030-HWD2 GT1030-HWDW2	GT1030-HBL GT1020-LBL GT1030-HWL GT1020-LWL GT1030-HBLW GT1020-LBLW GT1030-HWLW GT1020-LWLW
Input power supply voltage		24VDC (+10%, -15%), ripple voltage of 200mV or less	5VDC (±5%), supplied from PLC communication cable
Input frequency		–	
Input maximum apparent power		–	
Power consumption		2.2W or less (90mA/24VDC)	1.1W or less (220mA/5VDC)
	With backlight off	1.7W or less (70mA/24VDC)	0.6W or less (120mA/5VDC)
Inrush current		18A or less (26.4DCV) 1ms	–
Permissible instantaneous failure time		Within 5ms	–
Noise resistance		Noise voltage 1000Vp-p, noise width 1µs by noise simulator with noise frequency 30 to 100Hz	
Withstand voltage		500VAC for 1 minute between power supply terminal and ground	–
Insulation resistance		10MΩ or higher with an insulation resistance tester (500VDC between power supply terminal and ground)	–
Applicable wire size	Single-wire installation	0.14 to 1.5mm², AWG26 to AWG16 (single wire), 0.14 to 1.0mm², AWG26 to AWG16 (stranded wire), 0.25 to 0.5mm², AWG24 to AWG20 (bar terminal with insulation sleeve)	
	Two-wire installation	0.14 to 0.5mm², AWG26 to AWG20 (single wire), 0.14 to 0.2mm², AWG26 to AWG24 (stranded wire)	
Clamp terminal		AI2.5-6BU, AI0.34-6TQ, AI0.5-6WH (made by Phoenix Contact)	
Tightening torque (terminal block's terminal screws)		0.22 to 0.25 [N·m]	

Do not use or store the GOT under direct sun light or in an environment with excessively high temperature, dust, humidity or vibration.

For inquiries relating to products which conform to UL, cUL, and CE directives and shipping directives, please contact your local sales office.

Components description

GT1030



	GT1030-HBD GT1030-HWD GT1030-HBDW GT1030-HWDW	GT1030-HBL GT1030-HWL GT1030-HBLW GT1030-HWLW	GT1030-HBD2 GT1030-HWD2 GT1030-HBDW2 GT1030-HWDW2
C	Power supply terminal	–	Power supply terminal
D	RS-422 interface	RS-422 interface, Power supply terminal	RS-232 interface
E	Terminal resistance transfer switch	–	–

●Performance specifications

Item		Specification			
		GT1030-HBD GT1030-HWD GT1030-HBL GT1030-HWL	GT1030-HBDW GT1030-HWDW GT1030-HBLW GT1030-HWLW	GT1030-HBD2 GT1030-HWD2	GT1030-HBDW2 GT1030-HWDW2
Display*1	Type	STN monochrome (black/white) LCD			
	Screen size	4.5"			
	Resolution	288 × 96 [dots] (in horizontal mode)			
	Display size	109.42(W) × 35.98(H)[mm](in horizontal mode)			
	No. of displayed characters	16-dot standard font: 36 chars. × 6 lines (1-byte) or 18 chars. × 6 lines (2-byte) (in horizontal mode) 12-dot standard font: 48 chars. × 8 lines (1-byte) or 24 chars. × 8 lines (2-byte) (in horizontal mode)			
	Display colors	Monochrome (black/white)			
	View angle	Right/left: 30°, Up: 20°, Down: 30°(in horizontal display mode)			
	Contrast adjustment	16-step adjustment			
	Intensity	200 [cd/m²] (in green)	500 [cd/m²] (in white)	200 [cd/m²] (in green)	500 [cd/m²] (in white)
	Intensity adjustment	8-step adjustment			
	Life	Approx. 50,000 hours (Time for display contrast reaches 20% at operating ambient temperature of 25°C)			
Backlight	Color	3-color LED (green, orange and red) (no need to replace)	3-color LED (white, pink and red) (no need to replace)	3-color LED (green, orange and red) (no need to replace)	3-color LED (white, pink and red) (no need to replace)
	Function	Status control (color, on/flashing/off) is available and screen save time setting can be set. PLC can control color and status of backlight based on system information.			
Touch panel	Type	Matrix resistive type			
	No. of touch keys	Max. 50 keys/screen			
	Key size	Min. 16 × 16 [dots] (per key)			
	No. of simultaneous touch points	Max. 2 points			
	Life	1,000,000 times or more (operating force 0.98N or less)			
Memory	User memory*2	Built-in flash memory for saving project data (1.5MB or less) and OS			
	Life (No. of writings)	100,000 times			
Battery		GT11-50BAT type lithium battery			
	Backed up data	Clock data, alarm history, recipe data, time action set values			
	Life	Replacement guideline approx. 5 years (operating ambient temperature: 25°C)			
Built-in interface	For communication with PLC	GT1030-HBD/HWD, GT1030-HBDW/HWDW RS-422/485, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: Connecter terminal block, 9-pin Application: Communication with PLC Terminal resistance*3: OPEN/110Ω/330Ω (switched by terminal resistance transfer switch)		RS-232, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: Connecter terminal block, 9-pin Application: Communication with PLC	
		GT1030-HBL/HWL, GT1030-HBLW/HWLW RS-422, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: Connector terminal block, 9-pin Application: Communication with PLC			
	For communication with personal computer	RS-232, 1ch Transmission speed: 115200/57600/38400/19200/9600/4800bps Connector shape: Mini DIN 6-pin (female) Application: Communication with personal computer (project data read/write, OS installation, transparent function)			
Buzzer output		Single tone (tone length adjustable/none)			
Protective construction*4		Conforming to IP67f (front panel)			
External dimensions		145(W) × 76(H) × 29.5(D)[mm]			
Panel cut dimensions		137(W) × 66(H)[mm]			
Weight		GT1030-H□D(W): 0.3kg (excl. mounting brackets)		0.3kg (excl. mounting brackets)	
		GT1030-H□L(W): 0.28kg (excl. mounting brackets)			
Applicable software packages		GT Works3 Version1.54G or later (not supported GT Works2/GT Designer 2)			

*1 On LCD panels, bright dots (permanently lit) and black dots (never lit) generally appear.
Because the number of display elements that exist on an LCD panel is large, it is not possible to reduce appearance of the bright and black dots to zero.
Flickering may occur depending on the display colors.
Note that the existence of bright and black dots is a standard characteristic of LCD panels, and it does not mean that the products are defective or damaged.
Displaying one single screen for a long time can lead to burn-in, causing afterimages or image irregularities that could not disappear. Use the screen saver that is effective to prevent burn-in.

*2 The memory is ROM that permits overwriting of new data without having to delete the existing data.

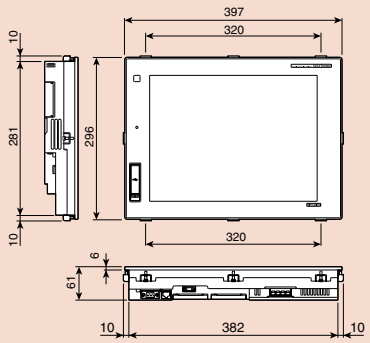
*3 In the case of GOT multi-drop connection, set the terminal resistance transfer switch on the GOT main unit according to the connection configuration.

*4 This does not guarantee protection in all users' environments. The specification is not applied when the interface protective cover and rear face protective cover are removed.
The unit may not be used in an environment where it is exposed to splashing oil or chemicals for a long time or it is soaked with oil mist.

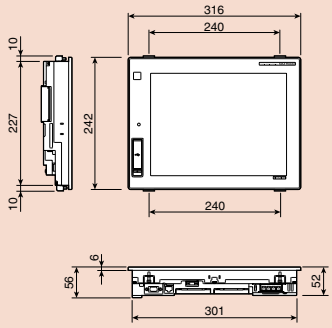
External dimensions

(Unit: mm)

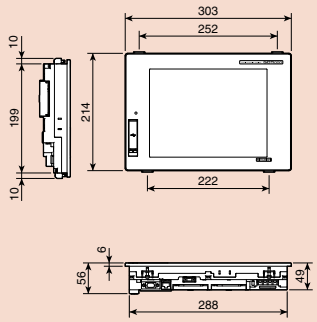
GT1695



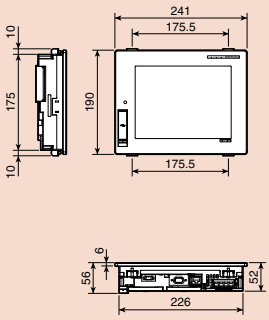
GT1685



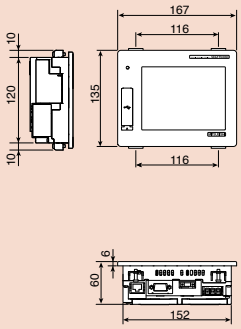
GT167□



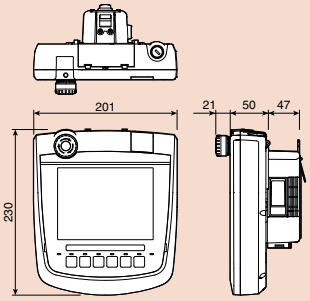
GT166□



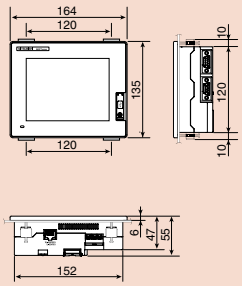
GT1655



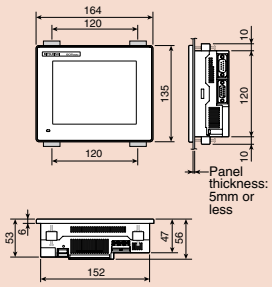
GT16 Handy



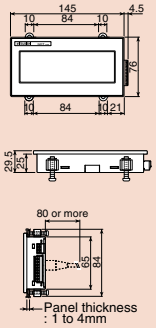
GT145□



GT105□



GT1030



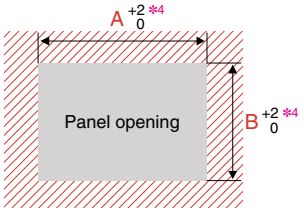
Panel cut dimensions

When the GOT is installed

(Unit: mm)

Screen size	Type of GOT main unit	A	B
15"	GT1695	383.5	282.5
12.1"	GT1685*1	302	228
10.4"	GT167□*2	289	200
8.4"	GT166□	227	176
5.7"	GT1655*3	153	121
	GT105□*3		
4.5"	GT1030	137	66

*1 Same dimensions as A985GOT(-V)
*2 Same dimensions as A975/970GOT(-B)
*3 Same dimensions as F940GOT
*4 For the GT1030, the tolerances are +1/0.



When the CF card extension unit (mounting unit on control panel) is installed

Type	A	B
GT15-CFEX-C08SET	94.0	33.0

Cautions when installing and uninstalling
When installing the CF card extension unit on the control panel, make sure that the extension unit does not interfere with the extension unit cable or the CF card interface of the GOT. Place the CF card extension unit at a distance of 25mm or more from the GOT.
For installation locations, see the GT16 User's Manual (Hardware).

For compatibility with GOT900 series, see "Backward compatibility" (GOT1000 Series Catalog).

Product installation spacing

The GOT must have the clearances from other devices as shown in [Fig. A]. The GOT may require more distance than the dimensions shown in the table depending on the types of connection cables. Consider the connector dimensions and cable bending radius when designing the installation.

GT16

(Unit: mm)

	Item	GT1695	GT1685	GT167□	GT166□	GT1655
A	GOT only	50 or more (20 or more)		50 or more (26 or more)	50 or more (36 or more)	61 or more
	When a bus connection unit is installed	50 or more (20 or more)		50 or more (26 or more)	50 or more (36 or more)	50 or more
	When a serial communication unit is installed	50 or more (20 or more)		50 or more (26 or more)	50 or more (36 or more)	49 or more
	When a RS-422 conversion unit is installed	50 or more	51 or more	63 or more	73 or more	–
	When an Ethernet communication unit is installed	–				
	When the CC-Link communication unit (GT15-J61BT13) is installed	50 or more (20 or more)				50 or more (24 or more)
	When a MELSECNET/H communication unit (coaxial) is installed	50 or more (20 or more)	50 or more (24 or more)	50 or more (33 or more)	50 or more	64 or more
	When a MELSECNET/H communication unit (optical) is installed	50 or more (20 or more)*1				79 or more*1
	When a CC-link IE Controller Network communication unit is installed	50 or more (20 or more)				57 or more
	When a CC-Link IE Field Network communication unit is installed	50 or more (20 or more)				57 or more
	When a printer unit is installed	50 or more (20 or more)		50 or more (26 or more)	50 or more (36 or more)	50 or more (29 or more)
	When a multimedia unit is installed	50 or more (20 or more)*2				–
	When a video input unit is installed	50 or more (20 or more)*2				–
	When a RGB input unit is installed	50 or more (20 or more)*3				–
	When a video/RGB input unit is installed	50 or more (20 or more)*2 *3				–
	When a RGB output unit is installed	50 or more (20 or more)*3				–
	When a CF card unit is installed	50 or more (20 or more)		50 or more (26 or more)	50 or more (36 or more)	50 or more (20 or more)
	When a CF card extension unit is installed	50 or more (20 or more)		50 or more (26 or more)	50 or more (36 or more)	50 or more
	When an audio output unit is installed	50 or more (20 or more)		50 or more (26 or more)	50 or more (36 or more)	50 or more
	When an external input/output unit is installed	50 or more (20 or more)		50 or more (26 or more)	50 or more (36 or more)	50 or more
B		80 or more (20 or more)				
C	(When a CF card is not used)	50 or more (20 or more)				50 or more (20 or more)*4
	(When a CF card is used)	50 or more (20 or more)				100 or more
D		50 or more (20 or more)				
E		100 or more (20 or more)				

*1 The distance varies depending on the cable to be used. For details, consult your local sales office.
The values in the table are given for your reference only and may not reflect actual conditions.
*2 The distances required when the coaxial cable 3C-2V (JIS C 3501) is used.
*3 The distance varies depending on the cable used. When the bending radius of the cable is larger than the indicated value, leave enough space appropriate for the bending radius.
*4 When using a battery, the required dimension is greater than when using a CF card.

GT14

(Unit: mm)

GOT main unit	A, D	B	C	E
GT1455	50 or more*3 (20 or more)	80 or more*1 (20 or more)	50 or more*2 (20 or more)	100 or more*4 (20 or more)
GT1450				

*1 50 or more (20 or more) in the case of vertical installation
*2 80 or more (20 or more) in the case of vertical installation
*3 The distance varies depending on the Ethernet cable used. When the bending radius of the Ethernet cable is larger than the indicated value, leave enough space appropriate for the bending radius.
*4 When using a USB memory or SD card, allow space for removal and mounting when installing.

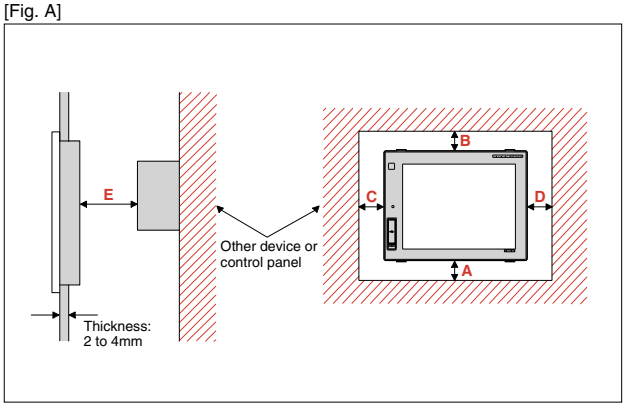
GT10

(Unit: mm)

GOT main unit	A	B	C	D	E
GT105□	50 or more (20 or more)	80 or more (20 or more)	50 or more (20 or more)	50 or more (20 or more)	100 or more (20 or more*3)
GT1030	50 or more (20 or more*1)	50 or more (20 or more)	50 or more (20 or more)	50 or more	80 or more (20 or more*2)

*1 50 or more when a RS-232/USB conversion adapter is used.
*2 80 or more when a personal computer connection cable is used or when a personal computer RS-232 interface is used for connecting multiple GOTs.
50 or more when a RS-232 interface is used for using an RS-232/USB conversion adapter.
*3 80 or more when using a USB cable or a memory board.

[Fig. A]



●Dimensions shown in parentheses apply when there are no devices nearby (contactor, etc.) which produce radiated noise or heat. Even with these dimensions, however, the ambient temperature must never exceed 55°C.
Depending on the unit and cable being used, a cable length longer than dimension A (or dimension D for the GT10) in above [Fig. A] may be required.

Function list

GT16 GT14 GT SoftGOT

Category	Function*1	Optional function board *2	Extended/optional function OS installation *2	Other necessary devices *3	Model: GT16 GT1695M-XTB□ XGA 15"	GT1685M-STB□ SVGA 12.1"	GT1675M-STB□ SVGA 10.4"	GT1675M-VTB□ VGA 10.4"	GT167□-VNB□ VGA 10.4"	GT1665M-STB□ SVGA 8.4"	GT1665M-VTB□ VGA 8.4"	GT1662-VNB□ VGA 8.4"	GT1655-VTBD VGA 5.7"	GT1665 HS-VTBD VGA*4 6.5"
Connection configuration	Mitsubishi PLC bus connection				●	●	●	●	●	●	●	●	●	—
	Mitsubishi PLC CPU direct connection				●	●	●	●	●	●	●	●	●	●
	Mitsubishi PLC computer link connection				●	●	●	●	●	●	●	●	●	●
	Mitsubishi PLC MELSECNET/H connection				●	●	●	●	●	●	●	●	●	—
	Mitsubishi PLC MELSECNET/10 connection				●	●	●	●	●	●	●	●	●	—
	Mitsubishi PLC CC-Link IE Controller Network connection				●	●	●	●	●	●	●	●	●	—
	Mitsubishi PLC CC-Link IE Field Network connection				●	●	●	●	●	●	●	●	●	—
	Mitsubishi PLC CC-Link connection (ID station/via G4)				●	●	●	●	●	●	●	●	●	● Via G4 only
	Mitsubishi PLC Ethernet connection			*10	●	●	●	●	●	●	●	●	●	●
	Third party PLC connection				●	●	●	●	●	●	●	●	●	●
	Microcomputer connection				●	●	●	●	●	●	●	●	●	●
	MODBUS®/RTU connection				●	●	●	●	●	●	●	●	●	●
	MODBUS®/TCP connection				●	●	●	●	●	●	●	●	●	●
	Temperature controller connection				●	●	●	●	●	●	●	●	●	●
	Inverter connection				●	●	●	●	●	●	●	●	●	●
	Servo amplifier connection				●	●	●	●	●	●	●	●	●	●
	CNC connection				●	●	●	●	●	●	●	●	●	●
	Robot controller connection				●	●	●	●	●	●	●	●	●	●
	GOT multi-drop connection			*10	●	●	●	●	●	●	●	●	●	●
	Multiple-GT14, GT12, GT11, GT10 connection*14				—	—	—	—	—	—	—	—	—	—
Hardware specifications — Memory	Standard memory capacity				15MB	15MB	15MB	15MB	11MB	15MB	15MB	11MB	15MB	15MB
	Total memory capacity when using optional memory (standard + optional)	Required*2 (GT15 only)		Memory card	Up to 57MB	Up to 57MB	Up to 57MB	Up to 57MB	Up to 53MB	Up to 57MB	Up to 57MB	Up to 53MB	Up to 57MB	Up to 57MB
Display colors	65,536 colors				●	●	●	●	—	●	●	—	●	●
	4,096 colors				—	—	—	—	● GT1675-VNB□ only	—	—	—	—	—
	256 colors				—	—	—	—	—	—	—	—	—	—
	16 colors				—	—	—	—	● GT1672-VNB□ only	—	—	●	—	—
	Monochrome (black/white) 16 gray scales				—	—	—	—	—	—	—	—	—	—
	Monochrome (black/white) 2 colors				—	—	—	—	—	—	—	—	—	—
	Monochrome (blue/white) 16 gray scales				—	—	—	—	—	—	—	—	—	—
Resolution	1920 × 1200 dots (WUXGA) (max. at specified resolution)				—	—	—	—	—	—	—	—	—	—
	1600 × 1200 dots (UXGA)				—	—	—	—	—	—	—	—	—	—
	1280 × 1024 dots (SXGA)				—	—	—	—	—	—	—	—	—	—
	1024 × 768 dots (XGA)				●	—	—	—	—	—	—	—	—	—
	800 × 600 dots (SVGA)				—	●	●	—	—	●	—	—	—	—
	640 × 480 dots (VGA)				—	—	—	●	●	—	●	●	●	●
	320 × 240 dots (QVGA)				—	—	—	—	—	—	—	—	—	—
	288 × 96 dots				—	—	—	—	—	—	—	—	—	—
	160 × 64 dots				—	—	—	—	—	—	—	—	—	—
Built-in interface	RS-232 interface				●	●	●	●	●	●	●	●	●	●
	RS-422 interface				*5	*5	*5	*5	*5	*5	*5	*5	—	—
	RS-422/232 interface				—	—	—	—	—	—	—	—	—	—
	RS-422/485 interface				●	●	●	●	●	●	●	●	●	●
	Bus interface				—	—	—	—	—	—	—	—	—	—
	Ethernet interface				●	●	●	●	●	●	●	●	●	●
	USB interface — USB host				●	●	●	●	●	●	●	●	●	●
	USB interface — USB device				●	●	●	●	●	●	●	●	●	●
	CF card interface				●	●	●	●	●	●	●	●	●	●
	SD card interface				—	—	—	—	—	—	—	—	—	—
	Optional function board interface				●	●	●	●	●	●	●	●	●	—
	Extension interface				● 2ch	● 2ch	● 2ch	● 2ch	● 2ch	● 2ch	● 2ch	● 2ch	● 1ch	—
	Multimedia & Video/RGB interface				●	●	●	●	—	●	●	—	—	—
	Video/RGB interface				—	—	—	—	—	—	—	—	—	—
Others	Vertical display				—	—	—	—	—	—	—	—	—	—
	Clock function			(Battery)	●	●	●	●	●	●	●	●	●	●
	Buzzer output				●	●	●	●	●	●	●	●	●	●
	Human sensor				●	●	—	—	—	—	—	—	—	—
	Printer		Required	(Printer unit)	●	●	●	●	●	●	●	●	●	—
	Memory card unit (Memory card extension unit)			Memory card unit/ Memory card extension unit	●	●	●	●	●	●	●	●	●	—
	Sound output		Required	Sound output unit	●	●	●	●	●	●	●	●	●	—
	External input/output		Required	External input/output unit	●	●	●	●	●	●	●	●	●	—
	Video input / RGB input / RGB output		Required	Video/RGB unit	●	●	●	●	—	●	●	—	—	—
	USB mouse/keyboard connection		Required		●	●	●	●	●	●	●	●	●	—
	Backlight OFF detection function				●	●	●	●	●	●	●	●	●	●
Main unit functions	Start from memory card	Required*2 (GT15 only)		Memory card	●	●	●	●	●	●	●	●	●	●
	Project data read/write			(Memory card/USB memory <GT16/GT14 only>)	●	●	●	●	●	●	●	●	●	●
	Resource data read				●	●	●	●	●	●	●	●	●	●
	FA transparent function				●	●	●	●	●	●	●	●	●	● *6
	Multi-channel function	Required*2 (GT15 only)			● Up to 4ch	● Up to 4ch	● Up to 4ch	● Up to 4ch	● Up to 4ch	● Up to 4ch	● Up to 4ch	● Up to 4ch	● Up to 4ch	● Up to 4ch
	Gateway function		Required	(Memory card/USB memory <GT16/GT14 only>)	●	●	●	●	●	●	●	●	●	●
	MES interface function	Required*2	Required	(Memory card)	●	●	●	●	●	●	●	●	●	—
	SoftGOT-GOT link function		Required		●	●	●	●	●	●	●	●	●	●
	File transfer function (FTP client)		Required	Memory card/USB memory <GT16/GT14 only>	●	●	●	●	●	●	●	●	●	●

*1 The function details, such as the number of settings and the data storage destination, vary depending on the model.
*2 An optional function board is required to use the functions that are indicated as "Required" in the "Optional function board" column. Some other optional functions may require the optional function board depending on the GOT function version and hardware version.
The extension/optional function OS must be installed to use the functions that are indicated as "Required" in the "Extended/optional function OS installation" column. A memory card or optional function board may be required when the extension/optional function OS is installed.
Check the size of the data stored in the GOT. For more details, see "Optional function board, memory card (CF card, SD card), and USB memory selection <GT16/GT15/GT14/GT12/GT11> (GOT1000 Series Catalog).
The GT14 and GT12 do not require the optional function board. The GT10 and GT SoftGOT1000 do not require the optional function board or installation of the extension/optional function OS.
*3 Necessary optional units, memory cards, and USB memory devices other than the optional function board are shown. Parenthesized devices will be required depending on conditions of use. For details, see "Notes for use" (GOT1000 Series Catalog).
*4 For details, see "GT10", "Handy GOT" and "GT SoftGOT1000" (GOT1000 Series Catalog).

	GT14		GT10			Model	
						GT10※4	
	GT145□-Q□BDE QVGA 5.7"	GT SoftGOT1000 Version3※4	Optional function board※2	Extended/optional function OS installation※2	Other necessary devices※3	GT105□-Q□BD QVGA 5.7"	GT1030-HB□(W)(2) 4.5"
	—	—				—	—
	●	●				●	●
	●	●				●	●
	—	●				—	—
	—	●				—	—
	—	●				—	—
	—	●				—	—
	● Via G4 only	—				● Via G4 only	● Via G4 only
	●	●				—	—
	●	●				●	●
	●	—				●	●
	●	—				●	●
	●	●				—	—
	●	—				—	—
	●	—				●	●
	●	—				●	●
	●	●				—	—
	●	●				—	—
	●	—			※10	●	●
	●	—				●	●
	9MB	57MB				3MB	1.5MB
	—	—				—	—
	● GT1455 ony	●				—	—
	—	—				—	—
	—	—				● GT1055-QSBD only	—
	—	—				—	—
	● GT1450 only	—				—	—
	—	—				—	●
	—	—				● GT1050-QBBD only	—
	—	●				—	—
	—	●				—	—
	—	●				—	—
	—	●				—	—
	—	●				—	—
	—	●				—	—
	●	—				●	—
	—	—				—	●
	—	—				—	—
	●	—				●	●
	—	—				—	—
	—	—				—	—
	●	—				●※11	●※11 GT1030-HB□(W) only
	—	—				—	—
	●	—				—	—
	●	—				—	—
	●	—				●	—
	—	—				—	—
	●	—				—	—
	—	—				—	—
	—	—				—	—
	—	—				—	—
	—	—				—	—
	●	—				●	●
	●	●				●	●
	●	●				●	●
	—	—				—	—
	●	●				●	●
	—	—				—	—
	—	●				—	—
	—	—				—	—
	—	—				—	—
	●	—				—	—
	●	—				●	—
	●	—				—	—
	●	●			(Memory card)	●	●
	●	●			(Memory card)	●	●
	●	—				●	●
	● Up to 2ch	—				—	—
	●	—				—	—
	—	—				—	—
	—	●					
	●	—				—	—

※5 The RS-232 interface can be used as an RS-422 interface by connecting an RS-422 conversion unit.
※6 Structural restrictions are applied.
※7 Only user alarms can be used.
※8 To use the historical data list display and the historical trend graph, it is necessary to specify the logging function in advance. In addition, it is necessary to install the optional function OS (logging).
※9 Read from the PLC clock.
※10 Different connection configurations may require different communication units. For details, see the GOT1000 Series Handbook and the GOT1000 Series Connection Manual.
※11 For the compatible hardware versions, please contact your local sales office.
※12 Only CPU direct connection and Ethernet connection are supported.
※13 Only the FTP server function is supported.
※14 When GT14, GT12, GT11 and GT10 are intermingled, the multiple connection function is not supported.

Function list

GT16 GT14 GT SoftGOT

Category		Function※1	Optional function board※2	Extended/optional function OS installation※2	Other necessary devices※3	Model: GT16									
						GT1695M-XTB□ XGA 15"	GT1685M-STB□ SVGA 12.1"	GT1675M-STB□ SVGA 10.4"	GT1675M-VTB□ VGA 10.4"	GT167□-VNB□ VGA 10.4"	GT1665M-STB□ SVGA 8.4"	GT1665M-VTB□ VGA 8.4"	GT1662-VNB□ VGA 8.4"	GT1655-VTBD VGA 5.7"	GT1665HS-VTBD VGA※4 6.5"
Screen design	Specifications	Base screen, window screen				●	●	●	●	●	●	●	●	●	●
		Dialog window display				●	●	●	●	●	●	●	●	●	●
		Graphic drawing: BMP image display				●	●	●	●	●	●	●	●	●	●
		Graphic drawing: JPEG image display				●	●	●	●	●	●	●	●	●	●
		Graphic drawing: DXF data				●	●	●	●	●	●	●	●	●	●
		Graphic drawing: IGES data				●	●	●	●	●	●	●	●	●	●
		Standard fonts (basic): (Japanese, Japanese (supporting European languages), Chinese (Simplified), Chinese (Simplified, supporting European languages), Chinese (Traditional, supporting European languages))				●	●	●	●	●	●	●	●	●	●
		Standard fonts (optional): Chinese (Simplified), Chinese (Traditional), Japanese		Required		●	●	●	●	●	●	●	●	●	●
		High-quality font				●	●	●	●	●	●	●	●	●	●
		TrueType font, TrueType font (7 segments)				●	●	●	●	●	●	●	●	●	●
		Windows® font				●	●	●	●	●	●	●	●	●	●
		Stroke basic font (extended)		Required		●	●	●	●	●	●	●	●	●	●
		Stroke font (optional)		Required		●	●	●	●	●	●	●	●	●	●
		Logo character function				●	●	●	●	●	●	●	●	●	●
	Common settings	Parts (object + figure) layer function				●	●	●	●	●	●	●	●	●	●
		Station No. switching				●	●	●	●	●	●	●	●	●	●
		Multilingual support function				●	●	●	●	●	●	●	●	●	●
		Password				●	●	●	●	●	●	●	●	●	●
		Boot logo				●	●	●	●	●	●	●	●	●	●
		Data operation function				●	●	●	●	●	●	●	●	●	●
		Offset function				●	●	●	●	●	●	●	●	●	●
		Security function: Security level authentication				●	●	●	●	●	●	●	●	●	●
		Security function: Operator authentication		Required	(Memory card/ USB memory <GT16 only>)	●	●	●	●	●	●	●	●	●	●
	Object settings	Lamp display				●	●	●	●	●	●	●	●	●	●
		Touch switch				●	●	●	●	●	●	●	●	●	●
		Numeric display/input				●	●	●	●	●	●	●	●	●	●
		Data list display				●	●	●	●	●	●	●	●	●	●
		Historical data list display※8		Required※8		●	●	●	●	●	●	●	●	●	●
		ASCII display/input				●	●	●	●	●	●	●	●	●	●
		Kana-Kanji conversion function: Normal version		Required		–	–	–	–	–	–	–	–	–	–
		Kana-Kanji conversion function: Enhanced version		Required		●	●	●	●	●	●	●	●	●	●
		Clock display				●	●	●	●	●	●	●	●	●	●
		Comment display				●	●	●	●	●	●	●	●	●	●
		Advanced alarm observation/display			(Memory card) (Battery)	●	●	●	●	●	●	●	●	●	●
		Alarm display				●	●	●	●	●	●	●	●	●	●
		Alarm history display			(Memory card)	●	●	●	●	●	●	●	●	●	●
		Floating alarm display				–	–	–	–	–	–	–	–	–	–
		Parts display			(Memory card)	●	●	●	●	●	●	●	●	●	●
		Parts movement			(Memory card)	●	●	●	●	●	●	●	●	●	●
		Panel meter display				●	●	●	●	●	●	●	●	●	●
		Level display				●	●	●	●	●	●	●	●	●	●
		Trend graph/Line graph/Bar graph/Statistical graph				●	●	●	●	●	●	●	●	●	●
		Historical trend graph※8		Required※8		●	●	●	●	●	●	●	●	●	●
		Scatter graph				●	●	●	●	●	●	●	●	●	●
		Status observation function				●	●	●	●	●	●	●	●	●	●
		Advanced recipe function		Required	(Memory card)	●	●	●	●	●	●	●	●	●	●
		Recipe function		Required	(Memory card)	●	●	●	●	●	●	●	●	●	●
	Others	Report function		Required	(Printer unit) (Memory card)	●	●	●	●	●	●	●	●	●	–
		Hardcopy function: File saving in memory card			Memory card	●	●	●	●	●	●	●	●	●	●
		Hardcopy function: Printing on printer		Required	(Printer unit)	●	●	●	●	●	●	●	●	●	–
		Barcode function		Required		●	●	●	●	●	●	●	●	●	–
		RFID function		Required		●	●	●	●	●	●	●	●	●	–
		Multimedia function		Required	Multimedia unit Memory card	●	●	●	●	–	●	●	–	–	–
		Remote personal computer function (Ethernet)		Required	License	●	●	●	●	–	●	●	–	●	–
		Remote personal computer function (serial)		Required	Video/RGB input unit	●	●	●	●	–	●	●	–	–	–
		VNC® server function		Required	License	●	●	●	●	●	●	●	●	●	●
		Operation panel function		Required	External input/ output unit	●	●	●	●	●	●	●	●	●	–
		Operation log function		Required	Memory card	●	●	●	●	●	●	●	●	●	●
		Document display function	Required※2 (GT15 only)	Required	Memory card	●	●	●	●	●	●	●	●	●	●
		Logging function		Required	(Memory card) (Battery)	●	●	●	●	●	●	●	●	●	●
		Log viewer function		Required	(Memory card/ USB memory)	●	●	●	●	●	●	●	●	●	●
		Script function: Project script/Screen script				●	●	●	●	●	●	●	●	●	●
		Script function: Object script		Required		●	●	●	●	●	●	●	●	●	●
		Device data transfer function		Required		●	●	●	●	●	●	●	●	●	●
Maintenance functions		Device monitor function				–	–	–	–	–	–	–	–	–	–
		System monitor function		Required		●	●	●	●	●	●	●	●	●	●
		List editor for A		Required		●	●	●	●	●	●	●	●	●	●
		List editor for FX		Required		●	●	●	●	●	●	●	●	●	●
		SFC monitor function	Required※2 (GT15 only)	Required	Memory card	●	●	●	●	●	●	●	●	●	●
		Motion SFC monitor function	Required※2 (GT15 only)	Required	Memory card	●	●	●	●	●	●	●	●	●	●
		Ladder editor function	Required※2 (GT15 only)	Required	Memory card	●	●	●	●	●	●	●	●	–	●
		Ladder monitor function	Required※2 (GT15 only)	Required	(Memory card)	●	●	●	●	●	●	●	●	●	●
		Intelligent module monitor function		Required		●	●	●	●	●	●	●	●	●	●
		Q motion monitor function		Required		●	●	●	●	●	●	●	●	●	●
		Servo amplifier monitor function		Required		●	●	●	●	●	●	●	●	●	●
		Network monitor function		Required		●	●	●	●	●	●	●	●	●	●
		CNC monitor function		Required		●	●	●	–	–	●	–	–	–	–
		CNC data input/output function		Required	Memory card/ USB memory <GT16 only>	●	●	●	–	–	●	–	–	–	–
		Backup/restoration function		Required	Memory card/ USB memory <GT16/GT14 only>	●	●	●	●	●	●	●	●	●	●
		MELSEC-L troubleshooting function		Required		●	●	●	●	●	●	●	●	●	●
		Maintenance time notification function			Battery	●	●	●	●	●	●	●	●	●	●

※1 The function details, such as the number of settings and the data storage destination, vary depending on the model.
※2 An optional function board is required to use the functions that are indicated as "Required" in the "Optional function board" column. Some other optional functions may require the optional function board depending on the GOT function version and hardware version.
The extension/optional function OS must be installed to use the functions that are indicated as "Required" in the "Extended/optional function OS installation" column. A memory card or optional function board may be required when the extension/optional function OS is installed.
Check the size of the data stored in the GOT. For more details, see "Optional function board, memory card (CF card, SD card), and USB memory selection <GT16/GT15/GT14/GT12/GT11> (GOT1000 Series Catalog).
The GT14 and GT12 do not require the optional function board. The GT10 and GT SoftGOT1000 do not require the optional function board or installation of the extension/optional function OS.
※3 Necessary optional units, memory cards, and USB memory devices other than the optional function board are shown. Parenthesized devices will be required depending on conditions of use. For details, see "Notes for use" (GOT1000 Series Catalog).
※4 For details, see "GT10", "Handy GOT" and "GT SoftGOT1000" (GOT1000 Series Catalog).

Graphic Operation Terminal
P.566

GT10

GT14					Model	
					GT10*4	
GT145□-Q□BDE QVGA 5.7"	GT SoftGOT1000 Version3*4	Optional function board*2	Extended/optional function OS installation*2	Other necessary devices*3	GT105□-Q□BD QVGA 5.7"	GT1030-HB□(W)(2) 4.5"
●	●				●	●
●	●				—	—
●	●				●	●
●	●				—	—
●	●				●	●
●	●				—	—
●	●				●	●
●	●				—	—
●	●				●	●
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*5 The RS-232 interface can be used as an RS-422 interface by connecting an RS-422 conversion unit.
*6 Structural restrictions are applied.
*7 Only user alarms can be used.
*8 To use the historical data list display and the historical trend graph, it is necessary to specify the logging function in advance. In addition, it is necessary to install the optional function OS (logging).
*9 Read from the PLC clock.
*10 Different connection configurations may require different communication units. For details, see the GOT1000 Series Handbook and the GOT1000 Series Connection Manual.
*11 For the compatible hardware versions, please contact your local sales office.
*12 Only CPU direct connection and Ethernet connection are supported.
*13 Only the FTP server function is supported.
*14 When GT14, GT12, GT11 and GT10 are intermingled, the multiple connection function is not supported.

GOT SIMPLE Lineup

GS21

Simple, high functioning, and user friendly model for a reliable system.

10 inch



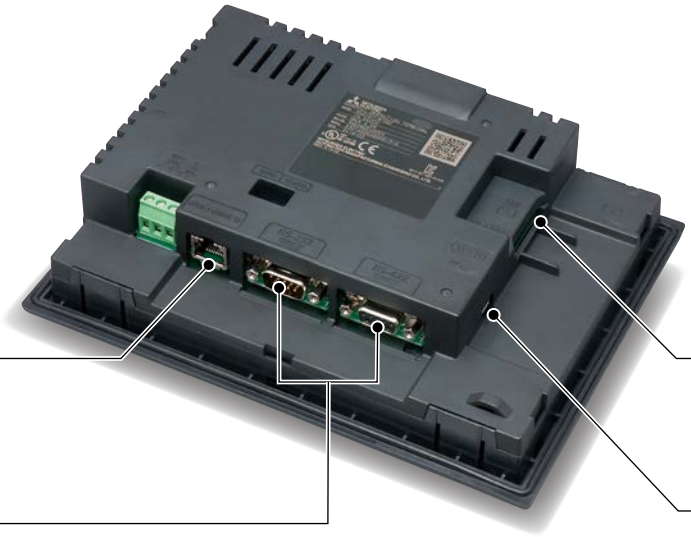
WVGA **GS2110-WTBD** | Resolution: 800×480
Display color: 65536 colors

7 inch



WVGA **GS2107-WTBD** | Resolution: 800×480
Display color: 65536 colors

Standard interface



Ethernet port
For connection with various equipment

RS-232, RS-422 Communication ports

SD memory card slot
For carrying data

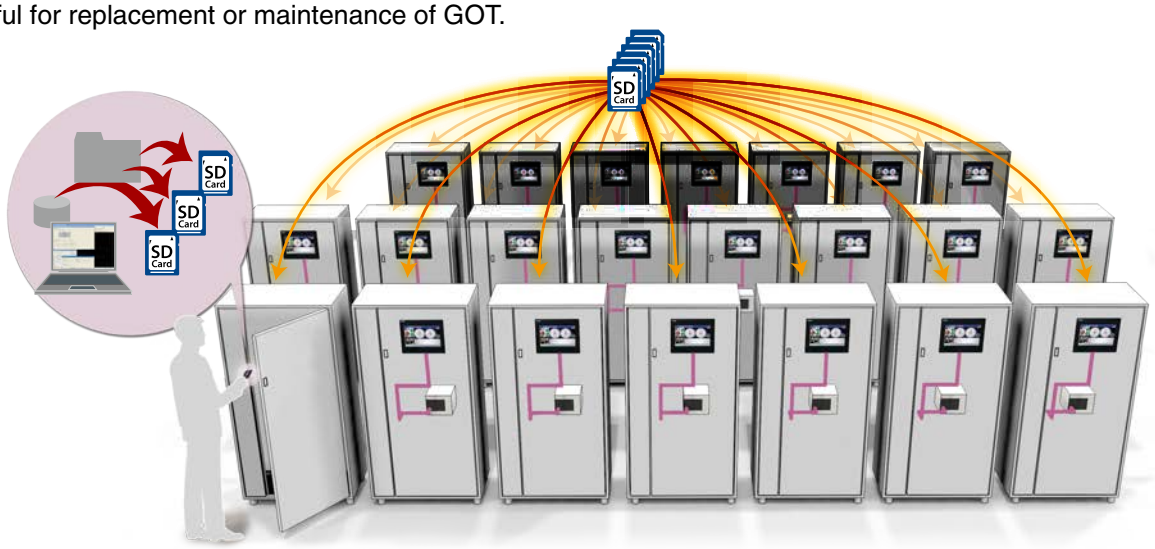
USB device
For connection with PC

Reduce mass production installation setup costs

Start from SD memory card

SD memory card slot

Transfer the screen data and all the necessary system data to make a GOT operate to a SD memory card in advance.
Then the GOT can be used just by inserting the SD memory card.
Useful for replacement or maintenance of GOT.

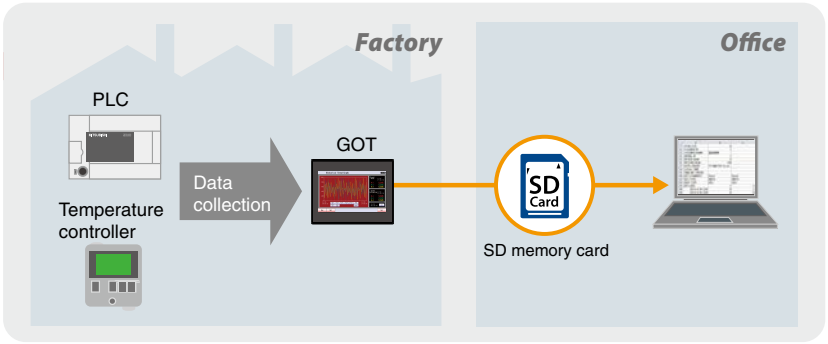


Device data collection

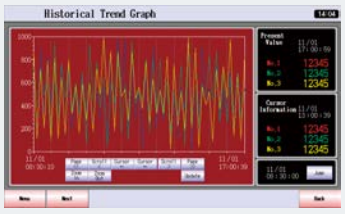
Logging function

SD memory card slot

GOT manages the data of all connected industrial devices.
The data can be collected at any arbitrary timing and can be used for data analysis and feedback.



Point! Logged data can be displayed on the GOT as a graph, so status change such as temperature change can be understood in a single glance.



Historical trend graph display



Historical data list display

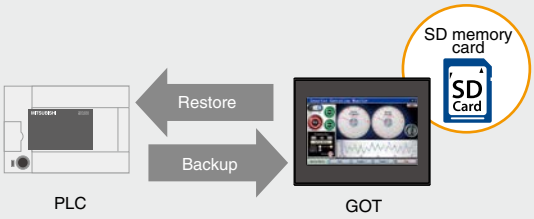
Backup of important programs

Backup/Restore

SD memory card slot

Using backup/restore function, PLC program can be replaced even without a PC.
When PLC program is backed up to GOT*1, PLC program and machine operation can instantly be restored even if an unexpected failure occurs.

*1 Separate SD memory card required

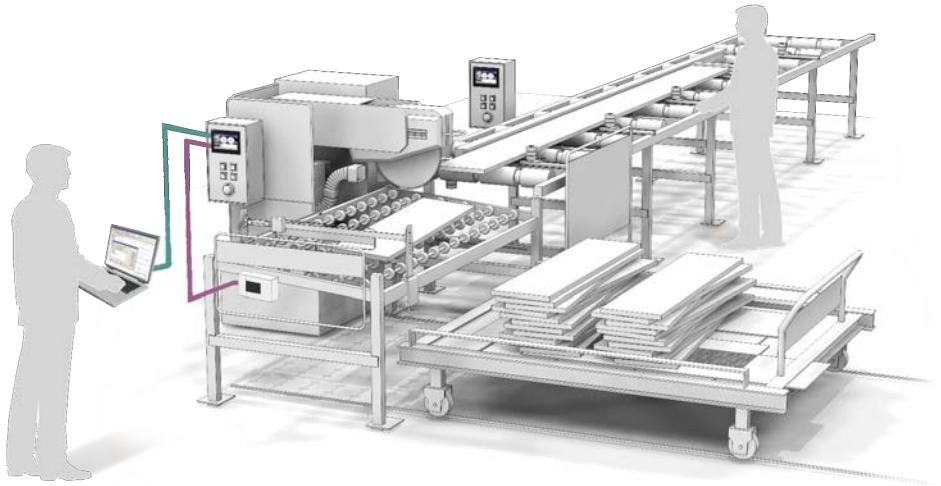


Setup and modification on-site

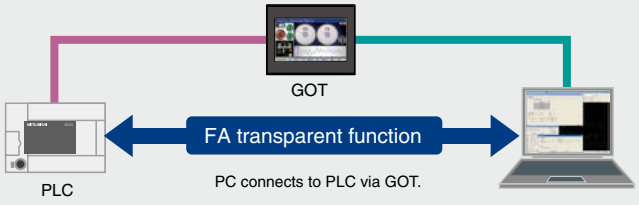
FA transparent function

USB device | RS-232, RS-422 Communication ports | Ethernet port

Set up and modify devices without changing cable connections.



The GOT acts as a transparent gateway to enable programming, start up, and adjustment of Mitsubishi industrial devices.



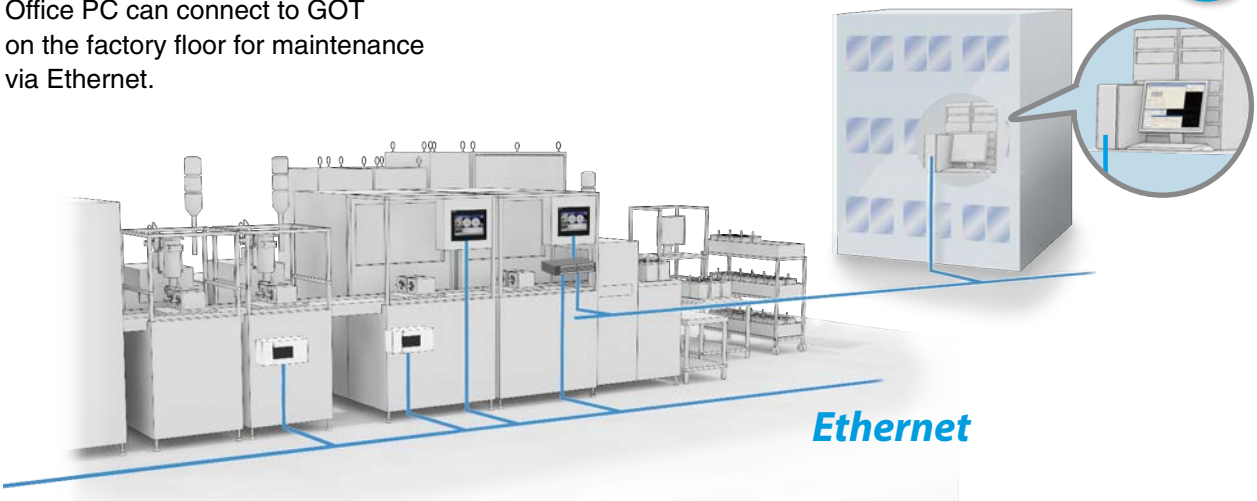
Reduce labor cost and save the hassle of changing cable connections.

Remote maintenance

Ethernet connection

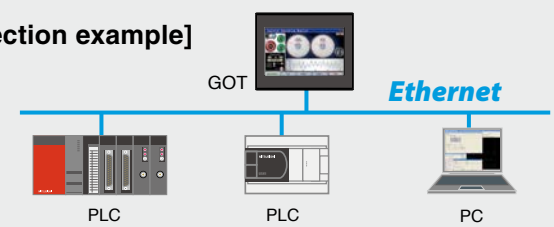
Ethernet port

Office PC can connect to GOT on the factory floor for maintenance via Ethernet.



With Ethernet, it is possible to connect a system of mixed vendors and models, expanding the possibilities at the factory floor.

[Connection example]



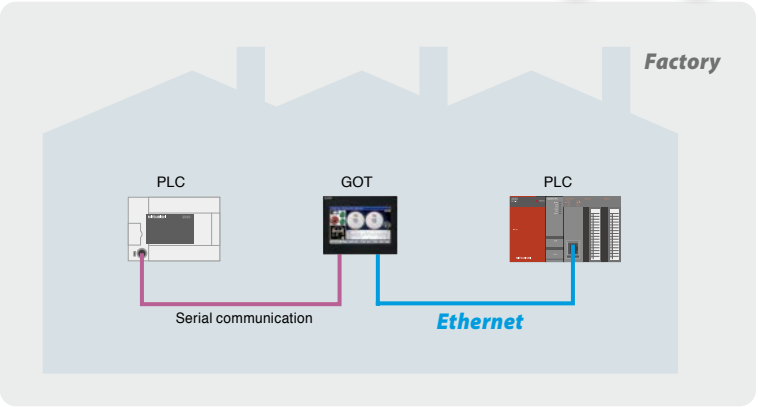
Use GOT SIMPLE to control industrial devices!

Multi-channel function

RS-232, RS-422 Communication ports

Ethernet port

Up to 2 channels of industrial device can be controlled with one GOT.
The data can be easily transferred between devices with just simple settings in GT Works3.



Direct connection to inverters

Inverter connection

RS-422 Communication ports

Inverter can be directly connected to GOT. Just by connecting them together, communication parameters can automatically be set.
GOT can also monitor PLC function devices, and even when multiple inverters are connected, one GOT can manage them all.

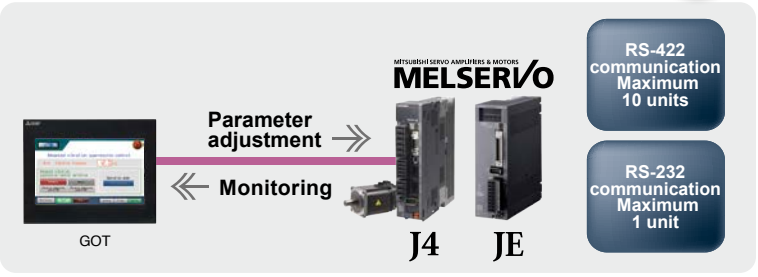


Easy monitoring of servo operation status

Servo connection

RS-232, RS-422 Communication ports

Easy setup, monitoring, adjusting alarms, diagnosis, parameter settings, and test operation.

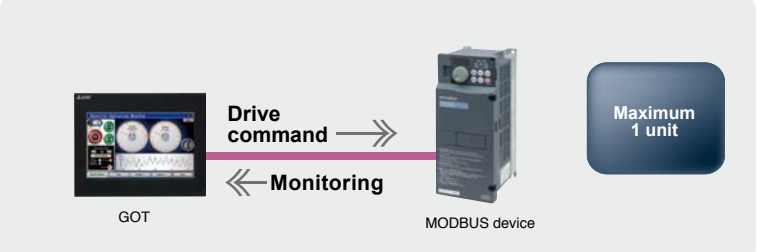


MODBUS® communication also supported

MODBUS communication

RS-232, RS-422 Communication ports

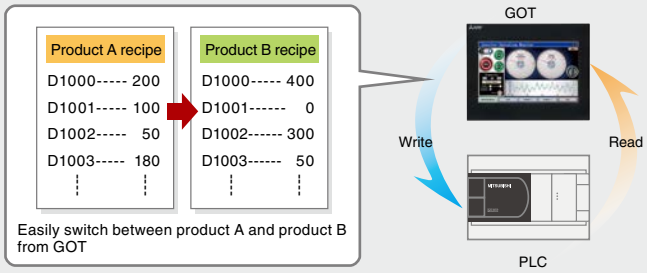
As a master station, GOT can communicate with a MODBUS/RTU slave device. 1 device can be connected for monitoring of production line, etc.



Convenient for frequent changeover

Recipe function

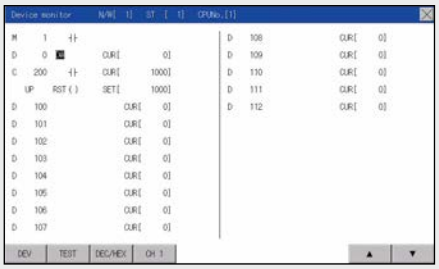
Recipe information such as material blend and machine conditions can be saved in the GOT. This information can be written from the GOT to the PLC, enabling changeover without changing the PLC program.
Adjusted data can also be read and stored in the GOT.



Monitor device value and set values for timer, etc.

Device monitor function

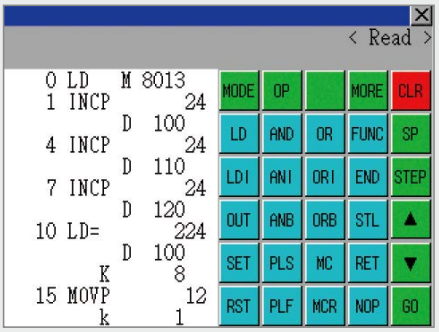
Monitor and change FX/L/Q series internal device ON/OFF status, word values, timer and counter values.



Program change without a PC on-site

MELSEC-FX list editor

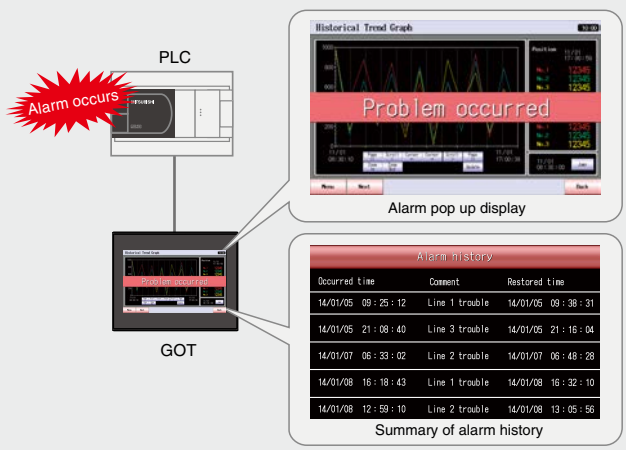
Convenient for minor on-site program changes.



Alarm status identification

Alarm function

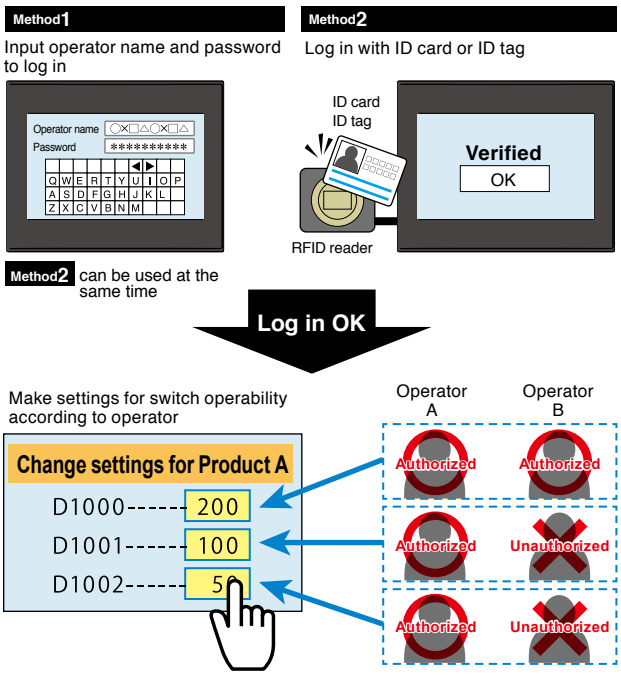
Alarm functions such as alarm display, alarm history, and alarm pop up display are included, and display settings can be made on each screen. Language switching functionality is also supported.



Strengthened security with operator based authorization

Operator authentication function

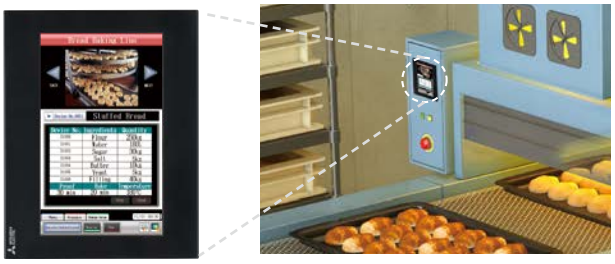
Setting the level (authority) of operation and display for each operator can strengthen security and prevent operation errors. There are two methods for operator authentication at startup or when changing screens.



Easily installed on compact equipment

Vertical display

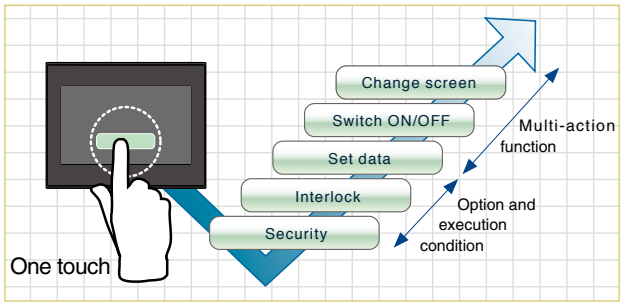
By using a GOT vertically, it can be easily installed on compact equipment and can neatly display vertical letters. Less scrolling is needed when displaying lists.



Setting multiple functions with one switch

Multi-action switch

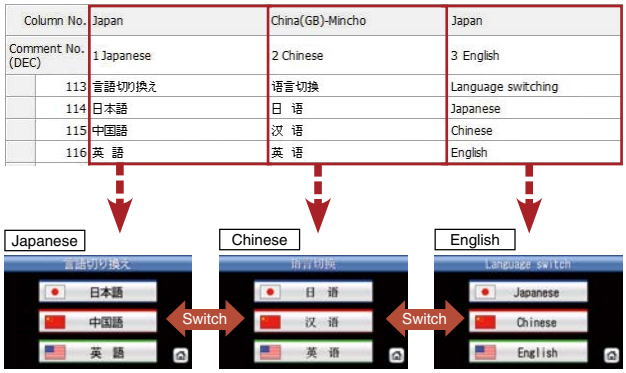
Multiple functions can be set to one switch, so there is no need for multiple switches for separate functions. By setting execution sequence and conditions, delay, repeat, interlock settings can be combined, reducing the burden of PLC programming.



Language change according to country of the operator

Language switching

Screen can be easily made for switching between Japanese, Chinese, English, etc. 30 languages can be set for each comment. Screens, not only languages, can be switched based on purpose.



Saving energy when operator is not present

Screen saver

Screen save time can be set from 1 to 60 minutes. By setting the backlight ON/OFF, energy can be saved when no operator is present. PLC can also control the ON/OFF status, so the backlight will turn ON and alarm screen will display when an alarm occurs.

GOT SIMPLE function list

Screen design

■Figure/object functions
- Figure
- Logo text
- Touch switch
- Lamp
- Numerical display, Numerical input
- Text display, Text input
- Date display, Time display
- Comment display
- Parts display
- Parts movement
- Simple alarm display
- Alarm display (user)
- Level
- Panel meter
- Line graph
- Trend graph
- Bar graph
- Statistic bar graph
- Statistic pie graph
- Scatter graph
- Historical trend graph
- Historical data list display

■Functions performed on background of GOT
- Logging
- Recipe
- Device data transfer
- Trigger action
- Time action
- Hard copy (File output/Serial printer output)
- Project/screen script

■Functions used with peripheral devices
- Barcode function
- RFID function
- Report function (Serial printer output)

GOT functions
- Base screen
- Overlap window
- Superimpose window
- Dialog window
- Key window
- Language switching
- System information
- Operator authentication
- Startup logo
- FA transparent
- Multi-channel function
- Station No. switching
- Backup/Restore

Debug functions
- Device monitor
- MELSEC-FX list editor

Graphic Operation Terminal GOT SIMPLE Series

Interaction with various industrial devices

In addition to various built-in functions, direct connection between Mitsubishi industrial devices will improve productivity and reduce costs.

PLC

MELSEC iQ-R series | MELSEC Q series | MELSEC L series | MELSEC-F



Servo

MELSERVO



Inverter

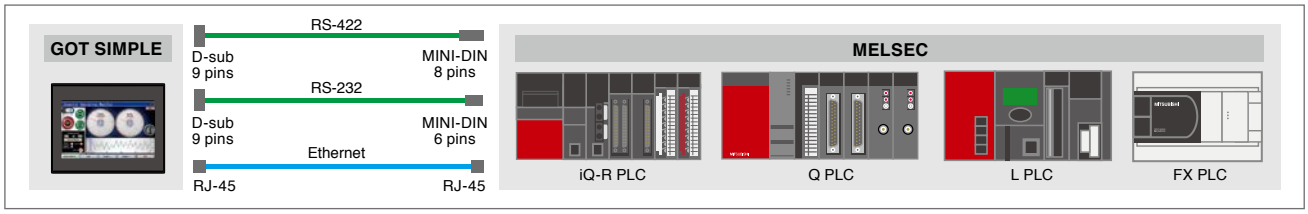
FREQROL



FREQROL-A800 FREQROL-D700

Connection to PLCs

A cable is required to connect GOT and PLC. Please prepare the appropriate cable.



GOT SIMPLE Product list

Cables

Product name		Model	Cable length	Description
RS-422 Cable	FXCPU direct connection cable, FXCPU expansion board connection cable	GT01-C10R4-8P	1m	FXCPU <=> GOT FXCPU expansion board <=> GOT [MINI-DIN 8 pins <=> D-sub 9 pins]
		GT01-C30R4-8P	3m	
		GT01-C100R4-8P	10m	
		GT01-C200R4-8P	20m	
		GT01-C300R4-8P	30m	
	QnA/A/FXCPU direct connection cable, Computer link connection cable	GT01-C30R4-25P	3m	QnA/ACPU/motion controller CPU[A series]/FXCPU <=> GOT RS-422 converter cable [FA-CNV□ CBL] <=> GOT Serial communication unit <=> GOT [D-sub 25 pins <=> D-sub 9 pins]
		GT01-C100R4-25P	10m	
		GT01-C200R4-25P	20m	
		GT01-C300R4-25P	30m	
	Computer link connection cable	GT09-C30R4-6C	3m	Serial communication unit <=> GOT Computer link unit <=> GOT [Stranded wire <=> D-sub 9 pins]
		GT09-C100R4-6C	10m	
		GT09-C200R4-6C	20m	
		GT09-C300R4-6C	30m	
RS-232 Cable	Q/LCPU direct connection cable	GT01-C30R2-6P	3m	Q/LCPU <=> GOT [MINI-DIN 6 pins <=> D-sub 9 pins]
	FXCPU expansion board connection cable, FXCPU special adapter connection cable	GT01-C30R2-9S	3m	FXCPU expansion board <=> GOT FXCPU special adapter <=> GOT [D-sub 9 pins <=> D-sub 9 pins]
	FXCPU special adapter connection cable	GT01-C30R2-25P	3m	FXCPU special adapter <=> GOT [D-sub 25 pins <=> D-sub 9 pins]
	Computer link connection cable	GT09-C30R2-9P	3m	Serial communication unit <=> GOT Computer link unit <=> GOT [D-sub 9 pins <=> D-sub 9 pins]
		GT09-C30R2-25P	3m	Serial communication unit <=> GOT Computer link unit <=> GOT [D-sub 25 pins <=> D-sub 9 pins]
USB Cable	Data transfer cable	GT09-C30USB-5P	3m	PC[Screen design software] <=> GOT [USB-A <=> USB Mini-B]

Other options

Product name	Model	Description
SD memory card	L1MEM-2GBSD	SD memory card 2GB
	L1MEM-4GBSD	SDHC memory card 4GB

Connectable third-party PLCs

Manufacturer	Series/model name		Computer link connection RS-422	Computer link connection RS-232	CPU direct connection RS-422	CPU direct connection RS-232
Omron	SYSMAC CJ1	CJ1H	○*2	○*2	×	○
		CJ1G				
		CJ1M				
	SYSMAC CJ2	CJ2H				○*3
		CJ2M				
	SYSMAC CP1	CP1H	○	○		×
		CP1L				
		CP1E [N type]*1				○
Keyence	KV-700		○	○	×	○
	KV-1000					
	KV-3000					
	KV-5000					×
	KV-5500					

Manufacturer	Series/model name	Computer link connection RS-422	Computer link connection RS-232	CPU direct connection RS-422	CPU direct connection RS-232
Panasonic Industrial Devices SUNX	FP0	×		×	○
	FP-M				
	FP-Σ				
	FP-X	○			
Siemens AG *4	SIMATIC S7-200 series	×		×	○
	SIMATIC S7-300 series				
	SIMATIC S7-400 series				
	SIMATIC S7-1200 series				×

*1 Among CP1E (N type), only direct connection is possible for CPU units of 20 I/O points or less.
*2 RS-422 or RS-232 can be selected.
*3 Only CJ2M-CPU1□ can be connected.
*4 Use GT09-C30R20801-9S to connect to Siemens PLCs.



For connection details, see the GOT2000 series connection manuals below.

- Mitsubishi Product (SH-081197ENG)
- Non Mitsubishi Product 1 (SH-081198ENG)
- Non Mitsubishi Product 2 (SH-081199ENG)
- Microcomputer, MODBUS Products, Peripherals (SH-0811200ENG)

General specifications

Item	Specifications					
Operating ambient temperature	0 to 50°C					
Storage ambient temperature	-20 to 60°C					
Operating/Storage ambient humidity	10 to 90%RH, non-condensing (The wet bulb temperature is 39°C) When the ambient temperature exceeds 40°C, maintain the absolute humidity at 40°C and 90%.					
Vibration resistance	Conforms to IEC 61131-2		Frequency	Acceleration	Half amplitude	Sweep Count
		Under intermittent vibration	5 to 8.4Hz	–	3.5mm	10times each in X, Y and Z directions
			8.4 to 150Hz	9.8m/s²	–	
		Under continuous vibration	5 to 8.4Hz	–	1.75mm	–
			8.4 to 150Hz	4.9m/s²	–	
Shock resistance	Conforms to IEC 61131-2 (147m/s², 3times each in the X, Y, and Z directions)					
Operating atmosphere	Must be free of lamp black, corrosive gas, flammable gas, or excessive amount of electro conductive dust particles. Must be no direct sunlight. (Same as for saving)					
Operating altitude*1	2000m (6562ft) max.					
Installation location	Inside control panel					
Overvoltage category*2	II or less					
Pollution degree*3	2 or less					
Cooling method	Self-cooling					
Grounding	Class D grounding (100Ω or less), To be connected to the panel when grounding is not possible.					

*1 Do not use or store the GOT under pressures higher than the atmospheric pressure of altitude 0m (0ft). Failure to observe this instruction may cause a malfunction.
When the air inside the control panel is purged by pressurization, the surface sheet may be lifted by high pressure. As a result, the touch panel may be difficult to press, and the sheet may be peeled off.
*2 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within the premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the raged voltage of 300V is 2500V.
*3 This index indicates the degree to which conductive pollution is generated in the environment where the equipment is used. In pollution degree 2, only non-conductive pollution occurs but temporary conductivity may be produced due to condensation.

Power supply specifications

Item	Specifications	
	GS2110-WTBD	GS2107-WTBD
Input power supply voltage	24VDC (+10%, -15%), ripple voltage 200mV or less	
Power consumption	7.6W (317mA/24V) or less	6.5W (271mA/24V) or less
At backlight off	3.8W (158mA/24V) or less	3.8W (158mA/24V) or less
Inrush current	17A or less (6ms, 25°C ambient temperature, maximum load)	
Permissible instantaneous power failure time	Within 5ms	
Noise immunity	Conforms to IEC61000-4-4, 2kV (power supply line)	
Dielectric withstand voltage	350VAC for 1 minute (across power supply terminals and earth)	
Insulation resistance	500VDC across power terminals and earth, 10 MΩ or more by an insulation resistance tester	

Function specifications

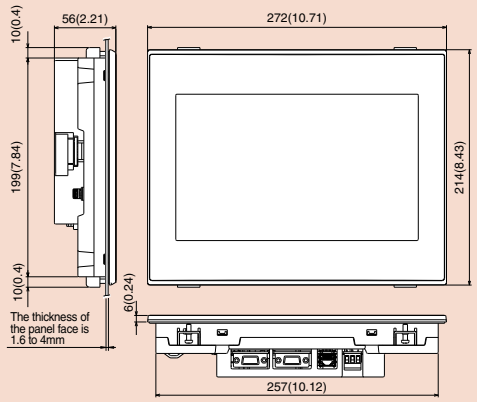
Item		Specifications	
		GS2110-WTBD	GS2107-WTBD
Display	Type	TFT color liquid crystal display	
	Screen size	10"	7"
	Resolution	800 × 480 [dots]	
	Display size	W222 (8.74) × H132.5 (5.22) [mm] (inch) (Horizontal format)	W154 (6.06) × H85.9 (3.38) [mm] (inch) (Horizontal format)
	Display character	16-dot standard font : 50 characters 30 lines (2-byte) (Horizontal format)	
	Display color	65536 colors	
	Brightness	32-level adjustment	
Backlight		LED-type (no replacement required) Backlight off/screen saving time can be set.	
Touch panel	Type	Analog-resistive film type	
	Key size	Minimum 2 × 2 [dots] (per key)	
	Number of points touched simultaneously	Simultaneous 2-point presses prohibited (Only one point can be touched.)	
	Life	1 million times (operating force 0.98N max.)	
Memory	C drive	Flash memory (Internal) (9Mbytes), for storing project data, OS	
		Life (Number of write times) 100,000times	
Built-in interface	RS-422	RS-422, 1ch Transmission speed : 115200/57600/38400/19200/9600/4800bps Connector shape : D-sub 9 pins (Female) Application : For communicating with controllers Terminating resistor : 330Ω fixed	
	RS-232	RS-232, 1ch Transmission speed : 115200/57600/38400/19200/9600/4800bps Connector shape : D-sub 9 pins (Male) Application : For communication with controller, bar code reader and printer For PC connection (FA transparent function)	
	Ethernet	Data Transfer method : 100BASE-TX, 10BASE-T, 1ch Connector shape : RJ-45 (modular jack) Application : For communication with controllers For PC connection (Project data read/write, FA transparent function)	
	USB	USB (Full Speed 12Mbps) 1ch Connector shape : Mini-B Application : For PC connection (Project data read/write, FA transparent function)	
	SD memory card	Conforms to the SD standard, 1ch Supported memory card : SDHC memory card, SD memory card Application : Project data read/write, logging data save	
Buzzer output		Single tone (LONG/SHORT/OFF adjustable)	
Protective structure		IP65F (only the front part of the panel)	
External dimensions		W272 (10.71) × H214 (8.43) × D56 (2.21) [mm] (inch)	W206 (8.11) × H155 (6.11) × D50 (1.97) [mm] (inch)
Panel cutting dimensions		W258 (10.16) × H200 (7.88) [mm] (inch) (Horizontal format)	W191 (7.52) × H137 (5.40) [mm] (inch) (Horizontal format)
Weight		Approx. 1.3kg (Excluding mounting fixtures)	Approx. 0.9kg (Excluding mounting fixtures)
Compatible software package (Version of GT Designer3)		Version 1.105K or later *	

* Installation of GS installer is required.
The functions described here are available in GT Designer3 Version 1.118Y and later.

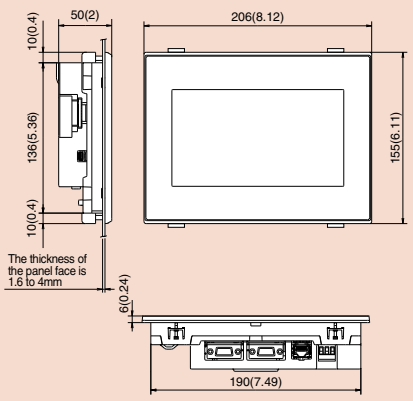
External dimensions

Unit: mm (inch)

GS2110-WTBD



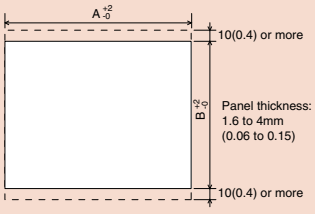
GS2107-WTBD



■Panel cutting dimensions

Cut holes in the following dimensions on the panel. Ensure 10mm of space in upper and lower parts of the panel for mounting fixtures.

- Horizontal format (If the vertical format is selected, the dimension must be rotated 90 degrees.)



Item	A	B
GS2110-WTBD	258(10.16)	200(7.88)
GS2107-WTBD	191(7.52)	137(5.4)

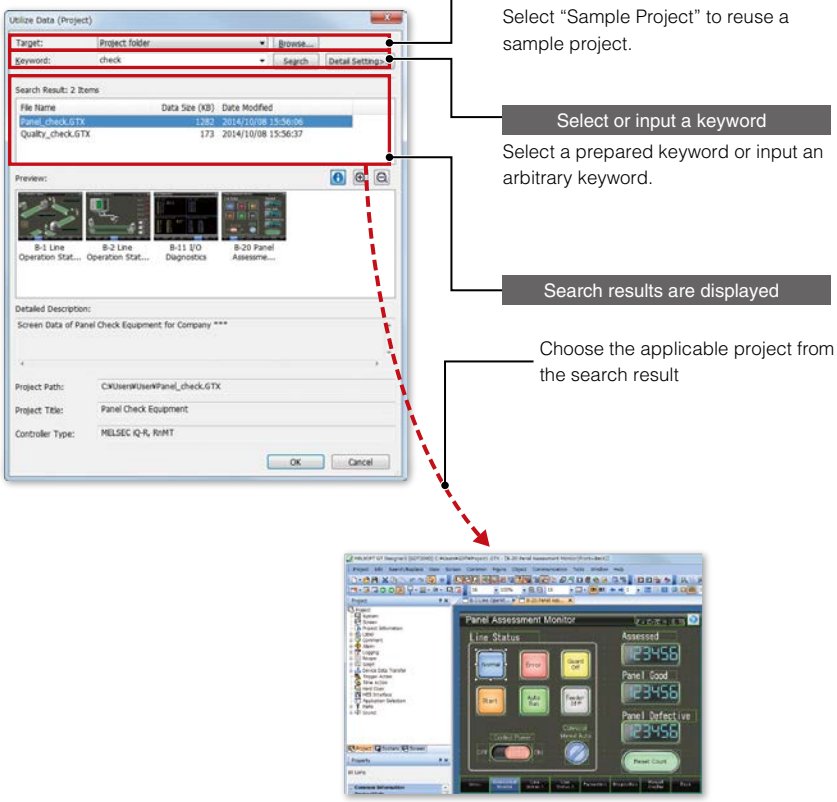
MELSOFT GT Works3

Professional Designs in Just a Few Clicks

The GOT2000 introduces an efficient approach to reuse previously created screen designs.

Utilize data (Projects)

When creating a new project, search through the existing projects to find any existing projects that may be reused.
Keyword search helps narrow down the search.



Specify search range

Select “Sample Project” to reuse a sample project.

Select or input a keyword

Select a prepared keyword or input an arbitrary keyword.

Search results are displayed

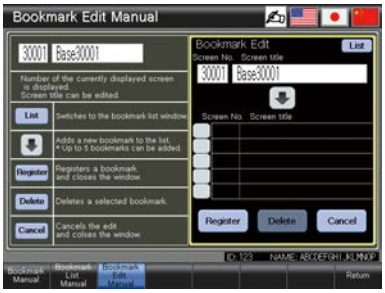
Choose the applicable project from the search result

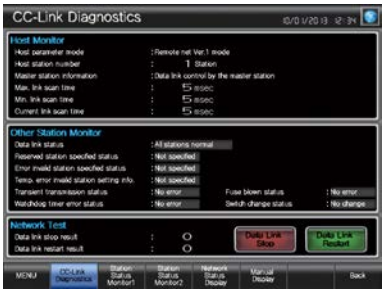


Sample projects [English, Japanese, Chinese (Simplified)]

GOT2000 has many sample projects that can be used when designing screens. Easily create a screen just by selecting a sample project.







GOT Screen Design Software
MELSOFT GT Works3 +plus

Utilize data (Screens)

Reuse individual screens from past or sample projects. The settings are also applied and reused so that you can create project data easily.



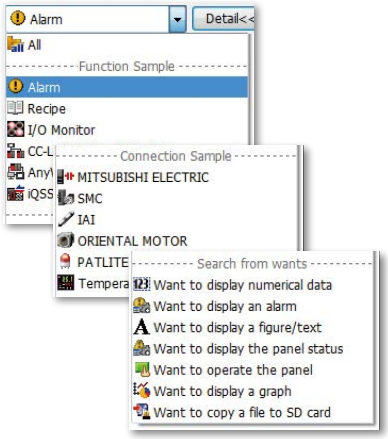
NEW
Graphical meter
Create stylish, clear meters

NEW
Table
Easily create tables

Search by target/category/keyword

Select a search target, category, or keyword and you can quickly find the screen you need.

Category list



Search results are displayed

Just drag and drop to easily apply associated settings to your screen.

NEW

Graphical meter

Just select a meter from the preset list and you can create stylish, clear meters. The position and angle of scales can be adjusted by mouse operation and the shape and design can be changed easily. Warning color display indicates the machine status clearly.

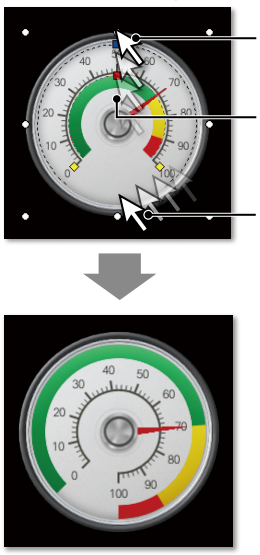
* To be supported by GT21 soon

Select from the preset list



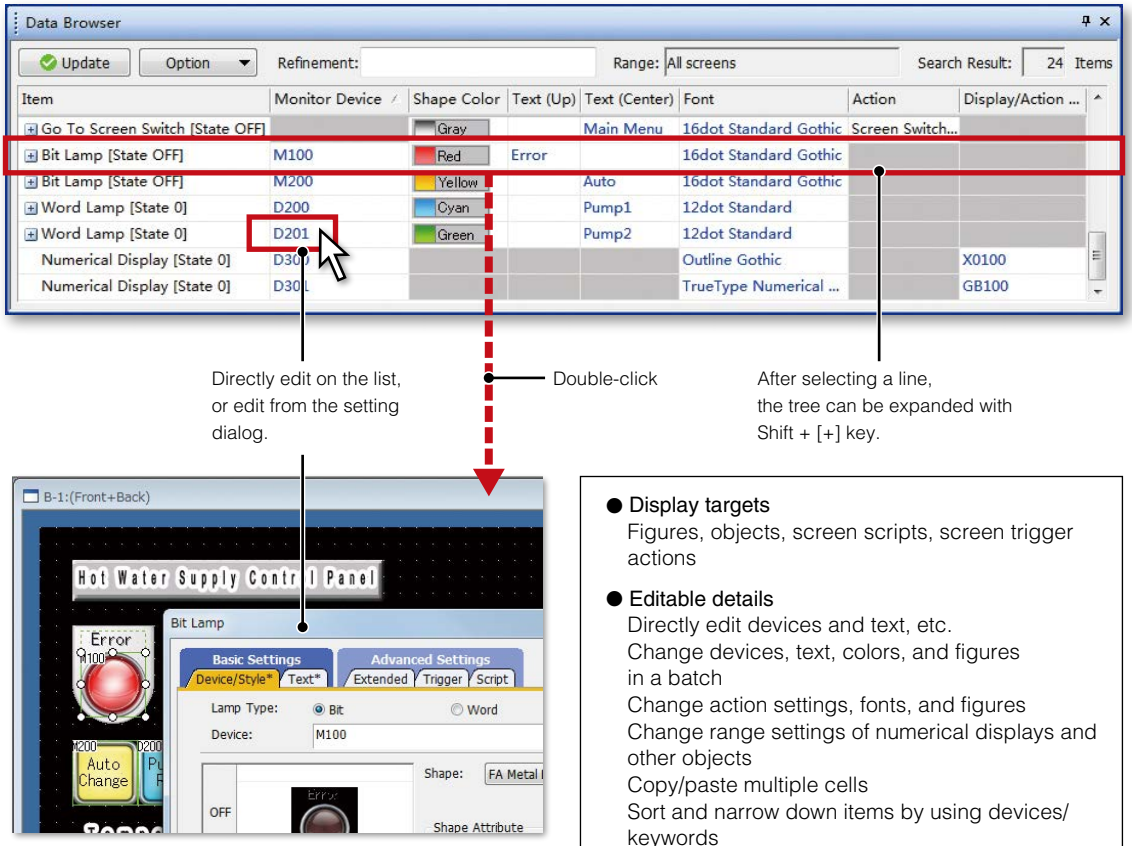
The list includes various choices

Easy to adjust settings by mouse operation



Data browser

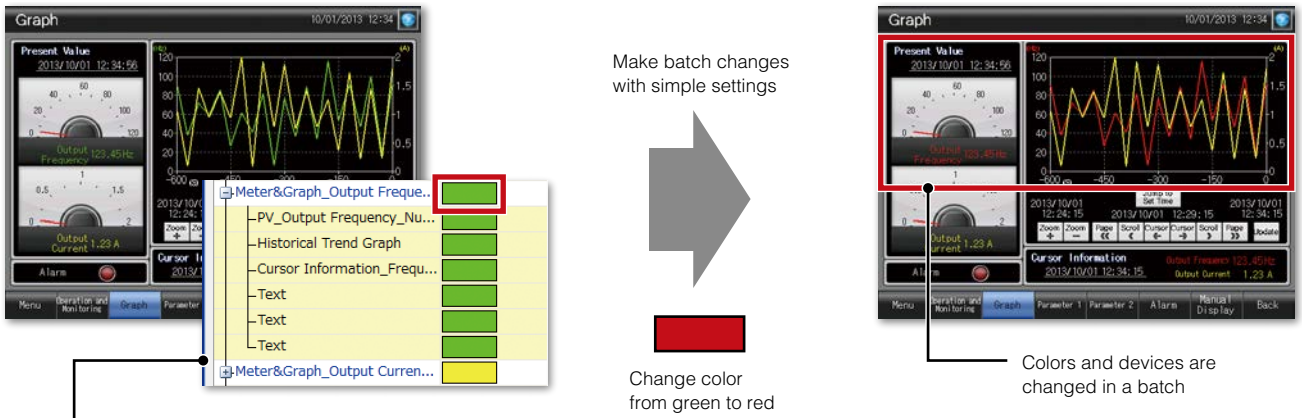
The data browser shows a list of objects used in the project. The settings can be edited directly on the browser or by opening the setting dialog. You can easily identify any duplicate data and no longer have to open multiple screens.



- **Display targets**
  Figures, objects, screen scripts, screen trigger actions
- **Editable details**
  Directly edit devices and text, etc.
  Change devices, text, colors, and figures in a batch
  Change action settings, fonts, and figures
  Change range settings of numerical displays and other objects
  Copy/paste multiple cells
  Sort and narrow down items by using devices/ keywords
  Interchange columns with drag & drop

Template

Customize each template to the desired look-and-feel, ranging from color options to device selection. Attributes such as devices and colors can be set for each template.
You can easily change devices and colors by associating each object with the template's attribute.



Template attributes (color)

- Historical trend graph line color
- Text color
- Numerical display value color
- :

- **Items that can be registered in templates**
  Figures, Objects
- **Attributes that can be registered and changed in templates**
  Device (Bit, Word), Numerical value, Text, Color, Figure, Font, Text size

NEW

e-Manual

e-Manual is the Mitsubishi Electric FA Electrical Document Manual with a dedicated viewer (e-Manual Viewer). Useful functions are included such as keyword search of multiple manuals, saving your favorites, saving memos, and others.

Concept movie

Windows® version

Tablet version



❶ Install e-Manual Viewer



❷ Always download the latest manuals.
Easy to update with just one click!

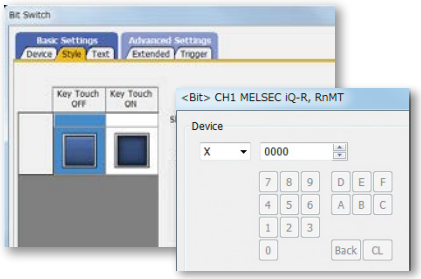


❸ Increase your screen design efficiently

Quickly confirm with F1 key

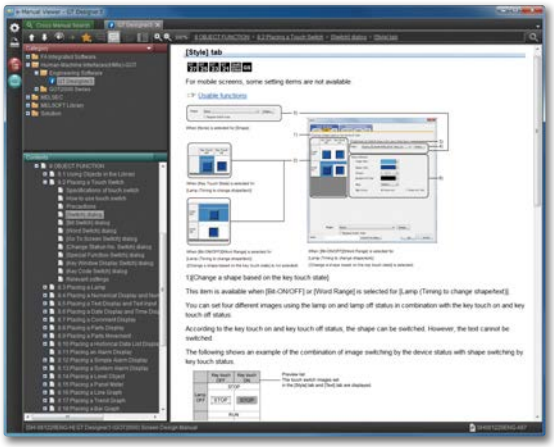
Press the F1 key in GT Works3 and jump to e-Manual for the dialog being edited! Quickly check setting methods and other information!

GT Works3





e-Manual





Easy to view, easy to use!

Easy to view contents, easy to use, useful functions help you access manuals efficiently. Quickly search for the information you need.

Cross Manual Search

Search required information from multiple manuals by keyword. You can get to the information you need without opening manuals one by one.

Bookmark

Bookmark frequently used manuals and pages and you can check the information quickly.

Note

Take a memo, such as know-how, and add it to the manual and you can customize manuals as you like.

Easily upgrade from GOT1000!

Simply change the GOT Type using the screen design software to upgrade your GOT1000 projects to GOT2000.
It will be a drop in replacement because the panel size is exactly the same.

STEP1 Replace GOT



GOT1000 GOT2000

STEP2 Change GOT type



STEP3 Transfer the data

✻ The screen data cannot be converted and the GOT type cannot be changed from GOT2000 to GOT1000.

GOT2000 Series Product list

GOT2000 model name

GT27 15 □ - X T B A □

Symbol	Screen size
15	15"
12	12.1"
10	10.4"
08	8.4"
05	5.7"
04	4.3" Wide
03	3.8"

Symbol	Structure
None	Standard
F	Open frame model

Symbol	Resolution
X	XGA
S	SVGA
V	VGA
R	480 × 272 dots
P	320 × 128 dots

Symbol	Display section
T	TFT color
M	TFT monochrome

Symbol	Panel color
B	Black
W	White
N	No frame

Symbol	Power type
A	100 V AC to 240 V AC
D	24 V DC
L	5 V DC

Symbol	Communication interface
None *1	Refer to Remarks column of GOT
S *1	RS-232 and RS-422/485 interfaces, or RS-422 interface only
S2 *1	Two RS-232 interfaces
-GF *2	CC-Link IE Field Network communication unit set

*1 For GT21 only
*2 For GT27/GT25 only

GT27	Advanced model with multi-touch gesture functions
GT25	High-performance, cost efficient, mid-range model
GT23	Unchallenged cost performance
GT21	Compact models with basic functions

GOT2000 main units

Classification		Model	Screen size	Display section Display color	Panel color	Power	Remarks
GT27	GT2715	GT2715-XTBA	15" XGA	TFT color 65536 colors	Black	100 to 240 V AC	Multimedia & Video/RGB compatible Multi-touch compatible
		GT2715-XTBD				24 V DC	
	GT2712	GT2712-STBA	12.1" SVGA		Black	100 to 240 V AC	
		GT2712-STBD				24 V DC	
		GT2712-STWA			White	100 to 240 V AC	
		GT2712-STWD *1				24 V DC	
	GT2710	GT2710-STBA	10.4" SVGA		Black	100 to 240 V AC	
		GT2710-STBD				24 V DC	
		GT2710-VTBA	10.4" VGA			100 to 240 V AC	
		GT2710-VTBD				24 V DC	
		GT2710-VTWA			White	100 to 240 V AC	
		GT2710-VTWD *1				24 V DC	
	GT2708	GT2708-STBA	8.4" SVGA		Black	100 to 240 V AC	
		GT2708-STBD				24 V DC	
		GT2708-VTBA	8.4" VGA			100 to 240 V AC	
		GT2708-VTBD				24 V DC	
	GT2705	GT2705-VTBD	5.7" VGA		Black	24 V DC	Multi-touch compatible
GT25	GT2512	GT2512-STBA	12.1" SVGA	TFT color 65536 colors	Black	100 to 240 V AC	—
		GT2512-STBD				24 V DC	
		GT2512F-STNA NEW			—	100 to 240 V AC	Open frame model
		GT2512F-STND NEW				24 V DC	
	GT2510	GT2510-VTBA	10.4" VGA		Black	100 to 240 V AC	—
		GT2510-VTBD				24 V DC	
		GT2510-VTWA			White	100 to 240 V AC	
		GT2510-VTWD *1				24 V DC	
		GT2510F-VTNA NEW			—	100 to 240 V AC	Open frame model
		GT2510F-VTND NEW				24 V DC	
	GT2508	GT2508-VTBA	8.4" VGA		Black	100 to 240 V AC	—
		GT2508-VTBD				24 V DC	
		GT2508-VTWA			White	100 to 240 V AC	
		GT2508-VTWD *1				24 V DC	
		GT2508F-VTNA NEW			—	100 to 240 V AC	Open frame model
		GT2508F-VTND NEW				24 V DC	
GT23	GT2310	GT2310-VTBA	10.4" VGA	TFT color 65536 colors	Black	100 to 240 V AC	—
		GT2310-VTBD				24 V DC	
	GT2308	GT2308-VTBA	8.4" VGA		Black	100 to 240 V AC	
		GT2308-VTBD				24 V DC	
GT21	GT2104	GT2104-RTBD	4.3" Wide [480 × 272 dots]	TFT color 65536 colors	Black	24 V DC	Ethernet, RS-422/485, RS-232
	GT2103	GT2103-PMBD	3.8" [320 × 128 dots]	TFT Monochrome (black/white) 32 shade grayscale 5-color LED (white, green, pink, orange, red)	Black	24 V DC	Ethernet, RS-422/485
		GT2103-PMBDS				24 V DC	RS-232, RS-422/485
		GT2103-PMBDS2				24 V DC	RS-232 × 2 channels
		GT2103-PMBLS				5 V DC	RS-422 (FXCPU connection only)

*1 To conform to ATEX/KCs standard, protective sheet (GT25-□□PSCC-UC) and special fitting (GT25-□□FIT-EXS) in the product list (page 623) are required. (Only productive sheet is required for GT2508-VTWD.) For the details, please refer to the Technical Bulletin "GOT2000 Series in Compliance with the ATEX Directive and KCs Certification Requirements" (No. GOT-A-0101).

For inquiries relating to the status of conforming to various standards and laws (CE, ATEX [to be obtained soon], UL/cUL, Class I Division 2, EAC, KC, KCs [to be obtained soon], and maritime certifications [ABS/BV/DNV GL/LR/NK/RINA]), please contact your local sales office.

GOT2000 + CC-Link IE Field Network communication unit sets

Classification		Model	Screen size	Display section Display color	Panel color	Power	Remarks
GT27	GT2715	GT2715-XTBA-GF	15" XGA	TFT color 65536 colors	Black	100 to 240 V AC	GOT + GT15-J71GF13-T2
		GT2715-XTBD-GF				24 V DC	
	GT2712	GT2712-STBA-GF	12.1" SVGA		Black	100 to 240 V AC	
		GT2712-STBD-GF				24 V DC	
		GT2712-STWA-GF			White	100 to 240 V AC	
		GT2712-STWD-GF				24 V DC	
	GT2710	GT2710-STBA-GF	10.4" SVGA		Black	100 to 240 V AC	
		GT2710-STBD-GF				24 V DC	
		GT2710-VTBA-GF	10.4" VGA			100 to 240 V AC	
		GT2710-VTBD-GF				24 V DC	
		GT2710-VTWA-GF			White	100 to 240 V AC	
		GT2710-VTWD-GF				24 V DC	
	GT2708	GT2708-STBA-GF	8.4" SVGA		Black	100 to 240 V AC	
		GT2708-STBD-GF				24 V DC	
		GT2708-VTBA-GF	8.4" VGA			100 to 240 V AC	
		GT2708-VTBD-GF				24 V DC	
	GT2705	GT2705-VTBD-GF	5.7" VGA		Black	24 V DC	
GT25	GT2512	GT2512-STBA-GF	12.1" SVGA	TFT color 65536 colors	Black	100 to 240 V AC	GOT + GT15-J71GF13-T2
		GT2512-STBD-GF				24 V DC	
	GT2510	GT2510-VTBA-GF	10.4" VGA		Black	100 to 240 V AC	
		GT2510-VTBD-GF				24 V DC	
		GT2510-VTWA-GF			White	100 to 240 V AC	
		GT2510-VTWD-GF				24 V DC	
	GT2508	GT2508-VTBA-GF	8.4" VGA		Black	100 to 240 V AC	
		GT2508-VTBD-GF				24 V DC	
		GT2508-VTWA-GF			White	100 to 240 V AC	
		GT2508-VTWD-GF				24 V DC	

For inquiries relating to the status of conforming to various standards and laws (CE, ATEX [to be obtained soon], UL/cUL, Class I Division 2, EAC, KC, KCs [to be obtained soon], and maritime certifications [ABS/BV/DNV GL/LR/NK/RINA]), please contact your local sales office.

GOT2000 communication units

Product name	Model	Specifications	Supported model			
			GT27	GT25	GT23	GT21
Ethernet communication unit *1	GT25-J71E71-100	Data transfer method: 100BASE-TX, 10BASE-T Compatible software: GT Works3 Ver.1.160S or later	●	●	—	—
Serial communication unit	GT15-RS2-9P	RS-232 serial communication unit (D-sub 9-pin male)	●	●	—	—
	GT15-RS4-9S	RS-422/485 serial communication unit (D-sub 9-pin female) *1 *2	●	●	—	—
	GT15-RS4-TE	RS-422/485 serial communication unit (terminal block) *1 Can be used only when connected with temperature controllers/indicating controllers by RS-485 connection or at the GOT multi-drop connection	●	●	—	—
Q bus connection unit	GT15-QBUS	Q bus connection (1 channel) unit standard model	●	●	—	—
	GT15-QBUS2	Q bus connection (2 channels) unit standard model	●	●	—	—
	GT15-75QBUSL	Q bus connection (1 channel) unit slim model *3	●	●	—	—
	GT15-75QBUS2L	Q bus connection (2 channels) unit slim model *3	●	●	—	—
MELSECNET/H communication unit	GT15-J71LP23-25	Normal station unit (optical loop)	●	●	—	—
	GT15-J71BR13	Normal station unit (coaxial bus)	●	●	—	—
CC-Link IE Controller Network communication unit	GT15-J71GP23-SX	Normal station unit (optical loop)	●	●	—	—
CC-Link IE Field Network communication unit	GT15-J71GF13-T2	Intelligent device station unit	●	●	—	—
CC-Link communication unit	GT15-J61BT13	Intelligent device station unit CC-Link Ver. 2 compliant	●	●	—	—
Field network adapter unit	GT25-FNADP	Supported network: PROFIBUS DP, DeviceNet *4	●	●	—	—
Wireless LAN communication unit *5	GT25-WLAN	IEEE802.11b/g/n compliant, built-in antenna, wireless LAN access point (base station) *6, station (client), connection to personal computer, tablet, smartphone Compliance with: Japan Radio Law *7, FCC *8, R&TTE *8, SRRC *9, KC *9	●	●	—	—
Serial multi-drop connection unit	GT01-RS4-M	For GOT multi-drop connection	●	●	●	●

*1 May not be able to be used depending on the connection target. For details, please refer to the GOT2000 Series Connection Manual.
*2 Cannot be used when connected with temperature controllers or indicating controllers by RS-485 (2-wire type) connection.
*3 Cannot be stacked with other units.
*4 The unit should be used with an Anybus® CompactCom M40 network communication module manufactured by HMS. Please purchase the module by specifying the article number.

Supported network	Communication module product name	Communication module article number
PROFIBUS DP	ABCC-M40-DPV1	AB6910-B, AB6910-C
DeviceNet	ABCC-M40-DEV	AB6909-B, AB6909-C

*5 Data transfer in wireless LAN communication may not be as stable as that in cable communication. A packet loss may occur depending on the surrounding environment and the installation location. Be sure to perform a confirmation of operation before using this product.
*6 When [Operation Mode] is set to [Access Point] in [Wireless LAN Setting] of GT Designer3, up to five stations are connectable.
*7 The product with hardware version A or later complies with the regulation. The product with hardware version A can be used only in Japan.
*8 The product with hardware version B or later complies with the regulation. The product with hardware version B or later can be used in Japan, the United States, the EU member states, Switzerland, Norway, Iceland, and Liechtenstein.
*9 The product with hardware version D or later complies with the regulation. The product with hardware version D or later can be used in Japan, the United States, the EU member states, Switzerland, Norway, Iceland, Liechtenstein, China (excluding Hong Kong, Macau, Taiwan), and Korea.

GOT2000 option units

Product name	Model	Specifications	Supported model			
			GT27	GT25	GT23	GT21
Printer unit	GT15-PRN	USB slave (PictBridge) for printer connection, 1 channel Cable for connection between printer unit and printer (3m) included	●	●	—	—
Multimedia unit	GT27-MMR-Z	For video input (NTSC/PAL), 1 channel, recording video/playing video files	● ※1	—	—	—
Video input unit	GT27-V4-Z	For video input (NTSC/PAL), 4 channels	● ※1	—	—	—
RGB input unit	GT27-R2	For analog RGB input, 2 channels (simultaneous display) ※3	● ※1	—	—	—
	GT27-R2-Z	For analog RGB input, 2 channels (display by channel) ※3	● ※1	—	—	—
Video/RGB input unit	GT27-V4R1-Z	For video input (NTSC/PAL), 4 channels/analog RGB, 1 channel input	● ※1	—	—	—
RGB output unit	GT27-ROUT	For analog RGB output, 1 channel (slim unit)	● ※1	—	—	—
	GT27-ROUT-Z	For analog RGB output, 1 channel	● ※1	—	—	—
Sound output unit	GT15-SOUT	For sound output (ϕ3.5 stereo pin jack)	●	●	—	—
External I/O unit	GT15-DIOR	For connecting an external I/O device and an operation panel (negative common input, source type output)	●	●	—	—
	GT15-DIO	For connecting an external I/O device and an operation panel (positive common input, sink type output)	●	●	—	—
SD memory card unit	GT21-03SDCD	For mounting an SD memory card	—	—	—	● ※2

※1 This unit is not usable for the 5.7 inch model.

※2 Only available to GT2103. (Excluding GT2103-PMBLS)

※3 The settings for GT27-R2 and GT27-R2-Z differ in the screen design software.

GOT2000 software

Product name	Model	Description		
HMI/GOT Screen Design Software MELSOFT GT Works3	SW1DND-GTWK3-E	English Version	Standard license product	DVD-ROM
	SW1DND-GTWK3-EA		Volume license product ※1	
	SW1DND-GTWK3-EAZ		Additional license product ※1 ※6	
FA Integrated Engineering Software MELSOFT iQ Works ※2 ※3	SW2DND-IQWK-E	English Version	Standard license product	DVD-ROM
License key for GT SoftGOT2000 ※4	GT27-SGTKEY-U	USB port license key		
Remote Personal Computer Operation Function (Ethernet) License ※5	GT25-PCRAKEY-1	1 license		
	GT25-PCRAKEY-5	5 licenses		
	GT25-PCRAKEY-10	10 licenses		
	GT25-PCRAKEY-20	20 licenses		
VNC Server Function License ※5	GT25-VNCSKEY-1	1 license		
	GT25-VNCSKEY-5	5 licenses		
	GT25-VNCSKEY-10	10 licenses		
	GT25-VNCSKEY-20	20 licenses		
MES I/F Function License ※5	GT25-MESIFKEY-1	1 license		
	GT25-MESIFKEY-5	5 licenses		
	GT25-MESIFKEY-10	10 licenses		
	GT25-MESIFKEY-20	20 licenses		
GOT Mobile Function License ※5	GT25-WEBSKEY-1 NEW	1 license		
	GT25-WEBSKEY-5 NEW	5 licenses		
	GT25-WEBSKEY-10 NEW	10 licenses		
	GT25-WEBSKEY-20 NEW	20 licenses		

※1 The desired number of licenses (2 or more) can be purchased. For details, please contact your local sales office.

※2 Volume license product and additional license product are also available. For more details, please refer to the MELSOFT iQ Works catalog (L(NA)08232ENG).

※3 The product includes the following software.
- System Management Software [MELSOFT Navigator]
- Motion Controller Engineering Software [MELSOFT MT Works2]
- Robot Engineering Software [MELSOFT RT ToolBox2 mini]
- MITSUBISHI ELECTRIC FA Library
- Programmable Controller Engineering Software [MELSOFT GX Works3, GX Works2, GX Developer]
- HMI/GOT Screen Design Software [MELSOFT GT Works3]
- Inverter Setup Software [MELSOFT FR Configurator2]

※4 To use GT SoftGOT2000, a license key for GT SoftGOT2000 is necessary for each personal computer.

※5 1 license is required for 1 GOT unit.

※6 This product does not include the DVD-ROM. Only the license certificate with the product ID No. is issued.

GOT2000 options

Product name		Model		Specifications			Supported model			
							GT27	GT25	GT23	GT21
Protective sheet *1		GT27-15PSGC		For 15"	• Antiglare type • Transparent • With a hole for the USB environmental protection cover • A set of 5 sheets		●	—	—	—
		GT25-12PSGC		For 12.1"			●	●	—	—
		GT25-10PSGC		For 10.4"			●	●	—	—
		GT25-08PSGC		For 8.4"			●	●	—	—
		GT25-05PSGC		For 5.7"			●	—	—	—
		GT27-15PSCC		For 15"	• Clear type • Transparent • With a hole for the USB environmental protection cover • A set of 5 sheets		●	—	—	—
		GT25-12PSCC		For 12.1"			●	●	—	—
		GT25-10PSCC		For 10.4"			●	●	—	—
		GT25-08PSCC		For 8.4"			●	●	—	—
		GT25-05PSCC		For 5.7"			●	—	—	—
		GT25-12PSCC-UC *8		For 12.1"	• Clear type • Transparent • Without a hole for the USB environmental protection cover *2 • A set of 5 sheets		● *8	●	—	—
		GT25-10PSCC-UC *8		For 10.4"			● *8	● *8	●	—
		GT25-08PSCC-UC *8		For 8.4"			●	● *8	●	—
		GT21-04RPSGC-UC		For 4.3" Wide	• Antiglare type • Transparent • Without a hole for the USB environmental protection cover • A set of 5 sheets		—	—	—	●
		GT21-03PSGC-UC		For 3.8"			—	—	—	●
		GT21-04RPSCC-UC		For 4.3" Wide	• Clear type • Transparent • Without a hole for the USB environmental protection cover • A set of 5 sheets		—	—	—	●
		GT21-03PSCC-UC		For 3.8"			—	—	—	●
Environmental protection sheet		GT25F-12ESGS	NEW	For 12.1"	• For conforming to IP67F • Antiglare type • Slivery • 1 sheet		—	● *7	—	—
		GT25F-10ESGS	NEW	For 10.4"			—	● *7	—	—
		GT25F-08ESGS	NEW	For 8.4"			—	● *7	—	—
USB environmental protection cover		GT25-UCOV		For 15"/12.1"/10.4"/8.4"	Environmental protection cover for the USB interface on the GOT front face (for replacement)		●	●	—	—
		GT25-05UCOV		For 5.7"			●	—	—	—
Protective cover for oil *3		GT20-15PCO		For 15"			●	—	—	—
		GT20-12PCO		For 12.1"			●	●	—	—
		GT20-10PCO		For 10.4"			●	●	●	—
		GT20-08PCO		For 8.4"			●	●	●	—
		GT25-05PCO		For 5.7"			●	—	—	—
		GT21-04RPCO		For 4.3" Wide			—	—	—	●
		GT10-20PCO		For 3.8"			—	—	—	●
Stand		GT15-90STAND		For 15"			●	—	—	—
		GT15-80STAND		For 12.1"			●	●	—	—
		GT15-70STAND		For 10.4"/8.4"			●	●	●	—
		GT05-50STAND		For 5.7"			●	—	—	—
Memory card	SD memory card	NZ1MEM-2GBSD		SD memory card for GOT, 2 GB			●	●	●	●
		NZ1MEM-4GBSD		SDHC memory card for GOT, 4 GB			●	●	●	●
		NZ1MEM-8GBSD		SDHC memory card for GOT, 8 GB			●	●	●	●
		NZ1MEM-16GBSD		SDHC memory card for GOT, 16 GB			●	●	●	●
	CF card	GT05-MEM-128MC		CF card for GT27-MMR-Z, 128 MB			●	—	—	—
		GT05-MEM-256MC		CF card for GT27-MMR-Z, 256 MB			●	—	—	—
		GT05-MEM-512MC		CF card for GT27-MMR-Z, 512 MB			●	—	—	—
		GT05-MEM-1GC		CF card for GT27-MMR-Z, 1 GB			●	—	—	—
		GT05-MEM-2GC		CF card for GT27-MMR-Z, 2 GB			●	—	—	—
		GT05-MEM-4GC		CF card for GT27-MMR-Z, 4 GB			●	—	—	—
		GT05-MEM-8GC		CF card for GT27-MMR-Z, 8 GB			●	—	—	—
		GT05-MEM-16GC		CF card for GT27-MMR-Z, 16 GB			●	—	—	—
Memory card adaptor		GT05-MEM-ADPC		Conversion adapter from CF card for GT27-MMR-Z to memory card (TYPE II)			●	—	—	—
Attachment *10		GT15-70ATT-98		For 10.4"	For replacing GT168□, GT158□, A985GOT *4		●	●	●	—
		GT15-70ATT-87			For replacing A870GOT-SWS/TWS or A8GT-70GOT-TB/TW/SB/SW		●	●	●	—
		GT15-60ATT-97		For 8.4"	For replacing GT167□, GT157□, A97□GOT		●	●	●	—
		GT15-60ATT-96			For replacing A960GOT		●	●	●	—
		GT15-60ATT-87			For replacing A870GOT-EWS, A8GT-70GOT-EB/EW, A77GOT-EL, A77GOT-EL-S5/S3		●	●	●	—
		GT15-60ATT-77			For replacing A77GOT-CL, A77GOT-CL-S5/S3, A77GOT-L, A77GOT-L-S5/S3		●	●	●	—
		GT15-50ATT-95W		For 5.7"	For replacing A956WGOT, F940WGOT		●	—	—	—
		GT15-50ATT-85			For replacing A85□GOT		●	—	—	—
		GT21-04RATT-40	NEW	For 4.3" Wide	For replacing GT104□		—	—	—	● *9
Battery		GT11-50BAT		Battery for backup of SRAM data, clock data, and system status log data *6.			● (For replacement)	● (For replacement)	● (Option)	● *5 (For replacement)
Special fitting *8		GT25-12FIT-EXS	NEW	For 12.1"	A set of special fittings for conforming to ATEX/KCs standard		● *8	—	—	—
		GT25-10FIT-EXS	NEW	For 10.4"	A set of special fittings for conforming to ATEX/KCs standard		● *8	● *8	—	—

*1 The white model does not have the front USB interface. It is recommended to use the products that the USB environmental protection cover area is closed.
*2 When using the product with the USB environmental protection cover area closed, the front USB interface cannot be used.
*3 Check if the protective cover for oil can be used in the actual environment before use. When using the cover, the front USB interface and human sensor cannot be used.
*4 Including the GP250□ and GP260□ manufactured by Digital Electronics Corporation.
*5 GT2103 does not have a built-in battery.
*6 GT21 does not support the system status log data backup function.
*7 GT2512F, GT2510F, GT2508F only.
*8 To conform to ATEX/KCs standard, use GOT model that conforms to the standard with an appropriate option. For the supported models, please contact your local sales office.
*9 GT2104-RTBD only.
*10 The attachment can be used when the mounting panel thickness is 2 to 3 mm. After replacement using the attachment, the replaced GOT does not comply with IP67F.

GOT2000 cables

Product name		Model	Cable length	Recommended product [9]	Specifications	Supported model			
						GT27	GT25	GT23	GT21
QCPU bus connection cable	QCPU connection cable GOT-to-GOT connection cable	GT15-QC06B	0.6 m	○	QCPU ⇔ GOT GOT ⇔ GOT	●	●	—	—
		GT15-QC12B	1.2 m						
		GT15-QC30B	3 m						
		GT15-QC50B	5 m						
		GT15-QC100B	10 m						
	QCPU connection cable GOT-to-GOT connection cable (long distance)	GT15-QC150BS	15 m	○	For connecting the QCPU and GOT (long distance), A9GT-QCNB is required For connecting the GOT and GOT (long distance)	●	●	—	—
		GT15-QC200BS	20 m						
		GT15-QC250BS	25 m						
		GT15-QC300BS	30 m						
		GT15-QC350BS	35 m						
Bus extension connector box		A9GT-QCNB	—	—	Connect the connector box to the main base unit of PLC when connecting the QCPU and GOT (long distance).	●	●	—	—
Bus connection cable ferrite core		GT15-QFC	—	○	Attach a ferrite core to the GOT-A900 bus connection cable when an existing GOT-A900 is replaced with a GOT2000. (two ferrite cores/set)	●	●	—	—
RS-485 terminal block conversion unit		FA-LTBGT2R4CBL05	0.5 m	○	RS-485 terminal block conversion unit With a cable for connecting RS-422/485 (connector) of GOT2000 and a RS-485 terminal block conversion unit	●	●	—	—
		FA-LTBGT2R4CBL10	1 m						
		FA-LTBGT2R4CBL20	2 m						
RS-422 conversion cable		FA-CNV2402CBL	0.2 m	○	For connecting the QCPU/L02SCPU(-P) and the RS-422 cable (GT01-C□R4-25P, GT10-C□R4-25P, GT21-C□R4-25P5) For connecting the L6ADP-R2 and the RS-422 cable (GT01-C□R4-25P, GT10-C□R4-25P, GT21-C□R4-25P5) [MINI-DIN 6-pin ⇔ D-sub 25-pin]	●	●	●	● ∗12
		FA-CNV2405CBL	0.5 m						
RS-422 cable	QnA/A/FXCPU direct connection cable Computer link connection cable CC-Link (G4) connection cable	GT01-C30R4-25P	3 m	—	For connecting the QnA/ACPU/FXCPU/motion controller (A series) and the GOT For connecting the RS-422 connector conversion cable (FA-CNV□CBL) and the GOT For connecting the serial communication module and the GOT For connecting the peripheral connection module (AJ65BT-G4-S3) and the GOT [D-sub 25-pin ⇔ separate wire (connector terminal block 9-pin)]	●	●	●	● ∗3 ∗7
		GT01-C100R4-25P	10 m						
		GT01-C200R4-25P	20 m						
		GT01-C300R4-25P	30 m						
		GT10-C30R4-25P	3 m	—	For connecting the QnA/ACPU/FXCPU/motion controller (A series) and the GOT For connecting the RS-422 connector conversion cable (FA-CNV□CBL) and the GOT For connecting the serial communication module and the GOT For connecting the peripheral connection module (AJ65BT-G4-S3) and the GOT [D-sub 25-pin ⇔ separate wire (connector terminal block 9-pin)]	—	—	—	● ∗10
		GT10-C100R4-25P	10 m						
		GT10-C200R4-25P	20 m						
		GT10-C300R4-25P	30 m						
		GT21-C30R4-25P5	3 m	—	For connecting the QnACPU and GOT For connecting the RS-422 connector conversion cable (FA-CNV□CBL) and GOT For connecting the serial communication module and GOT For connecting the peripheral connection module (AJ65BT-G4-S3) and GOT [D-sub 25-pin ⇔ separate wire (connector terminal block 5-pin)] ∗ GT2103-PMBD cannot be connected to Q00JCPU, Q00CPU, Q01CPU, A Series, or FX1/ FX2 Series.	—	—	—	● ∗2
		GT21-C100R4-25P5	10 m						
		GT21-C200R4-25P5	20 m						
		GT21-C300R4-25P5	30 m						
	Computer link connection cable	GT09-C30R4-6C	3 m	○	For connecting the serial communication module and GOT For connecting a computer link module and GOT [separate wire ⇔ D-sub 9-pin]	●	●	●	● ∗3 ∗7
		GT09-C100R4-6C	10 m						
		GT09-C200R4-6C	20 m						
		GT09-C300R4-6C	30 m						
	FXCPU direct connection cable FXCPU communication expansion board connection cable	GT01-C10R4-8P	1 m	—	For connecting the FXCPU and GOT For connecting the FXCPU communication expansion board and GOT [MINI-DIN 8-pin ⇔ D-sub 9 pin]	●	●	●	● ∗3 ∗7
		GT01-C30R4-8P	3 m						
		GT01-C100R4-8P	10 m						
		GT01-C200R4-8P	20 m						
		GT01-C300R4-8P	30 m						
		GT10-C10R4-8P	1 m	—	For connecting the FXCPU and GOT For connecting the FXCPU communication expansion board and GOT [MINI-DIN 8-pin ⇔ separate wire (connector terminal block 9-pin)]	—	—	—	● ∗4
		GT10-C30R4-8P	3 m						
		GT10-C100R4-8P	10 m						
		GT10-C200R4-8P	20 m						
		GT10-C300R4-8P	30 m						
		GT21-C10R4-8P5	1 m	—	For connecting the FXCPU and GOT For connecting the FXCPU communication expansion board and GOT [MINI-DIN 8-pin and separate wire (connector terminal block 5-pin)]	—	—	—	● ∗2
		GT21-C30R4-8P5	3 m						
		GT21-C100R4-8P5	10 m						
		GT21-C200R4-8P5	20 m						
		GT21-C300R4-8P5	30 m						
		GT10-C10R4-8PL	1 m	—	For connecting the FXCPU and GOT For connecting the FXCPU communication expansion board and GOT [MINI-DIN 8-pin ⇔ separate wire (connector terminal block 9-pin)] ∗ This cable cannot be used for FX1NC, FX2NC, FX3UC-D/DSS, FX3G, or FX3GC.	—	—	—	● ∗4
		GT10-C10R4-8PC	1 m	—	For connecting the FXCPU and GOT For connecting the FXCPU communication expansion board and GOT [MINI-DIN 8-pin ⇔ connector terminal block 9-pin with separate wire connected]	—	—	—	● ∗4
		GT10-C30R4-8PC	3 m						
		GT10-C100R4-8PC	10 m						
		GT10-C200R4-8PC	20 m						
		GT10-C300R4-8PC	30 m						
	RS-422 connector conversion cable	GT10-C02H-9SC	0.2 m	—	For connecting a PLC and GOT [D-sub 9-pin ⇔ separate wire (connector terminal block 9-pin)]	—	—	—	● ∗10

GOT2000 cables

Product name		Model	Cable length	Recommended product [9]	Specifications	Supported model			
						GT27	GT25	GT23	GT21
RS-232 cable	Q/LCPU direct connection cable	GT01-C30R2-6P	3 m	—	For connecting the Q/LCPU and GOT For connecting L6ADP-R2 and GOT/personal computer (GT SoftGOT2000) [MINI-DIN 6-pin ⇔ D-sub 9 pin]	●	●	●	● ∗5 ∗8
		GT10-C30R2-6P	3 m	—	For connecting the Q/LCPU and GOT [MINI-DIN 6-pin ⇔ separate wire (connector terminal block 9-pin)]	—	—	—	● ∗6
					For connecting multiple GOTs [MINI-DIN 6-pin ⇔ separate wire (connector terminal block 9-pin)]	—	—	—	● ∗11
	FXCPU communication expansion board connection cable FXCPU communication special adapter connection cable	GT01-C30R2-9S	3 m	—	For connecting the FXCPU communication expansion board and GOT/personal computer (GT SoftGOT2000) For connecting an FXCPU communication special adapter and GOT/personal computer (GT SoftGOT2000) [D-sub 9-pin ⇔ D-sub 9 pin]	●	●	●	● ∗5 ∗8
	FXCPU communication special adapter connection cable	GT01-C30R2-25P	3 m	—	For connecting an FXCPU communication special adapter and GOT/personal computer (GT SoftGOT2000) [D-sub 25-pin ⇔ D-sub 9 pin]	●	●	●	● ∗5 ∗8
	Computer link connection cable CC-Link (G4) connection cable	GT09-C30R2-9P	3 m	○	For connecting a serial communication module and GOT For connecting a computer link module and GOT For connecting the peripheral connection module (AJ65BT-R2N) and GOT [D-sub 9-pin ⇔ D-sub 9 pin]	●	●	●	● ∗5 ∗8
	Computer link connection cable	GT09-C30R2-25P	3 m	○	For connecting a serial communication module and GOT For connecting a computer link module and GOT [D-sub 25-pin ⇔ D-sub 9 pin]	●	●	●	● ∗5 ∗8
	RS-232 connector conversion cable	GT10-C02H-6PT9P	0.2 m	—	For connecting a PLC and GOT For connecting multiple GOTs For connecting a barcode reader, RFID, or serial printer and a GOT [D-sub 9-pin ⇔ MINI-DIN 6-pin]	—	—	—	● ∗11
	Data transfer cable	GT01-C30R2-6P	3 m	—	For connecting a GOT and a personal computer [MINI-DIN 6-pin ⇔ D-sub 9-pin] ∗ This cable is usable for the FA transparent function only, and cannot be used to transfer screen or OS data.	—	—	—	● ∗11
Conversion cable for connecting external I/O unit		GT15-C03HTB	0.3 m	○	For connecting an external I/O unit (GT15-DIO) and external I/O interface unit (A8GT-C05TK, A8GT-C30TB, user-fabricated cable) for GOT-A900	●	●	—	—
Analog RGB cable		GT15-C50VG	5 m	○	For connecting an RGB image output device (external monitor, personal computer, or others) and GOT	●	—	—	—
USB cable	Data transfer cable Printer connection cable	GT09-C30USB-5P	3 m	○	For connecting a personal computer (screen design software) and GOT For connecting a personal computer (GT SoftGOT2000) and QnU/L/FXCPU For connecting a PictBridge-compatible printer and printer unit (GT15-PRN) [USB-A ⇔ USB Mini-B]	●	●	●	● ∗9
Extended USB waterproof cable		GT10-C10EXUSB-5S	1 m	—	Use this cable for extracting the USB port of a GOT to the surface of a control panel	—	—	—	●

∗1 FA-LTBGT2R4CBL□, FA-CNV240□CBL are developed by Mitsubishi Electric Engineering Company Limited and sold through your local sales office.
The other products listed are developed by Mitsubishi Electric Systems & Service Co., LTD. and sold through your local sales office.

∗2 This cable is usable for GT2103-PMBD.

∗3 This cable is usable for GT2104-RTBD, GT2103-PMBDS.

∗4 This cable is usable for GT2104-RTBD, GT2103-PMBDS, GT2103-PMBLS. For GT2103-PMBLS, use a 3 m or shorter cable.

∗5 This cable is usable for GT2103-PMBDS, GT2103-PMBDS2.

∗6 This cable is usable for GT2104-RTBD, GT2103-PMBDS2.

∗7 GT2104-RTBD, GT2103-PMBDS is possible to correspond by combining the GT10-C02H-9SC type RS-422 connector conversion cable.

∗8 GT2103-PMBDS, GT2103-PMBDS2 is possible to correspond by combining the GT10-C02H-6PT9P type RS-232 connector conversion cable.

∗9 This cable is not usable for the printer connection.

∗10 This cable is usable for GT2104-RTBD, GT2103-PMBDS.

∗11 This cable is usable for GT2103-PMBDS, GT2103-PMBDS2.

∗12 This cable is usable for GT2104-RTBD, GT2103-PMBD, GT2103-PMBDS.

GOT2000 cables for non-Mitsubishi industrial devices

RS-232 and RS-422 cables are available from every manufacturer. For more details, please see the GOT2000 Series Connection Manual.

GOT2000 manuals

Manual name	Manual number
GOT2000 Series User's Manual (Hardware)	SH-081194ENG
GOT2000 Series User's Manual (Utility)	SH-081195ENG
GOT2000 Series User's Manual (Monitor)	SH-081196ENG
GOT2000 Series Connection Manual (Mitsubishi Products) For GT Works3 Version1	SH-081197ENG
GT Designer3 (GOT2000) Screen Design Manual	SH-081220ENG

GOT1000 Series Product list

GOT1000 model name

GT16 9 5 M - X T B A □ □

Code	Screen size
9	15"
8	12.1"
7	10.4"
6	8.4", 6.5"
5	5.7"
4	4.7"
3	4.5"
2	3.7"

Code	Display colors
5	256 colors or more
2	16 colors
0	Monochrome

Code	Mounting type
V	Compatible with video/RGB
None	Panel mount type
HS	Handy type
M	Compatible with multimedia & Video/RGB

Code	Resolution
X	XGA (1024 × 768 dots)
S	SVGA (800 × 600 dots)
V	VGA (640 × 480 dots)
Q	QVGA (320 × 240 dots)
None	(288 × 96 dots) (160 × 64 dots)

Code	Display device
T	TFT color (high brightness, wide viewing angle)
N	TFT color
S	STN color
B	STN monochrome (blue/white)
L	STN monochrome
H	STN monochrome (White/black, high contrast)

Code	Power supply
A	100 to 240VAC
D	24VDC
L	5VDC

Code	Communication interface
E*1	With built-in Ethernet
2*2	With built-in RS-232
None*2	With built-in RS-422

*1 GT145□-Q□BDE only
*2 GT10 only

GT16	High performance models with multimedia and a host of features and functions
GT14	Standard model with advanced features and communication interfaces
GT10	Compact models with basic functions

Code	Main unit frame
B	Black
W	White

Code	GT10 backlight
W	White backlight
None	Green backlight

※ For inquiries relating to products which conform to UL, cUL, and CE directives and shipping directives, please contact your local sales office.

GOT1000 main units

Model name			Screen size [resolution]	Display		Display colors (number of colors)		Power supply	Memory size	Remarks
GT16	GT1695	GT1695M-XTBA	15" XGA [1024 × 768 dots]	TFT color LCD (high brightness, wide viewing angle)		65,536 colors		100-240VAC	15MB	Compatible with multimedia & Video/RGB
		GT1695M-XTBD						24VDC		
	GT1685	GT1685M-STBA	12.1" SVGA [800 × 600 dots]	TFT color LCD (high brightness, wide viewing angle)		65,536 colors		100-240VAC	15MB	Compatible with multimedia & Video/RGB
		GT1685M-STBD						24VDC		
	GT167□	GT1675M-STBA	10.4" SVGA [800 × 600 dots]	TFT color LCD (high brightness, wide viewing angle)		65,536 colors		100-240VAC	15MB	Compatible with multimedia & Video/RGB
		GT1675M-STBD						24VDC		
		GT1675M-VTBA	10.4" VGA [640 × 480 dots]	TFT color LCD (high brightness, wide viewing angle)		65,536 colors		100-240VAC	15MB	Compatible with multimedia & Video/RGB
		GT1675M-VTBD						24VDC		
		GT1675-VNBA*1		TFT color LCD		4,096 colors		100-240VAC	11MB	–
		GT1675-VNBD*1						24VDC		
		GT1672-VNBA*1		TFT color LCD		16 colors		100-240VAC	11MB	–
		GT1672-VNBD*1						24VDC		
	GT166□	GT1665M-STBA	8.4" SVGA [800 × 600 dots]	TFT color LCD (high brightness, wide viewing angle)		65,536 colors		100-240VAC	15MB	Compatible with multimedia & Video/RGB
		GT1665M-STBD						24VDC		
		GT1665M-VTBA	8.4" VGA [640 × 480 dots]	TFT color LCD (high brightness, wide viewing angle)		65,536 colors		100-240VAC	15MB	Compatible with multimedia & Video/RGB
		GT1665M-VTBD						24VDC		
		GT1662-VNBA*1		TFT color LCD		16 colors		100-240VAC	11MB	–
		GT1662-VNBD*1						24VDC		
	GT1655	GT1655-VTBD*1	5.7" VGA [640 × 480 dots]	TFT color LCD (high brightness, wide viewing angle)		65,536 colors		24VDC	15MB	–
	Handy GOT	GT1665HS-VTBD*1	6.5" VGA [640 × 480 dots]	TFT color LCD (high brightness, wide viewing angle)		65,536 colors		24VDC	15MB	–
GT14	GT145□	GT1455-QTBDE*1	5.7" QVGA [320 × 240 dots]	TFT color LCD		65,536 colors		24VDC	9MB	–
		GT1450-QMBDE*1		TFT monochrome LCD		Monochrome (black/white)16 gray scales				
GT10	GT105□	GT1055-QSBD	5.7" QVGA [320 × 240 dots]	STN color LCD		256 colors		24VDC	3MB	–
		GT1050-QBBD		STN monochrome LCD		Monochrome (blue/white) 16 gray scales				
GT10	GT1030	GT1030-HBD*1	4.5" [288 × 96 dots]	STN monochrome LCD (High contrast)	Frame color Black	Monochrome (black/white)	3-color LED (green, orange, red)	24VDC	1.5MB	Dedicated to RS-422 connection
		GT1030-HBD2*1								Dedicated to RS-232 connection
		GT1030-HBL*1						5VDC		Dedicated to RS-422FX connection
		GT1030-HBDW*1					3-color LED (white, pink, red)	24VDC		Dedicated to RS-422 connection
		GT1030-HBDW2*1								Dedicated to RS-232 connection
		GT1030-HBLW*1						5VDC		Dedicated to RS-422FX connection
		GT1030-HWD*1	4.5" [288 × 96 dots]	STN monochrome LCD (High contrast)	White	Monochrome (black/white)	3-color LED (green, orange, red)	24VDC	1.5MB	Dedicated to RS-422 connection
		GT1030-HWD2*1								Dedicated to RS-232 connection
		GT1030-HWL*1						5VDC		Dedicated to RS-422FX connection
		GT1030-HWDW*1					3-color LED (white, pink, red)	24VDC		Dedicated to RS-422 connection
		GT1030-HWDW2*1								Dedicated to RS-232 connection
		GT1030-HWLW*1						5VDC		Dedicated to RS-422FX connection

*1 Not supported by GT Works2/GT Designer2.

GOT1000 communication interface

Product name	Model name	Specifications		Applicable model			
				GT16	GT14	Handy GOT	GT10
Bus connection unit	GT15-QBUS	Bus connection (1ch) unit standard model for QCPU (Q mode)/ motion controller CPU (Q series)		●	–	–	–
	GT15-QBUS2	Bus connection (2ch) unit standard model for QCPU (Q mode)/ motion controller CPU (Q series)		●	–	–	–
Serial communication unit	GT15-RS2-9P	RS-232 serial communication unit (D-sub 9-pin (male))		●	–	–	–
	GT15-RS4-9S	RS-422/485 serial communication unit (D-sub 9-pin (female))*1 *2		●	–	–	–
	GT15-RS4-TE	RS-422/485 serial communication unit (terminal block)*1 ※ Usable only when connecting to temperature controllers/indicating controllers via RS-485 or in GOT multi-drop connection		●	–	–	–
RS-422 conversion unit	GT15-RS2T4-9P	RS-232→RS-422 conversion unit	RS-422 connector: 9-pin	●*4 *5	–	–	–
	GT15-RS2T4-25P		RS-422 connector: 25-pin	●*4 *5	–	–	–
MELSECNET/H communication unit	GT15-J71LP23-25	Standard station unit (optical loop)		●	–	–	–
	GT15-J71BR13	Standard station unit (coaxial bus)		●	–	–	–
CC-Link IE Controller Network communication unit	GT15-J71GP23-SX	Standard station unit (optical loop)		●	–	–	–
CC-Link IE Field Network communication unit	GT15-J71GF13-T2	Intelligent device station unit		●	–	–	–
CC-Link communication unit	GT15-J61BT13	Intelligent device station unit (supporting CC-Link version 2)		●	–	–	–
Serial multi-drop connection unit	GT01-RS4-M	For GOT multi-drop connection		●	●	–	●*3
Connector conversion adapter	GT10-9PT5S	Conversion connector between D sub 9-pin male and Europe terminal block 5-pin		–	●	–	●*3
RS-232/485 Signal Conversion Adapter	GT14-RS2T4-9P	Conversion adapter from RS-232 to RS-485		–	●	–	–
CC-Link interface unit	GT11HS-CCL	CC-Link interface unit for Handy GOT		–	–	●	–
	GT11H-CCL			–	–	●	–

*1 The unit may not be able to be used depending on the connection destination. See "List of connectable models" (GOT1000 Series Catalog).
*2 The unit cannot be used when connecting to temperature controllers/indicating controllers via RS-485 (2-wire type)
*3 For the hardware version compatible with GOT, please contact your local sales office.
*4 For the instructions for connection of GT16/GT15, please contact your local sales office. The unit cannot be used with the GT1655.
*5 When using the unit in a direct connection with a QCPU, only the QnUCPU is supported.

GOT1000 optional units

Product name	Model name	Specifications	Applicable model			
			GT16	GT14	Handy GOT	GT10
Printer unit	GT15-PRN	USB slave (PictBridge) for printer connection, 1ch ✻ Cable for printer connection (3m) included	●	–	–	–
Multimedia unit	GT16M-MMR	For video input (NTSC/PAL) 1ch Record video images/play video files	●✻2	–	–	–
Video input unit	GT16M-V4	For video input (NTSC/PAL) 4ch	●✻2	–	–	–
RGB input unit	GT16M-R2	For analog RGB input 2ch	●✻2	–	–	–
Video/RGB input unit	GT16M-V4R1	For video input (NTSC/PAL) 4ch / analog RGB 1ch composite input	●✻2	–	–	–
RGB output unit	GT16M-ROUT	For analog RGB output 1ch	●✻2	–	–	–
CF card unit	GT15-CFCD	For additional CF card port (B drive) on the back of the GOT	●	–	–	–
CF card extension unit	GT15-CFEX-C08SET	For additional CF card port (B drive) at the front of the control panel✻1	●	–	–	–
Sound output unit	GT15-SOUT	For sound output	●	–	–	–
External input/output unit	GT15-DIOR	For external input/output devices and operation panel connection (negative common input / source type output)	●	–	–	–
	GT15-DIO	For external input/output devices and operation panel connection (positive common input / sink type output)	●	–	–	–

✻1 Includes unit to be installed on the control panel, unit to be installed on the GOT, and connection cable (0.8m).
✻2 Excluding the GT16□□-VNB□ and GT1655.
✻3 Only the GT1585V and GT1575V are supported.

GOT1000 software

Product name	Model name	Contents		
HMI Screen Design Software MELSOFT GT Works3 Version1	SW1DND-GTWK3-E	Single license	*DVD-ROM	English version
	SW1DND-GTWK3-EA	Multiple-licence✻1	*DVD-ROM	English version
FA Integrated Engineering Software MELSOFT iQ Works✻3	SW1DND-IQWK-E	Single license	*DVD-ROM	English version
License key for GT SoftGOT1000✻4	GT15-SGTKEY-U	For USB port		
Personal computer remote operation function (Ethernet) license✻5	GT16-PCRAKEY	1 license		
VNC® server function license✻5	GT16-VNCSKEY	1 license (For GT16)		
	GT14-VNCSKEY	1 license (For GT14)		

✻1 The desired number of licenses (2 or more) can be purchased. For details, please contact your local sales office.
✻2 Multiple-license product and additional license product are also available. For more details, please refer to the MELSOFT iQ Works catalog (L(NA)08232).
✻3 The product includes the following software.
・System Management Software [MELSOFT Navigator] ・Programmable Controller Engineering Software [MELSOFT GX Works2] ・Motion Controller Engineering Software [MELSOFT MT Works2]
・Servo Setup Software [MELSOFT MR Configurator2] ・Screen Design Software for Graphic Operation Terminal [MELSOFT GT Works3] ・Robot Programming Software [MELSOFT RT ToolBox2 mini]
✻4 To use GT SoftGOT1000, a license key for GT SoftGOT1000 is necessary for each personal computer.
✻5 1 license is required for 1 GOT unit.

GOT1000 options

Product name	Model name	Specifications		Applicable model			
				GT16	GT14	Handy GOT	GT10
Backlight	GT16-90XLTT	Backlight	For GT1695M-XTB□	●	–	–	–
	GT16-80SLTT		For GT1685M-STB□	●	–	–	–
	GT16-70SLTT		For GT1675M-STB□	●	–	–	–
	GT16-70VLTT		For GT1675M-VTB□✻1	●	–	–	–
	GT16-70VLTTA		For GT1675M-VTB□✻2	●	–	–	–
	GT16-70VLTN		For GT1675-VNB□/GT1672-VNB□	●	–	–	–
	GT16-60SLTT		For GT1665M-STB□	●	–	–	–
	GT16-60VLTT		For GT1665M-VTB□	●	–	–	–
	GT16-60VLTN		For GT1662-VNB□	●	–	–	–
Optional function board	GT16-MESB	Optional function board ✻ The required optional function board varies depending on the GOT main unit and function. For the details, see "Notes for use" (GOT1000 Series Catalog).	For MES interface function	●	–	–	–
GT10 memory loader	GT10-LDR	For GT1030/GT1020 (for OS project data transfer) no power source required		–	–	–	●
GT10 memory board	GT10-50FMB	For GT105□/GT104□ (for OS and project data transfer)		–	–	–	●
Protective sheet	GT16-90PSCB	Protective sheet for 15" screen (for GT16)	Clear, 5 sheets	●	–	–	–
	GT16-90PSGB		Anti-glare, 5 sheets	●	–	–	–
	GT16-90PSCW		Clear (frame: white), 5 sheets	●	–	–	–
	GT16-90PSGW		Anti-glare (frame: white), 5 sheets	●	–	–	–
	GT16-90PSCB-012		Clear (USB protective cover type), 5 sheets✻14	●	–	–	–
	GT16-80PSCB	Protective sheet for 12.1" screen (for GT16)	Clear, 5 sheets	●	–	–	–
	GT16-80PSGB		Anti-glare, 5 sheets	●	–	–	–
	GT16-80PSCW		Clear (frame: white), 5 sheets	●	–	–	–
	GT16-80PSGW		Anti-glare (frame: white), 5 sheets	●	–	–	–
	GT16-80PSCB-012		Clear (USB protective cover type), 5 sheets✻14	●	–	–	–
	GT16-70PSCB	Protective sheet for 10.4" screen (for GT16)	Clear, 5 sheets	●	–	–	–
	GT16-70PSGB		Anti-glare, 5 sheets	●	–	–	–
	GT16-70PSCW		Clear (frame: white), 5 sheets	●	–	–	–
	GT16-70PSGW		Anti-glare (frame: white), 5 sheets	●	–	–	–
	GT16-70PSCB-012		Clear (USB protective cover type), 5 sheets✻14	●	–	–	–
	GT16-60PSCB	Protective sheet for 8.4" screen (for GT16)	Clear, 5 sheets	●	–	–	–
	GT16-60PSGB		Anti-glare, 5 sheets	●	–	–	–
	GT16-60PSCW		Clear (frame: white), 5 sheets	●	–	–	–
	GT16-60PSGW		Anti-glare (frame: white), 5 sheets	●	–	–	–
	GT16-60PSCB-012		Clear (USB protective cover type), 5 sheets✻14	●	–	–	–
	GT16H-60PSC	Protective sheet for 6.5" screen (for GT16 Handy GOT)	Clear, 5 sheets	–	–	●	–
	GT16-50PSCB	Protective sheet for 5.7" screen (for GT16)	Clear, 5 sheets	●	–	–	–
	GT16-50PSGB		Anti-glare, 5 sheets	●	–	–	–
	GT16-50PSCW		Clear (frame: white), 5 sheets	●	–	–	–
	GT16-50PSGW		Anti-glare (frame: white), 5 sheets	●	–	–	–
	GT16-50PSCB-012		Clear (USB protective cover type), 5 sheets✻14	●	–	–	–
	GT14-50PSCB	Protective sheet for 5.7" screen (for GT14)	Clear, 5 sheets	–	●	–	–
	GT14-50PSGB		Anti-glare, 5 sheets	–	●	–	–
	GT14-50PSCW		Clear (frame: white), 5 sheets	–	●	–	–
	GT14-50PSGW		Anti-glare (frame: white), 5 sheets	–	●	–	–

GOT1000 options

Product name		Model name	Specifications			Applicable model			
						GT16	GT14	Handy GOT	GT10
Protective sheet		GT10-50PSCB	Protective sheet for 5.7" screen (for GT105□)	Clear, 5 sheets		–	–	–	●
		GT10-50PSGB		Anti-glare, 5 sheets		–	–	–	●
		GT10-50PSCW		Clear (frame: white), 5 sheets		–	–	–	●
		GT10-50PSGW		Anti-glare (frame: white), 5 sheets		–	–	–	●
		GT10-30PSCB	Protective sheet for 4.5" screen (for GT1030)	Clear, 5 sheets		–	–	–	●
		GT10-30PSGB		Anti-glare, 5 sheets		–	–	–	●
		GT10-30PSCW		Clear (frame: white), 5 sheets		–	–	–	●
		GT10-30PSGW		Anti-glare (frame: white), 5 sheets		–	–	–	●
USB protective cover		GT16-UCOV	Protective cover for USB interface on main unit front panel (for replacement)	For 15"/12.1"/10.4"/8.4"		●	–	–	–
		GT16-50UCOV		For 5.7"		●	–	–	–
		GT14-50UCOV		For 5.7"		–	●	–	–
		GT11-50UCOV		For 5.7"		–	–	–	–
Oil resistant cover※7		GT05-90PCO	Oil resistant cover for 15" screen			●	–	–	–
		GT05-80PCO	Oil resistant cover for 12.1" screen			●	–	–	–
		GT05-70PCO	Oil resistant cover for 10.4" screen			●	–	–	–
		GT05-60PCO	Oil resistant cover for 8.4" screen			●	–	–	–
		GT16-50PCO	Oil resistant cover for 5.7" screen			●	–	–	–
		GT05-50PCO	Oil resistant cover for 5.7" screen			–	●	–	●
		GT10-30PCO	Oil resistant cover for 4.5" screen			–	–	–	●
Emergency stop switch guard		GT16H-60ESCOV	Cover for accidental operation prevention of emergency stop switch (for GT16 Handy GOT)			–	–	●	–
Handy GOT wall-mounting fixture		GT14H-50ATT	GT14 Handy GOT wall-mounting fixture			–	–	–	●※6
Stand		GT15-90STAND	Stand for 15" type			●	–	–	–
		GT15-80STAND	Stand for 12.1" type			●	–	–	–
		GT15-70STAND	Stand for 10.4"/8.4" type			●	–	–	–
		GT05-50STAND	Stand for 5.7" type			●	●	–	●
Memory card	CF card	GT05-MEM-128MC	128MB flash ROM			●	–	●	–
		GT05-MEM-256MC	256MB flash ROM			●	–	●	–
		GT05-MEM-512MC	512MB flash ROM			●	–	●	–
		GT05-MEM-1GC	1GB flash ROM			●	–	●	–
		GT05-MEM-2GC	2GB flash ROM			●	–	●	–
		GT05-MEM-4GC	4GB flash ROM			●	–	●※10	–
		GT05-MEM-8GC	8GB flash ROM			●	–	●※10	–
		GT05-MEM-16GC	16GB flash ROM			●	–	●※10	–
	SD card	L1MEM-2GBSD	2GB SD memory card			–	●	–	–
		L1MEM-4GBSD	4GB SDHC memory card			–	●	–	–
Memory card adapter		GT05-MEM-ADPC	CF card→memory card (TYPE Ⅱ) conversion adapter			●	–	●	–
Attachment		GT15-70ATT-98	Attachment for 10.4" type	A985GOT※8		GT167□ →GT157□ GT1275	●	–	–	–
		GT15-70ATT-87		A870GOT-SWS A870GOT-TWS A8GT-70GOT-TW	A8GT-70GOT-TB A8GT-70GOT-SW A8GT-70GOT-SB		●	–	–	–
		GT15-60ATT-97	Attachment for 8.4" type	A97□GOT		GT166□ →GT156□ GT1265	●	–	–	–
		GT15-60ATT-96		A960GOT			●	–	–	–
		GT15-60ATT-87		A870GOT-EWS A8GT-70GOT-EW A8GT-70GOT-EB	A77GOT-EL-S5 A77GOT-EL-S3 A77GOT-EL		●	–	–	–
		GT15-60ATT-77		A77GOT-CL-S5 A77GOT-CL-S3 A77GOT-CL	A77GOT-L-S5 A77GOT-L-S3 A77GOT-L		●	–	–	–
		GT15-50ATT-95W	Attachment for 5.7" type	A956WGOT	F940WGOT	GT1655 GT155□ →GT145□ GT115□	●	●	–	–
		GT15-50ATT-85		A85□GOT			●	●	–	–
Battery		GT15-BAT	Battery for backup of clock data and maintenance time notification data				●※11	–	●※13	–
		GT11-50BAT	Battery for backup of clock data, alarm history, recipe data, time action set values (for replacement)				●※12	●	●※9	●※6

※1 Function version C or earlier.
※2 Function version D or later.
※3 Function version B or earlier.
※4 Function version C or later.
※5 Excluding the GT115□-Q□BDQ and GT115□-Q□BDA.
※6 Excluding the GT1020.
※7 Check if the oil resistant cover can be used in the actual environment before use.
When using the oil resistant cover, the front USB interface and human sensor cannot be used.
※8 Including the GP250□ and GP260□ manufactured by Pro-face.
※9 Can be used only with the GT11 Handy.
※10 Can be used only with the GT16 Handy.
※11 Excluding GT1655. Application: Battery for backup of clock data, maintenance time notification data, system log data, SRAM user area (for replacement)
※12 Can be used only with the GT1655. Application: Battery for backup of clock data, maintenance time notification data, system log data, SRAM user area (for replacement)
※13 Can be used only with the GT16 Handy. Application: Battery for backup of clock data, maintenance time notification data, system log data, SRAM user area (for replacement)
※14 The front-face USB interface cannot be used when using a protective sheet that covers the USB protective cover area.

GOT1000 manuals

※Manuals are supplied as PDF documents with the software package in the DVD-ROM. Printed manuals are also available.

Manual title	Catalog No.
GT Designer3 Version1 Screen Design Manual (Fundamentals)	SH-080866ENG
GT Designer3 Version1 Screen Design Manual (Functions) *A set of two volumes	SH-080867ENG
GOT1000 Series Connection Manual (Mitsubishi Products) for GT Works3	SH-080868ENG
GOT1000 Series Connection Manual (Non-Mitsubishi Products 1) for GT Works3	SH-080869ENG
GOT1000 Series Connection Manual (Non-Mitsubishi Products 2) for GT Works3	SH-080870ENG
GOT1000 Series Connection Manual (Microcomputer, MODBUS Products, Peripherals) for GT Works3	SH-080871ENG
GOT1000 Series Gateway Functions Manual for GT Works3	SH-080858ENG
GOT1000 Series MES Interface Function Manual for GT Works3	SH-080859ENG
GT SoftGOT1000 Version3 Operating Manual for GT Works3	SH-080861ENG

Manual title	Catalog No.
GT Simulator3 Version1 Operating Manual for GT Works3	SH-080860ENG
GT Converter2 Version3 Operating Manual for GT Works3	SH-080862ENG
GOT1000 Series User's Manual (Extended Functions, Option Functions) for GT Works3	SH-080863ENG
GT16 User's Manual (Hardware)	SH-080928ENG
GT16 User's Manual (Basic Utility)	SH-080929ENG
GT14 User's Manual	JY997D44801C
GT16 Handy GOT User's Manual (Hardware • Utility, Connection) *A set of two volumes	JY997D41201
GT10 User's Manual	JY997D24701

GOT1000 cables

Product name		Model name	Cable length	Third party products ※1	Application	Applicable model ※2			
						GT16	GT14	Handy GOT	GT10
Bus connection cable for QCPU (Q mode)	QCPU extension cable GOT-to-GOT connection cable	GT15-QC06B	0.6m	○	For connection between QCPU and GOT For connection between GOT and GOT	●	–	–	–
		GT15-QC12B	1.2m						
		GT15-QC30B	3m						
		GT15-QC50B	5m						
		GT15-QC100B	10m						
	Long-distance connection cable for QCPU GOT-to-GOT long-distance connection cable	GT15-QC150BS	15m	○	For long-distance (13.2m or more) connection between QCPU and GOT (A9GT-QCNB required) For long-distance connection between GOT and GOT	●	–	–	–
		GT15-QC200BS	20m						
		GT15-QC250BS	25m						
		GT15-QC300BS	30m						
		GT15-QC350BS	35m						
Bus extension connector box		A9GT-QCNB	–	–	Used for QCPU long-distance (13.2m or more) bus connection	●	–	–	–
Bus connection cable for QnA/ACPU/motion controller CPU (A series)	Large CPU extension cable	GT15-C12NB	1.2m	○	For connection between QnA/ACPU/motion controller CPU (A series, extension base) and GOT	●	–	–	–
		GT15-C30NB	3m						
		GT15-C50NB	5m						
		GT15-AC06B	0.6m	○	For connection between QnA/ACPU/motion controller CPU (A series, extension base) and A7GT-CNB	●	–	–	–
		GT15-AC12B	1.2m						
		GT15-AC30B	3m						
		GT15-AC50B	5m						
		GT15-A370C12B-S1	1.2m	○	For connection between motion controller CPU (A series, main base) and GOT	●	–	–	–
		GT15-A370C25B-S1	2.5m						
		GT15-A370C12B	1.2m	○	For connection between motion controller CPU (A series, main base) and A7GT-CNB	●	–	–	–
		GT15-A370C25B	2.5m						
	Small CPU extension cable	GT15-A1SC07B	0.7m	○	For connection between QnAS/AnSCPU/motion controller CPU (A series) and GOT	●	–	–	–
		GT15-A1SC12B	1.2m						
		GT15-A1SC30B	3m						
		GT15-A1SC50B	5m	○	For connection between QnAS/AnSCPU and GOT	●	–	–	–
		GT15-A1SC05NB	0.45m	○	For connection between QnAS/AnSCPU/motion controller CPU (A series) and A7GT-CNB	●	–	–	–
		GT15-A1SC07NB	0.7m						
		GT15-A1SC30NB	3m						
		GT15-A1SC50NB	5m	○	For connection between QnAS/AnSCPU and A7GT-CNB	●	–	–	–
	Small CPU long-distance connection cable	GT15-C100EXSS-1	10.6m	○	For long-distance connection between QnAS/AnSCPU/ motion controller CPU (A series) and GOT For long-distance connection between A7GT-CNB and GOT ※Set of GT15-EXCNB and GT15-C□BS	●	–	–	–
		GT15-C200EXSS-1	20.6m						
		GT15-C300EXSS-1	30.6m						
	GOT-to-GOT connection cable	GT15-C07BS	0.7m	○	For connection between GOT and GOT	●	–	–	–
		GT15-C12BS	1.2m						
		GT15-C30BS	3m						
		GT15-C50BS	5m						
	GOT-to-GOT long-distance connection cable	GT15-C100BS	10m	○	For connection between GOT and GOT	●	–	–	–
		GT15-C200BS	20m						
		GT15-C300BS	30m						
	A0J2HCPU connection cable	GT15-J2C10B	1m	○	For connection between power supply unit (A0J2-PW) for A0J2HCPU and GOT	●	–	–	–
Bus connector conversion box		A7GT-CNB	–	–	Used for QnA/ACPU long-distance bus connection	●	–	–	–
Buffer circuit cable		GT15-EXCNB	0.5m	○	Usable as GT15-C□EXSS-1 in combination with GT15-C□BS	●	–	–	–
Ferrite core set for Q bus cable (two-pack)		GT15-QFC	–	○	Ferrite cores for replacing existing GOT-A900 bus cable with bus cable for GOT1000	●	–	–	–
Ferrite core set for A bus cable (two-pack)		GT15-AFC	–	○					
RS-422 conversion cable		GT16-C02R4-9S	0.2m	○	For connection between RS-422/485 (connector) of GT16 and RS-422 cable (D-sub 9 pins)	●	–	–	–
		GT16-C02R4-25S	0.2m	○	For connection between RS-422/485 (connector) of GT16 and RS-422 cable (D-sub 25 pins)	●	–	–	–
RS-485 terminal block conversion unit		FA-LTBGTR4CBL05	0.5m	○	RS-485 terminal block conversion unit ※With cable for connection between RS-422/485 (connector) of GT16 and RS-485 terminal block conversion unit	●	–	–	–
		FA-LTBGTR4CBL10	1m						
		FA-LTBGTR4CBL20	2m						
RS-422 cable	QnA/A/FXCPU direct connection cable Computer link connection cable	GT01-C30R4-25P	3m	–	For connection between QnA/ACPU/motion controller CPU (A series)/FXCPU (D-sub 25-pin connector) and GOT For connection between FA-CNV□CBL and GOT For connection between serial communication unit and GOT For connection between AJ65BT-G4-S3 and GOT	●※6	●	●※3 –	●※4
		GT01-C100R4-25P	10m						
		GT01-C200R4-25P	20m						
		GT01-C300R4-25P	30m						
		GT10-C30R4-25P	3m	–	For connection between QnA/A/FXCPU (D-sub 25-pin connector) and GOT For connection between serial communication unit (AJ71QC24(N)-R4) and GOT	–	–	–	●※5
		GT10-C100R4-25P	10m						
		GT10-C200R4-25P	20m						
		GT10-C300R4-25P	30m						
	Computer link connection cable	GT09-C30R4-6C	3m	○	For connection between serial communication unit and GOT For connection between computer link unit and GOT	●※6	●	●※3 –	●※4
		GT09-C100R4-6C	10m						
		GT09-C200R4-6C	20m						
		GT09-C300R4-6C	30m						
	FXCPU direct connection cable FX communication function extension board connection cable	GT01-C10R4-8P	1m	–	For connection between FXCPU (MINI-DIN 8-pin connector) and GOT For connection between FXCPU communication function extension board (MINI-DIN 8-pin connector) and GOT	●※6	●	●※3 –	●※4
		GT01-C30R4-8P	3m						
		GT01-C100R4-8P	10m						
		GT01-C200R4-8P	20m						
		GT01-C300R4-8P	30m						
		GT10-C10R4-8P	1m			–	–	–	●※5
		GT10-C30R4-8P	3m						
		GT10-C100R4-8P	10m						
		GT10-C200R4-8P	20m						
		GT10-C300R4-8P	30m						
		GT10-C10R4-8PL	1m	–	For connection between FXCPU (MINI-DIN 8-pin connector) and GOT For connection between FXCPU communication function extension board (MINI-DIN 8-pin connector) and GOT ※The unit cannot be used with the FX1NC, FX2NC, FX3UC-D/DSS, FX3G.				
		GT10-C10R4-8PC	1m	–	For connection between FXCPU (MINI-DIN 8-pin connector) and GOT For connection between FXCPU communication function extension board (MINI-DIN 8-pin connector) and GOT	–	–	–	●※5
		GT10-C30R4-8PC	3m						
		GT10-C100R4-8PC	10m						
		GT10-C200R4-8PC	20m						
		GT10-C300R4-8PC	30m						
	Connector conversion cable for F930→GT1030 replacement	GT10-C02H-9SC	0.2m	–	For replacing a F930GOT unit with the GT1030 series unit Converts D-sub 9-pin connector to loose wire (Europe terminal block)	–	–	–	●
RS-232 cable	Q/LCPU direct connection cable Data transfer cable	GT01-C30R2-6P	3m	–	For connection between Q/LCPU and GOT/personal computer (GT SoftGOT1000) (D-sub 9-pin)	●	●	–	●※4
					For connection between personal computer (screen design software) (D-sub 9-pin, female) and GOT (MINI-DIN 6-pin, male)	–	–	●	●※5
		GT10-C30R2-6P	3m	–	For connection between Q/LCPU and GOT For connection between GOT and GOT	–	–	–	●※5
		GT11H-C30R2-6P	3m	–	For connector conversion box between Q/LCPU and Handy GOT	–	–	●	–

GOT1000 cables

Product name		Model name	Cable length	Third party products *1	Application	Applicable model *2			
						GT16	GT14	Handy GOT	GT10
RS-232 cable	FX communication function extension board connection cable, FX communication function adapter connection cable, Data transfer cable	GT01-C30R2-9S	3m	–	For connection between FXCPU communication function extension board (D-sub 9-pin connector) and GOT/personal computer (GT SoftGOT1000) (D-sub 9-pin) For connection between FXCPU communication function adapter (D-sub 9-pin connector) and GOT For connection between personal computer (screen design software) (D-sub 9-pin, female) and GOT (D-sub 9-pin, female)	●	●	●*3	●*4
	FX communication function adapter connection cable	GT01-C30R2-25P	3m	–	For connection between FXCPU communication special adapter (D-sub 25-pin connector) and GOT, personal computer (GT SoftGOT1000) (D-sub 9-pin)	●	●	●*3	●*4
	Computer link connection cable	GT09-C30R2-9P	3m	○	For connection between serial communication unit and GOTFor connection between computer link unit and GOT For connection between AJ65BT-R2N and GOT (GT09-C30R2-9P only)	●	●	●*3	●*4
		GT09-C30R2-25P	3m						
Connector conversion box for Handy GOT		GT16H-CNB-42S	–	–	Converts Handy GOT connector to RJ-45 for terminal block, D-sub connector or Ethernet for each signal type	–	–	●*7	–
		GT11H-CNB-37S	–	–	Converts D-sub 37-pin connector to terminal block and D-sub 9-pin connector	–	–	●*8	–
External connection cable	FA device, power supply and operation switch connection cable	GT16H-C30-42P	3m	–	For connection between connector conversion box and Handy GOT	–	–	●*7	–
		GT16H-C60-42P	6m						
		GT16H-C100-42P	10m						
		GT16H-C30-32P	3m	–	For connection between CC-Link interface unit and Handy GOT	–	–	●*7	–
		GT16H-C50-32P	5m						
		GT16H-C80-32P	8m						
		GT16H-C130-32P	13m						
		GT11H-C30-37P	3m	–	For connection between FA device connection relay cable and GOT	–	–	●*8	–
		GT11H-C60-37P	6m						
		GT11H-C100-37P	10m						
		GT11H-C30	3m	–	For connection between FA device, power supply and operation switches and GOT	–	–	●*8	–
		GT11H-C60	6m						
		GT11H-C100	10m						
	Dedicated cable for CC-Link interface unit	GT11H-C30-32P	3m	–	For connection between CC-Link interface unit and Handy GOT	–	–	●*8	–
		GT11H-C50-32P	5m						
		GT11H-C80-32P	8m						
		GT11H-C130-32P	13m						
FA device connection relay cable	RS-422, power supply and operation switch connection cable	GT11H-C15R4-8P	1.5m	–	For connection between FXCPU and GOT For connection between power supply and operation switches and GOT	–	–	●*8	–
		GT11H-C15R4-25P	1.5m	–	For connection between A/QnACPU and GOT For connection between power supply and operation switches and GOT	–	–	●*8	–
	RS-232, power supply and operation switch connection cable	GT11H-C15R2-6P	1.5m	–	For connection between QCPU and GOT For connection between power supply and operation switches and GOT	–	–	●*8	–
Barcode reader connection cable		GT10-C02H-6PT9P	0.2m	–	For connection between barcode reader (D-sub 9-pin, male) and GOT (MINI-DIN 6-pin, male) RS-232	–	–	–	●*5
External I/O unit connection conversion cable		GT15-C03HTB	0.3m	○	For connection between GOT1000 (external I/O unit) and GOT-A900 external I/O interface unit connection cable (A8GT-C05TK/A8GT-C30TB/user-fabricated cable)	●	–	–	–
Analog RGB cable		GT15-C50VG	5m	○	For connection between external monitor, personal computer and vision sensor and GOT	●	–	–	–
USB cable	RS-232/USB conversion adapter for data transfer	GT10-RS2TUSB-5S	–	–	For connection between personal computer (USB) and GOT (RS-232) (Adapter and personal computer are connected with GT09-C30USB-5P.)	–	–	–	●*5
	Data transfer cable	GT09-C30USB-5P	3m	○	For connection between personal computer (USB) and GOT (USB mini-B) For connection between QnUCPU (USB mini-B) and personal computer (GT SoftGOT1000)	●	–	●	●*4
					For connection between printer and GOT (printer unit)	●	–	–	–
Extension USB waterproof cable		GT14-C10EXUSB-4S	1m	–	For extending the USB port of GOT to the control panel	–	●	–	–
		GT10-C10EXUSB-5S	1m	–		–	–	–	●*4

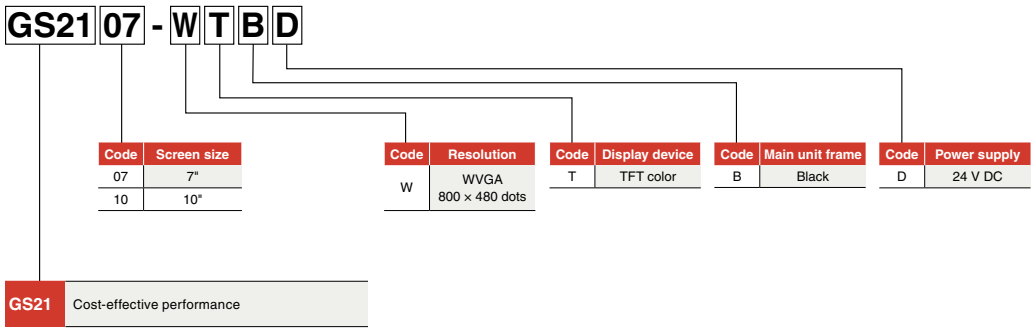
*1 FA-LTBGTR4CBL□ is developed by Mitsubishi Electric Engineering Company Limited and sold through your local sales office.
The other products listed are developed by Mitsubishi Electric System & Service Co., LTD. and sold through your local sales office.
*2 The applicable connection configuration and cable vary depending on the GOT main unit. For more details, see the GOT1000 Series Handbook and the GOT1000 Series Connection Manual.
*3 Can be used when used together with the Handy GOT connector conversion box.
*4 Can be used only with the GT105□ and GT104□.
*5 Can be used only with the GT1030 and GT1020.
*6 To connect with RS-422/485 interface of GT16 main unit, an RS-422 conversion cable (GT16-C02R4-9S) is required.
*7 Can be used only with the GT16 Handy.
*8 Can be used only with the GT11 Handy.

GOT1000 cables for non-Mitsubishi industrial devices

RS-232 and RS-422 cables are available from every manufacturer. For more details, please see the GOT1000 Series Connection Manual.

GOT SIMPLE Series Product list

GOT SIMPLE (GS21) model name



GOT SIMPLE (GS21) Base Units

Category		Model	Screen size	Display section Display color	Panel color	Power	Stocked Item
GS21	GS2110	GS2110-WTBD	10" WVGA	TFT color 65536 colors	Black	24 V DC	S
	GS2107	GS2107-WTBD	7" WVGA				S

For inquiries relating to the status of conforming to various standards and laws (CE, ATEX [to be obtained soon], UL/cUL, Class I Division 2, EAC, KC, KCs [to be obtained soon], and maritime certifications [ABS/BV/DNV GL/LR/NK/RINA]), please contact your local sales office.

MC Works64

e-F@ctory's SCADA software
Create an advanced, integrated monitoring system for FA equipment.

The Mitsubishi SCADA software MC Works64 provides a highly functional monitoring control system that works with a wide range of FA equipment, thus helping to achieve solutions for ensuring visualization, analysis and continuous improvement.

■Enhancement of visibility and operability

It may be difficult to effectively represent equipment monitoring using only 2D graphics. On the other hand, 3D graphics can enhance the visibility with its stereoscopic displays.
3D graphics allow you to have monitor views from various angles. This enables you to know the condition of equipment quickly and accurately, have instinctive monitoring views and make intuitive control.

■Visualizing energy

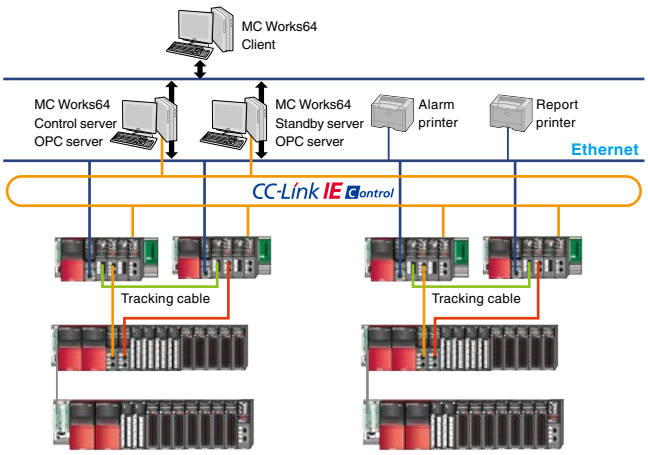
By monitoring energy consumption, energy use can be reduced over time.
Energy consumption can be visualized through the integration of Mitsubishi Electric's energy measurement equipment and AX Energy; an energy analysis and visualization tool.
The lineup of Mitsubishi Electric's energy-saving equipment, that includes the inverter with enhanced motor control, will reduce energy consumption at your plant.

■Preventive maintenance

Mitsubishi Electric's MES interface module can be used to collect information on production control. AX Facility can then display and analyze the diagnosis and equipment failure information.
These products automatically collect the information on the condition of equipment from a large amount of data, using it for the improvement of: the availability factor, preventive maintenance, fault prediction etc.

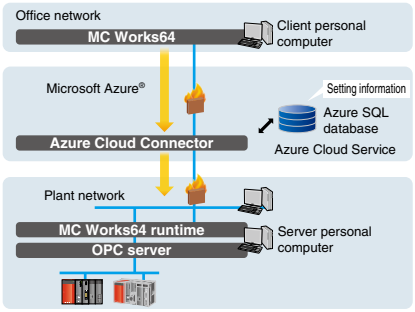
■Enhancement of reliability

MC Works64 enables you to construct redundant server systems and server-and-client systems.
It is possible to utilize two servers, a control server and a standby server, to enhance the reliability of the system and to reduce the communication load on the network.
It is possible to embody a configuration suitable for the system size, from a stand-alone system to a large-scale system.

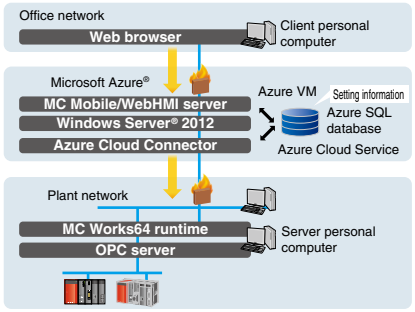


■Cloud×Microsoft Azure® [Partner product]

Microsoft Azure®, the Cloud service by Microsoft®, is supported. You can store data and server applications on the Cloud to construct a flexible system.



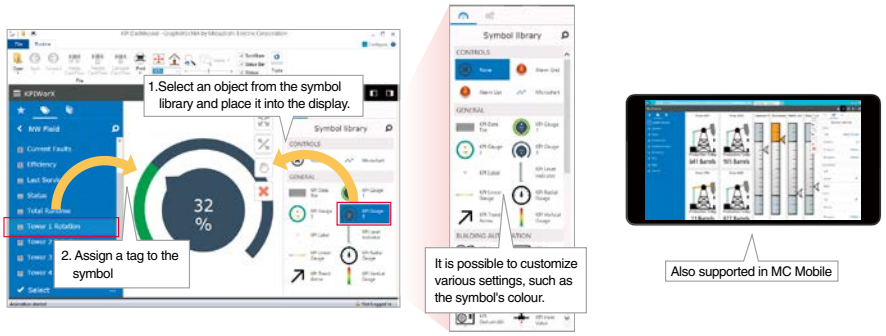
1. How to use Microsoft Azure® as a communication route
Merit You can monitor a subject easily and safely.



2. How to have a server application on Microsoft Azure®
Merit You can save the time for managing server PC.

■KPIWorX

During runtime mode, it is possible to create a personalized monitoring display. There are a variety of widgets available (device symbols, alarms, trends etc.) that can be arranged on the screen as desired in order to display the necessary data. After creating these displays it is possible to save them and reload them at a later time; either for viewing or further customization.



High-speed, reliable data collection × MC Historian

A high performance and high reliability data logger that can collect 100,000 points per second* (by comparison, the collection performance of the TrendWorX64 is 20,000 points per second*).
It is also possible to log the result of a calculation based upon a user-defined formula.
Long term logging is possible thanks to a high-compression logging feature. High reliability can be ensured through redundancy and distributed processing.
*Depends on the system configuration.

Energy monitoring × AX Energy

It is possible to visualize and analyze CO_2 emissions and the consumption of energy, including electricity and gas, based on plant, facility and device leading to energy savings and cutting costs. You can express daily and monthly energy consumption in the form of a graph, and you can easily switch their views.
You can also use Microsoft® Excel® to create a form in the format of your choice.

Preventive maintenance × AX Facility

It is possible to use prior knowledge on equipment faults to create a resource that improves recovery times. It is possible to analyze the causes of facility troubles together with their frequency to know their trends, providing aid for preventive maintenance. You can use Microsoft® Excel® to create a form in the format of your choice from the result of analysis.

Quality management × AX Quality

AX Quality creates management charts for the analysis of quality control and process capacity, reducing the labor of onsite operators and managers. AX Quality provides SQC/SPC data analysis, SQC charts, reports, and SPC rule-based alarms.

Mobile monitoring × MC Mobile (optional package)

MC Mobile is the mobile software that monitors important applications of a building or a plant. It is easy to set up and use MC Mobile efficiently. The user can have access to, and monitor, important data anytime, anywhere and from any terminal. The manager, the engineer, the maintenance worker and the operator can: access and monitor data in real-time, view data on alarms, trends, energy, quality, production information etc.
MC Works64 supports server and client systems and redundancy.
MC Mobile is compatible with mobile terminals using the following technologies; Microsoft® Windows Phone® and Surface®, Apple® iPhone® and iPad®, Android® phones and tablets, or HTML5.

Report × ReportWorX Lite (optional package)

Data from databases can be extracted and used to create various types of reports including: daily, weekly, monthly and yearly reports. This software can create a form in the Microsoft® Excel® format and can also save files in HTML and PDF formats. In addition, you can register multiple form format templates. MC Works64 includes a simplified version of this software called ReportWorX Express that supports OPC, TrendWorX64 Logger Database, MC Historian, AlarmWorX64 Logger Database, Energy Star and AX Quality. Among them, ReportWorX Lite (optional package) is recommended.

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• Apple, iPhone and iPad are the registered trademarks or the trademarks of Apple Inc. in the US.
• Ethernet is the trademark of Xerox Corporation in the US.

INDUSTRIAL ROBOTS

Industrial Robot

The "robot" built with the latest technology for FA for future-oriented factories.

The combination of high-speed, high-precision basic performance and intelligent sensors is most ideal for the cell production field.
Its high affinity with programmable controllers and other FA products will bring an ultimate user-friendliness.

MELFA

Vertical, multiple-joint type

RV-F Series



A perfect choice for future-oriented assembly cells capable of multiproduct variable quantity production

Product specification P.644

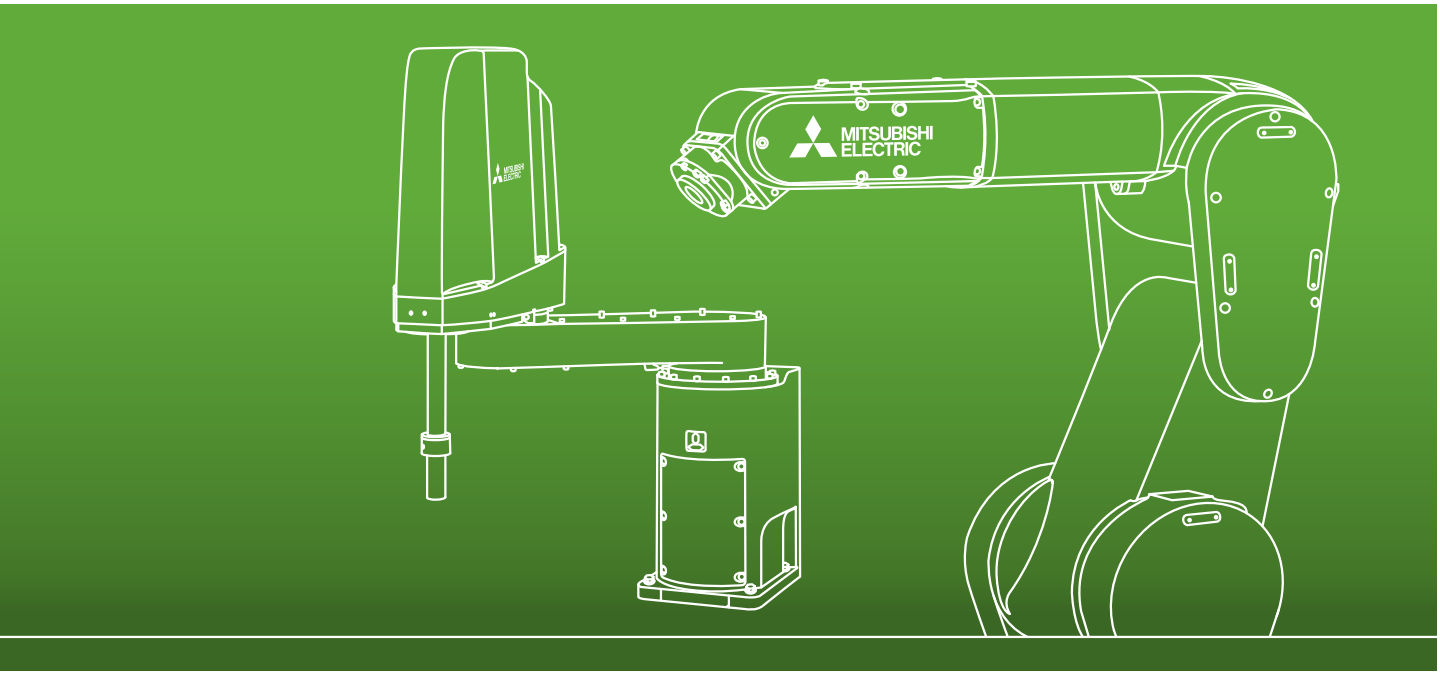
Horizontal, multiple-joint type

RH-F Series



Ideal for a wide variety of uses, from assembly of small parts to transporting heavy articles and box packing

Product specification P.652



Ceiling

RH-3FHR



Small-footprint ceiling installation, high-speed, high-precision operation!

To learn product specifications, please refer to the separate catalog "Industrial Robot F Series".

Options



Force sensor set



MELFA-3D Vision



Multifunctional electric hand

Offers intelligent solutions to work with more advanced applications

Product specification
P.657

RV/RH-F Series Features & Line Up

Features

Contributes to improve productivity with high-frequency operations RV RH

Enhanced continuous operation performance by adopting the in-house motor and reviewing the overload detection system. Can be worked under high-frequency movement.



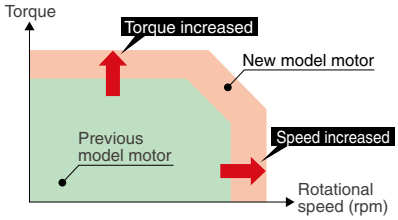
Changes in operating posture can be made even more quickly!! RV

Changes in operating posture, which occur frequently during assembly, can be completed at rapid speed, increasing the speed of the axis close at hand as well as that of the base axis. Enables changes to be made to the operating posture at high speed.



The fastest high-speed operation in its class RV RH

Its high-rotation and high-torque output thanks to the in-house developed motor and high-rigidity arm, combined with our unique drive control technology delivers best-in-class operating performance.
Continuous operation has also been improved, contributing to cycle time reduction and enhanced productivity.

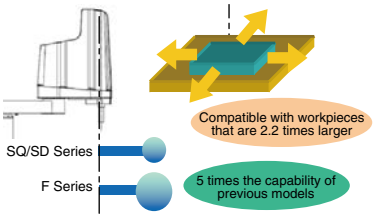


Improved speed for the vertical movements RH

Improved speed for the vertical movements that are so essential to horizontal multi-joint robot operation. 2400 mm/s, **[RH-6FH: Twice as fast as the conventional speed]**

Enhanced wrist axis RH

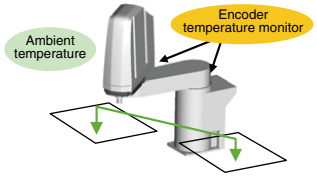
Tolerable J4 axis inertia dramatically increased. Applies easily to multiple hands, offset hands, etc.
[5 times that of previous models (RH-20FH)]



Enhanced wrist (RH-20FH)

Improved continuous operatability RV RH

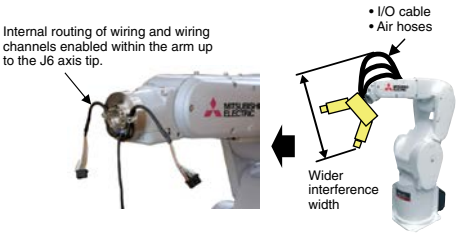
Overload detection levels optimized based on the ambient temperature settings for the robot (set in the parameters). This helps improve continuous operability using load levels calculated based on actual environmental conditions for the robot axes.



The encoder temperature is monitored such that the machine is shut down due to error if the temperature exceeds the tolerable limit.

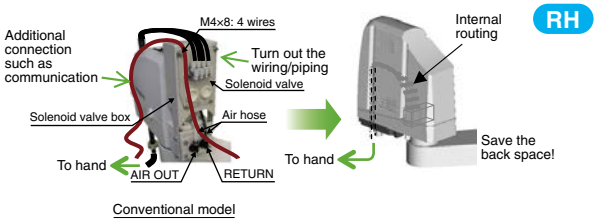
Internal routing of hand wiring and wiring channels

Internal routing of cables and air hoses is enabled through the internal channels that lead up to the end of the robot arm.
Such internal routing increases the areas of the work envelope that the robot can reach without twisting and entangling cables and hoses.
This prevents interference with cables around devices and reduces the risk of wiring disconnection.



RV

Note: Specify a model with Internal wiring (a model ending in '-SHxx'). The supported Internal wiring types may vary by model.



RH

Line Up

RV-F SERIES

A compact 6-axis jointed robot with an optimal arm length and wider range of movement suited for complex assembly and processing tasks.
Compact body and slim arm design, allowing operating area to be expanded and load capacity increased.
Layout accommodates a wide range of applications from transport of mechanical parts to assembly of electrical parts.
Environmental resistance specifications enable application to a wide range of uses without needing to consider the installation environment.



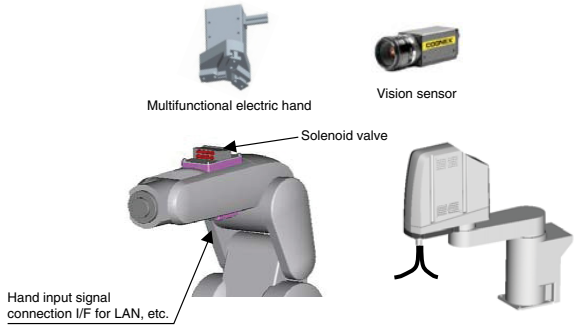
Type	RV-2F	RV-2FL	RV-4F	RV-4FL	RV-7F	RV-7FL	RV-7FLL	RV-13F	RV-13FL	RV-20F	RV-35F	RV-50F	RV-70F
Maximum load capacity	3 kg		4 kg		7 kg		7 kg	13 kg		20 kg	35 kg	50 kg	70 kg
Maximum reach radius	504 mm	649 mm	515 mm	649 mm	713 mm	908 mm	1503 mm	1094 mm	1388 mm	1094 mm	2050 mm		

Computuability with internal Ethernet cable tools

RV RH

Internal installation of wiring and piping for connecting to vision sensors enabled.

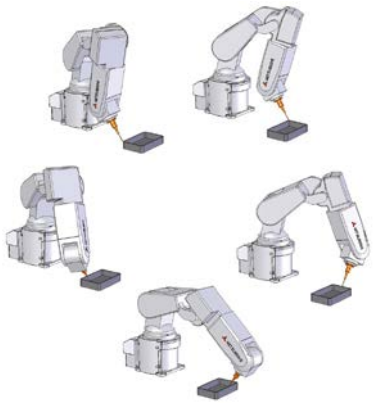
●Hand wiring ●Pipe ●Ethernet cable for the vision sensor
●Multifunctional electric hand



Expanded J4 axis operating range

RV

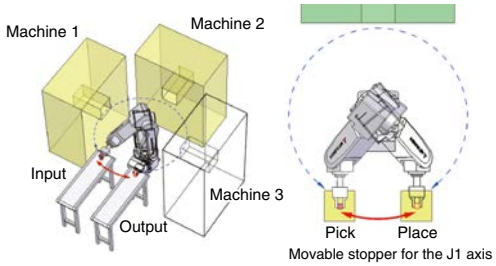
Expanding the J4 axis operating range enables the posture to be changed continuously during assembly and transport operations. It also eliminates the need for the robot to move in the opposite direction partway through an operation.



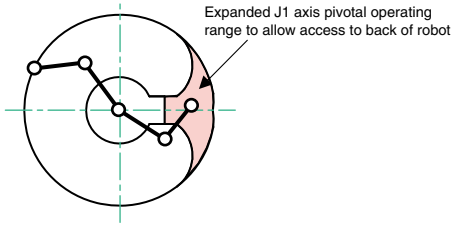
Expanded pivotal operating range

Improved flexibility for robot layout design considerations.
Enabling more effective use of access space around the entire perimeter including to the rear.
Shortened movement distances, enabling takt times to be shortened.

RV



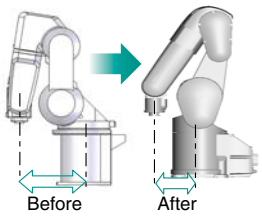
RH



Compact installation with operation performed near the robot base

RV

Use of a flap-style arm contributes to a slimming of customer equipment, enabling operations to be completed in even closer proximity to the robot.



RH-F SERIES

Matches perfectly to a variety of applications with a wide range of operating areas and variations.
High speed and high accuracy achieved with the highly rigid arm and latest servo control technology.
Suitable for a wide range of fields from mass production of food and pharmaceutical products requiring high-speed operation to assembly operations requiring high precision.



Type	RH-3FH			RH-6FH			RH-12FH			RH-20FH			RH-3FHR		
Maximum load capacity	3 kg			6 kg			12 kg			20 kg			3 kg		
Maximum reach radius	350 mm	450 mm	550 mm	350 mm	450 mm	550 mm	700 mm	850 mm	1000 mm				350 mm		
Z - axis stroke	150 mm *1			200 mm/340 mm			350 mm/450 mm						150 mm *2		

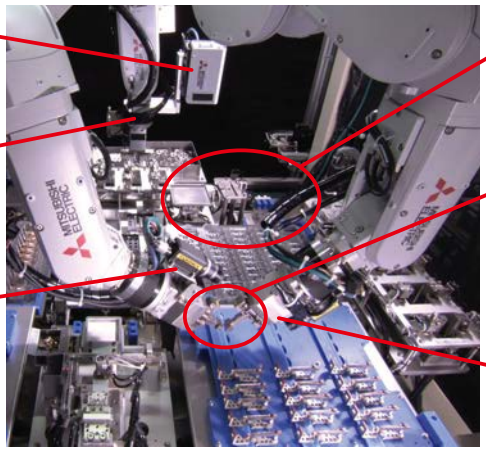
*1: Clean specifications : 120 mm *2: Clean specifications, Waterproof specifications : 120 mm

Intelligent Solutions

To meet the demands of more advanced applications

By utilizing high-precision vision sensor and force sensor for controlling the robot's power level, works that could not be automated due to their high difficulty level can now be automated.

Examples of function utilization in robot control cell production system



Three-dimensional vision sensor

- Process work without use of parts feeder or positioning jig
- Kitting and sorting of works in a disorganized or overlapped status

Force control

- Detects pressing force and force status at insertion timing for improved work quality
- Assembly of difficult fitting works
- Teaching support with force information

Two-dimensional vision sensor

- The robot and camera can be calibrated through a simple process using vision sensor setting tools
- Simple connection between the robot and camera using Ethernet
- Simple control using vision control commands in the robot programs

Safety solution

- High safety compliant with international standards
- Robot's automatic operation continues even with a safety fence opened
- Operators and robots share an operation area

iQ Platform compatible functions

- Improved responsivity through high-speed communications
- Large amounts of data
- Batch management of multiple robots

Collision avoidance

iQ Platform

- Check interference of arm and hand between two robots for collision avoidance

Coordinated control

iQ Platform

- Two robots are in coordination to transport long objects and heavy articles
- Completes transport assembly while maintaining positional relationship of the parts not fixed

Multi-function hand

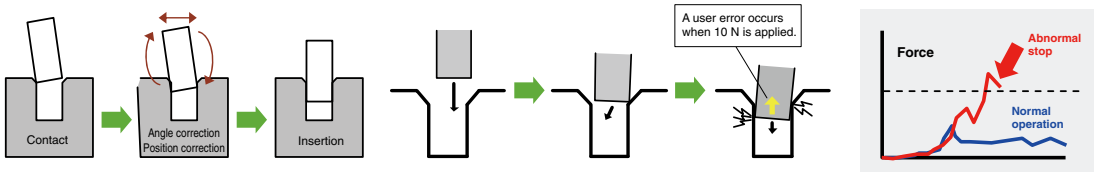
- Use of an Multifunctional electric hand enables handling of various parts in different sizes
- Reduction of setup changes
- Multi-hand function for simultaneous transport and cycle time reduction

Force control function

Highly-accurate mating operation, quality assurance, reliabilit y improvement

Flexible control + Error detection

The robot can be flexibly controlled and operated profiling the target workpiece. When a workpiece is inserted with an excessive force, an error is generated to stop the operation.

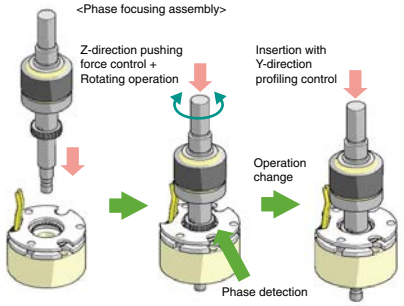


Performs complex assembly works such as phase focusing

Operation change with force detection

Contact detection switches operation directions or force controls.

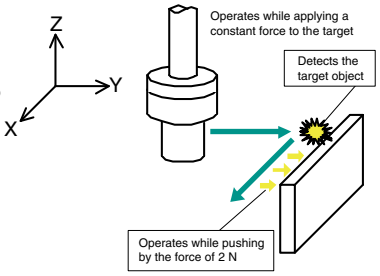
This function realizes highly-flexible assembly works by changing the force control characteristics during interpolation operation.



Performs operations with a constant force

Pushing force control

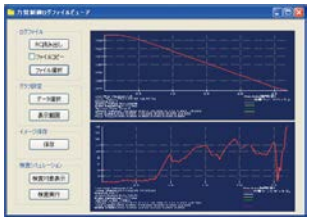
A robot performs pushing operations in a specified direction with a constant force. This control can also be used for deburring works and tension applying works.



Teaching support

Force GUI has been installed.

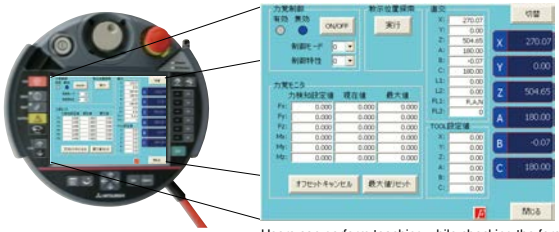
- Because force GUI screens are utilized for the personal computer support software (RT ToolBox2) and teaching boxes (R56TB/R57TB, R32TB/R33TB) as standard, users can easily operate force sensors.
- The force data synchronized with position data can be saved as log data.
- RT ToolBox2 displays log data in a graph.
- Log data files can be transferred to a personal computer via FTP.



■Force log (RT ToolBox2 log viewer)



R32TB/R33TB



R56TB/R57TB

Users can perform teaching while checking the force status on the force control-dedicated screen of the teaching boxes, realizing the optimal position teaching.

3D vision sensor

Realizes supply of discretely placed parts

The use of 3D vision sensors realizes supply of discretely placed parts without dedicated trays and part feeders, reducing part supply work.



MELFA-3D Vision

Realizes high-speed bin picking using our unique technology

Eliminates the need to register the 3D model of a target workpiece, shortening the startup time.

3D modeling is no longer required - this sensor changed the common sense of vision sensors!

3D vision sensors changed the common sense of vision sensors and realized bin picking (picking of discretely placed parts), eliminating the need to register the shape of workpieces. With a bit of information required for gripping (hand jaw width, jaw dimensions, adsorption pad size etc.), this hand grips various workpieces, shortening the startup time.

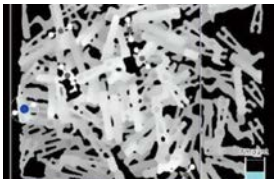
* Some other devices such as 2D vision sensors are required for final positioning.
* When 3D and 2D vision sensors are used together, adjust 2D vision sensors.



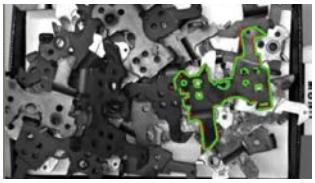
Picking of discretely placed parts

Applicable to multiple recognition methods

Users can use different recognition methods, such as model-less recognition or model matching, for their applications.



Model-less recognition



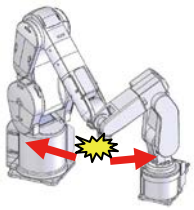
Model matching recognition

Collision avoidance

iQ Platform [Q type controllers only]

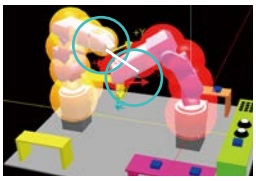
For automatic prevention of collisions between robots

The software constantly monitors robots motion, predicts collisions before they occur, and immediately stops the robots. This avoids damage to the robot during both the JOG operations and automatic mode operations.



Decreases downtime during startup operation

Reduces the number of recovery man-hours required after collisions due to teaching operation errors or failure to set interlocks.



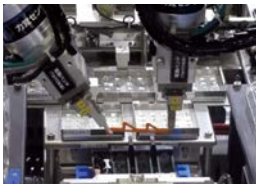
Checking interference using the robot with a defined solid model

Coordinated control

iQ Platform [Q type controllers only]

Coordinated control between multiple robots

Enables coordinated control between multiple robots through CPU connection between the robots. Easy to operate and use under normal operation through individual robot operation.



Enables installation work to be completed while gripper positions between robots are maintained.

Coordinated transport

Enables transport of lengthy or heavy objects using multiple small-sized robots instead of larger ones.

Multifunctional electric hand

The highly-functional operation control that cannot be performed with air cylinders

Users can set the grip force and gripping speed depending on a target workpiece, such as a soft one and heavy one. When users need to handle workpieces with different sizes, they can set the optimal stroke in the operating position setting. Position feedback of hands can be utilized for the judgments of success/failure in gripping and OK/NG products with the measurement of workpiece dimensions and product inspections.

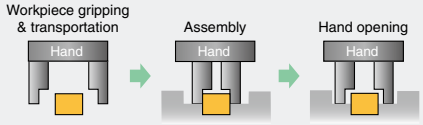






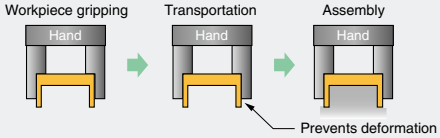
● Multifunctional electric hand (manufactured by TAIYO)

Prevents interference using the opening/closing stroke control



<Benefits of electric hands>
◎Multipoint position control
(applicable to a wide variety of products, opening/closing stroke adjustment)

Prevents deformation of resin moldings



<Benefits of electric hands>
◎Speed control (workpiece shape retention, impact cushioning)
◎Grip force control (prevention of workpiece deformation)

Easy control

With a robot program, users can easily set the operation stroke and grip force according to the dimensions of workpieces.

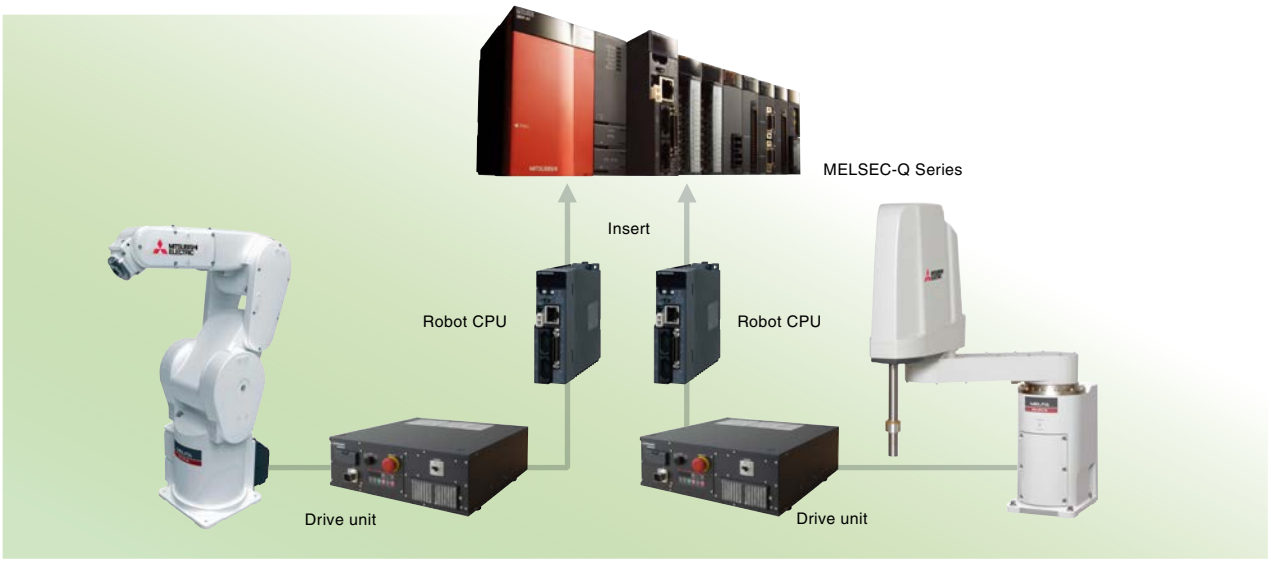
Easy operation

Users can flexibly operate electric hands on the hand-dedicated screen of the teaching box.

Controller Type Line Up

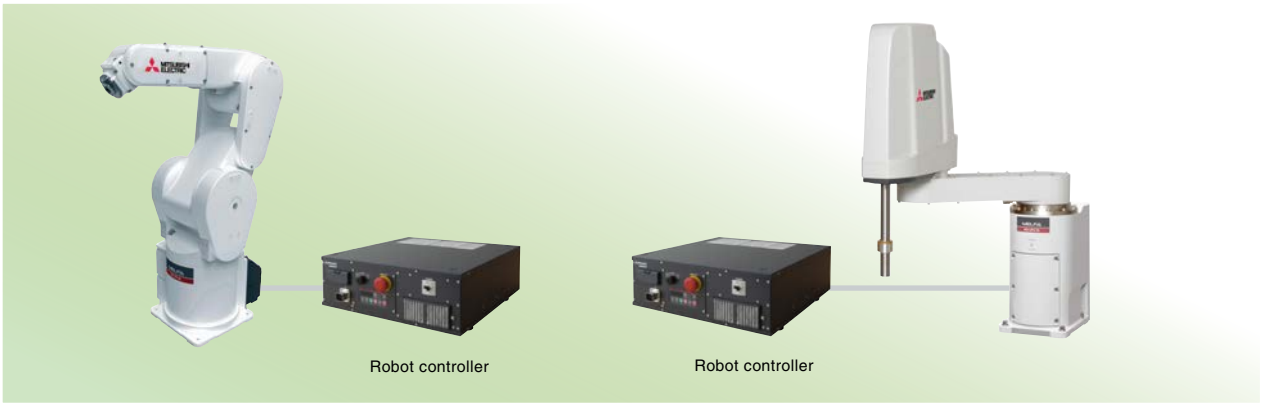
QTYPE Controller

Compatible with the "iQ Platform," this controller makes seamless integration of various controllers at production site, HMI, engineering environment, and network.
The multi-CPU configuration dramatically improved an affinity with FA devices, offering fast and easy execution of delicate control and information management.



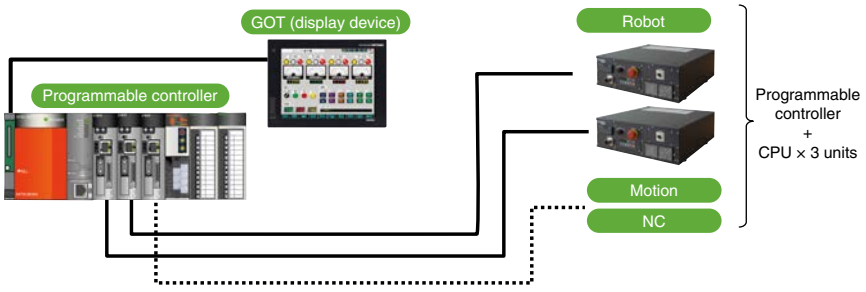
DTYPE Controller

This is a stand-alone controller, similar to the conventional type. The robot controller can be used as centralized control for cell construction.
Various interfaces come as a standard feature to construct a system most suited to customers' application.



Multiple CPU environment

The multi-CPU configuration with the programmable controller CPU and robot, Motion, and NC will dramatically improve an affinity with FA devices, offering fast and easy execution of delicate control and information management.



Features of iQ Platform Controllers

QType Controller

iQ Platform

iQ Platform function

Improved responsivity through high-speed communications

Increases the speed of data communications between CPUs and dramatically reduces I/O processing times using a high-speed standard base between multiple CPUs.



Measurement example: Transfer of 16-word data
(With data matching check)
CC-Link: 262 ms
Between multiple CPUs: 63 ms
(Approx. 4×)

Large amounts of data

The number of device points between the programmable controller and robot was increased to 8192 input points and 8192 output points. This allows the system to handle larger programs, more complicated control, and other objects that require a lot of I/O points.

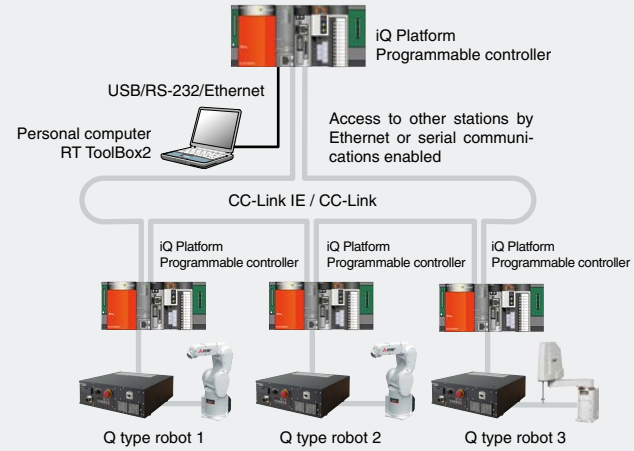


Number of I/O points: 8192/8192
Remote I/O: 256/256
CC-Link (4 stations, 1×): 126/126
CC-Link (4 stations, 8×): 894/894

Batch management of multiple robots

Enables access to robots in the programmable controller network from a PC connected to the main CPU. Leads to a shortening of rise times and improved maintainability for robots on the production line.

Enables Robot 1, Robot 2, and Robot 3 to be monitored from a single location.



Shared memory expansion

Enhanced efficiency of monitoring and maintenance operations onsite using a single GOT (display device) as the Human Machine Interface (HMI).

<GOT screen shots>



Operation panel screen | Jog/hand operation screen | Current position monitor screen | Current value and load factor monitor screen | Maintenance forecast screen | Manual/video display menu

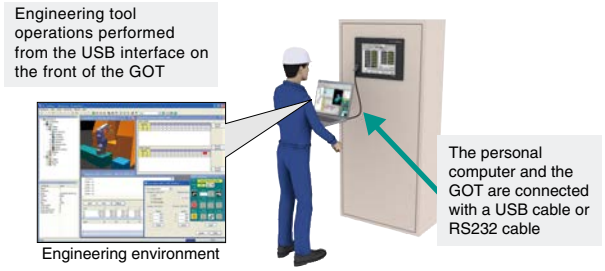
Enables the robot to be controlled from the GOT even without a teaching box.
Current robot position data, error information, and other items can be displayed easily on the GOT.

Internal robot information

- ●Error, variable, and program information
- ●Maintenance information (Remaining battery capacity, grease life, etc.)
- ●Robot status (Current speed, current position, etc.)
- ●Servo data (Load factor, current values, etc.)

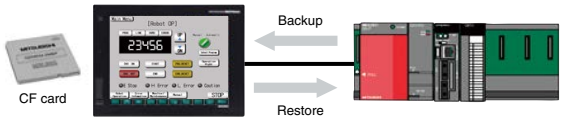
GOT connection (transparent function)

Programs and parameters can be edited from the USB interface on the front of the GOT using a transparent function for improved operability. (For GOT1000 Series + 2000 Series)



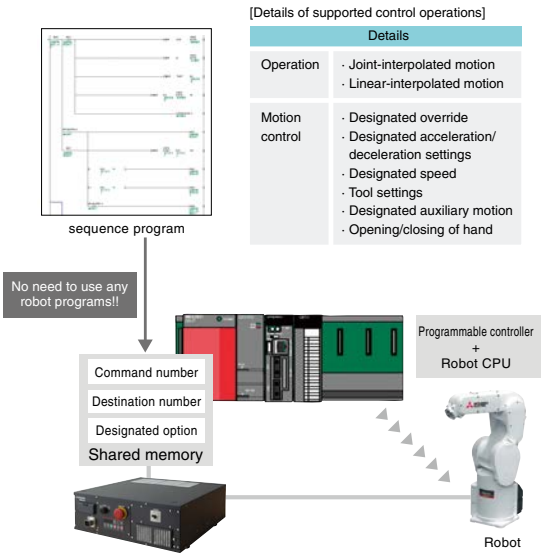
GOT backup/restore functions (Supported on GT14, GT15 and GT16)

Robot data on the GOT can be backed up to and restored from a CF card or USB memory stick. With no need for a PC.
This helps prevent data from being lost due to the empty battery / battery or robot malfunction.
Data can be saved after periodic maintenance tasks are performed or when unexpected errors occur. Dramatically improves serviceability.



Direct execution function for programmable controllers

Robots can be controlled easily using programmable controller language. System operation can be controlled using a single programmable controller. This enables the operation of the programmable controller to handle making changes to system specifications and troubleshooting directly.



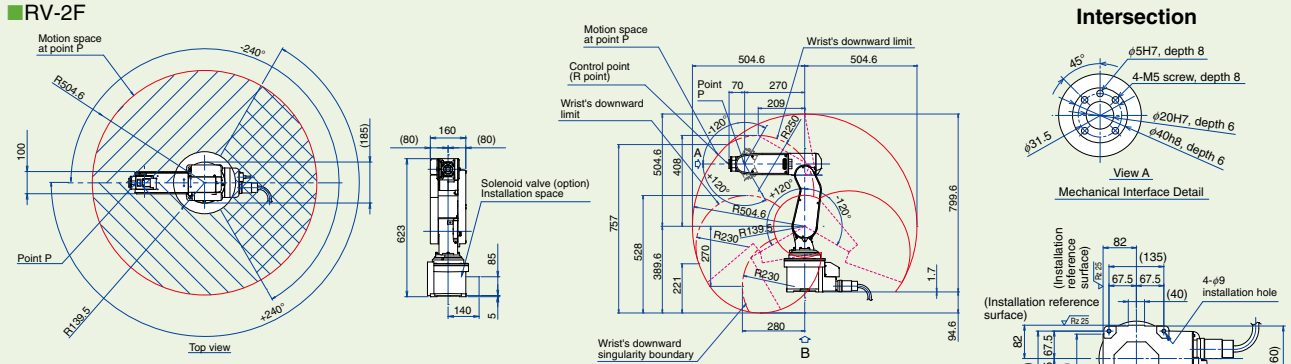
[Details of supported control operations]

	Details
Operation	· Joint-interpolated motion · Linear-interpolated motion
Motion control	· Designated override · Designated acceleration/ deceleration settings · Designated speed · Tool settings · Designated auxiliary motion · Opening/closing of hand

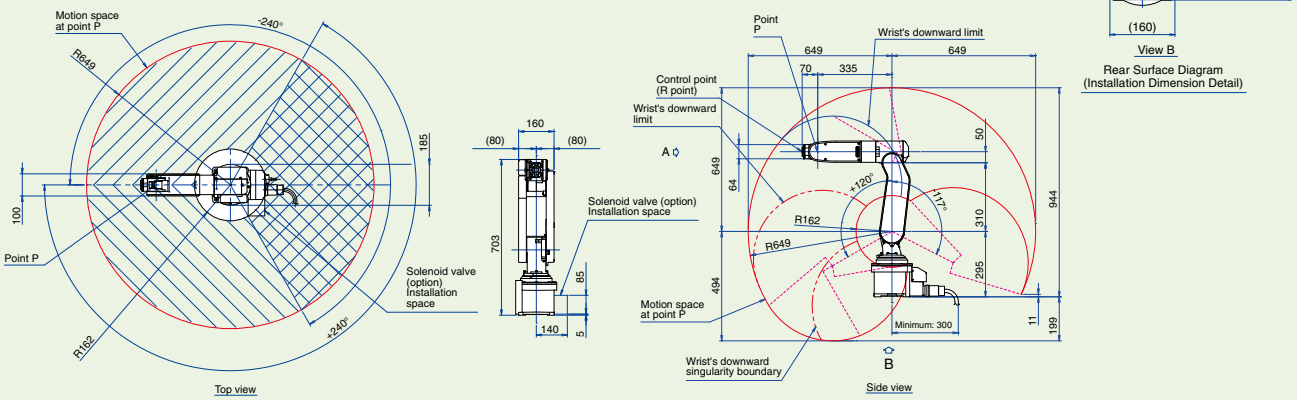
RV-2F/4F Specifications/Operating Range

External Dimensions/Operating Range Diagram

RV-2F



RV-2FL

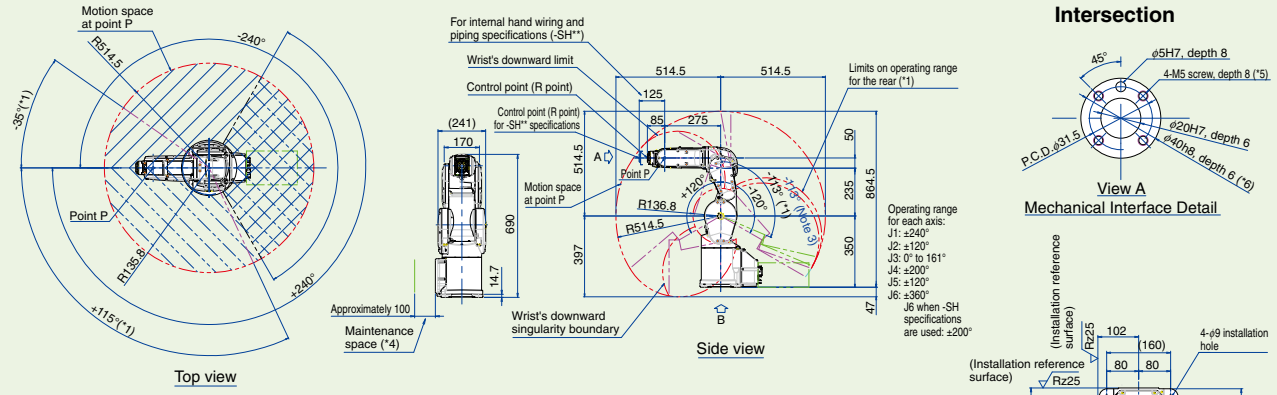


Specifications

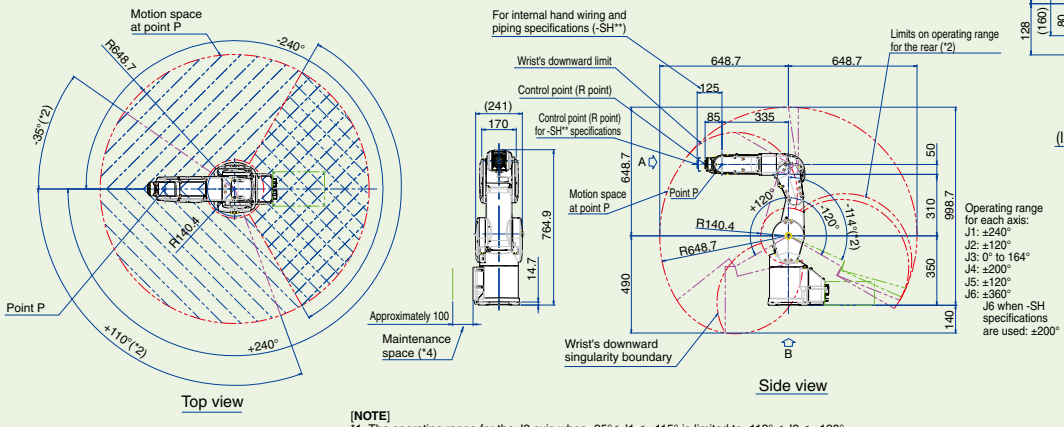
Type		Unit	RV-2F(B)	RV-2FL(B)	RV-4F(M)(C)	RV-4FL(M)(C)
Environmental specifications			Standard		Standard/ Oil mist/ Clean	
Protection degree			IP30		IP40 (standard)/ IP67 (oil mist) *1/ ISOclass3 *7	
Installation			Floor type, ceiling type, (wall-mounted type *2)			
Structure			Vertical, multiple-joint type			
Degrees of freedom			6			
Drive system *9			AC servo motor (J2, J3 and J5: with brake)		AC servo motor	
Position detection method			Absolute encoder			
Maximum load capacity		kg	Maximum 3 (Rated 2) *8		Maximum 4 (Rated 4) *8	
Arm length	NO1 arm	mm	230 + 270	310 + 335	240 + 270	245 + 300
Maximum reach radius		mm	504	649	515	649
Operating range	J1	deg	480 (±240)			
	J2		240 (-120 to +120)	237 (-117 to +120)	240 (-120 to +120)	
	J3		160 (-0 to +160)		161 (-0 to +161)	164 (-0 to +164)
	J4		400 (±200)			
	J5		240 (-120 to +120)			
	J6		720 (-360 to +360)			
Maximum speed	J1	deg/sec	300	225	450	420
	J2		150	105	450	336
	J3		300	165	300	250
	J4		450	412	540	540
	J5		450		623	623
	J6		720		720	720
Maximum composite speed *3		mm/sec	4955	4200	9027	9048
Cycle time *4		sec	0.6	0.7	0.36	0.36
Position repeatability		mm	±0.02			
Ambient temperature		°C	0 to 40			
Mass		kg	19	21	39	41
Tolerable moment	J4	Nm	4.17		6.66	
	J5		4.17		6.66	
	J6		2.45		3.96	
Tolerable amount of inertia	J4	kgm^2	0.18		0.2	
	J5		0.18		0.2	
	J6		0.04		0.1	
Tool wiring			Hand: 4 input points/4 output points Signal cable for the multi-function hand		Hand: 8 input points/8 output points Signal cable for the multi-function hand and sensors LAN X 1 <100 BASE-TX> (8-pin) *5	
Tool pneumatic pipes			ϕ4 x 4		Primary: ϕ6 x 2 Secondary: ϕ4 x 8, ϕ4 x 4 (from base portion to forearm)	
Machine cable			5 m (connector on both ends)			
Connected controller			CR750, CR751			

RV-2F/4F Specifications/Operating Range

RV-4F



RV-4FL

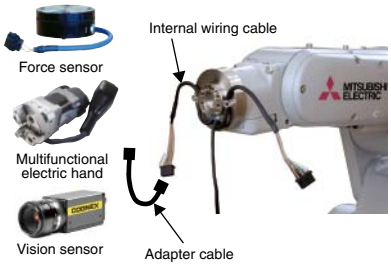


[NOTE]
*1. The operating range for the J2 axis when -35°≤ J1 ≤ +115° is limited to -113° ≤ J2 ≤ +120°.
*2. The operating range for the J2 axis when -35°≤ J1 ≤ +110° is limited to -114° ≤ J2 ≤ +120°.
*3. Make sure to leave enough space open for cable connections between devices.
*4. Make sure to leave enough space open for removing and attaching covers during maintenance work.
*5. Specify a thread engagement length of 7.5 to 8 mm.
*6. The depth of the ϕ40-mm section is 3.5 mm for Clean/Mist models and 6 mm for Standard.

Internal wiring specifications (excludes RV-2F) (*1)

Internal piping ready apparatus	Type (Special device No.)					
	-SH01	-SH02	-SH03	-SH04	-SH05	-SH06
Tool pneumatic pipes ϕ4 (×4/×2)	○ (×4)	—	—	○ (×2)	○ (×2)	—
Hand: 8 input points	○	○	—	○	○	—
Vision sensor (*2)	—	○	○	—	○	—
Force sensor	—	○ Either apparatus only	○	○	—	—
Electrical hand	—		○	—	—	—

*1) Operating range of the J6 axis is ±200deg; protection grade: IP40
*2) Confirmation is made with the connection and operation of internal vision sensor cable with the In-Sight EZ by COGNEX.



RV – 4 F L C – 1 D – S H 0 1

Robot structure
RV: Vertical, multiple-joint type

Load capacity
2: 2 kg
4: 4 kg

Series
F: F Series

Arm length
Blank: Standard arm
L: Long arm

Special device No.
SHxx: Internal wiring specifications

Controller type
D: CR750-D 1D: CR751-D
Q: CR750-Q 1Q: CR751-Q

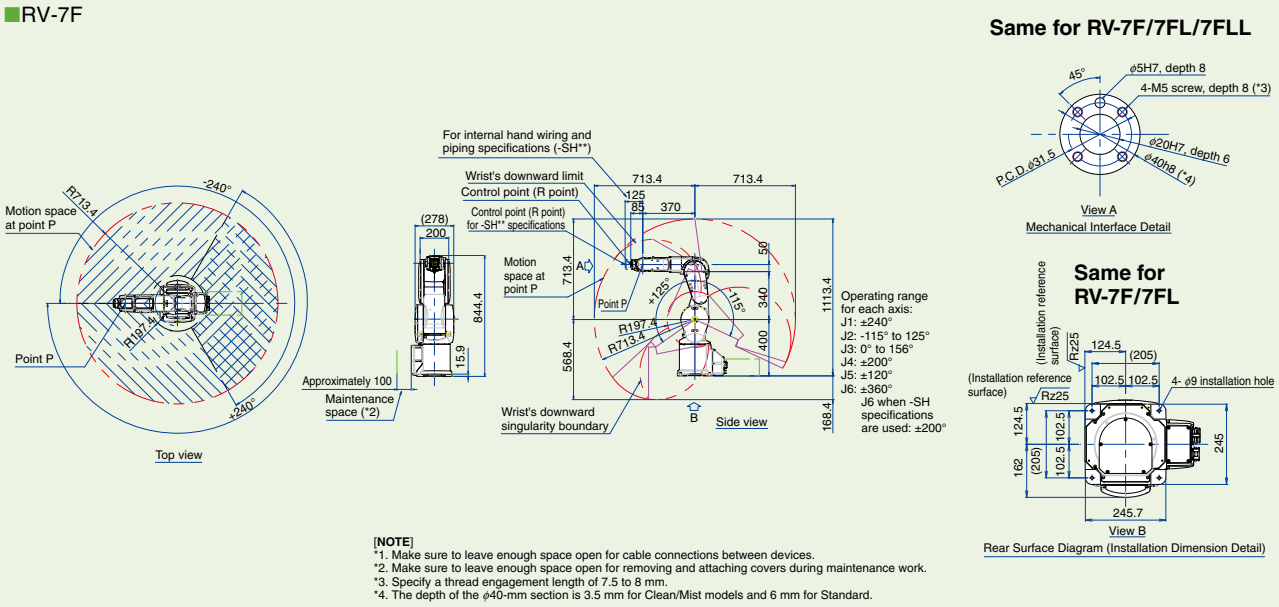
Environment specification
Blank: Standard specifications
M: Oil mist specifications
C: Clean specifications

*1: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use. Air will need to be purged from the lines. For details, refer to the specifications sheet.
*2: The wall-mounted specification is a custom specification where the operating range of the J1-axis is limited.
*3: This is the value at the surface of the mechanical interface when all axes are composited.
*4: The cycle time is based on back-and-forth movement over a vertical distance of 25 mm and horizontal distance of 300 mm when the load is 1 kg.
*5: Can also be used as a spare line (0.2 sq. mm, 4-pair cable) for conventional models.
*6: Select either controller according to your application. CR751-D: Standalone type, CR751-Q: iQ Platform compatible type.
*7: Preservation of cleanliness levels depends on conditions of a downstream flow of 0.3 m/s in the clean room and internal robot suctioning. A ϕ8-mm coupler for suctioning is provided at the back of the base.
*8: The maximum load capacity indicates the maximum payload when the mechanical interface is facing downward (±10° to the perpendicular).
*9: The standard model does not have a brake on the J1, J4, or J6 axis. There are models available with brakes included for all axes. (RV-2FB)

RV-7F Specifications/Operating Range

External Dimensions/Operating Range Diagram

RV-7F



[NOTE]
*1. Make sure to leave enough space open for cable connections between devices.
*2. Make sure to leave enough space open for removing and attaching covers during maintenance work.
*3. Specify a thread engagement length of 7.5 to 8 mm.
*4. The depth of the φ40-mm section is 3.5 mm for Clean/Mist models and 6 mm for Standard.

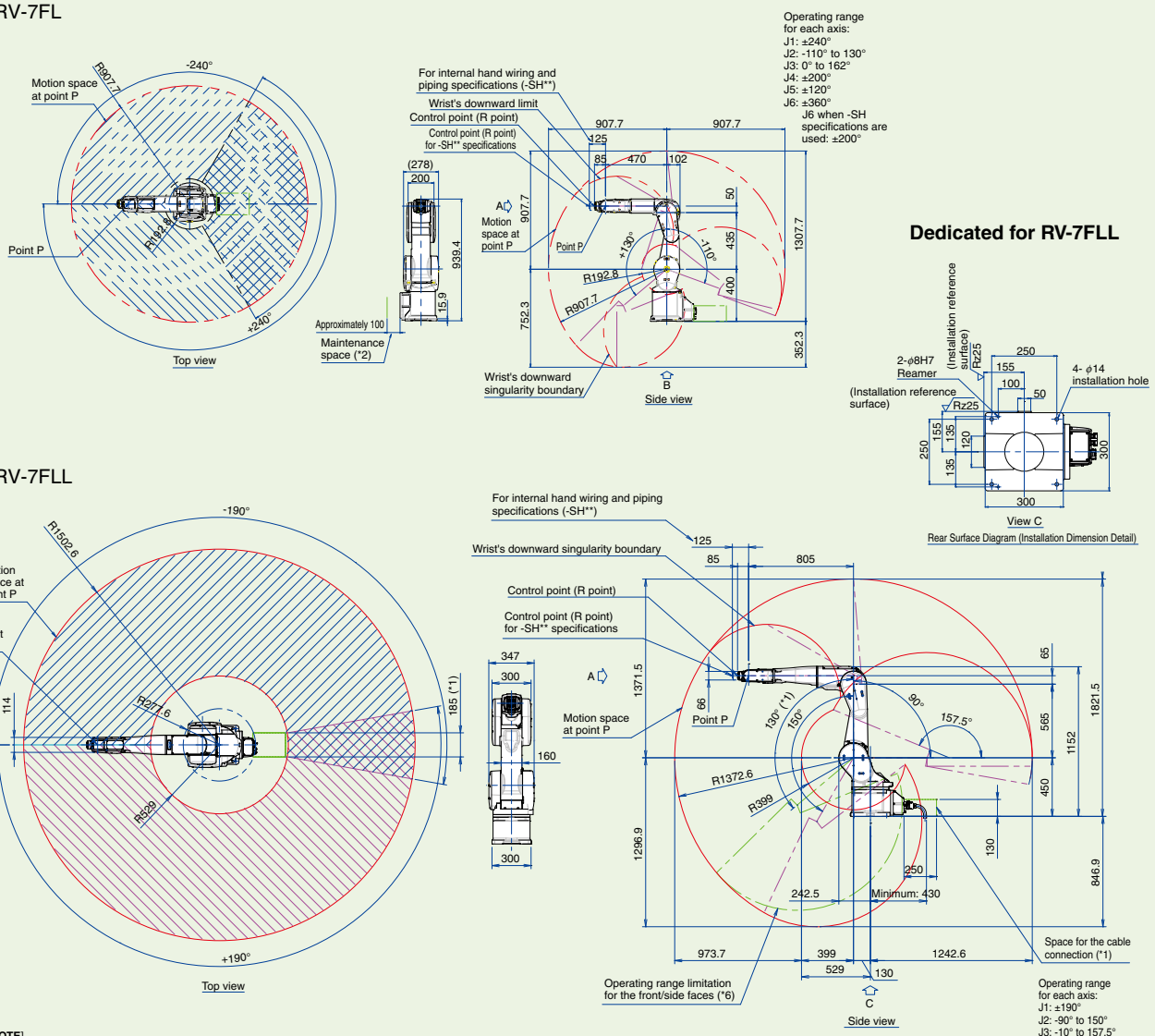
Specifications

Type		Unit	RV-7F(M)(C)	RV-7FL(M)(C)	RV-7FLL(M)(C)
Machine class			Standard/ Oil mist/ Clean		
Protection degree			IP40 (standard)/ IP67 (oil mist) *1/ ISOclass3 *7		
Installation			Floor type, ceiling type, (wall-mounted type *2)		
Structure			Vertical, multiple-joint type		
Degrees of freedom			6		
Drive system			AC servo motor		
Position detection method			Absolute encoder		
Maximum load capacity		kg	Maximum: 7 (Rated: 7)		
Arm length	NO1 arm	mm	340 + 370	435 + 470	565 + 805
Maximum reach radius		mm	713	908	1503
Operating range	J1	deg	480 (±240)		380 (±190)
	J2		240 (-115 to +125)	240 (-110 to +130)	240 (-90 to +150)
	J3		156 (-0 to +156)	162 (-0 to +162)	167.5 (-10 to +157.5)
	J4		400 (±200)		
	J5		240 (-120 to +120)		
	J6		720 (±360)		
Maximum speed	J1	deg/sec	360	288	234
	J2		401	321	164
	J3		450	360	219
	J4		337		375
	J5		450		
	J6		720		
Maximum composite speed *3		mm/sec	11064	10977	15300
Cycle time *4		sec	0.32	0.35	0.63
Position repeatability		mm	±0.02		±0.06
Ambient temperature		°C	0 to 40		
Mass		kg	65	67	130
Tolerable moment	J4	Nm	16.2		
	J5		16.2		
	J6		6.86		
Tolerable amount of inertia	J4	kgm^2	0.45		
	J5		0.45		
	J6		0.10		
Tool wiring			Hand: 8 input points/8 output points (20 pins total) Serial signal cable for parallel I/O (2-pin + 2-pin power line) LAN X 1 <100 BASE-TX> (8-pin) *5		
Tool pneumatic pipes			Primary: φ6 x 2 Secondary: φ4 x 8, φ4 x 4 (from base portion to forearm)		Primary: φ6 x 2 Secondary: φ4 x 8, φ4 x 4 (With wrist attached)
Machine cable			5 m (connector on both ends)		7 m (connector on both ends)
Connected controller			CR750, CR751		

*1: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use.
*2: The wall-mounted specification is a custom specification where the operating range of the J1-axis is limited.
*3: This is the value at the surface of the mechanical interface when all axes are composited.
*4: The cycle time is based on back-and-forth movement over a vertical distance of 25 mm and horizontal distance of 300 mm when the load is 1 kg.
*5: Can also be used as a spare line (0.13 sq. mm, 4-pair cable) for conventional models. Provided up to the inside of the forearm.
*6: Select either controller according to your application.
*7: Preservation of cleanliness levels depends on conditions of a downstream flow of 0.3 m/s in the clean room and internal robot suctioning. A φ8-mm coupler for suctioning is provided at the back of the base.

RV-7F Specifications/Operating Range

RV-7FL



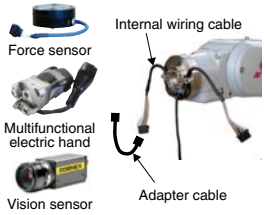
RV-7FLL

[**NOTE**]
*1. Make sure to leave enough space open for cable connections between devices.
*2. Make sure to leave enough space open for removing and attaching covers during maintenance work.
*3. Specify a thread engagement length of 7.5 to 8 mm.
*4. The depth for the ϕ40 part is 3.5 mm (Oil mist/clean), 6 mm (Standard), or 6.5 mm (-SH** models).
*5. Limits on the operating range for the front part: When the J1-axis angle is inside the range of +145° ≤ J1 ≤ +215° or -145° ≤ J1 ≤ -215°, the operating range of the J2-axis is limited to -110° ≤ J2 ≤ +120°.
*6. Limits on the operating range for the front part: When the J1-axis angle is inside the range of J1 ≥ +120° or J1 ≤ -120°, the operating range of the J2-axis is limited to -90° ≤ J2 ≤ +130°.

Internal wiring specifications (*1)

Internal piping ready apparatus	Type (Special device No.)					
	-SH01	-SH02	-SH03	-SH04	-SH05	-SH06
Tool pneumatic pipes ϕ4	○ (×4)	—	—	○ (×2)	○ (×2)	—
Hand: 8 input points	○	○	—	○	○	—
Vision sensor (*2)	—	○	○	—	○	—
Force sensor	—	○	○	○	—	—
Electrical hand	—	(Either apparatus only)	○	—	—	—

*1) Operating range of the J6 axis is ±200deg; protection grade: IP40
*2) Confirmation is made with the connection and operation of internal vision sensor cable with the In-Sight EZ by COGNEX.



RV–7FLLC–1D–SH01

Robot structure
RV: Vertical, multiple-joint type

Maximum load capacity
7: 7 kg

Series
F: F Series

Arm length
Blank: Standard arm
L : Long arm
LL: Super long arm

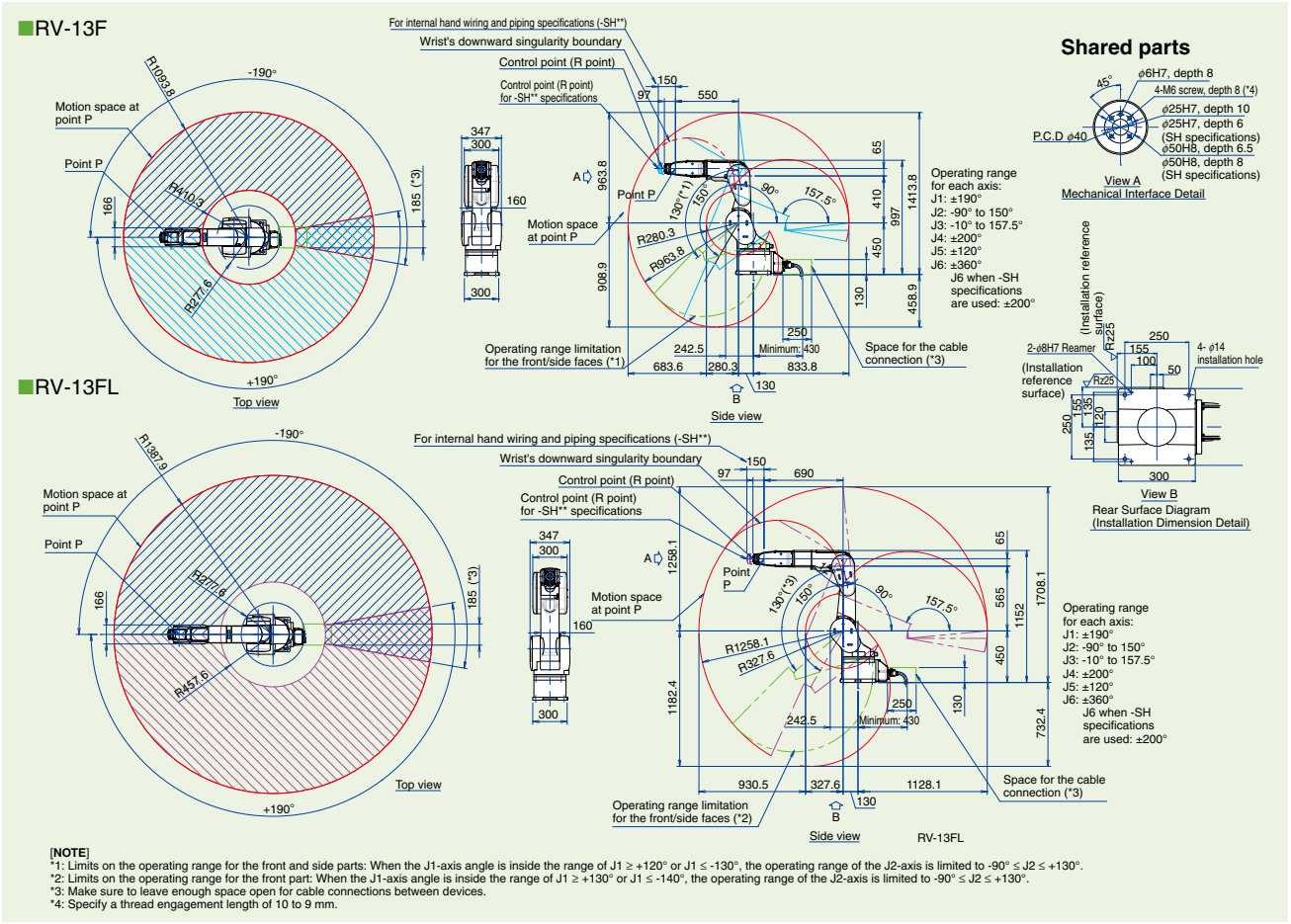
Environment specification
Blank: Standard specifications
M: Oil mist specifications
C: Clean specifications

Controller type
D: CR750-D
Q: CR750-Q
1D: CR751-D
1Q: CR752-Q

Special device No.
SHxx: Internal wiring specifications

RV-13F/20F Specifications/Operating Range

External Dimensions/Operating Range Diagram



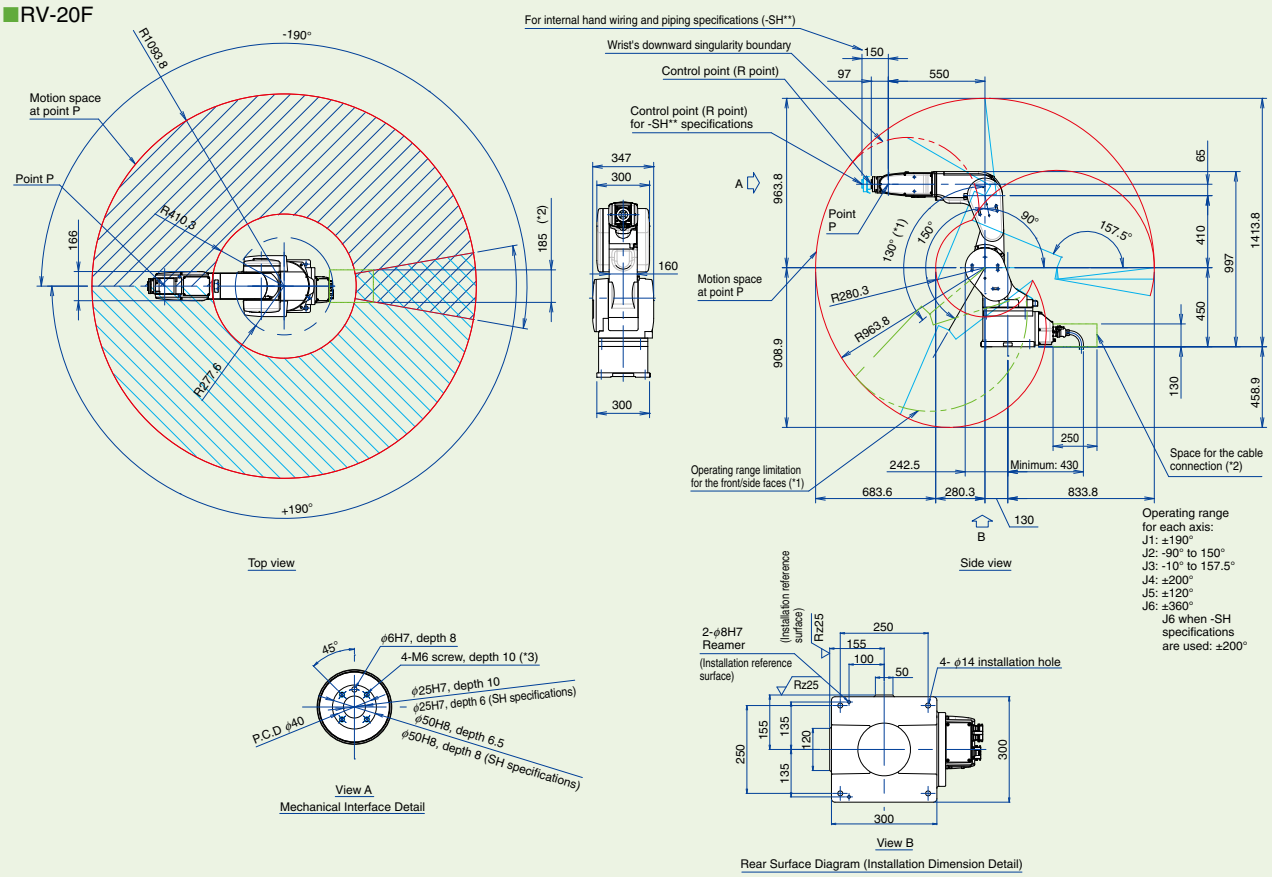
[NOTE]
*1: Limits on the operating range for the front and side parts: When the J1-axis angle is inside the range of J1 ≥ +120° or J1 ≤ -130°, the operating range of the J2-axis is limited to -90° ≤ J2 ≤ +130°.
*2: Limits on the operating range for the front part: When the J1-axis angle is inside the range of J1 ≥ +130° or J1 ≤ -140°, the operating range of the J2-axis is limited to -90° ≤ J2 ≤ +130°.
*3: Make sure to leave enough space open for cable connections between devices.
*4: Specify a thread engagement length of 10 to 9 mm.

Specifications

Type		Unit	RV-13F(M)(C)	RV-13FL(M)(C)	RV-20F(M)(C)
Machine class			Standard/ Oil mist/ Clean		
Protection degree			IP40 (standard)/ IP67 (oil mist) *1/ ISOclass3 *7		
Installation			Floor type, ceiling type, (wall-mounted type *2)		
Structure			Vertical, multiple-joint type		
Degrees of freedom			6		
Drive system			AC servo motor		
Position detection method			Absolute encoder		
Maximum load capacity		kg	Maximum: 13 (Rated: 12) *8		Maximum: 20 (Rated: 15) *8
Arm length	NO1 arm	mm	410 + 550	565 + 690	410 + 550
Maximum reach radius		mm	1094	1388	1094
Operating range	J1	deg	380(±190)		
	J2		240 (-90 to +150)		
	J3		167.5 (-10 to +157.5)		
	J4		400 (±200)		
	J5		240 (-120 to +120)		
	J6		720 (±360)		
Maximum speed	J1	deg/sec	290	234	110
	J2		234	164	110
	J3		312	219	110
	J4		375	375	124
	J5		375	375	125
	J6		720	720	360
Maximum composite speed *3		mm/sec	10450	9700	4200
Cycle time *4		sec	0.53	0.68	0.70
Position repeatability		mm	±0.05		
Ambient temperature		°C	0 to 40		
Mass		kg	120	130	120
Tolerable moment	J4	Nm	19.3		49.0
	J5		19.3		49.0
	J6		11		11
Tolerable amount of inertia	J4	kgm²	0.47		1.40
	J5		0.47		1.40
	J6		0.14		0.14
Tool wiring			Hand: 8 input points/8 output points (20 pins total) Serial signal cable for parallel I/O (2-pin + 2-pin power line) LAN X 1 <100 BASE-TX> (8-pin) *5		Hand: 8 input points/8 output points (20 pins total) Serial signal cable for parallel I/O (2-pin + 2-pin power line) LAN X 1 <100 BASE-TX> (8-pin) *5
Tool pneumatic pipes			Primary: φ6 x 2 Secondary: φ4 x 8, φ4 x 4 (With wrist attached)		
Machine cable			7 m (connector on both ends)		
Connected controller *6			CR750, CR751		

RV-13F/20F Specifications/Operating Range

RV-20F

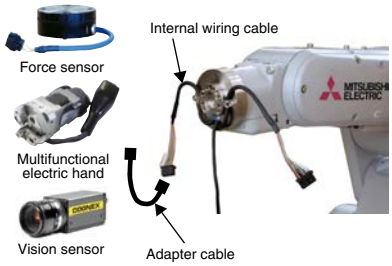


[**NOTE**]
*1: Limits on the operating range for the front and side parts: When the J1-axis angle is inside the range of J1 ≥ +120° or J1 ≤ -130°, the operating range of the J2-axis is limited to -90° ≤ J2 ≤ +130°.
*2: Make sure to leave enough space open for cable connections between devices.
*3: Specify a thread engagement length of 10 to 9 mm.

Internal wiring specifications (*1)

Internal piping ready apparatus	Type (Special device No.)				
	-SH01	-SH02	-SH03	-SH04	-SH05
Tool pneumatic pipes φ4	○ (×4)	—	—	○ (×2)	○ (×2)
Hand: 8 input points	○	○	—	○	○
Vision sensor (*2)	—	○	○	—	○
Force sensor	—	○	○	○	—
Electrical hand	—	(Either apparatus only)	○	—	—

*1) Operating range of the J6 axis is ±200deg; protection grade: IP40
*2) Confirmation is made with the connection and operation of internal vision sensor cable with the In-Sight EZ by COGNEX.



RV – 20 F L C – 1 D – SH01

Robot structure
RV: Vertical, multiple-joint type

Maximum load capacity
13: 13 kg
20: 20 kg

Series
F: F Series

Arm length
Blank: Standard arm
L: Long arm

Special device No.
SHxx: Internal wiring specifications

Controller type
D: CR750-D 1D: CR751-D
Q: CR750-Q 1Q: CR751-Q

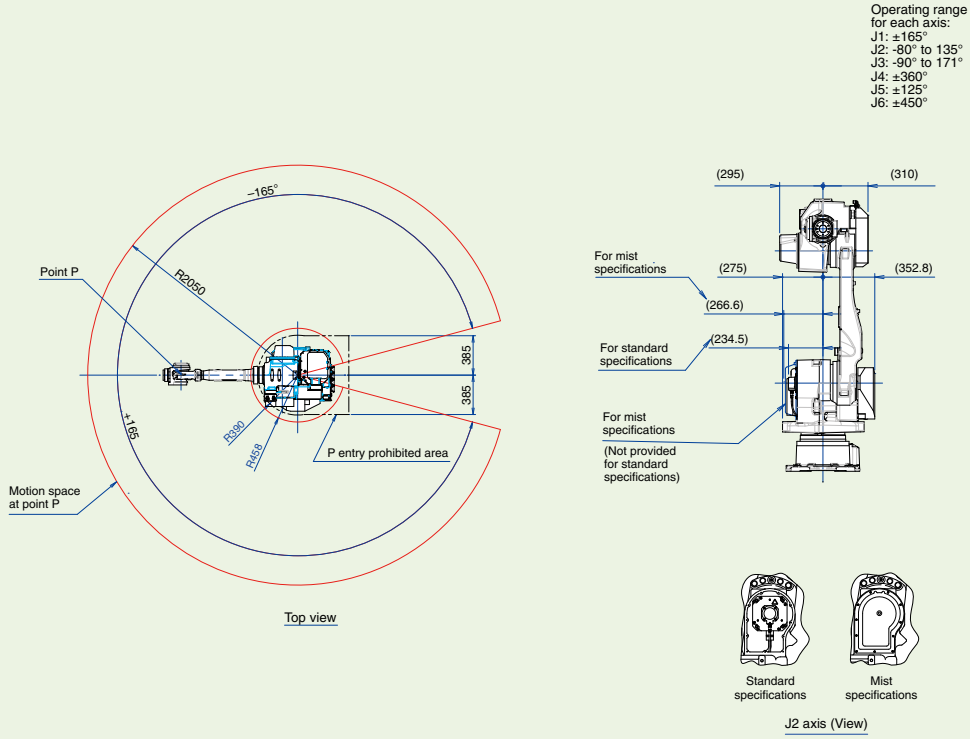
Environment specification
Blank: Standard specifications
M: Oil mist specifications
C: Clean specifications

*1: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use.
*2: The wall-mounted specification is a custom specification where the operating range of the J1-axis is limited.
*3: This is the value at the surface of the mechanical interface when all axes are composited.
*4: The cycle time is based on back-and-forth movement over a vertical distance of 25 mm and horizontal distance of 300 mm when the load is 5 kg.
*5: Can also be used as a spare line (0.13 sq. mm, 4-pair cable) for conventional models. Provided up to the inside of the forearm.
*6: Select either controller according to your application.
*7: Preservation of cleanliness levels depends on conditions of a downstream flow of 0.3 m/s in the clean room and internal robot suctioning. A φ8-mm coupler for suctioning is provided at the back of the base.
*8: The maximum load capacity indicates the maximum payload when the mechanical interface is facing downward (±10° to the perpendicular).

RV-35F/50F/70F Specifications/Operating Range

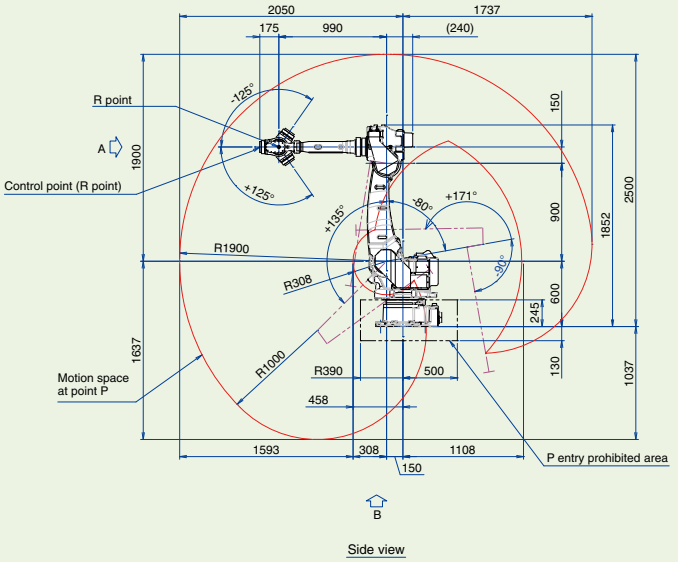
External Dimensions/Operating Range Diagram

RV-35F/50F/70F

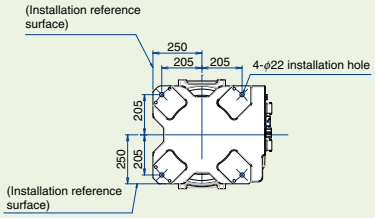


Specifications

Type		Unit	RV-35F(M)	RV-50F(M)	RV-70F(M)
Machine class			Standard/ Oil mist		
Protection degree			J1 to J4:IP40, J5 to J6:IP67 (standard)/ IP67 (oil mist) *1		
Installation			Floor type		
Structure			Vertical, multiple-joint type		
Degrees of freedom			6		
Drive system			AC servo motor		
Position detection method			Absolute encoder		
Maximum load capacity		kg	35	50	75
Arm length	NO1 arm	mm	900 + 990		
Maximum reach radius		mm	2050		
Operating range	J1	deg	330 (±165)		
	J2		215 (-80 to +135)		
	J3		261 (-90 to +171)		
	J4		720 (±360)		
	J5		250 (±125)		
	J6		900 (±450)		
Maximum speed	J1	deg/sec	185	180	175
	J2		180		145
	J3		190	180	165
	J4		305	255	235
	J5		305	255	235
	J6		420	370	350
Maximum composite speed *2		mm/sec	13450	13000	11500
Position repeatability		mm	±0.07		
Ambient temperature		°C	0 to 40		
Mass		kg	640		
Tolerable moment	J4	Nm	160	210	300
	J5		160	210	300
	J6		90	130	150
Tolerable amount of inertia	J4	kgm²	16	30	
	J5		16	30	
	J6		5	12	
Tool wiring			Hand: 16 input points/16 output points LAN X 1		
Tool pneumatic pipes			ϕ10 x 2		
Connected controller *3			CR760-D/Q		

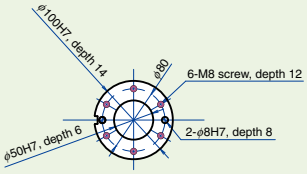


Side view



View B

Rear Surface Diagram (Installation Dimension Detail)



View A

Mechanical Interface Detail

<Operable range>
(1) For 11° ≤ J2 < 56°, J3 ≤ [170.5 - {(1 / 6) * (J2 - 8)}]°
(2) For J2 ≥ 56°, the point P shall not enter the operable range limit area.
(3) For J3 ≥ 162.5°, J2 ≤ 1031 - 6 × J3°
(4) For J2 ≥ 130°, J1 ≤ 110°, or for J1 > 110°, J2 ≤ 130°

RV-●●F(M)-□-S**

Maximum load capacity
(one of 35, 50 or 70)

Environment specification
Blank: Standard specifications
M: Robot oil mist specifications

Special device No.
S**: Special specification No.

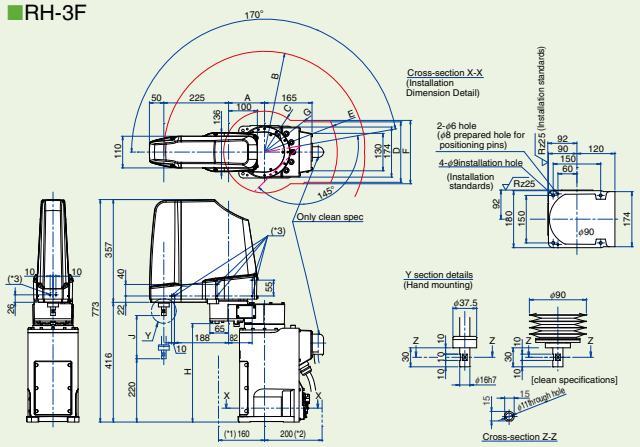
Connected robot controller type
D: Standalone type robot controller
Q: iQ Platform compatible robot controller

*1: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use.
*2: This is the value at the surface of the mechanical interface when all axes are composited.
*3: Select either of the controllers according to your application. CR760-D: Standalone type, CR760-Q: iQ Platform compatible type.

RH-3F/6F/12F/20F Specifications/Operating Range

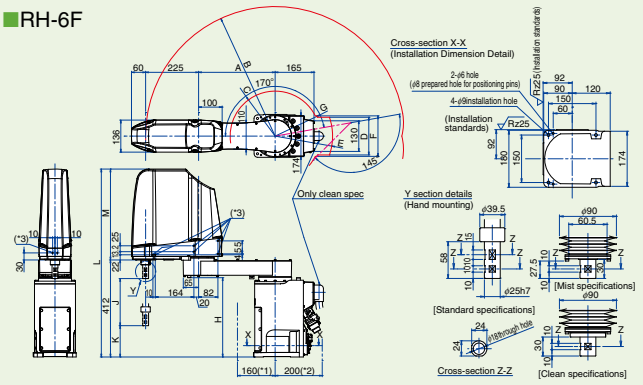
External Dimensions/Operating Range Diagram

RH-3F



[NOTE]
*1: Space required for the battery replacement
*2: Space required for the interconnection cable
*3: Screw holes (M4, 6 mm long) for affixing user wiring and piping. (6 locations on both sides and 2 locations on the front of the No. 2 arm.)

RH-6F



[NOTE]
*1: Space required for the battery replacement
*2: Space required for the interconnection cable
*3: Screw holes (M4, 6 mm long) for affixing user wiring and piping. (6 locations on both sides and 2 locations on the front of the No. 2 arm.)

Variable dimensions

Robot series	A	B	C	D	E	F	G	H	J
RH-3FH3515	125	R350	R142	210	R253	220	R174	342	150
RH-3FH3512C	125	R350	R142	224	R253	268	R196	342	120
RH-3FH4515	225	R450	R135	210	R253	220	R174	337	150
RH-3FH4512C	225	R450	R135	224	R253	268	R197	337	120
RH-3FH5515	325	R550	R191	160	R244	172	R197	337	150
RH-3FH5512C	325	R550	R191	160	R253	259	R222	337	120

Variable dimensions

Robot series	A	B	C	D	E	F	G	H	J	K	L	M
RH-6FH3520	125	R350	R142	210	R253	220	R174	342	200	133	798	386
RH-6FH3520M/C	125	R350	R142	224	R253	268	R196	342	200	133	798	386
RH-6FH3534	125	R350	R142	210	R253	220	R174	342	340	–7	938	526
RH-6FH3534M/C	125	R350	R142	224	R253	268	R196	342	340	–43	938	526
RH-6FH4520	225	R450	R135	210	R253	220	R174	337	200	133	798	386
RH-6FH4520M/C	225	R450	R135	224	R253	268	R197	337	200	133	798	386
RH-6FH4534	225	R450	R135	210	R253	220	R174	337	340	–7	938	526
RH-6FH4534M/C	225	R450	R135	224	R253	268	R197	337	340	–43	938	526
RH-6FH5520	325	R550	R191	160	R244	172	R197	337	200	133	798	386
RH-6FH5520C	325	R550	R191	160	R253	259	R222	337	200	133	798	386
RH-6FH5520M	325	R550	R191	160	R244	259	R222	337	200	133	798	386
RH-6FH5534	325	R550	R191	160	R244	172	R197	337	340	–7	938	526
RH-6FH5534C	325	R550	R191	160	R253	259	R222	337	340	–43	938	526
RH-6FH5534M	325	R550	R191	160	R244	259	R222	337	340	–43	938	526

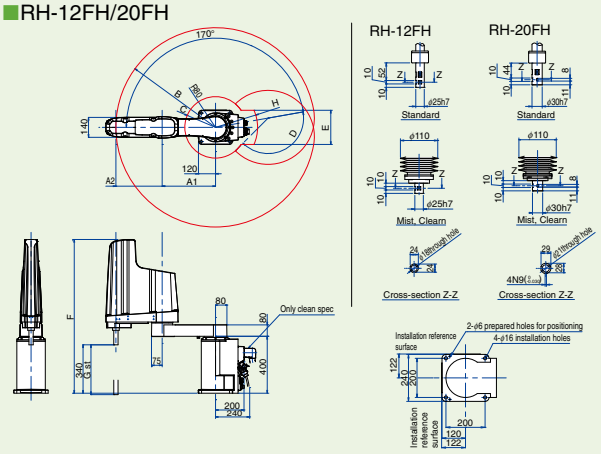
Specifications

Type		Unit	RH-3FH3515/12C	RH-3FH4515/12C	RH-3FH5515/12C	RH-6FH35XX/M/C	RH-6FH45XX/M/C	RH-6FH55XX/M/C
Machine class			Standard/ Clean			Standard/ oil mist/ Clean		
Protection degree *1			IP20/ ISOclass3 *7			IP20 *6/ IP65 *6/ ISO3 *7		
Installation			Floor type			Floor type *8		
Structure			Horizontal, multiple-joint type					
Degrees of freedom			4					
Drive system			AC servo motor					
Position detection method			Absolute encoder					
Maximum load capacity		kg	Maximum 3 (rating 1)			Maximum 6 (rating 3)		
Arm length	NO1 arm	mm	125	225	325	125	225	325
	NO2 arm		225					
Maximum reach radius		mm	350	450	550	350	450	550
Operating range	J1	deg	340 (±170)					
	J2		290 (±145)					
	J3 (Z)	mm	150 (Clean specification : 120) *1			xx = 20 : 200/ xx = 34 : 340		
	J4 (θ)	deg	720 (±360)					
Maximum speed	J1	deg/sec	420			400		
	J2		720			670		
	J3 (Z)	mm/s	1100			2400		
	J4 (θ)	deg/sec	3000			2500		
Maximum composite speed *2		mm/sec	6800	7500	8300	6900	7600	8300
Cycle time *3		sec	0.41	0.46	0.51	0.29		
Position repeatability	Y-X composite	mm	±0.010	±0.010	±0.012	±0.010	±0.010	±0.012
	J3 (Z)		±0.01					
	J4 (θ)	deg	±0.004					
Ambient temperature		°C	0 to 40					
Mass		kg	29	29	32	36	36	37
Tolerable amount of inertia	Rating	kgm^2	0.005			0.01		
	Maximum		0.06			0.12		
Tool wiring			Hand: 8 input points/8 output points (20 pins total) Serial signal cable for parallel I/O (2-pin + 2-pin power line) LAN X 1 <100 BASE-TX> (8-pin) *4					
Tool pneumatic pipes			Primary: ϕ6 x 2 Secondary: ϕ4 x 8					
Machine cable			5 m (connector on both ends)					
Connected controller *5			CR750, CR751			CR750, CR751		

*1: The range for vertical movement listed in the environmental resistance specifications (C: Clean specifications) for the RH-3FH is narrower than for the standard model. Keep this in mind when working with the RH-3FH. The environment-resistant specifications are factory-set custom specifications.
*2: The value assumes composition of J1, J2, and J4.
*3: Value for a maximum load capacity of 2 kg. The cycle time may increase if specific requirements apply such as high work positioning accuracy, or depending on the operating position. (The cycle time is based on back-and-forth movement over a vertical distance of 25 mm and horizontal distance of 300 mm.)
*4: Can also be used as a spare line (0.2 sq. mm, 4-pair cable) for conventional models.
*5: Select either controller according to your application.
Note that controllers with oil mist specifications come equipped with a controller protection box (CR750-MB) and "-SM" is appended at the end of the robot model name.
If you require it, consult with the Mitsubishi Electric dealer.
*6: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use. Direct jet to the bellows is excluded.
*7: Preservation of cleanliness levels depends on conditions of a downstream flow of 0.3 m/s in the clean room and internal robot suctioning. A ϕ8-mm coupler for suctioning is provided at the back of the base.
*8: If you require it, consult with the Mitsubishi Electric dealer.

RH-3F/6F/12F/20F Specifications/Operating Range

RH-12FH/20FH



Variable dimensions

Robot series	A1	A2	B	C	D	E	F	G	H
RH-12FH55xx	225	325	R550	R191	145°	240	1080/1180	350/450	R295
RH-12FH55xxM/C	225	325	R550	R191	145°	320	1080/1180	350/450	R382
RH-12FH70xx	375	325	R700	R216	145°	240	1080/1180	350/450	R295
RH-12FH70xxM/C	375	325	R700	R216	145°	320	1080/1180	350/450	R382
RH-12FH/20FH85xx	525	325	R850	R278	153°	–	1080/1180	350/450	–
RH-12FH/20FH85xxM/C	525	325	R850	R278	153°	240	1080/1180	350/450	R367
RH-20FH100xx	525	475	R1000	R238	153°	240	1080/1180	350/450	R295
RH-20FH100xxM/C	525	475	R1000	R238	153°	320	1080/1180	350/450	R382

RH – 20 F H 100 45 M – 1 D – S**

Robot structure
RH: Horizontal, multiple-joint type

Maximum load capacity
3: 3 kg 12: 12 kg
6: 6 kg 20: 20 kg

Series
FH: F Series

Arm length
35: 350 mm 70: 700 mm
45: 450 mm 85: 850 mm
55: 550 mm 100: 1000 mm

Special device No.
S**: Special specification No.

Controller type
D: CR750-D 1D: CR751-D
Q: CR750-Q 1Q: CR751-Q

Environment specification
Blank: Standard specifications
M: Oil mist specifications
C: Clean specifications

Vertical stroke
12: 120 mm 34: 340 mm
15: 150 mm 35: 350 mm
20: 200 mm 45: 450 mm

Specifications

Type		Unit	RH-12FH55XX/M/C	RH-12FH70XX/M/C	RH-12FH85XX/M/C	RH-20FH85XX/M/C	RH-20FH100XX/M/C
Machine class			Standard/ oil mist/ Clean			Standard/ oil mist/ Clean	
Protection degree *1			IP20/ IP65 *6/ ISO3 *7			IP20/ IP65 *6/ ISO3 *7	
Installation			Floor type			Floor type	
Structure			Horizontal, multiple-joint type				
Degrees of freedom			4				
Drive system			AC servo motor				
Position detection method			Absolute encoder				
Maximum load capacity		kg	Maximum 12 (rating 3)			Maximum 20 (rating 5)	
Arm length	NO1 arm	mm	225	375	525	525	525
	NO2 arm		325			325	475
Maximum reach radius		mm	550	700	850	850	1000
Operating range	J1	deg	340 (±170)				
	J2		290 (±145)		306 (±153)	306 (±153)	
	J3 (Z)	mm	xx = 35 : 350/ xx = 45 : 450			xx = 35 : 350/ xx = 45 : 450	
	J4 (θ)	deg	720 (±360)				
Maximum speed	J1	deg/sec	420		280	280	
	J2		450				
	J3 (Z)	mm/sec	2800			2400	
	J4 (θ)	deg/sec	2400			1700	
Maximum composite speed *2		mm/sec	11435	12535	11350	11372	13283
Cycle time *3		sec	0.30	0.30	0.30	0.30	0.36
Position repeatability	Y-X composite	mm	±0.012	±0.015	±0.015	±0.015	±0.02
	J3 (Z)		±0.01				
	J4 (θ)	deg	±0.005				
Ambient temperature		°C	0 to 40				
Mass		kg	65	67	69	75	77
Tolerable amount of inertia	Rating	kgm²	0.025			0.065	
	Maximum		0.3			1.05	
Tool wiring			Hand: 8 input points/8 output points (20 pins total) Serial signal cable for parallel I/O (2-pin + 2-pin power line) LAN X 1 <100 BASE-TX> (8-pin) *4				
Tool pneumatic pipes			Primary: ϕ6 x 2 Secondary: ϕ6 x 8				
Machine cable			5 m (connector on both ends)				
Connected controller *5			CR750, CR751				

*1: The environment-resistant specifications (C: Clean specification, M: Mist specification) are factory-set custom specifications.
*2: The value assumes composition of J1, J2, and J4.
*3: Value for a maximum load capacity of 2 kg. The cycle time may increase if specific requirements apply such as high work positioning accuracy, or depending on the operating position.
(The cycle time is based on back-and-forth movement over a vertical distance of 25 mm and horizontal distance of 300 mm.)
*4: Can also be used as a spare line (0.2 sq. mm, 4-pair cable) for conventional models.
*5: Select either controller according to your application. Note that controllers with oil mist specifications come equipped with a controller protection box (CR750-MB) and "-SM" is appended at the end of the robot model name. If you require it, consult with the Mitsubishi Electric dealer.
*6: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use. Direct jet to the bellows is excluded.
*7: Preservation of cleanliness levels depends on conditions of a downstream flow of 0.3 m/s in the clean room and internal robot suctioning. A ϕ8-mm coupler for suctioning is provided at the back of the base.

Controller Q type/D type Specifications/System Configuration

Controller Specifications

Type		Unit	CR750-Q	CR751-Q
Robot CPU			Q172DRCPU	
Path control method			PTP control and CP control	
Number of axes controlled			Maximum 6 axes	
Robot language			MELFA-BASIC IV/V	
Position teaching method			Teaching method, MDI method	
Memory capacity	Number of teaching points	points	13,000	
	Number of steps	step	26,000	
	Number of programs	Unit	256	
External input/ output *4	General-purpose I/O	points	8192 input points/8192 output points with the multiple CPU common device	
	Dedicated I/O	points	Assigned to multiple CPU common device.	
	Hand open/close	points	8 input / 8 output	
	Emergency stop input	points	1 (redundant)	
	Door switch input	points	1 (redundant)	
	Enabling device input	points	1 (redundant)	
	Emergency stop output	points	1 (redundant)	
	Mode output	points	1 (redundant)	
	Robot error output	points	1 (redundant)	
	Synchronization of additional axes	points	1 (redundant)	
Interface	RS-422	ports	1 (Teaching pendant: dedicated T/B)	
	Ethernet	ports	1 (dedicated teaching pendant port) 10BASE-T	
	USB *5	ports	1 (USB port of programmable controller CPU unit can be used.)	
	Additional-axis interface	channels	1 (SSCNET III)	
	Encoder input	channels	Q173DPX (Sold separately)	
Ambient temperature		°C	0 to 40 (drive unit)/0 to 55 (Robot CPU)	
Relative humidity		%RH	45 to 85	
Power supply *4	Input voltage range *1	V	RV-2F/4F, RH-3FH/6FH: Single-phase 180 to 253 V AC RV-7, 7FLL/13F/20F, RH-12FH/20FH: Three-phase 180 to 253 V AC or Single-phase 207 to 253 V AC	
	Power capacity *2	KVA	RV-2F series, RH-3FH series: 0.5 RV-4F series, RH-6FH series: 1.0 RH-12FH/20FH series: 1.5 RV-7F series (excluding RV-7FLL): 2.0 RV-7FLL, RV-13F series, RV-20F series: 3.0	
External dimensions (including legs)		mm	430 (W) x 425 (D) x 174 (H)	430 (W) x 425 (D) x 98 (H) / 430 (W) x 425 (D) x 174 (H) *6
Weight		kg	Approx. 18	Approx. 12 / Approx. 18 *6
Structure [protective specification]			Self-contained floor type/open structure (Vertical and horizontal position can be placed) [IP20]	
Grounding *3		Ω	100 or less (class D grounding)	

*1: The rate of power-supply voltage fluctuation is within 10%.
*2: The power capacity indicates the rating for normal operation. Take note that the power capacity does not include the currentbeing input when the power is turned on. The power capacity is only a rough guide and whether or not operation can be guaranteed depends on the input power-supply voltage.
*3: Grounding works are the customer's responsibility.
*4: For CR751, crimp or solder wiring for connection to user wiring connectors for emergency stop input/output, door switch input, etc. and power supply connectors. The optional terminal block replacement tool available separately can also be used to connect wiring.
*5: For RV-7FLL / 13F / 20F

Controller Specifications

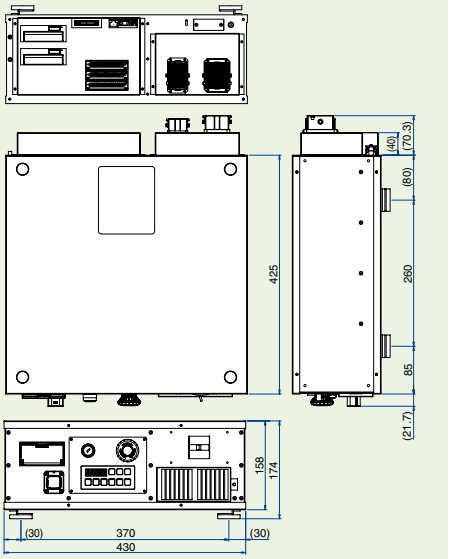
Type		Unit	CR750-D	CR751-D
Path control method			PTP control and CP control	
Number of axes controlled			Maximum 6 axes	
Robot language			MELFA-BASIC IV/V	
Position teaching method			Teaching method, MDI method	
Memory capacity	Number of teaching points	points	39,000	
	Number of steps	step	78,000	
	Number of programs	Unit	512	
External input/ output *5	General-purpose I/O	points	0 input/0 output (Up to 256/256 when options are used)	
	Dedicated I/O	points	Assigned to general-purpose I/O.	
	Hand open/close	points	8 input / 8 output	
	Emergency stop input	points	1 (redundant)	
	Door switch input	points	1 (redundant)	
	Enabling device input	points	1 (redundant)	
	Emergency stop output	points	1 (redundant)	
	Mode output	points	1 (redundant)	
	Robot error output	points	1 (redundant)	
	Synchronization of additional axes	points	1 (redundant)	
Interface	RS-422	ports	1 (Teaching pendant: dedicated T/B)	
	Ethernet	ports	1 (dedicated teaching pendant port), 1 (for customer) 10BASE-T/100BASE-TX	
	USB *6	ports	1 (Ver. 2.0 device functions only, mini B terminal)	
	Additional-axis interface	channels	1 (SSCNET III)	
	Extension slot *1	slots	2	
	Encoder input	channels	2	
Ambient temperature		°C	0 to 40	
Relative humidity		%RH	45 to 85	
Power supply *5	Input voltage range *2	V	RV-2F/4F, RH-3FH/6FH: Single-phase 180 to 253 V AC RV-7, 7FLL/13F/20F, RH-12FH/20FH: Three-phase 180 to 253 V AC or Single-phase 207 to 253 V AC	
	Power capacity *3	KVA	RV-2F series, RH-3FH series: 0.5 RV-4F series, RH-6FH series: 1.0 RH-12FH/20FH series: 1.5 RV-7F series (excluding RV-7FLL): 2.0 RV-7FLL, RV-13F series, RV-20F series: 3.0	
External dimensions (including legs)		mm	430 (W) x 425 (D) x 174 (H)	430 (W) x 425 (D) x 98 (H) / 430 (W) x 425 (D) x 174 (H) *6
Weight		kg	Approx. 18	Approx. 12 / Approx. 18 *6
Structure [protective specification]			Self-contained floor type/open structure (Vertical and horizontal position can be placed) [IP20]	
Grounding *4		Ω	100 or less (class D grounding)	

*1: For installing option interface.
*2: The rate of power-supply voltage fluctuation is within 10%.
*3: The power capacity indicates the rating for normal operation. Take note that the power capacity does not include the currentbeing input when the power is turned on. The power capacity is only a rough guide and whether or not operation can be guaranteed depends on the input power-supply voltage.
*4: Grounding works are the customer's responsibility.
*5: For CR751, crimp or solder wiring for connection to user wiring connectors for emergency stop input/output, door switch input, etc. and power supply connectors. The optional terminal block replacement tool available separately can also be used to connect wiring.
*6: For RV-7FLL / 13F / 20F

CR750-Q / D



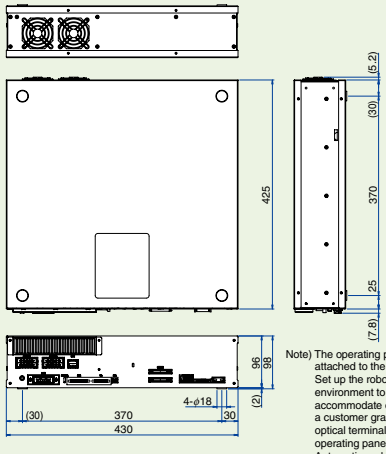
External Dimensions



CR751-Q / D



External Dimensions



Note) The operating panel is not attached to the CR-751. Set up the robot operating environment to accommodate operation by a customer graphical optical terminal (GOT) or operating panel. Automatic and other operation modes can be enabled from the teaching pendant.

Multiple CPU environment

Unit	Type
Base	High-speed standard base between multiple CPU
	• Q35DB: 5 slots
	• Q38DB: 8 slots
	• Q312DB: 12 slots
Power supply	• Q61P • Q62P • Q63P
	• Q64PN
Programmable controller CPU	Universal model
	• Q03UD (E/V) CPU
	• Q04UD (H/EH/V) CPU
	• Q06UD (H/EH/V) CPU
	• Q10UD (H/EH) CPU
	• Q13UD (H/EH/V) CPU
	• Q20UD (H/EH) CPU
	• Q26UD (H/EH/V) CPU
	• Q50UDEHCPU
	• Q100UDEHCPU

Note) To learn more about individual units of programmable controllers, please refer to the Mitsubishi Electrics FA website.

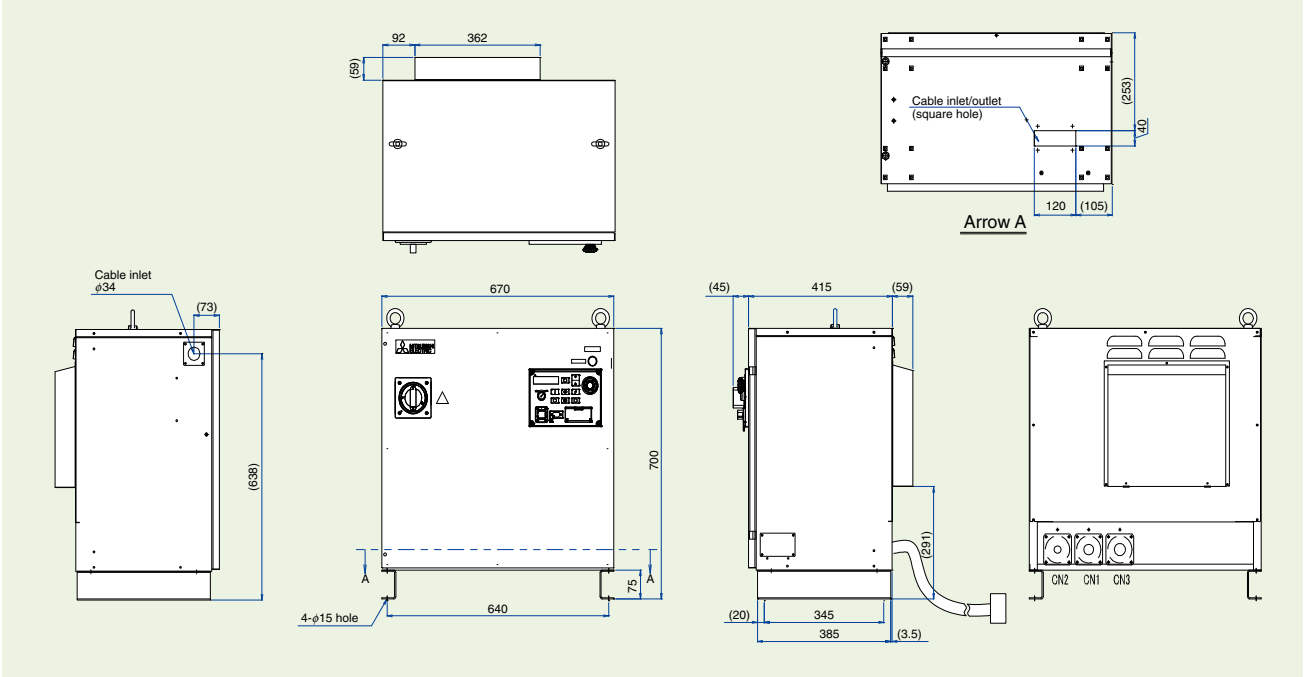
Controller Specifications

Type		Unit	CR760-Q iQ Platform compatible functions	CR760-D Stand alone
Robot CPU			Q172DRCPU	Built-in
Path control method			PTP control and CP control	
Number of axes controlled			6 axes + additional 8 axes available	
Robot language			MELFA-BASIC IV/V	
Position teaching method			Teaching method, MDI method	
Memory capacity	Number of teaching points	points	13,000	
	Number of steps	step	26,000	
	Number of programs	Unit	256	
External input/ output	General-purpose I/O	points	0 input/0 output	
	Dedicated I/O	points	Assigned to general-purpose I/O.	
	Hand open/close	points	16 input / 16 output	
	Emergency stop input	points	1 (redundant)	
	Door switch input	points	1 (redundant)	
	Enabling device input	points	1 (redundant)	
	Emergency stop output	points	1 (redundant)	
	Mode output	points	1 (redundant)	
	Robot error output	points	1 (redundant)	
	Synchronization of additional axes	points	1 (redundant)	
Interface	RS-232	ports	1	Use the function of the programmable controller.
	RS-422	ports	1 (Teaching pendant: dedicated T/B)	
	Ethernet	ports	1 (dedicated teaching pendant port) 10BASE-T	1 (dedicated teaching pendant port), 1 (for customer) 10BASE-T/100BASE-TX
	USB	ports	Use the function of the programmable controller.	1
	Additional-axis interface	channels	1 (SSCNET III)	
	Extension slot	slots	Use the option of the programmable controller.	3
	Encoder input	channels	Use the option of the programmable controller.	2
	Memory extension slot	slots	–	1
Ambient temperature		°C	0 to 40	
Relative humidity		%RH	45 to 85	
Power supply	Input voltage range	V	RV-35F/50F/70F: Three-phase AC 180 V to 253 V	
	Power capacity	KVA	RV-35F/50F/70F: Maximum : 20	
External dimensions (including legs)		mm	670 (W) x 415 (D) x 700 (H)	
Weight		kg	Approx. 120	
Structure [protective specification]			Self-contained floor type/sealed structure [IP54]	
Grounding		Ω	100 or less (class D grounding)	

CR760

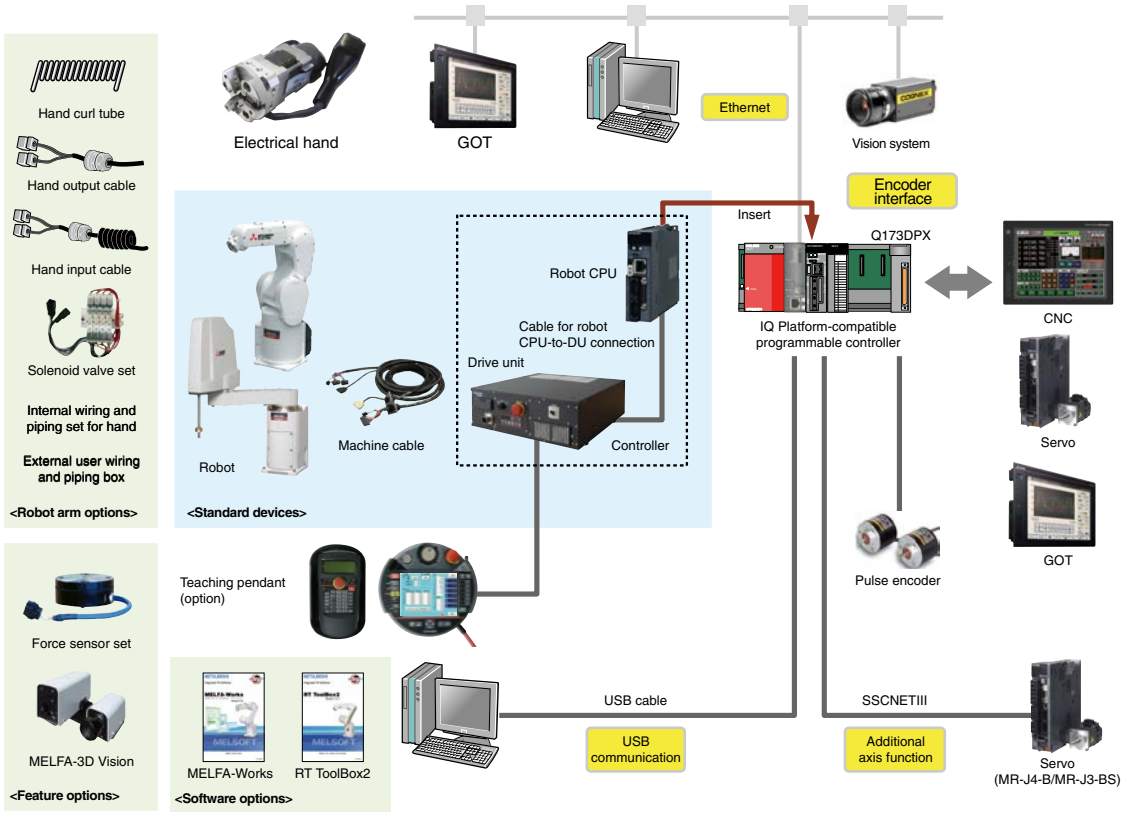


External Dimensions (For RV-35F/50F/70F)



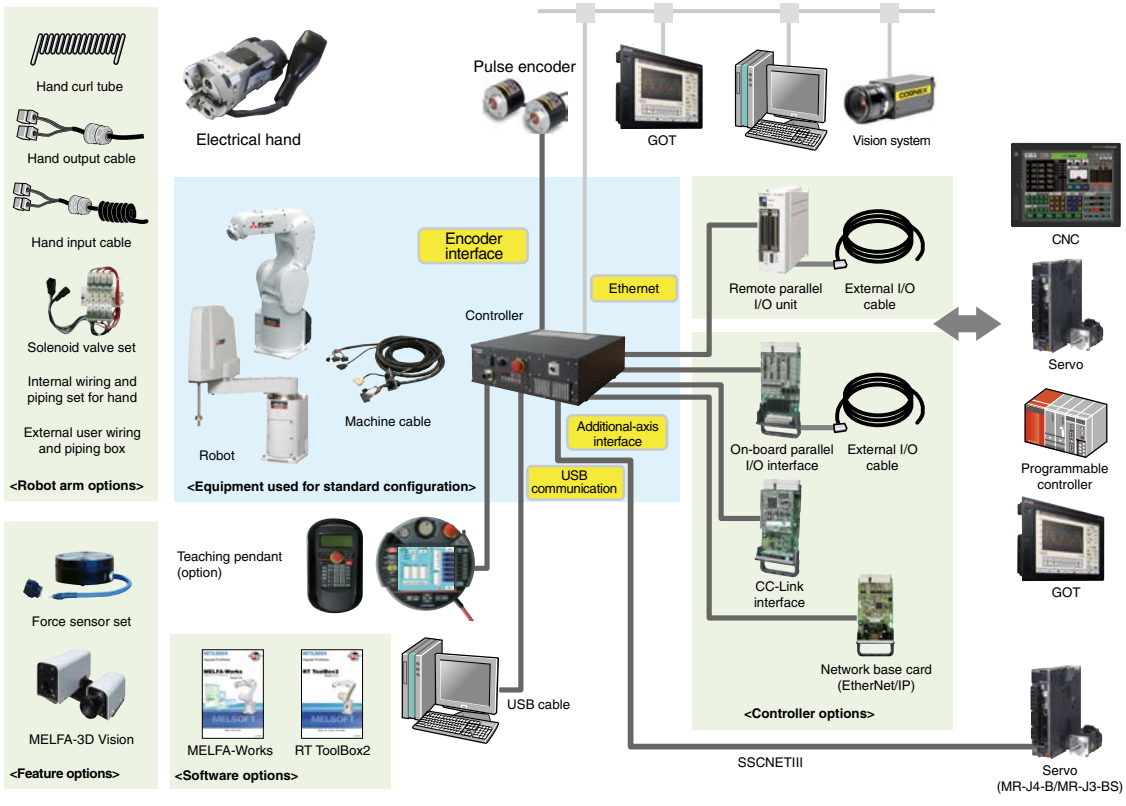
F-Q SERIES

System Configuration



F-D SERIES

System Configuration



Options

■Configurations options

Classification	Name	Type	RV					RH				Functional specifications
			2F 2FL	4F 4FL	7F 7FL	7FLL	13F 13FL 20F	3FH	6FH	12FH 20FH	3FHR	
Robot arm	Solenoid valve set	1E-VD0□ (Sink) 1E-VD0□E (Source)	○	–	–	–	–	–	–	–	–	1 to 2 valves, with solenoid valve output cable. □ indicates the number of solenoid valves (1 or 2 valves) Output: ϕ4
		1F-VD0□-02 (Sink) 1F-VD0□E-02 (Source)	–	○	○	○	–	–	–	–	–	1 to 4 valves, with solenoid valve output cable. □ indicates the number of solenoid valves (1, 2, 3, or 4 valves) Output: ϕ4
		1F-VD0□-03 (Sink) 1F-VD0□E-03 (Source)	–	–	–	–	○	–	–	–	–	1 to 4 valves, with solenoid valve output cable. □ indicates the number of solenoid valves (1, 2, 3, or 4 valves) Output: ϕ6
		1F-VD0□-01 (Sink) 1F-VD0□E-01 (Source)	–	–	–	–	–	○	○	–	–	1 to 4 valves, with solenoid valve output cable. □ indicates the number of solenoid valves (1, 2, 3, or 4 valves) Output: ϕ4
		1S-VD0□-01 (Sink) 1S-VD0□E-01 (Source)	–	–	–	–	–	–	–	○	–	1 to 4 valves, with solenoid valve output cable. □ indicates the number of solenoid valves (1, 2, 3, or 4 valves) Output: ϕ6
		1S-VD04-05 (Sink) 1S-VD04E-05 (Source)	–	–	–	–	–	–	–	–	○	4 valves, with solenoid valve output cable. Output: ϕ4 (Standard)
		1S-VD04W-05 (Sink) 1S-VD04WE-05 (Source)	–	–	–	–	–	–	–	–	○	4 valves, with solenoid valve output cable. Output: ϕ4 (water proof/clean)
	Hand output cable	1E-GR35S	○	–	–	–	–	–	–	–	–	Straight cable for 2-solenoid valve systems, total length of 300 mm, with a robot connector on one side and unterminated on the other side
		1F-GR35S-02	–	○	○	○	○	–	–	–	–	Straight cable for 4-solenoid valve systems, total length of 300 mm, with a robot connector on one side and unterminated on the other side
		1F-GR60S-01	–	–	–	–	–	○	○	○	–	Straight cable for 4-solenoid valve systems, total length of 1050 mm, with a robot connector on one side and unterminated on the other side, equipped with a splash-proof grommet
		1S-GR35S-02	–	–	–	–	–	–	–	–	○	Straight cable for 4-solenoid valve systems, total length of 450 mm, with a robot connector on one side and unterminated on the other side
	Hand input cable	1S-HC30C-11	○	–	–	–	–	–	–	–	–	4-point type, with a robot connector on one side and unterminated on the other side
		1F-HC35S-02	–	○	○	○	○	–	–	–	–	8-point type, total length of 1000 mm, with a robot connector on one side and unterminated on the other side
		1F-HC35C-01	–	–	–	–	–	○	○	–	–	8-point type, total length of 1650 mm (includes a 350-mm-long curled section), with a robot connector on one side and unterminated on the other side, equipped with a splash-proof grommet
		1F-HC35C-02	–	–	–	–	–	–	–	○	–	8-point type, total length of 1800 mm (includes a 350-mm-long curled section), with a robot connector on one side and unterminated on the other side, equipped with a splash-proof grommet
		1S-HC00S-01	–	–	–	–	–	–	–	–	○	4-point type, total length of 1210 mm, with a robot connector on one side and unterminated on the other side
	Hand (curl) tube	1E-ST040□C	○	○	○	○	–	–	–	–	–	ϕ4: 1 to 4 valves (L = 300 mm) □ indicates the number of solenoid valves (2, 4, 6, 8). 2 or 4 valves for RV-2F.
		1E-ST0408C-300	–	–	–	–	–	○	○	–	–	Compatibility with ϕ4-4 solenoid valve systems (L = 300 mm)
		1N-ST060□C	–	–	–	–	○	–	–	○	–	ϕ6: 1 to 4 valves (L = 600 mm) □ indicates the number of solenoid valves (2, 4, 6, 8).
		1N-ST0608C-01	–	–	–	–	–	–	–	○	–	For 1- to 4-ϕ6-valve systems, total length of 1300 mm (including curl part 250 mm)
	Hand tube	1S-ST0304S	–	–	–	–	–	–	–	–	○	ϕ3: 2 valves (Maximum usable length: 400 mm)
	External wiring set 1 for the forearm	1F-HB01S-01	–	○	○	○	○	–	–	–	–	Used for the forearm. External wiring box used for connecting the hand input cable, the Ethernet cable, and the electrical hand and force sensor cable.
	External wiring set 2 for the forearm	1F-HB02S-01	–	○	○	○	○	–	–	–	–	Used for the forearm. External wiring box used for connecting the force sensor, the electrical hand, and the Ethernet cable.
	External wiring set 1 for the base	1F-HA01S-01	–	○	○	○	○	–	–	–	–	Used for the base. External wiring box used for connecting the communications output for the electrical hand, the electrical hand and force sensor cable, and the Ethernet cable. There are hand input connection available.
	External wiring set 2 for the base	1F-HA02S-01	–	○	○	○	○	–	–	–	–	Used for the base. External wiring box used for connecting the communications output for the electrical hand, the electrical hand, the force sensor cable, and the Ethernet cable. No hand input connection available.
	Internal wiring and piping set for hand	1F-HS604S-01	–	–	–	–	–	–	–	○	–	Wiring and piping set for internal mounting in the tip axis (Compatible with 8 input points for hand systems + ϕ6-2 solenoid valve systems) For 350 mm Z-axis stroke
		1F-HS604S-02	–	–	–	–	–	–	–	○	–	Wiring and piping set for internal mounting in the tip axis (Compatible with 8 input points for hand systems + ϕ6-2 solenoid valve systems) For 450 mm Z-axis stroke
		1F-HS408S-01	–	–	–	–	–	–	○	–	–	Wiring and piping set for internal mounting in the tip axis (Compatible with 8 input points for hand systems + ϕ4-4 solenoid valve systems) For 200 mm Z-axis stroke
		1F-HS408S-02	–	–	–	–	–	–	○	–	–	Wiring and piping set for internal mounting in the tip axis (Compatible with 8 input points for hand systems + ϕ4-4 solenoid valve systems) For 340 mm Z-axis stroke
		1F-HS304S-01	–	–	–	–	–	○	–	–	–	Wiring and piping set for internal mounting in the tip axis (Compatible with 4 input points for hand systems +ϕ3-2solenoid valve systems)
	External user wiring and piping box	1F-UT-BOX	–	–	–	–	–	○	○	–	–	Box for external wiring of user wiring (hand I/O, hand tube)
		1F-UT-BOX-01	–	–	–	–	–	–	–	○	–	Box for external wiring of user wiring (hand I/O, hand tube)
	Machine cable (replacement for shorter 2 m type) (*1)	1S-02UCBL-01	–	○	○	○	○	–	○	○	○	2 m long cables for securement purposes (2-wire set with power supply and signal)
		1F-02UCBL-02	–	–	–	–	–	○	–	–	–	2 m long cables for securement purposes (2-wire set with power supply and signal)
	Machine cable, for extension/fixed CR-750	1S-□□CBL-11	○	–	–	–	–	–	–	–	–	Exchange type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)
		1S-□□CBL-01	–	○	○	○	○	–	○	○	○	Extention type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)
		1S-□□CBL-03	–	–	–	–	–	○	–	–	–	Extention type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)
	Machine cable, for extension/fixed CR-751	1F-□□UCBL-11	○	–	–	–	–	–	–	–	–	Exchange type, extended length 5 m, 10m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)
		1F-□□UCBL-02	–	○	○	○	○	○	○	○	○	Exchange type, extended length 10 m, 15 m, 20 m (2wires set with power and signal wires) □□ indicates the length of cables (10, 15, 20 m)
	Machine cable, for extension/flexible CR-750	1S-□□LCBL-11	○	–	–	–	–	–	–	–	–	Exchange type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)
		1S-□□LCBL-01	–	○	○	○	○	–	○	○	○	Extention type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)
		1S-□□LCBL-03	–	–	–	–	–	○	–	–	–	Extention type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)
	Machine cable, for extension/flexible CR-751	1F-□□LUCBL-11	○	–	–	–	–	–	–	–	–	Exchange type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)
		1F-□□LUCBL-02	–	○	○	○	○	○	○	○	○	Exchange type, extended length 10 m, 15 m, 20 m (2wires set with power and signal wires) □□ indicates the length of cables (10, 15, 20 m)
	Stopper for changing the J1-axis operating range	1S-DH-11J1	○	–	–	–	–	–	–	–	–	Stopper for making changes, installed by customer
		1F-DH-05J1	–	–	–	○	○	–	–	–	–	Stopper for making changes, installed by customer (Compatible with the RV-7FLL.)
		1F-DH-04	–	–	○	–	–	–	–	–	–	Stopper for making changes, installed by customer
		1F-DH-03	–	○	–	–	–	–	–	–	–	Stopper for making changes, installed by customer
		1F-DH-02	–	–	–	–	–	–	–	○	–	Stopper for making changes, installed by customer
		1S-DH-01	–	–	–	–	–	○	○	–	–	Stopper for making changes, installed by customer
		1S-DH-05J1	–	–	–	–	–	–	–	–	○	Stopper for making changes, installed by customer
	Stopper for changing the J2-axis operating range	1S-DH-11J2	○	–	–	–	–	–	–	–	–	Stopper for making changes, installed by customer
		1S-DH-05J2	–	–	–	–	–	–	–	–	○	Stopper for making changes, installed by customer
	Stopper for changing the J3-axis operating range	1S-DH-11J3	○	–	–	–	–	–	–	–	–	Stopper for making changes, installed by customer

Note 1) This is a special specification for shipping. Inquire for delivery and prices.

Options

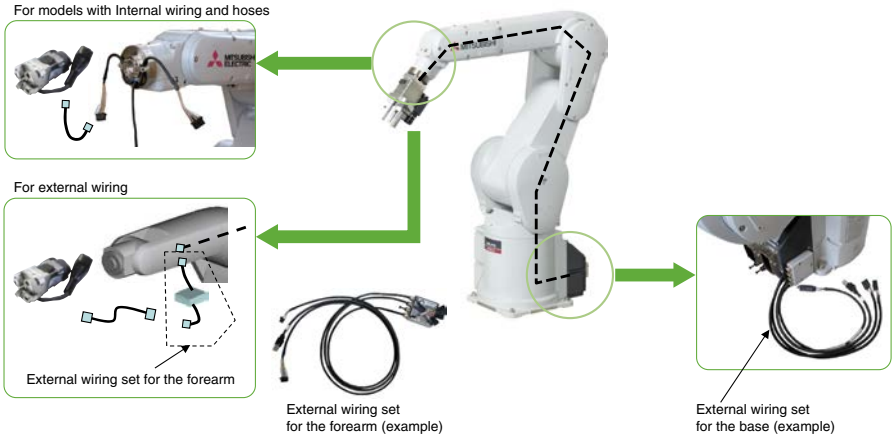
Classification	Name	Type	CR750		CR751		CR760		Functional specifications
			Q type	D type	Q type	D type	Q type	D type	
Controller	Standard teaching pendant (7 m, 15 m)	R32TB(-**)	○	○	–	–	○	○	7 m: Standard, 15 m: Custom (*-15* is included in the model name) For controller CR-750-*
	High-function teaching pendant (7 m, 15 m)	R56TB(-**)	○	○	–	–	○	○	7 m: Standard, 15 m: Custom (*-15* is included in the model name) For controller CR-750-*
	Standard teaching pendant (7 m, 15 m)	R33TB(-**)	–	–	○	○	–	–	7 m: Standard, 15 m: Custom (*-15* is included in the model name) For controller CR-751-*
	High-function teaching pendant (7 m, 15 m)	R57TB(-**)	–	–	○	○	–	–	7 m: Standard, 15 m: Custom (*-15* is included in the model name) For controller CR-751-*
	Conversion cable for the teaching box	2F-32CON03M	–	–	○	○	–	–	Conversion cable used to connect the R32TB to the CR-751 controller. Cable length: 3 m.
	On-board Parallel I/O interface (Sink type) (Source type)	2A-RZ361 2A-RZ371	–	○	–	○	–	○	32 output points/ 32 input points
	Remote Parallel I/O cable (5 m, 15 m)	2A-CBL**	–	○	–	○	–	○	CBL05: 5 m, CBL15: 15 m, not terminated at one end. For 2A-RZ361/371.
	On-board Parallel I/O interface (Installed internally) (Sink type) (Source type)	2D-TZ368 2D-TZ378	–	○	–	○	–	○	32 output points/ 32 input points
	Remote Parallel I/O cable (5 m, 15 m)	2D-CBL**	–	○	–	○	–	○	CBL05: 5 m, CBL15: 15 m, not terminated at one end. For 2D-TZ368/378.
	CC-Link interface	2D-TZ576	–	○	–	○	–	○	CC-Link Intelligent device station, Ver. 2.0, 1 to 4 stations
	Network base card	2D-TZ535	–	○	–	○	–	–	Communications interface for attaching to Anybus-CompactCom modules An HMS EtherNet/IP module (AB6314) and a PROFINET IO module (AB6489-B) must be separately prepared by customers. (*1)
	Force sensor set	4F-FS001-W200	○	○	○	○	–	–	Set of devices required for the force control function including a force sensor and interface unit
	MELFA- 3D Vision	4F-3DVS2-PKG1	○	○	○	○	–	–	Set of devices required for the 3D vision sensor function, including a 3D camera head and control unit (applicable model: RV-F series)
	Terminal block replacement tool for the user wiring	2F-CNUSR01M	–	–	○	○	–	–	Terminal block replacement tool for the wiring for the external input/output, such as emergency input/output, door switch input, and enabling device input
	Encoder distribution unit	2F-YZ581	○	○	○	○	–	–	Unit for connecting one rotary encoder to multiple robot controllers (up to four controllers) when the tracking function is used
	Controller protection box	CR750-MB	○	○	–	–	–	–	With a built-in CR750-D/Q for improved dust-proofing to IP54 (dedicated CR750)
	Controller protection box	CR751-MB	–	–	○	○	–	–	With a built-in CR751-D/Q for improved dust-proofing to IP54 (dedicated CR751)
	Personal computer support software	3D-11C-WINJ	○	○	○	○	○	○	With simulation function (CD-ROM)
	Personal computer support software -mini	3D-12C-WINJ	○	○	○	○	○	○	Simple version (CD-ROM)
	Simulator (MELFA-Works)	3F-21D-WINJ	○	○	○	○	○	○	Layout study/Takt time study/Program debug. Add-in software for Solidworks® (*2)
	Extension memory	2D-TZ454	–	–	–	–	–	○	Extended user program area of 2 MB

*1: Ethernet is a registered trademark of Fuji Xerox Co., Ltd.
*2: SolidWorks® is a registered trademark of SolidWorks Corporation (USA).

■RV-4F/7F/13F/20F Series Tooling device configuration

Hand configuration	Wiring format	Robot specifications	Required device		Comments
			External wiring set for the forearm	External wiring set for the base (*3)	
• Air-hand + Hand input signal	Interior equipment	-SH01	– (*1)	–	Air hoses: Up to 2 systems (4 mm diameter x 4); 8 input signals
	Exterior equipment	Standard	– (*2)	–	Air hoses: Up to 4 systems (4 mm diameter x 8) are possible.
• Air-hand + Hand input signal • Vision sensor	Interior equipment	-SH05	– (*1)	(1F-HA01S-01)	Air hoses: Up to 1 systems (4 mm diameter x 2); 8 input signals
	Exterior equipment	Standard	1F-HB01S-01 (*2)	1F-HA01S-01	Air hoses: Up to 4 systems (4 mm diameter x 8) are possible.
• Air-hand + Hand input signal • Force sensor	Interior equipment	-SH04	– (*1)	(1F-HA01S-01)	Air hoses: Up to 1 systems (4 mm diameter x 2); 8 input signals
	Exterior equipment	Standard	1F-HB01S-01 (*2)	1F-HA01S-01	Air hoses: Up to 4 systems (4 mm diameter x 8) are possible.
• Air-hand + Hand input signal • Vision sensor • Force sensor	Interior equipment (Air hoses are part of exterior equipment)	-SH02	– (*1)	(1F-HA01S-01)	Air hoses are exterior equipment: 4 systems (4 mm diameter x 8)
	Exterior equipment	Standard	1F-HB01S-01	1F-HA01S-01	Air hoses: Up to 4 systems (4 mm diameter x 8) are possible.
• Electrical hand + Hand input signal • Vision sensor	Interior equipment	-SH02	–	(1F-HA01S-01)	
	Exterior equipment	Standard	1F-HB01S-01	1F-HA01S-01	
• Electrical hand • Vision sensor • Force sensor	Interior equipment	-SH03	–	(1F-HA02S-01)	
	Exterior equipment	Standard	1F-HB02S-01	1F-HA02S-01	

*1: Users must provide the solenoid valves for Internal wiring model air-hands.
*2: Users must provide solenoid valves and hoses/input cables as needed for External wiring model air-hands.
*3: The external wiring set for the base is provided for models with Internal wiring and hoses.



Options Description

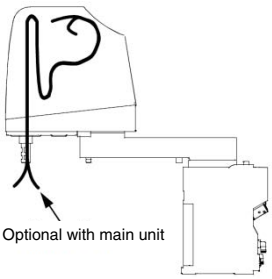
Solenoid valve set



For RH-3F and 6FH
For RH-12FH and 20FH

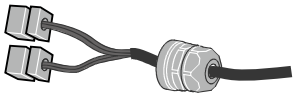
This optional solenoid valve is designed for tooling control, for example, when attaching a hand at the tip of a robot arm.
Assembled with a manifold, fittings, and connectors for easy attachment to the robot unit.
Mounting shape of the solenoid valve is different depending on the robot. Please check details before use.

Internal wiring and piping set for hand



This air hose and cable set is designed to insert an input signal cable from the second arm to the shaft tip.
The set includes an air hose, a hand input signal cable, and a fixing metal sheet, and comes with grease (for shaft top coating), silicon rubber, and cable ties.

Hand output cable

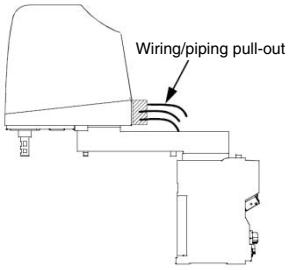


Wire size × no. of core wires	AWG#24(0.2mm^2) × 12 cores
Full length	300mm (RV), 1050mm (RH)

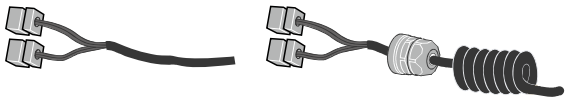
Useful when using a solenoid valve other than the optional solenoid valve set.
One side can be connected to a hand signal output connector in the robot machine. The other side is designed for cable bridging.

External user wiring and piping box

A useful option to pull out hand wiring and piping from inside the robot, such as taking an air hose and a signal line out from rear of the second arm.
It comes with a joint to pull out the air hose, and a hole to secure with the cable clamp to draw out the signal line.
The optional hand output cable and hand input cable can be fixed.



Hand input cable



RV RH

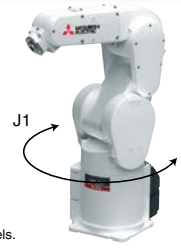
Wire size × no. of core wires	AWG#24(0.2mm^2) × 12 cores
Full length	1000mm (RV), 1650/1800mm (RH: inc. curled part of 350mm)

These are for air-hands designed by customers to capture hand opening/closing signals and grip confirmation signal for the controller.
One side can be connected to a hand signal input connector located on the robot's main unit top surface. The other side is connected to a hand designed by the customer.

Stopper for changing the J1-axis operating range

	RV (*1)	RH
+J1	(Standard +240°) +210, +150, +90°	(Standard +170°) +150, +130°
-J1	(Standard -240°) -210, -150, -90°	(Standard -170°) -150, -130°

*1: Applicable to RV-2F only. Refer to specifications for other models.



Designed to limit the J1 axis operating range with a mechanical stopper of the robot's main unit and the controller parameter.
Useful when there is a need to limit operating range, for example, an interference with a peripheral unit.

Standard teaching pendant

R32TB: For CR750/CR760
R33TB: For CR751



Dimensions	195mm (W) × 292mm (H) × 106mm (D)
Mass	Approx. 0.9kg (main unit only; excludes cables)
Display area	LCD display: 24 characters × 8 lines with backlight
Display language	Japanese, English

Designed to teach program creation, modification, management and operating position, and perform jog feed.
Equipped with three position enable switches for safe use.
The same teaching box can be switched among multiple robots.
Power should be turned off when switching to another robot.

High-function teaching pendant

R56TB: For CR750/CR760
R57TB: For CR751



Dimensions	252mm (W) × 240mm (H) × 114mm (D)
Mass	Approx. 1.3kg (main unit only; excludes cables)
Interface	USB port × 1
Display area	6.5 inch TFT (640 × 480) Color touch screen, backlight
Display language	Japanese, English

Advanced teaching box with improved monitoring capability, in addition to the R32TB functions.
Program editing, parameter settings, and other operations equivalent to RT ToolBox2 are available to streamline the debug operation.

Options Description

On-board Parallel I/O interface

<Input>

Type	DC input	
No. of outputs	32	
Insulation type	Photocoupler insulation	
Rated input voltage	12VDC	24VDC
Rated input current	Approx. 3mA	Approx. 7mA

<Output>

Type	Transistor output
No. of outputs	32
Insulation type	Photocoupler insulation
Rated load voltage	12VDC /24VDC
Maximum load current	0.1A per point



Designed for the installation of additional external I/O.
Cables to connect with external devices are not included.
Please use the optional Remote Parallel I/O cables (5m, 15m).
Available in both Sink type and Source type.

CC-Link interface

Communication function	Bit data/word data transmission
Station type	Intelligent device station
Support station	Local station (no master station function)
CC-Link compatible version	Ver.2 Extended cyclic setting ready
Occupied station no.	1/2/3/4 stations occupancy setting ready



The optional CC-Link interface with its CC-Link function is capable of making cyclic transmission of not only bit data but also word data as well to the robot controller.

MELFA-3D Vision

This 3D vision sensor for small robots is small and performs high-speed and high-accuracy measurements. This sensor is optimal as a replacement for a parts feeder. Its unique model-less recognition processing enables high-speed picking.
(Applicable model: RV-F series)



Safety Option



Operators can enter an operation area without stopping robots.

Safety expansion module	Input signal	Safety input	2 systems (redundant)
		Exclusive stop input (SKIP)	1 system
		Encoder input for tracking	For 1 unit
	Exterior dimensions		92.6×127×51.2 mm
	Compatible robot controller		CR750/CR751 (D/Q)

On-board Parallel I/O interface (Installed internally)

<Input>

Type	DC input	
No. of outputs	32	
Insulation type	Photocoupler insulation	
Rated input voltage	12VDC	24VDC
Rated input current	Approx. 3mA	Approx. 9mA

<Output>

Type	Transistor output
No. of outputs	32
Insulation type	Photocoupler insulation
Rated load voltage	12VDC /24VDC
Maximum load current	0.1A per point



To use the external I/O, simply attach this optional item to the controller.
Cables to connect with external devices are not included.
Please use the optional Remote Parallel I/O cables (5m, 15m).
I/O specifications are the same as the programmable controller interface.
Available in both Sink type and Source type.

Force sensor set



The force sensor and interface unit detect a force applied to the arm to perform copying and fitting works in the same way as humans.
Ideal for works that require delicate force adjustment and force detection.

Vision system



The In-Sight software developed exclusively for use with Mitsubishi Electric FA devices with enhanced linking to In-Sight, the vision system produced by COGNEX Corporation, offers better compatibility with FA devices, allowing it to be utilized more easily as a more user-friendly vision system.

Up to three robots and seven vision systems can be connected together to the same system by Ethernet connection.
Easy Builder allows connection to vision systems, setting of job (vision programs) settings, and calibration between the robot and vision system to be completed easily and quickly.
The included dedicated vision system commands enable vision system startup, job selection, and control of data receiving and other operations to be completed quickly and easily using a single command without any need for protocols.

About safety

(1) Please read carefully the Safety Manual attached to the product and operate the industrial robots as specified.
Mitsubishi Electrics assumes no responsibility for compensations regarding any failure or damage caused by usage other than described in the safety manual.
(2) When designing or manufacturing a safety circuit and/or an emergency stop circuit, please ensure to follow the descriptions listed in safety measures of Standard Specifications and/or Instruction Manual.
Mitsubishi Electrics assumes no responsibility for compensations regarding any failure or damage caused by safety circuit and emergency stop circuit other than the described details.

LOW-VOLTAGE POWER DISTRIBUTION PRODUCTS

Low-voltage Circuit Breakers

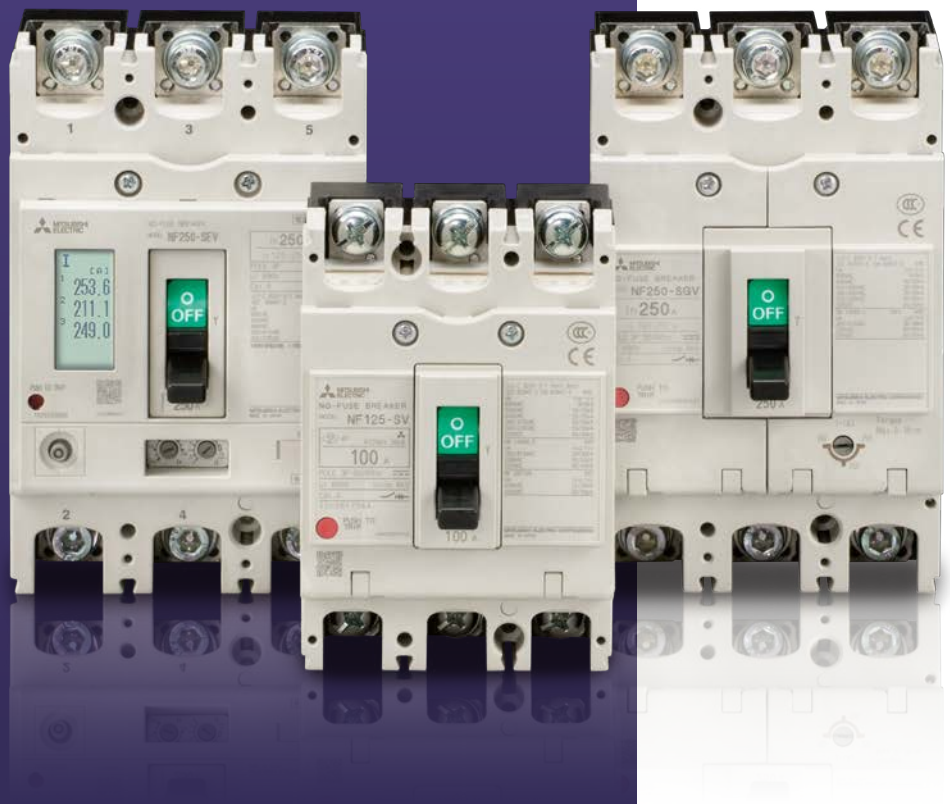
Magnetic Contactor and Starters

Our Power Distribution Products are compact, easy-to-use, and built with safety in mind, including the full lineup of Low-voltage Circuit Breakers.

World Super WS-V Series

Low-voltage Circuit Breakers

Mitsubishi is proud to support the future creation of electrical equipment through its Low-voltage Circuit Breakers.



For more than 50 years, Mitsubishi's Low-voltage circuit breaker continued to deliver market needs.
Our complete lineup, including the WS-V series built with a new breaking technology, is designed to respond to the individual market needs of the Receiving and Distribution and machineries.

Product details P.664

MS-T/N Series
Magnetic Contactor and Starters

A wide variety of lineup to meet any and all demands



The MS-T/N series magnetic contactors and starters are eco-friendly, ready for global use, compact, easy-to-use, and built with safety in mind. Compatible with many international standards and highly-reliable to meet various situations from switchboards to machineries.

Product details P.850

Low-voltage Circuit Breakers

For more than 50 years, Mitsubishi's Low Voltage Circuit breakers and earth leakage circuit breakers continued to deliver market needs.

Our complete lineup, including the WS-V series built with a new breaking technology, is designed to respond to the individual market needs of the receiving and distribution and machineries.

Molded Case Circuit Breakers



Circuit breaker for protection against overload and short circuit

Detailed Specifications P.672 | Installation and Connection P.716 | Characteristics and Dimensions P.760

Earth Leakage Circuit Breakers



Circuit breaker for protection against overload, short circuit, and electrification

Detailed Specifications P.682 | Installation and Connection P.716 | Characteristics and Dimensions P.800

Motor Protection Breakers



Circuit breaker for protection of motor and against short circuit

Detailed Specifications P.688

UL 489 Listed Circuit Breakers



Circuit breaker compliant with UL 489 America

Detailed Specifications P.689 | Installation and Connection P.716 | Characteristics and Dimensions P.818

Measuring Display Unit Breakers



Circuit breaker with measuring and display function

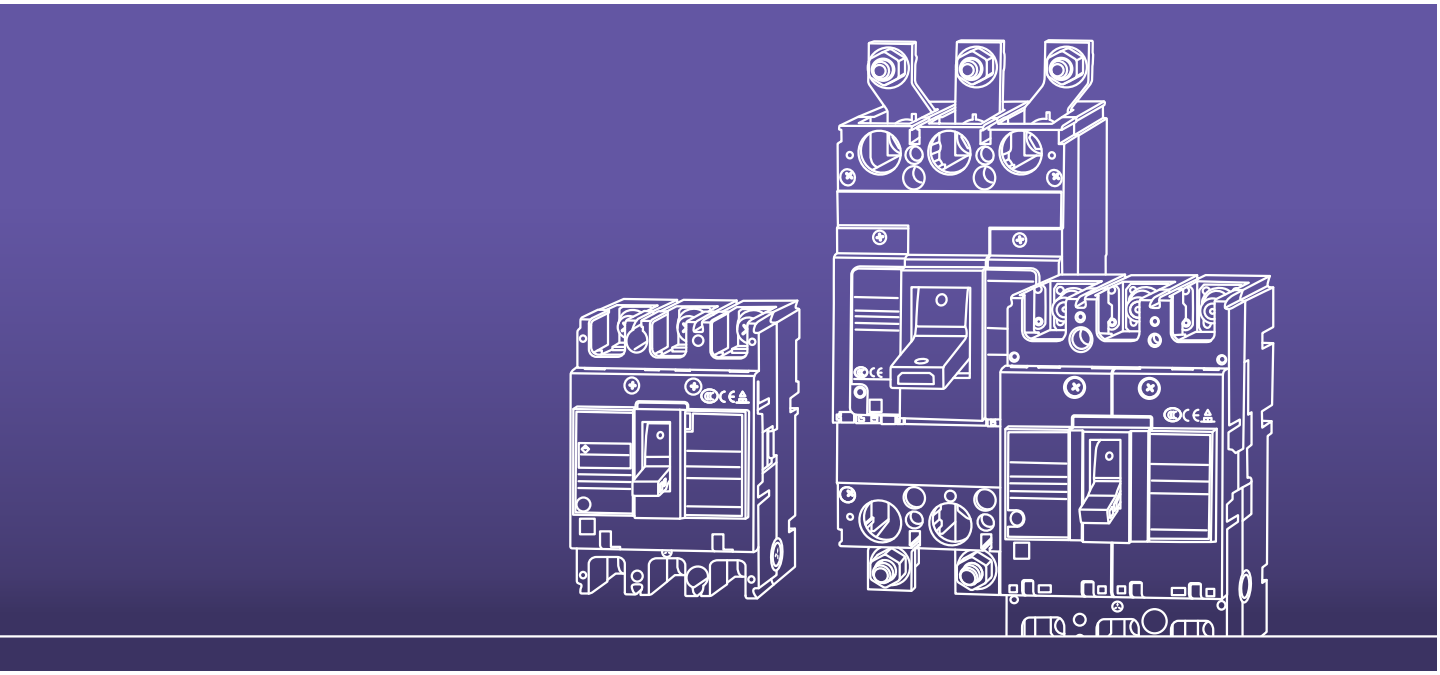
Detailed Specifications P.693 | Installation and Connection P.716 | Characteristics and Dimensions P.832

Miniature Circuit Breakers



Circuit breaker for protection against overload and short circuit of branch circuit

Detailed Specifications P.702 | Characteristics and Dimensions P.838



Residual Current Circuit Breaker



Circuit breaker for protection against earth leakage and electrification of branch circuit

Detailed Specifications P.704 | Characteristics and Dimensions P.841

Isolating Switch



Mechanical switch for equipment

Detailed Specifications P.703 | Characteristics and Dimensions P.843

Circuit Protectors



Circuit breaker for protection against overload of equipment

Detailed Specifications P.706 | Installation and Connection P.709 | Characteristics and Dimensions P.844

Low Voltage Air Circuit Breakers



Main circuit breaker to meet demands more advanced and multi-functional facilities

Detailed Specifications P.710 | Installation and Connection P.710

Related Components



Our lineup also includes an earth leakage relay

Detailed Specifications P.712

Product Line-up

Classification \ Frame (A)		20 30 32	40 50 60 63	70 100 125	160	225 250	
Molded Case Circuit Breakers	NF-C Economy class	NF30-CS	NF63-CV	NF125-CV		NF250-CV	
	NF-S Standard class	NF32-SV	NF63-SV	NF125-SV NF125-SGV NF125-SEV	NF160-SGV	NF250-SV NF250-SGV NF250-SEV	
	NF-H/L High-performance class		NF63-HV	NF125-HV NF125-LGV NF125-HEV NF125-HGV	NF160-LGV NF160-HGV	NF250-HV NF250-LGV NF250-HEV NF250-HGV	
	NF-R/U Ultra current-limiting class			NF125-RGV NF125-UV		NF250-RGV NF250-UV	
Earth Leakage Circuit Breakers	NV-C Economy class		NV63-CV	NV125-CV		NV250-CV	
	NV-S Standard class	NV32-SV	NV63-SV	NV125-SV NV125-SEV		NV250-SV NV250-SEV	
	NV-H/R High-performance class		NV63-HV	NV125-HV NV125-HEV		NV250-HV NV250-HEV	
Motor Protection Breakers	NF-MB	NF32-SV (*1)	NF63-CV (*1) NF63-SV (*1)	NF125-SV (*1)		NF250-SV (*1)	
UL 489 Listed Circuit Breakers	UL 489 Listed MCCB		NF50-SVFU	NF100-CVFU NF125-SVU NF125-HVU		NF225-CWU NF250-SVU NF250-HVU	
	UL 489 Listed ELCB		NV50-SVFU	NV100-CVFU NV125-SVU NV125-HVU		NV250-SVU NV250-HVU	
Measuring Display Unit Breakers	MDU Breakers					NF250-SEV with MDU NF250-HEV with MDU	
Miniature Circuit Breakers		BH-DN	BH-D6 BH-D10	BH BH-P			
Residual Current Circuit Breaker			BV-D				
Residual Current Circuit Breaker with Overload Protection			BV-DN				
Isolating Switch			KB-D				
Circuit Protectors		CP30-BA CP-S					
Air Circuit Breakers	AE-SW						
Related Components	Earth Leakage Relays	NV-ZBA, NV-ZSA, NV-ZHA, NV-ZLA					

Note: *1 When placing an order, specify “MB.”
WS-V Series (New models)

	400	600 630	800	1000	1250	1600	2000	2500	3200	4000	5000	6300
	NF400-CW	NF630-CW	NF800-CEW									
	NF400-SW NF400-SEW	NF630-SW NF630-SEW	NF800-SDW NF800-SEW	NF1000-SEW	NF1250-SDW NF1250-SEW	NF1600-SDW NF1600-SEW						
	NF400-HEW	NF630-HEW	NF800-HEW									
	NF400-REW NF400-UEW	NF630-REW	NF800-REW NF800-UEW									
	NV400-CW	NV630-CW										
	NV400-SW NV400-SEW	NV630-SW NV630-SEW	NV800-SEW									
	NV400-HEW NV400-REW	NV630-HEW	NV800-HEW									
	NF400-SWU NF400-HWU	NF630-SWU NF630-HWU										
	NF400-SEP with MDU NF400-HEP with MDU	NF630-SEP with MDU NF630-HEP with MDU	NF800-SEP with MDU NF800-HEP with MDU									
		AE630-SW		AE1000-SW	AE1250-SW	AE1600-SW	AE2000-SW AE2000-SWA	AE2500-SW	AE3200-SW	AE4000-SWA AE4000-SW	AE5000-SW	AE6300-SW

The next No.1 breaker brand Mitsubishi WS-V Series

The all-new "World Super V Series (WS-V Series)" is the result of revolutionary evolution, equipped with a new cutoff technology to enhance interrupting performance, and compatible with the latest standards of various countries to deliver optimal performance according to individual needs.

High-Performance

Takes high-performance to the next level

Adoption of the Expanded ISTAC

Standardization

Enhanced usability based on user-friendly product design

Widened the scope of internal auxiliary sharing parts

Environment

Eco-friendly products

Adapt to RoHS directive and the use of restricted substance is within the line limits stipulated by the said directive

Global

Full lineup to meet the fast-growing internationalization

Compatible with JIS, IEC (EN), GB, UL/CSA and other national standards worldwide

High-Performance Takes High-Performance to The Next Level

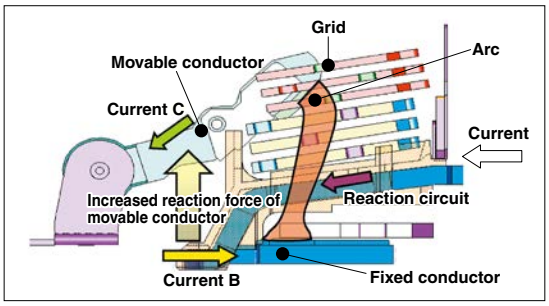
Technologies based on long year experience are brought together to realize more improved performance

The new circuit breaking technology “Expanded ISTAC” has improved the current-limiting performance and upgraded the overall breaking capacity. Expansion of the conductor under the stator shortens the contact parting time of the mover as compared to the conventional ISTAC structure.
The current-limiting performance has been improved remarkably. (The maximum peak current value has been reduced by approx. 10%.)

Example of breaking capacity improvement

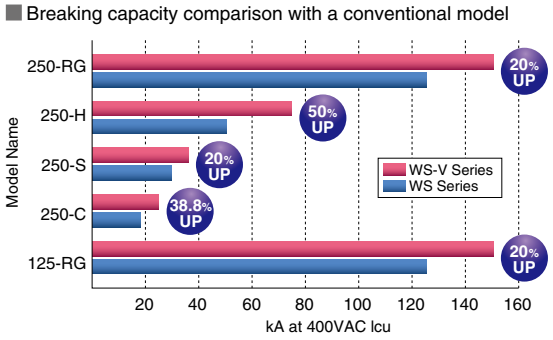
Previous Model NF250-SW	→	New Model NF250-SV
50kA /25kA (at 230VAC)		85kA /85kA (at 230VAC)

New circuit breaking technology (Expanded ISTAC)



Breaking capacity of 5 models is 20% to 50% higher than the W & WS Series

Improvement of breaking capacity on 250AF-C/S/H models (Fixed) & 125.250AF-R models (Thermal/Adjustable).



The new electronic circuit breakers (with display) and MDU breakers can display various measurement items

This will enable energy management through “visualization”, which leads to energy saving.

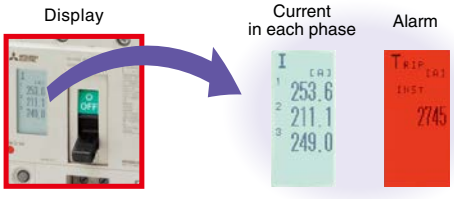


Electronic Circuit Breaker (with display)



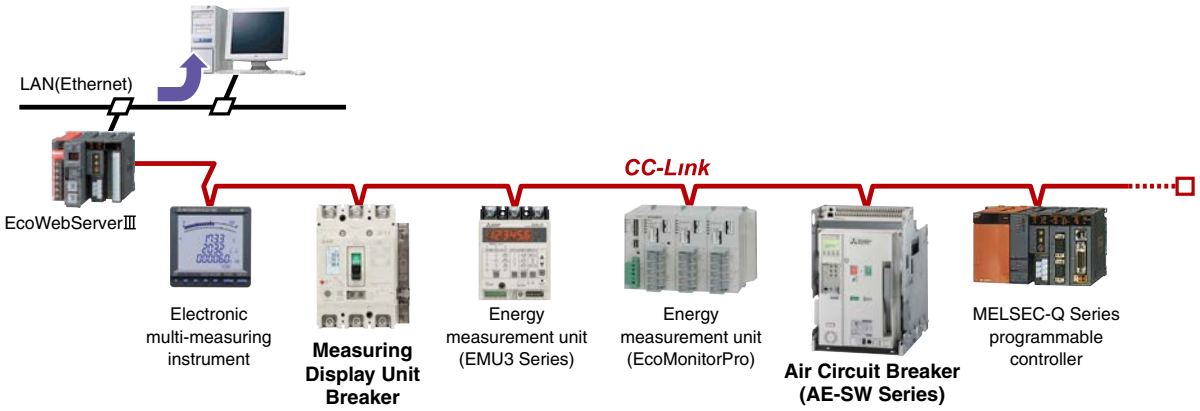
Measuring Display Unit Breaker

- The display is on the circuit breaker body and shows circuit information.
- Detailed setting can be done on the display.
- The display turns red during alarms.



Intelligent Communications through CC-Link

Measuring data can be transmitted to Personal Computer through CC-Link.



Standardization Enhanced Usability Based on User-Friendly Product Design

Compact design for easy to use

The thermal adjustable circuit breakers and electronic circuit breakers are smaller.

NF250-SGW



(Conventional model : 105 × 165 × **86mm**)

NF250-SGV



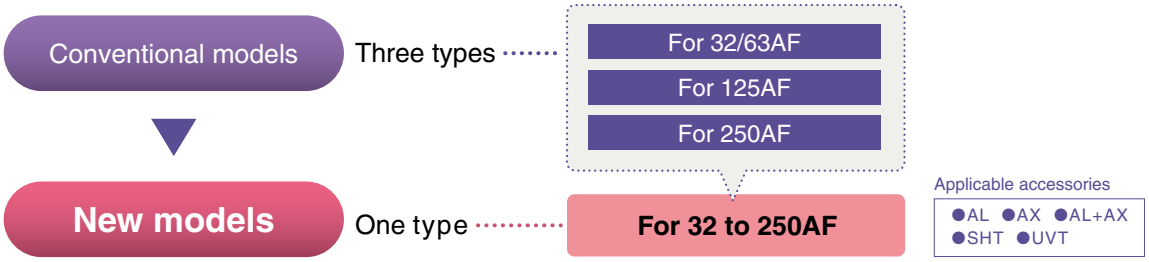
(New model : 105 × 165 × **68mm**)

Volume ratio 79%
(Compared with our conventional models)

250AF circuit breakers' fixed types (NF250-CV, NF250-SV, NF250-HV, NV250-CV, NV250-SV, NV250-HV), thermal adjustable types (NF250-SGV, NF250-HGV, NF250-RGV), and electronic types (NF250-SEV, NF250-HEV, NV250-SEV, NV250-HEV) are the same size, leading to the reduction and standardization of panel design.

Types of internal accessories are reduced from 3 types to 1 type

Standardization of internal accessories contributes to the reduction of stock and delivery time.



32AF and 63AF circuit breakers can now be used in both AC and DC circuits without specifying when ordering. This will lead to prevention of ordering mistakes.

The earth leakage circuit breakers can now be equipped with a voltage shunt trip device (SHT).

Innovative manufacturing using a robot-cell production line

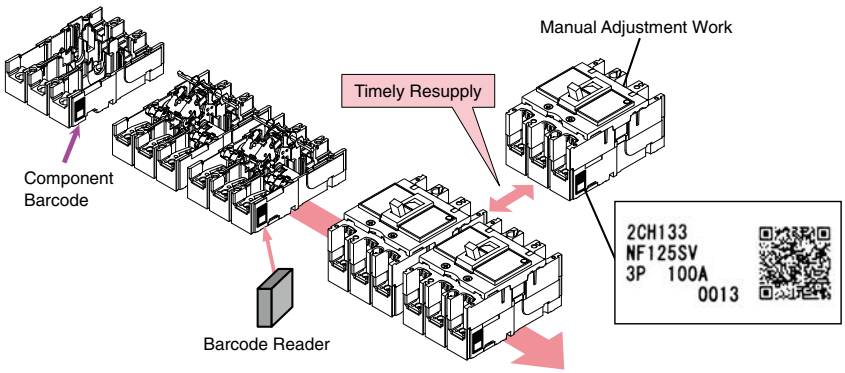
This manufacturing innovation takes the pursuit of increased productivity, shortened manufacturing lead-time and improved quality to the upper limits.



Robot-cell Production Line

Individual unit production management system

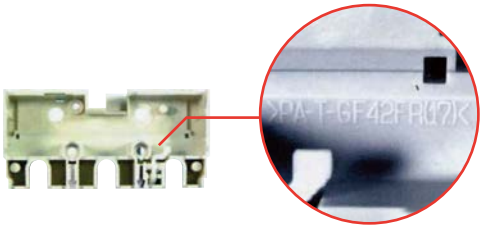
A multi-model, single-unit flow production system is utilized the ultimate multi-cycle production method. The production line is controlled using barcodes to manage the model information for each unit. Small-lot, flexible production that's one step ahead!



Environment Eco-Friendly Products

Use of Various Recyclable Materials

The circuit breakers are made of thermo-plastic materials that are easy to recycle.
(Some models are partially made of thermoset materials.)
The major plastic parts bear material identifications so that they can be recycled.



Eco-friendly products

Our products are compliament with the RoHS directive and the use of restricted substances is within the line limits stipulated by the said directive.

Energy Saving at Mitsubishi Electric Corporation Fukuyama Works

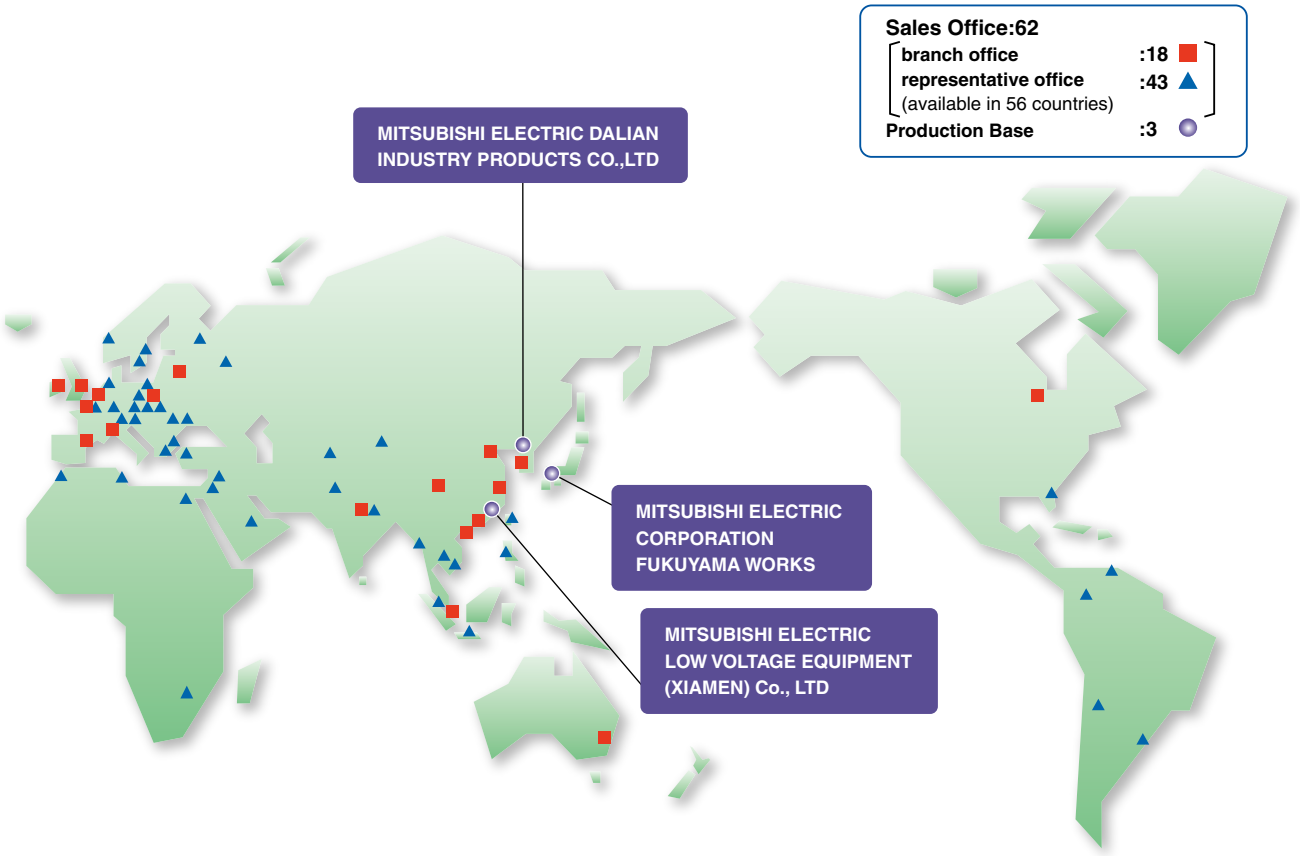
Mitsubishi Electric Corporation Fukuyama Works uses energy saving support devices such as MDU breakers and EcoServer to save energy through “visualization” of energy. Along with “visualization”, Fukuyama Works also installed high-efficiency equipments to further promote energy saving.
Through energy saving activity, Fukuyama Works has successfully reduced its electrical power consumption rate by 27% in 2007 (compared with 1990).



Global Full Lineup to Meet The Fast-Growing Internationalization

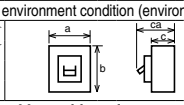
Global Networks of Sales Offices and Production Bases

Our sales networks are designed to comfort customers internationally through the worldwide distributors. Constantly contactable distributors enable us to accommodate customer’s needs for smooth supply.

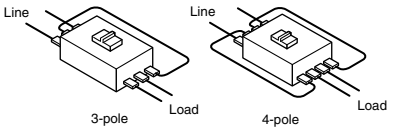


Detailed Specifications

●NF-C (Economy class)

Frame (A)				30	50	60	63	100	125
Model				NF30-CS	NF63-CV			NF125-CV	
Image									
Rated current In (A) Rated ambient temperture 40°C (45°C for marine use)				3 5 10 15 20 30	3 4 (5) 6 10 (15) 16 20 25 (30) 32 40 50	(60)	63	50 (60) 63 (75) 80 100	125
Number of poles				2 3	2 3	2 3	2 3	2 3	2 3
Rated insulation voltage Ui (V)				500	600	600	600	600	600
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	–	–	–	–	–	–
			500V	–	2.5/2.5	2.5/2.5	2.5/2.5	7.5/4	7.5/4
			440V	–	2.5/2.5	2.5/2.5	2.5/2.5	10/5	10/5
			415V	1.5/1.5	2.5/2.5	2.5/2.5	2.5/2.5	10/5	10/5
			400V	1.5/1.5	5/5	5/5	5/5	10/5	10/5
			380V	1.5/1.5	5/5	5/5	5/5	10/5	10/5
			230V	2.5/2 (240V)	7.5/7.5	7.5/7.5	7.5/7.5	30/15	30/15
			200V	2.5/2 (240V)	7.5/7.5	7.5/7.5	7.5/7.5	30/15	30/15
		DC	250V	–	2.5/2.5 (*7)	2.5/2.5 (*7)	2.5/2.5 (*7)	7.5/4 (*4)	7.5/4 (*4)
Rated impulse withstand voltage Uimp (kV)				4	8	8	8	8	8
Current (*1)				AC	AC/DC compatible	AC/DC compatible	AC/DC compatible	AC/DC compatible	AC/DC compatible
Suitability for isolation				–	Compatible	Compatible	Compatible	Compatible	Compatible
Reverse connection				–	Possible	Possible	Possible	Possible	Possible
Number of operating cycles	Without current			10,000	10,000	10,000	10,000	10,000	10,000
	With current (440VAC)			6,000 (AC415V)	6,000	6,000	6,000	6,000	6,000
Utilization category				A	A	A	A	A	A
Pollution degree				2	3	3	3	3	3
EMC environment condition (environment A or B)				N/A	N/A	N/A	N/A	N/A	N/A
Overall dimensions (mm)			a	45 67.5	50 75	50 75	50 75	60 90	60 90
			b	96	130	130	130	130	130
			c	52	68	68	68	68	68
			ca	67	90	90	90	90	90
Mass of front-face type (kg)				0.25 0.35	0.45 0.65	0.5 0.7	0.5 0.7	0.6 0.9	0.6 0.9
Installation and connections	Front connection	(F)	Page	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal
	Solderless (BOX) terminal	(SL)	716	–	–	–	–	●	●
	Rear	(B)		●Round stud (assembled in)	●Round stud	●Round stud	●Round stud	●Bar stud	●Bar stud
	Plug-in	(PM)		–	●	●	●	●	●
Cassette-type accessories	Alarm switch	(AL)	725	● (*5)	● (*6)	● (*6)	● (*6)	● (*6)	●(*6)
	Auxiliary switch	(AX)		●(*5)	● (*6)	● (*6)	● (*6)	● (*6)	●(*6)
	Shunt trip	(SHT)		–	● (*6)	● (*6)	● (*6)	● (*6)	●(*6)
	Undervoltage trip	(UVT)		–	● (*6)	● (*6)	● (*6)	● (*6)	●(*6)
	With lead-wire terminal block	(SLT)	737	●	●	●	●	●	●
	Pre-alarm	(PAL)	739	–	–	–	–	–	–
External accessories	Enclosure	Closed	(S)	753	●	●	●	●	●	●
		Dustproof	(I)		–	●	●	●	●	●
		Waterproof	(W)		–	– ●	– ●	– ●	– ●	– ●
	Electrical operation device	(NFM)		756	–	–	–	– ●	– ●
	Mechanical interlock (MI) (*10)	Panel mounting		752	–	●	●	●	●
		Breaker mounting			–	●	●	●	●
	Handle lock device	LC		750	●	●	●	●	●
		HL			●	●	●	●	●
		HL-S			–	●	●	●	●
	External operating handle	(F)		740	–	●	●	●	●
		(V)			–	●	●	●	●
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)			744	●	●	●	●	●
	Rear stud	(B-ST)		718	–	●	●	●	●
	Plug-in	(PM)			–	●	●	●	●
	IEC 35mm rail mounting adapters			759	●	●	●	–	–
CE marking				TÜV approval	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration
CCC recognition				Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process
Marine use approval (NK, LR, ABS, GL)				☆ (NK, LR, ABS)	☆	☆	☆	☆	☆
Automatic tripping device				Hydraulic magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Trip button				– (*2)	Equipped	Equipped	Equipped	Equipped	Equipped
Page of Characteristics and dimensions				760	762			764	

Notes: *1 The trip action characteristics differ between AC and DC for products that are compatible with both AC and DC.
*2 It is attached with the alarm switch.
*3 In case of a current rating of 100A, it does not specify NK rating.
*4 Use two poles for three- and four-pole products. In this case, do not use the neutral pole of the four-pole products. If wired as shown on the right, three and four poles can be used for up to 400 and 500VDC, respectively.
*5 The standard lead drawing is performd laterally. Load drawing is also available.
*6 The cassette type design makes it easy for customer to install. Available for installation on side below 250A frame (excluding UVT).
*7 Use two poles for three- and four-pole products. In this case, do not use the neutral pole of the four-pole products. Not available for use with connection as shown on the right.
*8 Place an order of other models in conjunction with the circuit breaker.
*9 Solid state relay output is option. Please specify if other output is necessary. (Standard type is thus SLT equipped).
*10 Not isolation compatible, excluding 400 to 800A frame.

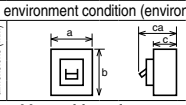


●NF-C (Economy class)

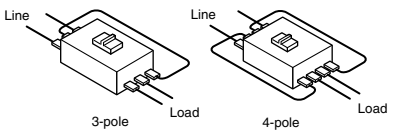
	225	250	400	600	630	800
	NF250-CV		NF400-CW	NF630-CW		NF800-CEW
						
	(100) 125 150 175 200 225 (*3)	250	250 300 350 400	500 600	630	Adjustable 400 450 500 600 700 800
	2 | 3	2 | 3	2 | 3	2 | 3	2 | 3	3
	600	600	690	690	690	690
	–	–	–	–	–	–
	10/8	10/8	15/8	18/9	18/9	18/9
	15/12	15/12	25/13	36/18	36/18	36/18
	25/19	25/19	36/18	36/18	36/18	36/18
	25/19	25/19	36/18	36/18	36/18	36/18
	25/19	25/19	40/20	40/20	40/20	40/20
	36/27	36/27	50/25	50/25	50/25	50/25
	36/27	36/27	50/25	50/25	50/25	50/25
	15/12 (*4)	15/12 (*4)	20/10 (*4)	20/10 (*4)	20/10 (*4)	–
	8	8	8	8	8	8
	AC/DC compatible	AC/DC compatible	AC/DC compatible	AC/DC compatible	AC/DC compatible	AC
	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
	Possible	Possible	Possible	Possible	Possible	Possible
	8,000	8,000	6,000	6,000	6,000	4,000
	4,000	4,000	1,000	1,000	1,000	500
	A	A	A	A	A	B
	3	3	3	3	3	3
	N/A	N/A	N/A	N/A	N/A	A
	105	105	140	140	140	210
	165	165	257	257	257	275
	68	68	103	103	103	103
	92	92	134	134	134	155
	1.3 | 1.5	1.3 | 1.5	4.4 | 5.0	5.2 | 6.0	5.2 | 6.0	10.9
	●Screw terminal	●Screw terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal
	●	●	–	–	–	–
	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud
	●	●	●	●	●	●
	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)
	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)
	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)
	●(*6)	●(*6)	●	●	●	●
	●	●	●	●	●	●
	–	–	–	–	–	●(*9)
	●	●	–	–	–	–
	●	●	●	●	●	●
	– | ●	– | ●	●	●	●	●
	●	●	●(*8)	●(*8)	●(*8)	●(*8)
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	●	–	–	–	–
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	●	● | ●	● | ●	● | ●	●
	●	●	●	● | ●	● | ●	●
	–	–	–	–	–	–
	TÜV approval	TÜV approval	Self-declaration	Self-declaration	Self-declaration	Self-declaration
	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process
	☆	☆	☆	☆	☆	☆
	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Electronic (effective value detection)
	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped
	768		776	782		786

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.
2. Specify "P-LT" when using a plug-in product with a lead-wire terminal block.
3. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.

●NF-S (Standard class)

Frame (A)				30		32		50			60			63		
Model				NF32-SV				NF63-SV								
Image																
Rated current In (A) Rated ambient temperture 40°C (45°C for marine use)				3 4 (5) 6 10 15 16 20 25 (30)		32		3 4 (5) 6 10 (15) 16 20 25 (30) 32 40 50			(60)			63		
Number of poles				2	3	2	3	2	3	4	2	3	4	2	3	4
Rated insulation voltage Ui (V)				600		600		600			600			600		
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	–		–		–			–			–		
			500V	2.5/2.5		2.5/2.5		7.5/7.5			7.5/7.5			7.5/7.5		
			440V	2.5/2.5		2.5/2.5		7.5/7.5			7.5/7.5			7.5/7.5		
			415V	2.5/2.5		2.5/2.5		7.5/7.5			7.5/7.5			7.5/7.5		
			400V	5/5		5/5		7.5/7.5			7.5/7.5			7.5/7.5		
			380V	5/5		5/5		7.5/7.5			7.5/7.5			7.5/7.5		
			230V	7.5/7.5		7.5/7.5		15/15			15/15			15/15		
			200V	7.5/7.5		7.5/7.5		15/15			15/15			15/15		
		DC	250V	2.5/2.5 (*5)		2.5/2.5 (*5)		7.5/7.5 (*5)			7.5/7.5 (*5)			7.5/7.5 (*5)		
Rated impulse withstand voltage Uimp (kV)				8		8		8			8			8		
Current (*1)				AC/DC compatible		AC/DC compatible		AC/DC compatible			AC/DC compatible			AC/DC compatible		
Suitability for isolation				Compatible		Compatible		Compatible			Compatible			Compatible		
Reverse connection				Possible		Possible		Possible			Possible			Possible		
Number of operating cycles	Without current			10,000		10,000		10,000			15,000			15,000		
	With current (440VAC)			6,000		6,000		6,000			8,000			8,000		
Utilization category				A		A		A			A			A		
Pollution degree				3		3		3			3			3		
EMC environment condition (environment A or B)				N/A		N/A		N/A			N/A			N/A		
Overall dimensions (mm)			a	50	75	50	75	50	75	100	50	75	100	50	75	100
			b	130		130		130			130			130		
			c	68		68		68			68			68		
			ca	90		90		90			90			90		
Mass of front-face type (kg)				0.45	0.65	0.45	0.65	0.5	0.7	0.9	0.55	0.75	1.0	0.55	0.75	1.0
Installation and connections	Front connection	(F)	Page	●Screw terminal		●Screw terminal		●Screw terminal			●Screw terminal			●Screw terminal		
	Solderless (BOX) terminal	(SL)		–		–		–			–			–		
	Rear	(B)	716	●Bar stud		●Round stud		●Round stud			●Round stud			●Round stud		
	Plug-in	(PM)		●		●		●			●			●		
Cassette-type accessories	Alarm switch	(AL)	725	● (*4)		● (*4)		● (*4)		●	● (*4)		●	● (*4)		●
	Auxiliary switch	(AX)		● (*4)		● (*4)		● (*4)		●	● (*4)		●	● (*4)		●
	Shunt trip	(SHT)		● (*4)		● (*4)		● (*4)		●	● (*4)		●	● (*4)		●
	Undervoltage trip	(UVT)		● (*4)		● (*4)		● (*4)		●	● (*4)		●	● (*4)		●
	With lead-wire terminal block	(SLT)	737	●		●		●		●	●		●	●		●
	Pre-alarm	(PAL)	739	–		–		–			–			–		
External accessories	Enclosure	Closed (S)	753	●		●		●		–	●		–	●		–
		Dustproof (I)		●		●		●		–	●		–	●		–
		Waterproof (W)		–	●	–	●	–	●	–	–	●	–	–	●	–
	Electrical operation device	(NFM)	756	–		–		–			–			–		
	Mechanical interlock (MI) (*7)	Panel mounting	752	●		●		●		●	●		●	●		●
		Breaker mounting		●		●		●		–	●		–	●		–
	Handle lock device	LC	750	●		●		●			●			●		
		HL		●		●		●			●			●		
		HL-S		●		●		●			●			●		
	External operating handle	(F)	740	●		●		●			●			●		
		(V)		●		●		●			●			●		
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)		744	●		●		●		●	●		●	●		●
	Rear stud	(B-ST)	718	●		●		●			●			●		
	Plug-in	(PM)		●		●		●		●	●		●	●		●
	IEC 35mm rail mounting adapters		759	●		●		●		–	●		–	●		–
CE marking				Self-declaration		Self-declaration		Self-declaration			Self-declaration			Self-declaration		
CCC recognition				Recognition in process		Recognition in process		Recognition in process			Recognition in process			Recognition in process		
Marine use approval (NK, LR, ABS, GL)				☆		☆		☆		–	☆		–	☆		–
Automatic tripping device				Thermal-magnetic		Thermal-magnetic		Thermal-magnetic			Thermal-magnetic			Thermal-magnetic		
Trip button				Equipped		Equipped		Equipped			Equipped			Equipped		
Page of Characteristics and dimensions				762				762								

Notes: *1 The trip action characteristics differ between AC and DC for products that are compatible with both AC and DC.
*2 In case of a current rating of 100A, it does not specify NK rating.
*3 Use two poles for three- and four-pole products. In this case, do not use the neutral pole of the four-pole products. If wired as shown on the right, three and four poles can be used for up to 400 and 500VDC, respectively. (In case of NF250-SV, three and four poles can be used for up to 500 and 600VDC)
*4 The cassette type design makes it easy for customer to install. Available for installation on side below 250A frame (excluding UVT).
*5 Use two poles for three- and four-pole products. In this case, do not use the neutral pole of the four-pole products. Not available for use with connection as shown on the right.
*6 Place an order of other models in conjunction with the circuit breaker.
*7 Not isolation compatible. excluding 400 to 800A frame.



●NF-S (Standard class)

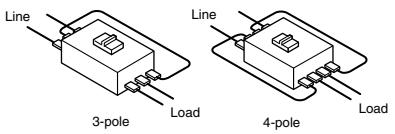
	100			125			125			125		160			225			250		
	NF125-SV						NF125-SGV			NF125-SEV		NF160-SGV			NF250-SV					
																				
	(15) 16 20 (30) 32 40 50 (60) 63 (75) 80 100			125			16-20 20-25 25-32 32-40 35-50 45-63 56-80 70-100 90-125			16-32 32-63 63-125		125-160			(100) 125 150 160 175 200 225 (*2)			250		
	2	3	4	2	3	4	2	3	4	3	4	2	3	4	2	3	4	2	3	4
	690			690			690			690		690			690			690		
	8/8			8/8			8/8			8/8		8/8			8/8			8/8		
	18/18			18/18			30/30			30/30		30/30			30/30			30/30		
	25/25			25/25			36/36			36/36		36/36			36/36			36/36		
	30/30			30/30			36/36			36/36		36/36			36/36			36/36		
	30/30			30/30			36/36			36/36		36/36			36/36			36/36		
	30/30			30/30			36/36			36/36		36/36			36/36			36/36		
	50/50			50/50			85/85			85/85		85/85			85/85			85/85		
	50/50			50/50			85/85			85/85		85/85			85/85			85/85		
	40/40 (*3)			40/40 (*3)			20/20 (300V) (*3)			–		20/20 (300V) (*3)			20/20 (300V) (*3)			20/20 (300V) (*3)		
	8			8			8			8		8			8			8		
	AC/DC compatible			AC/DC compatible			AC/DC compatible			AC		AC/DC compatible			AC/DC compatible (*1)			AC/DC compatible (*1)		
	Compatible			Compatible			Compatible			Compatible		Compatible			Compatible			Compatible		
	Possible			Possible			Possible			Possible		Possible			Possible			Possible		
	25,000			25,000			50,000			25,000		40,000			25,000			25,000		
	10,000			10,000			30,000			10,000		15,000			10,000			10,000		
	A			A			A			A		A			A			A		
	3			3			3			3		3			3			3		
	N/A			N/A			N/A			A		N/A			N/A			N/A		
	60	90	120	60	90	120	105		140	105	140	105		140	105		140	105		140
	130			130			165			165		165			165			165		
	68			68			68			68		68			68			68		
	90			90			92			92		92			92			92		
	0.7	1.0	1.3	0.7	1.0	1.3	1.4	1.6	2.0	1.7	2.2	1.4	1.6	2.0	1.4	1.6	2.0	1.4	1.6	2.0
	●Screw terminal			●Screw terminal			●Screw terminal			●Screw terminal		●Screw terminal			●Screw terminal			●Screw terminal		
	●			●			●			●	●	●			●		●	●		●
	●Bar stud			●Bar stud			●Bar stud			●Bar stud	●Bar stud	●Bar stud			●Bar stud			●Bar stud		
	●		●	●		●	●			●	●	●			●		●	●		●
	● (*4)		●	● (*4)		●	● (*4)		●	● (*4)	●	● (*4)		●	● (*4)		●	● (*4)		●
	● (*4)		●	● (*4)		●	● (*4)		●	● (*4)	●	● (*4)		●	● (*4)		●	● (*4)		●
	● (*4)		●	● (*4)		●	● (*4)		●	● (*4)	●	● (*4)		●	● (*4)		●	● (*4)		●
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	●		●	●		●	●			●	●	●			●		●	●		●
	–			–			–			–		–			–			–		
	Self-declaration			Self-declaration			Self-declaration			Self-declaration		Self-declaration			TÜV approval		Self-declaration	TÜV approval		Self-declaration
	Recognition in process			Recognition in process			Recognition in process			Recognition in process		Recognition in process			Recognition in process			Recognition in process		
	☆		–	☆		–	☆ (LR, ABS, GL)		–	☆ (LR, ABS, GL)	–	☆ (LR, ABS, GL)		–	☆		–	☆		–
	Thermal-magnetic			Thermal-magnetic			Thermal-magnetic			Electronic (effective value detection)		Thermal-magnetic			Thermal-magnetic			Thermal-magnetic		
	Equipped			Equipped			Equipped			Equipped		Equipped			Equipped			Equipped		
	764						772			774		772			768					

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.
2. Specify “P-LT” when using a plug-in product with a lead-wire terminal block.
3. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.

●NF-S (Standard class)

Frame (A)				250			250		400			400		600			630		
Model				NF250-SGV			NF250-SEV		NF400-SW			NF400-SEW		NF630-SW					
Image																			
Rated current In (A) Rated ambient temperture 40°C (45°C for marine use)				125-160 140-200 175-250			80-160 125-250		250 300 350 400			Adjustable 200 225 250 300 350 400		500 600			630		
Number of poles				2	3	4	3	4	2	3	4	3	4	2	3	4	2	3	4
Rated insulation voltage Ui (V)				690			690		690			690		690			690		
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	8/8			8/8		10/10			10/10		10/10			10/10		
			500V	30/30			30/30		30/30			30/30		30/30			30/30		
			440V	36/36			36/36		42/42			42/42		42/42			42/42		
			415V	36/36			36/36		45/45			50/50		50/50			50/50		
			400V	36/36			36/36		45/45			50/50		50/50			50/50		
			380V	36/36			36/36		50/50			50/50		50/50			50/50		
			230V	85/85			85/85		85/85			85/85		85/85			85/85		
			200V	85/85			85/85		85/85			85/85		85/85			85/85		
		DC	250V	20/20 (300V) (*2)			–		40/40 (*2)			–		40/40 (*2)			40/40 (*2)		
Rated impulse withstand voltage Uimp (kV)				8			8		8			8		8			8		
Current				AC/DC compatible			AC		AC/DC compatible			AC		AC/DC compatible			AC/DC compatible		
Suitability for isolation				Compatible			Compatible		Compatible			Compatible		Compatible			Compatible		
Reverse connection				Possible			Possible		Possible			Possible		Possible			Possible		
Number of operating cycles	Without current			25,000			25,000		6,000			6,000		6,000			6,000		
	With current (440VAC)			10,000			10,000		1,000			1,000		1,000			1,000		
Utilization category				A			A		A			B		A			A		
Rated short time with stand current Icw (kA) at 0.25s				–			–		–			5		–			–		
Pollution degree				3			3		3			3		3			3		
EMC environment condition (environment A or B)				N/A			A		N/A			A		N/A			N/A		
Overall dimensions (mm)			a	105		140	105	140	140		185	140	185	140		185	140		185
			b	165			165		257			257		257			257		
			c	68			68		103			103		103			103		
			ca	92			92		155			155		155			155		
Mass of front-face type (kg)				1.4	1.6	2.0	1.7	2.2	4.6	5.2	6.8	6.0	7.6	5.4	6.2	8.0	5.4	6.2	8.0
Installation and connections	Front connection	(F)	Page	●			●Screw terminal	●Screw terminal	●Busbar terminal			●Busbar terminal		●Busbar terminal			●Busbar terminal		
	Solderless (BOX) terminal	(SL)		●			●	●	–	–	–	–	–	–	–	–	–	–	–
	Rear	(B)	716	●Bar stud			●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud
	Plug-in	(PM)		●			●	●	●		●	●	●	●		●	●		●
Cassette-type accessories	Alarm switch	(AL)	725	● (*3)		●	● (*3)	●	● (*3)		●	● (*3)	●	● (*3)		●	● (*3)		●
	Auxiliary switch	(AX)		● (*3)		●	● (*3)	●	● (*3)		●	● (*3)	●	● (*3)		●	● (*3)		●
	Shunt trip	(SHT)		● (*3)		●	● (*3)	●	● (*3)		●	● (*3)	●	● (*3)		●	● (*3)		●
	Undervoltage trip	(UVT)		● (*3)		●	● (*3)	●	●		●	●	●	●		●	●		●
	With lead-wire terminal block	(SLT)	737	●			●	●	●		●	●	●	●		●	●		●
	Pre-alarm	(PAL)	739	–			●		–			● (*5)		–			–		
External accessories	Enclosure	Closed (S)	753	●		–	●	–	–		–	–		–		–	–		–
		Dustproof (I)		●		–	●	–	●		–	●	–	●		–	●		–
		Waterproof (W)		●		–	●	–	●		–	●	–	●		–	●		–
	Electrical operation device	(NFM)	756	●			●		● (*6)			● (*6)		● (*6)			● (*6)		
	Mechanical interlock (MI) (*7)	Panel mounting	752	●			●	●	●		●	●	●	●		●	●		●
		Breaker mounting		●			●	–	●		–	●	–	●		–	●		–
	Handle lock device	LC	750	●			●		–			–		–			–		
		HL		●			●		●			●		●			●		
		HL-S		●			●		●			●		●			●		
	External operating handle	(F)	740	●			●		●			●		●			●		
		(V)		●			●		●			●		●			●		
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)		744	●			●	●	●		●	●	●	●		●	●		●
	Rear stud	(B-ST)	718	●			●	●	●		●	●		●	●	●	●	●	●
	Plug-in	(PM)		●			●	●	●	●	●	●	●	●	●	●	●	●	●
	IEC 35mm rail mounting adapters		759	–			–		–			–		–			–		
CE marking				Self-declaration			Self-declaration		Self-declaration			Self-declaration		Self-declaration			Self-declaration		
CCC recognition				Recognition in process			Recognition in process		Recognition in process			Recognition in process		Recognition in process			Recognition in process		
Marine use approval (NK, LR, ABS, GL)				☆ (LR, ABS, GL)		–	☆ (LR, ABS, GL)	–	☆		–	☆	–	☆		–	☆		–
Automatic tripping device				Thermal-magnetic			Electronic (effective value detection)		Thermal-magnetic			Electronic (effective value detection)		Thermal-magnetic			Thermal-magnetic		
Trip button				Equipped			Equipped		Equipped			Equipped		Equipped			Equipped		
Page of Characteristics and dimensions				772			774		776			778		782					

Notes:
*1 The trip action characteristics differ between AC and DC for products that are compatible with both AC and DC.
*2 Use two poles for three- and four-pole products. In this case, do not use the neutral pole of the four-pole products. If wired as shown on the right, three and four poles can be used for up to 400 and 500VDC, respectively.
*3 The cassette type design makes it easy for customer to install. Available for installation on side below 250A frame (excluding UVT).
*4 Use two poles for three- and four-pole products. In this case, do not use the neutral pole of the four-pole products. Not available for use with connection as shown on the right.
*5 Solid state relay output is option. Please specify if other output is necessary. (Standard type is thus SLT equipped) AS for flush plate type, an outline differs from a standard.
*6 Place an order of other models in conjunction with the circuit breaker.
*7 Not isolation compatible. excluding 400 to 800A frame.

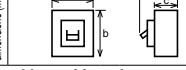


●NF-S (Standard class)

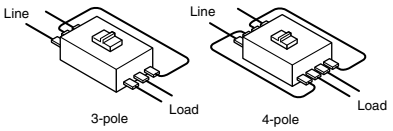
630	800	800	1000	1250	1200	1600	1600
NF630-SEW	NF800-SEW	NF800-SDW	NF1000-SEW	NF1250-SEW	NF1250-SDW	NF1600-SEW	NF1600-SDW
							
Adjustable 300 350 400 500 600 630	Adjustable 400 450 500 600 700 800	(700) 800	Adjustable 500 600 700 800 900 1000	Adjustable 600 700 800 1000 1200 1250	1000 1250	Adjustable 800 1000 1200 1400 1500 1600	1600
3 4	3 4	2	3 4	3 4	2	3 4	2
690	690	690	690	690	690	690	690
10/10	10/10	–	25/13	25/13	–	25/13	–
30/30	30/30	–	65/33	65/33	–	65/33	–
42/42	42/42	–	85/43	85/43	–	85/43	–
50/50	50/50	–	85/43	85/43	–	85/43	–
50/50	50/50	–	85/43	85/43	–	85/43	–
50/50	50/50	–	85/43	85/43	–	85/43	–
85/85	85/85	–	125/63	125/63	–	125/63	–
85/85	85/85	–	125/63	125/63	–	125/63	–
–	–	40/40	–	–	40/20	–	40/20
8	8	8	8	8	8	8	8
AC	AC	DC	AC	AC	DC	AC	DC
Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible
6,000	4,000	4,000	3,000	3,000	3,000	3,000	3,000
1,000	500	500	500	500	500	500	500
B	B	A	B	B	A	B	B
7.6	9.6	–	20 at 0.1	20 at 0.1	–	20 at 0.1	–
3	3	3	3	3	3	3	3
A	A	N/A	A	A	N/A	A	A
140 185	210 280	210	210 280	210 280	210	210 280	210
257	275	275	406	406	406	406	406
103	103	103	140	140	140	140	140
155	155	155	190	190	190	190	190
6.5 8.3	10.9 14.2	9.0	23.5 30.7	23.5 30.7	22.0	34.5 41.2	32.0
●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal ●Busbar terminal	●Busbar terminal ●Busbar terminal	●Busbar terminal	●Busbar terminal ●Busbar terminal	●Busbar terminal
– –	– –	–	– –	– –	–	–	–
●Bar stud ●Bar stud	●Bar stud ●Bar stud	●Bar stud	●Bar stud ●Bar stud	●Bar stud ●Bar stud	●Bar stud	●Bar stud ●Bar stud	●Bar stud
● ●	● ●	●	● –	● –	●	–	–
● (*3) ●	● (*3) ●	●	● ●	● ●	●	● ●	●
● (*3) ●	● (*3) ●	●	● ●	● ●	●	● ●	●
● (*3) ●	● (*3) ●	●	● ●	● ●	●	● ●	●
● ●	● ●	●	● ●	● ●	●	● ●	●
● ●	● ●	●	● ●	● ●	●	● ●	●
● (*5)	● (*5)	–	● (*5)	● (*5)	–	● (*5)	–
–	–	–	–	–	–	–	–
● –	● –	●	– –	– –	–	–	–
● –	● –	●	– –	– –	–	–	–
● (*6)	● (*6)	●(*6)	● (*6)	● (*6)	● (*6)	● (*6)	● (*6)
● ●	● ●	●	●	●	●	●	●
● ●	● ●	●	–	–	–	–	–
–	–	–	–	–	–	–	–
●	●	●	●	●	●	●	●
●	●	●	–	–	–	–	–
●	●	●	● ●	● ●	●	● ●	●
●	●	●	–	–	–	–	–
● ●	● ●	●	●	●	●	–	–
● ●	● ●	●	–	–	–	–	–
● ●	●	●	●	●	●	–	–
–	–	–	–	–	–	–	–
Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration
Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	–	Recognition in process	–
☆ –	☆ –	–	☆ –	☆ –	–	–	–
Electronic (effective value detection)	Electronic (effective value detection)	Thermal-magnetic	Electronic (effective value detection)	Electronic (effective value detection)	Thermal-magnetic	Electronic (effective value detection)	magnetic
Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped
784	786	788	792	792	794	796	798

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.
2. Specify "P-LT" when using a plug-in product with a lead-wire terminal block.
3. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.

●NF-L / NF-H / NF-R (High-performance class)

Frame (A)				50			60			63			100			125			125			125			125		
Model				NF63-HV									NF125-HV						NF125-LGV			NF125-HGV			NF125-RGV		
Image																											
Rated current In (A) Rated ambient temperture 40°C (45°C for marine use)				10 15 16 20 25 30 32 40 50			60			(63)			15 16 20 30 32 40 50 60 63 75 80 100			125			16-20 20-25 25-32 32-40 35-50 45-63 56-80 70-100 90-125			16-20 20-25 25-32 32-40 35-50 45-63 56-80 70-100 90-125			16-20 20-25 25-32 32-40 40-50 50-63 63-80 80-100 100-125		
Number of poles				2	3	4	2	3	4	2	3	4	2	3	4	2	3	4	2	3	4	2	3	4	2	3	
Rated insulation voltage Ui (V)				690			690			690			690			690			690			690			690		
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	2.5/2.5			2.5/2.5			2.5/2.5			10/8			10/8			8/8			10/8			–		
			500V	7.5/7.5			7.5/7.5			7.5/7.5			30/23			30/23			36/36			50/38			–		
			440V	10/8			10/8			10/8			50/38			50/38			50/50			65/65			125/125		
			415V	10/8			10/8			10/8			50/38			50/38			50/50			70/70			150/150		
			400V	10/8			10/8			10/8			50/38			50/38			50/50			75/75			150/150		
			380V	10/8			10/8			10/8			50/38			50/38			50/50			75/75			150/150		
			230V	25/19			25/19			25/19			100/75			100/75			90/90			100/100			150/150		
			200V	25/19			25/19			25/19			100/75			100/75			90/90			100/100			150/150		
		DC	250V	7.5/7.5 (*5)			7.5/7.5 (*5)			7.5/7.5 (*5)			–			–			20/20 (300V) (*2)			40/40 (300V) (*2)			–		
Rated impulse withstand voltage Uimp (kV)				8			8			8			8			8			8			8			8		
Current				AC/DC compatible (*1)			AC/DC compatible (*1)			AC/DC compatible (*1)			AC			AC			AC/DC compatible			AC/DC compatible			AC		
Suitability for isolation				Compatible			Compatible			Compatible			Compatible			Compatible			Compatible			Compatible			Compatible		
Reverse connection				Possible			Possible			Possible			Possible			Possible			Possible			Possible			Possible		
Number of operating cycles	Without current			15,000			15,000			15,000			25,000			25,000			50,000			50,000			50,000		
	With current (440VAC)			8,000			8,000			8,000			10,000			10,000			30,000			30,000			30,000		
Utilization category				A			A			A			A			A			A			A			A		
Pollution degree				3			3			3			3			3			3			3			3		
EMC environment condition (environment A or B)				N/A			N/A			N/A			N/A			N/A			N/A			N/A			N/A		
Overall dimensions (mm)			a	50	75	100	50	75	100	50	75	100	90		120	90		120	105		140	105		140	105		
			b	130			130			130			130			130			165			165			165		
			c	68			68			68			68			68			68			68			68		
			ca	90			90			90			90			90			92			92			92		
Mass of front-face type (kg)				0.5	0.7	0.9	0.55	0.75	1.0	0.55	0.75	1.0	0.8	1.0	1.3	0.8	1.0	1.3	1.4	1.6	2.0	1.4	1.6	2.0	1.5	1.8	
Installation and connections	Front connection	(F)	Page	●Screw terminal			●Screw terminal			●Screw terminal			●Screw terminal			●Screw terminal			●			●			●Screw terminal		
	Solderless (BOX) terminal	(SL)		●			●			●			●			●			●			●			●		
	Rear	(B)	716	●Round stud			●Round stud			●Round stud			●Bar stud			●Bar stud			●Bar stud			●Bar stud			●Bar stud		
	Plug-in	(PM)		●			●			●			●		●	●		●	●			●			●		
Cassette-type accessories	Alarm switch	(AL)	725	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●
	Auxiliary switch	(AX)		● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●
	Shunt trip	(SHT)		● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●
	Undervoltage trip	(UVT)		● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●	● (*3)		●
	With lead-wire terminal block	(SLT)	737	●		●	●		●	●		●	●		●	●		●	●			●			●		
	Pre-alarm	(PAL)	739	–			–			–			–			–			–			–			–		
External accessories	Enclosure	Closed (S)	753	●		–	●		–	●		–	●		–	●		–	●		–	●		–	–		
		Dustproof (I)		●		–	●		–	●		–	●		–	●		–	●		–	●		–	–		
		Waterproof (W)		–	●	–	–	●	–	–	●	–	●		–	●		–	●		–	●		–	–		
	Electrical operation device	(NFM)	756	–			–			–			●			●			●			●			●		
	Mechanical interlock (MI) (*4)	Panel mounting	752	●		●	●		●	●		●	●		●	●		●	●			●			●		
		Breaker mounting		●		–	●		–	●		–	●		–	●		–	●			●			●		
	Handle lock device	LC	750	●			●			●			●			●			●			●			●		
		HL		●			●			●			●			●			●			●			●		
		HL-S		●			●			●			●			●			●			●			●		
	External operating handle	(F)	740	●			●			●			●			●			●			●			●		
		(V)		●			●			●			●			●			●			●			●		
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)		744	●		●	●		●	●		●	●		●	●		●	●			●			●		
	Rear stud	(B-ST)	718	●			●			●			●	●	●	●	●	●	●			●			●		
	Plug-in	(PM)		●		●	●		●	●		●	●	●	●	●	●	●	●			●			●		
	IEC 35mm rail mounting adapters		759	●		–	●		–	●		–	–			–			–			–			–		
CE marking				Self-declaration			Self-declaration			Self-declaration			Self-declaration			Self-declaration			Self-declaration			Self-declaration			Self-declaration		
CCC recognition				Recognition in process			Recognition in process			Recognition in process			Recognition in process			Recognition in process			Recognition in process			Recognition in process			Recognition in process		
Marine use approval (NK, LR, ABS, GL)				☆		–	☆		–	☆		–	☆		–	☆		–	☆ (LR, ABS, GL)		–	☆ (LR, ABS, GL)		–	☆ (LR, ABS, GL)		
Automatic tripping device				Thermal-magnetic			Thermal-magnetic			Thermal-magnetic			Thermal-magnetic			Thermal-magnetic			Thermal-magnetic			Thermal-magnetic			Thermal-magnetic		
Trip button				Equipped			Equipped			Equipped			Equipped			Equipped			Equipped			Equipped			Equipped		
Page of Characteristics and dimensions				762									764						772			772			772		

Notes: *1 The trip action characteristics differ between AC and DC for products that are compatible with both AC and DC.
*2 Use two poles for three- and four-pole products. In this case, do not use the neutral pole of the four-pole products. If wired as shown on the right, three and four poles can be used for up to 500 and 600VDC, respectively.
*3 The cassette type design makes it easy for customer to install. Available for installation on side below 250A frame (excluding UVT).
*4 Not isolation compatible, excluding 400 to 800A frame.
*5 Use two poles for three- and four-pole products. In this case, do not use the neutral pole of the four-pole products. Not available for use with connection as shown on the right.

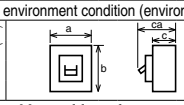


●NF-L / NF-H / NF-R (High-performance class)

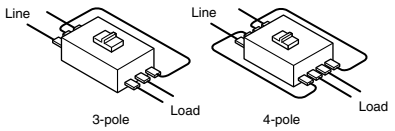
125	160	160	225	250	250	250	250
NF125-HEV	NF160-LGV	NF160-HGV	NF250-HV		NF250-LGV	NF250-HGV	NF250-RGV
							
16-32 32-63 63-125	125-160	125-160	125 150 160 175 200 225	250	125-160 140-200 175-250	125-160 140-200 175-250	125-160 160-200 200-250
3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3
690	690	690	690	690	690	690	690
10/8	8/8	10/8	10/8	10/8	8/8	10/8	–
50/38	36/36	50/38	50/38	50/38	36/36	50/38	–
65/65	50/50	65/65	65/65	65/65	50/50	65/65	125/125
70/70	50/50	70/70	70/70	70/70	50/50	70/70	150/150
75/75	50/50	75/75	75/75	75/75	50/50	75/75	150/150
75/75	50/50	75/75	75/75	75/75	50/50	75/75	150/150
100/100	90/90	100/100	100/100	100/100	90/90	100/100	150/150
100/100	90/90	100/100	100/100	100/100	90/90	100/100	150/150
–	20/20 (300V) (*2)	40/40 (300V) (*2)	40/40 (300V) (*2)	40/40 (300V) (*2)	20/20 (300V) (*2)	40/40 (300V) (*2)	–
8	8	8	8	8	8	8	8
AC	AC/DC compatible	AC/DC compatible	AC/DC compatible (*1)	AC/DC compatible (*1)	AC/DC compatible	AC/DC compatible	AC
Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible
25,000	40,000	40,000	25,000	25,000	25,000	25,000	25,000
10,000	15,000	15,000	10,000	10,000	10,000	10,000	10,000
A	A	A	A	A	A	A	A
3	3	3	3	3	3	3	3
A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
105 140	105 140	105 140	105 140	105 140	105 140	105 140	105
165	165	165	165	165	165	165	165
68	68	68	68	68	68	68	68
92	92	92	92	92	92	92	92
1.7 2.2	1.4 1.6 2.0	1.4 1.6 2.0	1.4 1.6 2.0	1.4 1.6 2.0	1.4 1.6 2.0	1.4 1.6 2.0	1.5 1.8
●Screw terminal ●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Busbar terminal
● ●	●	●	● ●	● ●	●	●	●
●Bar stud ●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud
● ●	●	●	● ●	● ●	●	●	●
● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3)
● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3)
● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3)
● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3) ●	● (*3)
● ●	●	●	● ●	● ●	●	●	●
●	–	–	–	–	–	–	–
–	● –	–	–	–	● –	–	–
● –	● –	● –	● –	● –	● –	● –	–
● –	● –	● –	● –	● –	● –	● –	–
●	●	●	●	●	●	●	●
● ●	●	●	● ●	● ●	●	●	●
● –	●	●	● –	● –	●	●	●
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
● ●	●	●	● ●	● ●	●	●	●
● ●	●	●	● ●	● ●	●	●	–
● ●	●	●	● ●	● ●	●	●	●
–	–	–	–	–	–	–	–
Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration
Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process
☆ (LR, ABS, GL) –	☆ (LR, ABS, GL)	☆ (LR, ABS, GL)	☆ –	☆ –	☆ (LR, ABS, GL)	☆ (LR, ABS, GL)	☆ (LR, ABS, GL)
Electronic (effective value detection)	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped
774	772	772	768		772	772	772

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.
2. Specify "P-LT" when using a plug-in product with a lead-wire terminal block.
3. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.

●NF-H / NF-R (High-performance class)

Frame (A)				250		400			630		800		
Model				NF250-HEV		NF400-HEW		NF400-REW	NF630-HEW	NF630-REW	NF800-HEW		NF800-REW
Image													
Rated current In (A) Rated ambient temperture 40°C (45°C for marine use)				80-160 125-250		Adjustable 200 225 250 300 350 400		Adjustable 200 225 250 300 350 400	Adjustable 300 350 400 500 600 630	Adjustable 300 350 400 500 600 630	Adjustable 400 450 500 600 700 800		Adjustable 400 450 500 600 700 800
Number of poles				3	4	3	4	3	3	4	3	4	3
Rated insulation voltage Ui (V)				690		690		690	690	690	690		690
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	10/8		35/18		–	35/18	–	15/15		–
			500V	50/38		50/50		70/35	50/50	70/35	50/50		70/35
			440V	65/65		65/65		125/63	65/65	125/63	65/65		125/63
			415V	70/70		70/70		125/63	70/70	125/63	70/70		125/63
			400V	75/75		70/70		125/63	70/70	125/63	70/70		125/63
			380V	75/75		70/70		125/63	70/70	125/63	70/70		125/63
			230V	100/100		100/100		150/75	100/100	150/75	100/100		150/75
			200V	100/100		100/100		150/75	100/100	150/75	100/100		150/75
		DC	250V	–		–		–	–	–	–		–
Rated impulse withstand voltage Uimp (kV)				8		8		8	8	8	8		8
Current				AC		AC		AC	AC	AC	AC		AC
Suitability for isolation				Compatible		Compatible		Compatible	Compatible	Compatible	Compatible		Compatible
Reverse connection				Possible		Possible		Possible	Possible	Possible	Possible		Possible
Number of operating cycles	Without current			25,000		6,000		6,000	6,000	6,000	4,000		4,000
	With current (440VAC)			10,000		1,000		1,000	1,000	1,000	500		500
Utilization category				A		B		B	B	B	B		B
Rated short time with stand current Icu (kA) at 0.25s				–		5		5	7.6	7.6	9.6		9.6
Pollution degree				3		3		3	3	3	3		3
EMC environment condition (environment A or B)				A		A		A	A	A	A		A
Overall dimensions (mm)			a	105	140	140	185	140	140	185	140	210	280	210
			b	165		257		257	257		257	275		275
			c	68		103		103	103		103	103		103
			ca	92		155		155	155		155	155		155
Mass of front-face type (kg)				1.7	2.2	6.0	7.6	6.0	6.5	8.3	6.0	10.9	14.2	10.9
Installation and connections	Front connection	(F)	Page	●Screw terminal		●Busbar terminal		●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal
	Solderless (BOX) terminal	(SL)	716	●	●	–	–	–	–	–	–	–	–	–
	Rear	(B)		●Bar stud	●Bar stud	●Bar stud		●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud
	Plug-in	(PM)		●	●	●	●	●	●	●	●	●	●	●
Cassette-type accessories	Alarm switch	(AL)	725	● (*1)	●	● (*1)	●	● (*1)	● (*1)	●	● (*1)	● (*1)	●	● (*1)
	Auxiliary switch	(AX)		● (*1)	●	● (*1)	●	● (*1)	● (*1)	●	● (*1)	● (*1)	●	● (*1)
	Shunt trip	(SHT)		● (*1)	●	● (*1)	●	● (*1)	● (*1)	●	● (*1)	● (*1)	●	● (*1)
	Undervoltage trip	(UVT)		● (*1)	●	●	●	●	●	●	●	●	●	●
	With lead-wire terminal block	(SLT)	737	●	●	●	●	●	●	●	●	●	●	●
	Pre-alarm	(PAL)	739	●		● (*2)		● (*2)	● (*2)		● (*2)	● (*2)		● (*2)
External accessories	Enclosure	Closed (S)	753	–		–		–	–		–	–		–
		Dustproof (I)		●	–	–		–	–		–	–		–
		Waterproof (W)		●	–	–		–	–		–	–		–
	Electrical operation device	(NFM)	756	●		● (*3)		● (*3)	● (*3)		● (*3)	● (*3)		● (*3)
	Mechanical interlock (MI) (*4)	Panel mounting	752	●	●	●	●	●	●	●	●	●	●	●
		Breaker mounting		●	–	●	–	●	●	–	●	●	–	●
	Handle lock device	LC	750	●		–		–	–		–	–		–
		HL		●		●		●	●		●	●		●
		HL-S		●		●		●	●		●	●		●
	External operating handle	(F)	740	●		●		●	●		●	●		●
		(V)		●		●		●	●		●	●		●
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)		744	●	●	●	●	●	●	●	●	●		●
	Rear stud	(B-ST)	718	●	●	●		●	●	●	●	●	●	●
	Plug-in	(PM)		●	●	●		●	●	●	●	●		●
	IEC 35mm rail mounting adapters		759	–		–		–	–		–	–		–
CE marking				Self-declaration		Self-declaration		Self-declaration	Self-declaration	Self-declaration	Self-declaration		Self-declaration	Self-declaration
CCC recognition				Recognition in process		Recognition in process		Recognition in process	Recognition in process	Recognition in process	Recognition in process		Recognition in process	Recognition in process
Marine use approval (NK, LR, ABS, GL)				☆ (LR, ABS, GL)	–	☆	–	☆	☆	–	☆	☆	–	☆
Automatic tripping device				Electronic (effective value detection)		Electronic (effective value detection)		Electronic (effective value detection)	Electronic (effective value detection)		Electronic (effective value detection)			Electronic (effective value detection)
Trip button				Equipped		Equipped		Equipped	Equipped		Equipped			Equipped
Page of Characteristics and dimensions				774		778		778	784		784	786		786

Notes: *1 The cassette type design makes it easy for customer to install. Available for installation on side below 250A frame (excluding UVT).
*2 Solid state relay output is option. Please specify if other output is necessary. (Standard type is thus SLT equipped).
*3 Place an order of other models in conjunction with the circuit breaker.
*4 Not isolation compatible, excluding 400 to 800A frame.



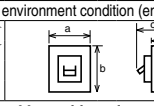
●NF-U (Ultra current-limiting class)

	125			250			400		800	
	NF125-UV			NF250-UV			NF400-UEW		NF800-UEW	
										
	15 20 30 40 50 60 75 100 125			125 150 175 200 225 250			Adjustable 200 225 250 300 350 400		Adjustable 400 450 500 600 700 800	
	2	3	4	2	3	4	3	4	3	4
	690			690			690		690	
	10/10			15/15			–		35/35	
	200/200			200/200			170/170		170/170	
	200/200			200/200			200/200		200/200	
	200/200			200/200			200/200		200/200	
	200/200			200/200			200/200		200/200	
	200/200			200/200			200/200		200/200	
	200/200			200/200			200/200		200/200	
	200/200			200/200			200/200		200/200	
	–			–			–		–	
	8			8			8		8	
	AC			AC			AC		AC	
	Compatible			Compatible			Compatible		Compatible	
	Possible			Possible			Possible		Possible	
	25,000			25,000			6,000		4,000	
	10,000			10,000			1,000		500	
	A			A			B		B	
	–			–			5		9.6	
	3			3			3		3	
	N/A			N/A			A		A	
	90	120		105	140		140	280	210	280
	191			240			297	322	322	
	68			68			200		200	
	90			92			252		252	
	1.35	1.5	1.9	2.5	2.7	3.7	16.2	25.4	27.6	33.7
	●Screw terminal			●Screw terminal			●Busbar terminal		●Busbar terminal	
	●Bar stud			●Bar stud			–		–	
	●Bar stud			●Bar stud			●Bar stud		●Bar stud	
	●	–		●	–		●	–	–	
	● (*1)	●		● (*1)	●		● (*1)		● (*1)	
	● (*1)	●		● (*1)	●		● (*1)		● (*1)	
	● (*1)	●		● (*1)	●		● (*1)		● (*1)	
	● (*1)	●		● (*1)	●		●		●	
	●			●			●		●	
	–			–			● (*2)		● (*2)	
	–			–			–		–	
	–			–			–		–	
	–			–			–		–	
	●			●			● (*3)		● (*3)	
	●			●			●		●	
	–			–			–		–	
	●			●			–		–	
	●			●			●		●	
	●			●			●		●	
	●			●			●		●	
	●			●			●	–	–	
	●			●			●		●	
	–			–			–		–	
	●	–		●	–		–		–	
	–			–			–		–	
	Self-declaration			Self-declaration			Self-declaration		Self-declaration	
	–			–			–		–	
	☆	–		☆	–		☆	–	–	
	Thermal-magnetic			Thermal-magnetic			Electronic (effective value detection)		Electronic (effective value detection)	
	Equipped			Equipped			Equipped		Equipped	
	766			770			780		790	

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.
2. Specify "P-LT" when using a plug-in product with a lead-wire terminal block.
3. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.

Detailed Specifications

●NV-C (Economy class) Harmonic Surge Ready

Frame (A)			50		60		63		100	125
Model			NV63-CV						NV125-CV	
Image										
Rated current In (A) Rated ambient temperture 40°C			(5) (10) (15) 16 20 25 (30) 32 40 50		(60)		63		(60) 63 (75) 80 100	125
Number of poles			2	3	2	3	2	3	3	3
Phase line (*1)			1φ2W	3φ3W, 1φ3W, 1φ2W	1φ2W	3φ3W, 1φ3W, 1φ2W	1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W
Rated operational voltage Ue (V) (*2)		AC	100-240	100-440	100-240	100-440	100-240	100-440	100-440	100-440
High-speed type	Rated current sensitivity	(mA)	30	30,100/200/500 selectable	30	30,100/200/500 selectable	30	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable
	Max. operating time (s)	at IΔn	0.1		0.1		0.1		0.1	0.1
		at 5IΔn	0.04		0.04		0.04		0.04	0.04
Time-delay type	Rated current sensitivity	(mA)	–		–		–		(100/200/500 selectable)	(100/200/500 selectable)
	Max. operating time (s)	(*3)	–		–		–		(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)
	Internal non-operating (s)	(or more)	–		–		–		(0.1/0.5/1.0)	(0.1/0.5/1.0)
Earth leakage indication system			Mechanical type (button)		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)	Mechanical type (button)
Rated short-circuit breaking capacities (kA) IEC 60947-2 EN 60947-2 (Icu/Ics)		AC 440V	–	2.5/2.5	–	2.5/2.5	–	2.5/2.5	10/5	10/5
		AC 415V	–	2.5/2.5	–	2.5/2.5	–	2.5/2.5	10/5	10/5
		AC 400V	–	5/5	–	5/5	–	5/5	10/5	10/5
		230V	7.5/7.5		7.5/7.5		7.5/7.5		30/15	30/15
		200V	7.5/7.5		7.5/7.5		7.5/7.5		30/15	30/15
		100V	7.5/7.5		7.5/7.5		7.5/7.5		30/15	30/15
Rated impulse withstand voltage Uimp (kV)			6		6		6		6	6
Current			AC		AC		AC		AC	AC
Suitability for isolation			Compatible		Compatible		Compatible		Compatible	Compatible
Reverse connection (below 230VAC)			Possible		Possible		Possible		Possible	Possible
Number of operating cycles	Without current		10,000		10,000		10,000		10,000	10,000
	With current		6,000		6,000		6,000		6,000	6,000
Utilization category			A		A		A		A	A
Pollution degree			2		2		2		2	2
EMC environment condition (environment A or B)			A		A		A		A	A
Overall dimensions (mm)		a	75		75		75		90	90
		b	130		130		130		130	130
		c	68		68		68		68	68
		ca	90		90		90		90	90
Mass of front-face type (kg)			0.7	0.75	0.7	0.75	0.7	0.75	1.0	1.0
Installation and connections	Front connection	(F)	Page	●Screw terminal		●Screw terminal		●Screw terminal	●Screw terminal	●Screw terminal
	Solderless (BOX) terminal	(SL)	716	–		–		–	–	–
	Rear	(B)		●Round stud		●Round stud		●Round stud	●Bar stud	●Bar stud
	Plug-in	(PM)		–		–		–	–	–
Cassette-type accessories	Alarm switch	(AL)	725	● (*4)		● (*4)		● (*4)	● (*4)	● (*4)
	Auxiliary switch	(AX)		● (*4)		● (*4)		● (*4)	● (*4)	● (*4)
	Shunt trip	(SHT)		● (*4)		● (*4)		● (*4)	● (*4)	● (*4)
	Undervoltage trip	(UVT)		● (*4)		● (*4)		● (*4)	● (*4)	● (*4)
	Earth leakage alarm switch	(EAL)		–		–		–	–	–
	With lead-wire terminal block	(SLT)	737	●		●		●	●	●
	Test button module	(TBM)	738	● (*5)		● (*5)		● (*5)	● (*5)	● (*5)
External accessories	Enclosure	Closed (S)	753	–		–		–	–	–
		Dustproof (I)		–		–		–	–	–
		Waterproof (W)		–		–		–	–	–
	Electrical operation device	(NFM)	756	–		–		–	●	●
	Mechanical interlock (MI) (*7)	Panel mounting	752	●		●		●	●	●
		Breaker mounting		●		●		●	●	●
	Handle lock device	LC	750	●		●		●	●	●
		HL		●		●		●	●	●
		HL-S		●		●		●	●	●
	External operating handle	(F)	740	●		●		●	●	●
		(V)		●		●		●	●	●
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)		744	●		●		●	●	●
	Rear stud	(B-ST)	718	●		●		●	●	●
	Plug-in	(PM)		–		–		–	–	–
	IEC 35mm rail mounting adapters		759	●		●		●	–	–
CE marking			Self-declaration		Self-declaration		Self-declaration		Self-declaration	Self-declaration
CCC recognition			–	Recognition in process	–	Recognition in process	–	Recognition in process	Recognition in process	Recognition in process
Marine use approval (NK, LR, ABS, GL)			–		–		–		–	–
Automatic tripping device			Thermal-magnetic		Thermal-magnetic		Thermal-magnetic		Thermal-magnetic	Thermal-magnetic
Trip button			Equipped		Equipped		Equipped		Equipped	Equipped
Page of Characteristics and dimensions			800						802	

Notes: *1 If using a 3-pole earth leakage circuit breaker as a 1-pole 2-phase device, connect the left and right poles and not the central pole. When wiring to single-phase 3-wire, connect the neutral line to the central pole.
*2 In case of time delay type, rated voltage is 200-440VAC.
*3 When the operating time are 0.45, 1.0 and 2.0 seconds, the Earth Leakage circuit breaker operates between 0.15 and 0.45 seconds, between 0.6 and 1.0 seconds and between 1.2 and 2.0 seconds respectively.
*4 The cassette type design makes it easy for customer to install. Available for installation on side below 250A frame (excluding UVT).
*5 Standard type is SLT equipped.
*6 Place an order of other models in conjunction with the circuit breaker.
*7 Not isolation compatible, excluding 400 to 630A frame.
*8 AC100V does not acquire the CCC certification.

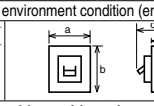
●NV-C (Economy class) Harmonic Surge Ready

	225	250	400	600	630
	NV250-CV		NV400-CW	NV630-CW	
					
	125 150 175 200 225	250	250 300 350 400	500 600	(630)
	3	3	3	3	3
	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W
	100-440	100-440	100-440	200-440	200-440
	30,100/200/500 selectable	30,100/200/500 selectable	(30),100/200/500 selectable	–	–
	0.1	0.1	0.1	–	–
	0.04	0.04	0.04	–	–
	(100/200/500 selectable)	(100/200/500 selectable)	(100/200/500 selectable)	(100/200/500 selectable)	(100/200/500 selectable)
	(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)
	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)
	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)
	15/12	15/12	25/13	36/18	36/18
	25/19	25/19	36/18	36/18	36/18
	25/19	25/19	36/18	36/18	36/18
	36/27	36/27	50/25	50/25	50/25
	36/27	36/27	50/25	50/25	50/25
	36/27	36/27	50/25	–	–
	6	6	8	8	8
	AC	AC	AC	AC	AC
	Compatible	Compatible	Compatible	Compatible	Compatible
	Possible	Possible	Possible	Possible	Possible
	8,000	8,000	6,000	6,000	6,000
	4,000	4,000	1,000	1,000	1,000
	A	A	A	A	A
	2	2	3	3	3
	A	A	A	A	A
	105	105	140	140	140
	165	165	257	257	257
	68	68	103	103	103
	92	92	134	155	155
	1.7	1.7	6.1	6.9	6.9
	●Screw terminal	●Screw terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal
	–	–	–	–	–
	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud
	–	–	–	–	–
	● (*4)	● (*4)	● (*4)	● (*4)	● (*4)
	● (*4)	● (*4)	● (*4)	● (*4)	● (*4)
	● (*4)	● (*4)	● (*4)	● (*4)	● (*4)
	● (*4)	● (*4)	●	●	●
	–	–	–	–	–
	●	●	●	●	●
	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)
	–	–	–	–	–
	–	–	–	–	–
	–	–	–	–	–
	●	●	● (*6)	● (*6)	● (*6)
	●	●	●	●	●
	●	●	●	●	●
	●	●	–	–	●
	●	●	●	●	●
	●	●	●	●	●
	●	●	●	●	●
	●	●	●	●	●
	●	●	●	●	●
	–	–	–	–	–
	–	–	–	–	–
	TÜV approval	TÜV approval	Self-declaration	Self-declaration	Self-declaration
	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process
	–	–	–	–	–
	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
	Equipped	Equipped	Equipped	Equipped	Equipped
	804		808	812	

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.
2. Specify "P-LT" when using a plug-in product with a lead-wire terminal block.
3. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.
4.

Rated operational voltage	Applicable circuit voltage	Available voltage range
100-240V	100/110/200/220/230/240V	85-264V
100-440V	100/110/200/220/240/254/265/380/400/415/440V	85-484V
200-440V	200/220/240/254/265/380/400/415/440V	170-484V

●NV-S (Standard class) Harmonic Surge Ready

Frame (A)				30	32	50	60	63	100		125		125	
Model				NV32-SV		NV63-SV			NV125-SV				NV125-SEV	
Image														
Rated current In (A) Rated ambient temperture 40°C				(5) 6 10 (15) 16 20 25 (30)	(32)	(5) (10) (15) 16 20 25 (30) 32 40 50	(60)	63	(15) 16 20 (30) 32 40 50 (60) 63 (75) 80 100 (*3)		125		63-125	
Number of poles				3	3	3	3	3	3	4	3	4	3	4
Phase line (*1)				3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ2W	3ϕ4W
Rated operational voltage Ue (V) (*2)			AC	100-440	100-440	100-440	100-440	100-440	100-440	200-440	100-440	200-440	100-440	
High-speed type	Rated current sensitivity (mA)			30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable		30,100/200/500 selectable		(30),100/200/500 selectable	
	Max. operating time (s)	at IΔn		0.1	0.1	0.1	0.1	0.1	0.1		0.1		0.1	
		at 5IΔn		0.04	0.04	0.04	0.04	0.04	0.04		0.04		0.04	
Time-delay type	Rated current sensitivity (mA)			–	–	–	–	–	(100/200/500selectable)		(100/200/500selectable)		(100/200/500selectable)	
	Max. operating time (s) (*4)			–	–	–	–	–	(0.45/1.0/2.0selectable)		(0.45/1.0/2.0selectable)		(0.45/1.0/2.0selectable)	
	Internal non-operating (s) (or more)			–	–	–	–	–	(0.1/0.5/1.0)		(0.1/0.5/1.0)		(0.1/0.5/1.0)	
Earth leakage indication system				Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)		Mechanical type (button)		Mechanical type (button)	
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	5/5	5/5	7.5/7.5	7.5/7.5	7.5/7.5	25/25		25/25		36/36	
			415V	5/5	5/5	7.5/7.5	7.5/7.5	7.5/7.5	30/30		30/30		36/36	
			400V	5/5	5/5	7.5/7.5	7.5/7.5	7.5/7.5	30/30		30/30		36/36	
			230V	10/10	10/10	15/15	15/15	15/15	50/50		50/50		85/85	
			200V	10/10	10/10	15/15	15/15	15/15	50/50		50/50		85/85	
			100V	10/10	10/10	15/15	15/15	15/15	50/50	–	50/50	–	85/85	
Rated impulse withstand voltage Uimp (kV)				6	6	6	6	6	6		6		6	
Current				AC	AC	AC	AC	AC	AC		AC		AC	
Suitability for isolation				Compatible	Compatible	Compatible	Compatible	Compatible	Compatible		Compatible		Compatible	
Reverse connection (below 230VAC)				Possible	Possible	Possible	Possible	Possible	Possible		Possible		Possible	
Number of operating cycles	Without current			10,000	10,000	15,000	15,000	15,000	25,000		25,000		25,000	
	With current			6,000	6,000	8,000	8,000	8,000	10,000		10,000		10,000	
Utilization category				A	A	A	A	A	A		A		A	
Rated short time withstand current Icu (kA) at 0.25s				–	–	–	–	–	–		–		–	
Pollution degree				2	2	2	2	2	2		2		2	
EMC environment condition (environment A or B)				A	A	A	A	A	A		A		A	
Overall dimensions (mm)			a	75	75	75	75	75	90	120	90	120	105	140
			b	130	130	130	130	130	130		130		165	
			c	68	68	68	68	68	68		68		68	
			ca	90	90	90	90	90	90		90		92	
Mass of front-face type (kg)				0.75	0.75	0.75	0.8	0.8	1.1	1.4	1.1	1.4	1.9	2.5
Installation and connections	Front connection (F)		Page	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal		●Screw terminal		●	
	Solderless (BOX) terminal (SL)			–	–	–	–	–	–		–		–	
	Rear (B)		716	●Round stud	●Round stud	●Round stud	●Round stud	●Round stud	●Bar stud		●Bar stud		●Bar stud	
	Plug-in (PM)			–	–	–	–	–	–		–		–	
Cassette-type accessories	Alarm switch (AL)			● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	●	● (*5)	●	● (*5)	●
	Auxiliary switch (AX)			● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	●	● (*5)	●	● (*5)	●
	Shunt trip (SHT)		725	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	●	● (*5)	●	● (*5)	●
	Undervoltage trip (UVT)			● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	●	● (*5)	●	● (*5)	●
	Earth leakage alarm switch (EAL)			–	–	–	–	–	–		–		–	
	With lead-wire terminal block (SLT)		737	●	●	●	●	●	●	●	●	●	●	
	Test button module (TBM)		738	● (*6)	● (*6)	● (*6)	● (*6)	● (*6)	● (*6)		● (*6)		● (*6)	
External accessories	Enclosure	Closed (S)	753	–	–	–	–	–	–		–		●	–
		Dustproof (I)		–	–	–	–	–	–		–		●	–
		Waterproof (W)		–	–	–	–	–	–		–		●	–
	Electrical operation device (NFM)		756	–	–	–	–	–	●		●		●	
	Mechanical interlock (MI) (*8)	Panel mounting	752	●	●	●	●	●	●	●	●	●	●	
		Breaker mounting		●	●	●	●	●	●	–	●	–	●	–
	Handle lock device	LC	750	●	●	●	●	●	●		●		●	
		HL		●	●	●	●	●	●		●		●	
		HL-S		●	●	●	●	●	●		●		●	
	External operating handle	(F)	740	●	●	●	●	●	●		●		●	
		(V)		●	●	●	●	●	●		●		●	
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)		744	●	●	●	●	●	●		●		●	
	Rear stud (B-ST)		718	●	●	●	●	●	●		●		●	
	Plug-in (PM)			–	–	–	–	–	–		–		–	
	IEC 35mm rail mounting adapters		759	●	●	●	●	●	–		–		–	
CE marking				Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration		Self-declaration		Self-declaration	
CCC recognition				Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process		Recognition in process		Recognized	
Marine use approval (NK, LR, ABS, GL)				–	–	–	–	–	–		–		–	
Automatic tripping device				Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic		Thermal-magnetic		Electronic (effective value detection)	
Trip button				Equipped	Equipped	Equipped	Equipped	Equipped	Equipped		Equipped		Equipped	
Page of Characteristics and dimensions				800		800			802				806	

Notes: *1 If using a 3-pole earth leakage cirsuit breaker as a 1-pole 2-phase device, connect the left and right poles and not the central pole. When wiring to single-phase 3-wire, connect the neutral line to the central pole.
*2 In case of time delay type, rated voltage is 200-440VAC.
*3 In case of time delay type, rated current is produced with 20 amp. or more.
*4 When the operating time are 0.45, 1.0 and 2.0 seconds, the Earth Leakage circuit breaker operates between 0.15 and 0.45 seconds, between 0.6 and 1.0 seconds and between 1.2 and 2.0 seconds respectively.
*5 Cassette type accessories are field mountable type. It can respend to adhesion attachment of a breaker as standard below 250A frame. (excluding UVT.)
*6 Standard type is SLT equipped.
*7 Place an order of other models in conjunction with the circuit breaker.
*8 Not isolation compatible, excluding 400 to 800A frame.
*9 AC100V does not acquire the CCC certification.

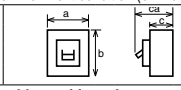
●NV-S (Standard class) Harmonic Surge Ready

	225	250	250	400	400	600	630	630	800
	NV250-SV		NV250-SEV	NV400-SW	NV400-SEW	NV630-SW		NV630-SEW	NV800-SEW
									
Rated current (A)	125 150 175 200 225	250	125-250	250 300 350 400	Adjustable 200 225 250 300 350 400	500 600	(630)	Adjustable 300 350 400 500 600 630	Adjustable 400 450 500 600 700 800
Number of poles	3	3	3	3	3 | 4	3	3	3 | 4	3
Applicable circuit	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W | 3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W | 3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W
Rated operational voltage (V)	100-440	100-440	100-440	100-440	100-440	200-440	200-440	100-440	200-440
Sensitivity current (A)	(30),100/200/500 selectable	(30),100/200/500 selectable	(30),100/200/500 selectable	(30),100/200/500 selectable	(30),100/200/500 selectable	–	–	–	–
Operating time (s)	0.1	0.1	0.1	0.1	0.1	–	–	–	–
Non-operating time (s)	0.04	0.04	0.04	0.04	0.04	–	–	–	–
Sensitivity current (A)	(100/200/500selectable)	(100/200/500selectable)	(100/200/500selectable)	(100/200/500selectable)	(100/200/500selectable)	100/200/500selectable	100/200/500selectable	(100/200/500selectable)	100/200/500selectable
Operating time (s)	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	0.45/1.0/2.0selectable	0.45/1.0/2.0selectable	(0.45/1.0/2.0selectable)	0.45/1.0/2.0selectable
Non-operating time (s)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	0.1/0.5/1.0	0.1/0.5/1.0	(0.1/0.5/1.0)	0.1/0.5/1.0
Operation type	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)
Rated breaking capacity (kA)	36/36	36/36	36/36	42/42	42/42	42/42	42/42	42/42	42/42
Rated breaking capacity (kA)	36/36	36/36	36/36	45/45	50/50	50/50	50/50	50/50	50/50
Rated breaking capacity (kA)	36/36	36/36	36/36	45/45	50/50	50/50	50/50	50/50	50/50
Rated breaking capacity (kA)	85/85	85/85	85/85	85/85	85/85	85/85	85/85	85/85	85/85
Rated breaking capacity (kA)	85/85	85/85	85/85	85/85	85/85	85/85	85/85	85/85	85/85
Rated breaking capacity (kA)	85/85	85/85	85/85	85/85	85/85	–	–	85/85	–
Number of mounting screws	6	6	6	8	8	8	8	8	8
Terminal type	AC	AC	AC	AC	AC	AC	AC	AC	AC
Terminal cover	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Phase barrier	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible
Mechanical life (cycles)	25,000	25,000	25,000	6,000	6,000	6,000	6,000	6,000	4,000
Electrical life (cycles)	10,000	10,000	10,000	1,000	1,000	1,000	1,000	1,000	500
Frame	A	A	A	A	B	A	A	B	A
Width (mm)	–	–	–	–	5	–	–	7.6	9.6
Number of poles	2	2	2	3	3	3	3	3	3
Frame	A	A	A	A	A	A	A	A	A
Height (mm)	105	105	105	140	140 | 185	140	140	140 | 185	210
Depth (mm)	165	165	165	257	257	257	257	257	275
Width (mm)	68	68	68	103	103	103	103	103	103
Mounting pitch (mm)	92	92	92	155	155	155	155	155	155
Weight (kg)	1.9	1.9	1.9	6.4	6.2 | 8.2	6.9	6.9	7.1 | 8.9	15.3
Terminal shape	●Screw terminal	●Screw terminal	●	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal
Front connection	–	–	–	–	–	–	–	–	–
Rear connection	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud
Plug-in	–	–	–	–	–	–	–	–	–
Short-time delay overcurrent trip	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)
Instantaneous overcurrent trip	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)
Ground fault trip	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)	● (*5)
Phase failure trip	● (*5)	● (*5)	● (*5)	●	●	●	●	●	●
Neutral pole protection	–	–	–	–	–	–	–	–	–
Overload alarm	●	●	●	●	●	●	●	●	●
Overload pre-alarm	● (*6)	● (*6)	● (*6)	● (*6)	● (*6)	● (*6)	● (*6)	● (*6)	● (*6)
Ground fault alarm	–	–	●	–	–	–	–	–	–
Ground fault pre-alarm	–	–	●	–	● | –	–	–	● | –	–
Phase failure alarm	–	–	●	–	● | –	–	–	● | –	–
Phase failure pre-alarm	●	●	●	● (*7)	● (*7)	● (*7)	● (*7)	● (*7)	● (*7)
Load current	●	●	●	●	●	●	●	●	●
Peak demand current	●	●	●	●	●	●	●	●	●
Voltage	●	●	●	–	–	–	–	–	–
Power	●	●	●	●	●	●	●	●	●
Power factor	●	●	●	●	●	●	●	●	●
Frequency	●	●	●	●	●	●	●	●	●
Energy	●	●	●	●	●	●	●	●	●
Harmonic distortion	●	●	●	●	●	●	●	●	●
Maximum/minimum value	–	–	–	–	●	–	–	●	–
Communication	–	–	–	–	–	–	–	–	–
Standard	TÜV approval	TÜV approval	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration
Standard	Recognition in process	Recognition in process	Recognized	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process
Standard	–	–	–	–	–	–	–	–	–
Trip unit	Thermal-magnetic	Thermal-magnetic	Electronic (effective value detection)	Thermal-magnetic	Electronic (effective value detection)	Thermal-magnetic	Thermal-magnetic	Electronic (effective value detection)	Electronic (effective value detection)
Trip unit	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped
	804		806	808	810	812		814	816

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.
2. Specify "P-LT" when using a plug-in product with a lead-wire terminal block.
3. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.
4.

Rated operational voltage	Applicable circuit voltage	Available voltage range
100-440V	100/110/200/220/240/254/265/380/400/415/440V	85-484V
200-440V	200/220/240/254/265/380/400/415/440V	160-484V

●NV-H / NV-R (High-performance class) Harmonic Surge Ready

Frame (A)				50	60	63	100		125		125		225	250	250
Model				NV63-HV			NV125-HV				NV125-HEV		NV250-HV		NV250-HEV
Image															
Rated current In (A) Rated ambient temperture 40°C				(15) 16 20 (30) 32 40 50	(60)	63	(15) 16 20 (30) 32 40 50 (60) 63 (75) 80 100 (*3)		125		63-125		125 150 175 200 225	250	125-250
Number of poles				3	3	3	3	4	3	4	3	4	3	3	3
Phase line (*1)				3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ3W, 1ϕ2W
Rated operational voltage Ue (V) (*2)			AC	100-440	100-440	100-440	100-440	200-440	100-440	200-440	100-440		100-440	100-440	100-440
High-speed type	Rated current sensitivity (mA)			30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable		30,100/200/500 selectable		(30),100/200/500 selectable		30,100/200/500 selectable	30,100/200/500 selectable	(30),100/200/500 selectable
	Max. operating time (s)	at IΔn		0.1	0.1	0.1	0.1		0.1		0.1		0.1	0.1	0.1
		at 5IΔn		0.04	0.04	0.04	0.04		0.04		0.04		0.04	0.04	0.04
Time-delay type	Rated current sensitivity (mA)			–	–	–	(100/200/500selectable)		(100/200/500selectable)		(100/200/500selectable)		(100/200/500selectable)	(100/200/500selectable)	(100/200/500selectable)
	Max. operating time (s) (*4)			–	–	–	(0.45/1.0/2.0selectable)		(0.45/1.0/2.0selectable)		(0.45/1.0/2.0selectable)		(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)
	Internal non-operating (s) (or more)			–	–	–	(0.1/0.5/1.0)		(0.1/0.5/1.0)		(0.1/0.5/1.0)		(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)
Earth leakage indication system				Mechanical type (button)			Mechanical type (button)		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)	Mechanical type (button)	Mechanical type (button)
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	10/8	10/8	10/8	50/38		50/38		65/65		65/65	65/65	65/65
			415V	10/8	10/8	10/8	50/38		50/38		70/70		70/70	70/70	70/70
			400V	10/8	10/8	10/8	50/38		50/38		75/75		75/75	75/75	75/75
			230V	25/19	25/19	25/19	100/75		100/75		100/100		100/100	100/100	100/100
			200V	25/19	25/19	25/19	100/75		100/75		100/100		100/100	100/100	100/100
			100V	25/19	25/19	25/19	100/75	–	100/75	–	100/100		100/100	100/100	100/100
Rated impulse withstand voltage Uimp (kV)				6	6	6	6		6		6		6	6	6
Current				AC	AC	AC	AC		AC		AC		AC	AC	AC
Suitability for isolation				Compatible	Compatible	Compatible	Compatible		Compatible		Compatible		Compatible	Compatible	Compatible
Reverse connection (below 230VAC)				–	–	–	–		–		–		–	–	–
Number of operating cycles	Without current			15,000	15,000	15,000	25,000		25,000		25,000		25,000	25,000	25,000
	With current			8,000	8,000	8,000	10,000		10,000		10,000		10,000	10,000	10,000
Utilization category				A	A	A	A		A		A		A	A	A
Rated short time withstand current Icu (kA) at 0.25s				–	–	–	–		–		–		–	–	–
Pollution degree				2	2	2	2		2		2		2	2	2
EMC environment condition (environment A or B)				A	A	A	A		A		A		A	A	A
Overall dimensions (mm)			a	75	75	75	90	120	90	120	105	140	105	105	105
			b	130	130	130	130		130		165		165	165	165
			c	68	68	68	68		68		68		68	68	68
			ca	90	90	90	90		90		92		92	92	92
Mass of front-face type (kg)				0.75	0.8	0.8	1.1	1.4	1.1	1.4	1.9	2.5	1.8	1.8	1.9
Installation and connections	Front connection (F)		Page	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal		●Screw terminal		●		●Screw terminal	●Screw terminal	●
	Solderless (BOX) terminal (SL)			–	–	–	–		–		–		–	–	–
	Rear (B)		716	●Round stud	●Round stud	●Round stud	●Bar stud		●Bar stud		●Bar stud		●Bar stud	●Bar stud	●Bar stud
	Plug-in (PM)			–	–	–	–		–		–		–	–	–
Cassette-type accessories	Alarm switch (AL)			● (*5)	● (*5)	● (*5)	● (*5)	●	● (*5)	●	● (*5)	●	● (*5)	● (*5)	● (*5)
	Auxiliary switch (AX)			● (*5)	● (*5)	● (*5)	● (*5)	●	● (*5)	●	● (*5)	●	● (*5)	● (*5)	● (*5)
	Shunt trip (SHT)		725	● (*5)	● (*5)	● (*5)	● (*5)	●	● (*5)	●	● (*5)	●	● (*5)	● (*5)	● (*5)
	Undervoltage trip (UVT)			● (*5)	● (*5)	● (*5)	● (*5)	●	● (*5)	●	● (*5)	●	● (*5)	● (*5)	● (*5)
	Earth leakage alarm switch (EAL)			–	–	–	–		–		–		–	–	–
	With lead-wire terminal block (SLT)		737	●	●	●	●	●	●	●	●		●	●	●
	Test button module (TBM)		738	● (*6)	● (*6)	● (*6)	● (*6)		● (*6)		● (*6)		● (*6)	● (*6)	● (*6)
External accessories	Enclosure	Closed (S)	753	–	–	–	–		–		●	–	–	–	●
		Dustproof (I)		–	–	–	–		–		●	–	–	–	●
		Waterproof (W)		–	–	–	–		–		●	–	–	–	●
	Electrical operation device (NFM)		756	–	–	–	●		●		●		●	●	●
	Mechanical interlock (MI) (*7)	Panel mounting	752	●	●	●	●	●	●	●	●		●	●	●
		Breaker mounting		●	●	●	●	–	●	–	●	–	●	●	●
	Handle lock device	LC	750	●	●	●	●		●		●		●	●	●
		HL		●	●	●	●		●		●		●	●	●
		HL-S		●	●	●	●		●		●		●	●	●
	External operating handle	(F)	740	●	●	●	●		●		●		●	●	●
		(V)		●	●	●	●		●		●		●	●	●
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)		744	●	●	●	●		●		●		●	●	●
	Rear stud (B-ST)		718	●	●	●	●		●		●		●	●	●
	Plug-in (PM)			–	–	–	–		–		–		–	–	–
	IEC 35mm rail mounting adapters		759	●	●	●	–		–		–		–	–	–
CE marking				Self-declaration	Self-declaration	Self-declaration	Self-declaration		Self-declaration		Self-declaration		Self-declaration	Self-declaration	Self-declaration
CCC recognition				Recognition in process	Recognition in process	Recognition in process	Recognition in process		Recognition in process		Recognized		Recognition in process	Recognition in process	Recognized
Marine use approval (NK, LR, ABS, GL)				–	–	–	–		–		–		–	–	–
Automatic tripping device				Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic		Thermal-magnetic		Electronic (effective value detection)		Thermal-magnetic	Thermal-magnetic	Electronic (effective value detection)
Trip button				Equipped	Equipped	Equipped	Equipped		Equipped		Equipped		Equipped	Equipped	Equipped
Page of Characteristics and dimensions				800			802				806		804		806

Notes: *1 If using a 3-pole earth leakage cirsuit breaker as a 1-pole 2-phase device, connect the left and right poles and not the central pole. When wiring to single-phase 3-wire, connect the neutral line to the central pole.
*2 In case of time delay type, rated voltage is 200-440VAC.
*3 In case of time delay type, rated current is produced with 20 amp. or more.
*4 When the operating time are 0.45, 1.0 and 2.0 seconds, the Earth Leakage circuit breaker operates between 0.15 and 0.45 seconds, between 0.6 and 1.0 seconds and between 1.2 and 2.0 seconds respectively.
*5 Cassette type accessories are field mountable type. It can respend to adhesion attachment of a breaker as standard. (excluding UVT.)
*6 Standard type is SLT equipped.
*7 Not isolation compatible.
*8 AC100V does not acquire the CCC certification.

●NV-H / NV-R (High-performance class) Harmonic Surge Ready

	400	400	630	800
	NV400-HEW	NV400-REW	NV630-HEW	NV800-HEW
				
	Adjustable 200 225 250 300 350 400	Adjustable 200 225 250 300 350 400	Adjustable 300 350 400 500 600 630	Adjustable 400 450 500 600 700 800
	3 / 4	3	3	3
	3φ3W, 1φ3W, 1φ2W / 3φ4W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W
	100-440	100-440	100-440	100-440
	(30), 100/200/500 selectable	(30), 100/200/500 selectable	–	–
	0.1	0.1	–	–
	0.04	0.04	–	–
	(100/200/500 selectable)	(100/200/500 selectable)	(100/200/500 selectable)	(100/200/500 selectable)
	(0.45/1.0/2.0)	(0.45/1.0/2.0)	(0.45/1.0/2.0)	(0.45/1.0/2.0 selectable)
	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)
	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)
	65/65	125/63	65/65	65/65
	70/70	125/63	70/70	70/70
	70/70	125/63	70/70	70/70
	100/100	150/75	100/100	100/100
	100/100	150/75	100/100	100/100
	100/100	150/75	100/100	100/100
	8	8	8	8
	AC	AC	AC	AC
	Compatible	Compatible	Compatible	Compatible
	–	–	–	–
	6,000	6,000	6,000	4,000
	1,000	1,000	1,000	500
	B	B	B	B
	5	5	7.6	9.6
	3	3	3	3
	A	A	A	A
	140 / 185	140	140	210
	257	257	257	275
	103	103	103	103
	155	155	155	155
	6.6 / 8.2	6.6	7.1	15.3
	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal
	–	–	–	–
	●Bar stud	●Bar stud	●Bar stud	●Bar stud
	–	–	–	–
	● (*5)	● (*5)	● (*5)	● (*5)
	● (*5)	● (*5)	● (*5)	● (*5)
	● (*5)	● (*5)	● (*5)	● (*5)
	●	●	●	●
	–	–	–	–
	●	●	●	●
	● (*6)	● (*6)	● (*6)	● (*6)
	–	–	–	–
	● / –	●	●	●
	● / –	●	●	●
	● (*7)	● (*7)	● (*7)	● (*7)
	●	●	●	●
	●	●	●	●
	–	–	–	–
	●	●	●	●
	●	●	●	●
	●	●	●	●
	●	●	●	●
	●	●	●	●
	●	●	●	●
	–	–	–	–
	–	–	–	–
	Self-declaration	Self-declaration	Self-declaration	Self-declaration
	Recognition in process	Recognition in process	Recognition in process	Recognition in process
	–	–	–	–
	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)
	Equipped	Equipped	Equipped	Equipped
	810	810	814	816

Remarks:
1. Products with rated current parenthesized are produced when an order is placed.
2. The setting is set to 500mA and delivered when not specifying the rated current sensitivity and the time of time-delay type of operation to 2.0 seconds.
3. Specify "FP-LT" when using a flush plate product with a lead-wire terminal block.
4. Specify "P-LT" when using a plug-in product with a lead-wire terminal block.
5. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.
6.

Rated operational voltage	Applicable circuit voltage	Available voltage range
100-440V	100/110/200/220/240/254/265/380/400/415/440V	85-484V
200-440V	200/220/240/254/265/380/400/415/440V	175-484V

Detailed Specifications

●NF-MB

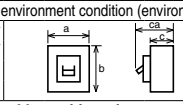
Please specify MB

Frame (A)				30	32	50		100	225
Model				NF32-SV		NF63-CV	NF63-SV	NF125-SV	NF250-SV
Rated current In (A) Rated motor capacity (kW) Rated ambient temperture 40°C (45°C for marine use)				A / 200/220V kW / 400/440V kW 25 / 5.5 / 11 16 / 3.7 / 7.5 12 / – / 5.5 10 / 2.2 / – 8 / – / 3.7 7.1 / 1.5 / – 5 / – / 2.2 4 / 0.75 / 1.5	A / 200/220V kW / 400/440V kW 32 / 7.5 / 15	A / 200/220V kW / 400/440V kW 45 / 11 / 22 40 / – / 18.5 32 / 7.5 / 15 25 / 5.5 / 11 16 / 3.7 / 7.5 12 / – / 5.5 10 / 2.2 / – 8 / – / 3.7	A / 200/220V kW / 400/440V kW 7.1 / 1.5 / – 5 / – / 2.2 4 / 0.75 / 1.5	A / 200/220V kW / 400/440V kW 100 / – / 55 90 / 22 / 45 71 / 18.5 / 37 63 / 15 / 30 45 / 11 / 22 (40) / – / 18.5 32 / 7.5 / 15 (25) / 5.5 / 11 (16) / 3.7 / 7.5 (12.5) / – / 5.5	A / 200/220V kW / 400/440V kW 225 / 55 / 110 200 / – / – 175 / 45 / 90 150 / 37 / 75 125 / 30 / –
Number of poles				3	3	3	3	3	3
Rated insulation voltage Ui (V)				500	500	500	500	500	500
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	2.5/2.5	2.5/2.5	2.5/2.5	7.5/7.5	25/25	36/36
			415V	2.5/2.5	2.5/2.5	2.5/2.5	7.5/7.5	30/30	36/36
			400V	5/5	5/5	5/5	7.5/7.5	30/30	36/36
			380V	5/5	5/5	5/5	7.5/7.5	30/30	36/36
			230V	7.5/7.5	7.5/7.5	7.5/7.5	15/15	50/50	85/85
Rated impulse withstand voltage Uimp (kV)				8	8	8	8	8	8
Current				AC	AC	AC	AC	AC	AC
Suitability for isolation				Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Reverse connection				Possible	Possible	Possible	Possible	Possible	Possible
Number of operating cycles	Without current			10,000	10,000	10,000	15,000	25,000	25,000
	With current (440VAC)			6,000	6,000	6,000	8,000	10,000	10,000
Utilization category				A	A	A	A	A	A
Pollution degree				3	3	3	3	3	3
EMC environment condition (environment A or B)				N/A	N/A	N/A	N/A	N/A	N/A
Overall dimensions (mm)			a	75	75	75	75	90	105
			b	130	130	130	130	130	165
			c	68	68	68	68	68	68
			ca	90	90	90	90	90	92
Mass of front-face type (kg)				0.65	0.65	0.65	0.7	1.0	1.6
Installation and connections	Front connection	(F)	Page	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal
	Solderless (BOX) terminal	(SL)		–	–	–	–	●	●
	Rear	(B)	716	●Round stud	●Round stud	●Round stud	●Round stud	●Bar stud	●Bar stud
	Plug-in	(PM)		●	●	●	●	●	●
Cassette-type accessories	Alarm switch	(AL)	725	● (*1)	● (*1)	● (*1)	● (*1)	● (*1)	● (*1)
	Auxiliary switch	(AX)		● (*1)	● (*1)	● (*1)	● (*1)	● (*1)	● (*1)
	Shunt trip	(SHT)		● (*1)	● (*1)	● (*1)	● (*1)	● (*1)	● (*1)
	Undervoltage trip	(UVT)		● (*1)	● (*1)	● (*1)	● (*1)	● (*1)	● (*1)
	With lead-wire terminal block	(SLT)	737	●	●	●	●	●	●
External accessories	Enclosure	Closed (S)	753	●	●	●	●	●	●
		Dustproof (I)		●	●	●	●	●	●
		Waterproof (W)		●	●	●	●	●	●
	Electrical operation device	(NFM)	756	–	–	–	–	● (*3)	● (*3)
	Mechanical interlock (MI) (*2)	Panel mounting	752	●	●	●	●	●	●
		Breaker mounting		●	●	●	●	●	●
	Handle lock device	LC	750	●	●	●	●	●	●
		HL		●	●	●	●	●	●
		HL-S		●	●	●	●	●	●
	External operating handle	(F)	740	●	●	●	●	●	●
		(V)		●	●	●	●	●	●
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)		744	●	●	●	●	●	●
	Rear stud	(B-ST)	718	●	●	●	●	●	●
	Plug-in	(PM)		●	●	●	●	●	●
	IEC 35mm rail mounting adapters		759	●	●	●	●	–	–
CE marking				Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	TÜV approval
CCC recognition				Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process
Marine use approval (NK, LR, ABS, GL)				☆	☆	☆	☆	☆	☆
Automatic tripping device				Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Trip button				Equipped	Equipped	Equipped	Equipped	Equipped	Equipped
Page of Characteristics and dimensions				762		762		764	768

Notes: *1 The cassette type design makes it easy for customer to install. Available for installation on side (excluding UVT).
*2 Not isolation compatible.
*3 Place an order of other models in conjunction with the circuit breaker.

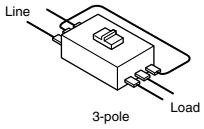
Remarks: 1. The motor circuit breakers do not have an applicable rated motor capacity. Select a motor circuit breaker based on the total load current of the motor.
2. Products with rating parenthesized are produced when an order is placed.
3. Specify “P-LT” when using a plug-in product with a lead wire terminal block.
4. The circuit breaker has the rated short circuit breaking capacity specified in the shaded cells.

●UL 489 Listed Molded Case Circuit Breakers

Frame (A)				50	100	125			
Model				NF50-SVFU	NF100-CVFU	NF125-SVU		NF125-HVU	
Image									
Rated current In (A) (*4) Rated ambient temperture 40°C (IEC 30°C)				(3) 5 10 15 20 30 40 50	60 (70) 75 (80) (90) 100	15 20 30 40 50 60 (70) 75 (80) (90) 100	125	15 20 30 40 50 60 (70) 75 (80) (90) 100	125
Number of poles				2 | 3	2 | 3	2 | 3	2 | 3	3	3
Rated short-circuit breaking capacities (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage	AC (V)	240	240	480	480	600Y/347	600Y/347
			DC (V)	–	–	–	–	–	–
		AC	600Y/347V	–	–	–	–	18	18
			480V	–	–	30	30	50	50
			480Y/277V	–	–	–	–	–	–
			240V	14	14	50	50	100	100
			120V	–	–	–	–	–	–
		DC	60V	–	–	–	–	–	–
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)		440	600	690	690	690	690
		AC	690V	–	–	8/4	8/4	10/5	10/5
			500V	–	7.5/4	18/9	18/9	25/13	25/13
			440V	7.5/4	10/5	30/15	30/15	50/25	50/25
			415V	10/5	10/5	30/15	30/15	50/25	50/25
			400V	10/5	10/5	30/15	30/15	50/25	50/25
			380V	10/5	10/5	30/15	30/15	50/25	50/25
			230V	15/8	15/8	50/25	50/25	100/50	100/50
		DC	250V	–	–	–	–	–	–
			60V	–	–	–	–	–	–
Rated impulse withstand voltage Uimp (kV)				6	8	8	8	8	8
Current (*1)				AC	AC	AC	AC	AC	AC
Suitability for isolation				Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Reverse connection				–	Possible	Possible	Possible	Possible	Possible
Utilization category				A	A	A	A	A	A
Pollution degree				3	3	3	3	3	3
EMC environment condition (environment A or B)				N/A	N/A	N/A	N/A	N/A	N/A
Overall dimensions (mm)			a	36 | 54	50 | 75	90	90	90	90
			b	120	150	160	160	160	160
			c	68	68	68	68	68	68
			ca	90	90	90	90	90	90
Mass of front-face type (kg)				0.3 | 0.45	0.55 | 0.8	1.0 | 1.1	1.0 | 1.1	1.1	1.1
Installation and connections	Front (F)	Screw terminal	(AMP-N)	Page	●	●	●	●	●	●
		Solderless terminal	(SL)	716	–	●	●	●	●	●
		Bar	(BAR)		–	● (*5)	●	●	●	●
		Power supply solderless load bar	(SL/BAR)		–	● (*5, 6)	● (*6)	● (*6)	● (*6)	● (*6)
Cassette-type accessories (*2)	Alarm switch		(AL)	725	● (*7)	● (*7)	● (*7)	● (*7)	● (*7)	● (*7)
	Auxiliary switch		(AX)		● (*7)	● (*7)	● (*7)	● (*7)	● (*7)	● (*7)
	Shunt trip		(SHT)		● (*7)	● (*7)	● (*7)	● (*7)	● (*7)	● (*7)
	Undervoltage trip		(UVT)		●	● (*7)	● (*7)	● (*7)	● (*7)	● (*7)
	With lead-wire terminal block		(SLT)	737	●	●	●	●	●	●
External accessories (*2)	Mechanical interlock		(MI)	752	–	–	–	–	–	–
	Handle lock device		(HL)	750	●	●	●	●	●	●
			(HL-S)		●	●	●	●	●	●
	External operating handle		(F)	740	●	●	●	●	●	●
			(V)		●	●	●	●	●	●
	Terminal cover	Large terminal cover	(TC-L)	744	●	●	●	●	●	●
		Small terminal cover	(TC-S)	745	– (*3)	– (*3)	– (*3)	– (*3)	– (*3)	– (*3)
	IEC 35mm rail mounting adapters			759	Standard accessory	Standard accessory	–	–	–	–
CE marking					TÜV approval	TÜV approval	TÜV approval	TÜV approval	TÜV approval	TÜV approval
CCC recognition					Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process
Automatic tripping device					Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Trip button					Equipped	Equipped	Equipped	Equipped	Equipped	Equipped
Page of Characteristics and dimensions					818	820	822		822	

Notes: *1 The trip action characteristics differ between AC and DC for products that are compatible with both AC and DC.
*2 These accessories differ from the general and CE/CCC products in specifications. Please consult us for details.
*3 The standard structure conforms to IP20 (finger protection).
*4 The rated ambient temperature for NF50-SVFU, NF100-CVFU, NF125-SVU and NF125-HVU is specified at 40°C also by IEC.
*5 The circuit breakers with busbar terminals have insulation barriers.
*6 Circuit breakers for power supply solderless load screw terminal (SL/AMP-N) are available. In this case, a busbar terminal is not provided on the load side.
*7 These cassette type circuit breakers can be installed by the customer. They can be installed with their side faces in close contact (except NF50-SVFU and UVT).

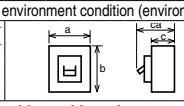
Remarks: 1. Products with rated current parenthesized are produced when an order is placed.
2. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.
3. The 3-pole circuit breakers can be used on single-phase circuits.



US UL Standard 489
UL File No.E167691 Body
UL File No.E108284 Accessories

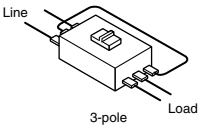
Canada CSA Standard
C22.2 No.5

●UL 489 Listed Molded Case Circuit Breakers

Frame (A)				225	250			
Model				NF225-CWU	NF250-SVU		NF250-HVU	
Image								
Rated current In (A) (*5) Rated ambient temperture 40°C (IEC 30°C)				125 150 175 200 225	125 150 175 200 225	250	125 150 175 200 225	250
Number of poles				3	3	3	3	3
Rated short-circuit breaking capacities (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage	AC (V)	240	480	480	600Y/347	600Y/347
			DC (V)	–	–	–	–	–
		AC	600Y/347V	–	–	–	18	18
			480V	–	35	35	50	50
			480Y/277V	–	–	–	–	–
			240V	35	65	65	100	100
			120V	–	–	–	–	–
		DC	60V	–	–	–	–	–
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)		600	690	690	690	690
		AC	690V	–	8/4	8/4	10/5	10/5
			500V	10/5	25/13	25/13	36/18	36/18
			440V	15/8	36/18	36/18	50/25	50/25
			415V	18/9	36/18	36/18	50/25	50/25
			400V	18/9	36/18	36/18	50/25	50/25
			380V	18/9	36/18	36/18	50/25	50/25
			230V	35/18	65/33	65/33	100/50	100/50
		DC	250V (*3)	10/5	–	–	–	–
			60V	–	–	–	–	–
Rated impulse withstand voltage Uimp (kV)				6	8	8	8	8
Current (*1)				AC/DC compatible	AC	AC	AC	AC
Suitability for isolation				Compatible	Compatible	Compatible	Compatible	Compatible
Reverse connection				Possible	Possible	Possible	Possible	Possible
Utilization category				A	A	A	A	A
Pollution degree				3	3	3	3	3
EMC environment condition (environment A or B)				N/A	N/A	N/A	N/A	N/A
Overall dimensions (mm)			a	105	105	105	105	105
			b	165	185	185	185	185
			c	68	68	68	68	68
			ca	92	92	92	92	92
Mass of front-face type (kg)				1.5	1.6	1.6	1.6	1.6
Installation and connections	Front (F)	Screw terminal	(AMP-N)	●	●	●	●	●
		Solderless terminal	(SL)	–	●	●	●	●
		Bar	(BAR)	●	●	●	●	●
		Power supply solderless load bar	(SL/BAR)	–	●(*8)	●(*8)	●(*8)	●(*8)
Cassette-type accessories (*2)	Alarm switch		(AL)	●	●(*7)	●(*7)	●(*7)	●(*7)
	Auxiliary switch		(AX)	●	●(*7)	●(*7)	●(*7)	●(*7)
	Shunt trip		(SHT)	●	●(*7)	●(*7)	●(*7)	●(*7)
	Undervoltage trip		(UVT)	●	●(*7)	●(*7)	●(*7)	●(*7)
	With lead-wire terminal block		(SLT)	●	●	●	●	●
External accessories (*2)	Mechanical interlock		(MI)	●(*6)	–	–	–	–
	Handle lock device		(HL)	●	●	●	●	●
			(HL-S)	●	●	●	●	●
	External operating handle		(F)	●	●	●	●	●
			(V)	●	●	●	●	●
	Terminal cover	Large terminal cover	(TC-L)	●	●	●	●	●
		Small terminal cover	(TC-S)	– (*4)	– (*4)	– (*4)	– (*4)	– (*4)
	IEC 35mm rail mounting adapters			–	–	–	–	–
CE marking				TÜV approval	TÜV approval	TÜV approval	TÜV approval	TÜV approval
CCC recognition				Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process
Automatic tripping device				Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Trip button				Equipped	Equipped	Equipped	Equipped	Equipped
Page of Characteristics and dimensions				824	826		826	

Notes: *1 The trip action characteristics differ between AC and DC for products that are compatible with both AC and DC.
*2 These accessories differ from the general products in specifications. Please consult us for details.
*3 When using a 3-pole circuit breaker, use two poles. When wired as shown right, NF225-CWU can be used at up to 400 V DC.
*4 Since NF225-CWU comes with a protective cover, it has an IP20 (finger protection) structure as standard. Other models have IP20 (finger protection) structures as standard.
*5 The rated ambient temperature for NF250-SVU and NF250-HVU is specified at 40°C also by IEC.
*6 Not isolation compatible.
*7 These cassette type circuit breakers can be installed by the customer. They can be installed with their side faces in close contact (except UVT).
*8 Circuit breakers for power supply solderless load screw terminal (SL/AMP-N) are available. In this case, a busbar terminal is not provided on the load side.

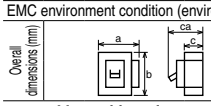
Remarks: 1. Products with rated current parenthesized are produced when an order is placed.
2. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.
3. The 3-pole circuit breakers can be used on single-phase circuits.



US UL Standard 489	
UL File No.E167691	Body
UL File No.E108284	Accessories

Canada CSA Standard
C22.2 No.5

●UL 489 Listed Molded Case Circuit Breakers

Frame (A)				400		630	
Model				NF400-SWU	NF400-HWU	NF630-SWU	NF630-HWU
Image							
Rated current In (A) Rated ambient temperture 40°C				250 300 350 400	250 300 350 400	500 600 630	500 600 630
Number of poles				3	3	3	3
Rated short-circuit breaking capacities (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage	AC (V)	600Y/347	600Y/347	600Y/347	600Y/347
			DC (V)	–	–	–	–
		AC	600Y/347V	20	25	20	25
			480V	35	65	35	65
			480Y/277V	–	–	–	–
			240V	65	100	85	100
			120V	–	–	–	–
		DC	60V	–	–	–	–
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)		690	690	690	690
		AC	690V	10/10(5/5)(*4)	15/10	10/10	15/10
			500V	30/30(25/25)(*4)	42/42	30/30	42/42
			440V	42/42(36/36)(*4)	65/65	42/42	65/65
			415V	45/45(36/36)(*4)	70/70	45/45	70/70
			400V	45/45(36/36)(*4)	70/70	45/45	70/70
			380V	50/50(42/42)(*4)	70/70	50/50	70/70
			230V	85/85(65/65)(*4)	100/100	85/85	100/100
		DC	250V	–	–	–	–
			60V	–	–	–	–
Rated impulse withstand voltage Uimp (kV)				8	8	8	8
Current				AC	AC	AC	AC
Suitability for isolation				Compatible	Compatible	Compatible	Compatible
Reverse connection				Possible	Possible	Possible	Possible
Utilization category				A	A	A	A
Pollution degree				3	3	3	3
EMC environment condition (environment A or B)				N/A	N/A	N/A	N/A
Overall dimensions (mm)			a	140	140	210	210
			b	257	257	275	275
			c	103	103	103	103
			ca	155	155	155	155
Mass of front-face type (kg)				5.7	5.7	9.6	9.6
Installation and connections	Front (F)	Screw terminal	(AMP-N)	–	–	–	–
		Solderless terminal	(SL)	●	–	●(*7)	–
		Bar	(BAR)	●(*5)	●(*5)	●(*5)	●(*5)
		Power supply solderless load bar	(SL/BAR)	●(*5)	–	●(*5)	–
Cassette-type accessories	Alarm switch		(AL)	●(*3)	●(*3)	●(*3)	●(*3)
	Auxiliary switch		(AX)	●(*3)	●(*3)	●(*3)	●(*3)
	Shunt trip		(SHT)	●(*3)	●(*3)	●(*3)	●(*3)
	Undervoltage trip		(UVT)	●	●	●	●
	With lead-wire terminal block		(SLT)	●	●	●	●
External accessories	Mechanical interlock		(MI)	●(*1)(*2)	●(*1)(*2)	●(*1)(*2)	●(*1)(*2)
	Handle lock device		(HL)	●(*6)	●(*6)	●(*6)	●(*6)
			(HL-S)	–	–	–	–
	External operating handle		(F)	●	●	●	●
			(V)	●	●	●	●
	Terminal cover	Large terminal cover	(TC-L)	●	●	●	●
		Small terminal cover	(TC-S)	–	–	–	–
	IEC 35mm rail mounting adapters			–	–	–	–
CE marking				TÜV approval	TÜV approval	TÜV approval	TÜV approval
CCC recognition				Recognition in process	Recognition in process	Recognition in process	Recognition in process
Automatic tripping device				Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Trip button				Equipped	Equipped	Equipped	Equipped
Page of Characteristics and dimensions				828	828	830	830

Installation and connections				Page
		Screw terminal	(AMP-N)	
	Front (F)	Solderless terminal	(SL)	716
		Bar	(BAR)	
		Power supply solderless load bar	(SL/BAR)	

Cassette-type accessories			
Alarm switch	(AL)	725	
Auxiliary switch	(AX)		
Shunt trip	(SHT)		
Undervoltage trip	(UVT)		
With lead-wire terminal block	(SLT)	737	

External accessories				
Mechanical interlock		(MI)	752	
Handle lock device		(HL)	750	
		(HL-S)		
External operating handle		(F)	740	
		(V)		
Terminal cover	Large terminal cover	(TC-L)	744	
	Small terminal cover	(TC-S)	745	
IEC 35mm rail mounting adapters			759	

Notes: *1 Not isolation compatible.
*2 Not acquire the TÜV certification.
*3 Cassette type accessories are field mountable type. It can respend to adhesion attachment of a breaker as standard below 250A frame. (excluding UVT.)
*4 The values in parentheses apply to the circuit breakers with solderless terminals.
*5 The circuit breakers with busbar terminals have insulation barriers.
*6 Please consult us. (Models which are not UL or TUV certified but can be locked in the ON and OFF positions are available.)
*7 Not available for 630A.

Remarks: 1. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.
2. The 3-pole circuit breakers can be used on single-phase circuits.

US UL Standard 489	
UL File No.E167691	Body
UL File No.E108284	Accessories

Canada CSA Standard
C22.2 No.5

●UL 489 Listed Earth Leakage Circuit Breakers (Harmonic Surge Ready)

Frame (A)				50		100	125				250			
Model				NV50-SVFU		NV100-CVFU	NV125-SVU		NV125-HVU		NV250-SVU		NV250-HVU	
Image														
Rated current In (A) Rated ambient temperture 40°C				(5) (10) 15 20 30 40 50		60 (70) 75 (80) (90) 100	15 20 30 (40) 50 60 75 100	125	15 20 30 (40) 50 60 75 100	125	125 150 175 200 225	250	125 150 175 200 225	250
Number of poles				2	3	3	3	3	3	3	3	3	3	3
Phase line (*1)				1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W
Rated operational voltage AC V	UL 489			120-240		120-240	120-480	120-480	120-480	120-480	120-480	120-480	120-480	120-480
	IEC 60947-2 EN 60947-2			100-240	100-440	100-440	100-440	100-440	100-440	100-440	100-440	100-440	100-440	100-440
High-speed type	Rated current sensitivity I△n mA			30 50	30 50 100	30, 50, 100/200/500 selectable	30, 50, 100/200/500 selectable	30, 50, 100/200/500 selectable	30, 50, 100/200/500 selectable	30, 50, 100/200/500 selectable	30, 50, 100/200/500 selectable	30, 50, 100/200/500 selectable	30, 50, 100/200/500 selectable	30, 50, 100/200/500 selectable
	Pickup current, UL 1053			75% of I△n		75% of I△n	75% of I△n	75% of I△n	75% of I△n	75% of I△n	75% of I△n	75% of I△n	75% of I△n	75% of I△n
	Max. operating time (s) at 5I△n (*4)			0.04		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Earth leakage indication system				Display window		Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)
Rated short-circuit breaking capacities (kA)	UL 489 CSA C22.2 No.5-02	AC	480V	–		–	30	30	50	50	35	35	50	50
			240V	14		14	50	50	100	100	65	65	100	100
			120V	14		14	50	50	100	100	65	65	100	100
	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	–	7.5/4	10/5	30/15	30/15	50/25	50/25	36/18	36/18	50/25	50/25
			400V	–	10/5	10/5	30/15	30/15	50/25	50/25	36/18	36/18	50/25	50/25
			230V	15/8	15/8	15/8	50/25	50/25	100/50	100/50	65/33	65/33	100/50	100/50
			100V	15/8	15/8	15/8	50/25	50/25	100/50	100/50	65/33	65/33	100/50	100/50
Rated impulse withstand voltage Uimp (kV)				4	6	6	6	6	6	6	6	6	6	6
Suitability for isolation				Compatible		Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Reverse connection (below 240VAC)				–		Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible
Utilization category				A		A	A	A	A	A	A	A	A	A
Pollution degree				2		2	2	2	2	2	2	2	2	2
EMC environment condition (environment A or B)				A		A	A	A	A	A	A	A	A	A
Overall dimensions (mm)			a	36	54	75	90	90	90	90	105	105	105	105
			b	120		150	160	160	160	160	185	185	185	185
			c	68		68	68	68	68	68	68	68	68	68
			ca	90		90	90	90	90	90	92	92	92	92
Mass of front-face type (kg)				0.4	0.5	0.9	1.2	1.2	1.2	1.2	1.8	1.8	1.8	1.8
Installation and connections	Front (F)	Screw terminal	(AMP-N)	Page		●	●	●	●	●	●	●	●	●
		Solderless terminal	(SL)			–	●	●	●	●	●	●	●	●
		Bar	(BAR)	716		–	●(*5)	●	●	●	●	●	●	●
		Power supply solderless load bar	(SL/BAR)			–	●(*5, *6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)
Cassette-type accessories (*2)	Alarm switch		(AL)	725	–	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)
	Auxiliary switch		(AX)		–	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)
	Shunt trip		(SHT)		–	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)
	Undervoltage trip		(UVT)		–	●	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)
	With lead-wire terminal block		(SLT)	737	–	●	●	●	●	●	●	●	●	●
	Test button module		(TBM)	738	●(*9)		–	●(*9)	●(*9)	●(*9)	●(*9)	●(*9)	●(*9)	●(*9)
External accessories (*2)	Mechanical interlock		(MI)	752	–		–	–	–	–	–	–	–	–
	Handle lock device		(HL)	750	●		●	●	●	●	●	●	●	●
			(HL-S)		●		●	●	●	●	●	●	●	●
	External operating handle		(F)	740	●		●	●	●	●	●	●	●	●
			(V)		●		●	●	●	●	●	●	●	●
	Terminal cover	Large terminal cover	(TC-L)	744	●		●	●	●	●	●	●	●	●
		Small terminal cover	(TC-S)	745	●(*3)		– (*3)	– (*3)	– (*3)	– (*3)	– (*3)	– (*3)	– (*3)	– (*3)
	IEC 35mm rail mounting adapters			759	Standard accessory		Standard accessory	–	–	–	–	–	–	–
CE marking				TÜV approval		TÜV approval	TÜV approval	TÜV approval	TÜV approval	TÜV approval	TÜV approval	TÜV approval	TÜV approval	TÜV approval
CCC recognition				Recognition in process		Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process	Recognition in process
Automatic tripping device				Thermal-magnetic		Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Trip button				Equipped		Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped
Page of Characteristics and dimensions				818		820	822		822		826		826	

Notes:
*1 If using a 3-pole earth leakage circuit breaker as a 1-pole 2-phase device, connect the left and right poles and not the central pole.
*2 These are different from general models in specifications. Consult us for the details.
*3 The standard structure conforms to IP20 (finger protection).
*4 The maximum operating time is 0.1 according to UL 1053.
*5 The circuit breakers with busbar terminals have insulation barriers.
*6 Circuit breakers for power supply solderless load screw terminal (SL/AMP-N) are available. In this case, a bar terminal is not provided on the load side.
*7 Circuit breakers for 100 V AC do not have obtained CCC certificate.
*8 These cassette type accessories can be installed by the customer. They can be installed with their side faces in close contact with circuit breakers (except NV50-SVFU and UVT).
*9 Standard type is SLT equipped.

Remarks:
1. Products with rated current parenthesized are produced when an order is placed.
2.

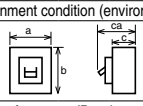
Rated operational voltage	Applicable circuit voltage	Available voltage range
120-240V (UL)	120/240V	66-264V
120-240-480V (UL)	120/240/480V	66-528V
240V (UL)	240V	132-264V
100-230V (IEC)	100/110/200/220/230V	85-253V
100-240V (IEC)	100/110/200/220/230/240V	85-264V
100-230-400-440V (IEC) 100-440V (IEC)	100/110/200/220/ 230/240/254/265/ 380/400/415/440V	85-484V
230-400-440V (IEC)	230/240/254/265/ 380/400/415/440V	195-484V

US UL Standard 489	
UL File No.E167691	Body
UL File No.E108284	Accessories

Canada CSA Standard
C22.2 No.144
C22.2 No.5

Detailed Specifications

●MDU Breakers

Frame (A)				250				400				630				800			
Model				NF250-SEV with MDU		NF250-HEV with MDU		NF400-SEP with MDU		NF400-HEP with MDU		NF630-SEP with MDU		NF630-HEP with MDU		NF800-SEP with MDU		NF800-HEP with MDU	
Image																			
Rated current In (A) Rated ambient temperture 40°C				Adjustable 125-250A (12.5A Step)				Adjustable 200 225 250 300 350 400				Adjustable 300 350 400 500 600 630				Adjustable 400 450 500 500 600 700 800			
Number of poles				3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4
Phase line				3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W	3ϕ3W, 1ϕ3W, 1ϕ2W	3ϕ4W
Rated insulation voltage Ui (V)				690				690				690				690			
Rated short-circuit breaking capacities (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	8/8		10/8		10/10		10/10		10/10		15/15		10/10		15/15	
			500V	18/18		30/23		30/30		50/50		30/30		50/50		30/30		50/50	
			440V	36/36		50/50		42/42		65/65		42/42		65/65		42/42		65/65	
			415V	36/36		70/70		45/45		70/70		45/45		70/70		45/45		70/70	
			400V	36/36		75/75		45/45		70/70		45/45		70/70		45/45		70/70	
			380V	36/36		75/75		45/45		70/70		45/45		70/70		45/45		70/70	
			230V	85/85		100/100		85/85		100/100		85/85		100/100		85/85		100/100	
			200V	85/85		100/100		85/85		100/100		85/85		100/100		85/85		100/100	
			100V	–		–		–		–		–		–		–		–	
Rated impulse withstand voltage Uimp (kV)				8				8				8				8			
Current				AC				AC				AC				AC			
Suitability for isolation				Compatible				Compatible				Compatible				Compatible			
Reverse connection (below 240VAC)				–				–				–				–			
Number of operating cycles		Without current		25,000				6,000				6,000				4,000			
		With current		10,000				1,000				1,000				500			
Utilization category				A				B				B				B			
Pollution degree				3				3				3				3			
EMC environment condition (environment A or B)				A				A				A				A			
Overall dimensions (mm)			a	105	140	105	140	140	185	140	185	210	280	210	280	210	280	210	280
			b	165				257				275				275			
			c	68				103				103				103			
			ca	92				155				155				155			
Mass of front-face type (Breaker mounting) (kg)				1.8	2.3	1.8	2.3	6.2	8	6.2	8	10.7	13.8	10.7	13.8	11.1	14.4	11.1	14.4
MDU installation				Breaker mounting, Panel mounting (*1)				Breaker mounting, Panel mounting (*2)											
Installation and connections	Front		(F)	Page	●	●	●	●	●										
	Rear (*3)		(B)	716	●	●	●	●	●										
	Plug-in		(PM)		–				–								–		
Cassette-type accessories	Alarm switch		(AL)		●(*4)	●	●(*4)	●	●(*4)										
	Auxiliary switch		(AX)		●(*4)	●	●(*4)	●	●(*4)										
	Shunt trip		(SHT)	725	●(*4)	●	●(*4)	●	●(*4)										
	Undervoltage trip		(UVT)		●(*4)	●	●(*4)	●	●										
	MDU transform AL, AX, AL + AX		(MG)		●(*4)	●	●(*4)	●	●(*4)										
	With lead-wire terminal block		(SLT)	737	●	●	●	●	●										
	Alarm contact output (*5)	Pre-alarm	(PAL)	739	● PAL 1a				● PAL 1a				● PAL 1a				● PAL 1a		
		Trip-indicator	(TI)		–				● PAL 1a, OAL 1a				● PAL 1a, OAL 1a				● PAL 1a, OAL 1a		
External accessories (*2)	Electrical operation device (*6) (NFM)			756	Available only for the MDU panel mounting type				Available only for the MDU panel mounting type. Disavailable alarm contact output.										
	Mechanical interlock (MI) (*7)	Panel mounting		752	●				●				●				●		
		Breaker mounting			●(*9)	–	●(*9)	–	Available only for the MDU panel mounting type										
	Handle lock device	LC		750	●				–				–				–		
		HL			●				●				●				●		
		HL-S			Available only for the MDU panel mounting type														
	External operating handle	(F)		740	Available only for the MDU panel mounting type														
		(V)			Available only for the MDU panel mounting type														
	Terminal cover	TC-L		744	●(*8)	●	●(*8)	●	Available only for the MDU panel mounting type										
		TC-S			●(*8)	●	●(*8)	●	–										
		TTC			●(*8)	●(*8)	●(*8)	●(*8)	●(*8)										
		BTC			●(*8)	●	●(*8)	●	Available only for the MDU panel mounting type and line side										
	Rear stud (B-ST)			718	●	●(*8)	●	●	–				–				–		
Automatic tripping device				Electronic (effective value detection)				Electronic (effective value detection)				Electronic (effective value detection)				Electronic (effective value detection)			
MDU measurement specifications				See. 36															
Trip button				Equipped				Equipped				Equipped				Equipped			
Page of Characteristics and dimensions				832				834				836				836			

Notes:
*1 In the case of panel mounting, the panel holder plate, the screws and the MDU connection cable (2m) are packed as standard. The MDU connection cable of 0.5m, 3m, 5m and 10m can be specified when ordering. And dimension of the front panel drilling of the breaker is different between breaker mounting and panel mounting.
*2 In the case of panel mounting, the panel holder plate, the nuts and the MDU connection cable (2m) are packed as standard. The MDU connection cable of 0.5m, 3m, 5m and 10m can be specified when ordering.
*3 For 250AF breakers, the studs are packed as standard. For 400/630/800AF breakers, please specify the installation angle of the studs because it is installed to the breaker before shipping.
*4 It can be installed to the breaker by each customer.
*5 In the case of the breaker with alarm contact output, the module (terminal) is attached to the right side of the breaker and the control power (AC/DC 100-240V 50-60Hz 5VA) is needed. The Output function for alarm output of PAL can set “Self-holding” or “Auto-reset”. Default setup is “Auto-reset”.
*6 For 250AF of electrical operation device, AL is used for the trip indication as standard. The breaker with alarm output contact is not available.
*7 Not isolation compatible.
*8 In the case of breaker mounting, the terminal cover is special type for MDU breaker.
*9 Available only for the MDU panel mounting type.

Measuring Display Unit Breakers (Circuit Breakers with Measuring Display Unit)

●Three major features of Measuring Display Unit Breakers

1. Saving of space and labor for installation
2. Improved and diversified functions
3. Provision of total cost advantages

Measuring Display Unit Breakers with built-in VT and CT and Measuring Display Unit realize measurement, display and transmission of electric circuit information in small space with less installation and wiring work and provide total cost advantages.
The Measuring Display Unit Breakers full of functions in small bodies are suitable for monitoring and protection of electric circuits and maintenance of equipment. A wide variety of models applicable to various networks supports the customers' energy saving activities through detailed energy control as energy saving supporting devices.

●Simply realizing measurement and monitoring of electric circuits for supporting various types of energy saving control

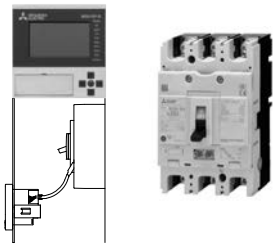
The circuit breakers measure and display the load current, line voltage, electric power, electric energy, harmonic current, leak current and power factor to realize detailed energy control. They support customers' energy saving control.

WS-V Series Measuring Display Unit Breakers

Applicable models
NF250-SEV with MDU, NF250-HEV with MDU

●The measuring display unit can be installed on the body or panel.

【Examples of installation of measuring display unit】

Breaker mounting	Panel mounting
	

Note: The size of holes in the face board of the circuit breaker body varies depending on whether the measuring display unit is installed on the body or the panel.

■Model list

Model type	Type name
CC-Link communication	MDU-DP-C
Electric energy pulse output	MDU-DP-P
No transmission	MDU-DP-N

■Measuring Display Unit cable list

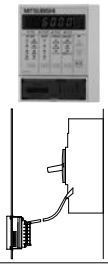
Type name	Cable length
MDU-DP-CB-2M	2m
MDU-DP-CB-3M	3m
MDU-DP-CB-5M	5m
MDU-DP-CB-10M	10m

W & WS Series Measuring Display Unit Breakers

Applicable models
NF400-SEP with MDU, NF400-HEP with MDU, NF630-SEP with MDU, NF630-HEP with MDU, NF800-SEP with MDU, NF800-HEP with MDU

●The measuring display unit can be installed on the body or panel.

【Examples of installation of measuring display unit】

Breaker mounting	Panel mounting
	

■Model list

Model type	Type name	Remarks
CC-Link communication	MDU-AC ○○○	• The model names do not include ○○○.
Electric energy pulse output	MDU-AP ○○○	• When installing the Measuring Display Unit on the body, specify the A frame type in ○○○. For example, when the circuit breaker NF400-SEP with MDU and the Measuring Display Unit with CC-Link communication are combined, the model name is MDU-AC400. If 630A frame or 800A frame is used, specify 630 or 800 in ○○○.
No transmission	MDU-AN ○○○	• When installing the Measuring Display Unit on the panel, specify the cable length (0.5 m, 2 m, 3 m, 5 m or 10 m) in ○○○. For example, when the Measuring Display Unit with CC-Link communication is installed on the panel with a 3-m cable, the model name is MDU-AC-PANEL 3M.

●Specifications for Measuring Display Unit (1)

The measurement and display items vary depending on the model or frame A.
(For the measurement accuracy, please refer to page 697.)

Applicable models
NF250-SEV with MDU, NF250-HEV with MDU

Table 1

Measurement and memory items (accuracy) (*1) (*2) / Model			Display	Storage (*3)	With CC-Link communication: Communication	Remarks
Load current (±1.0%)	Present value	Each phase	●	–	●	
		General (average value) (*5)	●	–	●	
		Phase with max. value	–	–	●	
	Present value of demand (*4)	Each phase	●	–	●	
		Phase with max. value	●	–	●	
	Max. demand value among all phases		●	●	●	
	Time of occurrence of max. demand value among all phases		●	●	●	
Line voltage (±1.0%)	Present value	Between each lines	●	–	●	
		General (average value) (*5)	●	–	●	
	Max. value among all lines		●	●	●	
	Time of occurrence of max. value among all lines		●	●	●	
Harmonic current (±2.5%)	Present value	Fundamental wave of each phase	●	–	●	
		Each order of each phase	●	–	●	
		General of each phase (*6)	●	–	●	
	Max. value of fundamental wave among all phases		●	●	●	
	Time of occurrence of max. value of fundamental wave among all phases		●	●	–	
	Max. value in each order of each phase		●	●	●	
	Time of occurrence of max. value in each order of each phase		●	●	●	
	Demand value (*4)	General of each phase (*6)	●	–	●	
		General max. value among all phases	●	●	●	
		Time of occurrence of general max. value among all phases	●	●	●	
	General distortion factor of each phase		●	–	–	
	Content in each order of each phase		●	–	–	
Electric power (±1.5%)	Present value		●	–	●	
	Demand value (*4)	Present value	●	–	●	
		Max. value	●	●	●	
		Time of occurrence of max. value	●	●	●	
Reactive power (±2.5%)	Present value		●	–	●	
	Demand value (*4)	Present value	●	–	●	
		Max. value	●	●	●	
		Time of occurrence of max. value	●	●	●	
Electric energy (±2.0%) (*7)	Integrated value		●	●	●	Value accumulated from previous reset to present
	Amount for last 1 hour		●	–	●	
	Max. value of amount for 1 hour		●	●	●	
	Time of occurrence of max. value of amount for 1 hour		●	●	●	
Reactive energy (±3.0%) (*7)	Integrated value		●	●	●	Value accumulated from previous reset to present
	Amount for last 1 hour		●	–	●	
	Max. value of amount for 1 hour		●	●	●	
	Time of occurrence of max. value of amount for 1 hour		●	●	●	
Cause of fault (*8)	Fault current (accuracy: ±15%)		●	●	●	Information on fault after previous reset or last fault, and cause of fault (continuously monitored)
	Cause of fault		●	●	●	
Power factor (±5.0%)	Present value		●	–	●	
	Max. value		●	●	●	
	Time of occurrence of max. value		●	●	–	
Frequency (±2.5%)	Present value		●	–	●	
Alarm of circuit breaker (*9)	PAL, OVER, IDM_AL, ILA_AL, IUB_AL		●	–	●	The PAL functions are enabled when the MDU breaker with PAL module (option) is used.
	Neutral line open phase alarm		●	–	–	The neutral line open phase alarm is given only on the display.
State of circuit breaker	Tripping state of circuit breaker (AL)		–	–	●	On installation of alarm switch for transmission with Measuring Display Unit (option)
	ON/OFF state of circuit breaker (AX)		–	–	●	On installation of auxiliary switch for transmission with Measuring Display Unit (option)
	Number of times of tripping of circuit breaker		–	●	●	On installation of alarm switch for transmission with Measuring Display Unit (option)
	Number of times of opening and closing of circuit breaker		–	●	●	On installation of auxiliary switch for transmission with Measuring Display Unit (option)
Default settings	Time setting		●	●	●	Initial setting and resetting after power failure are necessary (no power failure compensation)
	Demand time limit setting (*4)		●	●	●	By default, the demand time limit is 2 min. It can be set in the range from 0 to 15 min in 1-min steps.
	IDM_AL (current demand alarm)		●	●	●	By default, the function is off. The parameters can be set in the following ranges. Function: ON/OFF Pickup current: 50 to 100% (1% step) Demand time limit: 1 to 10 min (1-min step), 15, 20, 25 and 30 min
	ILA_AL (current open phase alarm)		●	●	●	By default, the function is off. The parameters can be set in the following ranges. Function: ON/OFF Pickup current: 10%, fixed (no setting) Operating time: 30 sec (no setting)
	IUB_AL (unbalanced current alarm)		●	●	●	By default, the function is off. The parameters can be set in the following ranges. Function: ON/OFF Pickup current: 30%, fixed (no setting) Operating time: 30 sec (no setting)
	Neutral line open phase alarm		●	●	●	30 When the single-phase 3-wire type is set, the function is turned on. Rated operating overvoltage: 135 V AC (no setting) Operating time: 1 sec (no setting)
	Phase switching setting		●	●	●	Default: No phase switching
	Alarm retention (self-retention or automatic reset) setting		●	●	●	Default: Automatic reset
	Phase and wire type		●	●	●	Default: 3-phase 3-wire
	Electric energy arbitrary setting		●	●	●	
	Reactive energy arbitrary setting		●	●	●	
	Display direction		●	●	●	Default: Vertical One of vertical, horizontal 1 and horizontal 2 can be selected.

Notes:
*1 The term “each phase” used for load current and harmonic current refers to phase 1, 2, 3 or N. However, the phase N is provided only on 4-pole circuit breakers. The term “between each phase” used for line voltage refers to between phases 1 and 2, 2 and 3, 3 and 1, 1 and N, 2 and N or 3 and N. However, voltage between phases 1 and N, 2 and N and 3 and N is applicable only on 4-pole circuit breakers. These circuit breakers measure the values every 0.25 sec. Therefore, even when a low order circuit breaker operates, operating current may not be measured.
*2 Each maximum value is the largest value among values obtained from the start of operation (after the previous reset) to the present.
*3 The integrated value of electric energy and the integrated value of reactive energy are stored upon occurrence of power failure and every 30 minutes, the fault current and the cause are stored upon occurrence of fault, the set values are stored when they are set, and other values are stored every 30 minutes in the nonvolatile E^2PROM.
*4 The demand time limit cannot be set individually. It is common to the items.
*5 The average values of load current and line voltage are calculated as shown below when the phase and wire type is specified.

Phase and wire type	Average present value of current	Average present value of voltage
Single-phase 2-wire	Average present value of current = phase 3 current	Average present value of voltage = voltage between phases 2
Single-phase 3-wire	Average present value of current = (phase 1 current + phase 3 current)/2	Average present value of voltage = (voltage between phases 1 and 2 + voltage between phases 2 and 3)/2
3-phase 3-wire 3-phase 4-wire	Average present value of current = (phase 1 current + phase 2 current + phase 3 current)/3	Average present value of voltage = (voltage between phases 1 and 2 + voltage between phases 2 and 3 + voltage between phases 3 and 1 phases)/3

*6 Sum of values of harmonic components in third to 19th orders except fundamental wave component
*7 The reverse power is not measured.
*8 If the upper limit of the fault current measurement range (rated current 125 to 250 A (adjustable): 4000 A, rated current 50, 60, 75, 100, 125 A (fixed): 2000 A)) is exceeded when overload or short circuit fault occurs, the cause of the fault may not be displayed, and the fault current may not be measured. For fault current, display of cause of fault and measurement of fault current are enabled when the AL for transmission with the Measuring Display Unit (option) is installed.
*9 When the alarm retention mode has been set to Automatic reset, the alarm display on the Measuring Display Unit will be reset automatically. When the alarm retention mode is Self-retention, the alarm display will be self-retained. In the self-retention mode, the display can be reset through the alarm reset operation (collective reset). OVER will be automatically reset regardless of the mode setting.

●Specifications for Measuring Display Unit (1)

The measurement and display items vary depending on the model or frame A.
(For the measurement accuracy, please refer to page 698.)

Applicable models
NF400-SEP with MDU, NF400-HEP with MDU, NF630-SEP with MDU, NF630-HEP with MDU, NF800-SEP with MDU, NF800-HEP with MDU

Table 2

Measurement and memory items (accuracy) (*3) / Model		MDU Display	Storage (*1)	Electric energy with pulse output: Pulse output (*1)	With CC-Link communication: Communication	Remarks
Load current (±2.5%)	Present value of each phase	●	–	–	●	Time limit: 0 to 15 min, changeable (Same as the present value when 0 min is specified)
	Demand value of each phase	●	–	–	●	
	Average present value (*11)	●	–	–	●	
	Max. demand value (general value) (*4)	●	●	–	●	Max. demand value after previous reset
	Time of occurrence of max. value (year, month, day, hour, minute)	–	●	–	●	
Line voltage (±2.5%)	Present value between each phases	●	–	–	●	
	Average present value (*11)	●	–	–	●	
	Max. value (general value) (*4)	●	●	–	●	Max. value after previous reset (not demand value)
	Time of occurrence of max. value (year, month, day, hour, minute)	–	●	–	●	
Harmonic current (±2.5%)	Current value in 3rd, 5th, 7th ... 19th orders of each phase	●	–	–	●	
	Max. value in 3rd, 5th, 7th ... 19th orders (general value) (*4)	●	●	–	●	Max. value after previous reset (not demand value)
	Time of occurrence of max. value (year, month, day, hour, minute)	–	●	–	●	
	Current value of general harmonics of each phase (*10)	●	–	–	●	Time limit: 0 to 15 min, changeable (Same as the present value when 0 min is specified)
	Demand value of general harmonics of each phase (*10)	●	–	–	●	
	Max. demand value (general value) (*4)	●	●	–	●	Max. demand value after previous reset
	Time of occurrence of max. value (year, month, day, hour, minute)	–	●	–	●	
Electric power (±2.5%)	Current value (also reverse power is measured)	●	–	–	●	Time limit: 0 to 15 min, changeable (Same as the present value when 0 min is specified)
	Demand value (also reverse power is measured)	●	–	–	●	
	Max. demand value	●	●	–	●	Max. demand value after previous reset
	Time of occurrence of max. value (year, month, day, hour, minute)	–	●	–	●	
Electric energy (±2.5%)	Electric energy (integrated value) (*5)	●	●	●	●	Value accumulated from previous reset to present
	Electric energy per time (*5)	●	–	–	●	Amount for 1 hour from hour to hour on built-in clock
	Max. value of electric energy per time (*5)	●	●	–	●	Max. demand value after previous reset
	Time of occurrence of max. value (year, month, day, hour, minute)	–	●	–	●	
Cause of fault	Fault current (accuracy: ±15%) (*11)	●	●	–	●	Information on fault after previous reset or last fault, and cause of fault (continuously monitored)
		●	●	–	●	
Power factor (±5%)	Present value	●	–	–	●	
Alarm of circuit breaker	PAL, OVER (*6) (*11)	● LED on	–	–	●	
State of circuit breaker	Tripping state of circuit breaker (AL)	–	–	–	●	When alarm switch for transmission with Measuring Display Unit (option) is installed
	ON/OFF state of circuit breaker (AX)	–	–	–	●	When auxiliary switch for transmission with Measuring Display Unit (option) is installed
Default settings	Time setting	–	–	–	●	Initial setting and resetting after power failure are necessary (no power failure compensation).
	Demand time limit setting (*7)	●	●	–	●	Default: 2 min Setting in 1-min steps in range from 0 to 15 min
	PAL pickup current setting * Setting on circuit breaker body The Measuring Display Unit does not have the setting function.	●	●	–	●	Default: 100% Setting in 5% steps in range from 70 to 100% Default setting on breaker body is 70% unless otherwise specified.
	Pulse unit setting	●	●	–	–	Default: 1 kWh/pulse Setting to 1 kWh, 10 kWh, 100 kWh, 1000 kWh or 10000 kWh
	Phase switching setting	●	●	–	●	Default: No phase switching
	Alarm retention (self-retention or automatic reset) setting	●	●	–	●	Default: Automatic reset

Notes: *1 The electric energy (integrated value) is stored upon occurrence of power failure and every 2 hours, the fault current and the cause are stored upon occurrence of fault, the demand time limit, EPAL sensitivity current, PAL pickup current, pulse unit, alarm retention and phase switching settings are stored when they are set, and other values are stored every 2 hours in the nonvolatile E^2PROM.
Each maximum value is the largest value among values obtained from the start of operation (after the previous reset) to the present.

*2 Every time the electric energy is integrated in the pulse unit (the unit can be set to 1 kWh, 10 kWh, 100 kWh, 1000 kWh or 10000 kWh), a pulse is output. Counting can be performed with a PLC.

*3 The term "each phase" used for load current and harmonic current refers to phase 1, 2, 3 or N. However, the phase N is provided only on 4-pole circuit breakers.
The term "between each phase" used for line voltage refers to between phases 1 and 2, 2 and 3, 3 and 1, 1 and N, 2 and N or 3 and N. However, voltage between phases 1 and N, 2 and N and 3 and N is applicable only on 4-pole circuit breakers.
The electric energy data is 6-digit data of up to 999999 kWh. The voltage and harmonic current are 3-digit data, and others are 4-digit.
These circuit breakers measure the values every 0.25 sec. Therefore, even when a low order circuit breaker operates, operating current may not be measured.

*4 Each general value indicates the value only of the phase with the maximum value.

*5 The electric energy is not measured in the case of reverse power flow.

*6 When the alarm retention mode has been set to Automatic reset, the PAL alarm LED display on the Measuring Display Unit front panel will be reset automatically. When the alarm retention mode is Self-retention, the alarm display will be self-retained. In the self-retention mode, the display can be reset through alarm reset operation (collective reset). OVER will be automatically reset regardless of the mode setting.

*7 The demand time limit cannot be set individually. It is common to the items.

*8 Sum of values of harmonic components in third to 19th orders except fundamental wave component.

*9 The average present value of load current is the average value of current among phases 1, 2 and 3 (the current of the phase N is not included even in the case of a 4-pole circuit breaker). When the circuit breaker is used on a single-phase 3-wire circuit, the calculated value is displayed. However, ignore it. The average present value of line voltage is the average value of voltages between phases 1 and 2, 2 and 3 and 3 and 1 (the voltages between phases 1 and N, 2 and N and 3 and N are not included in the case of a 4-pole circuit breaker).

*10 Setting at the pre-alarm current Ip (which can be set in the range from 70 to 100% of the rated current In in 5% steps) on the circuit breaker body. The Measuring Display Unit does not have the setting function.

*11 The operating time of PAL is shown below.

PAL	Same as pre-alarm operating time Tp on circuit breaker body

●Specifications for Measuring Display Unit (2)

Applicable models
NF250-SEV with MDU, NF250-HEV with MDU

Table 3

Item		Specification
Data updating cycle		250 ms (harmonic current: 2 s)
Tolerances		Current and voltage: ±1.0% (to rating input) Electric power: ±1.5% (to rating input) Reactive power: ±2.5% (to rating input) Harmonic current: ±2.5% (to rating input) Power factor: ±5% Frequency: ±2.5% Electric energy: ±2.0% (voltage 100 V to 440 V, range from 5 to 100% of current rating, power factor 1) Reactive energy: ±3.0% (voltage 100 V to 440 V, range from 10 to 100% of current rating, power factor 0) Fault current: ±15% (*1)
Demand time limit setting range		0 to 15 min (1-min steps)
Rated input	Voltage circuit (1ϕ2W, 3ϕ3W)	440 V (only 4-pole breakers applicable to 3ϕ4W)
	Voltage circuit (1ϕ3W)	
	Voltage circuit (3ϕ4W)	
	Current circuit	Load current/harmonic current: 250 A
	Frequency	50 Hz/60 Hz (automatic discrimination of frequency)
Power failure compensation	(1) Wh (integrated value) (2) Max. value (3) Setting data	Stored in EEPROM (nonvolatile memory) * Wh and varh are stored upon occurrence of power failure and every 30 min. Max. value is stored every 30 min. Setting data are stored when they are set.
	Clock	No power failure compensation
Clock accuracy		Approx. 1 min/month
External dimensions (unit: mm)		See Characteristics and Dimensions.
Control power supply		Compatible with 100 to 240 V AC/DC, 50/60 Hz (allowable voltage range: 85% to 110%), 12 VA (*2)
Other functions		Function for switching phases to be measured to 1-3 and 3-1 PAL alarm, self-retention/automatic reset setting function (*3) Function for counting number of times of opening and closing of circuit breaker body (*4)

Notes: *1 The measurement of fault current of load is enabled when the AL switch for transmission with Measuring Display Unit (option) is installed in the Measuring Display Unit Breaker body.
*2 When the MDU unit control power is turned on, a rush current transitionally flows (maximum rush current: 2A, energizing time: 1ms (240V AC)
*3 The PAL functions are enabled when the MDU breaker with PAL module (option) is used.
*4 The function is enabled when the AX switch for transmission with Measuring Display Unit (option) is installed in the Measuring Display Unit Breaker body.

●Network Specifications for Measuring Display Unit

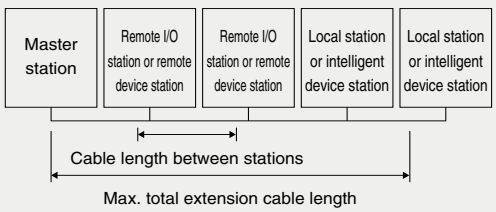
[Electric energy pulse output]

Table 4

Item	Specification
Output elements	Solid state relay (SSR), no voltage a contact (Ca and Cb terminals: no polarity)
Contact capacity	Compatible with 24V DC and 100 to 200 V AC, 20 mA
Output pulse unit	1, 10, 100, 1000 and 10000 kWh/pulse (settable)
Output pulse width	0.35 to 0.45 s
Max. wiring length	100m

[CC-Link communication]

Table 5

Item	Specification
Communication speed	10M/5M/2.5M/625k/156kbps
Communication method	Broadcast polling method
Synchronization method	Frame synchronization method
Encoding method	NRZI
Transmission format	Conforming to HDLC
Number of occupied stations	Remote device occupying 1 station
Number of connected units	Meet the following conditions. When a system consists only of Measuring Display Units, up to 42 units can be connected. Condition 1 for number of connected units $\{(1\times a)+(2\times b)+(3\times c)+(4\times d)\} \leqq 64$ a: Number of units occupying 1 station b: Number of units occupying 2 stations c: Number of units occupying 3 stations d: Number of units occupying 4 stations Condition 2 for number of connected units $\{(16\times A)+(54\times B)+(88\times C)\} \leqq 2304$ A: Number of units at 1 remote I/O station $\leqq 64$ B: Number of units at remote device station $\leqq 42$ C: Number of units at local station $\leqq 26$
Station number	Setting in range from 1 to 64 (Set the station number without fail.)
CC-Link version	CC-Link Ver.1.10
Max. total extension cable length and cable length between stations	 Cables applicable to CC-Link Ver. 1.10 (with use of 110-ohm terminal resistance)
Connecting cable	Cables applicable to CC-Link Ver. 1.10 (shielded 3-core twisted pair cables) * Cables applicable to Ver. 1.10 supplied by different manufacturers can be used simultaneously.

Communication speed	156kbps	625kbps	2.5Mbps	5Mbps	10Mbps
Cable length between stations	0.2 m or more				
Max. total extension cable length	1200m	900m	400m	160m	100m

Note: For more information, visit the website of CC-Link Partner Association ("http://www.cc-Link.org/").

●Specifications for Measuring Display Unit (2)

Applicable models
NF400-SEP with MDU, NF400-HEP with MDU, NF630-SEP with MDU, NF630-HEP with MDU, NF800-SEP with MDU, NF800-HEP with MDU

Table 6

Item		Specification
Data updating cycle		250 ms (harmonic current: 2 s)
Tolerances		Current, voltage and Electric power: ±2.5% (to rating input) Power factor: ±5% Electric energy: ±2.5% (voltage 100 V to 440 V, range from 5 to 100% of current rating, power factor 1) Fault current: ±15%
Demand time limit setting range		0 to 15 min (1-min steps)
Rated input	Voltage circuit (1φ2W, 3φ3W)	440 V (only 4-pole breakers applicable to 3φ4W)
	Voltage circuit (1φ3W)	
	Voltage circuit (3φ4W)	
	Current circuit	Load current/harmonic current: 100 A/225 A/400 A/600 A/800 A (Automatic discrimination. Determined based on A frame of circuit breaker. 100 A when rated current of 225 A frame is 100 A or less) Leakage current: 500 mA
	Frequency	50 Hz/60 Hz (automatic discrimination of frequency)
Power failure compensation	(1) Wh (integrated value) (2) Max. value (3) Setting data	Stored in EEPROM (nonvolatile memory) * Wh is stored upon occurrence of power failure and every 2 hours The max. value is stored every 2 hours. The setting data is stored when it is set.
	Clock	No power failure compensation
Clock accuracy		Approx. 1 min/month
External dimensions (unit: mm)		W×D×H: 90×75×30
Control power supply		Compatible with 100 to 240 V AC/DC, 50/60 Hz (allowable voltage range: 85% to 110%), 12 VA
Other functions		Function for switching phases to be measured to 1-3 and 3-1 ECA/PAL alarm, self-retention/automatic reset setting function

Note: *1 When the MDU unit control power is turned on, a rush current transitionally flows (maximum rush current: 2A, energizing time: 1ms (240V AC)

●Network Specifications for Measuring Display Unit

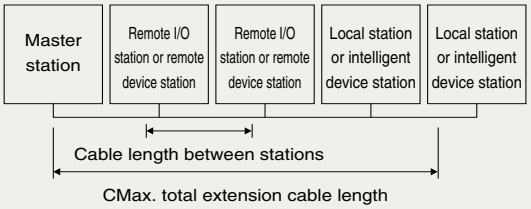
[Electric energy pulse output]

Table 7

Item	Specification
Output elements	Solid state relay (SSR), no voltage a contact (Ca and Cb terminals: no polarity)
Contact capacity	Compatible with 24V DC and 100 to 200 V AC, 20 mA
Output pulse unit	1, 10, 100, 1000 and 10000 kWh/pulse (settable)
Output pulse width	0.35 to 0.45 s
Max. wiring length	100m

[CC-Link communication]

Table 8

Item	Specification
Communication speed	10M/5M/2.5M/625k/156kbps
Communication method	Broadcast polling method
Synchronization method	Frame synchronization method
Encoding method	NRZI
Transmission format	Conforming to HDLC
Number of occupied stations	Remote device occupying 1 station
Number of connected units	Meet the following conditions. When a system consists only of Measuring Display Units, up to 42 units can be connected. Condition 1 for number of connected units {(1×a) + (2×b) + (3×c) + (4×d)} ≦ 64 a: Number of units occupying 1 station b: Number of units occupying 2 stations c: Number of units occupying 3 stations d: Number of units occupying 4 stations Condition 2 for number of connected units {(16×A) + (54×B) + (88×C)} ≦ 2304 A: Number of units at 1 remote I/O station ≦ 64 B: Number of units at remote device station ≦ 42 C: Number of units at local station ≦ 26
Station number	Setting in range from 1 to 64 (Set the station number without fail.)
CC-Link version	CC-Link Ver. 1.10
Max. total extension cable length and cable length between stations	 Cables applicable to CC-Link Ver. 1.10 (with use of 110-ohm terminal resistance) Communication speed: 156kbps / 625kbps / 2.5Mbps / 5Mbps / 10Mbps Cable length between stations: 0.2 m or more Max. total extension cable length: 1200m / 900m / 400m / 160m / 100m When the Measuring Display Unit is installed on the panel, the terminal block on the panel mounting plate and the terminal block on the Measuring Display Unit are connected with a CC-Link cable having a one-way length of 15 cm and an entire length of 30 cm. When connecting the unit in consideration of the following three points. (1) The one-way length of the CC-Link cable, 15 cm, is included in the distance between stations. (2) The entire length of the CC-Link cable, 30 cm, is included in the maximum transmission distance (total extension distance).
Connecting cable	Cables applicable to CC-Link Ver. 1.10 (shielded 3-core twisted pair cables) * Cables applicable to Ver. 1.10 supplied by different manufacturers can be used simultaneously.

Note: For more information, visit the website of CC-Link Partner Association (HYPERLINK "http://www.cc-Link.org/").

●Cautions when Using Measuring Display Unit Breakers (common instructions)

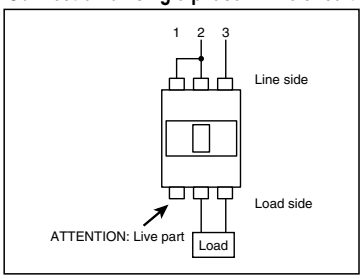
Measuring accuracy

(1) The accuracy of measurement of current or voltage is indicated as the percentage of error to the rated current or voltage for measurement by the Measuring Display Unit.
The measurement rated current is the maximum rated current of each ampere frame. For W & WS Series Measuring Display Unit Breakers, the accuracy is the max. rated current × ±2.5%. For WS-V Series Measuring Display Unit Breakers, the accuracy is the max. rated current × ±1%.
(For example, when the rated current of NF630-SEP with Measuring Display Unit is 350 A, the measurement rated current is 630 A, and the current accuracy is 630 A × ±2.5% = ±15 A.)
* The measurement rated voltage is 440 V. (Common to all A frames)
When the current is less than 1.0% of the measurement rated current in the case of WS-V Series Measuring Display Unit Breakers or less than 2.0% of the measurement rated current in the case of W & WS Series Measuring Display Unit Breakers or when the voltage is less than 5.0% of the measurement rated voltage in the case of WS-V Series Measuring Display Unit Breakers or less than 2.0% of the measurement rated current in the case of W & WS Series Measuring Display Unit Breakers, the current or voltage is cut off, and zero is displayed.
(2) When the current is cut off, the current is displayed as 0 A. However, if the current is 0.4% or more of the measurement rated current, the electric energy is measured.
(3) The accuracy of power factor is the percentage to electrical angle of 90°. A power factor of 50% or less is displayed as a reference value.
(4) The accuracy of electric energy is ±2.0% of the true value in the case of WS-V Series Measuring Display Unit Breakers and ±2.5% of the true value in the case of W & WS Series Measuring Display Unit Breakers in the range of measurement rated voltage (100 V to 440 V) × current (measurement rated current of 5 to 100%).

How to use Measuring Display Unit Breaker on single-phase 2-wire circuity

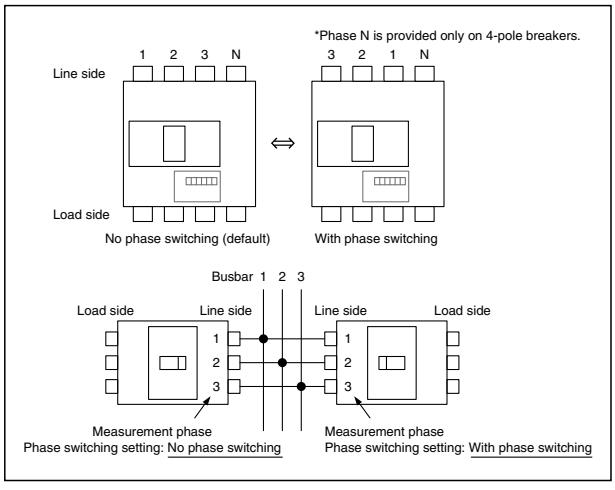
(1) Connect the breaker as shown in the right figure.
The phase 1 on the load side is charged. Insulate it.
As measurement data, use the current of the phases 2 and 3 and the voltage between the phases 2 and 3.
Although the current of the phase 1 and the voltage between the phases 1 and 2 and the phases 3 and 1 are measured, ignore the measurements. The Measuring Display Unit is designed for 3-phase 3-wire and single-phase and 3-wire circuits.
On W & WS Series Measuring Display Unit Breakers, the average values of load current and line voltage are calculated from the values of the phases 1, 2 and 3 (between the phases). Ignore these measurement values.
Also when the breaker is used on a single-phase 3-wire circuit, ignore these values.
When using any WS-V Series Measuring Display Unit Breaker, set the phase and wire type.

Connection on single-phase 2-wire circuit



Phase sequence of Measuring Display Unit Breaker

The phase sequence of Measuring Display Unit Breaker can be set by using the phase switching function as shown below.
When the breaker is installed vertically with the power supply side upward (see the right figure), the phase sequence is set as stated below.
No phase switching: 1, 2, 3 and N from the left (default)
With phase switching: 3, 2, 1, and N from the left
Set the phase sequence in accordance with the installation and wiring methods.
Notes (1) The phase N is provided only on 4-pole circuit breakers.
(2) Note that the position of the phase N is unchanged regardless of the phase switching setting.



Reverse connection of Measuring Display Unit Breaker

The Measuring Display Unit Breakers cannot be connected with the power supply and load sides set reversely.

Installation of Measuring Display Unit Breaker in close contact

The Measuring Display Unit Breakers must not be installed in close contact.
(1) In the case of 400, 630 or 800A frame, install the breaker body securing a wiring space of 30 mm or more on the right side of the breaker to connect the connecting cables and fitting the connecting cable connectors.
(2) In the case of WS-V Series Measuring display Unit Breaker, install the breaker body securing a wiring space of 40 mm or more on the right side of the breaker to connect the connecting cables.

●Cautions when using Measuring Display Unit Breaker (For Measuring Display Unit)

Transmission method

(1) One of No transmission, With pulse output and With CC-Link communication should be specified.
(2) W & WS Series Measuring Display Unit Breaker with CC-Link communication cannot be manufactured for installing the Measuring Display Unit on the breaker body.
(3) When With transmission is selected, data which can be transmitted depends on the function of the Measuring Display Unit Breaker body. The transmission options cannot be installed or changed later. Specify the options when issuing the initial order.
(4) For the maximum number of connected units and transmission distance for each transmission type, see the following tables.
<WS-V Measuring Display Unit Breakers>
Tables 4 and 5
<W & WS Measuring Display Unit Breakers>
Tables 7 and 8

Installation of Measuring Display Unit

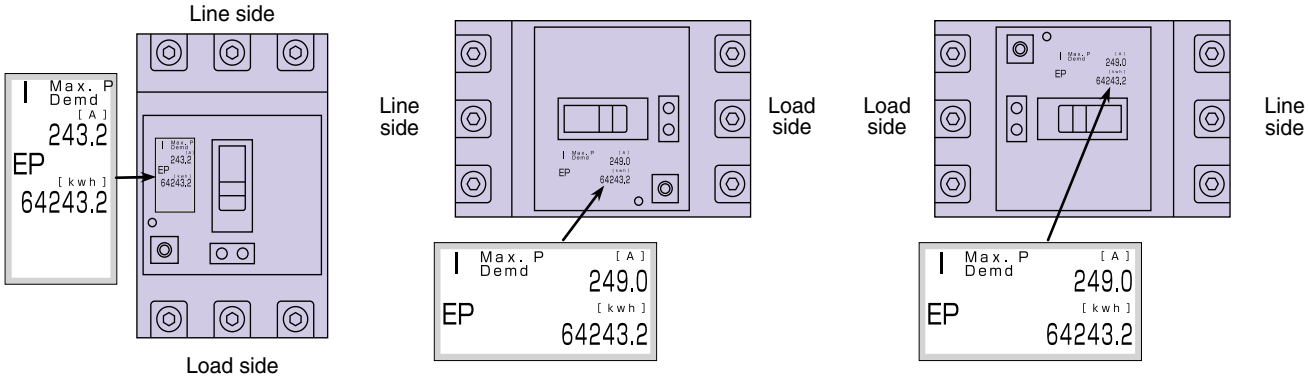
(1) When the installation of Measuring Display Unit on panel has been specified, the breaker will come with the panel mounting parts, mounting screws and 2-m connecting cable (standard).
(The 0.5-, 3-, 5- or 10-m connecting cable can be specified.)
(2) If the installation position of the Measuring Display Unit is changed from the panel to the body or vice versa, the Measuring Display Unit and the breaker body must be returned to the manufacturer for modification.

Measuring Display Unit Breaker with CC-Link communication (W & WS Series Measuring Display Unit Breakers)

(1) If you intend to use the circuit breaker with its pane out on the face board, specify the installation on panel.

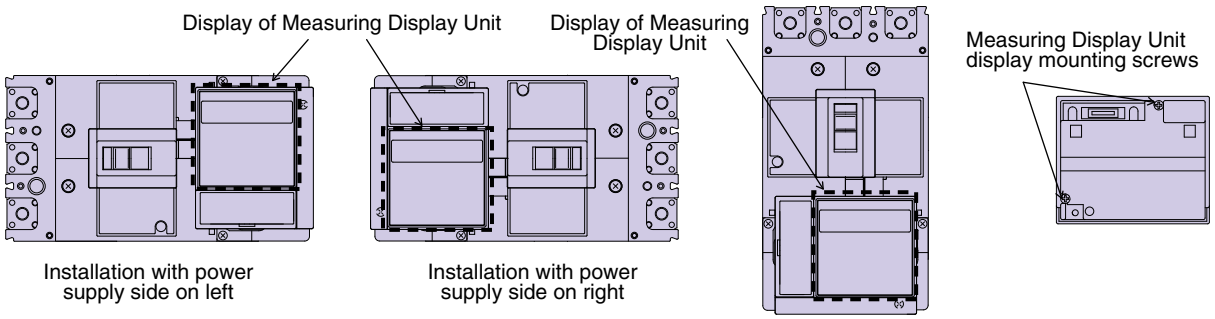
●Change of display direction for breaker mounting

<WS-V Series Measuring Display Unit Breaker>
(1) When installing the Measuring Display Unit on the breaker body installed in the horizontal direction, the direction of the display can be changed according to the installation direction.
(2) The display direction is set on the display unit.



Default display direction
Installation with line side on left
Installation with line side on right

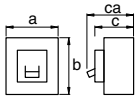
<W & WS Series Measuring Display Unit Breaker>
(1) When installing the Measuring Display Unit on the breaker body installed in the horizontal direction, the direction of the display of Measuring Display Unit can be changed for ease in reading according to the installation direction.
(2) Remove the screws on the rear panel of the Measuring Display Unit, and change the direction according to the installation direction.



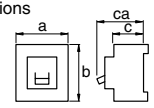
Installation with power supply side on left
Installation with power supply side on right
Default direction of Measuring Display Unit display

MEMO

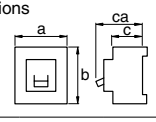
Detailed Specifications

Model			BH			BH-P		
Frame (A)			70	100	100	70	100	100
Image								
Number of poles			1	2	3	1	2	3
Rated current (A) at ambient temperature 40°C			70	70, 100	70, 100	70	70, 100	70, 100
Rated voltage (V)		AC	230/400			230/400		
		DC	125			125		
Rated short circuit capacity (kA)	IEC 60898-1	AC230/400V	3	–		3	–	
	IEC 60898-1	AC400V	–	3		–	3	
	–	DC125V	1			1		
Instantaneous tripping			Type C (5 In <, ≦10 In)					
Dimensions (mm) 		a	25	50	75	25	50	75
		b	95			74		
		c	57.5			60.5		
		ca	77.5			79		
Mass (kg)			0.16	0.32	0.48	0.13	0.26	0.38
Connection (*1)			Clamp terminal			Plug-in (line) Clamp (load)		
								
Automatic tripping device			Thermal, magnetic					
Optional accessories	Terminal cover		●			–		
	Mounting plate		●			–		
	Terminal base		–			●		
	Lock cover		●			●		
Approved by			–	LR, GL, NK	–	–	LR, BV, AB, GL, NK	–

Note: *1 If reguired solderless terminal can be supplied.
(BH : Line and Load side, BH-P : Load side only)

Model				BH-D6					BH-D10				BH-DN
Image													
Number of poles [P]				1	2	3	4(3+N)*1	2(1+N)*1	1	2	3	4(3+N)*1	2 (1+N)*1
Instantaneous tripping				Type B, C, D*2				Type B, C*2	Type B, C, D*2				Type C*2
Rated insulation voltage U_i [V]				440					440				230
Rated current I_n [A] at ambient temperature 30°C				0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63				0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40	0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63				6, 10, 16, 20
Rated short-circuit capacity [kA]	IEC 60898-1 (Icn)	AC	230V	6	–			6	10	–			4.5
			230/400V	6	–			–	10	–			–
			400V	–	6			–	–	10			–
Number of operating cycles		Without current		8,000					10,000				20,000
		With current		8,000					10,000				20,000
Dimensions [mm] 			a	18	36	54	72	36	18	36	54	72	18
			b	87					87				88
			c	44					44				44
			ca	70					70				70
Type of overcurrent release				Thermal-magnetic					Thermal-magnetic				Thermal-magnetic
Mounting				IEC35mm rail					IEC35mm rail				IEC35mm rail
Applicable wire size				1 to 25mm^2					1 to 25mm^2				1 to 10mm^2
Weight [kg]				0.15	0.3	0.45	0.55	0.25	0.15	0.3	0.45	0.55	0.12
Mass optional accessories	Alarm switch (AL)			●					●				–
	Auxiliary switch (AX)			●					●				–
	Shunt trip (SHT)			●					●				–
Terminal connection				Solderless					Solderless				Solderless
Based on standard				IEC 60898-1					IEC 60898-1				IEC 60898-1
CE marking				EN 60898-1 : Self-declaration					EN 60898-1 : Self-declaration				EN 60898-1 : Self-declaration
CCC				GB 10963.1					GB 10963.1				GB 10963.1

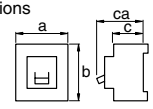
Notes: *1 N pole is a switched neutral pole (without overcurrent release device).
*2 Type B (3 In <, ≦ 5 In), Type C (5 In <, ≦ 10 In), Type D (10 In <, ≦ 20 In)

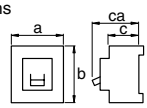
Model				BH-D10 (For DC)	
Image					
Number of poles [P]				1	2
Instantaneous tripping				Type B, C*3	
Rated insulation voltage U_i [V]				250	
Rated current I_n [A] at ambient temperature 30°C				0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63	
Rated short-circuit capacity [kA]	IEC 60898-2 (Icn)	DC	125V	10	–
			250V	–	10
Number of operating cycles		Without current		8,000	
		With current		4,000	
Dimensions [mm] 			a	18	36
			b	87	
			c	44	
			ca	70	
Type of overcurrent release				Thermal-magnetic	
Mounting				IEC35mm rail	
Applicable wire size				1 to 25mm^2	
Weight [kg]				0.15	0.3
Mass optional accessories	Alarm switch (AL)			●	
	Auxiliary switch (AX)			●	
	Shunt trip (SHT)			●	
Terminal connection				Solderless	
Based on standard				IEC 60898-2	
CE marking				EN 60898-2 : Self-declaration	
CCC				GB 10963.2	

Notes: *3 Type B: (5 In <, ≦ 7 In), Type C: (7 In <, ≦ 15 In)

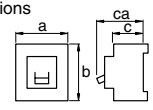


Detailed Specifications

		RCCB	
Model		BV-D	
Image			
Number of poles [P]		2(1+N)*1	4(3+N)*1 *3
Rated current [A] at ambient temperature 30°C		25, 40, 63	
Rated voltage [VAC]		230	230/400
Rated current sensitivity I△n [mA]		30, 300	
Max. operating time at 5I△n [s]		0.04	
Pulsating current sensitivity		Type AC	
Rated conditional short-circuit current [kA]		6	
Dimensions [mm] 	a	36	72
	b	85	
	c	44	
	ca	70	
Mass [kg]		0.2	0.35
Rated making and breaking capacity Im [A]		500(In 25,40A), 630(In63A)	
Rated conditional short-circuit current Inc [kA]		6	
Rated residual making and breaking capacity I△m [A]		500(In 25,40A), 630(In63A)	
Rated conditional residual short-circuit current I△c [kA]		6	
Number of operating cycles	Without current	8,000	
	With current	8,000	
Type of overcurrent release		–	
Mounting		IEC35mm rail	
Applicable wire size		1 to 25mm²	
Weight [kg]		0.2	0.35
Terminal connection		Solderless	
Based on standard		IEC 61008-2-2	
CE marking		EN 61008-2-2 : Self-declaration	
CCC		GB 16916.22	

		RCBO
Model		BV-DN
Image		
Number of poles [P]		2(1+N)*1
Rated current [A] at ambient temperature 30°C		6, 10, 16, 20, 25, 32, 40
Rated voltage [VAC]		230
Rated current sensitivity I△n [mA]		30, 100, 300
Max. operating time at 5I△n [s]		0.04
Pulsating current sensitivity		Type AC
Breaking capacity [kA] sym. (IEC 61009)		4.5
Tripping characteristics		Type C*2
Dimensions [mm] 	a	36
	b	88
	c	44
	ca	70
Mass [kg]		0.19
Automatic tripping device		Thermal, magnetic
Number of operating cycles	Without current	20,000
	With current	20,000 (In 6,10,16,20A) 15,000 (In 25A) 10,000 (In 32,40A)
Type of overcurrent release		Thermal-magnetic
Mounting		IEC35mm rail
Applicable wire size		1 to 16mm²
Weight [kg]		0.19
Terminal connection		Solderless
Based on standard		IEC 61009-2-2
CE marking		EN 61009-2-2 : Self-declaration
CCC		GB 16917.22

Notes: *1 N pole is a switched neutral pole (without overcurrent release device).
*2 Type C: (5 In <, ≦ 10 In)
*3 For use to three phase 4-wire type. When using, it be sure to connect the neutral wire to the neutral phase. Not available for use to three phase 3-wire type.

		Isolating switch			
Model		KB-D			
Image					
Number of poles [P]		1	2	3	4(3+N)
Utilization category		AC22A class			
Rated current [A] at ambient temperature 30°C		32, 63, 80			
Rated voltage [VAC]		230	400		
Short time withstand current [A]		20 × In, 1s			
Short-circuit making capacity [A]		20 × In			
Dimensions [mm] 	a	18	36	54	72
	b	87			
	c	44			
	ca	70			
Mass [kg]		0.09	0.18	0.27	0.36
Number of operating cycles	Without current	20,000			
	With current	3,000			
Mounting		IEC35mm rail			
Applicable wire size		1 to 25mm²			
Weight [kg]		0.1	0.2	0.3	0.4
Terminal connection		Solderless			
Based on standard		IEC 60947-3			
CE marking		EN 60947-3 : Self-declaration			
CCC		GB 14048.3			

Detailed Specifications

Accessories for Miniature Circuit Breakers

■Functions of Accessories

Internal accessory	Function
AL Alarm switch	Electrically indicates the trip status of the circuit breaker.
AX Auxiliary switch	Electrically indicates the On/Off status of the circuit breaker.
SHT Shunt trip	Electrically trips the circuit breaker from a remote location. Permissible working voltages are 70 to 110% of the AC rated voltage or 70 to 125% of the DC rated voltage.

■Equipping of Accessories

Accessory \ Model	BH-D6	BH-D10	BH, BH-P, BH-DN, BV-DN, KB-D, BV-D
AL	○	○	–
AX	○	○	
SHT	○	○	

○: Accessory equipped
–: Accessory not equipped

■Specifications

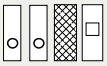
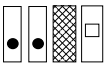
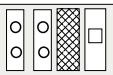
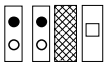
Type		AL	AX	AL+AX	AX+AX
		AL-05DLS	AX-05DLS	ALAX-05DLS	AX2-05DLS
Contact	Configuration	1C	1C	2C	2C
	Contact capacity	400VAC, 2A	230VAC, 5A	120VDC, 0.4A	48VDC, 1.5A	24VDC, 4A
Function	Line	–	–	AX	AX
	Load	AL	AX	AL	AX
Connection		Clamp terminal			
Compliance standard		IEC 60947-5-1			

Type	SHT	
	SHTA400-05DLS	SHTD048-05DLS
Cut-off switch	Equipped	
Voltage	110-400VAC	24-48VDC
Input power requirement	110VAC 60VA 230VAC 250VA 400VAC 750VA	24VDC 75VA 48VDC 300VA
Operating time [ms]	<20	
Connection	Solderless terminal	
Compliance standard	IEC 60947-2	

* Secure a sufficient input power supply so that the voltage will not drop below the permissible lower working voltage (70% of the lowest rated voltage).
* The operating time denotes the time from when the rated voltage is applied to SHT until the time the main contact of the breaker starts to open.

Detailed Specifications

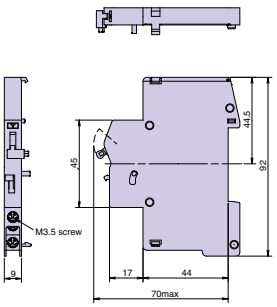
Combinations of Accessories

Accessory connection combinations	AL	
	AX	
	2AX	
	ALAX	
	SHT	
	AX+SHT	
	AL+SHT	
	2AX+SHT	
	ALAX+SHT	

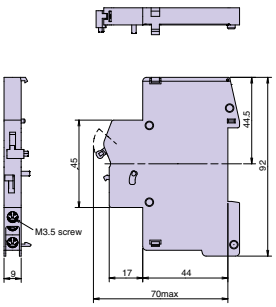


Outline Drawing

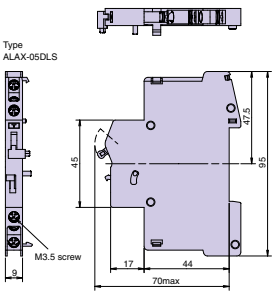
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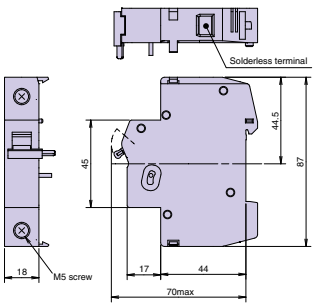
AX-05DLS



ALAX-05DLS
AX2-05DLS

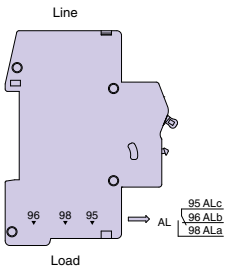


SHTA400-05DLS
SHTD048-05DLS

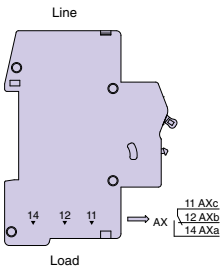


Connection of Line and Load Side

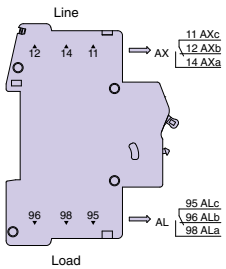
AL-05DLS



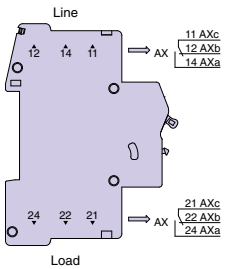
AX-05DLS



ALAX-05DLS

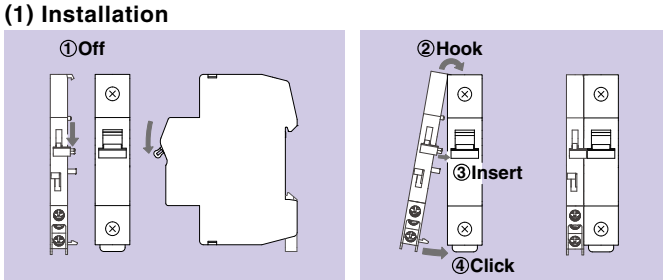


AX2-05DLS

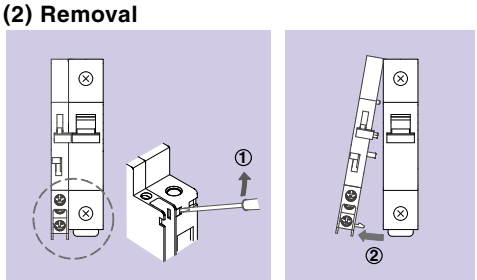


Installation of Accessories (AX, AL, SHT)

(1) Installation



(2) Removal



Detailed Specifications

■Circuit Protectors

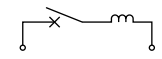
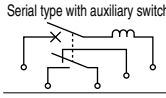
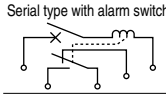
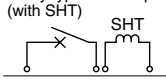
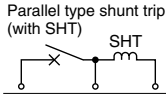
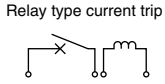
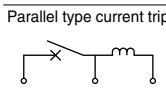
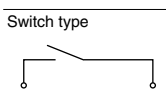
Frame (A)				30					
Model				CP30-BA			CP-S		
Image									
Number of poles				1	2	3	1	2	3
Rated insulation voltage Ui (V)				250			250		
Rated impulse withstand voltage Uimp (kV)				2.5			2.5		
Rated current (A)				0.1 0.25 0.3 0.5 1 2 3 5 7 10 15 20 30			0.05 0.1 0.25 0.3 0.5 0.75 1 2 2.5 3 5 7 7.5 10 15 20 25 30		
Rated short-circuit capacity (kA)	UL 1077 CSA C22.2 No.235 (*11)	Rated voltage (V)	AC (V)	250			250	–	
			DC (V)	65	125	–	65	–	
		AC		2.5kA at 250V			1.5kA at 250V	–	
		DC		2.5kA at 65V	2.5kA at 125V	–	1kA at 65V	–	
	IEC 60934 EN 60934 (Icn)	Rated insulation voltage Ui (V)		250			250		
		AC		250			1.5kA at 230V 2.5kA at 120V		
		DC		2.5kA at 60V	2.5kA at 120V	–	1kA at 60V	1kA at 120V (1kA at 60V) (*7)	1kA at 60V
	EN 60947-2 IEC 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)		250			–		
		AC		2.5/2.5kA at 230V			–		
		DC		2.5/2.5kA at 60V	2.5/2.5kA at 120V	–	–		
AC-DC common use				●		– (*1)	– (*8)		
Reverse connection				●			–		
Rated short time current (for switch only type)				–			AC250V 50/60Hz 1500A 0.02s AC125V 50/60Hz 2500A 0.02s DC65V 1000A 0.02s DC125V 1000A 0.02s		
Rated ambient temperature (°C)				40 (T40)			25 (T25)		
Operating characteristics				Instantaneous type (I); Medium type (M), (MD); Slow type (S), (SD); Fast type (F) (*2)			Instantaneous type (I); Medium type (M), (MD); Slow type (S), (SD); Fast type (F) (FD)		
Mode of tripping				Instantaneous type (I): magnetic only [MO]			Instantaneous type (I): magnetic only [MO]		
				Medium type (M), (MD) Slow type (S), (SD) Fast type (F) : hydraulic-magnetic [HM]			Medium type (M), (MD) Slow type (S), (SD) Fast type (F), (FD) : hydraulic-magnetic [HM]		
Method of operation				S-type (IEC 60934)					
Trip-free behaviour				Trip-free (IEC 60934)					
Mass (kg)				0.08	0.16	0.23	0.06	0.12	0.18
Accessories	Retractable small terminal cover (TC-S)			●Standard IP20 (front, terminal covers closed) [Certified of TUV]			–		
	Inertial delay (ID)			● (Medium, Slow type: AC only)			● (Medium, Slow, Fast type: AC only)		
	Alarm switch (AL)			● (1c)			● (1c) (*7)		
	Auxiliary switch (AX)			● (1c)			● (1c)		
	Shunt trip (SHT)			● (for relay type) (*3)			● (for parallel and relay type: AC only)		
	Large terminal cover (TC-L)			● (*6)			–		
	Flushpanel mounting brackets (FP)			●			–		
	Back facing wiring termnal (BT)			● (*4), (*6)			–		
	Lock cover (LC)			–			●	–	
	Accessory terminal cover (TC)			● (*6)			–		
Connection	Main body			20A or less : Screw terminal M4 30A : Screw termnal M5			Male tub terminal 6.3mm (#250) [Screw terminal M4 (series type only)]		
	Alarm switch / Auxiliary switch			Screw terminal M3.5			Male tub terminal 2.8mm (#110)		
Main body mounting method				Srface, IEC rail mounting Flush panel mounting (option)			Panel mounting		
International standard				UL(cURus), CCC (*5)			UL(UR) (*9), (*10)	–	
CE Marking				EN 60934 : TUV approval EN 60947-2 : Self-declaration (*5)			EN 60934 : TUV approval (*10)	Operating characteris is Medium type (M) only. The rated current, 0.3A, 2A, 3A and 7A are not applied.	

Notes: *1 The 3-pole products are for AC use only.
*2 Contact us for operating characteristics other than those mentioned above.
*3 In poles equipped with a shunt tripping mechanism, the overcurrent tripping element is not operative (switched shunt tripping).
*4 For back-face wiring terminals, specify if it will be used with 30A, or 20A or less.
*5 UL(cURus), CCC, and CE Marking are displayed on standard products.
*6 It is recognition of UL(cURus), CCC, and TUV.
*7 In case of DC use, only DC65V is available.
*8 Specify if for DC use when ordering.
*9 Specify when ordering. (In case of CP-S UL, type name is CP-SU.)
*10 Connection is male tub terminal only.
*11 CP30-BA only.

Remarks: 1. Products for non-standard conditions are special order. (Low temperature, 1st and 2nd-degree moisture fungal treatment, corrosion-resistant)
2. Although a buzzing sound may occur when an instantaneous type becomes 80% or more of the rated current for AC use, performance is not effected. Please take this point into consideration when selecting units for use in quiet environments.
3. Please use in environments free of high temperatures, humidity, dust, corrosive gas, vibration, and impact. Also, do not use it in a circuit with inrush current or harmonics. Problems may result.

Detailed Specifications

■Internal circuits and examples of application

Internal circuit	Available model	Operating characteristics							
		Instantaneous type	High speed type		Medium speed type	Low speed type			shunt trip
		I	F	FD	M	MD	S	SD	
Serial type 	CP30-BA	●	●	–	●	●	●	●	–
	CP-S	●	●	●	●	●	●	●	–
Serial type with auxiliary switch 	CP30-BA	●	●	–	●	●	●	●	–
	CP-S	●	●	●	●	●	●	●	–
Serial type with alarm switch 	CP30-BA	●	●	–	●	●	●	●	–
	CP-S	●	●	●	●	●	●	●	–
Relay type shunt trip (with SHT) SHT 	CP30-BA	–	–	–	–	–	–	–	●
	CP-S	–	–	–	–	–	–	–	●
Parallel type shunt trip (with SHT) SHT 	CP-S	–	–	–	–	–	–	–	●
Relay type current trip 	CP-S	●	●	●	●	●	●	●	–
Parallel type current trip 	CP-S	●	●	●	●	●	●	●	–
Switch type 	CP-S	–	–	–	–	–	–	–	–

■Internal accessories

Auxiliary switch (AX)

Operates in conjunction with the main circuit operating mechanism to electrically retrieve the ON/OFF status of protector.

Alarm switch (AL)

Operates in conjunction with the main circuit operating mechanism to electrically retrieve the tripping status of protector.

Remarks (1) When the handle of CP30-BA is constrained in the ON status, it does not issue the alarm signal even if it is tripped.
(2) The alarm switch will be reset when the body is reset or turned on.

Shunt trip (SHT)

A parallel relay type protector, which can break the circuit instantaneously when receiving an external signal

Inertial delay device

The inertial delay device is designed to avoid unnecessary operation caused by inrush current of transformer or lamp load. The device can withstand unrepeated one pulse of crest value 20 times higher than the rated current (pulse time = 8 ms). It can be added to circuits having high, medium and low speed operating characteristics. (It cannot be added to instantaneous or DC types.)

●Ratings of alarm switches (AL) and auxiliary switches (AX)

(1) For CP30-BA

Classification			AC			DC		
			Voltage (V)	Current (A)		Voltage (V)	Current (A)	
				Resistive load	Inductive load		Resistive load	Inductive load
Ratings of items other than those shaded in Table 1	For general load	Max.	(250)	(1)	(0.5)	50	1	0.5
			125	3	1	30	2	1
		Min.	0.1A/15VAC			0.1A/15VDC		
	For minute load	Max.	125	0.5	–	30	0.5	–
		Min.	1mA/24VDC, 2mA/12VDC, 5mA/6VDC					
Ratings of items shaded in Table 1	For general load	Max.	(250)	(1)	(0.5)	(50)	(1)	(0.5)
			125	3	(1)	30	(2), 0.5	(1)
		Min.	0.1A/15VAC			0.1A/15VDC		
	For minute load	Max.	125	(0.5), 0.1	–	30	(0.5), 0.1	–
		Min.	1mA/24VDC, 2mA/12VDC, 5mA/6VDC					

Remark: 1. The switches having the ratings in parentheses are manufactured at the customer's request. (Specify the voltage). Such switches do not conform to UL (cURus), CCC or CE Marking requirements.

(2) For CP-S

AC			DC		
Voltage (V)	Current (A)		Voltage (V)	Current (A)	
	Resistive load	Inductive load		Resistive load	Inductive load
250	3	2	250	0.2	0.2
125	5	3	125	0.4	0.4
–	–	–	30	4	3
–	–	–	14	5	4

Remark: 1. When using these switches to a circuit with a minute load (125 V AC, 0.1 A or 30 V DC, 0.1 A or less), designate the application as minute load.

●Ratings of shunt trip (SHT) coils

(1) For CP30-BA

Ratings

Rated operating voltage (V)		Time rating
100-200	Compatible with 100 to 200 V AC and 100 V DC	10 sec or less
24-48	Compatible with 24 to 48 V DC	

Coil resistance, resistance and impedance (at25°C)

Voltage (V)	Impedance for AC (Ω)	DC resistance for DC (Ω)
24-48	–	160
100-200	2400	2100

Remarks: 1. The allowable range is 70 to 110% of the rated voltage for AC and 75 to 120% of the rated voltage for DC.
2. The time rating is 10 seconds or less. Configure the circuit on which voltage will not be applied for more than 10 seconds.

(2) For CP-S

Ratings

Rated operating voltage (V)		Time rating
100	Compatible with 100 to 120 V AC (50/60Hz)	10 sec or less
200	Compatible with 200 to 240 V AC (50/60Hz)	
24, 48, 100	DC24, DC48, DC100	

Coil resistance, resistance and impedance (at25°C)

Voltage (V)	Impedance for AC (Ω)	DC resistance for DC (Ω)
24	–	110
48	–	110
100	1100	400
200	1100	–

Remarks: 1. The allowable range is 70 to 110% of the rated voltage for AC and 75 to 120% of the rated voltage for DC.
2. The time rating is 10 seconds or less. Configure the circuit on which voltage will not be applied for more than 10 seconds.

●Operation of auxiliary switch and alarm switch

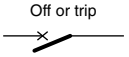
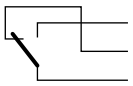
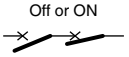
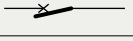
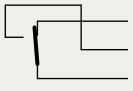
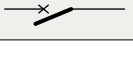
Protector status		Switch status CP30-BA, CP-S
AX	Off or trip 	 AXa (open) / ALa (closed) AXb (open) / ALb (closed) AXc / ALc
AL	Off or ON 	
AX	ON 	 AXa (closed) / ALa (open) AXb (closed) / ALb (open) AXc / ALc
AL	Trip 	

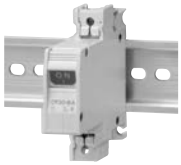
Table 1 List of numbers of internal accessories which can be fitted

●AL ○AX ◐AL or AX ■SHT

Type name	AX			AX More than one				AL			AL+AX			SHT			AL+SHT or AX+SHT			AL+AX+SHT
	1P	2P	3P	1P	2P	3P	3P	1P	2P	3P	1P	2P	3P	1P	2P	3P	1P	2P	3P	3P
CP30-BA	○	○ ○	○ ○	–	○ ○	○ ○	○ ○ ○	●	● ●	● ●	–	○ ●	○ ●	■	■ ■	■ ■		■ ◐	■ ◐	■ ○ ●
CP-S	○	○ ○	○ ○	–	○ ○	○ ○	○ ○ ○	●	● ●	● ●	–	● ○	● ○	■	■ ■	■ ■	–	◐ ■	◐ ■	● ○ ■

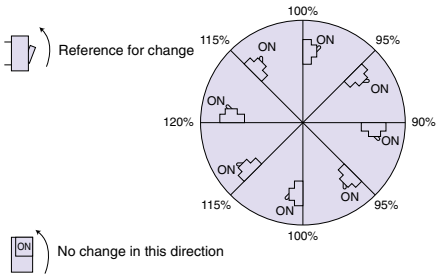
Remark: 1. All accessories should be fitted on the internal accessory terminal block.

Installation and connection

Installation method	With screws	On IEC rails	With embedded fittings	On panel
Appearance			 Circuit protectors with AL, AX and/or SHT cannot be installed by this method.	
CP30-BA	●	●	●	–
CP-S	–	–	–	●

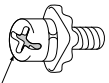
Installation posture

The operating characteristics of electromagnetic (instantaneous) type circuit protectors are not affected by the installation posture. However, when installing a fluid electromagnetic (high, medium or low speed) type circuit protector, pay attention to the installation angle because the operating current value is changed under the influence of the gravity applied to the iron core in the oil dash pot.
Generally, it is recommended to use the circuit protectors in the vertical direction.



Electric wires which can be connected and applicable screw terminals

CP30-BA

Classification	Shape of terminal		Electric wire size used (mm^2)	Applicable screw terminals	Tightening torque (N • m)
Body	Threaded terminal (standard specification)  Cross recessed or slotted	20 A or less M4	0.25-1.65	R1.25-4 R1.25-5	M4 1-1.4
			1.04-2.63	R2-4 R2-5	
		30A M5	2.63-6.64	R5.5-4 R5.5-5	M5 1.8-2.2
			6.64-10.52	*8-5NS (made by JST)	
Alarm and auxiliary switch terminals	Wire retaining screw (square washer)  Cross recessed or slotted	M3.5	0.25-1.65	R1.25-3.5	0.7-0.9
			1.04-2.63	R2-3.5	

*Use the screw terminal 8-5NS made by JST.

Detailed Specifications

●Low Voltage Air Circuit Breakers (AE-SW Series)

Frame (A)			630	1000	1250	1600	2000	2000	2500	3200	4000
Model			AE630-SW	AE1000-SW	AE1250-SW	AE1600-SW	AE2000-SWA	AE2000-SW	AE2500-SW	AE3200-SW	AE4000-SWA
Image			 AE1600-SW (Drawout type)					●See the catalog of Low Voltage Air Circuit Breakers, Y-0622, for the details.			
Rated current (CT rating) In (A)			630 (*1)	1000	1250	1600	2000	2000 (*1)	2500	3200	4000
Rated current setting Ir (A) (adjustable) (Rated ambient temperature 40°C) (For marine use 45°C)			315-346.5-378-409.5-441-472.5-504-535.5-567-598.5-630 (*1)	500-550-600-650-700-750-800-850-900-950-1000	625-687.5-750-812.5-875-937.5-1000-1062.5-1125-1187.5-1250	800-880-960-1040-1120-1200-1280-1360-1440-1520-1600	1000-1100-1200-1300-1400-1500-1600-1700-1800-1900-2000	1000-1100-1200-1300-1400-1500-1600-1700-1800-1900-2000 (*1)	1250-1375-1500-1625-1750-1875-2000-2125-2250-2375-2500	1600-1760-1920-2080-2240-2400-2560-2720-2880-3040-3200	2000-2200-2400-2600-2800-3000-3200-3400-3600-3800-4000
Number of poles			3, 4 (*2)								
Rated insulation voltage V			1000								
Current carrying capacity of neutral pole A			630	1000	1250	1600	2000	2000	2500	3200	4000
Rated breaking capacity (kA symmetrical RMS)	IEC 60947-2, EN 60947-2 BS JIS C 8201-2-1 Ann.1 Ann.2 NK, LR, GL, BV, ABS, DNV, CCS	AC690V	65					75			
		AC600V	65					75			
		AC240-500V	65					85			
Ics = % Icu			100%								
Rated short-time withstand current (kA symmetrical RMS)		1 second	65					75			
Suitability for isolation			Compatible								
Reverse connection			Possible								
Number of operating cycles		Without current	25000					20000			
		With current (690 V AC)	5000				1500	1500		1000	500
Utilization category			B								
Pollution degree			3								
EMC environment condition (environment A or B)			A								
Outline dimension (mm) Height (H) x width (W) x depth (D)	Fixed type	3-pole product	410×340×290					410×475×290			
		4-pole product	410×425×290					410×605×290			
	Drawout type	3-pole product	430×300×368					430×435×368			430×439×368
		4-pole product	430×385×368					430×565×368			430×569×368
Weight (kg) (Without Accessory)	Fixed type	3-pole product	40	41		42	47	60	61	63	81
		4-pole product	50	51		52	57	72	73	75	99
	Drawout type	3-pole product	63	64		65	70	92	93	95	108
		4-pole product	77	78		79	84	113	114	116	136
	Cradle only	3-pole product	26				31	35		36	49
		4-pole product	30				35	43		44	61
CE Marking			Self-declaration								
CCC recognition (☆ Certified)			☆								
Marine approval			☆Certified (NK, LR, GL, BV, ABS, DNV, CCS)								
Automatic tripping device			Electronic (effective value detection)								

●When the MCR is provided, the breaking capacity may be changed. See the catalog of Low Voltage Air Circuit Breakers, Y-0622.
●See the catalog of Low-voltage Air Circuit Breakers, Y-0622, for the details of the accessories.

Notes: *1 AE630-SW and AE2000-SW having low rating types are available. See the catalog of Low Voltage Air Circuit Breakers, Y-0622, for the details.
*2 The 4-pole products do not have obtained the marine approval.
*3 4 (HN) means the neutral poles current capacity is 50% of the rated current, for 4poles.
4 (FN) means the neutral poles current capacity is 100% of the rated current, for 4poles.
*4 ( ) shows the value for 4P FN type.
*5 Marine approval value is 138kA.

■Features

● **Higher reliability by High operating durability (Mechanical)**

● **Increase of rated short-time withstand current**

Combination of the Electronic trip relay (ETR) with MCR (*1) enables increase of the choice coordination range.

● **Applicability to increase and decrease of load and improvement of protection coordination**

The electronic tripping system enables detailed setting of tripping characteristics. The system uses RMS detection resistant to distorted waves.

● **More improved Electronic trip relay (ETR) and transmission functions**

To flexibly meet various requirements, functions suitable for purposes can be selected effectively. In addition, improved measuring functions are provided, so that the circuit breakers are applicable to CC-Link, PROFIBUS-DP and MODBUS transmission and helpful in establishing various electrical circuit measurement monitoring systems and energy-saving systems in combination with measuring display unit breakers.

Note: *1 MCR is an abbreviation for marking current release. It has INST characteristic only when the circuit breaker in the OFF state turns ON (closes). The circuit breaker will lose the INST characteristic after closing, and it will have LTD and STD characteristics.

● **Various connections**

Various connections for panel structures are available. (See the following figure.)

Connections

Connections / Model	Horizontal (standard)	Vertical (*1) (VT)	Front (FT)	Vertical terminal adapter (VTA)	Front terminal adapter (FTA)
Fixed type (FIX)	 (Standard)	 FIX-VT	—	 (FIX-VTA)	 (FIX-FTA)
Drawout type (DR)	 (Standard)	 (DR-VT)	 (DR-FT)	 (DR-VTA)	 (DR-FTA)

Note: *1 For AE2000-SWA, AE4000-SWA, AE4000-SW, AE5000-SW and AE6300-SW models, vertical terminal only is available.

●Low Voltage Air Circuit Breakers (AE-SW Series)

Frame (A)			4000	5000	6300
Model			AE4000-SW	AE5000-SW	AE6300-SW
Image (Reference)			 AE6300-SW (Drawout type)		●See the catalog of Low Voltage Air Circuit Breakers, Y-0622, for the details.
Rated current (CT rating) In (A)			4000	5000	6300
Rated current setting Ir (A) (adjustable) (Rated ambient temperature 40°C) (For marine use 45°C)			2000-2200-2400-2600-2800-3000-3200-3400-3600-3800-4000	2500-2750-3000-3250-3500-3750-4000-4250-4500-4750-5000	3150-3465-3780-4095-4410-4725-5040-5355-5670-5985-6300
Number of poles			3, 4 (HN, FN) (*3)		
Rated insulation voltage V			1000		
Current carrying capacity of neutral pole A			2000 (4000) (*4)	2500 (5000) (*4)	3150 (6300) (*4)
Rated breaking capacity (kA symmetrical RMS)	IEC 60947-2, EN 60947-2 BS JIS C 8201-2-1 Ann.1 Ann.2 NK, LR, GL, BV, ABS	AC690V	85		
		AC600V	85		
		AC240-500V	130 (*5)		
	Ics = % Icu		100%		
Rated short-time withstand current (kA symmetrical RMS)		1 second	100		
Suitability for isolation			Compatible		
Reverse connection			Possible		
Number of operating cycles		Without current	10000 (3P) /5000 (4P)		
		With current (690 V AC)	1000		
Utilization category			B		
Pollution degree			3		
EMC environment condition (environment A or B)			A		
Outline dimension (mm) Height (H) x width (W) x depth (D)	Fixed type	3-pole product	414×873×290		
		4-pole product	414×1003×290		
	Drawout type	3-pole product	480×875×368		
		4-pole product	480×1005×368		
Weight (kg) (without Accessory)	Fixed type	3-pole product	160	160	160
		4-pole product	180	180	180
	Drawout type	3-pole product	233	233	240
		4-pole product	256	256	263
	Cradle only	3-pole product	118	118	125
		4-pole product	133	133	140
CE Marking			Self-declaration		
CCC recognition (☆ Certified)			☆		
Marine approval			☆Certified (NK, LR, GL, BV, ABS)		
Automatic tripping device			Electronic (effective value detection)		

■Electronic trip relay (ETR) Type code

□□□-□

● Main setting module

WS1, WB1, WM1, WF1	AE630-1600-SW, AE2000-3200-SW, AE4000-SW
WS2, WB2, WM2, WF2	AE2000-SWA, AE4000-SWA, AE5000-SW
WS3,WB3,WM3, WF3	AE6300-SW

WS : General use
WM : Generator protection use
WB : INST/MCR only
WF : Protective coordination use

● Optional setting module

G1: Ground fault protection
N5: Neutral pole 50% protection
E1: Earth leakage protection
AP: 2nd Additional Pre-alarm
NA: Without optional setting

● ETR Auxiliary Equipment

☐ Temperature alarm(TAL)
☐ MCR switch(MCR-SW)

● Power supply

P1: AC･DC100-240V
P2: DC24-60V
P3: AC100-240V / DC100-125V with output contact
P4: DC24-60V with output contact
P5: DC100-240V with output contact (SSR)

Additional function

☐ Extension module(EX1)
☐ Display(DP1)
☐ Display onto panel board(DP2)
☐ VT unit(VT)

Network

☐ BIF-CC
☐ BIF-PR
☐ BIF-MD

Wire system (when EX1 is specified)

EX1 — ☐ 3φ3W / ☐ 3φ4W / ☐ Normal connection / ☐ Reverse connection

Normal connection: Upper terminal is connected to power supply.
Reverse connection: Lower terminal is connected to power supply.

For the details of the characteristics, alarm contact output and expanded functions of the ETR, see the catalog of Low Voltage Air Circuit Breakers, Y-0622.

*The display is optional.



■Earth Leakage Relays

Model			Interchangeable leakage relays (*1)					
			Electrical self-hold type		Mechanical self-hold type		Harmonic surge ready Electrical self-hold type	Harmonic surge ready Mechanical self-hold type
	Hole diameter mm		NV-ZBA		NV-ZSA		NV-ZHA	NV-ZLA
Model name of ZCT combined (*5)	15		ZT15B	–	ZT15B	–	ZT15B	ZT15B
	30		ZT30B	–	ZT30B	–	ZT30B	ZT30B
	40		ZT40B	–	ZT40B	–	ZT40B	ZT40B
	60		–	ZT60B	–	ZT60B	ZT60B	ZT60B
	80		–	ZT80B	–	ZT80B	ZT80B	ZT80B
	100		–	ZT100B	–	ZT100B	ZT100B	ZT100B
Image								
								
Phase line type			3φ4W, 3φ3W, 1φ3W, 1φ2W					
Control voltage AC V		JIS	120 • 240 selectable		120 • 240 selectable 240 • 415 selectable		–	–
		UL/JIS (*2) UL/CE (*3)	–		–		120 • 240 selectable 240 • 440 selectable	120 • 240 selectable 240 • 440 selectable 480
JIS	High speed type	Rated sensitivity current mA	30 100 • 200 • 500 selectable	100 • 200 • 500 selectable	30 100 • 200 • 500 selectable	100 • 200 • 500 selectable	–	–
		Max. operating time (s)	0.1		0.1			
	Delay type	Rated sensitivity current mA	100 • 200 • 500 selectable		100 • 200 • 500 selectable (200 • 500 • 1000 selectable)			
		Operating time (s) (*4)	0.3 • 0.8 • 1.6 selectable		0.3 • 0.8 • 1.6 selectable			
		Inertial non-operating time (s) or longer than (s)	0.1 • 0.5 • 1.1		0.1 • 0.5 • 1.1			
UL/JIS	High speed type	Rated sensitivity current mA	–		–		30 50	30 50
		Max. operating time (s)					0.1	0.1
	High speed • Delay type	Rated sensitivity current mA					100 • 200 • 500 selectable	100 • 200 • 500 selectable
		Max. operating time (s) (*4)					0.1 • 0.45 • 1.0 selectable	0.1 • 0.45 • 1.0 selectable
		Inertial non-operating time (s) or longer than (s)					– • 0.1 • 0.5	– • 0.1 • 0.5
UL/CE	High speed type	Rated sensitivity current mA	–		–		30 • 50 • 100 selectable	30 • 50 • 100 selectable
		Max. operating time (s) at 5IΔn					0.04	0.04
	Delay type	Rated sensitivity current mA					100 • 300 • 500 selectable 300 • 500 • 1000 selectable	100 • 300 • 500 selectable 300 • 500 • 1000 selectable
		Max. operating time (s) at 2IΔn (*4)					0.45 • 1.0 selectable	0.45 • 1.0 selectable
		Inertial non-operating time (s) at 2IΔn					0.1 • 0.5	0.1 • 0.5
Earth leakage indication			Electric type (LED)		Mechanical type (button)		Electric type (LED)	Mechanical type (button)
Resetting method			Push button or control power switch off		Push button (conbined with earth leakage indicator)		Push button or control power switch off	Push button (conbined with earth leakage indicator)
Built-in contact	Configuration		1c		1a1c		1a1c	1a1c
	Continuous current capacity A		5		5		5	5
	Contact capacity A		cosφ=1 / cosφ=0.4 L/R=0.007 120VAC 5 2 240VAC 5 2 24VDC 5 2		cosφ=1 / cosφ=0.4 L/R=0.007 120VAC 5 3 240VAC 3 2 415VAC 2 1 30VDC 4 3 100VDC 0.4 0.4 200VDC 0.2 0.2		cosφ=1 / cosφ=0.4 L/R=0.007 120VAC 5 2 240VAC 5 2 24VDC 5 2 Use auxiliary relay for AC415V contact.	cosφ=1 / cosφ=0.4 L/R=0.007 120VAC 5 3 240VAC 3 2 480VAC 1 1 30VDC 3 3
Connection		Front	●Clamp terminal		●Clamp terminal		●Clamp terminal	●Clamp terminal
		Rear	–		●Clamp terminal		●Clamp terminal	●Clamp terminal
Standard attachment (Front connection)			Mounting screw					
Mass kg		Relay	0.3		0.4		0.4	0.4
External accessories	Terminal cover		● (TC-ZBA)		● (TC-ZSA)		● (TC-ZSA) (*6)	● (TC-ZSA) (*6)
	Mounting hook for IEC 35mm rail (DIN rail) Fixture		● (DIN-ZBA)		–		–	–
Max. consumption VA			3					
Conforming standard	US UL standard (UR certified)		–		–		UL1053 Recognized component (File No.E196562)	UL1053 Recognized component (File No.E196562)
	Canada CSA standard		–		–		LR103083(Certified No.)	LR103083(Certified No.)
	European CE marking		–		–		Declaration for conformity IEC 60947-2 AnnexB EN 60947-2 AnnexB	Declaration for conformity IEC 60947-2 AnnexB EN 60947-2 AnnexB

Notes: *1 Interchangeable leakage relays can be easily combined with other relays and our ZCT. However, products with 30mA sensitivity (excluding NV-ZHA/ZLA) can only be used in combination with ZT15B, ZT30B and ZT40B.
*2 Indicates the UL-standard control voltage. UL, CSA and JIS standards are indicated together. For JIS voltage indications, 100-200V changeover is 120-240V changeover, 200-415V changeover is 240-440V changeover, and 460V and 480V are described together. When ordering, specify "UL/JIS".
*3 Indicates the UL-standard control voltage. UL, CSA and CE standards are indicated together. For CE voltage indications, 120-230V changeover is 120-240V changeover, 230-440V changeoever is 240-440V selectable, which are described together. When ordering, specify "UL/CE".
*4 When operating times are 0.3 and 0.45sec, 0.8 and 1.0sec and 1.6sec, the relay operates between 0.15 and 0.45sec, 0.6 and 1.0sec and 1.2 and 2.0sec, respectively.
*5 Can be combined with an interchangeable ZCT equipped with a primary conductor. Refer to the next page for details.
*6 Not UL-certified.

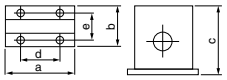
Remarks: 1. Relays with rates shown in parentheses are special-order.
2. The relay complies with CE marking conformity declaration only when used with CE marking type MCCB with a voltage tripping device to interrupt current during ground fault.
3. NV-ZBA/ZSA

Control voltage	Available voltage range	Example of applicable circuit voltage
120V	80-126V	100 • 110V • 120V
240V	160-252V	200 • 220 • 240V
415V	320-484V	400 • 415 • 440V

4.NV-ZHA/ZLA

Control voltage	Available voltage range	Example of applicable circuit voltage
120V	80-132V	100 • 110 • 120V
240V	160-264V	200 • 220 • 230 • 240V
440V	304-484V	380 • 400 • 415 • 440V
480V	368-528V	460 • 480V

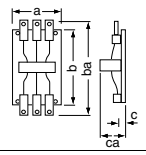
Interchangeable ZCT

Type		ZT15B	ZT30B	ZT40B	ZT60B	ZT80B	ZT100B
Aperture diameter (mm)		15	30	40	60	80	100
Mass (kg)		0.2	0.4	0.6	2.0	2.6	3.3
Rated short time current		50 (peak value)					
Dimensions (mm)	a	48	68	85	140	160	185
	b	52	52	52	90	90	90
	c	70	90	100	150	169	190
	d	25	50	50	100	100	100
	e	40	40	40	70	70	70

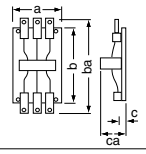
ZCT aperture diameter and wire size

	ZCT aperture diameter (mm)	15	30	40	60	80	100
		Max. 600V rated wire size in mm^2 (current in amperes)					
1ϕ2w	Polyvinyl-chloride insulated wire	14 (88)	60 (217)	150 (395)	325 (650)	600 (992)	800 (1185)
	Cross-linked polyethylene insulated cable	2 (33)	38 (190)	60 (260)	250 (655)	400 (870)	600 (1140)
1ϕ3w 3ϕ3w	Polyvinyl-chloride insulated wire	8 (61)	38 (162)	100 (298)	250 (556)	500 (842)	725 (1095)
	Cross-linked polyethylene insulated cable	2 (33)	22 (135)	60 (260)	200 (560)	325 (760)	600 (1140)
3ϕ4w	Polyvinyl-chloride insulated wire	8 (61)	38 (162)	100 (298)	150 (395)	325 (650)	600 (992)
	Cross-linked polyethylene insulated cable	–	14 (105)	38 (190)	100 (365)	250 (655)	400 (870)

Interchangeable ZCTs with primary conductors

Type		ZTA600A	ZTA1200A	ZTA2000A
Number of poles		3		
Rated voltage (VAC)		600		
Rated short time current (kA)		100 (peak value)		
	a	227	227	360
	b	256	298	250
	ba	366	444	594
	c	42	78	79
	ca	125	176	214

ELRs with a ZCT with primary conductors

Frame (A)		600	1200	2000	3200
Type	ZBA	Interchangeable ELR and interchangeable ZCTs with primary conductors			NV-ZBA3200
	ZSA				NV-ZSA3200
	ZHA				NV-ZHA3200
	ZLA				NV-ZLA3200
Number of poles		3			
Rated voltage (VAC)		600			
Rated short time current (kA)		100 (peak value)			
	a	227	227	360	490
	b	256	298	250	320
	ba	366	444	594	868
	c	42	78	79	111
	ca	125	176	214	290
Mass (kg)		6.5	11	27	54

			Control voltage (VAC)	Rated current sensitivity (mA)	Max. operating time (s)	Inertial non-operating time (s)
Specification of ELRs	High-speed type	ZBA	120 • 240 (*1)	100 • 200 • 500 (*1)	0.1	—
		ZSA	120 • 240 (*1) 240 • 415 (*1)	100 • 200 • 500 (*1)		
	Time-delay type	ZBA	120 • 240 (*1)	100 • 200 • 500 (*1)	0.3 • 0.8 • 1.6 (*1)	0.1 • 0.5 • 1.1
		ZSA	120 • 240 (*1) 240 • 415 (*1)	100 • 200 • 500 (*1) (200 • 500 • 1000 (*1))	0.3 • 0.8 • 1.6 (*1)	0.1 • 0.5 • 1.1
	(High-speed • Time-delay type)	ZHA	120 • 240 (*1) 240 • 440 (*1)	100 • 200 • 500 (*1)	0.1 • 0.45 • 1.0 (*1)	– • 0.1 • 0.5
				100 • 300 • 500 (*1) 300 • 500 • 1000 (*1)	0.45 • 1.0 (*1) (at 2IΔn)	0.1 • 0.5 (at 2IΔn)
		ZLA	120 • 240 (*1) 240 • 440 (*1) 480	100 • 200 • 500 (*1)	0.1 • 0.45 • 1.0 (*1)	– • 0.1 • 0.5
				100 • 300 • 500 (*1) 300 • 500 • 1000 (*1)	0.45 • 1.0 (*1) (at 2IΔn)	0.1 • 0.5 (at 2IΔn)

Note: *1 Selectable.

Mag Only (Instantaneous Tripping Circuit Breakers)

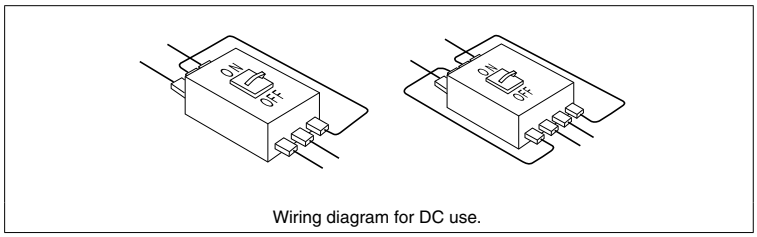
Fixed	NF63-CV/SV/HV	AC, DC	Rated current x 10 (AC) (DC)	
	NF125-CV/SV/HV	AC, DC		
	NF250-CV/SV/HV	AC, DC		
	NF400-CW/SW NF630-CW/SW	AC, DC		
Adjustable	NF800-SEW	AC	High: Rated current x 10 Low: Rated current x 2	
	NF800-SDW	DC	High: 8000A	Low: 3200A
	NF1000-SEW NF1250-SEW	AC	High: Rated current x 10 Low: Rated current x 2	
	NF1600-SEW	AC	High: Rated current x 10 Low: Rated current x 2	
	NF1250-SDW NF1600-SDW	DC	High: 8000A Low: 3200A	

Remarks: 1. The size, weight, accessories, etc., are all identical to the same-designation C, S and H series breakers.
2. For more details, contact your dealer.

DC MCCBs and DSN Switches

Breaking is more difficult with direct currents because the current value never reaches zero. While ordinary DC breakers are suitable for low voltages, special-voltage DC breakers are recommended for voltages in excess of 250VDC. Breakers for 550V are all 4-pole models.
The size, shape, drilling plan, accessories, etc., are all identical to the S Series breakers with the same designations.

Wiring diagram for DC usage.



Wiring diagram for DC use.

Remark: 1. The tripping characteristics will change if the wiring differs from the one shown here.

Model	NF63-SV		NF125-SV		NF250-SV		NF400-SW		NF630-SW		NF800-SDW		NF1250-SDW		NF1600-SDW	
Number of poles	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4
Rated voltage (VDC)	400	550	440	550	500	600	500	600	500	600	500	600	500	600	500	600
Rated breaking capacity (kA) IEC 60947-2 (Icu/Ics)	2/2		10/10		20/20		40/40		40/40		40/40		40/20		40/20	

Remark: 1. Time constant: 10ms or below.

●DC side

These breakers are designed as thyristor-Leonard system DC side breakers. They protect the thyristor from short circuiting when there is a power or communication failure (Mag Only breakers can also be used for this purpose). Use these breakers in combination with fast fuses for even greater protection.

Model	NF125-SV		NF250-SV		NF400-SW		NF630-SW		NF800-SDW		NF1250-SDW		NF1600-SDW	
Number of poles	2	3	2	3	2	3	2	3	2	3	2	3	2	3
Rated voltage (VDC)	250	440	300	500	250	480	250	480	250	480	250	480	250	480
Rated breaking capacity (kA) IEC 60947-2 (Icu/Ics)	40/40	10/10	20/20		20/20		20/20		20/20		20/20		20/20	
Instantaneous trip current (min.)	3 times rated current		3 times rated current		900A		1000A		1400A		2500A		3200A	

●DSN switches

These are standard MCCBs without the automatic tripping element. The tripping capacity is about six times the rated current.
The appearance, size, drilling plan and available accessories are all identical to similar standard S and C Series MCCBs.

Model	DSN63-CV	DSN125-CV	DSN250-CV	DSN400-CW	DSN630-CW	DSN800-CW
Rated current (A)	63	125	250	400	630	800
Number of poles	2 3	2 3	2 3	2 3	3	3
Rated voltage (AC/DC)	500/250	500/250	500/250	600/250	600/250	600/250
Max. switching current (AC/DC)	378/155	750/310	1500/625	2400/1000	3780/1575	4800/2000

Model	DSN32-SV	DSN63-SV	DSN125-SV	DSN125-SGV	DSN160-SGV	DSN250-SV	DSN250-SGV	DSN400-SW	DSN630-SW	DSN800-SW	DSN1000-SW	DSN1250-SW	DSN1600-SW
Rated current (A)	32	63	125	125	160	250	250	400	630	800	1000	1250	1600
Number of poles	2 3	2 3	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	3 4	3 4	3 4	3 4	3 4
Rated voltage (AC/DC)	500/250	500/250	690/250	690/300	690/300	690/250	690/300	690/250	690/250	690/250	690/250	690/250	690/250
Max. switching current (AC/DC)	192/80	378/155	750/310	750/315	960/400	1500/625	1500/625	2400/1000	3780/1575	4800/2000	6000/2500	7500/3125	9600/4000

400Hz MCCBs

Standard MCCBs cannot be used in 400Hz circuits. When standard MCCBs are used in high-frequency circuits (eq. 400Hz), the instantaneous characteristics are shifted higher. The 400Hz MCCB is recommended for use in 400Hz circuits.

●Specifications

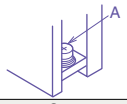
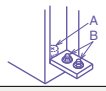
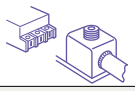
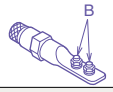
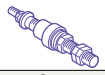
The appearance, size, rated interrupting capacity, drilling plan, accessories, etc., are all identical to the standard S and H Series breakers of the same designation.

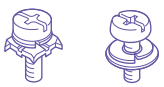
Model		NF125-SV	NF125-HV	NF250-SV	NF250-HV	NF400-SW	NF400-SEW	NF630-SW (*1)	NF630-SEW	NF800-SEW	NF1250-SEW	NF1600-SEW
Rated current (A)		16, 20, 32, 40, 50, 63, 80, 100	16, 20, 32, 40, 50, 63, 80, 100	125, 150 175, 200	125, 150 175, 200	225, 250 300, 350	200-350 adjustable	400, 500	300-500 adjustable	400-600 adjustable	600-800 adjustable	800-1200 adjustable
Number of poles		2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	3 4	3 4	3 4	3 4	3 4	3 4
Rated insulation voltage (V)		690										
Rated breaking capacity (kA) IEC 60947-2 (Icu/Ics)	690V	8/8	10/8	8/8	10/8	10/10	10/10	10/10	10/10	10/10	25/13	25/13
	500V	18/18	30/23	30/30	50/38	30/30	30/30	30/30	30/30	30/30	65/33	65/33
	440V	25/25	50/38	36/36	65/65	42/42	42/42	42/42	42/42	42/42	85/43	85/43
	400V	30/30	50/38	36/36	75/75	45/45	50/50	50/50	50/50	50/50	85/43	85/43
	230V	50/50	100/75	85/85	100/100	85/85	85/85	85/85	85/85	85/85	125/63	125/63

Note: *1 Instantaneous trip current : Rated current x 14 (Fix)

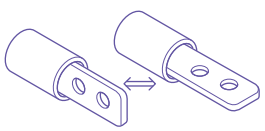
Connection Types

Table 1 Connection

Connection type (Code address)			Front connection (F)			Rear (B)		
			Screw terminal (AMP-N)	Busbar terminal (BAR)	Solderless (BOX) terminal (SL)	Bar stud (B-ST)	Round stud (B-ST)	
Image			Please refer to page 720. 	 	 	 	 	
MCCB	C•S•H•MB	NF30-CS	●	–	–	–	●	
		NF32-SV • NF63-CV • NF63-SV • NF63-HV	●	●	–	–	●	
		NF125-CV • NF125-SV • NF125-HV • NF125-SEV • NF125-SGV • NF125-LGV • NF125-HEV • NF125-HGV	●	●	●	●	–	
		NF160-SGV • NF160-LGV • NF160-HGV • NF250-CV • NF250-SV • NF250-HV • NF250-SEV • NF250-HEV • NF250-SGV • NF250-LGV • NF250-HGV	●	●	●	●	–	
		NF400-SW • NF400-SEW • NF400-HEW • NF400-REW • NF400-CW	–	●	–	●	–	
		NF630-SW • NF630-SEW • NF630-HEW • NF630-REW • NF630-CW	–	●	–	●	–	
		NF800-SEW • NF800-HEW • NF800-REW • NF800-SDW • NF800-CEW						
		NF1000-SEW • NF1250-SEW • NF1600-SEW				●		
	R•U	NF125-UV	●	●	●	●	–	
		NF125-RGV • NF250-RGV • NF250-UV	●	●	●	●	–	
		NF400-UEW	–	●	–	●	–	
		NF800-UEW						
	UL	NF50-SVFU	●	●	–	–	–	
		NF100-CVFU	●	●	●	–	–	
		NF125-SVU NF125-HVU	●	●	●	–	–	
		NF250-SVU NF250-HVU	●	●	●	–	–	
		NF225-CWU	●	●	–	–	–	
		NF-SKW • NF-SLW	–	●	●	–	–	
BH		BH-K • BH-C1 • BH-C2 • BV-C1 • BV-C2	●	–	–	–	–	
		BH-P	●(Only load side)	–	–	–	–	
ELCB	C•S•H	NV32-SV • NV63-CV • NV63-SV • NV63-HV	●	●	–	–	●	
		NV125-CV • NV125-SV • NV125-HV • NV125-SEV • NV125-HEV	●	●	–	●	–	
		NV250-CV/SV/HV • NV250-SEV/HEV	●	●	–	●	–	
		NV400-SW • NV400-SEW • NV400-HEW • NV400-REW • NV400-CW	–	●	–	●	–	
		NV630-SW • NV630-SEW • NV630-HEW • NV630-CW			–	●		
		NV800-SEW • NV800-HEW						

Remarks									
Kind of terminal screw (A) (Circuit breakers having frame size of 1000A and more are not provided with terminal screws (A).)									
Shape	Pan-head screw with clamp 			Pan-head screw 		Bolt (Hex-socket) 			Bolt 
Screw size	M5			M8		M8	2×M8		M10
Type	NF32-SV 63-CV 63-SV 63-HV 50-SVFU(*1)	BH-P	NV32-SV 63-CV 63-SV 63-HV	NF 63-CV(60, 63A) 63-SV(60, 63A) 63-HV(60, 63A) 125-CV 125-SV 125-HV 125-SEV 125-HEV 100-CVFU 125-SVU 125-HVU 125-UV	NV 63-CV(60, 63A) 63-SV(60, 63A) 63-HV(60, 63A) 125-CV 125-SV 125-HV 125-SEV 125-HEV	NF 125-SEV 125-HEV 125-RGV 125-SGV 125-LGV 125-HGV 160-SGV 160-LGV 160-HGV 250-CV 250-SV 250-HV 250-SEV 250-HEV 250-SGV 250-LGV 250-HGV 250-RGV 250-UV 225-CWU 250-SVU 250-HVU NV 125-SEV 125-HEV 250-CV 250-SV 250-HV 250-SEV 250-HEV	NF 400-UEW (4P) 800-CEW 800-SEW 800-HEW 800-REW 800-UEW 800-SDW	NV 800-SEW 800-HEW	NF 400-CW 400-SW 400-SEW 400-HEW 400-REW 400-UEW(3P) 630-CW 630-SW 630-SEW 630-HEW 630-REW NV 400-CW 400-SW 400-SEW 400-HEW 400-REW 630-CW 630-SW 630-SEW 630-HEW
	In case of clamp connection (*3)  ①When the wire size is 5.5 mm² or more, divide the wires, and connect them. ②When connecting wires differing in size, for example, ϕ1.6 wires and 5.5-mm² wires, connect the two kinds of wires together to a crimp terminal because the thinner wires easily come off. ③Do not tighten directly solid wires and cords consisting of thin copper wires used as strands, for example ϕ1.6 and 1.25-mm² wires, together.								

●With insulating base (tube) for installation of metallic board
●The bar stud installation position can be turned 90° on all models (except NF800-UEW). The current-carrying capacity of a vertically installed bus bar is larger than that of a horizontally installed bus bar even if the bus bars have the same dimensions.



Note *1 It is impossible to directly connect the wires of 40- and 50-A, NF/NV 50-SVFU.

	Plug-in (PM)		Plug-in type for distribution board
	Bar stud (PM)	Screw terminal (PM)	For distribution board for electric lamps (BPA)
			
	–	–	–
	–	●	–
	–	●	–
	●	–	–
	●	–	–
	● (Except for NF1600-SEW)	–	–
	–	●(Except for 4P)	–
	●(Except for 4P)	–	–
	● (Except for NF800-UEW)	–	–
	–	–	–
	–	–	–
	–	–	–
	–	–	–
	–	–	–
	–	–	–
	–	–	●
	–	●	–
	–	●	–
	●	–	–
	●	–	–
	The circuit breaker can be connected only by pushing it onto the preliminarily wired terminal block. Install it tightening the supplied screws through the mounting holes.		Mounting base for distribution board for electric lamps.

Table 2 List of terminal screws (B)

Model			Connection type: Front	Rear	Plug-in
MCCB	C • S • H	NF400-CW • NF400-SW • NF400-SEW • NF400-HEW • NF400-REW • NF630-CW • NF630-SW • NF630-SEW NF630-HEW • NF630-REW • NF800-CEW • NF800-SEW • NF800-HEW • NF800-REW • NF800-SDW • NF-SKW • NF-SLW	M12 bolt		
		NF1000-SEW • NF1250-SEW	M12 bolt		
		NF1600-SEW	M10 bolt		—
	U	NF400-UEW	M12 bolt		
		NF800-UEW	M12 bolt		—
ELCB	C•S•H	NV400-SW • NV400-SEW • NV400-HEW • NV400-REW • NV400-CW • NV630-SW • NV630-SEW • NV630-HEW • NV630-CW • NV-SKW	M12 bolt		
		NV800-SEW • NV800-HEW	M12 bolt		

Connecting Parts

For the connection shown in the table on the previous page, the following parts are available as connecting parts.

Table 3 Studs on rear surface (B-ST)

Type name	Number of poles	Applicable models		Set of order	Stud shape and major included parts	Remarks
		MCCB	ELCB			
ST-05SV2	2	NF32-SV, NF63-CV, NF63-SV NF63-HV	NV32-SV, NV63-CV NV63-SV, NV63-HV	sets	★Round studs ●Round studs (with insulating tube) (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Bolts and nuts	One set includes the parts for one unit. Please place an order for the number of circuit breakers.
ST-05SV3	3					
ST-05SV4	4	NF63-SV, NF63-HV	—			
ST-1SV2	2	NF125-CV, NF125-SV NF125-HV(3, 4P)	—	sets	★Bar studs ●Bar studs (with insulating tube) (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Bolts and nuts	
ST-1SV3	3		NV125-CV, NV125-SV NV125-HV			
ST-1SV4	4					
ST-1HV2	2	NF125-HV(2P)	—			
ST-2SV2	2	NF125-SEV, NF125-HEV, NF125-RGV NF125-SGV, NF125-LGV, NF125-HGV NF160-SGV, NF160-LGV, NF160-HGV NF250-SGV, NF250-LGV, NF250-HGV NF250-CV, NF250-SV NF250-LGV/HGV, NF250-HV NF250-SEV, NF250-RGV NF250-HEV, NF125-SGV/HGV NF125-LGV, NF160-SGV NF160-LGV/HGV	—	sets	★Bar studs ●Bar studs (with insulating tube) (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Bolts and nuts	
ST-2SV3	3		NV125-SEV, NV125HEV NV250-CV, NV250-SV NV250-HV, NV250-SEV NV250-HEV			
ST-2SV4	4					
ST-4SW2	2	NF400-CW, NF400-SW NF400-SEW, NF400-HEW NF400-REW	—		★Bar studs ●Insulating bases (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Bar studs (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Mounting screws, bolts and nuts	
ST-4SW3	3		NV400-CW, NV400-SW NV400-SEW NV400-HEW NV400-REW			
ST-4SW4	4			sets		
ST-6SW2	2	NF630-CW, NF630-SW NF630-SEW, NF630-HEW NF630-REW	—			
ST-6SW3	3		NV630-CW, NV630-SW NV630-SEW, NV630-HEW			
ST-6SW4	4					
ST-8SW2	2	NF800-SDW, NF800-CEW NF800-SEW, NF800-HEW NF800-REW	—	sets	★Bar studs ●Insulating base (2 pcs) ●Bar studs (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Mounting screws, bolts and nuts	
ST-8SW3	3		NV800-SEW, NV800-HEW			
ST-8SW4	4					

Table 4 Plug-in type terminal blocks (PM)

Type name	Number of poles	Applicable models	Set of order	Major included parts
PMDN-05SV2L	2	NF32-SV NF63-CV/SV/HV (3A-50A)	sets	Plug-in type terminal block (1 pc) Crip terminals (2-pole: 4pcs, 3-pole: 6 pcs, 4-pole: 8 pcs)
PMDN-05SV3L	3	NF32-SV NF63-CV/SV/HV (3A-50A) NV32-SV NV63-CV/SV/HV (5A-50A)		
PMDN-05SV4L	4			
PMDN-05SV2H	2	NF63-CV/SV/HV (60A, 63A)		
PMDN-05SV3H	3	NF63-CV/SV/HV (60A, 63A) NV63-CV/SV/HV (60A, 63A)		
PMDN-05SV4H	4			
PMDN-1SV2	2	NF125-CV/SV	sets	Plug-in type terminal block (1 pc) Crip terminals (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs)
PMDN-1HV2	2	NF125-HV		
PMDN-1SV3	3	NF125-CV/SV/HV NV125-CV/SV/HV		
PMDN-1SV4	4			
PMDN-1UV2	2	NF125-UV	sets	Plug-in type terminal block (2 pc) Crip terminals (2-pole: 4pcs, 3-pole: 6 pcs)
PMDN-1UV3	3			
—	4			
PMDN-2SV2	2	NF125-SEV/HEV/SGV/LGV/HGV NF160-SGV/LGV/HGV NF250-CV/SV/HV/SEV/HEV/SGV/LGV/HGV NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV	sets	Plug-in type terminal block (1 pc) Plug-in type barriers (2-pole: 2 pcs, 3-pole: 4 pcs, 4-pole: 6 pcs) Tulip terminals (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs)
PMDN-2SV3	3			
PMDN-2SV4	4			
PMDN-2SV2	2	NF125-RGV, NF250-RGV		
PMDN-2SV3	3			
PMDN-2UV2	2	NF250-UV	sets	Plug-in type terminal block (2 pc) Plug-in type barriers (2-pole: 2 pcs, 3-pole: 4 pcs) Tulip terminals (2-pole: 4pcs, 3-pole: 6 pcs)
PMDN-2UV3	3			
—	4			
PMDN-4SW2	2	NF400-CW/SW	sets	Plug-in type terminal block (2 pcs) Plug-in type barriers (4 pcs) Tulip terminals (3-pole: 6 pcs)
PMDN-4SW3	3	NF400-CW/SW/SEW NV400-CW/SW/SEW		
	3	NF400-HEW/REW NV400-HEW/REW		
PMDN-4SW4	4	NF400-SW/SEW NV400-SEW		
	4	NF400-HEW		
PMDN-8SW2	2	NF800-SDW	sets	Plug-in type terminal block (2 pcs) Tulip terminals (3-pole: 6 pcs)
PMDN-8SW3	3	NF800-CEW/SEW NV800-SEW		
	3	NF800-HEW/REW NV800-HEW		
PMDN-8SW4	4	NF800-SEW		
	4	NF800-HEW		

Note In addition to the circuit breakers shown above, 4-pole and 2-pole circuit breakers are available. We are ready to manufacture such circuit breakers to order. Please consult us.

Standard Tightening Torque

Rear
<Round stud>

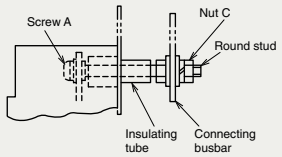


Fig. 1

<Bar stud>

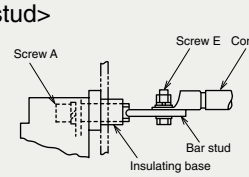


Fig. 2

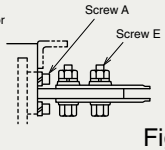


Fig. 3

Plug-in
<Screw terminal>

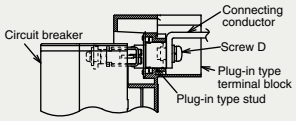


Fig. 4

<Bar stud>

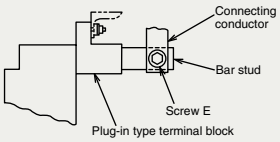


Fig. 5

Table 5 Standard tightening torque (*1)

Tightening torque N·m

Model / Connection type		Rear								Plug-in			
		Round stud				Bar stud				Screw terminal		Bar stud	
		Fig.1				Fig. 2, Fig.3				Fig.4		Fig.5	
		Screw A		Nut C		Screw A		Screw E		Screw D		Screw E	
MCCB	ELCB	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque
NF30-CS	–	M4×0.7	1	M6	2	–	–	–	–	–	–	–	–
NF32-SV, NF63-CV NF63-SV, NF63-HV	NV32-SV, NV63-CV NV63-SV, NV63-HV	M4×0.7	1	M6	2	–	–	–	–	M6	3	–	–
NF125-CV, NF125-SV NF125-HV, NF125-UV	NV125-CV, NV125-SV NV125-HV	–	–	–	–	M6	4	M8	12	M8	6	–	–
NF125-SEV, NF125-HEV, NF125-RGV NF250-CV, NF250-SV, NF250-HV, NF250-SEV NF250-HEV, NF250-RGV, NF250-UV NF250-LGV/HGV, NF250-RGV, NF125-SGV/HGV NF125-LGV, NF160-SGV, NF160-LGV/HGV NF125-SGV, NF125-LGV, NF125-HGV NF160-SGV, NF160-LGV, NF160-HGV NF250-SGV, NF250-LGV, NF250-HGV	NV125-SEV, NV125-HEV NV250-CV, NV250-SV NV250-HV, NV250-SEV NV250-HEV	–	–	–	–	M6	10	M8	12	–	–	M8	12
NF400-CW, NF400-SW, NF400-SEW NF400-HEW, NF400-REW NF400-UEW (3P)	NV400-CW, NV400-SW NV400-SEW, NV400-HEW NV400-REW	–	–	–	–	M8	20	M12	45	–	–	M12	45
NF400-UEW (4P)	–	–	–	–	–	M10	30	M12	45	–	–	M12	45
NF630-CW, NF630-SW NF630-SEW NF630-HEW, NF630-REW	NV630-CW, NV630-SW NV630-SEW NV630-HEW	–	–	–	–	M8	20	M12	45	–	–	M12	45
NF800-CEW, NF800-SDW NF800-SEW, NF800-HEW, NF800-REW NF800-UEW (*2)	NV800-SEW NV800-HEW	–	–	–	–	M10	30	2-M12	45	–	–	2-M12	45
NF1000-SEW NF1250-SEW	–	–	–	–	–	4-M8	12	2-M12	45	–	–	2-M12	45
NF1600-SEW	–	–	–	–	–	4-M8	12	4-M10	25	–	–	–	–

Notes *1 The appropriate range of tightening torque is ±20% of each value (standard tightening torque) shown in the above table. Please refer to the supplied assembly manual and instruction manual for more information.
*2 The plug-in type is not available.

Crimp Terminal Type

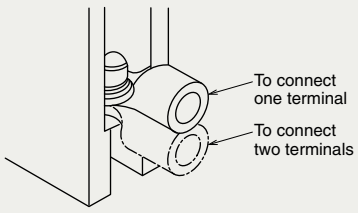
As the terminals in [ ], commercially available crimp terminals can be used. Please purchase the terminals at an electric material store.
For others, the crimp terminals for MCCB must be used. Place an order with us.
For the connection types shown in Fig. a and Fig. b, only crimp terminals will be delivered.

Table 6 List of applicable crimp terminals

Frame (A)	MCCB	ELCB	Nominal sectional area mm²	2	5.5	8	14	22
			Allowable current (600 V, IV wire at 30°C, not in conduit) (*4)	27A	49A	61A	88A	115A
			Size of mm²	1.04 to 2.63	2.63 to 6.64	6.64 to 10.52	10.52 to 16.78	16.78 to 26.66
30 50 100	BH-P	–		R-2-5	R-5.5-5	R-8-5	R-14-5	BH-22 (L330T459-23)
	BH-P100	–				R-8-8	R-14-8	R-22-8
30 32 50 60 63	NF30-CS, NF32-SV, NF63-CV*, NF63-SV* NF63-HV* *50A or below	NV32-SV, NV63-CV*, NV63-SV* NV63-HV* *50A or below		R-2-5 *(R-2-6)	R-5.5-5 *(R-5.5-6)	R-8-5	R-14-5	JST22-S5 BH-22 (L330T459-23)
	NF63-CV, NF63-SV, NF63-HV 60, 63A	NV63-CV, NV63-SV, NV63-HV 60, 63A		R-2-8	R-5.5-8	R-8-8	R-14-8	R-22-8
125	–	–		R-2-5 (R-2-6)	R-5.5-5 (R-5.5-6)	R-8-5	R-14-5	JST22-S5 (L330T459-23)
	NF125-CV, NF125-SV, NF125-HV, NF125-UV 60A or more	NV125-CV, NV125-SV, NV125-HV 60A or more		R-2-8	R-5.5-8	R-8-8	R-14-8	R-22-8
125 225 250	NF125-SEV, NF125-HEV, NF125-RGV NF250-CV, NF250-SV, NF250-HV, NF250-UV NF250-SEV, NF250-HEV, NF250-RGV NF125-SGV, NF160-SGV, NF250-SGV NF125-LGV, NF160-LGV, NF250-LGV NF125-HGV, NF160-HGV, NF250-HGV	NV125-SEV, NV125-HEV NV250-CV, NV250-SV, NV250-HV NV250-SEV, NV250-HEV					R-14-8	R-22-8
400 600 630	NF400-CW, NF400-SW, NF400-SEW NF400-HEW, NF400-REW, NF400-UEW NF630-CW, NF630-SW, NF630-SEW NF630-HEW, NF630-REW	NV400-CW, NV400-SW NV400-SEW, NV400-HEW NV400-REW, NV630-CW NV630-SW, NV630-SEW NV630-HEW						
800 1000 1200 1250	NF800-CEW, NF800-SEW, NF800-HEW NF800-REW, NF800-UEW, NF800-SDW NF1000-SEW, NF1250-SEW	NV800-SEW, NV800-HEW						

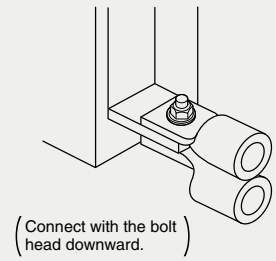
● Reference drawings of connection types

Method of connecting directly to terminal(s) of body

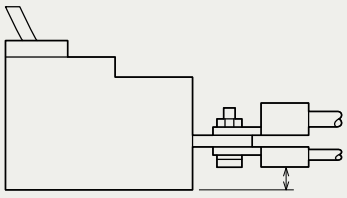


(Fig. a)

Method of connecting to front bar terminal

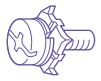
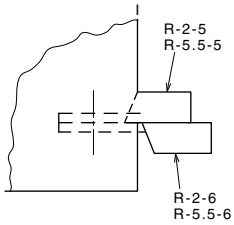
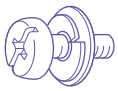
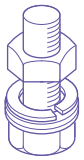


(Fig. b)



Carefully check the insulating distance between the connecting bus bar, crimp terminal and tightening bolt and the ground and the phase-to-phase insulating distance.

<Explanation of abbreviations>
R ..... Product specified by JIS
CB ..... Product specified by JEM 1399
AMP ..... Product made by Nippon AMP
JST ..... Product made by J.S.T. Mfg. Co., Ltd.
NTK ..... Product made by Nippon Tanshi Co., Ltd.
NTM ..... Product made by Nichifu Co., Ltd.
DST ..... Product made by Daido Solderless Terminal Mfg. Co., Ltd.

38	60	100	150	200	325	Crimp terminal tightening screw			Remarks	Reference drawing of connection type
162A	217A	298A	395A	469A	650A	Screw size	Tightening torque N • m	Shape		
26.66 to 42.42	42.42 to 60.57	96.3 to 117.2	117.2 to 152.05	192.6 to 242.27	242.27 to 325					
						M5	2 to 3	 M5 • M6	When connecting two crimp terminals, set the terminals as shown below if the *-marked terminals are used. 	(Fig. a)
AMP #322870 JST 38-S8 NTK R38-8S	1AF-60 (L330T459-12) CB60-S8					M8	5 to 7			
						M5	2 to 3	 M8		
AMP #322870 JST 38-S8 NTK R38-8S	1AF-60 (L330T459-12) CB60-S8					M8	5 to 7			
						M5	2 to 3	 M5		
AMP #322870 JST 38-S8 NTK R38-8S	1AF-60 (L330T459-12) CB60-S8					M8	5 to 7	 M8		
R-38-8	R-60-8	2AF (LN300T920-20) CB100-S8	2CR-150(*1) (LN300T920-21) (*1)CB150-S8			M8	8 to 13		When using 2AF, use a crimp tool having a nominal size of 100.	
R-38-12	R-60-12	R-100-12	R-150-12	R-200-12	JST325-12	M12	40 to 50		Fit to a front type bar terminal. Up to two pieces can be fitted to one terminal.	(Fig. b)
R-38-12	R-60-12	R-100-12	R-150-12 RD150-12 SD150-12	R-200-12 RD200-12 SD200-12	JST325-12 RD325-12 SD325-12					

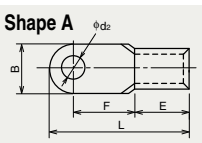
Notes *1 When using 2CR-150 or CB150-S8, insulate it from TC-S with insulating tube or tape. When using CB150-SB for a 2- or 3-pole circuit breaker, TCL-2SV3L is applicable.
*2 On the power supply side, pan-head screws M5 are used.
*3 When tightening a terminal screw without connecting a wire, crimp terminal or bar, tighten the screw to 20 to 30% of the torque shown in the above table (to prevent damage to the threads).
*4 The table shows not the allowable current values of circuit breakers, but those of wires applicable to crimp terminals.
Remark: 1. For the crimp terminals for UL listed circuit breakers, refer to the page of the characteristics and external dimensions of UL 489 Listed Circuit Breakers.

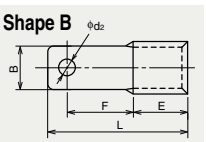
● Dimensions of crimp terminals <extracted from catalog of JST>

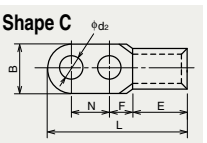
Part number	Shape	Applicable screw size	External dimensions						Applicable wire mm²
			ϕd2	B	L	F	E	Thickness	
R2-5	A	M5	5.3	9.5	16.8	7.3	4.8	0.8	1.04 to 2.63
R2-6		M6	6.4	12.0	21.8	11.0			
R2-8		M8	8.4						
R5.5-5	A	M5	5.3	9.5	19.8	8.3	6.8	1.0	2.63 to 6.64
R5.5-6		M6	6.4	12.0	25.8	13.0			
R5.5-8		M8	8.4	15.0	28.0	13.7			
R8-5	A	M5	5.3	12.0	23.8	9.3	8.5	1.2	6.64 to 10.52
8-5NS		M5	5.3	9.0	22.3				
R8-6		M6	6.4	12.0	23.8				
R8-8		M8	8.4	15.0	29.8	13.8			
8-5SC-9		M5	5.3	9	23.8	9.3	8.5	1.2	6.64 to 10.52
R14-5	A	M5	5.3	12.0	29.8	13.3	10.5	1.5	10.52 to 16.78
14-5NS		M5	5.3	9.0	28.3				
R14-6		M6	6.4	12.0	29.8				
R14-8		M8	8.4	16.0	32.8	14.5			
L330T459-23	A	M5	5.3	12.0	30.0	12.0	12.0	1.8	16.78 to 26.66
22-5NS		M5	5.3	9.5	28.7				
22-S6		M6	6.4	12.0	30.0				
R22-8		M8	8.4	16.5	33.7	13.5			
R22-12		M12	13.0	22.0	42.5	19.5			
38-S8	A	M8	8.4	15.5	38.0	16.0	14.0	1.8	26.66 to 42.42
R38-8		M8	8.4	22.0	42.7	17.7			
R38-12		M12	13.0						
L330T459-12	A	M8	8.4	22.0	46.7	20.7	18.0	2.0	42.42 to 60.57
R60-8		M8	8.4		49.7	20.7			
R60-12		M12	13.0						
LN300T920-20	B	M8	8.4	22.5	51.0	20.0	21.0	2.6	96.3 to 117.2
R100-12	A	M12	13.0	28.5	55.6	20.4			

Part number	Shape	Applicable screw size	External dimensions						Applicable wire mm²
			ϕd2	B	L	F	E	Thickness	
LN300T920-21	B	M8	8.4	22.5	70.0	33.0	27.0	3.2	117.2 to 152.05
L330T402-8		M8	8.4	25.3	61.5	23.0			
R150-12	A	M12	13.0	36.0	66.0	21.0			
R200-12	A	M12	13.0	44.0	78.0	24.5	31.5	4.0	192.6 to 242.27
325-12	A	M12	13.0	50.5	88.0	33.5	35.5	4.5	242.27 to 325
CB60-S8	B	M8	8.4	16.0	46.7	20.7	18.0	2.0	42.42 to 60.57
CB100-S8			8.4	22.0	52.5	20.5	21.0	2.6	96.3 to 117.2
CB150-S8			8.4	22.0	61.0	23.0	27.0	3.2	117.2 to 152.05

Part number	Shape	Applicable screw size	External dimensions							Applicable wire mm²
			ϕd2	B	L	F	E	N	Thickness	
RD60-12	C	M12	14.0	22.0	89.0	20.0	18.0	40	2.0	42.42 to 60.57
RD100-12			14.0	28.5	95.5	20.3	21.0		2.6	96.3 to 117.2
RD150-12			14.0	36.0	106.0	21.0	27.0		3.2	117.2 to 152.05
RD200-12			14.0	44.0	116.5	23.0	31.5		4.0	192.6 to 242.27
RD325-12			14.0	50.5	123.8	23.0	35.5		4.5	242.27 to 325
SD150-12	C	M12	14.0	36.0	107.0	29.0	28.0	32	3.2	117.2 to 152
SD200-12				44.0	108.0	36.0	32.0		4.0	192.6 to 242.2
SD325-12				50.5	125.0	38.0	37.0		4.5	242.2 to 325

Shape A 

Shape B 

Shape C 

Busbar

The size of the conductor can be connected is shown on the outline drawing of each model. The following special busbars are available. Use them as needed. When using any busbar, isolate it from the bare busbar on the circuit breaker power supply side with an insulating barrier.

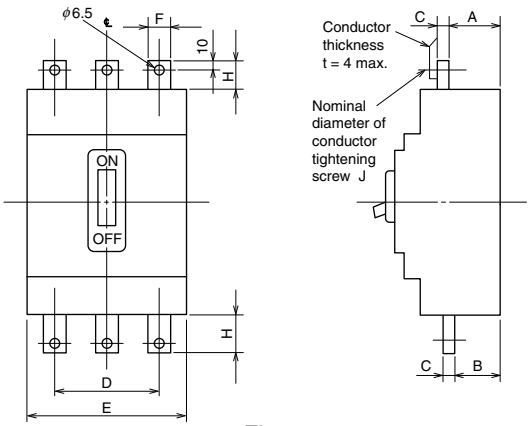


Fig. 1

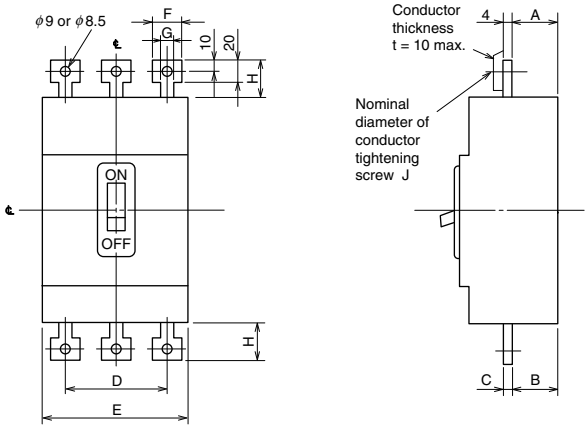


Fig. 2

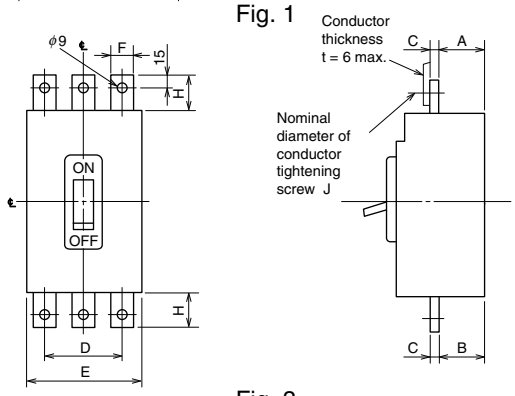
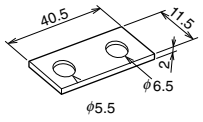
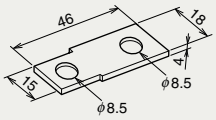
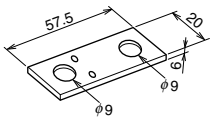


Fig. 3

Table 7 Table of variable dimensions

Type name	Applicable models		Outline and dimentions	Busbar									
	MCCB	ELCB		Fig.	A	B	C	D	E	F	G	H	J
FB-05SV	NF32-SV NF63-CV (50A or below) NF63-SV (50A or below) NF63-HV (50A or below)	NV32-SV NV63-CV (50A or below) NV63-SV (50A or below) NV63-HV (50A or below)		1	24	24	2	50	75	11.5	–	25	M5×0.8
FB-1SV	NF125-CV, NF125-SV NF125-HV, NF125-UV	NV125-CV NV125-SV NV125-HV		2	24	24	4	60	90	18	15	29	M8
FB-2SV	NF125-SEV NF125-HEV, NF125-RGV NF250-CV, NF250-SV, NF250-HV NF250-UV, NF250-SEV NF250-HEV, NF250-RGV NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV	NV125-SEV NV125-HEV NV250-CV, NV250-SV NV250-HV, NV250-SEV NV250-HEV		3	24	24	6	70	105	20	–	37	M8

Insulation Distance on Power Source Side

●Basic concept

Insulation distance (distance indicated in standards)

Be sure to at least secure the insulation distances (spatial distance and creeping distance) specified by the codes and standards of the relevant equipment and facilities where the circuit breakers are installed.
It is recommended that insulation barriers and insulation tape be used to enhance the electrical insulation between bare-live parts and between bare-live parts and ground to avoid accidents otherwise caused by a loose metal piece, conductive dust, abnormal surge voltage in the circuit or a similar event so as to improve the reliability of panels.

Arc Space (insulation space)

At the exhaust outlet side of breaker, arc space is necessary. When the actual load circuit is opened, especially when a large current such as overload or short-circuit is interrupted, ionized gas is emitted from the exhaust outlet. This gas can cause a short circuit between bare, live parts such as busbars, and also can cause grounding faults between conductive installation metal panels.
Therefore, it is important to secure enough arc space at the exhaust outlet side of the breaker and to strengthen insulation of parts exposed to the gas. In addition, securing enough space at the front of the exhaust outlet is necessary, because when the gas emission is blocked, failures such as deterioration of breaking performance can be caused.

●Insulation required part

With regard to insulation of bear, live parts of the line side of the breaker, please make sure to insulate at least C part C indicated in the diagram above with insulation tape, a tube or a terminal cover.

①A : Distance from the circuit breaker to the ceiling plate
②B1 : Distance from the circuit breaker to the uncovered conducting part of the upper circuit breaker terminal (front connection)
③B2 : Distance from the lower circuit breaker to the end face of the upper circuit breaker (rear connection)
④D1 : Distance from the side of the breaker to the side plate
⑤C : Insulated length of the power source terminal of the circuit breaker (front connection)
Please secure insulation using insulating tape, insulating tubing, insulation barrier, or a terminal cover, between bare charge parts within this size range. Please refer to a table a necessary size must.
◇When using insulation tape and insulation tubing together with insulation barriers and terminal covers, make them overlap with the other by at least 10 mm.
◇For the models with insulation barriers supplied as standard, please make sure to use the barriers.
a : clearance specified in standard
⑥D2 : Side-to-side spacing of breakers
While the circuit breakers can basically be installed together without a clearance in between, be sure to observe the following instructions.
◇It is desirable to install an insulation barrier between the adjacent circuit breakers or insulate the bare-live parts considering the effect of cutoff gas.
◇Be sure to secure the insulation distance (dimension a) as the minimum, indispensable requirement.
◇With a leakage circuit breaker and a leakage alarm circuit breaker installed in close contact with the other, a current of 2,500A or higher flowing through one of the circuit breakers could cause the other to operate falsely.
Be sure to secure a distance of at least 50 mm in between.
◇A circuit breaker of 400-ampere frame or larger with an SHT or a UVT could operate falsely if a current of 50 kA or higher flows through the adjacent circuit breaker. Be sure to secure a distance of at least 50 mm in between.

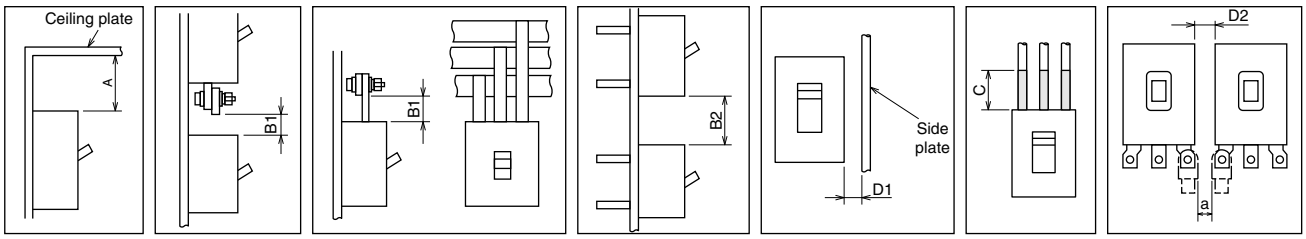


Table 8 Insulation distance (mm) (440VAC or below) *Figures in parentheses are for 230VAC or below.

Class • Series	Model		Ceiling plate			Vertical spacing		C	Horizontal spacing
	MCCB	ELCB	A			B1, B2			D1
			Uncovered metal Plate		Insulated plate, coated plate	Without terminal cover	With terminal cover		
			Without terminal cover	With terminal cover					
C • S • H • R • MB	NF30-CS	–	10	10	10	20	20	(*1)	20
	NF32-SV, NF63-CV	NV63-CV	5	5	5	20	20	(*1)	20
	NF63-SV, NF63-HV	NV32-SV, NV63-SV, NV63-HV	10	10	10	30	30	30	25
	NF125-CV	NV125-CV	50(30)	40(30)	10	50	50	(*1)	25
	NF125-SV	NV125-SV	50(10)	30(10)	10	50	50	50	25
	NF125-HV	NV125-HV	50	40	40	80	80	80	40
	NF250-CV	NV250-CV	40	40	40	50	50	50	50
	NF125-SEV, NF250-SV, NF250-SEV NF125-SGV, NF160-SGV, NF250-SGV	NV125-SEV, NV250-SV, NV250-SEV	70(40)	40	40	70(50)	50	70(50)	50
	NF125-HEV, NF250-HV, NF250-HEV NF125-LGV, NF160-LGV, NF250-LGV NF125-HGV, NF160-HGV, NF250-HGV	NV125-HEV, NV250-HV, NV250-HEV	80	60	60	80	80	80	60
	NF400-CW	NV400-CW	60	60	60	60	60	60	40
	NF400-SW, NF400-SEW	NV400-SW, NV400-SEW	70	70	70	70	70	70	70
	NF400-HEW, NF400-REW	NV400-HEW, NV400-REW	200	200	200	200	200	200	150
	NF630-SW, NF630-SEW, NF630-CW	NV630-CW, NV630-SW, NV630-SEW	70	70	70	70	70	70	70
	NF630-HEW, NF630-REW	NV630-HEW	200	200	200	200	200	200	150
	NF800-SEW, NF800-CEW	NV800-SEW	80	80	80	80	80	80	80
	NF800-HEW, NF800-REW	NV800-HEW	200	200	200	200	200	200	150
	NF1000-SEW, NF1250-SEW NF1600-SEW	–	100	100	100	100	100	100	100
R • U	NF125-RGV, NF250-RGV	–	30 (*6)	30 (*6)	30 (*6)	50 (*9)	50 (*9)	50	5
	NF125-UV, NF250-UV	–	(*1)	(*1)	(*1)	(*1)	(*1)	(*1)	25
	NF400-UEW	–	70	70	70	70	70	70	70
	NF800-UEW	–	80	80	80	80	80	80	80
BH	BH-K, BH-K100	–	(*1)		(*1)	(*1)		(*1)	20
UL	NF225-CWU	–	(40)	–	(40)	(50)	–	(50)	(50)
	NF50-SVFU	–	10 (*6)	10 (*6)	10 (*6)	20 (*7)	20 (*7)	30	10
	NF100-CVFU	–	50(25)	40(25)	10	50	50	50	25(15)
	NF125-SVU(*4)	–	40(10)	30(10)	10	50	50	50	25(20)
	NF125-HVU(*5)	–	40	40	40	80	80	80	25(20)
	NF250-SVU(*4)	–	40	40	40	70(50)	50	70(50)	50(20)
	NF250-HVU(*5)	–	40	40	40	80	80	80	50(20)
	NF400-SWU, NF400-HWU(*5)	–	70	70	70	70	70	70	70
	NF630-SWU, NF630-HWU(*5)	–	70	70	70	70	70	70	70

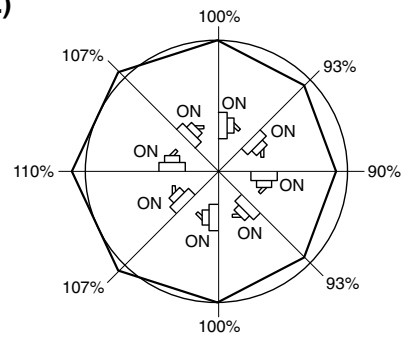
Remark: 1. The table shows the dimensions in the case of the use of a large terminal cover (TC-L).
Notes *1 It is not necessary to provide an insulation distance (an arc space) on the power supply side. However, if a grounding metal piece or the like comes in close contact with the terminal, be sure to completely insulate the terminals or the bare-live parts of the cable conductors.
*2 At more than 440 V AC, the distance shall be 10 mm.
*3 For 480Y/277V AC.
*4 For 480V AC.
*5 For 600Y/347V AC.
*6 An exhaust port is provided also on the circuit breaker load side. Secure the dimension A both on the power supply side and on the load side.
*7 When any of the circuit breakers NF125-RGB to NF250-RGV is used on the upstream side, an exhaust port is provided also on the circuit breaker load side. Secure the larger distance of the dimension B1 of NF125-RGV, NF250-RGV or NF50-SVFU and the dimension B1 of the downstream circuit breaker.

Effect of Installation Orientation

Installation orientation does not affect the operating characteristics of circuit breakers of electronic or thermo-magnetic operation types. However, the installation orientation affects the operating current of fully magnetic type circuit breakers as the iron core in the oil dash pot is under gravitational force.
It is generally suggested they be installed vertically.

●Hydraulic-magnetic (The same applies to other models of hydraulic-magnetic type.)

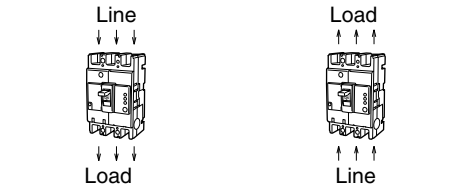
MCCB	
Class	Model
C	NF30-CS



Rate of change of rated current by mounting angle

Connection of Line and Load

The standard wiring of line and load on the circuit breaker is as shown in (a) normal connection on the right.
Avoid the wiring shown in (b) reverse connection. This may lead to a decrease in breaking performance.
However, the reverse connection is allowed for the following models (excluding MDU breakers).



(a) Normal connection (b) Reserve connection

Connection methods

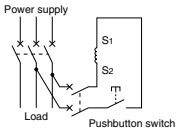
NF-C, NF-S, NF-H, NF-R and NF-U class BH-P, CP30-BA, NV-C, S, H and R class of 400 to 800AF, NF100-CVFU, NF125-SVU, NF125-HVU, NF250-SVU, NF250-HVU	Reverse connection is allowed for the standard models.

Internal Accessories

The accessories to be installed in circuit breakers include the followings. For the numbers of the accessories which can be installed. The standard internal accessories have lead wires (450 mm long) drawn out. (However, some of Models UVT and TBM have vertical lead wire terminal blocks as standard.)
When circuit breakers are installed side by side, keep a space of 8 mm or more for lead wires between the circuit breakers. (Models with lead wires drawn out toward load and models with lead wire grooves in the side faces can be installed in close contact.)

SHT (Shunt trip)

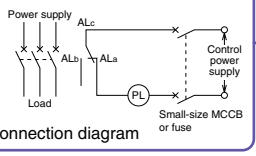
Device to electrically trip a circuit breaker from a distance. The allowable operating voltage range is 70 to 110% of the rated voltage. (JIS C 8201-2-1 Ann.1, Ann.2)



Connection diagram

AL (Alarm switch)

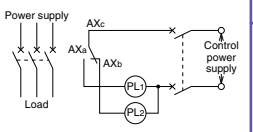
Switch to electrically display the tripping status of circuit breaker



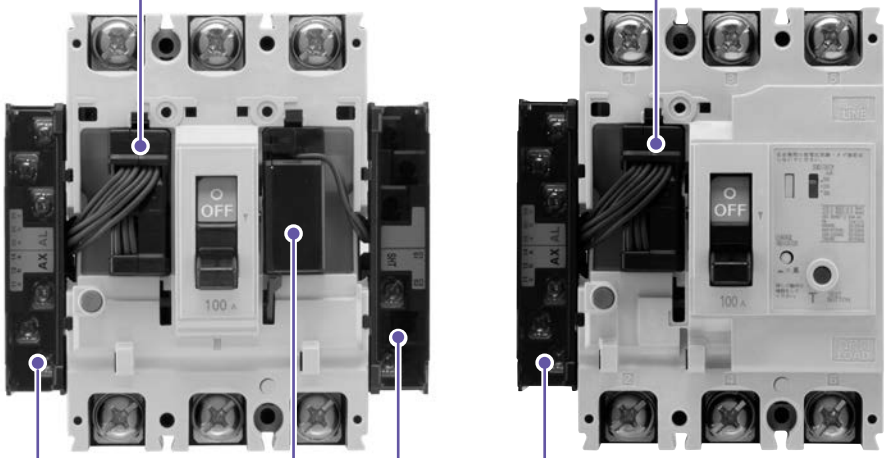
Connection diagram

AX (Auxiliary switch)

Switch to electrically display the ON-OFF status of circuit breaker

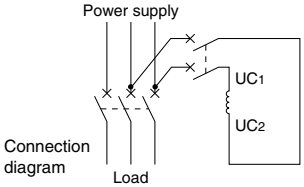


Connection diagram



UVT (Undervoltage trip)

Device to automatically trip a circuit breaker when the voltage drops. The operating voltage is 70 to 35% of the UVT rated voltage. (JIS C 8201-2-1 Ann.1)
When the voltage recovers at least to 85% or more, the circuit breaker can be turned on after the device is manually reset.



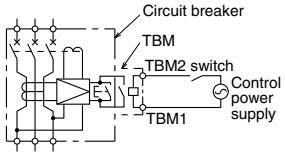
Connection diagram

SLT (Lead wire terminal block)

Terminals for connecting with internal accessories. The terminal block will be manufactured to order. For the detailed dimensions. (The dimensions of SLT slightly vary depending on the number of installed accessories and the model.)
However, circuit breakers with a frame size of 400A and above having an electrical operation device are normally provided with SLT.

TBM (Test button module)

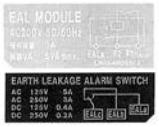
Unit to perform test under voltage from a distance. TBMs can be connected in parallel. (The standard TBMs are provided with SLT. In the case of the flush plate type, the external dimensions are partially different from those of the standard type.)



TBM circuit diagram

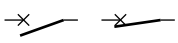
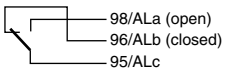
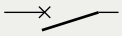
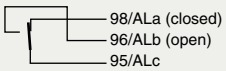
Kinds of Internal Accessories

Table 1

Accessory name		Nameplate (sample)	Accessory name		Nameplate (sample)
AL	Alarm switch		EAL	Earth leakage trip alarm switch	
AX	Auxiliary switch				
SHT	Shunt tripping device		TBM	Test button module	
UVT	Undervoltage tripping device				

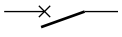
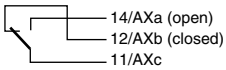
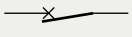
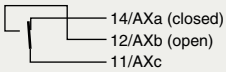
Operations and Ratings of Switches

Table 2 Operations of AL switch

Status of circuit breaker	Contact status of AL switch
 Off or On	 98/ALa (open) 96/ALb (closed) 95/ALc
 Trip	 98/ALa (closed) 96/ALb (open) 95/ALc

* The terminal numbers 98/ALa, 96/ALb and 95/ALc may vary depending on the number of installed switches and the installation poles.

Table 3 Operations of AX switch

Status of circuit breaker	Contact status of AX switch
 Off or Trip	 14/AXa (open) 12/AXb (closed) 11/AXc
 On	 14/AXa (closed) 12/AXb (open) 11/AXc

* The terminal numbers 14/AXa, 12/AXb and 11/AXc may vary depending on the number of installed switches and the installation poles.

Table 4 Ratings of AL and AX switches

Applied switch	AC			DC		
	Voltage V	Current A		Voltage V	Current A	
		Resistive load	Inductive load		Resistive load	Inductive load
A	(250)	(1)	(0.5)	(50)	(1)	(0.5)
	125	3	(1)	30	(2)	(1)
S	460	—	—	250	0.2	0.2
	250	3	2	125	0.4	0.4
	125	5	3	30	4	3
V	460	5	2	250	0.3	0.3
	250	10	10	125	0.6	0.6
	125	10	10	30	10	6

Remark: 1. The ratings in parentheses do not conform to UL.

Maximum Number of Internal Accessories

MCCB and Motor Protection Breakers

●AL ○AX ▨SHT or UVT ■PAL →Outgoing direction of lead wires

Handle of circuit breaker
Left pole → ← Right pole

▭ are cassette type accessories. (Some of UVT are not provided with cassettes.)

Table 5 Table of maximum number of internal accessories

Model								
	C	NF30-CS	NF63-CV NF125-CV	NF63-CV NF125-CV NF250-CV		NF400-CW NF630-CW	NF800-CEW	
	S		NF32-SV NF63-SV NF125-SV	NF32-SV NF63-SV NF125-SV NF125-SGV NF160-SGV NF250-SV NF250-SGV	NF125-SEV NF250-SEV	NF400-SW NF400-SEW NF630-SW NF630-SEW	NF800-SEW NF800-SDW	NF1000-SEW NF1250-SEW NF1600-SEW
	L • H • R		NF63-HV	NF63-HV NF125-HV NF125-LGV NF125-HGV NF125-RGV NF160-LGV NF160-HGV NF250-HV NF250-LGV NF250-HGV NF250-RGV	NF125-HEV NF250-HEV	NF400-HEW NF400-REW NF630-HEW NF630-REW	NF800-HEW NF800-REW	
	U			NF125-UV NF250-UV		NF400-UEW(3P)	NF400-UEW(4P) NF800-UEW	
Number of poles		2 or 3 poles	2 poles	2, 3 or 4 poles	3, 4 poles	2, 3 or 4 poles	2, 3 or 4 poles	2, 3 or 4 poles
AL and AX (standard) switches		S						V
Accessory								
AL		(*3)		❶ ❷	❶ ❷		(*7)	
AX		(*3)	① ②	① ② ③	① ② ③	① ③ ② ④	(*7) ① ⑤ ③ ② ⑥ ④	③ ① ② ⑤ ④ ⑥
SHT or UVT			(*1)	(*1)(*5)	(*1)(*5)	(*1) (*6)	(*1) (*6)	(*1)
AL + AX		(*3) 3-pole product only		(*2) ❶ ❷ ① ②	(*2) ❶ ❷ ① ②	(*7)	(*7)	
AL + SHT or UVT				(*1)	(*1)	(*1) (*6) (*7) (*8)	(*1) (*6) (*7) (*8)	(*1)
AX + SHT or UVT				(*1) ① ②	(*1) ① ②	(*1) (*6) (*7) (*8) ③ ① ②	(*1) (*6) (*7) (*8) ①③ ②④ ⑤ ③ ① ④ ②	(*1)
AL + AX + SHT or UVT				(*1)	(*1)	(*1) (*6) (*7) (*8)	(*1) (*6) (*7) (*8)	(*1)
PAL (contact output)					(*4)	(*9) Option for NF400-SEW, HEW, REW and UEW and NF630-SEW, HEW and REW	(*9) Option for NF800-CEW, SEW, HEW and REW and NF800-UEW	(*9) Option for NF1000-SEW and NF1250-SEW and NF1600-SEW

Notes
*1 When UVT is provided, the UVT voltage module will come in the vertical lead wire terminal block type. (SHT does not have a voltage module.)
*2 The second AX can be installed in place of the AL on the left pole side. When placing an order, specify the incorporation of the switches in the body.
*3 Although the lead wires are normally drawn out laterally, those with lead wires drawn out toward load are available. (Only for front connection type)
*4 PAL (contact output) can be installed together with AL and AX on the left pole side. (It cannot be installed together with SHT or UVT.) The standard type is provided with SLT. PAL control voltage (compatible with 100 to 200 V AC) is necessary.
*5 SHT and UVT can be installed on the left side.
*6 SHT and UVT are normally installed on the right pole side. If you intend to install them on the left pole side, specify so. (The reset preventing UVT must be installed on the left pole side.)
*7 In the case where three or more accessories are installed on the left pole side and AL, AX or AL and AX are installed on the pole on which SLT, SHT or UVT is installed, the SLT will be manufactured to order.
*8 When AL, AX or AL and AX are installed on the pole on which UVT is installed, the UVT voltage module must be installed separately.
*9 SLT is provided as standard. A control power supply (100 to 200 V AC) is required. (In this case, other internal accessories cannot be installed on the right pole side.)

Remarks: 1. For electrically operated automatic reset type circuit breakers having a frame size of 400A or above, the numbers of AL switches which can be installed are smaller by 1 than the values shown above.
2. The encircled numbers indicate the order of installation.

ELCB

Table 6 Table of maximum number of internal accessories

●AL ○AX SHT or UVT

Handle of circuit breaker
Left pole → ← Right pole

TBM →Outgoing direction of lead wires

are cassette type accessories.

Model				
	C	NV63-CV NV125-CV NV250-CV	NV400-CW NV630-CW	
	S	NV32-SV NV63-SV NV125-SV NV125-SEV NV250-SV NV250-SEV	NV400-SW NV400-SEW NV630-SW NV630-SEW	NV800-SEW
	H • R	NV63-HV NV125-HV NV125-HEV NV250-HV NV250-HEV	NV400-HEW NV400-REW NV630-HEW	NV800-HEW
	U			
Number of poles / Switch		2, 3, or 4 poles	3 poles	
Accessory		S		
AL				(*6)
AX		① ②		(*6)
AL + AX		(*2)	(*6)	(*6)
SHT or UVT		(*3)	(*5)	(*5)
AL + SHT or UVT			(*4) (*5) (*6)	(*4) (*5) (*6)
AX + SHT or UVT			(*4) (*5) (*6)	(*4) (*5) (*6)
AL + AX + SHT or UVT			(*4) (*5) (*6)	(*4) (*5) (*6)
TBM		(*1)	(*1)	(*1)

Notes *1 The standard type is provided with SLT. Only in the case of 24 V DC, specify the control voltage.
*2 The second AX can be installed in place of the AL on the left pole side. When placing an order, specify the incorporation of the switches in the body.
*3 When UVT is provided, the UVT voltage module will come in the vertical lead wire terminal block type. (SHT does not have a voltage module.)
*4 When AL, AX or AL and AX are installed on the pole on which UVT is installed, the UVF voltage module must be separately installed.
*5 When the accessory is provided with UVT, the UVT voltage module has a vertical lead wire terminal block. The UVT is not provided with a cassette.
*6 SLT to be used when three or more accessories are installed on the left pole is manufactured to order.

Remarks: 1. The encircled numbers indicate the order of installation.
2. TBM can be installed regardless of the number of installed AL, AX, SHT and UVT.

UL 489 Listed Circuit Breakers

Table 7 Table of maximum number of internal accessories

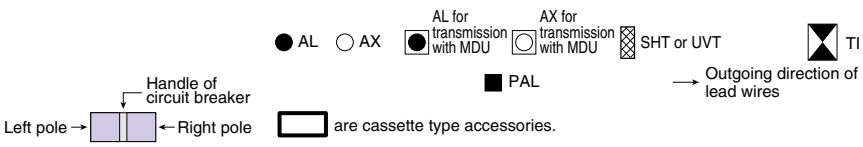
Handle of circuit breaker ● AL ○ AX ▨ SHT or UVT ➡ TBM →Outgoing direction of lead wires
Left pole → ← Right pole
▭ are cassette type accessories.

Model / Number of poles / AL and AX (standard) switches / Accessory									
MCCB	NF50-SVFU NF100-CVFU	NF50-SVFU NF100-CVFU	NF125-SVU NF125-HVU NF250-SVU NF250-HVU	NF225-CWU	NF400-SWU NF400-HWU	NF630-SWU NF630-HWU			
ELCB							NV50-SVFU	NV50-SVFU NV100-CVFU	NV125-SVU NV125-HVU NV250-SVU NV250-HVU
Number of poles	2 poles	3 poles	2 or 3 poles	3 poles	3 poles	3 poles	2 poles	3 poles	3 poles
AL and AX (standard) switches	S								
AL						(*4)			
AX						(*4)			
SHT or UVT	(*1) (*6)	(*1) (*3) (*6)	(*1) (*3)	(*1)	(*1) (*3)	(*1) (*3)		(*1) (*6)	(*1)
AL + AX		(*2)	(*2)		(*6)	(*6)		(*2)	(*2)
AL + SHT or UVT		(*1) (*6)	(*1)	(*1)	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)			
AX + SHT or UVT		(*1) (*6)	(*1)	(*1)	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)			
AL + AX + SHT or UVT		(*1) (*6)	(*1)	(*1)	(*1)(*3) (*4)(*5)	(*1)(*3) (*4)(*5)			
TBM							(*7)	(*7)	(*7)

Notes *1 When UVT is provided, the UVT voltage module will come in the vertical lead wire terminal block type. (SHT does not have a voltage module.)
*2 SHT cannot be installed.
*3 SHT and UVT are normally installed on the right pole side. If you intend to install them on the left pole side, specify so.
*4 In the case where three or more accessories are installed on the left pole side and AL, AX or AL and AX are installed on the pole on which SLT, SHT or UVT is installed, the SLT will be manufactured to order.
*5 When AL, AX or AL and AX are installed on the pole on which UVT is installed, the UVT voltage module must be installed separately.
*6 UVT of NF50-SVFU and NV50-SVFU are not provided with cassettes.
*7 The standard type is provided with SLT. Only in the case of 24 V DC, specify the control voltage.
Remarks: 1. The encircled numbers indicate the order of installation.
2. AL and AX for minute load can be manufactured to order. (These switches have been certified only by UL and CSA. They have not been certified by TUV.)

MDU Breakers

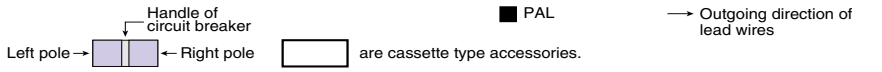
Table 8-1 Table of maximum number of internal accessories



Model	NF400-SEP with MDU NF400-HEP with MDU	NF600-SEP with MDU NF600-HEP with MDU NF800-SEP with MDU NF800-HEP with MDU
Number of poles	3 or 4 poles	
switch	S	
Accessory		
AL		(*1)
AX		(*1)
SHT	(*2)	(*2)
UVT	(*3) (*4)	(*3) (*4)
AL + AX	(*1)	(*1)
AL + SHT	(*1) (*2)	(*1) (*2)
AX + SHT	(*1) (*2)	(*1) (*2)
AL + AX + SHT	(*1) (*2)	(*1) (*2)
AL + UVT	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)
AX + UVT	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)
AL + AX + UVT	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)
PAL	(*6)	(*6)
EPAL	———	———
TI	(*6) With contact outputs for PAL and OAL	(*6) With contact outputs for PAL and OAL

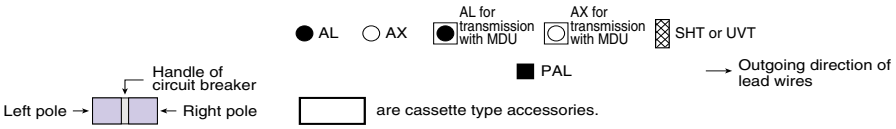
Notes *1 In the case where three or more accessories are installed on the left pole side and AL, AX or AL and AX are installed on the pole on which SLT, SHT or UVT is installed, the SLT will be manufactured to order.
*2 SHT and UVT are normally installed on the right pole side. If you intend to install them on the left pole side, specify so. (The reset preventing UVT must be installed on the left pole side.)
*3 The UVT voltage module is installed externally. UTV is not provided with a cassette.
*4 UVT is normally installed on the right pole. If you intend to install it on the left pole, specify so.
*5 When AL, AX or AL and AX are installed on the pole on which UVT is installed, the UVT voltage module must be installed separately.
*6 The standard model has a terminal block. A 5-VA control power supply (compatible with 100 to 240 V AC/DC) is required. (In this case, another internal accessory cannot be installed on the right pole.)
Remark: 1. The encircled numbers indicate the order of installation.

Table 8-2 Table of maximum number of internal accessories



Model / Number of poles / switch / Accessory	NF400-SEP with MDU NF400-HEP with MDU	NF600-SEP with MDU NF600-HEP with MDU NF800-SEP with MDU NF800-HEP with MDU
	3 or 4 poles	
	S	
AL for transmission with MDU (*1)		
AX for transmission with MDU (*1)		
AL + AX for transmission with MDU (*1)		
AL + AX + AL for transmission with MDU (*1)		
AL+AX + AX for transmission with MDU (*1)		
AL + AX + AL + AX for transmission with MDU (*1)		

Note *1 To transmit signals from AL, AX or AL and AX, AL and/or AX for transmission with the MDU are installed on the left pole side. In this case, the lead wires of AL and/or AX for transmission with the MDU installed on the left pole side cannot be drawn out to the outside or fitted to the terminal block.



Model / Number of poles / switch / Accessory	NF250-SEV with MDU NF250-HEV with MDU
	3 or 4 poles
	S
AL	
AX	
AL + AX	(*1)
SHT or UVT	(*2)
AL + SHT	(*2)
AX + SHT	(*2)
AL + AX + SHT	(*2)
AL + UVT	(*2)
AX + UVT	(*2)
AL + AX + UVT	(*2)
AL for transmission with MDU (*3)	
AL for transmission with MDU AX (*3)	
AL for transmission with MDU AL + AX (*3)	
AL for transmission with MDU AL + AX + AL (*3)	
AL for transmission with MDU AL + AX + AX (*3)	
AL for transmission with MDU AL + AX + AL + AX (*3)	

Notes *1 The second AX can be installed in place of the AL on the left pole side. When placing an order, specify the incorporation of the switches in the body.
*2 When UVT is provided, the UVT voltage module will come in the vertical lead wire terminal block type. (SHT does not have a voltage module.)
*3 To transmit signals from AL, AX or AL and AX, AL and/or AX for transmission with the MDU are installed on the left pole side. In this case, the lead wires of AL and/or AX for transmission with the MDU installed on the left pole side cannot be drawn out to the outside or fitted to the terminal block. In the case of 225A frame circuit breakers, AL for transmission with the MDU must be installed for fault current measurement.
Remark: 1. The encircled numbers indicate the order of installation.

Cassette Type Accessories

The internal accessories for major models having a frame size from 30 to 800 A come in cassettes, and they can be installed to and removed from circuit breakers by the user.
Some cassette type accessories have lead wires drawn out, and others have vertical lead wire terminal blocks (SLT). (These parts are supplied by 10 pieces for frame size from 30 to 250 A or by 1 piece for frame size from 400 to 800 A.)

Applicable models and kinds of cassette type accessories

	Model	Alarm switch (AL)	Auxiliary switch (AX)	Shunt tripping device (SHT)	Undervoltage tripping device (UVT)
MCCB	NF63-CV~NF250-CV, NF32-SV~NF250-SV NF63-HV~NF250-HV NF125-SGV~NF250-SGV, NF125-LGV~NF250-LGV NF125-HGV~NF250-HGV NF125-SEV, NF250-SEV, NF125-HEV, NF250-HEV NF125-RGV, NF250-RGV, NF125-UV, NF250-UV NF100-CVFU, NF125-SVU/HVU, NF250-SVU/HVU	○	○	○	○
	NF50-SVFU, NF400-CW, NF630-CW, NF800-CEW NF400-SW, NF630-SW, NF400-SEW~NF800-SEW NF800-SDW, NF400-HEW~NF800-HEW NF400-REW~NF800-REW, NF400-UEW, NF800-UEW NF400-SWU/HWU, NF630-SWU/HWU	○	○	○	–
ELCB	NV63-CV~NV250-CV, NV32-SV~NV250-SV NV63-HV~HV250-HV NV125-SEV, NV250-SEV, NV125-HEV, NV250-HEV NV100-CVFU, NV125-SVU/HVU, NV250-SVU/HVU	○	○	○	○
	NV50-SVFU, NV400-CW, NV630-CW NV400-SW, NV630-SW, NV400-SEW~NV800-SEW NV400-HEW~NV800-HEW, NV400-REW	○	○	○	–

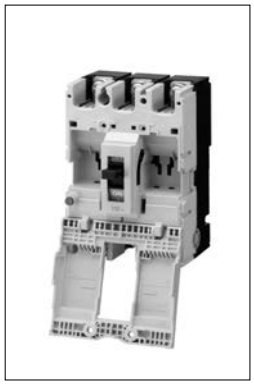
Procedure for installing cassette type accessories



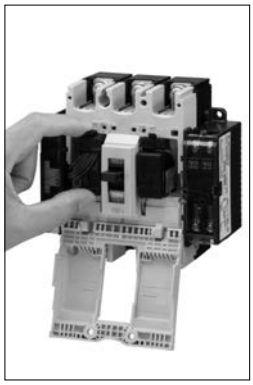
1. Press the trip button (PTT) to trip the circuit breaker. (*1)



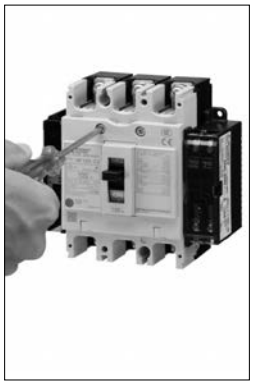
2. Loosen the cover screws.



3. Open the cover.



4. Install the cassette type accessory. (*2)



5. Close the cover, and tighten the screws.

Notes *1 When installing any cassette type accessory, set the circuit breaker to the tripped state.
*2 If the inner lid or another accessory has been installed, remove it before installing the accessory.
When any circuit breaker supplied with the inner lid is used without an accessory, fit the inner lid without fail.
Failure to do so may affect the short-circuiting performance.
Models with inner lid: NF125-SV, NF125-HV, NF125-UV
NV125-SV, NV125-HV
NF250-SV, NF250-HV
NV250-SV, NV250-HV
NF125-SVU, NF125-HVU, NV125-SVU, NV125-HVU
NF250-SVU, NF250-HVU, NV250-SVU, NV250-HVU
NF250-SEV, NF250-HEV, NF250-UV
NV250-HEV
NF125-SEV, NF125-HEV
NV125-SEV, NV125-HEV
NF400-REW, NF400-UEW
NF630-REW, NV400-REW
NF800-HEW, NF800-REW, NF800-UEW
NV800-HEW
NF630-SWU, NF630-HWU

Cautions when installing

Before installing or removing any cassette type accessory, set the circuit breaker and accessories to the no-voltage state.
Never install a cassette type accessory while the handle is in the ON or OFF position. Doing so may damage the accessory.
When installing an accessory with lead wires drawn out, apply the supplied nameplate to the circuit breaker side face.
When installing an accessory with lead wires drawn out for a frame size of 400 to 800 A, secure the lead wires along the circuit breaker side face with the supplied lead wire retainers.

Type name

Table 9-1

Model MCCB	Model ELCB	Installation pole	AL	AX	AL+AX	SHT	UVTN or UVTS
NF50-SVFU		For right pole	AL-03SVU AL-03SVURS	AX-03SVU AX-03SVURS	ALAX-03SVU ALAX-03SVURS	SHTA240-03SVUR SHTA440-03SVUR SHTD100-03SVUR SHTA240-03SVURS SHTA440-03SVURS SHTD100-03SVURS	–
		For left pole					
	NV50-SVFU	For left pole	AL-03SVU AL-03SVULS	AX-03SVU AX-03SVULS	ALAX-03SVU ALAX-03SVULS	SHTA240-03SVUL SHTA440-03SVUL SHTD100-03SVUL SHTA240-03SVULS SHTA440-03SVULS SHTD100-03SVULS	–
NF32-SV, NF63-CV, NF63-SV, NF63-HV NF125-CV, NF125-SV, NF125-HV NF125-SGV, NF125-LGV, NF125-HGV NF160-SGV, NF160-LGV, NF160-HGV NF125-SEV, NF125-HEV NF125-RGV, NF125-UV NF250-CV, NF250-SV, NF250-HV NF250-SGV, NF250-LGV, NF250-HGV NF250-SEV, NF250-HEV NF250-RGV, NF250-UV		For right pole	AL-05SV AL-05SVRS	AX-05SV AX-05SVRS	ALAX-05SV ALAX-05SVRS	SHTA240-05SVR SHTA550-05SVR SHTD125-05SVR SHTA240-05SVRS SHTA550-05SVRS SHTD125-05SVRS	UVTNAD130-05SVR UVTSAD130-05SVR UVTNA250-05SVR UVTSA250-05SVR UVTNA480-05SVR UVTSA480-05SVR UVTNAD130-05SVRS UVTSAD130-05SVRS UVTNA250-05SVRS UVTSA250-05SVRS UVTNA480-05SVRS UVTSA480-05SVRS
		For left pole					
	NV32-SV, NV63-CV NV63-SV, NV63-HV NV125-CV, NV125-SV NV125-HV NV125-SEV, NV125-HEV NV250-CV, NV250-SV NV250-HV NV250-SEV, NV250-HEV	For left pole	AL-05SV AL-05SVLS	AX-05SV AX-05SVLS	ALAX-05SV ALAX-05SVLS	SHTA240-05SVL SHTA550-05SVL SHTD125-05SVL SHTA240-05SVLS SHTA550-05SVLS SHTD125-05SVLS	UVTNAD130-05SVL UVTSAD130-05SVL UVTNA250-05SVL UVTSA250-05SVL UVTNA480-05SVL UVTSA480-05SVL UVTNAD130-05SVLS UVTSAD130-05SVLS UVTNA250-05SVLS UVTSA250-05SVLS UVTNA480-05SVLS UVTSA480-05SVLS
NF100-CVFU NF125-SVU/HVU NF250-SVU/HVU		For right pole	AL-05SVU AL-05SVURS	AX-05SVU AX-05SVURS	ALAX-05SVU ALAX-05SVURS	SHTA240-05SVUR SHTA550-05SVUR SHTD125-05SVUR SHTA240-05SVURS SHTA550-05SVURS SHTD125-05SVURS	UVTNAD130-05SVUR UVTSAD130-05SVUR UVTNA250-05SVUR UVTSA250-05SVUR UVTNA480-05SVUR UVTSA480-05SVUR UVTNAD130-05SVURS UVTSAD130-05SVURS UVTNA250-05SVURS UVTSA250-05SVURS UVTNA480-05SVURS UVTSA480-05SVURS
		For left pole					
	NV100-CVFU NV125-SVU/HVU NV250-SVU/HVU	For left pole	AL-05SVU AL-05SVULS	AX-05SVU AX-05SVULS	ALAX-05SVU ALAX-05SVULS	SHTA240-05SVUL SHTA550-05SVUL SHTD125-05SVUL SHTA240-05SVULS SHTA550-05SVULS SHTD125-05SVULS	UVTNAD130-05SVUL UVTSAD130-05SVUL UVTNA250-05SVUL UVTSA250-05SVUL UVTNA480-05SVUL UVTSA480-05SVUL UVTNAD130-05SVULS UVTSAD130-05SVULS UVTNA250-05SVULS UVTSA250-05SVULS UVTNA480-05SVULS UVTSA480-05SVULS
NF400-CW, NF400-SW, NF400-SEW NF400-HEW, NF400-REW, NF400-UEW NF630-CW, NF630-SW, NF630-SEW NF630-HEW, NF630-REW NF800-CEW, NF800-SDW, NF800-SEW NF800-HEW, NF800-REW, NF800-UEW		For right pole (2, or 3 poles)	–	AX-4SW AX-4SWRS AX2-4SWRS	–	SHT-4SW SHT-4SWRS	–
		For right pole (4 poles)	–	–	–	SHT-4SWRFS SHT-8SWRFS	–
		For left pole (2, 3 or 4 poles)					
	NV400-CW, NV400-SW NV400-SEW, NV400-HEW NV400-REW NV630-CW, NV630-SW NV630-SEW, NV630-HEW NV800-SEW, NV800-HEW	For left pole (2, 3 or 4 poles)	AL-4SWL AL-4SWLS AL2-4SWLS	AX-4SW AX-4SWLS AX2-4SWLS	ALAX-4SWL ALAX-4SWLS	SHT-4SW SHT-4SWLS	–
NF400-SWU, NF400-HWU NF630-SWU, NF630-HWU		For right pole	–	AX-4SWU AX-4SWURS AX2-4SWURS	–	SHT-4SWU SHT-4SWURS	–
		For left pole	AL-4SWUL	AX-4SWUL	ALAX-4SWUL	SHT-4SWU	

Remarks:
1. For the possibility of installation of accessories and the installation pole, refer to the tables of maximum numbers on pages 727 to 731.
2. AL and AX for minute load can be manufactured to order.
3. Corrosion-proof cassette type AL and AX are not available. When the circuit breaker body is exposed to class 1 tropicalization, class 2 tropicalization, reinforced corrosion resistance treatment or class 2 heat resistance treatment, place an order for the circuit breaker including the accessories.
4. Cassette type accessories with SLT for right pole cannot be installed to 4-pole circuit breakers. Accessories with SLT for right pole to be used in 4-pole circuit breakers are manufactured to order.
5. Cassette type accessories with SLT cannot be installed to flush plate type circuit breakers.
6. Cassette type accessories (AL, AX and SHT) cannot be installed to circuit breakers with MG.
7. It is impossible to install a combination of a cassette type accessory with lead wires drawn out and that with SLT or a combination of cassette type accessories with SLT on the same pole.
8. It is impossible to install the cassette type AL or AX to the pole to which UVT has been installed.
9. AX and SHT with lead wires drawn out for frame size from 400 to 800 A can be installed to any of the right and left poles.
10. When installing more than one AL or AX with lead wires drawn out for frame size from 400 to 800 A to one side, install the necessary number of the accessories for one piece. The lead wires from the circuit breaker vary in length depending on the installation position.
11. Install the cassette accessories for frame size from 400 to 800 A starting from the outside of the installation positions. For the installation positions, see the installation positions shown in the following table.
12. When three pieces of more of AL and AX are installed on a circuit breaker with a frame size 400 to 800 A, the AL and AX with SLT are manufactured to order.

Installation positions of cassette type accessories for 400 to 800 A frames

Installation positions

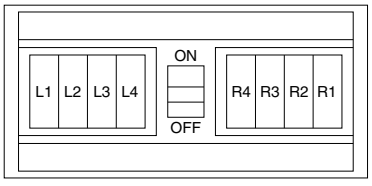


Table 9-2 Installation positions of cassette type accessories

Frame (A)	400 • 600 • 630					800							
Accessory \ Installation positions	L1	L2	L3	R2	R1	L1	L2	L3	L4	R4	R3	R2	R1
AL	○	○	–	–	–	○	○	○	–	–	–	–	–
AX	○	○	–	○	○	○	○	○	○	–	–	○ (*1)	○
AL + AX	○	○	–	–	–	○	○	–	–	–	–	–	–
SHT	–	○		○		–	–	○		○ (*1)		–	–

* Accessories only for Earth Leakage Circuit Breakers (NV-C, S and H), Earth Leakage Alarm Breakers (NF-Z) and single-phase 3-wire circuits (NF-N and NV-N) cannot be installed to R1, R2, R3 or R4.

Note *1 It is impossible to simultaneously install AX on R2 and SHT on R3 or R4.

Interpretation of type name

(1) Alarm switch • Auxiliary switch

AL 2 — 4 SV (or SW) L S B

Kind of accessory	
AL	Alarm switch
AX	Auxiliary switch

Number of accessories to be installed: When installing more than one AL or AX with SLT, specify the number.

Ampere frame	
05	For 30 to 250A frames
4	For 400 to 800A frames

Installation position	
R	Right pole, 2 or 3 poles
RF	Right pole, 4 poles
L	Left pole
Blank	Right and left

With SLT (vertical lead wire terminal block) (with lead wires drawn out unless otherwise specified)

Kind of switch	
Blank	Standard
B	Minute load

(2) Shunt tripping device
Undervoltage tripping device

SHT A1 — 1 SV (or SW) R S

Kind of accessory	
SHT	Shunt tripping device
UVTN (*1)	Undervoltage tripping device
UVTS (*2)	

Voltage (SHT)	
A240	AC100-240V
A440	AC380-440V
A480	AC380-480V
A550	AC380-550V
D100	DC100V
D125	DC100-125V
Blank	AC100-450/DC100-200V

Ampere frame	
05	For 30 to 250A frames
4	For 400•600•630A frames For 800A frames (3P)
8	For 800A frames (4P)

Installation position	
R	Right pole, 2 or 3 poles
RF	Right pole, 4 poles
L	Left pole
Blank	Right and left

With SLT (vertical lead wire terminal block) (with lead wires drawn out unless otherwise specified)

Voltage (UVTN or UVTS)	
AD130	Switching between 100 to 130 V AC and 100 to 130 V DC
A250	AC200-250V
A480	AC380-480V

Notes *1 The circuit breaker cannot be reset if voltage is not applied to UVTN. (Non-reset type UVT)
*2 The circuit breaker can be reset even if voltage is not applied to UVTS. (Reset type UVT)

Shunt Trip (SHT)

Coil ratings (standard)

Table 10-1

Model	Provision of coil burnout preventing switch	Voltage (V)	Input (VA) (*1) AC	Input (VA) (*1) DC	Operating time (*2) (ms)
NF50-SVFU NV50-SVFU	Provided	AC100-240 380-440 DC100	120	60	15 or less
NF32-SV, NF63-CV/SV/HV, NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV, NF125-CV/SV/HV/SEV/HEV/RGV/UV NF250-CV/SV/HV/SEV/HEV/RGV/UV NF250-SGV/LGV/HGV NV32-SV, NV63-CV/SV/HV NV125-CV/SV/HV/SEV/HEV, NV250-CV/SV/HV/SEV/HEV NF100-CVFU, NF125-SVU/HVU, NF250-SVU/HVU NV100-CVFU, NV125-SVU/HVU, NV250-SVU/HVU		AC100-240 380-550 DC100-125		50	
NF225-CWU		AC100-240 380-480 DC100-125		60	
NF400-CW/SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW NF800-CEW/SDW/SEW/HEW/REW/UEW NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW NV800-SEW/HEW, NF400-SWU/HWU, NF630-SWU/HWU		Compatible with 100 to 450 V AC and 100 to 200 V DC	100V 20 200V 50 380V 120 450V 170	100V 10 200V 35	5-15
NF1000-SEW, NF1250-SEW/SDW NF1600-SEW/SDW		AC100-120 200-240 380-450 DC100	200 300	70 100	7-15 15-25

Notes *1 Ensure that the voltage of the operating power supply for SHT is not dropped below the allowable operating voltage (70% of the rated minimum voltage value) by the input power.
*2 The operating time is the time from when the rated voltage is applied to the shunt tripping device until the main contact of the circuit breaker starts opening.
Remark: 1. The accessory is usable at 50 Hz and 60 Hz.

Coil ratings (list of available special voltage coils)

Table 10-2

Model	VAC										VDC											Compatible with AC/DC
	24	25-27	24-48	48	50-55	60	440-480	380-550	440-550	500-550	12	24	24-36	36	36-48	48	60	110	125	220	200-250	220-250	24-48
NF32-SV, NF63-CV/SV/HV NF125-CV/SV/HV/SEV/HEV/RGV/UV NF125-SGV/LGV/HGV, F160-SGV/LGV/HGV NF250-CV/SV/HV/SEV/HEV/RGV/UV NF250-SGV/LGV/HGV NV32-SV, NV63-CV/SV/HV NV125-CV/SV/HV/SEV/HEV NV250-CV/SV/HV/SEV/HEV NF100-CVFU, NF125-SVU/HVU, NF250-SVU/HVU NV100-CVFU, NV125-SVU/HVU, NV250-SVU/HVU	–	–	○	–	–	–	–	–	–	–	○	–	○	–	○	–	–	–	–	–	○	–	–
NF225-CWU	–	–	○	–	–	○	–	–	–	–	○	–	○	–	○	–	○	–	–	–	○	–	–
NF400-CW/SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW NF800-CEW/SDW/SEW/HEW/REW/UEW NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW NV800-SEW/HEW, NF400-SWU/HWU, NF630-SWU/HWU	–	–	–	–	–	–	–	○	–	–	○	–	–	–	–	–	–	–	–	–	–	–	○
NF1000-SEW, NF1250-SEW/SDW NF1600-SEW/SDW	○	–	–	○	–	–	○	–	–	○	○	○	–	○	–	○	–	○	○	–	–	–	–

Undervoltage Trip (UVT)

(1) Specifications for UVT and coil ratings

Table 11

Model	Specification		Coil ratings			
	Reset type	Non-reset type	Voltage (V)		Input (VA)	Operating time (*2) (ms)
			Standard voltage	Special voltage (*1)		
NF50-SVFU NV50-SVFU	–	○	AC/DC100-130V AC200-250V AC380-480V	AC/DC24V AC/DC48V	5	30 or less
NF32-SV, NF63-CV/SV/HV/HRV NF125-CV/SV/HV/RGV/SEV/HEV/UV NF125-SGV/LGV/HGV, NF160-SGV/LGV/HGV NF250-CV/SV/HV/RGV/SEV/HEV/UV NF250-SGV/LGV/HGV NV32-SV, NV63-CV/SV/HV NV125-CV/SV/HV/SEV/HEV NV250-CV/SV/HV/SEV/HEV NF100-CVFU, NF125-SVU/HVU, NF250-SVU/HVU NV100-CVFU, NV125-SVU/HVU, NV250-SVU/HVU	○	○		AC/DC24V AC/DC48V AC500-600V		
NF400-CW/SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW NF800-CEW/SDW/SEW/HEW/REW/UEW NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW NV800-SEW/HEW	○ (*4)	○ (*5)	Switching between 100 to 110 and 120 to 130 AC (*3) Switching between 200 to 220 and 230 to 250 AC Switching between 380 to 415 and 440 to 480 AC Switching between 100 and 110 DC	Switching between 24/48 AC (*3) Switching between 500 to 550/600 AC Switching between 24/48DC Switching between 110/125DC	5	5-30
NF1000-SEW, NF1250-SEW NF1600-SEW	○	○				5-35
NF400-SWU/HWU, NF630-SWU/HWU	○ (*4)	–				5-30
NF225-CWU	–	○		Switching between 24/48 AC (*3) Switching between 24/48DC Switching between 110/125DC		30 or less

Notes *1 Some special voltage models vary in voltage range.
*2 The operating time is the time from when the undervoltage tripping device is set to the no-voltage state until the main contact starts opening.
*3 The accessory is usable at 50 Hz and 60 Hz.
*4 If UVT is turned on without excitation, the circuit breaker instantaneously opens and immediately trips.
*5 Only for installation on the left pole

(2) Reset type and non-reset type UVT

■ Reset type (Refer to Table 12.)

The reset type UVT has a structure which does not trip a circuit breaker even if the UVT coil is not excited when the circuit breaker handle is in the OFF or reset position. Therefore, it keeps the circuit breaker in the reset state even if the coil is not excited when the breaker is reset electrically.
When the coil in the unexcited state is turned on, the circuit breaker is normally tripped. However, the major contacts of some models of circuit breakers may instantaneously close, or, on circuit breakers with AX, the AX switches may instantaneously change over. For electrical interlock, use a non-reset type UVT.

■ Non-reset type (Refer to Table 12.)

When the UVT coil is not excited, the circuit breaker cannot be set to the off state even if the circuit breaker is tried to be reset from the tripped state. When the coil exciting voltage restores to the reference voltage or more, the circuit breaker can be reset to the off state.

(3) Time delay UVT

- This type of UVT has a time delay in operation.
- It can prevent operation upon occurrence of instantaneous power failure.

Table 12

UVT module type name	Time delay	Voltage (V)	
		Standard voltage	Special voltage
U-05W	Switching among 0.1, 0.3 and 0.5 s	AC24/48 AC100–120/200–240/380–450 AC220–250/380–450/460–550 (Compatible with 50 Hz and 60 Hz) DC100–110	AC380–450/460–550/600–690 (Compatible with 50 Hz and 60 Hz) DC24/48
U-30W	Switching among 0.5, 1 and 3 s	AC100–120/200–240/380–450 AC220–250/380–450/460–550 (Compatible with 50 Hz and 60 Hz)	–

(4) Structure of UVT

The UVT mechanical unit is installed in a circuit breaker, and the UVT voltage module is installed on the outside of the circuit breaker. When the voltage drops, the UVT voltage module detects the voltage drop, and the UVT mechanical unit trips the circuit breaker.
The UVT voltage module has a vertical lead wire terminal block and is normally installed on the body. The external module will be manufactured to order.

●Outline drawing

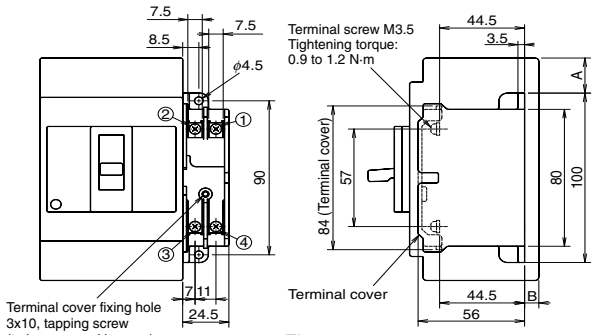


Fig. 1

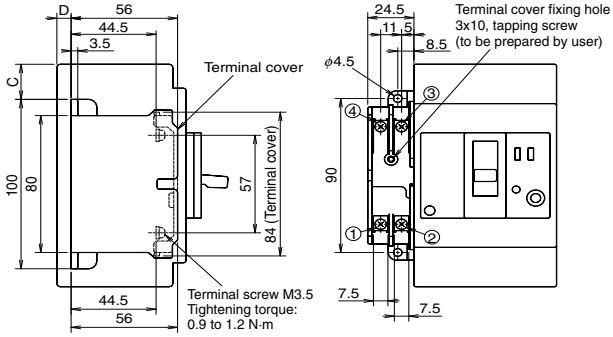


Fig. 2

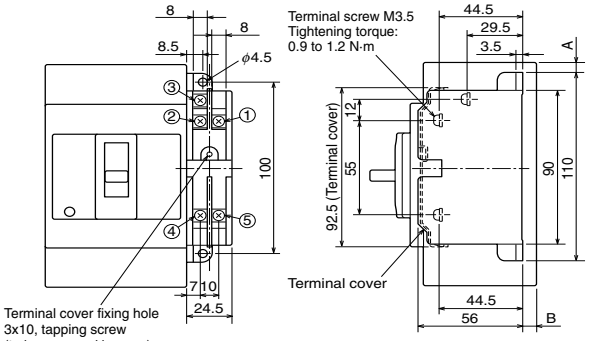


Fig. 3

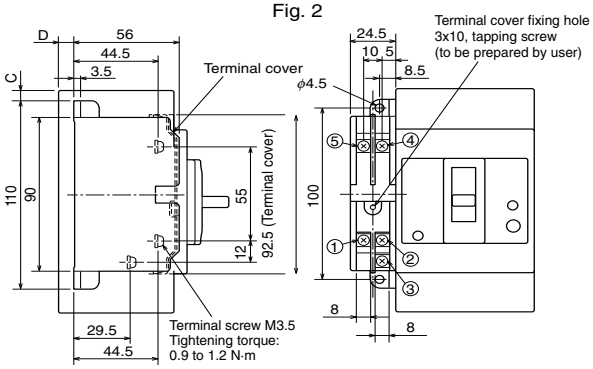
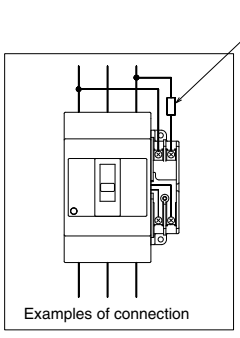


Fig. 4

●Examples of connection

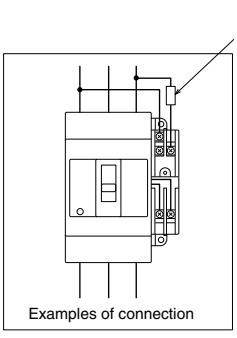


Terminal symbols

①	D1/P1	Control power supply terminal (COM)
②	D2/P2	Control power supply terminal (rated voltage)
③	J1/UC1	UVT coil connecting terminal
④	J2/UC2	UVT coil connecting terminal

Remarks: 1. When the UVT voltage module is installed on the body (standard), the UVT is supplied with J1/UC1 and J2/UC2 terminals connected with the UVT coil.
2. When the UVT is installed on the left pole side, the UVT module terminal positions are reversed (on the power supply and load sides). Carefully connect the terminals.

Fig. 5



Terminal symbols

①	D1/P1	Control power supply terminal (COM)
②	D2/P2	Control power supply terminal (rated voltage Lo)
③	D3/P3	Control power supply terminal (rated voltage Hi)
④	J1/UC1	UVT coil connecting terminal
⑤	J2/UC2	UVT coil connecting terminal

Remarks: 1. When the UVT is used at the rated voltage Lo, connect the control voltage to D1/P1 and D2/P2 terminals.
When the UVT is used at the rated voltage Hi, connect the control voltage to D1/P1 and D3/P3 terminals.
(Ex.) 100 to 110/120 to 130 V AC
(Rated voltage Lo/rated voltage Hi)
2. When the UVT voltage module is installed on the body (standard), the UVT is supplied with J1/UC1 and J2/UC2 terminals connected with the UVT coil.
3. When the UVT is installed on the left pole side, the UVT module terminal positions are reversed (on the power supply and load sides). Carefully connect the terminals.

Fig. 6

Table 13 Installation on right pole side

Model	Reference drawing	Variable dimensions A	Variable dimensions B
NF50-SVFU	Fig. 1 Fig. 5	11	7.5
NF32-SV, NF63-CV/SV/HV		20.5	7.5
NF100-CVFU		20.5	7.5
NF125-CV/SV/HV		20.5	7.5
NF125-SVU/HVU		41.5	7.5
NF125-UV		81.5	7.5
NF125-SEV/HEV/RGV, NF250-CV/SV/HV/RGV/SEV/HEV NF125-SGV/LGV/HGV, NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV		38	7.5
NF250-SVU/HVU		48	7.5
NF250-UV		113	7.5
NF225-CWU	Fig. 3 Fig. 6	25.5	7.5
NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW, NF400-SWU/HWU		67.5	41.5
NF400-UEW(3P)		107.5	138.5
NF800-CEW/SDW/SEW/HEW/REW, NF630-SWU/HWU		76.5	41.5
NF400-UEW(4P), NF800-UEW		123.5	138.5
NF1000-SEW, NF1250-SEW, NF-1600-SEW		161	63

Table 14 Installation on left pole side

Model	Reference drawing	Variable dimensions C	Variable dimensions D
NV125-CV/SV/HV	Fig. 2	20.5	7.5
NV125-SEV/HEV, NV250-CV/SV/HV/SEV/HEV	Fig. 5	38	7.5
NF400-CW/SW/SEW/HEW/REW	Fig. 4 Fig. 6	67.5	41.5
NF630-CW/SW/SEW/HEW/REW			
NV400-CW/SW/SEW/HEW/REW			
NV630-CW/SW/SEW/HEW			
NF400-ZCW/ZSW/ZEW			
NF400-SWU/HWU			
NF400-UEW(3P)		107.5	138.5
NF800-CEW/SDW/SEW/HEW/REW		76.5	41.5
NV800-SEW/HEW, NF630-SWU/HWU			
NF400-UEW(4P), NF800-UEW		123.5	138.5

Lead Wire Drawing

Lead wire lateral drawing … Available to all models

Note *1 Except for BH, BH-P, BH-S, BH-PS, BH-D6, BH-D10, BH-DN, BV-D, BV-DN and KB-D.

Remark: 1. Although the following models are applicable to lead wires drawn laterally, they are normally applicable to installation in close contact with the circuit breaker side faces. (The circuit breaker side faces have grooves.)

NF32-SV, NF63-CV/SV/HV~NF250-CV/SV/HV/UV
NF125-SEV/HEV, NF250-SEV/HEV, NF125-RGV
NF250-RGV, NF125-SGV/LGV/HGV~NF250-SGV/LGV/HGV
NV32-SV, NV63-CV/SV/HV~NV250-CV/SV/HV
NV125-SEV/HEV, NV250-SEV/HEV
NF50-SVFU, NF100-CVFU, NF125-SVU/HVU, NF250-SVU/HVU, NF225-CWU
NV100-CVFU, NV125-SVU/HVU
NV250-SVU/HVU

(When a 4-pole model among the above models has accessories installed on the right pole side, the lead wires are 400 mm long.)

Lead wires drawing to load

Table 15

Model applicable to lead wire drawing to load	(only front connection type)
NF30-CS	

Specifications for lead wires

Table 16

Applicable model	Kind of lead wire	Lead wire thickness	Lead wire length	Example of ring mark
NF30-CS	Heat-resistant wire	0.4mm²	450mm	98/ALa (Red), 96/ALb (Blue) 95/ALc (Gray), 14/AXa (Brown) 12/AXb (Black), 11/AXc (White) C1/S1 (Red), C2/S2 (Red) J1/UC1 (White), J2/UC2 (White) A terminal symbol is indicated on each lead wire with a ring mark.
1000A frame or above		0.75mm²		
30 to 800A frames except above models		0.5mm²		

Lead Wire Terminal Block

(1) Vertical lead wire terminal block (SLT)

The lead wire terminal blocks for plug-in terminal blocks are available (P-LT).
The drilling size of these terminal blocks differs from the standard size. Consult us for details.
For a flush plate type circuit breaker, a terminal block will be installed on the circuit breaker rear face. (Specify as FP-LT.)

Note *1 When the circuit breaker body is equipped with internal accessories and electrical operation device of motor-driven type (2) or spring charge type (2), the circuit breaker is normally provided with a lead wire terminal block.

MCCB

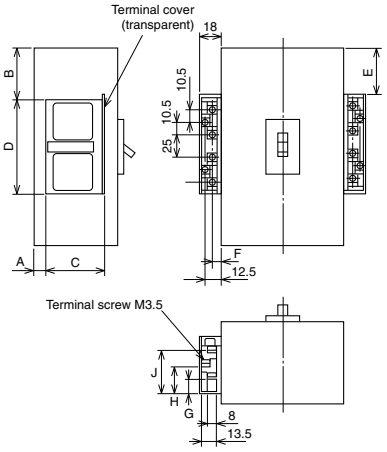


Table 17-1 Table of variable dimensions

Model	A	B	C	D	E	F	G	H	J
NF30-CS (*1)	4	4.5	44.5	86.5	4.5	7	10	22	34
NF32-SV, NF63-CV/SV/HV	7	26.5	54	86.5	26.5	7	14	26	38
NF125-CV/SV/HV	7	26.5	54	86.5	26.5	7	14	26	38
NF125-UV	7	87.5	54	86.5	87.5	7	14	26	38
NF250-UV	7	119	54	86.5	119	7	14	26	38
NF125-SEV/HEV/RGV, NF250-CV/SV/HV/SEV/HEV/RGV NF125-SGV/LGV/HGV, NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV	7	44	54	86.5	44	7	14	26	38
NF50-SVFU	7	27.5	54	86.5	27.5	7	14	26	38
NF100-CVFU	7	28.5	54	86.5	28.5	7	14	26	38
NF125-SVU/HVU	7	47.5	54	86.5	47.5	7	14	26	38
NF225-CWU	7	37	54	86.5	37	7	14	26	38
NF400-CW/SW/SEW/HEW/REW, NF400-SWU/HWU NF630-CW/SW/SEW/HEW/REW	41	79.5	54	86.5	79.5	7	14	26	38
NF800-CEW/SDW/SEW/HEW/REW, NF630-SWU/HWU		88.5	54	86.5	88.5	7	14	26	38
NF1000-SEW, NF1250-SEW, NF1600-SEW	62.5	173	54	86.5	173	7	14	26	38
NF400-UEW(3P) (*1)	138	119.5	54	86.5	119.5	7	14	26	38
NF400-UEW(4P), NF800-UEW (*1)		135.5	54	86.5	135.5	7	14	26	38

Note *1 The terminal positions are different from those shown in the left figure. Consult us for details.
Remark: 1. Terminal screw tightening torque: M3.5 … 0.9 to 1.2 N·m

ELCB

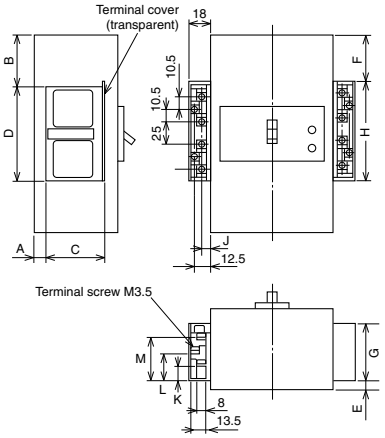


Table 17-2 Table of variable dimensions

Model	A	B	C	D	E	F	G	H	J	K	L	M
NV50-SVFU	16.5	17	54	86.5	16.5	17	54	86.5	6	10.5	22.5	34.5
NV32-SV, NV63-CV/SV/HV	7	26.5	54	86.5	7	26.5	54	86.5	7	14	26	38
NV100-CVFU	7	36.5	54	86.5	7	36.5	54	86.5	7	14	26	38
NV125-CV/SV/HV	7	26.5	54	86.5	7	26.5	54	86.5	7	14	26	38
NV125-SVU/HVU	7	47.5	54	86.5	7	47.5	54	86.5	7	14	26	38
NV125-SEV/HEV, NV250-CV/SV/HV/SEV/HEV	7	44	54	86.5	7	44	54	86.5	7	14	26	38
NV250-SVU/HVU	7	54	54	86.5	7	54	54	86.5	7	14	26	38
NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW	41	79.5	54	86.5	26.5	79.5	52	92	7	14	26	38
NV800-SEW/HEW (*1)	41	88.5	54	86.5	26.5	88.5	52	92	7	14	26	38

Note *1 The terminal positions are different from those shown in the left figure. Consult us for details.
Remarks: 1. Terminal screw tightening torque: M3.5 … 0.9 to 1.2 N·m
2. The lead wire terminal block for TBL is provided on the right pole side. However, the lead wire terminal blocks for TBL of NV30-FA and NV50-FA are provided on the left pole side.

14-terminal SLT

SLT for installing three or more internal accessories on the left pole side

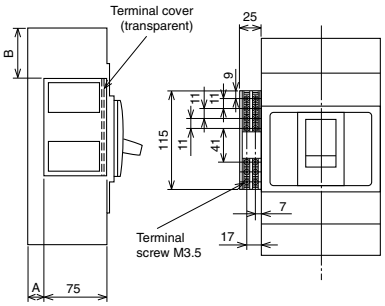


Table 17-3

Model		A	B
MCCB	ELCB		
NF400-CW/SW/SEW NF400-HEW/REW NF630-CW/SW/SEW NF630-HEW/REW	NV400-CW/SW/SEW NV400-HEW/REW NV630-CW/SW/SEW/HEW	20	60
NF400-UEW(3P)	–	117	100
NF800-CEW/SDW/SEW NF800-HEW/REW	NV800-SEW/HEW	20	69
NF400-UEW(4P), NF800-UEW	–	117	116
NF1000-SEW, NF1250-SEW NF1600-SEW	–	35	154

Remark: 1. The terminal positions are different from those shown in the left figure. Consult us for details.

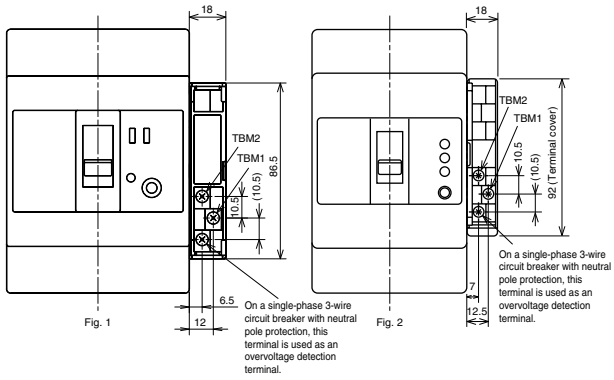
Test Button Module (TBM)

- The test button is kept pressed while control input voltage is applied to the button. (When ELCB of time delay type is used, apply voltage for 2 seconds or more.)
- The test button module is supplied with voltage through a circuit isolated from the main circuit. It can share the control sequence with SHT of a molded case circuit breaker.
- Unlike TBL, the test button modules can be connected in parallel.
- The module is normally provided with a vertical lead wire terminal block (SLT).

Table 18

Model	NV32-SV NV63-CV/SV/HV NV125-CV/SV/HV NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV NV50-SVFU NV100-CVFU NV125-SVU/HVU NV250-SVU/HVU	NV400-CW/SW NV630-CW/SW NV400-SEW~NV800-SEW NV400-HEW~NV800-HEW NV400-REW
Control input Rated voltage (V)	Compatible with 100 to 240 AC and 100 to 240 DC (DC24) (*1)	
Control input (VA)	1.5 VA or less	1 VA or less
Reference drawing	Fig. 1	Fig. 2

Note *1 Unless otherwise specified, the module will be manufactured for 100 to 240 V AC and 100 to 240 V DC.
In the case of 24 V DC, specify the voltage.
Remark: 1. The length of the lead wires to be connected to TBM1 and 2 shall be 100 m or more.



For a flush plate type with 250A frame or below, the external dimensions of the flush plate type differ from the standard dimensions.

Pre-Alarm Module (PAL)

The pre-alarm is a function to output an alarm when the load current exceeds the preset current value. It is helpful in securing continuous power supply and preventive maintenance.
It can be fitted to electronic circuit breakers with a frame size from 125 to 1600 A.

■ 125 and 250A frames

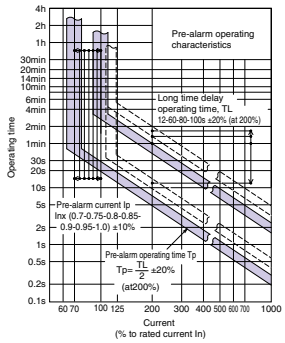
● Pre-alarm module (PAL module)

The standard modules have SLT. Other internal accessories cannot be installed on the right pole side.
A control power supply (compatible with 100 to 240 V AC and DC) is necessary. The control power supply voltage range is 85 to 246 V AC/DC, and the required volt-ampere is 5 VA.

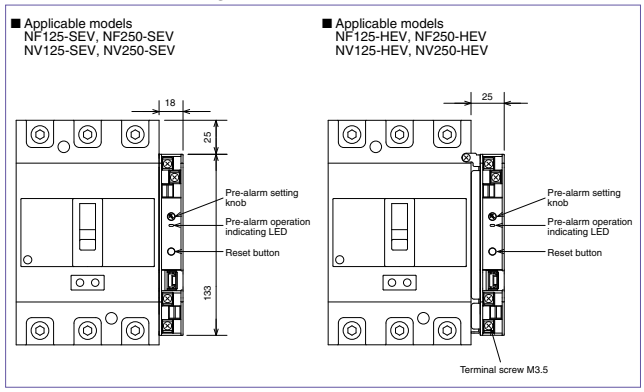
Table 19-1

Model	Switching capacity Contact output (1a)	Resetting method
NF125-SEV NF125-HEV NF250-SEV NF250-HEV NV125-SEV NV125-HEV NV250-SEV NV250-HEV	AC125V 2A DC 30V 2A AC250V 2A DC100V 0.3A	Press the reset button, or turn off the control power supply.

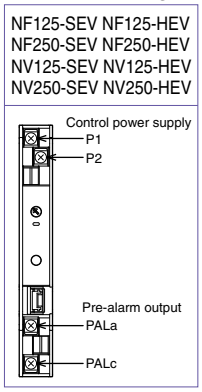
Pre-alarm characteristics



Dimensional drawing of pre-alarm module



Terminal arrangement



● Pre-alarm LED indication

When the load current exceeds the preset current value, the LED lamp on the pre-alarm module front panel starts blinking. When the pre-alarm output is given, the lamp stops blinking and turns on.

● Pre-alarm current setting (IP setting)

The pre-alarm current can be set to the rated current In × 0.7, 0.75, 0.8, 0.85, 0.9, 0.95 or 1.0 with the knob on the pre-alarm module front panel.

■ 400 A frame or above

● Solid state relay (SSR) output (PAL lead)

The lead wires are drawn out. On the right pole side, only internal accessories with lead wires drawn out can be installed. A control power supply is unnecessary.

Table 19-2

Model	Switching capacity Solid state relay (SSR) – Non-contact output	Resetting method
NF400-SEW NF400-HEW NF400-REW NF400-UEW NF630-SEW NF630-HEW NF630-REW NF800-CEW NF800-SEW NF800-HEW NF800-REW NF800-UEW NF1000-SEW NF1250-SEW NF1600-SEW NV400-SEW NV400-HEW NV400-REW NV630-SEW NV630-HEW NV800-SEW NV800-HEW	AC/DC24 to 240V 20mA	When the load current becomes lower than the preset current value, the alarm is reset.

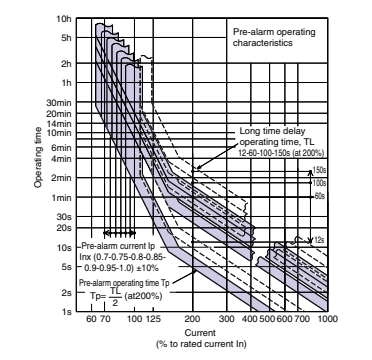
● Pre-alarm module (PAL module)

The standard modules have SLT. Other internal accessories cannot be installed on the right pole side.
A control power supply (compatible with 100 to 200 V AC) is necessary except for NF-ZEW. The control power supply voltage range is 80 to 242 V AC, and the required volt-ampere is 10 VA.

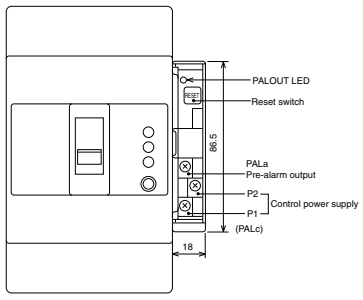
Table 19-3

Model	Switching capacity Contact output (1a)	Resetting method
NF400-SEW NF400-HEW NF400-REW NF400-UEW NF630-SEW NF630-HEW NF630-REW NF800-CEW NF800-SEW NF800-HEW NF800-REW NF800-UEW NF1000-SEW NF1250-SEW NF1600-SEW NV400-SEW NV400-HEW NV400-REW NV630-SEW NV630-HEW NV800-SEW NV800-HEW	100 V AC or 200 V AC, 2 A	Press the reset button, or turn off the control power supply.

Pre-alarm characteristics



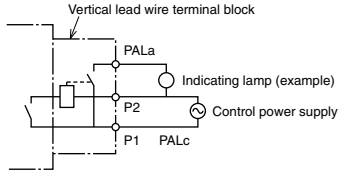
Detailed drawing of pre-alarm module



Pre-alarm module output rating

AC		
Voltage V	Current (A)	
	Resistive load	Inductive load
200	3	2
100	3	2

A control power supply (compatible with 100 to 200 V AC) is necessary. For the wiring method, see the following figure. (The control power supply voltage range is 80 to 242 V AC.) The required volt-ampere is 10 VA.



● Pre-alarm LED display (standard device)

When the load current exceeds the preset current value, the LED lamp on the circuit breaker front panel starts blinking. When the pre-alarm output is given, the lamp stops blinking and turns on.

● Pre-alarm current setting (IP setting)

The pre-alarm current can be set to the rated current In × 0.7, 0.75, 0.8, 0.85, 0.9, 0.95 or 1.0 with the knob on the circuit breaker front panel.

F-Type Operating Handle

Operating handle of breaker mount type to be installed to circuit breaker body

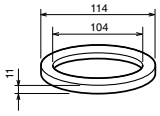
Appearance (Color: Munsell N1.5)



- The handle provides an isolating function in combination with the circuit breaker body (except F10SW and above).
- It has a safety device which prevents the circuit breaker turning on while the door is open.
- It can be locked in the OFF position. (Up to 3 commercially available padlocks (35 mm and 40 mm) can be fitted. A type which can be locked in the ON or OFF position can be manufactured. Specify the type if required.) On circuit breakers with a frame size of 1000A or above, the handle can be locked in the ON or OFF position. (If it is necessary to lock the handle only in the OFF position, specify so.)
- It is in protection class IP54 (IEC 60529). (For circuit breakers with a frame size of 1000A or above, the protection class (IEC 60529) is IP3X (IP5X when dust-proof packing is provided).

Dust-proof packing (optional)

Type name	Operating handle type name	Delivery category
PFL	F10SW~F120UR	●



Outline drawings

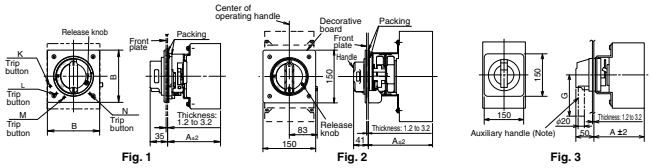
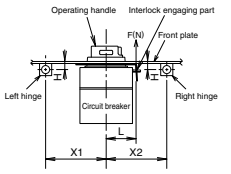


Fig. 1 Fig. 2 Fig. 3

Note Auxiliary handles are provided with F10SW, F10SW4P and F120UR as standard.
Auxiliary handles (F-HT) are provided for F-4S ~ F-6SUL as option.

Center of hinge and breaker



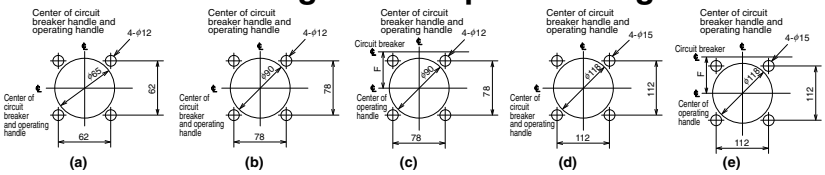
- The left drawing shows the relationship between the hinges and circuit breaker viewed from the load side of the circuit breaker.

Center of hinge and circuit breaker

	Hinge on left side		Hinge on right side	
	H	X_1	H	X_2
For 30 to 250 A frames	0 or more	(5H+85) or more	Less than 10	170 or more
			10 or more	(5H+120) or more
For 400 to 800 A frames	0 or more	(5H+85) or more	0 or more	(4H+120) or more
For 1000 to 1600 A frames	0 or more	(8H+150) or more	0 or more	(4H+120) or more

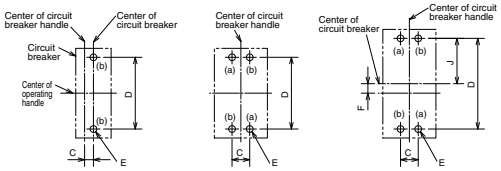
Remarks: 1. The handle is opened and closed in the projection area of the handle and does not run over the projection area of the circuit breaker (except when the auxiliary handle is provided.)
2. When the operating handle is fitted to NV, the test button cannot be pressed easily. If necessary, use a circuit breaker with TBL or TBM. When using an Earth Leakage Alarm Breaker, use the externally resetting type (ECA-SLT RST) or automatically resetting type (ARS).

Dimensional drawings of front plate drilling



(a) (b) (c) (d) (e)

Dimensional drawings of circuit breaker mounting holes



(f) (g) (h)

Door lock withstand load

	F(N)	L(mm)
F-05~F-2	500	50
F-4~F-8		68

Table 20 Summary of dimensions

Type name	Door opening position: OFF position	Door opening position: Reset position	Applicable model: MCCB	MCCB: Number of poles	Applicable model: ELCB	ELCB: Number of poles	Reference drawing: Dimensional drawing	Reference drawing: Drilling plan	A (*1)	B	C	D	E	F	G	J	Trip button position (*4)	Mounting screw
F-05SV2 F-05SVE2	–	○	NF32-SV NF63-CV, NF63-SV, NF63-HV	2P	–	–	Fig. 1	f	105	104	13	111	M4 screw or ϕ5	–	–	–	N	(a) Circuit breaker mounting screw (2 pcs.) (b) Circuit breaker handle mounting screw (2 pcs.) F-05SV2 F-05SVE2 F-1SV2 F-1SVE2 F-05SRUL2 F-03SVUL2 F-05SVUL2 Only the screws (b) are used for the following models.
F-05SV F-05SVE (*2)	–	○	NF32-SV NF63-CV, NF63-SV, NF63-HV	3P • 4P	NV32-SV NV63-CV, NV63-SV, NV63-HV	2P • 3P		g			25						L	
F-1SV2, F-1SVE2	–	○	NF125-CV, NF125-SV	2P	–	–		f	105		15			–		–	N	
F-1SV F-1SVE	–	○	NF125-CV, NF125-SV NF125-HV	3P • 4P 2P • 3P • 4P	NF125-CV, NV125-SV, NV125-HV	3P • 4P		g			30						L	
F-1UV, F-1UVE	–	○	NF125-UV	2P • 3P • 4P	–	–		c				172		31		86	L	
F-2SV F-2SVE	–	○	NF125-SEV, NF125-HEV, NF125-RV NF125-SGV, NF125-LGV, NF125-HGV NF160-SGV, NF160-LGV, NF160-HGV NF250-SGV, NF250-LGV, NF250-HGV NF250-CV, NF250-SV, NF250-HV NF250-SEV, NF250-HEV, NF250-RV	2P • 3P • 4P	NV125-SEV, NV125-HEV NV250-CV, NV250-SV, NV250-HV NV250-SEV, NV250-HEV	3P • 4P		b	107		35	126					K	
F-2UV, V-2UVE	–	○	NF250-UV	2P • 3P • 4P	–	–		c				201		38		100.5	K	
F-1SVUL	–	○	NF125-SVU, NF125-HVU	3P	NV125-SVU, NV125-HVU	3P		h	105		30	123		6		61.5	L	
F-2SVUL	–	○	NF250-SVU, NF250-HVU	3P	NV250-SVU, NV250-HVU	3P		b	107		35	126					K	
F-03SVUL2	–	○	NF50-SVFU	2P	NV50-SVFU	2P		a	105	80	9	82.5		–		–	M	
F-03SVUL	–	○		3P		3P		g			18							
F-05SVUL2	–	○	NF100-CVFU	2P	–	–		b		104	13	111					N	
F-05SVUL	–	○		3P	NV100-CVFU	3P		g			25						L	
F-2SUL	–	○	NF225-CWU	3P	–	–		b	107	104	35	126					–	
F-4S F-4SE	–	○	NF400-CW, SW, SEW, HEW, REW NF630-CW, SW, SEW, HEW, REW	2P, 3P, 4P	NV400-CW, SW, SEW, HEW, REW NV630-CW, SW, SEW, HEW	3P, 4P	Fig. 2	d	183	–	44	194	M6 screw or ϕ7	–	–	–	–	(a)(b) Circuit breaker mounting screw (4 pcs.)
F-4U F-4UE	–	○	NF400-UEW	3P	–	–		e	280			234		20				
F-8S F-8SE	–	○	NF800-CEW, SDW, SEW NF800-HEW, REW	2P, 3P, 4P	NV800-SEW, HEW	3P		d	183		70	243		–				
F-8U F-8UE	–	○	NF800-UEW NF400-UEW(4P)	3P, 4P	–	–		e	280			290		23.5				
F-4SUL	–	○	NF400-SWU/HWU	3P	–	3P		d	183		44	194		–				
F-6SUL	–	○	NF630-SWU/HWU	3P	–	–					70	243						
F10SW (*3)	–	○	NF1000-SEW NF1250-SEW/SDW NF1600-SEW/SDW	2P, 3P	–	–	Fig. 3	d	221	–	70	375	M8 screw or ϕ10	–	200			
F10SW4P (*3)				4P				g										

Notes *1 The dimensions for the front connection type are shown. On some models of the rear connection type and plug-in type, the reference surface for mounting the circuit breaker may change.
*2 For the 4-pole plug-in type, a special handle is required. Consult us for details.
*3 If a handle which can be locked only in the OFF position is required, specify so.
*4 The circuit breaker can be tripped by operating the trip button while the door is open.
*5 Do not remove the sponge packing used to secure the protection class IP51. Fit the supplied packing without fail.
*6 The handle cannot be used when the circuit breaker is installed on IEC 35-mm rails.

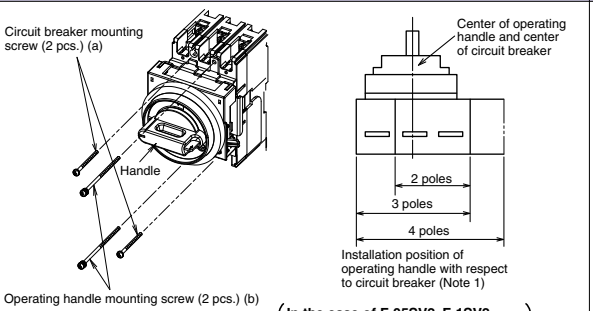
Remarks: 1. The handles with E in their model names are designed for emergency stop devices. Their delivery category is ●.
2. The standard handles are Reset Open Type which can open the doors only when they are reset to open. OFF Open type handles which can open the doors when they are in the OFF position can be manufactured to order.
3. A handle which can be operated and can indicate the ON and OFF positions in the same manner as the standard models even if the circuit breaker is installed horizontally can be manufactured to order.
4. F10SW and higher models do not conform to the isolation function.
5. Handles which are opened and closed in the OFF position can be opened also in the reset position.

●Installation procedure For details, please refer to Operating Handle Installation Manual supplied with the product.

① Installation to a breaker Install the operating handle to the circuit breaker in accordance with the following procedure.

Installation procedure

250A frame and below

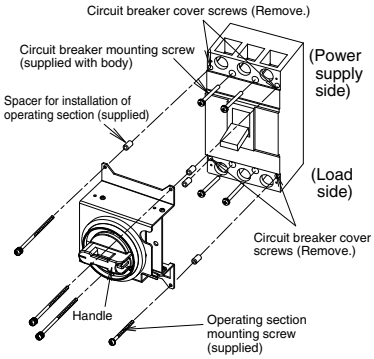


(Installation procedure)
① Install the circuit breaker on the panel with the two circuit breaker mounting screws through the holes (a).
② Install the operating handle with the supplied two operating handle mounting screws through the holes (b).

(In the case of F-05SV2, F-1SV2, F-05SRUL2, F-05SUL2 and F-1SUL2

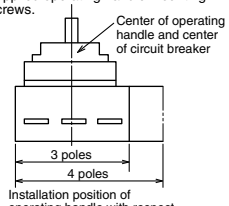
Tighten the circuit breaker and operating handle together with the supplied two operating handle mounting screws.

400 to 1600A frames



(In the case of F-4S to F-6SUL)
The operating handle mounting screws are tapping screws without washers or spring washers.

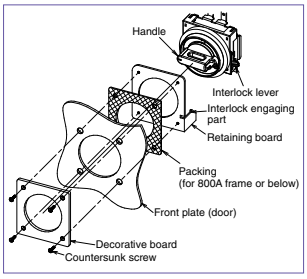
(Installation procedure)
① Remove the circuit breaker cover screws in the same positions as the operating handle mounting holes.
② Install the circuit breaker with the four circuit breaker mounting screws.
③ Fit the spacer(s) for installation of operating handle between the circuit breaker and operating handle. (The number of the spacers varies depending on the model.)
④ Install the operating handle with the supplied operating handle mounting screws.



Note *1 In the case of F-05SRUL2, the center of the operating handle is the same as the center of the circuit breaker.

② Installation of decorative board and retaining board

Drill holes in the door according to the drilling size shown on the previous page, and tighten the decorative board and retaining board with the supplied countersunk screws. In the case of 800A frame or below, fit the supplied packing to the position shown right.



●Door locking mechanism

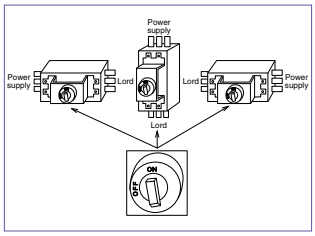
The panel door can be opened only when the operating handle is operated to open (reset). (On F-4S to F10SW, the door lock is held in the released state even if the handle is returned to OFF.) The door can be opened when the handle is in the ON position if the release knob is operated with a tool.

●Operation locking mechanism

Circuit breakers with a frame size of 800A or below can be locked by setting the handle in the OFF position. (Operating handles which can lock circuit breakers in the ON or OFF position can be manufactured.) Operate the locking part, and lock the handle with padlocks. Up to three padlocks can be fitted.
Lockout hasps (scissors locks) can be used.
If the circuit breaker trips even when the operating handle is locked in the ON position, also the operating handle indicates that it has tripped.
[F-2SUL or below: Only when one 35-mm padlock (weighing 70 g or less) is used
F-4S or above: Only when one 40-mm padlock (weighing 100 g or less) is used]
To 800A frame or below, padlocks with dimension C of 3 mm to 8 mm can be applied.
For 1000A or above, padlocks with dimension of 3 mm to 6 mm can be applied. (When using padlocks of 3 mm or less, please consult us.)

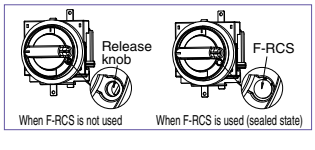
●Circuit breaker installation direction (except UL 489 listed circuit breakers)

We can supply circuit breakers on which the handles and their ON and OFF positions are in the same directions as on vertically installed circuit breakers even when they are installed horizontally. The door drilling size is identical. If you intend to install an operating handle on a horizontally installed circuit breaker, specify "Y" (horizontal installation with power supply on the left) or "Z" (horizontal installation with power supply on the right) at the end of the model name. (Ex.: F-4S Y)



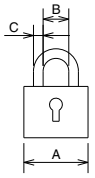
●Sealing of release knob

The use of an optional part, Release Protection "F-RCS", can prevent the panel door being opened by operating the release knob. (800A frame or below)



●Operation Lock Devices

(1) Padlock



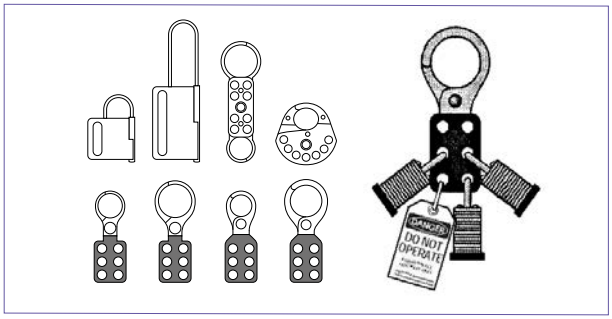
Padlock Dimensions

Use commercially available padlocks. (mm)

Applicable model	A (Nominal size)	B	C
All models	35	19	5
	40	22 or 23	5.5

Dimension C: Maximum 8mm.

(2) Lockout Devices (Scissors Lock)



●How to order

For 800A frame or below, specify the following specification symbols together with the model name.
· Operation lock: LF ····· Lock in OFF position
· Operation lock: LN ····· Lock in ON or OFF position
· Door opening: DR ····· Reset to open
· Operation lock: DF ····· Open in OFF position
· Installation direction: Blank ··· Power supply upward
· Installation direction: Y ····· Power supply on left
· Operation lock: Z ····· Power supply on right
For a standard product with a frame size of 1000A or above, specify the model name. When it is required to enable the operation lock only in the OFF position, specify the model name and "only lock in OFF position."
If you intend to seal the release knob, place an order for the release protection. (Lot: 10 pcs.)

●Interpretation of model name

(1) For 800A frame or below

F	–	1	SV	UL	E	2
1)		2)	3)	4)	5)	6)

1) F: Operating handle type name
2) 1: Circuit breaker group (0.5, 1, 2, 4, 6 or 8)
3) SV: Classification of circuit breaker (S, SV, H, U, UV, SR or SG)
4) UL: Blank···General product UL···UL 489 listed product
5) E: Blank···Standard E···For emergency stop
6) 2: Blank···3P or 4P 2···2P

(2) For 1000A frame or above

F	10	SW	4P
1)	2)	3)	4)

1) F: Operating handle type name
2) 4: Circuit breaker A frame (10 or 120)
3) SW: Series name
4) 4P: Number of poles (4P) * Not indicated for 3P

V-Type Operating Handle

Operating handle of door mount type consisting of operating section to be mounted on circuit breaker body and operating handle on panel door

Appearance (Color: Munsell N1.5)



- The handle provides an isolation function in combination with the circuit breaker body.
- Conforming to the safety regulations of EN Standard (EN 60204-1)
- Protection class (IEC 60529) IP65 as standard
- The handle can be locked only in the OFF position with up to three commercially available padlocks (35 mm or 40 mm).
- The panel door can be opened in the OFF position. In the ON and trip positions, the panel door is locked and cannot be opened. However, the door can be opened even in the ON and trip positions by operating the release part with a tool.

Outline drawings

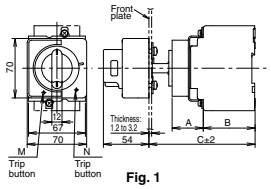


Fig. 1

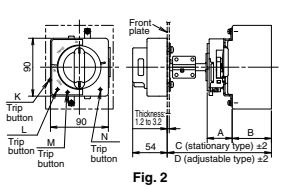


Fig. 2

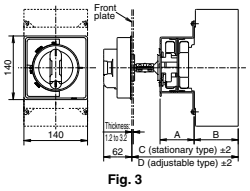
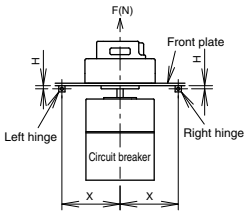


Fig. 3

Note Auxiliary handles (F-HT) are provided for V-4S ~ V-6SUL as option.

Center of hinge and breaker

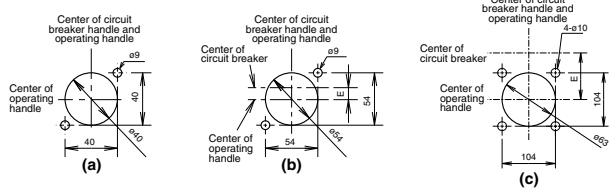


Relationship between hinges and circuit breaker viewed from load side of circuit breaker

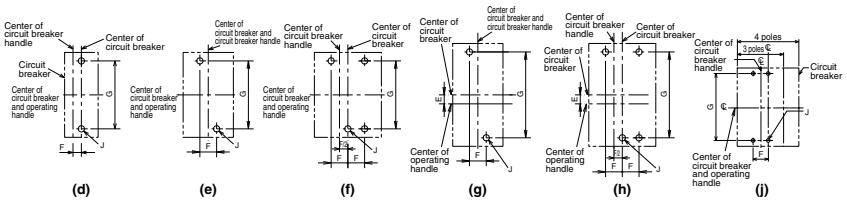
	H	X
For 30 to 250 A frames	0 or more	5H+100 or more
For 400 to 800 A frames		8H+150 or more

* The above figure shows the relationship viewed from the load side.

Dimensional drawings for front plate drilling



Dimensional drawings of circuit breaker mounting holes



Door lock withstand load

	F(N)
30 to 800A frames	200

Table 21 Summary of dimension

Type name		Applicable model				Reference drawing			Dimensions (mm)									Trip button position (*5)
Stationary type	Adjustable type	MCCB	Number of poles	ELCB	Number of poles	Dimensional drawing	Drilling plan		A	B	Stationary type C	Adjustable type(*2) D (min)	Adjustable type(*2) D (max)	E	F	G	J	
V-05SV2 V-05SVE2	(*1) Adjusting unit V-AD3S is mounted on stationary type.	NF32-SV NF63-CV, NF63-SV, NF63-HV	2P	–	–	Fig. 2	b	d	39	61	125	–	–	–	12.5	111	M4 screw or ϕ5	N
V-05SV V-05SVE		NF32-SV NF63-CV, NF63-SV, NF63-HV	3P	NV32-SV NV63-CV, NV63-SV, NV63-HV	2P, 3P			e				162	300	–	25			L
			4P	–	–													
V-1SV2, V-1SVE2		NF125-CV, NF125-SV	2P	–	–			d				–	–	–	15			N
V-1SV V-1SVE		NF125-CV, NF125-SV	3P	NV125-CV, NV125-SV NV125-HV	3P			e						–				
			4P		4P			f										
		NF125-HV	2P, 3P	–	–			e							30			L
			4P					f										
V-1UV V-1UVE		NF125-UV	2P, 3P	–	–			g	39					30.5		172		
			4P					h										
V-2SV V-2SVE		NF125-SEV, NF125-HEV, NF125-SGV NF125-LGV, NF125-HGV, NF125-RGV NF160-SGV, NF160-LGV, NF160-HGV NF250-CV, NF250-SV, NF250-HV NF250-SGV, NF250-LGV, NF250-HGV NF250-SEV, NF250-HEV, NF250-RGV	2P, 3P	NV125-SEV, NV125-HEV NV250-CV, NV250-SV, NV250-HV NV250-SEV, NV250-HEV	3P			e	41			162	300	–	35	126		K
			4P		4P			f										
V-2UV V-2UVE		NF250-UV	2P, 3P	–	–			g						37.5		201		
			4P					h										
V-03SVUL2	–	NF50-SVFU	2P	NV50-SVFU	2P	Fig. 1	a	d	39	61	125	–	–	–	9	82.5	M4 screw or ϕ5	M
V-03SVUL			3P		3P			e							18			N
V-05SVUL2	(*1) Adjusting unit V-AD3S is mounted on stationary type.	NF100-CVFU	2P	–	–	Fig. 2	b	d	39	61	125	–	–	–	12.5	111		N
V-05SVUL			3P	NV100-CVFU	3P			e				162	300	–	25			L
V-1SVUL		NF125-SVU, NF125-HVU	3P	NV125-SVU, NV125-HVU	3P	Fig. 2	b	g	39	61	125	162	300	6	30	123		L
V-2SVUL		NF250-SVU, NF250-HVU	3P	NV250-SVU, NV250-HVU	3P										35	126		K
V-2SUL		NF225-CWU	3P	–	3P			e	41	61	125	162	300	–	35	126		–
V-4S V-4SE	(*1) Adjusting unit V-AD3L is mounted on stationary type.	NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW	2P, 3P, 4P	NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW	3P, 4P	Fig. 3	c	j	76	97	191	233	300	–	44	194	M6 screw or ϕ7	–
V-4U V-4UE		NF400-UEW	3P	–	–			h		194	288	330	397	20		234		
V-8S V-8SE		NF800-CEW/SDW/SEW/HEW/REW	2P, 3P, 4P	NV800-SEW/HEW	3P			j		97	191	233	300	–	70	243		
V-4SUL		NF400-SWU/HWU	3P	–	3P										44	194		
V-6SUL		NF630-SWU/HWU	3P	–	–										70	243		

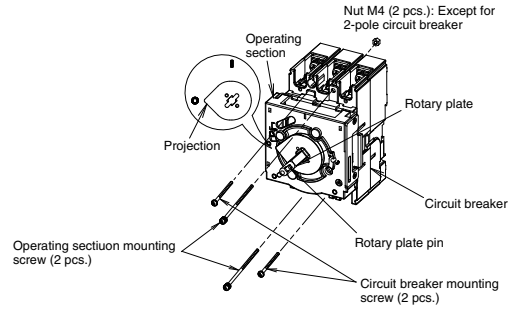
Notes
*1 For the adjustable type, purchase the optional adjusting unit V-AD3S or V-AD3L.
*2 The dimensions of the adjustable type models provided with the adjusting unit V-AD3S or V-AD3L are shown.
*3 When using the operating handle for a plug-in type model with a frame size of 250A or below, specify so.
*4 The dimensions on the front connection type are shown. For the rear connection and plug-in types, separately consult us.
*5 The circuit breaker can be tripped by operating the trip button while the door is open. (The trip button position varies depending on the model.)
*6 The handle cannot be used when the circuit breaker is installed on IEC 35-mm rails.

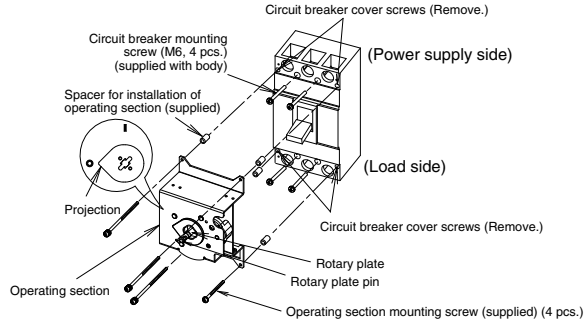
Remarks:
1. The products whose model names contain E are designed for emergency stop. The delivery category is ●. That of V-05SVE is ●.
2. When the operating handle is fitted to NV, the test button cannot be pressed easily. If necessary, use a circuit breaker with TBL or TBM. When using an Earth Leakage Alarm Breaker, use the externally resetting type (ECA-SLT) or automatically resetting type (ARS).

●Installation procedure For details, please refer to Operating Handle Installation Manual supplied with the product.

① Installation to a breaker Install the operating handle to the circuit breaker in accordance with the following procedure.

	250A frame and below	400 to 800A frames
Installation procedure	**(Installation procedure)** ① Operating handle for 3- or 4-pole circuit breaker Set the rotary plate of the operating section to the OFF (symbol O) position, and fit the plate to the circuit breaker with the supplied operating section mounting screws and nuts. Install the circuit breaker to the panel with the circuit breaker mounting screws (2 pcs.). ② Operating handle for 2-pole circuit breaker Install the operating section together with the circuit breaker to the panel with the supplied operating section mounting screws (2 pcs.)	**(Installation procedure)** ① Remove the circuit breaker cover screws (4 pcs.) in the same positions as the operating handle mounting holes. ② Install the circuit breaker with the circuit breaker mounting screws (4 pcs.). ③ Fit the supplied operating section mounting spacers (4 pcs.) between the circuit breaker and operating handle. ④ Set the rotary plate to the OFF (symbol O) position, and install the operating section to the circuit breaker with the supplied operating section mounting screws.



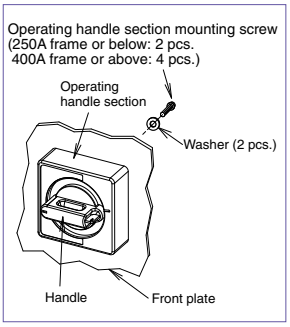


② Installation of operating handle section

Drill a hole in the door according to the dimensional drawing for front plate drilling given on the previous page, and install the operating handle section in accordance with the following procedure.

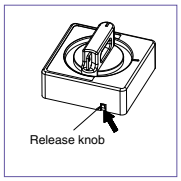
- Tighten the operating handle section from the back of the front plate. Temporarily tighten the screws to center the section in the hole.
- Set the handle of the operating handle section to the OFF state, tighten the front plate, and make sure that the handle can be smoothly turned to the ON and OFF positions.

Turn the handle to the right and left in the OFF state, and make sure that OFF is displayed. If OFF is not displayed, move the operating handle section up and down and to the right and left for adjustment. (Take care that the operating handle section is in parallel with the circuit breaker.) Then, open the front plate, and finally tighten the screws.



●Door locking mechanism

The operating handle is provided with an interlock mechanism to prevent the door opening in the ON and TRIP positions. In the OFF position, the door can be opened. However, the door can be opened in the ON or TRIP position by pressing the release knob in the arrow direction with a tool (3 mm wide and 1.8 mm thick).



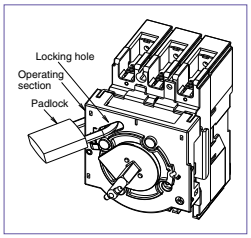
●Operation locking mechanism

① Operating handle section

Operation lock can be set only in the OFF Position. Up to three commercially available padlocks (A = 35 or 40 mm) can be fitted. Lockout hasps (scissors locks) can be used. When the operating handle section is locked with padlocks, also the door is locked.

② Operating section

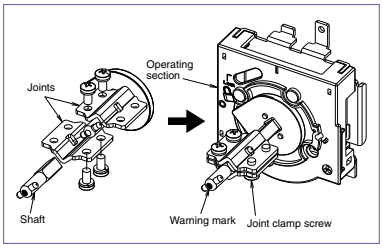
The operating section can be locked so that the circuit breaker will not be turned on carelessly when the inside of the panel is inspected with the panel door open. Fit a padlock through the hole in the operating section of the operating handle.



●Adjusting unit

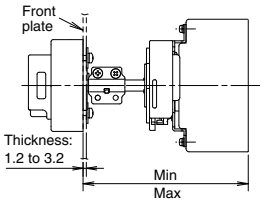
The height from the circuit breaker mounting surface to the panel door can be adjusted by fitting the optional adjusting unit V-AD3S or V-AD3L. Cut the shaft of the adjusting unit according to the height.

Note The adjusting unit is not applicable to 2-pole external type circuit breakers. If it is used on a 2-pole external type circuit breaker, the positions may not be correctly displayed.

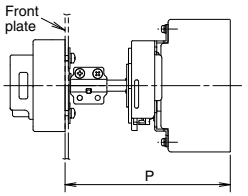


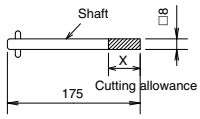
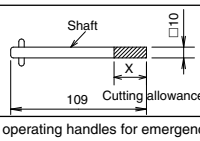
Make adjustments with the adjusting unit as stated below.

①External dimension drawing



②Calculation of shaft cutting allowance



Type name	Dimensions (mm) Min	Dimensions (mm) Max	Cutting allowance	Calculation
V-05SV V-05SVUL V-1SV V-1SVUL V-1SUL V-2SV V-2SVUL V-2SUL	162	300		(Cutting allowance)(P max)(panel size) X = 300 mm - P
V-2SGUL	180	318		
V-4S V-8S	233	300		
V-4SUL V-6SUL				

Note The unit is applicable to operating handles for emergency stop (E).

●Padlocks

The user must prepare padlocks.
The dimensions of the padlocks are the same as those shown on page 752.

●How to order

Specify the model name of the operating handle.
For adjustable type, place an order for the adjustment unit. (One lot includes 1 pc.)
250A frame or below: V-AD3S
400 to 800A frames: V-AD3L

●Interpretation of model name

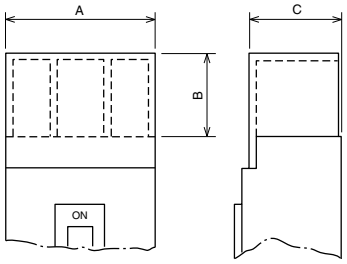
(1) For 800A frame or below

V	–	1	S	UL	E	2
1)		2)	3)	4)	5)	6)

1) V: Operating handle type name
2) 1: Circuit breaker group (0.5, 1, 2, 4, 6 or 8)
3) S: Classification of circuit breaker (S, SV, H, U, UV)
4) UL: Blank···General product UL···UL 489 listed product
5) E: Blank···Standard E···For emergency stop
6) 2: Blank···3P or 4P 2···2P

Terminal Covers

The terminal covers are used to avoid exposure of live parts. Many kinds of terminal covers, including large terminal covers (TC-L), small terminal covers (TC-S), transparent terminal covers (TTC), rear terminal covers (BTC) and plug-in terminal covers (PTC), for various models and applications are available, and they are helpful. (The terminal covers cannot be fitted to electrically operated circuit breakers of spring charged type (2) and motor-drive type (2). The standard terminal covers can be used for the spring charged type (1). For the motor-drive type, special terminal covers can be manufactured. Consult us for details.)



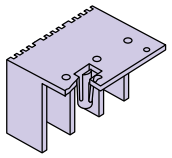
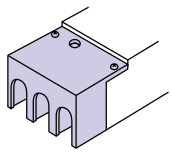
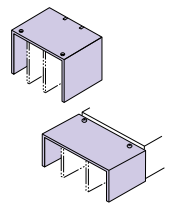
TC-L TC-S TTC

●Quick terminal covers

These covers are very convenient because they can be fitted only by inserting them into the mounting holes in the circuit breaker body. To remove the terminal cover, shift the projections of the terminal cover with the tip of a slotted screwdriver or finger, and draw it out.

●Table of variable dimensions

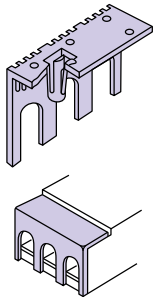
Table 22 Large terminal covers (TC-L)

Type name	Color	Number of poles of circuit breaker	Applicable model MCCB	Applicable model ELCB	Dimensions (mm) A	B	C	Contents Number of covers	Cover mounting screw	Sealing plate	Appearance	Remarks
TCL-03CS2W	White	2	NF30-CS	– (*1)	43.5	25	30.5	2	–	2		
TCL-03CS3W	White	3		–	67	25	30.5	2	–	2		
TCL-05SV2 (*2)(*8)	White	2	NF32-SV NF63-CV/SV/HV	–	50	25	65.5	2	–	2		
TCL-05SV2L (*2)(*9)	White	2	NF32-SV NF63-CV/SV/HV	–	50	40	65.5	2	–	2		
TCL-05SV3 (*3)(*8)	White	3	NF32-SV NF63-CV/SV/HV	NV32-SV, NV63-HV	75	25	65.5	2	–	2		
	White	2, 3	–	NV63-CV/SV								
TCL-05SV3L (*3)(*9)	White	3	NF32-SV, NF63-CV/SV/HV	NV32-SV, NV63-HV	75	40	65.5	2	–	2		
	White	2, 3	–	NV63-CV/SV								
TCL-05SV4 (*3)	White	4	NF63-SV/HV	–	100	25	65.5	2	–	2		
TCL-1SV2 (*2)	White	2	NF125-CV/SV	–	60	40	65.5	2	–	2		
TCL-1SV3 (*3)	White	3	NF125-CV/SV	NV125-CV/SV/HV	90	40	65.5	2	–	2		
	White	2, 3	NF125-HV/UV	–								
TCL-1SV4 (*3)	White	4	NF125-SV/HV/UV	NV125-SV/HV	120	40	65.5	2	–	2		
TCL-2SV3 (*3)(*10)	White	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	40	65.5	2	–	2		
	White	3	(*6)									
TCL-2SV3L (*3)(*11)	White	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	50	65.5	2	–	2		
TCL-2SV4 (*3)(*5)	White	4	NF250-SV/HV/UV NF250-SEV/HEV NF125-SEV/HEV NF225-SWM (*6)	NV250-SV/HV NV250-SEV/HEV NV125-SEV/HEV	140	40	65.5	2	–	2		
TCL-4SW3 (*3)	White	2, 3	NF400-CW/SW/SEW NF630-CW/SW/SEW	NV400-CW/SW/SEW NV630-CW/SW/SEW	171	110	99.5	2	–	2	Quick type The cover can be sealed with the sealing plate.	
	White	3	NF400-SEP with MDU (*7)	–								
			NF400-UEW (*4)	–	171	110	132.5/196.5	2	–			
TCL-4SW4 (*3)	White	4	NF400-SW/SEW/HEW NF630-SW/SEW NF400-SEP with MDU (*7)	NV400-SEW/HEW NV630-SEW	240	110	105	2	6	–		Use in combination with insulating barrier.
TCL-8SW3 (*3)	White	2, 3	NF800-CEW/SDW/SEW/HEW/REW	NV800-SEW/HEW	224	155	103.5	2	4	–		
	White	3	NF600-SEP with MDU/HEP with MDU (*7) NF800-SEP with MDU/HEP with MDU (*7)	–								
TCL-8UW3	Transparent	3	NF800-UEW (*4)	–	220	155	146/194.5	2	4	–		
TCL-8SW4 (*3)	White	4	NF800-SEW/HEW NF600-SEP with MDU/HEP with MDU (*7) NF800-SEP with MDU/HEP with MDU (*7)	–	294	155	103.5	2	6	–		
TCL-8UW4	Transparent	4	NF400-UEW, NF800-UEW (*4)	–	290	155	146/194.5	2	6	–		
TCL-10SW3	Transparent	3	NF1000-SEW NF1250-SEW/SDW	–	220	150	139	2	4	–		
TCL-10SW4	Transparent	4	NF1000-SEW NF1250-SEW/SDW	–	290	150	139	2	4	–	Screw type	
TCL-03SVU2 (*3)	White	2	NF50-SVFU	NV50-SVFU	36	30	65.5	2	–	–	Quick type (Remove the existing cover from the body, and fit the terminal cover.)	
TCL-03SVU3 (*3)	White	3	NF50-SVFU	NV50-SVFU	54	30	65.5	2	–	–		
TCL-05SVU2 (*2)(*8)	White	2	NF100-CVFU	–	50	25	65.5	2	2	–	Screw type	
TCL-05SU2L (*2)(*9)	White	2	NF100-CVFU	–	50	40	65.5	2	2	–		
TCL-05SVU3 (*3)(*8)	White	3	NF100-CVFU	NV100-CVFU	75	25	65.5	2	2	–		
TCL-05SVU3L (*3)(*9)	White	3	NF100-CVFU	NV100-CVFU	75	40	65.5	2	2	–		
TCL-1SVU3 (*3)	White	2, 3	NF125-SVU	–	90	40	65.5	2	2	–	Screw type (Remove the existing cover from the body, and fit the terminal cover.)	
		3	NF125-HVU	NV125-SVU/HVU								
TCL-2SVU3 (*3)(*10)	White	3	NF250-SVU/HVU	NV250-SVU/HVU	105	40	65.5	2	2	–	Screw type (Remove the existing cover from the body, and fit the terminal cover.)	
TCL-2SVU3L (*3)(*11)	White	3	NF250-SVU/HVU	NV250-SVU/HVU	105	50	65.5	2	2	–	Screw type (Remove the existing cover from the body, and fit the terminal cover.)	
TCL-2SWU3 (*10)	White	3	NF225-CWU	–	105	40	65.5	2	–	–	Quick type (Remove the existing cover from the body, and fit the terminal cover.)	
TCL-2SWU3L (*3)(*11)	White	3	NF225-CWU	–	105	50	65.5	2	–	–	Quick type (Remove the existing cover from the body, and fit the terminal cover.)	
TCL-4SWU	White	3	NF400-SWU/HWU	–	171	110	99.5	2	–	2	Quick type	
TCL-6SWU	Transparent	3	NF630-SWU/HWU	–	224	155	103.5	2	4	–	Screw type	Use in combination with insulating barrier.

Notes *1 For 2-pole NV, use TC-L for 3-pole circuit breaker.
*2 For a circuit breaker with F or V type operating handle, specify the model name with F at the end.
(F or V type operating handle dedicated models, screws are used for fixing.)
*3 The standard models can be used in combination with F and V Type Operating Handles.
*4 The dimension C is the size on the power supply side and load side.
*5 When a crimp terminal applicable to wires with a size of 117.2 to 152.05 mm^2 (Model 2CR-150 or CB150-S8) is used, TC-L cannot be fitted. Insulate the terminal from TC-S with insulating tube or taping.
*6 In the case of installation on the body, specify the model name with-MDU at the end.
*7 It cannot be installed in the case of installation on the body.
*8 Applicable to circuit breakers with rating of 75A or less (max. wire size 25 mm^2)
*9 Applicable to circuit breakers with rating of 125A or less (max. wire size 60 mm^2)
*10 Applicable to circuit breakers with rating of 200A or less (max. wire size 100 mm^2)
*11 Applicable to circuit breakers with rating of 250A or less (max. wire size 150 mm^2) (Applicable to UL wire 300MCM)

Remarks: 1. The wire sizes shown in the above notes *10 to *13 are those of the 600-V vinyl insulated wires.
2. Insulate the exposed live parts of crimp terminals with insulating tape or the like.
3. When protection from the power supply and load sides is necessary, separately consult us.

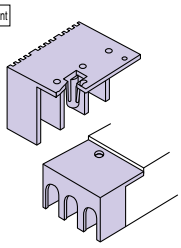
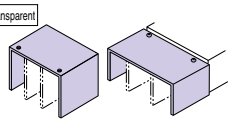
Table 23 Small terminal covers (TC-S)

Type name	Color	Number of poles of circuit breaker	Applicable model		Dimensions (mm)			Contents			Appearance	Remarks
			MCCB	ELCB	A	B	C	Number of covers	Cover mounting screw	Sealing plate		
TCS-03CS2W	White	2	NF30-CS	–	43.5	5	30.5	2	–	2	 Quick type The cover can be sealed with the sealing plate.	
TCS-03CS3W	White	3		–	67	5	30.5	2	–	2		
TCS-05SV2 (*1)	White	2	NF32-SV, NF63-CV/SV/HV	–	50	5	65.5	2	–	2		
TCS-05SV3 (*2)	White	3	NF32-SV, NF63-CV/SV/HV	NV32-SV, NV63-HV	75	5	65.5	2	–	2		
	White	2, 3	–	NV63-CV/SV								
TCS-1SV2(*2)	White	2	NF125-CV/SV	–	60	6.5	65.5	2	–	2		
TCS-1SV3(*3)	White	3	NF125-CV/SV	NV125-CV/SV/HV	90	6.5	65.5	2	–	2		
	White	2, 3	NF125-HV/UV	–								
TCS-2SV3 (*2)	White	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	6.5	65.5	2	–	2		

Notes *1 For a circuit breaker with F type operating handle, specify the model name with F at the end.
(F type operating handle dedicated models, screws are used for fixing.)
*2 The standard models can be used in combination with F and V Type Operating Handles.

Remarks: 1. Small terminal covers for 4-pole circuit breakers are available.
2. Insulate the exposed live parts of crimp terminals with insulating tape or the like.

Table 24 Transparent terminal covers (TTC)

Type name	Number of poles of circuit breaker	Applicable model		Dimensions (mm)			Contents			Appearance	Remarks
		MCCB	ELCB	A	B	C	Number of covers	Cover mounting screw	Sealing plate		
TTC-03CS2	2	NF30-CS	–	43.5	25	30.5	2	–	2	Transparent  Quick type The cover can be sealed with the sealing plate.	
TTC-03CS3	3		–	67	25	30.5	2	–	2		
TTC-05SV2 (*1)	2	NF32-SV NF63-CV/SV/HV	–	50	25	65.5	2	–	2		
TTC-05SV3 (*2)	3	NF32-SV NF63-CV/SV/HV	NV32-SV, NV63-HV	75	25	65.5	2	–	2		
	2, 3	–	NV63-CV/SV								
TTC-1SV2 (*1)	2	NF125-CV/SV	–	60	40	65.5	2	–	2		
TTC-1SV3 (*2)	3	NF125-CV/SV	NV125-CV/SV/HV	90	40	65.5	2	–	2		
	2, 3	NF125-HV/UV	–								
TTC-2SV3 (*2)(*3)(*5)	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	40	65.5	2	–	2		
	3	–	–								
TTC-4SW3	2, 3	NF400-CW/SW/SEW NF400-HEW/REW NF630-CW/SW/SEW NF630-HEW/REW	NV400-CW/SW/SEW NV400-HEW/REW NV630-CW/SW/SEW NV630-HEW	171	110	104.5	2	4	–		
	3	NF400-SEP with MDU/HEP with MDU(*4)	–								
TTC-4SW4	4	NF400-SW/SEW/HEW NF630-SW/SEW/HEW NF400-SEP with MDU/HEP with MDU(*4)	NV400-SEW/HEW NV630-SEW	240	110	104.5	2	6	–	Transparent  Screw type	Use in combination with insulating barrier.
TTC-8SW3	2, 3	NF800-CEW/SDW/SEW NF800-HEW/REW	NV800-SEW/HEW	224	155	103.5	2	4	–		
	3	NF600-SEP with MDU/HEP with MDU (*4) NF800-SEP with MDU/HEP with MDU (*4)	–								
TTC-8SW4	4	NF800-SEW/HEW NF600-SEP with MDU/HEP with MDU (*4) NF800-SEP with MDU/HEP with MDU (*4)	–	294	155	103.5	2	6	–		

Notes *1 For a circuit breaker with F type operating handle, specify the model name with F at the end.
(F type operating handle dedicated models, screws are used for fixing.)
*2 The standard models can be used in combination with F and V Type Operating Handles.
*3 When a crimp terminal applicable to wires with a size of 117.2 to 152.05 mm² (Model 2CR-150 or CB150-S8) is used, TTC cannot be fitted.
Use TCL-2SV3L. Or insulate the terminal from TC-S with insulating tube or taping.
*4 In the case of installation on the body, specify the model name with • MDU at the end.
*5 Applicable to circuit breakers with rating of 200A or less (max. wire size 100 mm²)

<BTC>

Fig. 1

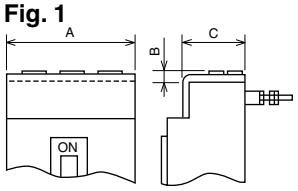
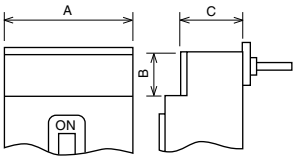


Fig. 2



<PTC>

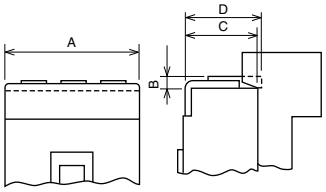
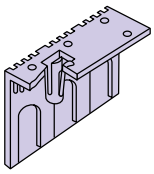
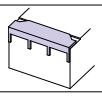
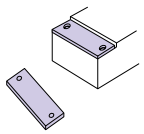


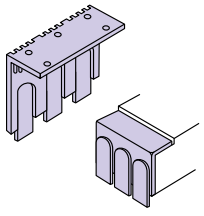
Table 25 Rear terminal cover (BTC)

Type name	Color	Number of poles of circuit breaker	Applicable model MCCB	Applicable model ELCB	Dimensions (mm) A	B	C	Contents Number of covers	Cover mounting screw	Sealing plate	Appearance	Remarks
BTC-03CS2W	White	2	NF30-CS	–	43.5	6.5	30.5	2	–	2		Cover for connection block in the case of simple rear connection
BTC-03CS3W	White	3		–	67	6.5	30.5	2	–	2		
BTC-05SV2	White	2	NF32-SV NF63-CV/SV/HV	– (*1)	50	5	65.5	2	–	2		Cover for stud connection block on back in the case of rear connection type
BTC-05SV3	White	3	NF32-SV NF63-CV/SV/HV	NV32-SV, NV63-HV	75	5	65.5	2	–	2		
	White	2, 3	–	NV63-CV/SV								
BTC-1SV2	White	2	NF125-CV/SV	–	60	6.5	65.5	2	–	2		
BTC-1SV3	White	3	NF125-CV/SV	NV125-CV/SV/HV	90	6.5	65.5	2	–	2		
	White	2, 3	NF125-HV/UV	–								
BTC-2SV3	White	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	6.5	65.5	2	–	2		
BTC-4SW3	White	2, 3	NF400-CW/SW/SEW NF630-CW/SW/SEW	NV400-CW/SW/SEW NV630-CW/SW/SEW	140	42 (*2)	99.5	2	–	2	Quick type The cover can be sealed with the sealing plate. 	
	White	3	NF400-SEP with MDU (*5)	(*5)								
			NF400-UEW (*4)	–	140	42 (*2)	132.5/196.5	2	–			
BTC-4SW4 (*3)	Transparent	4	NF400-SW/SEW/HEW NF630-SW/SEW/HEW NF400-SEP with MDU/HEP with MDU (*5)	NV400-SEW/HEW NV630-SEW	185	42 (*2)	97.5	2	6	–	 Screw type	
BTC-8SW3 (*3)	Transparent	2, 3	NF800-CEW/SDW/SEW/HEW/REW	NV800-SEW/HEW	210	32 (*2)	97.5	2	8	–		
	Transparent	3	NF600-SEP with MDU/HEP with MDU (*5) NF800-SEP with MDU/HEP with MDU (*5)	–								
			NF800-UEW (*4)	–	210	32 (*2)	146/194.5	2	4	–		
BTC-8SW4 (*3)	Transparent	4	NF800-SEW/HEW NF600-SEP with MDU/HEP with MDU (*5) NF800-SEP with MDU/HEP with MDU (*5)	(*5)	280	32 (*2)	97.5	2	10	–		
			NF400-UEW, NF800-UEW (*4)	–	280	32 (*2)	146/194.5	2	6	–		

Notes *1 For 2-pole ELCB, use BTC for 3-pole circuit breaker.
*2 Dimension B in Fig. 2
*3 The covers can be used for plug-in type circuit breakers. Other models are designed only for rear connection type.
*4 The dimension C is the size on the power supply side and load side.
*5 In the case of installation on the body, it can be fitted only on the power supply side.

Remarks: 1. PTC-4SW3 can be used as the back terminal covers for NF400-HEW/REW, NF630-HEW/REW, NV400-HEW/REW and NV630-HEW.
2. For terminal covers for 4-pole circuit breakers not listed above, consult us.

Table 26 Plug-in terminal covers (PTC)

Type name	Color	Number of poles of circuit breaker	Applicable model MCCB	Applicable model ELCB	Dimensions (mm) A	B	C	D	Contents Number of covers	Cover mounting screw	Sealing plate	Appearance	Remarks
PTC-05SV2	White	2	NF32-SV NF63-CV/SV/HV	–	50	6.5	65.5	72	2	2	–	 Screw type	Cover for stud connection block in the case of plug-in type
PTC-05SV3	White	3	NF32-SV NF63-CV/SV/HV	NV32-SV, NV63-HV	75	6.5	65.5	72	2	2	–		
	White	2, 3	–	NV63-CV/SV									
PTC-1SV2	White	2	NF125-CV/SV	–	60	6.5	65.5	–	2	4	–		
PTC-1SV3	White	3	NF125-CV/SV	NV125-CV/SV/HV	90	6.5	65.5	–	2	4	–		
	White	2, 3	NF125-HV/UV	–									
PTC-2SV3	White	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	6.5	65.5	78.5	2	4	–		
PTC-4SW3 (*2)	Transparent	2, 3	NF400-CW/SW/SEW NF630-CW/SW/SEW	NV400-CW/SW/SEW NV630-CW/SW/SEW	140	42	97.5	–	2	4	–	Same as screw type of BTC	
			NF400-HEW/REW (*1) NF630-HEW/REW (*1)	NV400-HEW/REW (*1) NV630-HEW (*1)									

Notes *1 The covers can be used as back terminal covers.
*2 See Fig. 2 of BTC.

Table 27 List of terminal covers applicable to F and V Type Operating Handles

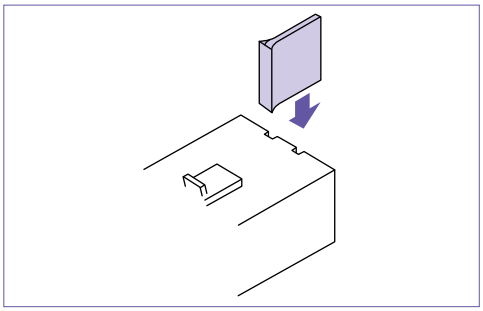
Type name			Applicable operating handles	Number of poles of circuit breaker	Applicable model	
Large terminal covers (TC-L)	Small terminal covers (TC-S)	Transparent terminal covers (TTC)			MCCB	ELCB
TCL-05SV2F (*2)(*3) TCL-05SV2LF (*2)(*4)	TCS-05SV2F (*2)	TTC-05SV2F (*2)	F-05SV2, V-05SV2	2	NF32-SV, NF63-CV/SV/HV	– (*1)
TCL-05SV3 (*3)	TCS-05SV3	TTC-05SV3	F-05SV, V-05SV	3	NF32-SV, NF63-CV/SV/HV	NV32-SV, NV63-HV
TCL-05SV3L (*4)				2, 3	–	NV63-CV/SV
TCL-05SV4	–	–		4	NF32-SV, NF63-CV/SV/HV	–
TCL-1SV2F (*2)	TCS-1SV2F (*2)	TTC-1SV2F (*2)	F-1SV2, V-1SV2	2	NF125-CV/SV	–
TCL-1SV3	TCS-1SV3	TTC-1SV3	F-1SV, V-1SV	3	NF125-CV/SV	NV125-CV/SV/HV
				2, 3	NF125-HV/UV	–
TCL-1SV4	–	–		4	NF125-CV/SV/HV/UV	NV125-CV/SV/HV
TCL-2SV3 (*5) TCL-2SV3L (*6)	TCS-2SV3	TTC-2SV3	F-2SV, V-2SV	2, 3	NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV, NV250-SEV/HEV NV125-SEV/HEV
TCL-2SV4	–	–		4	NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV, NV250-SEV/HEV NV125-SEV/HEV
TCL-4SW3 TCL-4SP3W	–	TTC-4SW3	F-4S V-4S	2, 3	NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW
TCL-4SW4	–	TTC-4SW4		4	NF400-SW/SEW/HEW NF630-SW/SEW/HEW	NV400-SEW/HEW NV630-SEW
TCL-8SW3	–	TTC-8SW3	F-8S V-8S	2, 3	NF800-CEW/SDW/SEW/HEW/REW	NV800-SEW/HEW
TCL-8SW4	–	TTC-8SW4		4	NF800-SEW/HEW	–

Notes *1 For 2-pole NV, use a terminal cover for 3-pole circuit breaker.
*2 Only for F and V Type Operating Handles (screw type)
*3 Applicable to circuit breakers with rating of 75A or less (max. wire size 25 mm²)
*4 Applicable to circuit breakers with rating of 125A or less (max. wire size 60 mm²)
*5 Applicable to circuit breakers with rating of 200A or less (max. wire size 100 mm²)
*6 Applicable to circuit breakers with rating of 250A or less (max. wire size 150 mm²)

Remark: 1. The terminal covers for UL 489 Listed Circuit Breakers can be normally combined with F Type Operating Handles.

Insulating Barriers

The insulating barrier enhances the insulation between the phases of circuit breaker terminals. It also prevents accidents due to conductive foreign matter and dust, and secondary accidents when isolating a fault current.



●The insulating barrier is available for the models listed in the table below.

Table 28

("●" denotes optional)

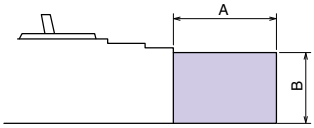
Applicable model		Connecting method			
MCCB	ELCB	Front	Rear	Flush plate	Plug-in
NF32-SV, NF63-CV NF125-CV, NF100-CVFU	NV32-SV, NV63-CV NV125-CV, NV100-CVFU	●	–	–	–
NF63-SV/HV NF125-SV/HV	NV63-SV/HV NV125-SV/HV	Standard attachment	–	–	–
NF125-SEV/HEV, NF125-ZEV NF250-CV/SV/HV/SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-SEV/HEV/ZEV with MDU	NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV NV250-SEV/HEV with MDU	Standard attachment	–	–	Standard attachment
NF125-SVU NF125-HVU NF250-SVU NF250-HVU NF225-CWU	NV125-SVU NV125-HVU NV250-SVU NV250-HVU NV100-SWU	Standard attachment	–	–	–
NF400-CW/SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW	Standard attachment	●	●	Standard attachment
NF400-UEW(4P) NF800-CEW/SEW/HEW/REW/SDW	NV800-SEW/HEW	Standard attachment	●	●	●
NF800-UEW	–	Standard attachment	●	●	–
NF400-SWU/HWU NF630-SWU/HWU	–	Standard attachment	–	–	–
NF1000-SEW, NF1250-SEW/SDW	–	Standard attachment	–	–	Standard attachment
NF1600-SEW/SDW	–	Standard attachment	–	–	–

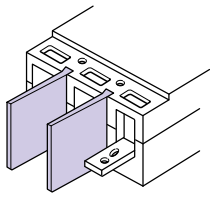
Always mount the insulating barrier when it comes with the circuit breaker.

●Insulating Barrier-Front (BA-F)

Table 29 Summary of dimensions

Type name	Applicable model		Dimensions (mm)		Quantity per breaker			Reference diagram
	MCCB	ELCB	A	B	2P	3P	4P	
BAF-05SV	NF32-SV NF63-CV NF125-CV	NV32-SV NV63-CV NV125-CV	50	59.5	1 (*2)	2	3	
	NF63-SV/HV NF125-SV/HV/UV	NV63-SV/HV NV125-SV/HV						
BAF-2SV	NF125-SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV/UV/SEV/HEV NF250-SGV/LGV/HGV/RGV NF250-SEV/HEV/ZEV with MDU	NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV NV250-SEV/HEV with MDU	100	59.5	2	4	6	
BAF-05SVU	NF100-CVFU	NV100-CVFU	50	59.5	2	4	–	
	NF125-SVU NF125-HVU	NV125-SVU NV125-HVU						
BAF-2SVU	NF250-SVU NF250-HVU	NV250-SVU NV250-HVU	100	59.5	–	4	–	
BAF-2SWU	NF225-CWU	–	100	59.5	–	4	–	
BAF-4SW	NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW	110	98.5	2	4	6	
BAF-4UW (*1)	NF400-UEW(3P)	–	110	132/ 98.5	–	4	–	
BAF-8SW	NF800-CEW/SEW/SDW/HEW/REW	NV800-SEW/HEW	110	98.5	1	2	3	
BAF-10SW	NF400-UEW(4P) NF800-UEW, NF1000-SEW NF1250-SEW/SDW	–	110	132	1	2	3	
BAF-4SWU	NF400-SWU/HWU	–	110	98.5	–	4	–	
	NF630-SWU/HWU(less than 600A)	–	110	98.5	–	2	–	
BAF-6SWU	NF630-SWU/HWU(630A)	–	150	98.5	–	4	–	
BAF-16SW	NF1600-SEW/SDW	–	185	132	1	2	3	



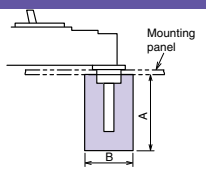


Notes *1 The barriers BAF-4UW for the power supply and load sides vary in the dimension B.
*2 Not supplied with ELCB.

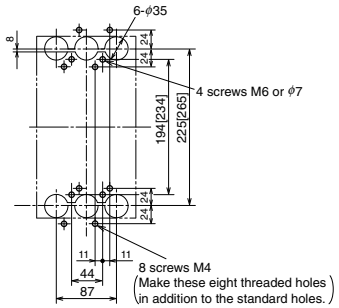
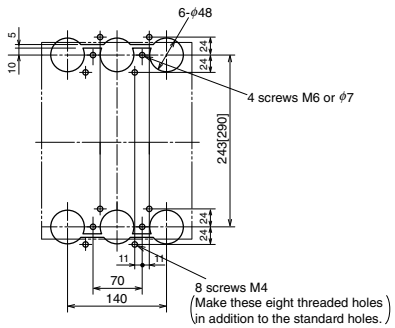
●Insulating Barrier-Rear (BA-B)

Table 30 Summary of dimensions

Type name	Applicable model		Dimensions (mm)		Quantity per breaker			Reference diagram
	MCCB	ELCB	A	B	2P	3P	4P	
BAB-4SW	NF400-CW/SW/SEW/HEW/REW NF400-UEW(3P) NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW	140	74.5	–	4	6	
BAB-8SW	NF800-CEW/SEW/SDW/HEW/REW NF400-UEW(4P) NF800-UEW	NV800-SEW/HEW	140	74.5	–	4	6	



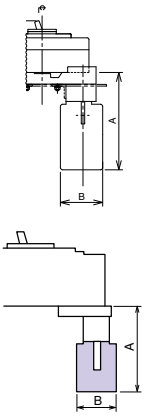
Drilling size for use of BA-B (in the case of 3-pole circuit breaker)

NF400-CW, NF400-SW, NF400-SEW, NF400-HEW, NF400-REW, NF400-UEW NV400-CW, NV400-SW, NV400-SEW, NV400-HEW, NV400-REW NF630-CW, NF630-SW, NF630-SEW, NF630-HEW, NF630-REW NV630-CW, NV630-SW, NV630-SEW, NV630-HEW	**NF800-CEW, NF800-SEW, NF800-HEW, NF800-REW, NF800-UEW NV800-SEW, NV800-HEW**
Power supply side Note The dimensions in brackets are those for NF400-UEW.  Load side	Note The dimensions in brackets are those for NF800-UEW. 

The drilling size drawings show the dimensions viewed from the rear side.

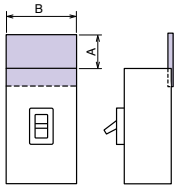
●Insulating Barrier-Plug-in (BA-P)

Table 31 Summary of dimensions

Type name	Applicable model		Dimensions (mm)		Quantity per breaker			Reference diagram
	MCCB	ELCB	A	B	2P	3P	4P	
BAP-2SV	NF125-SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV NF250-SGV/LGV/HGV/RGV NF250-SEV/HEV	NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV	172	74.5	4	4	6	
BAP-4SW	NF400-CW/SW NF400-SEW/HEW/REW/UEW NF630-CW/SW NF630-SEW/HEW/REW	NV400-CW/SW NV400-SEW/HEW/REW NV630-CW/SW NV630-SEW/HEW	178	74.5	–			
BAP-8SW	NF800-CEW/SEW NF800-HEW/REW	NV800-SEW/HEW	172	74.5				
	NF1000-SEW NF1250-SEW	–	215	74.5				

●Earth fault preventing barriers (BA-G)

Table 32 Summary of dimensions

Type name	Applicable model		Dimensions (mm)		Quantity per breaker	Reference diagram
	MCCB	ELCB	A	B	3P	
BAG-05SV3	NF32-SV NF63-CV/SV/HV	NV32-SV NV63-CV/SV/HV	30	75	1	 Earth fault preventing barrier (3 poles)
BAG-1SV3	NF125-CV/SV/HV	NV125-CV/SV/HV	40	90		
BAG-2SV3	NF125-SEV/HEV NF250-CV/SV/HV/SEV/HEV NF250-SEV/HEV/ZEV with MDU	NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV NV250-SEV/HEV with MDU	63	105		
BAG-4SW3	NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW	63	164		
BAG-4UW3	NF400-UEW	–	63	164		
BAG-8SW3	NF800-CEW/SEW/SDW/HEW/REW	NV800-SEW/HEW	110	210		
BAG-8UW3	NF800-UEW	–	110	210		
BAG-10SW3	NF1000-SEW NF1250-SEW/SDW	–	98	210		
BAG-16SW3	NF1600-SEW/SDW	–	150	300		

Also the earth fault preventing barriers for 2- and 4-pole circuit breakers are available.

Handle Lock Devices, Lock Covers, Auxiliary Handles, Card Holders

(1) Handle Lock Devices (HL and HL-S)

These devices are used to lock the circuit breakers in the ON or OFF position. If overcurrent flows while the circuit breaker is locked, it will trip. Model HL (red resin moldings) to be fitted to handles and Model HL-S to be secured on circuit breaker covers are available. (Use a commercially available padlock having the nominal size shown in the right table. If a padlock in another size is used, the device may not lock correctly.)

Padlock size (mm)

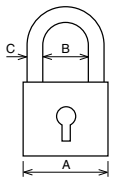
Application	A (Nominal size)	B	C
a	25	11	4
b	35	19	5
c	40	22 or 23	5.5

Table 33 HL

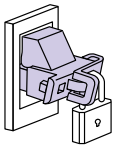
Type name	Applicable model MCCB	Applicable model ELCB	Reference diagram	Padlock
HL-05FH	NF30-CS	–	Fig. 4	a
HLN-05SV	NF32-SV, NF63-CV/SV/HV NF125-CV/SV/HV/UV, NF125-SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF250-SGV/LGV/HGV/RGV	NV32-SV, NV63-CV/SV/HV NV125-CV/SV/HV, NV125-SEV/HEV NV250-CV/SV/HV, NV250-SEV/HEV	Fig. 1	
HLF-05SV	NF32-SV, NF63-CV/SV/HV NF125-CV/SV/HV/UV, NF125-SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF250-SGV/LGV/HGV/RGV	NV32-SV, NV63-CV/SV/HV NV125-CV/SV/HV, NV125-SEV/HEV NV250-CV/SV/HV, NV250-SEV/HEV		
HLF-05SVU	NF125-SVU/HVU NF250-SVU/HVU	NV125-SVU/HVU NV250-SVU/HVU		
		–		
HLF-2SWU	NF225-CWU	–		
HL-4CW (*1)	NF400-CW	NV400-CW	Fig. 2	c
HL-4SW (*1)	NF400-SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW NF800-CEW/SDW/SEW/HEW/REW/UEW	NV400-SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW NV800-SEW/HEW		
HL-4SWU	NF400-SWU/HWU, NF630-SWU/HWU	–		
HL (*2)	NF1000-SEW, NF1250-SEW/SDW, NF1600-SEW/SDW	–	Fig. 3	

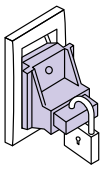
Notes *1 When a padlock is not used, the device can be used as a lock cover (LC).
*2 Place an order for a circuit breaker body combined with the device.

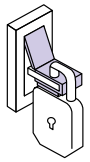
Remarks: 1. One lot of HL-4CW and HL-4SW contains one piece, and one lot of others contains 10 pieces.
2. HLF types are used for OFF lock, and HLN types for ON lock.



Padlock


Fig. 1


Fig. 2


Fig. 3

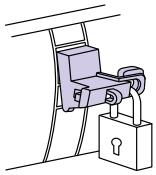

Fig. 4

Table 34 HL-S

Type name	Applicable model MCCB	Number of poles	Applicable model ELCB	Number of poles	A	B	C	D	E	F	Reference diagram	Padlock
HLS-05SV2 (*1)	NF32-SV, NF63-CV, NF63-SV NF63-HV	2P	–	–	32	75	50	–	63	32	Fig. 5	b
	NF125-CV, NF125-SV	2P	–	–			57					
HLS-05SV (*1)	NF32-SV, NF63-CV, NF63-SV NF63-HV	3P	NV32-SV, NV63-HV	3P			75					
	NF63-SV,NF63-HV	4P	–	–				23				
	NF125-CV, NF125-SV	3P	NV125-CV, NV125-SV, NV125-HV	3P			86	–				
	NF125-HV	2P, 3P	–	–								
	NF125-SV, NF125-HV	4P	NV125-SV, NV125-HV	4P				28				
	NF125-UV	2P, 3P	–	–	62.5			–		1.5		
		4P	–	–				28				
HLS-2SV (*1)	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV, NF250-SV, NF250-HV NF250-SGV/LGV/HGV/RGV	2P	NV125-SEV, NV125-HEV NV250-CV, NV250-SV, NV250-HV NV250-SEV, NV250-HEV	3P	32	84	100	–		32		
	NF125-SEV, NF125-HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV, NF250-SV, NF250-HV NF250-SEV, NF250-HEV NF250-SGV/LGV/HGV/RGV	3P										
	NF125-SEV, NF125-HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SV, NF250-HV, NF250-SEV, NF250-HEV NF250-SGV/LGV/HGV/RGV	4P	NV125-SEV, NV125-HEV NV250-SV, NV250-SEV, NV250-HEV	4P				33				
	NF250-UV	2P, 3P	–	–	69.5			–		-5.5		
		4P	–	–				33				
HLS-03SVU (*1)	NF50-SVFU	2P, 3P	NV50-SVFU	2P, 3P	–	–	–	–			Fig. 9	
HLS-05SVU2 (*1)	NF100-CVFU	2P	–	–	32	75	50	–		32	Fig. 5	
HLS-05SVU (*1)	NF100-CVFU	3P	NV100-CVFU	3P			75					
	NF125-SVU/HVU	2P, 3P	NV125-SVU/HVU	3P			86					
HLS-05SVU (*2)	NF125-SVU/HVU	2P, 3P	NV125-SVU/HVU	3P	32	75	86	–		32	Fig. 5	
HLS-2SVU (*1)	NF250-SVU/HVU	3P	NV250-SVU/HVU	3P		84	100					
HLS-2SWU (*1)	NF225-CWU	3P	–	3P		84	100	–		32	Fig. 6	
HLS-4SW (*3)	NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW	2P, 3P, 4P	NV400-CW/SW/SEW/ HEW/REW NV630-CW/SW/SEW/ HEW	3P, 4P	–	–	–	–	–	–	Fig. 7	
HLS-4UW (*3)	NF400-UEW	3P	–	–	–	–	–	–	–	–		
HLS-8SW (*3)	NF800-CEW/SDW/SEW/HEW/REW	2P, 3P, 4P	NV800-SEW/HEW	3P, 4P	–	–	–	–	–	–		
HLS-8UW (*3)	NF400-UEW	4P	–	–	–	–	–	–	–	–	Fig. 8	
	NF800-UEW	3P, 4P										

Notes *1 For locking in OFF position
*2 A, B, C and D in Figs. 5 and 6 are drilling sizes in front plate.
*3 Terminal covers cannot be fitted.

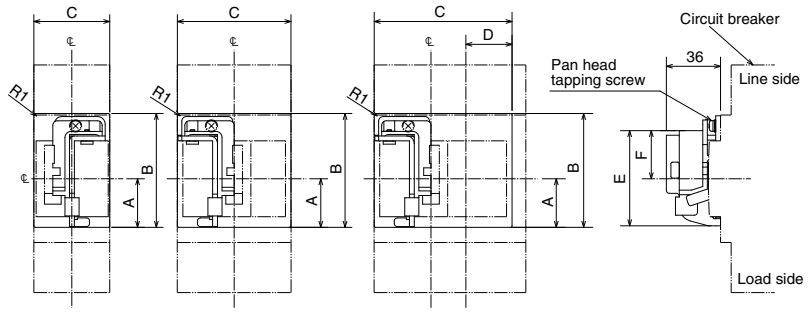


Fig. 5

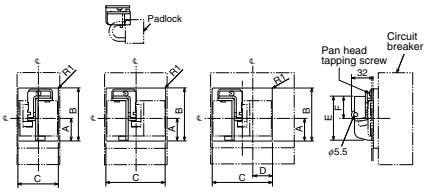


Fig. 6

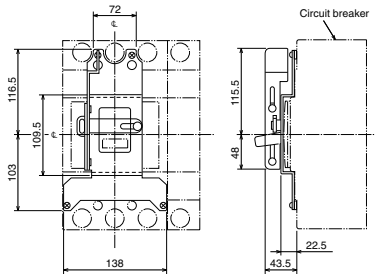


Fig. 7

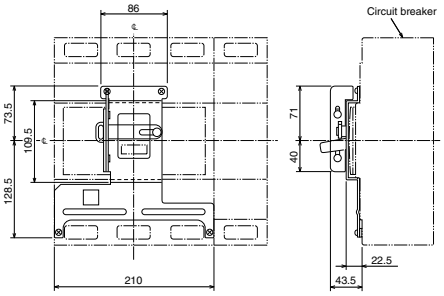


Fig. 8

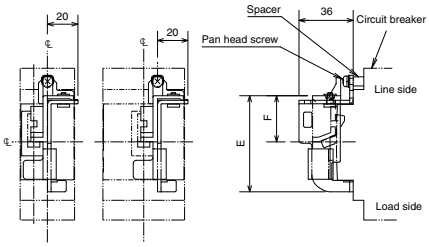
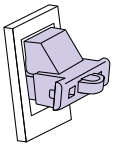


Fig. 9

(2) Lock Covers (LC)

Lock Cover is a plug-in lock for indicating easily without using padlocks that it is prohibited to operate the circuit breaker. A “Caution” tag can be hung on it. The covers are red resin moldings.



LC-05SW to LC-2SW



LCBH1



LCBH2, 3

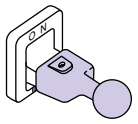
Table 35 LC

Type name	Applicable model	
	MCCB	ELCB
LC03CS	NF30-CS	–
LC-05SV	NF32-SV NF63-CV/SV/HV NF125-CV/SV/HV/UV NF125-SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV/UV NF250-SEV/HEV NF250-SGV/LGV/HGV/RGV	NV32-SV NV63-CV/SV/HV NV125-CV/SV/HV NV125-SEV/HEV NV250-CV/SV/HV NV250-SEV/HEV
LCBH1R (red) LCBH1Y (yellow)	BH-P(1P)	–
LCBH2R (red) LCBH2Y (yellow)	BH-P(2P)	–
LCBH3R (red) LCBH3Y (yellow)	BH-P(3P)	–

Remark: 1. One lot of LCBH, LCBL and LCNVL contains 50 pieces, and one lot of other models contains 10 pieces.

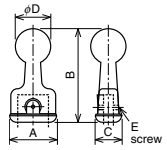
(3) Auxiliary Handles (HT)

These handles facilitate opening and closing circuit breakers.



Auxiliary Handles

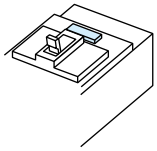
Table 36 HT

Type name	Applicable model	Dimensions					Outline dimension drawing
		A	B	C	D	E	
HT-4CW (*1)	NF400-CW, NV400-CW	59	77.5	32	38	M4	
HT-4SW (*1) (*2)	NF400-SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW NF800-CEW/SDW/SEW/HEW NF800-REW/UEW NV400-SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW NV800-SEW/HEW		81				
HT-10SW	NF1000-SEW NF1250-SEW/SDW NF1600-SEW/SDW	62	118	34	45	M4	

Notes *1 HT can be supplied separately. The user can fit it to the circuit breaker. (One lot contains 1 piece.)
*2 1-pole circuit breakers with 800A frame and 4-pole NF400-UEW come with auxiliary handles as standard accessories.

(4) Card Holders (CH)

Cards showing the circuit breaker name and circuit number can be inserted to the card holder.
Fit the card holder to the circuit breaker body or the flush plate in the flush frame. (Although a card holder is supplied with each circuit breaker body, the card holder is available as an optional part.)



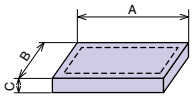


Table 37 Card holder size (mm)

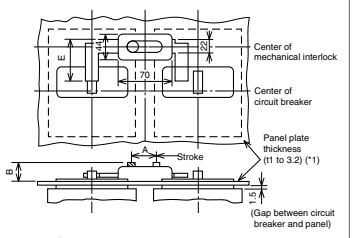
Applicable model	Type name	A	B	C	Card size
NF250-SV or below NV250-SV or below	CH-P No.5	44	12	5	39×9
NF400-SW or above NV400-SW or above	CH-P No.3	38	22	5	33×20

Mechanical Interlocks (MI)

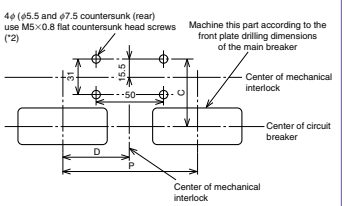
This mechanical interlock device is used to enable one of two circuit breakers to turn on. Install the device on the panel.
Mechanical interlocks to be installed directly to circuit breaker bodies can be manufactured.
Consult us for details.

●Front, rear and plug-in types

Front, rear and plug-in types (Panel mounting)
These interlocks can be locked with padlocks.



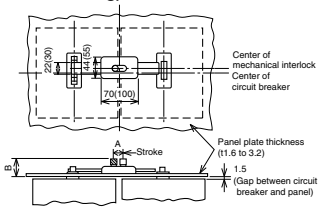
Outside Dimension Diagram



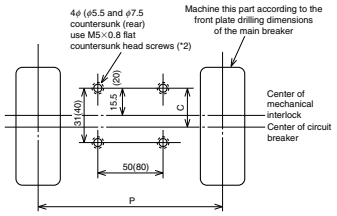
Drilling Dimension Diagram

Fig. 1

Front, rear and plug-in types (Panel mounting)



Outside Dimension Diagram



Drilling Dimension Diagram

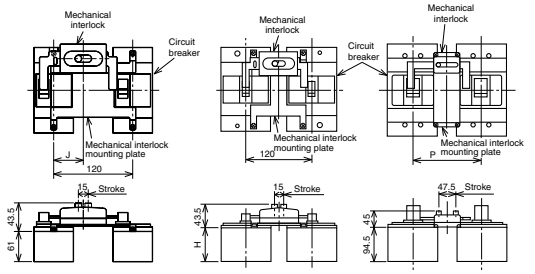
Fig. 2

Breaker mountiong (front) Terminal covers cannot be fitted.

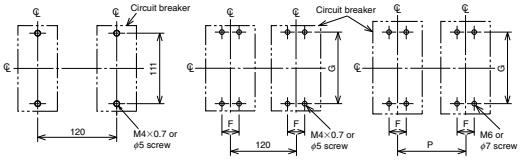
Type name	J
MI-05SVFB2	47.5
MI-1SVFB2	45

Type name	F	G	H
MI-05SVFB3	25	111	61
MI-05SWHFB3	25	111	75
MI-1SVFB3	30	111	61
MI-2SVFB3	35	126	61

Type name	F	G	P
MI-4SWFB3	44	194	190
MI-8SWFB3	70	243	260



Outside Dimension Diagram



Drilling Dimension Diagram (breaker mount)

Fig. 3

Notes *1 For 400A frame or above, use a panel 1.6 to 3.2 thick.
*2 When the panel is 2.3 or more thick, countersink the panel (rear side) in φ9.5 for the four φ5.5 holes.

Table 38 Table of variable dimensions

Applicable model		Pitch (P) (*1)						Dimensions (mm)						Reference diagram	Breaker mount (*3)	Reference diagram (3P)
MCCB	ELCB (*6)	Standard			Semi-standard		Standard		t	A	B	C	D	E		Type name	
		Type name	2P	3P	3P		Type name	4P								2P•3P	
NF32-SV, NF63-CV/SV/HV	–	MI-05SV3	120	–	–	–	–	–	(*2) –	15	33	63	47.5	58	(Fig. 1)	MI-05SVFB2	(Fig. 3)
NF32-SV, NF63-CV/SV/HV	NV32-SV, NV63-CV/SV/HV		–	120	–	130	MI-05SV4	120 (*4)		15	33	63	–	58		MI-05SVFB3	
NF125-CV/SV	–	MI-05SV3	120	–	–	–	–	–		15	33	63	45	58		MI-1SVFB2	
NF125-CV/SV/HV	NV125-CV/SV/HV		–	120	130	150	MI-1SV4	130 (*4)		15	33	63	–	58		MI-1SVFB3	
NF125-UV	–									15	33	32.5		58		–	–
NF125-SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV, NF250-SEV/HEV NF250-SGV/LGV/HGV/RGV	NV125-SEV/HEV NV250-CV/SV/HV NV250-SEV/HEV	MI-05SV3	120 (*4)		150	180	MI-2SV4	150 (*4)		15	33	63	–	58		MI-2SVFB3	(Fig. 3)
NF250-UV	–											25.5				–	–
NF225-CWU	–	MI-05SWU3	–	120 (*4)	–	–	–	–		15	33	63	–	58		–	–
NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW	MI-4SW3	190		–	210	MI-4SW4	250		47.5	33	83.5	–	74		MI-4SWFB3	(Fig. 3)
NF400-UEW (3P)	–		–	190			–	–	(*2) –			83.5				–	
NF800-CEW/SDW/SEW/HEW/REW	NV800-SEW/HEW	MI-8SW3	220		–	240	MI-8SW4	290		47.5	33	83.5	–	74		MI-8SWFB3	
NF400-UEW (4P) NF800-UEW	–		–	220								60				–	
NF1000-SEW, NF1250-SEW/SDW	–	MI-10SW3	220		–	–	MI-10SW4	290	2.3 (*5)	47.5	47	37.5	–	–	(Fig. 2)	–	–
NF1600-SEW/SDW	–	MI-16SW3	315		–	–	MI-16SW4	426		65	54.5	39	–	–		–	

Notes *1 Specify the circuit breaker mounting pitch (P).
*2 No need to specify the panel thickness (t). (Usable panel thickness range: t = 1~3.2mm. Above 400AF, use panel thickness t = 1.6~3.2mm)
*3 Terminal covers cannot be fitted. (However, TCL-4SW3 can be fitted.)
*4 When UVT is provided, separately install the module.
*5 If the thickness is not 2.3, specify the panel thickness (t).
*6 For NV with TBL, use a circuit breaker with MG.

Remarks: 1. When a mechanical interlock is installed on the panel, screw type terminal covers cannot be installed.
2. These devices do not provide an isolation function. However, 400, 600, 630 and 800A frame circuit breakers can be made conforming to it. (See Note 3.)
3. On a 2-pole circuit breaker obtained by removing the neutral pole conductor from a 3-pole circuit breaker, the mechanical interlock can be installed in the same manner as on a 3-pole circuit breaker.

Boxes for Circuit Breakers and Boxed Circuit Breakers

(1) Kinds and specifications

Table 39

			Closed type (S)		Dust-proof type (I)	Water-proof type (W)
	Appearance		 (*1)	 (*1)		
MCCB (*2)	NF30-CS	2, 3P	NFS-03CS	–	–	–
	NF32-SV, NF63-CV/SV/HV	2P	NFS-05SV2 (*5)	–	NFI-05SV	–
		3P	NFS-05SV			NFW-05SV
	NF125-CV/SV	2P	NFS-1SV2 (*5)	–	NFI-1SV	–
		3P	NFS-1SV			NFW-1SV
	NF125-HV	2, 3P				NFW-1HV
	NF125-SGV/LGV NF160-SGV/LGV NF250-SGV/LGV NF250-CV/SV, NF125/250-SEV	2, 3P	NFS-2SV	–	NFI-2SV	NFW-2SV
	NF125/160/250-HGV NF250-HV, NF125/250-HEV		–			
	NF400-CW		–	–	NFI-4CW	NFW-4CW
	NF400-SW/SEW		–	–	NFI-4SW	NFW-4SW
	NF630-CW/SW/SEW		–	–	NFI-6SW	NFW-6SW
	NF800-CEW/SDW/SEW		–	–	NFI-8SW	NFW-8SW
ELCB (*2)	NV32-SV, NV63-CV/SV/HV	2P	NFS-05SV	–	NFI-05SV	–
		3P	NFS-05SV			NFW-05SV
	NV125-CV/SV	3P	NFS-1SV	–	NFI-1SV	NFW-1SV
	NV125-HV		NFS-1SV			NFW-1HV
	NV250-CV/SV, NV125/250-SEV		NFS-2SV	–	NFI-2SV	NFW-2SV
	NV250-HV, NV125/250-HEV		–			
	NV400-CW		–	–	NFI-4CW	NFW-4CW
	NV400-SW/SEW		–	–	NFI-4SW	NFW-4SW
	NV630-CW/SW/SEW		–	–	NFI-6SW	NFW-6SW
	NV800-SEW		–	–	NFI-8SW	NFW-8SW
Operating method			Direct operation of circuit breaker handle		Operation through operating handle mechanism	
Standard paint color			Box: Munsell 5Y7/1 Operating handle: Munsell N1.5			
Protection class (IEC 60529)			IP3X		IP4X (*3)	IP65 (*4)

Notes *1 The window frame varies depending on the model.
*2 For 1-pole circuit breakers, boxes are not manufactured.
*3 The protection class of NFI-1SV and NFI-2SV is IP3X.
*4 The protection class of NFW-4CW, NFW-4SW, NFW-6SW and NFW-8SW is IP54.
*5 The circuit breaker body is a 2-pole external type.
Remarks: 1. Only internal accessories with lead wires drawn out can be fitted. (However, LT and SLT can be fitted on the right pole side.)
2. The dust-proof type (I) models do not provide an isolation function.

●Selection of rated current

When selecting the rated current of circuit breaker, it is necessary to consider the temperature in the box. When the rated current is carried, the temperature in the box increases by 10 to 20K. Correct the rated current with the temperature correction curve.
Determine the maximum working current to be 80% or less of the rated current.

●Locking

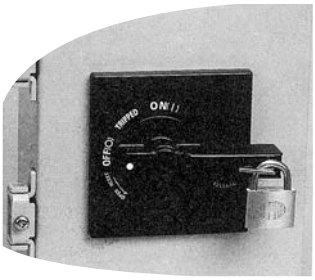
Type I and W boxed circuit breakers can be provided with locks in the following parts. Locking can prevent unnecessary operation.
①Cover and case
②ON or OFF position of operating handle
(Padlocks must be prepared by the user. The dimensions of the padlocks are shown on page 739.)

●Interlock (only for Dust-proof type)

The cover cannot be opened while the circuit breaker is in the ON state. However, if the interlock release screw is turned, the cover is released from the locked state and can be opened even in the ON state.

●Handle operation and display

The ON, OFF or trip state of the body is displayed on each position on the decorative board.



Example of Type I operating handle block

(2) External dimensions

■MCCB

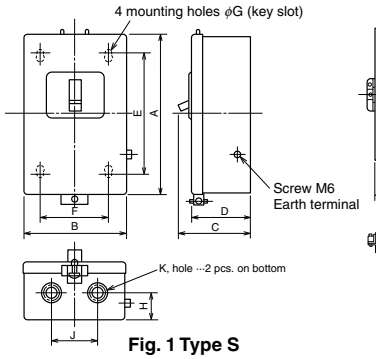


Fig. 1 Type S

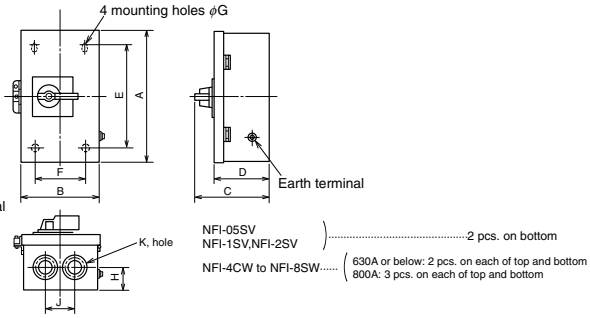


Fig. 3 Type I

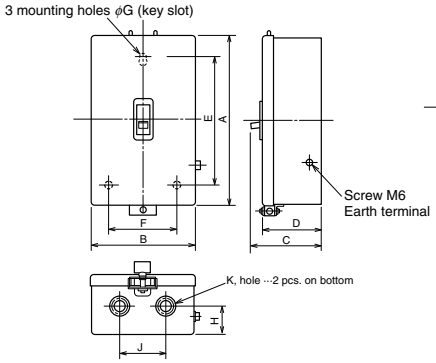


Fig. 2 Type S

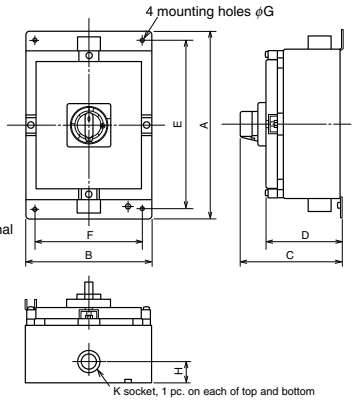


Fig. 4 Type W

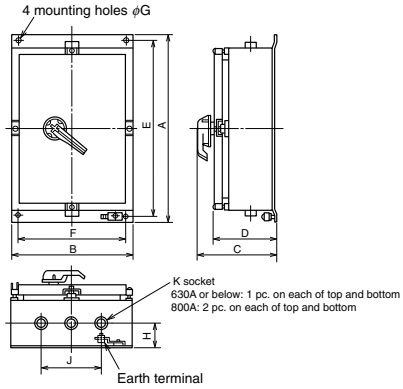


Fig. 5 Type W

Table 40 Table of variable dimensions (Boxes for 4-pole circuit breakers are not manufactured.) Note) The sockets are applicable to thick steel duct (JIS C 8305) and conduit tube thread.

Box type	Type name	Applicable Model	Variable dimensions										
			Fig.	A	B	C	D	E	F	G	H	J	K
S	NFS-03CS	NF30-CS	2	188	158	69	58	150	78	6	25	100	20, 28
	NFS-05SV2	NF32-SV, NF63-CV/SV/HV	1	260	178	98	78	202	100	7	34	100	28, 35, 44
	NFS-05SV												
	NFS-1SV2	NF125-CV/SV	1	310	178	98	78	252	100	7	34	100	28, 35, 44
	NFS-1SV	NF125-CV/SV/HV											
	NFS-2SV	NF250-CV/SV, NF125/250-SEV NF125-SGV/LGV NF160-SGV/LGV NF250-SGV/LGV	1	440	247	137	116	373	170	9	52	120	50, 62, 78
I	NFI-05SV	NF32-SV, NF63-CV/SV/HV	3	350	186	155.5	117	286	120	7	42	100	28, 35, 44
	NFI-1SV	NF125-CV/SV/HV	3	352	188	155.5	118	286	120	7	42	100	28, 35, 44
	NFI-2SV	NF250-CV/SV/HV, NF125/250-SEV/HEV NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV	3	442	248	162	124	373	170	9	54	120	50, 62, 78
	NFI-4CW	NF400-CW	3	730	320	244	191	650	240	11	87	120	50, 62, 78
	NFI-4SW	NF400-SW/SEW	3	730	320	244	191	650	240	11	65	120	50, 62, 78
	NFI-6SW	NF630-CW/SW/SEW	3	940	433	260	207	856	350	15	90	150	92
	NFI-8SW	NF800-CEW/SDW/SEW	3	1353	543	304	251	1270	460	15	90	320	104
W	NFW-05SV	NF32-SV, NF63-CV/SV/HV	4	390	265	214	160	350	225	9.5	45	–	28
	NFW-1SV	NF125-CV/SV	4	390	265	214	160	350	225	9.5	50	–	36
	NFW-1HV	NF125-HV	4	480	265	239	186	440	225	9.5	60	–	36
	NFW-2SV	NF250-CV/SV/HV, NF125/250-SEV/HEV NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV	4	550	355	264	210	510	315	11	75	–	54
	NFW-4CW	NF400-CW	5	800	355	257	220	760	315	11	85	–	70
	NFW-4SW	NF400-SW/SEW	5	800	355	257	220	760	315	11	85	–	70
	NFW-6SW	NF630-CW/SW/SEW	5	800	355	257	220	760	315	11	85	–	82
	NFW-8SW	NF800-CEW/SDW/SEW	5	1435	550	339	265	1395	515	15	100	180	104

■ELCB

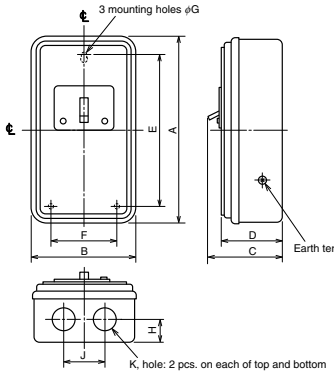


Fig. 1 Type S

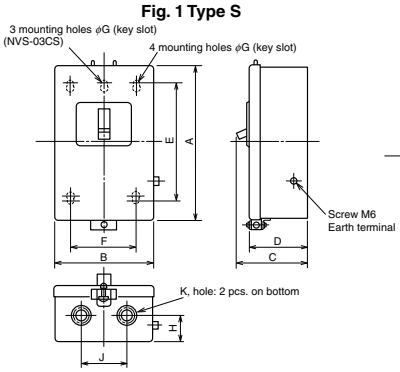


Fig. 2 Type S

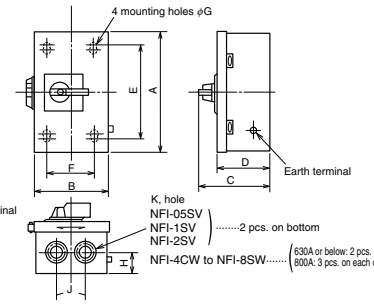


Fig. 3 Type I

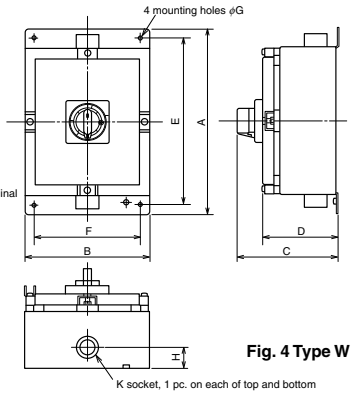


Fig. 4 Type W

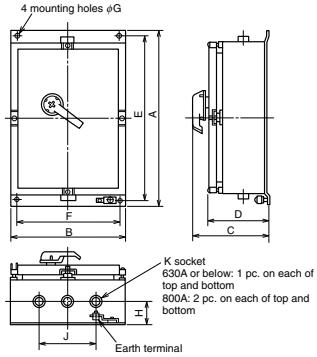


Fig. 5 Type W

Table 41 Table of variable dimensions (Boxes for 4-pole circuit breakers are not manufactured.) Note) The sockets are applicable to thick steel duct (JIS C 8305) and conduit tube thread.

Box type	Type name	Applicable Model	Variable dimensions										
			Fig.	A	B	C	D	E	F	G	H	J	K
S	NFS-05SV2	NV32-SV, NV63-CV/SV/HV	2	260	178	98	78	202	100	7	34	100	28, 35, 44
	NFS-05SV												
	NFS-1SV2	NV125-CV/SV	2	310	178	98	78	252	100	7	34	100	28, 35, 44
	NFS-1SV	NV125-CV/SV/HV											
	NFS-2SV	NV250-CV/SV, NV125/250-SEV	2	440	247	137	116	373	170	9	52	120	50, 62, 78
I	NFI-05SV	NV32-SV, NV63-CV/SV/HV	3	350	186	155.5	117	286	120	7	42	100	28, 35, 44
	NFI-1SV	NV125-CV/SV/HV	3	352	188	155.5	118	286	120	7	42	100	28, 35, 44
	NFI-2SV	NV250-CV/SV/HV, NV125/250-SEV/HEV	3	442	248	162	124	373	170	9	54	120	50, 62, 78
	NFI-4CW	NV400-CW	3	730	320	244	191	650	240	11	87	120	50, 62, 78
	NFI-4SW	NV400-SW/SEW	3	730	320	244	191	650	240	11	65	120	50, 62, 78
	NFI-6SW	NV630-CW/SW/SEW	2	940	433	260	207	856	350	15	90	150	92
	NFI-8SW	NV800-SEW	3	1353	543	304	251	1270	460	15	90	320	104
W	NFW-05SV	NV32-SV, NV63-CV/SV/HV	4	390	265	214	160	350	225	9.5	45	–	28
	NFW-1SV	NV125-CV/SV	4	390	265	214	160	350	225	9.5	50	–	36
	NFW-1HV	NV125-HV	4	480	265	239	186	440	225	9.5	60	–	36
	NFW-2SV	NV250-CV/SV/HV, NV125/250-SEV/HEV	4	550	355	264	210	510	315	11	75	–	54
	NFW-4CW	NV400-CW	5	800	355	257	220	760	315	11	85	–	70
	NFW-4SW	NV400-SW/SEW	5	800	355	257	220	760	315	11	85	–	70
	NFW-6SW	NV630-CW/SW/SEW	5	800	355	257	220	760	315	11	85	–	82
	NFW-8SW	NV800-SEW	5	1435	550	339	265	1395	515	15	100	180	104

Electrical Operated Circuit Breakers and Electrical Operation Devices



Spring charge type (1)



Spring charge type (2)
Standard paint color: Munsell 5Y7/1



Motor-drive type (2)
Standard paint color: Munsell 5Y7/1

(1) Specifications

●Electrically operated circuit breakers

Table 42

Specify the electrical operation device together with the circuit breaker body.

Electrically operating method				Spring charge type (1)	Spring charge type (2)		Motor-drive type (2)	
MCCB	Class S, H and R			NF125-SV, NF125-HV NF125-SEV, NF125-HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SV, NF250-HV NF250-SEV, NF250-HEV NF250-SGV/LGV/HGV/RGV NF125-RV, NF250-RV	NF400-SW, NF400-SEW NF400-HEW, NF400-REW NF630-SW, NF630-SEW NF630-HEW, NF630-REW NF800-SDW, NF800-SEW NF800-HEW, NF800-REW	NF1000-SEW NF1250-SEW NF1250-SDW NF1600-SEW NF1600-SDW	NF400-SW, NF400-SEW NF400-HEW, NF400-REW NF630-SW, NF630-SEW NF630-HEW, NF630-REW NF800-SDW, NF800-SEW NF800-HEW, NF800-REW	NF1000-SEW NF1250-SEW NF1250-SDW NF1600-SEW NF1600-SDW
	Class C			NF125-CV NF250-CV	NF400-CW NF630-CW NF800-CEW	–	NF400-CW NF630-CW NF800-CEW	–
	Class U			NF125-UV NF250-UV	NF400-UEW NF800-UEW	–	NF400-UEW NF800-UEW	–
	Motor breakers			NF125-SV, NF250-SV	–	–	–	–
ELCB	Class S, H and R			NV125-SV, NV125-HV NV125-SEV, NV125-HEV NV250-SV, NV250-HV NV250-SEV, NV250-HEV	NV400-SW, NV400-SEW NV400-HEW, NV400-REW NV630-SW, NV630-SEW NV630-HEW, NF800-SEW NV800-HEW	–	NV400-SW, NV400-SEW NV400-HEW, NV400-REW NV630-SW, NV630-SEW NV630-HEW, NF800-SEW NV800-HEW (*3)	–
	Class C			NV125-CV NV250-CV	NV400-CW NV630-CW	–	NV400-CW(*3) NV630-CW	–
	Motor breakers			NV125-SV, NV250-SV	–	–	–	–
Rated operating voltage (V) (Allowable operating voltage range: 85 to 110%)				Compatible with 100 to 240 V AC and 100 to 250 V DC 24 V DC, 48 to 60 V DC (*1)	DC100-110, AC100-110 AC200-220(DC125, AC240)		DC100-110, AC100-110, AC200-220 (DC125, AC240)	
Operating current (Ams) Values in ( ): Starting current	DC	100/110V	ON	0.5 (1.5)	8	10	3.0(8.0)	5.0(13.5)
			OFF		1.0 (3.0)	1.0 (4.0)		
	AC	100/110V	ON	0.6 (3.0)	10	10	4.0(8.0)	5.0(10.0)
			OFF		1.0 (3.0)	1.0 (3.0)		
		200/220V	ON	0.5 (2.5)	8	8	2.0(4.5)	3.5(7.0)
			OFF		0.5 (1.5)	0.5 (1.5)		
Operating time	s	ON		0.05~0.1(*2)	0.05	0.07	0.3 or less (self-holding type)	
		OFF		0.6 or less (self-holding type)	3 or less (self-holding type)			
		Charge		1.2 or less (self-holding type)			–	–
Required transformer capacity VA				150	700		400	700
Endurance voltage				1500V	1500V			

Notes *1 When the rated operating voltage is 24 V DC or 48 to 60 V DC, specify the voltage. If the voltage is not specified, the circuit breaker will be manufactured for 100 to 240 V AC and 100 to 250 V DC.
*2 For 24-V DC circuit breakers, the operating time at a voltage of 100% or more is shown.
*3 Models for special voltage (125 V DC or 240 V AC) are not provided with the test button.

Remarks: 1. Flush plate type circuit breakers can be manufactured to order.
2. The models with voltage in parentheses are special voltage products.
3. For the spring charge type (1), use an ON-OFF operating switch for minute load.
4. For the spring charge type (1) The circuit breaker of 3 pole can be used TC-S, TC-L, TTC, BTC and PTC.
In case of 125A frame 4 pole can be used only TC-L.
In case of 250A frame 4 pole can be used TC-S, TC-L, TTC, BTC and PTC.
5. When the body of the spring charge type (1) breaker is an earth leakage alarm breaker, the reset button cannot be pressed. Provide such a circuit breaker with an external reset or automatic reset system (except for the electronic type).
6. When the body of the motor-drive type (2) or spring charge type (2) has internal accessories, they are normally provided with lead wire terminal blocks.
7. The types other than the spring charge type (1) do not provide an isolation function.
8. When placing an order for a CE marked product of the spring charge type (1) or spring charge type (2), specify the model name with CE.
9. The switching durability of electrically operated circuit breakers conforms to JIS.

●Electrical operation devices

The following models of Electrical Operation Devices are supplied also as separate devices. The user can install them to the circuit breaker body.
(Front connection, rear connection and plug-in types)
(When requiring a motor breaker or a CE marked product, place an order for it together with the circuit breaker body.)

Table 43

Electrically operating method	Spring charge type (1)				
Applicable models / Rated operating voltage	NF125-CV/SV/HV	NV125-CV/SV/HV	NF125-SEV/HEV/SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV/UV/SEV/HEV/SGV/LGV/HGV/RGV NF250-UV	NV250-CV/SV/HV	NV125-SEV/HEV NV250-SEV/HEV
Compactible to 100-240VAC/100-250VDC	MDSAD240-NF1SVE	MDSAD240-NV1SVE	MDSAD240-NF2SVE	MDSAD240-NV2SVE	MDSAD240-NVE2SVE
24VDC	MDSD024-NF1SVE	MDSD024-NV1SVE	MDSD024-NF2SVE	MDSD024-NV2SVE	MDSD024-NVE2SVE
48-60VDC	MDSD060-NF1SVE	MDSD060-NV1SVE	MDSD060-NF2SVE	MDSD060-NV2SVE	MDSD060-NVE2SVE

●Cautions

- All electrical operations are based on intermittent rating. Avoid operating any device continuously 10 times or more (ON and OFF operations are counted as one time).
- Operate any device at 85 to 110% of the rated operating voltage.
- The dielectric strength of electrical operation circuits is 1500 V. When performing dielectric strength test of any of these devices and other devices, if the test voltage exceeds the rated value (1500 V), disconnect the operation power supply terminal.
- When collectively operating more than one electrical operation device, isolate the devices connecting a relay to each device.
  If the control terminals are directly connected in parallel, a circuit will be formed, and the devices may not normally function.

●Automatic reset (optional)

The automatic reset type has a built-in alarm switch in the circuit breaker and is connected in such a way that the OFF operation circuit is closed when the circuit breaker trips. Therefore, when the circuit breaker trips, it is automatically reset.
However, when the circuit breaker thermally trips, it may not be automatically reset.
If an automatic reset spring charge type (1) is required, the user must wire the device in accordance with the external connection diagram shown in Fig. 1 in (3).

(2) Installation and connection (List of manufacturable)

Table 44

Frame (A) \ Installation and connection method	Front connection type	Rear connection type	Plug-in type (*1)
50~250	○	○	○ (*2)
400~800	○	○	○
1000, 1250	○	○	○
1600	○	○	–

Notes *1 For ELCB, only 3-pole circuit breakers with a frame size of 125 to 400 A can be manufactured.
*2 In the case of 4-pole 125 A frame circuit breakers and U class, the circuit breakers are supplied as special models. Consult us for details.
Remarks: 1. All models of the front connection type are provided with bar terminals (except the spring charge type (1)).
2. 2-pole circuit breakers of all models are obtained by removing the neutral pole conductors from 3-pole circuit breakers.

(3) Structure and operation

■Spring charge type (1)

●Electrical operation

- When the ON operation switch is closed, the relay will operate, the motor will be driven, the latch mechanism will be released, and the closing spring force will instantaneously turn on the circuit breaker.
- When the OFF operation switch is closed, the relay will operate, the motor will be driven, the circuit breaker will be turned off (reset), and, at the same time, the closing spring will be charged.

Note: The charge may not be completed because the circuit protective function operates.

●Manual operation

- After turning the MANUAL/AUTO selection switch on the cover upper surface to MANUAL, press the ON button, and the latch mechanism will be released, and the closing spring force will instantaneously turn on the circuit breaker.
- After turning the MANUAL/AUTO selection switch on the cover upper surface to MANUAL, draw out the manual handle, and move it upward and downward about 10 to 14 times. Then, the circuit breaker will be turned off (reset), and, at the same time, the closing spring will be charged.
  Although the circuit breaker can be turned off even if the switch is not turned to MANUAL, the selection switch should be set to MANUAL because remote operation may be accepted.
- After turning the changeover switch to MANUAL, draw out the OFF lock plate, and lock the circuit breaker in the OFF state with padlocks (to be prepared by the user). Up to three padlocks can be fitted.
  ϕ5 to ϕ8 padlocks can be fitted.

Note: After the completion of manual operation (on-site operation), return the selection switch to AUTO without fail. If it is not returned, electrical operation (remote operation) cannot be performed.

●Display of tripping state

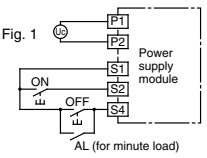
When the circuit breaker trips in the ON state, the tripping state is displayed. When it trips in the OFF state, the OFF state is kept displayed.
Note: When it trips in the OFF state, signals from AL will not be output.

●Cautions for use

① To the ON or OFF operation switch (to be prepared by the user), current only of 24 V DC and 15 to 30 mA flows. Use a switch for minute load.
② Operate the operation switch for 0.1 s or more to turn on and for 20 ms or more to turn off. If it is operated for less than the time, it may not function.
The wire to the operation switch shall be less than 100 m.
③ The power supply module has a built-in switching power supply. Therefore, it may interfere with communication devices near the module. In such a case, install a noise filter on the input side.
④ For the automatic reset type, purchase a circuit breaker with alarm switch (for minute load), and connect the signal circuit (among the terminal numbers S1, S2 and S4) as shown in Fig. 1.

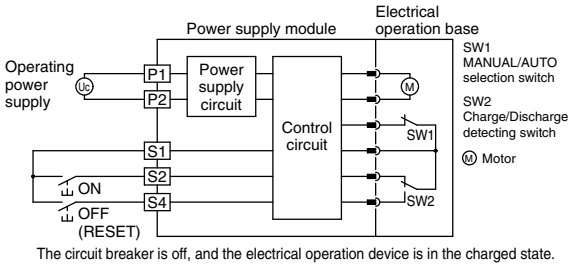
If the circuit breaker in the OFF state is tripped by UVT-N or the like, it cannot be automatically reset. To reset it, it is necessary to turn it on under no current. After this operation, it will be automatically reset.

Fig. 1



AL "a" (alarm switch for minute load)

Operation circuit



The circuit breaker is off, and the electrical operation device is in the charged state.

Symbol	Interpretation of symbol
SW1	MANUAL/AUTO selection switch
SW2	Limit switch (For spring condition detection charge/discharge)
Ⓜ	Motor

Note *1 When power is applied, inrush current (capacitor charging current) of 60 A flows to the breaker and fuse installed on the power supply circuit for 1 ms or so. When selecting the breaker and fuse, make sure that they will not cause problems, such as blowout and malfunction.

■Motor-drive type (2)

●Electrical operation

Forward and reverse motor rotation is changed by ball screw to switch the breaker ON and OFF (reset).

●Manual operation

The manual operation handle can be used to switch the breaker ON and OFF directly.

●Cautions for use

①In the case of a circuit breaker with UVT, if the circuit breaker trips owing to the operation of UVT, the procedure for re-closing the circuit breaker varies depending on the condition of the electrical operation device before the circuit breaker trips.
- Tripping in ON state: Reset (OFF). → Turn on.
- Tripping in OFF state: Turn on (idle tripping). → Reset (OFF). → Turn on.

(If the circuit breaker cannot be turned on (idle tripping), reset (OFF) it, and turn on.)
- When an automatic reset system is configured on a non-reset type circuit breaker with UVT, if UVT is set to the no-voltage state, the operations to turn off (reset), trip, turn off (reset) and trip are repeated.

Therefore, configure the circuit in such a way that power is disconnected from the electrical operation device before the circuit breaker is tripped by the non-reset type UVT.

②Current of about 0.2 A will flow to the ON-OFF switch. Use an appropriate switch.

③Do not apply ON and OFF operation signals continuously.
An interval of 0.5 sec or more is necessary between ON and OFF signals.

④In the case of the automatic reset type device, it will perform the reset operation with an interval of 0.5 sec after NFB performs the tripping action.

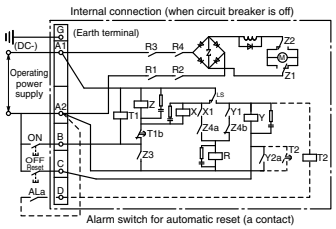
⑤The electrical operation device has a built-in pumping preventing circuit. Therefore, it can operate to turn off the circuit breaker while the ON operation switch is held in the closing state, but it cannot turn on continuously after turning off. To turn on, once turn off the ON operation switch, and turn on the switch. Do not apply the ON operation signal continuously.

⑥The manual operating handle moves at a high speed during electrical operation. Pay attention to the handle. Keep the operation circuit power supply off during manual operation.

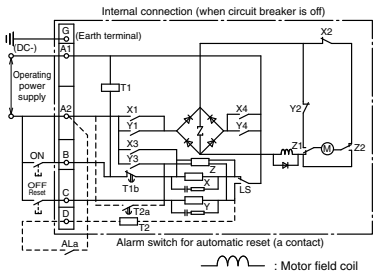
⑦In the manual operation, surely turn the manual operating handle to the position indicated on the nameplate.

●Operation circuit ···· For the automatic reset type, the connections indicated with the dashed lines are added.

●Operation circuit 1
[NF400-CW~NF800-UEW
NV400-CW~NV800-HEW]



●Operation circuit 2
[NF1000-SEW~NF1600-SEW]



Ⓜ : Motor
X : Relay for ON operation
Y : Relay for OFF operation
R : Motor driving relay
Z : Polarity switching relay (Operation circuit 1 or 2)
(R1)~(R4): Relay switches

Z, K: Exciting coil of keep relay (Operation circuit 3)
LS, LS1, LS2: Limit switches
X1~X4, Y1~Y4, Y2a, Z4a, Z4b, Z1, Z2, Z3, K1, T1b, T2a: Relay switches
T_1 : Pumping preventing timer
T_2 : Timer for automatic reset

: Motor field coil
: Surge absorbing circuit
: Surge absorber

■Spring charge type (2)

●Electrical operation

When the ON operation switch is closed, the closing coil will be excited to release the latch mechanism, and the closing spring force will instantaneously turn on the circuit breaker. When the OFF operation switch is closed, the relay will operate to start the motor, turn off (reset) the circuit breaker and, at the same time, charge the closing spring.

●Manual operation

- Press the ON button, and the latch mechanism will be released, and the closing spring force will instantaneously turn on the circuit breaker.
- Turning off (resetting)
  Push the leaf spring, bring out the manual handle, and move the handle upward and downward more than ten times. Then, the circuit breaker will be turned off (reset), and, at the same time, the closing spring will be charged.

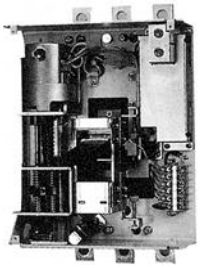
●Cautions for use

①In Before installing or removing the electrical operation device to or from the circuit breaker, trip the circuit breaker, and discharge the electrical operation device. After the device is installed to the circuit breaker, the device will not trip the circuit breaker in the OFF state even if the trip button is pressed. This is not a trouble. The electrical operation device takes 3 seconds to turn off the circuit breaker. To open the circuit immediately by remote operation, use a circuit breaker with SHT or UVT.
- The device has a built-in pumping preventing relay.

②Current of about 9 A and 0.2 A will flow to the ON and OFF switches, respectively. Use appropriate switches.



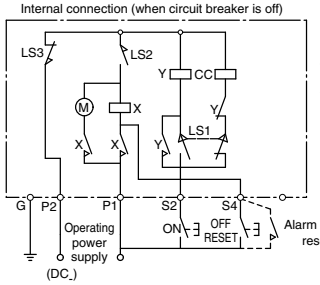
Internal structure of spring charge type



Internal structure of motor-drive type

●Operation circuit

For the automatic reset type, the connections indicated with the dashed lines are added.

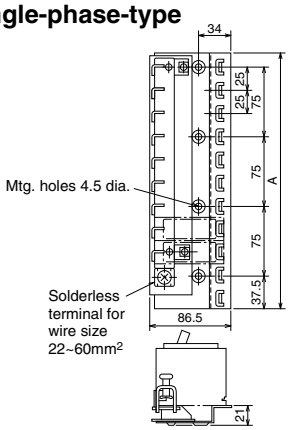


CC : Coil for making
Y : Relay for pumping prevention
X : Relay for self-sustaining on OFF side
LS1: Limit switch interlocking with cam
LS2: Limit switch interlocking with cam
LS3: Limit switch interlocking with OFF lock plate
M : Motor

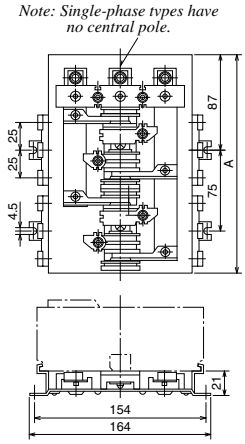
Distribution Board Mounting Parts, Lock Covers and Handle Caps

●BPA-type mounting base (for BH-P)

Single-phase-type



Note: Single-phase types have no central pole.



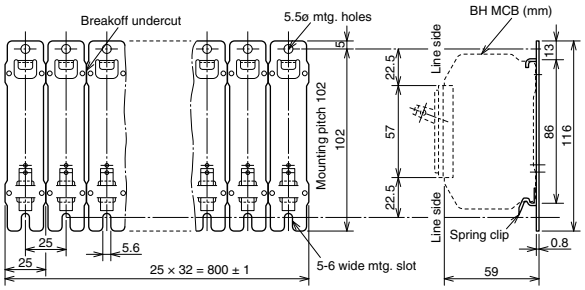
Solderless terminal for wire size :
125A 14~50mm²
250A 22~125mm²

Three-phase-type

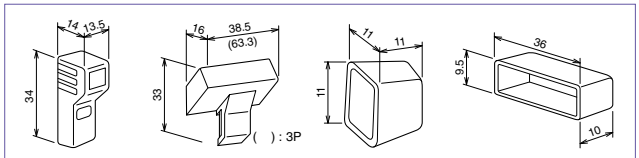


Max. no. of ways	1ph, 2w	1ph, 3w		3ph, 4w		Neutral terminal
	Main : 125A	Main : 125A	Main : 250A	Main : 125A	Main : 250A	
6	BPA-1106	BPA-2106	–	BPA-3106	–	NT-06
9	BPA-1109	–	–	–	–	–
12	BPA-1112	BPA-2112	–	BPA-3112	–	NT-12
15	BPA-1115	–	–	–	–	–
18	BPA-1118	BPA-2118	BPA-2218	BPA-3118	BPA-3218	NT-18
24	–	BPA-2124	BPA-2224	BPA-3124	BPA-3224	NT-24
30	–	–	BPA-2230	–	BPA-3230	NT-30
36	–	–	BPA-2236	–	BPA-3236	NT-36
42					BPA-3242	NT-42

●Mounting plate (for BH)



One mounting plate has 32 circuits.
One package includes 10 mounting plates (320 circuits).



a) Lock cover for 1-pole units
b) Lock cover for 2-pole, 3-pole units
c) Handle cap for 1-pole units
d) Handle cap for 2-pole units

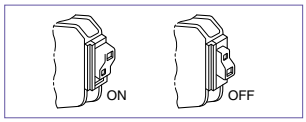
Outlines and dimensions (mm)

●Lock covers and handle caps (for 1-pole, 2-pole and 3-pole types)

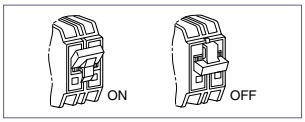
Many panelboards include some restricted-operation circuits, which must either normally remain on, such as all-night lighting or alarms, or must remain off, such as spare circuits, or circuits used in repair or construction work. Breakers for such circuits can be locked by simply installing a lock cover on the handle.

Colors available

Fig. ref.	Item	Poles	Colors		
			Red	Yellow	Green
a)	Lock cover	1	LCBH1R	LCVH1Y	–
b)		2	LCBH2R	LCBH2Y	–
b)		3	LCBH3R	LCBH3Y	–
c)	Cap	1	HC1R	HC1Y	HC1G
d)		2	HC2R	HC2Y	HC2G



Lock cover in place (1-pole unit)



Lock cover in place (2-pole unit)

IEC 35-mm Rail Mounting Adapters

Table 45

Type name	Number of poles of circuit breaker	Applicable model		Fig.
		MCCB	ELCB	
DIN-03CS	2, 3	NF30-CS	–	Fig. 1
(Note1) DIN-05SV	2, 3	NF32-SV NF63-CV/SV/HV	NV32-SV NV63-CV/SV/HV	Fig. 2

Remark: 1. Place an order in units of 10 pieces.

●External dimension

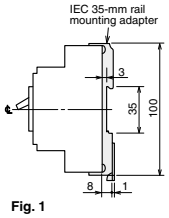


Fig. 1

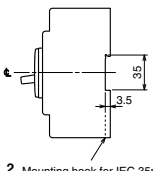


Fig. 2 Mounting hook for IEC 35mm rail [DIN-05SV]

Molded Case Circuit Breakers

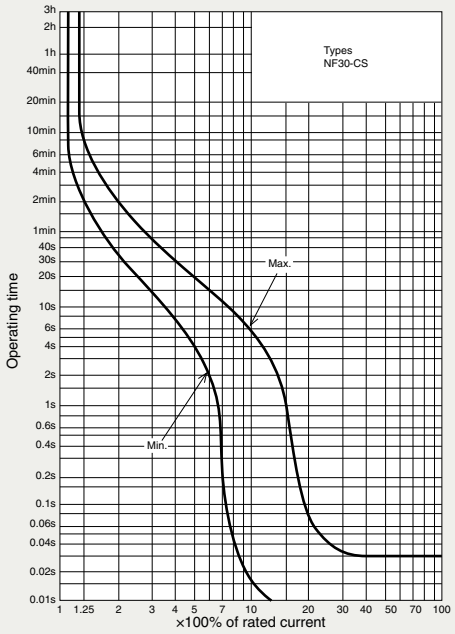
NF30-CS



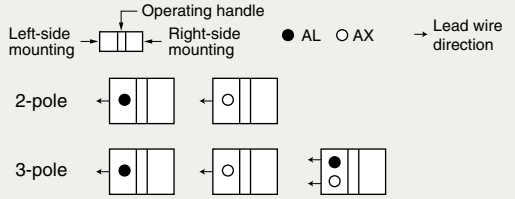
NF30-CS

Model				NF30-CS	
Rated current In (A)				3, 5, 10, 15, 20, 30	
Number of poles				2	3
Rated insulation voltage Ui (V)				500	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	–	
			500V	–	
			415V	1.5/1.5	
			380V	1.5/1.5	
			240V	2.5/2	
Standard Attached Parts (Front connection)				Mounting screw: M4×0.7×20 (2pcs)	

Operating Characteristics

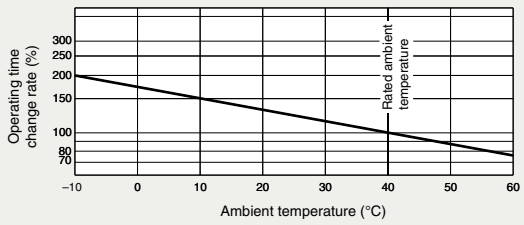


Internal Accessories



Remark: 1. Standard lead wire is drawn from side. However, lead wire drawn by load can be produced upon request.

Temperature Characteristics Curve



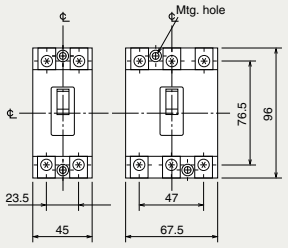
External Accessories

Accessories			Type name
Terminal cover	Small	(TC-S)	TCS-03CS3W (*1)
	Large	(TC-L)	TCL-03CS3W (*1)
	Rear	(BTC)	BTC-03CS3W (*1)
	Skeleton	(TTC)	TTC-03CS (*1)
Handle lock		(HL)	HL-05FH
Lock cover		(LC)	LC03CS
IEC 35mm rail mounting adapter		(DIN)	DIN-03CS

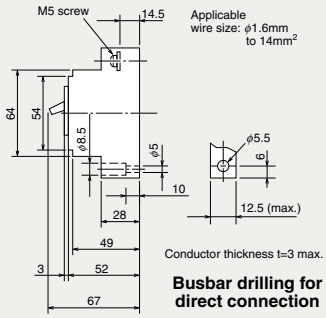
Note *1 The designation depends on the number of poles.

Outline Drawing

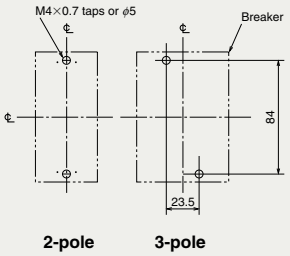
Front connection



2-pole 3-pole



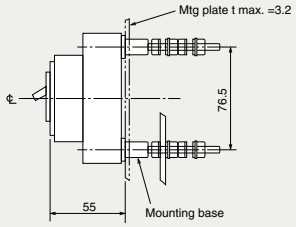
Busbar drilling for direct connection

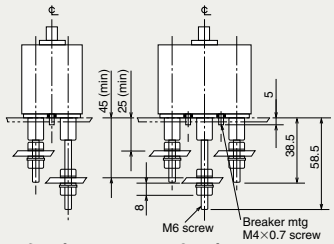


2-pole 3-pole

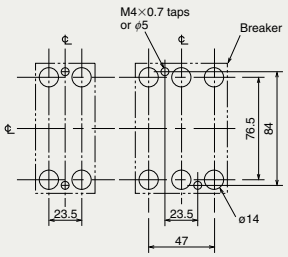
Drilling plan

Rear connection



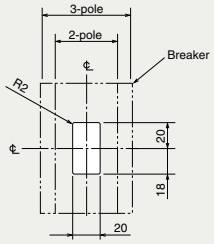


2-pole 3-pole



2-pole 3-pole

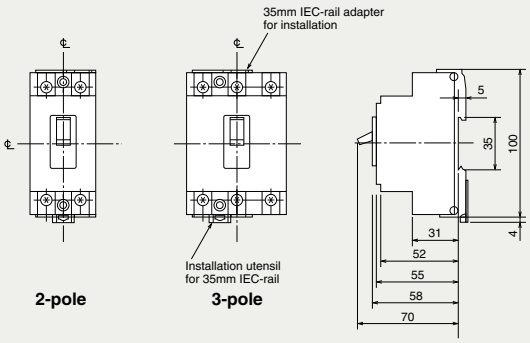
Drilling plan



Front-plate cutout

1mm clearance on each side of handle

IEC Rail Mounting Adapter



2-pole 3-pole

NF32-SV NF63-CV NF63-SV NF63-HV

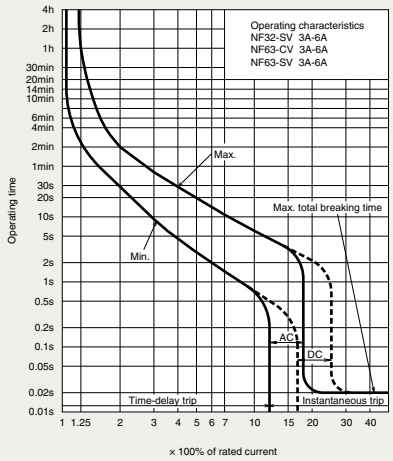


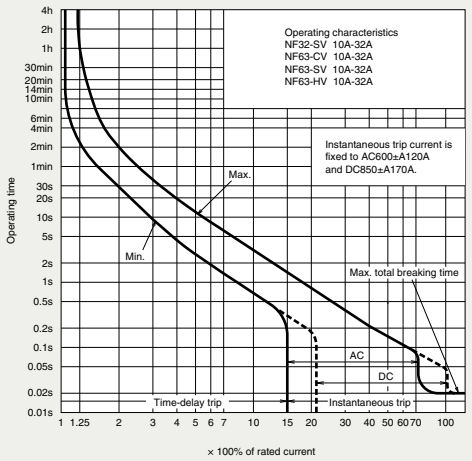
NF63-SV

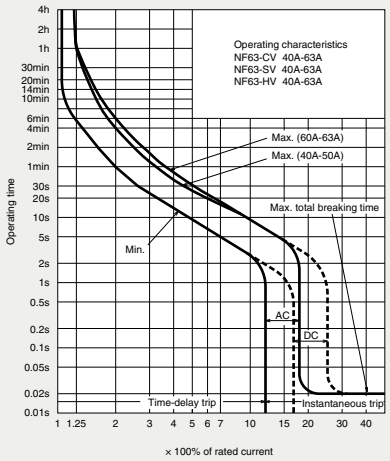
Model				NF32-SV	NF63-CV	NF63-SV	NF63-HV
Rated current In (A)				3 4 (5) 6 10 (15) 16 20 25 (30) 32	3 4 (5) 6 10 (15) 16 20 25 (30) 32 40 50 (60) 63	3 4 (5) 6 10 (15) 16 20 25 (30) 32 40 50 (60) 63	10 (15) 16 20 25 (30) 32 40 50 (60) 63
Number of poles				2 3	2 3	2 3 4	2 3 4
Rated insulation voltage Ui (V)				600	600	600	690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	–	–	–	2.5/2.5
			500V	2.5/2.5	2.5/2.5	7.5/7.5	7.5/7.5
			440V	2.5/2.5	2.5/2.5	7.5/7.5	10/8
			415V	2.5/2.5	2.5/2.5	7.5/7.5	10/8
			400V	5/5	5/5	7.5/7.5	10/8
			380V	5/5	5/5	7.5/7.5	10/8
			230V	7.5/7.5	7.5/7.5	15/15	25/19
		DC	250V (*1)	2.5/2.5	2.5/2.5	7.5/7.5	7.5/7.5
Standard attached parts (front connection)				Mounting screw: M4×0.7×55 (2 and 3P: 2pcs, 4P: 4pcs) Insulation barrier: (2P: 1pc, 3P: 2pcs, 4P: 3pcs) (*2)			

Notes *1 Use two poles for three- and four-pole products. Not available for use with connection as shown at the bottom of page 672.
*2 Supplied with NF63-SV and NF63-HV.

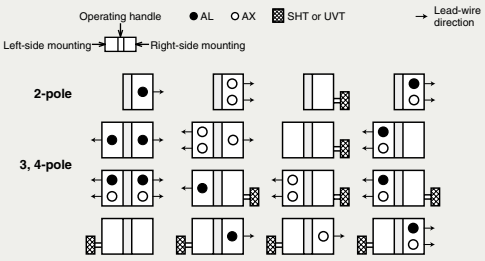
Operating Characteristics



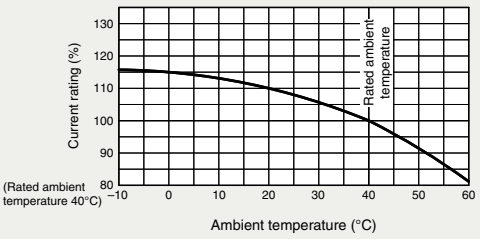




Internal Accessories



Temperature Compensation Curve



External Accessories

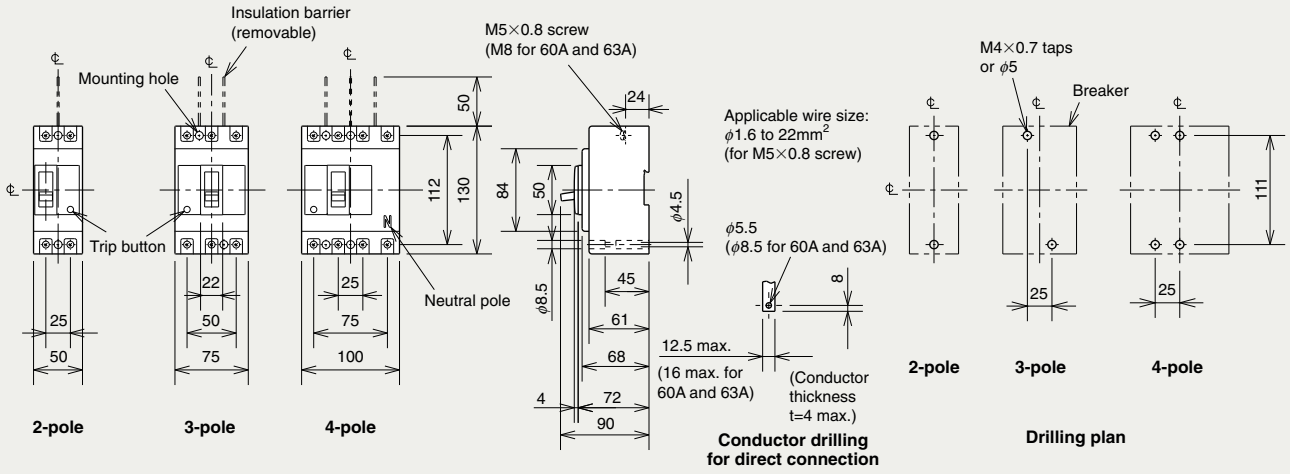
Accessories			Type name
Operating handle	F	2P	F-05SV2
		3, 4P	F-05SV
	V	2P	V-05SV2
		3, 4P	V-05SV
Handle lock device	LC		LC-05SV
	HL (*1)		HLF-05SV
			HLN-05SV
	HL-S		HLS-05SV

Note *1 HLF types are used for OFF lock and HLN types for ON lock.

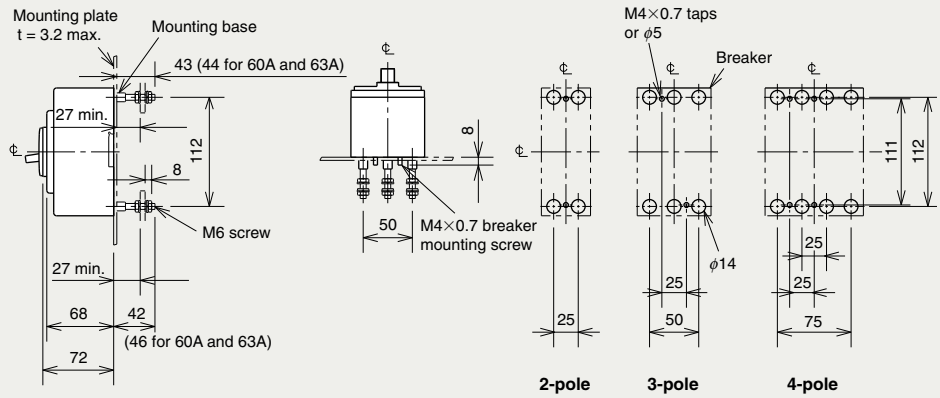
Accessories				Type name
Mechanical interlock		MI	2, 3P	MI-05SV3
			4P	MI-05SV4
Terminal cover	Small	TC-S	2P	TCS-05SV2
			3P	TCS-05SV3
	Large	TC-L	2P	TCL-05SV2
				TCL-05SV2L
			3P	TCL-05SV3
				TCL-05SV3L
			4P	TCL-05SV4
	Skeleton	TTC	2P	TTC-05SV2
			3P	TTC-05SV3
	Rear	BTC	2P	BTC-05SV2
			3P	BTC-05SV3
	Plug-in	PTC	2P	PTC-05SV2
			3P	PTC-05SV3
IEC 35mm rail mounting adapters				DIN-05SV

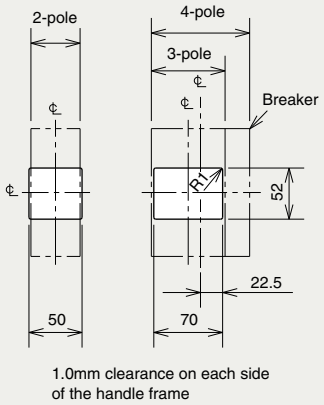
Outline Drawing

Front connection

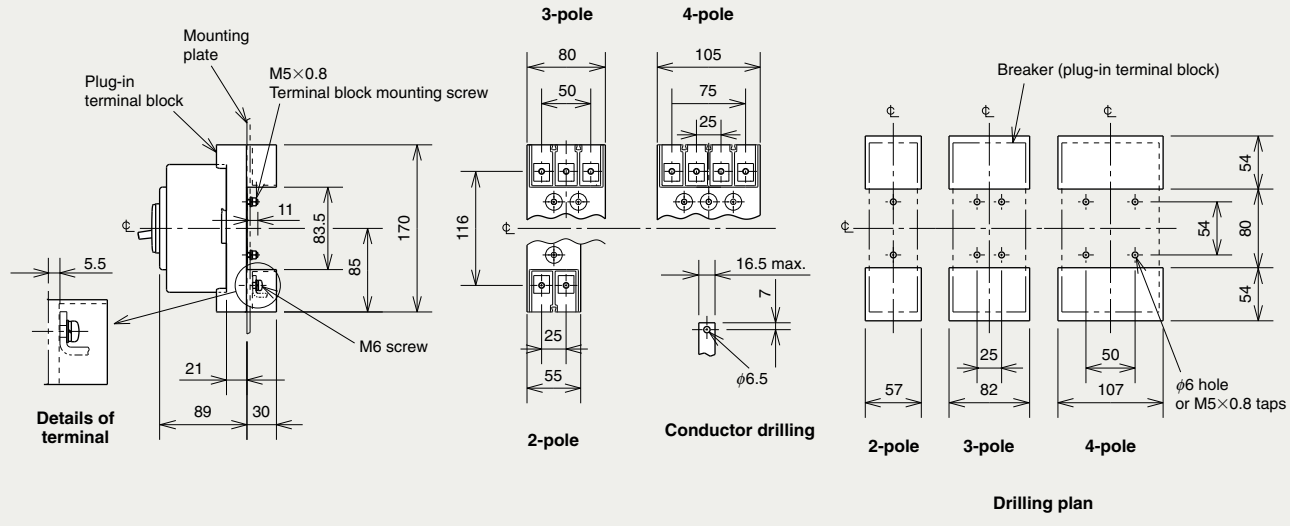


Rear connection





Plug-in



Remark: 1. Only 2-pole and 3-pole models are available for NF32-SV and NF63-CV.

NF125-CV NF125-SV NF125-HV

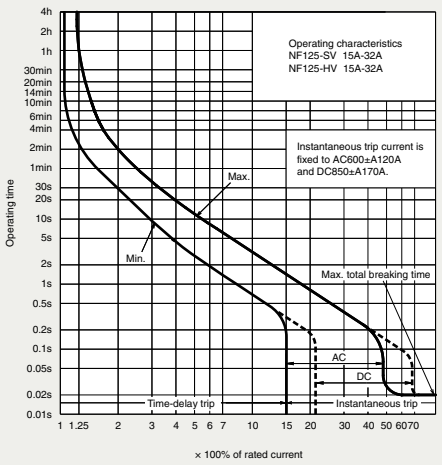


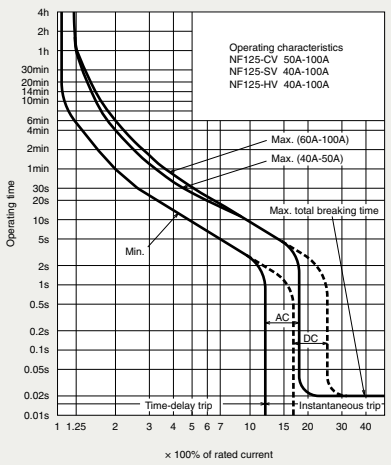
NF125-SV

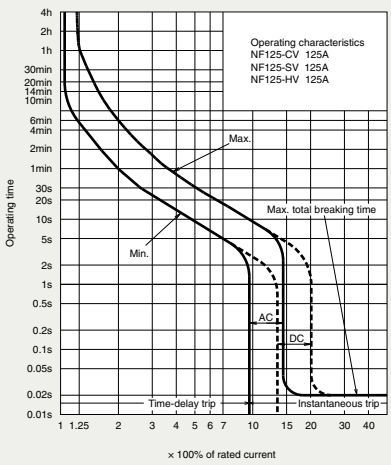
Model				NF125-CV	NF125-SV	NF125-HV
Rated current In (A)				50 (60) 63 (75) 80 100 125	(15) 16 20 (30) 32 40 50 (60) 63 (75) 80 100 125	(15) 16 20 (30) 32 40 50 (60) 63 (75) 80 100 125
Number of poles				2 3	2 3 4	2 3 4
Rated insulation voltage Ui (V)				600	690	690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	–	8/8	10/8
			500V	7.5/4	18/18	30/23
			440V	10/5	25/25	50/38
			415V	10/5	30/30	50/38
			400V	10/5	30/30	50/38
			380V	10/5	30/30	50/38
			230V	30/15	50/50	100/75
		DC	250V (*1)	7.5/4	40/40	–
Standard attached parts (front connection)				Mounting screw: M4×0.7×55 (2 and 3P: 2pcs, 4P: 4pcs) (*2) Insulation barrier: (2P: 1pc, 3P: 2pcs, 4P: 4pcs)		

Notes *1 Use two poles for three- and four-pole products.
If wired as shown at the bottom of page 672, three and four poles can be used for up to 400 and 500VDC, respectively.
*2 Supplied with NF125-SV and NF125-HV.

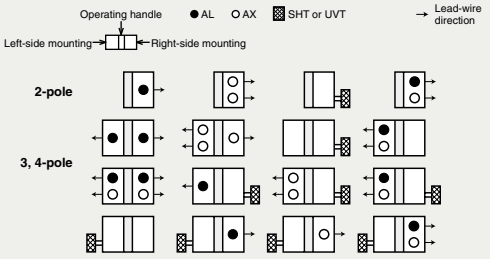
Operating Characteristics



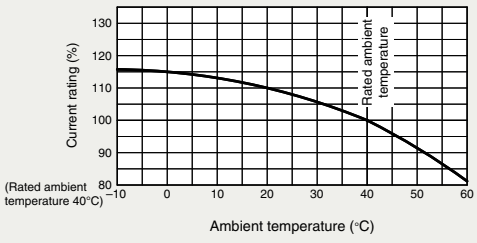




Internal Accessories



Temperature Compensation Curve



External Accessories

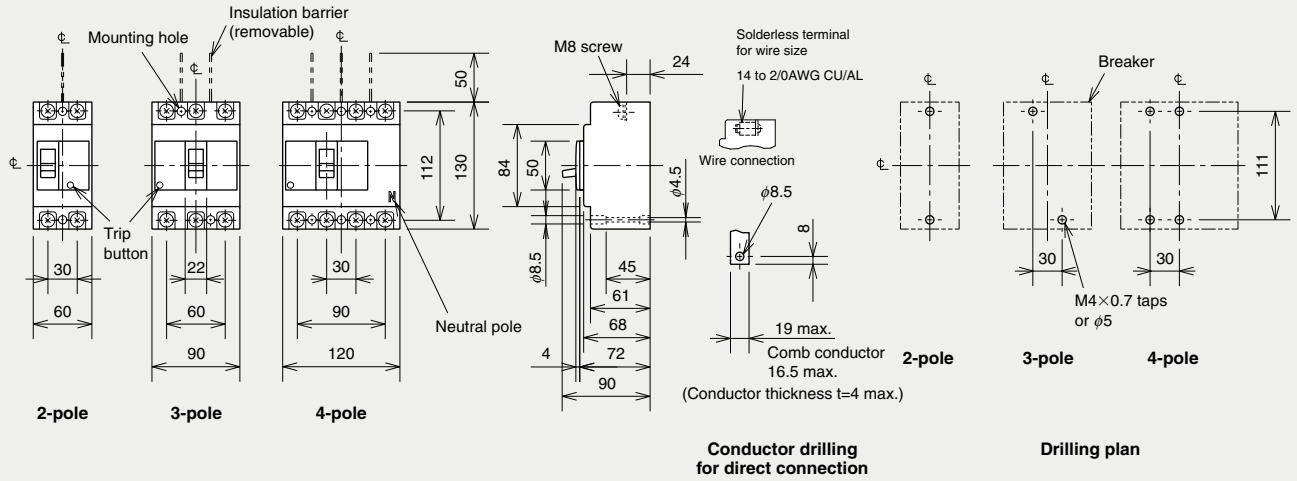
Accessories			Type name
Operating handle	F	2P	F-1SV2
		3, 4P	F-1SV
	V	2P	V-1SV2
		3, 4P	V-1SV
Handle lock device	LC		LC-05SV
	HL (*1)		HLF-05SV
			HLN-05SV
	HL-S		HLS-05SV

Notes *1 HLF types are used for OFF lock and HLN types for ON lock.
*2 Specify the working voltage.

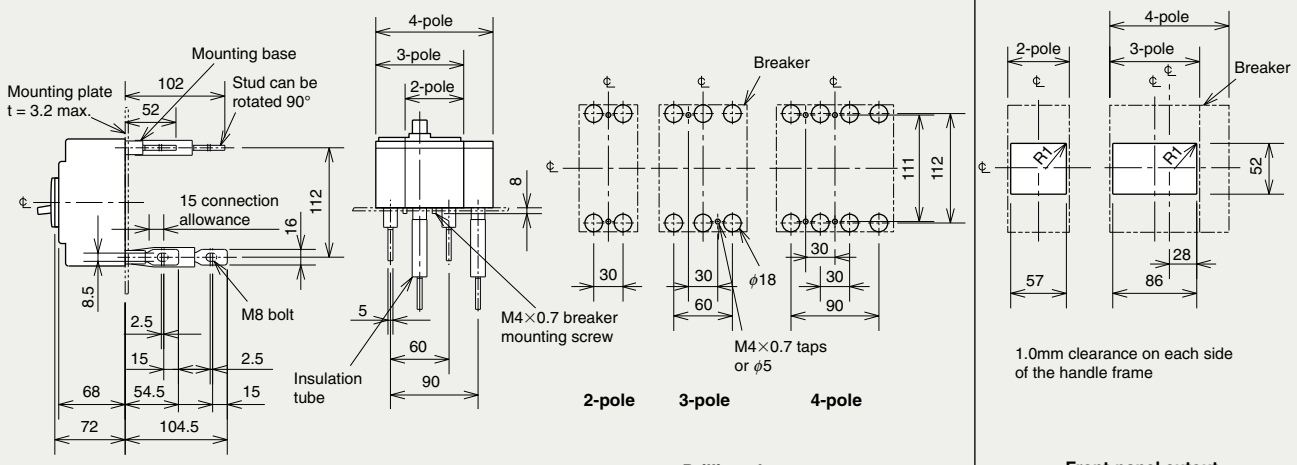
Accessories				Type name
Mechanical interlock		MI	2, 3P	MI-05SV3
			4P	MI-05SV4
Terminal cover	Small	TC-S	2P	TCS-1SV2
			3P	TCS-1SV3
	Large	TC-L	2P	TCL-1SV2
			3P	TCL-1SV3
			4P	TCL-1SV4
	Skeleton	TTC	2P	TTC-1SV2
			3P	TTC-1SV3
	Rear	BTC	2P	BTC-1SV2
			3P	BTC-1SV3
	Plug-in	PTC	2P	PTC-1SV2
			3P	PTC-1SV3
Electrical operation device				(*2)

Outline Drawing

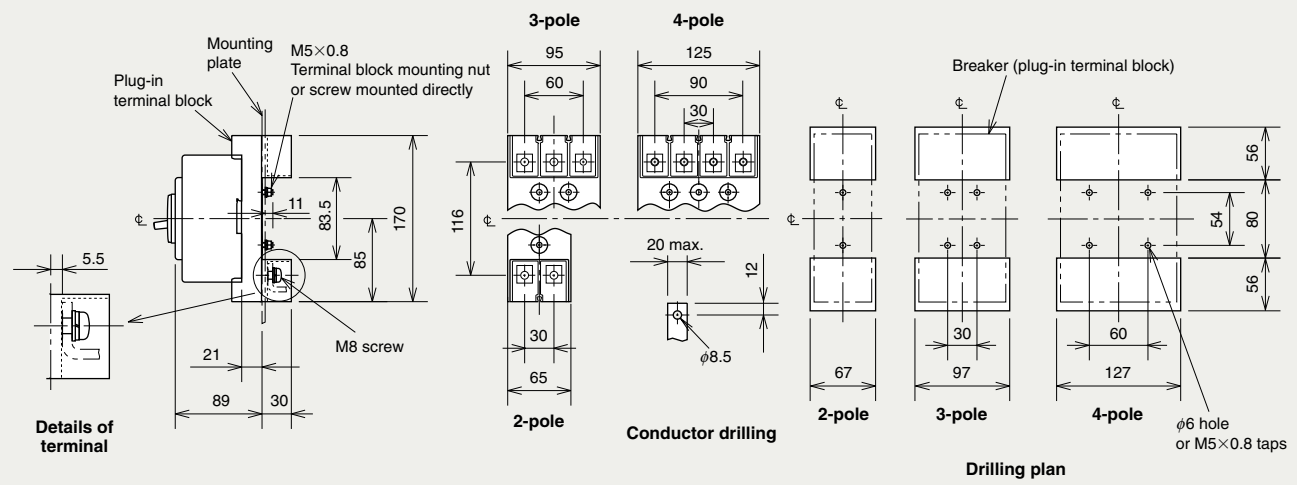
Front connection



Rear connection



Plug-in



Remarks: 1. The 2-pole models of NF125-HV are 3-pole models with the central pole removed.
2. Only 2-and 3-pole models are available for NF125-CV.

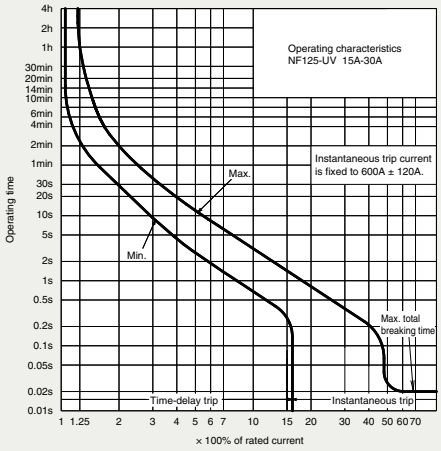
NF125-UV

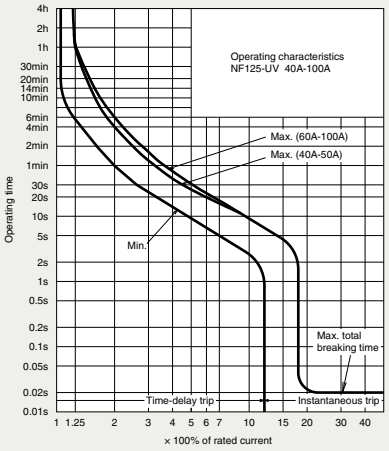


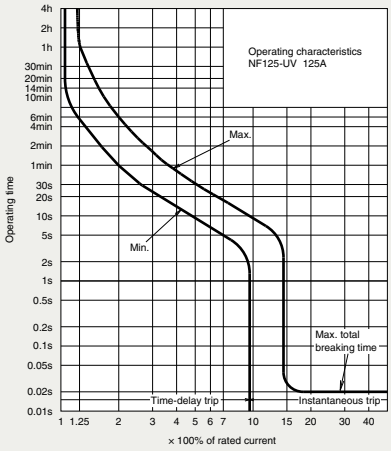
NF125-UV

Model				NF125-UV
Rated current In (A)				15 20 30 40 50 60 75 100 125
Number of poles				2 / 3 / 4
Rated insulation voltage Ui (V)				690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	10/10
			500V	200/200
			440V	200/200
			415V	200/200
			400V	200/200
			380V	200/200
			230V	200/200
		DC	250V	–
Standard attached parts (front connection)				Mounting screw: M4×0.7×55 (2 and 3P: 2pcs, 4P: 4pcs) M4×0.7×73 (2 and 3P: 2pcs)

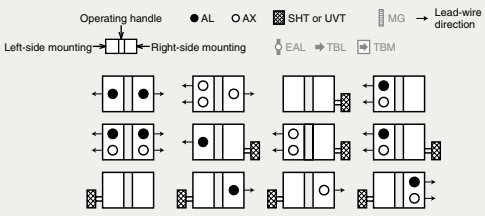
Operating Characteristics



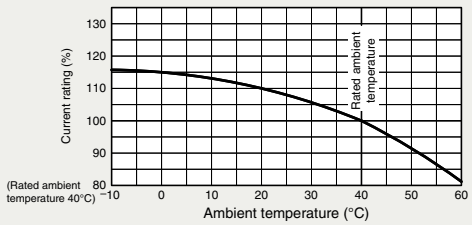




Internal Accessories



Temperature Compensation Curve



External Accessories

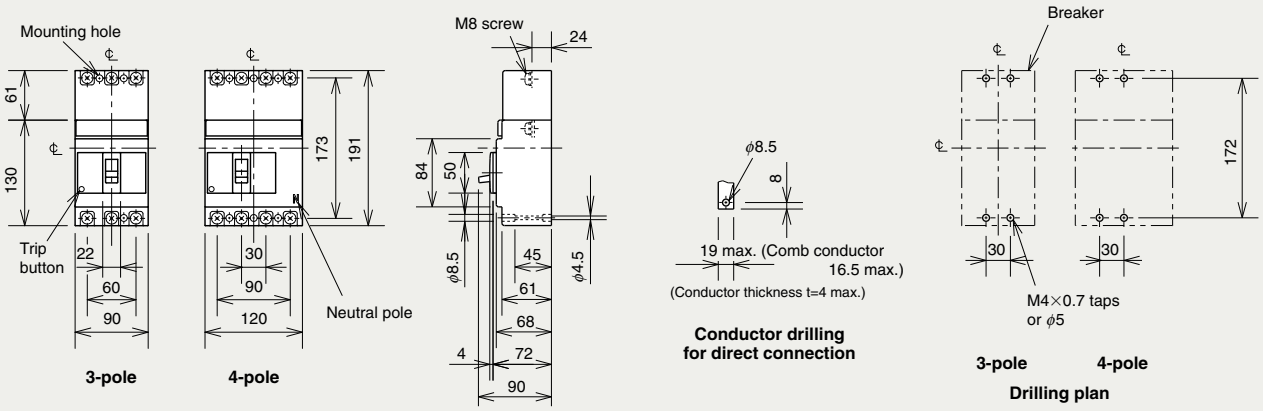
Accessories		Type name
Operating handle	F	F-1UV
	V	V-1UV
Lock cover	LC	LC-05SV
Handle lock device	HL (*1)	HLF-05SV
		HLN-05SV
	HL-S	HLS-05SV

Accessories				Type name
Mechanical interlock		MI	2, 3P	MI-05SV3
			4P	MI-05SV4
Terminal cover	Small	TC-S	3P	TCS-1SV3
	Large	TC-L	3P	TCL-1SV3
			4P	TCL-1SV4
	Skeleton	TTC	3P	TTC-1SV3
	Rear	BTC	3P	BTC-1SV3
	Plug-in	PTC	3P	PTC-1SV3
Electrical operation device				(*2)

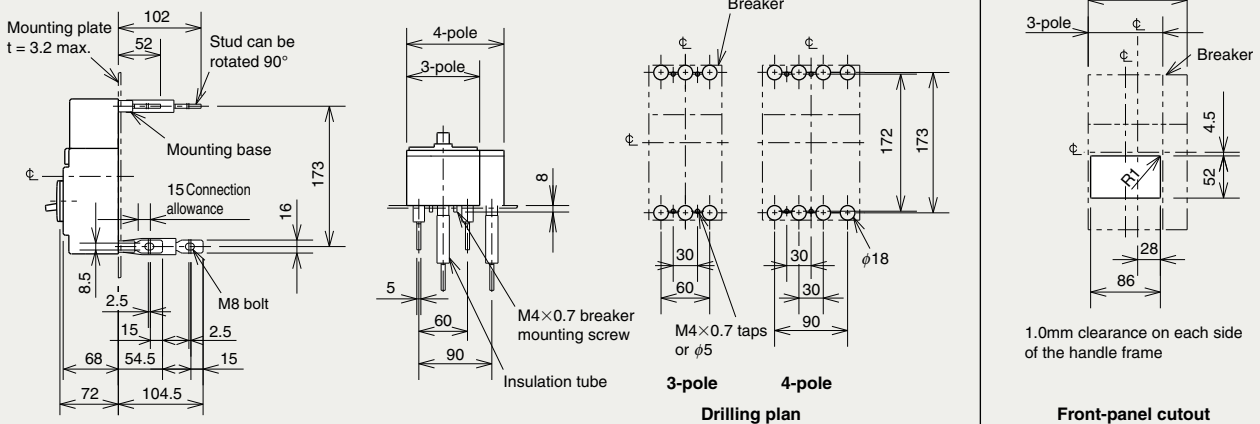
Notes *1 HLF types are used for OFF lock and HLN types for ON lock.
*2 Specify the working voltage.

Outline Drawing

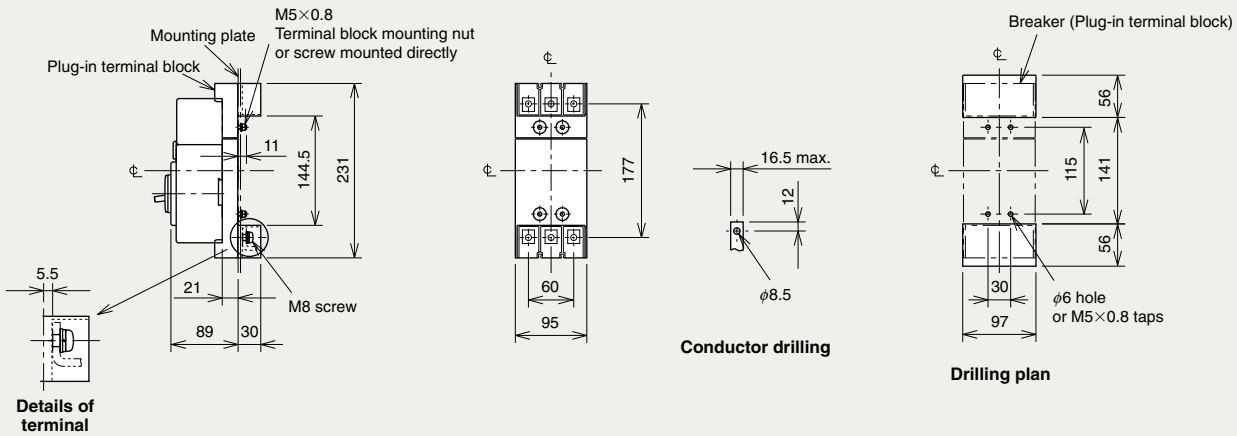
Front connection



Rear connection



Plug-in



Remark: 1. 2-pole models are 3-pole models with the central pole removed.

NF250-CV NF250-SV NF250-HV

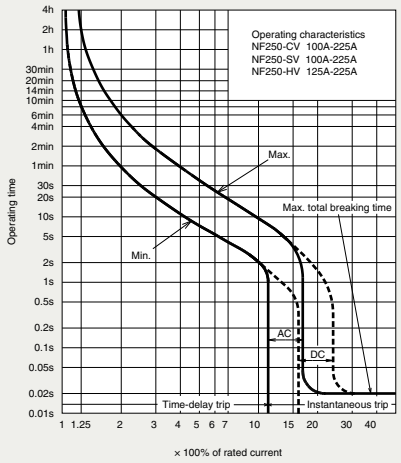


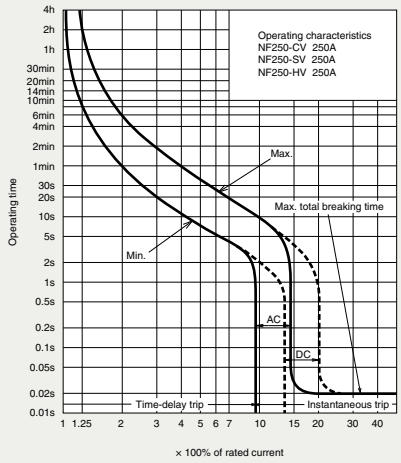
NF250-SV

Model				NF250-CV	NF250-SV	NF250-HV
Rated current In (A)				(*1) (100) 125 150 175 200 225 250	(*1) (100) 125 150 160 175 200 225 250	125 150 160 175 200 225 250
Number of poles				2 3	2 3 4	2 3 4
Rated insulation voltage Ui (V)				600	690	690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	–	8/8	10/8
			500V	10/8	30/30	50/38
			440V	15/12	36/36	65/65
			415V	25/19	36/36	70/70
			400V	25/19	36/36	75/75
			380V	25/19	36/36	75/75
			230V	36/27	85/85	100/100
		DC (*1)	250V	15/12	20/20 (300V)	40/40 (300V)
Standard attached parts (front connection)				Mounting screw: M4×0.7×55 (2 and 3P: 2pcs, 4P: 4pcs) Insulation barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)		

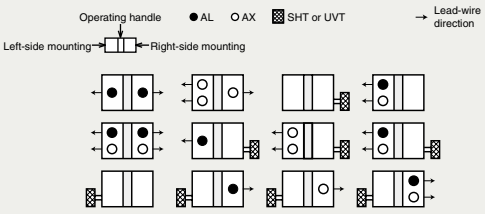
Note *1 Use two poles for three- and four-pole products. In this case, do not use the neutral pole of the four-pole products. If wired as shown at the bottom of page 672, three-pole NF250-CV can be used for up to 400VDC, three-pole NF250-SV and NF250-HV up to 500VDC and four-pole products up to 600VDC.

Operating Characteristics

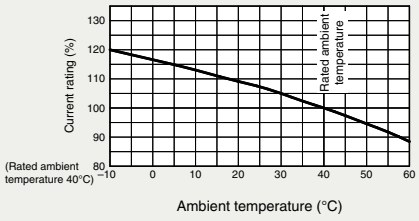




Internal Accessories



Temperature Compensation Curve



External Accessories

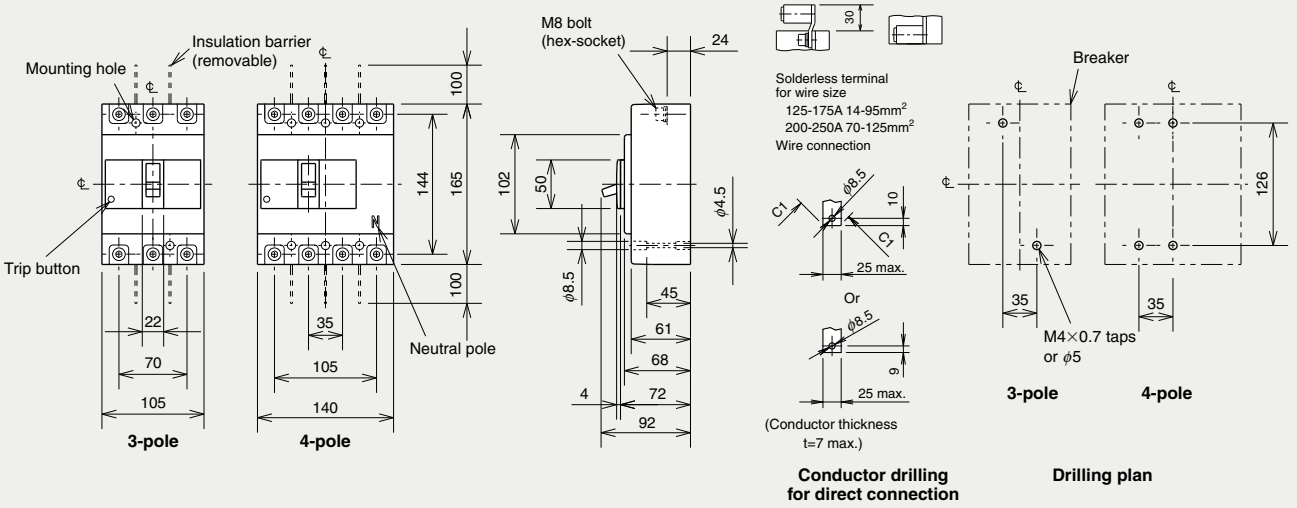
Accessories		Type name
Operating handle	F	F-2SV
	V	V-2SV
Handle lock device	LC	LC-05SV
	HL (*1)	HLF-05SV
		HLN-05SV
	HL-S	HLS-2SV

Accessories				Type name
Mechanical interlock		MI	2, 3P	MI-05SV3
			4P	MI-2SV4
Terminal cover	Small	TC-S	2, 3P	TCS-2SV3
	Large	TC-L	2, 3P	TCL-2SV3
				TCL-2SV3L
			4P	TCL-2SV4
	Skeleton	TTC	2, 3P	TTC-2SV3
	Rear	BTC	2, 3P	BTC-2SV3
	Plug-in	PTC	2, 3P	PTC-2SV3
Electrical operation device				(*2)

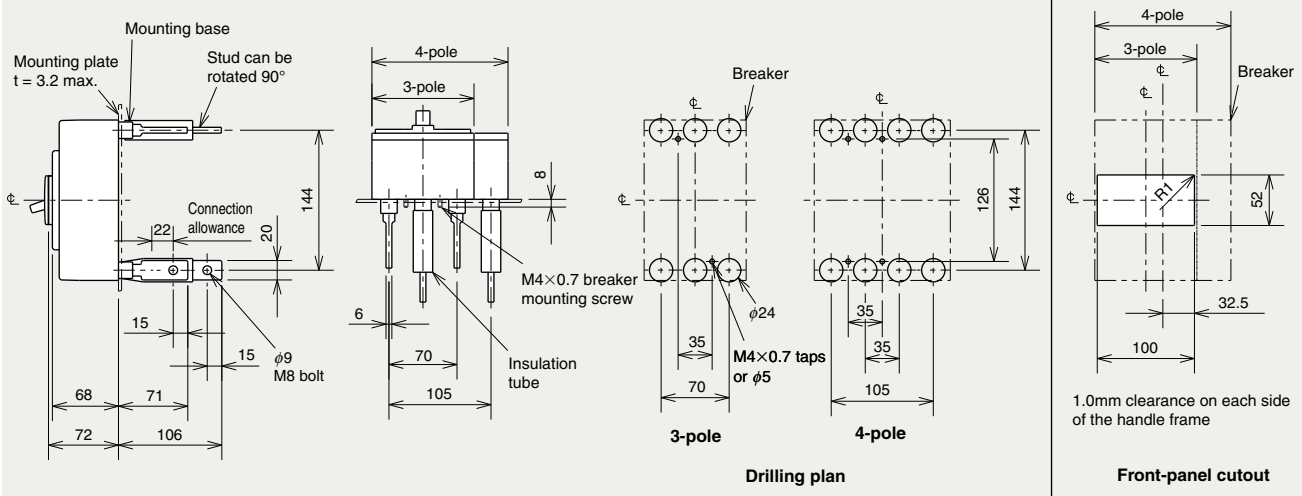
Notes *1 HLF types are used for OFF lock and HLN types for ON lock.
*2 Specify the working voltage.

Outline Drawing

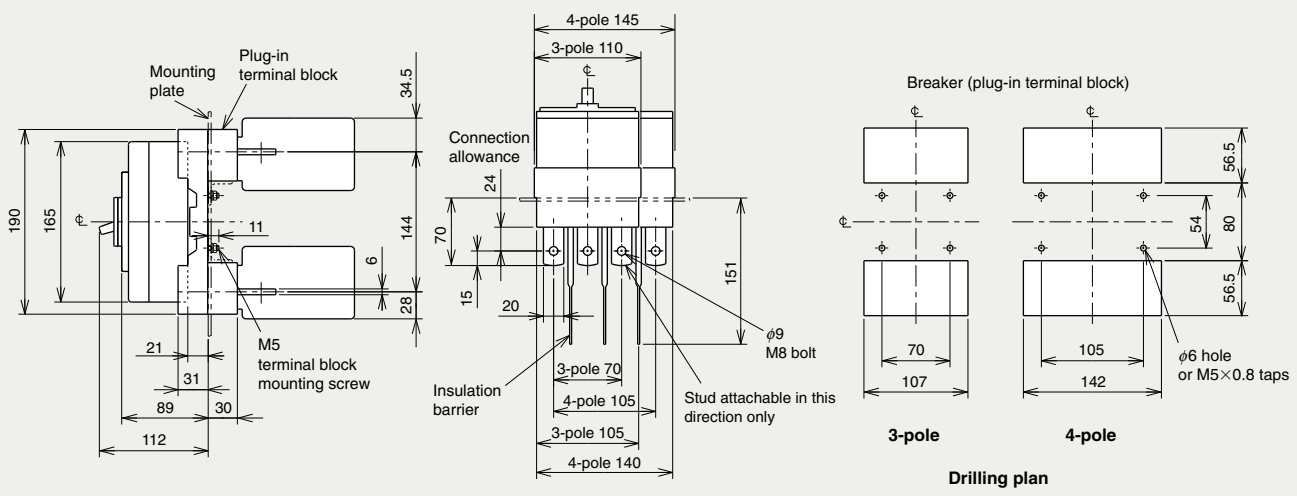
Front connection



Rear connection



Plug-in



Remarks: 1. 2-pole models are 3-pole models with the central pole removed.
2. Only 2-pole and 3-pole models are available for NF250-CV.

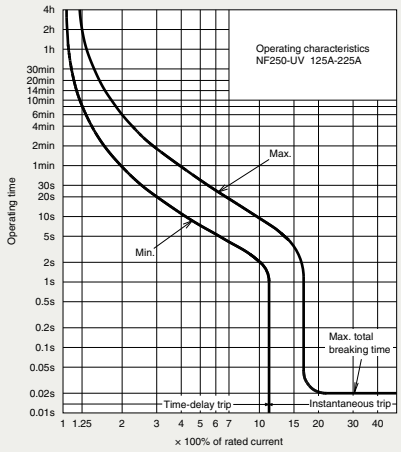
NF250-UV

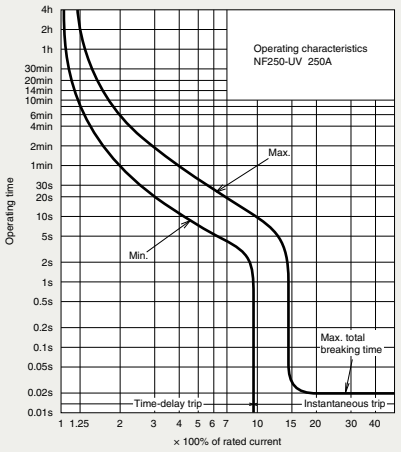


NF250-UV

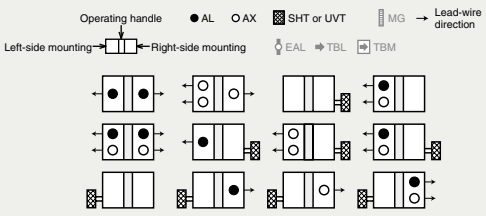
Model				NF250-UV		
Rated current In (A)				125 150 175 200 225 250		
Number of poles				2	3	4
Rated insulation voltage Ui (V)				690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	15/15		
			500V	200/200		
			440V	200/200		
			415V	200/200		
			400V	200/200		
			380V	200/200		
			230V	200/200		
		DC	250V	–		
Standard attached parts (front connection)				Mounting screw: M4×0.7×55 (2 and 3P: 2pcs, 4P: 4pcs) Mounting screw: M4×0.7×73 (2 and 3P: 2pcs) Insulation barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)		

Operating Characteristics

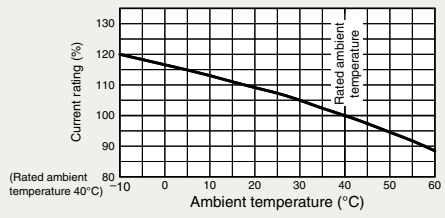




Internal Accessories



Temperature Compensation Curve



External Accessories

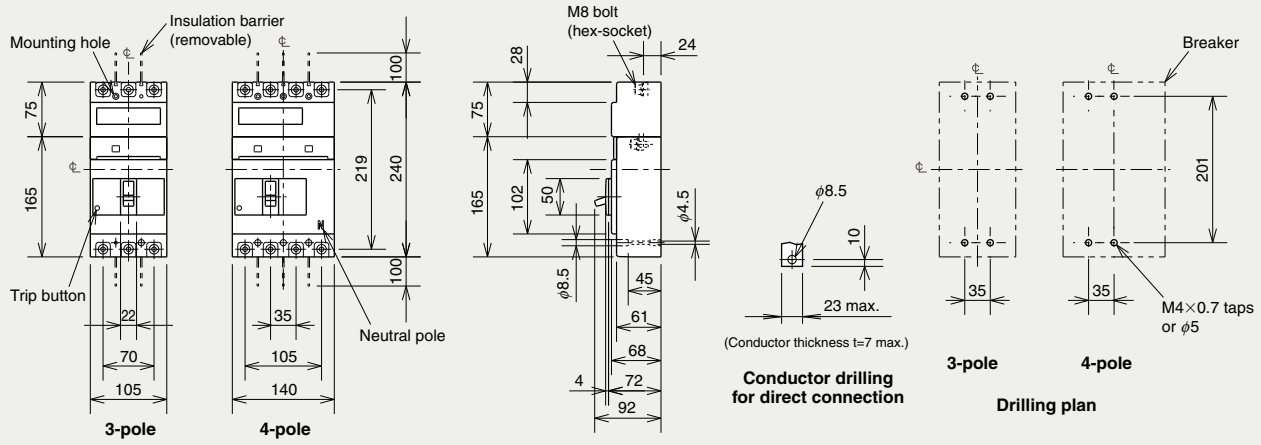
Accessories		Type name
Operating handle	F	F-2UV
	V	V-2UV
Handle lock device	LC	LC-05SV
	HL (*1)	HLF-05SV
		HLN-05SV
	HL-S	HLS-2SV

Accessories				Type name
Mechanical interlock		MI	2, 3P	MI-05SV3
			4P	MI-2SV4
Terminal cover	Small	TC-S	2, 3P	TCS-2SV3
	Large	TC-L	2, 3P	TCL-2SV3
				TCL-2SV3L
			4P	TCL-2SV4
	Skeleton	TTC	2, 3P	TTC-2SV3
	Rear	BTC	2, 3P	BTC-2SV3
	Plug-in	PTC	2, 3P	PTC-2SV3
Electrical operation device				(*2)

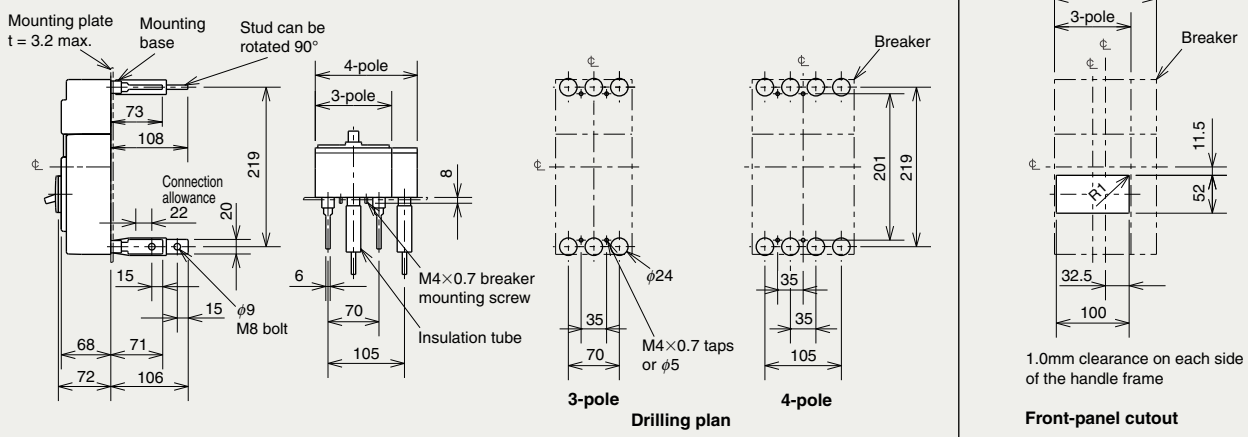
Notes *1 HLF types are used for OFF lock and HLN types for ON lock.
*2 Specify the working voltage.

Outline Drawing

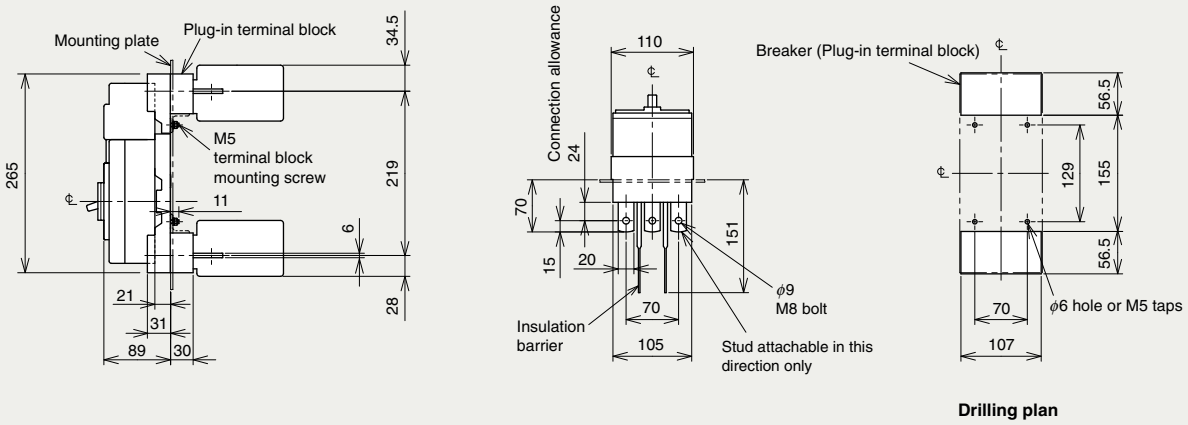
Front connection



Rear connection



Plug-in



Remark: 1. 2-pole models are 3-pole models with the central pole removed.

NF125-SGV NF160-SGV NF250-SGV NF125-LGV NF160-LGV NF250-LGV NF125-HGV NF160-HGV NF250-HGV NF125-RGV NF250-RGV



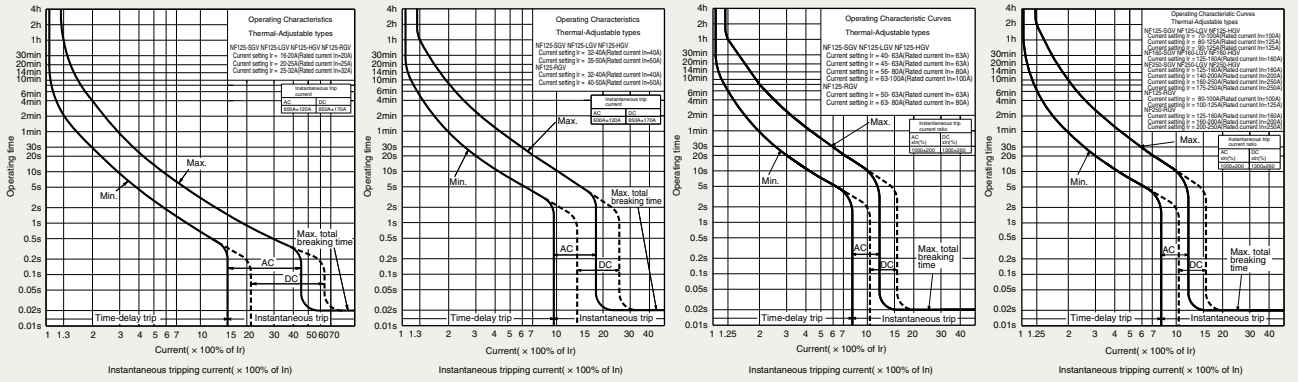
NF250-SGV

Model				NF125-SGV			NF160-SGV			NF250-SGV			NF125-LGV			NF160-LGV			NF250-LGV		
Rated current In (A)				16-20, 20-25, 25-32 32-40, 35-50, 45-63 56-80, 70-100, 90-125			125-160			125-160 140-200 175-250			16-20, 20-25, 25-32 32-40, 35-50, 45-63 56-80, 70-100, 90-125			125-160			125-160 140-200 175-250		
Number of poles				2	3	4	2	3	4	2	3	4	2	3	4	2	3	4	2	3	4
Rated insulation voltage Ui (V)				690			690			690			690			690			690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	8/8			8/8			8/8			8/8			8/8			8/8		
			500V	30/30			30/30			30/30			36/36			36/36			36/36		
			440V	36/36			36/36			36/36			50/50			50/50			50/50		
			415V	36/36			36/36			36/36			50/50			50/50			50/50		
			400V	36/36			36/36			36/36			50/50			50/50			50/50		
			380V	36/36			36/36			36/36			50/50			50/50			50/50		
			230V	85/85			85/85			85/85			90/90			90/90			90/90		
			200V	85/85			85/85			85/85			90/90			90/90			90/90		
		DC (*1)	300V	20/20			20/20			20/20			20/20			20/20			20/20		
Standard attached parts (front connection)				Mounting screw: M4×0.7×55 (2 and 3P: 2pcs, 4P: 4pcs) Insulation barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)																	

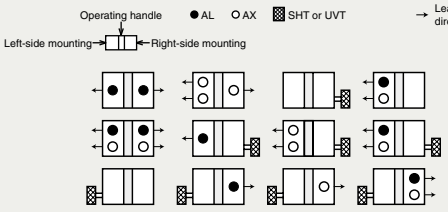
Model				NF125-HGV			NF160-HGV			NF250-HGV			NF125-RGV		NF250-RGV	
Rated current In (A)				16-20, 20-25, 25-32 32-40, 35-50, 45-63 56-80, 70-100, 90-125			125-160			125-160 140-200 175-250			16-20, 20-25, 25-32 32-40, 40-50, 50-63 63-80, 80-100, 100-125		125-160 160-200 200-250	
Number of poles				2	3	4	2	3	4	2	3	4	2	3	2	3
Rated insulation voltage Ui (V)				690			690			690			690		690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	10/8			10/8			10/8			–		–	
			500V	50/38			50/38			50/38			–		–	
			440V	65/65			65/65			65/65			125/125		125/125	
			415V	70/70			70/70			70/70			150/150		150/150	
			400V	75/75			75/75			75/75			150/150		150/150	
			380V	75/75			75/75			75/75			150/150		150/150	
			230V	100/100			100/100			100/100			150/150		150/150	
			200V	100/100			100/100			100/100			150/150		150/150	
		DC (*1)	300V	40/40			40/40			40/40			–		–	
Standard attached parts (front connection)				Mounting screw: M4×0.7×55 (2 and 3P: 2pcs, 4P: 4pcs) Insulation barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)												

Note *1 When wired as shown at the bottom of page 672, three-pole models can be used for up to 500VDC, and four-pole models for up to 600VDC.

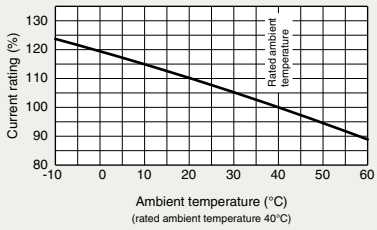
Operating Characteristics



Internal Accessories



Temperature Compensation Curve



External Accessories

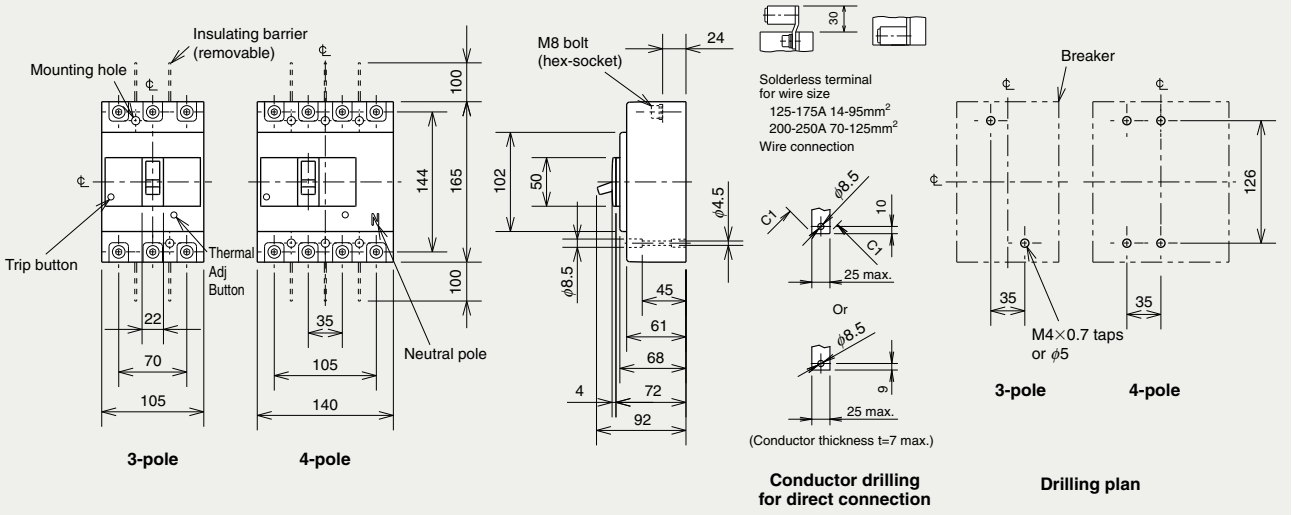
Accessories		Type name
Operating handle	F	F-2SV
	V	V-2SV
Handle lock device	LC	LC-05SV
	HL (*1)	HLF-05SV
		HLN-05SV
	HL-S	HLS-2SV

Accessories				Type name
Mechanical interlock		MI	2, 3P	MI-05SV3
			4P	MI-2SV4
Terminal cover	Small	TC-S	2, 3P	TCS-2SV3
	Large	TC-L	2, 3P	TCL-2SV3
				TCL-2SV3L
			4P	TCL-2SV4
	Skeleton	TTC	2, 3P	TTC-2SV3
	Rear	BTC	2, 3P	BTC-2SV3
	Plug-in	PTC	2, 3P	PTC-2SV3
Electrical operation device				(*2)

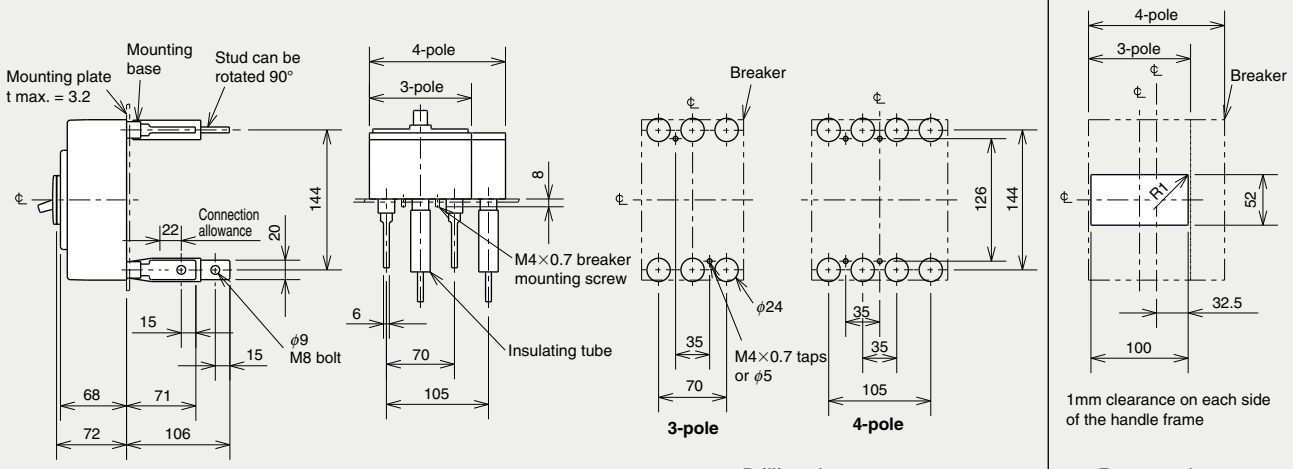
Notes *1 HLF types are used for OFF lock and HLN types for ON lock.
*2 Specify the working voltage.

Outline Drawing

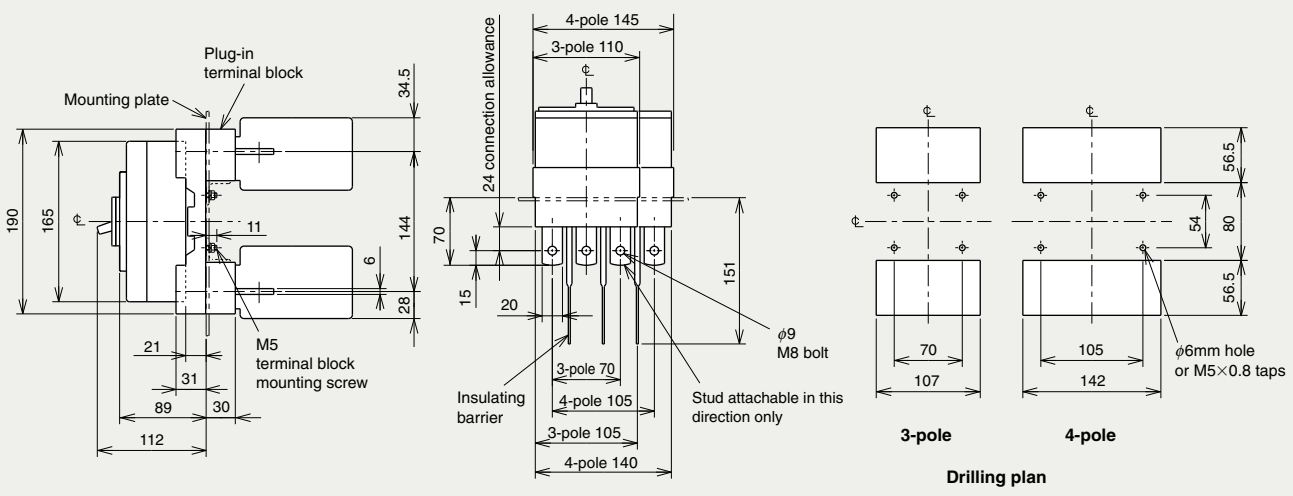
Front connection



Rear connection



Plug-in



Remark: 1. 2-pole models are 3-pole models with the central pole removed.

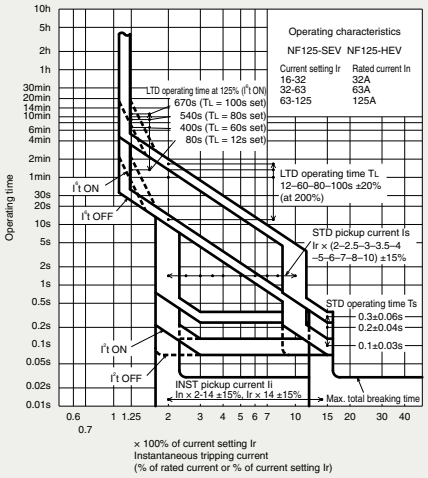
NF125-SEV
NF125-HEV
NF250-SEV
NF250-HEV

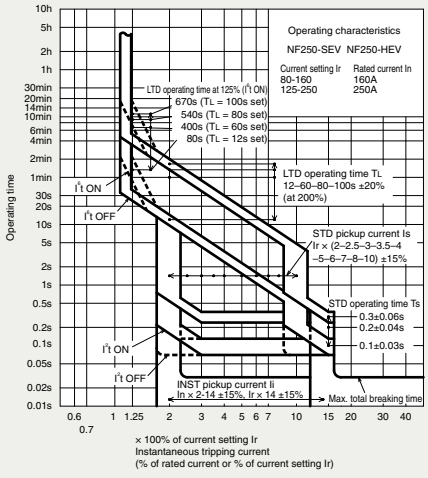


NF125-SEV

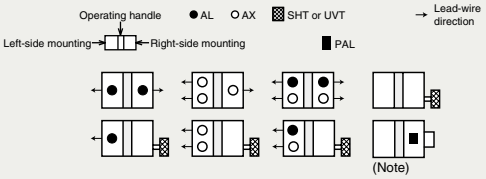
Model				NF125-SEV	NF125-HEV	NF250-SEV	NF250-HEV
Rated current In (A)				32 63 125	32 63 125	160 250	160 250
Current setting Ir (A)				16-32 32-63 63-125	16-32 32-63 63-125	80-160 125-250	80-160 125-250
Number of poles				3 4	3 4	3 4	3 4
Rated insulation voltage Ui (V)				690	690	690	690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	8/8	10/8	8/8	10/8
			500V	30/30	50/38	30/30	50/38
			440V	36/36	65/65	36/36	65/65
			415V	36/36	70/70	36/36	70/70
			400V	36/36	75/75	36/36	75/75
			380V	36/36	75/75	36/36	75/75
			230V	85/85	100/100	85/85	100/100
		DC	250V	–	–	–	–
Standard attached parts (front connection)				Mounting screw: M4×0.7×55 (3P: 2pcs, 4P: 4pcs) Insulation barrier: (3P: 4pcs, 4P: 6pcs)			

Operating Characteristics

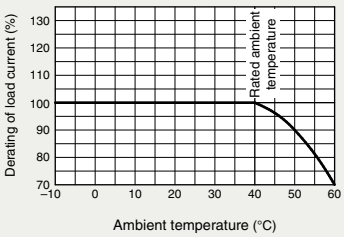




Internal Accessories



Current Reducing Curve



The rated current does not have thermal characteristics. Reduce the current as shown in the curve on the left chart if the ambient temperature exceeds 40 °C.

External Accessories

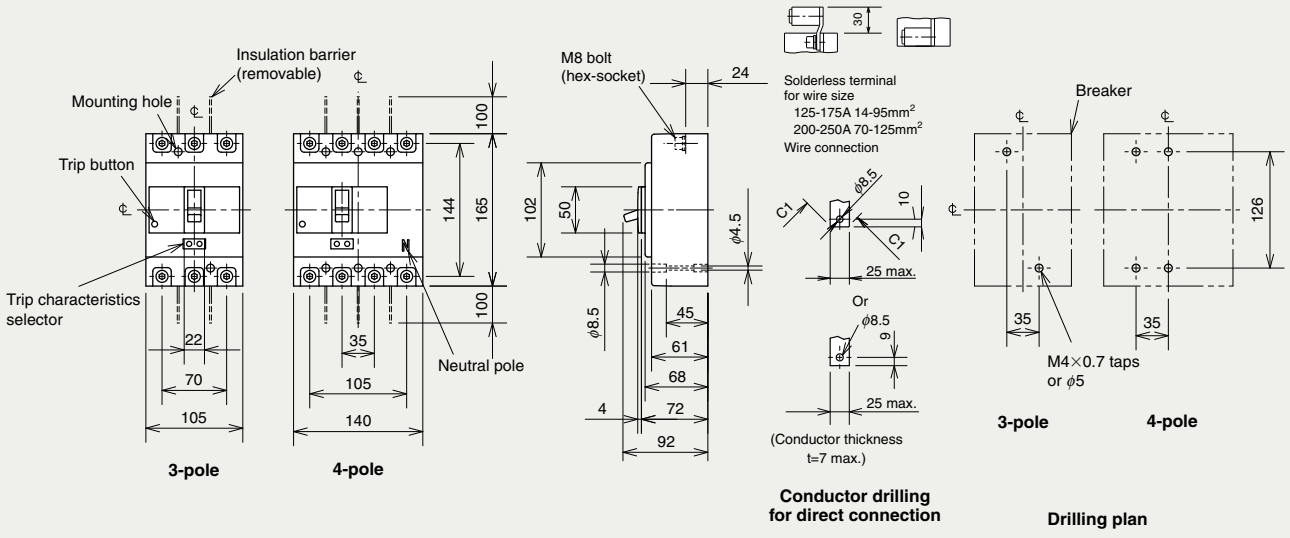
Accessories		Type name
Operating handle	F	F-2SV
	V	V-2SV
Handle lock device	LC	LC-05SV
	HL (*1)	HLF-05SV
		HLN-05SV
	HL-S	HLS-2SV

Accessories				Type name
Mechanical interlock		MI	3P	MI-05SV3
			4P	MI-2SV4
Terminal cover	Small	TC-S	3P	TCS-2SV3
	Large	TC-L	3P	TCL-2SV3
				TCL-2SV3L
			4P	TCL-2SV4
	Skeleton	TTC	3P	TTC-2SV3
	Rear	BTC	3P	BTC-2SV3
	Plug-in	PTC	3P	PTC-2SV3
Electrical operation device				(*2)

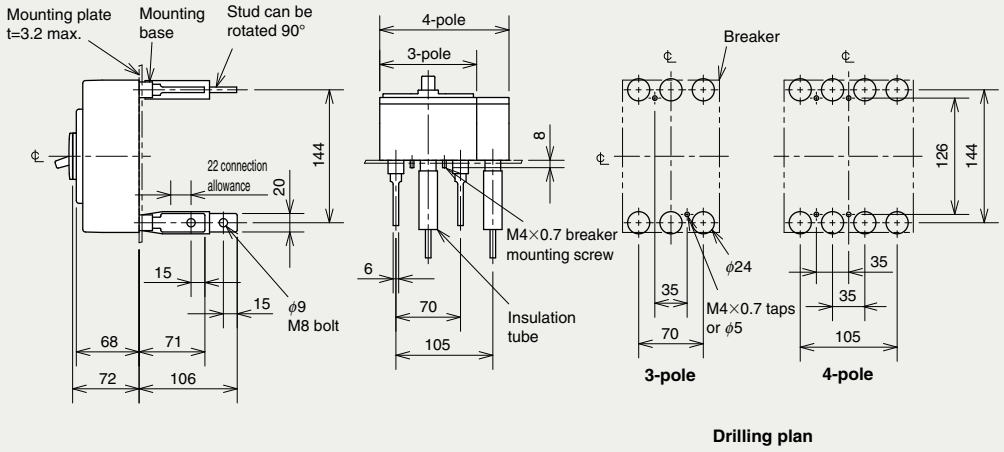
Notes *1 HLF types are used for OFF lock and HLN types for ON lock.
*2 Specify the working voltage.

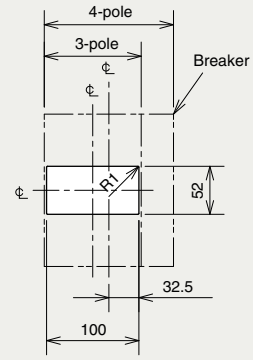
Outline Drawing

Front connection

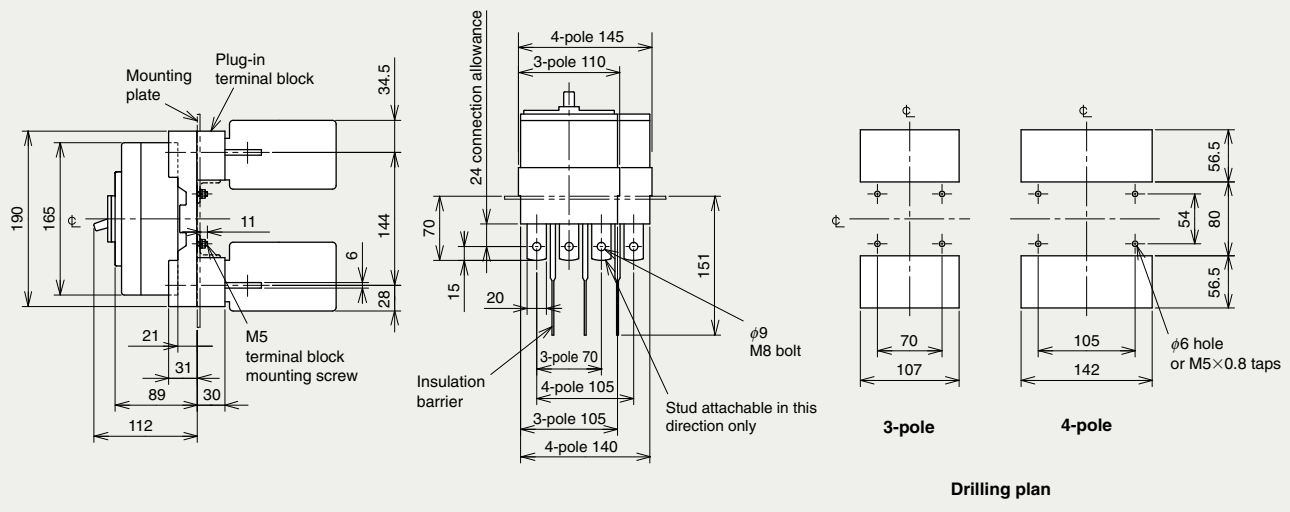


Rear connection





Plug-in



NF400-CW
NF400-SW

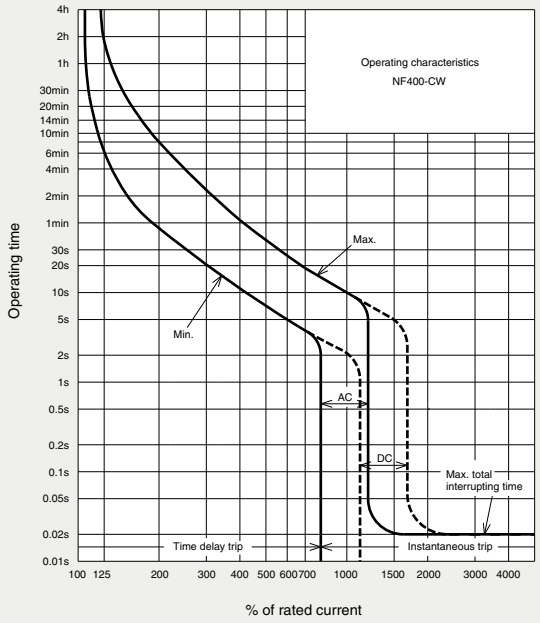


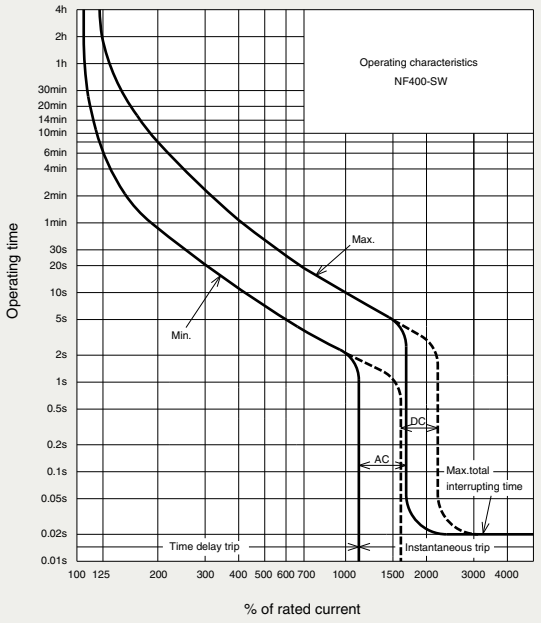
NF400-SW

Model				NF400-CW		NF400-SW		
Rated current In (A)				250 300 350 400				
Number of poles				2	3	2	3	4
Rated insulation voltage Ui (V)				690		690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	–		10/10		
			500V	15/8		30/30		
			440V	25/13		42/42		
			400V	36/18		45/45		
			230V	50/25		85/85		
		DC (*1)	250V	20/10		40/40		
Standard attached parts			Front connection	Mounting screw: M6×60 (4pcs) Insulating barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)				
			Rear connection	Mounting screw: M6×72 (4pcs)				

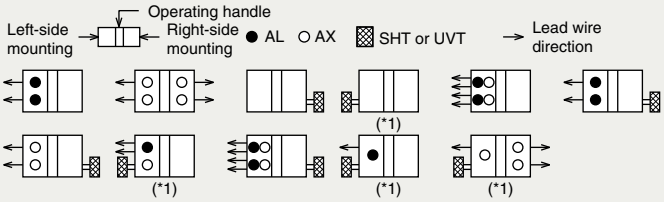
Note *1 When wired as shown at the bottom of page 672, 3-pole models can be used for up to 400VDC, and 4-pole models for up to 500VDC.

Operating Characteristics



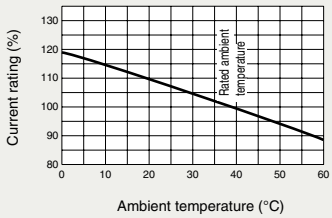


Internal Accessories



Note *1 Right-side mounting is standard of SHT and UVT. Specify separately for left-side mounting.

Temperature Compensation Curve



External Accessories

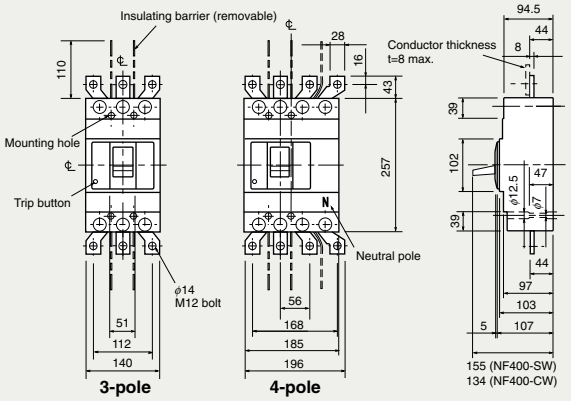
Accessories			Type name
Operating handle	F		F-4S
	V		V-4S
Mechanical interlock	MI	2, 3P	MI-4SW3
		4P	MI-4SW4
Auxiliary handle	HT		HT-4CW, HT-4SW

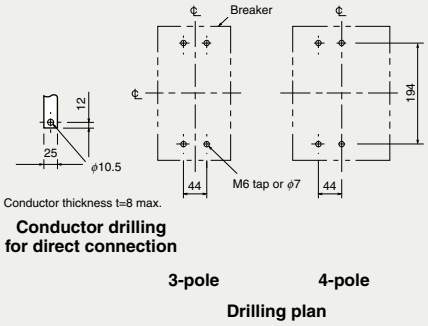
Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

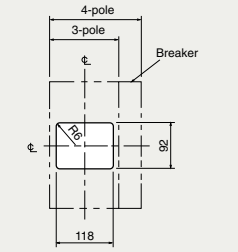
Accessories				Type name
Terminal cover	Large	TC-L	2, 3P	TCL-4SW3
			4P	TCL-4SW4
	Skeleton	TTC	2, 3P	TTC-4SW3
			4P	TTC-4SW4
	Rear	BTC	2, 3P	BTC-4SW3
			4P	BTC-4SW4
Handle lock device		HL		HL-4CW, HL-4SW
		HL-S		HLS-4SW
Electrical operation device		NFM	3P	(*1)
			4P	

Outline Drawing

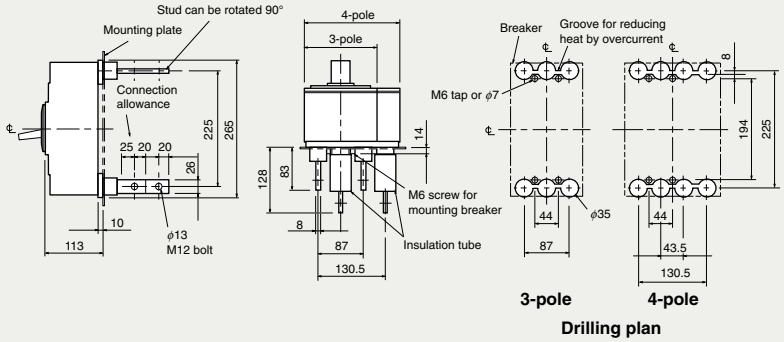
Front connection



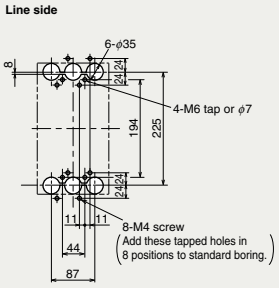




Rear connection

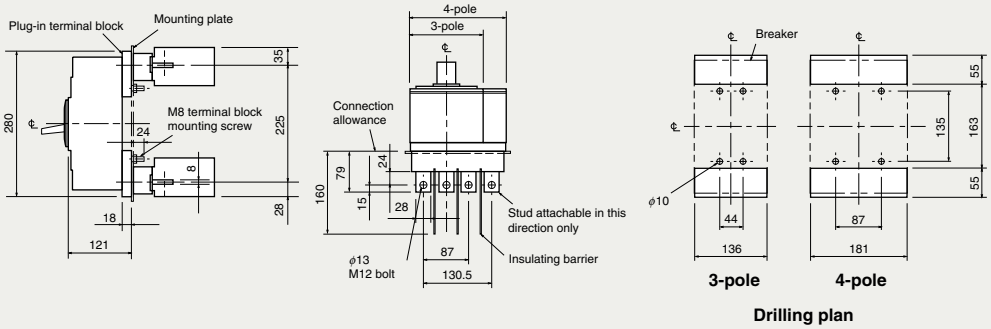


Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

Plug-in



Remark: 1. 2-pole models are 3-pole models with the central pole removed.

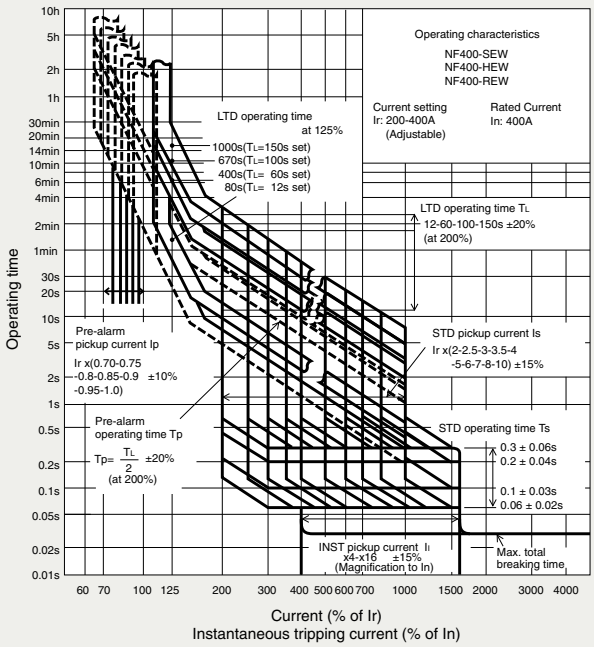
NF400-SEW NF400-HEW NF400-REW



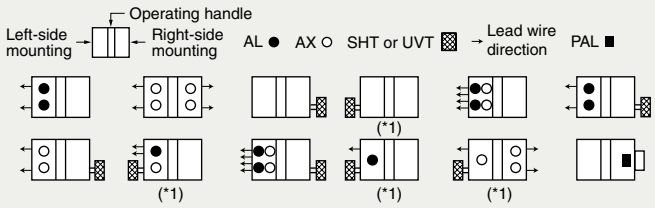
NF400-SEW

Model				NF400-SEW		NF400-HEW		NF400-REW
Rated current In (A)				200-400 adjustable				
Number of poles				3	4	3	4	3
Rated insulation voltage Ui (V)				690		690		690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	10/10		35/18		–
			500V	30/30		50/50		70/35
			440V	42/42		65/65		125/63
			400V	50/50		70/70		125/63
			230V	85/85		100/100		150/75
Standard attached parts			Front connection	Mounting screw: M6×72 (4pcs) Insulating barrier: (3P: 4pcs, 4P: 6pcs)				
			Rear connection	Mounting screw: M6×85 (4pcs)				

Operating Characteristics

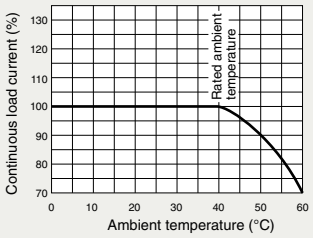


Internal Accessories



Note *1 Right-side mounting is standard of SHT and UVT. Specify separately for left-side mounting.

Current Reducing Curve



External Accessories

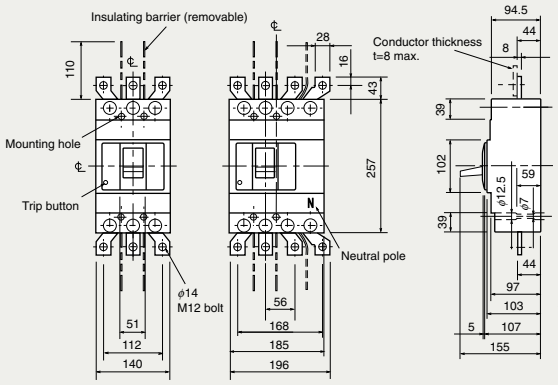
Accessories			Type name
Operating handle	F		F-4S
	V		V-4S
Mechanical interlock	MI	3P	MI-4SW3
		4P	MI-4SW4
Auxiliary handle	HT		HT-4SW

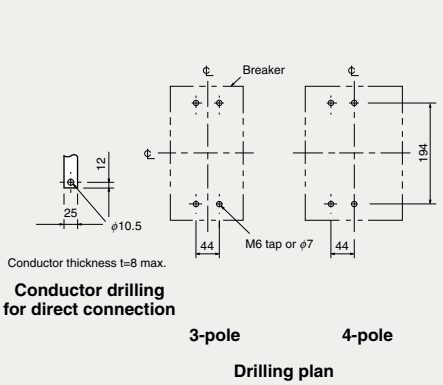
Accessories				Type name
Terminal cover	Large	TC-L	3P	TCL-4SW3 (*2)
			4P	TCL-4SW4 (*3)
	Skeleton	TTC	3P	TTC-4SW3
			4P	TTC-4SW4
	Rear	BTC	3P	BTC-4SW3 (*2)
			4P	BTC-4SW4 (*3)
Handle lock device		HL		HL-4SW
		HL-S		HLS-4SW
Electrical operation device		NFM	3P	(*1)
			4P	

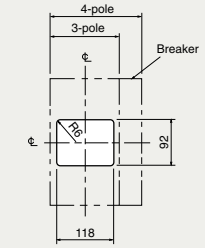
Notes *1 Specify the operation method and voltage. Order in combination with the breaker unit.
*2 This is for NF400-SEW. For rear terminal cover of NF400-HEW/REW, use PTC-4SW3.
*3 This is for NF400-SEW/HEW.

Outline Drawing

Front connection



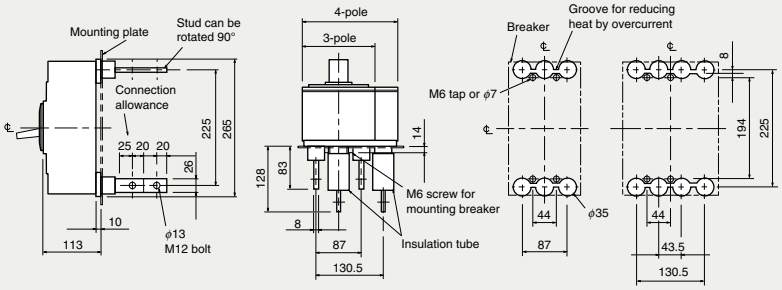




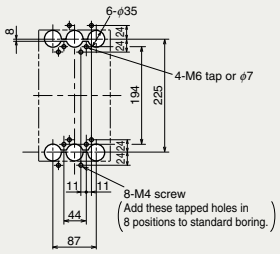
1.0mm clearance on each side of the handle frame.

Front-panel cutout

Rear connection

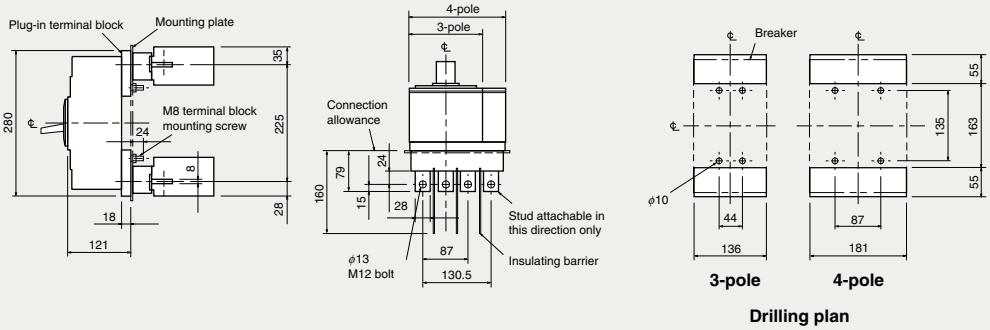


Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

Plug-in



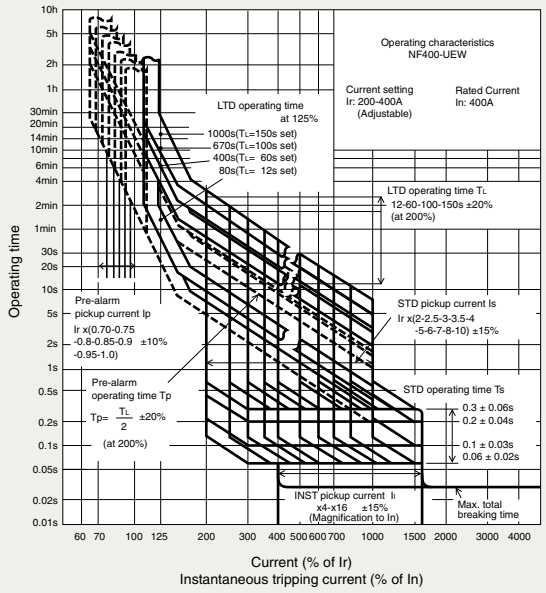
NF400-UEW



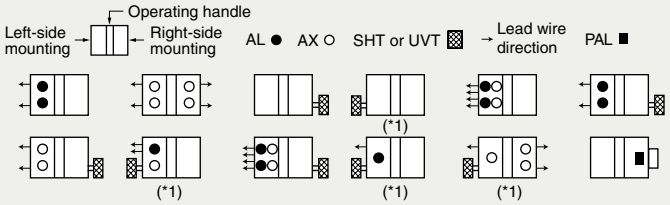
NF400-UEW

Model				NF400-UEW	
Rated current In (A)				200-400 adjustable	
Number of poles				3	4
Rated insulation voltage Ui (V)				690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	–	
			500V	170/170	
			440V	200/200	
			400V	200/200	
			230V	200/200	
Standard attached parts (4-pole models are provided with auxiliary handle.)			Front connection	Mounting screw: M6×65 (2pcs), M6×174 (2pcs) Insulating barrier: (3P: 4pcs)	
			Rear connection	Mounting screw: M6×72 (2pcs), M6×181 (2pcs)	

Operating Characteristics

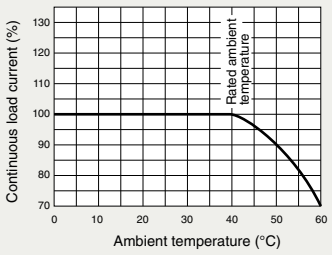


Internal Accessories



Note *1 Right-side mounting is standard of SHT and UVT. Specify separately for left-side mounting.
Remarks: 1. Specification of 4-pole model is same as that of NF800-UEW.

Current Reducing Curve



External Accessories

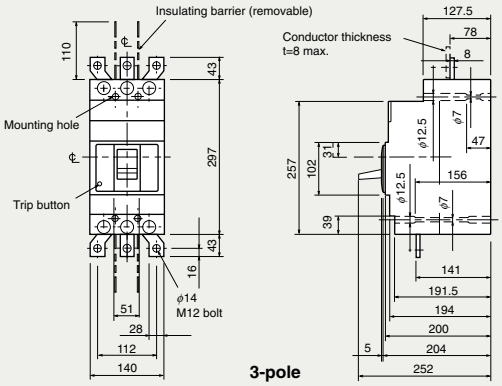
Accessories		Type name
Operating handle	F	F-4U
	V	V-4U
Mechanical interlock	MI	MI-4SW3
Auxiliary handle	HT	HT-4SW

Accessories				Type name
Terminal cover	Large	TC-L	3P	TCL-4SW3
	Skeleton	TTC	3P	–
	Rear	BTC	3P	BTC-4SW3
Handle lock device		HL		HL-4SW
		HL-S		HLS-4UW
Electrical operation device				(*1)

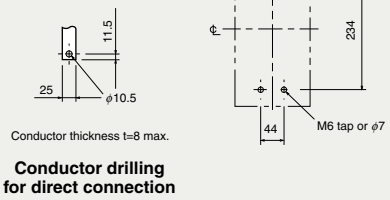
Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.
Remark *1 Specification of 4-pole model is same as that of NF800-UEW.

Outline Drawing

Front connection



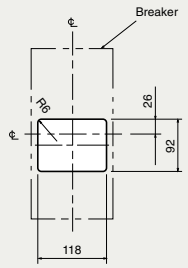
3-pole



Conductor drilling for direct connection

3-pole

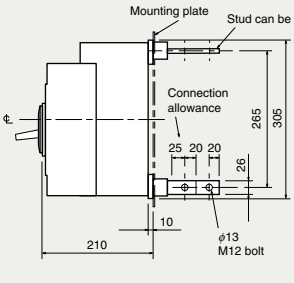
Drilling plan

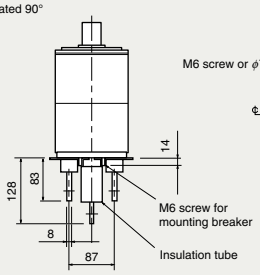


1.0mm clearance on each side of the handle frame.

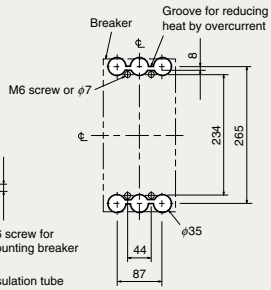
Front-panel cutout

Rear connection





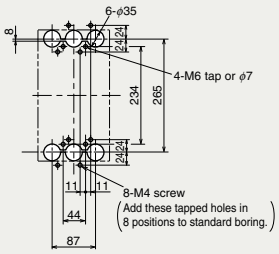
3-pole



Drilling plan

Boring dimensions for rear connection type barriers (3-pole)

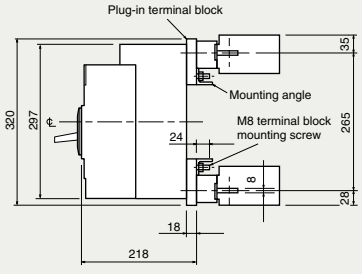
Line side



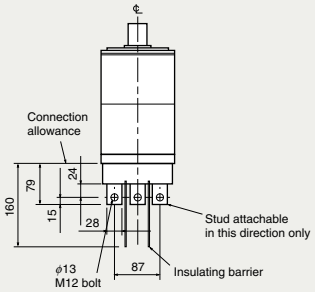
Load side

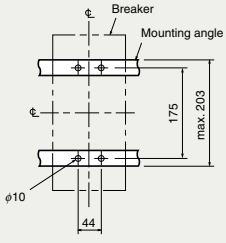
Note The bore dimensional drawing shows the breaker viewed from the rear.

Plug-in



3-pole





3-pole

Drilling plan

NF630-CW
NF630-SW

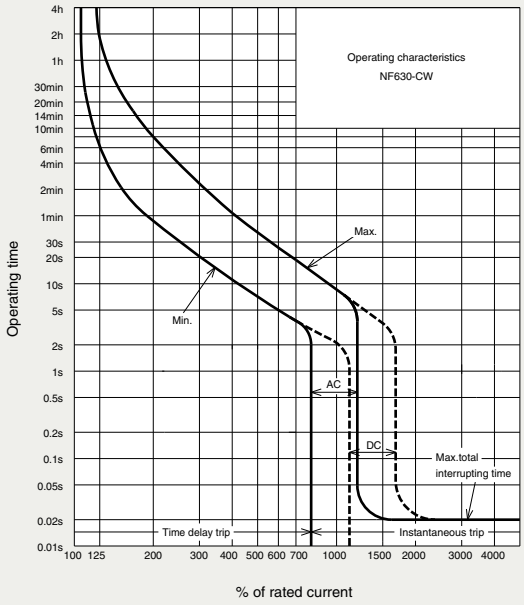


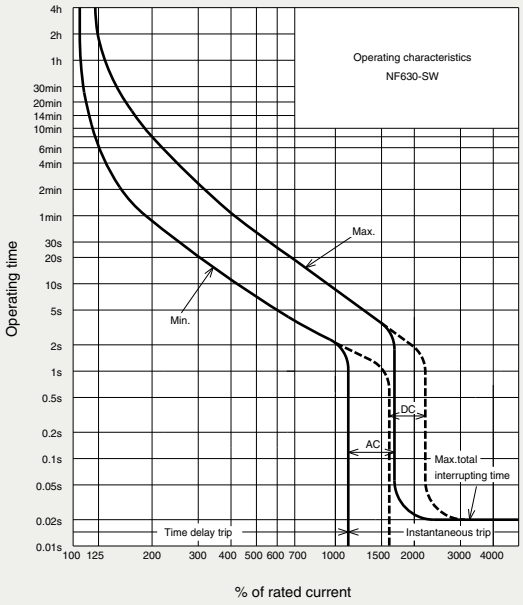
NF630-SW

Model				NF630-CW		NF630-SW		
Rated current In (A)				500 600 630				
Number of poles				2	3	2	3	4
Rated insulation voltage Ui (V)				690		690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	–		10/10		
			500V	18/9		30/30		
			440V	36/18		42/42		
			400V	36/18		50/50		
			230V	50/25		85/85		
		DC (*1)	250V	20/10		40/40		
Standard attached parts			Front connection	Mounting screw: M6×72 (4pcs) Insulating barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)				
			Rear connection	Mounting screw: M6×85 (4pcs)				

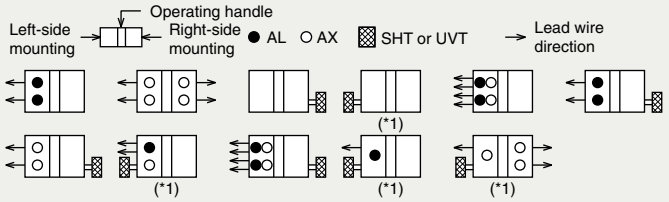
Note *1 When wired as shown at the bottom of page 672, 3-pole models can be used for up to 400VDC, and 4-pole models for up to 500VDC.

Operating Characteristics



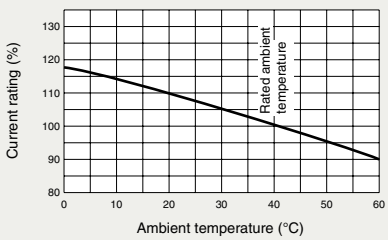


Internal Accessories



Note *1 Right-side mounting is standard of SHT and UVT. Specify separately for left-side mounting.

Temperature Compensation Curve



External Accessories

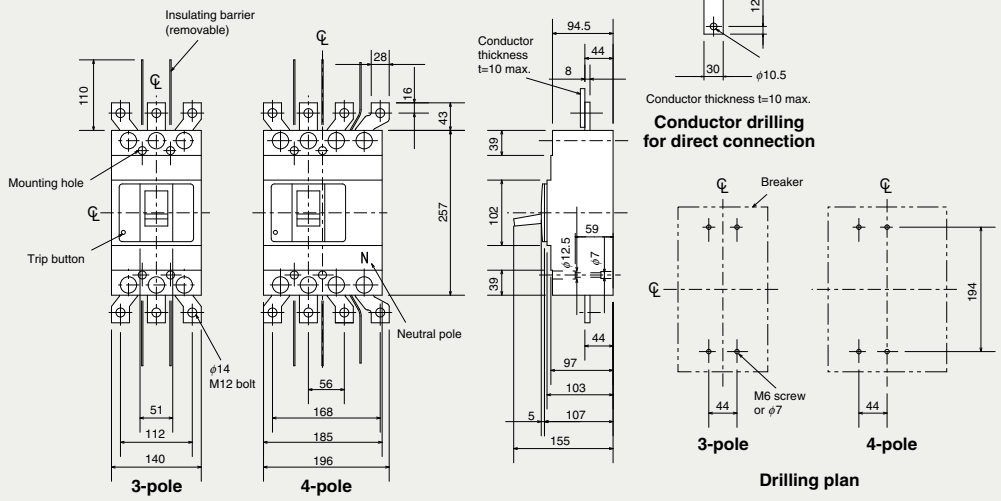
Accessories			Type name
Operating handle	F		F-4S
	V		V-4S
Mechanical interlock	MI	2, 3P	MI-4SW3
		4P	MI-4SW4
Auxiliary handle	HT		HT-4SW

Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

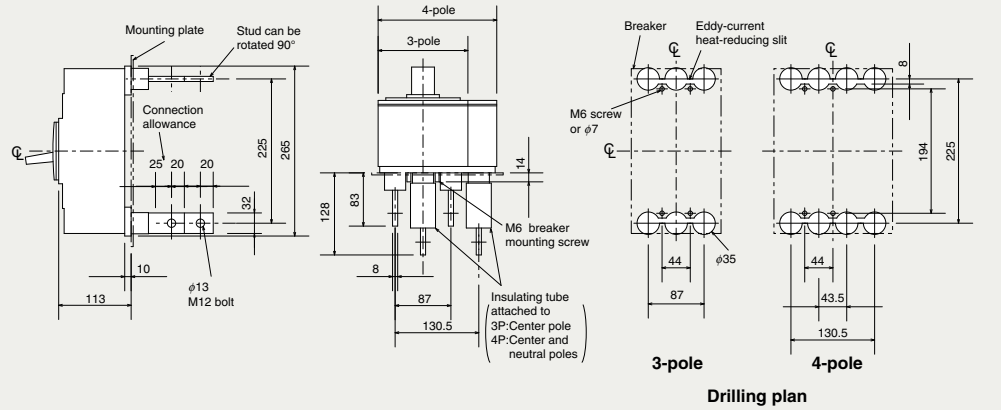
Accessories				Type name
Terminal cover	Large	TC-L	2, 3P	TCL-4SW3
			4P	TCL-4SW4
	Skeleton	TTC	2, 3P	TTC-4SW3
			4P	TTC-4SW4
	Rear	BTC	2, 3P	BTC-4SW3
			4P	BTC-4SW4
Handle lock device		HL		HL-4SW
		HL-S		HLS-4SW
Electrical operation device		NFM	3P	(*1)
			4P	

Outline Drawing

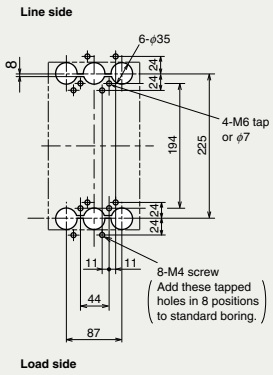
Front connection



Rear connection

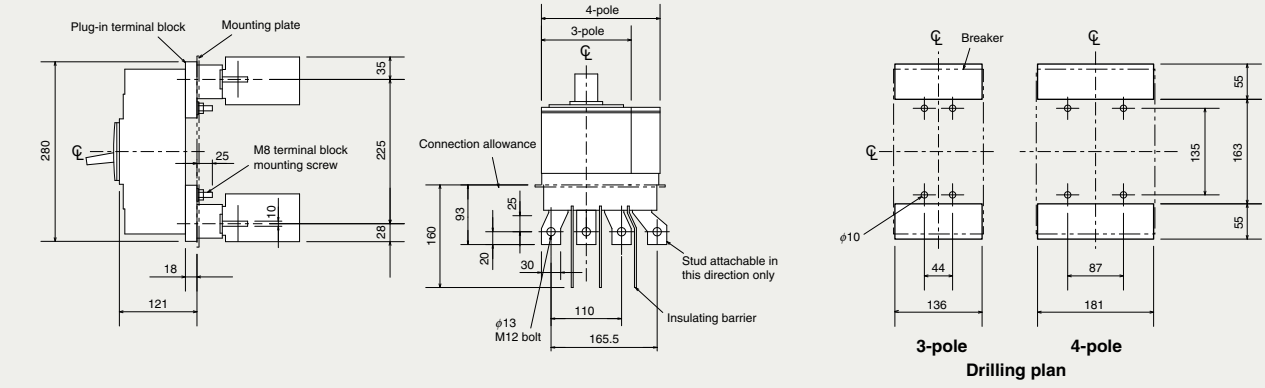


Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

Plug-in



Remark: 1. 2-pole models are 3-pole models with the central pole removed.

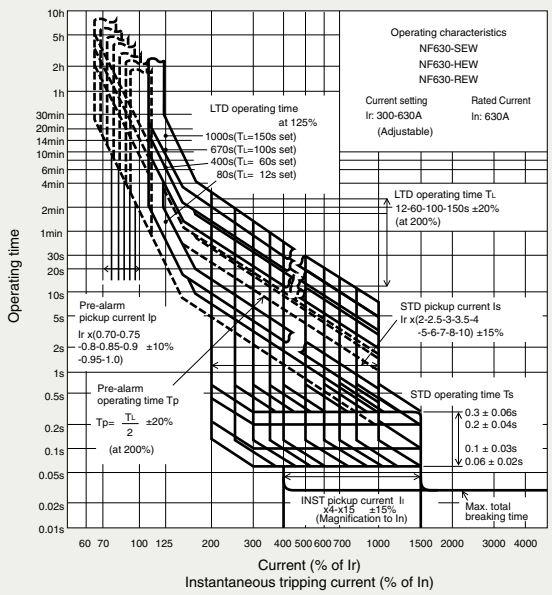
NF630-SEW
NF630-HEW
NF630-REW



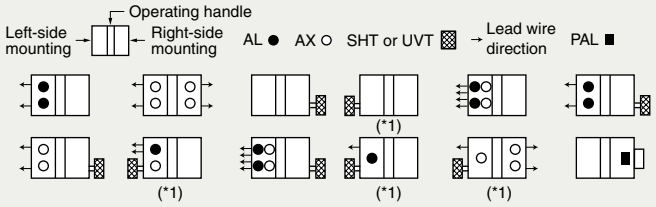
NF630-SEW

Model				NF630-SEW		NF630-HEW		NF630-REW
Rated current In (A)				300-630 adjustable				
Number of poles				3	4	3	4	3
Rated insulation voltage Ui (V)				690		690		690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	10/10		35/18		–
			500V	30/30		50/50		70/35
			440V	42/42		65/65		125/63
			400V	50/50		70/70		125/63
			230V	85/85		100/100		150/75
Standard attached parts			Front connection	Mounting screw: M6×72 (4pcs) Insulating barrier: (3P: 4pcs, 4P: 6pcs)				
			Rear connection	Mounting screw: M6×85 (4pcs)				

Operating Characteristics

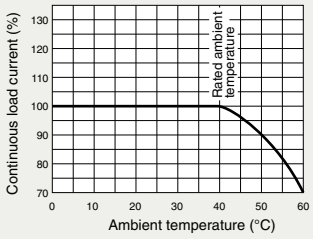


Internal Accessories



Note *1 Right-side mounting is standard of SHT and UVT. Specify separately for left-side mounting.

Current Reducing Curve



External Accessories

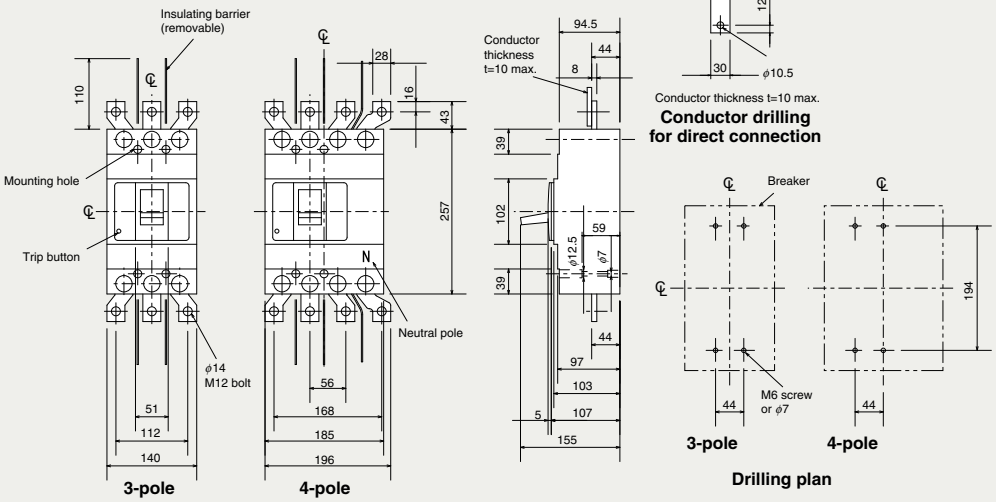
Accessories			Type name
Operating handle	F		F-4S
	V		V-4S
Mechanical interlock	MI	3P	MI-4SW3
		4P	MI-4SW4
Auxiliary handle	HT		HT-4SW

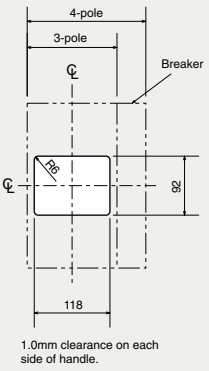
Accessories				Type name
Terminal cover	Large	TC-L	3P	TCL-4SW3 (*2)
			4P	TCL-4SW4 (*3)
	Skeleton	TTC	3P	TTC-4SW3
			4P	TTC-4SW4
	Rear	BTC	3P	BTC-4SW3 (*2)
			4P	BTC-4SW4 (*3)
Handle lock device		HL		HL-4SW
		HL-S		HLS-4SW
Electrical operation device		NFM	3P	(*1)
			4P	

Notes *1 Specify the operation method and voltage. Order in combination with the breaker unit.
*2 This is for NF630-SEW. For rear terminal cover of NF630-HEW/REW, use PTC-4SW3.
*3 This is for NF630-SEW/HEW.

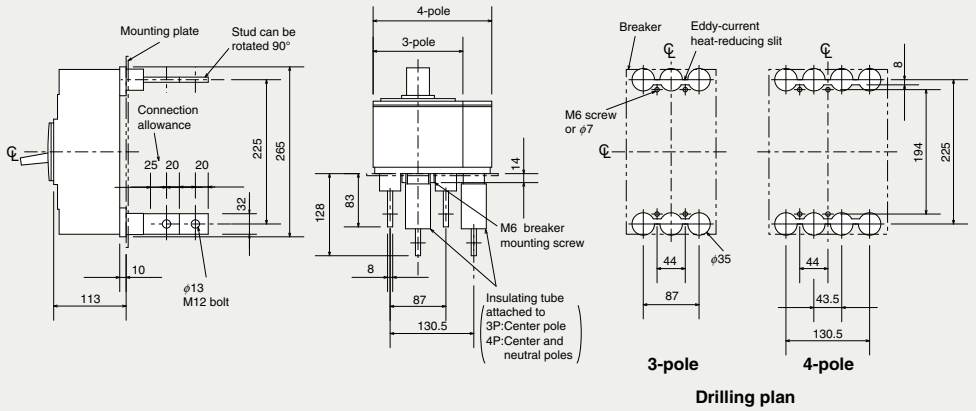
Outline Drawing

Front connection

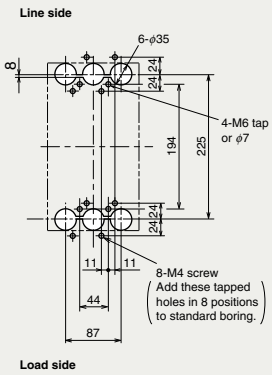




Rear connection

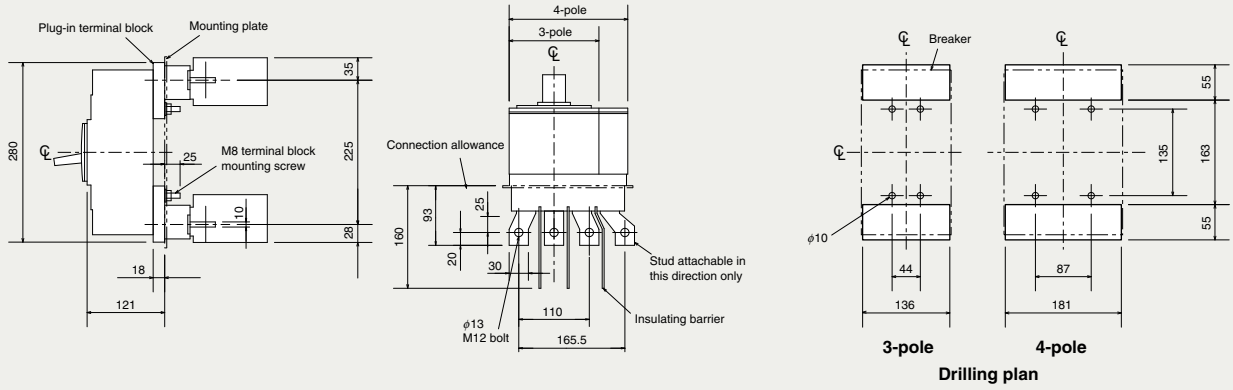


Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

Plug-in



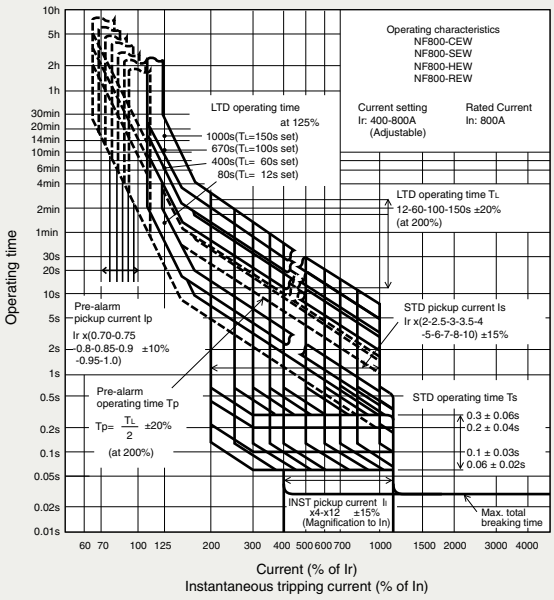
NF800-CEW
NF800-SEW
NF800-HEW
NF800-REW



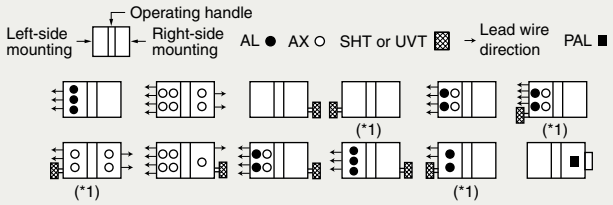
NF800-SEW

Model				NF800-CEW	NF800-SEW	NF800-HEW	NF800-REW
Rated current In (A)				400-800 adjustable			
Number of poles				3	3 4	3 4	3
Rated insulation voltage Ui (V)				690	690	690	690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	–	10/10	15/15	–
			500V	18/9	30/30	50/50	70/35
			440V	36/18	42/42	65/65	125/63
			400V	36/18	50/50	70/70	125/63
			230V	50/25	85/85	100/100	150/75
Standard attached parts (4-pole models are provided with auxiliary handle.)			Front connection	Mounting screw: M6×35 (4pcs) Insulating barrier: (3P: 2pcs, 4P: 3pcs)			
			Rear connection	Mounting screw: M6×40 (4pcs)			

Operating Characteristics

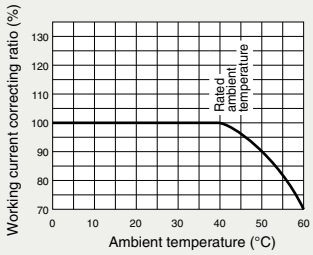


Internal Accessories



Note *1 Right-side mounting is standard of SHT and UVT. Specify separately for left-side mounting.

Current Reducing Curve



External Accessories

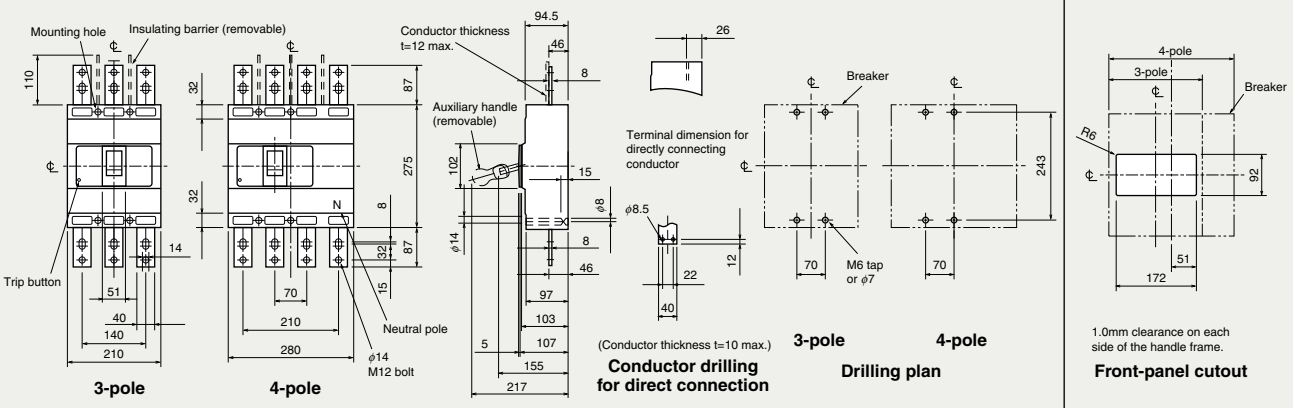
Accessories			Type name
Operating handle	F		F-8S
	V		V-8S
Mechanical interlock	MI	3P	MI-8SW3
		4P	MI-8SW4
Auxiliary handle	HT		HT-4SW

Accessories				Type name
Terminal cover	Large	TC-L	3P	TCL-8SW3
			4P	TCL-8SW4
	Skeleton	TTC	3P	TTC-8SW3
			4P	TTC-8SW4
	Rear	BTC	3P	BTC-8SW3
			4P	BTC-8SW4
Handle lock device		HL		HL-4SW
		HL-S		HLS-8SW
Electrical operation device		NFM	3P	(*1)
			4P	

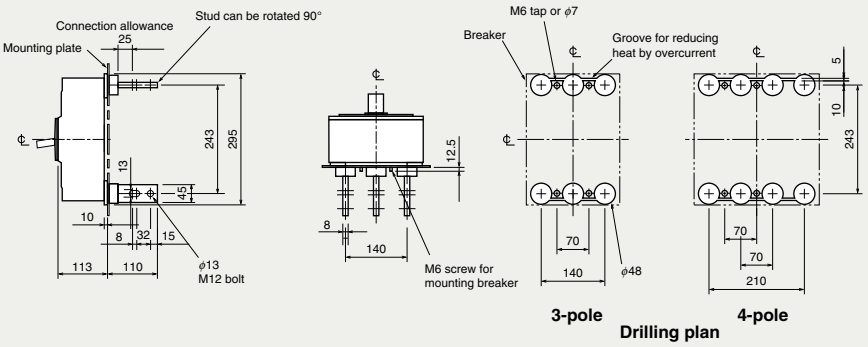
Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing

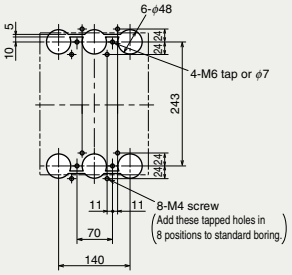
Front connection



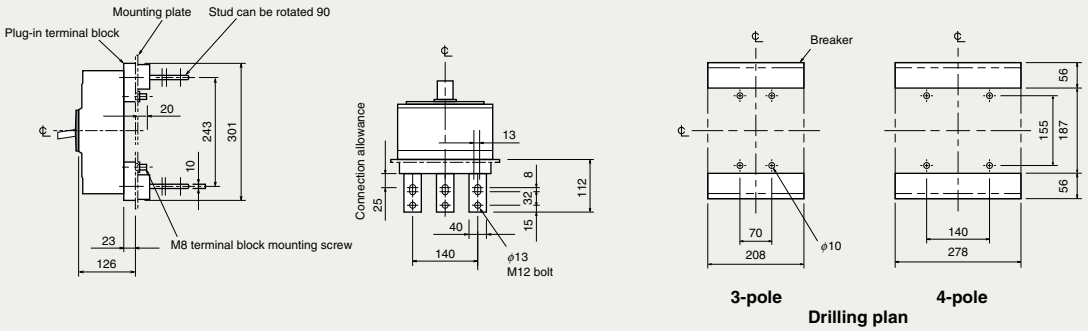
Rear connection



Boring dimensions for rear connection type barriers (3-pole)



Plug-in



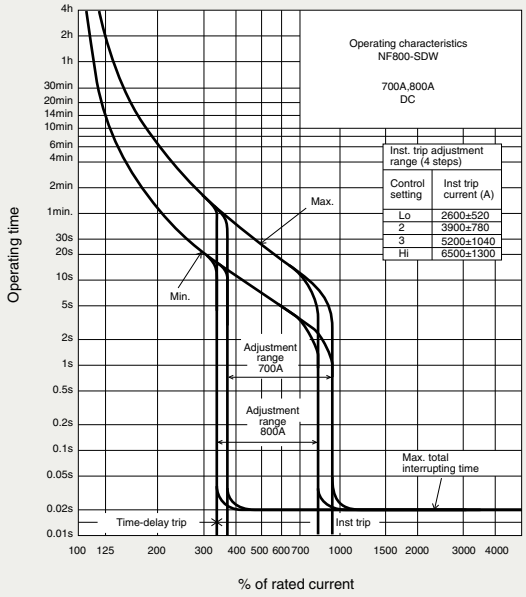
NF800-SDW



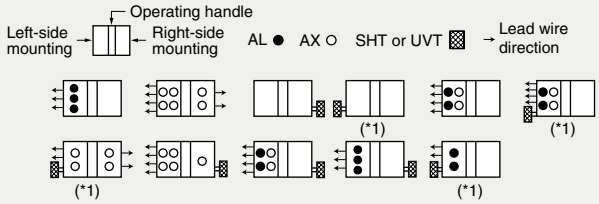
NF800-SDW

Model				NF800-SDW
Rated current In (A)				(700), 800
Number of poles				2
Rated insulation voltage Ui (V)				690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics) Time constant not larger than 10ms	DC	250V	40/40
Standard attached parts (4-pole models are provided with auxiliary handle.)			Front connection	Mounting screw: M6×35 (4pcs) Insulating barrier: (2P: 1pc, 3P: 2pcs, 4P: 3pcs)
			Rear connection	Mounting screw: M6×40 (4pcs)

Operating Characteristics

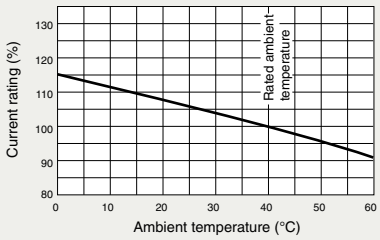


Internal Accessories



Note *1 Right-side mounting is standard of SHT and UVT. Specify separately for left-side mounting.

Temperature Compensation Curve



External Accessories

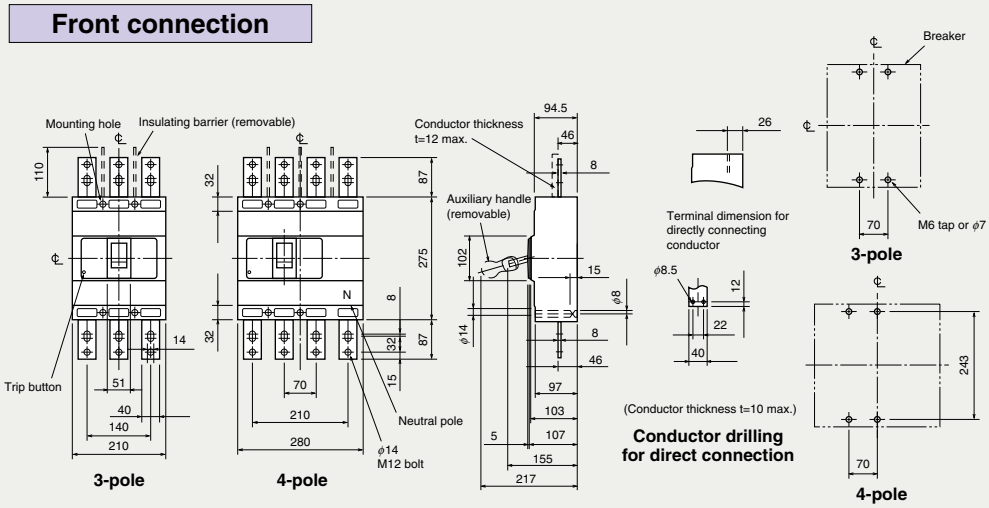
Accessories			Type name
Operating handle	F		F-8S
	V		V-8S
Mechanical interlock	MI	2, 3P	MI-8SW3
		4P	MI-8SW4
Auxiliary handle	HT		HT-4SW

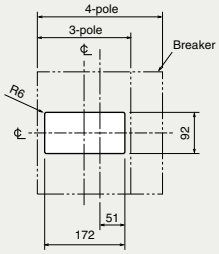
Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

Accessories				Type name
Terminal cover	Large	TC-L	2, 3P	TCL-8SW3
			4P	TCL-8SW4
	Skeleton	TTC	2, 3P	TTC-8SW3
			4P	TTC-8SW4
	Rear	BTC	2, 3P	BTC-8SW3
			4P	BTC-8SW4
Handle lock device		HL		HL-4SW
		HL-S		HLS-8SW
Electrical operation device		NFM	2, 3P	(*1)
			4P	

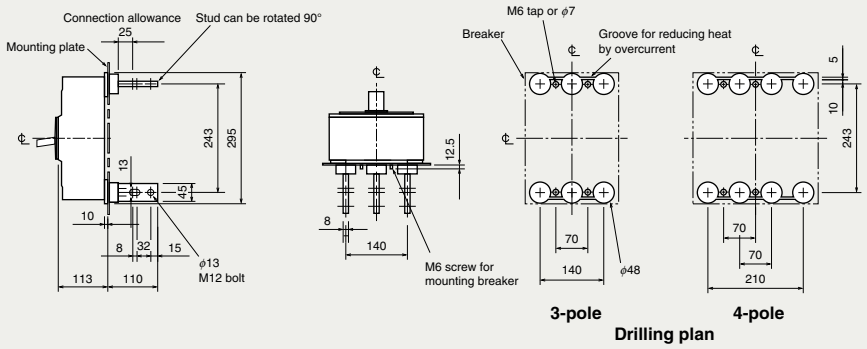
Outline Drawing

Front connection

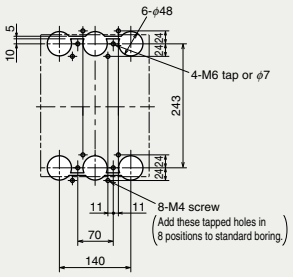




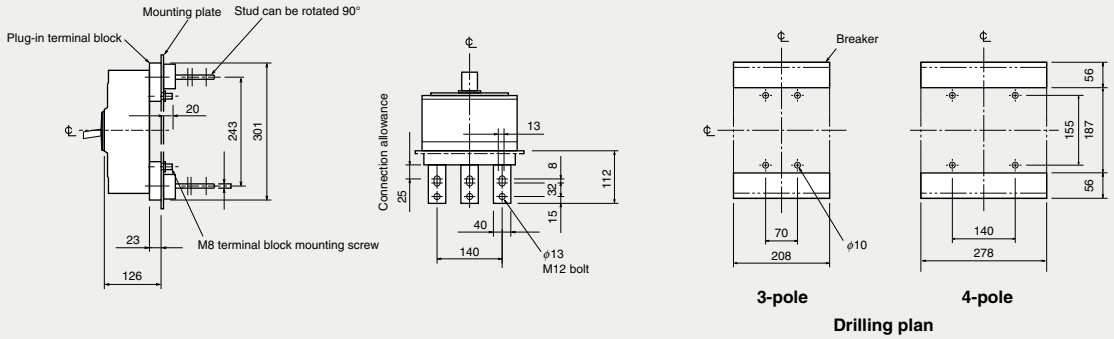
Rear connection



Boring dimensions for rear connection type barriers (3-pole)



Plug-in



Remarks: 1. Standard specification of NF800-SDW is 2-pole model. 3-pole and 4-pole models are available for DC special voltage.
2. 2-pole models are 3-pole models with the central pole removed.

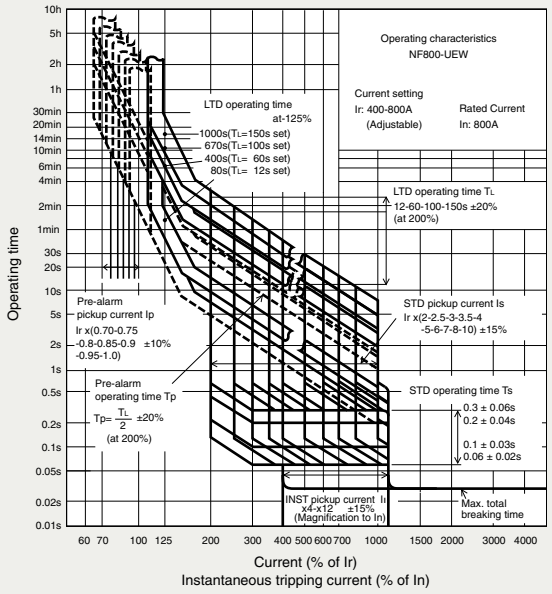
NF800-UEW



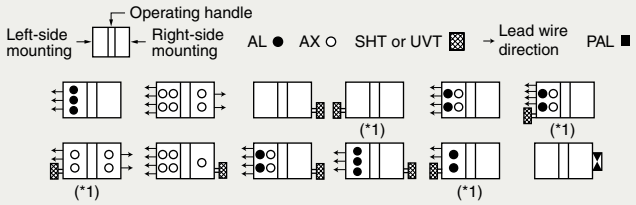
NF800-UEW

Model				NF800-UEW	
Rated current In (A)				400-800 adjustable	
Number of poles				3	4
Rated insulation voltage Ui (V)				690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	35/35	
			500V	170/170	
			440V	200/200	
			400V	200/200	
			230V	200/200	
Standard attached parts (4-pole models are provided with auxiliary handle.)			Front connection	Mounting screw: 3P: M6×35, M6×132 (2pcs each) 4P: M6×35 (3pcs), M6×132 (2pcs) Insulating barrier: (3P: 2pcs, 4P: 3pcs)	
			Rear connection	Mounting screw: 3P: M6×40, M6×137 (2pcs each) 4P: M6×40 (3pcs), M6×137 (2pcs)	

Operating Characteristics

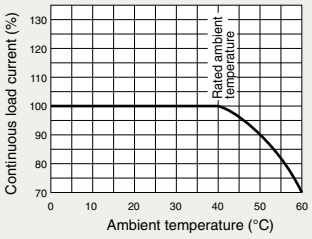


Internal Accessories



Note *1 Right-side mounting is standard of SHT and UVT. Specify separately for left-side mounting.

Current Reducing Curve



External Accessories

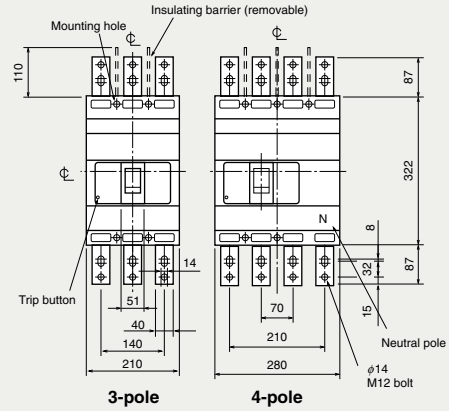
Accessories			Type name
Operating handle	F		F-8U
	V		–
Mechanical interlock	MI	3P	MI-8SW3
		4P	MI-8SW4
Auxiliary handle	HT		HT-4SW

Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

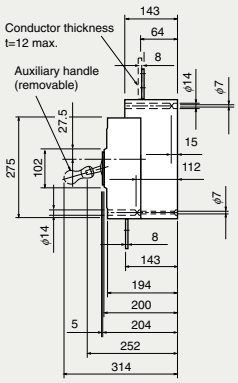
Accessories				Type name
Terminal cover	Large	TC-L	3P	TCL-8UW3
			4P	TCL-8UW4
	Skeleton	TTC	3P	–
			4P	–
	Rear	BTC	3P	BTC-8SW3
			4P	BTC-8SW4
Handle lock device		HL		HL-4SW
		HL-S		HLS-8UW
Electrical operation device				(*1)

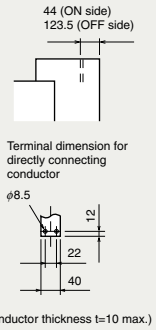
Outline Drawing

Front connection

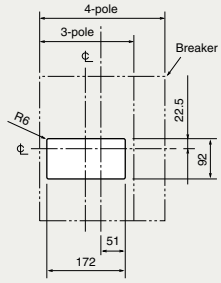


3-pole 4-pole



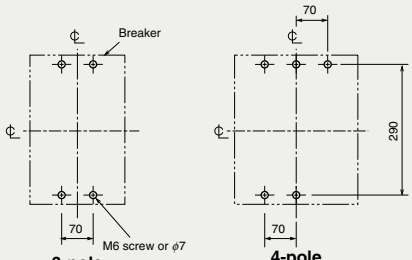


Conductor drilling for direct connection



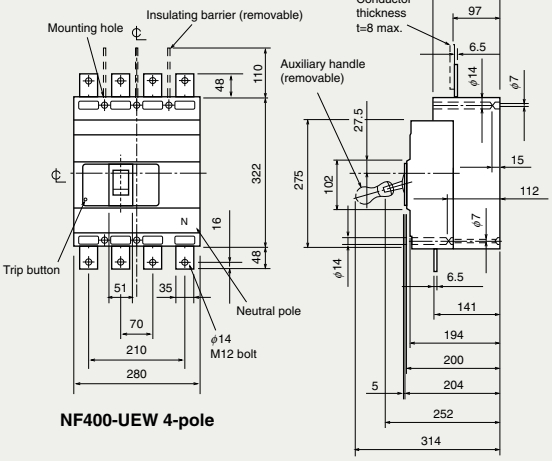
1.0mm clearance on each side of the handle frame.

Front-panel cutout



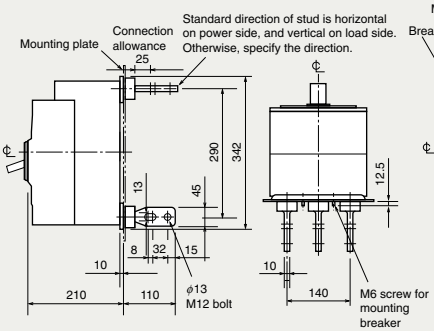
3-pole 4-pole

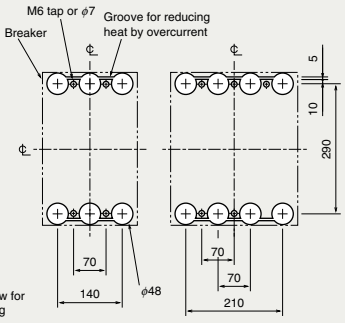
Drilling plan



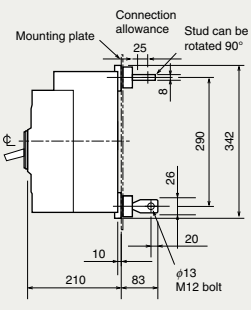
NF400-UEW 4-pole

Rear connection





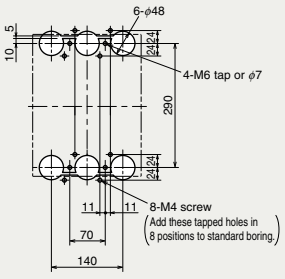
3-pole 4-pole



NF400-UEW 4-pole

Drilling plan

Boring dimensions for rear connection type barriers (3-pole)



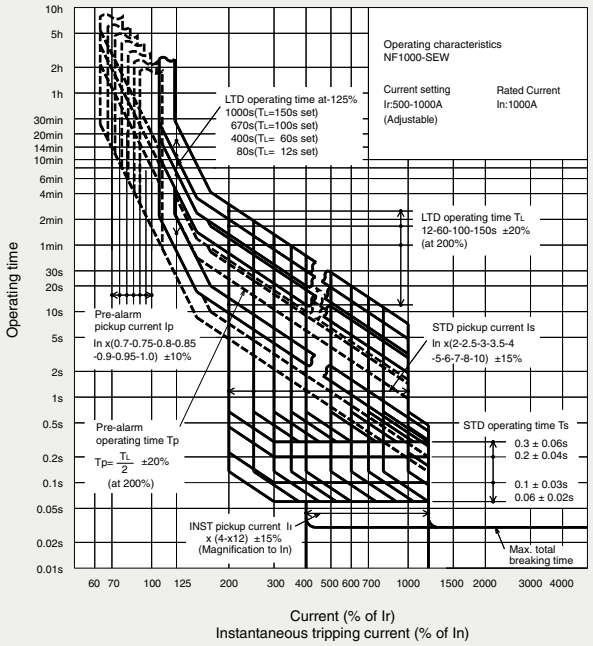
NF1000-SEW NF1250-SEW

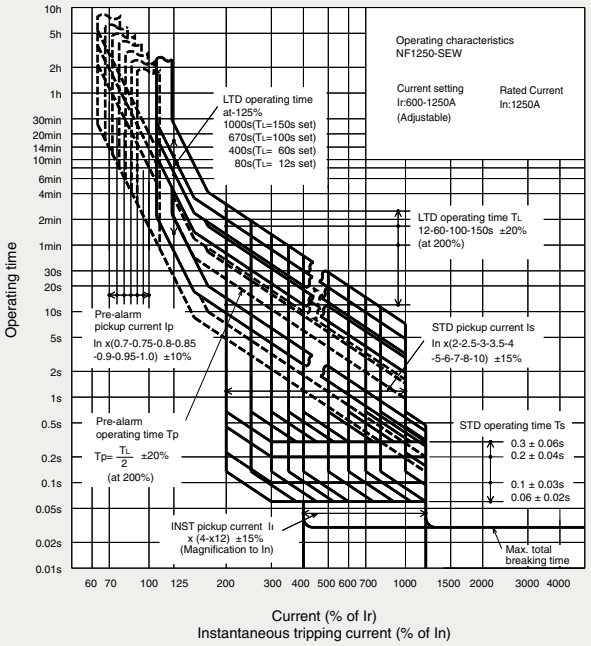


NF1250-SEW

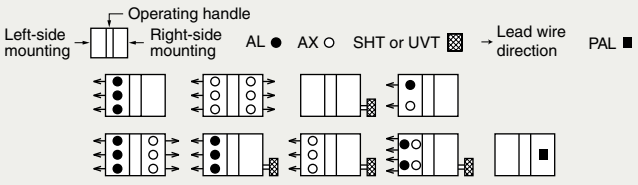
Model				NF1000-SEW		NF1250-SEW	
Rated current In (A)				500–1000 Adjustable		600–1250 Adjustable	
Number of poles				3	4	3	4
Rated insulation voltage Ui (V)				690		690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	25/13		25/13	
			500V	65/33		65/33	
			440V	85/43		85/43	
			400V	85/43		85/43	
			230V	125/63		125/63	
Standard attached parts			Front connection	Mounting screw: M8×40 (4pcs) Insulating barrier: (3P: 2pcs, 4P: 3pcs) Auxiliary handle: (1pc)			
			Rear connection	Mounting screw: M8×40 (4pcs) Insulating barrier: (3P: 2pcs, 4P: 4pcs) Auxiliary handle: (1pc)			

Operating Characteristics

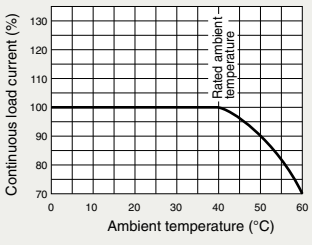




Internal Accessories



Current Reducing Curve



External Accessories

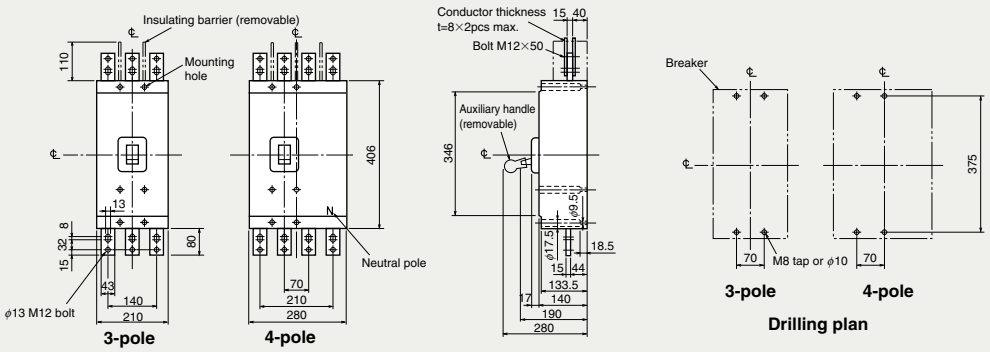
(An order for ☆ should be placed at the same time as an order of circuit breaker main body.)

Accessories			Type name	Accessories			Type name
Operating handle	F	3P	F10SW	Auxiliary handle	HT		HT-10SW
		4P	F10SW4P	Handle lock device	HL		HL (☆)
Mechanical interlock	MI	3P	MI-10SW3	Large terminal cover	TC-L	3P	TCL-10SW3
		4P	MI-10SW4			4P	TCL-10SW4
				Electrical operation device	NFM	3P	(*1)
						4P	

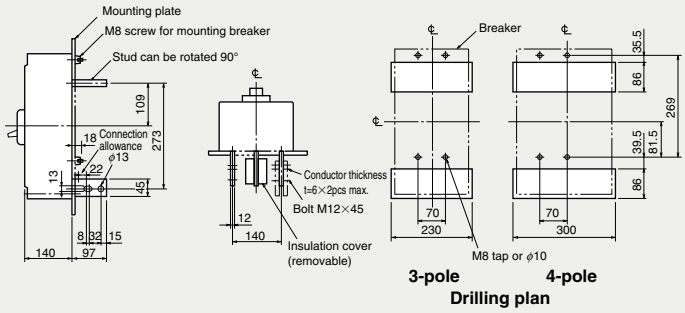
Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

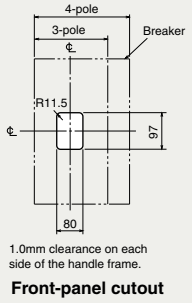
Outline Drawing

Front connection

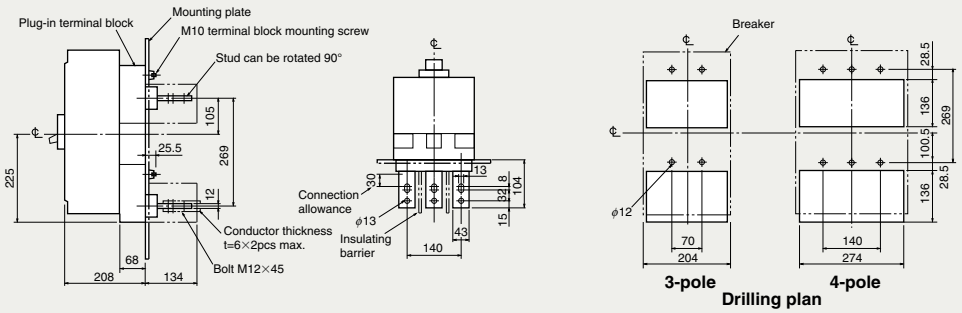


Rear connection





Plug-in



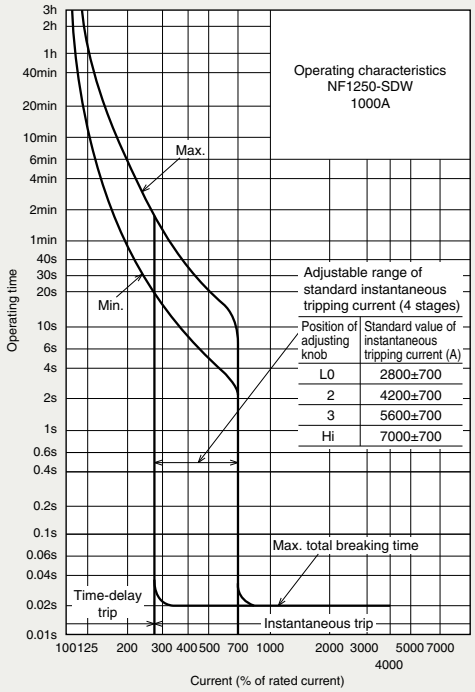
NF1250-SDW

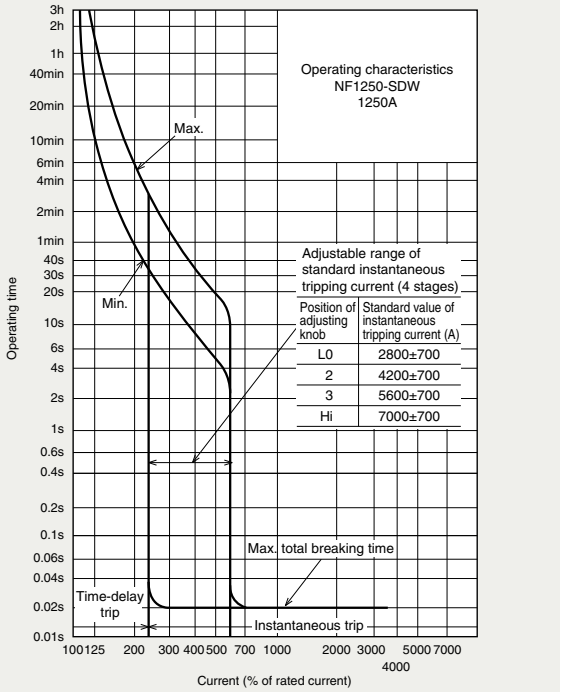


NF1250-SDW

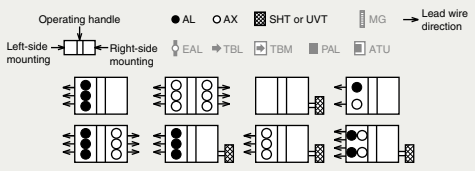
Model				NF1250-SDW
Rated current In (Amp.)				1000, 1250
Number of poles				2
Rated insulation voltage Ui (V)				690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics) Time constant not large than 10ms	DC	250V	40/20
Standard Attached parts			Front connection	Mounting screw: M8×40 (4pcs) Insulating barrier: (2P: 1pc, 3P: 2pcs, 4P: 3pcs) Auxiliary handle: (1pc)
			Rear connection	Mounting screw: M8×40 (4pcs) Insulating barrier: (3P: 2pcs, 4P: 4pcs) Auxiliary handle: (1pc)

Operating Characteristics

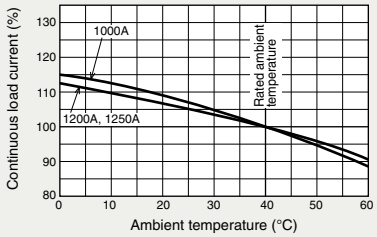




Internal Accessories



Temperature Compensation Curve



External Accessories

(An order for ☆ should be placed at the same time as an order of circuit breaker main body.)

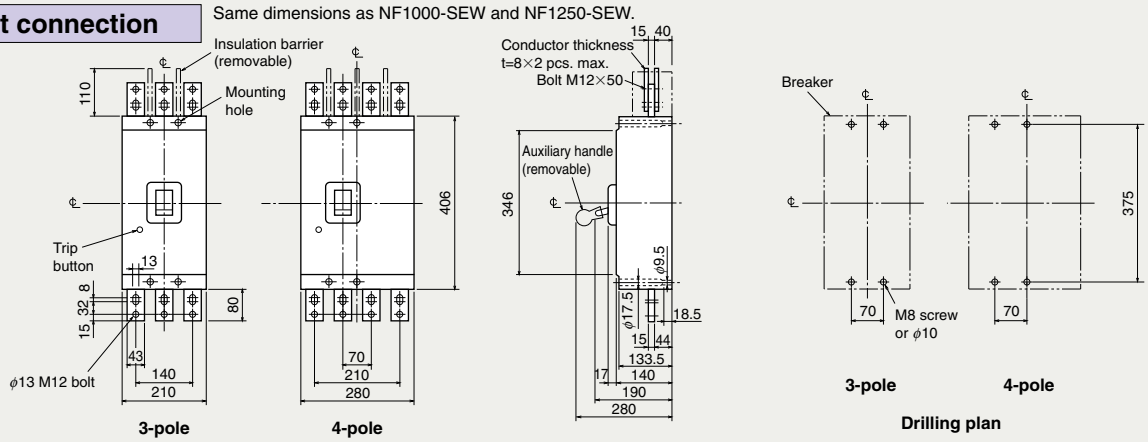
Accessories			Type name	Accessories			Type name
Operating handle	F	2, 3P	F10SW	Auxiliary handle	HT		HT-10SW
		4P	F10SW4P	Handle lock device	HL		HL (☆)
Mechanical interlock	MI	2, 3P	MI-10SW3	Large terminal cover	TC-L	2, 3P	TCL-10SW3
		4P	MI-10SW4			4P	TCL-10SW4
				Electrical operation device	NFM	2, 3P	(*1)
						4P	

Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing

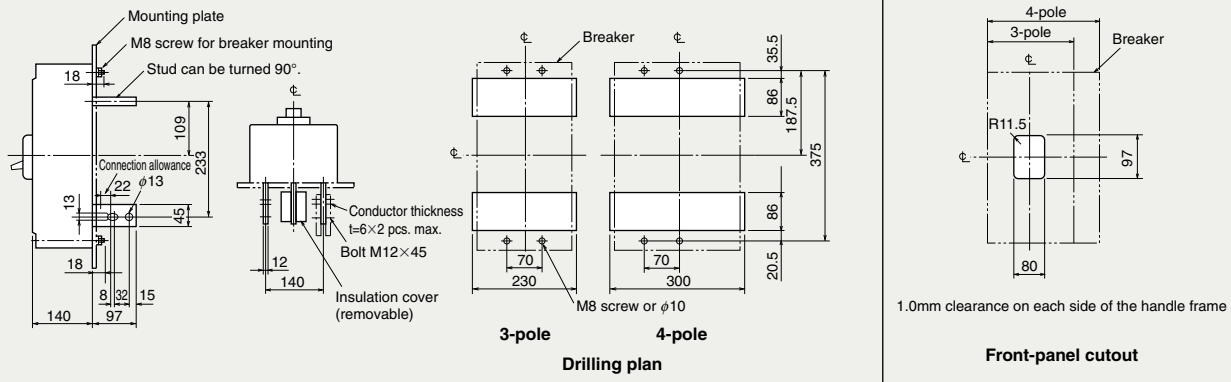
Front connection

Same dimensions as NF1000-SEW and NF1250-SEW.



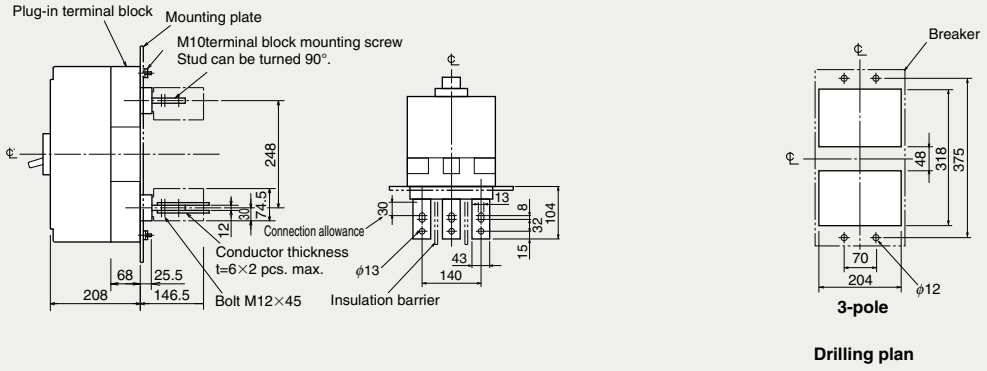
Rear connection

Differing in external dimensions from NF1000-SEW and NF1250-SEW.



Plug-in

Differing in external dimensions from NF1000-SEW and NF1250-SEW.



Remarks: 1. Standard specification of NF1250-SDW is 2-pole model. 3-pole and 4-pole models are available for DC special voltage.
2. 2-pole models are 3-pole models with the central pole removed.

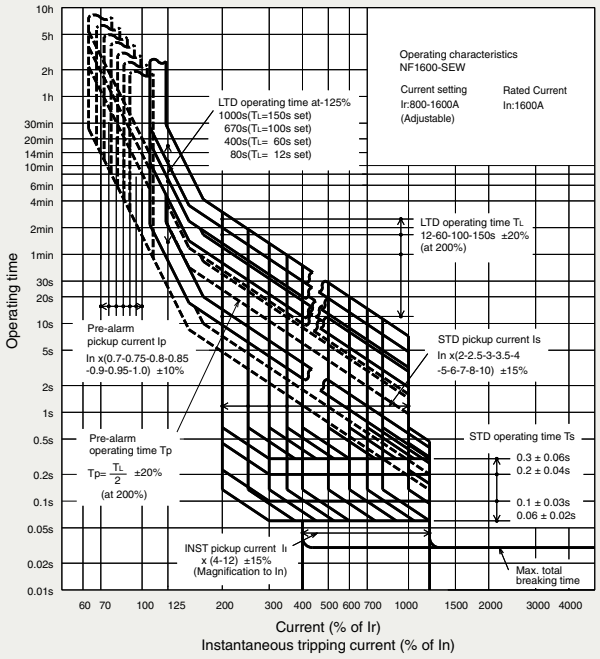
NF1600-SEW



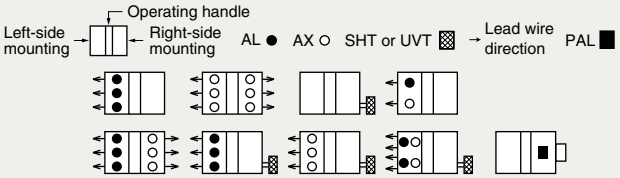
NF1600-SEW

Model				NF1600-SEW	
Rated current In (A)				Adjustable 800–1600	
Number of poles				3	4
Rated insulation voltage Ui (V)				690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	25/13	
			500V	65/33	
			440V	85/43	
			400V	85/43	
			230V	125/63	
Standard attached parts			Front connection	Mounting screw: M8 × 40 (4pcs) Insulating barrier: (3P: 2pcs, 4P: 3pcs) Auxiliary handle: (1pc)	
			Rear connection	Mounting screw: M8 × 40 (4pcs) Auxiliary handle: (1pc)	

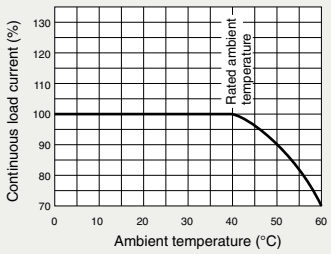
Operating Characteristics



Internal Accessories



Current Reducing Curve



External Accessories

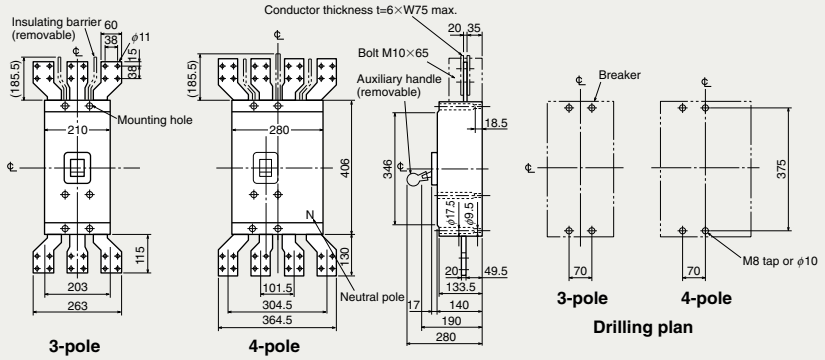
(An order for ☆ should be placed at the same time as an order of circuit breaker main body.)

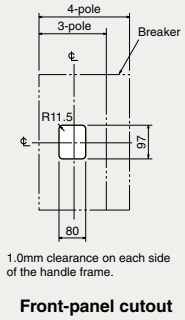
Accessories			Type name	Accessories			Type name
Operating handle	F	3P	F10SW	Auxiliary handle	HT		HT-10SW
		4P	F10SW4P	Handle lock device	HL		HL (☆)
Mechanical interlock	MI	3P	MI-16SW3	Electrical operation device	NFM	3P	(*1)
		4P	MI-16SW4			4P	

Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

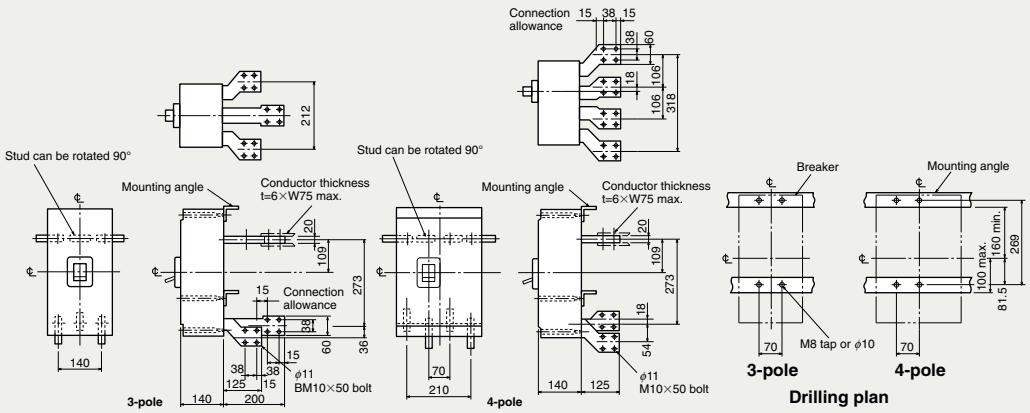
Outline Drawing

Front connection





Rear connection



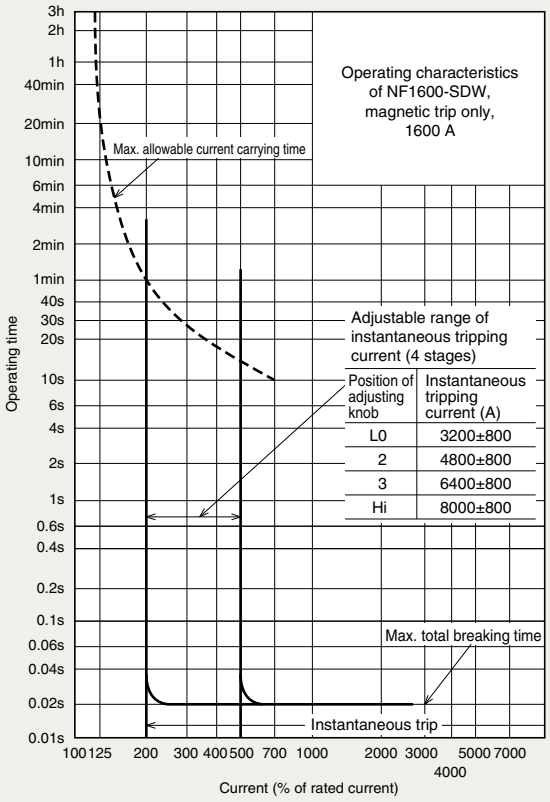
NF1600-SDW



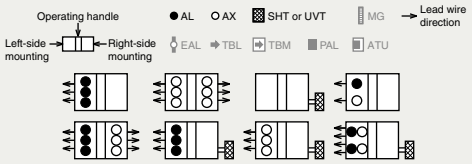
NF1600-SDW

Model				NF1600-SDW
Rated current In (Amp.)				1600
Number of poles				2
Rated insulation voltage Ui (V)				690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics) Time constant not large than 10msec	DC	250V	40/20
Standard Attached parts			Front connection	Mounting screw: M8×40 (4pcs) Insulating barrier: (2P: 1pc, 3P: 2pcs, 4P: 3pcs) Auxiliary handle: (1pc)
			Rear connection	Mounting screw: M8×40 (4pcs) Auxiliary handle: (1pc)

Operating Characteristics



Internal Accessories



External Accessories

(An order for ☆ should be placed at the same time as an order of circuit breaker main body.)

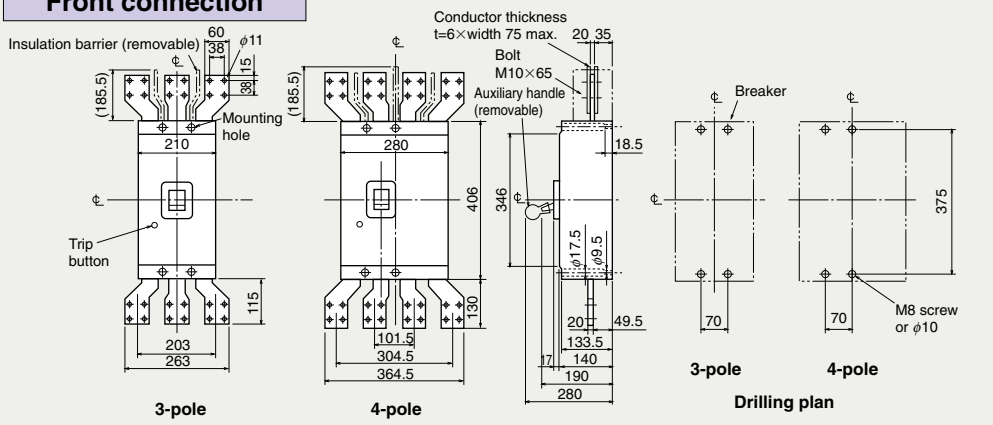
Accessories			Type name	Accessories			Type name
Operating handle	F	2, 3P	F10SW	Auxiliary handle	HT		HT-10SW
		4P	F10SW4P	Handle lock device	HL		HL (☆)
Mechanical interlock	MI	2, 3P	MI-16SW3	Electrical operation device	NFM	2, 3P	(*1)
		4P	MI-16SW4			4P	

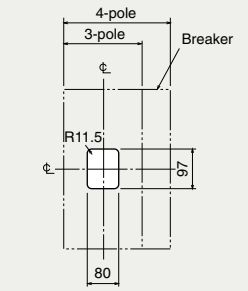
Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing

Front connection

Same dimensions as NF1600-SEW.



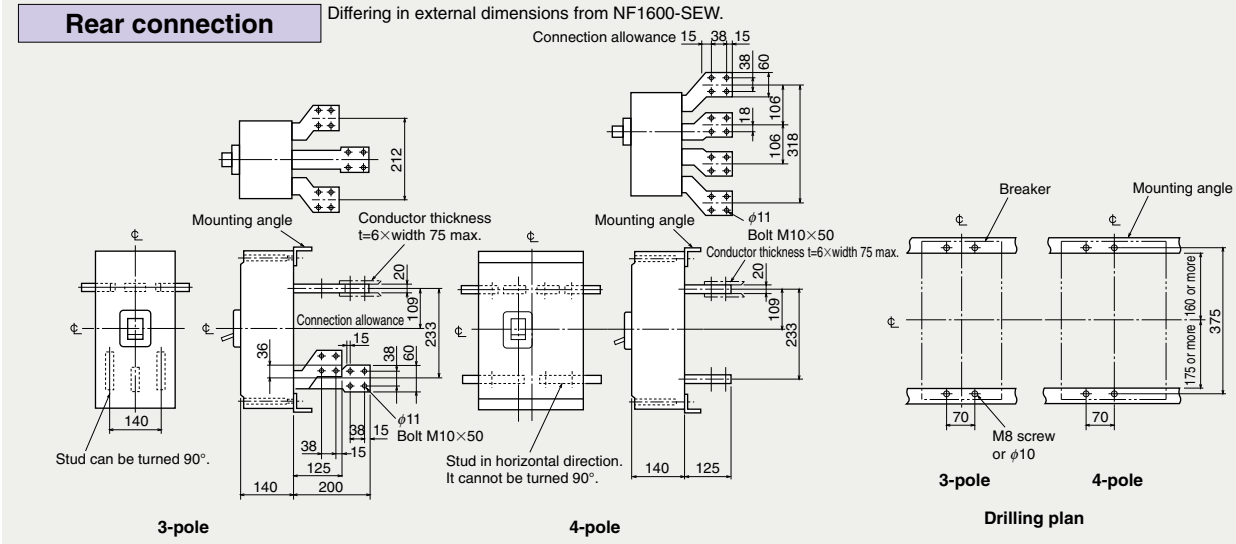


1.0mm clearance on each side of the handle frame

Front-panel cutout

Rear connection

Differing in external dimensions from NF1600-SEW.



Remarks: 1. Standard specification of NF1600-SDW is 2-pole model. 3-pole and 4-pole models are available for DC special voltage.
2. 2-pole models are 3-pole models with the central pole removed.

NV32-SV
NV63-CV
NV63-SV
NV63-HV

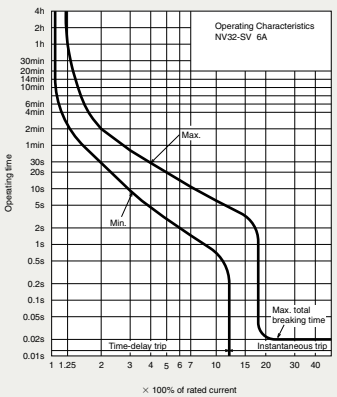


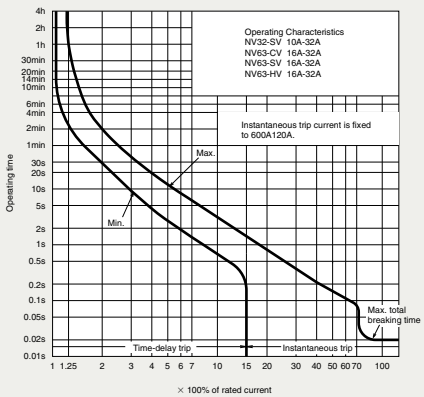
NV63-SV

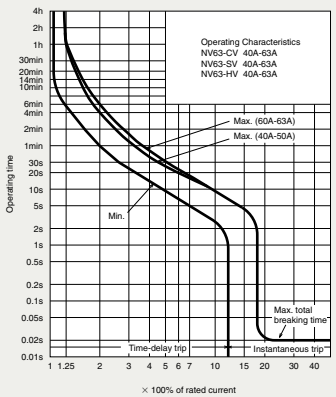
Model				NV32-SV	NV63-CV		NV63-SV		NV63-HV
Rated current In (A)				(5) 6 10 (15) 16 20 25 (30) 32	(5) (10) (15) 16 20 25 (30) 32 40 50 (60) 63		(5) (10) (15) 16 20 25 (30) 32 40 50 (60) 63		(15) 16 20 25 (30) 32 40 50 (60) 63
Number of poles				3	2	3	2	3	3
Phase line				3φ3W, 1φ2W	1φ2W	3φ3W, 1φ2W	1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W
Rated operational voltage Ue (V)			AC	100-440	100-240	100-440	100-240	100-440	100-440
High-speed type	Rated current sensitivity (mA)			(15) 30 100/200/500 selectable	30	15 30 100/200/500 selectable	(15) 30	(15) 30 100/200/500 selectable	(15) 30 100/200/500 selectable
	Max operating time (s)		at IΔn	0.1	0.1		0.1		0.1
			at 5IΔn	0.04	0.04		0.04		0.04
Time-delay type	Rated current sensitivity (mA)			–	–		–		–
	Max operating time (s)			–	–		–		–
	Inertial operating time (s) (or more)			–	–		–		–
Earth-leakage indication system				Mechanical type (button)	Mechanical type (button)		Mechanical type (button)		Mechanical type (button)
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	440V	5/5	–	2.5/2.5	–	7.5/7.5	10/8
			415V	5/5	–	2.5/2.5	–	7.5/7.5	10/8
			400V	5/5	–	5/5	–	7.5/7.5	10/8
			230V	10/10	7.5/7.5		15/15		25/19
			200V	10/10	7.5/7.5		15/15		25/19
			100V	10/10	7.5/7.5		15/15		25/19
Standard attached parts (Front connection)				Mounting screw: M4×0.7×55 (2pcs) (*1)			Insulation barrier: (2P: 1pc, 3P: 2pcs)		

Note *1 Attached to NV63-SV and NV63-HV.

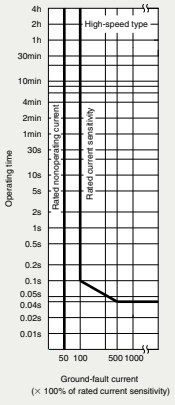
Operating Characteristics







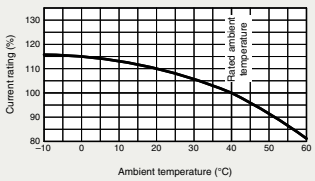
Earth leakage Tripping Characteristics



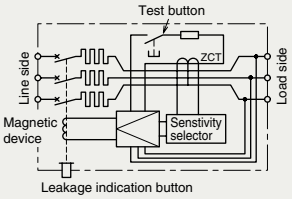
Internal Accessories



Temperature Compensation Curve



Internal Wiring Diagram



External Accessories

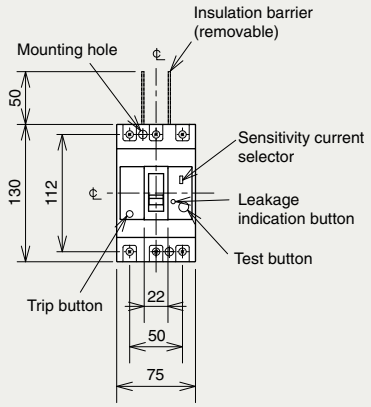
Accessories		Type name
Operating handle	F	F-05SV
	V	V-05SV
Handle lock device	LC	LC-05SV
	HL (*1)	HLF-05SV
		HLN-05SV
	HL-S	HLS-05SV

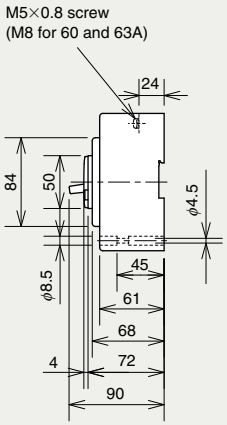
Note *1 HLF types are used for OFF lock and HLN types for ON lock.

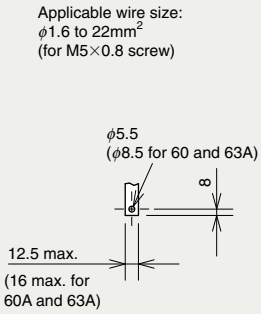
Accessories			Type name
Mechanical interlock		MI	MI-05SV3
Terminal cover	Small	TC-S	TCS-05SV3
	Large	TC-L	TCL-05SV3
			TCL-05SV3L
	Skeleton	TTC	TTC-05SV3
	Rear	BTC	BTC-05SV3
	Plug-in	PTC	PTC-05SV3
IEC 35mm rail mounting adapters			DIN-05SV

Outline Drawing

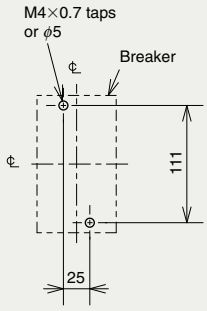
Front connection





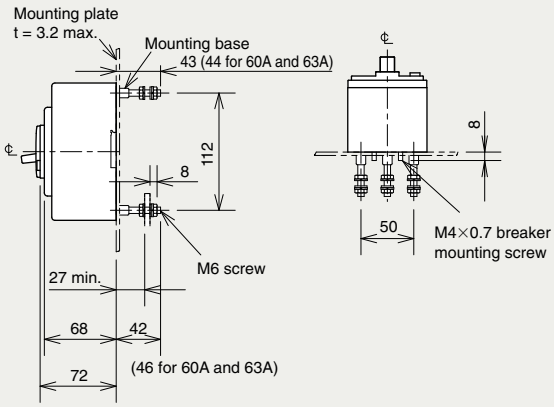


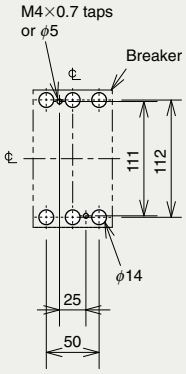
Conductor drilling for direct connection



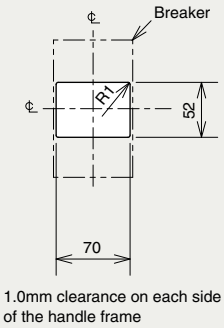
Drilling plan

Rear connection





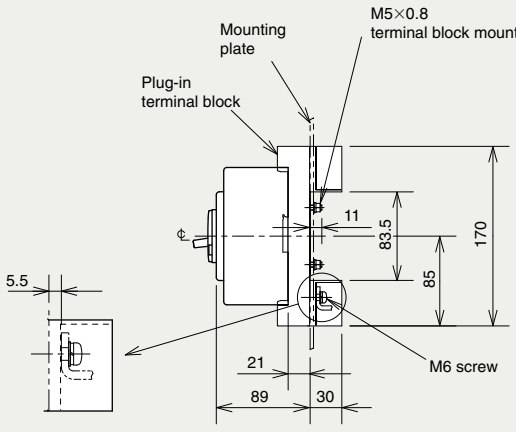
Drilling plan



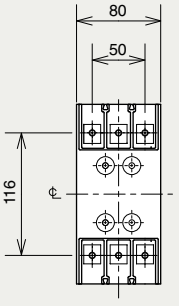
1.0mm clearance on each side of the handle frame

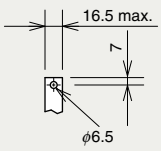
Front-panel cutout

Plug-in

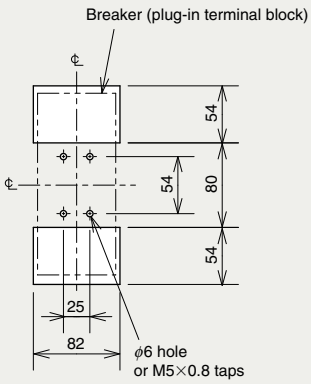


Details of terminal





Conductor drilling



Drilling plan

Remark: 1. 2-pole models are 3-pole models with the central pole removed.

NV125-CV
NV125-SV
NV125-HV

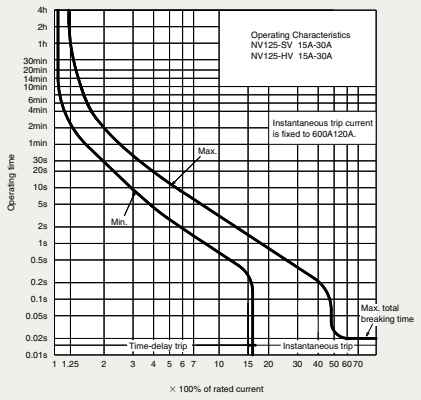


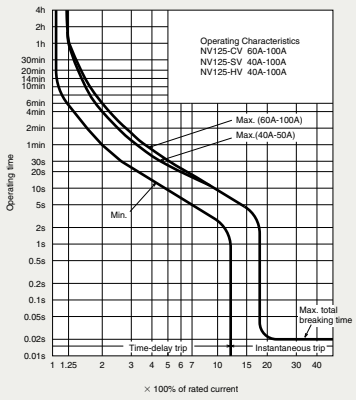
NV125-SV

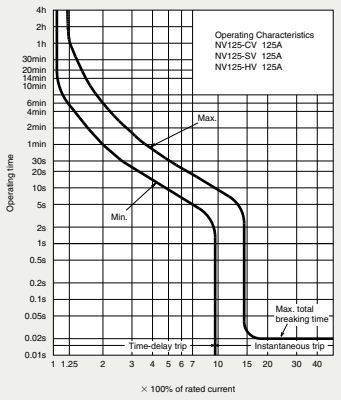
Model				NV125-CV	NV125-SV		NV125-HV	
Rated current In (A)				(60) 63 (75) 80 100 125	(15) 16 20 30 32 40 50 (60) 63 (75) 80 100 125 (*2)		(15) 16 20 (30) 32 40 50 (60) 63 75 80 100 125 (*2)	
Number of poles				3	3	4	3	4
Phase line				3φ3W, 1φ2W	3φ3W, 1φ2W	3φ4W	3φ3W, 1φ2W	3φ4W
Rated operational voltage Ue (V)			AC	100-440	100-440	200-440	100-440	200-440
High-speed type	Rated current sensitivity (mA)			(15) 30 100/200/500 selectable	30 100/200/500 selectable		(30) 100/200/500 selectable	
	Max operating time (s)		at IΔn	0.1	0.1		0.1	
			at 5IΔn	0.04	0.04		0.04	
Time-delay type	Rated current sensitivity (mA)			(100/200/500 selectable)	(100/200/500 selectable)		(100/200/500 selectable)	
	Max operating time (s)			(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)		(0.45/1.0/2.0 selectable)	
	Inertial operating time (s) (or more)			(0.1/0.5/1.0)	(0.1/0.5/1.0)		(0.1/0.5/1.0)	
Earth-leakage indication system				Mechanical type (button)	Mechanical type (button)		Mechanical type (button)	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	440V	10/5	25/25		50/38	
			415V	10/5	30/30		50/38	
			400V	10/5	30/30		50/38	
			230V	30/15	50/50		100/75	
			200V	30/15	50/50		100/75	
			100V	30/15	50/50	–	100/75	–
Standard attached parts (Front connection)				Mounting screw: M4×0.7×55 (3P: 2pcs, 4P: 4pcs) (*1) Insulation barrier: (3P: 2pcs, 4P: 3pcs)				

Notes *1 Attached to NV125-SV and NV125-HV.
*2 In case of time delay type, rated current is produced with 20 amp. or more.

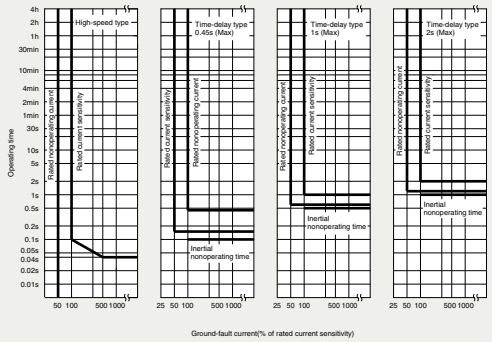
Operating Characteristics



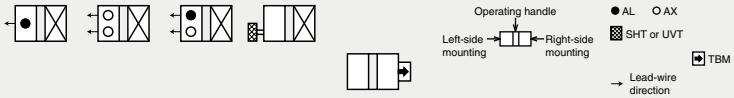




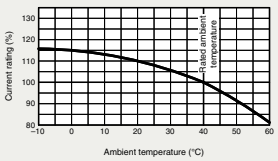
Earth leakage Tripping Characteristics



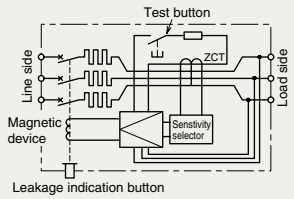
Internal Accessories



Temperature Compensation Curve



Internal Wiring Diagram



External Accessories

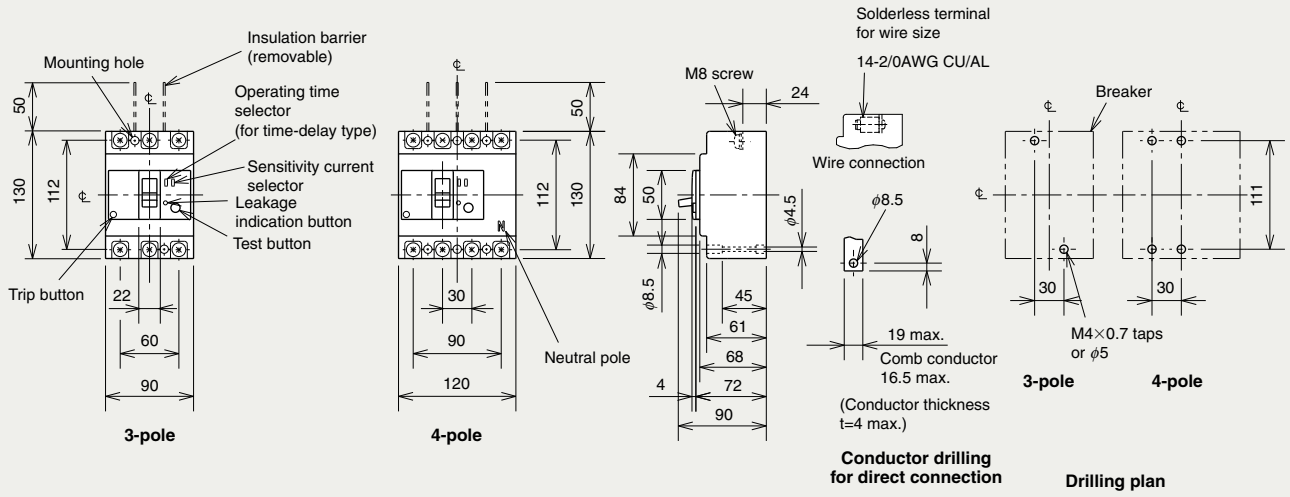
Accessories		Type name
Operating handle	F	F-1SV
	V	V-1SV
Handle lock device	LC	LC-05SV
	HL (*1)	HLF-05SV
		HLN-05SV
	HL-S	HLS-05SV

Accessories				Type name
Mechanical interlock		MI	3P	MI-05SV3
			4P	MI-1SV4
Terminal cover	Small	TC-S		TCS-1SV3
	Large	TC-L	3P	TCL-1SV3
			4P	TCL-1SV4
	Skeleton	TTC		TTC-1SV3
	Rear	BTC		BTC-1SV3
	Plug-in	PTC		PTC-1SV3
Electrical operation device				(*2)

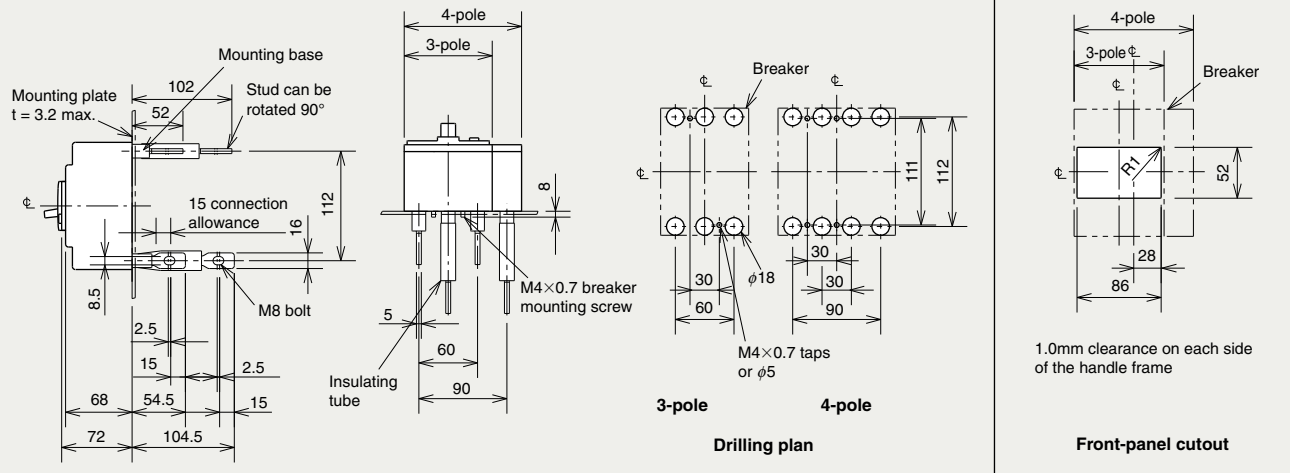
Notes *1 HLF types are used for OFF lock and HLN types for ON lock.
*2 Specify the working voltage.

Outline Drawing

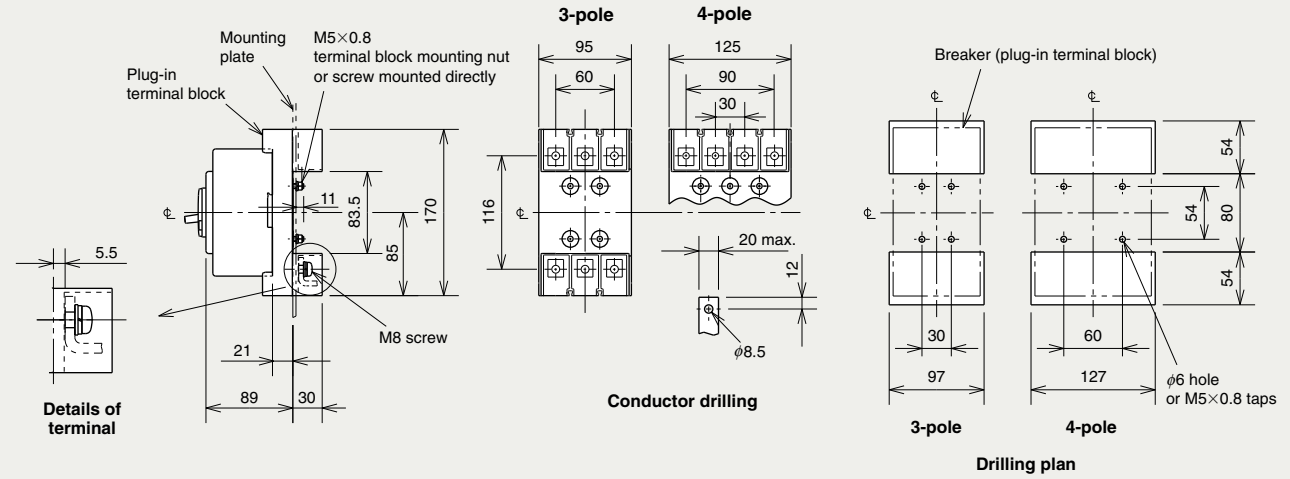
Front connection



Rear connection



Plug-in



Remark: 1. Only 3-pole models are available for NV125-CV.

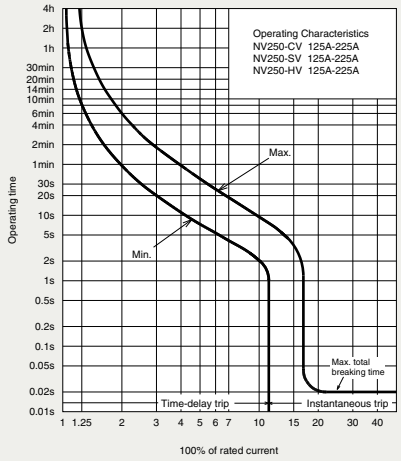
NV250-CV
NV250-SV
NV250-HV

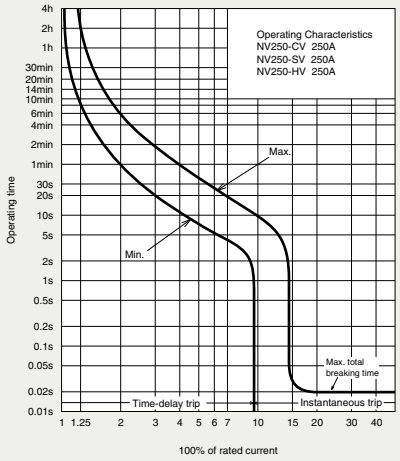


NV250-CV

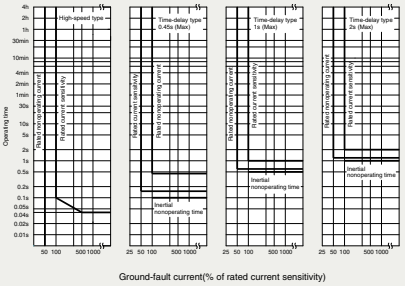
Model				NV250-CV	NV250-SV		NV250-HV	
Rated current In (A)				125 150 175 200 225 250	125 150 175 200 225 250		125 150 175 200 225 250	
Number of poles				3	3	4	3	4
Phase line				3φ3W, 1φ2W	3φ3W, 1φ2W	3φ4W	3φ3W, 1φ2W	3φ4W
Rated operational voltage Ue (V)			AC	100-440	100-440	200-440	100-440	200-440
High-speed type	Rated current sensitivity (mA)			30 100/200/500 selectable	(30) 100/200/500 selectable		(30) 100/200/500 selectable	
	Max operating time (s)	at IΔn		0.1	0.1		0.1	
		at 5IΔn		0.04	0.04		0.04	
Time-delay type	Rated current sensitivity (mA)			(100/200/500 selectable)	(100/200/500 selectable)		(100/200/500 selectable)	
	Max operating time (s)			(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)		(0.45/1.0/2.0 selectable)	
	Inertial operating time (s) (or more)			(0.1/0.5/1.0)	(0.1/0.5/1.0)		(0.1/0.5/1.0)	
Earth-leakage indication system				Mechanical type (button)	Mechanical type (button)		Mechanical type (button)	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	440V	15/12	36/36		65/65	
			415V	25/19	36/36		70/70	
			400V	25/19	36/36		75/75	
			230V	36/27	85/85		100/100	
			200V	36/27	85/85		100/100	
			100V	36/27	85/85	–	100/100	
Standard attached parts (Front connection)				Mounting screw: M4×0.7×55 (3P: 2pcs, 4P: 4pcs) Insulation barrier: (3P: 4pcs, 4P: 6pcs)				

Operating Characteristics

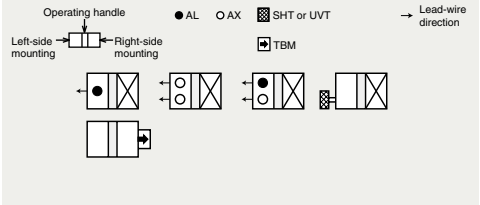




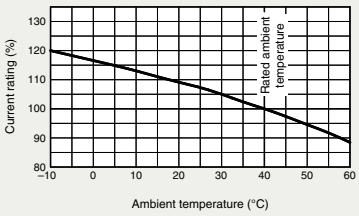
Earth leakage Tripping Characteristics



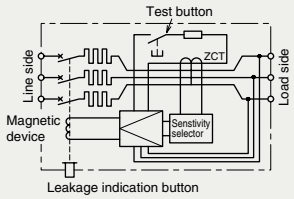
Internal Accessories



Temperature Compensation Curve



Internal Wiring Diagram



External Accessories

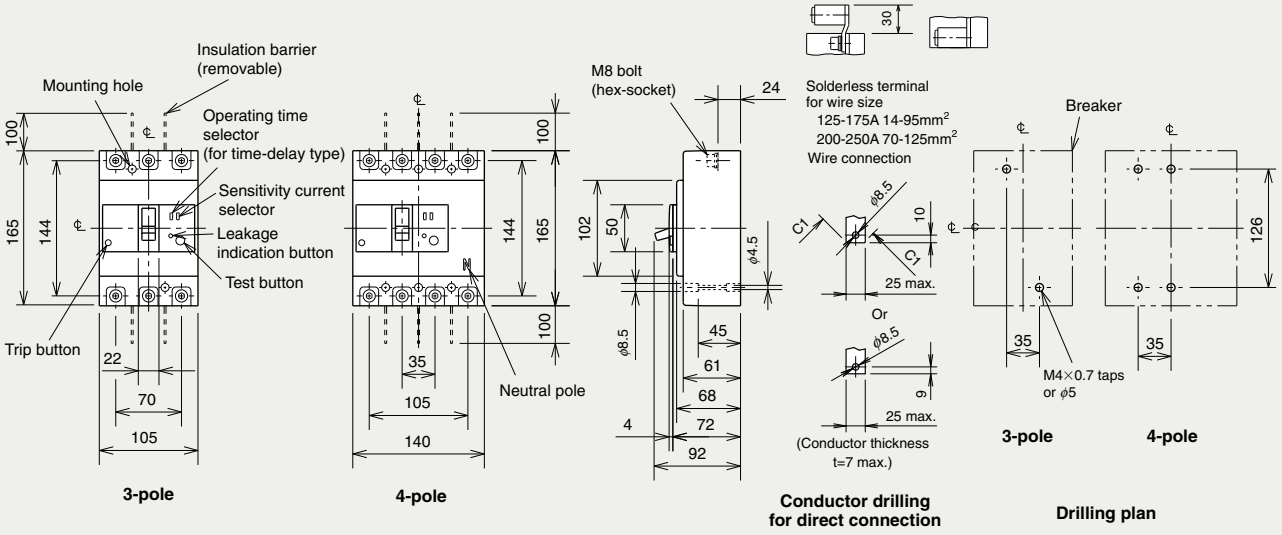
Accessories		Type name
Operating handle	F	F-2SV
	V	V-2SV
Handle lock device	LC	LC-05SV
	HL (*1)	HLF-05SV
		HLN-05SV
	HL-S	HLS-2SV

Accessories				Type name
Mechanical interlock		MI	3P	MI-05SV3
			4P	MI-2SV4
Terminal cover	Small	TC-S	3P	TCS-2SV3
	Large	TC-L	3P	TCL-2SV3
				TCL-2SV3L
			4P	TCL-2SV4
	Skeleton	TTC	3P	TTC-2SV3
	Rear	BTC	3P	BTC-2SV3
	Plug-in	PTC	3P	PTC-2SV3
Electrical operation device				(*2)

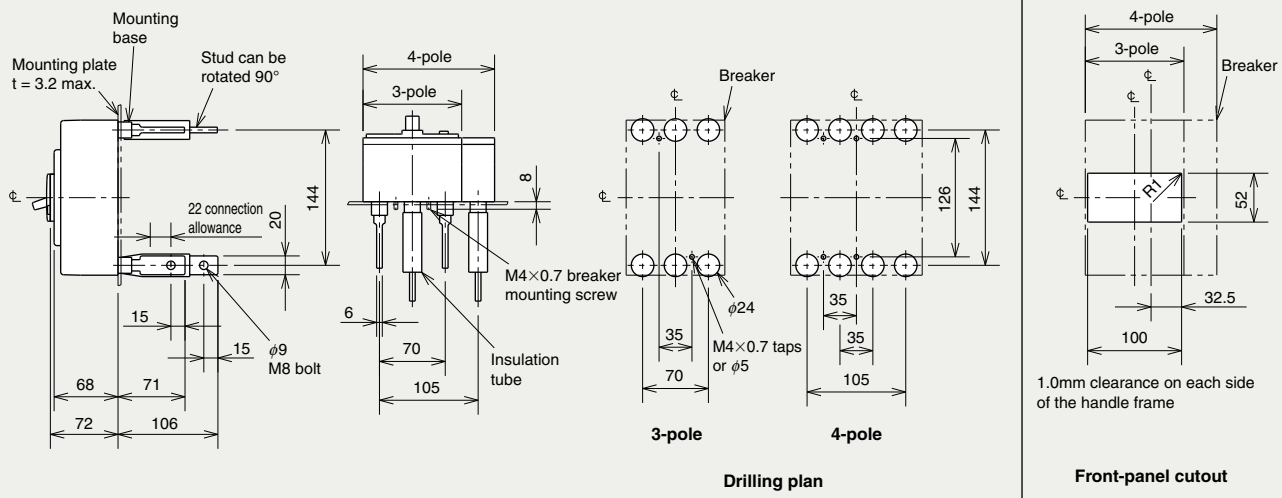
Notes *1 HLF types are used for OFF lock and HLN types for ON lock.
*2 Specify the working voltage.

Outline Drawing

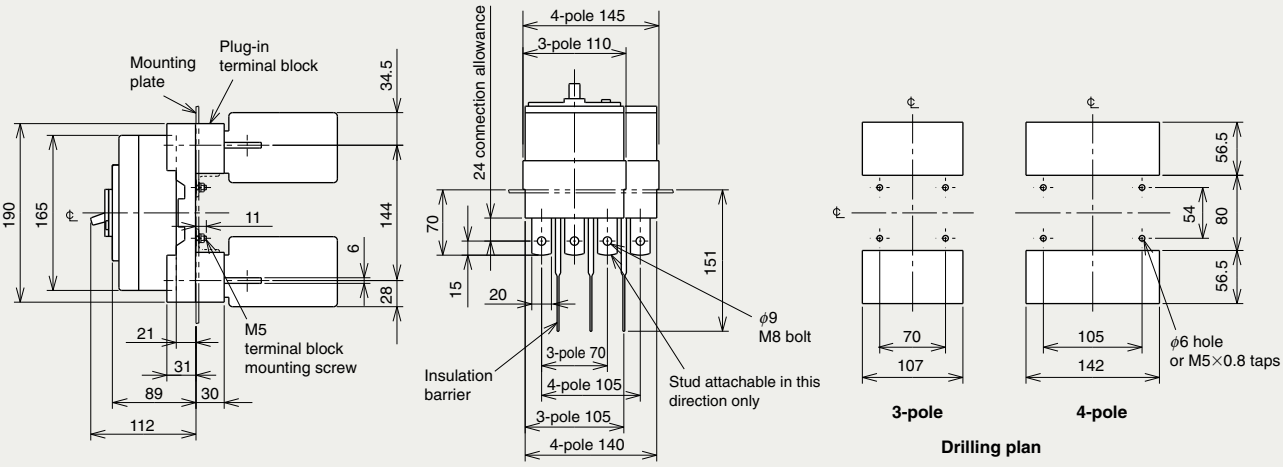
Front connection



Rear connection



Plug-in



Remark: 1. Only 3-pole models are available for the model of NV250-CV.

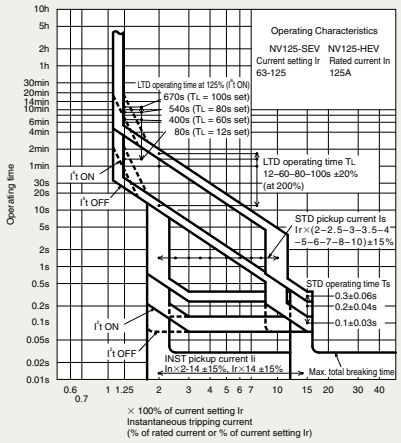
NV125-SEV NV125-HEV NV250-SEV NV250-HEV

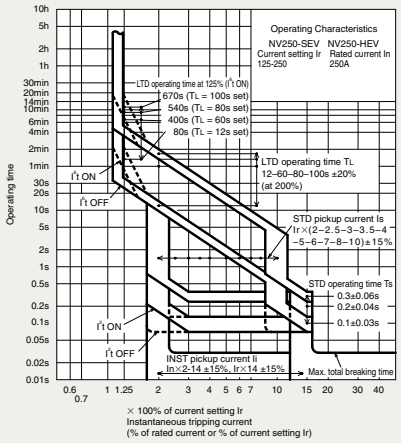


NV250-SEV

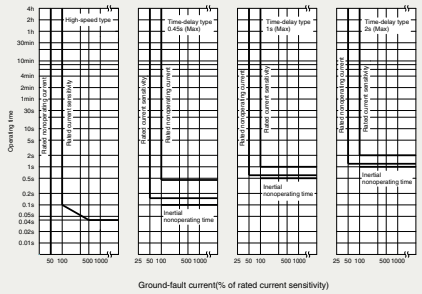
Model				NV125-SEV	NV125-HEV	NV250-SEV	NV250-HEV
Rated current In (A)				125	125	250	250
Current setting Ir (A)				63-125	63-125	125-250	125-250
Number of poles				3 / 4	3 / 4	3	3
Phase line type				3φ3W, 1φ2W / 3φ4W	3φ3W, 1φ2W / 3φ4W	3φ3W, 1φ2W	3φ3W, 1φ2W
Rated operational voltage Ui			V	440	440	440	440
Rated operational voltage Ue (V)			AC	100-440	100-440	100-440	100-440
High-speed type	Rated current sensitivity (mA)			(30) 100/200/500 selectable	(30) 100/200/500 selectable	(30) 100/200/500 selectable	(30) 100/200/500 selectable
	Max operating time (s)		at IΔn	0.1	0.1	0.1	0.1
			at 5IΔn	0.04	0.04	0.04	0.04
Time-delay type	Rated current sensitivity (mA)			(100/200/500 selectable)	(100/200/500 selectable)	(100/200/500 selectable)	(100/200/500 selectable)
	Max operating time (s)			(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)
	Inertial operating time (s) (or more)			(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)
Earth-leakage indication system				Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	440V	36/36	65/65	36/36	65/65
			415V	36/36	70/70	36/36	70/70
			400V	36/36	75/75	36/36	75/75
			230V	85/85	100/100	85/85	100/100
			200V	85/85	100/100	85/85	100/100
			100V	85/85	100/100	85/85	100/100
Standard attached parts (Front connection)				Mounting screw: M4×0.7×55 (3P: 2pcs, 4P: 4pcs) Insulation barrier: (3P: 4pcs, 4P: 6pcs)			

Operating Characteristics

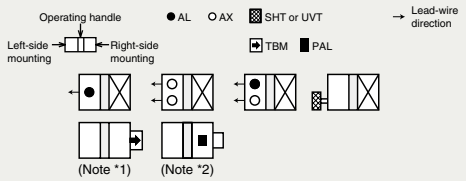




Earth leakage Tripping Characteristics

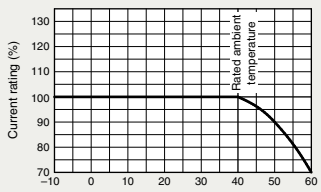


Internal Accessories



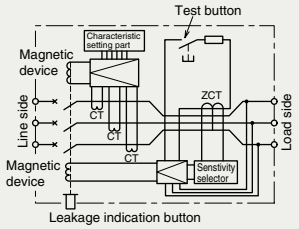
Notes *1 For the 24VDC TBM only instruct us of a control voltage. (The standard shared voltage is 100-240VAC/100-240VDC.)
*2 SLT-equipped is standard. Control voltage (100-200VAC) is necessary.

Current Reducing Curve



The rated current does not have thermal characteristics. Reduce the current as shown in the curve on the left chart if the ambient temperature exceeds 40°C.

Internal Wiring Diagram



External Accessories

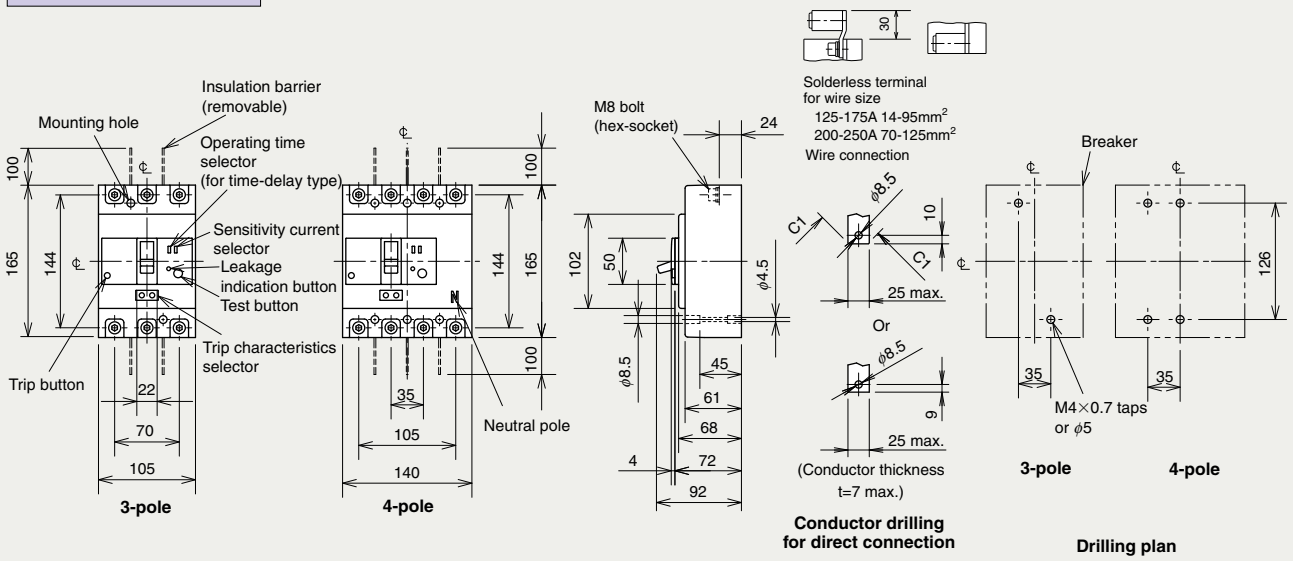
Accessories		Type name
Operating handle	F	F-2SV
	V	V-2SV
Handle lock device	LC	LC-05SV
	HL (*1)	HLF-05SV
		HLN-05SV
	HL-S	HLS-2SV

Notes *1 HLF types are used for OFF lock and HLN types for ON lock.
*2 Specify the working voltage.

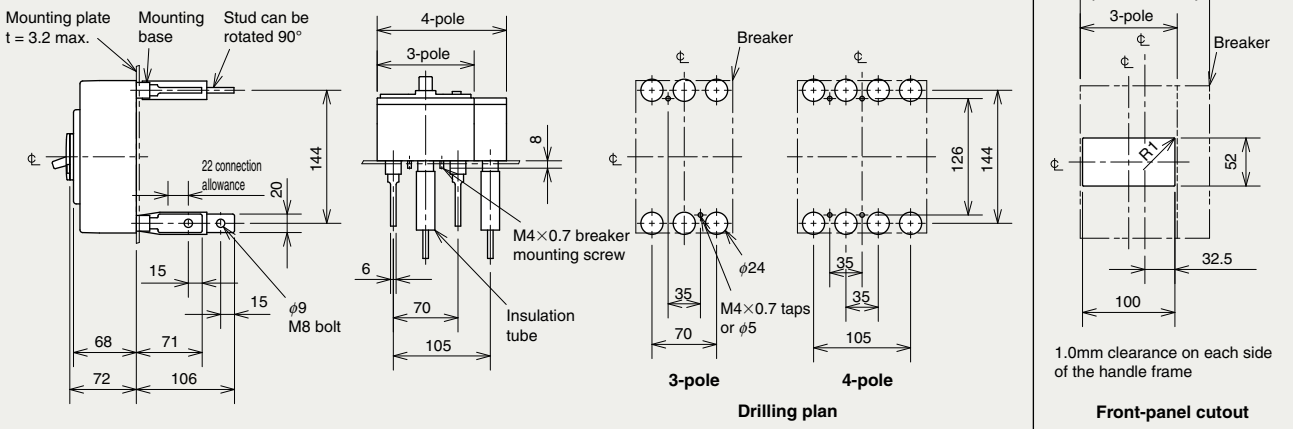
Accessories				Type name
Mechanical interlock		MI	3P	MI-05SV3
			4P	MI-2SV4
Terminal cover	Small	TC-S	3P	TCS-2SV3
	Large	TC-L	3P	TCL-2SV3
				TCL-2SV3L
			4P	TCL-2SV4
	Skeleton	TTC	3P	TTC-2SV3
	Rear	BTC	3P	BTC-2SV3
	Plug-in	PTC	3P	PTC-2SV3
Electrical operation device				(*2)

Outline Drawing

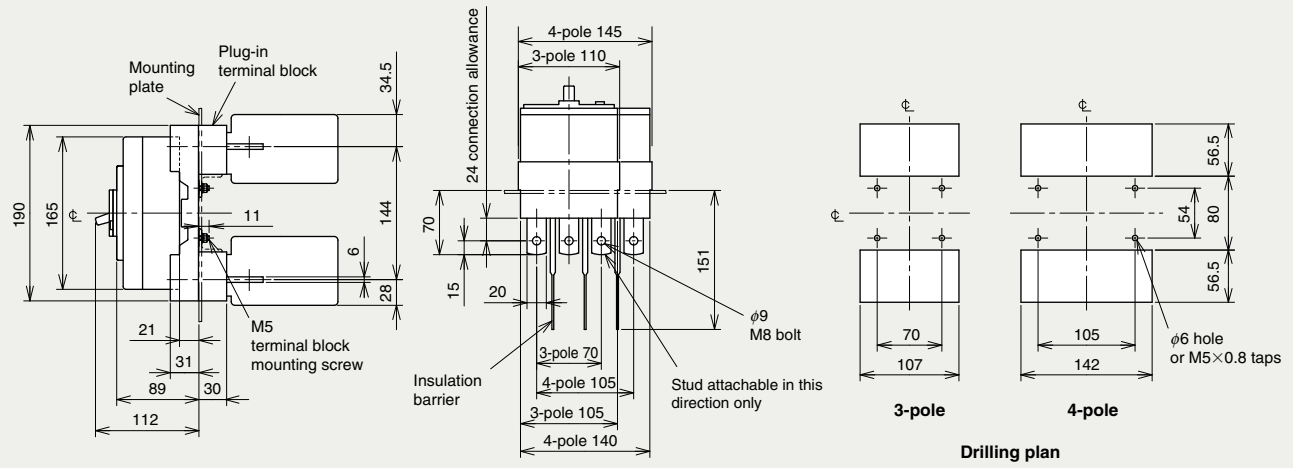
Front connection



Rear connection



Plug-in



Remark: 1. Only 3-pole models are available for the model of NV250-SEV and NV250-HEV.

NV400-CW
NV400-SW

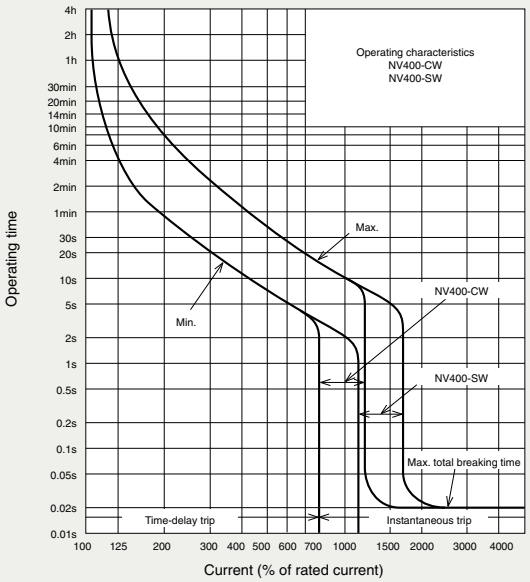


NV400-SW

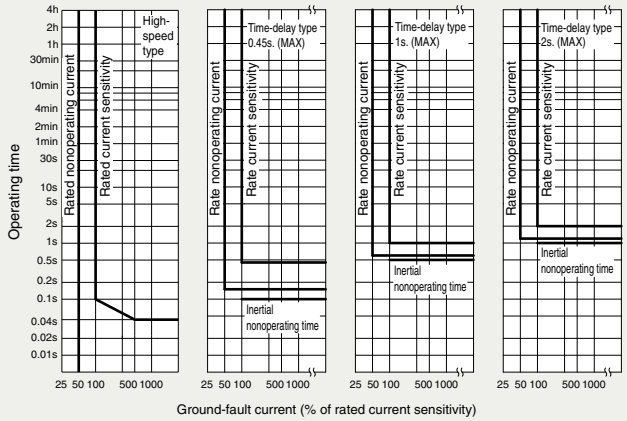
Model			NV400-CW	NV400-SW
Number of poles			3	
Rated operational voltage Ue (V AC) (*1)			100-440 Multi-voltage type	
Rated current In (A)			250 300 350 400	
High-speed type	Rated current sensitivity IΔn (mA)		(30) 100 · 200 · 500 Selectable	
	Max. operating time at 5IΔn (s)		0.04	
Time-delay type	Rated current sensitivity IΔn (mA)		(100 · 200 · 500 Selectable)	
	Max. operating time at 2IΔn (s)		(0.45 · 1.0 · 2.0 Selectable)	
	Inertial non-operating time at 2IΔn (s)		(0.1 · 0.5 · 1.0)	
Earth-leakage indication system			Button	
Rated short-circuit breaking capacity (kA) IEC 60947-2 (Icu/Ics) EN 60947-2	AC	440V	25/13	42/42
		400V	36/18	45/45
		230V	50/25	85/85
Standard attached parts (Front connection)			Mounting screw: M6×60 (4pcs) Insulation barrier: (4pcs)	

Note *1 Rated operational voltage of time-delay type is for 200-440V.

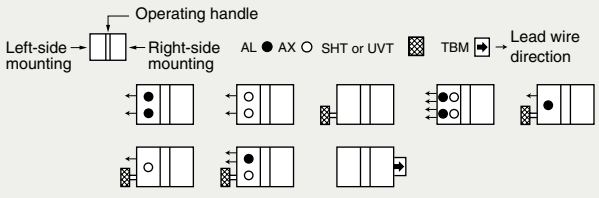
Operating Characteristics



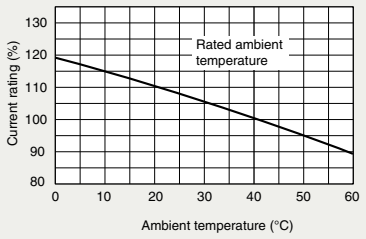
Earth Leakage Tripping Characteristics



Internal Accessories



Temperature Compensation Curve



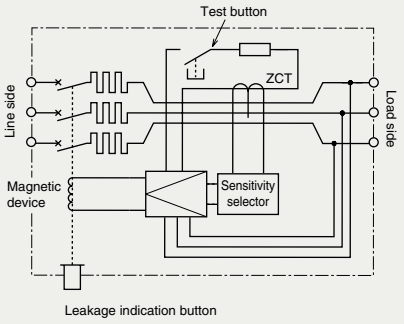
External Accessories

Accessories		Type name
Operating handle	F	F-4S
	V	V-4S
Mechanical interlock	MI	MI-4SW3

Accessories			Type name
Auxiliary handle		HT	HT-4CW, HT-4SW
Terminal cover	Large	TC-L	TCL-4SW3
	Skeleton	TTC	TTC-4SW3
	Rear	BTC	BTC-4SW3
Handle lock device		HL	HL-4CW, HL-4SW
		HL-S	HLS-4SW
Electrical operation device			(*1)

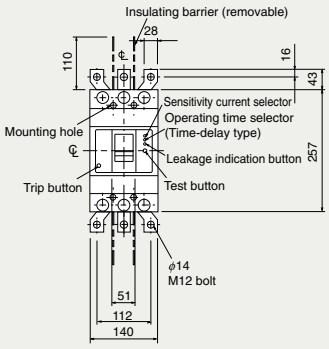
Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

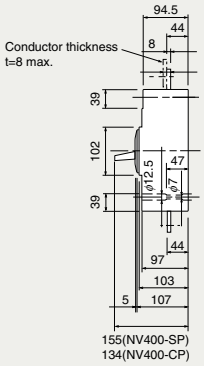
Internal Wiring Diagram

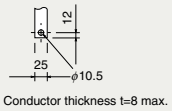


Outline Drawing

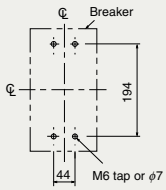
Front connection



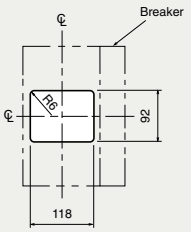




Conductor drilling for direct connection



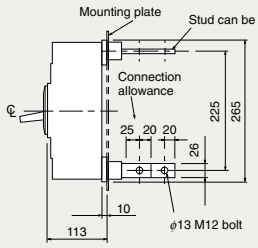
Drilling plan

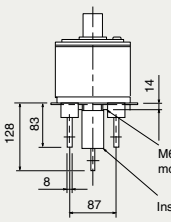


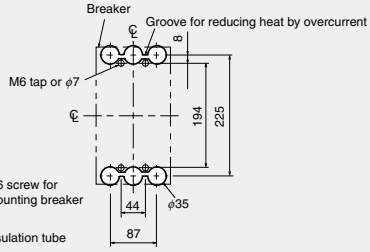
1.0mm clearance on each side of the handle frame.

Front-panel cutout

Rear connection



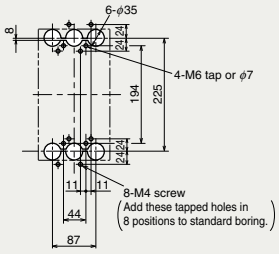




Drilling plan

Boring dimensions for rear connection type barriers (3-pole)

Line side



Load side

Note The bore dimensional drawing shows the breaker viewed from the rear.

NV400-SEW
NV400-HEW
NV400-REW

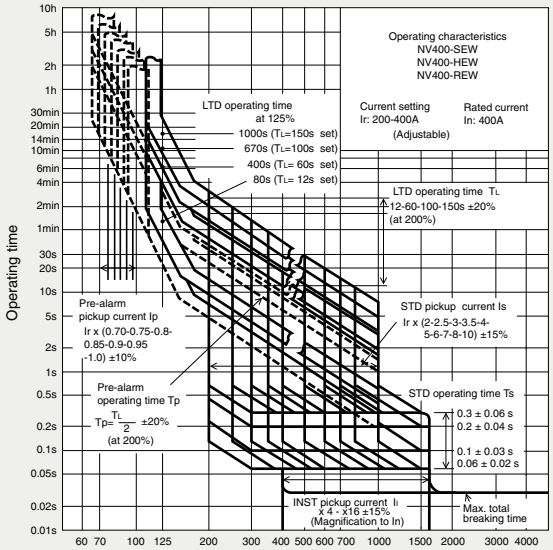


NV400-SEW

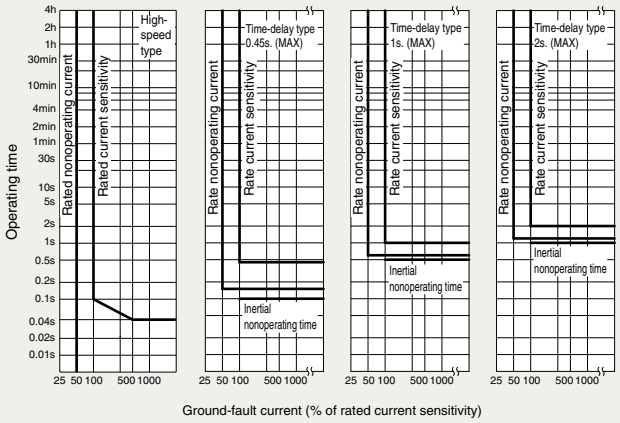
Model			NV400-SEW		NV400-HEW		NV400-REW
Number of poles			3	4	3	4	3
Rated operational voltage Ue (V AC) (*1)			100-440 Multi-voltage type				
Rated current In (A)			200-400 adjustable				
High-speed type	Rated current sensitivity IΔn (mA)		(30) 100 · 200 · 500 Selectable				
	Max. operating time at 5IΔn (s)		0.04				
Time-delay type	Rated current sensitivity IΔn (mA)		(100 · 200 · 500 Selectable)				
	Max. operating time at 5IΔn (s)		(0.45 · 1.0 · 2.0 Selectable)				
	Max. inertial non-operating time at 2IΔn (s)		(0.1 · 0.5 · 1.0)				
Earth-leakage indication system			Button				
Rated short-circuit breaking capacity (kA) IEC 60947-2 (Icu/Ics) EN 60947-2	AC	440V	42/42		65/65		125/63
		400V	50/50		70/70		125/63
		230V	85/85		100/100		150/75
Standard attached parts (Front connection)			Mounting screw: M6×72 (4pcs) Insulation barrier: (3P: 4pcs, 4P: 6pcs)				

Note *1 Rated operational voltage of time-delay type is for 200-440V.

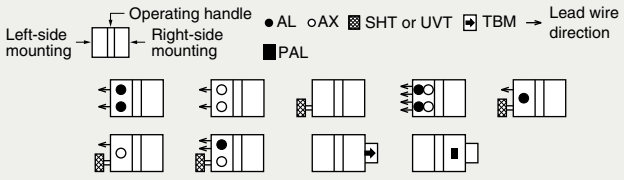
Operating Characteristics



Earth Leakage Tripping Characteristics

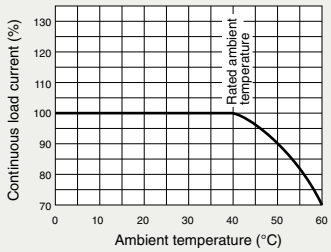


Internal Accessories



Remarks: 1. Instead of TBM, pre-alarm module (PAL) can be attached.

Current Reducing Curve



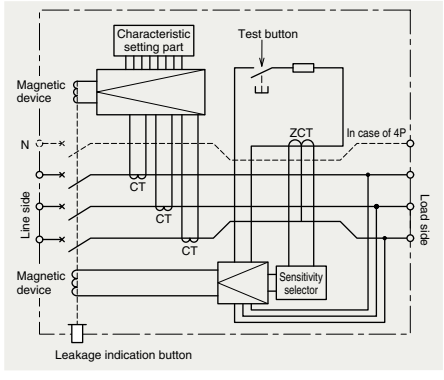
External Accessories

Accessories			Type name
Operating handle	F		F-4S
	V		V-4S
Mechanical interlock	MI	3P	MI-4SW3
		4P	MI-4SW4

Accessories				Type name
Auxiliary handle		HT		HT-4SW
Terminal cover	Large	TC-L	3P	TCL-4SW3 (*1)
			4P	TCL-4SW4 (*1)
	Skeleton	TTC	3P	TTC-4SW3
			4P	TTC-4SW4
	Rear	BTC	3P	BTC-4SW3 (*2)
			4P	BTC-4SW4
Handle lock device		HL		HL-4SW
		HL-S		HLS-4SW
Electrical operation device		NVM	3P	(*3)
			4P	

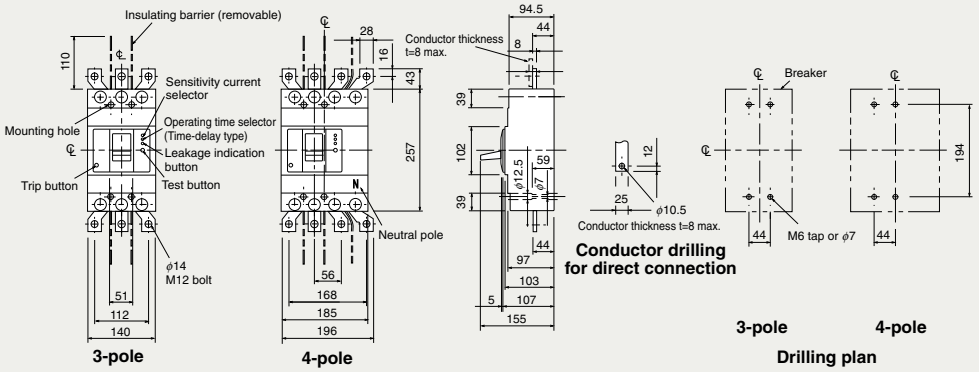
Notes *1 This is for NV400-SEW.
*2 This is for NV400-SEW. For rear terminal cover of NV400-HEW/REW, use PTC-4SW3.
*3 Specify the operation method and voltage. Order in combination with the breaker unit.

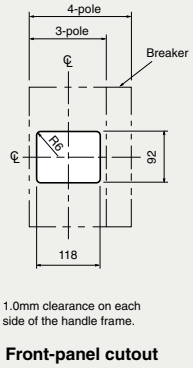
Internal Wiring Diagram



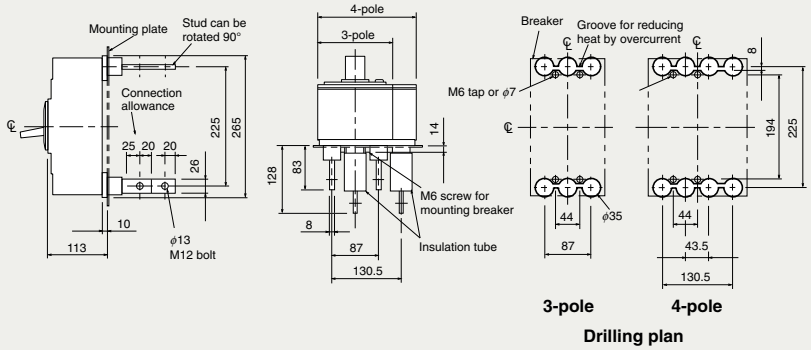
Outline Drawing

Front connection

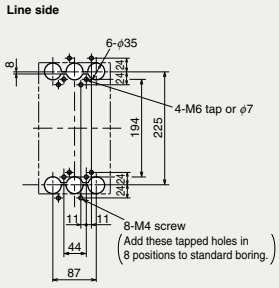




Rear connection



Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

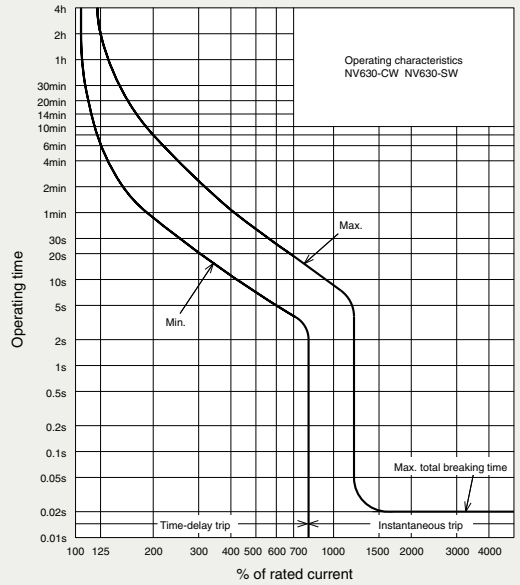
NV630-CW
NV630-SW



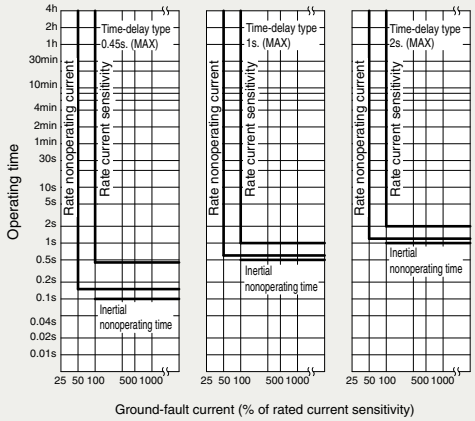
NV630-SW

Model			NV630-CW	NV630-SW
Number of poles			3	
Rated operational voltage Ue (V AC)			100-440 Multi-voltage type	
Rated current In (A)			500 600 630	
High-speed type	Rated current sensitivity IΔn (mA)		–	
	Max. operating time at 5IΔn (s)		–	
Time-delay type	Rated current sensitivity IΔn (mA)		100 · 200 · 500 Selectable	
	Max. operating time at 5IΔn (s)		0.45 · 1.0 · 2.0 Selectable	
	Max. inertial non-operating time at 2IΔn (s)		0.1 · 0.5 · 1.0	
Earth-leakage indication system			Button	
Rated short-circuit breaking capacity (kA) IEC 60947-2 (Icu/Ics) EN 60947-2	AC	440V	36/18	42/42
		400V	36/18	50/50
		230V	50/25	85/85
Standard attached parts (Front connection)			Mounting screw: M6×72 (4pcs) Insulation barrier: (4pcs)	

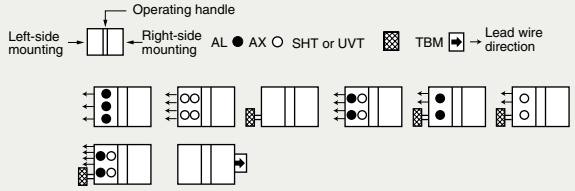
Operating Characteristics



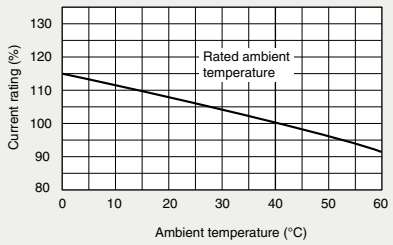
Earth Leakage Tripping Characteristics



Internal Accessories



Temperature Compensation Curve



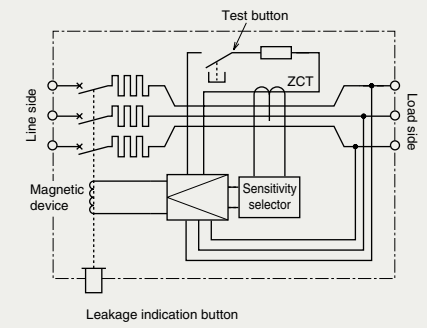
External Accessories

Accessories		Type name
Operating handle	F	F-4S
	V	V-4S
Mechanical interlock	MI	MI-4SW3

Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

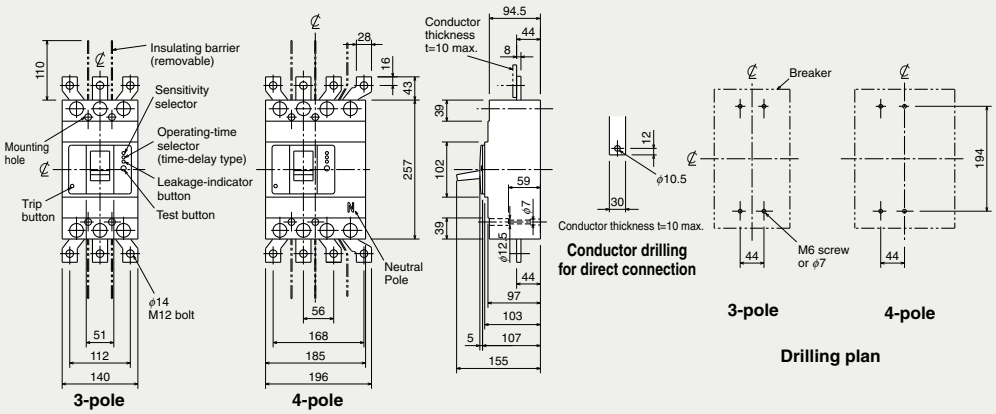
Accessories			Type name
Auxiliary handle		HT	HT-4SW
Terminal cover	Large	TC-L	TCL-4SW3
	Skeleton	TTC	TTC-4SW3
	Rear	BTC	BTC-4SW3
Handle lock device		HL	HL-4SW
		HL-S	HLS-4SW
Electrical operation device			(*1)

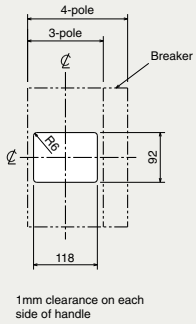
Internal Wiring Diagram



Outline Drawing

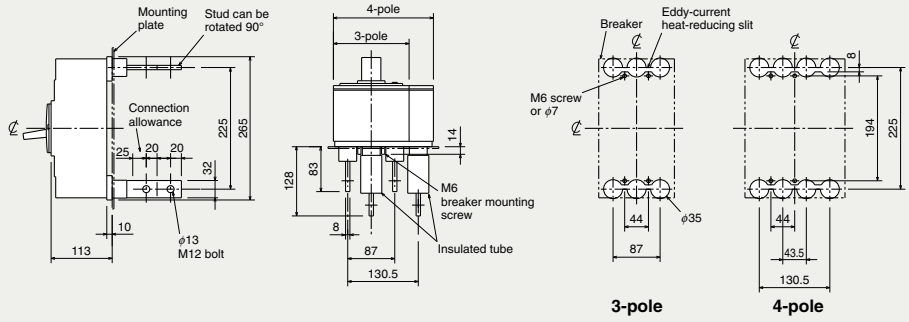
Front connection



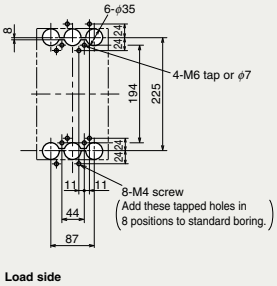


Front-plate cutout

Rear connection



Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

NV630-SEW
NV630-HEW

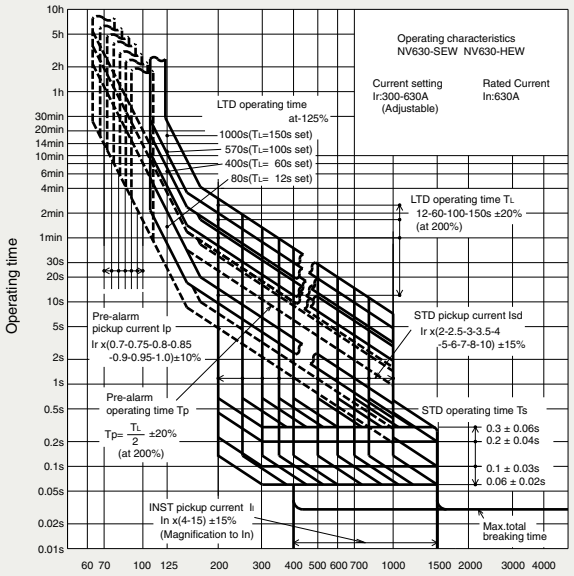


NV630-SEW

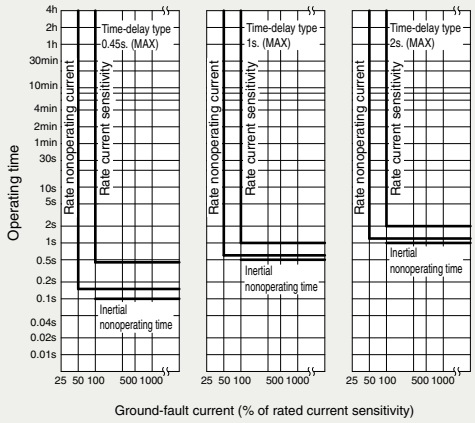
Model		NV630-SEW		NV630-HEW
Number of poles		3	4	3
Rated operational voltage Ue (V AC) (*1)		100-440 Multi-voltage type		
Rated current In (A)		300-630 adjustable		
High-speed type	Rated current sensitivity IΔn (mA)	–		
	Max. operating time at 5IΔn (s)	–		
Time-delay type	Rated current sensitivity IΔn (mA)	(100 · 200 · 500 Selectable)		
	Max. operating time at 5IΔn (s)	(0.45 · 1.0 · 2.0 Selectable)		
	Max. inertial non-operating time at 2IΔn (s)	(0.1 · 0.5 · 1.0)		
Earth-leakage indication system		Button		
Rated short-circuit breaking capacity (kA) IEC 60947-2 (Icu/Ics) EN 60947-2	AC 440V	42/42		65/65
	AC 400V	50/50		70/70
	AC 230V	85/85		100/100
Standard attached parts (Front connection)		Mounting screw: M6×72 (4pcs) Insulation barrier: (3P: 4pcs, 4P: 6pcs)		

Note *1 Rated operational voltage of time-delay type is for 200-440V.

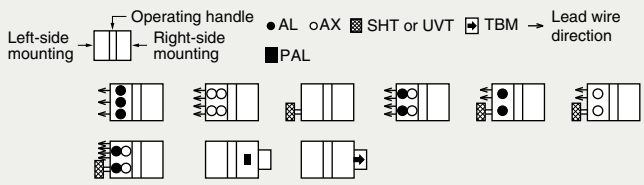
Operating Characteristics



Earth Leakage Tripping Characteristics

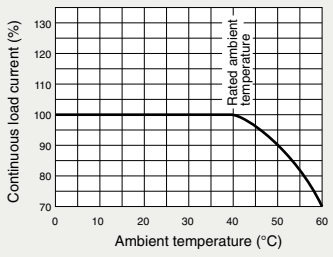


Internal Accessories



Remarks: 1. Instead of TBM, pre-alarm module (PAL) can be attached.

Current Reducing Curve



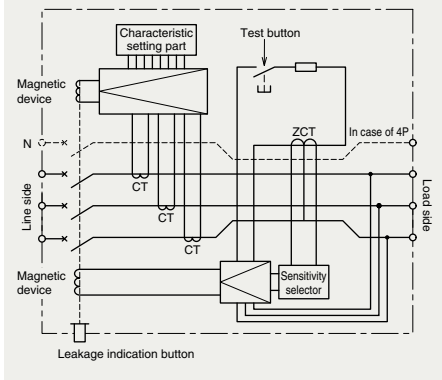
External Accessories

Accessories			Type name
Operating handle	F		F-4S
	V		V-4S
Mechanical interlock	MI	3P	MI-4SW3
		4P	MI-4SW4

Accessories				Type name
Auxiliary handle		HT		HT-4SW
Terminal cover	Large	TC-L	3P	TCL-4SW3 (*1)
			4P	TCL-4SW4 (*1)
	Skeleton	TTC	3P	TTC-4SW3
			4P	TTC-4SW4
	Rear	BTC	3P	BTC-4SW3 (*2)
			4P	BTC-4SW4
Handle lock device		HL		HL-4SW
		HL-S		HLS-4SW
Electrical operation device		NVM	3P	(*3)
			4P	

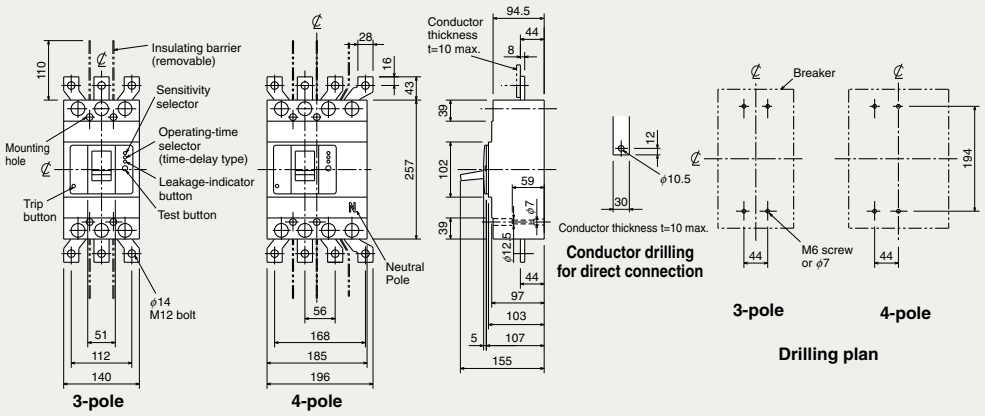
Notes *1 This is for NV630-SEW.
*2 This is for NV630-SEW. For rear terminal cover of NV630-HEW, use PTC-4SW3.
*3 Specify the operation method and voltage. Order in combination with the breaker unit.

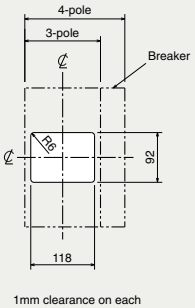
Internal Wiring Diagram



Outline Drawing

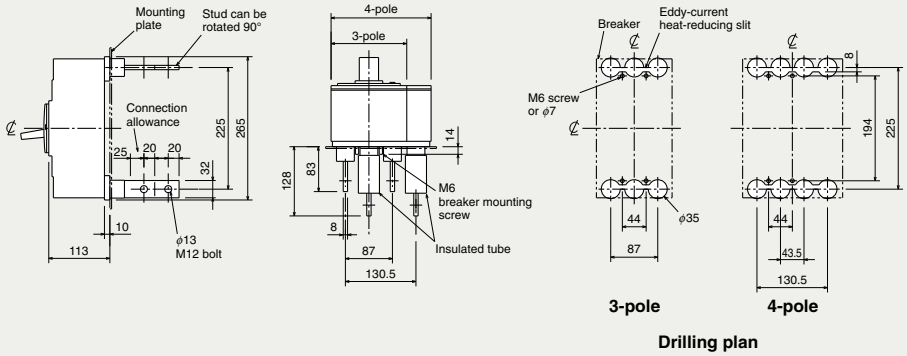
Front connection



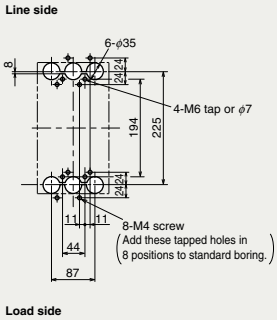


Front-plate cutout

Rear connection



Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

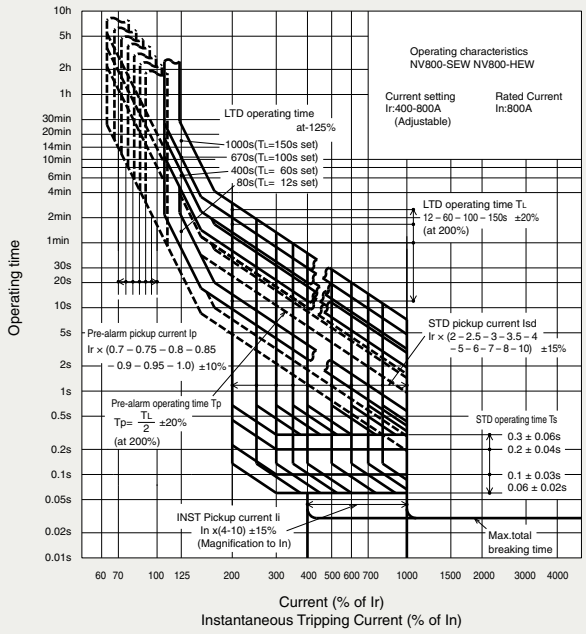
NV800-SEW
NV800-HEW



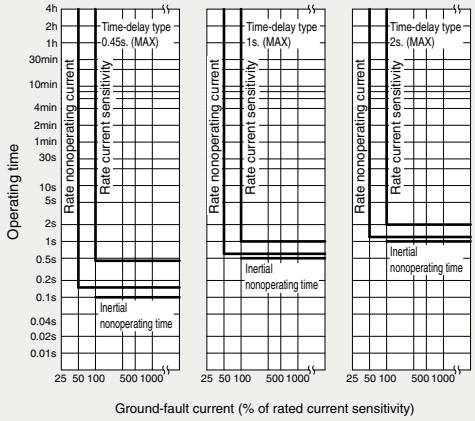
NV800-SEW

Model			NV800-SEW	NV800-HEW
Number of poles			3	
Rated operational voltage Ue (V AC)			100-440 Multi-voltage type	
Rated current In (A)			400-800 adjustable	
High-speed type	Rated current sensitivity IΔn (mA)		–	
	Max. operating time at 5IΔn (s)		–	
Time-delay type	Rated current sensitivity IΔn (mA)		100 · 200 · 500 Selectable	
	Max. operating time at 5IΔn (s)		0.45 · 1.0 · 2.0 Selectable	
	Max. inertial non-operating time at 2IΔn (s)		0.1 · 0.5 · 1.0	
Earth-leakage indication system			Button	
Rated short-circuit breaking capacity (kA) IEC 60947-2 (Icu/Ics) EN 60947-2	AC	440V	42/42	65/65
		400V	50/50	70/70
		230V	85/85	100/100
Standard attached parts (Front connection)			Mounting screw: M6×35 (4pcs) Insulation barrier: (2pcs)	

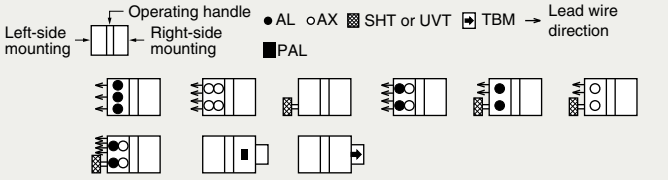
Operating Characteristics



Earth Leakage Tripping Characteristics

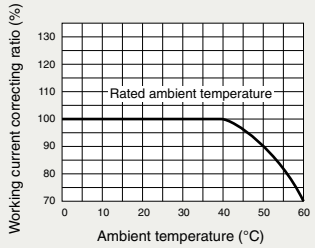


Internal Accessories



Remarks: 1. Instead of TBM, pre-alarm module (PAL) or trip indicator (TI) can be attached.

Current Reducing Curve



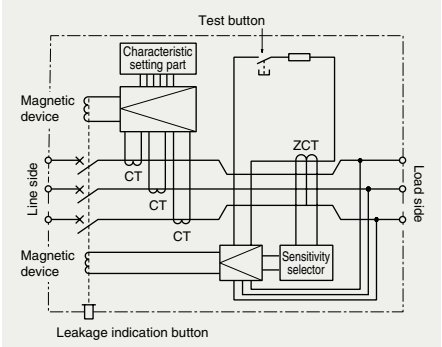
External Accessories

Accessories		Type name
Operating handle	F	F-8S
	V	V-8S
Mechanical interlock	MI	MI-8SW3

Note *1 Specify the operation method and voltage. Order in combination with the breaker unit.

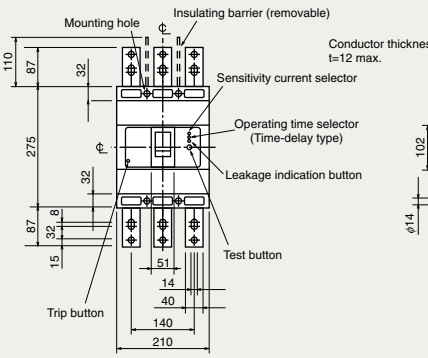
Accessories			Type name
Auxiliary handle		HT	HT-4SW
Terminal cover	Large	TC-L	TCL-8SW3
	Skeleton	TTC	TTC-8SW3
	Rear	BTC	BTC-8SW3
Handle lock device		HL	HL-4SW
		HL-S	HLS-8SW
Electrical operation device			(*1)

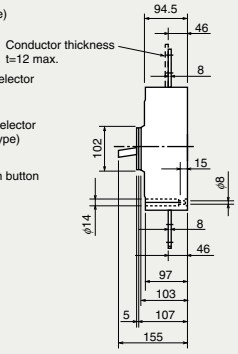
Internal Wiring Diagram

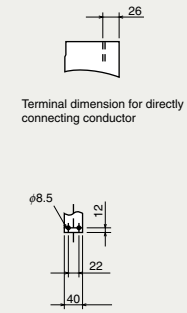


Outline Drawing

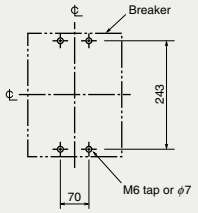
Front connection



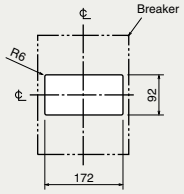




Conductor drilling for direct connection



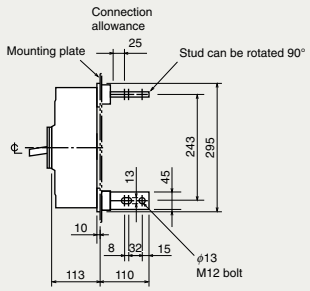
Drilling plan

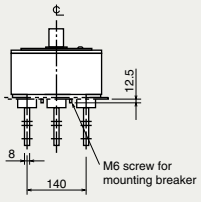


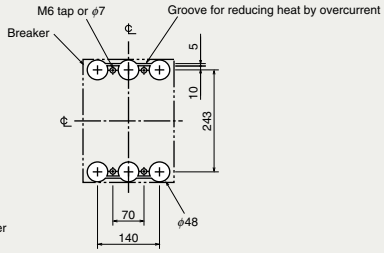
1.0mm clearance on each side of the handle frame.

Front-panel cutout

Rear connection

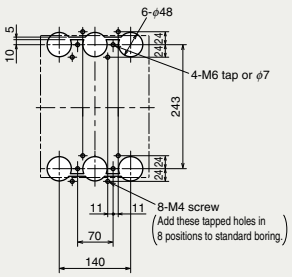






Drilling plan

Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

NF50-SVFU NV50-SVFU



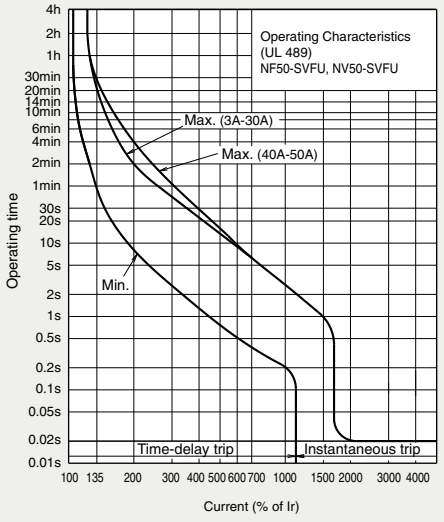
NF50-SVFU

Model				NF50-SVFU	Model				NV50-SVFU	
Rated current In (A) Rated ambient temperature 40°C				(3) 5 10 15 20 30 40 50	Rated current In (A) Rated ambient temperature 40°C				(5) (10) 15 20 30 40 50	
Number of poles				2 3	Number of poles				2	3
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage VAC		240	Phase line				1φ2W	3φ3W 1φ2W
		AC	600Y/347V	–	Rated voltage VAC	UL 489			120-240	
			480V	–		IEC 60947-2 EN 60947-2			100-240	100-440
			480Y/277V	–	High-speed type	Rated current sensitivity IΔn mA			30 50	30 50 100
			240V	14		Pick-up current UL 1053			75% of IΔn	
			120V	–		Operating time (sec) within AT 5IΔn			0.04 (*1)	
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui V		440		Earth-leakage indication system			Indicator window	
		AC	690V	–	Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	AC	480V	–	
			500V	–				240V	14	
			440V	7.5/4				120V	14	
			415V	10/5		IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	–	7.5/4
			400V	10/5				400V	–	10/5
			380V	10/5				230V	15/8	15/8
			230V	15/8				100V	15/8	15/8
Standard attached parts (Front connection)				IEC35 rail mounting claws						

Note *1 0.1 for UL1053.
Remark: 1. The mounting screws must be prepared by the user. (Recommended size: M4×0.7×65 (2 pcs).)

Operating Characteristics

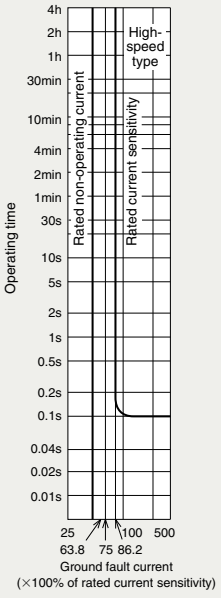
(The CE and CCC characteristics are noted differently. Contact us for more information.)



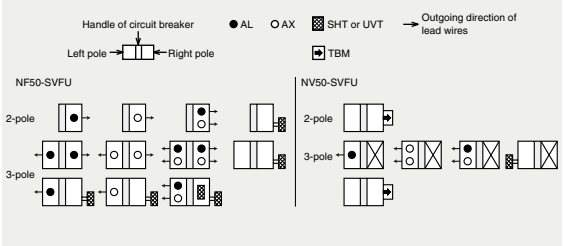
Earth Leakage Tripping Characteristics

(The CE and CCC characteristics are noted differently. Contact us for more information.)

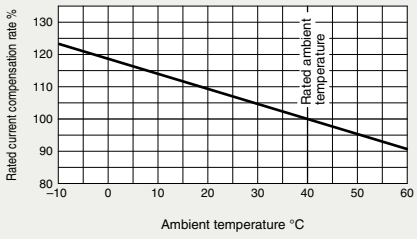
NV50-SVFU
(UL 1053)



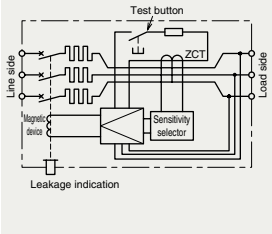
Internal Accessories



Temperature Compensation Curve



Internal Wiring Diagram

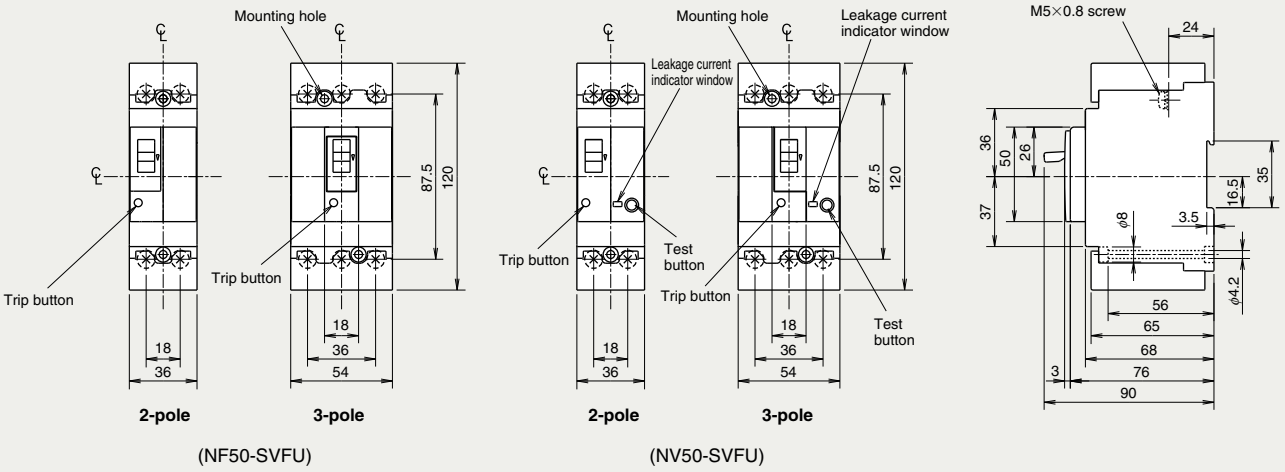


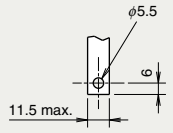
External Accessories

Accessories			Type name	Accessories				Type name
Operating handle	F	2P	F-03SVUL2	Terminal cover	Large	TC-L	2P	TCL-03SVU2
		3P	F-03SVUL				3P	TCL-03SVU3
	V	2P	V-03SVUL2					
		3P	V-03SVUL					
Handle lock device	HL		HLF-03SVU					
	HL-S		HLS-03SVU					

Outline Drawing

Front connection





(Conductor thickness t=4 max.)

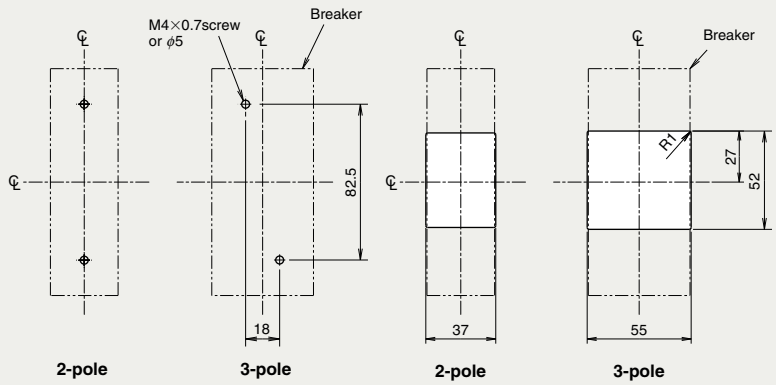
Conductor drilling for direct connection

Remarks: 1. The mounting screws are not enclosed with the breaker.
2. The wires cannot be connected directly.

Compatible crimp terminals Tightening torque 22lb-in (2.5N·m)

Applicable wire range (*1)		Crimp terminal type (*2)	
mm²	AWG (#) (60°C/75°C)	JST	NTM
1.04-2.63	16-14	R2-5 2-M5 V2-5 V2-M5	R2-5 R2-5M
2.63-4.6	12	-	R3.5-5S R3.5-5L
2.63-6.64	12-10	R5.5-5 V5.5-5	R5.5-5 R5.5-5S R5.5-5N
6.64-10.52	8	R8-5	R8-5 R8-5S
10.52-16.78	6	R14-5 14-NK5	R14-5 R14-5S
16.78-26.66	4	22-S5 22-S6	R22-5S

JST: Japan Solderless Terminal Mfg. Co.
NTM: Nichifu Co., Ltd.
Notes *1 14AWG or lager to comply with UL Standards.
*2 When using with a wire connection, use the crimp terminal combination shown above.



The drilling dimensions have a 1.0 mm clearance on each side of breaker window frame.

Drilling plan **Front panel drilling plan**

NF100-CVFU NV100-CVFU



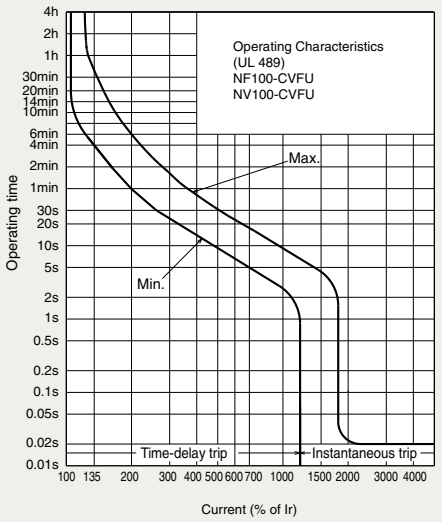
NF100-CVFU

Model				NF100-CVFU	Model				NV100-CVFU
Rated current In (A) Rated ambient temperature 40°C				60 (70) 75 (80) (90) 100	Rated current In (A) Rated ambient temperature 40°C				60 (70) 75 (80) (90) 100
					Number of poles				3
					Phase line				3φ3W 1φ2W
Number of poles				2 3	Rated voltage VAC	UL 489			120-240
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage VAC		240		IEC 60947-2 EN 60947-2			100-440
		AC	600Y/347V	–	High-speed type	Rated current sensitivity IΔn mA			30/50/ 100/200/500 selectable
			480V	–		Pick-up current UL 1053			75% of IΔn
			480Y/277V	–		Operating time (sec) within AT 5IΔn			0.04 (*1)
			240V	14					
			120V	–					
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui V		600	Earth-leakage indication system				Mechanical button
		AC	690V	–	Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	AC	480V	–
			500V	7.5/4				240V	14
			440V	10/5				120V	14
			415V	10/5		IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	10/5
			400V	10/5				400V	10/5
			380V	10/5				230V	15/8
			230V	15/8				100V	15/8
Standard attached parts (Front connection)				IEC35 rail mounting claws, Insulating barrier (2P: 2pcs, 3P: 4pcs) (Only for type with bar terminal) Mounting screw M4×0.7×55 (2 screws)					

Note *1 0.1 for UL1053.

Operating Characteristics

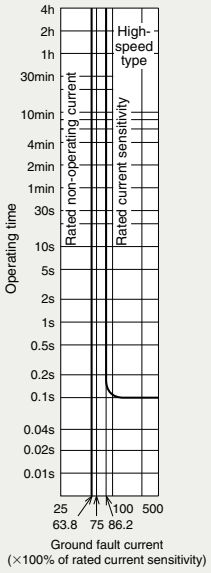
(The CE and CCC characteristics are noted differently. Contact us for more information.)



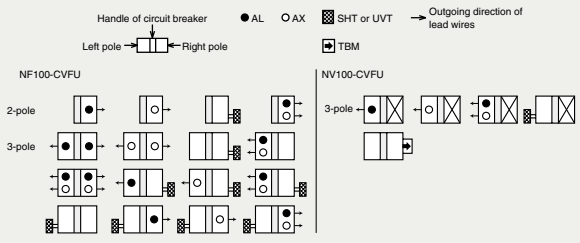
Earth Leakage Tripping Characteristics

(The CE and CCC characteristics are noted differently. Contact us for more information.)

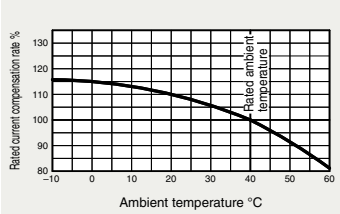
NV100-CVFU
(UL 1053)



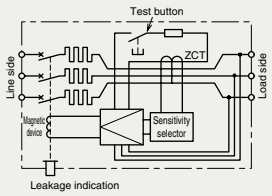
Internal Accessories



Temperature Compensation Curve



Internal Wiring Diagram

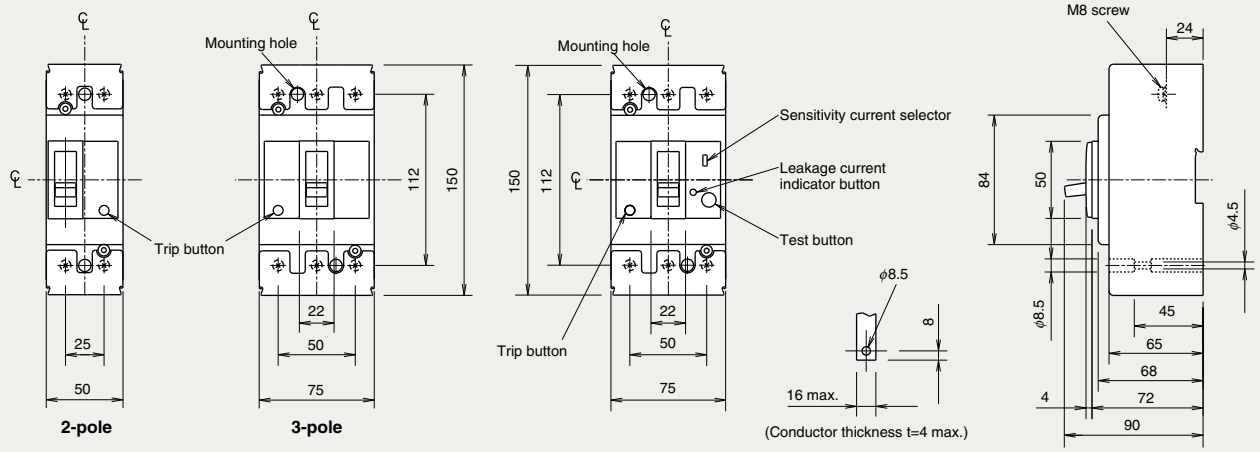


External Accessories

Accessories			Type name	Accessories				Type name
Operating handle	F	2P	F-05SVUL2	Terminal cover	Large	TC-L	2P	TCL-05SVU2
		3P	F-05SVUL					TCL-05SVU2L
	V	2P	V-05SVUL2				3P	TCL-05SVU3
		3P	V-05SVUL					TCL-05SVU3L
Handle lock device	HL		HLF-05SVU					
	HL-S	2P	HLS-05SVU2					
		3P	HLS-05SVU					

Outline Drawing

Front connection



(NF100-CVFU) (NV100-CVFU)

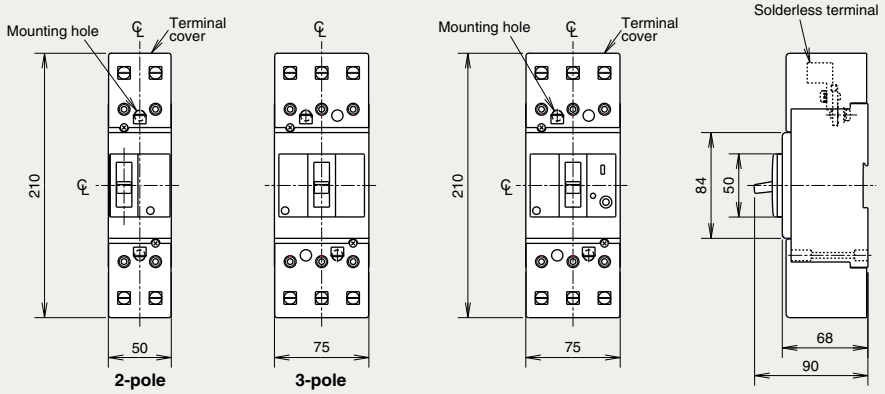
Conductor drilling for direct connection

Compatible crimp terminals Tightening torque 54lb-in (6N·m)

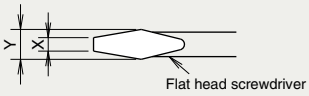
Applicable wire range		Crimp terminal type (*1)	
mm²	AWG (#) (60°C/75°C)	JST	NTM
2.5-2.63	14	R2-8	R2-8
2.63-6.64	12-10	R5.5-8	R5.5-8
6.64-10.52	8	R8-8	R8-8
10.52-16.78	6	R14-8	R14-8 R14-8S
16.78-26.66	4	R22-8	R22-8S
26.66-42.42	2	38-S8	R38-8S
42.42-60.57	1/0	60-2BA 60-S8	CB60-8

JST: Japan Solderless Terminal Mfg. Co.
NTM: Nichifu Co., Ltd.
Note *1 When using with a wire connection, use the crimp terminal combination shown above.

Front connection(solderless terminal)

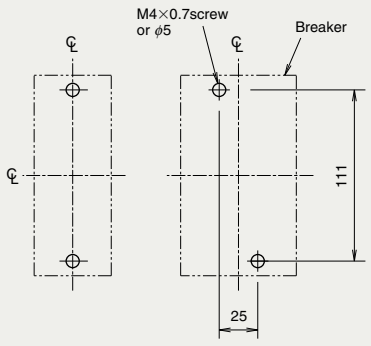


Size of screwdriver with bolting
Please bolt with flat head screwdriver.
The length of X : 6mm-7mm
The length of Y ≦ 9.5mm

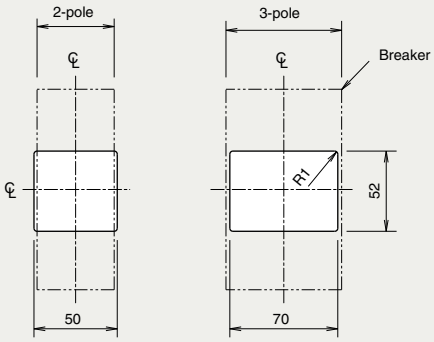


Wire size 60°C/75°C CU ONLY	Number of strands
14AWG	7
12-10AWG	7
8AWG	7
6-4AWG	7
2AWG	7
1-1/0AWG	19

The tightening torque is different according to connected wire.
Refer to instruction manual for details.
Remark: Periodical retightening prevents overheating by the setting of twisted strands or the stress of heating and cooling.



Drilling plan



The drilling dimensions have a 1.0 mm clearance on each side of breaker window frame.

Front panel drilling plan

NF125-SVU
NF125-HVU
NV125-SVU
NV125-HVU



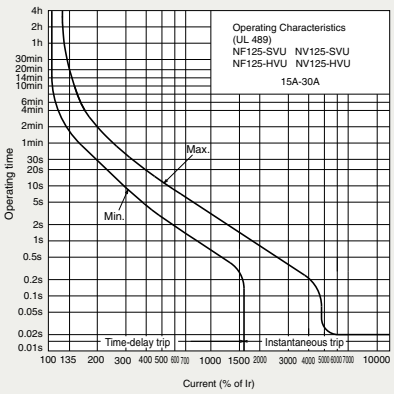
NF125-HVU

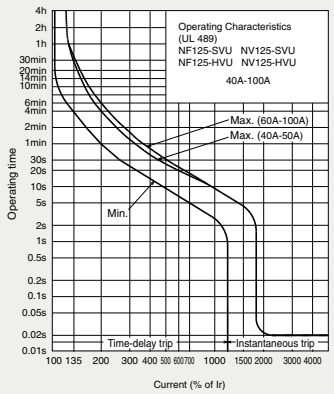
Model				NF125-SVU		NF125-HVU	
Rated current In (A) Rated ambient temperature 40°C				15 20 30 40 50 60 (70) 75 (80) (90) 100	125	15 20 30 40 50 60 (70) 75 (80) (90) 100	125
Number of poles				2	3	3	3
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage VAC		480	480	600Y/347V	600Y/347V
		AC	600Y/347V	–	–	18	18
			480V	30	30	50	50
			240V	50	50	100	100
			120V	–	–	–	–
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui V		690	690	690	690
		AC	690V	8/4	8/4	10/5	10/5
			500V	18/9	18/9	25/13	25/13
			440V	30/15	30/15	50/25	50/25
			415V	30/15	30/15	50/25	50/25
			400V	30/15	30/15	50/25	50/25
			380V	30/15	30/15	50/25	50/25
			230V	50/25	50/25	100/50	100/50
Standard attached parts (Front connection)				Mounting screw M4×0.7×55 (2 screws), Insulating barrier (2P: 2pcs, 3P: 4pcs)			

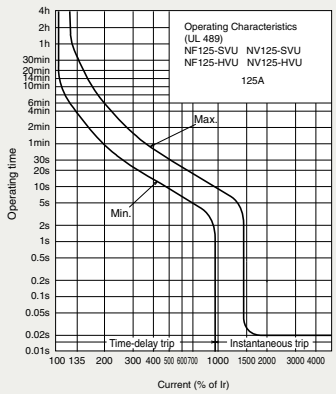
Model				NV125-SVU		NV125-HVU	
Rated current In (A) Rated ambient temperature 40°C				15 20 30 (40) 50 60 75 100	125	15 20 30 (40) 50 60 75 100	125
Number of poles				3	3	3	3
Phase line				3φ3W 1φ2W	3φ3W 1φ2W	3φ3W 1φ2W	3φ3W 1φ2W
Rated voltage VAC	UL 489			120-480	120-480	120-480	120-480
	IEC 60947-2 EN 60947-2			100-440	100-440	100-440	100-440
High-speed type	Rated current sensitivity IΔn mA			30/50/100/200/500 selectable	30/50/100/200/500 selectable	30/50/100/200/500 selectable	30/50/100/200/500 selectable
	Pick-up current UL 1053			75% of IΔn	75% of IΔn	75% of IΔn	75% of IΔn
	Operating time (sec) within AT 5IΔn			0.04 (*1)	0.04 (*1)	0.04 (*1)	0.04 (*1)
Earth-leakage indication system				Mechanical button	Mechanical button	Mechanical button	Mechanical button
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	AC	480V	30	30	50	50
			240V	50	50	100	100
			120V	50	50	100	100
	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	30/15	30/15	50/25	50/25
			400V	30/15	30/15	50/25	50/25
			230V	50/25	50/25	100/50	100/50
			100V	50/25	50/25	100/50	100/50

Note *1 0.1 for UL1053.

Operating Characteristics (The CE and CCC characteristics are noted differently. Contact us for more information.)



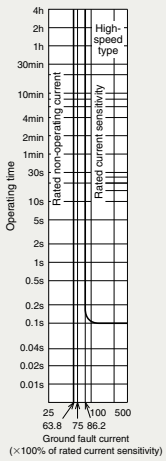




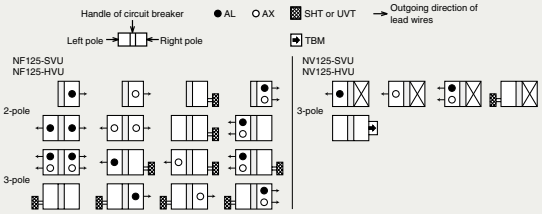
Earth Leakage Tripping Characteristics

(The CE and CCC characteristics are noted differently. Contact us for more information.)

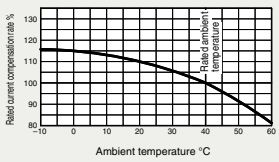
NV125-SVU
NV125-HVU
(UL 1053)



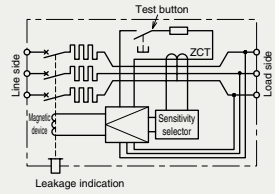
Internal Accessories



Temperature Compensation Curve



Internal Wiring Diagram

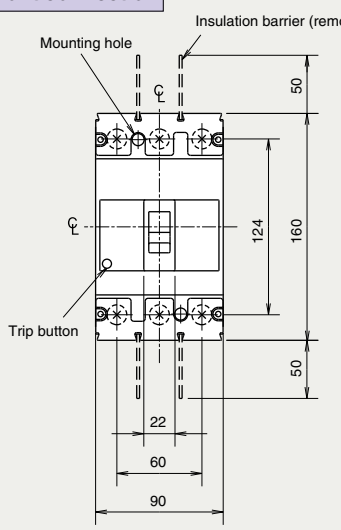


External Accessories

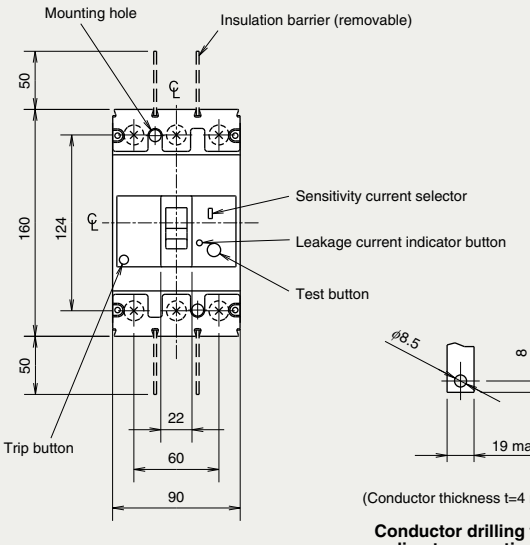
Accessories		Type name	Accessories			Type name
Operating handle	F	F-1SVUL	Terminal cover	Large	TC-L	TCL-1SVU3
	V	V-1SVUL				
Handle lock device	HL	HLF-05SVU				
	HL-S	HLS-05SVU				

Outline Drawing

Front connection



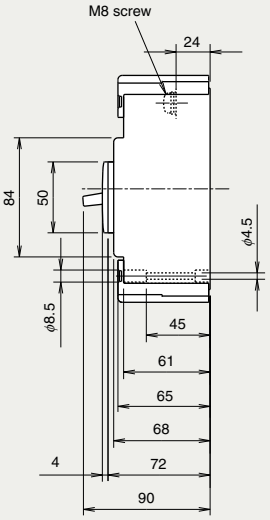
(NF125-SVU, NF125-HVU)



(NV125-SVU, NV125-HVU)

(Conductor thickness t=4 max.)

Conductor drilling for direct connection

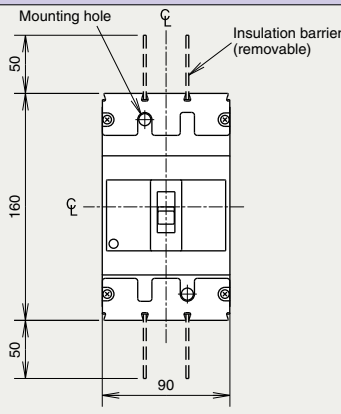


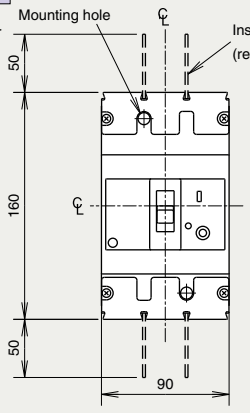
Compatible crimp terminals Tightening torque 54lb-in (6N·m)

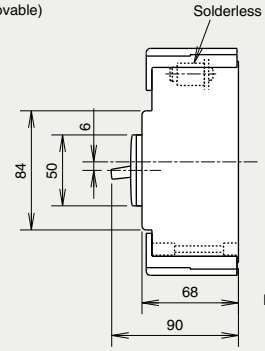
Applicable wire range		Crimp terminal type (*1)	
mm^2	AWG (#) (60°C/75°C)	JST	NTM
2.5-2.63	14	R2-8	R2-8
2.63-6.64	12-10	R5.5-8	R5.5-8
6.64-10.52	8	R8-8	R8-8
10.52-16.78	6	R14-8	R14-8 R14-8S
16.78-26.66	4	R22-8	R22-8S
26.66-42.42	2	38-S8	R38-8S
42.42-60.57	1/0	60-2BA 60-S8	CB60-8

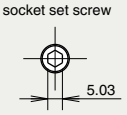
JST: Japan Solderless Terminal Mfg. Co.
NTM: Nichifu Co., Ltd.
Note *1 When using with a wire connection, use the crimp terminal combination shown above.

Front connection (solderless terminal)



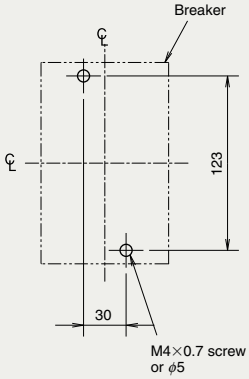




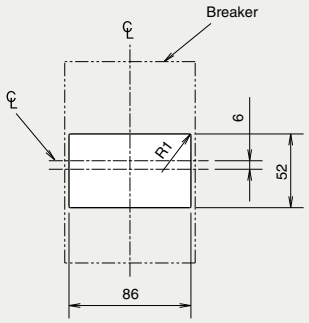


Wire size 60°C/75°C CU ONLY	Number of strands
14AWG	[a] 7
12-10AWG	[a] 7
8AWG	7
6AWG	7
4-2AWG	7
1AWG	19

The tightening torque is different according to connected wire.
Refer to instruction manual for details.
a:Solid copper wire is usable.
Remark: Periodical retightening prevents overheating by the setting of twisted strands or the stress of heating and cooling.



Drilling plan



The drilling dimensions have a 1.0 mm clearance on each side of breaker window frame.

Front panel drilling plan

Remark: 1. 2-pole models are 3-pole with the central pole conductor removed.

NF225-CWU

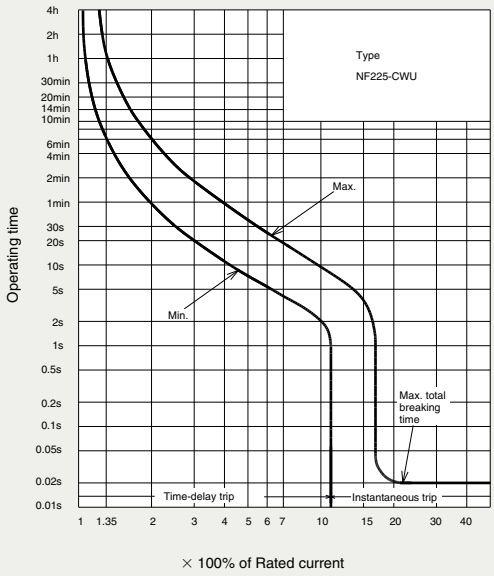


NF225-CWU

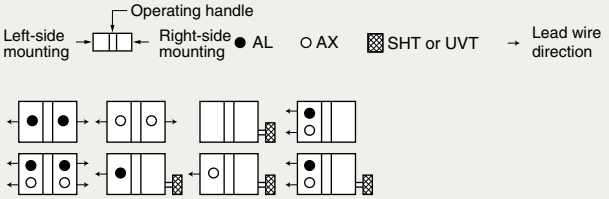
Model				NF225-CWU
Rated current In (A) at ambient temperature 40˚C (IEC30˚C)				125 150 175 200 225
Number of poles				3
Rated short-circuit breaking capacities (kA)	UL 489	Rated voltage (VAC)		240
		AC	240V	35
	IEC 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)		600
		AC	500V	10/5
			440V	15/8
			400V	18/9
			230V	35/18
		DC	250V	10/5 (*1)
Standard attached parts				Mounting screw: M4×0.7×55 (2pcs), Insulation barrier: (4pcs), Terminal cover: (1 set) (*2)

Notes *1 Use either two poles. When wired as shown at the bottom of page 690, the models can be used for up to 400 V DC.
*2 The standard configuration contains a protection cover and adopts the IP20 (finger protection) structure.

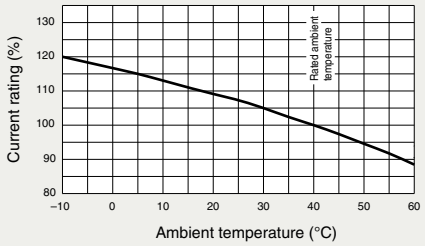
Operating Characteristics



Internal Accessories



Temperature Compensation Curve

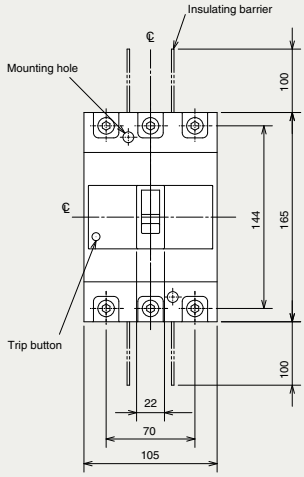


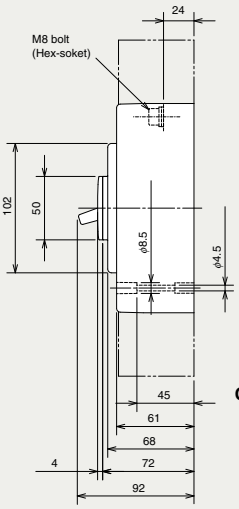
External Accessories

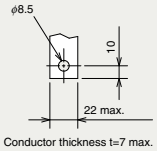
Accessories		Type name	Accessories		Type name
Operating handle	F	F-2SUL	Mechanical interlock	MI	MI-05SWU3
	V	V-2SUL	Terminal cover	Large TC-L	TCL-2SWU3 TCL-2SWU3L
Handle lock device	HL	HLF-2SWU			

Outline Drawing

Front connection





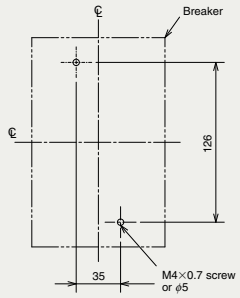


Conductor drilling for direct connection

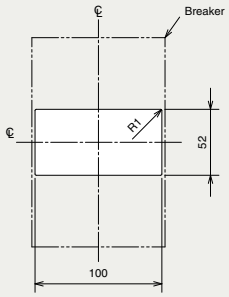
Compatible crimp terminals Tightening torque 90lb-in (10N.m)

Applicable wire range		Crimp terminal type (*1)	
mm²	AWG (#) (60°C/75°C)	JST	NTM
16.78-26.66	4	R22-8 22-S8	R22-8 R22-8S CB22-8S
26.66-42.42	2	R38-8 38-S8	R38-8 R38-8S
42.42-60.57	1/0	R60-8 60-2BA CB60-S8	R60-8 CB60-8 CB60-8S
60.57-76.28	2/0	70-8	R70-8
76.28-96.3	3/0	80-3BA CB80-S8	
96.3-117.2	4/0	100-3BA CB100-S8	

JST: Japan Solderless Terminal Mfg. Co.
NTM: Nichifu Co., Ltd.
Note *1 When using with a wire connection, use the crimp terminal combination shown above.



Drilling plan



Front cover cutout

1mm clearance on each side of handle

NF250-SVU
NF250-HVU
NV250-SVU
NV250-HVU



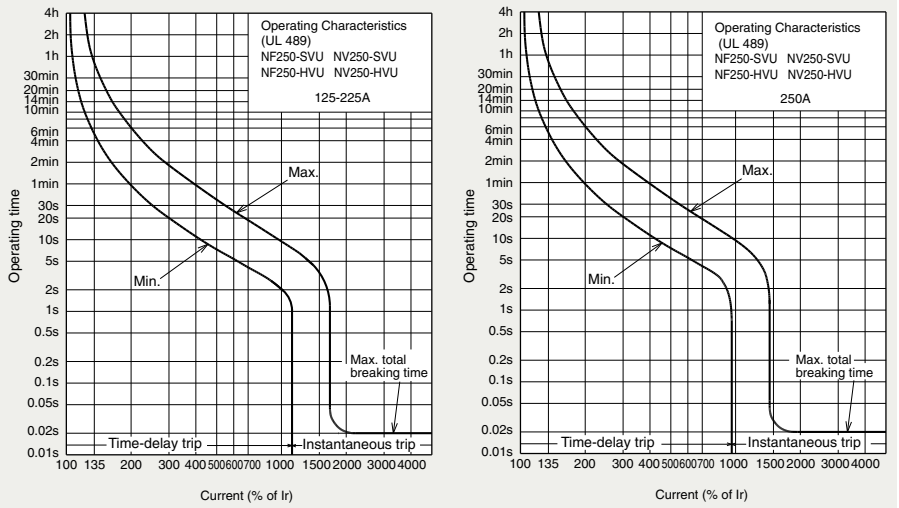
NF250-HVU

Model				NF250-SVU		NF250-HVU	
Rated current In (A) Rated ambient temperature 40°C				125 150 175 200 225	250	125 150 175 200 225	250
Number of poles				3	3	3	3
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage VAC		480	480	600Y/347V	600Y/347V
		AC	600Y/347V	–	–	18	18
			480V	35	35	50	50
			240V	65	65	100	100
			120V	–	–	–	–
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui V		690	690	690	690
		AC	690V	8/4	8/4	10/5	10/5
			500V	25/13	25/13	36/18	36/18
			440V	36/18	36/18	50/25	50/25
			415V	36/18	36/18	50/25	50/25
			400V	36/18	36/18	50/25	50/25
			380V	36/18	36/18	50/25	50/25
			230V	65/33	65/33	100/50	100/50
Standard attached parts (Front connection)				Mounting screw M4×0.7×55 (2 screws), Insulating barrier (4pcs)			

Model			NV250-SVU		NV250-HVU	
Rated current In (A) Rated ambient temperature 40°C			125 150 175 200 225	250	125 150 175 200 225	250
Number of poles			3	3	3	3
Phase line			3ø3W 1ø2W	3ø3W 1ø2W	3ø3W 1ø2W	3ø3W 1ø2W
Rated voltage VAC	UL 489		120-480	120-480	120-480	120-480
	IEC 60947-2 EN 60947-2		100-440	100-440	100-440	100-440
High-speed type	Rated current sensitivity IΔn mA		30/50/ 100/200/500 selectable	30/50/ 100/200/500 selectable	30/50/ 100/200/500 selectable	30/50/ 100/200/500 selectable
	Pick-up current UL 1053		75% of IΔn	75% of IΔn	75% of IΔn	75% of IΔn
	Operating time s within AT 5IΔn		0.04 (*1)	0.04 (*1)	0.04 (*1)	0.04 (*1)
Earth-leakage indication system			Mechanical button	Mechanical button	Mechanical button	Mechanical button
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	AC 480V	35	35	50	50
		AC 240V	65	65	100	100
		AC 120V	65	65	100	100
	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC 440V	36/18	36/18	50/25	50/25
		AC 400V	36/18	36/18	50/25	50/25
		AC 230V	65/33	65/33	100/50	100/50
		AC 100V	65/33	65/33	100/50	100/50

Note *1 0.1 for UL1053.

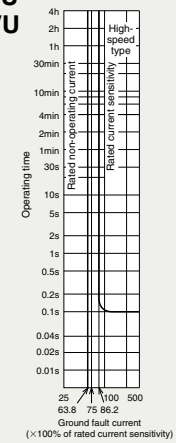
Operating Characteristics (The CE and CCC characteristics are noted differently. Contact us for more information.)



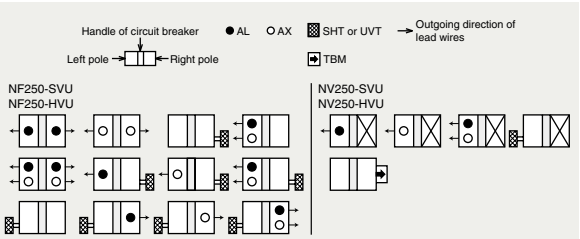
Earth Leakage Tripping Characteristics

(The CE and CCC characteristics are noted differently. Contact us for more information.)

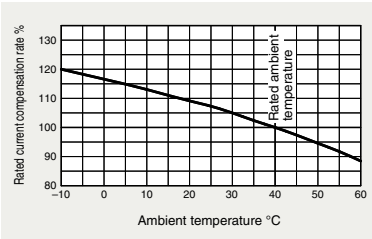
NV250-SVU
NV250-HVU
(UL 1053)



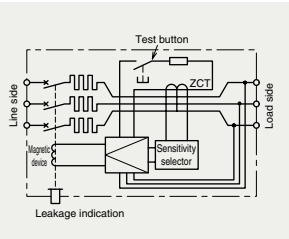
Internal Accessories



Temperature Compensation Curve



Internal Wiring Diagram



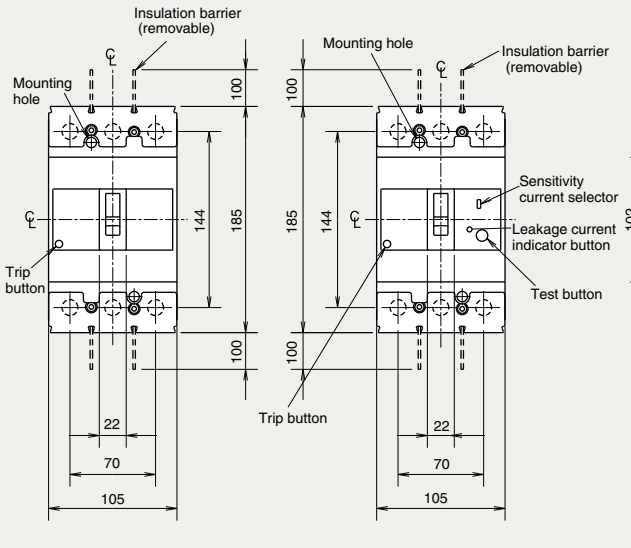
External Accessories

Accessories		Type name
Operating handle	F	F-2SVUL
	V	V-2SVUL
Handle lock device	HL	HLF-05SVU
	HL-S	HLS-2SVU

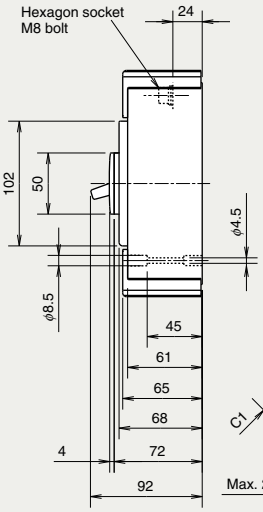
Accessories			Type name
Terminal cover	Large	TC-L	TCL-2SVU3
			TCL-2SVU3L

Outline Drawing

Front connection



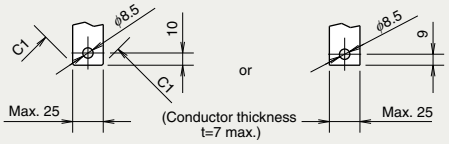
(NF250-SVU, NF250-HVU) (NV250-SVU, NV250-HVU)



Compatible crimp terminals Tightening torque 90lb-in (10N.m)

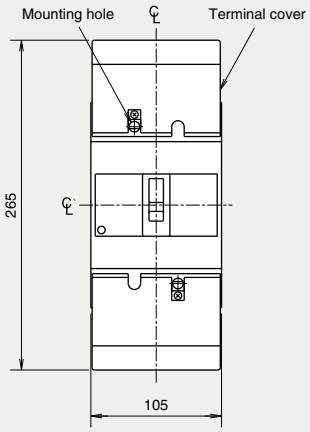
Applicable wire range		Crimp terminal type (*2)	
mm²	AWG (#) (60°C/75°C)	JST	NTM
16.78-26.66	4	R22-8 22-S8	R22-8 R22-8S CB22-8S
26.66-42.42	2	R38-8 38-S8	R38-8 R38-8S
42.42-60.57	1/0	R60-8 60-2BA CB60-S8	R60-8 CB60-8 CB60-8S
60.57-76.28	2/0	70-8	R70-8
76.28-96.3	3/0	80-3BA CB80-S8	
96.3-117.2	4/0	100-3BA CB100-S8	
117.2-152.05	250/300MCM	CB150-S8 (*1)	

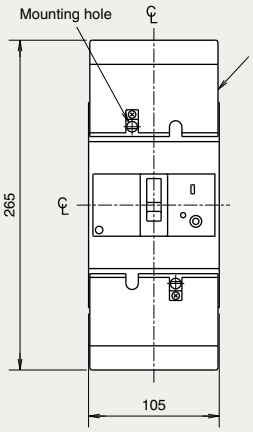
JST: Japan Solderless Terminal Mfg. Co.
NTM: Nichifu Co., Ltd.
Notes *1 TCL-2SVU3L can be mounted when using CB150-S8.
*2 When using with a wire connection, use the crimp terminal combination shown above.

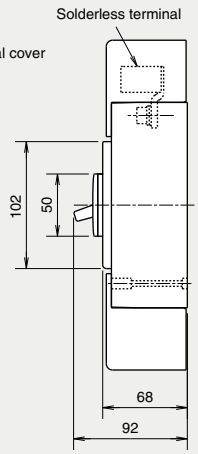


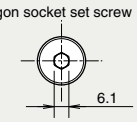
Conductor drilling for direct connection

Front connection (solderless terminal)





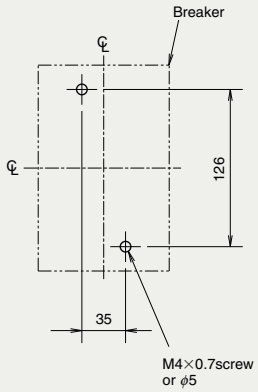




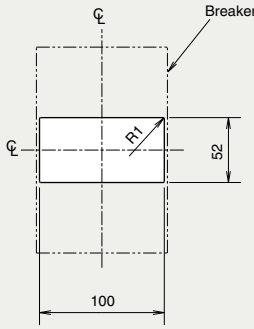
Wire size 60°C/75°C CU ONLY	Number of strands
4-2AWG	7
1-1/0AWG	19
3/0-4/0AWG	19
250-350MCM	37

The tightening torque is different according to connected wire.
Refer to instruction manual for details.

Remark: Periodical retightening prevents overheating by the setting of twisted strands or the stress of heating and cooling.



Drilling plan



The drilling dimensions have a 1.0 mm clearance on each side of breaker window frame.

Front panel drilling plan

NF400-SWU NF400-HWU

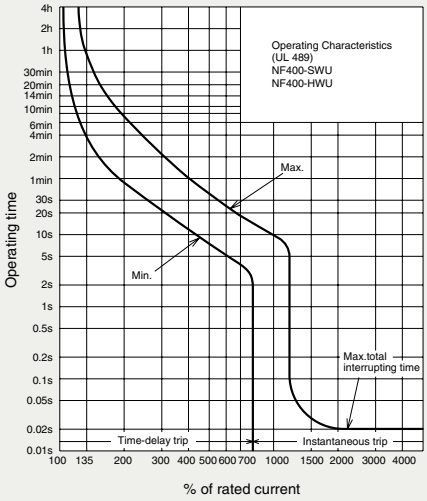


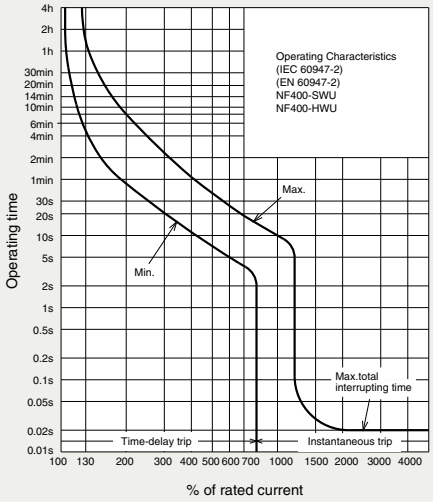
NF400-SWU

Model				NF400-SWU	NF400-HWU
Rated current In (A) at ambient temperature 40˚C				250 300 350 400	250 300 350 400
Number of poles				3	3
Rated short-circuit breaking capacities (kA)	UL 489 CSA C22 2 No.5-02	Rated voltage (VAC)		600Y/347	600Y/347
		AC	600Y/347V	20	25
			480V	35	65
			240V	65	100
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)		690	690
		AC	690V	10/10 (5/5) (*1)	15/10
			500V	30/30 (25/25) (*1)	42/42
			440V	42/42 (36/36) (*1)	65/65
			400V	45/45 (36/36) (*1)	70/70
			230V	85/85 (65/65) (*1)	100/100
Standard attached parts				Mounting screw: M6×60 (4screws) Insulating plate (1pce) Insulating barrier (4pcs) (Only for type with bar terminals)	Mounting screw: M6×60 (4screws) Insulating plate (1pce) Insulating barrier (4pcs) (Only for type with bar terminals)

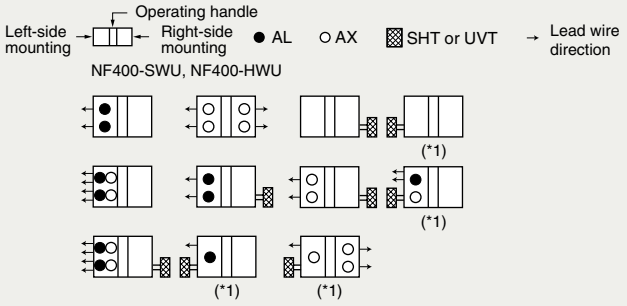
Notes *1 In case of solderless terminal, interrupting capacity reduces: (/).
*2 0.1 for UL1053.

Operating Characteristics



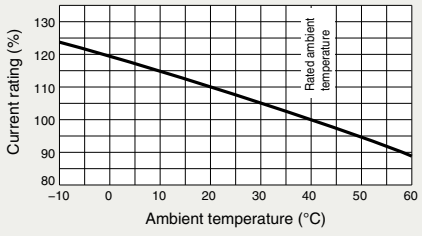


Internal Accessories



Note *1 Right-side mounting is standard of SHT and UVT. Specify separataly for left-side mounting.

Temperature Compensation Curve

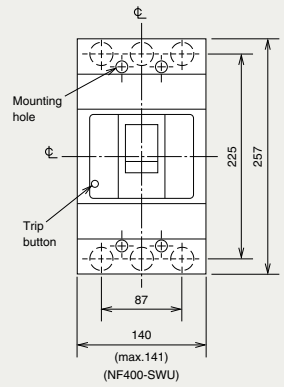


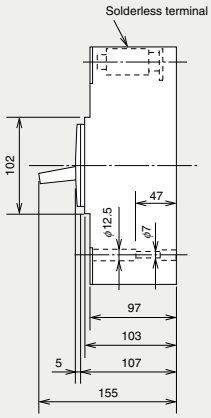
External Accessories

Accessories		Type name	Accessories			Type name
Operating handle	F	F-4SUL	Terminal cover	Large	TC-L	TCL-4SWU
	V	V-4SUL				
Handle lock device	HL	HL-4SWU				

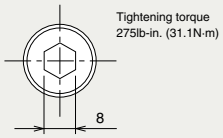
Outline Drawing

Front connection (Solderless terminal)





Hexagon socket set screw



UL

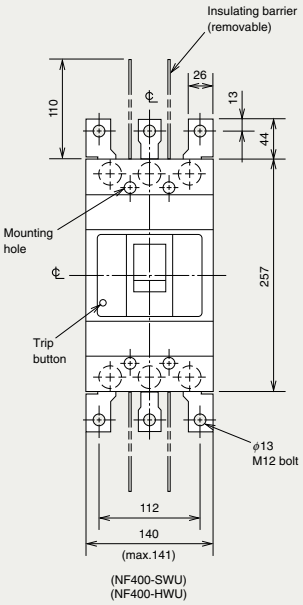
Ampere ratings	Wire size	Number of strands
250A, 300A	250-350kcmil CU	37
250A	350kcmil AL	
350A, 400A	(2) 3/0AWG CU	19

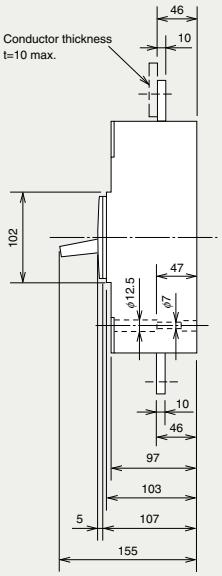
IEC

Ampere ratings	Wire size (IEC 60228)	
	Class 2	Class 5
250A, 300A	70-185mm^2	95-185mm^2
350A, 400A	150-240mm^2	150-185mm^2

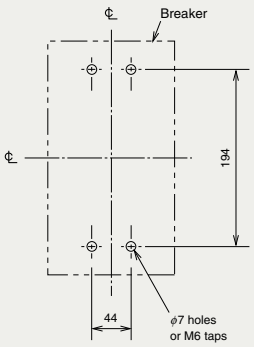
Remarks: 1. Do not remove solderless terminal in any case.
2. When using the solderless terminals, conduct periodic inspections and tightening as the wires may wear down over use.
3. Use a wire size that can carry the rated current.
4. When using IEC Class 5 (multi-core wire), pay attention to strand breakage and pinching, etc., while tightening.
5. The NF400-HWU does not have a solderless terminal.

Front connection (Busbar terminal)

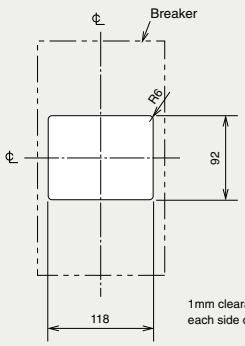




Remark: Do not remove busbar terminal in any case.



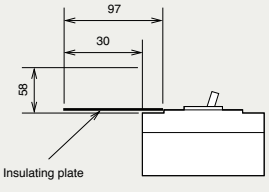
Drilling plan



Front-panel cutout

CAUTION

When mounted in steel or cast box cover must be insulated as shown.
58mm air gap to cover or 0.8mm fibre insulating plate extending 12.7mm out from each side of breaker.



(Line)

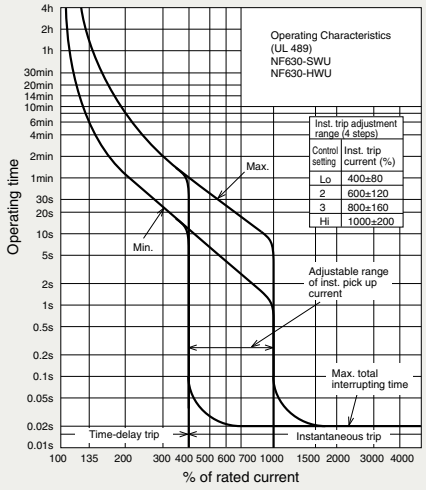
NF630-SWU
NF630-HWU

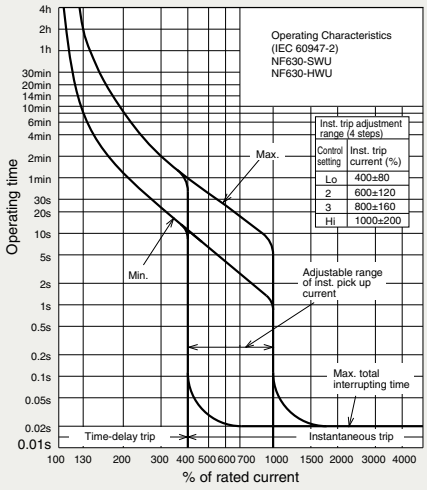


NF630-SWU

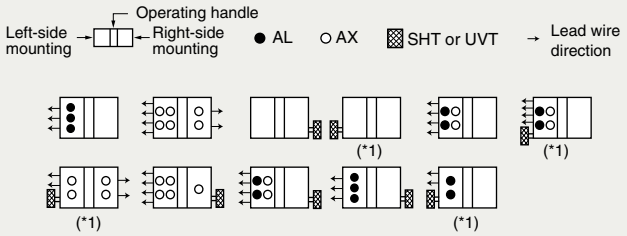
Model				NF630-SWU	NF630-HWU
Rated current In (A) at ambient temperature 40˚C				500 600 630	500 600 630
Number of poles				3	3
Rated short-circuit breaking capacities (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage (VAC)		600Y/347	600Y/347
		AC	600Y/347V	20	25
			480V	35	65
			240V	85	100
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)		690	690
		AC	690V	10/10	15/15
			500V	30/30	42/42
			440V	42/42	65/65
			400V	45/45	70/70
			230V	85/85	100/100
Standard attached parts				Mounting screw: M6×35 (4pcs) Insulating plate (1pce) Insulating barrier (500A,600A: 2pcs, 630A: 4pcs) (Only for type with bar terminals)	Mounting screw: M6×35 (4pcs) Insulating plate (1pce) Insulating barrier (500A,600A: 2pcs, 630A: 4pcs) (Only for type with bar terminals)

Operating Characteristics



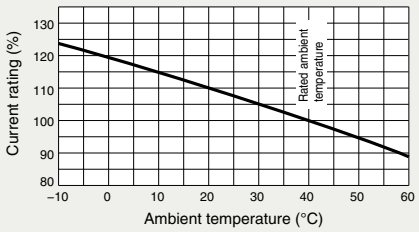


Internal Accessories



Note *1 Right-side mounting is standard of SHT and UVT. Specify separataly for left-side mounting.

Temperature Compensation Curve

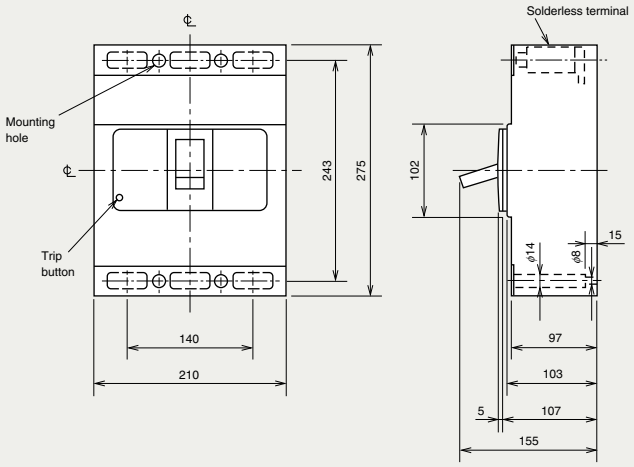


External Accessories

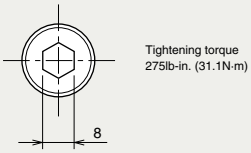
Accessories		Type name	Accessories			Type name
Operating handle	F	F-6SUL	Terminal cover	Large	TC-L	TCL-6SWU
	V	V-6SUL				
Handle lock device	HL	HL-4SWU				

Outline Drawing

Front connection (Solderless terminal)



Hexagon socket set screw



UL

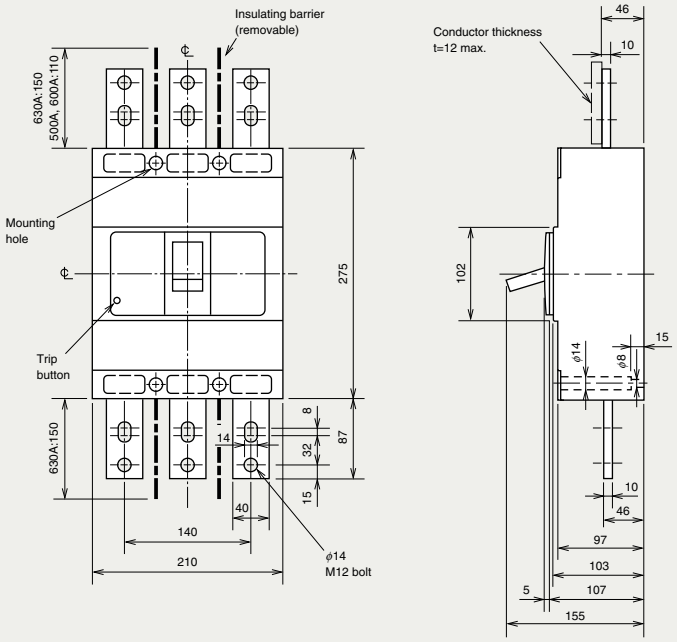
Ampere ratings	Wire size	Number of strands
500A, 600A	(2) 250-350kcmil CU ONLY	37

IEC

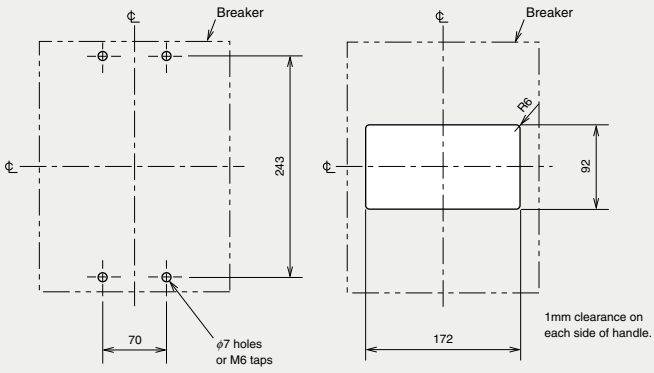
Ampere ratings	Wire size (IEC 60228)	
	Class 2	Class 5
500A, 600A	(2) 95-185mm^2	(2) 120-185mm^2

Remarks: 1. Do not remove solderless terminal in any case.
2. When using the solderless terminals, conduct periodic inspections and tightening as the wires may wear down over use.
3. Use a wire size that can carry the rated current.
4. When using IEC Class 5 (multi-core wire), pay attention to strand breakage and pinching, etc., while tightening.
5. The 630A and NF630-HWU does not have a solderless terminal.

Front connection (Busbar terminal)

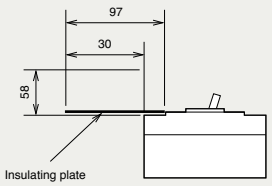


Remark: Do not remove busbar terminal in any case.



CAUTION

When mounted in steel or cast box cover must be insulated as shown.
58mm air gap to cover or 0.8mm fibre insulating plate extending 12.7mm out from each side of breaker.



(Line)

NF250-SEV with MDU
NF250-HEV with MDU



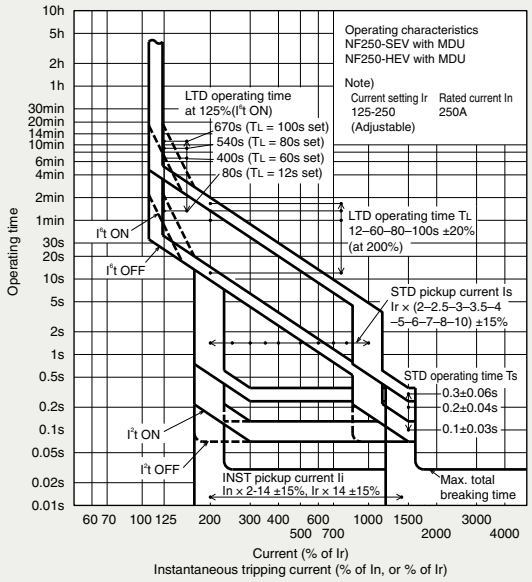
NF250-SEV with MDU (Breaker mounting)

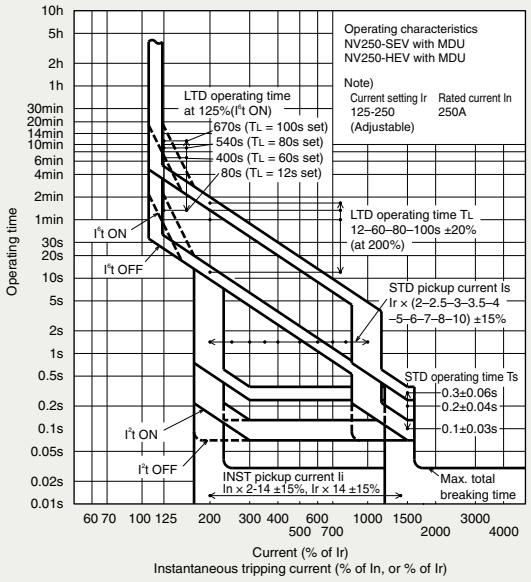


NF250-SEV with MDU (Panel mounting)

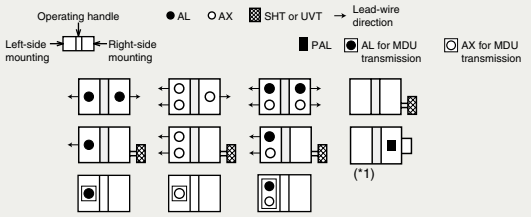
Model				NF250-SEV with MDU		NF250-HEV with MDU	
Rated current In (A) Rated ambient temperature 40°C				250		250	
Current setting Ir (A)				125-250		125-250	
Number of poles				3	4	3	4
Rated insulation voltage Ui (V)				690		690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	8/8		10/8	
			500V	18/18		30/23	
			440V	36/36		50/50	
			415V	36/36		70/70	
			400V	36/36		75/75	
			380V	36/36		75/75	
			230V	85/85		100/100	
		DC	250V	–		–	
Standard attached parts (Front connection)				Mounting screw M4 × 0.7 × 55 (3P: 2psc, 4P: 4pcs) Insulation barrier (3P: 4pcs, 4P: 6pcs)			
MDU accessories		Breaker mounting		MDU, Connection cable (for breaker mounting)			
		Panel mounting		MDU, Panel mounting bracket, Panel mounting screw, Connection cable (for panel mounting)			

Operating Characteristics



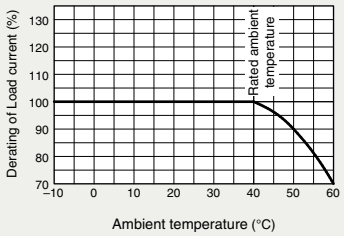


Internal Accessories



Note *1 SLT-equipped is standard. Control voltage (100-240VAC/100-240VDC) is necessary.

Current Reducing Curve



The rated current does not have thermal characteristics. Reduce the current as shown in the curve on the left chart if the ambient temperature exceeds 40 °C.

External Accessories

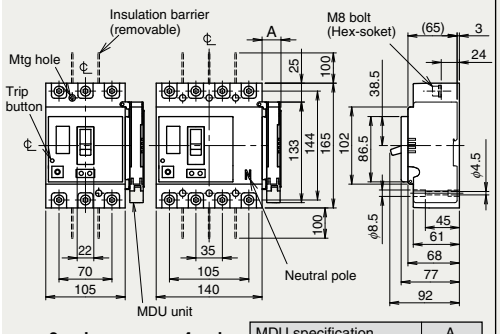
Accessories		Type name
Operating handle (*1)	F	F-2SV
	V	V-2SV
Handle lock device	LC	LC-05SV
	HL (*2)	HLF-05SV
		HLN-05SV
	HL-S (*1)	HLS-2SV

Accessories				Type name
Mechanical interlock		MI (*3)	3P	MI-05SV3
			4P	MI-2SV4
Terminal cover	Small	TC-S	3P	TCS-2SV3 (*5)
	Large	TC-L	3P	TCL-2SV3 (*5)
				TCL-2SV3L (*5)
			4P	TCL-2SV4
	Skeleton	TTC	3P	TTC-2SV3 (*5)
	Rear	BTC	3P	BTC-2SV3 (*5)
Electrical operation device (*1)				(*4)

Notes
*1 Available only for the MDU panel mounting type.
*2 HLF types are used for OFF lock and HLN types for ON lock.
*3 When selecting the MDU breaker mounting, only the MI panel mounting can be manufactured.
*4 Specify the working voltage.
*5 In the case of the MDU breaker mounting type, specify the model name with MP at the end.

Outline Drawing

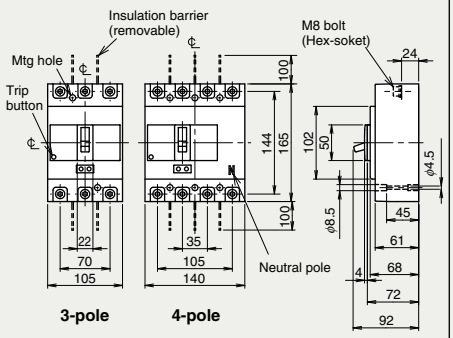
Front connection



3-pole 4-pole

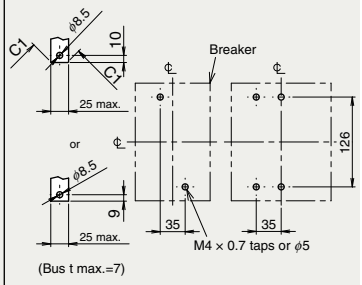
MDU breaker mounting

MDU specification	A
No transmission, pulse output	25
CC-Link	32



3-pole 4-pole

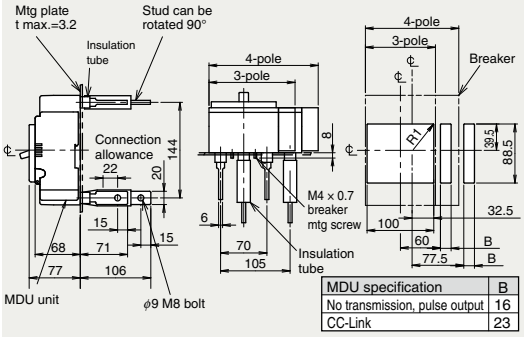
MDU panel mounting



3-pole 4-pole

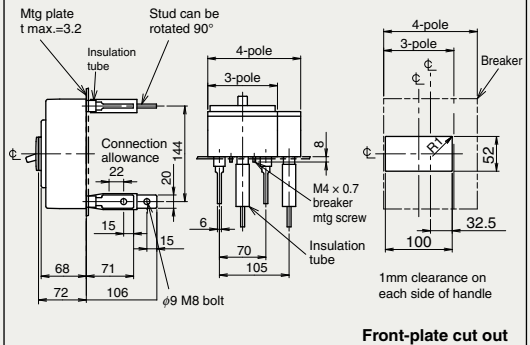
Bus drilling for direct connection **Drilling plan**

Rear mounting



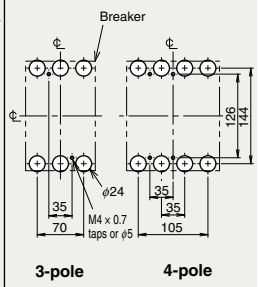
MDU specification	B
No transmission, pulse output	16
CC-Link	23

MDU breaker mounting **Front-plate cut out**



Front-plate cut out

MDU panel mounting

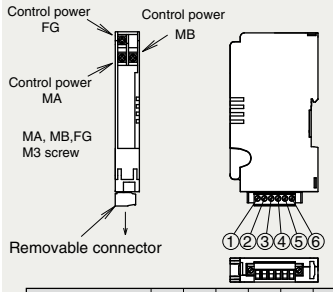


3-pole 4-pole

Drilling plan

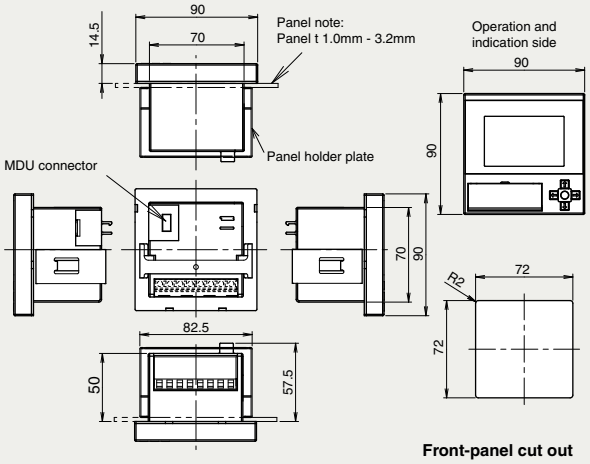
MDU unit terminal for breaker mounting

This figure is without terminal cover.
Please bind wires.



MDU specification	①	②	③	④	⑤	⑥
No transmission	–	–	–	–	–	–
Pulse output	–	–	–	–	Cb	Ca
CC-Link	–	SLD	–	DG	DB	DA

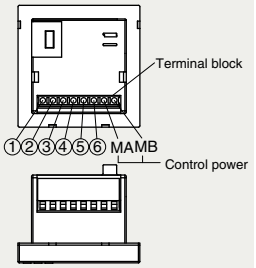
MDU panel mounting



Front-panel cut out

MDU terminal for panel mounting

This figure is without terminal cover.
Please bind wires.



MDU specification	①	②	③	④	⑤	⑥
No transmission	–	–	–	–	FG	–
Pulse output	Ca	Cb	–	–	FG	–
CC-Link	DA	DB	DG	SLD	FG	–

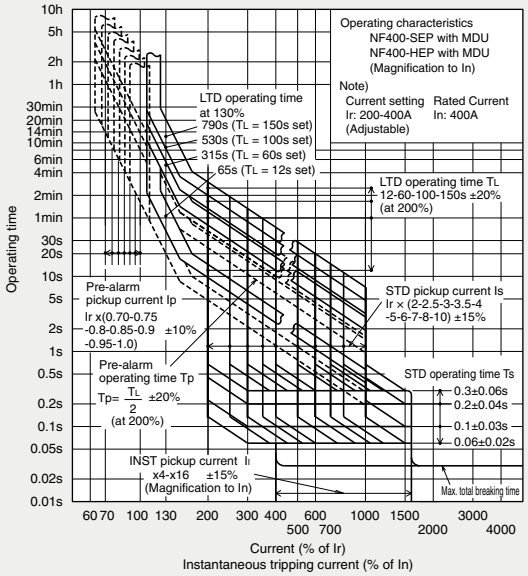
NF400-SEP with MDU
NF400-HEP with MDU



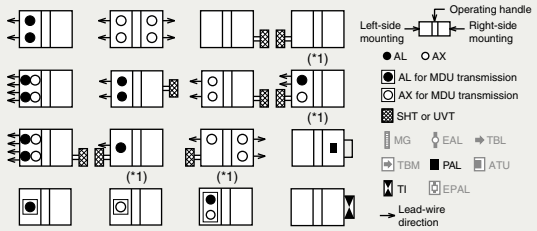
NF400-SEP with MDU (Breaker mounting)

Model				NF400-SEP with MDU		NF400-HEP with MDU	
Rated current In (A) Rated ambient temperature 40°C				200 225 250 300 350 400 Adjustable			
Number of poles				3	4	3	4
Rated operational voltage Ue V				690		690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	10/10		10/10	
			500V	30/30		50/50	
			440V	42/42		65/65	
			415V	45/45		70/70	
			400V	45/45		70/70	
			380V	45/45		70/70	
			230V	85/85		100/100	
			200V	85/85		100/100	
Standard attached parts (Front connection)		Breaker		Mounting screw M6 × 60 (4pcs) Insulation barrier (3P: 4pcs, 4P: 6pcs)			
MDU accessories		Breaker mounting		MDU, Connection cable (for breaker mounting)			
		Panel mounting		MDU, Panel mounting bracket, Panel mounting screw, Connection cable (for panel mounting)			

Operating Characteristics

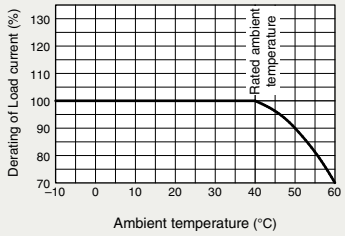


Internal Accessories



Note *1 Right side mounting is standard of SHT and UVT. Specify separately for left side mounting.

Current Reducing Curve



The rated current does not have thermal characteristics. Reduce the current as shown in the curve on the left chart if the ambient temperature exceeds 40°C.

External Accessories

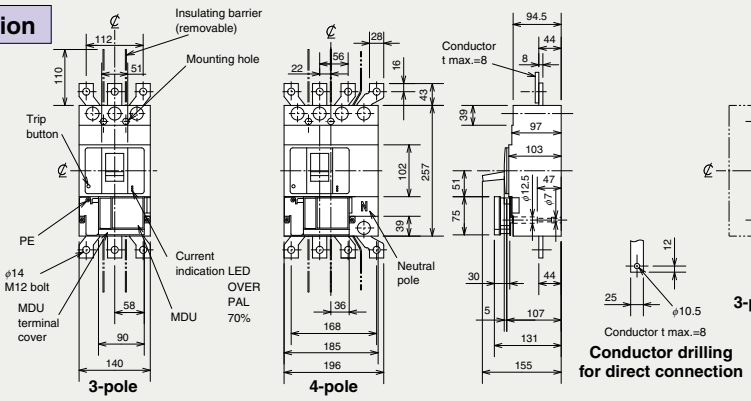
Accessories			Type name	
			Breaker mounting	Panel mounting
Operating handle	F		–	F-4S
	V		–	V-4S
Handle lock device	HL		HL-4SW	HL-4SW
	HL-S		–	HLS-4SW
Mechanical interlock	MI (*2)	3P	MI-4SW3	MI-4SW3
		4P	MI-4SW4	MI-4SW4
Auxiliary handle	HT		HT-4SW	HT-4SW

Accessories				Type name	
				Breaker mounting	Panel mounting
Terminal cover	Large	TC-L	3P	–	TCL-4SW3 (*1)
			4P	–	TCL-4SW4 (*1)
	Skeleton	TTC	3P	TTC-4SW3-MDU	TTC-4SW3
			4P	TTC-4SW4-MDU	TTC-4SW4
	Rear	BTC	3P	BTC-4SW3 (*1) Only line side	BTC-4SW3 (*4)
			4P	BTC-4SW4 Only line side	BTC-4SW4
Electrical operation device		NFM	3P	–	(*3)
			4P		

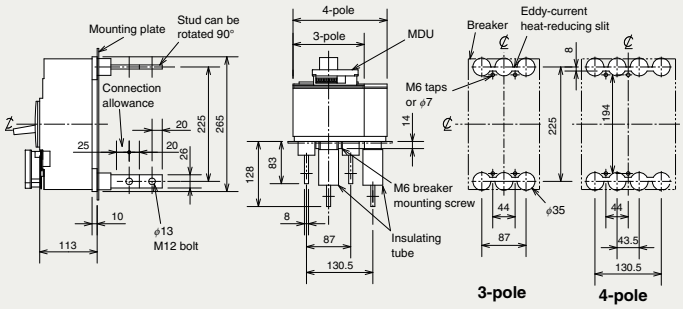
Notes *1 For NF400SEP with MDU.
*2 When selecting the MDU breaker mounting, only the MI panel mounting can be manufactured.
*3 Specify the operation method and voltage. Order in combination with the breaker unit.
*4 This is for NF400-SEP with MDU. For rear terminal cover of NF400-HEP with MDU, use PTC-4SW3.

Outline Drawing

Front connection



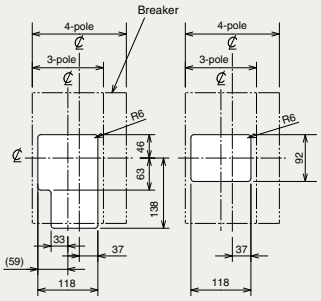
Rear connection



Note The drilling plan is different if insulating barriers are installed.

Front-plate cutout

1mm clearance on each side of handle. (Load side of breaker mounting has given the space to pass wires to the terminal.)



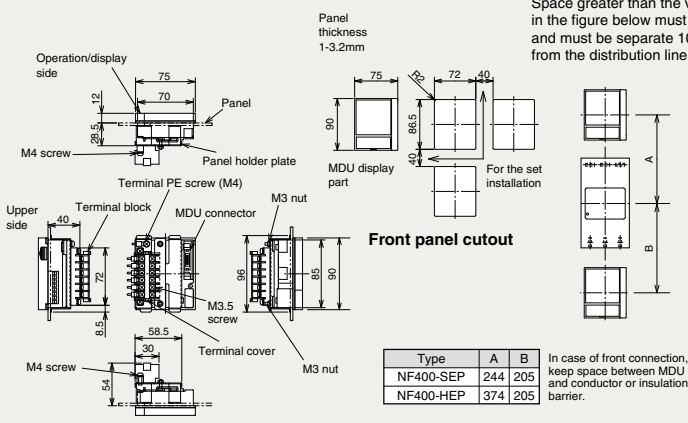
CC-Link ; only MDU panel mounting

NF400-SEP, NF400-HEP with MDU (No transmission, pulse output)

MDU panel mounting

MDU is connected with circuit breaker via MDU connection cable.

Space greater than the value shown in the figure below must be secured, and must be separate 10cm or more from the distribution line.



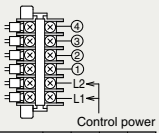
Type	A	B
NF400-SEP	244	205
NF400-HEP	374	205

In case of front connection, keep space between MDU and conductor or insulation barrier.

MDU terminal

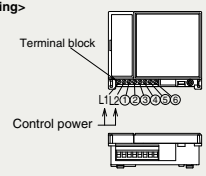
Figure of the breaker mounting is removed the terminal cover.

<Panel mounting>



	①	②	③	④
No transmission	—	—	—	—
Pulse output	—	—	113	114

<Breaker mounting>



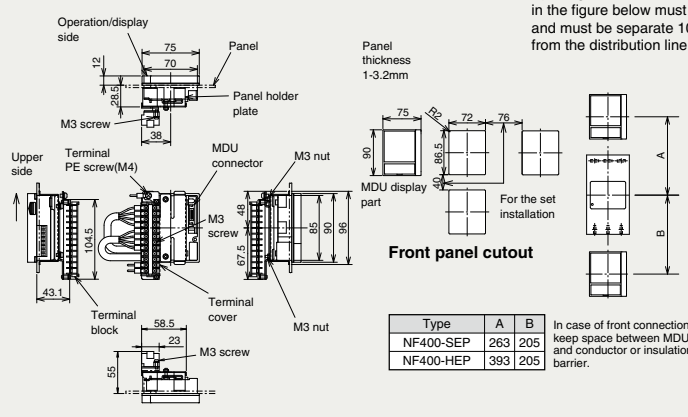
	①	②	③	④	⑤	⑥
No transmission	—	FG	—	—	—	—
Pulse output	—	FG	—	—	113	114

NF400-SEP, NF400-HEP with MDU (CC-Link)

MDU panel mounting

MDU is connected with circuit breaker via MDU connection cable.

Space greater than the value shown in the figure below must be secured, and must be separate 10cm or more from the distribution line.



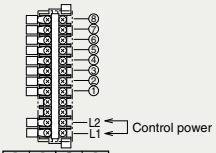
Type	A	B
NF400-SEP	263	205
NF400-HEP	393	205

In case of front connection, keep space between MDU and conductor or insulation barrier.

MDU terminal

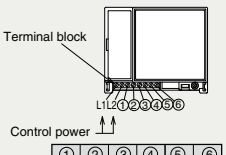
Figure of the breaker mounting is removed the terminal cover.

<Panel mounting>



①	②	③	④
SLD	DG	DB	DA
⑤	⑥	⑦	⑧
SLD	DG	DB	DA

<Breaker mounting>



①	②	③	④	⑤	⑥
—	FG	SLD	DG	DB	DA

NF630-SEP with MDU
NF630-HEP with MDU
NF800-SEP with MDU
NF800-HEP with MDU

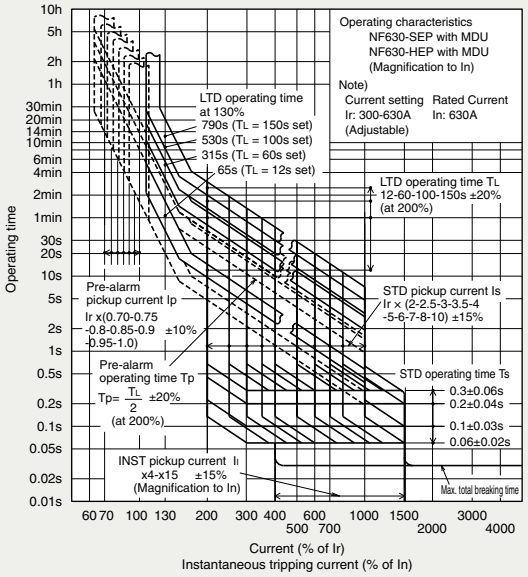


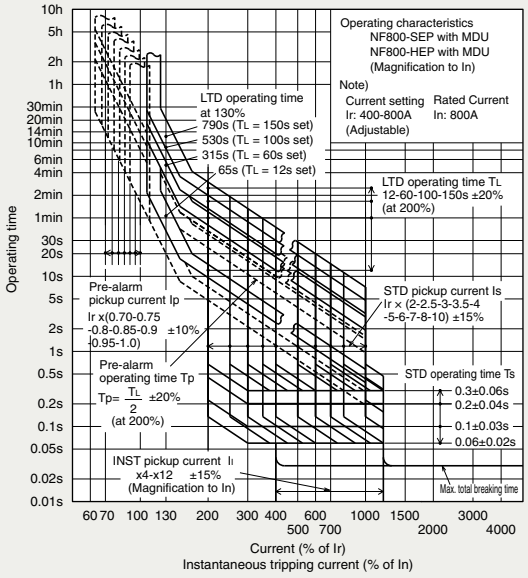
NF630-SEP with MDU (Breaker mounting)

Model			NF630-SEP with MDU		NF630-HEP with MDU		NF800-SEP with MDU		NF800-HEP with MDU	
Rated current In (A) Rated ambient temperature 40°C			300 350 400 500 600 630 Adjustable				400 450 500 600 700 800 Adjustable			
Number of poles			3	4	3	4	3	4	3	4
Rated operational voltage Ue V			690		690		690		690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC 690V	10/10		15/15		10/10		15/15	
		AC 500V	30/30		50/50		30/30		50/50	
		AC 440V	42/42		65/65		42/42		65/65	
		AC 415V	45/45		70/70		45/45		70/70	
		AC 400V	45/45		70/70		45/45		70/70	
		AC 380V	45/45		70/70		45/45		70/70	
		AC 230V	85/85		100/100		85/85		100/100	
		AC 200V	85/85		100/100		85/85		100/100	
Standard attached parts (Front connection) (*1)		Breaker	Mounting screw M6 × 35 (4pcs) Insulation barrier (3P: 2pcs, 4P: 3pcs)							
MDU accessories		Breaker mounting	MDU, Breaker mounting plate, Mounting screw for breaker mounting plate, Connection cable (for breaker mounting), MDU Mounting screw							
		Panel mounting	MDU, Panel mounting bracket, Panel mounting nut, Connection cable (for panel mounting), MDU Mounting screw							

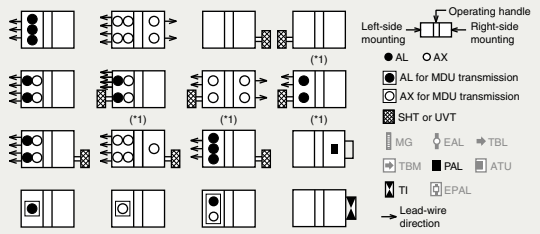
Note *1 4-pole models are provided with auxiliary handle.

Operating Characteristics



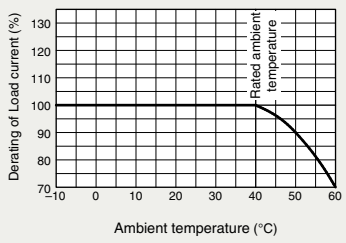


Internal Accessories



Note *1 Right side mounting is standard of SHT and UVT. Specify separately for left side mounting.

Current Reducing Curve



The rated current does not have thermal characteristics. Reduce the current as shown in the curve on the left chart if the ambient temperature exceeds 40°C.

External Accessories

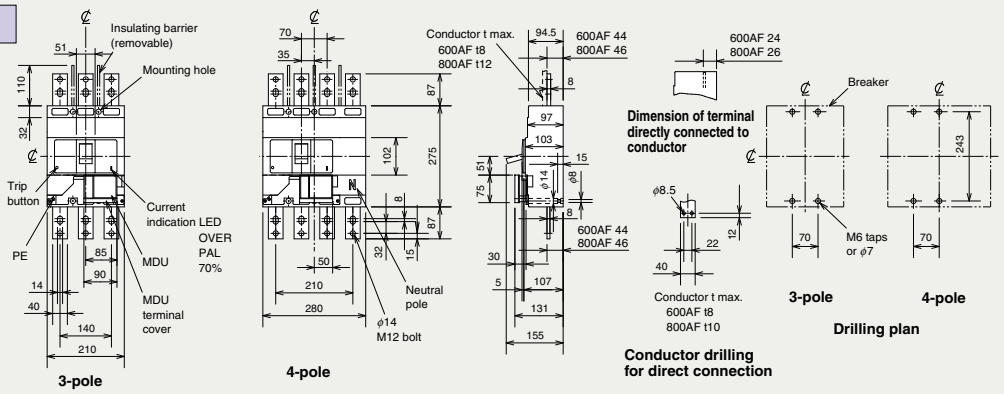
Accessories			Type name	
			Breaker mounting	Panel mounting
Operating handle	F		–	F-8S
	V		–	V-8S
Handle lock device	HL		HL-4SW	HL-4SW
	HL-S		–	HLS-8SW
Mechanical interlock	MI (*1)	3P	MI-8SW3	MI-8SW3
		4P	MI-8SW4	MI-8SW4
Auxiliary handle	HT		HT-4SW	HT-4SW

Accessories				Type name	
				Breaker mounting	Panel mounting
Terminal cover	Large	TC-L	3P	–	TCL-8SW3
			4P	–	TCL-8SW4
	Skeleton	TTC	3P	TTC-8SW3-MDU	TTC-8SW3
			4P	TTC-8SW4-MDU	TTC-8SW4
	Rear	BTC	3P	BTC-8SW3 Only line side	BTC-8SW3
			4P	BTC-8SW4 Only line side	BTC-8SW4
Electrical operation device		NFM	3P	–	(*2)
			4P		

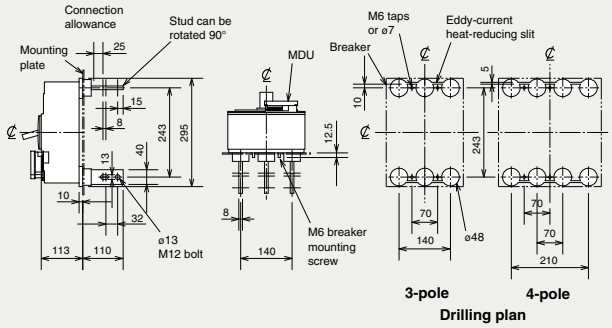
Notes *1 When selecting the MDU breaker mounting, only the MI panel mounting can be manufactured.
*2 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing

Front connection



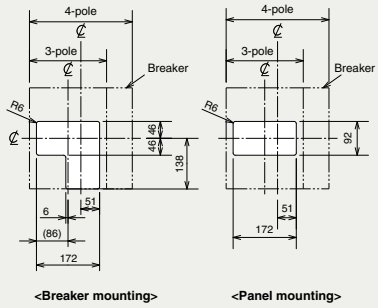
Rear connection



Note The drilling plan is different if insulating barriers are installed.

Front-plate cutout

1mm clearance on each side of handle. (Load side of breaker mounting has given the space to pass wires to the terminal.)



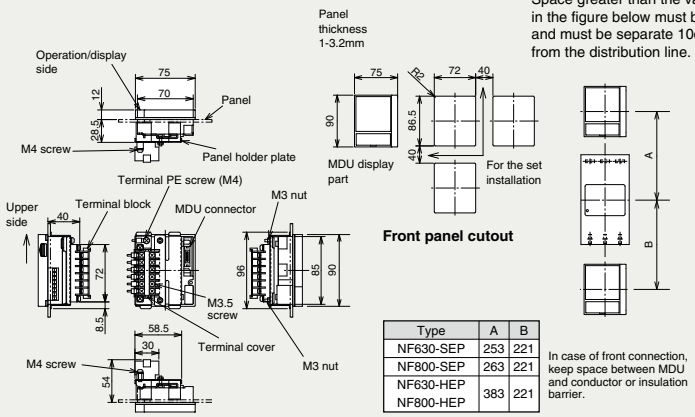
CC-Link ; only MDU panel mounting

NF630-SEP, NF630-HEP, NF800-SEP, NF800-HEP with MDU (No transmission, Pulse output)

MDU panel mounting

MDU is connected with circuit breaker via MDU connection cable.

Space greater than the value shown in the figure below must be secured, and must be separate 10cm or more from the distribution line.



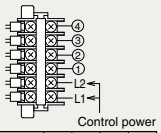
Type	A	B
NF630-SEP	253	221
NF800-SEP	263	221
NF630-HEP	383	221
NF800-HEP		

In case of front connection, keep space between MDU and conductor or insulation barrier.

MDU terminal

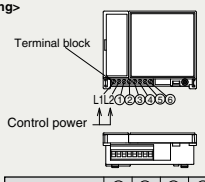
Figure of the breaker mounting is removed the terminal cover.

<Panel mounting>



	①	②	③	④
No transmission	—	—	—	—
Pulse output	—	—	113	114

<Breaker mounting>



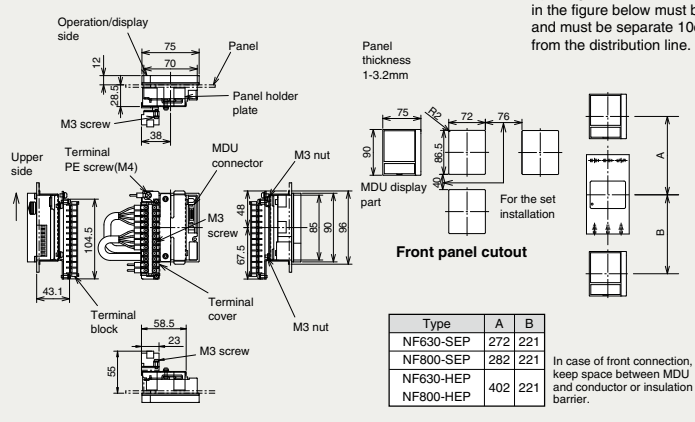
	①	②	③	④	⑤	⑥
No transmission	—	FG	—	—	—	—
Pulse output	—	FG	—	—	113	114

NF630-SEP, NF630-HEP, NF800-SEP, NF800-HEP with MDU (CC-Link)

MDU panel mounting

MDU is connected with circuit breaker via MDU connection cable.

Space greater than the value shown in the figure below must be secured, and must be separate 10cm or more from the distribution line.



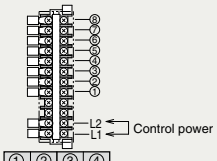
Type	A	B
NF630-SEP	272	221
NF800-SEP	282	221
NF630-HEP	402	221
NF800-HEP		

In case of front connection, keep space between MDU and conductor or insulation barrier.

MDU terminal

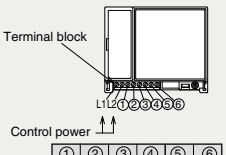
Figure of the breaker mounting is removed the terminal cover.

<Panel mounting>



①	②	③	④
SLD	DG	DB	DA
⑤	⑥	⑦	⑧
SLD	DG	DB	DA

<Breaker mounting>



①	②	③	④	⑤	⑥
—	FG	SLD	DG	DB	DA

BH
BH-P



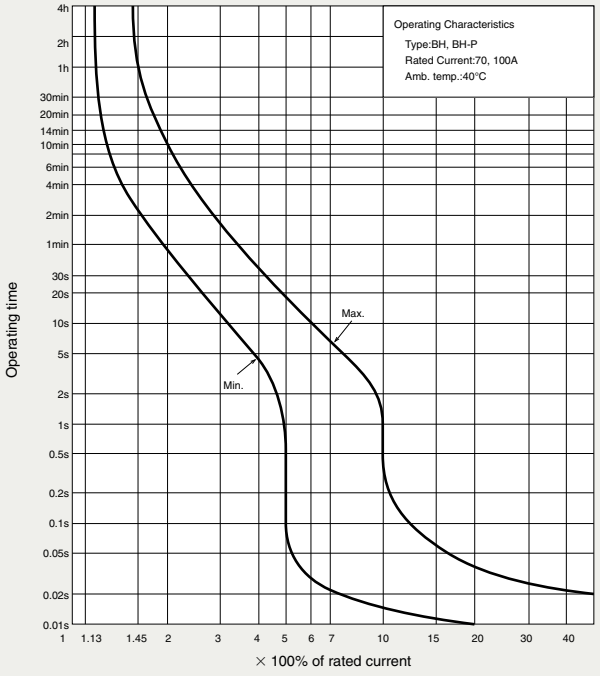
BH



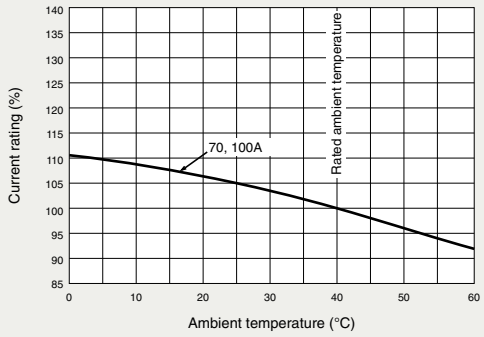
BH-P

Model			BH			BH-P		
Number of poles			1	2	3	1	2	3
Rated current (A) at ambient temperature 40˚C			70	70, 100	70, 100	70	70, 100	70, 100
Rated voltage (V)		AC	230/400			230/400		
		DC	125			125		
Rated short circuit capacity (kA)	IEC 60898-1	AC230/400V	3	–		3	–	
		AC400V	–	3		–	3	
	–	DC125V	1			1		

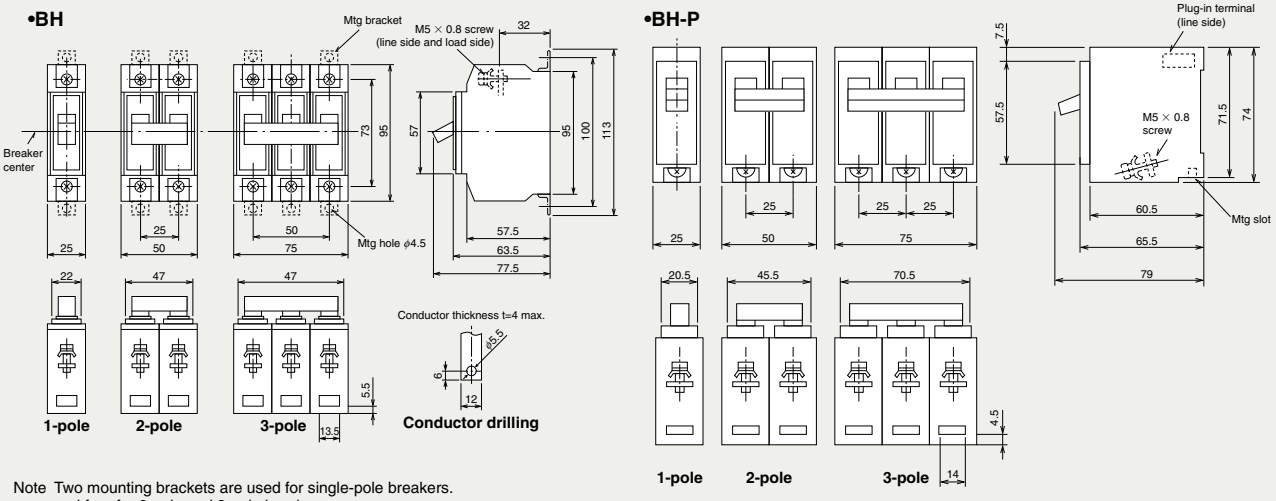
Operating Characteristics



Temperature Compensation Curve



Outline Drawing



Note Two mounting brackets are used for single-pole breakers.
and four for 2-pole and 3-pole breakers.

BH-D6
BH-D10

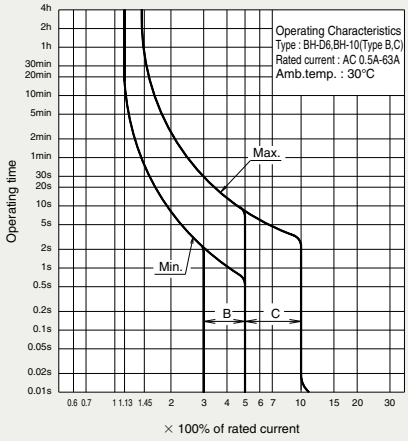


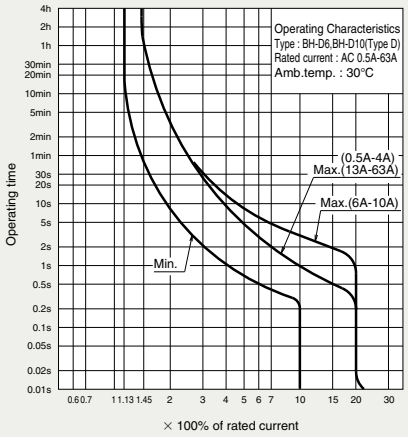
BH-D6

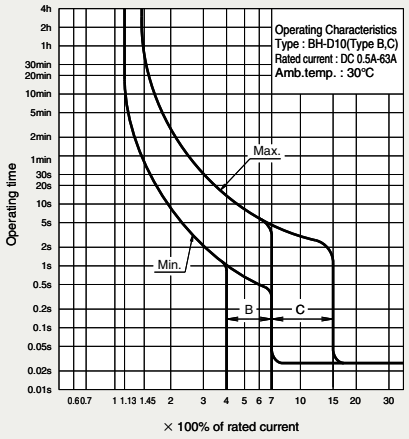
Model				BH-D6					BH-D10				BH-D10 (For DC)	
Number of poles (P)				1	2	3	4(3+N) (*1)	2(1+N) (*1)	1	2	3	4(3+N) (*1)	1	2
Instantaneous tripping				Type B, C, D				Type B, C	Type B, C, D				Type B, C	
Rated insulation voltage Ui (V)				440					440				250	
Rated current In (A) at ambient temperature 30°C				0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63				0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40	0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63				0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63	
Rated short-circuit capacity (kA)	IEC60898-1 GB10963.1 (Icn)	AC	230V	6	–			6	10	–			6	–
			230/400V	6	–			–	10	–			6	–
			400V	–	6			–	–	10			–	6
	IEC60898-2 GB10963.2 (Icn)	DC	125V	–					–				10	–
			250V	–					–				–	10

Note *1 N pole is a switched neutral pole (without overcurrent release device).

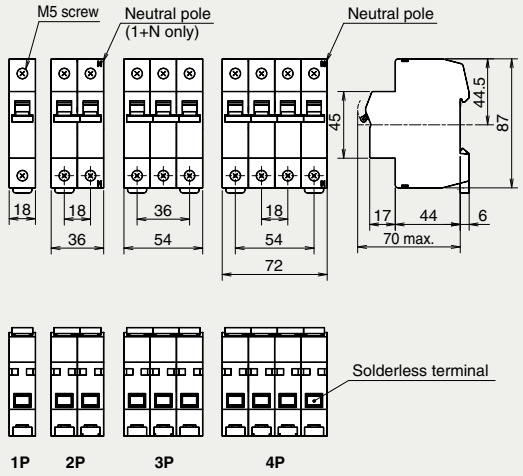
Operating Characteristics



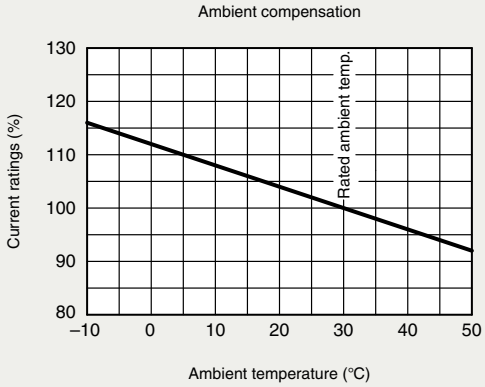




Outline Drawing



Temperature Compensation Curve



BH-DN

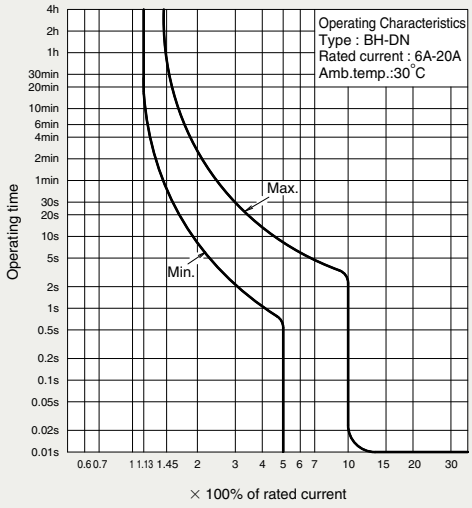


BH-DN

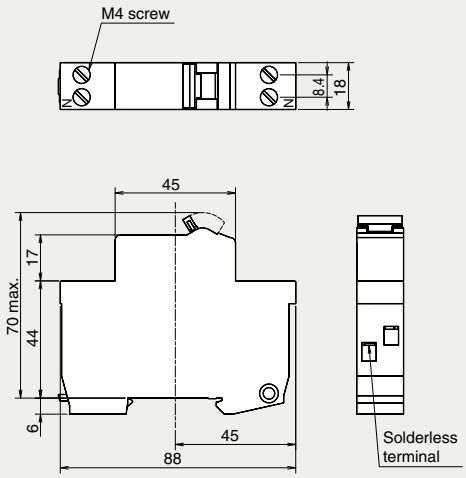
Model				BH-DN
Number of poles (P)				2 (1+N) (*1)
Instantaneous tripping				Type C
Rated insulation voltage Ui (V)				230
Rated current In (A) at ambient temperature 30˚C				6, 10, 16, 20
Rated short-circuit capacity (kA)	IEC60898-1 GB10963.1 (Icn)	AC	230V	4.5

Note *1 N pole is a switched neutral pole (without overcurrent release device).

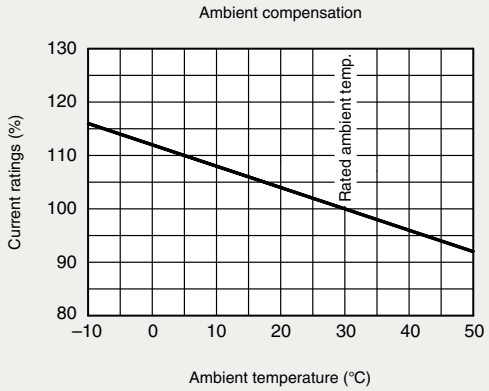
Operating Characteristics



Outline Drawing



Temperature Compensation Curve



BV-D

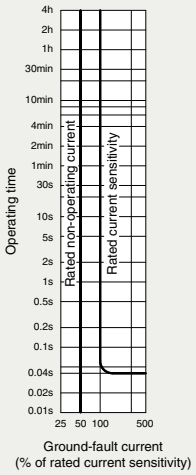


BV-D

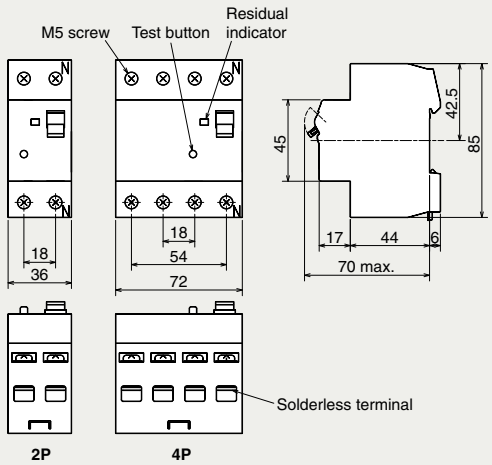
Model	BV-D	
Number of poles (P)	2 (1+N) (*1)	4 (3+N) (*1) (*2)
Rated operational voltage Ue (VAC)	230	230/400
Rated current In (A) at ambient temperature 30°C	25, 40, 63	
Rated current sensitivity IΔn (mA)	30, 300	
Max. operating time at 5IΔn (s)	0.04	
Pulsating current sensitivity	Type AC	
Residual operation	Dependent on line voltage	
Rated making and breaking capacity Im (A)	500 (In 25, 40A) 630 (In63A)	
Rated conditional short-circuit current Inc (kA)	6	
Rated residual making and breaking capacity IΔm (A)	500 (In 25, 40A) 630 (In63A)	
Rated conditional residual short-circuit current IΔc (kA)	6	

Notes *1 N pole is a switched neutral pole (without overcurrent release device).
*2 For use to three phase 4-wire type. When using, it be sure to connect the neutral wire to the neutral phase. Not available for use to three phase 3-wire type.

Operating Characteristics



Outline Drawing



BV-DN

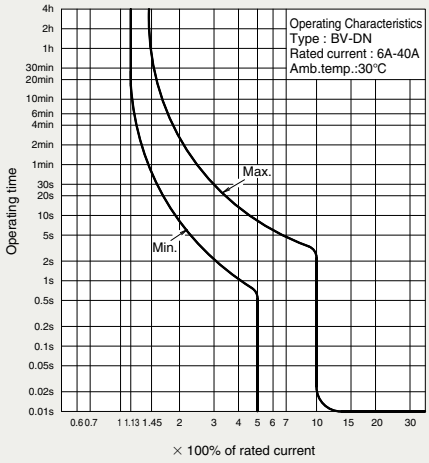


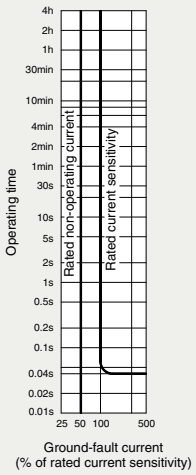
BV-DN

Model				BV-DN
Number of poles (P)				2 (1+N) (*1)
Rated operational voltage Ue (VAC)				230
Rated current In (A) at ambient temperature 30˚C				6, 10, 16, 20, 25, 32, 40
Instantaneous tripping				Type C
Rated current sensitivity IΔn (mA)				30, 100, 300
Max. operating time at 5IΔn (s)				0.04
Pulsating current sensitivity				Type AC
Residual operation				Dependent on line voltage
Rated short-circuit capacity (kA)	IEC61009-1 GB16917.1 (Icn)	AC	230V	4.5

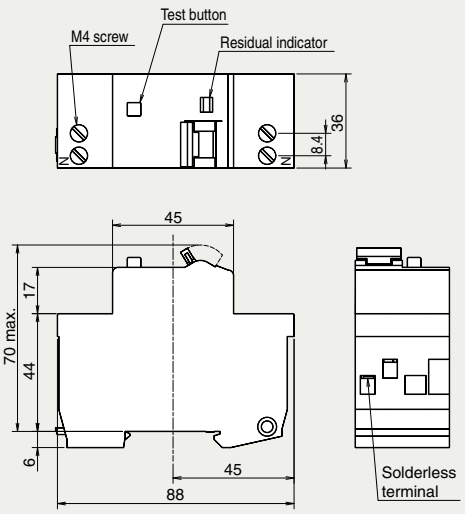
Note *1 N pole is a switched neutral pole (without overcurrent release device).

Operating Characteristics

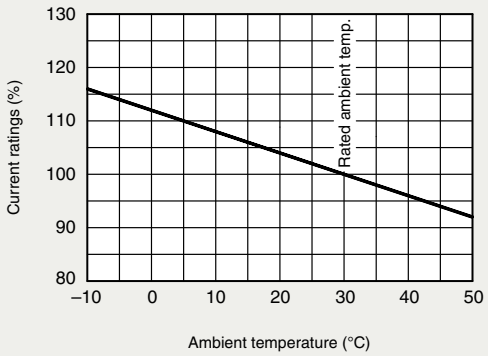




Outline Drawing



Temperature Compensation Curve



KB-D

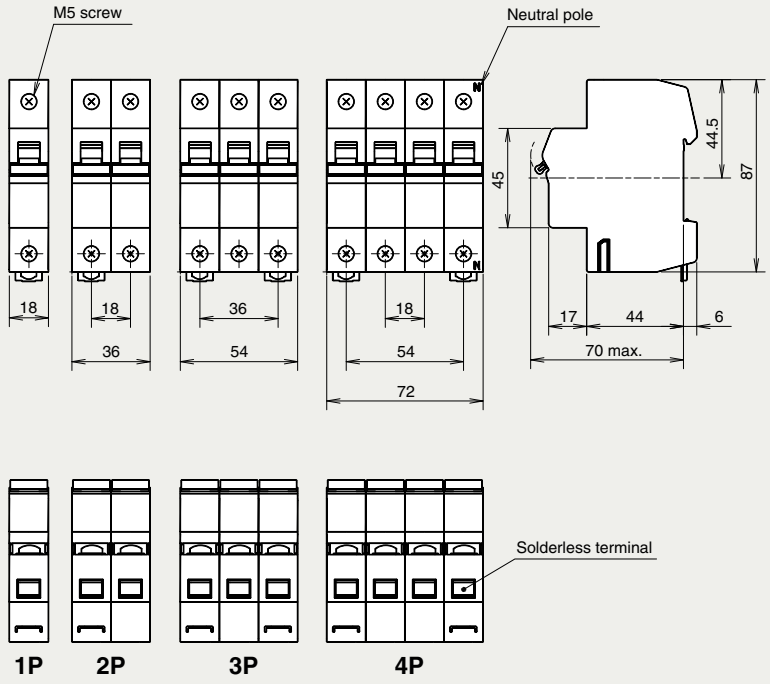


KB-D

Model	KB-D			
Number of poles (P)	1	2	3	4 (3+N) (*1)
Utilization category	AC22A class			
Rated insulation voltage Ui (V)	250	440		
Rated voltage Ue (VAC)	230	400		
Rated current In (A) at ambient temperature 30˚C	32, 63, 80			
Short-time withstand current (A)	20×In , 1sec			
Short-time making current (A)	20×In			

Note *1 N pole is a switched neutral pole (without overcurrent release device).

Outline Drawing



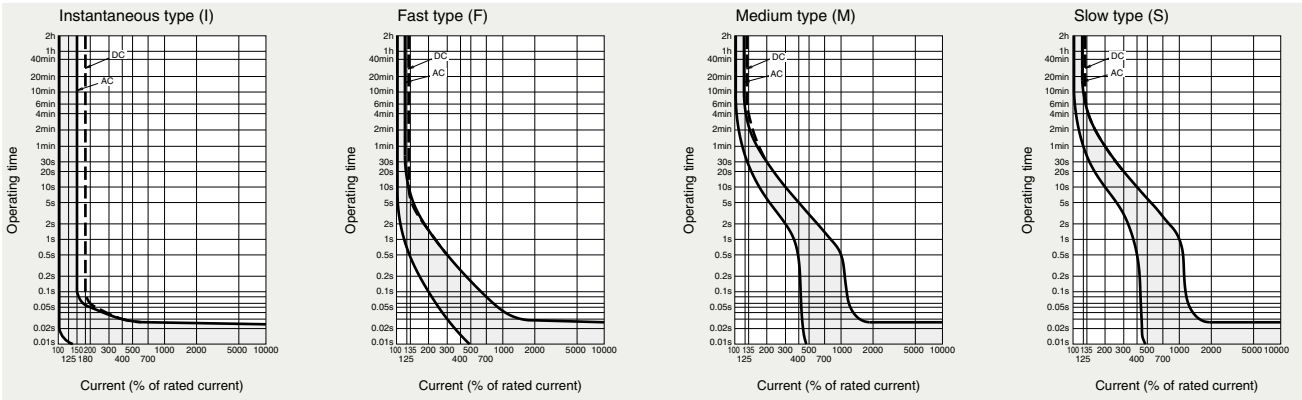
CP30-BA



CP30-BA

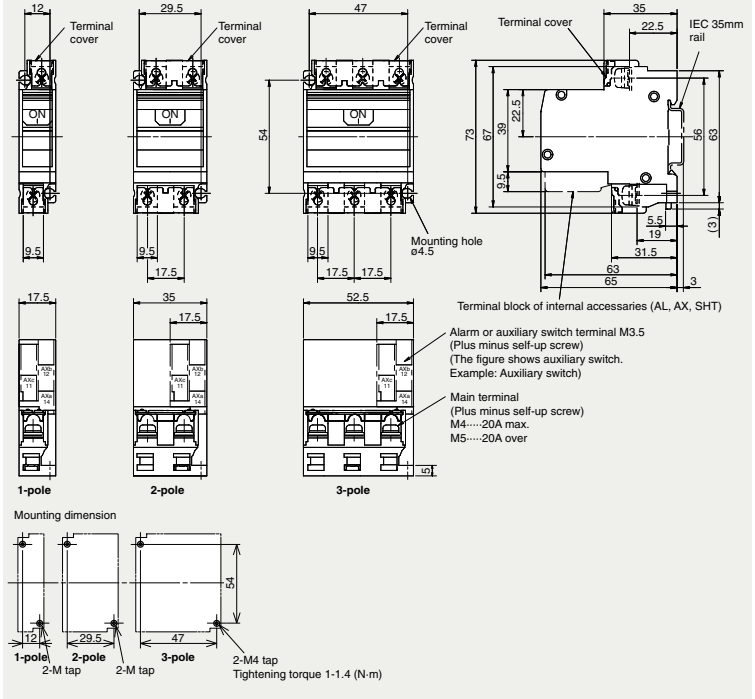
Frame (A)				30		
Model				CP30-BA		
Number of poles				1	2	3
Rated impulse withstand voltage Uimp (kV)				2.5		
Rated current (A)				0.1, 0.25, 0.3, 0.5, 1, 2, 3, 5, 7, 10,15, 20, 30		
Rated short-circuit capacity (kA)	UL 1077 CSA C22.2 No.235	Rated voltage (V)	AC (V)	250		
			DC (V)	65	125	–
		AC		2.5kA at 250V		
		DC		2.5kA at 65V	2.5kA at 125V	–
	IEC 60934 EN 60934	Rated insulation voltage Ui (V)		250		
		AC		2.5kA at 230V		
		DC		2.5kA at 60V	2.5kA at 120V	–
	EN 60947-2 IEC 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)		250		
		AC		2.5/2.5kA at 230V		
		DC		2.5/2.5kA at 60V	2.5/2.5kA at 120V	–
AC-DC common use				●		–
Operating characteristics				Instantaneous type (I) Medium type (M),(MD) Slow type (S),(SD) Fast type (F)		
Mode of tripping				Instantaneous type (I): magnetic only Other type (M, MD, S, SD, F):hydraulic-magnetic		

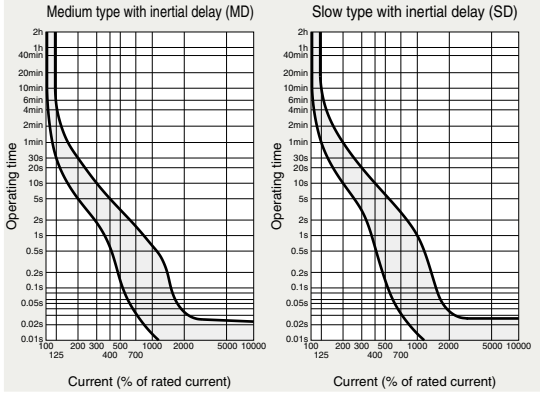
Operating Characteristics



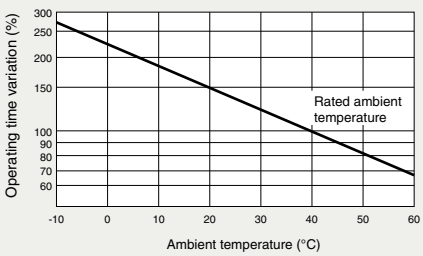
Outline Drawing

•CP30-BA





Temperature Characteristics Curve



(1) Dimensions of electrical operated circuit breakers

The following concept is applied for the dimensions of the electrical operated circuit breaker. Please understand this before using this type of breaker.

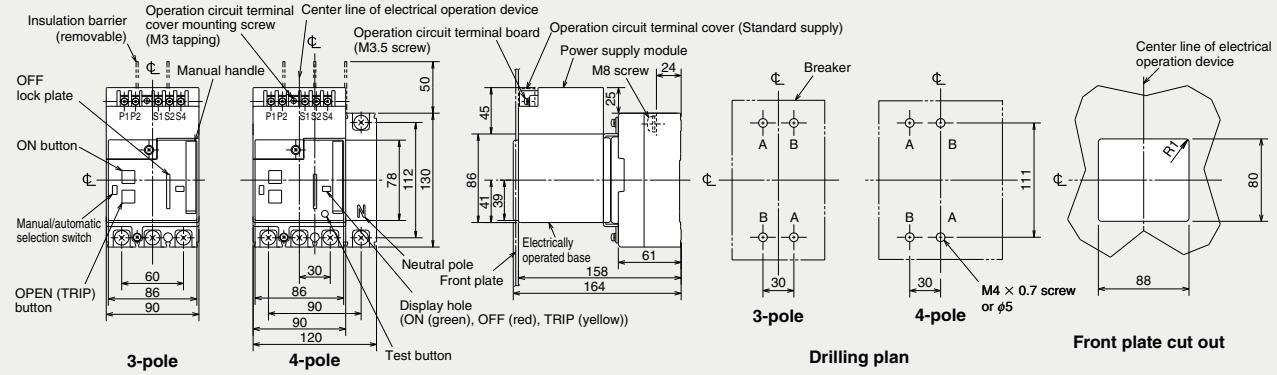
Connection method	Outline dimensions listing method
Front connection (Rear connection)	See table below
Rear connection Plug-in	The drilling dimensions and connection related dimensions are the same as the dimensions for the breaker body. Refer to the dimension drawings of each model. Note that for the rear connection type, four mounting holes are required even for the 2-pole or 3-pole types.

Model	Listed page	Model	Listed page
NF125-CV/SV/HV NV125-CV/SV/HV	845	NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW	846
NF125-UV	767	NF400-UEW (3P) NV400-CW/SW/SEW/HEW/REW NF400-UEW (4P) NV630-CW/SW/SEW/HEW	
NF125-SEV/HEV/RV/ZEV NF250-CV/SV/HV/SEV/HEV NF250-RV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV	845	NF800-CEW/SEW/HEW/REW/SDW NF800-UEW NV800-SEW/HEW	847
		NF1000-SEW, NF1250-SEW/SDW NF1600-SEW/SDW	848
NF250-UV	771		

(2) Front connection (Rear connection)

NF125-CV, NF125-SV, NF125-HV
NV125-CV, NV125-SV, NV125-HV

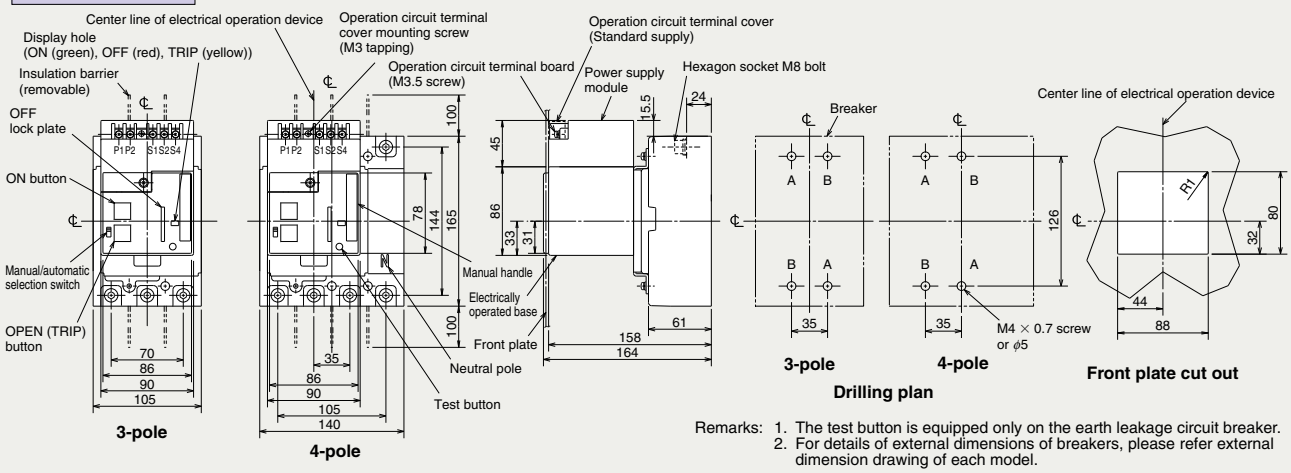
Front connection



Remarks: 1. This cannot be mounted on the 2-pole breaker.
2. The test button is equipped only on the earth leakage circuit breaker.

NF125-SEV, NF125-HEV, NF125-RV
NF250-CV, NF250-SV, NF250-HV, NF250-SEV, NF250-HEV, NF250-RV
NV125-SEV, NV125-HEV
NV250-CV, NV250-SV, NV250-HV, NV250-SEV, NV250-HEV
NF125-SGV/LGV/HGV/RGV
NF160-SGV/LGV/HGV
NF250-SGV/LGV/HGV/RGV

Front connection

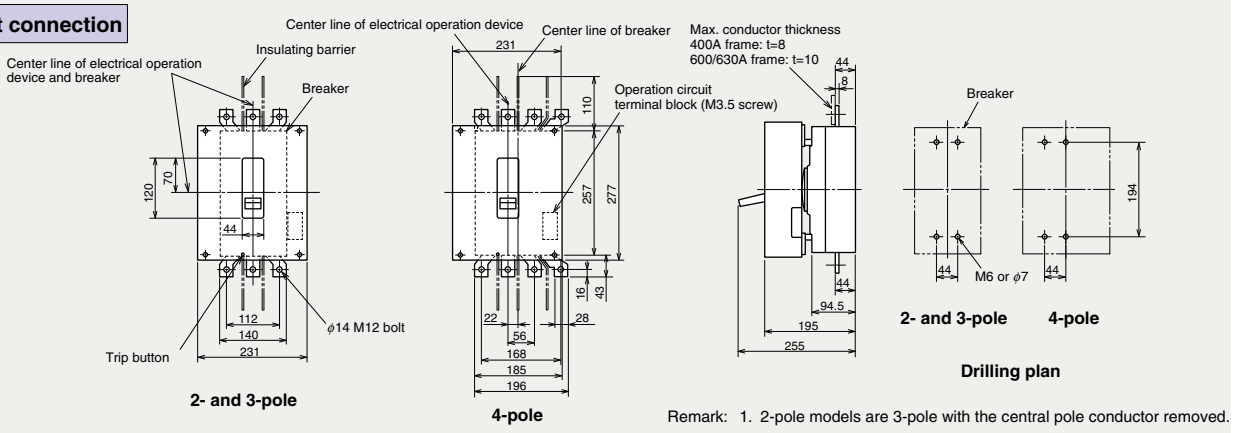


Remarks: 1. The test button is equipped only on the earth leakage circuit breaker.
2. For details of external dimensions of breakers, please refer external dimension drawing of each model.

Outline Drawing

NF400-CW, NF400-SW, NF400-SEW, NF400-HEW, NF400-REW, NF630-CW, NF630-SW, NF630-SEW, NF630-HEW, NF630-REW Motor drive type

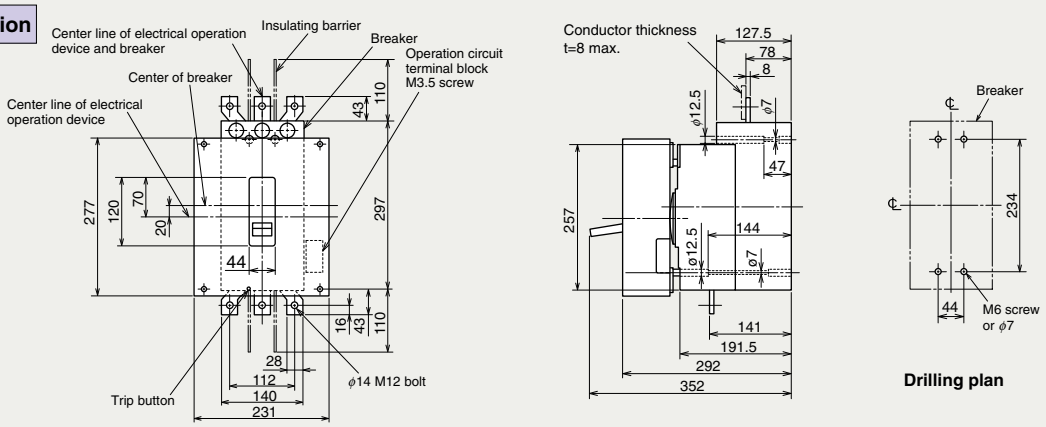
Front connection



Remark: 1. 2-pole models are 3-pole with the central pole conductor removed.

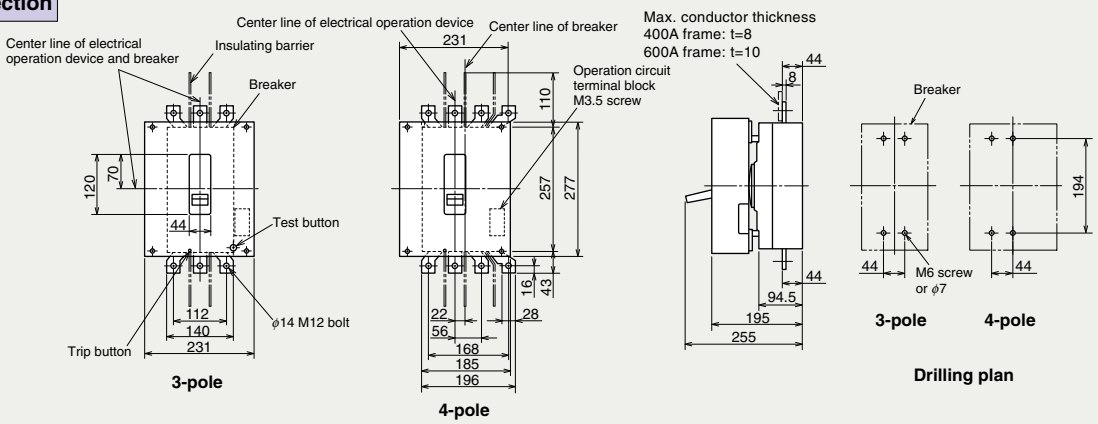
NF400-UEW (3-pole) Motor drive type

Front connection



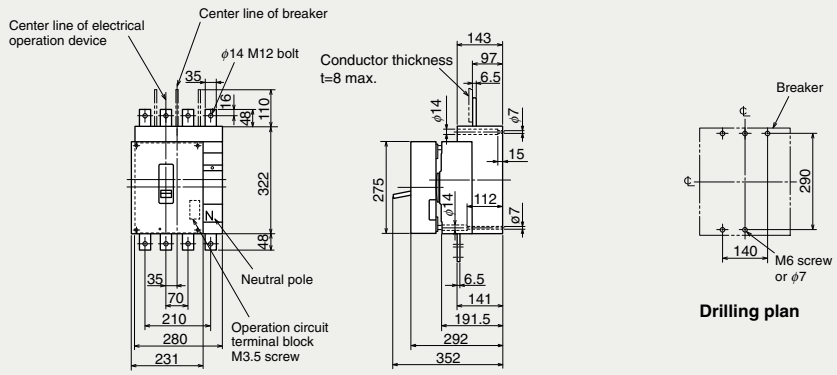
NV400-CW, NV400-SW, NV400-SEW, NV400-HEW, NV400-REW, NV630-CW, NV630-SW, NV630-SEW, NV630-HEW Motor drive type

Front connection



NF400-UEW (4-pole) Motor drive type

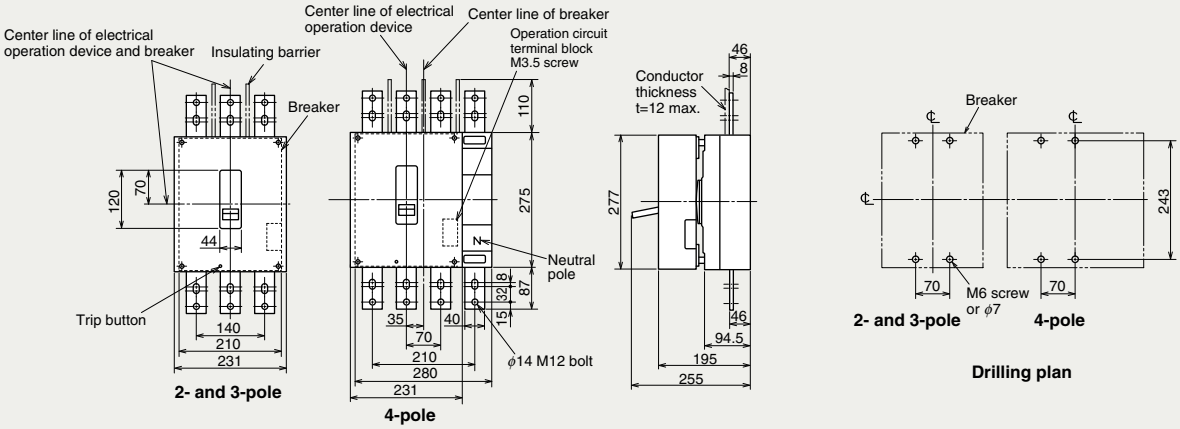
Front connection



Outline Drawing

NF800-CEW, NF800-SDW, NF800-SEW, NF800-HEW, NF800-REW Motor drive type

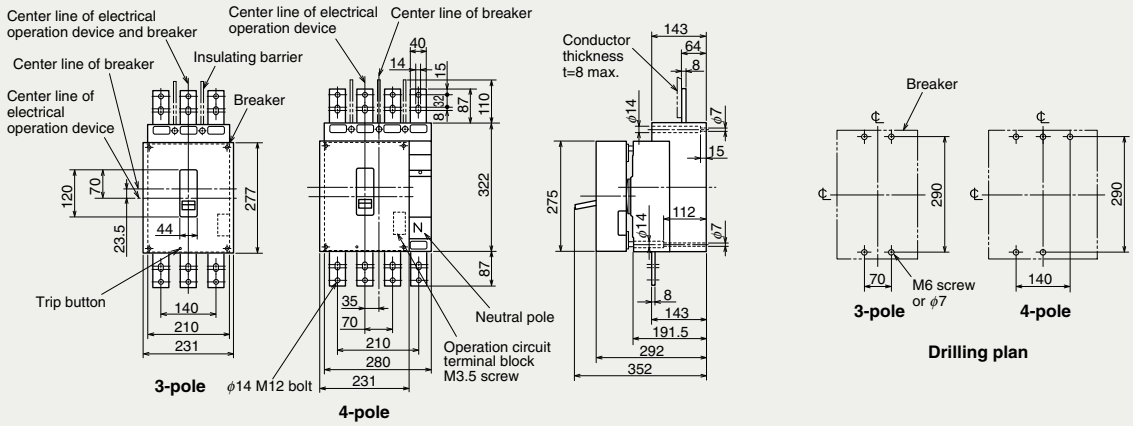
Front connection



Remark: 1. 2-pole models are 3-pole with the central pole conductor removed.

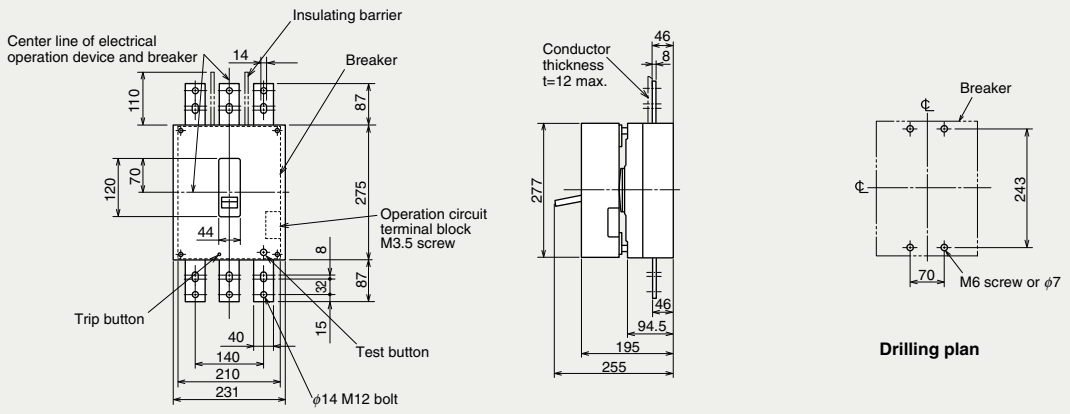
NF800-UEW Motor drive type

Front connection



NV800-SEW, NV800-HEW Motor drive type

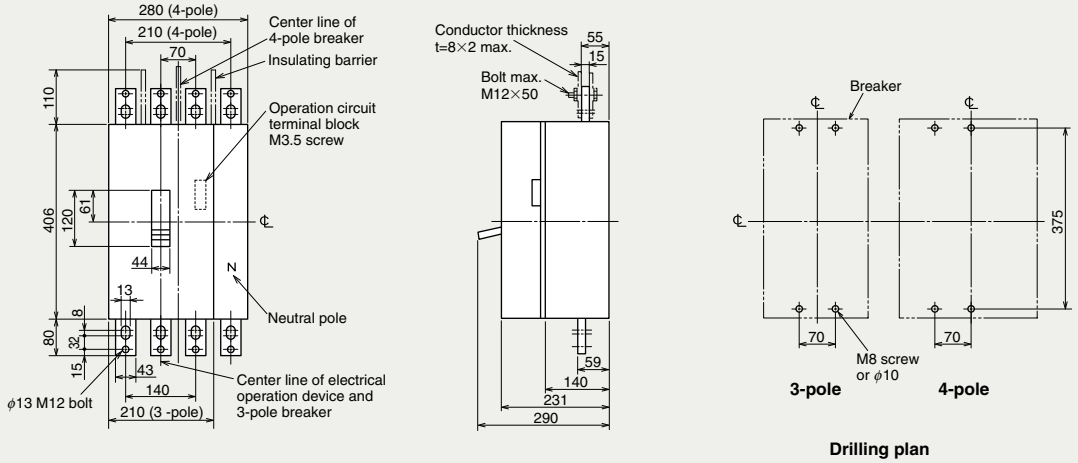
Front connection



Outline Drawing

NF1000-SEW, NF1250-SEW, NF1250-SDW Motor drive type

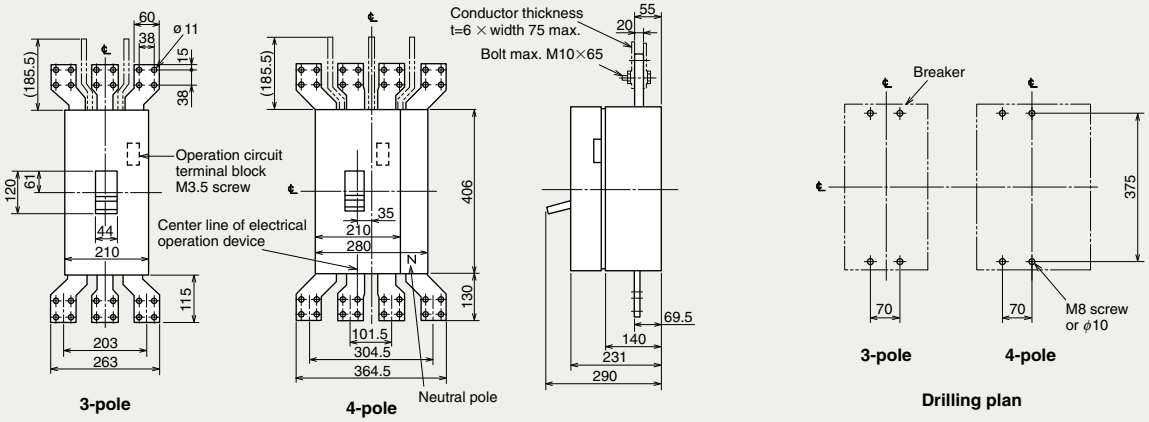
Front connection



Remark: 1. 2-pole models are 3-pole with the central pole conductor removed.

NF1600-SEW, NF1600-SDW Motor drive type

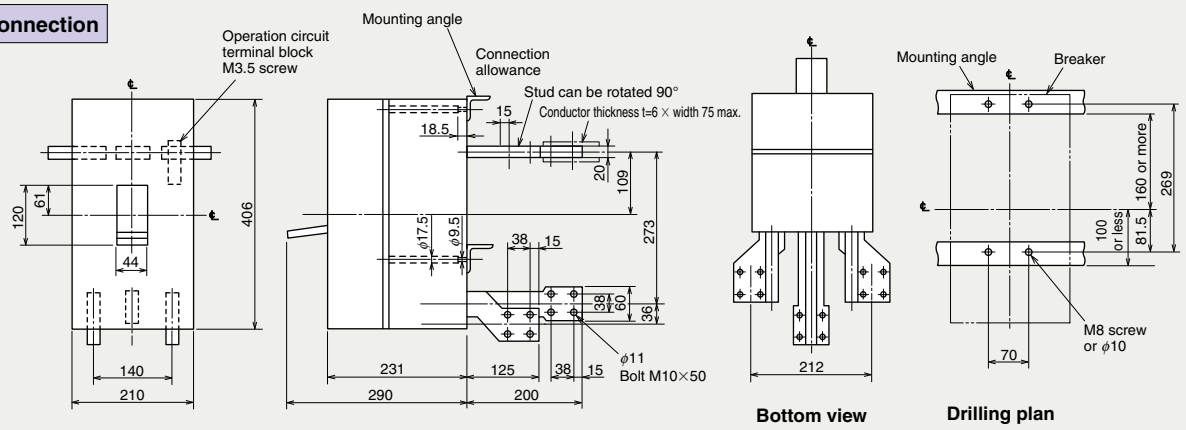
Front connection



Outline Drawing

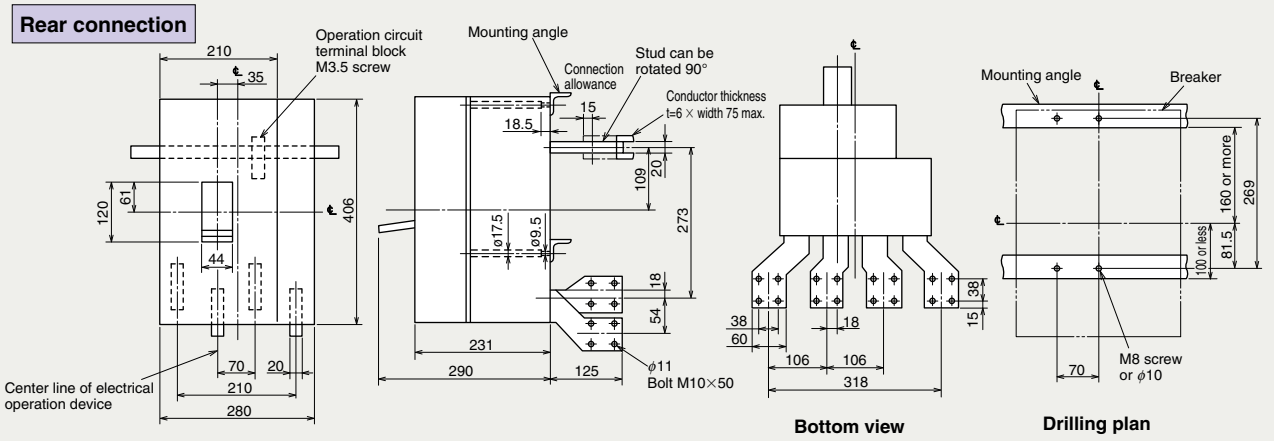
NF1600-SEW (3-pole) Motor drive type

Rear connection



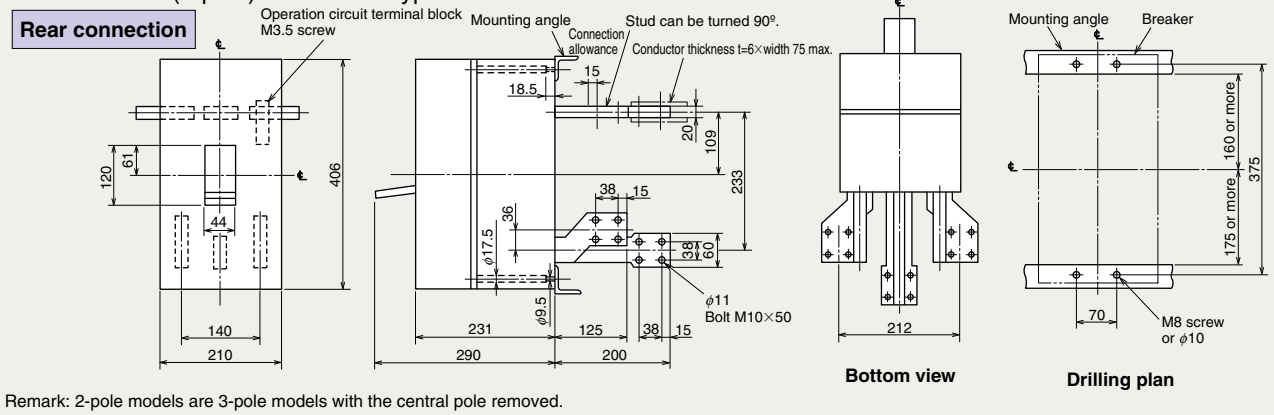
NF1600-SEW (4-pole) Motor drive type

Rear connection



NF1600-SDW (3-pole) Motor-drive type

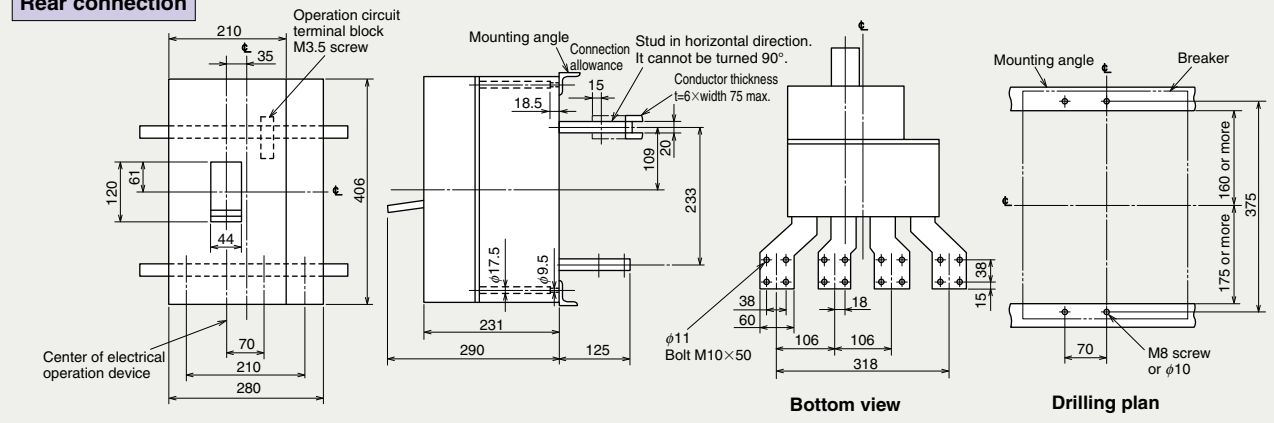
Rear connection



Remark: 2-pole models are 3-pole models with the central pole removed.

NF1600-SDW (4-pole) Motor-drive type

Rear connection



Magnetic Contactor and Starters

A wide variety of lineup to meet all demands

The MS-T/N Series Magnetic Starters are eco-friendly, ready for global use, compact, easy-to-use, and built with safety in mind. Compatible with many international standards and highly-reliable to meet various situations from switchboards to equipment.

Magnetic Starters



All models in the MS-T series are equipped with terminal covers.
Also, the series includes a wider range of operating coils. (10-100A)

List of Produced Models P.861 | Selections P.864 | Specifications P.873

Magnetic Contactors



All models in the MS-T series are equipped with terminal covers.
Also, the series includes a wider range of operating coils. (10-100A)

List of Produced Models P.861 | Selections P.864 | Specifications P.875

Contactor Relays



Can be used as control relays for magnetic contactors,
using the large number of contacts to transmit signals.

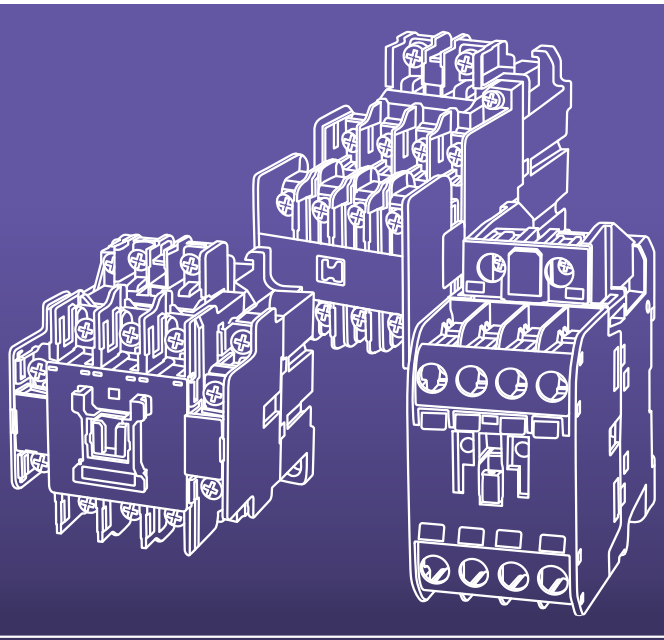
List of Produced Models P.862 | Selections P.865 | Specifications P.887

Thermal Overload Relays



Can be used to protect motors against burning out when overloaded or
under locking.

List of Produced Models P.862 | Selections P.865 | Specifications P.881



Definite Purpose Magnetic Contactors



Our lineup of magnetic contactors responds to a diverse range of customer needs.

List of Produced Models P.862 | Selections P.864 | Specifications P.882

Solid State Contactors



We have a lineup of high frequency switching, maintenance free, long life products that are ideal for applications where a switching sound is not desired.

List of Produced Models P.892

Optional Units



These products can be easily attached to, or combined with, magnetic contactors, contactor relays and thermal relays.
There are a range of options available that have been designed with concern for safety and ease of use.

Selections P.865 | Specifications P.889

Motor Circuit Breaker

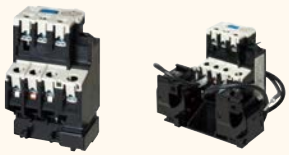


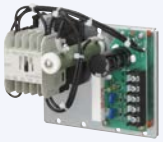
Our wide lineup of related devices is ideal for controlling or protecting motors and other devices.

Specifications P.894

Magnetic Contactor and Starters

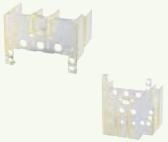
Product designation by purpose		MS-T/N Series Magnetic Starters/Magnetic Contactors			
		Standard (AC operated type)	Reversing	DC operated type	Mechanically latched type
External appearance of representative models	MS-T Series	 MS-T MSO-T S-T	 MS-2×T MSO-2×T S-2×T	 MSOD-T  SD-T	 SL/SLD-T
	MS-N Series	 MS-N MSO-N S-N	 MS-2×N MSO-2×N S-2×N	 MSOD-N  SD-N	 SL/SLD-N
Purpose/ Functions		・Can be used for general purpose activities such as starting and stopping a motor or to protect a motor against burning out.	・Applicable for normal and reverse rotation, and reverse phase braking (plugging), together with use as a switch between normal and emergency power sources.	・Can be used with DC control circuits. (The main circuit can be used with both AC or DC)	・The switch's state is mechanically maintained, so that no release will occur during blackouts or drops in power voltage. ・Uses ・Roadway lighting ・Memory circuits in industrial plants, etc. ・As an power switch between power purchase and private power generation

Product designation by purpose		MS-T/N Series Magnetic Starters/Magnetic Contactors		Thermal Overload Relays
		With fast wiring terminal	3 Pole Magnetic Contactors	
External appearance of representative models	MS-T Series	 MSO-T□BC S-T□BC	 S-T32	 TH-T TH-T□SR
	MS-N Series	–	 S-N□8	 TH-N TH-N□SR
Purpose/ Functions		・Providing safety during maintenance inspections, such as by allowing easy wiring operations and protecting against electric shocks without the need to install a protective cover.	・Because there are only 3 main contacts and no auxiliary contacts installed, the contact area for attachment to the circuit board is reduced. ・An auxiliary contact unit can also be attached to provide auxiliary contacts.	・Can be used to protect motors against burning out when overloaded or under locking. Overload phase failure protection models (TH-T/N□KP), delayed trip models (TH-T/N□SR) and quick trip models (TH-T/N□FS, TH-T□FSKP & TH-N□KF) are also available.

	MS-T/N Series Magnetic Starters/Magnetic Contactors				
	Delay open type	Magnetic Starter with Overload, Phase Failure Protections	Magnetic Starter with Thermal Relays and Saturable Reactors	Magnetic Starters with Quick-trip Thermal Relays	Magnetic Starters with Push Button switch
	 MSO/S-T□DL	 MSO-T□KP	 MSO-T□SR	 MSO-T□FSKP	 MS-T□PM
	 MSO/S-N□DL	 MSO-N□KP	 MSO-N□SR	 MSO-N□FS/KF	 MS-N□PM
	・Contactor prevent instantaneous drop-out when connected motors, resulting from momentary voltage drop or power interruption caused by lighting or similar. Starter or contactor remain closed for 1 to 4 seconds. ・Uses ・Temporary memory circuits for automated control equipment, etc.	・Protection functionality is provided against motor overloads, locking and phase failure.	・Capable of providing protection against overloads and locking, and preventing unnecessary motions of thermal relays, for motors with long startup time or a large inrush current.	・Appropriate for protection of motors with a short allowed time during periods of locking, such as underwater motors and compressors.	・Because a push button is integrated to magnetic starter, it can be operated without installing a separate push button.

	Contactor type Contactor Relay				
	Standard (AC operated type)	DC operated type	Mechanically latched type	Delay open type	With fast wiring terminal
	 SR-T	 SRD-T	 SRL-T SRLD-T	 SR-T□DL	 SR/SRD-T□BC
	–	–	–	–	–
	・Can be used as control relays for magnetic contactors, etc., using the large number of electrical contacts to transmit signals.	・Can be used with DC control circuits. (The contact part can be used with both alternating or direct current)	・The switch's state is mechanically maintained, so that no release will occur during blackouts or drops in power voltage.	・Contactor prevent instantaneous drop-out when connected motors, resulting from momentary voltage drop or powor interruption caused by lighting or similar. Starter or contactor remain closed for 1 to 4 seconds.	・Providing safety during maintenance inspections, such as by allowing easy wiring operations and protecting against electric shocks without the need to install a protective cover.

Magnetic Contactor and Starters

Product designation by purpose	Optional Units (Magnetic Starters/Magnetic Contactors/Contactor Relays)	
	UT Series	UN Series
External appearance of representative models	 Operation coil surge absorber unit UT-SA  Auxiliary contact blocks UT-AX  Mechanical interlocks UT-ML  DC/AC interface unit for operating coils UT-SY  Single attachment unit UT-HZ  Reset release for thermal relays UN-RR	 Protective cover units for charging parts UN-CV/UN-CZ  Protective cover units for terminals UN-CW  Operation coil surge absorber unit UN-SA  Auxiliary contact blocks UN-AX  Auxiliary contact unit with contacts for low level signals UN-LL22  DC/AC interface unit for operating coils UN-SY  LED display for thermal relays UN-TL  Mechanical interlocks UN-ML  Reset release for thermal relays UN-RR
Purpose/ Functions	・These products can be easily attached to, or combined with, magnetic contactors, contactor relays and thermal relays. Please choose the appropriate product to match your intended purpose. ・Uses ・UT/UN-CV/CZ: Protection of the charging part ・UT/UN-SA: Suppressing switching surges in the coil ・UN-LL: Switching of low voltage and minute electric current ・UT/UN-SY: Making it possible to switch magnetic contactors operating on alternating current using programmable controller output (24VDC) ・UN-TL: Displaying whether thermal relays are tripped. ・UT/UN-ML: Preventing simultaneous closure of reversing magnetic contactors ・UT/UN-RR: Enabling thermal resets outside the control board ・UT/UN-CW: Protection of the terminal part ・UT/UN-AX: Increasing the number of auxiliary contacts	

Product designation by purpose	Related Components		
	Solid State Contactors	Optional Unit for Use with Solid State Contactors	Electronic Motor Protection Relay
External appearance of representative models	 US-N  US-K  US-H	 Driving unit with output UA-SH  Driving unit UA-DR1  Power control unit UA-PC	 ET-N
Purpose/ Functions	・High frequency switching, maintenance free, long life products that are ideal for applications where a switching sound is not desired. ・Uses ・Facilities such as hotels and clean rooms ・Heater load switch for equipment such as injection molding machines	・The range of applications is expanded when used in combination with US-N/K US-H series solid state contactors. ・Uses ・UA-DR1: For controlling alternating current control circuits ・UA-PC: For power control	・Electronic motor protection relay capable of protecting against overloads, locking and phase failure during startup and operation of alternating current motors, and detecting phase reversals.

	Definite Purpose Magnetic Starters, Connectors and Contactor Relays			Definite Purpose Magnetic Contactors
	DC Interface Contactors	NC Main Contact Contactors	DC Contactors	Medium Voltage Vacuum Contactors
	 MSOD-Q  SD-Q  SD-QR (Reversing)	 B(D)-N	 DU(D)-N	 SH-V
	・Can be operated directly using transistor output (24VDC0.1A) from programmable controllers, etc.	・b contacts (always closed contacts) are used as the main circuit contacts, so it has applications in motor controls and power switches for electric light circuits. ・Uses ・For short circuits during the startup resistance of motors ・For ensuring smooth startup of alternating current motors	・Can be applied to controlling direct current motors of 440V or under and switching of general direct current circuits ・Uses ・Controller for variable speed motors ・For use in dynamic brakes	・Exceptionally safe high capacity magnetic contactor with no arcing, as a result of the breaker inside the vacuum bulb

	Related Components			Low Voltage / Reduced Voltage Starter
	Pneumatic Time Delay Relays	Voltage Detecting Relay	Re-Starting Relay	Star-Delta Starters
	 SRT(D)-N	 SRE	 UA-DL2	 EYD/EY/EYF-N
	・A pneumatic timer for time intervals between 0.1 and 60 seconds where a precise time interval is not required.	・Can be used for detecting drops in power supply voltage, such as for switching to private power generation as a result of a power outage, or when used in a voltage drop alarm.	・A relay that automatically restarts a loaded device, that has stopped as a result of voltage drops for a short time and momentary blackouts, upon the resumption of power supply. ・Uses ・Motor and heater overload circuits for various kinds of industrial plants	・Can be used to reduce electrical and mechanical shock by reducing startup voltage and controlling startup torque.

MS-T Series Introduction

Down-sizing Small

10A frame model is over 16% smaller with a width of just 36mm!!

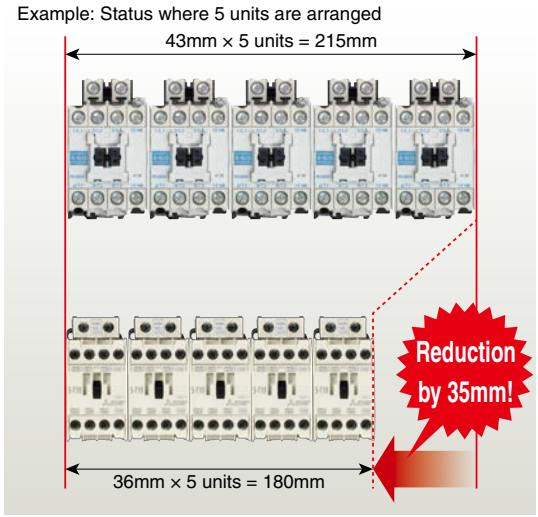
There is a saying that "every bit helps" and now with the industries smallest* general purpose Magnetic Contactor in its class, customers are able to more easily down-size their boards than ever before.

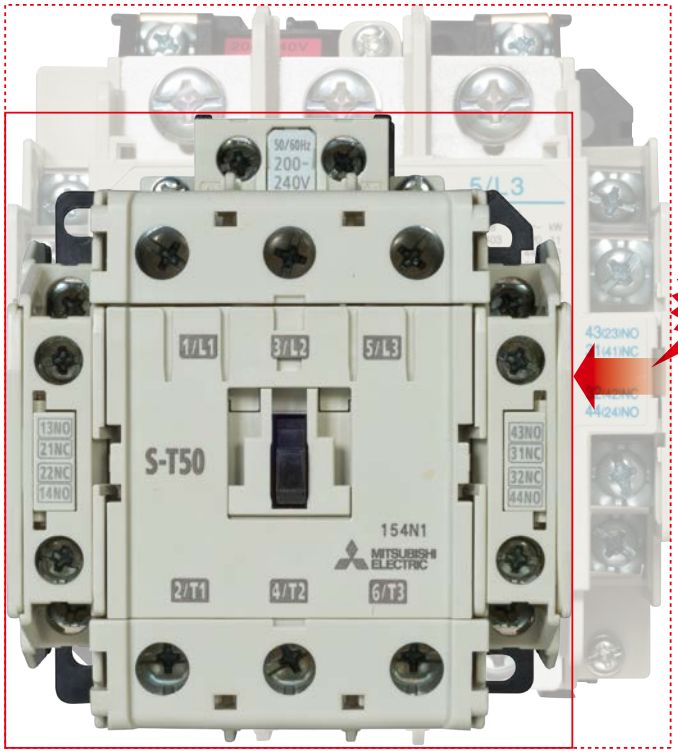
For AC-operated 10A frame class general-purpose Magnetic Contactor (based on survey conducted by Mitsubishi dated September 2016)



S-T10 (actual size)

Example: Status where 5 units are arranged

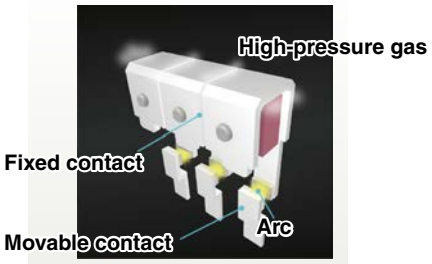




S-T50 (actual size)

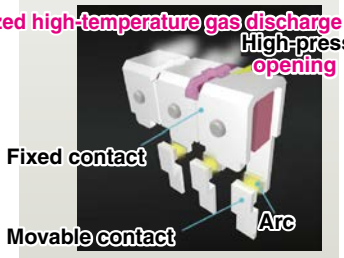
The optimized high-temperature gas discharge structure and arc runner shape streamline the outline dimensions!!

Traditional MS-N Series

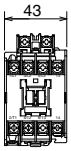
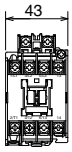
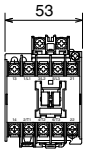
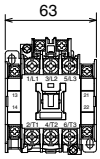
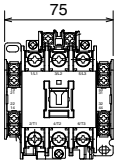
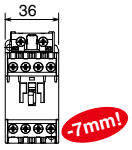
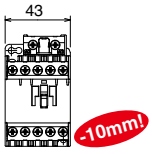
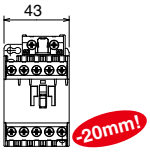
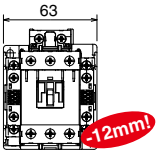
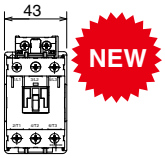


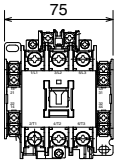
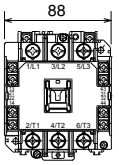
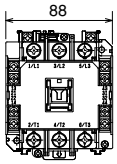
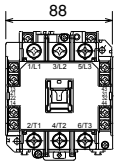
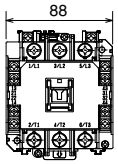
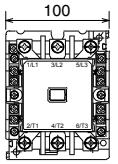
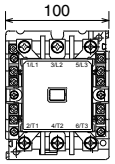
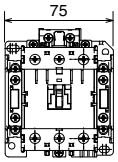
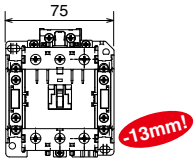
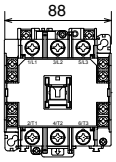
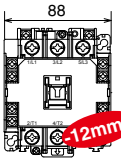
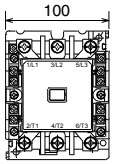
New MS-T Series

Optimized high-temperature gas discharge structure

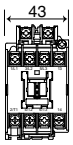
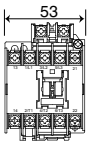
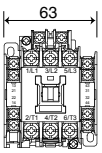
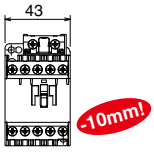
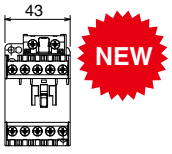
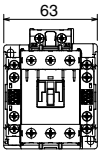
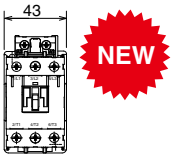


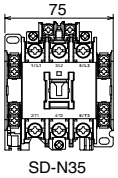
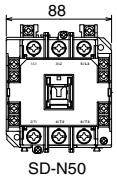
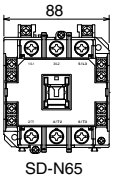
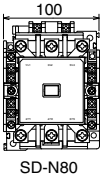
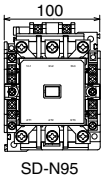
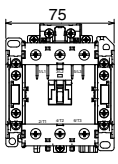
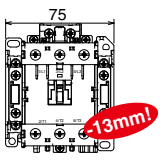
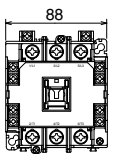
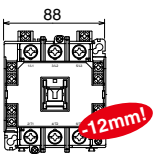
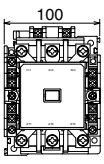
<AC operated type>

Frame size		11A	13A		20A	25A	32A
Traditional MS-N Series	Front view	 S-N10	 S-N11 (Auxiliary 1-pole)	 S-N12 (Auxiliary 2-pole)	 S-N20	 S-N25	–
New slimline MS-T Series	Front view	 -7mm! S-T10	 -10mm! S-T12 (Auxiliary 2-pole)		 -20mm! S-T20	 -12mm! S-T25	 NEW S-T32

Frame size		35A	50A		65A		80A	100A
Traditional MS-N Series	Front view	 S-N35	 S-N50	 S-N50AE	 S-N65	 S-N65AE	 S-N80	 S-N95
New slimline MS-T Series	Front view	 S-T35	 -13mm! S-T50		 S-T65		 -12mm! S-T80	 S-T100

<DC operated type>

Front view		13A		18A	20A	32A
Traditional SD-N Series	Front view	 SD-N11	 SD-N12	–	 SD-N21	–
New slimline SD-T Series	Front view	 -10mm! SD-T12		 NEW SD-T20	 SD-T21	 NEW SD-T32

Front view		35A	50A	65A	80A	100A
Traditional SD-N Series	Front view	 SD-N35	 SD-N50	 SD-N65	 SD-N80	 SD-N95
New slimline SD-T Series	Front view	 SD-T35	 -13mm! SD-T50	 SD-T65	 -12mm! SD-T80	 SD-T100

Standardization

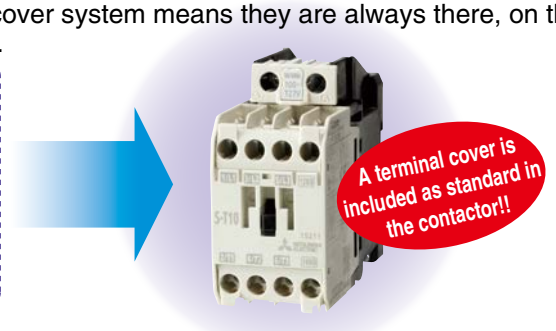
New integrated terminal covers

Target frame : 10A to 50A frame

The perennial issues of remembering to order the terminal covers, fitting them correctly or loosing them in the process are challenges of the past. The integrated terminal cover system means they are always there, on the Magnetic Contactor or its Auxiliary contact, ready to be used.



Traditional solution: Cover + Contactor



Reduce your coil inventory by up to 50%

Target frame : 10A to 35A frame

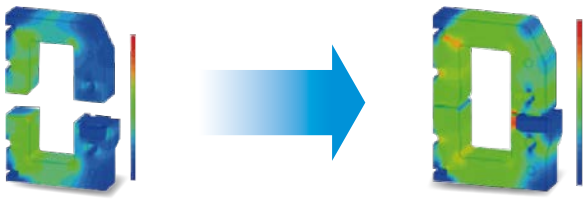
The 14 types of operation coil ratings available with the SN Series have been halved to 8 types with that increasing the applicable voltage range. Users can reduce their inventory, and by integrating the types of coils manufactured, a shorter delivery can be realized.

Coil designation	Rated voltage [V]	
	50Hz	60Hz
12VAC	12	12
24VAC	24	24
48VAC	48–50	48–50
100VAC	100	100–110
120VAC	110–120	115–120
127VAC	125–127	127
200VAC	200	200–220
220VAC	208–220	220
230VAC	220–240	230–240
260VAC	240–260	260–280
380VAC	346–380	380
400VAC	380–410	400–440
440VAC	415–440	460–480
500VAC	500	500–550

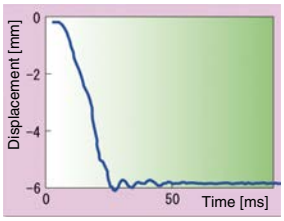
Coil designation	Rated voltage [V]
	50Hz/60Hz
12VAC	12
24VAC	24
48VAC	48–50
100VAC	100–127
200VAC	200–240
300VAC	260–340
400VAC	380–440
500VAC	460–550

* The conventional eight types are available for the 50A and larger frames.

By integrating the electromagnetic field analysis and drive analysis, inconsistency in the electromagnetic attraction force is suppressed and rise of the coil temperature is reduced.



OFF state　　ON state



When 150VAC 60Hz is applied on 200VAC coil

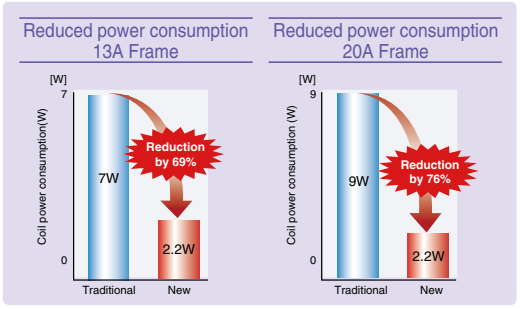
Capable of direct drive with transistor output of PLC, etc

Target frame : 10A to 32A frame *DC-operated models

The adopted high-efficiency polarized electromagnet greatly reduces the coil power consumption, and enables all models to be directly driven with a 24VDC, 0.1A rating transistor output. (24VDC coil)

	Conventional Model	New Model	Lowering Rate
13A Frame (Coil:12/24VDC)	7W	2.2W	69%
20A Frame (Coil:12/24VDC)	9W	2.2W	76%
32A Frame (Coil:12/24VDC)	–	2.2W	–

*48VDC to 220VDC:3.3W



Safety & Quality

Terminal cover with finger protection function

Target frame : 10A to 50A frames

In addition to the Magnetic Contactor, a terminal cover has been provided as a standard for the thermal, magnetic relay and auxiliary contact unit options. This realizes a finger protection function that complies with the DIN and VDE Standards, prevents electric shocks, and increases safety during maintenance and inspections.
[Finger Protection]
In the provisions regarding worker safety and accident protection during use of low-voltage switchgear and control-gear assemblies set forth with DIN EN 50274/VDE 0660 Teil 514, the range for providing protection against contact of live sections is divided into "Finger Safe (preventing finger contact)" and "Back of hand safe (protecting back of hand contact), and standards are provided. The MS-T Series terminal cover satisfies the requirements of these provisions.



A light touch

Target frame : All S-T Series

The MS-T Series' auxiliary contacts can operate with load as light as 20V 3mA making it suitable for direct control/operation from a PLC output.



Smart wiring

Smart design means Smart wiring

Target frame : 10A to 50A frames

The integrated terminal covers have an additional benefit in that they act as a guide to improve wiring efficiency but also retain the terminal screw in place: no mislaying the screw, no dropping it or having trouble reinserting it in to the terminal block just fast efficient wiring. Fast wiring terminals (model name with suffix “BC”) are also available to further improve wiring efficiency, workability and hence productivity.



① Screw holder lifts up the screw.
② Insert a ring crimp lug
③ Tighten the screw

Easy branch circuit wiring with Motor Circuit Breaker and optional connection conductor unit

Target frame : 10A to 32A frames

Easy wiring is available for the new MS-T Series by using the Motor Circuit Breaker and optional connection conductor unit, contributing your productivity improvement.



Global Standard Global Standard

Complies with main International Standards

In addition to compliance with the main International Standards including IEC, JIS, UL, CE, and CCC, we plan to acquire compliance with Shipping Standards and other International Standards.
We hope to contribute to your business expansions overseas.

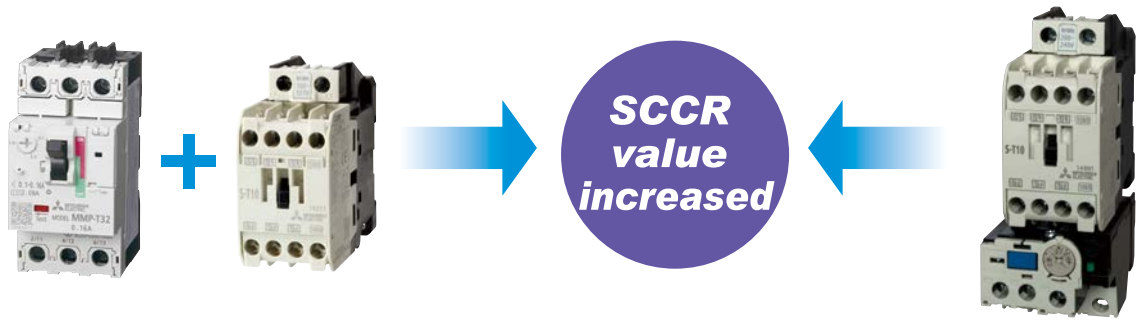
	Applicable standard					Safety certification standard
	International	Japan	European countries		China	U.S. & Canada
Standards	IEC Note	JIS	EN EC directive	Certificate authority	GB	c UL us
			CE	TÜV Rheinland	CCC	

Note : Also compliant with the requirements for mirror contacts comply with IEC60947-4-1 Annex F.

Higher SCCR value achieved by using with Motor Circuit Breaker

When the MMP-T Series and the MS-T Series are used together, the higher SCCR (UL short-circuit current rating) value, can be achieved. That will be a great support for your business in North America.

* For details on the SCCR value when used in combination with the Motor Circuit Breaker, refer to the Motor Circuit Breaker catalog.



List of Produced Models

●Magnetic Starters/Magnetic Contactors (NonReversing)

New release

Frame				T10	T12	T20	T21	T25	T32	T35	T50	T65	T80	T100	N125	N150	N180	N220	N300	N400	N600	N800
Category AC-3 Rated capacity [kW]		220V		2.5 [2.2]	3.5 [2.7]	4.5 [3.7]	5.5 [4]	7.5 [5.5]	7.5 [7.5]	11 [7.5]	15 [11]	18.5 [15]	22 [19]	30 [22]	30	37	45	55	75	110	160	200
		440V		4 [2.7]	5.5 [4]	7.5 [7.5]	11 [7.5]	15 [11]	15 [15]	18.5 [15]	22 [22]	30 [30]	45 [37]	55 [45]	60	75	90	110	150	200	300	400
Auxiliary contact (Note 6)		standard		1a	1a1b	1a1b	← 2a2b →		—	← 2a2b →												
Model Name		special		1b	2a	2a	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Magnetic Starters	Enclosed	Standard specifications	MS-□	○	○	–	○	–	–	○	○	○	○	○	○	○	○	○	○	○	–	–
		With push button	MS-□PM	○	○	–	○	–	–	○	○	○	○	○	–	–	–	–	–	–	–	–
		3-element (2E) thermal	MS-□KP	○	○	–	○	–	–	○	○	○	○	○	○	○	○	○	○	○	–	–
		Open time quick motion type	MS-□QM	–	–	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	–	–
	Open type	Standard specifications	MSO-□	○	○	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	–	–
			MSOD-□	–	○	○	○	–	–	○	○	○	○	○	○	○	–	○	○	○	–	–
		3-element (2E) thermal	MSO-□KP	○	○	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	–	–
			MSOD-□KP	–	○	○	○	–	–	○	○	○	○	○	○	○	–	○	○	○	–	–
		With saturable reactor	MSO-□SR	○	○	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	–	–
			MSOD-□SR	–	○	○	○	–	–	○	○	○	○	○	○	○	–	○	○	○	–	–
		3-element (2E) thermal With saturable reactor	MSO-□KPSR	–	–	–	○	○	–	○	○	○	○	○	○	○	○	○	○	○	–	–
			MSOD-□KPSR	–	–	–	○	–	–	○	○	○	○	○	○	○	–	○	○	○	–	–
		2-element Quick-acting characteristics thermal	MSO-□FS	–	–	–	○	○	–	○	○	○	○	○	–	–	–	–	–	–	–	–
			MSOD-□FS	–	–	–	○	–	–	○	○	○	○	○	–	–	–	–	–	–	–	–
		3-element (2E) Quick-acting characteristics thermal	MSO-□FSKP	○	○	○	○	○	–	○	○	○	○	○	–	–	–	–	–	–	–	–
			MSOD-□FSKP	–	○	○	○	–	–	○	○	○	○	○	–	–	–	–	–	–	–	–
		3-element (2E) Quick-acting characteristics thermal	MSO-□KF	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Open time quick motion type	MSO-□QM	–	–	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	–	–
		Surge absorber mounted type	MSO-□SA	○	○	○	○	○	–	○	○	–	–	–	–	–	–	–	–	–	–	–
			MSOD-□SA	–	○	○	○	–	–	○	○	–	–	–	–	–	–	–	–	–	–	–
		Wiring streamlining terminal	MSO-□BC	○	○	○	○	○	–	○	○	–	–	–	–	–	–	–	–	–	–	–
			MSOD-□BC	–	○	○	○	–	–	○	○	–	–	–	–	–	–	–	–	–	–	–
		Anticorrosion treatment	MSO-□YS	○	○	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○	–	–
			MSOD-□YS	–	○	○	○	–	–	○	○	○	○	○	○	○	–	○	○	○	–	–
		Delay open type	MSO-□DL	–	○	–	○	–	–	○	○	○	○	○	–	○	–	○	○	○	–	–
		Mechanically latched type	MSOL-□	–	–	–	○	–	–	○	○	○	○	○	○	○	–	○	○	○	–	–
			MSOLD-□	–	–	–	○	–	–	○	○	○	○	○	○	○	–	○	○	○	–	–
		With terminal cover	MSO-□CW	–	–	–	–	–	–	–	–	○	○	–	–	–	–	–	–	–	–	–
Magnetic Contactors	Open type	Standard specifications	S-□	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			SD-□	–	○	○	○	–	○	○	○	○	○	○	○	○	–	○	○	○	○	○
		Surge absorber mounted type	S-□SA (Note3)	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–
			SD-□SA	–	○	○	○	–	○	○	○	–	–	–	–	–	–	–	–	–	–	–
		Anticorrosion treatment	S-□YS	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	○	○	○	○
		Open time quick motion type	S-□QM	–	–	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	–	–
		Wiring streamlining terminal	S-□BC	○	○	○	○	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–
			SD-□BC	–	○	○	○	–	○	○	○	–	–	–	–	–	–	–	–	–	–	–
		With terminal cover	S-□CW	–	–	–	–	–	–	–	–	○	○	–	–	–	–	–	–	–	–	–
		Delay open type	S-□DL	–	○	–	○	–	–	*	*	*	*	*	–	○	–	○	○	○	–	–
		Mechanically latched type	SL-□	–	–	–	○	–	–	○	○	○	○	○	○	○	–	○	○	○	○	○
			SLD-□	–	–	–	○	–	–	○	○	○	○	○	○	○	–	○	○	○	○	○
		Class 2 heat resistance	S-□FN	–	○	–	○	–	–	*	*	–	*	*	–	○	–	–	–	○	–	–
		Class 2 heat resistance Mechanically latched type	SL-T□FN	–	–	–	○	–	–	–	*	–	*	*	–	○	–	–	–	○	–	–
			SLD-T□FN	–	–	–	○	–	–	–	*	–	*	*	–	○	–	–	–	○	–	–

Note 1: The figure in the square brackets indicates the rated current shown on the rating plate of the product at which the category AC-3 opening/closing durability is 2,000,000 times (1,000,000 times for the T20 380V). Refer to the electric durability curve for the life performance.

● Magnetic Starters/Magnetic Contactors (Reversing)

New release

Frame			2X T10	2X T12	2X T20	2X T21	2X T25	2X T32	2X T35	2X T50	2X T65	2X T80	2X T100	2X N125	2X N150	2X N180	2X N220	2X N300	2X N400	2X N600	2X N800
Category AC-3 Rated capacity [kW]		220V	2.5 [2.2]	3.5 [2.7]	4.5 [3.7]	5.5 [4]	7.5 [5.5]	7.5 [7.5]	11 [7.5]	15 [11]	18.5 [15]	22 [19]	30 [22]	30	37	45	55	75	110	160	200
		440V	4 [2.7]	5.5 [4]	7.5 [7.5]	11 [7.5]	15 [11]	15 [15]	18.5 [15]	22 [22]	30 [30]	45 [37]	55 [45]	60	75	90	110	150	200	300	400
Auxiliary contact (Notes 4 to 6)		Standard	(1a×2) +2b	(1a1b×2)+2b					← 2a2b×2					→	← 3a3b×2				→	← 4a4b×2	→
Model Name		Special	(1b×2) +2b	(2a×2)+2b		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Magnetic Starters	Enclosed	Standard specifications	MS-□	—	—	—	○	—	—	○	○	○	○	○	○	○	○	○	○	○	—	—
	Enclosed	3-element (2E) thermal	MS-□KP	—	—	—	○	—	—	○	○	○	○	○	○	○	○	○	○	○	—	—
	Open type	Standard specifications	MSO-□	○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□	—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		3-element (2E) thermal	MSO-□KP	○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□KP	—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		With saturable reactor	MSO-□SR	○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□SR	—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		3-element (2E) thermal With saturable reactor	MSO-□KPSR	—	—	—	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□KPSR	—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		2-element Quick-acting characteristics thermal	MSO-□FS	—	—	—	○	○	—	○	○	○	○	○	—	—	—	—	—	—	—	—
			MSOD-□FS	—	—	—	○	—	—	○	○	○	○	○	—	—	—	—	—	—	—	—
		3-element (2E) Quick-acting characteristics thermal	MSO-□FSKP	○	○	○	○	○	—	○	○	○	○	○	—	—	—	—	—	—	—	—
			MSOD-□FSKP	—	○	○	○	—	—	○	○	○	○	○	—	—	—	—	—	—	—	—
		3-element (2E) Quick-acting characteristics thermal	MSO-□KF	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Surge absorber mounted type	MSO-□SA	○	○	○	○	○	—	○	○	—	—	—	—	—	—	—	—	—	—	—
			MSOD-□SA	—	○	○	○	—	—	○	○	—	—	—	—	—	—	—	—	—	—	—
		Wiring streamlining terminal	MSO-□BC	○	○	○	○	○	—	○	○	—	—	—	—	—	—	—	—	—	—	—
			MSOD-□BC	—	○	○	○	—	—	○	○	—	—	—	—	—	—	—	—	—	—	—
		With terminal cover	MSO-□CW	—	—	—	—	—	—	—	—	○	○	—	—	—	—	—	—	—	—	—
		Anticorrosion treatment	MSO-□YS	○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□YS	—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		Mechanically latched type	MSOL-□	—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
			MSOLD-□	—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
Magnetic Contactors	Open type	Standard specifications	S-□	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			SD-□	—	○	○	○	—	○	○	○	○	○	○	○	○	—	○	○	○	○	○
		Surge absorber mounted type	S-□SA (Note3)	○	○	○	○	○	○	○	○	—	—	—	—	—	—	—	—	—	—	—
			SD-□SA	—	○	○	○	—	○	○	○	—	—	—	—	—	—	—	—	—	—	—
		Anticorrosion treatment	S-□YS	—	—	—	—	—	—	○	○	○	○	○	○	○	○	○	○	○	○	○
		Wiring streamlining terminal	S-□BC	○	○	○	○	○	○	○	○	—	—	—	—	—	—	—	—	—	—	—
			SD-□BC	—	○	○	○	—	○	○	○	—	—	—	—	—	—	—	—	—	—	—
		With terminal cover	S-□CW	—	—	—	—	—	—	—	—	○	○	—	—	—	—	—	—	—	—	—
		Mechanically latched type	SL-□	—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	○	○
			SLD-□	—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	○	○
		Class 2 heat resistance	S-□FN	—	○	—	○	—	—	○	○	—	○	○	—	○	—	—	—	○	—	—
		With reversible conductor (both power supply and load side)	S-□SD	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			SD-□SD	—	○	○	○	—	○	○	○	○	○	○	○	○	—	○	○	○	○	○
		3-pole common on power supply side with crossover conductor	S-□SG	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			SD-□SG	—	○	○	○	—	○	○	○	○	○	○	○	○	—	○	○	○	○	○
		3-pole common on load side with crossover conductor	S-□SX	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			SD-□SX	—	○	○	○	—	○	○	○	○	○	○	○	○	—	○	○	○	○	○
		3-pole reverse-phase switch on load side with crossover conductor	S-□SF	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			SD-□SF	—	○	○	○	—	○	○	○	○	○	○	○	○	—	○	○	○	○	○

Notes 1: —indicates out of manufacturing range, and * indicates to be released soon.
2: The value given in brackets for the Class AC-3 rated capacity applies to the enclosed Magnetic Starter.
3: The T65 to N800 type AC operation coils are a surge absorber-installed type so the coil does not generate an open/close surge. Therefore, the surge absorber for coils is not required.
4: The +2b for the T10 to T20 auxiliary contact arrangements in the Reversing type represents the b contact built into the UT-ML11 interlock unit. This does not need to be specified when ordering.
5: For the auxiliary contact arrangement in the reversing type, the auxiliary contact arrangement combination for two Magnetic Contactors is indicated as ×2. When using the standard contact arrangement, there is no need to make a special designation, but when using the special arrangement, designate the contact arrangement for two units.
<Designation example> In case of 1b × 2 + 2b: 2B
6: The auxiliary contact arrangement for the mechanically latched type differs from the delay open type.

●Thermal Overload Relays

New release

Frame			T18	T25	T50	T65	T100	N120	N120TA	N220	N400	N600
Heater designation (Standard specifications)			0.12 to 15	0.24 to 22	24 to 50	12 to 65	54 to 100	42 to 82	105 to 125	82 to 180	105 to 330	250 to 660
Thermal Overload Relays	Standard specifications	TH-☐	○	○	○	○	○	○	○	○	○	○
	With saturable reactor	TH-☐SR	○	○	○	○	○	○	○	○	○	○
	2-element Quick-acting characteristics thermal	TH-☐FS	—	○	○	○	○	—	—	—	—	—
	3-element (2E) thermal	TH-☐KP	○	○	○	○	○	○	○	○	○	○
	3-element (2E) thermal With saturable reactor	TH-☐KPSR	—	○	○	○	○	○	○	○	○	○
	3-element (2E) Quick-acting characteristics thermal	TH-☐FSKP	○	○	○	○	○	—	—	—	—	—
		TH-☐KF	—	—	—	—	—	—	—	—	—	—
	With terminal cover	TH-☐CW	—	—	—	○	—	—	—	—	—	—
	Wiring streamlining terminal	TH-☐BC	○	○	○	—	—	—	—	—	—	—
	Anticorrosion treatment	TH-☐YS	○	○	○	○	○	○	○	○	○	○

Note 1: —indicates out of manufacturing range.

●Contactor Relays

Frame		T5	T9
Number of contact		5	9
Contact arrangement		5a	9a
		4a1b	7a2b
		3a2b	5a4b
Standard	SR-☐	○	○
DC operated type	SRD-☐	○	○
Mechanically latched type	SRL-☐	○	—
	SRLD-☐	○	—
With large rated auxiliary contacts	SR-☐JH	○	○
	SRD-☐JH	○	○
With overlap contact	SR-☐LC	○	○
	SRD-☐LC	○	○
Delay open type	SR-☐DL	○	○
With fast wiring terminal	SR-☐BC	○	○
	SRD-☐BC	○	○
With surge absorber	SR-☐SA	○	○
	SRD-☐SA	○	○

Notes 1: —indicates out of manufacturing range.
2: Refer to the individual rating table for the contact rating when using a type with large capacity contact or type with overlap contact. The value given in brackets is the value for switching the load with two poles installed in a series.
3: When using the mechanically latched type (SRL-☐, SRLD-☐), one each can be mounted on the opening coil and closing coil.
4: Only the side-on auxiliary contact unit UT-AX11 can be mounted on the mechanically latched type SRL-T5 or SRLD-T5. Only UN-AX11 can be mounted on SRL-N4 or SRLD-N4.
5: Both the surge absorber unit and DC/AC interface unit cannot be additionally mounted onto the Contactor Relay's coil terminal.
6: A live section protection cover is provided as a standard.
7: The minimum applicable load level for the contacts at the SR(D)-T9 head-on section (four terminals on upper level) is the same as UT-AX2/4.

Composition of the Model Code

Magnetic Starters

Note 1. For details of product manufacturing specifications and applicable devices, please refer to the table of all models manufactured (pages 871 and 872) and also to the individual pages for each model. Also, some combinations of model codes may not be able to be manufactured. If you are uncertain about whether particular models can be combined, please contact us for further advice.

●Enclosed Magnetic Starters

MS — 2× T21 KP SA PM

Basic type	
MS	AC operated type

Non-Reversing/Reversing	
No code	Non-Reversing
2×	Reversing

Frame size
T10,T12,T21,T35,T50,T65,T80,T100

Combined Thermal Overload Relays	
No code	Manual reset (standard)
AR	Automatic reset

Combined Thermal Overload Relays	
No code	With 2-element Thermal Overload Relays
KP	With 3-element Thermal Overload Relays
FS	With 2-element quick trip type Thermal Overload Relays
FSKP	With 3-element quick trip type Thermal Overload Relays

Push-button operation (only non-reversible type)	
No code	Standard specifications without push-button
PM	With push-button (with thermal reset)
PS	With push-button (without thermal reset)

Operation coil specifications	
No code	Standard
SA	Surge absorber mounting type

●Open type Magnetic Starters

MSO — 2× T10 BC KP SA YS

Basic type	
MSO	AC operated type
MSOD	DC operated type
MSOL	Mechanically latched AC operated type
MSOLD	Mechanically latched DC operated type

Non-Reversing/Reversing	
No code	Non-Reversing
2×	Reversing

Frame size
T10-T100

Finger protection		Applicable model
No code	Standard	T10-T50
BC	With fast wiring terminal	
CW	With terminal cover	T65, T80

Reset method of Thermal Overload Relays	
No code	Manual reset (standard)
AR	Automatic reset

Combined Thermal Overload Relays	
No code	With 2-element Thermal Overload Relays
KP	With 3-element Thermal Overload Relays
SR	With 2-element delay trip type Thermal Overload Relays
KPSR	With 3-element delay trip type Thermal Overload Relays
FS	With 2-element quick trip type Thermal Overload Relays
FSKP	With 3-element quick trip type Thermal Overload Relays

Special environment		Applicable model
No code	Standard	T10-T100
YS	Anticorrosion treatment specification	

Operation coil and operation circuit specification		Applicable model
No code	Standard	T10-T50
SA	With surge absorber	
DL	Delay open type	T12, T21

■Magnetic Contactors

S — 2× T10 BC SA

Basic type	
S	AC operated type
SD	DC operated type
SL	Mechanically latched AC operated type
SLD	Mechanically latched DC operated type

Non-Reversing/Reversing	
No code	Non-Reversing
2×	Reversing

Frame size
T10-T100

Finger protection		Applicable model
No code	Standard	T10-T50
BC	With fast wiring terminal	
CW	With terminal cover	T65, T80

Operation coil and operation circuit specification		Applicable model
No code	Standard	T10-T50
SA	With surge absorber	
DL	Delay open type	T12, T21

With special auxiliary contact		Applicable model
No code	Standard	All series
JH	With large rated auxiliary contacts	T10-T100

Thermal Overload Relays

TH — T18 BC KP YS

Basic type

TH	Thermal Overload Relays

Frame size

T18, T25, T50, T65, T100

Note: Frame size classification by mounting type
Magnetic Starters for independent mounting → T25
For Magnetic Starters → T18

Reset method of Thermal Overload Relays

No code	Manual reset (standard)
AR	Automatic reset
Combined Thermal Overload Relays	
No code	2-element Thermal Overload Relays
KP	3-element Thermal Overload Relays
SR	2-element delay trip type (with saturable reactor)
KPSR	3-element delay trip type (with saturable reactor)
FS	2-element quick trip type
FSKP	3-element quick trip type

Finger protection

		Applicable model
No code	Standard	T18, T25, T50
BC	With fast wiring terminal	
CW	With terminal cover	T65

Special environment

		Applicable model
No code	Standard	T18, T25, T50, T65, T100
YS	Anticorrosion treatment specification	

Contactor Relays

SR — T5 BC SA

Basic type

SR	AC operated type
SRD	DC operated type
SRL	Mechanically latched AC operated type
SRLD	Mechanically latched DC operated type

Frame size

T5, T9

Finger protection

		Applicable model
No code	Standard	T5, T9
BC	With fast wiring terminal	

Operation coil and operation circuit specification

		Applicable model
No code	Standard	T5, T9
SA	With surge absorber	

With special contact

		Applicable model
No code	Standard	T5, T9
JH	With large rated auxiliary contacts	
DL	Delay open type	
LC	With overlap contact	

Optional Units

UT — AX 4 BC

Basic type

UT	Optional units

Unit type

		Application
AX	Additional auxiliary contacts	UT
ML	Mechanical interlocks	UT
SA	Surge absorbers	UT
HZ	For thermal relay independent mounting	UT
SD	Reversible connection wire (conductor)	UT
SG	Crossover connection wire (conductor)	UT
SY	DC/AC interface for operation coil	UT

Finger protection

		Applicable model
No code	Standard	All units
BC	With fast wiring terminal	AX, ML, HZ

Unit specification, applicable model, and others

1 to 2-digit number

Explanation of terms

Item	Purpose	Meaning of terms	Name and display of representative models (Numbers go inside ☐)
1. Devices	(1) Magnetic starter (magnetic switch)	Combines an magnetic contactor and thermal relay.	Sealed model: MS Open model: MSO(D), MSOL(D)
	(2) Magnetic contactor	This is a contactor that switches the main contact parts using the power of the electromagnet. Accordingly, there are both AC and DC magnetic contactors, depending on the type of main circuit (AC or DC).	For use with both alternating current and direct current main circuits: S(D), SL(D) For use with direct current main circuits only: DU(D)
	(3) AC magnetic contactor	An magnetic contactor that uses an electromagnet powered by an AC power source.	S
	(4) DC magnetic contactor	An magnetic contactor that uses an electromagnet powered by a DC power source.	SD
	(5) Magnetic contactor with mechanical latch	A contactor where the contacts are closed (ON) by electrical (via a closing coil) or mechanical operation, and the closed state is maintained by the mechanical latch even if that controlling force is removed. Opening the circuit (OFF) is achieved by electrically (via a tripping coil) or mechanically tripping the contacts.	SL(D)
	(6) Delayed release magnetic contactor	A contactor that can maintain a closed circuit contact for a few seconds by discharging the capacitor, in the event of a voltage drop or momentary power interruption occurring to the control circuit.	S-☐DL
	(7) Reversing magnetic contactor	A magnetic contactor which can reverse the motor by switching the contacts	S-(D)-2x☐, SL(D)-2x☐
	(8) Thermal relay	When the motor experiences excess overcurrent (overload) as a result of overloading, locking or phase failure, the bimetal strips inside the relay are bent by the heat, which trips the output contacts on the magnetic contactor and opens the circuit, preventing the motor from burning out.	TH
2. Rating	(1) Rated insulation voltage	The voltage that is used as the standard for guaranteeing the withstand voltage and determining the insulation distance.	☐V (both AC and DC)
	(2) Rated operating voltage	The voltage that determines closed circuit capacity, interrupting capacity, switching frequency and switching durability.	☐-☐VAC, ☐VDC
	(3) Rated Capacity	The capacity of the maximum load capable of being applied at the rated operating voltage.	Motor ☐ ϕ ☐ kW, Resistance ☐ ϕ ☐ kW
	(4) Rated operating current	The maximum amount of current capable of being applied at the rated operating voltage while maintaining satisfactory performance.	AC-3☐A, AC-4☐A, DC1☐A
	(5) Open thermal current (Ith)	The amount of current that allows the passage of electric current for 8 hours without the temperatures of the individual parts rising above their rated values and without switching magnetic contactors.	Ith=☐A
	(6) Operating Coil	Drives the switching action of an magnetic contactor by magnetizing the iron core of an electromagnet and then demagnetizing it, creating and then removing the attractive force.	——
	・ Operating Coil Designations	The model code which must be specified at time of order and indicates a representative value of the rated operating voltage.	AC☐V, DC☐V
	・ Operating Coil Ratings	The rated operating voltage for the operating coil (nominal voltage) and the frequency (AC only).	☐V☐Hz, DC☐V
3. Performance	(1) Closed Circuit Capacity	The current value at which the circuit can be closed (contacts ON) under the conditions determined by the standard.	☐A
	(2) Interrupting Capacity	The current at which the circuit can be broken (contacts OFF) under the conditions determined by the standard.	☐A
	(3) Switching Frequency	The number of times the conductor can be switched under the conditions determined by the standard.	☐ times/hr
	(4) Switching Durability (Lifespan)	The maximum number of times an magnetic contactor can be switched, in actual operation without interference, under the conditions determined by the standard.	☐ x 10,000 times
	・ Mechanical durability	Durability against mechanical wear while being switched, without electrical current passing through the main circuit, under the conditions determined by the standard.	☐ x 10,000 times
	・ Electrical durability	Durability against electrical wear while being switched, with electrical current passing through the main circuit, under the conditions determined by the standard.	☐ x 10,000 times
4. Characteristic	(1) Operating Voltage	The minimum voltage, in the case where the magnetic contactor excites the operating coil, at which the contacts can be closed (ON). (In the case of mechanical latch format, closing voltage and tripping voltage)	☐ to ☐ V (Specified value: 85% or less of rated operating voltage)
	(2) Open voltage	Maximum voltage at which the contacts are opened (OFF), when the voltage applied to the magnetic contactor's operating coil is gradually reduced.	☐ to ☐ V (Specified value: 20% or more of rated operating voltage during alternating current operation 10% or more during direct current operation)
	(3) Operating time	The time from when the operating coil is excited, or from when it is demagnetized, until the operation of the contacts (ON or OFF) is completed.	☐ms
	(4) Operating Coil	[According to 2.(6)]	——
	・ Instantaneous power input	The instantaneous capacitance (input VA) immediately after the operating coil is excited. In the case of direct current operate, this is lower than the continuous power input.	Alternating current: ☐VA, Direct current: ☐W (=☐VA)
	・ Continuous power input	The capacitance of the coil (power consumption) after the operating coil has been excited and the contacts closed.	Alternating current: ☐VA, Direct current: ☐W (=☐VA)
5. Operation Others	(1) Inching	Inching or jogging is where the startup current is frequently switched by small rotations of the motor, etc.	——
	(2) Plugging (reverse phase braking)	Stopping the motor by suddenly switching the connection of the contacts to the reverse phase.	——
	(3) Self Maintenance of Status	This uses auxiliary a contacts of an magnetic contactor that has already been switched ON, to maintain the ON status of the circuit that passes current though the operating coil of that contactor, even if there is no ON signal. This is canceled by an OFF operation or a power interruption, etc.	
	(4) Interlock	As in the reversing format, when two magnetic contactors must not be set to ON at the same time, in order to make sure that one contactor cannot be switched to ON, the magnetic contactor that has already been switched ON prevents the other magnetic contactor from switching to ON. The two types of interlock are mechanical interlock, which uses a mechanical structure, and electrical interlock which uses auxiliary b contacts.	
	(5) a contact	This is a contact that is normally open, and which closes when power is supplied to the operating coil. It is also called an NO (Normally Open) contact.	—— 
	(6) b contact	This is a contact that is normally closed, and which opens when power is supplied to the operating coil. It is also called an NC (Normally Closed) contact.	
	(7) Main circuit	Circuits with a large electric current flow (from several A to around 1000A), such as motors and electric light circuits, etc., are switched by the main contact. (Terminal number between 1/L1-2/T1, 3/L2-4/T2, 5/L3-6/T3)	
	(8) Operating (control) circuit	Circuits with small current flows (from several tens of mA to several A), such as the operating coil of an magnetic contactor or display circuits, are switched with auxiliary a and b contacts.	——
	(9) Line starting	This is the most common way starting a motor, where the entire voltage is applied to the motor to start or stop it. Also called full voltage starting.	——
	(10) Star-delta starting	When starting the motor, the winding is arranged in a star to reduce the electrical and mechanical shock. After starting the winding is changed to a delta connection. The current used during starting is 1/3 of that for line starting, making this the cheapest reduced voltage starting method.	——
	(11) Category AC-3	Responsible for switching to start and stop the motor during continuous operation. (Durability testing uses 6 times the rated operating current for closing the circuit and current equal to the rated operating current for breaking the circuit)	
	(12) Category AC-4	Responsible for switching the startup current of the motor. (Durability testing uses 6 times the rated operating current for both closing and breaking the circuit), Can also be applied to inching and plugging.	
	(13) Category AC-1	Responsible for switching the electric heat and resistance load, etc., so that inrush current during starting is almost zero. (Durability testing uses current equal to the rated operating current for closing and breaking the circuit)	
	(14) 2E and 3E	2E: A motor protection relay that provides overloading/locking + phase failure protection, and has a thermal relay and electronics. 3E: An electronic motor protection relay that provides overload/locking + phase failure + antiphase (reverse phase) protection.	TH-☐KP, ET-N☐ ET-N☐

Coil characteristics

●Alternating voltage operation type

●For S-T10 to T50 types, SR-T5 and T9 types

Coil designation	Rated voltage [V] 50Hz/60Hz	Coil indication
24VAC	24	Rated voltage and frequency
48VAC	48-50	
100VAC	100-127	
200VAC	200-240	
300VAC	260-300	
400VAC	380-440	
500VAC	460-550	

Notes 1 : Even when the single rating (example: 200V60Hz) is specified for an order, the above rating voltage is indicated on the product.
2 : Even when the single rating (example: 200V60Hz) is specified for an order, the above rating voltage is indicated on the product.

●For S-T10SA to T50SA types, SR-T5SA and T9SA types

Coil designation	Rated voltage [V] 50Hz/60Hz	Coil indication	Varistor voltage [V]
24VAC	24	Rated voltage and frequency	120
48VAC	48-50		120
100VAC	100-127		470
200VAC	200-240		470
300VAC	260-300		910
400VAC	380-440		910

Notes 1 : Add "SA" to the end of the type name to order the operation coil surge absorber mounting type (varistor).
Example: S-T10SA 100VAC
2 : Even when the single rating (example: 200V60Hz) is specified for an order, the above rating voltage is indicated on the product.

●For S-N35, N50AE, N65AE, B-N20 types, For SR-K100 type, For SRT-NN/NF types

Coil designation	Rated voltage [V] 50Hz/60Hz		Coil indication
12VAC	12	12	Rated voltage and frequency
24VAC	24	24	
48VAC	48-50	48-50	
100VAC	100	100-110	
120VAC	110-120	115-120	
127VAC	125-127	127	
200VAC	200	200-220	
220VAC	208-220	220	
230VAC	220-240	230-240	
260VAC	240-260	260-280	
380VAC	346-380	380	
400VAC	380-415	400-440	
440VAC	415-440	460-480	
500VAC	500	500-550	

Note 1 : Even when the single rating (example: 200V60Hz) is specified for an order, the left rating voltage is indicated on the product.
Designations of the coils with the following voltage and frequency specifications are as follows.
220V60Hz→Designation 200VAC
380V50Hz→Designation 400VAC
240V50Hz→Designation 230VAC
220V50Hz→Designation 230VAC
415V50Hz→Designation 400VAC

●For S-N35SA, B-N20SA types, For SRT-NNSA/NFSA types

Coil designation	Rated voltage [V] 50Hz/60Hz		Coil indication	Varistor voltage [V]
12VAC	12	12	Rated voltage and frequency	120
24VAC	24	24		120
48VAC	48-50	48-50		120
100VAC	100	100-110		470
120VAC	110-120	115-120		470
127VAC	125-127	127		470
200VAC	200	200-220		470
220VAC	208-220	220		470
230VAC	220-240	230-240		470

Notes 1 : Add "SA" to the end of the model name to place an order for Magnetic Contactor with surge absorber (varistor).
Example: S-N35SA 100VAC
2 : Even when the single rating (example: 200V60Hz) is specified for an order, the left rating voltage is indicated on the product.
Designations of the coils with the following voltage and frequency specifications are as follows.
220V60Hz→Designation 200VAC
240V50Hz→Designation 230VAC
220V50Hz→Designation 230VAC
3 : Variations other than those indicated on the left cannot be manufactured.
4 : S-N50AE and N65AE are already equipped with a varistor. Therefore, no need to add "SA" to the end of model name for an order.

●For S-T65 to T100 types, For S-N50 to N800, B-N65/N100, DU-N30 to N 260 types

Coil designation	Rated voltage [V] 50Hz/60Hz	Coil indication
24VAC (Note 1)	24	Rated voltage and frequency
48VAC (Note 1)	48-50	
100VAC	100-127	
200VAC	200-240	
300VAC	260-350	
400VAC	380-440	
500VAC	460-550	

Notes 1 : The 24VAC and 48VAC coils for the following model names cannot be manufactured.
24VAC coil: S-N180/N220, N300/N400, N600/N800
DU-N180, N260
48VAC coil: S-N600/N800
2 : The coil ratings are different for some application models such as the delay open type (S-T□DL, S-N□DL). Please refer to the corresponding page.

●For S-T65QM to T100QM types, For S-N50QM to N400QM types

Coil designation	Rated voltage [V] 50Hz/60Hz	Coil indication
100VAC	100-127	Rated voltage and frequency
200VAC	200-240	

Note 1 : Variations other than coil designations of 100VAC and 200VAC cannot be manufactured.

Coil designation is the model code which must be specified at time of order. For information about whether or not a product with a special coil of the rated voltage designation can be manufactured, please contact your dealer or our company. Note that a special coil is manufactured without certifications for the various standards (no standard marks).

●DC operated type

●For SD-T12 to T100 types, SRD-T5 and T9 types

Coil designation	Rated voltage	Coil indication
12VDC	12VDC	Rated voltage
24VDC	24VDC	
48VDC	48VDC	
100VDC	100VDC	
110VDC	110VDC	
125VDC	120-125VDC	
200VDC	200VDC	
220VDC	220VDC	

Notes 1 : The operating coil terminal has a polarity (excluding T35 to T100 types). Connect the positive side to terminal number A1 (+) and the negative side to A2 (-).
2 : If the operation power supply is a rectifier, open and close the coil on the DC side.

●For SD-T12SA to T50SA types, SRD-T5SA and T9SA types

Coil designation	Rated voltage	Coil indication	Varistor voltage [V]
12VDC	12VDC	Rated voltage	47
24VDC	24VDC		47
48VDC	48VDC		120
100VDC	100VDC		470
110VDC	110VDC		470
125VDC	120-125VDC		470
200VDC	200VDC		470
220VDC	220VDC		470

Notes 1 : If the type with surge absorber for operation coil (varistor) is required, add “SA” to the end of the model when placing your order. Example: SD-T21SA 100VDC
2 : The operating coil terminal has a polarity (excluding T35SA to T50SA types). Connect the positive side to terminal number A1 (+) and the negative side to A2 (-).
3 : Variations other than the above cannot be manufactured.

●For SD-N35 to SD-N400, BD-N20 to N100, DUD-N30 to N260 types, For SRD-K100 type, For SRTD-NN/NF types

Coil designation	Rated voltage	Coil indication
12VDC	12VDC	Rated voltage
24VDC	24VDC	
48VDC	48VDC	
100VDC	100VDC	
110VDC	110VDC	
125VDC	120-125VDC	
200VDC	200VDC	
220VDC	220VDC	

Notes 1 : The coils do not have polarity.
2 : If the operation power supply is a rectifier, open and close the coil on the DC side.
3 : Two coils are internally connected in series for SD-N80 to SD-N400 and DUD-N60 to DUD-N260 types.

●For SD-N35SA, SRTD-NNSA/NFSA types, For BD-N20SA type

Coil designation	Rated voltage	Coil indication	Varistor voltage [V]
12VDC	12VDC	Rated voltage	120
24VDC	24VDC		120
48VDC	48VDC		120
100VDC	100VDC		470
110VDC	110VDC		470
125VDC	120-125VDC		470
200VDC	200VDC		470
220VDC	220VDC		470

Notes 1 : Add “SA” to the end of the model name to place an order for Magnetic Contactor with surge absorber (varistor).
Example: SD-N21SA 100VDC
2 : The coils do not have polarity.
3 : Variations other than the above cannot be manufactured.

●For D-N600/N800 types

Coil designation	Rated voltage	Coil indication
24VDC	24VDC	Rated voltage
48VDC	48VDC	
100VDC	100-110VDC	
125VDC	120-125VDC	
200VDC	200-220VDC	

Notes 1 : The operating coil terminal has polarity. Connect the positive side to terminal number A1 (+) and the negative side to A2 (-).
2 : If the operation power supply is a rectifier, open and close the coil on the DC side.
3 : Products with the 12VDC coil designation cannot be manufactured.

●Mechanically latched type

●For SL(D)-T21 to T100, SL(D)-N35 to SL(D)-N800, SRL(D)-T5 types

For alternating current		
Coil designation	Rated voltage [V] 50Hz/60Hz	Coil indication
100VAC	100-127	Rated voltage and frequency
200VAC	200-240	
300VAC	260-350	
400VAC	380-440	
500VAC	460-550	

For direct current		
Coil designation	Rated voltage	Coil indication
12VDC (Note 2)	12VDC	Rated voltage
24VDC	24VDC	
48VDC	48VDC	
100VDC	100V-110VDC	
125VDC	120V-125VDC	
200VDC	200V-220VDC	

Notes 1 : In addition to the alternating current coils with the rated voltages and frequencies indicated on the left, products with the following can be manufactured.
· For SRL-T5 or SL-T21 and SL-N35 to SL-N80
24VAC (24V, 50/60Hz), 48VAC(48-50V, 50/60Hz)
· For SRL-T5 or SL-T21
12VAC (12V, 50/60Hz)
2 : A coil with the rated voltage of 12VDC cannot be manufactured for N80 to N800 types.
3 : The coils for direct current do not have polarity.

Application to motor load

●Full-voltage starting

In the case of standard operation (not including inching), select a frame where the rated capacity of the magnetic starters and contactors is greater than the rated capacity of the motor.

● Can be applied to a standard 3 phase (3 ϕ) motor

Indicates the heater designation of a thermal relay for a standard 3 phase motor and the frame of the magnetic starter applicable to it.

Motor capacity [kW]	200 to 220V		400 to 440V	
	Heater designation [A] (setting range)	Magnetic Contactors frame	Heater designation [A] (setting range)	Magnetic Contactors frame
(0.015)	0.12 (0.1 to 0.16)	T10	–	
(0.025)	0.17 (0.14 to 0.22)	T10	–	
(0.03)	0.24 (0.2 to 0.32)	T10	–	
(0.035)	0.35 (0.28 to 0.42)	T10	–	
0.05	0.35 (0.28 to 0.42)	T10	0.24 (0.2 to 0.32)	T10
(0.07)	0.5 (0.4 to 0.6)	T10	0.35 (0.28 to 0.42)	T10
0.1	0.7 (0.55 to 0.85)	T10	0.35 (0.28 to 0.42)	T10
(0.15)	0.9 (0.7 to 1.1)	T10	0.5 (0.4 to 0.6)	T10
0.2	1.3 (1 to 1.6)	T10	0.7 (0.55 to 0.85)	T10
(0.3)	1.7 (1.4 to 2)	T10	0.9 (0.7 to 1.1)	T10
0.4	2.1 (1.7 to 2.5)	T10	1.3 (1 to 1.6)	T10
(0.55)	2.5 (2 to 3)	T10	1.3 (1 to 1.6)	T10
0.75	3.6 (2.8 to 4.4)	T10	1.7 (1.4 to 2)	T10
(1.0)	5 (4 to 6)	T10	2.5 (2 to 3)	T10
1.5	6.6 (5.2 to 8)	T10	3.6 (2.8 to 4.4)	T10
(1.9)2.2	9 (7 to 11)	T10	5 (4 to 6)	T10
(2.5)	11 (9 to 13)	T12	5 (4 to 6)	T10
(3.0)	11 (9 to 13)	T12	6.6 (5.2 to 8)	T12
3.7	15 (12 to 18)	T12	6.6 (5.2 to 8)	T12
5.5	22 (18 to 26)	T20, T21	11 (9 to 13)	T12
7.5	29 (24 to 34)	T20, T21	15 (12 to 18)	T20, T21
(9.0)	35 (30 to 40)	T25	15 (12 to 18)	T20, T21
11	42 (34 to 50)	T25	22 (18 to 26)	T25
15	54 (43 to 65)	T35	29 (24 to 34)	T25
18.5	67 (54 to 80)	T35	35 (30 to 40)	T35
22	82 (65 to 100)	T50	42 (34 to 50)	T35
30	105 (85 to 125)	T50	54 (43 to 65)	T50
37	125 (100 to 150)	T65	67 (54 to 80)	T50
45	150 (120 to 180)	T80	82 (65 to 100)	T65
(50)	180 (140 to 220)	T100	105 (85 to 125)	T65
55	180 (140 to 220)	T100	105 (85 to 125)	T80
(60)	180 (140 to 220)	T100	105 (85 to 125)	T80
75	250 (200 to 300)	N125	125 (100 to 150)	T100
90	330 (260 to 400)	N150	150 (120 to 180)	T100
110	330 (260 to 400)	N150	180 (140 to 220)	N125
132	500 (400 to 600)	N180	250 (200 to 300)	N125
150	500 (400 to 600)	N220	250 (200 to 300)	N150
160	500 (400 to 600)	N300	250 (200 to 300)	N180
200	660 (520 to 800)	N400	330 (260 to 400)	N220
300		N600	500 (400 to 600)	N300
400		N800	660 (520 to 800)	N400

Notes 1: Heater designation is the model code which must be specified at time of order.
2: For choices of heater designation with voltage, motor capacity other than those shown above, refer to page 870.
3: N600/N800 should be used in combination with the TH-N600 and a transformer (Mitsubishi CW-□model) sold separately.
4: The figures in brackets ( ) for motor capacity indicate special capacity.

●Applied to standard single phase (1 ϕ) motor

Indicates the frame of an magnetic starter that is applicable to a heater designation of a thermal relay used in a single phase motor.

Motor capacity [kW]	100 to 110V		200 to 220V	
	Heater designation [A] (setting range)	Magnetic Contactors frame	Heater designation [A] (setting range)	Magnetic Contactors frame
0.035	1.7 (1.4 to 2)	T10	0.9 (0.7 to 1.1)	T10
0.065	2.5 (2 to 3)	T10	1.3 (1 to 1.6)	T10
0.1	3.6 (2.8 to 4.4)	T10	1.7 (1.4 to 2)	T10
0.15	5 (4 to 6)	T10	2.5 (2 to 3)	T10
0.2	5 (4 to 6)	T10	2.5 (2 to 3)	T10
0.25	6.6 (5.2 to 8)	T12	3.6 (2.8 to 4.4)	T12
0.3	6.6 (5.2 to 8)	T12	3.6 (2.8 to 4.4)	T12
0.4	9 (7 to 11)	T12	5 (4 to 6)	T12
0.55	11 (9 to 13)	T20, T21	5 (4 to 6)	T20, T21
0.75	15 (12 to 18)	T20, T21	6.6 (5.2 to 8)	T20, T21
		T25		T25
		T35		T35

Notes 1: Heater designation is the model code which must be specified at time of order.
2: For choices of heater designation with voltage, motor capacity other than those shown above, refer to page 870.
3: In the case of the enclosed models (MS-T12 model), the applicable capacity of the 100 to 110V motors is 0.4kW.

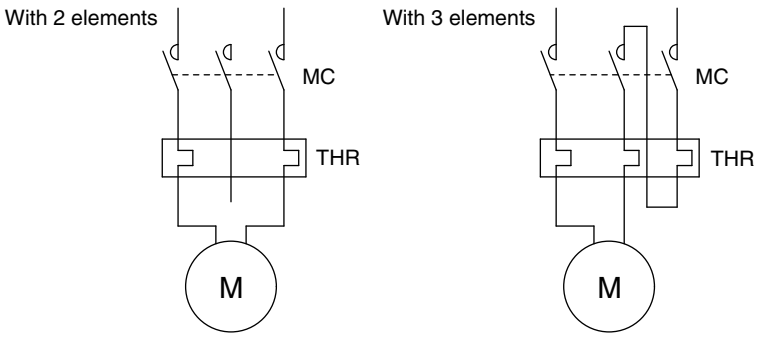
Thermal Relay Heater Designation Selection Table

●Thermal relay heater designation selection table

The table below shows a general guidance to select a thermal relay.

Voltage / Motor capacity [kW]	3 phase motor								Single phase motor				Voltage / Motor capacity [kW]
	200 to 220V	230 to 240V	346 to 350V	380V	400 to 440V	460 to 500V	550 to 600V	660V	100 to 110V	115 to 120V	200 to 220V	230 to 240V	
0.03	0.24A	0.24A	—	—	—	—	—	—					0.03
0.035	0.35A	0.24A	0.24A	0.24A	—	—	—	—	1.7A		0.9A		0.035
0.05	0.35A	0.35A	0.24A	0.24A	0.24A	—	—	—					0.05
0.06 to 0.065	0.5A	0.35A	0.35A	0.24A	0.24A	0.24A	—	—	2.5A		1.3A		0.06 to 0.065
0.07	0.5A	0.5A	0.35A	0.35A	0.35A	0.24A	—	—					0.07
0.09	0.7A	0.7A	0.35A	0.35A	0.35A	0.24A	0.24A	—					0.09
0.1	0.7A	0.7A	0.35A	0.35A	0.35A	0.35A	0.24A	—	3.6A		1.7A		0.1
0.12	0.9A	0.7A	0.5A	0.5A	0.5A	0.35A	0.24A	—		3.6A		2.1A	0.12
0.15	0.9A	0.9A	0.7A	0.7A	0.5A	0.5A	0.35A	—	5A		2.5A		0.15
0.18	1.3A	0.9A	0.7A	0.7A	0.7A	0.5A	0.5A	—	5A	5A		2.5A	0.18
0.2	1.3A	0.9A	0.7A	0.7A	0.7A	0.7A	0.5A	—	5A		2.5A		0.2
0.25	1.7A	1.3A	0.9A	0.9A	0.7A	0.7A	0.5A	—	6.6A	6.6A	3.6A	3.6A	0.25
0.3	1.7A	1.3A	0.9A	0.9A	0.9A	0.9A	0.7A	—	6.6A		3.6A		0.3
0.37 to 0.4	2.1A	2.1A	1.3A	1.3A	1.3A	0.9A	0.7A	—	9A	9A	5A	5A	0.37 to 0.4
0.55	2.5A	2.5A	1.7A	1.7A	1.3A	1.3A	0.9A	—	11A	11A	5A	6.6A	0.55
0.75	3.6A	3.6A	2.1A	2.1A	1.7A	1.7A	1.3A	1.3A	15A	15A	6.6A	9A	0.75
1.0	5A	5A	2.5A	2.5A	2.5A	2.1A	1.7A	1.7A					1.0
1.1	5A	5A	3.6A	2.5A	2.5A	2.1A	1.7A	1.7A	22A	22A	9A	9A	1.1
1.3	6.6A	5A	3.6A	3.6A	2.5A	2.5A	2.1A	2.1A					1.3
1.5	6.6A	6.6A	3.6A	3.6A	3.6A	2.5A	2.5A	2.1A	29A	22A	15A	11A	1.5
2.2	9A	9A	5A	5A	5A	3.6A	3.6A	3.6A					2.2
3	11A	11A	6.6A	6.6A	6.6A	5A	5A	3.6A		35A		15A	3
3.7 to 4	15A	15A	9A	9A	6.6A	6.6A	5A	5A		54A		29A	3.7 to 4
5.5	22A	22A	15A	11A	11A	9A	9A	6.6A		82A		42A	5.5
7.5	29A	29A	15A	15A	15A	11A	9A	9A		105A		54A	7.5
9	35A	29A	22A	22A	15A	15A	11A	11A					9
11	42A	42A	22A	22A	22A	22A	15A	15A					11
15	54A	54A	35A	29A	29A	22A	22A	15A					15
18.5 to 19	67A	67A	42A	35A	35A	29A	22A	22A					18.5 to 19
22	82A	82A	54A	42A	42A	35A	29A	22A					22
25	82A	82A	54A	54A	54A	35A	35A	29A					25
30	105A	105A	67A	54A	54A	42A	42A	35A					30
37	125A	125A	82A	67A	67A	54A	54A	42A					37
45	150A	150A	105A	82A	82A	67A	54A	54A					45
55 to 60	180A	180A	125A	105A	105A	82A	67A	67A					55 to 60
75	250A	250A	150A	125A	125A	105A	105A	82A					75
90	330A	330A	180A	150A	150A	125A	105A	105A					90
110	330A	330A	250A	180A	180A	150A	125A	105A					110
132	500A	500A	250A	250A	250A	180A	150A	150A					132
150 to 160	500A	500A	330A	250A	250A	250A	180A	180A					150 to 160
185	660A	500A	330A	330A	330A	250A	250A	180A					185
200	660A	660A	500A	330A	330A	330A	250A	180A					200
220	660A	660A	500A	500A	500A	330A	250A	250A					220
250	—	—	500A	500A	500A	330A	330A	250A					250
300 to 315	—	—	660A	500A	500A	500A	330A	330A					300 to 315
370 to 400	—	—	—	660A	660A	500A	500A	500A					370 to 400

Notes 1: When ordering based on motor capacity, use this table to determine the heater designation for the thermal relay. Please accurately specify the voltage and capacity.
2: Where the number of poles on the three phase motor is different, or in the case of a special generator, the full load current values may be different. In that case, specify the heater designation after checking the full load current of the motor.
3: As for a single phased motor, the full load current values may be different depending on its mode of startup and operation. Therefore, the table above should be used as a guideline, and the full load current should be checked in actual use when determining an appropriate heater designation. In the case of a single phase motor, please connect the motor as shown in the diagram below.



Connecting the thermal relay to a single phase motor

Magnetic Starters/Magnetic Contactors Specifications

Frame				T10	T12	T20	T21	T25	T32	T35	T50	T65	T80	T100
Applicable standard				IEC60947-4-1, EN60947-4-1, GB14048.4, JIS C8201-4-1										
Model name	Magnetic Contactors (Without Thermal Overload Relays, Open type)		Non-Reversing	S-T10	S-T12	S-T20	S-T21	S-T25	S-T32	S-T35	S-T50	S-T65	S-T80	S-T100
			Reversing	S-2×T10	S-2×T12	S-2×T20	S-2×T21	S-2×T25	S-2×T32	S-2×T35	S-2×T50	S-2×T65	S-2×T80	S-2×T100
	Magnetic Starters (With standard 2-element, With Thermal Overload Relays)	Open type	Non-Reversing	MSO-T10	MSO-T12	MSO-T20	MSO-T21	MSO-T25	–	MSO-T35	MSO-T50	MSO-T65	MSO-T80	MSO-T100
			Reversing	MSO-2×T10	MSO-2×T12	MSO-2×T20	MSO-2×T21	MSO-2×T25	–	MSO-2×T35	MSO-2×T50	MSO-2×T65	MSO-2×T80	MSO-2×T100
		Enclosed	Non-Reversing	MS-T10	MS-T12	–	MS-T21	–	–	MS-T35	MS-T50	MS-T65	MS-T80	MS-T100
			Reversing	–			MS-2×T21	–	–	MS-2×T35	MS-2×T50	MS-2×T65	MS-2×T80	MS-2×T100
		Combined Thermal Overload Relays		TH-T18			TH-T25		–	TH-T25/T50	TH-T25/T50	TH-T65	TH-T65/T100	TH-T65/T100
	Magnetic Starters (With Open type 3-element(2E), With Thermal Overload Relays)		Non-Reversing	MSO-T10KP	MSO-T12KP	MSO-T20KP	MSO-T21KP	MSO-T25KP	–	MSO-T35KP	MSO-T50KP	MSO-T65KP	MSO-T80KP	MSO-T100KP
			Reversing	MSO-2×T10KP	MSO-2×T12KP	MSO-2×T20KP	MSO-2×T21KP	MSO-2×T25KP	–	MSO-2×T35KP	MSO-2×T50KP	MSO-2×T65KP	MSO-2×T80KP	MSO-2×T100KP
		Combined Thermal Overload Relays		TH-T18KP			TH-T25KP		–	TH-T25/T50KP	TH-T25/T50KP	TH-T65KP	TH-T65/T100KP	TH-T65/T100KP
Main contact rating	Rated insulation voltage [V]			690										
	Rated impulse withstand voltage [kV]			6										
	Rated frequency [Hz]			50/60										
	Pollution degree			3										
	Rated operational current / power Category AC-3 (Three-phase squirrel-cage motor load standard responsibility) (Note 1) [kW/A]		220 to 240VAC	2.5/11 [2.2/11]	3.5/13 [2.7/13]	4.5/18 [3.7/18]	5.5/25 [4/20]	7.5/30(26) [5.5/26]	7.5/32 [7.5/32]	11/40 [7.5/35]	15/55 [11/50]	18.5/65 [15/65]	22/85 [19/80]	30/105 [22/100]
			380 to 440VAC	4/9 [2.7/7]	5.5/12 [4/9]	7.5/18 [7.5/18]	11/23 [7.5/20]	15/30(26) [11/25]	15/32 [15/32]	18.5/40 [15/32]	22/48 [22/48]	30/65 [30/65]	45/85 [37/80]	55/105 [45/93]
			500VAC	4/7 [2.7/6]	5.5/9 [5.5/9]	7.5/17 [7.5/17]	11/17 [7.5/17]	15/24 [11/20]	15/24 [11/20]	18.5/32 [15/26]	25/38 [22/38]	37/60 [30/45]	45/75 [45/75]	55/85 [45/75]
			690VAC	4/5	5.5/7	7.5/9	7.5/9	11/12	11/12	15/17	22/26	30/38	45/52	55/65
	Rated operational current / power Category AC-4 (Three-phase squirrel-cage motor load inching responsibility) [kW/A]		200 to 220VAC	1.5/8	2.2/11	3.7/18		4.5/20	5.5/26	5.5/26	7.5/35	11/50	15/65	19/80
			380 to 440VAC	2.2/6	4/9	5.5/13		7.5/17	11/24	11/24	15/32	22/47	30/62	37/75
			500 to 550VAC	2.7/6	5.5/9	5.5/10		7.5/12	7.5/13	11/17	15/24	22/38	30/45	37/55
	Single-phase motor maximum applicable load/ maximum capacity (Category AC-3) [kW/A]		100 to 110VAC	0.4/11	0.55/13	0.75/18	0.9/18(20)	1.2/26	1.5/32	1.7/34(35)	–	–	–	–
			200 to 220VAC	0.8/11	1.0/13	1.5/18	1.8/18(20)	–	–	–	–	–	–	–
	Rated operational current / power Category AC-1 (Resistance, heater load)		100 to 220VAC	20			32			60	80	100	120	150
			380 to 440VAC	11	13		32			60	80	100	120	150
	Conventional free air thermal current Ith [A]			20			32			60	80	100	120	150
Auxiliary contact rating	Contact arrangement	Standard accessory (Note 5)	Non-Reversing	1a	1a1b		2a2b		–	2a2b	2a2b	2a2b	2a2b	2a2b
			Reversing (Note 6, Note 8)	1a×2+2b	1a1b×2+2b		2a2b×2		2a2b×2	2a2b×2	2a2b×2	2a2b×2	2a2b×2	2a2b×2
		Max. number of additional options (Note 7)	Non-Reversing	One optional UT-AX2 or UT-AX4 and up to two optional UT-AX11 can be added.								One optional UN-AX2 or UN-AX4 and up to two optional UN-AX11 can be added.		4a4b
			Reversing (Note 6, Note 8)	Up to two optional UT-AX2, UT-AX4, or UT-AX11 can be added.					–	Up to two optional UT-AX2, UT-AX4, or UT-AX11 can be added.		Up to two optional UN-AX2, UN-AX4, or UN-AX11 can be added.		3a3b×2
	Rated operational current (Category AC-15 : Alternating current coil load) [A]		100 to 120VAC	6	6	6	6	6	–	6	6	6	6	6
			200 to 240VAC	3	3	3	3	3	–	3	3	3	3	3
	Conventional free air thermal current Ith [A]			10	10	10	10	10	–	10	10	10	10	10
Performance	Mechanical durability [ten thousand times]			1000								500		
	Electrical durability [ten thousand times]		Category AC-3	200 (Note 4)								200	100	
			Category AC-4	3 (Note 4)										
			Category AC-1	50										
	Switching frequency [time/hour]		Category AC-3	1800							1200			
			Category AC-4	300										
			Category AC-1	1200										600
Characteristic	Coil consumption [VA]		Sealed [VA]	7			7		4.5	10		20		23
			Inrush [VA]	45			75		55	110		115		210
Outside dimensions	Magnetic Contactors (without Thermal Overload Relays) (Width × Height × Depth) [mm]		Non-Reversing	36×75×78	43×75×78		63×81×81		43×81×81	75×89×91		88×106×106	88×106×106	100×124×127
			Reversing	82×85×78	97×85×78		136×81×81		96×81×111	160×114×97		216×115×112	216×115×112	270×140×137
	Open type Magnetic Starters (Width × Height × Depth) [mm]		Non-Reversing	45×115×79			63×128×82		–	75×157.5×91		90×158×106	90×169.5×106	100×191×127
			Reversing	90×125×79	97×125×79		136×138×82		–	160×179×97		216×169×112	216×180.5×112	270×208×137
Model names of attachable options (Note 9)	Auxiliary contact blocks	(Contact structure 1a1b)		UT-AX2/AX11								UN-AX2/AX11		UN-AX80
		(Contact structure 2a2b)		UT-AX4								UN-AX4		–
		With contact for low level signals		–								UN-LL22		–
	Operation coil surge absorber unit (Note 3)	(Varistor) (Note 2)		UT-SA21								–		–
		(Varistor + LED display)		UT-SA22								–		–
		(CR)		UT-SA23								–		–
		(Varistor + CR)		UT-SA25								–		–
	DC/AC interface	TRIAC output		UT-SY21								UN-SY31		–
		Contact output		UT-SY22								UN-SY32		–
	Charging part protection cover	For Electromagnetic Starters	Non-Reversing	–								UN-CZ500+UN-CZ501		UN-CZ800+UN-CZ801
			Reversing	–								UN-CZ504		UN-CZ804
		For Electromagnetic Contactors	Non-Reversing	–								UN-CZ500×2		UN-CZ800×2
			Reversing	–								UN-CZ502		UN-CZ802
	Terminal cover	For Magnetic Starters (non-reversing)		(Standard accessory)								UT-CW800+UT-CW655		–
		For Magnetic Contactors (non-reversing)		(Standard accessory)								UT-CW800		–
	Mechanical interlocks			UT-ML11			UN-ML21							UN-ML80

Notes 1: The figure inside the brackets ( ) for rated operating current is applicable to magnetic contactors (without thermal relays). The figure inside the brackets ( ) for motor capacity is applicable to enclosed magnetic starters.
2: We can also manufacture coil surge absorption built-in models (□-□SA models) for alternating current operated types T10 to T50 and direct current operated types T12 to T50.
3: The T65 to N800 alternating current operating coils incorporate surge absorption function, so that a surge absorption unit for the coil is not required because coil switching surges do not occur.
4: 1,000,000 times for T20 AC-3 Class 380V or higher, and 15,000 times for T35 to N800 AC-4 Class 380V or higher.
5: The auxiliary contact structures for mechanical latch and delayed release models are different. For details of mechanical latch models, refer to page 879.
6: +2b of T10 to T20 auxiliary contact arrangements in Reversing type represents b contact built in the UN-ML11 interlock unit.
7: The main unit and the auxiliary contact units need to be attached by customers as separate processes. The auxiliary contact unit for sealed models, and the head on auxiliary contact for mechanical latched models, cannot be attached as additions.
For details of the auxiliary contact unit, refer to pages 890.
8: For auxiliary contact arrangement in Reversing type, ×2 is displayed as combined auxiliary contact arrangement of two Magnetic Contactors. Please specify the contact arrangement for which two main units are combined must be designated. <Designation example> In case of 1b × 2 + 2b: 2B
9: In the case of using an option as an applied product, be aware that some options are unable to be attached. For details of combinations, refer to pages 890 to 891.
10: The figure in the square brackets indicates the rated current shown on the rating plate of the product at which the category AC-3 opening/closing durability is 2,000,000 times (1,000,000 times for the T20 380V). Refer to the electric durability curve for the life performance.

Frame				N125	N150	N180	N220	N300	N400	N600	N800
Applicable standard				IEC60947-4-1,EN60947-4-1,GB14048.4, JIS C8201-4-1							
Model name	Magnetic Contactors (Without Thermal Overload Relays, Open type)		Non-Reversing	S-N125	S-N150	S-N180	S-N220	S-N300	S-N400	S-N600	S-N800
			Reversing	S-2×N125	S-2×N150	S-2×N180	S-2×N220	S-2×N300	S-2×N400	S-2×N600	S-2×N800
	Magnetic Starters (With standard 2-element, With Thermal Overload Relays)	Open type	Non-Reversing	MSO-N125	MSO-N150	MSO-N180	MSO-N220	MSO-N300	MSO-N400	–	–
			Reversing	MSO-2×N125	MSO-2×N150	MSO-2×N180	MSO-2×N220	MSO-2×N300	MSO-2×N400	–	–
		Enclosed	Non-Reversing	MS-N125	MS-N150	MS-N180	MS-N220	MS-N300	MS-N400	–	–
			Reversing	MS-2×N125	MS-2×N150	MS-2×N180	MS-2×N220	MS-2×N300	MS-2×N400	–	–
		Combined Thermal Overload Relays		TH-N120(TA)	TH-N120(TA)	TH-N220RH	TH-N220RH	TH-N400RH	TH-N400RH	TH-N600(+CT)	TH-N600(+CT)
	Magnetic Starters (With Open type 3-element(2E), With Thermal Overload Relays)		Non-Reversing	MSO-N125KP	MSO-N150KP	MSO-N180KP	MSO-N220KP	MSO-N300KP	MSO-N400KP	–	–
			Reversing	MSO-2×N125KP	MSO-2×N150KP	MSO-2×N180KP	MSO-2×N220KP	MSO-2×N300KP	MSO-2×N400KP	–	–
		Combined Thermal Overload Relays		TH-N120(TA)KP	TH-N120(TA)KP	TH-N220RHKP	TH-N220RHKP	TH-N400RHKP	TH-K400RHKP	TH-N600KP(+CT)	TH-N600KP(+CT)
Main contact rating	Rated insulation voltage [V]			690							
	Rated impulse withstand voltage [kV]			6							
	Rated frequency [Hz]			50/60							
	Pollution degree			3							
	Rated operational current / power Category AC-3 (Three-phase squirrel-cage motor load standard responsibility) (Note 1) [kW/A]		220 to 240VAC	30/125	37/150	45/180	55/220	75/300	110/400	160/630	200/800
			380 to 440VAC	60/120	75/150	90/180	110/220	150/300	200/400	300/630	400/800
			500VAC	60/90	90/140	110/180	132/200	160/250	200/350	300/500	400/720
			690VAC	70	100	120	150	220	300	420	630
	Rated operational current / power Category AC-4 (Three-phase squirrel-cage motor load inching responsibility) [kW/A]		200 to 220VAC	22/93	30/125	37/150	45/180	55/220	75/300	110/400	160/630
			380 to 440VAC	45/90	55/110	75/150	90/180	110/220	150/300	200/400	300/630
			500 to 550VAC	45/65	55/80	75/140	90/140	110/200	150/250	200/350	300/500
	Single-phase motor maximum applicable load/ maximum capacity (Category AC-3) [kW/A]		100 to 110VAC	–	–	–	–	–	–	–	–
			200 to 220VAC	–	–	–	–	–	–	–	–
	Rated operational current / power Category AC-1 (Resistance, heater load)		100 to 220VAC	150	200	260	260	350	450	660	800
			380 to 440VAC	150	200	260	260	350	450	660	800
	Conventional free air thermal current Ith [A]			150	200	260	260	350	450	660	800
Auxiliary contact rating	Contact arrangement	Standard accessory (Note 5)	Non-Reversing	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b
			Reversing (Note 6, Note 8)	2a2b×2	3a3b×2	3a3b×2	3a3b×2	3a3b×2	3a3b×2	4a4b×2	4a4b×2
		Max. number of additional options (Note 7)	Non-Reversing	4a4b	4a4b	4a4b	4a4b	4a4b	4a4b	4a4b	4a4b
			Reversing (Note 6, Note 8)	3a3b×2	–	–	–	–	–	–	–
	Rated operational current (Category AC-15 : Alternating current coil load) [A]		100 to 120VAC	6	6	6	6	6	6	6	6
			200 to 240VAC	3	3	3	3	3	3	3	3
	Conventional free air thermal current Ith [A]			10	10	10	10	10	10	10	10
Performance	Mechanical durability [ten thousand times]			500							
	Electrical durability [ten thousand times]		Category AC-3	100					50		
			Category AC-4	3 (Note 4)							
			Category AC-1	50							
	Switching frequency [time/hour]		Category AC-3	1200							
			Category AC-4	300						150	60
			Category AC-1	600							
Characteristic	Coil consumption [VA]		Sealed [VA]	24	24	40	40	50	50	90	90
			Inrush [VA]	270	270	440	440	440	440	790	790
Outside dimensions	Magnetic Contactors (without Thermal Overload Relays) (Width × Height × Depth) [mm]		Non-Reversing	100×150×137	120×160×145	138×204×175	138×204×175	163×243×195	163×243×195	290×310×235	290×310×235
			Reversing	276×150×148	296×160×156	370×215×189	370×215×189	395×250×209	395×250×209	660×435×254	660×435×254
	Open type Magnetic Starters (Width × Height × Depth) [mm]		Non-Reversing	112×239×137	120×250×145	144×282×180.5	144×282×180.5	163×360×195	163×360×195	–	–
			Reversing	276×251×148	296×276×156	370×304×194.5	370×304×194.5	395×392×209	395×392×209	–	–
Model names of attachable options (Note 9)	Auxiliary contact blocks	(Contact structure 1a1b)		UN-AX80	UN-AX150					–	–
		(Contact structure 2a2b)		–	–	–	–	–	–	UN-AX600	
		With contact for low level signals		–	–	–	–	–	–	–	–
	Operation coil surge absorber unit (Note 3)	(Varistor) (Note 2)		–	–	–	–	–	–	–	–
		(Varistor + LED display)		–	–	–	–	–	–	–	–
		(CR)		–	–	–	–	–	–	–	–
		(Varistor + CR)		–	–	–	–	–	–	–	–
	DC/AC interface	TRIAC output		–	–	–	–	–	–	–	–
		Contact output		–	–	–	–	–	–	–	–
	Charging part protection cover	For Electromagnetic Starters	Non-Reversing	UN-CZ1250+ UN-CZ1251	UN-CZ1500+ UN-CZ1501	UN-CZ2200+UN-CZ2201		UN-CZ3000+UN-CZ3001		–	–
			Reversing	UN-CZ1254	UN-CZ1504	UN-CZ2204		UN-CZ3004		–	–
		For Electromagnetic Contactors	Non-Reversing	UN-CZ1250×2	UN-CZ1500×2	UN-CZ2200×2		UN-CZ3000×2		–	–
			Reversing	UN-CZ1252	UN-CZ1502	UN-CZ2202		UN-CZ3002		–	–
	Terminal cover	For Magnetic Starters (non-reversing)		–	–	–	–	–	–	–	–
		For Magnetic Contactors (non-reversing)		–	–	–	–	–	–	–	–
	Mechanical interlocks			UN-ML80	UN-ML150	UN-ML220				–	–

Notes 1: The figure inside the brackets ( ) for rated operating current is applicable to magnetic contactors (without thermal relays). The figure inside the brackets ( ) for motor capacity is applicable to enclosed magnetic starters.
2: We can also manufacture coil surge absorption built-in models (□-□SA models) for alternating current operated types T10 to T50 and direct current operated types T12 to T50.
3: The T65 to N800 alternating current operating coils incorporate surge absorption function, so that a surge absorption unit for the coil is not required because coil switching surges do not occur.
4: 1,000,000 times for T20 AC-3 Class 380V or higher, and 15,000 times for T35 to N800 AC-4 Class 380V or higher.
5: The auxiliary contact structures for mechanical latch and delayed release models are different. For details of mechanical latch models, refer to page 879.
6: +2b of T10 to T20 auxiliary contact arrangements in Reversing type represents b contact built in the UN-ML11 interlock unit.
7: The main unit and the auxiliary contact units need to be attached by customers as separate processes. The auxiliary contact unit for sealed models, and the head on auxiliary contact for mechanical latched models, cannot be attached as additions.
For details of the auxiliary contact unit, refer to pages 890.
8: For auxiliary contact arrangement in Reversing type, ×2 is displayed as combined auxiliary contact arrangement of two Magnetic Contactors. Please specify the contact arrangement for which two main units are combined must be designated. <Designation example> In case of 1b × 2 + 2b: 2B
9: In the case of using an option as an applied product, be aware that some options are unable to be attached. For details of combinations, refer to pages 890 to 891.

Magnetic Starters

■MS-T series (non-Reversing) : Enclosed
■MS-2xT series (Reversing) : Enclosed


MSO-T10

Model name		MS-T10	MS-T12	MS-T21	MS-T25	MS-T35	MS-T50	MS-T65	MS-T80	MS-T100
	Reversing	–	–	MS-2XT21	MS-2XT25	MS-2XT35	MS-2XT50	MS-2XT65	MS-2XT80	MS-2XT100
Rated capacity (kW) Category AC-3 (Note 1)	220 to 240VAC	2.5[2.2]	3.5[2.7]	5.5[4]	7.5[5.5]	11[7.5]	15[11]	18.5[15]	22[19]	30[22]
	380 to 440VAC	4[2.7]	5.5[4]	11[7.5]	15[11]	18.5[15]	22[22]	30[30]	45[37]	55[45]
	500VAC	4[2.7]	5.5[5.5]	11[7.5]	15[11]	18.5[15]	22[22]	37[30]	45[45]	55[45]
Heater rating (designation) of standard Thermal Overload Relays (A)		0.12 0.17 0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9	0.12 0.17 0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11	0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15 22	0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15 22	0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15 22 29 35	0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15 22 29 35 42	15 22 29 35 42 54	15 22 29 35 42 54 67 82	15 22 29 35 42 54 67 82 95
Operation coil rating		Refer to page 876								
Auxiliary contact arrangement	Non-Reversing Standard	1a	1a1b	2a2b						
	Non-Reversing Special	1b	2a	–						
	Reversing Standard	–		2a2bx2						
	Reversing Special	–		–						
B C A (unit: mm)	Non-reversing A	165		176		231		282		317
	Non-reversing B	76		104		135		160		190
	Non-reversing C	97.5		110		126		145		163
	Reversing A	–		192		247		282		347
	Reversing B	–		220		300		320		410
	Reversing C	–		115		130		140		154

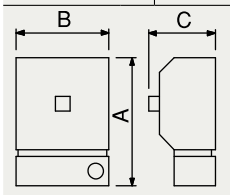
Note 1: The figure in the square brackets indicates the rated current shown on the rating plate of the product at which the category AC-3 opening/closing durability is 2,000,000 times (1,000,000 times for the T20 380V). Refer to the electric durability curve for the life performance.

■MSO-T series (non-Reversing) : Open type
■MSO-2xT series (Reversing) : Open type

Model name		MSO-T10	MSO(D)-T12	MSO(D)-T20	MSO(D)-T21	MSO-T25
	Reversing	MSO-2×T10	MSO(D)-2×T12	MSO(D)-2×T20	MSO(D)-2×T21	MSO-2×T25
Rated capacity (kW) Category AC-3 (Note 1)	220 to 240VAC	2.5[2.2]	3.5[2.7]	4.5[3.7]	5.5[4]	7.5[5.5]
	380 to 440VAC	4[2.7]	5.5[4]	7.5[7.5]	11[7.5]	15[11]
	500VAC	4[2.7]	5.5[5.5]	7.5[7.5]	11[7.5]	15[11]
Heater rating (designation) of standard Thermal Overload Relays (A)		0.12 0.17 0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9	0.12 0.17 0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11	0.12 0.17 0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15	0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15 22	0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15 22
Operation coil rating		Refer to pages 876				
Auxiliary contact arrangement	Non-Reversing Standard	1a	1a1b	1a1b	2a2b	2a2b
	Non-Reversing Special	1b	2a	2a	–	–
	Reversing Standard	1ax2+2b	1a1bx2+2b	1a1bx2+2b	2a2bx2	2a2bx2
	Reversing Special	1bx2+2b	2ax2+2b	2ax2+2b	–	–
B C A (unit: mm)	Non-Reversing A	115	115	115	128	128
	Non-Reversing B	45	45	45	63	63
	Non-Reversing C	79	79(101)	79(101)	82(109)	82
	Reversing A	125	125	125	138	138
	Reversing B	90	97	97	136	136
	Reversing C	79	79(101)	79(101)	82(115)	82
IEC 35mm rail mounting type		◄				►
Option	Front clip-on auxiliary contact block mounting type	◄				►
	Side clip-on auxiliary contact block mounting type	◄				►
	Surge absorber mounting type	◄				►

Note 1: The figure in the square brackets indicates the rated current shown on the rating plate of the product at which the category AC-3 opening/closing durability is 2,000,000 times (1,000,000 times for the T20 380V). Refer to the electric durability curve for the life performance.

■MSO-T series (non-Reversing) : Open type
■MSO-2xT series (Reversing) : Open type

Model name			MSO(D)-T35	MSO(D)-T50	MSO(D)-T65	MSO(D)-T80	MSO(D)-T100
	Non-Reversing		MSO(D)-2×T35	MSO(D)-2×T50	MSO(D)-2×T65	MSO(D)-2×T80	MSO(D)-2×T100
Rated capacity (kW) Category AC-3 (Note 1)	220 to 240VAC		11[7.5]	15[11]	18.5[15]	22[19]	30[22]
	380 to 440VAC		18.5[15]	22[22]	30[30]	45[37]	55[45]
	500VAC		18.5[15]	22[22]	37[30]	45[45]	55[45]
Heater rating (designation) of standard Thermal Overload Relays (A)			0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15 22 29 35	0.24 0.35 0.5 0.7 0.9 1.3 1.7 2.1 2.5 3.6 5 6.6 9 11 15 22 29 35 42	15 22 29 35 42 54	15 22 29 35 42 54 67 82	15 22 29 35 42 54 67 82 95
Operation coil rating			Refer to pages 876				
Auxiliary contact arrangement	Non-Reversing	Standard	2a2b	2a2b	2a2b	2a2b	2a2b
		Special	–	–	–	–	–
	Reversing	Standard	2a2b×2	2a2b×2	2a2b×2	2a2b×2	2a2b×2
		Special	–	–	–	–	–
 (unit: mm)	Non-Reversing	A	157.5		158(160)	174.5(176.5)	196(206)
		B	75		90	90	100
		C	91(123)		106(133)	106(133)	127(157)
	Reversing	A	179		169	185.5	213
		B	160		216	216	270
		C	97(129)		112(139)	112(139)	137(167)
IEC 35mm rail mounting type			←		→		–
Option	Front clip-on auxiliary contact block mounting type		←		→		–
	Side clip-on auxiliary contact block mounting type		←		→		
	Surge absorber mounting type		←		–		

Note 1: The figure in the square brackets indicates the rated current shown on the rating plate of the product at which the category AC-3 opening/closing durability is 2,000,000 times (1,000,000 times for the T20 380V). Refer to the electric durability curve for the life performance.

●Thermal Overload Relays configuring the Magnetic Starters

Thermal Overload Relays models and heater types that configure Magnetic Starters

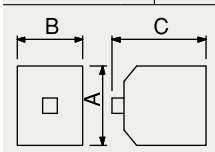
Magnetic Contactors frame	Thermal Overload Relays model	Heater designation (adjustable range of stabilized current) (A)
T10, T12, T20	TH-T18	0.12(0.1 to 0.16), 0.17(0.14 to 0.22), 0.24(0.2 to 0.32), 0.35(0.28 to 0.42), 0.5(0.4 to 0.6), 0.7(0.55 to 0.85), 0.9(0.7 to 0.1), 1.3(1 to 1.6), 1.7(1.4 to 2), 2.1(1.7 to 2.5), 2.5(2 to 3), 3.6(2.8 to 4.4), 5(4 to 6), 6.6(5.2 to 8), 9(7 to 11), 11(9 to 13)*, 15(12 to 18)*
T21, T25	TH-T25 (Note 3)	0.24(0.2 to 0.32), 0.35(0.28 to 0.42), 0.5(0.4 to 0.6), 0.7(0.55 to 0.85), 0.9(0.7 to 1.1), 1.3(1 to 1.6), 1.7(1.4 to 2), 2.1(1.7 to 2.5), 2.5(2 to 3), 3.6(2.8 to 4.4), 5(4 to 6), 6.6(5.2 to 8), 9(7 to 11), 11(9 to 13), 15(12 to 18), 22(18 to 26)*
T35	TH-T25	0.24 (0.2 to 0.32), 0.35 (0.28 to 0.42), 0.5 (0.4 to 0.6), 0.7 (0.55 to 0.85), 0.9 (0.7 to 1.1), 1.3 (1 to 1.6), 1.7 (1.4 to 2), 2.1 (1.7 to 2.5), 2.5 (2 to 3), 3.6 (2.8 to 4.4), 5 (4 to 6), 6.6 (5.2 to 8), 9 (7 to 11), 11 (9 to 13), 15 (12 to 18), 22 (18 to 26)
	TH-T50	29 (24 to 34)
T50	TH-T25	0.24 (0.2 to 0.32), 0.35 (0.28 to 0.42), 0.5 (0.4 to 0.6), 0.7 (0.55 to 0.85), 0.9 (0.7 to 1.1), 1.3 (1 to 1.6), 1.7 (1.4 to 2), 2.1 (1.7 to 2.5), 2.5 (2 to 3), 3.6 (2.8 to 4.4), 5 (4 to 6), 6.6 (5.2 to 8), 9 (7 to 11), 11 (9 to 13), 15 (12 to 18), 22 (18 to 26)
	TH-T50	29 (24 to 34), 35 (30 to 40), 42 (34 to 50)
T65	TH-T65	15 (12 to 18), 22 (18 to 26), 29 (24 to 34), 35 (30 to 40), 42 (34 to 50), 54 (43 to 65)
T80	TH-T65	15 (12 to 18), 22 (18 to 26), 29 (24 to 34), 35 (30 to 40), 42 (34 to 50), 54 (43 to 65)
	TH-T100	67 (54 to 80)
T100	TH-T65	15 (12 to 18), 22 (18 to 26), 29 (24 to 34), 35 (30 to 40), 42 (34 to 50), 54 (43 to 65)
	TH-T100	67 (54 to 80), 82 (65 to 100)

Notes 1: Select the value closer to the heater designation if the stabilized current has two values.
2: Heater designation marked with * has Magnetic Starters frames that cannot be applied. For information on the applicable Magnetic Starters frames, refer to the "Heater rating (designation) of standard Thermal Overload Relays" field in the above table.
3: The connection conductor kit UN-TH21 is required to use in combination with the Magnetic Contactor to make a Magnetic Starters.

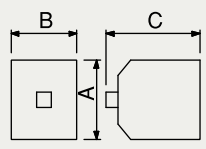
Magnetic Contactors

■S-T series (non-Reversing)
■S-2xT series (Reversing)


S-T10

Model name		Non-Reversing	S-T10	S(D)-T12	S(D)-T20	S(D)-T21	S-T25	S(D)-T32
		Reversing	S-2×T10	S(D)-2×T12	S(D)-2×T20	S(D)-2×T21	S-2×T25	S(D)-2×T32
Rated operational current (A) Category AC-3 (Note 1, 2)		220 to 240VAC	11[11]	13[13]	18[18]	25[20]	30(26)[26]	32[32]
		380 to 440VAC	9[7]	12[9]	18[18]	23[20]	30(26)[25]	32[32]
		500VAC	7[6]	9[9]	17[17]	17[17]	24[20]	24[20]
Conventional free air thermal current Ith (A)			20	20	20	32	32	32
Operation coil rating			Refer to pages 876					
Auxiliary contact arrangement	Non-Reversing	Standard	1a	1a1b	1a1b	2a2b	2a2b	–
		Special	1b	2a	2a	–	–	–
	Reversing	Standard	1a×2+2b	1a1b×2+2b	1a1b×2+2b	2a2b×2	2a2b×2	–
		Special	1b×2+2b	2b×2+2b	2b×2+2b	–	–	–
 (unit: mm)	Non-Reversing	A	75	75	75	81	81	81
		B	36	43	43	63	63	43
		C	78	78(100)	78(100)	81(108)	81	81(108)
	Reversing	A	85	85	85	81	81	81
		B	82	97	97	136	136	96
		C	78	78(100)	78(100)	81(114)	81	111(138)
IEC 35mm rail mounting type			←					→
Option	Front clip-on auxiliary contact block mounting type		←					→
	Side clip-on auxiliary contact block mounting type		←					→
	Surge absorber mounting type		←					→

Notes 1: The figure in the square brackets indicates the rated current shown on the rating plate of the product at which the category AC-3 opening/closing durability is 2,000,000 times (1,000,000 times for the T20 380V). Refer to the electric durability curve for the life performance.
2: The content within ( ) of rated capacity and rated operational current is applied to the Magnetic Contactor.

Model name		Non-Reversing	S(D)-T35	S(D)-T50	S(D)-T65	S(D)-T80	S(D)-T100
		Reversing	S(D)-2×T35	S(D)-2×T50	S(D)-2×T65	S(D)-2×T80	S(D)-2×T100
Rated operational current (A) Category AC-3 (Note 1)		220 to 240VAC	40[35]	55[50]	65[65]	85[80]	105[100]
		380 to 440VAC	40[32]	50[50]	65[65]	85[80]	105[93]
		500VAC	32[26]	38[38]	60[45]	75[75]	85[75]
Conventional free air thermal current Ith (A)			60	80	100	120	150
Operation coil rating			Refer to pages 876				
Auxiliary contact arrangement	Non-Reversing	Standard	2a2b	2a2b	2a2b	2a2b	2a2b
		Special	–	–	–	–	–
	Reversing	Standard	2a2b×2	2a2b×2	2a2b×2	2a2b×2	2a2b×2
		Special	–	–	–	–	–
 (unit: mm)	Non-Reversing	A	89		106		124(134)
		B	75		88		100
		C	91(123)		106(133)		127(157)
	Reversing	A	114		115		140(147)
		B	160		216		270
		C	97(129)		112(139)		137(167)
IEC 35mm rail mounting type			←				–
Option	Front clip-on auxiliary contact block mounting type		←				–
	Side clip-on auxiliary contact block mounting type		←				→
	Surge absorber mounting type		←		–		

Note 1: The figure in the square brackets indicates the rated current shown on the rating plate of the product at which the category AC-3 opening/closing durability is 2,000,000 times (1,000,000 times for the T20 380V). Refer to the electric durability curve for the life performance.

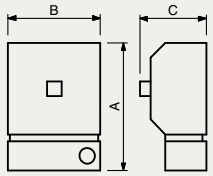
Open Model Magnetic Starters

■MSO-N series (non-Reversing) : Open type
■MSO-2xN series (Reversing) : Open type


MSO-N150


MSO-N220

Delivery date category	
▭	Standard item
○	Substandard item
●	Special Item

Model name	Non-Reversing		MSO-N125	MSO-N150	MSO-N180	MSO-N220	MSO-N300	MSO-N400
	Reversing		MSO-2×N125	MSO-2×N150	MSO-2×N180	MSO-2×N220	MSO-2×N300	MSO-2×N400
Rated capacity (kW) Category AC-3	220 to 240VAC		30	37	45	55	75	110
	380 to 440VAC		60	75	90	110	150	200
	500VAC		60	90	110	132	160	200
Heater rating (designation) of standard Thermal Overload Relays (A)			42 54 67 82 105	42 54 67 82 105 125	82 105 125 150	82 105 125 150 180	105 125 150 180 250	105 125 150 180 250 330
Operation coil rating			Refer to the table below					
Auxiliary contact arrangement	Non-Reversing	Standard	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b
		Special	–	–	–	–	–	–
	Reversing	Standard	2a2b×2	3a3b×2	○3a3b×2	3a3b×2	○3a3b×2	○3a3b×2
		Special	–	–	–	–	–	–
	Non-Reversing	A	239	250	282		360	
		B	112	120	144		163	
		C	136	145	178		195	
		Product weight [kg]	3.5	4.6	8.0		12	
	Reversing	A	251	276	304		392	
		B	276	296	370		395	
		C	147	156	194.5		209	
		Product weight [kg]	7	8.3	17		26	
IEC 35mm rail mounting type			–	–	–	–	–	–
Option	Front clip-on auxiliary contact block mounting type		–	–	–	–	–	–
	Side clip-on auxiliary contact block mounting type		◄———					———►
	Surge absorber mounting type		◄———		General purpose coil models contain a surge absorber			———►
	Reversing mechanical interlock attachment		◄———					———►
Special Specifications	Anti-corrosion treatment	MSO-☐YS	●	●	●	●	●	●
	Delay open type	MSO-☐DL	–	●	–	●	●	●
Special specification thermal relay	Quick response model (with 2E)	MSO-☐KF	–	–	–	–	–	–
	Saturated reactor attached	MSO-☐SR	○	○	○	●	●	●
	With 2E (3 elements)	MSO-☐KP	○	○	●	●	●	●

Notes 1: *MSO-2xN18 model has auxiliary contacts (head on unit) as a standard attachment.
2: "CX" of the model name refers to the CAN terminal attachments.
3: The** mark means that CAN terminal attachments cannot be manufactured for this model.

●Thermal relay combined with an magnetic starter

Model names and types of heaters for thermal relays that can be combined with magnetic starters

Magnetic Contactors frame	Thermal Overload Relays model	Heater designation (adjustable range of stabilized current) (A)
N125, N150	TH-N120(KP)	42(34 to 50), 54(43 to 65), 67(54 to 80), 82(65 to 100)
	TH-N120TA(KP)	105(85 to 125), 125(100 to 150)*
N180, N220	TH-N220RH(KP)	82(65 to 100), 105(85 to 125), 125(100 to 150), 150(120 to 180), 180(140 to 220)*
N300, N400	TH-N400RH(KP)	105(85 to 125), 125(100 to 125), 150(120 to 180), 180(140 to 220), 250(200 to 300), 330(260 to 400)*
N600, N800	TH-N600(KP)	250(200 to 300):400/5A, 330(260 to 400):500/5A, 500(400 to 600):750/5A, 660(520 to 800)*:1000/5A

Notes 1: Where the stabilized current value is between two heater designations, choose the heater designation to which the current value is closer.
2: Use the TH-N600 model thermal relay combined with the transformer (CW-15☐ model/15VA by Mitsubishi Electric) whose current transformation ratio is shown in the table.
3: The N600 and N800 models should be combined with the TH-N600. (An MSO model cannot be manufactured.)
4: "CX" of the model name refers to the CAN terminal attachments.
5: Heater designations with the *mark have magnetic starter frames to which they cannot be applied, so please refer to the heater rating (designation) column of the standard model thermal relay on the table above, for applicable magnetic starter frames.

●Coil Ratings

Operating coil rating (Alternating current operate) for S-N125 to N800

Coil designation	Ratings		Coil designation	Ratings		Coil designation	Ratings	
100VAC	100–127V	50Hz	300VAC	260–350V	50Hz	500VAC	460–550V	50Hz
	100–127V	60Hz		260–350V	60Hz		460–550V	60Hz
200VAC	200–240V	50Hz	400VAC	380–440V	50Hz	(24VAC)	24V	50/60Hz
	200–240V	60Hz		380–440V	60Hz	(48VAC)	48–50V	50/60Hz

Note 1: 24VAC cannot be manufactured for N180 to N800, 48VAC cannot be manufactured for N600 and N800.

Magnetic Contactors

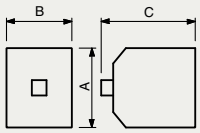
■S-N series (non-Reversing)
■S-2x series (Reversing)


S-N125


S-N220


S-N600

Delivery date category	
▭	Standard item
○	Substandard item
●	Special Item

Model name			S-N125	S-N150	S-N180	S-N220	S-N300	S-N400	S-N600	S-N800
	Non-Reversing		S-N125	S-N150	S-N180	S-N220	S-N300	S-N400	S-N600	S-N800
	Reversing		S-2×N125	S-2×N150	S-2×N180	S-2×N220	S-2×N300	S-2×N400	S-2×N600	S-2×N800
Rated capacity (kW) Category AC-3	220 to 240VAC		125	150	180	220	300	400	630	800
	380 to 440VAC		120	150	180	220	300	400	630	800
	500VAC		90	140	180	200	250	350	500	720
Conventional free air thermal current Ith [A]			150	200	260	260	350	450	660	800
Operation Coil Ratings			Refer to the table below							
Auxiliary contact arrangement	Non-Reversing	Standard	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	●2a2b
		Special	–	–	–	–	–	–	–	–
	Reversing	Standard	2a2b×2	3a3b×2	3a3b×2	3a3b×2	○3a3b×2	○3a3b×2	●4a4b×2	●4a4b×2
		Special	–	–	–	–	–	–	–	–
	Non-Reversing	A	150	160	204		243		310	
		B	100	120	138		163		290	
		C	137	145	175		195		235	
		Product weight [kg]	2.7	3.3	5.5		9.5		24	
	Reversing	A	150	160	215		250		435	
		B	276	296	370		395		660	
		C	147	156	189		209		254	
		Product weight [kg]	6	7	12.8		21		54	
IEC 35mm rail mounting type			–	–	–	–	–	–	–	–
Option	Front clip-on auxiliary contact block mounting type		–	–	–	–	–	–	–	–
	Side clip-on auxiliary contact block mounting type		◄———					———►	–	–
	Surge absorber mounting type		–	–	–	–	–	–	–	–
	Reversing mechanical interlock attachment possible		◄———					———►	–	–
Special Specifications	Anti-corrosion treatment	S-□YS	●	●	●	●	●	●	●	–
	Delay open type	S-□DL	–	●	–	●	●	●	–	–

Notes 1: *S-2xN18 model has auxiliary contacts (head on unit) as a standard attachment.
2: "CX" of the model name refers to the CAN terminal attachments.
3: The** mark means that CAN terminal attachments cannot be manufactured for this model.

●Coil Ratings

Operating coil rating (Alternating current operate) for S-N125 to N800

Coil designation	Ratings		Coil designation	Ratings		Coil designation	Ratings	
100VAC	100—127V	50Hz	300VAC	260—350V	50Hz	500VAC	460—550V	50Hz
	100—127V	60Hz		260—350V	60Hz		460—550V	60Hz
200VAC	200—240V	50Hz	400VAC	380—440V	50Hz	(24VAC)	24V	50/60Hz
	200—240V	60Hz		380—440V	60Hz	(48VAC)	48—50V	50/60Hz

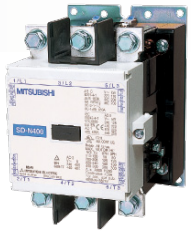
Note 1: 24VAC cannot be manufactured for N180 to N800, 48VAC cannot be manufactured for N600 and N800.

DC Operate magnetic Contactors

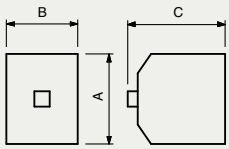
■SD-N series (non-Reversing)
■SD-2xN series (Reversing)



SD-N125



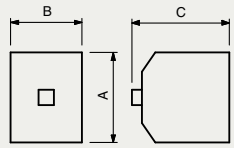
SD-N400

Model name	Non-Reversing		SD-N125	SD-N150	SD-N220	SD-N300	SD-N400	SD-N600	SD-N800
	Reversing		SD-2×N125	SD-2×N150	SD-2×N220	SD-2×N300	SD-2×N400	SD-2×N600	SD-2×N800
Rated capacity (kW) Category AC-3	200 to 220VAC		125	150	220	300	400	630	800
	380 to 440VAC		120	150	220	300	400	630	800
Conventional free air thermal current Ith [A]			150	200	260	350	450	660	800
Operating coil voltage (designation)			12VDC, 24VDC*, 48V, 100V, 110V, 125V (120 to 125V), 200V, 220V [Figures in brackets ( ) indicates rated values]						
Auxiliary contact arrangement (Both standard and special)	Non-Reversing		2a2b	2a2b	2a2b	2a2b	○2a2b	○2a2b	○2a2b
	Reversing		○2a2b×2	○3a3b×2	○3a3b×2	○3a3b×2	○3a3b×2	●4a4b×2	●4a4b×2
	Non-Reversing	A	150	160	204	243		310	
		B	100	120	138	163		371	
		C	162	170	200	221		235	
		Product weight [kg]	4.3	4.8	7.5	13.5		29	
	Reversing	A	150	160	215	250		435	
		B	276	296	370	395		800	
		C	173	181	214	235		254	
		Product weight [kg]	9.2	10	17	29		64	
IEC 35mm rail mounting type			—	—	—	—	—	—	—

Notes 1: "CX" of the model name refers to the CAN terminal attachments.
2: Ratings with an * mark are for special products, rated at SD-N220 and above.
3: 12VDC cannot be manufactured for SD-N600 and N800.

Magnetic Contactor with Mechanical Latch

- SL-T series (AC closing coil, non-reversing)
- SL-N series (AC closing coil, non-reversing)
- SLD-N series (DC closing coil, non-reversing)
- SL-2×N series (AC closing coil, reversing)
- SLD-2×N series (DC closing coil, reversing)

Model name									
	Non-Reversing	SL-T21(BC)	SL/SLD-N125	SL/SLD-N150	SL/SLD-N220	SL/SLD-N300	SL/SLD-N400	SL/SLD-N600	SL/SLD-N800
	Reversing	–	SL/SLD-2×N125	SL/SLD-2×N150	SL/SLD-2×N220	SL/SLD-2×N300	SL/SLD-2×N400	SL/SLD-2×N600	SL/SLD-2×N800
Rated capacity (kW) Category AC-3	200 to 220VAC	20	125	150	220	300	400	630	800
	380 to 440VAC	20	120	150	220	300	400	630	800
Conventional free air thermal current Ith [A]		32	150	200	260	350	450	660	800
Operating coil voltage (designation)		Alternating current operate: 100V, 200V, 300V, 400V, 500V Direct current operate: 12VDC, 24VDC, 48VDC, 100V (100 to 110V), 125V (120 to 125V), 200V (200 to 220V) [Figures in brackets ( ) indicate rated values]							
Auxiliary contact arrangement (Both standard and special)	Non-Reversing	2a2b	1a2b	1a2b	1a2b	1a2b	○1a2b	○1a2b	○1a2b
	Reversing	●2a2b	●1a2b×2	●2a3b×2	●2a3b×2	●2a3b×2	●2a3b×2	●3a4b×2	●3a4b×2
	Non-Reversing A	81	194	203	227	262		392	
	Non-Reversing B	63	100	120	138	163		290	
	Non-Reversing C	136.5	137	145	175	195		235	
	Non-Reversing Product weight [kg]	0.55	3.1	3.7	6	10		27	
	Reversing A	81	194	203	232.5	265.5		467	
	Reversing B	136	276	296	370	395		660	
	Reversing C	136.5	148	156	189	209		254	
	Reversing Product weight [kg]	1.15	7	8	14	22		60	
IEC 35mm rail mounting type		◄——►	–	–	–	–	–	–	–

Notes 1: Operating coils are rated for 15 minutes
2: "CX" of the model name refers to the CAN terminal attachments.
3: 12VDC cannot be manufactured for SD-N600 and N800.

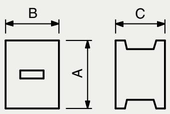
Low-Voltage Power Distribution Product
Features/ Summary
List Produced Models
Selections Order Procedure
Specifications
Magnetic Starter/ Contactor
Thermal Overload Relays
Contactor Relays
Option Unit
Solid State Contactors
Motor Circuit Breakers

DC Interface Contactors

■SD-Q, MSOD-Q series (Non-Reversing)
■SD-QR, MSOD-QR series (Reversing)

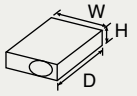


SD-Q11

Model name	Type	Non-Reversing		Reversing	
	Magnetic Contactors SD-	Q11	Q12	QR11	QR12
	Magnetic Starters MSOD-	Q11	Q12	QR11	QR12
Combined Thermal Overload Relays	Model name	TH-N12(KP)		TH-N12(KP)	
	Heater designation Applicable range [A]	0.12 to 11		0.12 to 11	
Rated capacity (kW) Category AC-3	200 to 240V	2.5		2.5	
	380 to 440V	4		4	
Rated operational current (A) Category AC-3	200 to 240V	12		12	
	380 to 440V	9		9	
Conventional free air thermal current Ith [A]		20		20	
Auxiliary contact arrangement	Standard	1a	1a1b	2b	2a2b
	Special	● 1b	● 2a	–	–
	Magnetic Contactors A	51	52	59	59
	Magnetic Contactors B	45	56	90	112
	Magnetic Contactors C	66.5	67.5	66.5	67.5
	Magnetic Contactors Product weight [kg]	0.19	0.21	0.42	0.46
	Magnetic Starters A	91	92.5	98.5	98.5
	Magnetic Starters B	49.5	56	94.5	112
	Magnetic Starters C	77	77	77	77
	Magnetic Starters Product weight [kg]	0.3	0.31	0.52	0.56
IEC 35mm rail mounting type		←			→
Coil Ratings		24VDC			

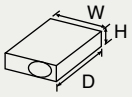
Thermal Overload Relays Specification

TH-T series

Frame			T18	T25
Appearance				
Model name	with 2-elements	For Magnetic Starters	TH-T18	TH-T25
		For independent mounting	–	
	with 3-elements	For Magnetic Starters	TH-T18KP	TH-T25KP
		For independent mounting	–	
	Outside dimensions [mm] W×H×D	For Magnetic Starters	45×55×76.5	63×51×79
		For independent mounting	–	
	Product weight [kg]	For Magnetic Starters	0.11	0.16
		For independent mounting	–	
Applicable standard			IEC60947-4-1, EN60947-4-1, JIS C8201-4-1, GB14048.4	
Use condition		Ambient temperature [°C]	-10 to +40 (Standard: 20°C; maximum temperature on the board: 55°C)	
		Frequency [Hz]	0(DC) to 400	
Main circuit specifications	Rated insulation voltage [V]		690	
	Rated impulse withstand voltage [kV]		6	
	Pollution degree		3	
	Heater designation (adjustable range of stabilized current) [A] (Rated operational voltage : 550V maximum)		0.12 (0.1 to 0.16) 0.17 (0.14 to 0.22) 0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18)	0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18) 22 (18 to 26)
	Power consumption [VA/element] at minimum/maximum stabilization		0.8 / 1.8	1.5 / 3.0
	Terminal screw size		M3.5	M4
	Compatible with terminal	Electric wire size [mm²]	ϕ1.6, 0.75 to 2.5	ϕ1.6 to 2.6, 1.25 to 6
		Crimp lug size	1.25-3.5 to 2-3.5, 5.5-S3	1.25-4 to 5.5-4
Operation circuit (contact) specifications	Contact arrangement		1a1b	1a1b
	Conventional free air thermal current Ith [A]		2	5
	Rating Operational Current [A] Category AC-15 (AC operated Magnetic Contactors Coil opening and closing) a contact/b contact. The value in brackets indicates the rating for automatic reset.	24VAC	2(0.5) / 2(0.5)	2(0.5) / 3(0.5)
		120VAC	2(0.5) / 2(0.5)	2(0.5) / 3(0.5)
		240VAC	1(0.5) / 1(0.5)	1(0.5) / 2(0.5)
		550VAC	0.3(0.3) / 0.3(0.3)	0.3(0.3) / 0.3(0.3)
	Rating Operational Current [A] Category DC-13 (DC operated Magnetic Contactors Coil opening and closing) The value in brackets indicates the rating for automatic reset.	24VDC	0.5(0.3)	1(0.3)
		110VDC	0.2(0.2)	0.2(0.2)
		220VDC	0.1(0.1)	0.1(0.1)
	Minimum applicable load level		20V 5mA	20V 5mA
	Terminal screw size		M3.5	M3.5
	Compatible with terminal	Electric wire size [mm²]	ϕ1.6, 0.75 to 2.5	ϕ1.6, 0.75 to 2.5
		Crimp lug size	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5
Characteristics/Functions	Trip class		10A	
	Operating characteristic curve description page		Page 886	
	Vibration resistance (vibration resistance malfunction performance)		10 to 55 Hz, 19.6 m/s²	
	Trip-free		◎	◎
	Reset method		Manual/Automatic switchable	Manual/Automatic switchable
	Operation indication (lever indication)		◎	◎
	Manual trip check		◎	◎
Applied products	With saturable reactor	TH-□SR	○	○
	With 3-element (2E) thermal saturable reactor	TH-□KPSR	○	○
	2-element quick-acting characteristics thermal	TH-□FS	○	○
	With 3-element (2E) thermal quick-acting characteristics	TH-□FSKP	○	○

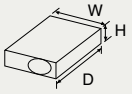
Notes 1: The ambient temperature compensator is mounted on all types.
2: The ◎ mark indicates standard equipment.

TH-T series

Frame			T50	T65	T100
Appearance					
Model name	with 2-elements	For Magnetic Starters	TH-T50	TH-T65	TH-T100
		For independent mounting	–		–
	with 3-elements	For Magnetic Starters	TH-T50KP	TH-T65KP	TH-T100KP
		For independent mounting	–		–
	Outside dimensions [mm] W×H×D	For Magnetic Starters	74.3×72×83.5	89×57×83.5	89×73.5×83.5
		For independent mounting	–		–
	Product weight [kg]	For Magnetic Starters	0.2	0.26	0.32
		For independent mounting	–		–
Applicable standard			IEC60947-4-1, EN60947-4-1, JIS C8201-4-1, GB14048.4		
Use condition		Ambient temperature [°C]	-10 to +40 (Standard: 20°C; maximum temperature on the board: 55°C)		
		Frequency [Hz]	0(DC) to 400		
Main circuit specifications	Rated insulation voltage [V]		690		
	Rated impulse withstand voltage [kV]		6		
	Pollution degree		3		
	Heater designation (adjustable range of stabilized current) [A] (Rated operational voltage : 550V maximum)		29 (24 to 34) 35 (30 to 40) 42 (34 to 50)	15 (12 to 18) 22 (18 to 26) 29 (24 to 34) 35 (30 to 40) 42 (34 to 50) 54 (43 to 65)	67 (54 to 80) 82 (65 to 100)
	Power consumption [VA/element] at minimum/maximum stabilization		1.6/3.2	2.4/5.5	2.5/6.0
	Terminal screw size		M5	M6	M6
	Compatible with terminal	Electric wire size [mm²]	ϕ5.5 to 14	–	–
		Crimp lug size	5.5-5 to 14-5	5.5-6 to 22-6	14-6 to 22-6, 38-S6
Operation circuit (contact) specifications	Contact arrangement		1a1b	1a1b	1a1b
	Conventional free air thermal current Ith [A]		5	5	5
	Rating Operational Current [A] Category AC-15 (AC operated Magnetic Contactors Coil opening and closing) a contact/b contact The value in brackets indicates the rating for automatic reset.	24VAC	2(0.5) / 3(0.5)	2(0.5) / 3(0.5)	2(0.5) / 3(0.5)
		120VAC	2(0.5) / 3(0.5)	2(0.5) / 3(0.5)	2(0.5) / 3(0.5)
		240VAC	1(0.5) / 2(0.5)	1(0.5) / 2(0.5)	1(0.5) / 2(0.5)
		550VAC	0.3(0.3) / 0.3(0.3)	0.5(0.5) / 1(0.5)	0.5(0.5) / 1(0.5)
	Category DC-13 (DC operated Magnetic Contactors Coil opening and closing) The value in brackets indicates the rating for automatic reset.	24VDC	1(0.3)	1(0.3)	1(0.3)
		110VDC	0.2(0.2)	0.2(0.2)	0.2(0.2)
		220VDC	0.1(0.1)	0.1(0.1)	0.1(0.1)
	Minimum applicable load level		20V 5mA	20V 5mA	20V 5mA
	Terminal screw size		M3.5	M4	M4
	Compatible with terminal	Electric wire size [mm²]	ϕ1.6, 1.25 to 2	ϕ1.6, 1.25 to 2	ϕ1.6, 1.25 to 2
		Crimp lug size	1.25-3.5 to 2-3.5	1.25-4 to 2-4, 5.5-S4	1.25-4 to 2-4, 5.5-S4
Characteristics/Functions	Trip class		10A	15 to 42A:10 54A:10A	67A:10 82A:10A
	Operating characteristic curve description page		Page 886		
	Vibration resistance (vibration resistance malfunction performance)		10 to 55Hz 19.6m/s²		
	Trip-free		◎	◎	◎
	Reset method		Manual/Automatic switchable	Manual/Automatic switchable	Manual/Automatic switchable
	Operation indication (lever indication)		◎	◎	◎
	Manual trip check		◎	◎	◎
Applied products	With saturable reactor	TH-□SR	○ (TH-T50SR)	○ (TH-T65SR)	○ (TH-T100SR)
	With 3-element (2E) thermal saturable reactor	TH-□KPSR	○ (TH-T50KPSR)	○ (TH-T65KPSR)	○ (TH-T100KPSR)
	2-element quick-acting characteristics thermal	TH-□FS	△ (TH-T50FS)	△ (TH-T65FS)	△ (TH-T100FS)
	With 3-element (2E) thermal quick-acting characteristics	TH-□FSKP	△ (TH-T50FSKP)	△ (TH-T65FSKP)	△ (TH-T100FSKP)

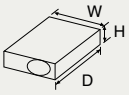
Notes 1: The ambient temperature compensator is mounted on all types.
2: The ◎ mark indicates standard equipment, the ○ indicates substandard items.

TH-N series

Frame			N120	N120TA	N220
Appearance					
Model name	with 2-elements	For Magnetic Starters	TH-N120	TH-N120TA	TH-N220RH
		For independent mounting		TH-N120TAHZ	TH-N220HZ
	with 3-elements	For Magnetic Starters	TH-N120KP	TH-N120TAKP	TH-N220RHKP
		For independent mounting		TH-N120TAHZKP	TH-N220HZKP
	Outside dimensions [mm] W×H×D	For Magnetic Starters	103×67×105	112×87×105	144×114×179.5
		For independent mounting		112×103×105	144×104×166.5
	Product weight [kg]	For Magnetic Starters	0.48	0.75	2.5
		For independent mounting		1.0	2.5
Applicable standard			JIS, JEM, IEC, VDE, BS, UL, GB		
Use condition		Ambient temperature [°C]	-10 to +40 (Standard: 20°C; maximum temperature on the board: 55°C)		
		Frequency [Hz]	0 (DC) to 400		50 to 60
Main circuit specifications	Heater designation (adjustable range of stabilized current) [A] (The dotted lines (---) on the table to the right show the compatibility with the frames of magnetic contactors) (For heater designations of applied products, refer to the relevant portion of the main document)		42 (34 to 50) 54 (43 to 65) 67 (54 to 80) 82 (65 to 100)	105 (85 to 125) 125 (100 to 150)	82 (65 to 100) 105 (85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220)
	Power consumption [VA/element] at minimum/maximum stabilization		3.0 / 7.1	3.8 / 8.6	1.0 / 2.3 (Note 5)
	Terminal screw size		M8	M8	M10
	Compatible with terminal	Electric wire size [mm^2]	–	–	–
		Crimp lug size	8-8 to 38-8	38-8 to 100-8	22-10 to 150-10
Operation circuit (contact) specifications	Contact arrangement		1a1b	1a1b	1a1b
	Conventional free air thermal current Ith [A]		5	5	5
	Rating Operational Current [A] Category AC-15 (AC operated Magnetic Contactors Coil opening and closing) a contact/b contact. The value in brackets indicates the rating for automatic reset.	24VAC	2 / 3	2 / 3	2 / 3
		120VAC	2 / 3	2 / 3	2 / 3
		240VAC	1 / 2	1 / 2	1 / 2
		550VAC	0.5 / 1	0.5 / 1	0.5 / 1
	Category DC-13 (DC operated Magnetic Contactors Coil opening and closing). The value in brackets indicates the rating for automatic reset.	24VDC	1	1	1
		110VDC	0.2	0.2	0.2
		220VDC	0.1	0.1	0.1
	Minimum applicable load level		20V 5mA	20V 5mA	20V 5mA
	Terminal screw size		M4	M4	M4
	Compatible with terminal	Electric wire size [mm^2]	ϕ1.6, 1.25 to 2	ϕ1.6, 1.25 to 2	ϕ1.6, 1.25 to 2
		Crimp lug size	1.25-4 to 2-4, 5.5-S4	1.25-4 to 2-4, 5.5-S4	1.25-4 to 2-4, 5.5-S4
Characteristics/Functions	Operating characteristic curve description page		Page 886		
	Vibration resistance (vibration resistance malfunction performance)		10 to 55Hz 19.6m/s2		
	Trip-free		◎	◎	◎
	Reset method		Manual/Automatic switchable	Manual/Automatic switchable	Manual/Automatic switchable
	Operation indication (lever indication)		◎	◎	◎
	Manual trip check		◎	◎	◎
Frame of magnetic contactor that can be combined with the product			N125, N150	N125, N150 N150	N180, N220 N220
Applied product	Delayed reaction model	With 2 elements (TH-□SR)	○(TH-N120SR)	○(TH-N120TASR)	○(TH-N220□SR)
		2E format (TH-□KPSR)	○(TH-N120KPSR)	○(TH-N120TAKPSR)	○(TH-N220□KPSR)
	Quick response model	With 2 elements (TH-□SR)	–	–	–
		2E format (TH-□KPSR)	–	–	–
Option	Charging part protection cover		–	–	–
	Reset release		◎(UN-RR□6)	◎(UN-RR□6)	◎(UN-RR□6)
	Operating status display		◎(UN-TL60)	◎(UN-TL60)	◎(UN-TL60)
	Main unit / IEC35mm rail attachment unit		–	–	–
	Cover to prevent mistaken operation		◎(UN-CV603)	◎(UN-CV603)	◎(UN-CV603)

Notes 1: The ambient temperature compensator is mounted on all types.
2: The ◎ mark indicates a standard model (standard equipment), the ○ indicates substandard models, the △ indicates a special product, the – indicates that this item cannot be manufactured.
3: In the case of a single unit attachment to the model with CAN terminal, the model name will be TH-N20CXHZ or TH-N20CXHZKP.
4: The TH-N600 (KP) model should be used in combination with a transformer made for measuring instruments (Rated secondary load of 15VA and above). Recommended models for use with the 250, 330 and 500A are the CW-15LM or the CW-15L. In case of 660A is the CW-40LM. The current transformation ratio is listed in the heater designation column of the table.
5: The power consumption shown includes only the power consumed by the heating element. (The power consumed by the transformer in N220 - N600 frames is not included)
6: TH-N18DM (KP) meets the specification to use in combination with SD-Q19. The structure of the TH-N18 (KP) is different, but the other points (specifications, properties, functionality) are same.

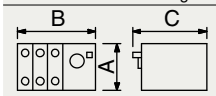
TH-N series

Frame			N400	N600
Appearance				
Model name	with 2-elements	For Magnetic Starters	TH-N400RH	TH-N600 (Note 4)
		For independent mounting	TH-N400HZ	
	with 3-elements	For Magnetic Starters	TH-N400RHKP	TH-N600KP (Note 4)
		For independent mounting	TH-N400HZKP	
	Outside dimensions [mm] W×H×D	For Magnetic Starters	144×160×193.5	63×42×83.5
		For independent mounting	144×173×166.5	
	Product weight [kg]	For Magnetic Starters	2.7	0.14
		For independent mounting	2.7	
Applicable standard			JIS, JEM, IEC, VDE, BS, UL, GB	
Use condition		Ambient temperature [°C]	-10 to +40 (Standard: 20°C; maximum temperature on the board: 55°C)	
		Frequency [Hz]	50 to 60	
Main circuit specifications	Heater designation (adjustable range of stabilized current) [A] (The dotted lines (---) on the table to the right show the compatibility with the frames of magnetic contactors) (For heater designations of applied products, refer to the relevant portion of the main document)		105 (85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 250 (200 to 300) 330 (260 to 400) * The thermal relay parts of heater designations of 180A and below are same with the N220 frame.	250 (200 to 300) (Current transformation ratio: 400/5A) 330 (260 to 400) (Current transformation ratio: 500/5A) 500 (400 to 600) (Current transformation ratio: 750/5A) 660 (520 to 800) (Current transformation ratio: 1000/5A)
	Power consumption [VA/element] at minimum/maximum stabilization		1.0 / 2.3 (Note 5)	1.0 / 2.3 (Note 5)
	Terminal screw size		M12	–
	Compatible with terminal	Electric wire size [mm²]	–	–
		Crimp lug size	22-12 to 200-12	–
Operation circuit (contact) specifications	Contact arrangement		1a1b	1a1b
	Conventional free air thermal current Ith [A]		5	5
	Rating Operational Current [A] Category AC-15 (AC operated Magnetic Contactors Coil opening and closing a contact/b contact) The value in brackets indicates the rating for automatic reset.	24VAC	2 / 3	2 / 3
		120VAC	2 / 3	2 / 3
		240VAC	1 / 2	1 / 2
		550VAC	0.5 / 1	0.5 / 1
	Category DC-13 (DC operated Magnetic Contactors Coil opening and closing) The value in brackets indicates the rating for automatic reset.	24VDC	1	1
		110VDC	0.2	0.2
		220VDC	0.1	0.1
	Minimum applicable load level		20V 5mA	20V 5mA
	Terminal screw size		M4	M4
	Compatible with terminal	Electric wire size [mm²]	ϕ1.6, 1.25 to 2	ϕ1.6, 1.25 to 2
		Crimp lug size	1.25-4 to 2-4, 5.5-S4	1.25-4 to 2-4, 5.5-S4
Characteristics/Functions	Operating characteristic curve description page		Page 886	
	Vibration resistance (vibration resistance malfunction performance)		10 to 55Hz 19.6m/s2	
	Trip-free		◎	◎
	Reset method		Manual/Automatic switchable	Manual/Automatic switchable
	Operation indication (lever indication)		◎	◎
	Manual trip check		◎	◎
Frame of magnetic contactor that can be combined with the product			N300, N400 N400	N600, N800
Applied product	Delayed reaction model	With 2 elements (TH-□SR)	○(TH-N400□SR)	○(TH-N600SR)
		2E format (TH-□KPSR)	○(TH-N400□KPSR)	○(TH-N600KPSR)
	Quick response model	With 2 elements (TH-□SR)	–	–
		2E format (TH-□KPSR)	–	–
Option	Charging part protection cover		–	–
	Reset release		◎(UN-RR□6)	◎(UN-RR□6)
	Operating status display		◎(UN-TL60)	◎(UN-TL60)
	Main unit / IEC35mm rail attachment unit		–	–
	Cover to prevent mistaken operation		◎(UN-CV603)	◎(UN-CV603)

Notes 1: The ambient temperature compensator is mounted on all types.
2: The ◎ mark indicates a standard model (standard equipment), the ○ indicates substandard models, the △ indicates a special product, the – indicates that this item cannot be manufactured.
3: In the case of a single unit attachment to the model with CAN terminal, the model name will be TH-N20CXHZ or TH-N20CXHZKP.
4: The TH-N600 (KP) model should be used in combination with a transformer made for measuring instruments (Rated secondary load of 15VA and above). Recommended models for use with the 250, 330 and 500A are the CW-15LM or the CW-15L. In case of 660A is the CW-40LM. The current transformation ratio is listed in the heater designation column of the table.
5: The power consumption shown includes only the power consumed by the heating element. (The power consumed by the transformer in N220 - N600 frames is not included)
6: TH-N18DM (KP) meets the specification to use in combination with SD-Q19. The structure of the TH-N18 (KP) is different, but the other points (specifications, properties, functionality) are same.

Thermal Overload Relays (Product Introductions)

TH-T series

Model name		TH-T18	TH-T25	TH-T50	TH-T65	TH-T100
Application		MSO-T10 -T12 -T20 MSOD-T12 -T20	MSO-T21 -T25 -T35 -T50 MSOD-T21 -T35 -T50	MSO-T35 -T50 MSOD-T35 -T50	MSO-T65 -T80 -T100 MSOD-T65 -T80 -T100	MSO-T80 -T100 MSOD-T80 -T100
Standard heater rating (designation) (A)		0.12, 0.17, 0.24, 0.35, 0.5, 0.7, 0.9,1.3, 1.7, 2.1, 2.5, 3.6, 5, 6.6, 9, 11, 15	0.24, 0.35, 0.5, 0.7, 0.9, 1.3, 1.7, 2.1, 2.5, 3.6, 5, 6.6, 9, 11, 15, 22	29, 35, 42	15, 22, 29 35, 42, 54	67, 82
Contact arrangement		1a1b	1a1b	1a1b	1a1b	1a1b
 (Unit: mm)	A	55	53	74	57	73.5
	B	45	63	74.3	89	89
	C	76.5	80	88	83.5	83.5

Heater types

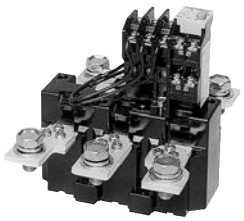
Heater types of TH type Thermal Overload Relays

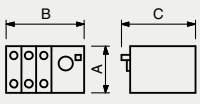
Model	For Magnetic Starters		For single mounting		Heater designation (adjustable range of stabilized current) (A)
	2-element	3-element (2E)	2-element	3-element (2E)	
Standard	T18	T18KP	– (Note 1)	– (Note 1)	0.12(0.1 to 0.16) 0.17(0.14 to 0.22) 0.24(0.2 to 0.32) 0.35(0.28 to 0.42) 0.5(0.4 to 0.6) 0.7(0.55 to 0.85) 0.9(0.7 to 1.1) 1.3(1 to 1.6) 1.7(1.4 to 2) 2.1(1.7 to 2.5) 2.5(2 to 3) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18)
	T25	T25KP	T25 (Note 1)	T25KP (Note 1)	0.24(0.2 to 0.32) 0.35(0.28 to 0.42) 0.5(0.4 to 0.6) 0.7(0.55 to 0.85) 0.9(0.7 to 1.1) 1.3(1 to 1.6) 1.7(1.4 to 2) 2.1(1.7 to 2.5) 2.5(2 to 3) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18) 22(18 to 26)
	T50	T50KP	–	–	29(24 to 34) 35(30 to 40) 42(34 to 50)
	T65	T65KP	T65	T65KP	15(12 to 18) 22(18 to 26) 29(24 to 34) 35(30 to 40) 42(34 to 50) 54(43 to 65)
	T100	T100KP	–	–	67(54 to 80) 82(65 to 100)
Quick trip type	–	T18FSKP	– (Note 1)	– (Note 1)	2.1(1.7 to 2.5) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18)
	T25FS	T25FSKP	T25FS	T25FSKP	2.1(1.7 to 2.5) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18) 22(18 to 26)
	T50FS	T50FSKP	–	–	29(24 to 34) 35(30 to 40) 42(34 to 50)
	T65FS	T65FSKP	T65FS	T65FSKP	42(34 to 50) 54(43 to 65)
	T100FS	T100FSKP	–	–	67(54 to 80) 82(65 to 93)
Delay trip type	T18SR	–	– (Note 1)	–	0.24(0.2 to 0.32) 0.35(0.28 to 0.42) 0.5(0.4 to 0.6) 0.7(0.55 to 0.85) 0.9(0.7 to 1.1) 1.3(1 to 1.6) 1.7(1.4 to 2) 2.1(1.7 to 2.5) 2.5(2 to 3) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18)
	T25SR	T25KPSR	T25SR (Note 1)	T25KPSR (Note 1)	0.24(0.2 to 0.32) 0.35(0.28 to 0.42) 0.5(0.4 to 0.6) 0.7(0.55 to 0.85) 0.9(0.7 to 1.1) 1.3(1 to 1.6) 1.7(1.4 to 2) 2.1(1.7 to 2.5) 2.5(2 to 3) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18) 22(18 to 26)
	T50SR	T50KPSR	–	–	29(24 to 34) 35(30 to 40) 42(34 to 50)
	T65SR	T65KPSR	T65SR	T65KPSR	15(12 to 18) 22(18 to 26) 29(24 to 34) 35(30 to 40) 42(34 to 50) 54(43 to 65)
	T100SR	T100KPSR	–	–	67(54 to 80) 82(65 to 100)

Note 1: Combining UT-HZ18 allows the T18 frame to be used singly (screw mounting or IEC 35 mm rail mounting).
Combining UN-RM20 allows the T25 frame for single mounting to have the IEC 35mm rail mounted.

TH-N series


TH-N120TA


TH-N400HZKP

Model name		TH-N120	TH-N120TA	TH-N120TAHZ	TH-N220RH	TH-N220HZ	TH-N400RH	TH-N400HZ	TH-N600
Application		MSO-N125 -N150 Single attachment possible	MSO-N125 -N150	For single mounting	MSO-N180 -N220	For single mounting	MSO-N300 -N400	For single mounting	This should be used in combination with a transformer for use with measuring instruments (15VA).
Standard heater rating (designation) (A)		42, 54 67, 82	105, 125		82, 105, 125 150, 180		105, 125, 150 180, 250, 330		250 (transformer 400/5A) 330 (transformer 500/5A) 500 (transformer 750/5A) 660 (transformer 1000/5A)
Contact arrangement (rated)		1a1b (a contact 110VAC2A, 220VAC1A, b contact 110VAC 3A, 220VAC2A)							
	A	67	87	103	114	104	160	173	42
	B	103	112	112	144	144	144	144	63
	C	105	105	105	178	167	194	167	83.5
	Product weight [kg]	0.46	0.57	1.0	2.5	2.5	2.7	2.7	0.14
Standard item with 2 elements	TH-☐			●					●
Special Specifications: Quick response model (with 2E)	TH-☐FS	–	–	–	–	–	–	–	–
Special Specifications: Saturated reactor attached	TH-☐SR	○	○	–	○	○	●	●	●
Special Specifications: Corrosion resistant model	TH-☐YS	●	●	●	●	●	●	●	●

Notes 1: For single attachment models, it is possible to attach only the thermal relays with wiring.
2: "CX" of the model name refers to the CAN terminal attachments.

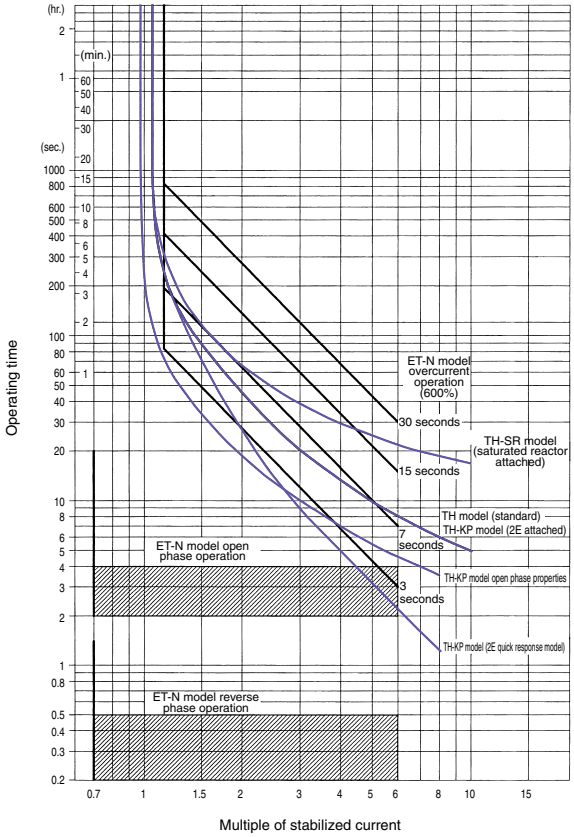
●Heater types

Types of heaters in TH model thermal relays

For Magnetic Starters		For single mounting		Heater designation (adjustable range of stabilized current) (A)
2-element	(2E)3-element	2-element	(2E)3-element	
N120	N120KP	N120	N120KP	42(34 to 50) 54(43 to 65) 67(54 to 80) 82(65 to 100)
N120TA	N120TAKP	N120TAHZ	N120TAHZKP	105(85 to 125) 125(100 to 150)
N220RH	N220RHKP	N220HZ	N220HZKP	82(65 to 100) 105(85 to 125) 125(100 to 150) 150(120 to 180) 180(140 to 220)
N400RH	N400RHKP	N400HZ	N400HZKP	105(85 to 125) 125(100 to 150) 150(120 to 180) 180(140 to 220) 250(200 to 300) 330(260 to 400)
N600	N600KP	–	–	250(200 to 300) 330(260 to 400) 500(400 to 600) 660(520 to 800) * When combined with a transformer (see notes)

Notes 1: The TH-N600 (KP) model should be used in combination with a transformer for measuring instruments (Rated load of 15VA and current transformation ratio as follows; 250A: 400/5A, 330A: 500/5A, 500A: 750/5A, 660A: 1000/5A).
2: "CX" of the model name refers to the CAN terminal attachments.

●Comparison of operating properties of various motor protection relays



TH model standard (2 elements attached) thermal relay
General overloading/locking protection for the motor.

TH-KP model thermal relay with 2E (can also be used with 3 elements)
General overloading/locking/phase failure protection for the motor.
Overloading/locking/phase failure protection for motors with a 3-phase 4-wire system of power distribution.

TH-SR model thermal relay with saturated reactor
Overloading/locking protection for motors with a long startup time or for motors that are frequently used for inching or intermittent operation.

TH-KF model thermal relay with quick response properties (also used with 2E)
Protection for motors with a short allowable time for locking such as underwater motors, etc.

TH-FS model thermal relay with quick response properties and 2 elements
Locking protection for refrigerator compressor motors etc.

ET-N model electronic motor protection relay
Protection from overloading and locking of motors, as well as a wide range of phase failure and phase reversals, etc.

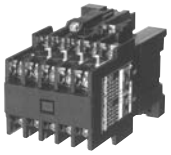
Contactor Relays Specification

SR-T series

Model name				SR-T5	SR-T9
Number of poles				5	9
Contact arrangement				5a	9a
				4a1b	7a2b
				3a2b	5a4b
Rated insulation voltage [V]				690	
Applicable standard				IEC60947-5-1, EN60947-5-1, JIS C8201-5-1	
Rated impulse withstand voltage [kV]				6	
Rated frequency [Hz]				50/60	
Pollution degree				3	
Contact rating (Note 1)	AC rated operational current [A]	Category AC-15 (Coil load)	120VAC	6	
			240VAC	3	
			440VAC	1.5	
			550VAC	1.2	
		Category AC-12 (resistive load)	120VAC	10	
			240VAC	8	
			440VAC	5	
			550VAC	5	
	DC rated operational current [A]	Category DC-13 (large coil load)	24VDC	3	
			48VDC	1.5	
			110VDC	0.6(2)	
			220VDC	0.3(0.8)	
		Category DC-12 (resistive loads)	24VDC	10	
			48VDC	8	
			110VDC	5(8)	
			220VDC	1(3)	
	Minimum applicable load level			20V 3mA	
Performance	Mechanical durability [ten thousand times]			1,000	
	Electrical durability [ten thousand times]			50	
	Switching frequency [time/hour]			1,800	
Characteristic	Coil consumption (Note 3)	Inrush [VA]		45	
		Sealed [VA]		7	
	Power consumption (Note 3) [W]			2.2	
Optional unit (Note 2)	Surge absorber unit			○	○
	Additional auxiliary contact block			○	×
IEC 35mm rail mounting				○	○

Notes 1: The value in brackets indicates the current when switching the load with two poles installed in series.
2: In the optional unit field, ○ and × indicate mountable and non-mountable, respectively.
3: Coil consumption are average values in case of applying 220V60Hz to AC200V coil.

SR-K series

Frame				K100
Appearance				 SR-K100
Number of poles				10
Contact arrangement				10a, 9a1b
				8a2b, 7a3b
				6a4b, 5a5b
Contact rating (Note 2)	Conventional free air thermal current Ith [A]			16
	AC rated operational current [A]	Category AC-15 (Coil load)	110VAC	6
			220VAC	5
			440VAC	3
			550VAC	3
		Category AC-12 (resistive load)	110VAC	16
			220VAC	12
			440VAC	5
			550VAC	5
	DC rated operational current [A]	Category DC-13 (large coil load)	24VDC	5
			48VDC	3
			110VDC	0.8(2)
			220VDC	0.2(0.8)
		Category DC-12 (resistive loads)	24VDC	10
			48VDC	8
			110VDC	5(8)
			220VDC	1(3)
Standard			SR-□	◎
DC operated type			SRD-□	◎
Mechanically latched type			SRL-□	◎
			SRLD-□	◎
With large rated auxiliary contacts			SR-□JH	○
			SRD-□JH	○
With overlapping contacts			SR-□LC	○
			SRD-□LC	○
With terminal cover			SR-□CX	–
			SRD-□CX	–
Optional unit	With surge absorber (Note 3) (Note 4)			◎
	DC/AC interface (Note 4)			◎
	Charging part protection cover			◎
IEC 35mm rail mounting type				◎
690V applicable				◎

Notes 1: ◎ mark is standard, ○ mark is substandard, – is not able to be manufactured.
2: Where large capacity or overlapping contacts are included, the rating of the contacts can be found by referring to the individual ratings table. Values in brackets ( ) are for two pole straight line load switching.
3: In the case of mechanical latch (SRL-K100, SRLD-K100) models, one absorber can be attached to each of closing and tripping coils.
4: Surge absorption units and DC/AC interface units cannot be attached together as additions to the coil terminal of an contactor relay at the same time.
5: The ■ mark in the option unit column indicates that this option can be manufactured; the □ indicates that it cannot be manufactured.

Optional Units Model List

MS-T series

Model name		Auxiliary contact blocks			Operation coil surge absorber unit				Mechanical interlocks
Type		UT-AX4	UT-AX2	UT-AX11	UT-SA23	UT-SA21	UT-SA22	UT-SA25	UT-ML11
Mounting		Front clip-on		Side clip-on	Mounting on top				Side clip-on
Specification/ Function		Twin contact built-in 4-pole auxiliary contact (4a, 2a2b, 3a1b)	Twin contact built-in 2-pole auxiliary contact (2a, 1a1b, 2b)	Twin contact built-in 2-pole auxiliary contact (1a1b)	Operation coil surge absorber: With CR 200VAC	With varistor 48VAC (Shared with DC) 200VAC (Shared with DC) 400VAC	With varistor + indicating LED 200VAC (Shared with DC)	With varistor + CR 48VAC (Shared with DC) 200VAC (Shared with DC)	Combining it with two single Magnetic Contactors configures the reversing type. ML11 is the electrical interlock 2b contact built-in type.
Appearance (Typical example)		 UT-AX4	 UT-AX2	 UT-AX11	 UT-SA21				 UT-ML11
Applied model	Magnetic Starters	T10-T32		T10-T32	T10-T32				T10-T20
	Magnetic Contactors								
	Contactor Relays	SR-T5		SR-T5	SR-T5/T9				–
Others		Combination with UT-AX11 is not available.		Combination with UT-AX2/4 is not available.	–				–

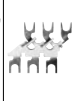
MS-T/N series

Model name	Auxiliary contact blocks									Auxiliary contact unit for low level signals	
Type	UT-AX2(BC)	UT-AX4(BC)	UT-AX11(BC)	UN-AX2(CX)	UN-AX4(CX)	UN-AX11(CX)	UN-AX80	UN-AX150	UN-AX600	UN-LL22(CX)	
Mounting	Front clip-on		Side clip-on	Front clip-on		Side clip-on				Front clip-on	
Specification/ Function	Twin contact built-in 2-pole auxiliary contact (2a, 1a1b, 2b)	Twin contact built-in 4-pole auxiliary contact (4a, 2a2b, 3a1b)	Twin contact built-in 2-pole auxiliary contact (1a1b)	Twin contact built-in 2-pole auxiliary contact (2a, 1a1b, 2b)	Twin contact built-in 4-pole auxiliary contact (4a, 2a2b, 3a1b)	Twin contact built-in 2-pole auxiliary contact (1a1b)	Twin contact built-in 2-pole auxiliary contact (1a1b)	Twin contact built-in 2-pole auxiliary contact (1a1b)	Twin contact built-in 4-pole auxiliary contact (2a2b)	A combination of 2 low level signal contacts and twin (standard) contacts, for a total 4 pole auxiliary contact structure For low level signals 1a1b (5V 5mA) Twin contact 1a1b (20V 5mA)	
Appearance											
(Typical example)	UT-AX2	UT-AX4	UT-AX11	UN-AX2	UN-AX4	UN-AX11	UN-AX80	UN-AX150	UN-AX600	UN-LL22	
Standard compliance achieved	UL · CSA	UL · CSA	UL · CSA	UL · CSA	UL · CSA	UL · CSA	UL · CSA	UL · CSA	UL · CSA	UL · CSA	
Product weight [g]	20	50	50	30	50	40	55	35	200	60	
Others	Combination with UT-AX11(BC) is not available.		Combination with UT-AX2, 4(BC) is not available.	Combination with UN-AX11(CX) is not available.		Combination with UN-AX2, 4, LL22(CX) is not available.	–			Combination with UN-AX11(CX) is not available.	

Model name	DC/AC interface unit for operating coils								Protective cover units								
Type	UT-SY21(BC)	UT-SY22(BC)	UN-SY11	UN-SY12	UN-SY21(CX)	UN-SY22(CX)	UN-SY31	UN-SY32	UN-CV□0	UN-CV251, CV□2	UN-CZ605	UN-CZ□0	UN-CZ□2	UN-CZ□1	UN-CZ□4	UT-CV□, UN-CV□	UT-CW□, UN-CW□
Mounting	Mounting on top		For Independent mounting		Mounting on top				Front clip-on								
Specification/ Function	The magnetic contactor and contactor relay operating on alternating current can be controlled with 24VDC.								Charging part protection cover							Mistaken operation prevention cover	terminal cover
	TRIAC output Input 24VDC 15mA	Relay output Input 24VDC 10mA	TRIAC output Input 24VDC 15mA	Relay output Input 24VDC 10mA	TRIAC output Input 24VDC 15mA	Relay output Input 24VDC 10mA	TRIAC output Input 24VDC 15mA	Relay output Input 24VDC 10mA	For magnetic contactor For contactor relays	For magnetic starters (MSO-)	Thermal relay for (TH-T65, TH-N60)	For magnetic contactors (power source side and load side) For magnetic starters (power source side)	For reversing magnetic contactors	For magnetic starters (load side)	For reversing magnetic starters	UN-CV117 For use with magnetic contactors and contactor relays UN-CV□3 For thermal relay (TH-) UN-CV30 For pneumatic timers	For magnetic contactor For contactor relays For thermal relay
Appearance																	
(Typical example)	UT-SY21		UN-SY11		UN-SY21		UN-SY32		UN-CV250		UN-CZ605	UN-CZ500		UN-CZ501		UN-CV103	UT-CW110
Standard compliance achieved																	
Product weight [g]	30	60	40	40													
Others	–				–												

Notes 1: There are limits on types, rated voltage and use in combination with other models.
2: There is also the UN-RY10 (applicable models: 2XN10 & N11), which integrates the 3 connecting conductors each on the power source and load sides.
3: There is also the UN-RY10L (applicable models: 2XN10 & N11), which integrates 3 connecting conductors.

	Operation coil surge absorber unit														Main circuit surge absorption unit	
	UT-SA□3	UT-SA21	UT-SA22	UT-SA25	UN-SA□3	UN-SA21	UN-SA22	UN-SA25	UN-SA721	UN-SA712	UN-SA722	UN-SA713	UN-SA723	UN-SA725	UT-SA33□	UN-SA33
	Mounting on top														Front clip-on	Independent mounting
	Operation coil surge absorber														Main circuit surge absorber	
	With CR UT-SA23 200VAC UT-SA13 200VDC	With varistor 48VAC (Shared with DC) 200VAC (Shared with DC) 400VAC	With varistor + indicating LED 200VAC (Shared with DC)	With varistor + With CR 48VAC (Shared with DC) 200VAC (Shared with DC)	With CR UN-SA13 200VDC UN-SA23 200VAC	With varistor 200VAC (Shared with DC) 400VAC	With varistor + indicating LED 200VAC (Shared with DC)	With varistor + With CR 48VAC (Shared with DC) 200VAC (Shared with DC)	With varistor 48VAC (Shared with DC) 100VAC (Shared with DC) 200VAC (Shared with DC) 400VAC	With varistor + indicating LED 100VAC (Shared with DC) 200VAC (Shared with DC)		With CR 200VDC	With CR 200VAC	With varistor + With CR 48VAC (Shared with DC) 100VAC (Shared with DC) 200VAC (Shared with DC	With CR 240VAC (AC100 to 240V)	
	 UT-SA21	 UT-SA22	 UN-SA21	 UN-SA22	 UN-SA721	 UN-SA712	 UN-SA722	 UN-SA713	 UN-SA723	 UN-SA725	 UT-SA33□	 UN-SA33		
	UL · CSA	UL · CSA		UL · CSA	UL · CSA	UL · CSA		UL · CSA	UL · CSA							
	13		18	17	13		18	17	20	25	25	25	20	25		78
	–														–	

	Mechanical interlock unit			Main circuit conductor kit							3 pole parallel connection unit	Connecting conductor kit	Fault detection unit	Reset release		LED display	Single attachment unit	
	UT-ML11 (BC)	UT-ML20 (BC)	UN-ML□	UT-SD□	UN-SD□	UT-SG□	UN-SG□	UN-YG□	UT-YD20	UN-YD□	UT-YY20, UN-YY□	UT-TH50, UN-TH□	UN-FD□ (CX)	UT-RR□	UN-RR□	UN-TL□	UT-HZ18 (BC)	UN-RM20
	Side clip-on			Main cuit									Independent mounting	Front clip-on		Front clip-on	–	
	Combined with two single units of magnetic contactors to form a reversing model. The model incorporates an electric interlock 2b contact	Combined with two single units of magnetic contactors to form a reversing model. The model incorporates an electric interlock 2b contact	Combined with two single units of magnetic contactors to form a reversing model. The ML11(CX) incorporates an electric interlock 2b contact	Connecting conductor for reversing model magnetic contactors		Connecting conductor for jumper connecting reversing model magnetic contactors		3 pole connecting conductor for short circuits	2 pole connecting conductor for short circuits		3 pole parallel connecting conductor	Conductor for connecting magnetic contactors and thermal relays	Detecting the conduction mode (contact welds) of the main circuit 100VAC 200VAC	For use in thermal resets outside the circuit board 200mm 400mm 550mm 700mm		Thermal relay trip display 100VAC 200VAC 24VDC	Can be attached with TH-T18, using screws or with the IEC35mm rails.	Can be attached with TH-T25 and TH-20, using screws or with the IEC35mm rails.
	 UT-ML11	 UT-ML20	 UN-ML21										 UN-FD4				 UT-HZ18	 UN-RM20
	UL · CSA	UL · CSA	UL · CSA															
													120				35	20
	–			–									–	–		–	–	

Solid State Contactors Model List

■US-N□/K□ Model Solid State Contactors (Standard Models)

200VAC series

AC-1 rated operating current [A]		5	8	20	30	40	50	70	80
Heater capacity [kW]	1φ200V (Note 2)	1	1.6	4	6	8	10	14	16
	3φ200V	1.7	2.7	6.9	10.3	13.8	17.3	24.2 (Note 1)	27.7
Maximum applicable motor capacity [kW] 3φ200V (Note 3)		0.4	0.4	2.2	3.7	5.5	5.5	11 (Note 1)	11
For 3 phase load US-N□ US-K□		 US-N5SS US-N5SSTE	 US-N8SS US-N8SSTE	 US-N20 US-N20TE	 US-N30 US-N30TE (Note 4)	 US-N40 US-N40TE	 US-N50 US-N50TE (Note 4)	 US-N70NS US-N70NSTE	 US-N80NS US-N80NSTE
For single phase load For combined 3 phase load US-K□								 US-K70	

400VAC series

AC-1 rated operating current [A]				20	30	40	50	70	80
Heater capacity [kW]	1φ400V (Note 2)			8	12	16	20	28	32
	3φ400V			13.8	20.7	27.7	34.6	48.5 (Note 1)	55.4
Maximum applicable motor capacity [kW] 3φ400V (Note 3)				3.7	7.5	11	11	22 (Note 1)	22
For 3 phase load US-N□ US-NH□ US-KH□				 US-N20 US-N20TE	 US-N30 US-N30TE (Note 4)	 US-N40 US-N40TE	 US-N50 US-N50TE (Note 4)	 US-NH70NS US-NH70NSTE	 US-NH80NS US-NH80NSTE
For single phase load For combined 3 phase load US-KH□								 US-KH70	

IEC 35mm rail mounting type	Can be manufactured with standard products	(Note 6)			
Charging part protection cover unit	Equipped with standard products (Except US-K70, KH70)				
Driving unit		UA-DR1			
Driving unit with output	UA-SH8 (Note 8)	UA-SH1			
Reversing unit	UA-RE				
Fault Detection Unit	UN-FD (for 200V main circuit) & UN-FD4 (for 400V main circuit)				
Power control unit	UA-PC				

Option

(Note 5)


UA-SH8


UA-DR1


UA-SH1


UA-RE

	100	120	150	200
	20	24	30	40
	34.6 (Note 1)	41.5	52 (Note 1)	69 (Note 1)
	15 (Note 1)	15	18.5 (Note 1)	22 (Note 1)
	 US-K100TE	 US-K120TE	 US-K150TE	
	 US-K100		 US-K150	 US-K200

	100	120	150	200
	40	48	60	80
	69.3 (Note 1)	83	103.9 (Note 1)	138.5 (Note 1)
	30 (Note 1)	30	37 (Note 1)	45 (Note 1)
	 US-KH100TE	 US-KH120TE	 US-KH150TE	
	 US-KH100		 US-KH150	 US-KH200


UN-FD


UA-PC

US-KD8 Model Solid State Contactor (For Direct Current Load)

Direct Current	DC-1 rated operating current [A]	8
	Rated voltage	DC24 to 110V
	For direct current load US-KD8	 US-KD8
IEC 35mm rail mounting type		Can be manufactured with standard products
Option	Driving unit with output	UA-SH8

US-H□ Model Solid State Contactor

AC-1 rated operating current [A] (-10 to 40°C)		20	30	40	50
Heater capacity [kW] (-10 to 40°C) (Note 8)	1ϕ200V	4	6	8	10
	3ϕ200V	6.9	10.3	13.8	17.3
	3ϕ400V	13.8	20.7	27.7	34.6
US-H□		 US-H20 US-H20DD	 US-H30 US-H30DD	 US-H40 US-H40DD	 US-H50 US-H50DD
IEC 35mm rail mounting type		(Note 6)			
Option	Fault Detection Unit	UN-FD (for 200V main circuit) & UN-FD4 (for 400V main circuit)			
	Power control unit	UA-PC			
	Charging part protection cover unit	UN-CV501US			

Notes 1: When used with the US-K(H)□ model, this shows the capacity when applied to a 3 phase load by combining two or three units of the US-K(H)□ model for single phase load together.
2: Shows the capacity for each pole.
3: Motor load application capacity will vary depending on the conditions of use.
4: The photograph shows the US-N□TE model. The external dimensions of the US-N□ model are smaller.
5: The option unit ▭ column shows the extent of application.
6: Can be attached with the specialized product (US-□RM).
7: This shows the values when the main circuit control format is controlled collectively.
8: When the US-N5SS/N8SS (TE) model is attached to the UA-SH8 driving unit with output, remove the cover of the US-N□ model main unit.

Motor Circuit Breakers

■MMP-T series

●Features

● Protects failure of the industrial motor by means of a single device

One Motor Circuit Breaker can detect overload operation and phase-loss operation of a motor and also makes it possible to cut off short-circuit current. This compact body Motor Circuit Breaker achieves a rated short-circuit breaking capacity of 100kA (200/240V).

● Improves safety during product maintenance

The Motor Circuit Breaker is provided with a DIN and VDE standards-compliant charging part protection cover as standard. This cover helps to improve safety during maintenance work.

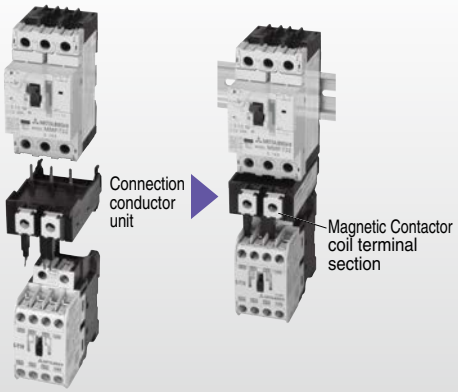


MMP-T32

● Reduces the size of the control board and distribution board

The internal structure of the Motor Circuit Breaker has been optimized to reduce depth. When a connection conductor unit (UT-MT□) is used, it will further reduce the size of the control board and distribution board. Furthermore, it can be assembled with an auxiliary contact/alarm contact unit as well as a short-circuit indicator unit (displays in red when short-circuit occurs) in a 45mm-width body.

Example of wiring with connection conductor unit



●Model Code

■MMP-T series

MMP – T32 BC ▲ 32A

Model name	Model
MMP	AC operated type

Frame	Specification
T32	32A

Code	Specification
BC	With fast wiring terminal

Heater designation (A)	Current setting range (A)
0.16	0.1 – 0.16
0.25	0.16 – 0.25
0.4	0.25 – 0.4
0.63	0.4 – 0.63
1	0.63 – 1
1.6	1 – 1.6
2.5	1.6 – 2.5
4	2.5 – 4
6.3	4 – 6.3
8	5.5 – 8
10	7 – 10
13	9 – 13
18	12 – 18
25	18 – 25
32	24 – 32

●Specification List

Frame A			32									
Type name			MMP-T32						MMP-T32BC*1			
Standard			JIS C8201-2-1 Ann.1, JIS 8201-4-1, EN60947-2, EN60947-4-1, IEC60947-2, IEC60947-4-1, GB14048.2									
Number of poles			3									
Handle shape			Tumbler handle									
Rated current In [A]			0.1 to 32									
Rated operational voltage Ue [V.]			200 to 690									
Rated frequency [Hz]			50/60									
Rated insulation voltage Ui [V]			690									
Rated impulse withstand voltage Uimp [kV]			6									
Rated short-circuit breaking capacity [kA]	Rated current Ie [A]*2		200/240V		400/415V		440/460V		500V		600/690V	
	Heater designation	Current setting range	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics
JIS C8201-2-1 Ann.1 IEC60947-2	0.16	0.1 – 0.16	100		100		100		100		100	
	0.25	0.16 – 0.25	100		100		100		100		100	
	0.4	0.25 – 0.4	100		100		100		100		100	
	0.63	0.4 – 0.63	100		100		100		100		100	
	1	0.63 – 1	100		100		100		100		100	
	1.6	1 – 1.6	100		100		100		100		100	
	2.5	1.6 – 2.5	100		100		100		100		8	6
	4	2.5 – 4	100		100		100		100		8	6
	6.3	4 – 6.3	100		100		100		100		6	5
	8	5.5 – 8	100		100		50	38	42	32	6	5
	10	7 – 10	100		100		50	38	42	32	6	5
	13	9 – 13	100		100		50	38	42	32	6	5
	18	12 – 18	100		50	38	35	27	10	8	4	3
	25	18 – 25	100		50	38	35	27	10	8	4	3
	32	24 – 32	100		50	38	35	27	10	8	4	3
Selectivity category	JIS C8201-2-1 Ann.1 IEC60947-2		Cat.A									
Utilization category	JIS C8201-4-1 IEC60947-4-1		AC-3									
Trip class (JIS C8201-4-1, IEC60947-4-1)			10									
Instantaneous release current			13 × Maximum Ie									
Durability	Mechanical [times]		100,000									
	Electrical [times]		100,000									
Phase loss sensitive			Yes									
Trip display			Yes									
Test trip function			Yes									
Auxiliary contact unit			UT-MAX (1a or 1b) AC-12: 125V/5A, 250V/3A									
Alarm contact unit			UT-MAL (1a or 1b) DC-12: 125V/0.4A, 250V/0.2A									
Short-circuit indicator unit			UT-TU									
Weight [g]			330									

*1: MMP-T32BC type is based on the specification of wiring streamlining terminal.
*2: UL-compliant rated working current is described on a different page.

●How to Order

At time of your order, please specify your desired products as shown below. (A space should be inserted in the ▲ -marked position.)

Model	Heater nominal
MMP-T32 MMP-T32BC	▲ 32A

●How to Order the Options

	Type name	Contact arrangement
Auxiliary contact unit	UT-MAX	▲ 1a
	UT-MAX	▲ 1b
Alarm contact unit	UT-MAL	▲ 1a
	UT-MAL	▲ 1b
Short-circuit indicator unit	UT-TU	

●Type 1 Coordination (Non-reversing/Reversing, Full-voltage)

The rated short-circuit breaking capacity given in the table below applies when MMP-T32 and Magnetic Contactor are used in combination.

● MMP-T32 Motor Circuit Breaker combined with S(D)-T Magnetic Contactor

Three-phase AC motor (AC-3) IEC												Motor Circuit Breaker		
200/240V			400/415V			440/460V			500V			Model name	Heater designation	Rated current setting range [A]
P[kW]	Ie[A]	Iq[kA]	P[kW]	Ie[A]	Iq[kA]	P[kW]	Ie[A]	Iq[kA]	P[kW]	Ie[A]	Iq[kA]			
–	–	–	0.2	0.55	50	0.2	0.58	50	0.2	0.5	50	MMP-T32 (BC)	0.63	0.4 to 0.63
0.1	0.65	50	0.4	1	50	0.4	1	50	0.4	0.8	50		1	0.63 to 1
0.2 0.3	1.1 1.5	50	0.4	1	50	0.4	1	50	0.75	1.4	50		1.6	1 to 1.6
0.4	2	50	0.75	1.7	50	0.75	1.7	50	1.5	2.5	50		2.5	1.6 to 2.5
0.75	3.3	50	1.5	3.1	50	1.5	3	50	2.2	3.6	50		4	2.5 to 4
1.5	6	50	2.2	4.5	50	2.2	4.2	50	3.7	5.7	50		6.3	4 to 6.3
1.5	6	50	3.7	7.1	50	3.7	6.5	50	3.7	5.7	42		8	5.5 to 8
2.2	8.6	50	3.7	7.1	50	5.5	9.8	50	5.5	8.4	42		10	7 to 10
–	–	–	5.5	10.5	50	5.5	9.8	50	7.5	11.2	42		13	9 to 13
3.7	13.4	50	7.5	14	50	7.5	12.7	35	11	16.4	10		18	12 to 18
5.5	19.8	50	11	20.5	50	11	18.5	35	–	–	–		25	18 to 25
7.5	26.4	50	15	27	50	15	24.5	35	–	–	–		32	24 to 32

Notes 1: Model names of the units (such as connection conductor unit) used for combining Motor Circuit Breaker and Magnetic Contactor are as follows.
S-T10(BC) to S-T20(BC): UT-MT20, S-T21(BC)/T25(BC): Electric wire connection, S-T32(BC): UT-MT32
SD-T12(BC)/T20(BC): UT-MT20D+UT-BT32D, SD-T21(BC): Electric wire connection, SD-T32(BC): UT-MT32D+UT-BT32D
S-2×T10(BC): UT-MT20+UT-RT10+UT-BT20 (2 units), S-2×T12(BC)/T20(BC): UT-MT20+UT-RT20+UT-BT20 (2 units), S-2×T21(BC)/T25(BC): Electric wire connection, S-2×T32(BC): UT-MT32+UT-RT32+UT-BT32 (2 units)
SD-2×T12(BC)/T20(BC): UT-MT20D+UT-RT20+UT-BT32D (2 units), SD-2×T21(BC): Electric wire connection, SD-2×T32(BC): UT-MT32D+UT-RT32+UT-BT32D (2 units)
2. The above table indicates combinations of Motor Circuit Breaker with Magnetic Contactor selected based on the SF-JR 4-pole standard three-phase motor (manufactured by Mitsubishi Electric).

● MMP-T32 Motor Circuit Breaker combined with SD-Q Magnetic Contactor

Three-phase AC motor (AC-3) IEC												Motor Circuit Breaker		
200/240V			400/415V			440/460V			500V			Model name	Heater designation	Rated current setting range [A]
P[kW]	Ie[A]	Iq[kA]	P[kW]	Ie[A]	Iq[kA]	P[kW]	Ie[A]	Iq[kA]	P[kW]	Ie[A]	Iq[kA]			
–	–	–	0.2	0.55	50	0.2	0.58	50	0.2	0.5	50	MMP-T32 (BC)	0.63	0.4 to 0.63
0.1	0.65	50	0.4	1	50	0.4	1	50	0.4	0.8	50		1	0.63 to 1
0.2 0.3	1.1 1.5	50	0.4	1	50	0.4	1	50	0.75	1.4	50		1.6	1 to 1.6
0.4	2	50	0.75	1.7	50	0.75	1.7	50	1.5	2.5	50		2.5	1.6 to 2.5
0.75	3.3	50	1.5	3.1	50	1.5	3	50	2.2	3.6	50		4	2.5 to 4
1.5	6	50	2.2	4.5	50	2.2	4.2	50	3.7	5.7	50		6.3	4 to 6.3
1.5	6	50	3.7	7.1	50	3.7	6.5	50	3.7	5.7	42		8	5.5 to 8
2.2	8.6	50	3.7	7.1	50	–	–	–	–	–	–		10	7 to 10

Note: The above table indicates combinations of Motor Circuit Breaker with Magnetic Contactor selected based on the SF-JR 4-pole standard three-phase motor (manufactured by Mitsubishi Electric).

Magnetic Contactors (Non-Reversing /Reversing) Model name							Various units Model name
200/240V	S-(2X)T10(BC)	S(D)-(2X)T12(BC)	S(D)-(2X)T20(BC)	S(D)-(2X)T21(BC)	S-(2X)T25(BC)	S(D)-(2X)T32(BC)	Note 1
400/415V	S-(2X)T10(BC)	S(D)-(2X)T12(BC)	S(D)-(2X)T20(BC)	S(D)-(2X)T21(BC)	S-(2X)T25(BC)	S(D)-(2X)T32(BC)	
440/460V	S-(2X)T10(BC)	S(D)-(2X)T12(BC)	S(D)-(2X)T20(BC)	S(D)-(2X)T21(BC)	S-(2X)T25(BC)	S(D)-(2X)T32(BC)	
500V	S-(2X)T10(BC)	S(D)-(2X)T12(BC)	S(D)-(2X)T20(BC)	S(D)-(2X)T21(BC)	S-(2X)T25(BC)	S(D)-(2X)T32(BC)	

Magnetic Contactors (Non-Reversing /Reversing)		Connection conductor unit
Model name		Model name
SD-Q(R)11	SD-Q(R)12	UT-MQ12

●Usage Environment

(1) Ambient temperature (Applied to the outside of the control panel) : -10°C to 40°C
Average daily atmospheric temperature: 35°C (Max.), Average yearly atmospheric temperature: 25°C (Max.)

(2) Maximum temperature of the inside of the control panel : 55°C (Yearly average temperature of the inside of the control panel should be 40°C or less.)
Please note that the operating characteristic may vary with the ambient temperature.

(3) Ambient temperature : 45% to 85%RH However, dew condensation and freezing should be avoided.

(4) Height above sea level : 2000m or less

(5) Vibration : 10 to 55Hz, 19.6m/s^2 or less

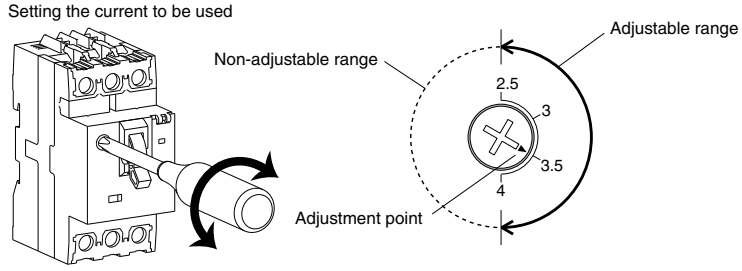
(6) Impact : 49m/s^2 or less

(7) Atmosphere : Inclusion of dust, smoke, corrosive gas, moisture, salt content and the like in the atmosphere should be avoided as much as possible.
Please note that continuing to use the device in a closed condition for a long period may cause contact failure.
Never use the device under an atmosphere that contains flammable gas.

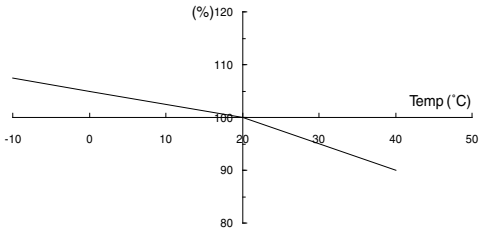
(8) Storage temperature/Relative humidity : -30°C to 65°C 45% to 85%RH However, dew condensation and freezing should be avoided.
The storage temperature is ambient temperature during transportation or storage and should be within the usage temperature when starting to use the device.

(9) Precaution on use : Set the position of adjustment dial by taking ambient temperature and mounting conditions into consideration.

Setting the current to be used



<Fig. 1 Ambient temperature compensation characteristics>

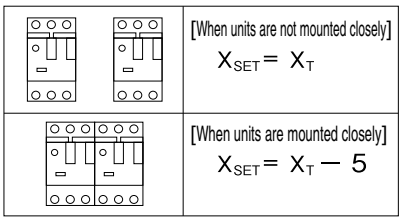


$I_{SET} = I / X_{SET} \times 100$

(I : Rated current of motor
X_{SET} : The dial position is set based on the information in Fig. 1 and Fig. 2 on the right.)

Example: When the units are mounted closely for 2.8A rated current of motor (I) and 40°C ambient temperature
$I_{SET} = 2.8 / (90-5) \times 100 \fallingdotseq 3.3A$ →
Set the position of adjustment dial to 3.3A.

<Fig. 2 Mounting condition compensation>

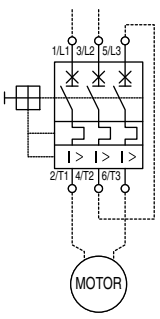


(10) Connection

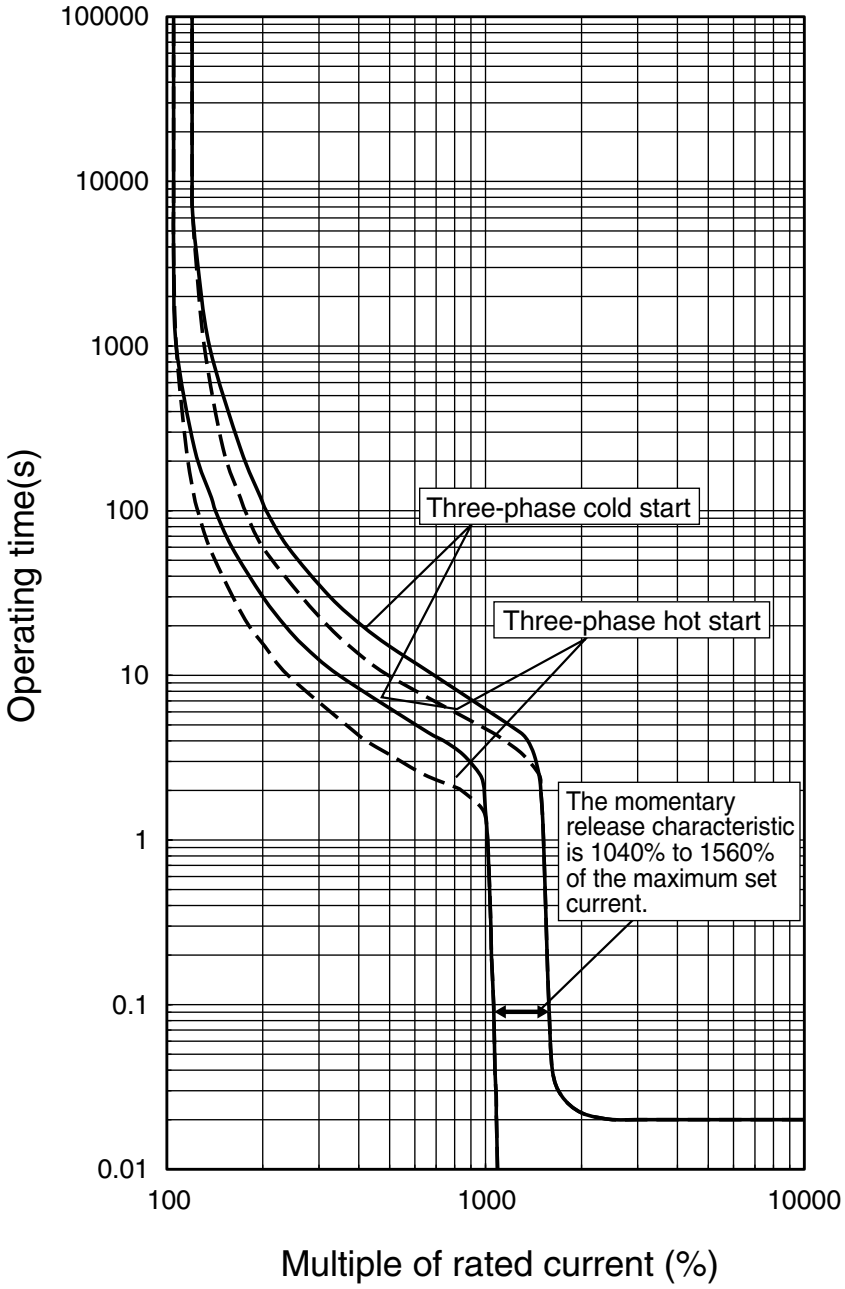
Model name		MMP-T32	UT-MAX(LL), UT-MAL(LL)
Terminal screw size		M4	M3.5
Recommended insulation coating (L) peel-off length when the electric wire strand is connected		10mm	8.5mm
Applicable wire size	Single wire [mm]	ϕ1.6, ϕ2.6	ϕ1.6
	Stranded wire [mm^2]	1 to 6	0.5 to 2
	UL Electric wire (60/70˚C, Copper only)	#14 to #8	#16 to #14
Crimp lug size		R1.25-4 to R5.5-4 8-4NS (Note 3)	0.5-3.7A to 2-S3A (Note 3)
Terminal screw tightening torque [N·m]		1.7	1.0

Notes 1: In each terminal, two wires or two crimp lugs are allowed to be connected.
2: As for handling, temperature adjustment, and closely-attached installation, please read the Instruction Manual.

(11) Application to single-phase motor : Select the appropriate heater designation by checking the value of full-load currents of the motor. Since the Motor Circuit Breaker is provided with protection functionality of open-phase, connect as shown on the right-side figure when using it for a single-phase motor.



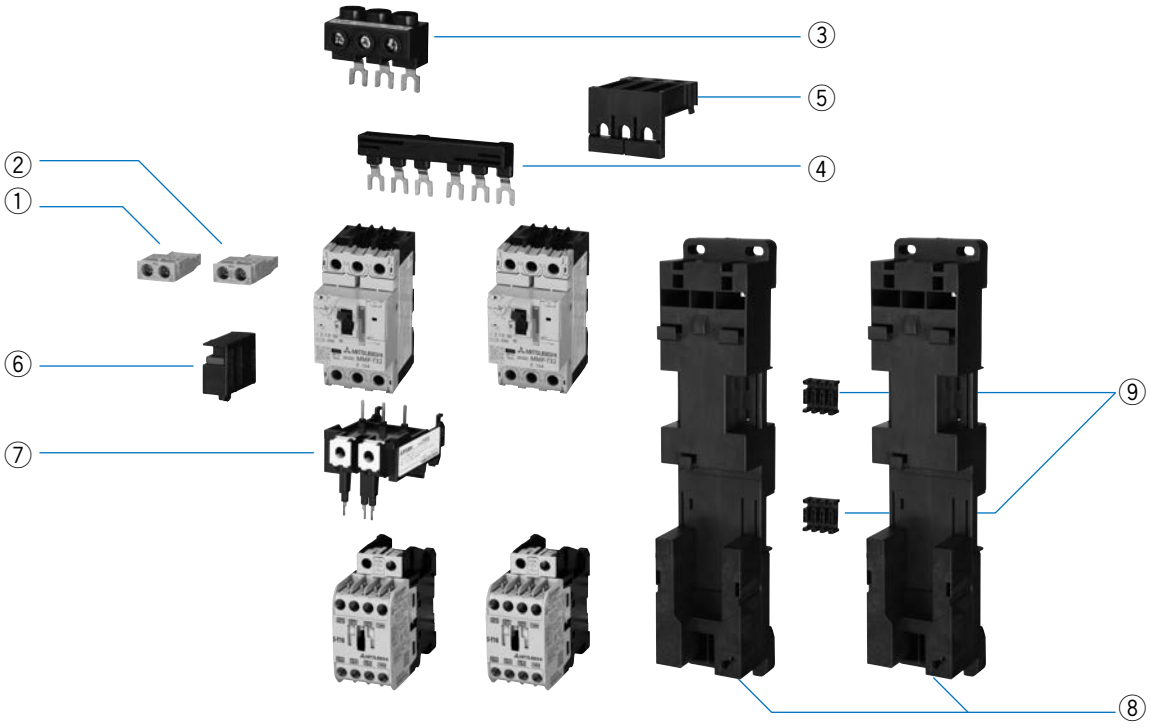
● Operating Characteristic Curve



●List of Options

Number	Product name	Model	Specification	Description	Applied model
①	Auxiliary contact unit (to be internally installed)	UT-MAX	1a	Contact of the unit operates in conjunction with ON/OFF operation of MMP-T32.	MMP-T32
			1b		
		UT-MAXLL (for subtle load)	1a		
			1b		
②	Alarm contact unit (to be internally installed)	UT-MAL	1a	The contact of this unit operates in sync with the tripping function (any one of short-circuit, overload, or open-phase) of the main unit. (The contact does not operate in sync with the ON/OFF state of the main unit.)	
			1b		
		UT-MALLL (for subtle load)	1a		
			1b		
③	3 phase feed-in terminal	UT-EP3		This terminal block unit is used for connecting the strands of electric wires (single-core wires or stranded wires) of the power supply side when the main unit is connected in parallel using a bus bar.	
④	Bus bar	UT-2B4	45mm	This unit supplies power individually to two or three main units without using electric wires (parallel connection).	
			Twin type		
		UT-3B4	45mm		
			Triple type		
		UT-2B5	57mm		
			Twin type		
		UT-3B5	57mm		
			Triple type		
⑤	Line side terminal adapter kit	UT-CV3		Power supply-side terminal cover to respond to UL60947-4-1A, Type E/F.	
⑥	Short-circuit indicator unit	UT-TU		This unit has a feature that the red lamp is lit only when the device is tripped due to short-circuit. This unit is required for application to UL60947-4-1A, Type E/F.	
⑦	Connection conductor unit	UT-MT20		A unit to connect and link the MMP-T32 and Magnetic Contactor electrically and mechanically. This unit is required for application to UL60947-4-1A, Type E/F.	
		UT-MT20D			
		UT-MT32			
		UT-MT32D			
		UT-MQ12			
⑧	Mounting base unit	UT-BT20		A plate to install the combination starter with MMP-T32 and Magnetic Contactor combined. Rail mounting and screw mounting are available.	
		UT-BT32			
		UT-BT32D			
⑨	Jointing block unit	UT-RT10		A set of the blocks for mechanically connecting two mounting base units. This unit is required for combining MMP-T32 with a reversing magnetic contactor.	
		UT-RT20			
		UT-RT32			

●Option combination Diagram



Compatibility with Japanese and Overseas Standards

Series	Model		Type	Compliant/applicable standard					Safety Certification Standard(Note 5)				EC Directives	Third party(Note 5) certification organization	CCC(Note 5) Certification	Shipping Certification Standards(Note 5)				Heat Resistance Certification Standards	
				JIS(Note 4)	JEM	IEC	DIN VDE	BS EN	Electric parts	UL		CSA	CE mark	TÜV	GB	NK	KR	BV	LR	Heat resistance type 1	Heat resistance type 2(Note 5)
				Japan	Japan	Inter-national	Germany	United Kingdom Europe	Japan	United States		Canada	Europe		China	Japan	Korea	France	United Kingdom	Japan	
MS-T Series	Magnetic Contactors	Non-reversing	S-T10 to T32	○	–	○	○	○	✻	–	◎	◎	○	◎	◎	◎	◎	◎	◎	–	☆
			S-T35 to T100	○	–	○	○	○	✻	–	◎	◎	○	◎	◎	◎	◇	◇	◎	–	☆
		Reversing	S-2×T10 to T100	○	–	○	○	○	✻	–	◎	◎	○	–	◎	–	–	–	–	–	☆
		Direct current operate	SD-T12 to T100	○	–	○	○	○	✻	–	◎	◎	○	◎	◎	◎	–	◇	◎	–	–
		Mechanical latch	SL(D)-T21 to T100	○	–	○	○	○	✻	–	☆	☆	–	–	◎	–	–	–	–	–	☆
	Open Model Magnetic Starters	Non-reversing 2 elements	MSO-T10 to T100	○	–	○	○	○	✻	–	–	–	–	–	–	–	–	–	–	–	–
		Non-reversing 3 elements(2E)	MSO-T10KP to T100KP	○	–	○	○	○	✻	–	–	–	○	–	◎	–	–	–	–	–	–
		Reversing 2 elements	MSO-2×T10 to T100	○	–	○	○	○	✻	–	–	–	–	–	–	–	–	–	–	–	–
		Reversing 3 elements(2E)	MSO-2×T10KP to T100KP	○	–	○	○	○	✻	–	–	–	○	–	◎	–	–	–	–	–	–
		Direct current operate 2 elements	MSOD-T12 to T100	○	–	○	○	○	✻	–	–	–	–	–	–	–	–	–	–	–	–
		Direct current operate 2 elements(2E)	MSOD-T12KP to T100KP	○	–	○	○	○	✻	–	–	–	○	–	◎	–	–	–	–	–	–
	Enclosed Magnetic Starters	Non-reversing 2 elements	MS-T10 to T100	○	–	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–
		Non-reversing 3 elements(2E)	MS-T10KP to T100KP	○	–	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–
	Thermal Overload Relays	2 elements	TH-T18 to T100	○	–	○	○	○	✻	–	–	–	–	–	–	✻	✻	–	–	–	–
		3 elements(2E)	TH-T18KP/T25KP	○	–	○	○	○	✻	–	◎	◎	○	◎	◎	✻	✻	◎	◎	–	–
			TH-T50KP to T100KP	○	–	○	○	○	✻	–	◎	◎	○	◎	◎	✻	✻	◇	◎	–	–
	Contactor Relays	Alternating current operate	SR-T5/T9	○	–	○	○	○	✻	–	◎	◎	○	◎	◎	✻	✻	◎	◎	☆	☆
		Direct current operate	SRD-T5/T9	○	–	○	○	○	✻	–	◎	◎	○	◎	◎	✻	✻	◇	◎	–	–
		Mechanical latch	SRL(D)-T5	○	–	○	○	○	✻	–	–	–	–	–	◎	–	–	–	–	–	☆
	Option Unit	Additional auxiliary contacts	UT-AX2, 4, 11	○	–	○	○	○	✻	◎	–	–	○	◎	◎	✻	✻	◎	◎	–	–
		Surge Absorption	UT-SA23, 21, 22	○	–	○	○	○	✻	◎	–	–	–	–	✻	✻	✻	–	–	–	–
		Mechanical interlocks	UT-ML11/ML20	○	–	○	○	○	✻	◎	–	–	○	–	✻	✻	✻	–	–	–	–
MS-N Series	Magnetic Contactors	Non-reversing	S-N35 to N400	○	○	○	○	○	✻	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	☆	☆
		Reversing	S-2×N35 to N400	○	○	○	○	○	✻	◎	◎	◎	○	–	◎	–	–	–	–	☆	☆
		Direct current operate	SD-N35 to N400	○	○	○	○	○	✻	◎	◎	◎	○	◎	◎	◎	–	◎	◎	–	–
		Mechanical latch	SL-N35 to N400	○	○	○	○	○	✻	☆	–	–	–	–	◎	☆	–	–	–	–	☆
	Open Model Magnetic Starters	Non-reversing 2 elements	MSO-N35/N50 to N400	○	○	○	○	○	✻	–	–	–	–	–	◎/–	–	–	–	–	–	–
		Non-reversing 3 elements(2E)	MSO-N35 to 400KP	○	○	○	○	○	✻	◎	◎	◎	○	–	◎	–	–	◎	◎	–	–
		Reversing 2 elements	MSO-2×N35/2×N50 to N400	○	○	○	○	○	✻	–	–	–	–	–	◎/–	–	–	–	–	–	–
		Reversing 3 elements(2E)	MSO-2×N35KP to N400KP	○	○	○	○	○	✻	☆	☆	☆	○	–	◎	–	–	–	–	–	–
		Direct current operate 2 elements	MSOD-N35/N50 to N400	○	○	○	○	○	✻	–	–	–	–	–	◎/–	–	–	◎	◎	–	–
		Direct current operate 3 elements(2E)	MSOD-N35 to N400KP	○	○	○	○	○	✻	–	–	–	○	–	◎	–	–	◎	◎	–	–
	Enclosed Magnetic Starters	Non-reversing 2 elements	MS-N35/N50 to N400	○	○	○	○	○	○	–	–	–	–	–	◎/–	–	–	–	–	–	–
		Non-reversing 3 elements(2E)	MS-N35 to N400KP	○	○	○	○	○	○	–	–	–	–	–	◎	–	–	–	–	–	–
	Thermal Overload Relays	Standard 2 elements	TH-N20 to N20TA/N60 to N400	○	○	○	○	○	✻	–	–	–	–	–	◎/–	✻	✻	–	–	–	–
		3 elements(2E)	TH-N20KP to N400KP	○	○	○	○	○	✻	–	◎	◎	○	◎	◎	✻	✻	◎	◎	–	–
	Contactor Relays	Direct current operate	SRD-N	○	○	○	○	○	✻	◎	◎	◎	○	◎	◎	✻	✻	◎	◎	–	–
		Mechanical latch	SRL-N	○	○	○	○	○	✻	–	–	–	–	–	◎	✻	✻	–	–	–	☆
	Option Unit	Additional auxiliary contacts	UN-AX2, 4, 11/80, 150	○	○	○	○	○	✻	◎	–	–	○	◎	◎/◉	✻	✻	◎	◎	–	–
		Surge Absorption	UN-SA	○	○	○	○	○	✻	◎	–	–	–	–	✻	✻	✻	–	–	–	–
		Mechanical interlocks	UN-ML	○	○	○	○	○	✻	◎	–	–	○	–	✻	✻	✻	–	–	–	–
Specific Uses	High Sensitivity Contactors	Non-reversing	SD-Q	○	○	○	○	○	✻	◎	◎	◎	○	◎	◎	–	–	–	–	–	–
		Reversing	SD-QR11/QR12	○	○	○	○	○	✻	◎	◎	◎	○	◎	◎	–	–	–	–	–	–
Product Marking (is marked on the product)			Standard number																		
			Certification mark							Note 2	Note 2		Note 3	Note 2	Note 2						
			Certification number																		

Notes 1: ○: standards compliant product
◎: certification acquired as a standard product
☆: certification acquired as an exclusive product
◉: Certification acquired, add "CN" at the end of the model name when ordering.
◇: Model for which acquisition (application) of certification is expected
✻: Model outside the application of standards certification
–: Model for which the acquisition (application) of certification was not carried out

2: If there is any unclear point regarding standards certification labels or product model name indications, please contact your dealer or our company.
3: Self-certified labels of the manufacturer. These labels are not standards certifications.
4: In the case where a JIS compliance statement is required, please request us.
5: If the terminal cover (included in MS-T Series as standard) is removed, the product will not qualify for Safety Certification Standard (UL Certification, CSA Certification), standards certified by CB, CCC Certification, Shipping Certification Standards, and Heat Resistance Certification Standards (Heat resistance type 2).

Order Procedure

Magnetic Starters/Magnetic Contactors

Note

For orders, specify products as shown below. Insert a space where ▲ is present.
If adding multiple two-character codes (such as SA, BC, and KP) after a frame size (T10 or others) of type name, specify them in alphabetical order of the first letters. (Example: MSO-T10BCKPSA)
(If they are not in alphabetical order, the type code is automatically changed.)

1. Standard (AC operated) Magnetic Starters

●MS (-2x) T model (sealed)

Model name	motor capacity	Main circuit voltage	Operation coil designation or operation circuit voltage	Auxiliary contact
MS-T21	▲ 3.7kW	▲ 200V	▲ 200VAC	▲
MS-T10		▲ 200V	▲ 200VAC	▲ 1B
Refer to page 864, 873	Select from page 869, 870.	Do not add AC to the main circuit voltage. (To distinguish it from the operation circuit voltage)	Select coil designation from page 876 or specify the working operation circuit voltage.	Specify the auxiliary contact arrangements.from page 873.

●MSO (-2x) T model (open model)

Model name	Motor capacity or heater designation (setting current)	Main circuit voltage	Operation coil designation or operation circuit voltage	Auxiliary contact
MSO-T10	▲ 9A	▲ 200V	▲ 200VAC	▲ 1B
Refer to page 864, 873	Select from page 869, 870.	Do not add AC to the main circuit voltage. (To distinguish it from the operation circuit voltage)	Select coil designation from page 876 or specify the working operation circuit voltage.	Specify the auxiliary contact arrangements.from page 873.

2. Standard (AC operated) Magnetic Contactors

●S-T model, S-2x T model

Model name	Operation coil designation or operation circuit voltage	Auxiliary contact
S-T20	▲ 200VAC	▲ 2A
S-T20	▲ 100VAC50Hz	
Refer to page 864, 875.	Select coil designation from page 876 or specify the working operation circuit voltage.	Specify the auxiliary contact arrangements. from page 876.

3. Direct current operated type magnetic starter/contactor

●MSOD-T model

Model name	Motor capacity or heater designation (setting current)	Main circuit voltage	Operating Coil designation	Auxiliary contact
MSOD-T21	▲ 3.7kW	▲ 200V	▲ 100VDC	▲
Refer to page 864, 876.	Select from page 870, 871.	Do not add AC to the main circuit voltage.	Select the coil designation on page 875.	Specify the auxiliary contact arrangements. from page 875.

●SD-T model

Model name	Operating Coil designation	Auxiliary contact
SD-T21	▲ 110VDC	▲
Refer to page 875.	Select the coil designation on page 867.	Specify the auxiliary contact arrangements. from page 875.

4. Magnetic starter/contactor with mechanical latch

●MSOL-T model

Model name	Motor capacity or heater designation (setting current)	Main circuit voltage	Closing coil	Tripping coil
MSOL-T21	▲ 3.7KW	▲ 200V	▲ MC-200VAC	▲ MT-200VAC
When a closing coil uses direct current, its model name is "MSOLD." Please refer to page 879.	Select from page 869, 870.	Do not add AC to the main circuit voltage. (To distinguish it from the operation circuit voltage)	Select the coil designation on page 868.	

●SL-T model, SLD-T model

Model name	closing coil designation	Tripping coil designation
SL-T21	▲ MC-100VAC	▲ MT-100VAC
Please refer to page 879. • When a closing coil uses direct current, its model name becomes SLD.	Select the coil designation on page 868.	

●SL-2×T model, SLD-2×T model

When the left and right side closing and tripping coils have the same coil rating, specify the above SL-T model when placing an order.
If the left and right side coils have different coil rating, however, specify the product as indicated below.

Model name	closing coil designation (left side)	Tripping coil designation (left side)	closing coil designation (right side)	Tripping coil designation (right side)
SL-2XT21	▲ MC1-100VAC	▲ MT1-100VAC	▲ MC2-100VAC	▲ MT2-100VDC
Please refer to page 879. • When a closing coil uses direct current, its model name becomes SLD.	Select the coil designation on page 868.			

5. Delay open type Magnetic Starters/Magnetic Contactors

●MSO-T☐DL model, S-T☐DL model

Model name	Main circuit voltage	Operating Coil
MSO-T21DL S-T12DL	▲ 15A ▲ 200V ▲ 200V	▲ 200VAC ▲ 200VAC
Specify from page 873, 875.	Specify the Thermal Overload Relays heater designation and the main circuit rated voltage. Be sure to specify the rated voltage also for Magnetic Contactors, since this specification is a required condition for internal wiring.	AC100V and AC200V are available for the operation coil designation.

Thermal Overload Relays

●TH-T model Thermal Overload Relays

Model name		Heater designation
TH-T25	▲	15A
To place an order for a Thermal Overload Relay, specify the model name code given below.		Specify the heater designation according to page 886. When the full load current is included in the two heater designations, give priority to the heaters on the table below.

●Model name code of Thermal Overload Relays

TH	—	T18
		Frame
		T18
		T25
		T50
		T65
		T100

KP	▲	Heater designation
Code		Specification
None		With 2-elements
KP		With 3-elements (2E)
FS		With 2-element quick trip type
FSKP		With 3-elements (2E) quick trip type
SR		With saturable reactor
KPSR		With 3-elements (2E) With saturable reactor
BC		With fast wiring terminal

Contactor model contactor relay

1. Standard model contactor relay

●SR-T□ model

Model name		Operating Coil designation		Contact structure
SR-T5	▲	200VAC	▲	2A2B
Refer to page 868, 887, 888.		Specify the operating coil and designation (or coil voltage and frequency) according to the ratings on pages 876.		Specify the contact structure according to pages 887 and 888.

Definite purpose magnetic starters and contactors

1. High sensitivity contactors

●SD-Q□ model

Model name		Operating coil designation or operating circuit voltage	Auxiliary contact
SD-Q11	▲	24VDC	
SD-QR12	▲	24VDC	
Refer to page 880.		Select the coil designation on page 880.	Specify the auxiliary contact arrangements. If not specified, this will be a standard contact structure. Please refer to page 880.

●MSOD-Q□ model

Model name		Motor capacity or heater designation (rectified current set value)		Main circuit voltage		Operating coil designation or operating circuit voltage	Auxiliary contact
MSOD-Q11	▲	9A	▲	200V	▲	24VDC	
MSOD-QR12	▲	9A	▲	200V	▲	24VDC	
Refer to page 880.		Select from page 869, 870.		Do not add AC to the main circuit voltage. (To distinguish it from the operation circuit voltage)		Select the coil designation on page 880.	Specify the auxiliary contact arrangements. If not specified, this will be a standard contact structure. Please refer to page 880.

Related devices

1. Solid State Contactors

●US-N model

Model name
US-N20TE
Refer to page 892.

●US-K model (3 phase load use)

Model name
US-K100TE
Refer to page 893.

●US-K model (Single phase and combined 3 phase load use)

Model name
US-K70
Refer to page 892.

●US-KD model (direct current load use)

Model name
US-KD8
US-KD8 is the only direct current load use model.

●US-H model (dedicated heater load use)

Model name
US-H20
Refer to page 893.

POWER MONITORING PRODUCTS

Power Management Measuring Devices

Energy Saving Supporting Devices

High-performance and reliable support equipment for power management, monitoring, control equipment, and energy-saving activities

Power Management Measuring Devices

The pursuit of ease-of-use and enhanced visibility;
Mitsubishi electronic indicating instrument

Product details **P.910**



Energy Saving Supporting Devices

"Visualization" is achieved through our energy-saving support devices and solutions, providing simplified measurement, collection, and analysis of energy consumption.
A perfect choice to your energy-saving activities to drive productivity and cost reduction.

Product details P.920



Electronic Multi Measuring Instruments

Improved Measurement Functions

Improved accuracy of active energy, reactive energy and power factor and expanded measurement ranges of harmonics and demand values have been realized.

■Line-up

Model name	Transmission/Option specifications	Main measurement items
ME96SSHA-MB (High-performance class)	MODBUS® RTU communication Plug-in module (options) • Analog/Pulse/Contact output/input • CC-Link communication • Digital input/output (for MODBUS® RTU communication) • Backup (on SD card) • MODBUS® TCP communication	A, DA, V, Hz = ±0.1% W, var, VA, PF = ±0.2% Wh = class 0.5S (IEC62053-22) varh = class 1S (IEC62053-24) Harmonics = 31st-deg (max) Rolling demand = W, var, VA
ME96SSRA-MB (Standard class)	MODBUS® RTU communication Plug-in module (options) • Analog/Pulse/Contact output/input • CC-Link communication • Digital input/output (for MODBUS® RTU communication) • Backup (on SD card) • MODBUS® TCP communication	A, DA, V = ±0.2% Hz = ±0.1% W, var, VA, PF = ±0.5% Wh = class 0.5S (IEC62053-22) varh = class 1S (IEC62053-24) Harmonics = 19th-deg (max) Rolling demand = W, var, VA
ME96SSEA-MB (Economy class)	MODBUS® RTU communication	A, DA, V = ±0.5% Hz = ±0.2% W, PF = ±0.5% Wh = class 0.5S (IEC62053-22) Harmonics = Only total

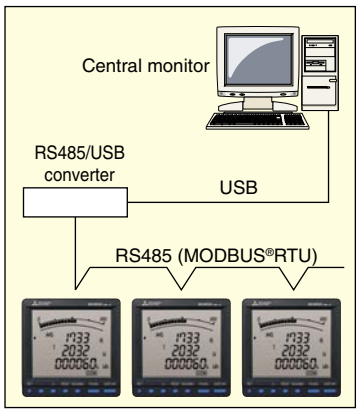


■Optional Plug-in Modules

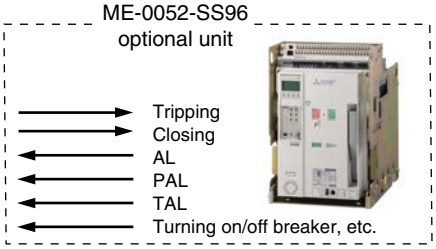
Model name	Analog output	Pulse/Alarm output	Contact input	Contact output	Transmission function	Used with
ME-4210-SS96	4	2	1	–	–	ME96SSHA-MB ME96SSRA-MB
ME-0040C-SS96	–	–	4	–	CC-Link	
ME-0052-SS96	–	–	5	2	–	
ME-0000BU-SS96	–	–	–	–	SD CARD	
ME-0000MT-SS96	–	–	–	–	MODBUS® TCP	

*1: Optional Plug-in Module can not be used with ME96SSEA-MB.

MODBUS® RTU System (ME96SSHA-MB/ME96SSRA-MB with ME-0052-SS96 (optional plug-in module))



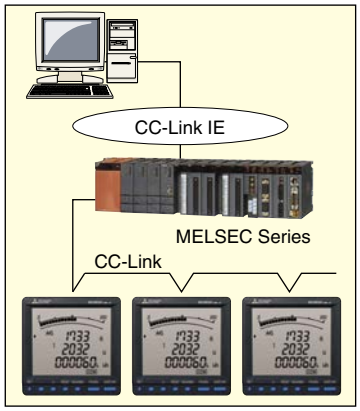
- MODBUS® RTU communication system optimizes computer monitoring operations
- Attachment of ME-0052-SS96 (optional) enables remote monitoring of the contact input signal and on/off control of the contact output signal
- Digital input signals can be latched for over 30ms, and there is no need for external latch circuits



<MODBUS® RTU Interface Specifications>
- Max. Baud rate: 38.4kbps
- Max. Connection Distance: 1,200m
- Max. Connection Units: 31

<Optional Plug-in Module ME-0052-SS96>
- Digital Input: 5 points (24VDC)
- Digital Output: 2 points (35VDC)

CC-Link System (ME96SSHA-MB/ME96SSRA-MB with ME-0040C-SS96 (optional plug-in module))

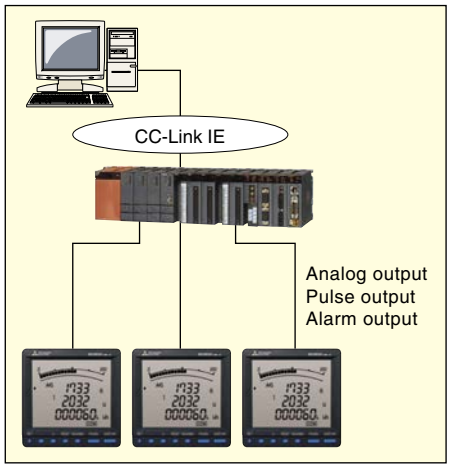


- Optimum transmission system for remote monitoring using Mitsubishi PLC
- Contact signals can be remotely monitored by installing the optional module ME-0040C-SS96. This is helpful in wiring and space saving.
- Digital unit signal can be latched for over 30ms, and there is no need for external latch circuits

← Abnormal Signal (Facility)
← Abnormal Signal (Earth Leakage)
← Abnormal Signal (Temperature)
← Circuit Breaker Status Signal, etc.

<CC-Link Interface>
- Max. Baud rate: 10Mbps
- Max. Connection Distance: 100m (10Mbps)~ 1,200m (156kbps)
- Max. Connection Units: 42
- Digital Input: 4 points (24VDC)

Analog/Pulse/Alarm Output System (ME96SSHA-MB/ME96SSRA-MB with ME-4210-SS96 (optional plug-in module))



- Applicable to analog output, pulse output and alarm output with the aid of the optional module ME-4210-SS96
- Remote monitoring of A, DA, V, W, var, VA, PF, Hz, Harmonics Current RMS value and Harmonics voltage RMS value at 4 to 20mA output (max. 4 outputs)
- Active energy, reactive energy, apparent power and periodic energy (ME96SSHA-MB) can be monitored by pulse output (max. 2 pulses)
- Can remotely monitor upper/lower limit alarm by contact output (max. 2 points)

<Analog output specifications>
- 4-20mA
- 4 outputs
- Resistance load 600Ω or less

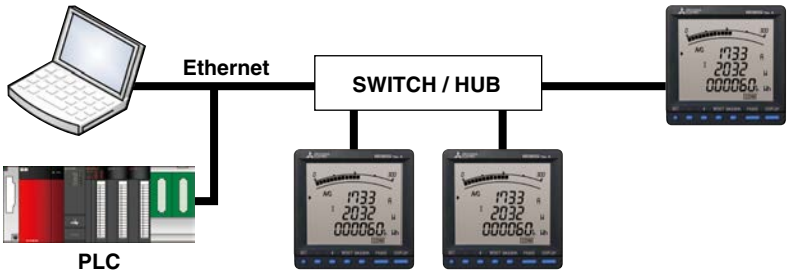
<Pulse output specifications>
- No-voltage a contact point
- 35VDC, 0.1A
- Select output from pulse widths of 0.125, 0.5 or 1s

<Alarm output specifications>
- No-voltage a contact point
- 35VDC, 0.1A

<Digital input specifications>
- 1 point (24VDC)

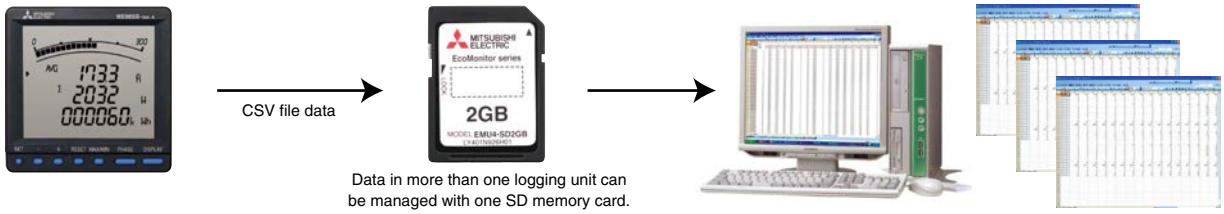
MODBUS® TCP Communication (ME96SSHA-MB/ME96SSRA-MB with ME-0000MT-SS96 (optional plug-in module))

There is available an optional module usable not only for the conventional MODBUS® RTU (RS-485) communication and CC-Link communication, but also for MODBUS® TCP communication in an Ethernet environment.



Data Logging (ME96SSHA-MB/ME96SSRA-MB with ME-0000BU-SS96 (optional plug-in module))

There is available an optional module which can retain data even when communication cannot be established.



Data in more than one logging unit can be managed with one SD memory card.

Note: Use the SD memory card (EMU4-SD2GB) made by Mitsubishi Electric.
Use of any memory card other than our product (EMU4-SD2GB) is not covered by the warranty.

Specifications

■ME96SSHA-MB/RA-MB/EA-MB

Model name			ME96SSHA-MB	
Phase wire			Three phase 4-wire, Three phase 3-wire (3CT, 2CT), Single phase 3-wire, Single phase 2-wire (common use)	
Rating		Current	5AAC, 1AAC (common use)	
		Voltage	Three phase 4-wire: 277/480VAC (max) Three phase 3-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max) Single phase 3-wire: 220/440VAC (max) Single phase 2-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max)	
		Frequency	50-60Hz (common use)	
			Measurement items	Class
Measurement items and accuracy	Current (A)		A1, A2, A3, AN, A_{AVG}	±0.1%
	Current demand (DA)		DA1, DA2, DA3, DAN, DA_{AVG}	±0.1%
	Voltage (V)		V12, V23, V31, V_{AVG} (L-L) V1N, V2N, V3N, V_{AVG} (L-N)	±0.1%
	Active power (W)		W1, W2, W3, ΣW	±0.2%
	Reactive power (var)		var1, var2, var3, Σvar	±0.2%
	Apparent power (VA)		VA1, VA2, VA3, ΣVA	±0.2%
	Power factor (PF)		PF1, PF2, PF3, ΣPF	±0.2%
	Frequency (Hz)		Hz	±0.1%
	Active energy (Wh)		Imported, Exported	class 0.5S (IEC62053-22)
	Reactive energy (varh)		Imported lead, lag Exported lead, lag	class 1S (IEC62053-24)
	Apparent energy (Vah)		—	±2.0%
	Harmonic current (HI)		Total, 1st to 31st degree (odd number degree only)	±1.0%
	Harmonic voltage (HV)		Total, 1st to 31st degree (odd number degree only)	±1.0%
	Rolling demand (DW)		Rolling block, fixed block	±0.2%
	Rolling demand, reactive power (Dvar)		Rolling block, fixed block	±1.0%
	Rolling demand, apparent power (DVA)		Rolling block, fixed block	±1.0%
	Periodic Active energy (Wh)		Periodic active energy 1, 2	class 0.5S (IEC62053-22)
	Operating time		Operating time 1, 2	(Reference)
Analog output response time			2s or less (HI, HV: 10s or less)	
Measuring method		Instantaneous value	A/V: RMS calculation, W/ var/ VA/ Wh/ varh/ VAh: Digital multiplication, PF: Power ratio calculation, Hz: Zero-cross, HI/HV: FFT	
		Demand value	DA: Thermal type calculation DW, Dvar, DVA: Rolling demand calculation	
Display	Indicator		LCD with LED backlight	
	No. of display digits and segments	Digital display	6 digits each at upper, middle, and lower line	
			A, DA, V, W, var, VA, PF, DW, Dvar, DVA: 4 digits Hz: 3 digits Wh, varh, VAh: 9 digits (6 or 12 possible) Harmonic distortion ratio, content ratio: 3 digits Harmonic RMS: 4 digits Operating time: 6 digits Contact input/output: I/O	
		Bar graph	21 segment bar graph, 22 segment indicator	
	Display updating time interval		0.5s or 1s (selectable)	
Communication			MODBUS® RTU communication	
Available optional plug-in module			ME-4210-SS96 ME-0000BU-SS96 ME-0040C-SS96 ME-0000MT-SS96 ME-0052-SS96	
Power failure compensation			Non-volatile memory used (items: setting value, max/min value, active/reactive energy, apparent energy, periodic active energy, rolling demand, operating time)	
Consumption (VA)	VT		Each phase 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)	
	CT		Each phase 0.1VA (5AAC)	
	Auxiliary power circuit		7VA (at 110VAC), 8VA (at 220VAC), 5W (at 100VDC)	
Auxiliary power			100-240VAC (±15%), 100-240VDC (-30% +15%)	
Weight			0.5kg	
Dimensions			96 (H) × 96 (W) × 90 (D)	
Installation method			Embedded	
Operating temperature			-5~+55°C (average operating temperature: 35°C or less per day)	
Operating humidity			0~85% RH (non condensing)	
Storage temperature			-25~+75°C (average temperature: 35°C or less per day)	
Storage humidity			0~85% RH (non condensing)	

*1: Class values based on 100% of rated value.
*2: Harmonic measurements where distortion ratio (content rate) is 100% or more may exceed ±1.0%.
*3: Harmonic current cannot be measured without voltage input.

ME96SSRA-MB		ME96SSEA-MB	
Three phase 4-wire, Three phase 3-wire (3CT, 2CT), Single phase 3-wire, Single phase 2-wire (common use)		Three phase 4-wire, Three phase 3-wire (3CT, 2CT), Single phase 3-wire, Single phase 2-wire (common use)	
5AAC, 1AAC (common use)		5AAC, 1AAC (common use)	
Three phase 4-wire: 277/480VAC (max) Three phase 3-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max) Single phase 3-wire: 220/440VAC (max) Single phase 2-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max)		Three phase 4-wire: 277/480VAC (max) Three phase 3-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max) Single phase 3-wire: 220/440VAC (max) Single phase 2-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max)	
50-60Hz (common use)		50-60Hz (common use)	
Measurement items	Class	Measurement items	Class
A1, A2, A3, AN, A_{AVG}	±0.2%	A1, A2, A3, AN, A_{AVG}	±0.5%
DA1, DA2, DA3, DAN, DA_{AVG}	±0.2%	DA1, DA2, DA3, DAN, DA_{AVG}	±0.5%
V12, V23, V31, V_{AVG} (L-L) V1N, V2N, V3N, V_{AVG} (L-N)	±0.2%	V12, V23, V31, V_{AVG} (L-L) V1N, V2N, V3N, V_{AVG} (L-N)	±0.5%
W1, W2, W3, ΣW	±0.5%	W1, W2, W3, ΣW	±0.5%
var1, var2, var3, Σvar	±0.5%	—	—
VA1, VA2, VA3, ΣVA	±0.5%	—	—
PF1, PF2, PF3, ΣPF	±0.5%	PF1, PF2, PF3, ΣPF	±0.5%
Hz	±0.1%	Hz	±0.2%
Imported, Exported	class 0.5S (IEC62053-22)	Receiving	class 0.5S (IEC62053-22)
Imported lead, lag Exported lead, lag	class 1S (IEC62053-24)	—	—
—	±2.0%	—	—
Total, 1st to 19th degree (odd number degree only)	±1.0%	Total	±2.0%
Total, 1st to 19th degree (odd number degree only)	±1.0%	Total	±2.0%
Rolling block, fixed block	±0.5%	—	—
Rolling block, fixed block	±1.0%	—	—
Rolling block, fixed block	±1.0%	—	—
Periodic active energy 1, 2	class 0.5S (IEC62053-22)	—	—
Operating time 1, 2	(Reference)	Operating time 1, 2	(Reference)
2s or less (HI, HV: 10s or less)		—	
A/V: RMS calculation, W/var/VA/Wh/varh: Digital multiplication, PF: Power ratio calculation, Hz: Zero-cross, HI/HV: FFT		A/V: RMS calculation, W: Digital multiplication, PF: Power ratio calculation, Hz: Zero-cross, HI/HV: FFT	
DA: Thermal type calculation DW, Dvar, DVA: Rolling demand calculation		DA: Thermal type calculation	
LCD with LED backlight		LCD with LED backlight	
6 digits each at upper, middle, and lower line		6 digits each at upper, middle, and lower line	
A, DA, V, W, var, VA, PF, DW, Dvar, DVA: 4 digits Hz: 3 digits Wh, varh: 9 digits (6 or 12 possible) Harmonic distortion ratio, content ratio: 3 digits Harmonic RMS: 4 digits Operating time: 6 digits Contact input/output: I/O		A, DA, V, W, PF: 4 digits Hz: 3 digits Wh: 9 digits (6 or 12 possible) Relative harmonic content: 3 digits Harmonic RMS value: 4 digits Operating time: 6 digits	
21 segment bar graph, 22 segment indicator		21 segment bar graph, 22 segment indicator	
0.5s or 1s (selectable)		0.5s or 1s (selectable)	
MODBUS® RTU communication		MODBUS® RTU communication	
ME-4210-SS96 ME-0000BU-SS96 ME-0040C-SS96 ME-0000MT-SS96 ME-0052-SS96		—	
Non-volatile memory used (items: setting value, max/min value, active/reactive energy, apparent energy, periodic active energy, rolling demand, operating time)		Non-volatile memory used (items: setting value, max/min value, active energy, operating time)	
Each phase 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)		Each phase 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)	
Each phase 0.1VA (5AAC)		Each phase 0.1VA (5AAC)	
7VA (at 110VAC), 8VA (at 220VAC), 5W (at 100VDC)		7VA (at 110VAC), 8VA (at 220VAC), 5W (at 100VDC)	
100-240VAC (±15%), 100-240VDC (-30% +15%)		100-240VAC (±15%), 100-240VDC (-30% +15%)	
0.5kg		0.5kg	
96 (H) × 96 (W) × 90 (D)		96 (H) × 96 (W) × 90 (D)	
Embedded		Embedded	
-5~+55°C (average operating temperature: 35°C or less per day)		-5~+55°C (average operating temperature: 35°C or less per day)	
0~85% RH (non condensing)		0~85%RH (non condensing)	
-25~+75°C (average temperature: 35°C or less per day)		-25~+75°C (average temperature: 35°C or less per day)	
0~85% RH (non condensing)		0~85%RH (non condensing)	

*1: Class values based on 100% of rated value.
*2: Harmonic measurements where distortion ratio (content rate) is 100% or more may exceed ±1.0%.
*3: Harmonic current cannot be measured without voltage input.

*1: Class values based on 100% of rated value.
*2: Harmonic measurements where distortion ratio (content rate) is 100% or more may exceed ±2.0%.

Standards Compliance

Electromagnetic Compatibility		
	Emissions	
	Radiated Emission	EN61326-1/CISPR 11, FCC Part15 Subpart B Class A
	Conducted Emission	EN61326-1/CISPR 11, FCC Part15 Subpart B Class A
	Harmonics Measurement	EN61000-3-2
	Flicker Meter Measurement	EN61000-3-3
	Immunity	
	Electrostatic discharge Immunity	EN61326-1/EN61000-4-2
	Radio Frequency Electromagnetic field Immunity	EN61326-1/EN61000-4-3
	Electrical Fast Transient/Burst Immunity	EN61326-1/EN61000-4-4
	Surge Immunity	EN61326-1/EN61000-4-5
	Conducted Disturbances, Induced By Radio Frequency Fields Immunity	EN61326-1/EN61000-4-6
	Power Frequency Magnetic Field Immunity	EN61326-1/EN61000-4-8
	Voltage Dips and Short Interruptions	EN61326-1/EN61000-4-11

Safety		
	Europe	CE, as per EN61010-1
	U.S. and Canada	cRUus as per UL61010-1, IEC61010-1
	Installation Category	III
	Measuring Category	III
	Pollution Degree	2

MODBUS® RTU Communication Specifications

Item	Specification
Interface	RS-485 2-wire half-duplex transmission
Protocol	RTU (binary data transfer)
Transmission method	Asynchronous
Connection type	Multi-point bus
Baud rate	2400, 4800, 9600, 19200, 38400bps
Data bit	8
Stop bit	1, 2
Parity	ODD, EVEN, NONE
Address	1 to 255 (0: for broadcast mode)
Distance	1,200m (max)
Max. connectable units	31 units
Terminal Resistance	120Ω 1/2W
Recommended Cable	Shielded twisted-pair AWG24 to 14

■ For more information on data, please refer to the following document.
· Electronic Multi-Measuring Instrument ME series MODBUS® Interface specifications…LMS-0492

CC-Link Communication Specifications

Item	Specification
No. of occupied stations	1 Station Remote device station
CC-Link version	CC-Link Ver 1.10 / Ver 2.00
Baud rate	10Mbps / 5Mbps / 2.5Mbps / 625kbps / 156kbps
Transmission method	Broadcast polling system
Synchronous method	Frame synchronous system
Encoding method	NRZI
Transmission path format	Bus format (EIA RS485)
Transmission format	HDLC
Error control system	CRC ($X^{16} + X^{12} + X^5 + 1$)
Number of connectable units	42 units (max, remote device station)
Remote station numbers (station numbers)	1 to 64

■ For CC-Link connection cables, please use the dedicated cables.
For information regarding dedicated cables, please refer to the CC-Link Partner Product Catalog published by the CC-Link Partner Association or CC-Link Partner Product Information on the CC-Link Partner Association website (http://www.cc-link.org).
Notes 1. Dedicated CC-Link cables compatible with Ver. 1.00 cannot be used in tandem with dedicated CC-Link high-performance cables compatible with Ver. 1.00.
Notes 2. In the case of systems consisting of units compatible with Ver. 1.00, 1.10 or 2.00 used in tandem with Ver. 1.00 or 1.10 cables, Ver. 1.00 specifications will apply for the maximum total cable length and length of cables between stations.
Notes 3. For terminal resistance, be sure to use 110 Ω ±5% (1/2W product) when using dedicated CC-Link cables or 130 Ω ±5% (1/2W product) when using dedicated CC-Link high-performance cables.
■ For more information on data, please refer to the following document.
· Electronic Multi-Measuring Instrument programming manual (CC-Link)……LEN080334
· Electronic Multi-Measuring Instrument programming manual (CC-Link)(For ver. 2 remote device station)…LEN130391

Input/Output Specifications

Item	Specification	Optional Plug-in Module type
Analog output	4-20mA (0~600 Ω)	ME-4210-SS96
Pulse/Alarm output	No-voltage “a” contact Capacity: 35VDC, 0.1A	ME-4210-SS96
Digital input	19-30VDC 7mA or less	ME-4210-SS96, ME-0040C-SS96, ME-0052-SS96
Digital output	No-voltage a contact Capacity: 35VDC, 0.2A	ME-0052-SS96

■MODBUS® TCP Communication Specifications

Item		Specification
Interface		1 port (10BASE-T/100BASE-TX)
Transmission method		Base band
Number of stages connected in cascade		Max. 4 stages (10BASE-T), max. 2 stages (100BASE-TX) (when repeater hub is used)
Max. distance between nodes		200m
Max. segment length		100m
Connector applicable to external wiring		RJ45
Cable	10BASE-T	Cable meeting IEEE802.3 10BASE-T standard (Unshielded twisted pair cable (UTP cable), category 3 or higher)
	100BASE-TX	Cable meeting IEEE802.3 100BASE-TX standard (Shielded twisted pair cable (STP cable), category 5 or higher)
Protocol		MODBUS® TCP (port No.502)
Max. number of connections		4
Support functions		Auto-negotiation function (automatic recognition of 10BASE-T/100BASE-TX) Auto-MDIX function (automatic recognition of straight cable/cross cable)

■ For more information on data, please refer to the following document.
Electronic Multi-Measuring Instrument ME series MODBUS® Interface specifications…LMS-0492

■Logging Specifications

Item		Specification
Logging mode		Automatic updating by overwriting (not provided with a function to automatically start according to the start time setting)
Kinds of logging data	Detailed data	Measurement data is stored at the specified “detailed data logging interval” (1 min, 5 min, 10 min, 15 min or 30 min). Note: The data will be output as a detailed data file. Note: As the integrated values, not the difference values, but the values displayed on the multi indicating instrument will be output.
	1-hour data	Measurement data is stored at a one-hour interval. Note: The data will be output as a one-hour data file or a one-day data file. Note: As the integrated values, not the difference values, but the values displayed on the multi indicating instrument will be output.
Number of logging elements	Detailed data	Max. 6 elements
	1-hour data	Max. 6 elements
Internal memory logging period	Detailed data	Detailed data logging interval: 1 min for 2 days Detailed data logging interval: 5 min for 10 days Detailed data logging interval: 10 min for 20 days Detailed data logging interval: 15 min for 30 days Detailed data logging interval: 30 min for 60 days
	1-hour data	400 days (about 13 months)
SD memory card (2GB) logging period		10 years or more
System log data		1200 records
Logging data / system log data output format		CSV format (ASCII code)
Power failure compensation		Backup by built-in lithium battery Total power interruption backup time: 5 years (at daily average temperature of 35°C or less) (The life of the lithium battery is 10 years (at a daily average temperature of 35°C or less).) The battery cannot be replaced by the customer. Please consider updating the module.
Set values (logging ID, logging elements and detailed data logging interval)		Stored in FRAM (non-volatile memory) Note: The data will not be deleted even if power interruption is caused by battery voltage drop (BAT. LED is on).
Logging data and system log data		Stored in SRAM (volatile memory) Note: The data will be deleted if power interruption is caused by battery voltage drop (BAT. LED is on).
Clock operation		Note: The clock operation will stop if power interruption is caused by battery voltage drop (BAT. LED is on). After power restoration, the clock operation will start from 00:00 on Jan. 1, 2016.
Clock accuracy		1 min / month
Output data storage medium		SD memory card (SD or SDHC)
Optional accessory		SD memory card (EMU4-SD2GB) *1

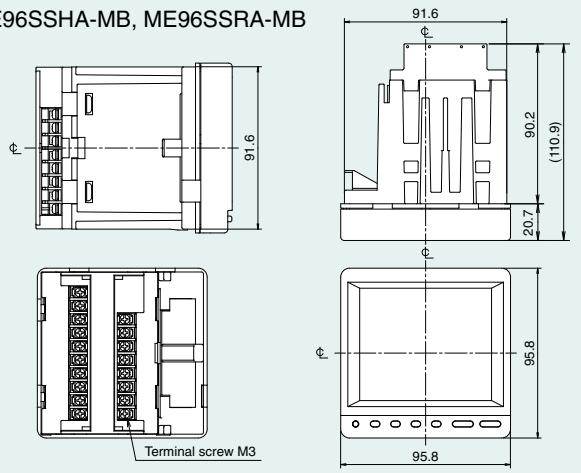
*1: Use the SD memory card (EMU4-SD2GB) made by Mitsubishi Electric.
Use of any memory card other than our product (EMU4-SD2GB) is not covered by the warranty.

■ For more information on data, please refer to the following document.
Logging specifications…LMS-0551

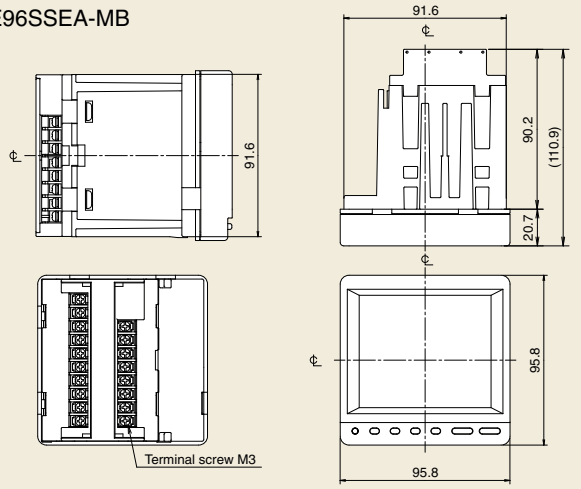
External Dimensions/Installation/Connections

■Dimensions

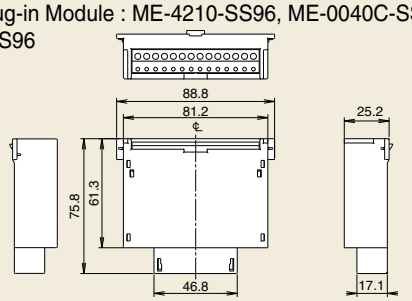
●ME96SSHA-MB, ME96SSRA-MB



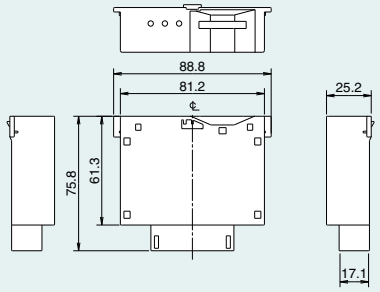
●ME96SSEA-MB



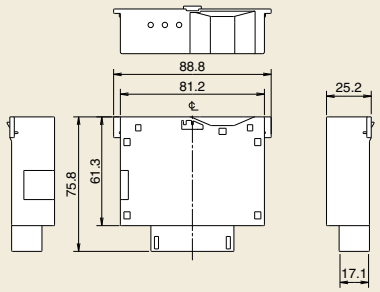
●Optional Plug-in Module : ME-4210-SS96, ME-0040C-SS96, ME-0052-SS96



●Optional Plug-in Module : ME-0000BU-SS96



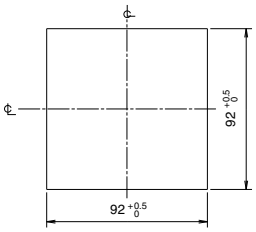
●Optional Plug-in Module : ME-0000MT-SS96



■Mounting

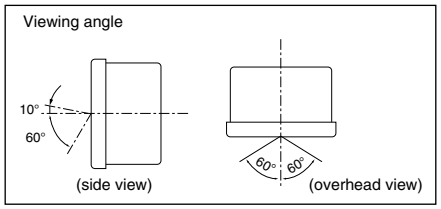
1 Dimension of panel

Panel hole dimensions are as shown in the following figure. It can be attached to a panel with thickness of 1.6 to 4.0mm.



2 View Angle

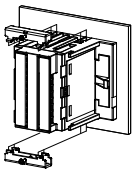
The contrast of the display changes at view angle. Mount it at the position that is easy to see.



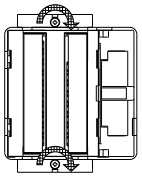
3 Attachment

For attachment of the basic device into the panel hole, attach according to the following procedure.

①The attachment lug is installed in two holes of the top and bottom of the basic device.



②Tighten the screws of the lug, and fix onto the panel.



Note

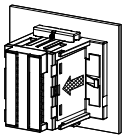
To prevent damage to the panel and screws, do not fasten screws too tightly.
Recommended torque for these products: 0.3~0.5N·m (approx. half of standard torque)
Also, please tighten the upper and lower screws at the same time.

Main unit mounting screws: M3

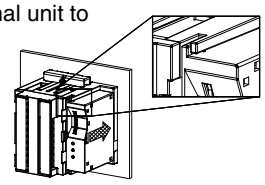
4 Installing Optional Plug-in Module

When installing the optional plug-in module onto the basic device, install according to the following procedure.

①Remove the optional cover.



②Attach the optional unit to the main unit.

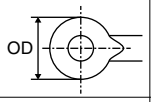


Fit the protruding part of the optional unit into the slot in the main unit.

■Wiring

1 Applicable Cable Size

The table on the right describes the applicable wire size.

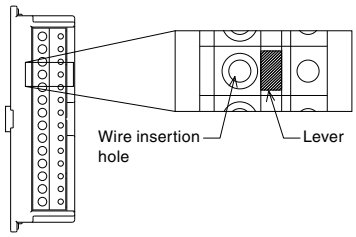
Part	Screw type	Wire specifications	Tightening torque
Product main body (auxiliary power supply, voltage input, current input and MODBUS® RTU communication terminals)	M3	• Use of crimp-style terminals: AWG26 to 14 (2 wires can be connected.) Applicable crimp-style terminal: OD of 6 mm or less, for screw M3 	0.6 to 0.8 N·m
Optional unit terminal (ME-0052-SS96, ME-0040C-SS96, ME-4210-SS96)	Screwless	• Single wire and stranded wire: AWG24 to 14 (Rod terminal can be used together with stranded wire.) Wire stripping length: 10 to 11 mm *1: To conform to UL Standard, use in accordance with the following requirements. • Single wire and stranded wire: AWG24 to 18 •Use of a bar terminal is not allowed. *2: When using a bar terminal for inserting two wires, select a terminal whose insertion part into the terminal block is 12 to 13 mm long.	–

2 Wiring

■Optional Plug-in Module Terminal

①Remove the wire casing at the end of the wire and solder to the rod terminal.
②With the lever pushed in, insert the wire and then release the lever to connect.

■Optional Plug-in Module Terminal



3 Confirmations

After wiring, make sure the following:
☐All wiring is connected
☐There is no mistake in wiring

Note

Protective sheet

There is a protective sheet covering the LCD screen to prevent scratching during panel installation. Please remove the sheet before using the meter. When removing the sheet, the LCD may turn on due to the static electricity generated. This is not abnormal; the LCD will turn off after a short time.

Installation position

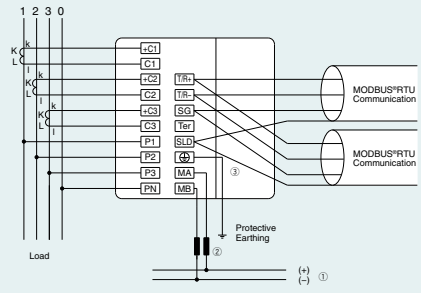
If installing the unit at the panel edge, choose an installation position where there is sufficient space for wiring work.

Optional unit

Turn the auxiliary power supply off before attaching the optional unit. If attached with the power on, the main unit will not recognize the optional unit. To remedy this, turn off/restart the auxiliary power supply or execute the “instrument restart” operation.

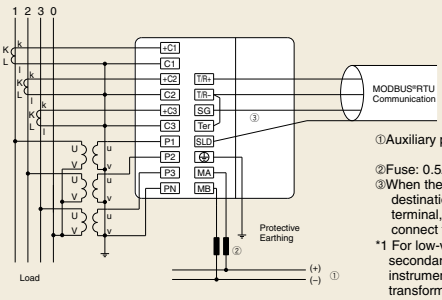
■Wiring Diagrams

●Three phase 4-wire system: Direct input



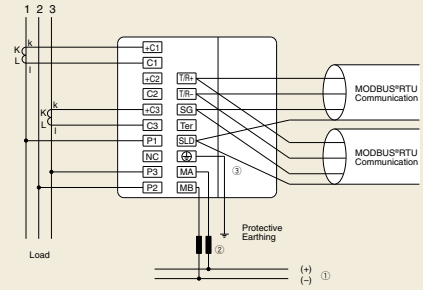
①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.

●Three phase 4-wire system: With VT



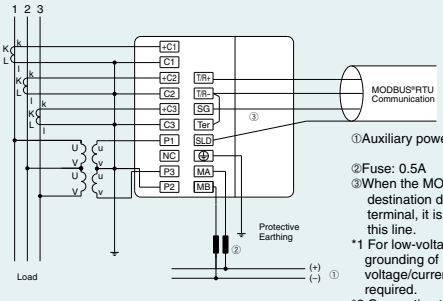
①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.

●Three phase 3-wire system: Direct input, 2CT



①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.
*2 Connection to NC terminal is prohibited.

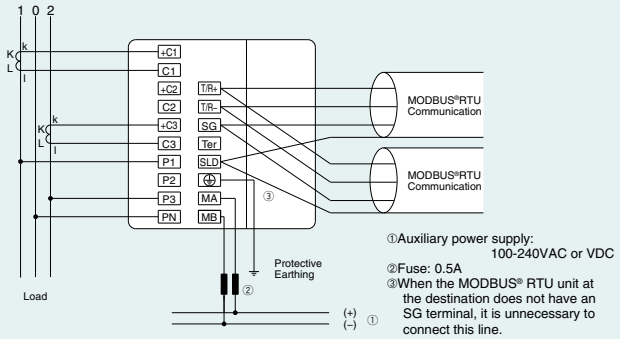
●Three phase 3-wire system: With VT, 3CT



①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.
*2 Connection to NC terminal is prohibited.

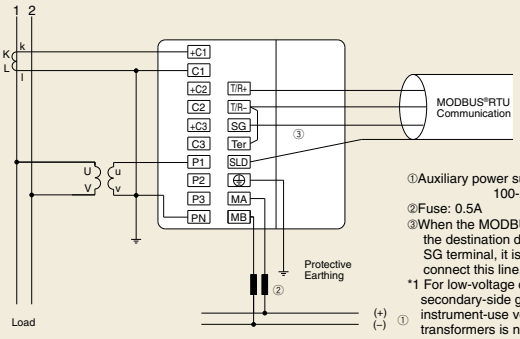
Wiring Diagrams (Continued)

●Single phase 3-wire system



①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.
*2 Connection to NC terminal is prohibited.

●Single phase 2-wire system: With VT

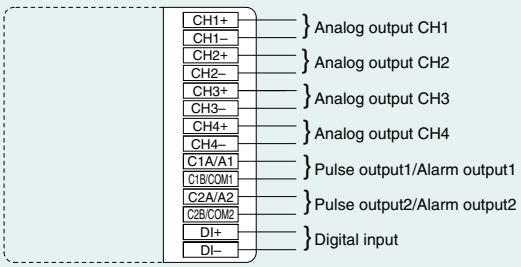


①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.
*2 Connection to NC terminal is prohibited.

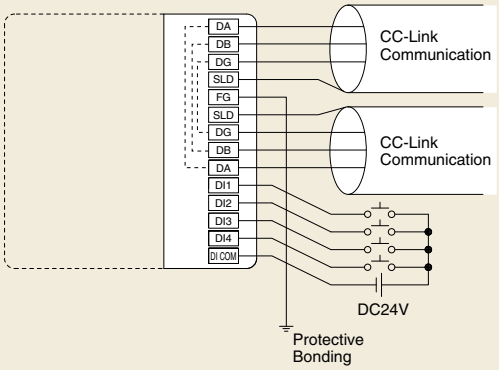
Note

1. The voltage input terminal will vary depending on if it is a 3-phase, 3-wire system or otherwise.
2. VT/CT polarity errors will cause incorrect measurement.
3. Always use the grounding terminal (⏚) in a grounded state. Perform grounding with a grounding resistance of 100Ω or less. Insufficient grounding may cause erroneous operation.
4. Use shielded twisted-pair cables for transmission signal lines.
5. Use terminal resistance (120Ω) for devices at both ends of the MODBUS® RTU communication transmission line. These meters can be terminated at 120Ω by short-circuiting the "T-" and "Ter" terminals.
6. Use the thickest possible grounding wire to ensure low impedance.
7. MODBUS® RTU transmission signal cables must not be in close proximity or bundled with high-voltage cables.

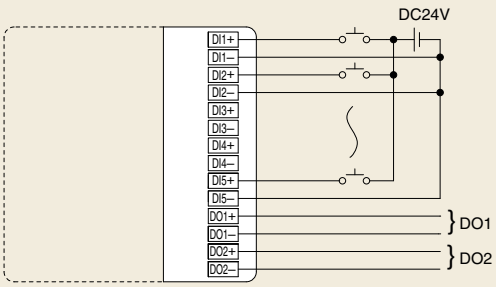
●Optional Plug-in Module: ME-4210-SS96



●Optional Plug-in Module: ME-0040C-SS96

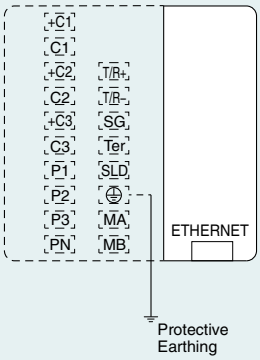


●Optional Plug-in Module: ME-0052-SS96

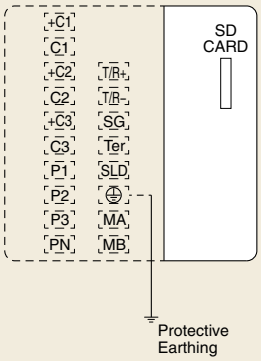


DI1-, DI2-, DI3-, DI4-, DI5-, are connected inside.

●Optional Plug-in Module: ME-0000MT-SS96



●Optional Plug-in Module: ME-0000BU-SS96



Wiring Diagrams (Continued)

Note

1. Pulse output, alarm output, and contact input/output cables must not be in close proximity or bundled with power cables or high-voltage cables. When laid parallel, separate by the distance shown in the following table.

Condition	Distance
Power lines under 600V/600A	More than 30cm
Other power lines	More than 60cm

2. Analog output cables must not be in close proximity or bundled with other power cables or input cables (e.g., VT, CT, auxiliary power supply). In addition, to prevent noise, surge and induction, use shielded cables or twisted-pair cables. Make sure that cables are as short as possible.
3. There is no insulation between the MODBUS® RTU communication portion and the optional module ME-4210-SS96, ME-0040C-SS96 or ME-0000MT-SS96.
4. Use only designated cables when connecting the CC-Link (see communication specifications). CC-Link dedicated cables cannot be used at the same time as CC-Link dedicated high-performance cables. Normal data transmission cannot be guaranteed if used at the same time.
   The terminal resistance value varies depending on the type of dedicated cable.
5. For cables connecting the CC-Link, connect shielded cables to “SLD” and ground “FG” cables. “SLD” and “FG” cables are connected inside the unit.
6. CC-Link transmission lines are small signal circuits: separate from strong electrical circuits by a distance of 10cm or more, or 30cm or more if laid in parallel over a long distance.
   Ground the terminal before use.
7. For CC-Link transmission, always use dedicated lines and comply with conditions for total wiring distance, distance between stations and terminal resistance values according to the communication speed. Not doing so may prevent normal communication (see the CC-Link Master Unit Operations Manual for information on dedicated lines and wiring conditions).
8. The terminal resistance supplied with the CC-Link Master Unit must always be used for the units at both ends of the CC-Link transmission line. If the meter is at the end of the CC-Link transmission line, connect it between the DA and DB terminals.
9. Communication errors may occur under the influence of high-frequency noise from other devices in the installation environment during high-speed communication (100 Mbps) via 100BASE-TX connection of MODBUS® TCP.
   Measures to be taken when the network system is configured to avoid the influence of high-frequency noise are shown below.
   (1) Wiring connection
   • When laying a twisted pair cable, do not bundle the cable together with any main circuit line or power line or lay it close to such a line.
   • Keep the twisted pair cables in the duct.
   (2) Communication method
   • Increase the number of communication retries as needed.
   • Replace the hub to be used for connection with that for 10 Mbps, and communicate at a data transmission speed of 10 Mbps.
10. Do not connect any terminal or RJ45 connector in the live state.
11. Do not insert or remove the SD memory card in the live state.

Rated voltage for each phase/wire system

Phase/Wire	Connection	Rated voltage	Figure
Three phase 4-wire	Star	Max. 277VAC (L-N)/480VAC(L-L)	1
Three phase 3-wire	Delta	Max. 220VAC (L-L)	2
	Star	Max. 440VAC (L-L)	3
Single phase 3-wire	–	Max. 220VAC (L-N)/440VAC(L-L)	4
Single phase 2-wire*	Delta	Max. 220VAC (L-L)	5
	Star	Max. 440VAC (L-L)	6

* The circuit derived from the three-phase 3-wire delta connection and the single-phase 2-wire transformer circuit have the maximum rating of 220 VAC.
The circuits derived from the three-phase 4-wire and three-phase 3-wire star connections and single-phase 3-wire connection have the maximum rating of 440 VAC.

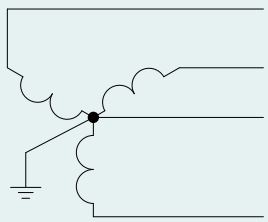


Fig. 1. Three phase 4-wire (star)

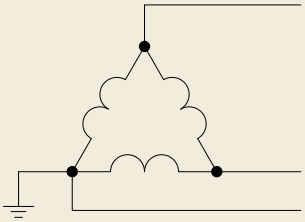


Fig. 2. Three phase 3-wire (delta)

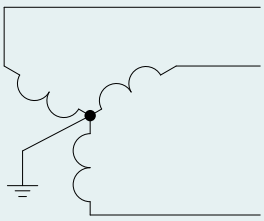


Fig. 3. Three phase 3-wire (star)

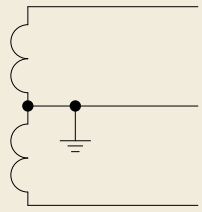


Fig. 4. Single phase 3-wire

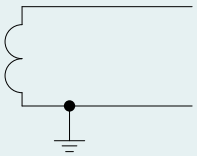


Fig. 5. Single phase 2-wire (delta)

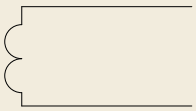


Fig. 6. Single phase 2-wire (star)

Device features

Energy Measuring Module

Measure Various Energy Data Easily: Simply Insert Directly into PLC Slot

■Line-up


QE81WH


QE84WH


QE81WH4W

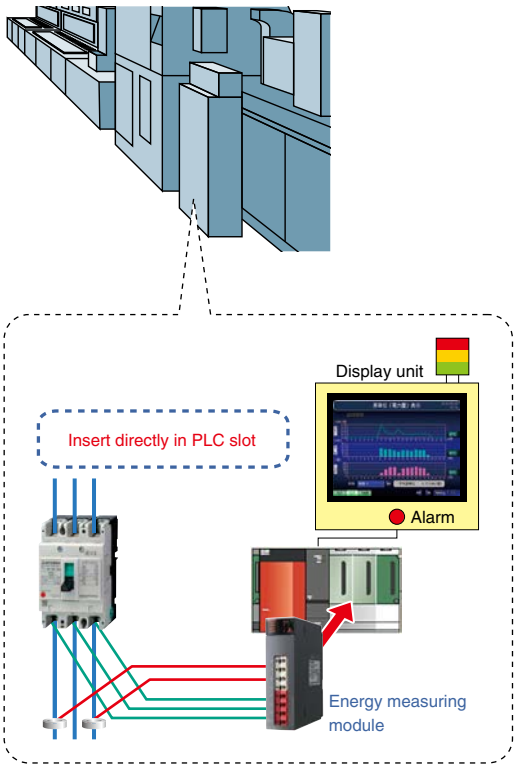

QE83WH4W

■General specifications

	Energy measuring module			
Model name	QE81WH	QE84WH	QE81WH4W	QE83WH4W
Phase Wire system	Single-phase 2-wire, single-phase 3-wire, 3-phase 3-wire		3-phase 4-wire*	
Measurement items	Electric energy (consumption, regenerative), reactive energy, current, voltage, power factor, frequency, etc.			
No. of measurement circuits	1	4	1	3

*A voltage converter (QE8WH4VT) is always required when use for 3-phase 4-wire circuit.

Usage Diagram



Insert into MELSEC-Q PLC

Modules can be inserted directly into a MELSEC-Q PLC, removing the need for a separate communication module or cable and realizing energy measurements with reduced wiring and set-up work. In addition, productivity-based energy management is possible through linking production data to detailed data on the energy use of manufacturing equipment.

Simplified Measurement of Various Energy Data

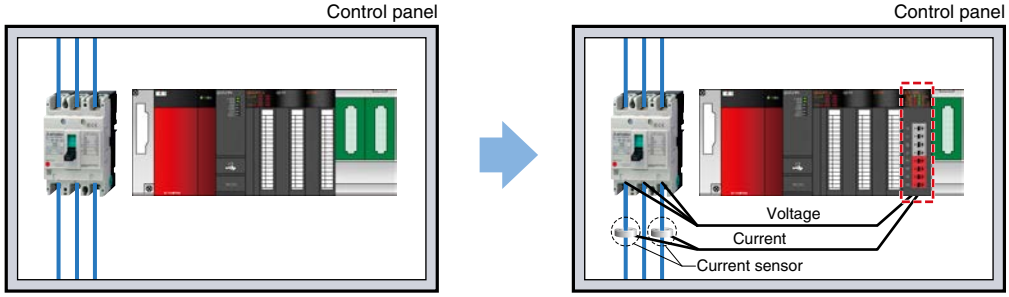
Energy measuring module can be used for diverse applications as they enable measurements of current, voltage and power consumption as well as other items such as frequency, power factor and reactive power. Choose from our extensive line-up designed for various circuits and phase/wire types.

Use Energy Data Effectively for Preventive Maintenance and Quality Control

Power-based faults in production equipment and quality defects can be detected through measuring energy data. This enables onsite personnel to take actions in advance and effectively manage maintenance and quality.

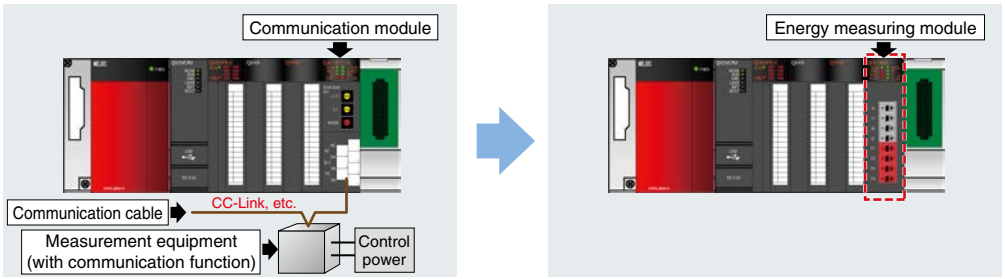
1 No Additional Space Required

●There is no need to change the layout of the control panel; simply insert the energy measuring module into an open slot of the base unit.



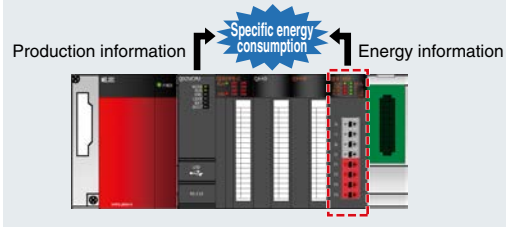
2 Less Wiring and Set-up Work

●Previously, installing an energy measuring device required a communication unit, cable and creation of a communication program. The energy measuring module eliminates this need, realizing reduced wiring and workload as well as lower costs.



3 High-speed (250ms or 500ms), Detailed Energy Measurements

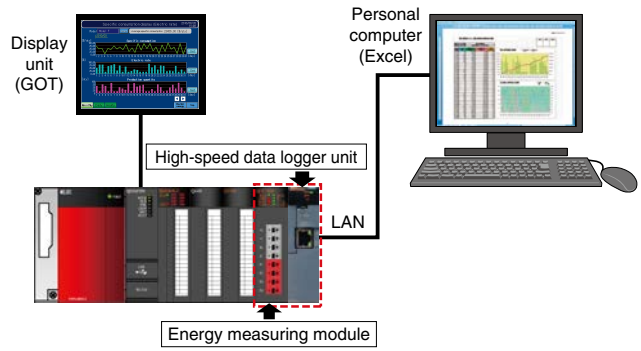
●Specific energy consumption*1 can be calculated by combining the production data of the PLC's CPU and the energy data of the energy measuring module.
●The data is collected at the high speed of 250ms (single circuit models) or 500ms (multi-circuit models) and stored in a buffer memory, supporting detailed management of specific energy consumption.
●In the current measurement mode of multi-circuit models, the module can measure the current on 8 circuits.



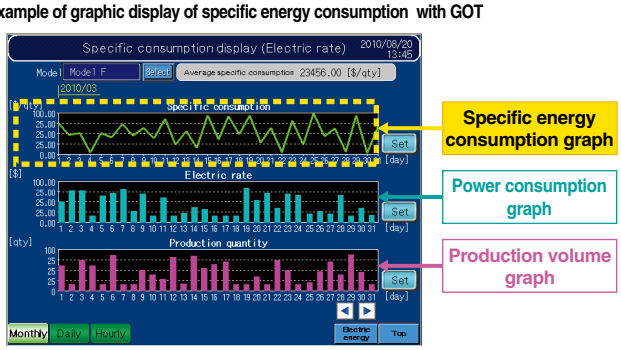
*1: Specific energy consumption is equal to energy consumption divided by production volume. It is a measure of energy productivity. Improving specific energy consumption leads to improvements in productivity.

4 Simple Visualization of Energy Use

●Visualization of the specific energy consumption can be easily achieved through use of a graphic operation terminal (GOT) installed on the control panel at the manufacturing site.
●Analysis is also possible using a computer combined with a high-speed data logger unit (QD81DL96).



Example of graphic display of specific energy consumption with GOT

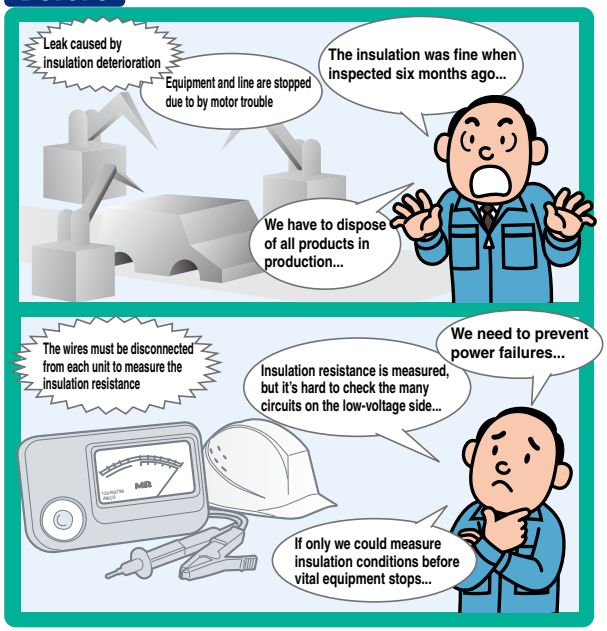


Device features

Insulation Monitoring Module

Insulation monitoring by PLC. Insulation deterioration in equipment can be detected without omission.

Before



After

Insulation deterioration is constantly monitored for each unit/load



Insulation Monitoring Module
QE82LG

- Prevention of sudden failure of machines and lines
- Reduction of downtime caused by insulation deterioration
- Cost reduced by ending defective product disposal due to sudden line stoppage
- Reduction of maintenance hours for periodic inspections
- Detection of insulation deterioration (earth leakage) at early stage

Advantages of Introducing the Insulation Monitoring Module

■Conventional systems

- Measurement of insulation resistance with wiring disconnected during inspection
- Power must be suspended to set the equipment in the non-voltage state
- When leakage current is detected, power supply stops suddenly
- Insulation deterioration cannot be detected easily due to the loc component

■Insulation Monitoring Module

Constant monitoring of leakage current during operation

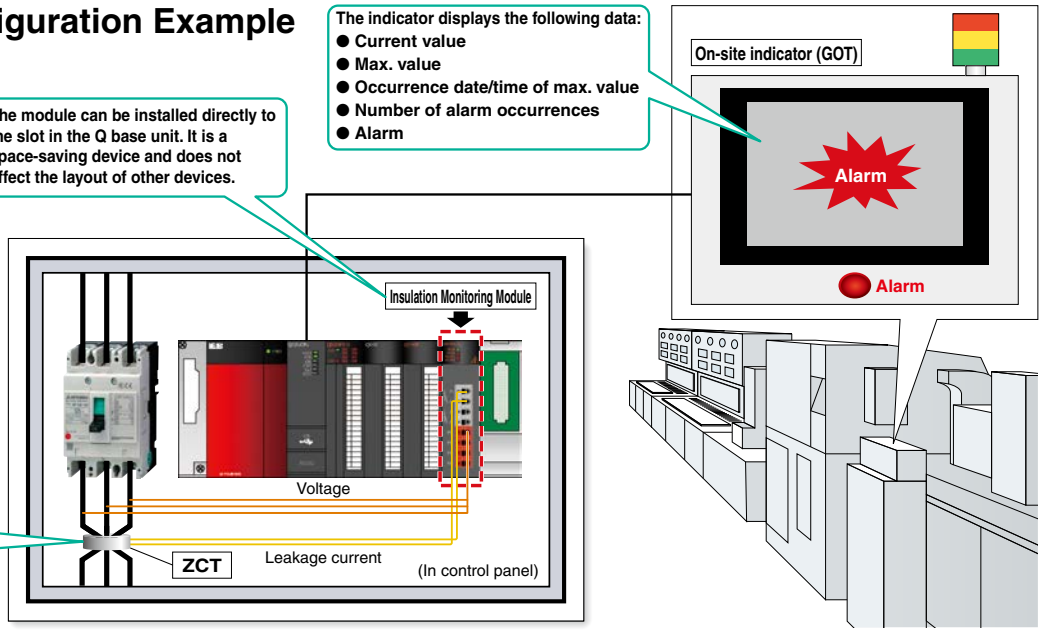


- Reduction of labor for insulation resistance test
- No need to suspend power supply to equipment
- Early detection of insulation deterioration signs
- Improvement of availability and reduction of product loss through measures taken before sudden stop

System Configuration Example

The indicator displays the following data:
- Current value
- Max. value
- Occurrence date/time of max. value
- Number of alarm occurrences
- Alarm

The module can be installed directly to the slot in the Q base unit. It is a space-saving device and does not affect the layout of other devices.



A split-type ZCT, which is newly added to the lineup, can be easily installed on existing equipment

*The maximum wiring length between the QE82LG and zero-phase converter (ZCT) is 50m.

1 Early Detection of Insulation Deterioration in Production Equipment

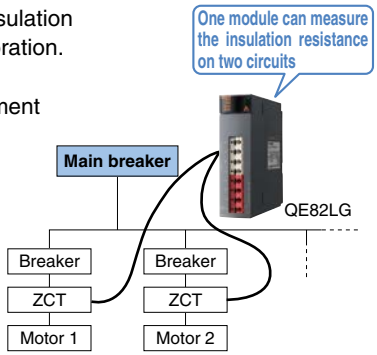
- Since this module is connected directly to the PLC in the control panel, leakage current from points close to loads can be measured easily without the need for additional installation space.
- The module can detect troubles caused by earth leakage (ground fault) and monitor the insulation of motor loads in the production equipment. It does not overlook ongoing insulation deterioration.
- Upper-limit monitoring values for alarms can be set in two stages. Insulation deterioration/condition is detected at each stage, enabling countermeasures before equipment stoppage/malfunction.

Conventional insulation monitoring equipment

System where leakage occurs can be identified, but it's not possible to detect insulation deterioration in equipment.

Insulation Monitoring Unit

Insulation monitoring pinpoints the problematic equipment, making it possible to recognize deteriorated insulation location early on!



2 Constant Monitoring for Insulation Deterioration of Equipment Using Ior Method

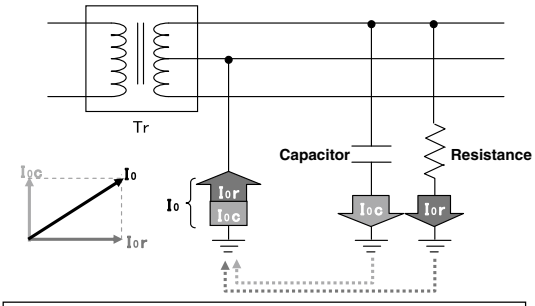
- The module can measure resistive-component leakage current (Ior). Even on circuits which cannot be monitored for insulation using the conventional Io method, such as inverter circuits on which capacitor component leakage current (Ioc) is large, the module removes the Ioc component and can correctly monitor the leakage current caused by insulation deterioration.
- The module constantly measures the resistive-component leakage current (Ior) even while equipment is running. It detects any sign of insulation deterioration without power interruption.

*A correct measurement cannot be made with the inverter or servo amplifier's binary value. Always measure with the primary value.

The Ior method stated in the "Standard Specifications for Public Works Construction (Electric Equipment Work)" edited by the Ministry of Land, Infrastructure, Transport and Tourism is used.

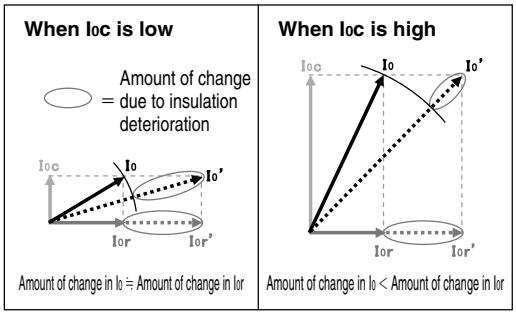
Since leakage current (Io) is affected by the Ioc of the whole equipment, the Ior measurement is effective for insulation deterioration diagnosis

■Method of leakage current measurement (Io and Ior measurements)



Ior : Leakage current caused by insulation deterioration (leakage current from resistive component)
Ioc : Leakage current flowing even in good insulation condition (leakage current from electrostatic capacity)
Io : Leakage current obtained by synthesizing Ior and Ioc (vector synthesis)

- The Ioc fluctuates on equipment with long wiring distance or inverter devices and filters.





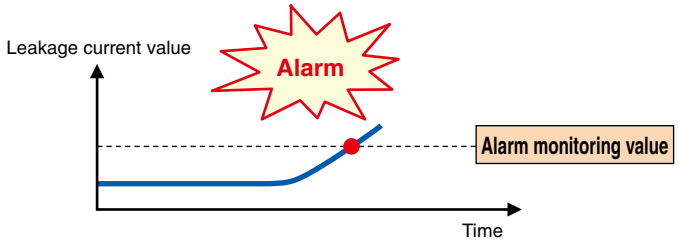
Insulation Monitoring Module Solution Example

Preventive Maintenance

From Corrective to Preventive Maintenance as a Result of Insulation Monitoring

Constant measurement of leakage current (Io or Ior) can prevent sudden trouble and reduce production loss due to equipment stoppage.

Example: Increase in leakage current is detected based on the preset alarm monitoring value, so maintenance of deteriorated insulation is performed.



Monitoring of upper limit alarm (leakage current) (Monitoring of equipment trouble)

↓ Alarm

Equipment maintenance and repair

↓

Reduction of production loss due to equipment stoppage

Device features

Energy Measurement Unit

EcoMonitor Pro

With a product line-up that offers effective utilization of panel space and saves wires, workability is enhanced! And with W-logging (offline/online) you can achieve energy management!



■Basic Specifications

Exterior	Series	Transmission (Output)	Model	Measurement Number of circuits	Measuring Items
 EMU2-RD3-C	High performance products	CC-Link	EMU2-HM1-C	1circuit	Current, voltage, power, amount of electrical energy, power factor
	Single-phase 2-wire/ single-phase 3-wire/3-phase 3-wire (shared)	None	EMU2-RD3-F	3circuits	Current and voltage Power and reactive power Amount of electrical energy and amount of reactive energy Power factor and frequency Harmonic current and harmonic voltage
			EMU2-RD5-F	5circuits	
			EMU2-RD7-F	7circuits	
 EMU2-RD5-C		CC-Link	EMU2-RD1-C	1circuit	
			EMU2-RD3-C	3circuits	
			EMU2-RD5-C	5circuits	
			EMU2-RD7-C	7circuits	
 EMU2-RD7-C	Exclusive 3-phase 4-wire products	None	EMU2-RD2-F-4W	2circuits	Current and voltage Power and reactive power Amount of electrical energy and amount of reactive energy Power factor and frequency Harmonic current and harmonic voltage
			EMU2-RD4-F-4W	4circuits	
		CC-Link	EMU2-RD2-C-4W	2circuits	
			EMU2-RD4-C-4W	4circuits	

Note: The display is a selection of 4 elements from current and electrical energy + measuring items.

Optional Products for Energy Measuring Units

Split type current sensor



50A, 100A, 250A products





Split state



5A Current Sensor (EMU2-CT5)



400A, 600A products



5A Current Sensor (EMU2-CT5-4W)



Split state

Split form current sensor (low voltage use only)

Items	Specifications					
Model	EMU-CT5-A	EMU-CT50/EMU-CT50-A	EMU-CT100/EMU-CT100-A	EMU-CT250/EMU-CT250-A	EMU-CT400-A	EMU-CT600-A
Rated primary current	5A	50A	100A	250A	400A	600A

Items	Specifications	
Model	EMU2-CT5	EMU2-CT5-4W
Phase wire system	Single-phase 2-wire/single-phase 3-wire/ 3-phase 3-wire	For 3-phase 4-wire use only
Rated primary current	5A	

When measuring medium-voltage circuits, or when using an existing CT, it becomes a 2-stage configuration combining a secondary CT (✻/5A) and a 5A split-form current sensor.

Data collection PC Kit





* Data collection computer kit for energy measuring unit (EMU2-PK3-EN).
Used in combination with logging display unit (EMU-D65-M).

Items	Specifications
Model	EMU2-PK3-EN
Equipment configuration	Data collection software (CD-ROM Disc1), USB communication cable (3m), LOCAL communication cable (3m), RS-232C conversion cable (2m)

Display unit

■Model
EMU4-D65

■Bundled
Connecting cable (1m)



Logging display unit

■Model
EMU2-D65-M

■Bundled
Connecting cable (1m)



Basic Specifications

Items			Specifications		
Item			Display unit	Logging display unit	
Model			EMU4-D65	EMU2-D65-M	
Rating			9VDC (see note 1)		
Auxiliary power supply			–		
Consumed VA			–		
Display			LCD (with backlight)		
Renewal cycle display			500ms		
Measuring value display	Wh+A+4 items		Electrical energy, current, 4 selected items		
	High freqency details		All measured data		
Alarm display	Alarm status		Upper and lower limit alarm, voltage sag alarm status, relay output status		
	Alarm value		Upper and lower limit alarm value, time upon occurrence, voltage sag alarm voltage value, time upon occurrence, length		
Settings	EMU settings		Phase wire, primary voltage, primary current, sensor, demand time, limit, pulse unit, measuring mode		
	Logging settings		–	Set logging items and logging operation	
	Clock settings		Set built-in clock	Set built-in clock in main body and display unit	
	Alarm settings		Upper and lower limit alarm value, voltage sag level, voltage sag length		
	Display settings		LCD contrast, backlight option settings		
Data reset			Maximum value, minimum value, upper and lower limit alarm value, voltage sag alarm value, electrical energy/reactive energy and logging data (see note 3)		
Data preset			Electrical energy/reactive energy		
Logging	Logging cycle		–	1second, 1minute, 1hour	
	Logging period	1second data (see note 4)	–	1circuit products	48hours
				2circuit products, 3circuit products	12hours
				4circuit products, 5circuit products	4hours
				7circuit products	2hours
		1minute data	–	10days	
		1hour data	–	131days	
	Logging data		–	Store logging data	
	Logging-capable measurement data		–	Electrical energy + selected 3 items (see note 5)	
Connection to energy measuring unit			With dedicated cable (included). Maximum cable length : 10m		
Number of maximum connected devices			7devices		
Mounting method			IEC rail mounting or mounting		
Operational temperature range			–5°C to 55°C		
Operational humidity range			30% to 80%RH or below (no condensation allowed)		
Storage temperature range			–10°C to 60°C		
Weight			0.1kg		

Note 1: Supply from energy measurement unit. When connecting to two or more devices, use display unit for power source (optional).
Note 2: Maximum and minimum values and upper and lower limit alarm data not displayed.
Note 3: Reset of logging data only available with EMU2-D65-M.
Note 4: Please refer to the number of circuits on the page 924 model table.
Note 5: Can be selected from the data displayed on the logging display unit (excluding maximum and minimum values). It is possible to set the logging element for each circuit.
Note 6: When connecting to 2 or more devices, please use the display unit between the connecting cables (optional). If you wish to extend the cable, please use the extension cable (optional).

Product Lineup

Energy Measuring Unit

EcoMonitor Light

The lineup consists of two types of measuring unit to make it simpler to easily visualize energy consumption.



EMU4-HD1-MB



EMU4-BD1-MB

High Performance Model

EMU4-HD1-MB

For customers who need more advanced functions than those of the standard model such as three-phase 4-wire measurement, pulse count and contact input!

①Same basic functions as the Standard Model.
②Three-phase 3-wire 440V direct voltage input is available.
③Three-phase 4-wire 277V/480V direct voltage input is available.
④Able to display harmonic current and voltage, apparent power, power consumption and CO_2 conversion.
⑤Equipped with pulse and contact input/output functions.

Product	Energy Measuring Unit [High Performance Model]
Model	EMU4-HD1-MB

Standard Model

EMU4-BD1-MB

For customers who want to start measuring energy in a simple and low-cost manner!

①Equipped with basic energy measurement functions such as for current, voltage, power and electric energy.
②Standard-equipped with MODBUS® RTU communication.

Product	Energy Measuring Unit [Standard Model]
Model	EMU4-BD1-MB

Optional Units



Logging Unit

For customers who want to easily manage data using SD memory cards!



CC-Link Communication Unit

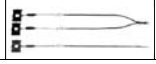
For customers who want to connect to CC-Link communication!

Optional Units

Product	Logging Unit	CC-Link Communication Unit
Model	EMU4-LM	EMU4-CM-C

Options

Split-type Current Sensor

Product name	Model	External view	UL/CE compatibility
Split-type current sensor	EMU-CT5-A		×
	EMU-CT50-A		×
	EMU-CT100-A		×
	EMU-CT-250-A		×
	EMU-CT400-A		○
	EMU-CT600-A		○
	EMU-CT50		○
	EMU-CT100		○
	EMU-CT250		○
	EMU2-CT5		○
	EMU2-CT5-4W		○

*1 Use commercially available cables for the connection of current sensors.
Compatible cable: AWG22-14
(Single wire: ϕ0.65 to ϕ1.62 mm^2, Stranded wires: ϕ0.33 to ϕ2.0 mm^2)
*2 Current sensor cable can be extended up to 50 m.
For the 5A current sensor (EMU2-CT5,EMU2-CT5-4W), cable can be extended to 10.5 m.
*3 In divided split-type Current Sensor (EMU2-CT5(4W)) usa, EMU2-CB-Q5A(4W) is needed.

Options for 5A Current Sensor (Current Sensor Cable)

Product name	Model	External view
5A Current sensor cable	EMU2-CB-Q5A (Single-phase 2-wire, single-phase 3-wire and three-phase 3-wire)	
	EMU2-CB-Q5A-4W (Three-phase 4-wire)	
Extension cable (Standard type)	EMU2-CB-T1M(1m) EMU2-CB-T5M(5m) EMU2-CB-T10M(10m)	
Extension cable (Separate type)	EMU2-CB-T1MS(1m) EMU2-CB-T5MS(5m) EMU2-CB-T10MS(10m)	

Options for Logging Unit

Product	Model	External View
SD memory card for logging unit	EMU4-SD2GB	
Lithium battery for logging unit*	EMU4-BT	

*Logging units include one lithium battery for logging unit when purchased.

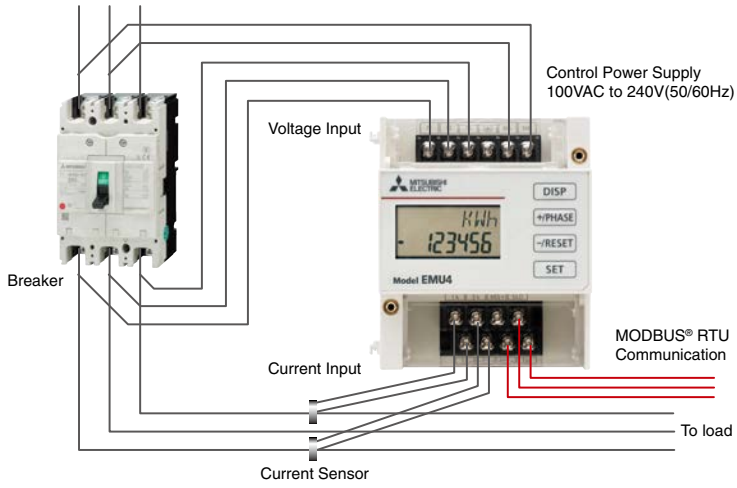
Panel Mounting Installation Option

Product	Model	External View
Panel mounting attachment	EMU4-PAT	

Examples of EcoMonitorLight Applications

1 Configuration Example of Measuring Devices

■Basic Installation



○You can use a general-purpose cable between the measuring unit and dedicated split current sensor. (Except for (EMU2-CT5(-4W))
○Always use in combination with a dedicated split current sensor.
○Give consideration to the rated current of the installation location for the dedicated split current sensor and select a model accordingly.



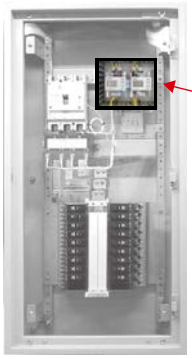
2 Examples of Measuring Unit Application

■Visual checking and management

For customers who want to visually check measured values with distribution boards!

●Installation inside a Board

For customers who want to install the unit inside a board for visual management of measured data!



Example of installation inside board



Key Point

Customers visually checking power use with a mechanical Watt-Hour meter can achieve board size reduction and space savings.

*Cannot be used for billing.

Example of Current Sensor Installation



Two split current sensors installed to secondary side of a breaker

*For three-phase 3-wire, Single-phase 3-wire.

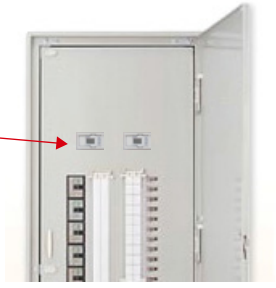
●Panel Installation

For customers who want to install the display screen on the board surface for monitoring of measurement data.



Key Point

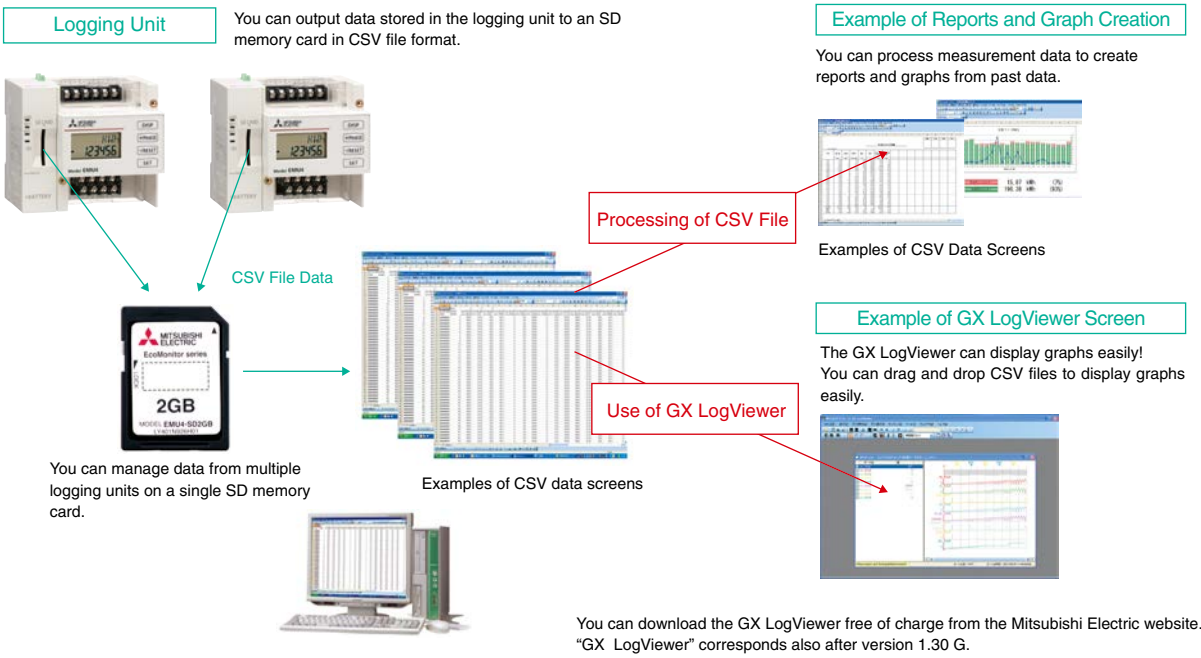
If you do not want the board surface installation screws to be exposed in the board surface, you can use the installation attachment (EMU4-PAT) to cover the screws.



3 Example of Logging Unit Applications

■Easy Management of Measurement Data of Measurement Points

For customers who want to periodically collect and easily manage energy measurement data!



You can download the GX LogViewer free of charge from the Mitsubishi Electric website.
"GX LogViewer" corresponds also after version 1.30 G.

Features of Logging Unit

(1)Easy Data Management with SD Memory Card

●You can output various types of measurement data (such as voltage, current and power) of the EcoMonitorLight stored in the logging unit to an SD memory card. The measurement data saved by saving carrying about and CSV data in a single SD memory card at two or more sets of logging units is collectable.

* It is necessary to always specify logging ID when collecting measurement data from multiple logging units on a single SD memory card. Refer to the operation manual for details.

●The logging unit features a two-step structure in which measurement data is saved for a specified period and output to an SD memory card. This prevents the loss of measurement data and provides secure and reliable data management.

(2)Managing Measurement Data in CSV Format

●The logging unit outputs measurement data to an SD memory card in CSV file format. The data can be processed freely using a personal computer in order to create graphs and manage results.

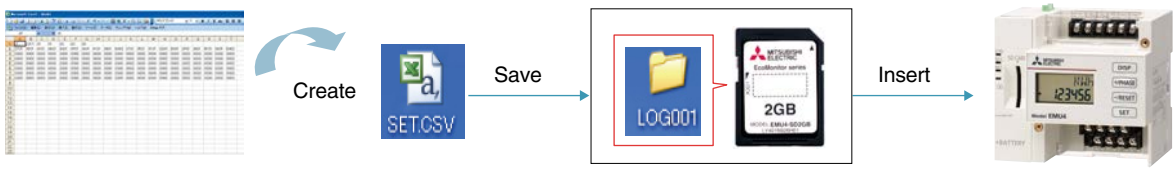
●Measurement data output to an SD memory card can be checked using Microsoft Excel or GX LogViewer (version 1.30G or later)*, and these can be used to display and analyze energy graphs from the data.

(3)Easy Expansion

●Customers already using the EcoMonitorLight can easily add the logging unit.

●Logging Settings

Able to freely create CSV file formats freely create CSV file formats by adding setting data files to an SD memory card in advance.



Specify settings such as logging start time, group number and channel number for the specified location in the setting data file (CSV file).

Change the name of the CSV file.

Specify the file name and save to SD memory card*.

*It is necessary for the folder name to match the logging ID of the logging units.

Data is logged using the specified format.

4 Examples of Data Acquisition Software (EMU4-SW1) Applications

■For customers who want to perform real-time energy monitoring from remote locations and energy management with a simple data acquisition system structure.

Using Data Acquisition Software EMU4-SW1 + MODBUS® RTU Communication

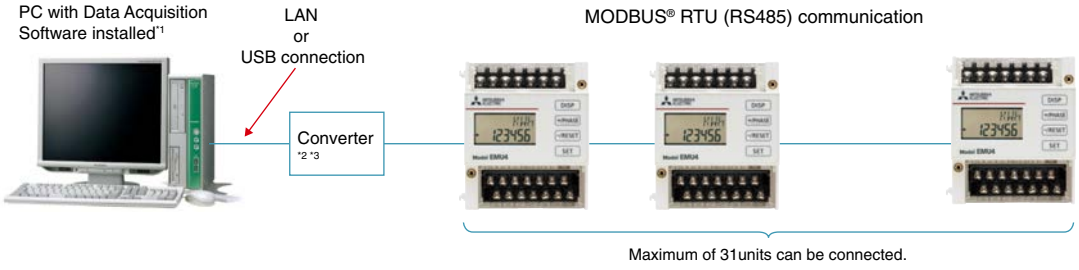
Energy management software (EMU4-SW1) performs data acquisition from energy measuring units equipped with a MODBUS® RTU communication interface.

* Data Acquisition Software (EMU4-SW1) carries out free download, and gets from the “design supportive tool data” of the Mitsubishi Electric site (http://www.MitsubishiElectric.co.jp/haisei/lvs/) energy-saving supporting aircraft machine menu.

Features of the Data Acquisition Software

(1)Capable of collecting a maximum of 124 items of measurement data from measurement devices and displaying corresponding current values.
(2)Capable of logging measurement data in designated cycles. (one minute or one hour)
(3)Logging data is output in Excel format.
(4)You can specify basic settings of energy measuring units connected for communication.

* The above features are some of the main ones of the data collection software (EMU4-SW1). Be sure to refer to the operation manual for details regarding all the features and other functions.



*1: One PC per each system is required.
*2: Converter used can be a LAN⇔RS485 converter or USB⇔485 converter.
*3: Connectable devices: LINEEYE SI-65 (LAN⇔RS485 converter) and LINEEYE SI-35USB (USB⇔485 converter)

●Examples of Data Acquisition Software (EMU4-SW1) Display Screens

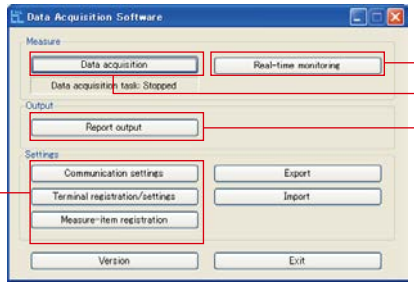


Converter
*2 *3

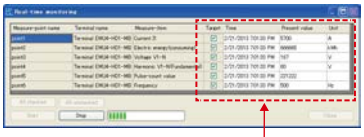
PC with Data Acquisition software installed*1



Main Screen



(1)Current Values Display



Selected measurement items are displayed in real time.

Current values are updated every one second.

(2)Measurement data is logged in the specified cycle.



Data Storage



Data is logged in CSV format every one minute or one hour.

(3)Logging data is output in Excel format.



Monthly, daily and detailed (one minute) data is output in Excel format.

You can output any reports you want by saving data in a report format to the specified folder.

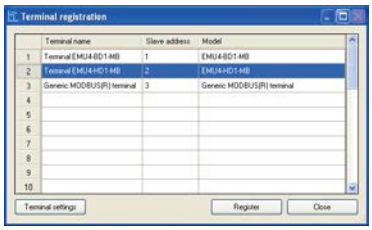


(4)Communications are used for settings

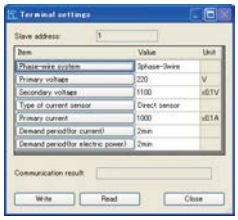
Communication Settings



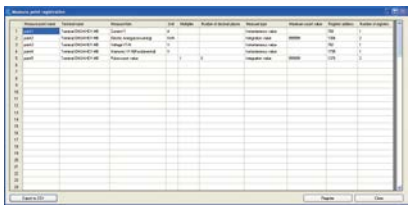
Terminal Registration



Terminal Settings



Measurement Point Registration



Note: (1) Display of current values and (2) Measurement data logging cannot be performed at the same time.

5 Examples of GOT1000 Series Applications

■On-site Visualization of Energy Data

For customers who want on-site visualization of energy consumption, and to manage the correlation of Production and energy!
[GOT1000 Series + MODBUS® RTU (RS485) Communication Application]

You can directly connect to the Mitsubishi GOT* by using MODBUS® RTU communication.
Displaying various energy information on a GOT installed on-site allows you to improve on-site energy-conservation awareness and perform production management to fit the energy conditions.



GOT1000 Series

*Compatible with GOT1000 series units that are standard-equipped with an RS485 serial port.

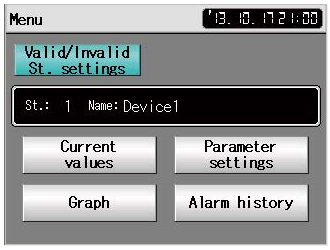
●Sample Screen

A sample Mitsubishi GOT*1 screens are provided.
You can view current values of various energy information such as power, current and voltage, and also display graphs of current and electric energy*2.
You can download the sample GOT screen free of charge from the Mitsubishi Electric FA website.

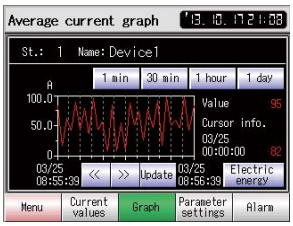
*1: GT14**-Q, GT1030 *2: Only compatible with GT14**-Q.

■GT14

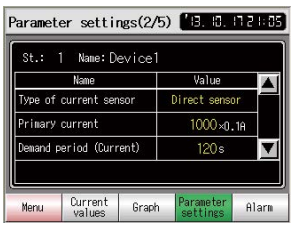
Main Screen



Graph Screen



Parameters Settings Screen



Current Value Screen

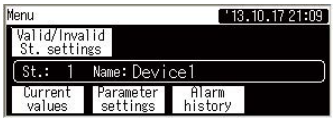


Alarm Screen

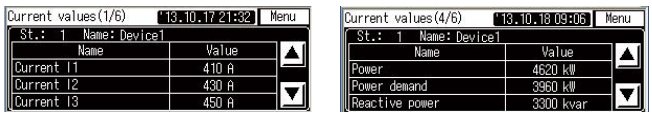


■GT10

Main Screen



Current Values Monitor Screen

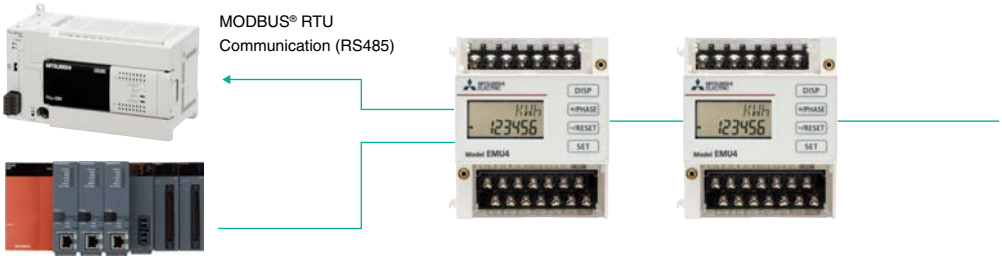


6 Connection to PLC System

■Energy Management with PLC

For customers who want to capture energy information in the PLC system, and manage production information and other types of data in an integrated manner.
Available uses include preventive equipment maintenance by using energy amount measurement and real-time measurement of each piece of production equipment, and linking of quality control indicators with production information.

●MODBUS® RTU (RS485) Communication Connection*



*In order to connect with a PLC, a module that is compatible with MODBUS® RTU (RS485) communication is required.

●CC-Link Communication Connection*



*In order to connect with a PLC, a unit that is compatible with CC-Link communication is required.

7 Connection to EcoWebServerⅢ System

■EcoWebServerⅢ

EcoWebServerⅢ (Energy-Saving Data Collecting Server) and CC-Link Communication Unit Application

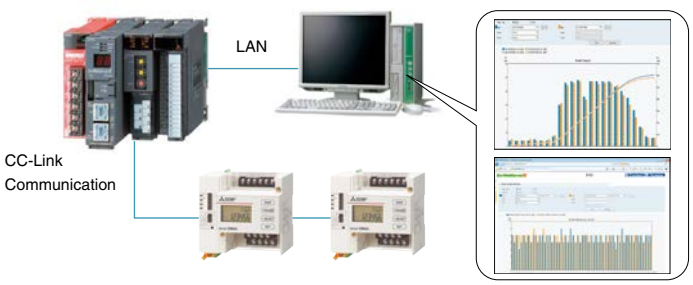
Adding a communication unit to an already installed energy measuring unit allows you to use the EcoWebServerⅢ system to visualize energy and perform simple analysis of measurement data.

What is EcoWebServerⅢ?

EcoWebServerⅢ is a device that collects the data of various measurement terminals using CC-Link communication network, and displays graphs of measurement data (such as power, current and voltage) and current value data in a Web browser.

Features of EcoWebServerⅢ

(1)Reduces unnecessary labor and cost by collecting energy information from various measurement terminals, and storing and visualizing data without the need for programming.
(2)Measurement data can be viewed in graphs of zoom (1 minute and 5 minutes), daily, monthly and annual formats.
(3)Production information can be captured to display specific consumption rate graphs.



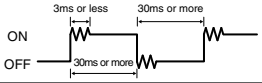
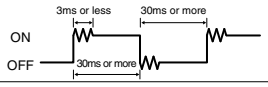


EcoWebServerⅢ
(Energy-Saving Data Collecting Server) Catalog

Specifications

Energy Measuring Unit

General Specifications

Item			Specification	
Model			EMU4-HD1-MB	EMU4-BD1-MB
Phase wire system			Single-phase 2-wire, single-phase 3-wire and three-phase 3-wire (Settings switching)	Single-phase 2-wire, single-phase 3-wire and three-phase 3-wire (Settings switching)
Instrument ratings	Voltage circuit	Single-phase 2-wire Single-phase 3-wire	110V, 220V, 440VAC Common (*2)	110V, 220VAC Common (*1)
		3-phase 3-wire	110VAC(between wires 1 and 2, and 2 and 3), 220VAC (between wires 1 and 3)	
		3-phase 4-wire	Min.: 63.5V/110VAC , Max.: 277V/480VAC (*3)	–
	Current circuit		50A, 100A, 250A, 400A, 600A AC (Dedicated split current sensor is used. All values indicate primary current values of current sensor.) 5AAC (Dedicated 5A current sensor is used. A transformer (CT) is used in two-step configuration together with the 5A current sensor in order to allow a maximum primary current value setting of 6,000A.) (*4)	
	Frequency		50Hz to 60Hz (Automatic frequency selection)	
Auxiliary power rating			100V-240VAC (+10%, -15%) 50Hz/60Hz	
No. of measurement circuits			1	
Consumption VA		Voltage circuit	For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)	
		Auxiliary power circuit	110VAC : 9VA 220VAC : 10VA	
Measured items			Current, demanded current, voltage, power, demanded power, reactive power, power factor, frequency, electric energy (consumption, regenerative), reactive electric energy and operating time	
			Apparent power, harmonic current, harmonic voltage, pulse count value, periodic electric energy and CO_2 conversion value	–
Main unit tolerances (*5)			Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input) Power factor: ±3.0% Electric energy: ±2.0% (in 5 to 100% range of rated values; Power factor = 1) Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; Power factor = 0) Harmonic current, harmonic voltage: ±2.5%	
Data update cycle			250ms *Electric energy and reactive electric energy are always sampled (following short-cycle load fluctuation also).	
Demand time limit setting			0sec, 10sec, 20sec, 30sec, 40sec, 50sec, 1-15min. (per 1min.), 20min, 25min and 30min.	
External input specifications	Input signal format		Non-voltage a contact, 1input (Select from the below functions)	–
	Functions		Set to pulse input: Pulse count (0 to 999,999count)	–
			Set to contact input: Contact monitoring only During contact monitoring + Electric energy measurement during operation (contact on)	–
	Insulation type		Photocoupler insulation	–
	Rated input voltage/current		Use a voltage/current that is appropriate for this switching due to the 5VDC/7mA current that flows in the contacts.	–
	Input conditions	Pulse	Pulse-on time: 30ms or more Pulse-off time: 30ms or more Chattering time: 3ms or less 	–
		Contacts	Contact on time: 30ms or more Contact off time: 30ms or more Chattering time: 3ms or less 	–
External output specifications	Output signal type		Non-voltage a contact, 1output (Select from the below functions)	–
	Functions		Monitoring of current demand upper limit Monitoring of current demand lower limit Monitoring of voltage upper limit Monitoring of voltage lower limit Monitoring of power demand upper limit Monitoring of power demand lower limit Monitoring of power factor upper limit Monitoring of power factor lower limit Monitoring of pulse count upper limit Automatic reset/Self-retention can be selected	–
	Insulation type		Semiconductor relay insulation	–
	Rated switching voltage/current		35VDC, 75mA 24VAC, 75mA (Power factor = 1)	–
Pulse Output Specifications	Output item		Electric energy	–
	Output signal type		Non-voltage a contact, 1output •Pulse units (kWh/pulse): 0.001, 0.01, 0.1, 1, 10, 100 Refer to the operation manual of a main unit for the details of a pulse setup.	–
	Insulation type		Semiconductor relay insulation	–
	Rated switching voltage/current		35VDC, 75mA 24VAC, 75mA (Power factor = 1)	–
	Output pulse width		0.1 to 0.15s	–
Power interruption backup	Recorded items		Set values, electric energy (consumption, regenerative), reactive electric energy, periodic electric energy, pulse count value and operating time (Stored in the nonvolatile memory)	

Item			Specification	
Model			EMU4-HD1-MB	EMU4-BD1-MB
Compatible standards			EMC:EN-61326-1:2006 Safety:EN-61010-1:2010	
Operating environment		Operating temperature range	-5℃ to +55℃ (average daily temperature of 35℃ or less)	
		Operating humidity range	30% to 85% (no condensation)	
		Storage temperature range	-10℃ to +60℃	
		Altitude	2,000m or less	
Commercial-frequency withstand voltage			Applies to all terminals (excluding communication and frame GND terminals), between external boards: 2,000VAC for 1min.	
			Applies to all current/voltage inputs, between auxiliary powers: 2,000VAC for 1min.	
			Applies to all current/voltage inputs and auxiliary power terminals, between all digital/pulse input, pulse/alarm output and communication terminals: 2,000VAC for 1min.	
Insulation resistance			In the same locations described above: 10MΩ or more (500VDC)	
Compatible wiring	Auxiliary power/Voltage input terminal		AWG24-14 (Single/Stranded wire) (Single wire: ϕ0.41 to ϕ1.62mm, Stranded wire: 0.13 to 2.0mm^2)	AWG24-16 (Single/Stranded wire) (Single wire: ϕ0.52 to ϕ1.29mm, Stranded wire: 0.21 to 1.3mm^2)
	Current input and input/output terminal		AWG22-14 (Single/Stranded wire) (Single wire: ϕ0.65 to ϕ1.62mm; Stranded wire: 0.35 to 2.0mm^2)	
Tightening torque	Auxiliary power/Voltage input terminal screw		0.8 to 1.0N•m	0.8N•m
	Current input and input/output terminal screw		0.5 to 0.6N•m	
	Board installation screw		0.63N•m	
Weight			0.3kg	0.2kg
External dimensions (units: mm)			75(W)×90(H)×75(D)(Excluding protruding parts)	

*1: 110V and 220V can be connected directly. An externally mounted voltage transformer (VT) is needed for voltages greater than those (primary voltage of up to a maximum of 6,600V).
*2: 110V, 220V and 440V can be connected directly. An externally mounted voltage transformer (VT) is needed for voltages greater than those (primary voltage of up to a maximum of 6,600V).
*3: 63.5V / 110V - 277V / 480V can be connected directly. An externally mounted voltage transformer (VT) is needed for voltages greater than those (primary voltage of up to a maximum of 6,600V).
*4: The settable primary current when using a 5A current sensor is as follows:
5A, 6A, 7.5A, 8A, 10A, 12A, 15A, 20A, 25A, 30A, 40A, 50A, 60A, 75A, 80A, 100A, 120A, 150A, 200A, 250A, 300A, 400A, 500A, 600A, 750A, 800A, 1000A, 1200A, 1500A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A, 6000A
(The CT primary side can be freely specified up to 6,000A. However, the CT secondary side is fixed at 5A.)
*5: Refer to “Specifications: Options (Split Current and 5A Current Sensors)” on page 939 for the current sensor error ratios.

Specifications of MODBUS®RTU Communication

Item	Specification
Physical interface	RS485 2wires half duplex
Communication protocol	MODBUS® RTU mode
Transmission method	Asynchronous
Transmission wiring type	Multi-drop bus (either directly on the trunk cable, forming a daisy-chain)
Baud rate	2400, 4800, 9600, 19200, 38400bps (default: 19,200bps)
Data bit	8
Stop bit	1,2 (default: 1)
Parity bit	ODD, EVEN, NONE (default:EVEN)
Slave address	1 to 255 (FFh) (default: 1) 0: Broadcast
Response time	1s or shorter from completion of receiving query data to response transmission
Terminating resistor	120Ω 1/2W
Transmission distance	1,200m
Maximum connectable devices	31devices
Recommended cable	SPEV(SB)-MPC-0.2×3P (Mitsubishi cable industries)

Logging Unit

General Specifications

Item		Specification
Model		EMU4-LM
Auxiliary power rating		6.4VDC (Power supplied from energy measuring unit)
Power interruption backup		Total power interruption backup time of the lithium battery (EMU4-BT) is one year (avg. daily temp. of 35°C or less); Mitsubishi Electric recommends replacing the battery every three years.
	Set values	Saved in FRAM (non-volatile memory) *Data is not deleted if there is a power outage.
	Logging data System log data	Saved in SRAM (volatile memory) *Data is deleted if there is a power outage when the battery voltage is low (BAT.LED lights up).
	Timer operation	*Timer operation is initialized if there is a power outage when the battery voltage is low (BAT.LED lights up). After the power is recovered, timer operation starts from the time of 2013/01/01 00:00:00.
Clock accuracy		1min./Month difference
Output data storage media (*1)		SD memory card (SD, SDHC)
Compatible model		Energy measuring unit (EcoMonitorLight) EMU4-BD1-MB, EMU4-HD1-MB
Compatible standard		EMC:EN-61326-1:2006
Operating environment	Operating temperature range	-5°C to +55°C (daily average temperature of 35°C or less)
	Operating humidity range	30% to 85%RH (no condensation)
	Storage temperature range	-10℃ to +60℃
	Altitude	2,000m or less
Weight		0.1kg *Weight of the logging unit only.
Dimensions (units: mm)		25(W) x 99(H) x 60(D) *Dimensions of the logging module only.
Expected product life		10years (Under operating environment conditions)
Parts sold separately		SD memory card (EMU4-SD2GB) (*1)
Consumables sold separately		Lithium battery for logging unit (EMU4-BT) (*2)

*1: Please contact local sales representative.
*2: The lithium battery for logging units is attached at the one time of logging unit purchase.

Logging Specifications

Item		Specification
Logging mode	Automatic refresh	Automatic overwrite/refresh
	Date/Time designation	Automatic start based on start time setting
Logging data type	Detailed data	Measurement data is memorized according to the specified “Detailed Data Logging Cycle” (1sec., and 1, 5, 10, 15 and 30-minute cycles)* Output as a detailed data file.
	1-hour data	Measurement data is memorized in 1-hour cycles. *Output as 1-hour and 1-day data files.
Amount of logging element	Detailed data	Detailed data logging cycle: 1sec. → Max. of 4elements Detailed data logging cycle: Other than 1sec. → Max. of 10elements
	1-hour data	Max. of 10elements
Internal memory logging period	Detailed data	Detailed data logging cycle: 1sec. → 20hours Detailed data logging cycle: 1min. → 20days Detailed data logging cycle: 5min. → 100days Detailed data logging cycle: 10min. → 200days Detailed data logging cycle: 15min. → 300days Detailed data logging cycle: 30min. → 600days
	1-hour data	620days (approx. 20months)
SD memory card (2GB) Logging period (*4)		Detailed data logging cycle: 1sec. →10months Detailed data logging cycle: 1, 5, 10, 15 and 30-min. → 10years or more
System log data		3,600records
Output format of logging and system log data		CSV format (ASCII code)

*4: The period indicated is that until the capacity of a 2GB SD memory card is exceeded when it is constantly connected. The data amount varies depending on the amount of characters.
The logging period indicates output at maximum capacity.

CC-Link Communication Unit

Basic Specifications

Item		Specification
Model		EMU4-CM-C
Auxiliary power rating		6.4VDC (6.4VDC Power supplied from energy measurement unit)
Compatible model		Energy measuring unit (EcoMonitorLight) EMU4-HD1-MB, EMU4-BD1-MB
Compatible standard		EMC EN-61326-1:2006
Operating environment	Operating temperature range	-5°C to +55°C (daily average temperature of 35°C or less)
	Operating humidity range	30% to 85%RH (no condensation)
	Storage temperature range	-10°C to +60°C
	Altitude	2,000m or less
Weight		0.1kg *Weight of the CC-Link communication unit main unit only.
Dimensions (units: mm)		25(W)×99(H)×60(D)
Expected product life		10years (Under operating environment conditions)

CC-Link Communication Specifications

Item	Specification
Number of Occupied Station	1Station Remote device station (I/o)data and word data can be transmitted
CC-Link Ver 1.10 Ver. 2.00 (Set by Version change switch)	Ver. 1.10, Ver. 2.00 (Set by version change switch)
Remote Station Number (Station Number)	1 to 64
Baud Rate	156K, 625K, 2.5M, 5M, and 10Mbps (Changes according to setting) (The interstation cable length and maximum total cable extension distance vary according to the transmission speed.) *100m (10M) to 1,200m (156k)
Max.connected device	A maximum of 42units can be connected if configured using only this module.
Cable terminating resistance	Use a specified cable for CC-Link communication connection. Resistance values for terminating resistance are different according to the type of specialized cable used.

Optional Parts

Split-type Current Sensor

Item	Specifications					
Model	EMU-CT50-A	EMU-CT100-A	EMU-CT250-A	EMU-CT400-A	EMU-CT600-A	EMU-CT5-A
Rated primary current	50AAC	100AAC	250AAC	400AAC	600AAC	5AAC
Rated secondary current	16.66mA	33.33mA	66.66mA	66.66mA	66.66mA	1.66mA
Maximum operating voltage	260VAC	500VAC	300VAC	460VAC	460VAC	460VAC
Measurement category	–			Ⅲ		–
Degree of contamination	–			2		–
Operating temperature range	-10 to +55°C (ave. daily temp. of 35°C or lower)					
Operating humidity range	25% to 95%RH (no condensation)					30% to 85%RH (no condensation)
CE marking compatible standard	–			EN61010-2-32		–
Maximum voltage compatible with CE marking	–			460V		–
Weight (1unit)	0.1kg	0.1kg	0.2kg	0.3kg	0.4kg	0.05kg

Split-type Current Sensor

Item	Specifications		
Model	EMU-CT50	EMU-CT100	EMU-CT250
Rated primary current	50AAC	100AAC	250AAC
Rated secondary current	16.66mA	33.33mA	66.66mA
Rated load	0.1VA		
Maximum use voltage	460VAC		
Ratio error	±1% (5 to 100% of rating, RL ≤ 10Ω)		
Phase difference variation	±30 min. (5 to 100% of rating, RL ≤ 10Ω)		
Measurement category	Ⅲ		
Degree of contamination	2		
Operating temperature range	-5 °C to +55 °C (daily average temperature of 35°C or less)		
Operating humidity range	5% to 95% RH (no condensation)		
CE marking compatible standard	EN61010-2-32		
Maximum voltage compatible with CE marking	460VAC		
Weight (1unit)	0.1kg		0.7kg

5A Current Sensor

Item	Specifications
Model	EMU2-CT5, EMU2-CT5-4W
Rated primary current	5AAC
Rated secondary current	1.66mA
Rated load	0.1VA
Maximum use voltage	260VAC
Ratio error	±1% (5 to 100% of rating)
Phase difference variation	±30min. (5 to 100% of rating, RL ≤ 10Ω)
Measurement category	Ⅲ
Degree of contamination	2
Operating temperature range	-5°C to +55°C (daily average temperature of 35°C or less)
Operating humidity range	5% to 95%RH (no condensation)
CE marking compatible standard	EN61010-2-32
Maximum voltage compatible with CE marking	260VAC
Weight (1unit)	0.1kg

SD Memory Card for Logging unit

Item	Specifications
Model	EMU4-SD2GB
Memory capacity	2GB
Weight	2g

Lithium battery for logging unit

Item	Specifications
Model	EMU4-BT
Type	Manganese dioxide lithium battery
Nominal voltage	3V
Capacity	220mAh
Weight	9g

*It is attached at the one time of logging unit purchase.

Software

Data Acquisition Software (EMU4-SW1)

Item		Specifications
Recommended system environment	Operating System	•Microsoft Windows 7 Professional(32bit or 64bit)SP1 •Microsoft Windows Vista Ultimate 32bit SP2 •Microsoft Windows XP Professional 32bit SP3
	Microsoft. NET Framework	•Microsoft. NET Framework 2.0 (Required)
	Microsoft Excel	•Microsoft Excel 2003 SP3/2007 SP3/2010 SP1
Basic specifications	Max. amount of connections	31units (Maximum connected units of MODBUS® RTU communication)
	Languages	Japanese, English
Data collection functions	Periodic collection	Data is collected and logged in 1-min. or 1-hour cycles. (Operated in background by the OS task scheduler.)
	Current value display	Constant communication is performed to display current values (Cannot be displayed during periodic collection.)
	Max. amount of collection points	124items
Setting functions	Communication settings	MODBUS® RTU communication settings (such as baud rate, stop bit length and parity bit)
	Terminal registration	Register the terminal performing data collection
	Terminal settings	Terminal settings functions (such as phase wire, rated current and rated voltage)
	Measured items registration	Measured items of collected data are registered.
	Export/Import	Set values of communication, terminals and measured items are saved in or read out from a file.
Report output	Output format	Paste aggregate data in an Excel template file. (Excel template files can be freely edited.)
	Output types	Monthly, daily and detailed (1-min intervals)

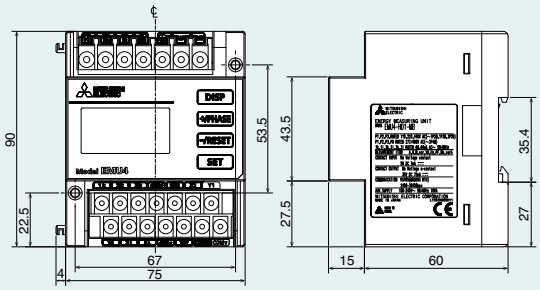
* Data Acquisition Software (EMU4-SW1) carries out gratis download, and gets from the “design supportive tool data” of the Mitsubishi Electric web site (http://www.MitsubishiElectric.co.jp/haisei/lvs/) energy-saving supporting aircraft machine menu.

External View

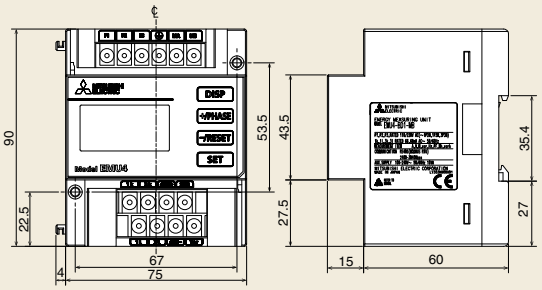
Energy Measuring Unit

Units (mm)

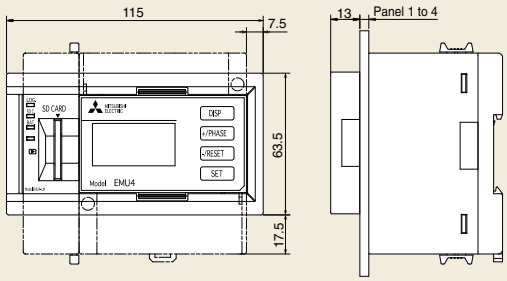
●[High Performance Model] EMU4-HD1-MB



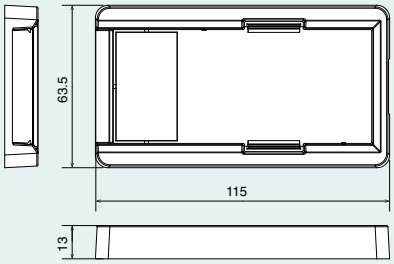
●[Standard Model] EMU4-BD1-MB



●Panel Mounting Attachment (EMU4-PAT) when Installed



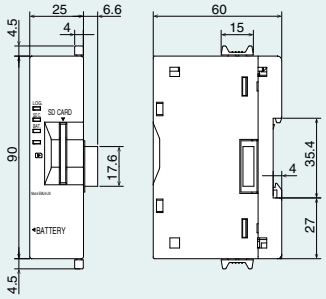
●Panel Mounting Attachment (EMU4-PAT)



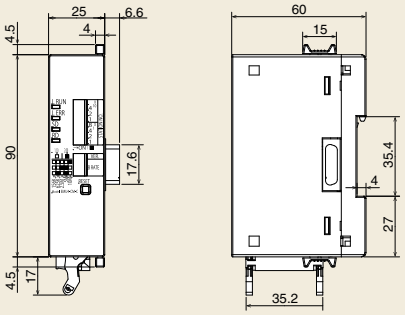
Logging/Communication Unit

Units (mm)

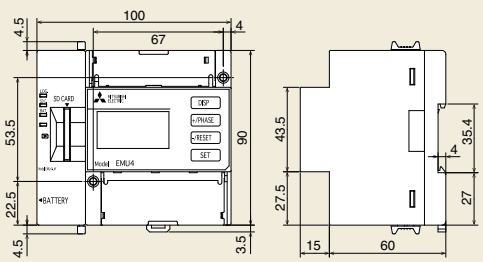
●Logging Unit
(EMU4-LM)



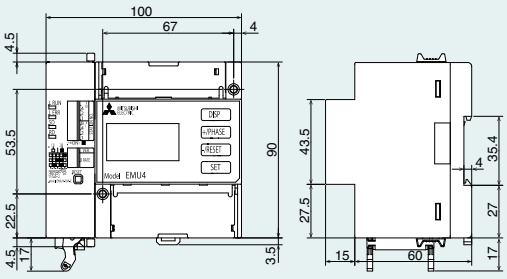
●CC-Link Communication Unit
(EMU4-CM-C)



●Energy Measuring Unit + Logging Unit



●Energy Measuring Unit + CC-Link Communication Unit

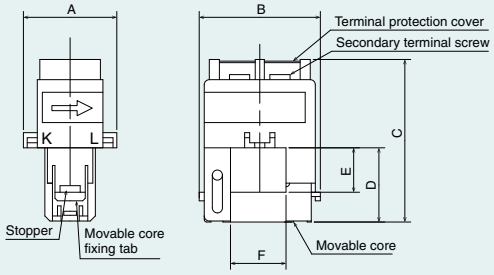


Optional Parts

Units (mm)

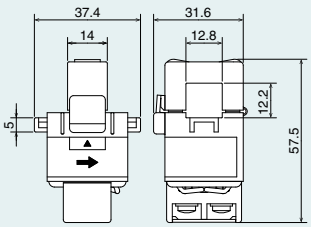
●Split-type Current Sensor

Split-type Current Sensor EMU-CT50, EMU-CT100, EMU-CT250

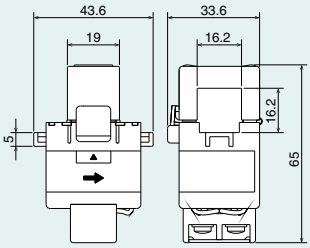


Model	A	B	C	D	E	F
EMU-CT50/CT100	31.5	39.6	55.2	25.7	15.2	18.8
EMU-CT250	36.5	44.8	66.0	32.5	22.0	24.0

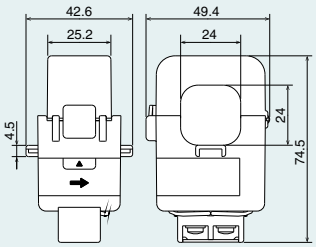
Split-type Current Sensor EMU-CT5-A, EMU-CT50-A



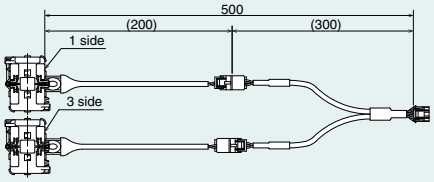
Split-type Current Sensor EMU-CT100-A



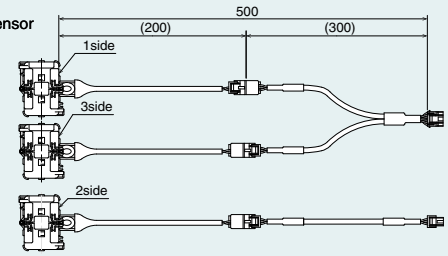
Split-type Current Sensor EMU-CT250-A



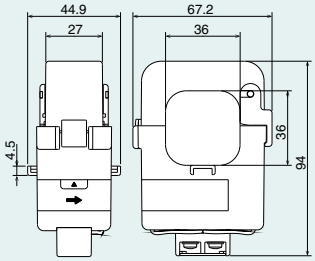
5A Split-type Current Sensor



5A Split-type Current Sensor

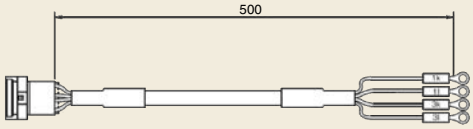


Split-type Current Sensor EMU-CT400-A, EMU-CT600-A

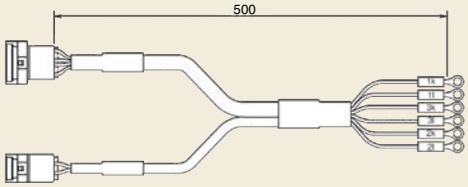


●Current Sensor Cable

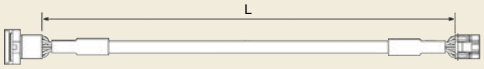
5A Split-type Current Sensor Cable EMU2-CB-Q5B



5A Split-type Current Sensor EMU2-CB-Q5B-4W

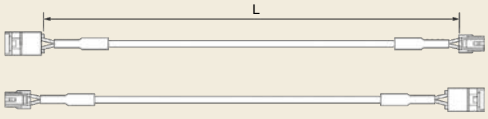


5A Split-type Current Sensor Extension Cable (Standard Type) EMU2-CB-T**M



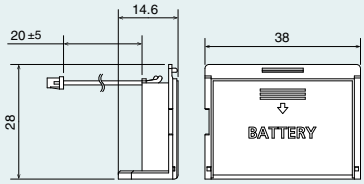
Model	EMU2-CB-T1M	EMU2-CB-T5M	EMU2-CB-T10M
L dimension	1m	5m	10m

5A Split-type Current Sensor Extension Cable (Separate Type) EMU2-CB-T**M

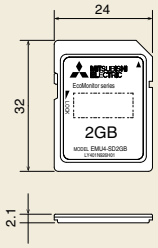


Model	EMU2-CB-T1MS	EMU2-CB-T5MS	EMU2-CB-T10MS
L dimension	1m	5m	10m

●Logging Unit Lithium Battery



●Logging Unit SD Memory Card

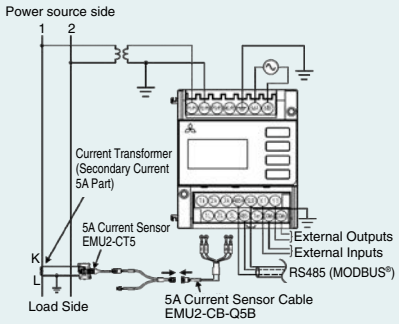


Configurations

Connection Configurations

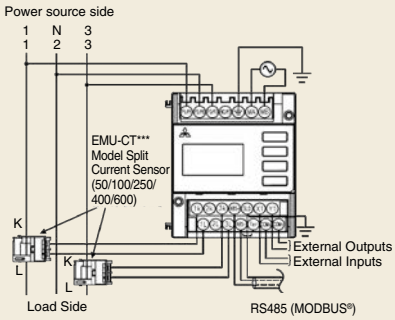
For EMU4-HD1-MB

●1P2W (For high-voltage circuit)



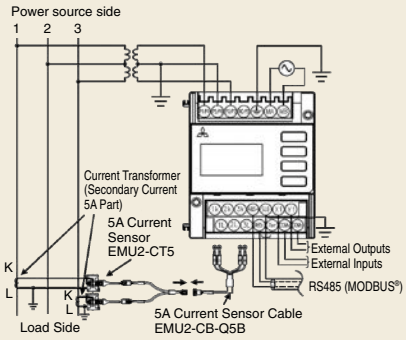
Name	Model	Amount
EcoMonitorLight [High Performance Model]	EMU4-HD1-MB	1
Split-type Current Sensor	EMU2-CT5	1
5A Current Sensor Cable	EMU2-CB-Q5B	1

●1P3W/3P3W (For low-voltage circuit)



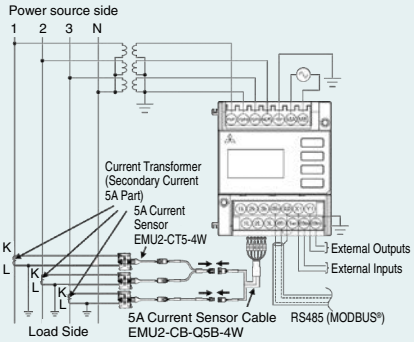
Name	Model	Amount
EcoMonitorLight [High Performance Model]	EMU4-HD1-MB	1
Split-type Current Sensor	EMU-CT***(50/100/250) EMU-CT***-A(50/100/250/400/600)	2

●3P3W (For high-voltage circuit)



Name	Model	Amount
EcoMonitorLight [High Performance Model]	EMU4-HD1-MB	1
Split-type Current Sensor	EMU2-CT5	1
5A Current Sensor Cable	EMU2-CB-Q5B	1

●3P4W (For high-voltage circuit)

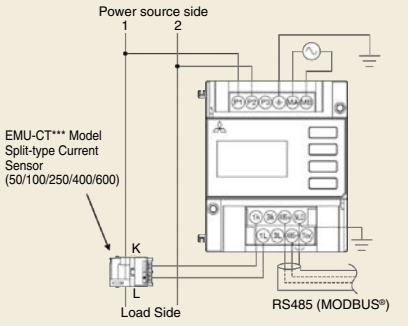


Name	Model	Amount
EcoMonitorLight [High Performance Model]	EMU4-HD1-MB	1
Split-type Current Sensor	EMU2-CT5-4W	1
5A Current Sensor Cable	EMU2-CB-Q5B-4W	1

Note:
- ●The cable (electrical wire) for between EMU-CT*** and the Split-type Current Sensor is provided by the customer.
- ●If installing to a low-voltage (600 V or less) circuit, it is not necessary to connect the secondary electrical circuit of the voltage transformer to ground.

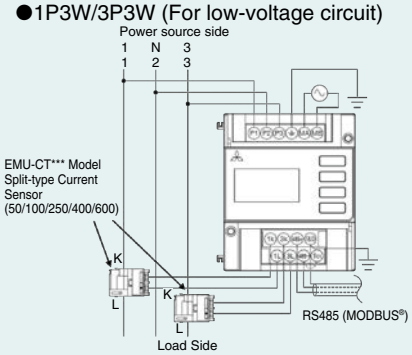
For EMU4-BD1-MB

●1P2W (For low-voltage circuit)



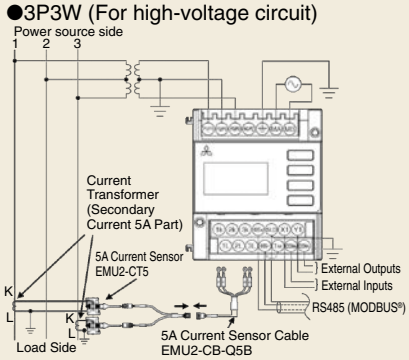
Name	Model	Amount
EcoMonitorLight [Standard Model]	EMU4-BD1-MB	1
Split-type Current Sensor	EMU-CT***(50/100/250) EMU-CT***-A(50/100/250/400/600)	1

●1P3W/3P3W (For low-voltage circuit)



Name	Model	Amount
EcoMonitorLight [Standard Model]	EMU4-BD1-MB	1
Split-type Current Sensor	EMU-CT***(50/100/250) EMU-CT***-A(50/100/250/400/600)	2

●3P3W (For high-voltage circuit)



Name	Model	Amount
EcoMonitorLight [Standard Model]	EMU4-BD1-MB	1
Split-type Current Sensor	EMU2-CT5	1
5A Current Sensor Cable	EMU2-CB-Q5B	1

Product Lineup

Energy Measuring Unit

EcoMonitorPlus

Three types of basic measuring unit*1 are available.
You can select the most suitable model according to the application.

*1: Basic unit cannot be used as an extension unit.



EMU4-BM1-MB

Energy Measuring Standard Model

Suitable for visualization of "energy" in a simple way!



EMU4-HM1-MB

Energy Measuring High Performance Model

In addition to the functions of the Standard Model, this model comes with additional functions for the measurement of 3-phase 4-wire and pulse count.



EMU4-LG1-MB

Insulation Monitor Model

Capable of Measuring Leakage Current.

Energy Measuring Unit (Extension Unit*1*2)

Two types of extension energy measuring unit are available.
You can select the most suitable model according to your need, such as measurement of same voltage or measurement of different voltages.

*1: Up to three extension units can be connected.
*2: Each extension unit can measure two circuits, but the circuits must be of the same voltage system. Different voltage system cannot be measured.



EMU4-VA2



EMU4-A2

Optional Units*1

*1: One basic unit can be connected with one optional unit.



EMU4-LM

For customers who want to easily manage data using SD memory cards!



EMU4-CM-C

For CC-Link communication

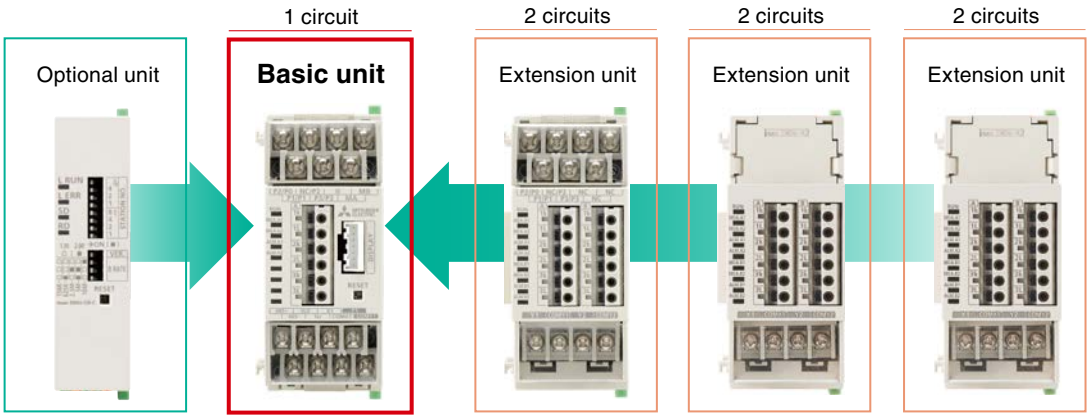
Features

Want to expand the energy-saving system in phases!

You can start measurement at locations where you want to achieve energy saving.
Expanding the system by adding more units as the number of measurement circuits increases.

Maximum

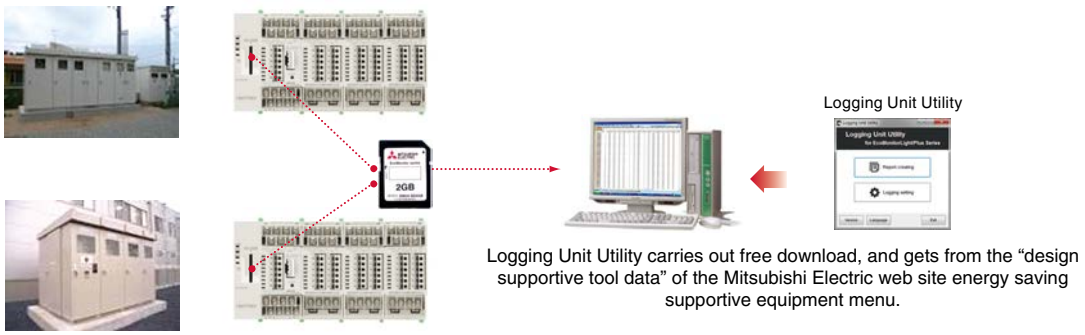
Number of measurement circuits
14 circuits (Singie-phase 2-wire)
7 circuits (Single-phase 3-wire,three-phase 3-wire,three-phase 4wire)



Basic unit cannot be used as an extension unit.
Up to three optional units can be connected.
On basic unit can be connected with only one optional unit.

Want to create reports and graphs for simplified management of measurement data!

Using the logging unit, you can collect data without a host application program such as a PC-based application.
Documentation software (Logging Unit Utility) enables easy creation of reports and graphs.

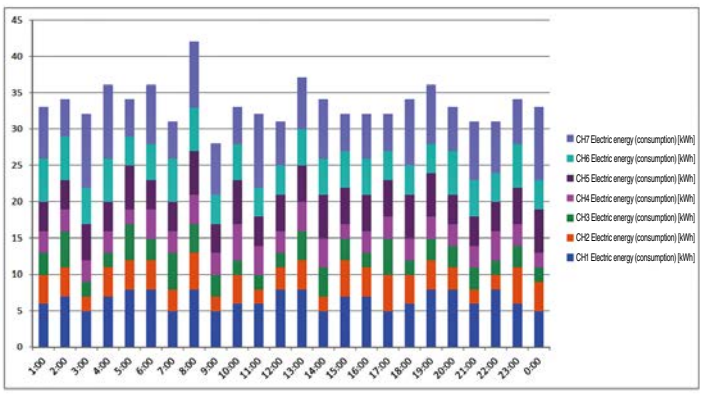


Logging Unit Utility carries out free download, and gets from the “design supportive tool data” of the Mitsubishi Electric web site energy saving supportive equipment menu.

Sample of report

2015/4/20

Time	CH1 Electric energy (consumption) [kWh]	CH2 Electric energy (consumption) [kWh]	CH3 Electric energy (consumption) [kWh]	CH4 Electric energy (consumption) [kWh]	CH5 Electric energy (consumption) [kWh]	CH6 Electric energy (consumption) [kWh]	CH7 Electric energy (consumption) [kWh]
1:00	6	4	3	3	4	6	7
2:00	7	4	5	3	4	6	5
3:00	5	2	2	3	5	5	10
4:00	7	4	2	3	4	6	10
5:00	8	4	5	2	6	4	5
6:00	8	4	3	4	4	5	8
7:00	5	3	5	3	4	6	5
8:00	8	5	4	4	6	6	9
9:00	3	2	3	3	4	4	7
10:00	6	4	2	5	6	5	5
11:00	6	2	2	4	4	4	10
12:00	8	3	2	3	5	4	6
13:00	8	4	4	4	5	5	7
14:00	5	2	4	4	6	5	8
15:00	7	5	3	2	5	5	5
16:00	7	4	2	3	5	5	6
17:00	5	5	5	3	5	4	5
18:00	6	4	2	3	6	4	9
19:00	8	4	3	3	6	4	8
20:00	8	3	3	3	4	6	6
21:00	6	2	3	3	4	5	8
22:00	8	2	2	4	4	4	7
23:00	6	5	3	3	5	6	6
0:00	5	4	2	2	6	4	10
Daily total	158	85	74	77	117	118	172
Daily maximum	8	5	5	5	6	6	10
Daily minimum	3	2	2	2	4	4	5
Daily average	6.6	3.5	3.1	3.2	4.9	4.9	7.2



Want to use the EcoMonitorPlus for purposes other than energy saving!

Measurement of leakage current

①Capable of measuring even extremely low levels of leakage current.

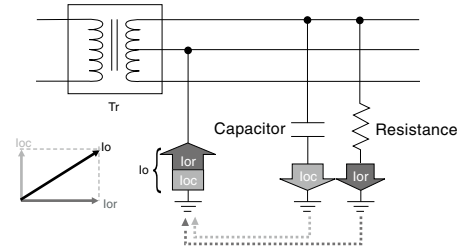
Insulation monitor unit (EMU4-LG1-MB)Leakage current resolution: 0.01mA

⇒Capable of measuring leakage current in equipment groups, such as motors.

②Monitoring of equipment insulation degradation using Ior system

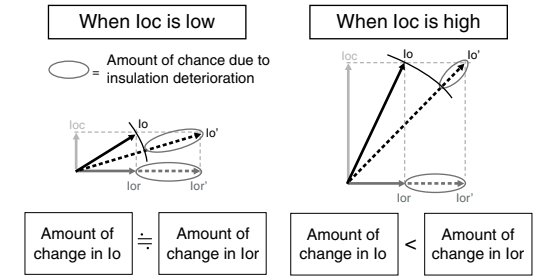
Since leakage current (Io) is affected by the Ioc of the whole equipment, the Ior measurement is effective for insulation deterioration diagnosis.

■Method of leakage current measurement(Io and Ior measurements)



Ior : Leakage current (resistive leakage current) which flows due to degraded insulation
Ioc: Leakage current (leakage current from electrostatic capacity) which flows even if the insulation condition is sound
Io : Composite leakage current of Ior and Ioc (composition of vectors)

Ioc fluctuates on equipment with long wiring distance or inverter devices and filters.



■Zero-phase Current converter

Product name	Model	External view
Split-type zero-phase current converter	CZ-22S	
	CZ-30S	
	CZ-55S	
	CZ-77S	
	CZ-112S	
Through-type zero-phase current converter	ZT15B	
	ZT30B	
	ZT40B	
	ZT60B	
	ZT80B	
	ZT100B	
Zero-phase current transformer with primary conductor	ZTA600A	* See the external view.
	ZTA1200A	
	ZTA2000A	

■Compact Display Unit

Product name	Model	External view
Compact display unit	EMU4-D65	
Compact display unit connecting cable	EMU2-CB1-DP	
Compact display unit power cable	EMU4-CB-DPS	

*1: Commercially available DC power supply units are required for the connection of multiple EMU4-D65 units.
Compatible product: Cosel PBA15F-9-N1.
*2: Compact display unit connecting cables are required for the connection of multiple display units.
*3: Up to seven compact display units can be connected.

Specifications

Energy Measuring Unit

Basic Unit

Item			Specification		
Model			Energy Measuring Standard Model EMU4-BM1-MB	Energy Measuring High Performance Model EMU4-HM1-MB	Insulation Monitor Model EMU4-LG1-MB
Phase wire system			Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire common	Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire/ three-phase 4-wire common	Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire/ three-phase 4-wire common
Instrument ratings	Voltage circuit	Single-phase 2-wire/ 3-phase 3-wire	110V, 220VAC common (*1)	110V, 220V, 440VAC common (*2)	110V, 220V, 440VAC common (*2)
		Single-phase 3-wire	110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3)	110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3) 220VAC (between wires 1 and 2, and wires 2 and 3), 440VAC (between wires 1 and 3)	110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3) 220VAC (between wires 1 and 2, and wires 2 and 3), 440VAC (between wires 1 and 3)
		3-phase 4-wire	–	Minimum: 63.5V/110VAC, Maximum: 277V/480VAC (*3)	
	Current circuit		50A, 100A, 250A, 400A, 600A (Dedicated split-type current sensor is used. All values indicate primary current values of current sensor.) 5A (Dedicated 5A current sensor is used. Current transformer (CT) is used in two-step configuration together with the 5A current sensor in order to allow a maximum primary current value setting of 30,000A) (*4)		1A (Mitsubishi ZCT is used. Primary current value of ZCT is indicated.)
	Frequency		50/60Hz (automatic frequency selection)		
Auxiliary power rating			100V – 240VAC (+10%, -15%) 50/60Hz		
No. of measurement circuits			1circuit	1circuit	1circuit
Consumption VA	Voltage circuit		For each phase: 0.1VA (110VAC), 0.2VA (220VAC)	For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)	For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)
	Current circuit		For each phase: 0.1VA (current sensor primary side)		
	Auxiliary power circuit (*10)		110VAC:2.0VA AC220V:3.0VA		
Measurement items			Current, demanded current, voltage, power, demanded power, reactive power, power factor, frequency, electric energy (regenerative, consumption), reactive electric energy (*7), current imbalance rate, voltage imbalance rate, operating time		–
			–	Apparent power, periodic electric energy, harmonic current, harmonic voltage, pulse count value, pulse conversion value, electric energy conversion value	Leakage current, demanded leakage current, resistance leakage current (*8), demanded resistance leakage current (*8), resistance leakage current difference conversion value (*8)
Main unit tolerances (*5)			Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input) Power factor: ±3.0% Electric energy: ±2.0%(in 5 to 100% range of rated values; power factor = 1) Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; power factor = 0)	Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input) Power factor: ±3.0% Electric energy: ±2.0%(in 5 to 100% range of rated values; power factor = 1) Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; power factor = 0) Harmonic current, harmonic voltage: ±2.5%	Low sensitivity mode Leakage current Io, resistive leakage current Ior: ±2.5% (relative to 10 to 100% of rating) Leakage current Io, resistive leakage current Ior: ±2.5mA (relative to 10% of rating or lower) High sensitivity mode Leakage current Io, resistive leakage current Ior: ±2.5mA
Data update cycle			100msec		Leakage current: 2sec, resistive leakage current: 2sec
External input specification	Input signal format		–	Non-voltage a contact, 1 input (Select function from below)	–
	Function		–	Contact/pulse input	–
		Contact input	–	Monitoring of contact and measurement of electric energy during operation (when contact is ON)	–
		Pulse input	–	Counting of input pulse (count: 0 to 999,999)	–
	Rated input voltage/current		–	5VDC, 7mA	–
External output specification	Output signal format		–	Non-voltage a contact, 1 output (Select function from below)	
	Function		–	Alarm/pulse output	Alarm
		Alarm output	–	Contact output of alarm generating status Select monitoring target from below. Monitoring of current demand upper limit, monitoring of current demand lower limit Monitoring of N-phase current demand upper limit Monitoring of line voltage upper limit Monitoring of line voltage lower limit Monitoring of phase voltage upper limit Monitoring of phase voltage lower limit Monitoring of power demand upper limit, monitoring of power demand lower limit Monitoring of power factor upper limit, monitoring of power factor lower limit Monitoring of pulse conversion value upper limit Monitoring of current imbalance rate upper limit Monitoring of voltage imbalance rate upper limit	Contact output of alarm generating status Select monitoring target from below Leakage current first stage alarm Leakage current second stage alarm Resistance leakage current first stage alarm Resistance leakage current second stage alarm Limit alarm of number of first stage alarm occurrences of leakage current Limit alarm of number of second stage alarm occurrences of leakage current Limit alarm of number of first stage alarm occurrences of resistance leakage current Limit alarm of number of second stage alarm occurrences of resistance leakage current
		Plus output	–	Pulse output of electric energy Select pulse unit from below. 0.001/0.01/0.1/1/10/100/1000/10000/100000(kWh/pulse) (*6)	–
	Rated switching voltage/current		–	35VDC 75mA, 24VAC 75mA (Power factor = 1)	
Power interruption backup	Recorded item		Setting values, electric energy (consumption, regenerative), reactive electric energy, periodic electric energy, operating time, pulse count value, pulse conversion value, electric energy conversion value, maximum value, minimum value (Stored in the nonvolatile memory)		•Setting values •Number of alarm occurrences •Maximum value (Stored in the nonvolatile memory)
Compatible standard			EMC: EN-61326-1:2013, Safety: EN-61010-1:2010		
Operating environment	Operating temperature range		-5°Cto +55°C (ave. daily temp. of 35°C or lower)		
	Operating humidity range		30% to 85%RH (no condensation)		
	Storage temperature range		-10°C to +60°C (ave. daily temp. of 35°C or lower)		
	Altitude		2,000 m or lower		
Commercial-frequency withstand voltage			Between all terminals (excluding communication circuit and frame GND terminal) and external casing: 2,000VAC for 1min Between all current/voltage inputs and all auxiliary power terminals: 2,000VAC for 1min		
			Between all current/voltage inputs, auxiliary power terminals and all contact/pulse inputs, pulse/alarm outputs, communication terminals: 2,000VAC for 1min		
Insulation resistance			At the same locations as above: 10 MΩ or more (500VDC)		
Compatible wire	Auxiliary power/voltage input terminal		AWG26-14 (single wire/stranded wires) (Single wire: ϕ0.41 to ϕ1.62mm, Stranded wires: 0.13 to 2.0mm^2)		
	Current input		Single wire: AWG24-17, Stranded wires: AWG20-26 (*9) (Single wire: ϕ0.5 to ϕ1.2mm, Stranded wires: 0.5 to 1.3mm^2)		
	Input/output terminal		–	AWG26-16 (single wire/stranded wires) (Single wire: ϕ0.41 to ϕ1.29mm, Stranded wires: 0.13 to 1.3mm^2)	
Weight			0.2kg		
External dimensions (unit: mm)			37.5 (W) x 90 (H) x 94 (D) mm (excluding protruding parts)		

* 1: 110V and 220V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 11,000V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
* 2: 110V, 220V and 440V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
* 3: 63.5V/110V – 277V/480V can be connected directly. An externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
* 4: The settable primary current when using the 5A current sensor is as follows: 5A, 6A, 7.5A, 8A, 10A, 12A, 15A, 20A, 25A, 30A, 40A, 50A, 60A, 75A, 80A, 100A, 120A, 150A, 200A, 250A, 300A, 400A, 500A, 600A, 750A, 800A, 1000A, 1200A, 1500A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A, 6000A, 7500A, 8000A, 10000A, 12000A, 20000A, 25000A, 30000A(CT primary side can be set freely up to 30,000A. However, CT secondary side is fixed at 5A.)
* 5: Refer to the specifications of options (split-type current sensor, 5A current sensor) on page 939 for the current sensor error rates.
* 6: Refer to the instruction manual for the detail on the setting of pulse unit.
* 7: Measurements are conducted based on a setting other than 2-circuit measurement mode with single-phase 2-wire setting.
* 8: It measures only in the case of Single-phase 2-wire, Single-phase 3-wire, 3-phase 3-wire.
* 9: Recommended bar terminal: Nichihu TGV TC-1.25-11T.
*10: Connected with optional units, it increases AC110V:4.5VA, AC220V:5.0VA. Connected with display units, it increases AC110V:1.5VA, AC220V:2.0VA.

Extension Unit

Item			Specification	
Model			Energy Measuring Extension Unit for Different voltage system EMU4-VA2	Energy Measuring Extension Unit for Same Voltage System EMU4-A2
Phase wire system			Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire/ 3-phase 4-wire common	(Same as the unit connected on the left side)
Instrument ratings	Voltage circuit	Single-phase 2-wire/ 3-phase 3-wire	110V, 220V, 440VAC common (*2)	
		Single-phase 3-wire	110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3) 220VAC (between wires 1 and 2, and wires 2 and 3), 440VAC (between wires 1 and 3)	
		3-phase 4-wire	Minimum: 63.5V/110VAC, Max.: 277V/480VAC (*3)	
	Current circuit		50A, 100A, 250A, 400A, 600A (Dedicated split-type current sensor is used. All values indicate primary current values of current sensor.) 5A (Dedicated 5A current sensor is used. Current transformer (CT) is used in two-step configuration together with the 5A current sensor in order to allow a maximum primary current value setting of 30,000A) (*4)	
	Frequency		50/60Hz (automatic frequency selection)	
Auxiliary power rating			(Same as basic unit)	
No. of measurement circuits			2circuits	2circuits
Consumption VA		Voltage circuit	For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)	–
		Current circuit	For each phase: 0.1VA (current sensor primary side)	
		Auxiliary power circuit (*10)	AC110V:1.0VA AC220VA:1.5VA	
Measurement items			Current, demanded current, voltage, power, demanded power, reactive power, power factor, frequency, electric energy (regenerative, consumption), reactive electric energy (*7), current imbalance rate, voltage imbalance rate, operating time	
			Apparent power, harmonic current, harmonic voltage, electric energy conversion value	
Main unit tolerances (*5)			Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input) Power factor: ±3.0% Electric energy: ±2.0%(in 5 to 100% range of rated values; power factor = 1) Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; power factor = 0) Harmonic current, harmonic voltage: ±2.5%	
Data update cycle			100msec	
External input specification	Input signal format		–	–
	Function		–	–
		Contact input	–	–
		Pulse input	–	–
	Rated input voltage/current		–	–
External output specification	Output signal format		Non-voltage a contact, 1 output (Select function from below)	
	Function		Alarm/pulse output	
		Alarm output	Contact output of alarm generating status Select monitoring target from below. Monitoring of current demand upper limit, monitoring of current demand lower limit Monitoring of N-phase current demand upper limit Monitoring of line voltage upper limit Monitoring of line voltage lower limit Monitoring of phase voltage upper limit Monitoring of phase voltage lower limit Monitoring of power demand upper limit, monitoring of power demand lower limit Monitoring of power factor upper limit, monitoring of power factor lower limit Monitoring of current imbalance rate upper limit Monitoring of voltage imbalance rate upper limit	
		Plus output	Pulse output of electric energy Select pulse unit from below. 0.001/0.01/0.1/1/10/100/1000/10000/100000(kWh/pulse) (*6)	
	Rated switching voltage/current		35VDC 75mA, 24VAC 75mA (Power factor = 1)	
Power interruption backup	Recorded item		Setting values, electric energy (consumption, regenerative), reactive electric energy, periodic electric energy, operating time, pulse count value, pulse conversion value, electric energy conversion value, maximum value, minimum value (Stored in the nonvolatile memory)	
Compatible standard			EMC: EN-61326-1:2013, Safety: EN-61010-1:2010	
Operating environment	Operating temperature range		-5°Cto +55°C (ave. daily temp. of 35°C or lower)	
	Operating humidity range		30% to 85%RH (no condensation)	
	Storage temperature range		-10°C to +60°C (ave. daily temp. of 35°C or lower)	
	Altitude		2,000 m or lower	
Commercial-frequency withstand voltage			Between all terminals (excluding communication circuit and frame GND terminal) and external casing: 2,000VAC for 1min	
			Between all current/voltage inputs and all auxiliary power terminals: 2,000VAC for 1min	
			Between all current/voltage inputs, auxiliary power terminals and all contact/pulse inputs, pulse/alarm outputs, communication terminals: 2,000VAC for 1min	
Insulation resistance			At the same locations as above: 10 MΩ or more (500VDC)	
Compatible wire	Auxiliary power/voltage input terminal		AWG26-14 (single wire/stranded wires) (Single wire: ϕ0.41 to ϕ1.62mm, Stranded wires: 0.13 to 2.0mm^2)	–
	Current input		Single wire: AWG24-17, Stranded wires: AWG20-26 (*9) (Single wire: ϕ0.5 to ϕ1.2mm, Stranded wires: 0.5 to 1.3mm^2)	
	Input/output terminal		AWG26-16 (single wire/stranded wires) (Single wire: ϕ0.41 to ϕ1.29mm, Stranded wires: 0.13 to 1.3mm^2)	
Weight			0.2kg	
External dimensions (unit: mm)			37.5 (W) x 90 (H) x 94 (D) mm (excluding protruding parts)	

*1: 110V and 220V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 11,000V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
*2: 110V, 220V and 440V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
*3: 63.5V/110V – 277V/480V can be connected directly. An externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
*4: The settable primary current when using the 5A current sensor is as follows:
5A, 6A, 7.5A, 8A, 10A, 12A, 15A, 20A, 25A, 30A, 40A, 50A, 60A, 75A, 80A, 100A, 120A, 150A, 200A, 250A, 300A, 400A, 500A, 600A, 750A, 800A, 1000A, 1200A, 1500A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A, 6000A, 7500A, 8000A, 10000A, 12000A, 20000A, 25000A, 30000A(CT primary side can be set freely up to 30,000A. However, CT secondary side is fixed at 5A.)
*5: Refer to the specifications of options (split-type current sensor, 5A current sensor) on page 939 for the current sensor error rates.
*6: Refer to the instruction manual for the detail on the setting of pulse unit.
*7: Measurements are conducted based on a setting other than 2-circuit measurement mode with single-phase 2-wire setting.
*8: It measures only in the case of Single-phase 2-wire, Single-phase 3-wire, 3-phase 3-wire.
*9: Recommended bar terminal: Nichifu TGV TC-1.25-11T.

Split-type Zero-phase Current Transformer

Item	Specification				
Model	CZ-22S	CZ-30S	CZ-55S	CZ-77S	CZ-112S
Hole diameter (mm)	22	30	55	77	112
Allowable current (A)	50	100	300	600	1.000
Weight (kg)	0.5	0.6	1.8	2.8	2.8
Rated short-time current	50kA (peak-to-peak value: 100kA)				

Through-type Zero-phase Current Transformer

Item	Specification					
Model	ZT15B	ZT30B	ZT40B	ZT60B	ZT80B	ZT100B
Hole diameter (mm)	15	30	40	60	80	100
Allowable current	Refer to the following table, "Zero-phase Current transformer (ZCT) inside Diameter, Maximum Through-wire Diameter and Allowable Current."					
Weight (kg)	0.2	0.4	0.6	2.0	2.6	3.3
Rated short-time current	50kA (peak-to-peak value: 100kA)					

Zero-phase Current Transformer with Primary Conductor

Item	Specification		
Model	ZTA600A	ZTA1200A	ZTA2000A
Allowable current (A)	600	1200	2000
Weight (kg)	6.5	11	27
Rated burden	3		
Number of polarities	AC600V		
Rated short-time current	100kA (peak value)		

Zero-phase Current transformer (ZCT) inside Diameter, Maximum Through-wire Diameter and Allowable Current

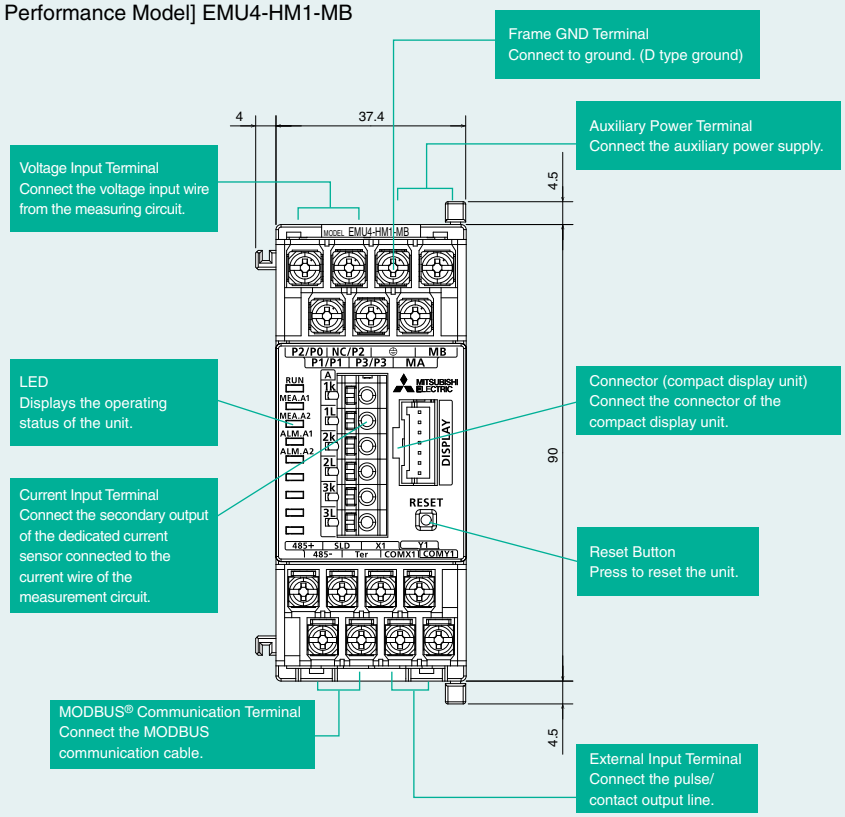
Wiring			Maximum through-wire diameter (mm²) (Allowable current (A) of wire)										
			Split type					Through type					
Phase wire	No. of wires	Wire type	CZ-22S	CZ-30S	CZ-55S	CZ-77S	CZ-112S	ZT15B	ZT30B	ZT40B	ZT60B	ZT80B	ZT100B
Single-phase 2-wire	2	600V polyvinyl-insulated wire (IV)	22 (115)	60 (217)	250 (556)	500 (842)	–	14 (88)	60 (217)	150 (395)	325 (650)	600 (992)	800 (1185)
		600V cross-linked polyethylene-insulated wire Single-core wire (CV wire)	22 (130)	38 (190)	200 (545)	500 (920)	1000 (1465)	2 (33)	38 (190)	60 (260)	250 (655)	400 (870)	600 (1140)
Single-phase 3-wire 3-phase 3-wire	3	600V polyvinyl-insulated wire (IV)	22 (115)	38 (162)	200 (496)	500 (842)	–	8 (61)	38 (162)	100 (298)	250 (556)	500 (842)	725 (1095)
		600V cross-linked polyethylene-insulated wire Single-core wire (CV wire)	14 (100)	22 (135)	150 (455)	325 (760)	800 (1285)	2 (33)	22 (135)	60 (260)	200 (560)	325 (760)	600 (1140)

*1: Note that the wire thickness may vary slightly depending on the manufacturer.
*2: The IV wire applies to cases where insulators are used.
*3: The IV wire applies to cases where insulation in a covered conduit in air.
(Cables of 600mm² or more have various structures. The values are shown for reference.)

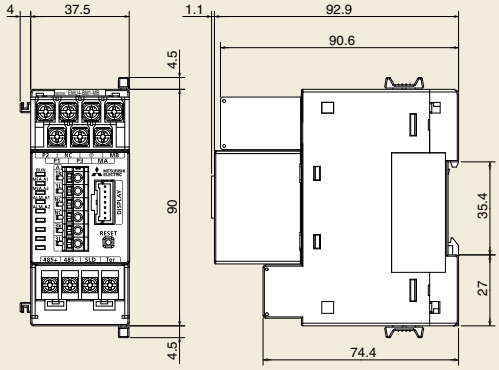
External View

Units (mm)

●[Energy Measuring High Performance Model] EMU4-HM1-MB

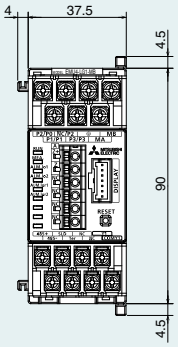


●[Energy Measuring Standard Model] EMU4-HM1-MB

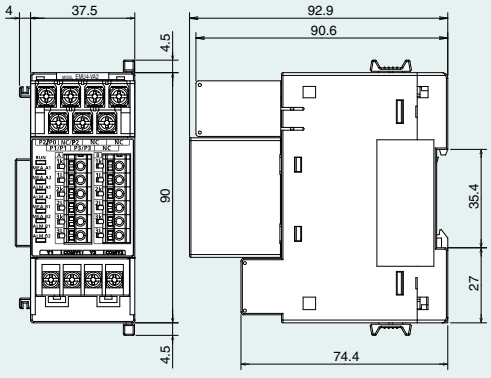


* This side view also applies to other basic unit models (EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB).

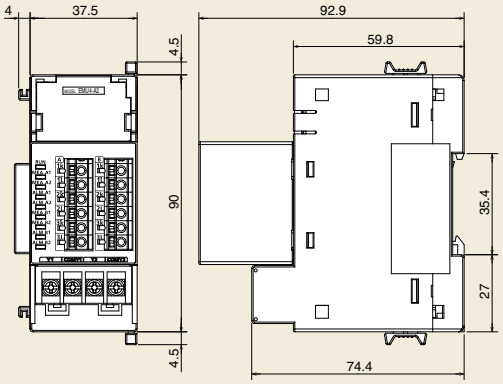
●[Insulation Monitor Model] EMU4-LG1-MB



●[Energy Measuring Extension Unit for Different Voltage System] EMU4-VA2



●[Energy Measuring Extension Unit for Same Voltage System] EMU4-A2



MEMO

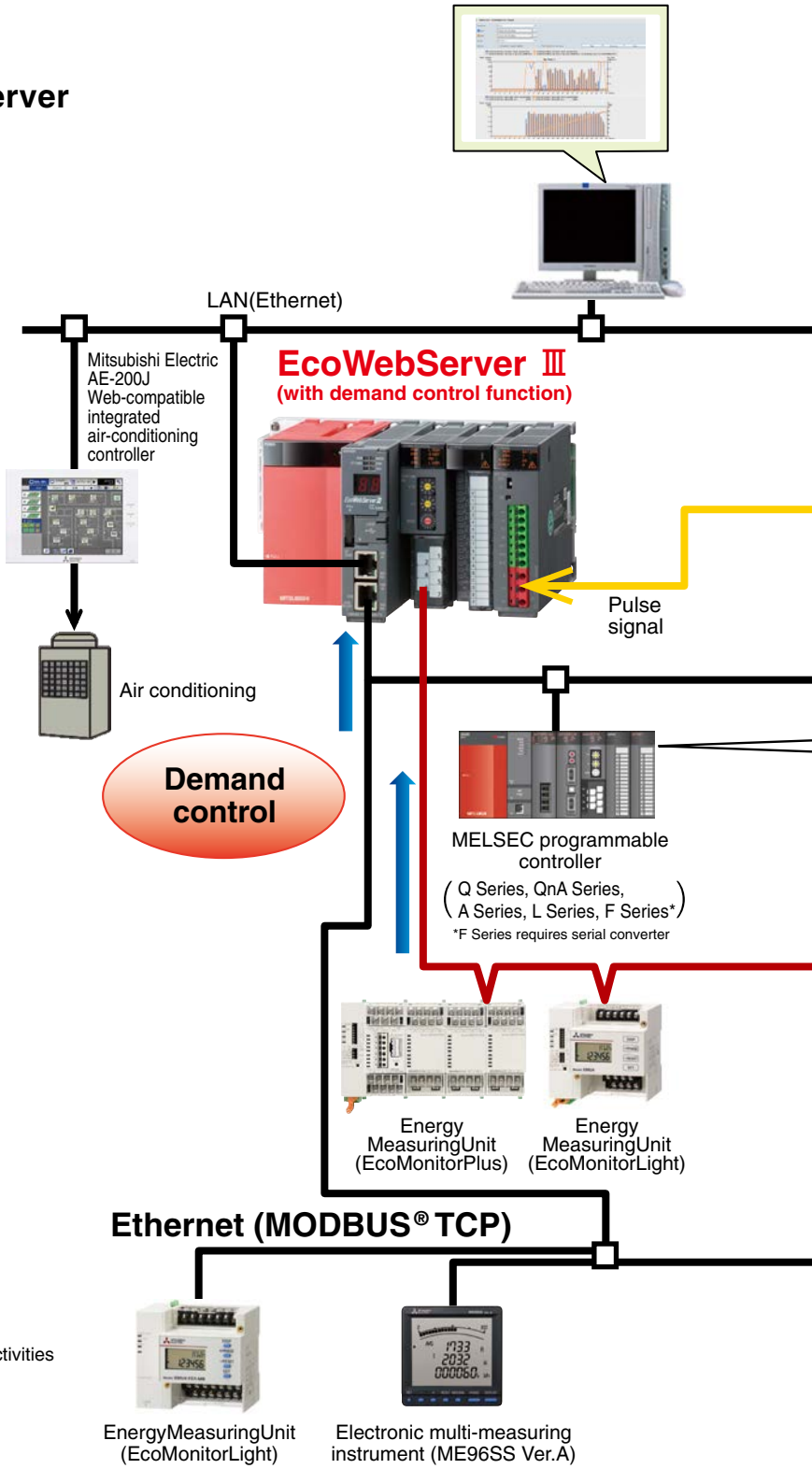
System Configuration Example

Energy Management System

Energy-saving Data Collection Server

EcoWebServerⅢ

Support factory, building and school energy-saving activities.
Build visualized environments and manage energy effectively.
Support to energy conditions at all times and quickly resolve energy loss problems.
Finaly reduce energy loss, increase productivity and cut production costs.



Energy-saving method

Plan Comparatively high specific consumption (waste of energy, negative influence on productivity)
Ex) △kWh of electricity per day can be saved with improvement.

Do
- Facilities start-up too fast
- After investigation and deciding appropriate start-up time, implement countermeasure

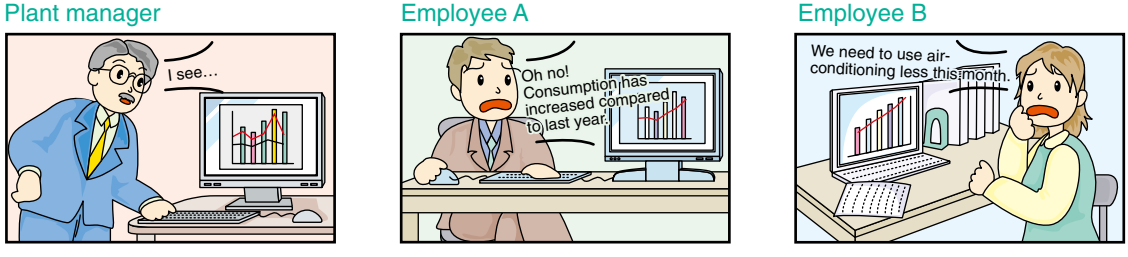
Check Compare data before and after implementing countermeasure (△kWh reduced per day)

Action Implement similar countermeasures for other facilities

Support energy-saving activities using "Visible Management"

1. Monitor/Manage energy by department
2. Specific consumption-based management of energy-saving activities
3. Monthly/Annual target-based management
4. Monitor equipment operating status
5. Manage/Record energy data

Entire factory



E-mail notification
(abnormal upper/lower limits, operating status, target value over specific consumption, over planned energy value, error information)

Transfers files in CSV format
(zoom (1 or 5 min), daily, monthly, annual, facility (daily), specific consumption, demand (daily, monthly, annual), demand alarm, control, operation history, system log file)

Acquire time information
Adjust EcoWebServer Ⅲ clock





FTP server
(File server)

SMTP server
(Mail server)

SNTP server
(Time server)

Receving point



Demand measurement



Electronic multi-measuring instrument (ME96SS Ver.A)

Data collection inside inner register

Measurement data written to inner register

Ethernet (MELSEC communication protocol)

Collects production data

Up to 32 units



QE81WH QE82LG

MELSEC-Q Series
Energy measuring module / Insulation monitoring module



MITSUBISHI GOT

Check demand information and alarm records onsite



Network monitoring lamp

Specific consumption management

Collects energy data

CC-Link



MDU breaker



Electronic multi-measuring instrument (ME96SS Ver.A)



Analog input
Temperature input
Contact output
(Enables remote control of load at locations far from EcoWebServer Ⅲ)



Air circuit breaker (AE-SW Series)

Target-based management



MODBUS® TCP ⇔ MODBUS® RTU Protocol converter

RS-485 (MODBUS® RTU)



Electronic multi-measuring instrument (ME96SS Ver.A)



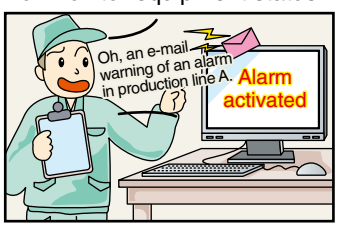
EnergyMeasuringUnit (EcoMonitorLight)



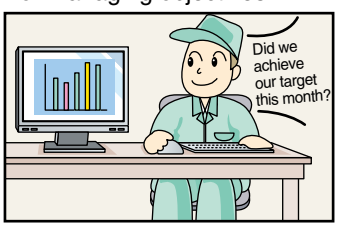
EnergyMeasuringUnit (EcoMonitorPlus)

Production line

For monitor equipment status



For managing objectives



For improvement activities



Importance of Visualizing Energy

Essentials Issues for Saving Energy

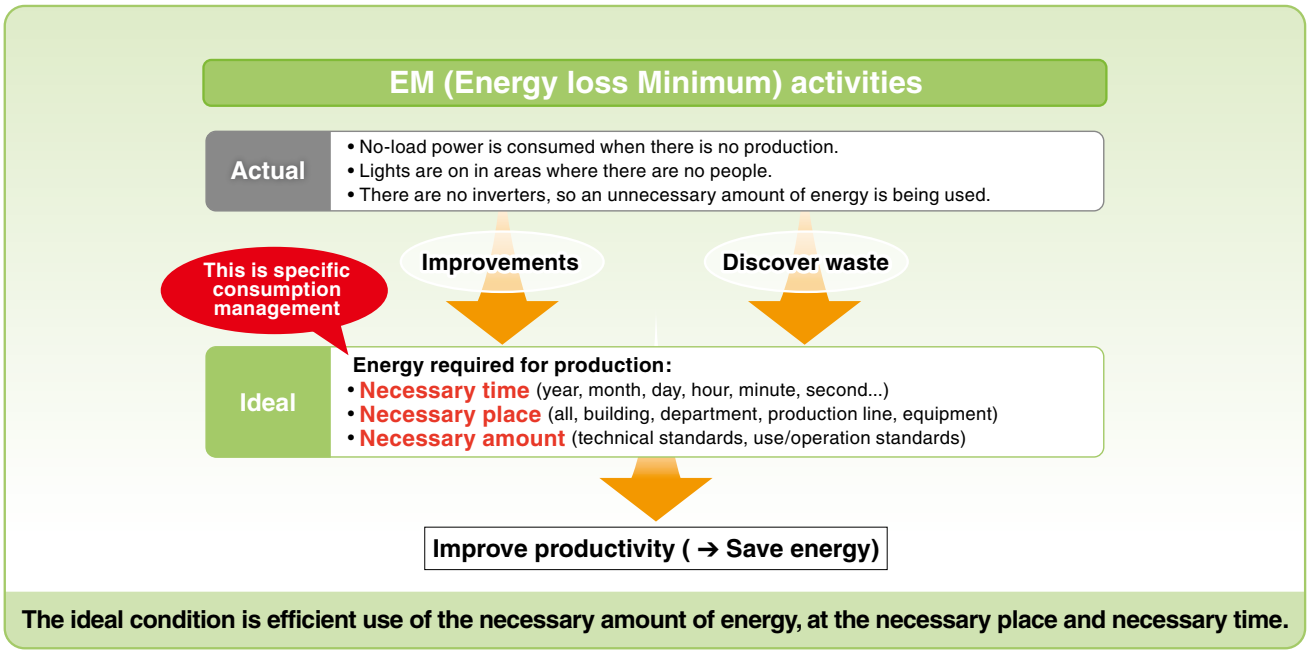
●Target Value Management

Managing objectives is a very important issue when practicing energy savings.
"Target value management" is the process of transforming actual conditions into ideal conditions, and thereby requires understanding the actual situation and how much "unseen" waste there is. For this reason, target value management involves performing detailed management of operations, moving from months to days and lines to equipment, and evolving from "seeing" waste to "understanding" it.
Additionally, when using target value management, it is necessary to construct and put into practice an organization that values "people who set objectives (manage)," "people who find things" and "people capable of thinking of improvements and implementing them."



●Specific consumption management

In lines where there is a large difference in production volume, it is difficult to save energy and improve productivity using energy management alone.
By understanding specific consumption —energy consumed per product— waste in energy and production processes can be clarified, and it becomes easier to implement countermeasures.
Rather than simply not using energy, it's important to use energy efficiently when, where and how much needed.



Importance of Demand Monitoring

Energy Saving by visualizing demand

●What is “Demand”....?

Demand is average electric power at a specified period. This period for demand differs for each country and the way of management method.

Electric fee is basically determined based on the highest demand in one year(→contract demand).

The highter the contract demand is, the more expensive the electric basic charge is.

There are two types of basic demand management method as below.

(1) Fixed block demand management method

The demand period consists of only an interval.

(2) Rolling block demand management method

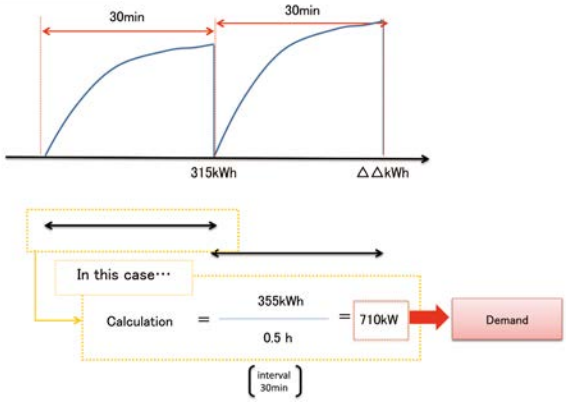
The demand period consists of interval and sub interval.

Interval is the period for caluclation of average electric.

Sub interval is the period for updata the calculation.

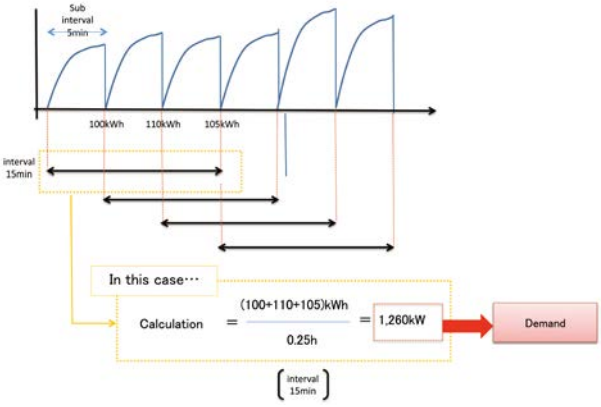
Fixed block demand management

Ex) Interval:30min



Rolling block demand management method

Ex) Interval:15min, Sub interval 5min



EcoWebServerⅢ with demand monitoring function comply with the Fixed block demand management method. Interval can be selected from 15min or 30min.

Subtotal Volume

- Demand (power demand) is computed and calculated by taking pulses from the multi-measuring meter (transaction meter) for power demand.

Estimation

- The value at the end of the 30-minute time limit is estimated from the measured demand (power demand).

Warning

- Based on the results of the estimation, an alarm is output and a notification sent when the objective demand has been exceeded.
- The alarm notification can be a buzzer, display lamp, etc., which is sent through the contact output.

Load interruption

- Load interruption may be necessary depending on power use.
- A control output signal can be used to automatically interrupt the load.

Reduce demand

||

Reduce basic free



Realize visualization of energy and demand management with one EcoWebServer Ⅲ.

Lineup

Energy-saving Data Collection Server EcoWebServer Ⅲ



Product name	Energy-saving Data Collection Server
Model no.	MES3-255C-EN
Communication	CC-Link, MODBUS® (TCP, RTU*)



Product name	Energy-saving Data Collection Server (with demand control function)
Model no.	MES3-255C-DM-EN
Communication	CC-Link, MODBUS® (TCP, RTU*)

*MODBUS® TCP ⇔ RTU converter is required for MODBUS® RTU communication.
MODBUS® TCP ⇔ RTU converter (SI-485 MB) is produced by LINEEYE CO.,LTD.

Network Specifications (CC-Link)

Item		Specifications
CC-Link communications section	Transmission speed	156kbps / 625kbps / 2.5Mbps / 5Mbps / 10Mbps
	Maximum total cable length (maximum transmission distance)	Transmission speed: 156kbps — Cable length between stations: 20cm or more — Maximum total cable length: 1200m 625kbps — 900m 2.5Mbps — 400m 5Mbps — 160m 10Mbps — 100m
	Maximum number of connected units	64 units However, conditions on the right must be met 1. Total number of stations a+b×2+c×3+d×4≦64 a: 1 station occupied, b: 2 stations occupied, c: 3 stations occupied, d: 4 stations occupied 2. Number of units connected 16× (A+D) +54×B+88×C≦2304 A: Number of remote I/O stations …64 max B: Number of remote device stations …42 max C: Number of local stations, intelligent device stations …26 max D: Number of reserve stations * * Unregistered station numbers from station 1 to the maximum number of stations are counted as reserve stations.
	Communication method	Broadcast polling method
	Synchronization method	Frame synchronization method
	Encoding method	NRZI method
	Transmission route format	Bus (RS-485)
	Transmission format	HDLC compatible
	Error control method	CRC ($x^{16}+x^{12}+x^{15}$)
	Connecting cable	CC-Link Ver1.10-compatible dedicated cable

Function Comparison/System Environment

Functions

Product Name			MES3-255C-EN	MES3-255C-DM-EN
Demand function			—	○
Connection device	CC-Link terminal device		Number of remote I/O stations≦64, Number of remote device stations≦42, Number of local stations≦26	
	MODBUS® terminal device		Number of MODBUS® TCP terminals≦255 Number of MODBUS® RTU terminals≦31 for each gateway Number of total MODBUS® terminals≦255	
	MITSUBISHI PLC, GOT		MC protocol connection (LAN CH2 used) * device read/write CC-Link unit (local) connection * device read	
Number of measuring points	Measuring points		255 points	
		Number of operation measuring points	32 points (includes 255 measuring points)	
	Virtual measuring points		128 points	
	Specific consumption measuring points		64 points	
	Connection point output		32 points	
	Demand monitoring	Receiving demand	—	2 points (fixed) whole day, timeframe 1-10
		Receiving electric energy	—	2 points (fixed) whole day, timeframe 1-10
Data saving function * CSV format	Zoom (every 1min) data		62-day amount	
	Zoom (every 5min) data		14-day amount	
	Daily data (on the hour or every 30min)		186-day amount	
	Monthly data (specified time (00min) once a day)		60-month amount	
	Yearly data (specified time (00min) once a month)		5-year amount	
	Virtual measuring point data (daily)		186-day amount	
	Virtual measuring point data (monthly)		60-month amount	
	Virtual measuring point data (yearly)		5-year amount	
	Specific consumption measuring point data (daily)		186-day amount	
	Specific consumption measuring point data (monthly)		60-month amount	
	Specific consumption measuring point data (yearly)		5-year amount	
	Equipment data (daily)		186-day amount	
	Operating history data		64KB×4 files	
	System log		256KB×8 files	
	Demand data (daily)		—	186-day amount
	Demand data (monthly(daily maximum))		—	60-month amount
	Demand data (yearly(monthly maximum))		—	5-year amount
	Demand alarm/Control log		—	128KB×62 files
Display function	Real-time	Demand monitor	—	• Displays current time limit demand load curve • Displays graph of same day demand results
		Current value monitor	The current value of the specified measuring points are displayed in the units registered for groups and display lists Displays differential display mode function/differential values for specified measuring points (time differential: amount used from previous hour to present time, daily differential/monthly differential: amount used from previous summary time to present)	
		Connection point output monitor	Displays connecting point output status	
	Graph display	Demand trend graph	—	Displays demand trend graph
		Measuring point comparison graph	Displays comparison of multiple measuring point data for specified display intervals/time displayed	
		Daily comparison graph	Displays comparison of specified measuring points for desired date	
		Specific consumption graph	Displays graph after dividing energy volume by number produced	
		Equipment graph	Displays graph of equipment efficiency, number of defects and equipment energy volume	
	Data file		Download measuring point data, virtual measuring point data, specific consumption data, equipment data, operating history data, system log, demand data *, alarms/control log * (*only for products with demand monitoring functions)	
	Equipment values list		Displays measuring points, connection point output and content of email notifications set for EcoServerⅢ	
Monitoring functions	Email notification function		Transmits main unit error notifications, periodic notifications, upper/lower limit notifications, operating status notifications, specific consumption objective value notifications, energy plan value notifications and demand notifications * to the specified SMTP Server (*only for products with demand monitoring functions)	
	Connection point output		Outputs connection points for EcoWebServerⅢ connection point output module or combined CC-Link input/output module	

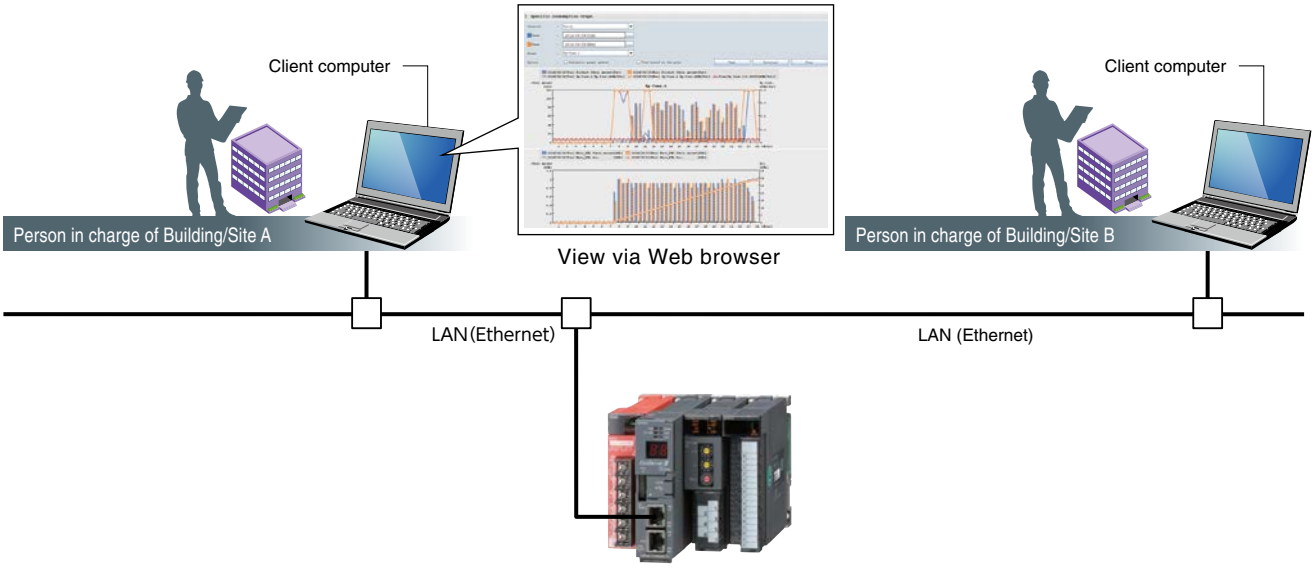
Recommended system environment

Item	Specification
OS (basic software)	Microsoft Windows Vista® Business (32bit) SP2, Microsoft Windows 7 Professional (32bit, 64bit) SP1 Microsoft Windows 8.1 Pro (32bit, 64bit), Microsoft Windows 10 Pro (32bit, 64bit)
CPU	Pentium® 1GHz processor or faster, or compatible microprocessor (DOS/V-compatible device)
Memory	1GB or more
Hard-disk	If data accumulated by EcoWebServerⅢ is saved to a computer, that storage capacity is required.
CD drive	1 group or more (required for installing setup software)
Display resolution	1280×1024 pixels or more
Display colors	65536 colors or more
Input device	Mouse and keyboard
External interface	10BASE-T / 100BASE-TX
Web browser	Internet Explorer® 7, 8 (32bit), 9 (32bit), 10 (32bit), 11 (32bit)
Java plug-in	Oracle Jave™ 8 JRE 8 (32bit), Oracle Java™ 7 JRE 7 (32bit), Oracle Java™ 6 JRE 6 (32bit)

Features

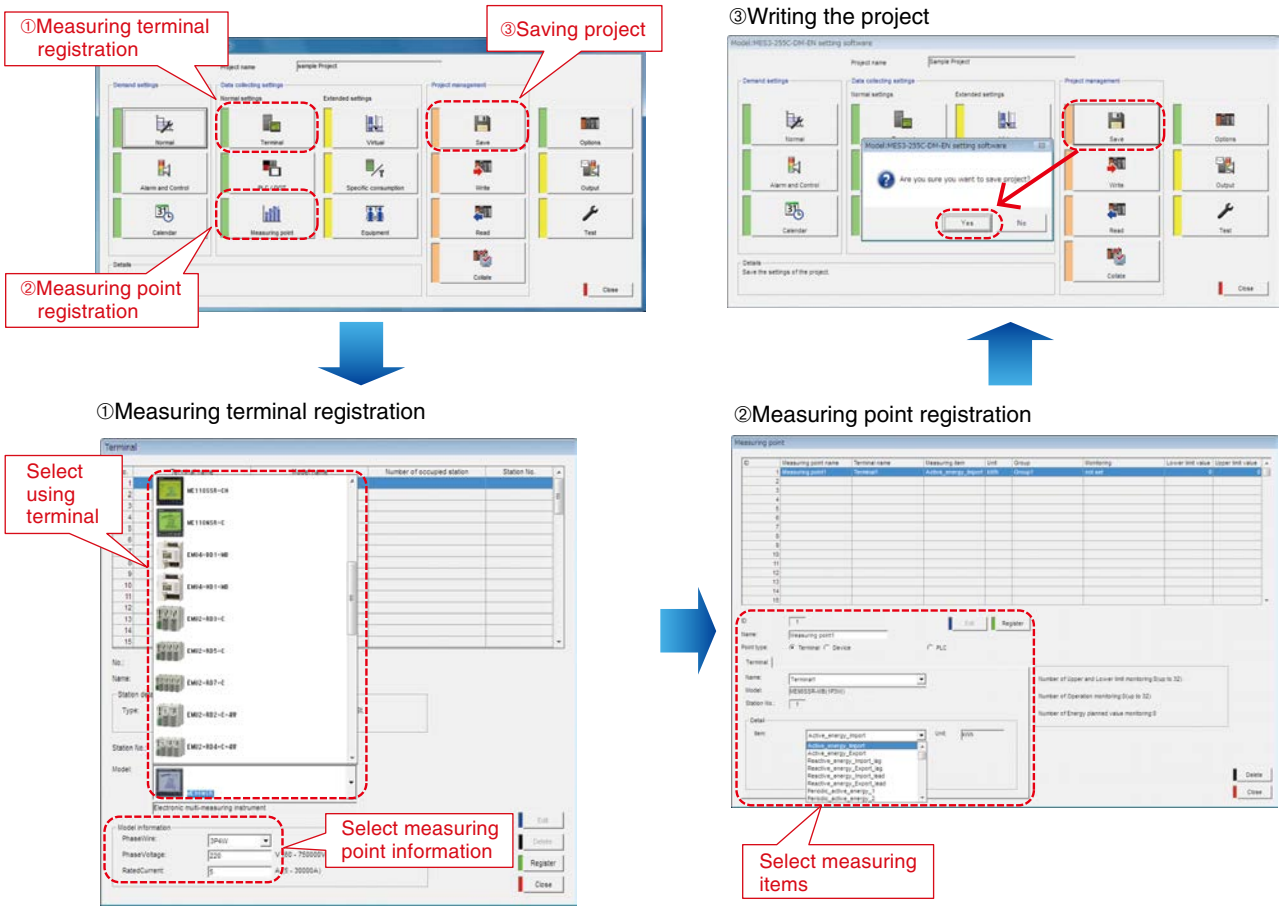
Measured data can be displayed on a Web browser with graphs without any programing.

Using the HTTP Server function, the collected data is transmitted via Ethernet across the Internet/Intranet so that all employees can confirm and understand amount of energy used in real-time.



Easy setting by using dedicated setting software.

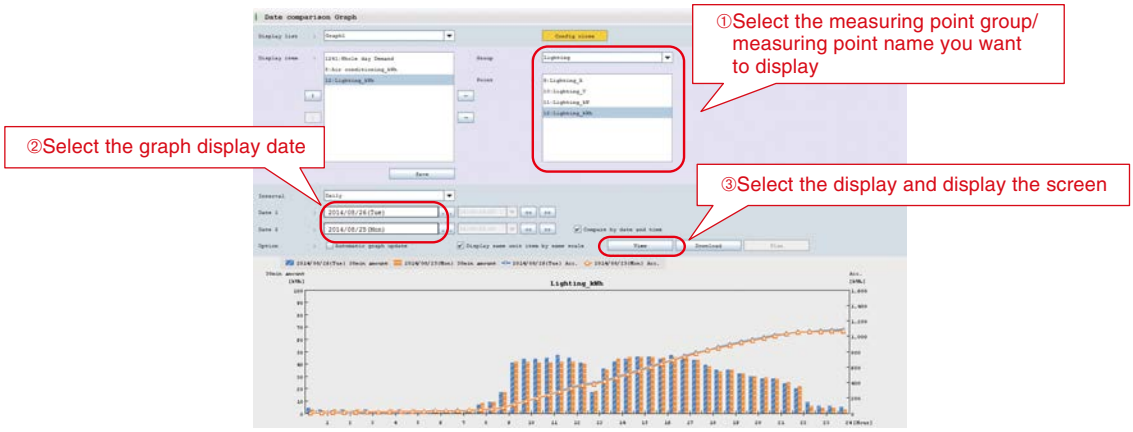
The minimum required registering configuration on the measuring is
“①Measuring terminal registration” → “②Measuring point registration” → “③Writing the project” only.



Add new comparison screens according to the scenario. Strong support provided for analyzing activities.

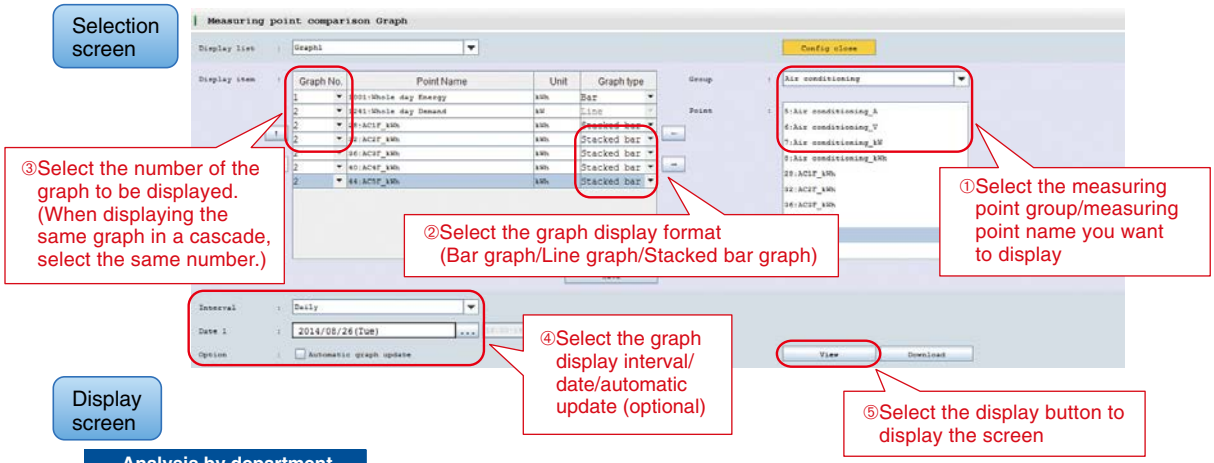
1 Date comparison graph

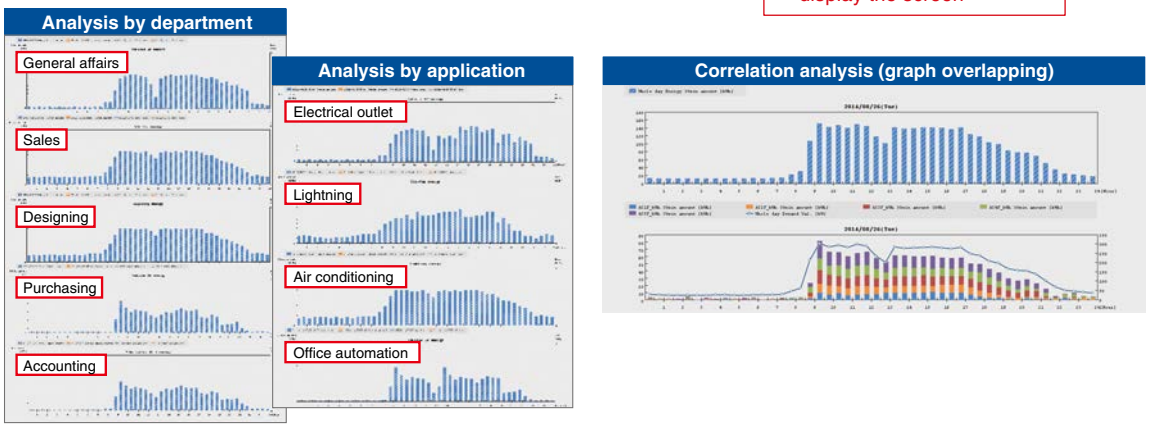
●The display procedure is select “①Measuring point group/name → ②Graph display date” and select “③Display” only.
●A comparison of the specified date and items can be displayed.



2 Measuring point comparison graph

●The display procedure is to select “①Measuring point group/name → ②Graph display format → ③Graph No. → ④Graph display intervals etc.” and select “⑤Display” only.
●It’s possible to select graphs and display various graphs in the format of your choice. It’s also possible to display the same graph, making it easy to understand graph correlations.

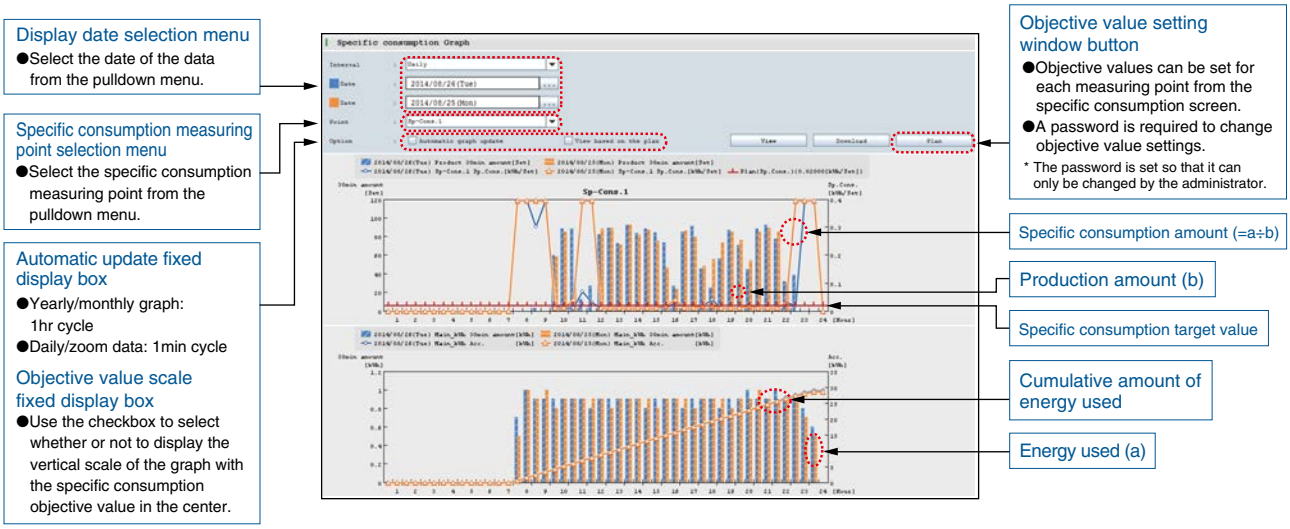




Easily understand productivity by confirming the specific consumption graph

●By integrating the production volumes from the measuring terminal and PLC, the specific consumption graph can be easily displayed and points related to the drop in specific consumption can be easily understood.

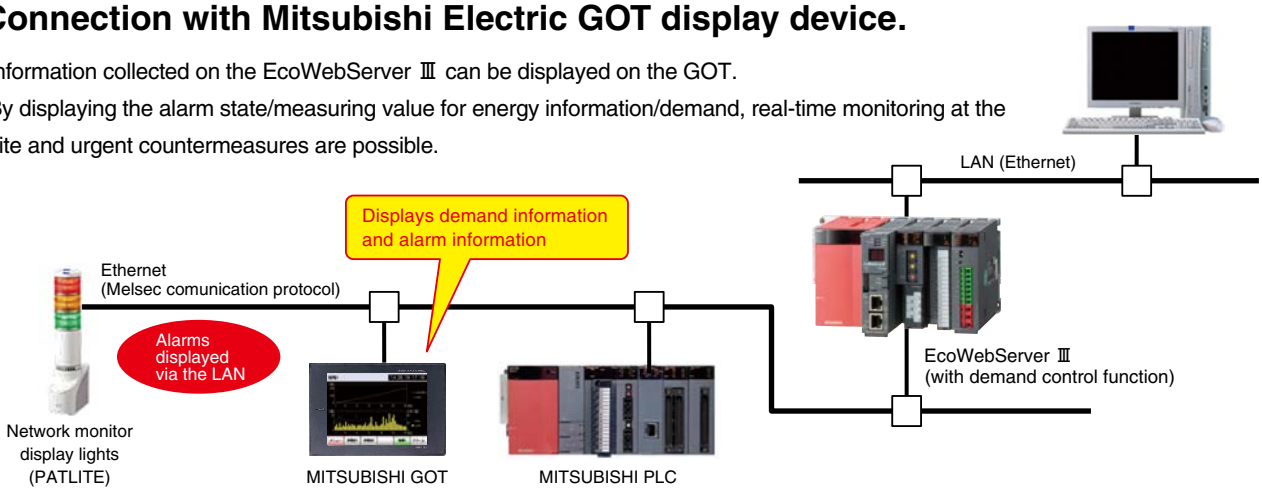
●Additionally, by comparing two specific consumption graphs at the same line, it is possible to confirm the benefits at the time the countermeasure was implemented.



Connection with Mitsubishi Electric GOT display device.

●Information collected on the EcoWebServer Ⅲ can be displayed on the GOT.

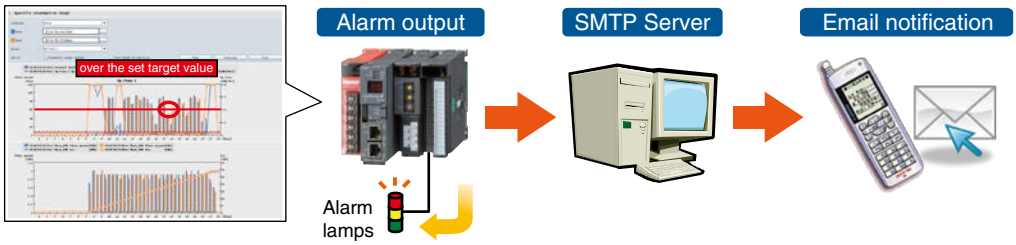
●By displaying the alarm state/measuring value for energy information/demand, real-time monitoring at the site and urgent countermeasures are possible.



Alarm output/email notification through a variety of monitoring functions.

●Objective values (upper/lower) and error information can be transmitted through email notifications/alarm output, and changes in status can be recognized immediately. The result of the careful target value management and monitoring the status monitoring ensure that problems occurring at the site are not overlooked.

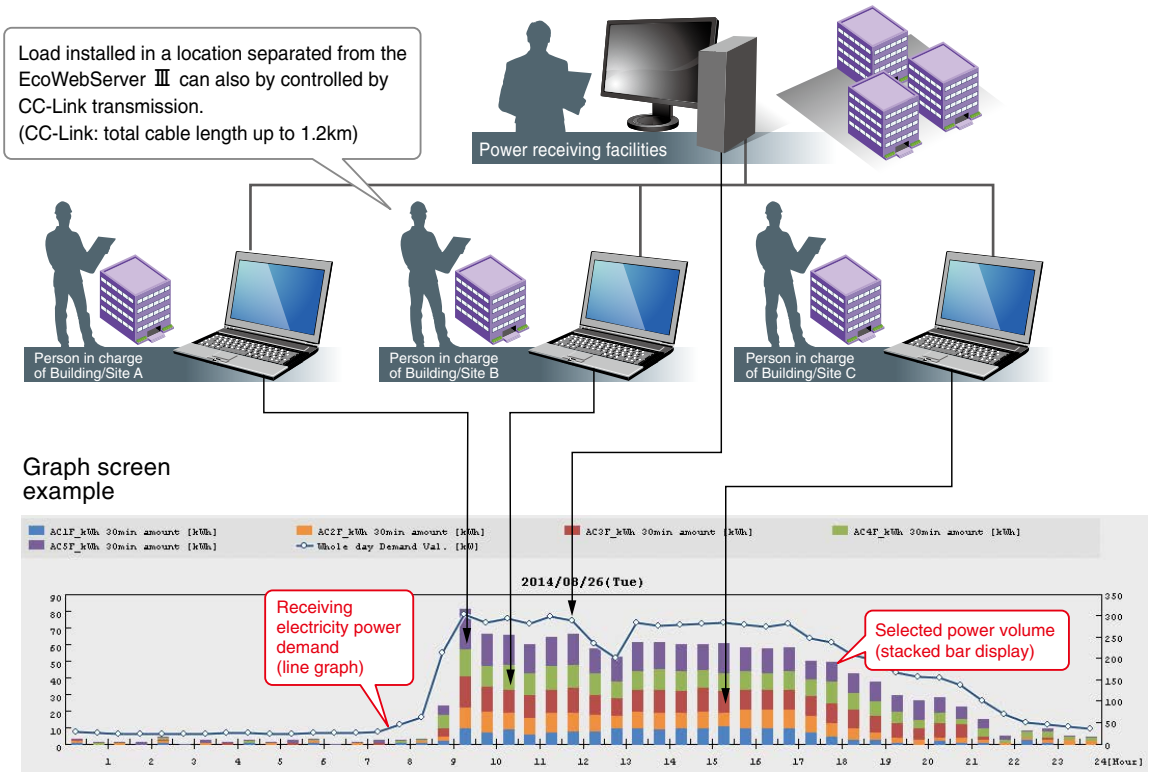
<Items monitored>
- Energy plan value
- Specific consumption objective value
- Upper/lower irregularity
- Change in operating state
- Error information
- Demand alarm



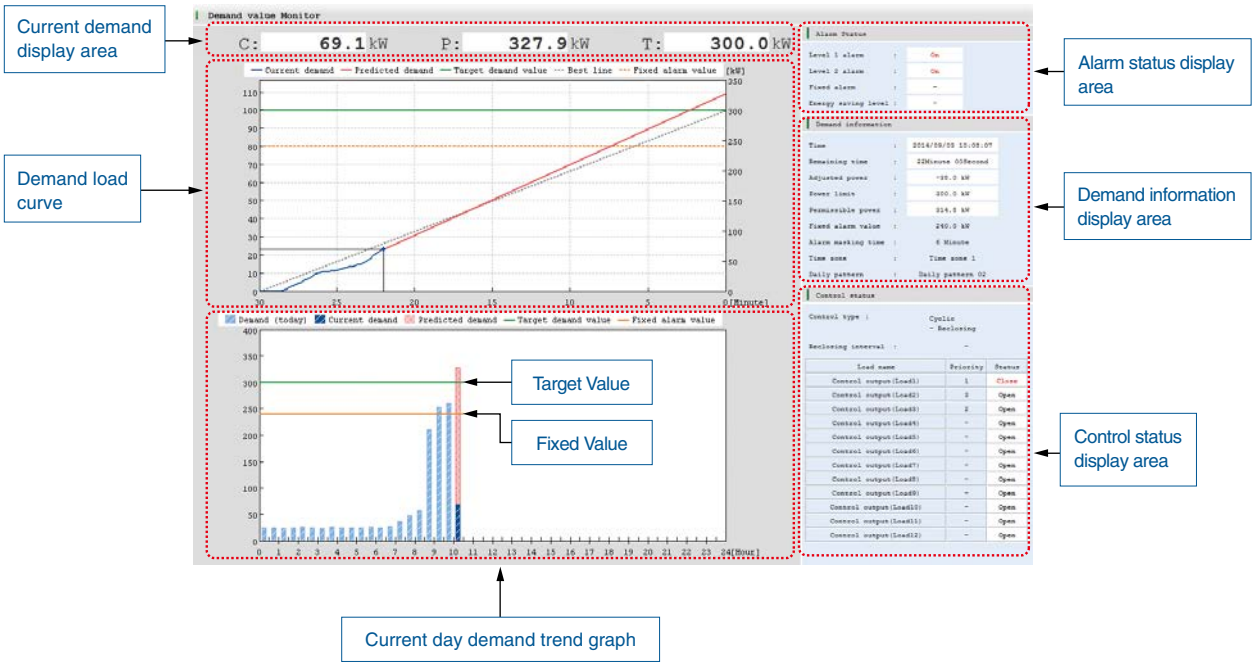
Simultaneously visualize demand trends and energy consumption per building/load

Compatible model: MES3-255C-DM-EN only

●As the breakdown of power demand (load balance) can be easily understood from the power demand trends and stacked bar graphs for each regional substation and operating equipment can be reviewed, and operations can be planned and proposed based on the analysis results, which enable peak shift/peak cut.



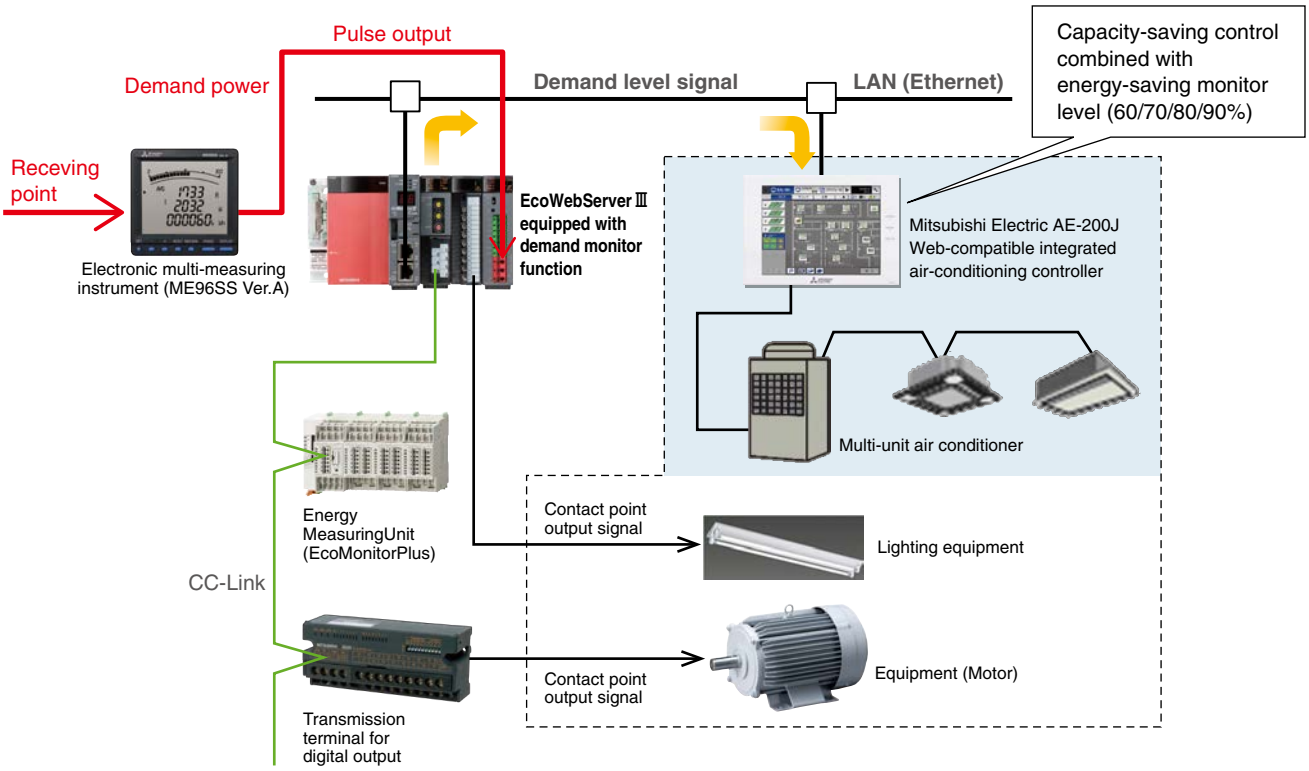
●Demand monitor screen



Energy-saving air conditioning operation realized by interconnecting with integrated air-conditioning controller.

Compatible model: MES3-255C-DM-EN only

●Demand control possible by interconnecting with Mitsubishi Electric Web-compatible integrated controller—AE-200J, G-150AD, etc.
Additionally, automatic control of load possible through contact point output via main unit of EcoWebServer Ⅲ and CC-Link.

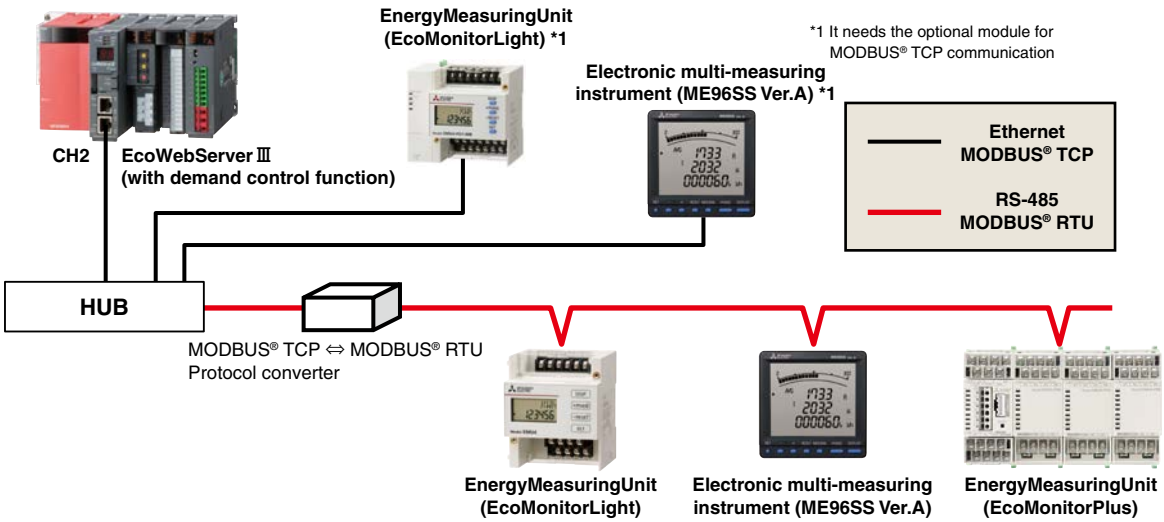


It can be connected at MODBUS® RTU/TCP communication

●Using the LAN interface (CH2) of EcoWebServer Ⅲ, **realize MODBUS® TCP communication.**
(As with the case of MC protocol communication)

●Using the LAN CH2 of EcoWebServer Ⅲ, via MODBUS® TCP ⇔ MODBUS® RTU converter,
realize **MODBUS® RTU communication.**

✻MODBUS® TCP ⇔ RTU converter is required for MODBUS® RTU communication.
MODBUS® TCP ⇔ RTU converter (SI-485 MB) is produced by LINEEYE CO.,LTD.



Main Unit Specifications

MES3-255C-EN front

7-segment LED display
Displays an error code when an error is detected. In addition, in IP address display mode, the preset IP address is displayed at start-up.

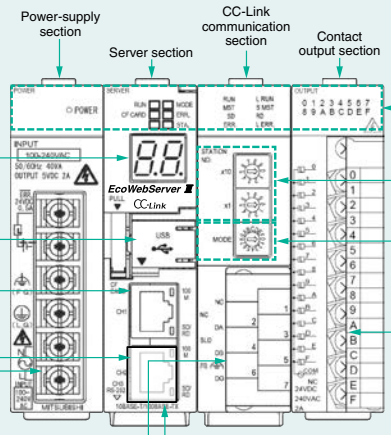
USB interface
Not used.

LAN interface CH1
Use connected to a computer network.

LAN interface CH2
Use when connected to a programmable controller network, MITSUBISHI GOT, MODBUS® communication.

Power-supply terminal block
Connect power supply. (Note 1)

CC-Link terminal block
Connect CC-Link communication cable.



LED display
Display each status.

CC-Link station number setting switch
Set CC-Link station number.

CC-Link transmission speed setting switch
Set CC-Link transmission speed.

Contact output terminal block
Closed when conditions monitoring function conditions are met.
Connect external equipment such as buzzers and lamps.

LED display
Display each status.

MES3-255C-DM-EN front

7-segment LED display
Displays an error code when an error is detected. In addition, in IP address display mode, the preset IP address is displayed at start-up.

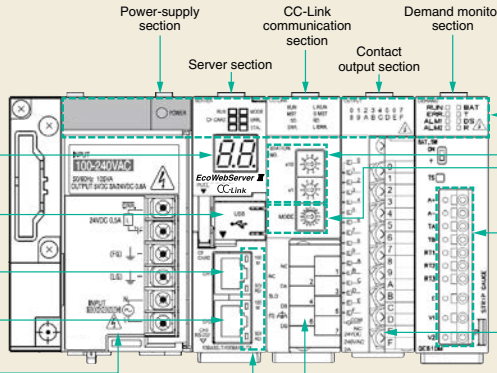
USB interface
Not used.

LAN interface CH1
Use connected to a computer network.

LAN interface CH2
Use when connected to a programmable controller network, MITSUBISHI GOT, MODBUS® communication.

Power-supply panel
When you open the panel, you will see the power-supply connection terminal. (Note 1)

LED display
Display each status.



LED display
Display each status.

CC-Link station number setting switch
Set CC-Link station number.

CC-Link transmission speed setting switch
Set CC-Link transmission speed.

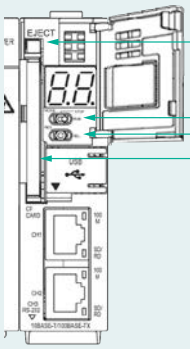
Demand monitor section connection terminal
Connect cable to pulse input, alarm output and control output for demand monitoring. (Note 2)

Contact output terminal block
Closed when conditions monitoring function conditions are met.
Connect external equipment such as buzzers and lamps.

CC-Link terminal block
Connect CC-Link communication cable.

Front surface (cover of Server section opened)/bottom surface (CC-Link transmission device)

●Front surface (cover of Server section opened)



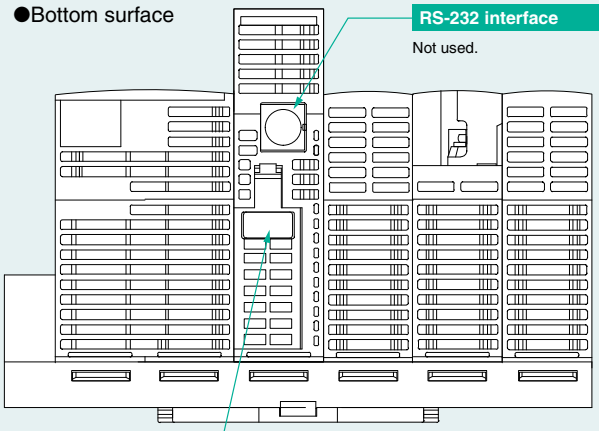
CompactFlash™ memory card EJECT button
Push the button and remove the CompactFlash™ memory card.

MODE/STOP/RUN switch
Normally, used in RUN state.

RESET/SELECT switch
Used when resetting the main unit.

CompactFlash™ memory card
Stores programs for collecting and displaying data. Data collected is also saved to it. (Note 3)

●Bottom surface



RS-232 interface
Not used.

Battery storage compartment
Store the battery.
Remove the cover and connect the connector. (Note 4)

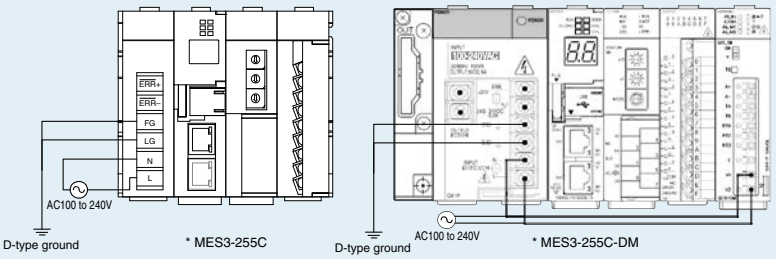
(Note 1) Connect to AC100-240V(+10%, -15%) 50/60Hz(±5%). Do not connect to a power supply other than that specified as this may cause an accident.
(Note 2) A separate power supply is required for the demand monitor section when using. When using the main device, AC100-240V(+10%, -15%) 50/60Hz power is required for the demand monitor connector terminals V1, V2. It is possible to connect power from the power-supply module.
(Note 3)
- CompactFlash™ memory cards are used in a constantly attached state. If they are removed while the power is on or the memory card is being accessed, this product will malfunction.
- When removing the card from the memory card slot, be sure to place the RESET/SELECT switch in the SELECT position and remove it only after turning off the power supply and the CF CARD LED has turned off.
- Do not use the CompactFlash™ memory card with any other product. This could corrupt the internal data.
- Do not insert a CompactFlash™ memory card other than the one included in the package in this device. If a different card is inserted, the system will not operate correctly.

(Note 4) Be sure to exchange the battery within three minutes after turning off the power. If more than three minutes passes after the battery is removed, the final one hour of data may be lost or the clock may initialize. (Data or configuration settings from more than one hour before will not be initialized). If the clock initializes, please set again after backing up the data.
Refer to the operating manual (hardware edition) for the battery replacement procedure.

Connection Diagram

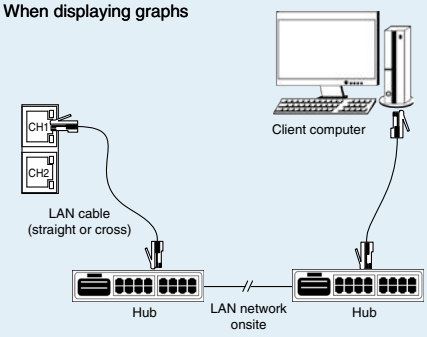
Model: MES3-255C-EN, MES3-255C-DM-EN

●Power-supply section

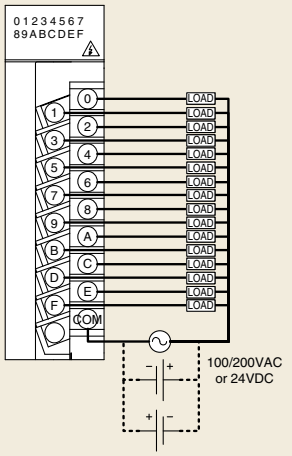


●Server communications section (LAN interface)

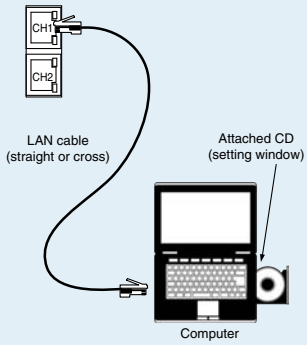
When displaying graphs



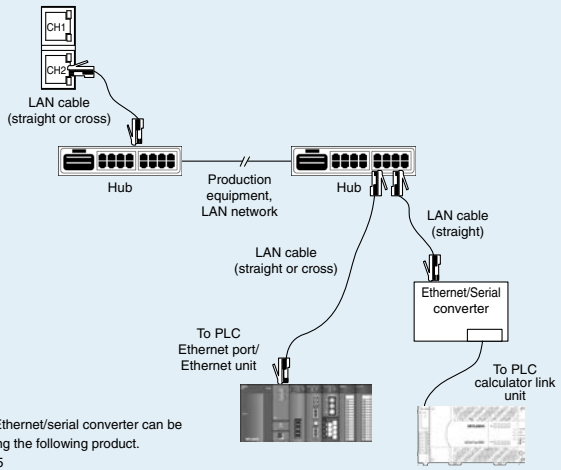
●Connecting point output section



When setting (CH1)

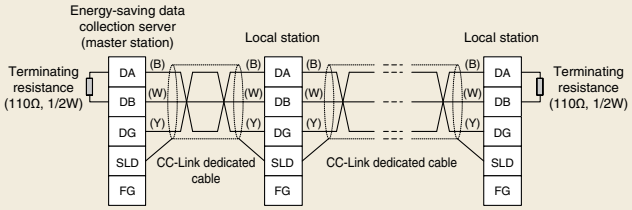


When connecting the PLC (CH2)



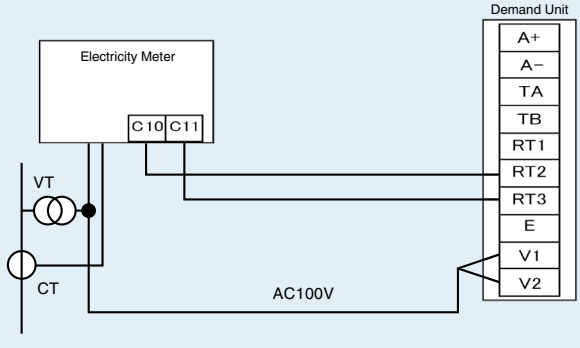
Operation of Ethernet/serial converter can be confirmed using the following product.
Line Eye SI-65

●CC-Link communication section



Demand monitor section

Where the transaction meter of the multi-measuring power demand meter is 10,000pulse/kWh

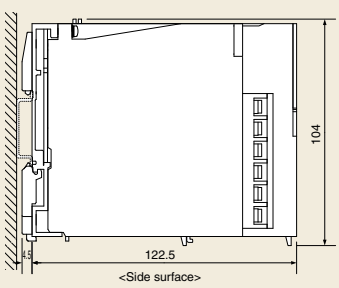


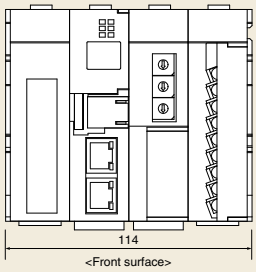
External Diagram/Bundled Products List

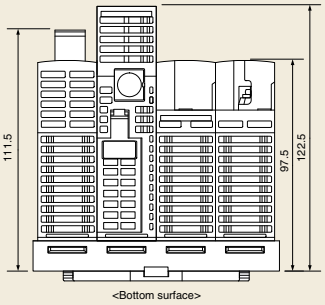
●External dimensions

Unit : mm

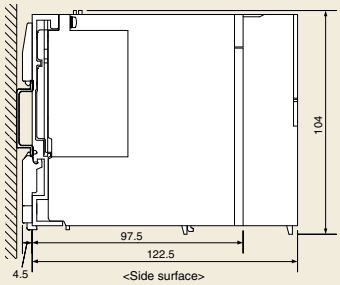
MES3-255C-EN

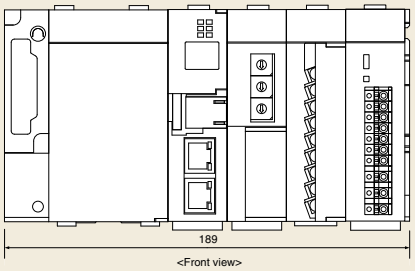


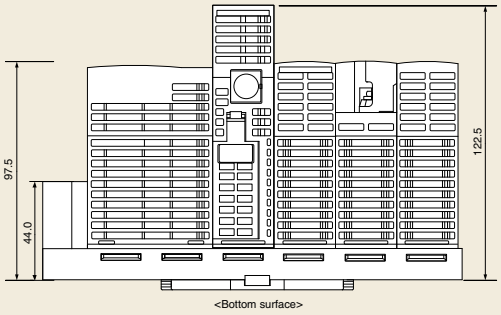




MES3-255C-DM-EN



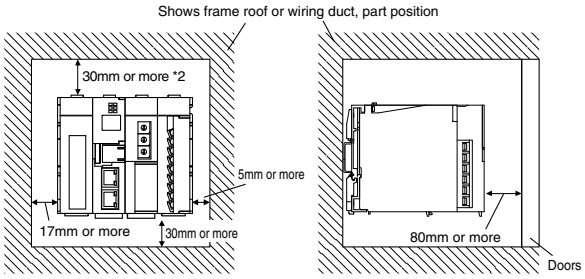




●Peripheral installation conditions

MES3-255C-EN

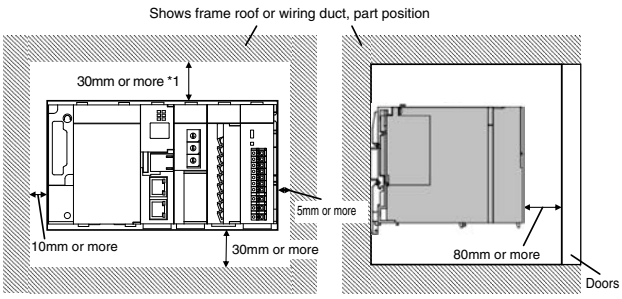
Peripheral installation conditions *1



*1 These are the conditions when considering radiation. At the same time, please secure enough space to replace the battery in the lower layer of the main unit.
*2 When height of the wiring duct is 50mm or less. Others are 40mm or more.

MES3-255C-DM-EN

Peripheral installation conditions



*1 When height of the wiring duct is 50mm or less. Others are 40mm or more.

■Bundled Products List

Product Name	CC-Link communication product	
	MES3-255C-EN	MES3-255C-DM-EN
Energy-saving Data Collection Server (main unit)	1	
CompactFlash™ memory card (software)	1	
Setup software (CD-R)/operating manual collection	1	
Battery (installed in lower surface of main unit battery section) *1	1	
Frame attachment screw	4 (M4 × 12)	4 (M4 × 14)
CC-Link terminal resistance (black: 110Ω/2W) (white: 130Ω1/2W)	Black: 2 White: 2	
IEC rail attachment adapter	Small 2 Large 2	
IEC rail attachment screw (M5 × 10)	2	
IEC rail attachment corner washer	2	
IEC rail attachment stop metal clamp	2	
Operating manual hardware edition	1	

*1 To purchase a replacement battery (model name: Q6BAT), inquire at the dealership where you purchased the main product.

Support Terminal

MES3-255C-EN, MES3-255C-DM-EN (CC-Link)

Product Name	Icon/type name		Station type	Number of occupying stations
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W)	EMU4-BD1-MB		Remote device station	1 station occupied
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-HD1-MB		Remote device station	1 station occupied
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-FD1-MB		Remote device station	1 station occupied
Energy measuring standard model *1	EMU4-BM1-MB		Remote device station	1 station occupied
Energy measuring high performance model *1	EMU4-HM1-MB		Remote device station	1 station occupied
Insulation Monitoring model *1	EMU4-LG1-MB		Remote device station	1 station occupied
Energy measuring extension model for same voltage system *2	EMU4-A2		Remote device station	*3
Energy measuring extension model for different voltage system *2	EMU4-VA2		Remote device station	*3
Energy measuring extension model for analog input *2	EMU4-AX4		Remote device station	*3
Energy measuring extension model for pulse/digital input *2	EMU4-PX4		Remote device station	*3
EnergyMeasuringUnit (Power reception and distribution monitoring (standard product 3 circuits))	EMU2-RD3-C		Remote device station	1 station occupied
EnergyMeasuringUnit (Power reception and distribution monitoring (standard product 5 circuits))	EMU2-RD5-C		Remote device station	1 station occupied
EnergyMeasuringUnit (Power reception and distribution monitoring (standard product 7 circuits))	EMU2-RD7-C		Remote device station	1 station occupied
EnergyMeasuringUnit (Power reception and distribution monitoring (3P4W 2 circuits))	EMU2-RD2-C-4W		Remote device station	1 station occupied
EnergyMeasuringUnit (Power reception and distribution monitoring (3P4W 4 circuits))	EMU2-RD4-C-4W		Remote device station	1 station occupied
EnergyMeasuringUnit	EMU3-DP1-C		Remote device station	1 station occupied
MDU breaker (WS-V)	MDU(WS-V)	NF250-SEV/HEV with MDU	Remote device station	1 station occupied
MDU breaker (WS)	MDU(WS)	NF400-SEP/HEP with MDU NF600-SEP/HEP with MDU NF800-SEP/HEP with MDU	Remote device station	1 station occupied
Low-voltage air circuit breaker (AE-SW with CC-Link interface unit)	AE-SW(BIF-CC)		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSHA-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSRA-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSH-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSR-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96NSR		Remote device station	1 station occupied
Electronic multi-measuring instrument with transmission function	ME110SSR-C(H)		Remote device station	1 station occupied
Electronic multi-measuring instrument with transmission function	ME110NSR-C		Remote device station	1 station occupied
Thermocouple temperature input unit	AJ65BT-68TD		Remote device station	4 station occupied
Platinum resistance temperature sensor Pt 100 temperature input unit	AJ65BT-64RD3		Remote device station	4 station occupied
Analog-digital conversion unit	AJ65BT-64AD		Remote device station	2 station occupied
Terminal block type 24 VDC input unit (8 points)	AJ65SBTB1-8D		Remote I/O station	1 station occupied
Terminal block type 24 VDC input unit (16 points)	AJ65SBTB1-16D		Remote I/O station	1 station occupied
Terminal block type 24 VDC input unit (32 points)	AJ65SBTB1-32D		Remote I/O station	1 station occupied
Terminal block type DC input transistor output combined unit (Input 8 points, Output 8 points)	AJ65SBTB1-16DT		Remote I/O station	1 station occupied
Terminal block type DC input transistor output combined unit (Input 16 points, Output 16 points)	AJ65SBTB1-32DT		Remote I/O station	1 station occupied
CC-Link master/local unit (Local station)	QJ61BT11N		Intelligent device station	1 station occupied
CC-Link master/local unit (Local station)	LCPU/LJ61BT11		Intelligent device station	1 station occupied

*1 EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB are main units of EcoMonitorPlus.
*2 EMU4-A2, EMU4-VA2, EMU4-AX4, EMU4-PX4 are extension units of EcoMonitorPlus.
*3 Conbination of main unit and extension unit occupied 1 station.

MES3-255C-EN, MES3-255C-DM-EN (MODBUS®)

Product Name	Icon/type name
Electronic multi-measuring instrument	ME96SSHA-MB
Electronic multi-measuring instrument	ME96SSRA-MB
Electronic multi-measuring instrument	ME96SSEA-MB
Electronic multi-measuring instrument	ME96SSH-MB
Electronic multi-measuring instrument	ME96SSR-MB
Electronic multi-measuring instrument	ME96SSE-MB
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W)	EMU4-BD1-MB
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-HD1-MB
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-FD1-MB
Energy measuring standard model *1	EMU4-BM1-MB
Energy measuring high performance model *1	EMU4-HM1-MB
Insulation Monitoring model *1	EMU4-LG1-MB
Energy measuring extension model for same voltage system *2	EMU4-A2
Energy measuring extension model for different voltage system *2	EMU4-VA2
Energy measuring extension model for analog input *2	EMU4-AX4
Energy measuring extension model for pulse/digital input *2	EMU4-PX4

*1 EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB are main units of EcoMonitorPlus.
*2 EMU4-A2, EMU4-VA2, EMU4-AX4, EMU4-PX4 are extension units of EcoMonitorPlus.

Related Products

EcoMeasureⅢ daily/monthly report specific consumption analysis software

This software supports the specific consumption analysis graph and ledger preparation of daily reports, monthly reports and annual reports from CSV files collected and output by the Mitsubishi Electric EcoWebServerⅢ Energy-saving Data Collection Server.
* The supporting product version, EcoWebServerⅢ with demand monitoring function, for EcoMeasureⅢ, will be released soon.

Features

(1) Easily create daily, monthly and annual reports.
- Ledger prepared ledger is saved as an Excel file in user-designated place.

(2) Easily perform specific consumption management as the index of energy-saving activities.
- Possible to manually input production volume and perform specific consumption management of energy information from EcoWebServerⅢ and E-Energy.
- Possible to prepare each specific consumption graph (zoom, daily, weekly and monthly).

(3) Easily collect data.
- CSV files stored in EcoWebServerⅢ and E-Energy can be downloaded with simple operations.

Product Appearance

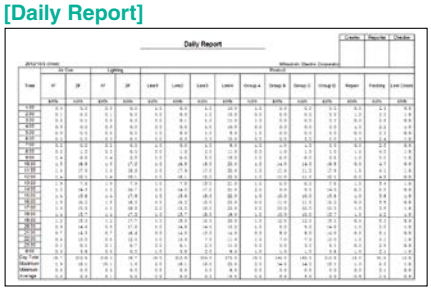


Specifications

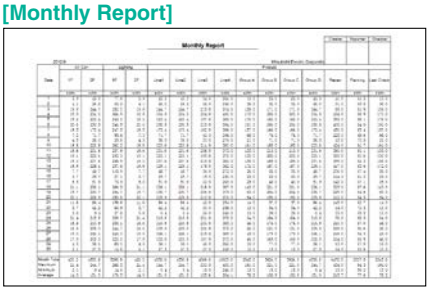
Item		Specifications	
Model name		MES3-SW1-DR-FR	
Language		English, Chinese *1	
Connection devices	Number of units	8 units maximum (combination of following target devices)	
	Target devices	EcoWebServerⅢ	
Number of virtual measurement points		Maximum 95 points (Total of 95 points including virtual measurement points for calculating measurement management points and virtual measurement points for input.) * Four arithmetic operations of up to 64 measurement management points (including constants) can be registered in the virtual measurement points for calculation.	
Number of virtual measurement point groups		Maximum five groups *Addition/Subtraction calculations for up to 32 virtual measurement points can be registered in the virtual measurement point groups.	
Ledger creation function	Ledger creation	Daily report creation, monthly report creation, annual report creation	
	Maximum number of items	The daily, monthly and annual reports can have up to 2,250 output items.	
	Calculation items	Analog (including specific consumption)	Maximum, minimum, average
		Pulse	Total, maximum, minimum, average
		Demand	Maximum
Specific consumption management function	Specific consumption display	Daily specific consumption, weekly specific consumption, monthly specific consumption and zoom specific consumption *2	
	Number of specific consumption	Maximum 100 points	
	Specific consumption target value	Can set by each specific consumption	
	Graph display	Specific consumption, target value, production volume, power used (kWh), accumulated power volume (kWh) * The specific consumption/target value/production volume units can be set freely.	
		Auto-scale function	
	List display	Daily/weekly/ monthly specific consumption	Power volume (kWh), production volume, specific consumption, accumulated power volume (kWh), accumulated production amount, specific consumption target value
		Zoom specific consumption	Power volume (kWh), production volume, specific consumption, power use/hour
	Automatic updating	Daily/weekly/ zoom specific consumption	Contents of display newly updated at designated time once per hour each hour
		Monthly specific consumption	Contents of display newly updated at designated time once per day each day
Operation environment	OS (basic software)	Microsoft Windows Vista® (32bit) (SP2) Home Basic / Home Premium / Business / Enterprise / Ultimate Microsoft Windows Server 2003(32bit) (SP2) Standard Microsoft Windows 7(32bit/64bit)(SP1) Professional Microsoft Windows 8.1 Pro（32bit/64bit） Microsoft Windows 10 Pro（32bit/64bit）	
	Required software	Microsoft Excel 2003(SP3) / 2007(SP3) / 2010(32bit/64bit)(SP1)	
	CPU	If using Windows XP : Pentium processor of 400MHz or higher or a compatible microprocessor (DOS/V- compatible) If using Windows Vista® or Windows 7 : As recommended for the operating system	
	Memory *3	As recommended for the operating system	
	Hard-disk *3	Software: Approx. 100MB or more	Data: 8GB or more *4
	CD-ROM drive	1 drive (for installing software)	
	LAN	10/100/1000BASE-T ×1	
	USB connector (Type A)	1 connector (for connecting hardware key)	
	Display resolution	800×600 pixels or more	
	Display color	256 colors or more	
Number of licenses (number of computers installed in)		• 1 license per 1 client • Hardware key attached (USB) (1 unit)	

*1 It needs to start in the Chinese version of Microsoft operating system (OS).
*2 If virtual measurement points for input or measurement points for E-Energy are included, no zoom specific consumption is displayed.
*3 Note that the required memory and available hard-disk space may vary depending on the system environment.
*4 Shows the capacity required when used with maximum eight subsystems connected.

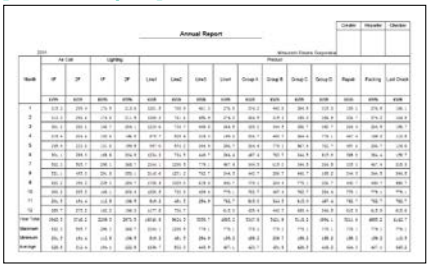
[Daily Report]



[Monthly Report]



[Annual Report]



We would like to improve the productivity and quality without changing the existing equipment.

We cannot afford large cost required for new equipment or modifying the existing equipment.

We would like to save energy, and be environmentally friendly.

We do not have enough workers engaged in examination for improvements and migration.

We would like to acquire and analyze data quickly.

We would like to preventive maintenance.



Equipment System Migration in 3 Steps

Mitsubishi Electric will propose a variety of products and functions based on various keywords to eliminate concerns of customers.

Step 1 [Stable operation] [Extension of equipment service life] [Preventive maintenance]

- Selecting the proper latest model
- Downsizing and space saving
- Replacing existing products manufactured by other companies with Mitsubishi products
- Improving the maintainability
- Utilizing the software assets and resources
- Improving the operability
- Step-by-step migration
- Preventive maintenance realized by migration

Step 2 [Productivity improvement]

- High-speed, high-accuracy control
- Smart wiring
- High-speed, large-capacity communication
- Networking

Control equipment

Not only various functions, high speed, large capacity and extensive networking but also top class reliability are proved by long-term actual achievements.

Mitsubishi PLCs

MELSEC iQ-R series



MELSEC Q series



MELSEC L series



Mitsubishi micro PLCs

MELSEC iQ-F series



MELSEC-F



Mitsubishi graphic operation terminals

GOT2000 Graphic Operation Terminal



Drive equipment

Mitsubishi inverters

FREQROL

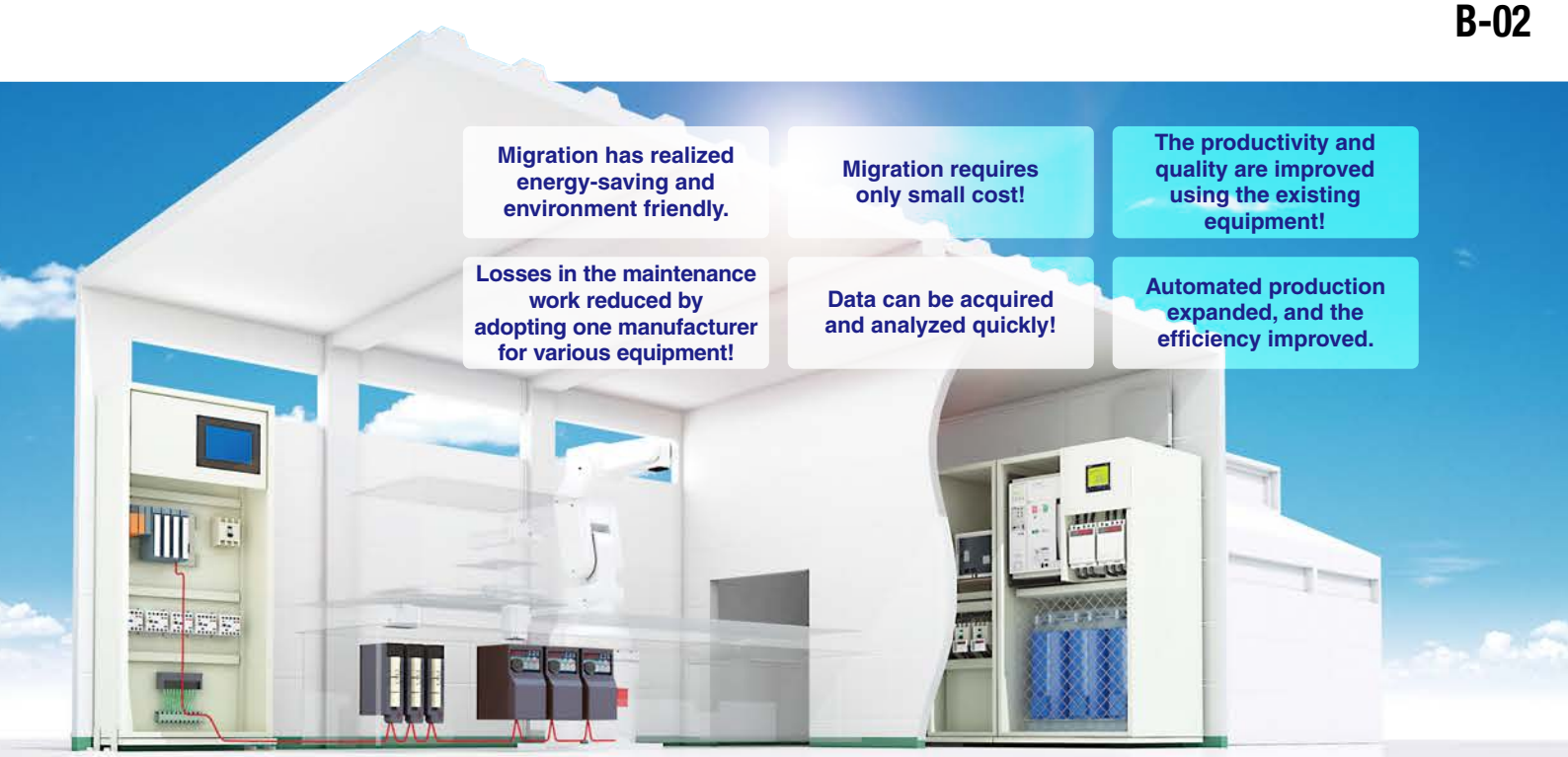


Mitsubishi AC servos

MELSERVO



SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK



Preventive maintenance and product life

Preventive maintenance of equipment and devices is required to use FA equipment for a long time.

There are two concepts of preventive maintenance.

Daily maintenance and inspection (Visual inspection)
- Indicator lamps (in the equipment main body, devices and units)
- Equipment mounting status
- Cable connection status

Periodic maintenance and inspection (Visual inspection)
- Maintenance of electrical equipment
- Ambient environment
- Checking stored programs

Product life

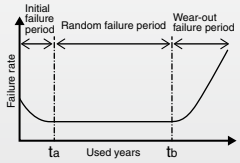
Service life 10 years

Overhaul maintenance 5 years

- Mitsubishi Electric recommends 10 years as the service life of FA equipment.

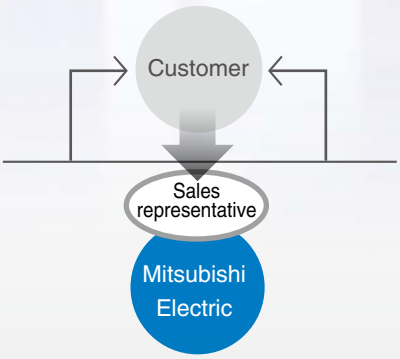
Replacing a unit whose service life is expired

Even if a unit is operating normally, the failure rate is high because each part is worn out and damages (related to the power ON time, surge, etc.) are accumulated.



- Mitsubishi Electric recommends overhaul maintenance of FA equipment in 5 years since the start of operation.
  - Maintenance of units (to prevent short-circuit by removing dust and adhering substances)
  - Replacement of parts requiring periodic replacement (such as fuses, batteries and memory cards)
  - Overhaul of units incorporating parts having limited service life*

*Aluminum electrolytic capacitors, fuses, relays, etc.



Mitsubishi Electric will support migration of equipment for the customer in cooperation with the sales representative.

[Quality improvement] [Promotion of energy saving]

- Standardizing the maintenance tool
- Utilizing the GOT
- Quick recovery from machine alarms
- Supporting and implementing energy saving

Mitsubishi Electric's motor control technology is advancing everyday. Mitsubishi drive equipment contribute to the realization of not only high functions and high performance but also energy saving.

Mitsubishi industrial robots

MELFA



Step 3

[Visualization] [Automation] [Safety and security measures]

- Acquiring, judging and analyzing data
- Image recognition inspection
- Automating inspections and judgments
- Safety control equipment
- Automation and labor saving by robots
- Duplicating the CPU
- Constructing the MES (manufacturing execution system)

Distribution control equipment

Mitsubishi Electric supports stable supply of electric power with its wide variety of products in the distribution control field, and proposes aggressive energy saving achieved by migration.

Mitsubishi low-voltage distribution control equipment



World Super WS-V Series



SS Super-S Series



MS-T series

Mitsubishi PLCs

How is the current status of the existing PLC?

Mitsubishi PLCs



MELSEC-A (large type) Discontinued September 2008

MELSEC-A (small type) Discontinued September 2014



A/QnA (large type), A2C, AnS (small type), AOJ2(H)

[Concerns about the existing equipment]

The equipment is working fine, but is getting old.

We would like to upgrade but the performance has reached the limit.

Components from different brands are installed in the equipment which is making maintenance troublesome.

[Concerns for migrating]

Need to keep the equipment running.

Don't know to which product to migrate to.

Can't read out the existing programs.

Mitsubishi Electric can eliminate these concerns!

Mitsubishi Electric offers various tools for replacement with latest models.

Mitsubishi Electric

A to Q migration catalogs and case examples

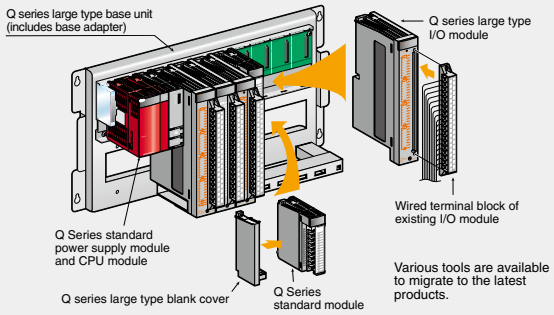
- MELSEC-A Series (large type) Transition Guide
- MELSEC A Series (small type) Transition Guide
- MELSEC-A Series Transition Examples



For example

A to Q hardware replacement!

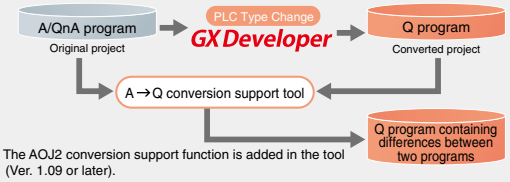
The hardware can be replaced without changing the size and location.



For example

A to Q program replacement!

Existing programs can be automatically converrted into Q programs using "PLC Type Change" in GX Developer (also included with GX Works2).
By converting both an existing program and a converted program into "Q program containing differences between two programs" using the A to Q conversion support tool (which can be downloaded free of charge), the correction efficiency is considerably improved.



* The AOJ2 conversion support function is added in the tool (Ver. 1.09 or later).

Migrate to the latest Mitsubishi PLCs!!

Mitsubishi supports migration with various tools and accumulated know-how.

Mitsubishi PLCs

MELSEC iQ-R series



►P.10

MELSEC Q series



►P.88

MELSEC L series



►P.118







Partner manufacturers

A to Q migration tool catalogs

●Migration tool catalogs



Mitsubishi Electric Engineering Co., Ltd.



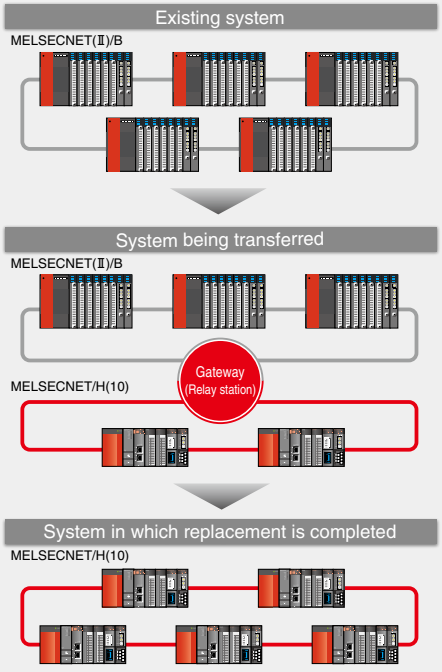
Mitsubishi Electric System & Service Co., Ltd.

Tools to easily migrate from A series to Q series available.

For example

Network replacement!

Mitsubishi data link system “MELSECNET” can be replaced in various methods.



[Benefits of migration]

- 3 year warranty!
- Easy connection with multiple communication ports!
- High speed and large capacity CPU!
- Improve efficiency with various convenient instructions!
- Abundant lineup enables selection of product suitable for the required specifications.
- The control panel can be downsized.
- Enhanced program security function!

Mitsubishi Micro PLCs

How is the current status of the existing PLC?

Mitsubishi micro PLCs



FX1S/FX1N/FX1NC
To be discontinued
December 2015

FX2N/FX2NC
Discontinued
September 2012

F1, F1J, F2, FX1, FX2, FX2C, FX0, FX0S, FX0N, FX1S, FX1N, FX1NC, FX2N, FX2NC

[Concerns about the existing equipment]

- The equipment is working fine, but is getting old.
- We would like to upgrade but the performance has reached the limit.
- Components from different brands are installed in the equipment which is making maintenance troublesome.

[Concerns for migrating]

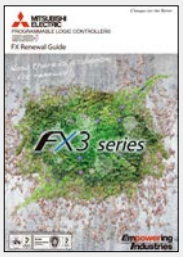
- Need to keep the equipment running.
- Don't know to which product to migrate to.
- Can't read out the existing programs.

Mitsubishi Electric can eliminate these concerns!

Mitsubishi Electric offers various tools for replacement with latest models.

Migration catalog

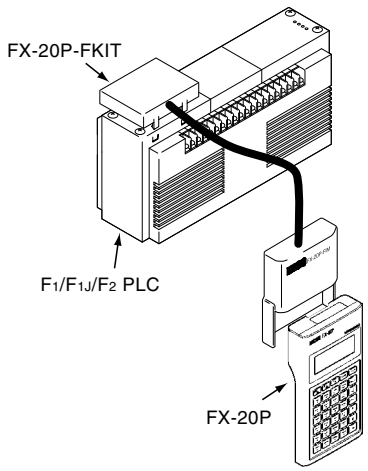
●FX Migration Guide



For example

F (F1, F1J, F2) series replacement!

The combination "FX-20P + FX-20P-FKIT" is available.



The F (F1, F1J, F2) series can be replaced by the FX series while reading out existing programs using the combination "FX-20P + FX-20P-FKIT".
After existing programs are transferred to the FX series, they can be corrected and debugged using GX Works2.

FX-20P
Discontinued
December 2012

* Contact your local dealer.

Migrate to the latest Mitsubishi PLCs!!

Micro PLCs are downsized compared to legacy models, and can fit into the existing space. Programs can be replaced with FX-20P-FKIT for F series or with GX Works2 for FX series.

Mitsubishi micro PLCs

MELSEC iQ-F series





►P.48

Mitsubishi micro PLCs

MELSEC-F FX3 series





►P.134

●Migration Guide from FX2N/FX2NC to FX3



●Migration Guide from FX1N/FX1NC to FX3



For example

Legacy FX series replacement!

Legacy FX series program can be transferred to the latest product by using PC type change function of GX Works2.

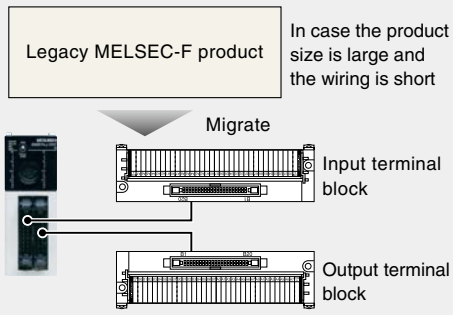
Programming software

GX Works2



For example

Replacing wiring!



Large size legacy product can be replaced easily with connector type FX series PLC and terminal block product of partner vendors.
(Connector type requires 24 V DC power supply)

[Benefits of migration]

- 3 year warranty!
- Easy connection with multiple communication ports!
- Expansion boards enable expansion at low cost!
- Convenient built-in functions enable system configuration at low cost!
- Abundant lineup enables selection of product suitable for the required specifications.
- Improve efficiency with various convenient instructions!
- Enhanced program security function!
- High-function and compact extension modules are available!

Mitsubishi graphic operation terminals

How is the current status of the existing GOT?

Mitsubishi graphic operation terminals



GOT-A900 series

GOT-A900 Discontinued March 2009



GOT-F900 series

GOT-F900 Discontinued March 2011

[Concerns about the existing equipment]

- The product is getting old and is not well maintained.
- Screen datas are not backed up.
- Components from different brands are installed in the equipment which is making maintenance troublesome.

[Concerns for migrating]

- Do we have to drill holes to replace?
- Can the screen data be replaced?
- Can we replace other brand HMI with GOT1000 or GOT2000 series products?

Mitsubishi Electric can eliminate these concerns!

Mitsubishi Electric offers various tools for replacement with latest models.

Migration documents

- Technical Bulletin for replacement of GOT-A900 with GOT1000



- Technical Bulletin for replacement of GOT-1000 with GOT2000



For example

Migration tool

Optional attachment is available for replacing GOT-900 to GOT1000 series with different screen size.

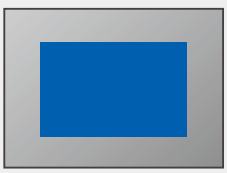


For example

Replacing of a Mitsubishi legacy product or other brand HMI!



Screen data created in the GOT-A800 series SW3NIW-A8GOTP



Screen data created in the GP-PRO/PB-III series manufactured by Digital Electronics Corporation

Migrate to the latest Mitsubishi Graphic Operation Terminals!!

GOT series has same panel-cut dimensions when the screen size is the same. Screen data can easily be replaced using GT Works3. GOT with the latest functions can reduce loads on the PLC, and can back up data.

Mitsubishi Graphic Operation Terminals

GOT2000

Graphic Operation Terminal





►P.566

Documents for migrating GOT-F900 series

●GOT-F900 Migration Guide ●Replacement Guide





For example **GT Works3 +plus**

comes with the following software to convert screen data from GOT-900 series to GOT1000, GOT2000 series.



GT Designer2 classic

GT Designer3

[Benefits of migration]

- 3 year warranty!
- Front side USB port enables easy maintenance*

* Excluding some models

- Can be connected to various networks!
- Easy connection with multiple communication ports!
- Decentralize control to GOT to assure stable operation!
- Improves visibility with brilliant color LCD!
- Abundant lineup enables selection of product suitable for the required specifications.
- Logging function to improve quality!

GT Works3 comes with GT Converter2 to convert screen data of legacy models and other brand HMI to GOT1000/GOT2000 series.

Screen design software

GT Works3
GT Works3 +plus
GT Convertor2



Mitsubishi Graphic Operation Terminals

GOT2000 series
GOT1000 series



GOT Mobile

Monitor your worksite anytime, anywhere.

Check the equipment status using a web browser.



Mitsubishi inverters

How is the current status of the existing inverter?

Mitsubishi inverters



A700 A500 F500



E500 S500

[Concerns about the existing equipment]

Replacement of service life limited components may be needed soon.

Need to manage and control many units.

Need to improve energy efficiency.

[Concerns for migrating]

Are there compatible products to the existing obsolete products?

How can we replace the parameters?

We are using coil type motor, eddy current joint type motor (AS), direct current (DC) motor, and have difficulty in daily and preventive maintenances.

Mitsubishi Electric can eliminate these concerns!

Mitsubishi Electric offers various tools for replacement with latest models.

Migration documents

- Inverter migration proposal



For example

Convenient compatibility

- Parameters can be converted easily using the convert function of “FR Configurator2” (optional) parameter setting software.



* Supports conversion from A500 to A800.

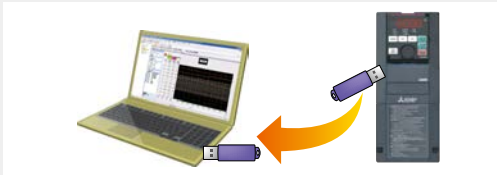
- The mounting compatibility with conventional models is secured.
- Mitsubishi Electric offers the (optional) mounting compatibility attachment though the compatibility may be different in some models.



Advantages of migration to the 800 series

- In the FR-A800 and F800 series, the trace function can store the operation status (such as the output frequency) just before activation of the protection function in the RAM built in the inverter. The stored data (trace data) can be copied to the USB memory. Troubleshooting can be performed easily even in distant places when the trace data is captured by the software (FR Configurator2) set up in the inverter.

The trace data stored in the built-in RAM is erased when the power is turned OFF or the inverter is reset.



Migrate to the latest Mitsubishi inverters!!

Abundant tools and documents to support migration are available.
Parameters can be converted easily using FR Configurator2.
Mitsubishi inverters with the latest functions considerably improves energy saving and ease of maintenance!

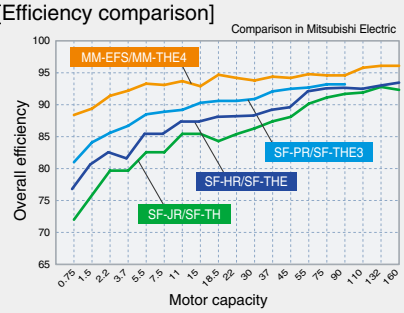
Energy saving

Replace with high-efficiency IPM motor (MM-EFS series)



- The FREQROL-F800 series is compatible with the IPM motor.
- Replacement is easy due to frame number being the same as that of the standard three-phase motor.

[Efficiency comparison]



- IPM motor with permanent magnet is more efficient than the high-performance energy-saving motors.
- Efficiency level meets "IE4 (super premium efficiency)" of international standard IEC 60034-30. (As of March 2013)

Improved ease of maintenance

Latest series use long service-life components and most advanced life diagnosis which improves ease of maintenance.

- Approximate life of limited service life components

Part name	Approximate service life	Service life specified by JEMA
Cooling fan	10 years	2 to 3 years
Capacitor for smoothing main circuit	10 years	5 years
Smoothing capacitor on PC Board	10 years	5 years

- Deterioration degree of main circuit capacitors, control circuit capacitors and rush current suppression circuits can be monitored.
- Self-diagnosis function sounds alarm for components having limited service life to prevent failures.

**It is economical to use Mitsubishi inverters for drive when Mitsubishi PLCs are used for control.
CC-Link and RS-485 communication enable precise control of multiple inverters.**



A800 ►P.438



F800 ►P.490



E700 ►P.522



D700 ►P.556









[Benefits of migration]

- Improved ease of maintenance with long service life components.
- Easy control with abundant network connections!
- Life diagnosis function notifies remaining service life of components!
- "Close contact" installation design saves installation space (E700 and D700).
- Easy operation with M dial
- Easy wiring (A800, F800 E700SC and D700).
- Abundant lineup enables selection of product suitable for the required specifications!
- Parameters can be copied using the USB memory (A800 and F800).
- The magnet motor is also available (A800 and F800).
- Easy replacement of cooling fan

Mitsubishi industrial robots

How is the current status of the existing robot?

Mitsubishi industrial robots



P series
EN series

M series
A series

E series
S series

[Concerns about the existing equipment]

Want to improve productivity of the equipment.

Maintenance is hard due to increased failures.

Want to visualize all standalone robots.

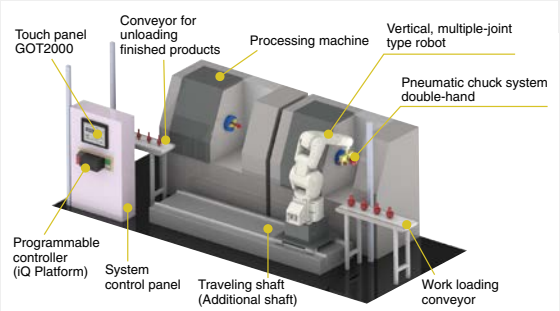
Mitsubishi Electric can eliminate these concerns!

It contributes to productivity, the improvement in reliability, and total cost reduction.

For example

Loading/Unloading of parts to a processing machine

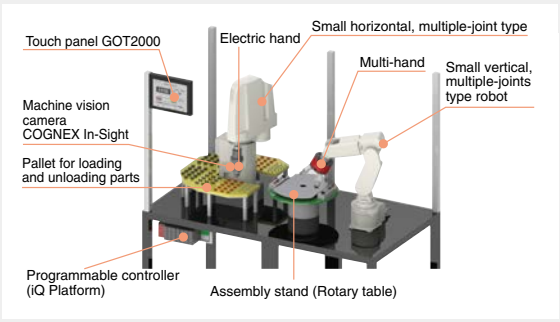
(A lathe, a machining center, a press machine, and a make-up machine, etc.)



For example

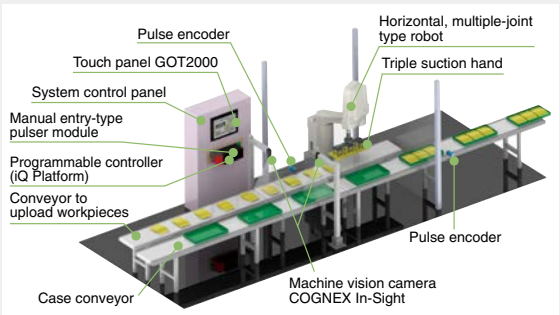
Assembly of electric components

(switch)



For example

Conveyor alignment for packed food products



Migrate to the latest Mitsubishi robots!!

Points for the employment of robots

A vertical, multiple-joint type robot realizes high-speed loading and unloading of parts to a processing machine. (Oil mist proof) Additional traveling shaft improves the operating rate of a robot and efficiently utilizes the facility.

Advantages

- Improvement of environmental resistance
- Smooth hand-over of products with various processing machines
- Higher operating rate of robot
- Shorter cycle time

Points for the employment of robots

High-speed parts kitting with a horizontal, multiple-joint type robot, fine assembly with a vertical, multiple-joint type robot, and the ability to handle a variety of workpieces with a high-functioning hand (a multi-hand and an electric hand)

Advantages

- High-speed kitting
- Capable of handling a wide variety of workpieces using only a small space
- No need to change hands to switch a kind of work
- Complicated assembly process
- Reduction of cycle time

Points for the employment of robots

High-speed vision-tracking of horizontal, multiple-joint type robot realizes non-stopping alignment process. It also processes simultaneous tracking for multiple conveyors.

Advantages

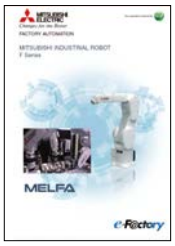
- High-speed tracking
- No need of alignment device
- Reduction of cycle time
- Stable quality due to automated process





iQ Platform

SQ series supports iQ Platform and enables higher speed control.



►P.636

[Benefits of migration]

- High-speed control improves tact time!
- Robot CPU in iQ Platform saves wiring
- Multiple robots can be controlled together.
- Robot can be controlled using PLC language!
- Downsized robot saves installation space.
- Improved operability with easy connection of GOT

Mitsubishi AC servos

How is the current status of the existing AC servo?

Mitsubishi AC servos



MR-J2S
To be discontinued
August 2015.

MR-A, MR-J, MR-J2, MR-J2S, MR-H, MR-SA/SB/SC/SD, MR-SO, MR-VA/VC

[Concerns about the existing equipment]

- AC servos is not tuned correctly and generates large noise.
- Takes time to complete positioning.
- Motor seems to be okay but the amplifier is a concern.

[Concerns for migrating]

- Are there compatible products to the existing obsolete products?
- Can the hardware be replaced easily?
- How can we replace the parameters?

Mitsubishi Electric can eliminate these concerns!

Various tools are available to migrate to the latest products.

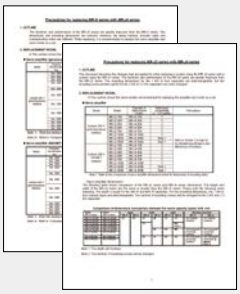
Mitsubishi Electric

Replacement support documents

- MR-J2-Super series migration catalog



- Cautions on replacement of the MR-J/MR-H series



- Migration Guide from MR-J2 Super/J2M series to MR-J4 series

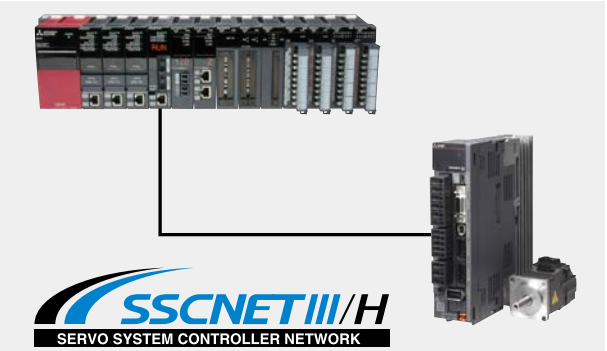


- New Product Newsletter for MR-J2S-B SSCNET conversion unit



MR-J4-B is recommended for replacing legacy Mitsubishi products and other manufacturers products.

- SSCNET III/H enables a simple system with less wiring.
- MR Configurator2 enables easy adjustment, monitor display, parameter setting, etc.



Migrate to the latest Mitsubishi AC servos!!

Abundant tools to support easy migration are available.
In multi-axis control, combining the motion controller contributes to function upgrade and space saving!



►P.270

MITSUBISHI SERVO AMPLIFIERS & MOTORS
MELSERVO-J4

0.05kW to 22kW



Partner manufacturer

●Migratoin tools available from Mitsubishi Electric System & Service Co. Ltd.

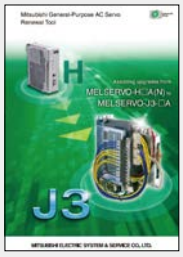
For replacing MR-J series



For replacing MR-J2S series



For replacing MR-H series



For replacing MR-SA series



For example

In case of MR-J2S series







Servo can be replaced with MR-J3A type using the migration tool.

[Benefits of migration]

- Easy servo adjustment to fit the equipment!
- Easy wiring with SSCNET III/H or SSCNET III.
- High-response control improves tact time!
- Easy setting of electronic gear.
- Smooth operation due to reduced cogging torque
- Easy tuning function
- Abundant lineup enables selection of product suitable for the required specifications!
- Space saving design allows close contact installation

Mitsubishi low-voltage distribution control equipment

How is the current status of the existing low-voltage distribution control equipment?

Low-voltage circuit breakers



No-fuse circuit breaker
NF225-SS series



No-fuse circuit breaker
NF2000 series

Need to replace the breaker because the current capacity has changed.

Concerned about aging products malfunctioning.

Need to replace the large obsolete products to save space.

Electromagnetic switches



Electromagnetic contactors
MS-K series

Concerned about aging products malfunctioning.

Want to save space by migrating to the latest products.

Power management measuring unit



Mechanical measuring unit

Concerned about aging products malfunctioning.

Need to reduce measuring work.

Mitsubishi Electric can eliminate these concerns!

Migrate to the latest Mitsubishi low-voltage distribution control equipment!!



No-fuse circuit breakers

World Super WS-V Series



Low-voltage air circuit breakers

world Super AE

Downsized products allows panel space saving.
Functions can be upgraded just by replacing.
Can prevent unnecessary operations of the earth-leakage circuit breaker by high function IC.



Electromagnetic contactors
MS-T series

Terminal cover installed for added safety.
Downsized products allows panel space saving.



Electronic multi-measuring instruments
ME96SS series

SS
Super-S Series

LCD improves visibility.
Easy data collection with communication function.
Various options facilitate setting changes for the display and output devices (electronic measuring instrument).

Product catalogs

●Mitsubishi WS-V Series Molded Case Circuit Breakers and Earth-leakage Circuit Breakers

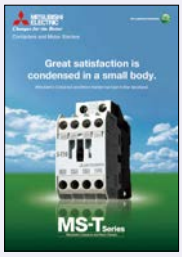


●Mitsubishi WS-AE Series Low Voltage Air Circuit Breakers



Product catalogs

●Mitsubishi MS-T Series Electromagnetic switches



Product catalogs

●Mitsubishi Super-S Series Electronic Multi-measuring Instrument ME96SS



Migrations by Mitsubishi Electric

Furthermore, Mitsubishi's migration can:

Energy measuring unit EcoMonitorLight

Single-circuit measuring unit, display unit, and setting unit integrated into a single measuring unit.
Allows easy and low cost energy "visualization".
Built-in MODBUS® communication allows system upgrade.



MDU breaker*

In addition to circuit breaker function, this product continuously monitors the electric circuit information (power amount, load current, leakage current, etc.) and enables centralized monitoring through communication.



No-fuse circuit breaker/ earth-leakage circuit breaker equipped with leakage current indication*

These products monitors leakage current data and investigate causes of electric leakage.



* These equipment are not sold in the USA.

Mitsubishi FA products can "visualize" power management equipment and of production equipment.

Directly connected to Q series PLC.



Electric power measuring unit [QE84WH]
PLC measures power information up to 4 channels which enables standard data control and state monitoring in each production equipment.



Insulation monitoring unit [QE821LG]
PLC continuously monitors the insulation status and supports preventive maintenance of the production equipment.



[Benefits of migration]

Low-voltage circuit breakers

- Downsized to save panel space.
- New circuit breaking technology allows higher performance.
- Contribute to energy saving and preventive maintenance through monitoring of the electric circuit information using the MDU breaker and others.

Electromagnetic switches

- Safe and easy wiring with CAN terminal.
- Detachable arc cover makes inspection easy.
- Save energy with low power consumption coil.

Electronic multi-measuring instrument

- Wide viewing angle LCD improves visibility.
- Set data transceiver allows easy setting and management.

The production capability of your factory

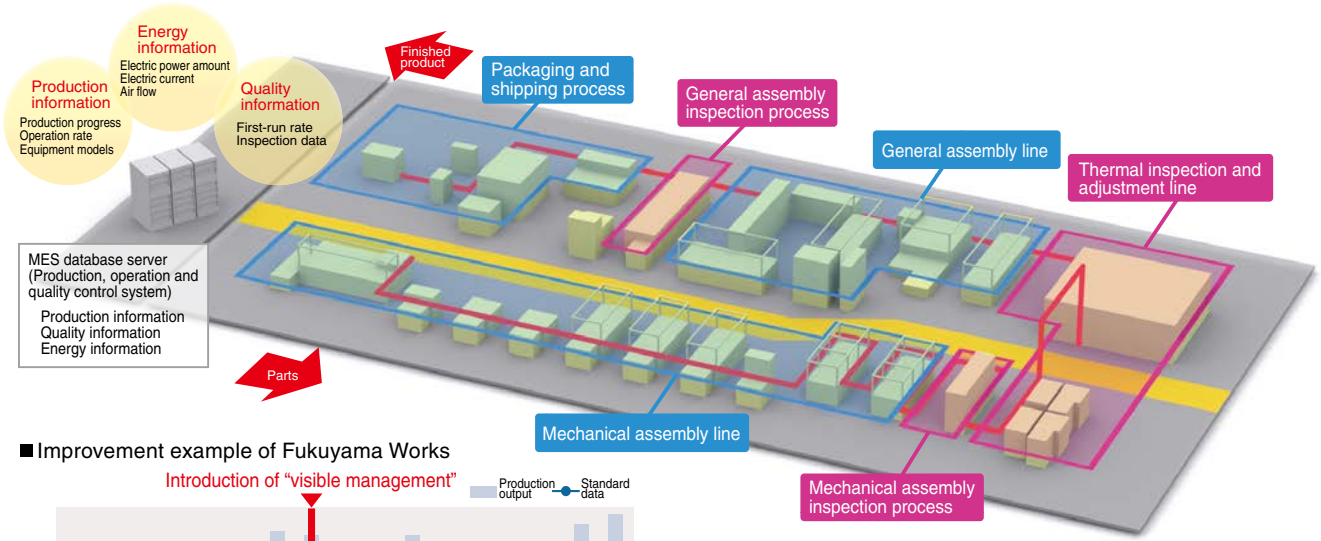
The MES interface is the key to realize the visual platform “e-F@ctory”.
A broad lineup of MES interface products of Mitsubishi Electric enables direct connection between the MES (manufacturing execution system) database and the shop floor equipment without communication gateways such as personal computers.

●Mitsubishi FA Integrated Solution e-F@ctory

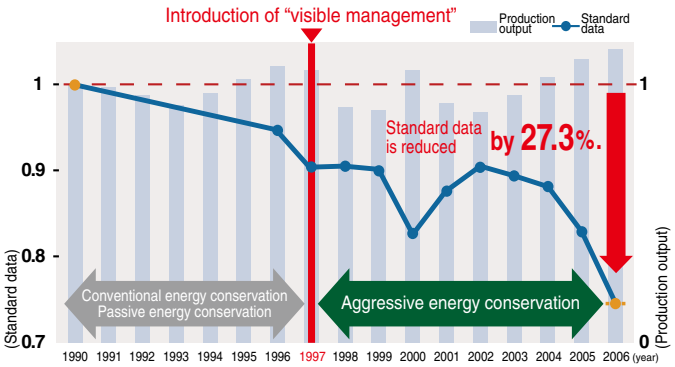


“Aggressive energy conservation”

Mitsubishi Electric’s Fukuyama Works adopted “visible management”, and is now implement “aggressive energy conservation” efforts. Fukuyama Works has realized an economical and ecological “eco factory”, and uses its eco expertise to engage in the energy conservation business.



■Improvement example of Fukuyama Works



Reduction by 27.3% in standard data
* Performance in 2006 compared to 1990

Reduction of approximately 23 million yen in basic power cost
* Performance in 2006 compared to 1990

Reduction of approximately **100 million yen** in basic power cost

* Performance in 2006 compared to 1990

Mitsubishi Electric's simple, convenient and compact EcoWebServerIII is advanced to support visible management of energy.

●Mitsubishi Energy-saving Data Collection Server EcoWebServerIII



●What is EcoWebServer?

EcoWebServer is an all-in-one type data collection server having excellent functions essential in energy-saving management of alarm units and machines.

Two types selectable



CC-Link connection type　　B-NET connection type

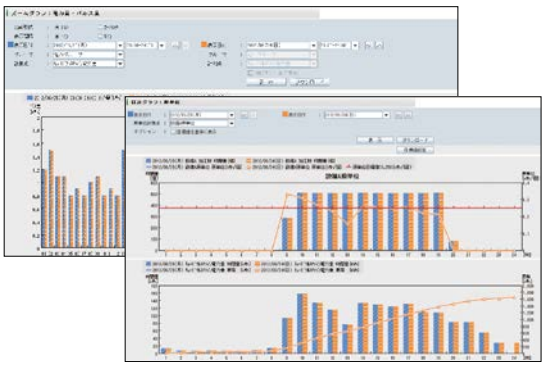
Remain available! Inherited functions

The setting software is provided as an accessory. There is no necessity to create programs.	The newly adopted universal design makes graphs easier to see.	Virtual measurement and production quantity are incorporated in the standard data control.	The measured data are processed and saved easily.
Simple setting Simple extension	**Graph display**	**Calculation function**	**CSV format Compatible with FTP**

Powered up! Improved performance

The daily data saving period has been extended from 2 months to 6 months. Extended saving period	The number of virtual measurement points and standard data measurement points have been increased.	The zoom data collection period has been reduced.
Extended saving period	**Enhanced calculation function**	**1 minute minimum**

Various graph displays are available to construct the "mechanism to let workers be aware" of status changes.



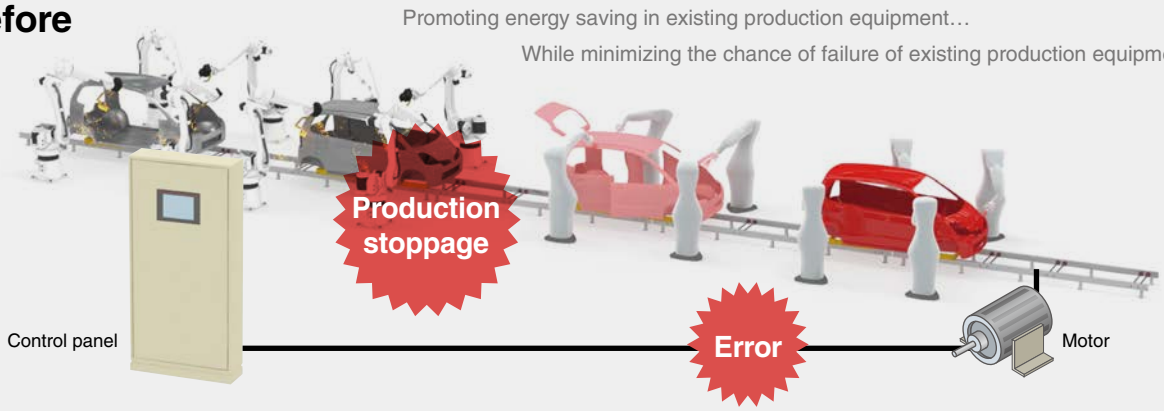
New functions added! Additional functions

Alarm outputs have been enabled to enhance the monitoring function.	The temperature and humidity data are collected for each section and application.	The energy loss in the equipment has been made visible.
Up to 16 contact outputs	**Multiple comparison**	**Equipment monitoring**

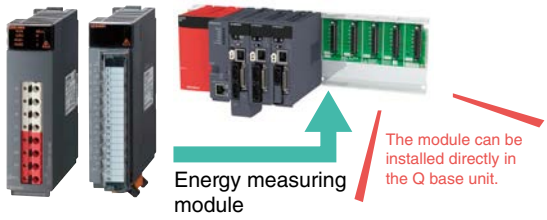
Power measurement and insulation monitoring together with PLC migration realize energy saving and preventive maintenance!

Before

Promoting energy saving in existing production equipment…
While minimizing the chance of failure of existing production equipment...



Energy Measuring Module Installation Example

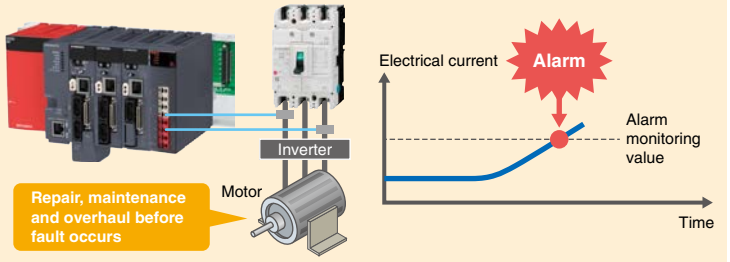


- Specific energy consumption can be managed in detail according to individual items or processes to assist in reducing the power consumption of production equipment and realize energy savings.
- Constantly measuring current (or power) consumption can help prevent serious faults and equipment failure, ultimately resulting in reduced production losses.

Preventive Maintenance Constant measurement of the electrical current

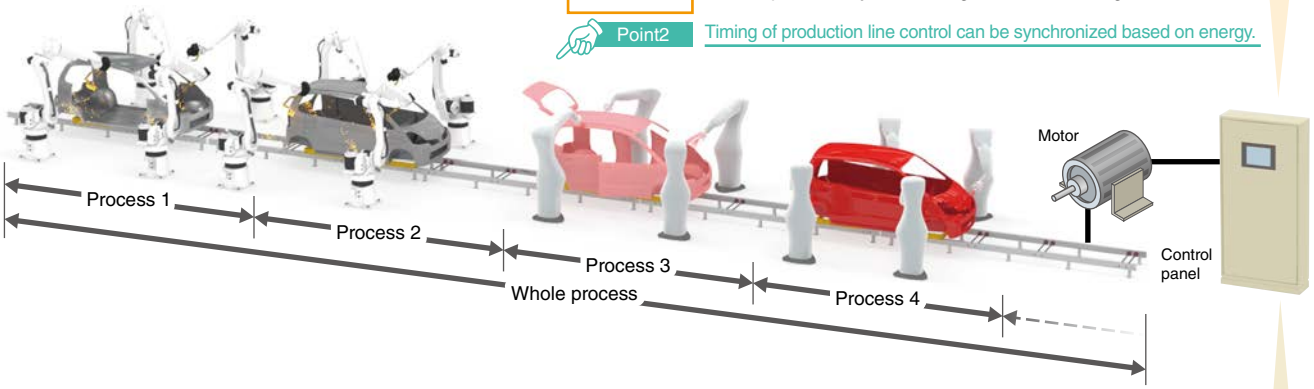
Point1 Preventive maintenance measures are taken before equipment stoppage.

Constant monitoring of the current value

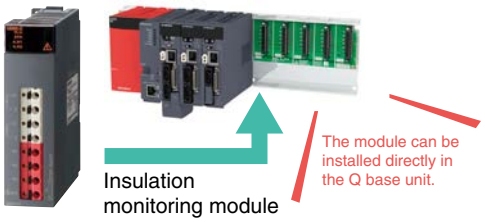


Energy Saving Item or process, synchronizing the control timing

Point2 Timing of production line control can be synchronized based on energy.



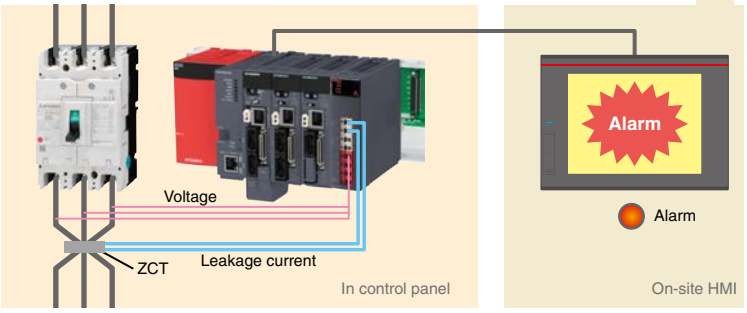
Insulation Monitoring Module Installation Example



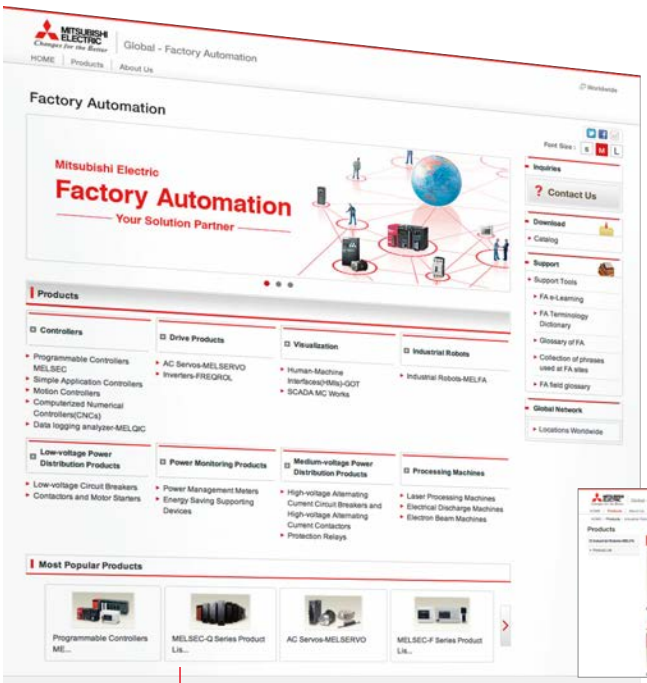
- Maintenance man-hours can be reduced by improving the efficiency of periodic inspection work.
- The resistive-component leakage current (Ior) can be measured so that a leakage current caused by insulation deterioration can be identified.

Preventive Maintenance Constant measurement of the Leakage current value, and constant monitoring for insulation deterioration for each unit/load

Point3 Prevention of sudden failure of machines and lines / Detection of insulation deterioration (earth leakage) at early stage



Global web site



Easily accessibility to the FA information of Mitsubishi Electric all over the world!

From “Worldwide” provided at the upper right corner of the top page, you can easily access to the FA web sites all over the world. On the pages for each country, you can check not only products purchasable all over the world but also the information on products developed specially for the region, catalogs and manuals in each language and various regional services. Please utilize “Worldwide” for expanding your business overseas.

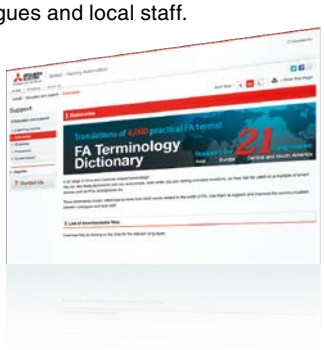


Global FA web site **www.MitsubishiElectric.com/fa**

Business support

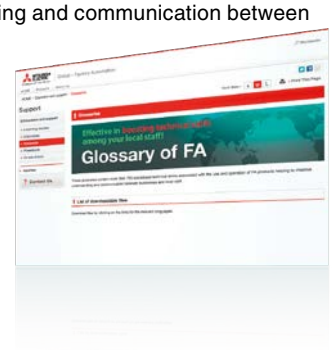
◆ Dictionaries

These dictionaries contain references to more than 4000 words related to the world of FA. Use them to support and improve the communication between colleagues and local staff.



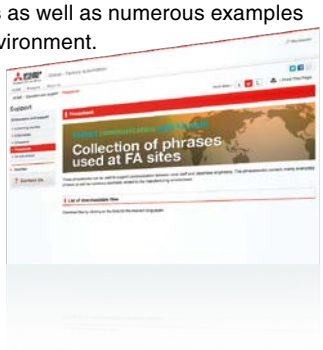
◆ Glossaries

These glossaries contain more than 750 specialized technical terms associated with the use and operation of FA products helping to improve understanding and communication between businesses and local staff.



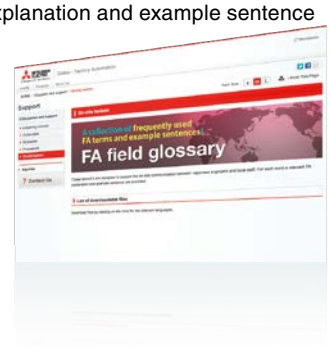
◆ Phrasebook

These phrasebooks can be used to support communication between local staff and Japanese enginners. The phrasebooks contain many everyday phrases as well as numerous examples related to the manufacturing environment.



◆ On-site lexicon

These lexicon's are designed to support the on-site communication between Japanese engineers and local staff. For each word a relevant FA explanation and example sentence are provided.



MITSUBISHI ELECTRIC ENGINEERING CO., LTD.

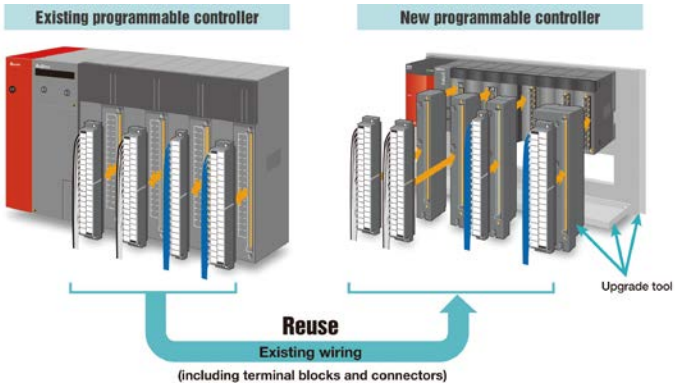
Mitsubishi Electric Engineering Co., Ltd. designs and sells peripheral components of Mitsubishi PLCs including PLC upgrade support equipment, wiring saving equipment and man-hour saving equipment.

PLC migration (upgrade) tools

Mitsubishi Electric Engineering Co., Ltd. offers migration (upgrade) tools for replacing the MELSEC-A series with the MELSEC-Q series and replacing the MELSEC-AnS series with the MELSEC-L/Q series.
The migration work time and wiring mistakes are considerably reduced by utilizing the existing wiring (including terminal blocks and connectors).

● Catalog



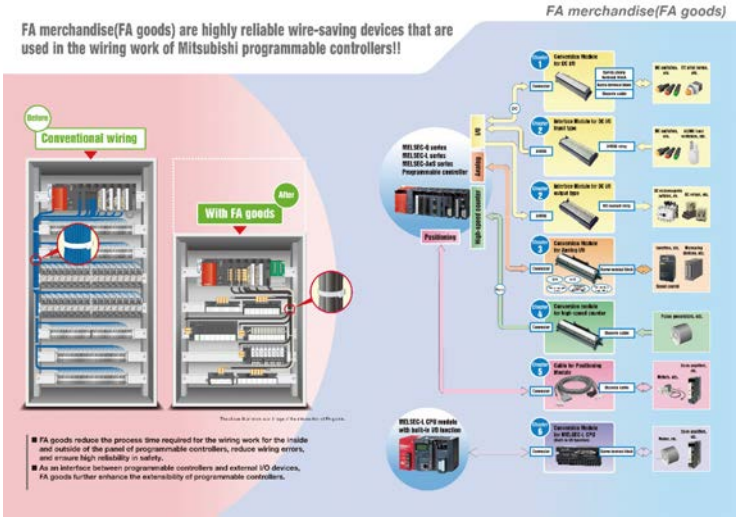


FA merchandise (FA goods)

Wiring saving equipment and man-hour saving equipment support the wiring of the PLCs.
These equipment reduce man-hours for wiring inside and outside the panel and wiring mistakes, and realize safety backed up by high reliability.

● Catalog



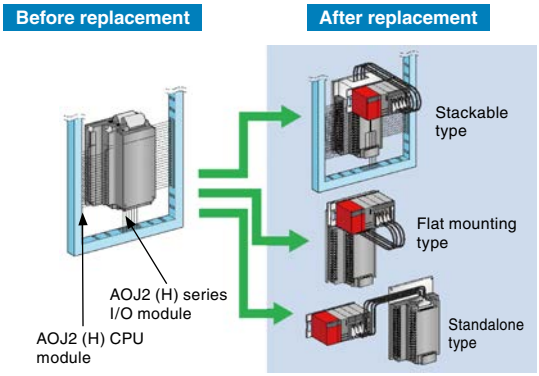


For the acquisition of Upgrade Tool and FA merchandise (FA goods), please contact your local Mitsubishi Electric sales office or sales representative.

Mitsubishi Electric System & Service Co., Ltd.

AOJ2 migration tool

This migration tool is used to replace the MELSEC-AOJ2 with the Q series.
It consists of the interface module (to which the wired terminal block of the existing I/O module can be directly mounted), Q series PLC mounting members and connection cables.
Either of three types of installation methods can be selected in accordance with the installation space.
This migration tool utilizes the existing wiring to reduce wiring mistakes and work time.

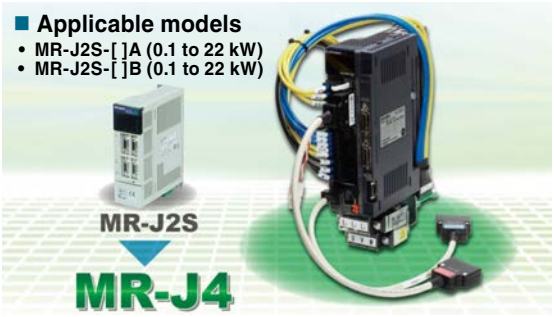


● Catalog



AC servo migration tool

This migration tool is used to replace the MR-J2Super series with the MR-J4 series.
Because the existing mounting dimensions and cables are compatible, replacement can be performed in a short time.
This migration tool is available also for step-by step migration consisting of primary replacement (in which only the amplifier is replaced) and secondary replacement (in which the motor is replaced).It utilizes your assets effectively.



● Catalog



FA integrated network cables

Mitsubishi Electric System & Service Co., Ltd. offers various network cables and wiring equipment for the controller network “CC-Link IE Control”, field network “CC-Link IE Field” and motion network “SSCNET III/H” to correspond with various applications.



CC-Link IE Control

Optical fiber cable for controller network “CC-Link IE Control”



Connection terminal for controller network “CC-Link IE Control”



CC-Link IE Field

Ethernet cable for field network “CC-Link IE Field”



Industrial switching hub for field network “CC-Link IE Field”

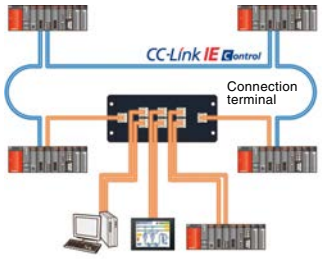


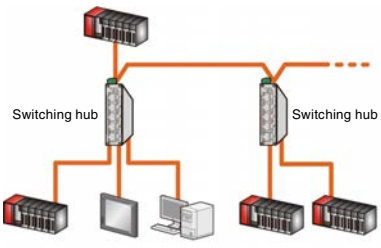
SSCNET III/H

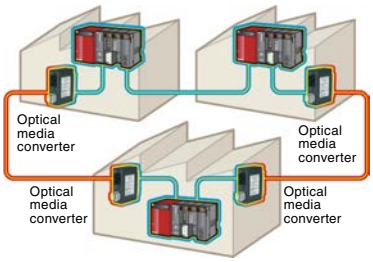
Optical fiber cable for motion network “SSCNET III/H”



Optical media converter for controller network “CC-Link IE Control”







Mitsubishi AC servo cable for MELSERVO-J4/J3/JN series

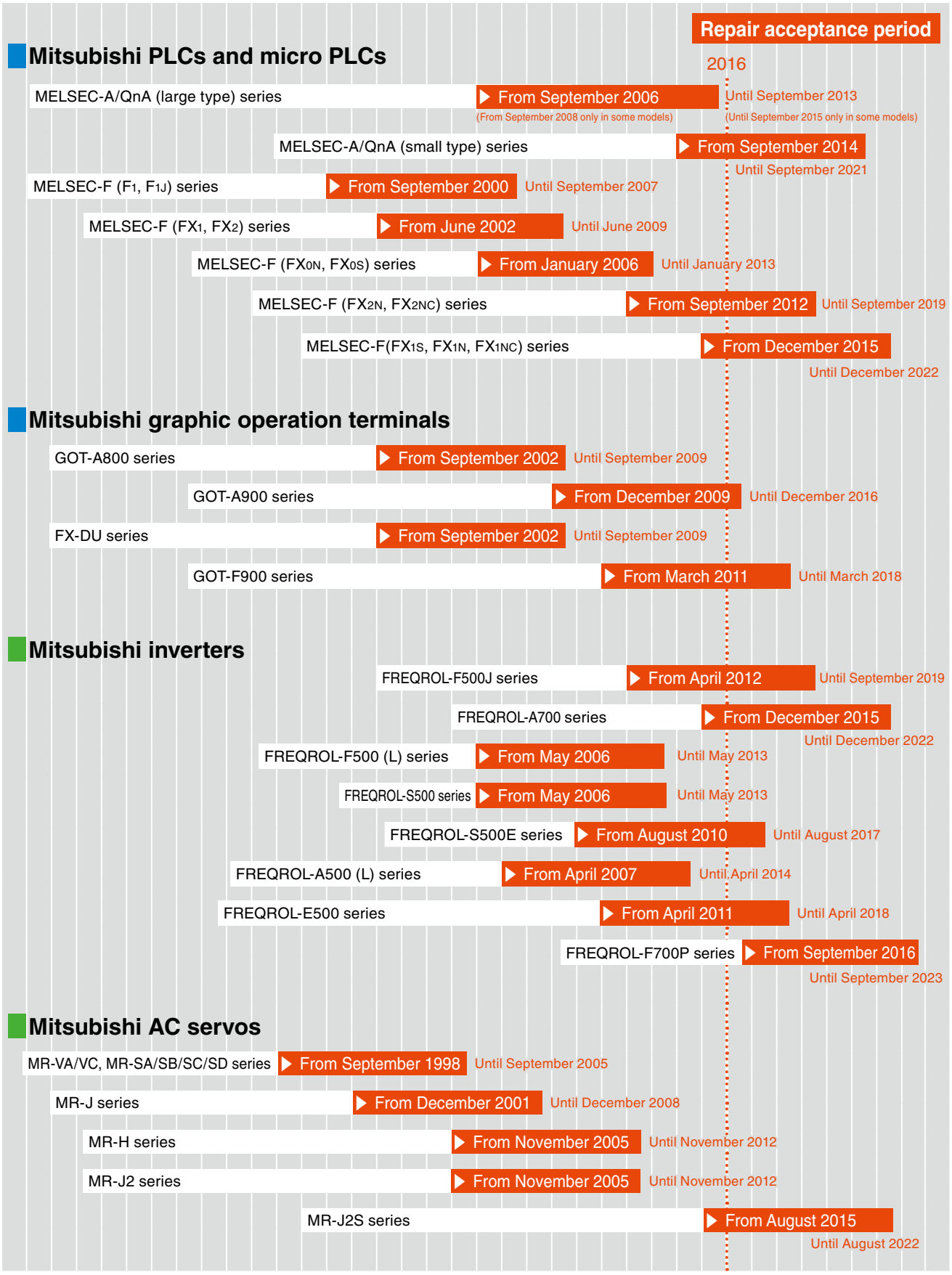
- This cable enables relay connection, and is available in a case in which the AC servo should be separated from the machine side during transportation or installation, a case in which a highly flexible part should be adopted partially in the AC servo, and other cases.
- Mitsubishi Electric System & Service Co., Ltd. produces cables (increment:1 m) for Mitsubishi MR-J4/J3/JN series servo encoders, power supplies and electromagnetic brakes.

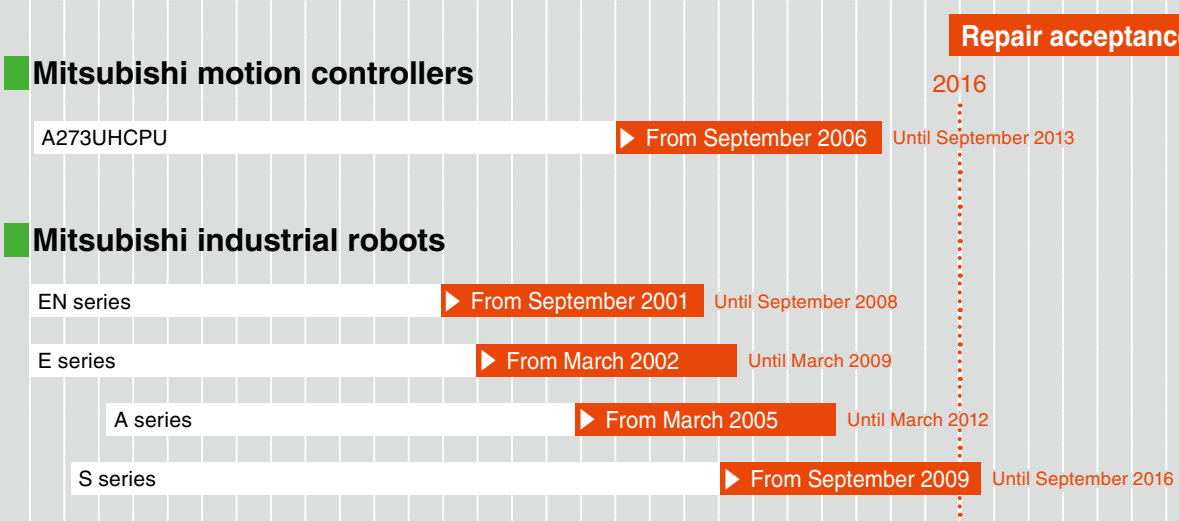
* Mitsubishi Electric System & Service Co., Ltd. produces cables other than cables of standard length sold by Mitsubishi Electric Corporation.



Production discontinuance of major FA products

Below is the repair acceptance period of major models and series in which production of the main unit are already discontinued. Production may be discontinued even in other models and series not shown below, and production may be discontinued before the date shown below or may be continued in some models and series shown below. Refer to the Mitsubishi Electric's website or contact Mitsubishi Electric sales representatives for further information.





Mitsubishi motion controllers

Mitsubishi industrial robots

Mitsubishi distribution control product

Migration time of Mitsubishi distribution control product due to deterioration

Model	Recommended migration time (after start of use)
Molded-case circuit breaker Earth-leakage circuit breaker	15 years or specified number of times of switching
Electromagnetic switch	10 years or specified number of times of switching

⚠ Safety precautions

- To properly use the products described in this document, make sure to read the relevant manuals before use.
- These products have been manufactured as general-purpose products for general industrial purposes, and have not been designed or manufactured to be incorporated in equipment or system used in situations that can affect or endanger human life.
- When considering using these products for special purposes such as equipment or system for nuclear power, electric power, aerospace, medical care or riding mobile object, contact the contact point in charge of sales in Mitsubishi Electric.
- These products have been manufactured under strict quality control. However, it is strongly advised to install a backup or failsafe function in the system when using these products in facilities where a failure of these products may cause a serious accident or loss.

Trademarks and registered trademarks

- MODBUS is a registered trademark of Schneider Electric SA.
- Ethernet is a trademark of Xerox Corporation.
- All other company names and product names described in this document are trademarks or registered trademarks of their representative companies.

Production/ Development

We Strive to Respond to Customers Needs in All Aspects of Our Production and Development Processes and Quality

Production

We manufacture products that satisfy our customers needs, with leading-edge production lines and technologies.

In cooperation with our network of factories and overseas production bases, our mother factory in Nagoya, Japan, has developed systems and solutions, such as e-F@ctory, that are designed to optimize and strengthen manufacturing and production processes. This is demonstrated through the total “visualization” of the factory operations from ensuring the highest level of productivity and machine optimization to energy management applied throughout the total plant operation.



Nagoya Works



Shinshiro Factory



Kani Factory

Nagoya Works (Nagoya, Aichi)

As the core factory of our FA business, Nagoya Works creates an extensive lineup and network of FA products. Its goal is to contribute to production throughout the world and become the No.1 FA supplier to our customers.



Fukuyama Works (Fukuyama, Hiroshima)

Fukuyama Works utilizes its world-class power distribution and control technology to manufacture protective, measurement and control equipment. It also produces a wide range of ecological and economical energy-saving products.



Nakatsugawa Works (Nakatsugawa, Gifu)

Nakatsugawa Works contributes to the future of lifestyles and the planet through environmentally conscious systems. It manufactures ventilators and industrial fans that create comfortable environments while saving energy.



Power Distribution Systems Center (Marugame, Kagawa)

The Power Distribution Systems Center specializes in vacuum circuit breakers and other electrical distribution equipment for factories, office buildings, public facilities, power plants, and railway substations, in addition to control and monitoring systems.



Mitsubishi Electric FA Industrial Products Corporation (Fukuoka, Fukuoka)

This site provides solutions to various needs in the area of geared motors, and hoists, which serve as driving sources for a broad range of equipment, from transport to food production.



Mitsubishi Electric India Pvt. Ltd.

We manufacture inverters, power distribution control devices, PLC and HMI, and we are building a manufacturing, sales, and service system that is responsive to the needs of the Indian market.



Mitsubishi Electric Automation (Thailand) Co., Ltd.

Founded as a production base for three-phase induction motors, but it now manufactures electric energy meter and die-cast parts, mainly for domestic use in Thailand.



Mitsubishi Electric Automation Manufacturing (Changshu) Co., Ltd.

Manufacturing servo, NC, and other drive control equipment. Production is local to meet the growing demand in China.



Mitsubishi Electric Low Voltage Equipmet (Xiamen) Co., Ltd.

Manufacturing low voltage power distribution and control equipment. The company is responding to the expansion of our customers’ production facilities in China.



Mitsubishi Electric Dalian Industrial Products Co., Ltd.

Founded as a production base for breakers, this site also manufactures inverters and electrical discharge machines today. It intends to further upgrade its production processes as a strategic overseas production base.

Development
We identify new customer needs promptly and accelerate our R&D cycle to respond to those needs.

Core Development Processes
To develop products in response to diversifying needs, two core development centers have been created integrating the related departments of FA and Industrial Automation Machinery. These state-of-the-art centers maximise the technology synergies to produce world-class products.



FA Development Center (within Nagoya Works)

The FA Development Center pursues solutions for our customers' diverse and advanced needs in the areas of control technology, networking, HMIs, complex software, drives etc.



Industrial Automation Development Center (within Nagoya Works)

The state-of-the-art development environment is capable of responding to trends for more compact features, higher precision, and higher speeds. The design, processing technology and service domains have been brought together to strengthen Mitsubishi Electric's total development power.

Comprehensive strength
To promote the development of competitive products and create technologies for the future we foster world-leading R&D activities whilst utilizing our network of overseas and domestic research institutes.



Advanced Technology R&D Center (Amagasaki, Hyogo)

As an advanced technology base for all of Mitsubishi Electric's business areas, the R&D Center has many responsibilities: from the development of common infrastructure technologies and new products to the research and development of potential new businesses for the future.



Information and Technology R&D Center (Kamakura, Kanagawa)

The R&D Center plays an important role in creating new businesses and innovating existing ones through basic research and development in the areas of information, communications, and optical and electromagnetic technologies.

Development at the global level
We develop products that satisfy the needs of our overseas customers, propose new global-scale FA business plans, adopt cutting-edge technologies from overseas and promote other development activities, all from a global perspective.



European Development Center (Düsseldorf, Germany)

In addition to investigating and researching cutting-edge technologies, the European Development Center develops products for the European market, in the languages of the European countries, as well as working to obtain various EU standards and certifications.



North American Development Center (Chicago, Boston) USA

As a planning and development base for new products and new business creation in North America, the North American Development Center aims to incubate new FA businesses and investigate advanced technologies.



China Design (Dalian, China)

Based on close cooperation between sales departments and our mother factory, we are expanding our product lineup and developing new specifications for the Chinese market.



Indian Development Center (Pune, India)

The company develops for the Indian market. Also, as a development base for the global market, it partners with other development bases to develop common technologies for FA equipment.

Quality
In response to our customers' trust and confidence, we constantly review and reinforce our quality management system.



Anechoic room

Manufacturing servo, NC, and other drive control equipment. Production is local to meet the growing demand in China.



LSI evaluation facility

Manufacturing low voltage power distribution and control equipment. The company is responding to the expansion of our customers' production facilities in China.



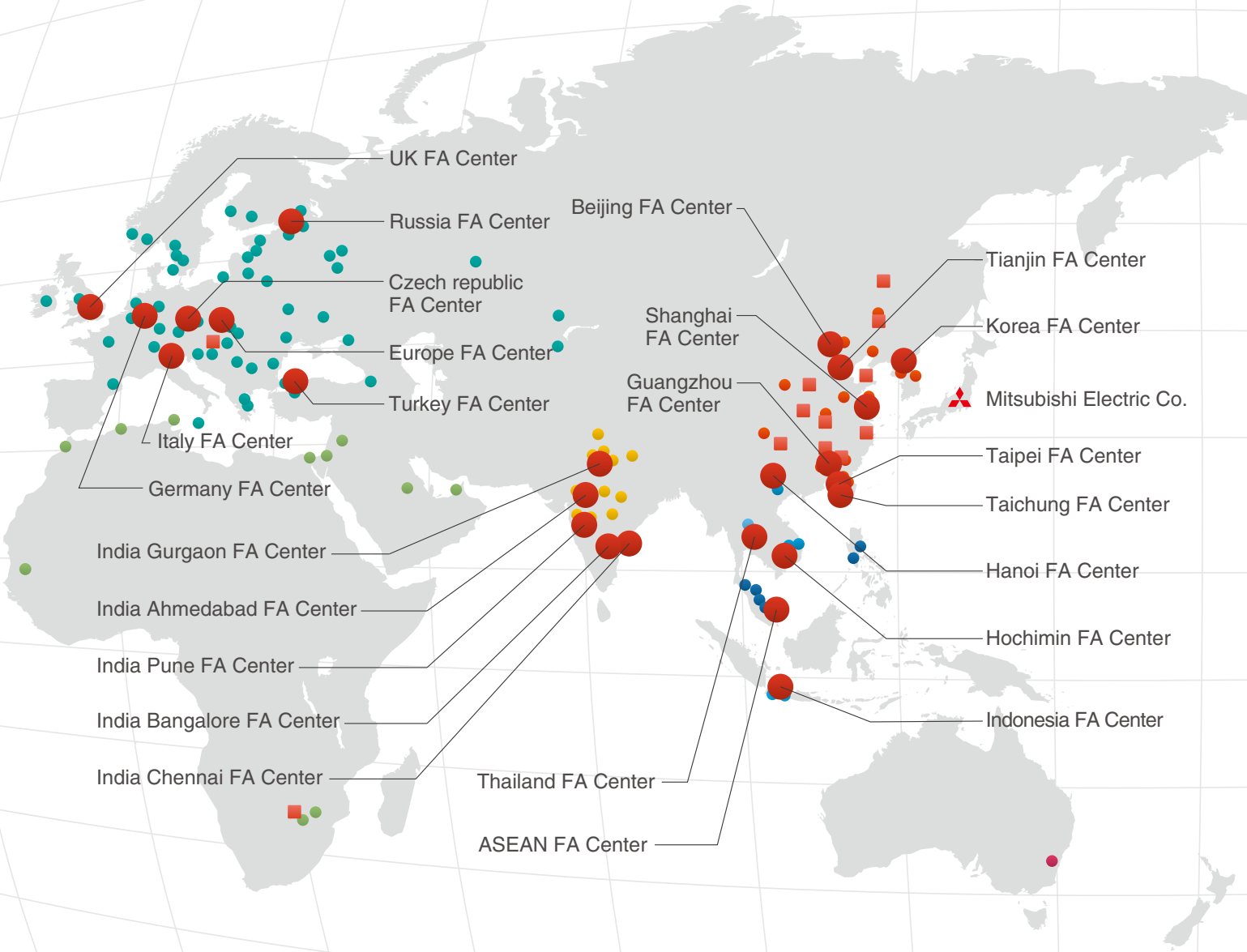
Inspecting machining equipment performance

We exhaustively inspect the drive control and machining performance of machining equipment, testing to ensure continuing precision machining after delivery.

GLOBAL NETWORK

Our Global Network Delivers Reliable Technologies and Security All Over the World





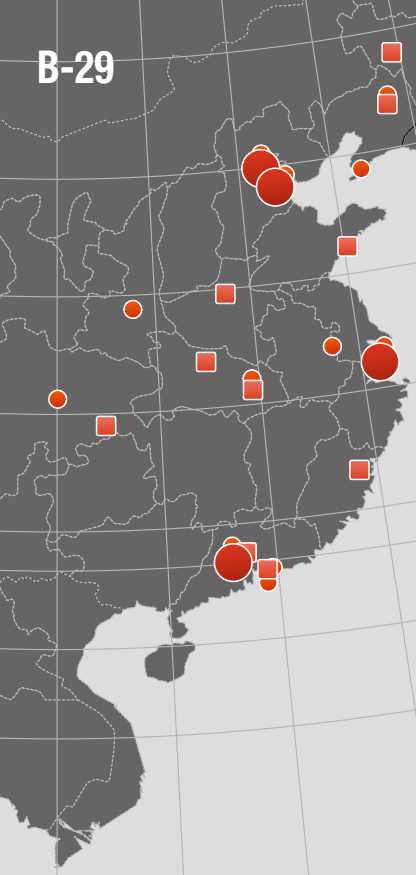
GLOBAL N



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China Mainland

China Main Land

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PLC HMI SV INV RB CNC LVS MC

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* Robot:華南地区受付窓口

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RB Industrial Robots CNC Computerized Numerical Controllers LVS Low-voltage Circuit Breakers MC Contactors and Motor Starters * For repairing or after-sales technical support, please contact your nearest FA Center.

China Mainland

China Main Land

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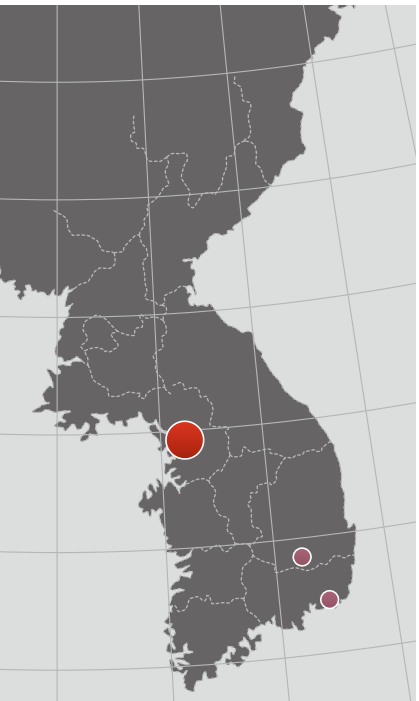
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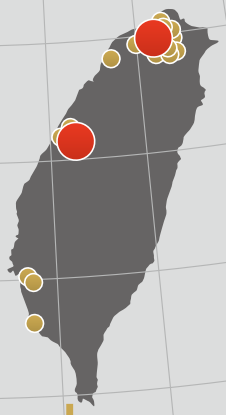
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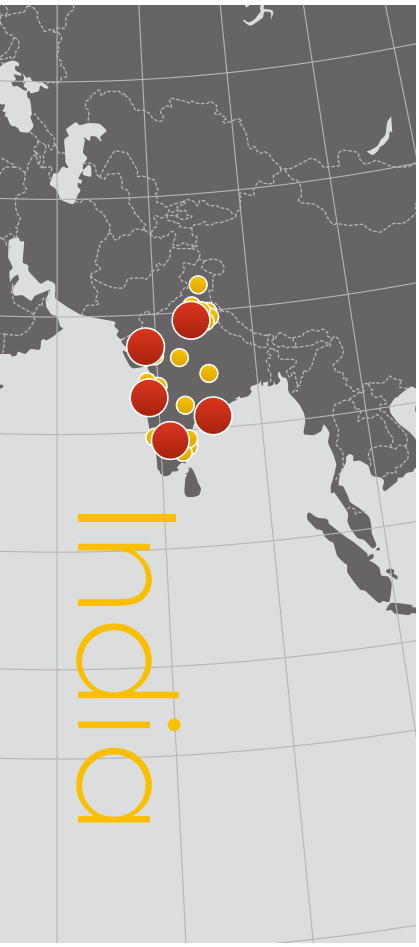
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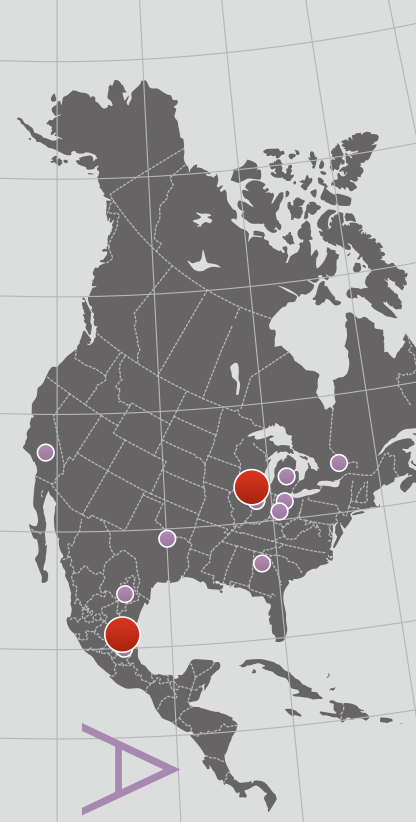
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Oceania

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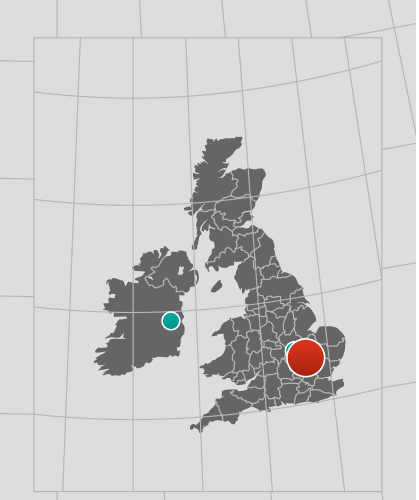
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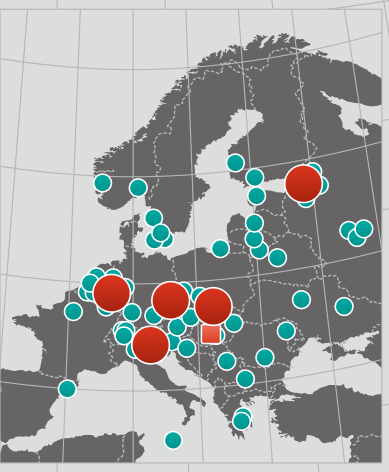
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HP http://www.koningenhartman.com LANGUAGE German, English, Dutch

ES Elektro B.V. PLC HMI SV INV RB CNC LVS MC
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ROMANIA
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Aleea Lacul Morii Nr. 3, Sector 6, 060841 Bucuresti, Romania
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HP http://www.siriustrading.ro LANGUAGE Romanian, English

RUSSIA
Electrotechnical Systems Siberia Ltd. PLC HMI SV INV RB LVS MC
62, office 450A, Sibiryakov-Gvardeitcev str., 630088, Novosibirsk, Russia
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HP http://www.es-electro.ru LANGUAGE Russian, English

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HP http://www.nc-tech.ru LANGUAGE Russian, English

Avtomatika Sever PLC HMI SV INV LVS MC
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HP http://www.avtomatika.info LANGUAGE Russian, English

PTF ConSys PLC HMI SV INV RB LVS MC
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Techpribor PLC HMI SV INV LVS MC
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HP http://www.techpribor-kaliningrad.ru LANGUAGE Russian, English

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HP hhtp://www.idom.ru LANGUAGE Russian, English

RPS-Avtomatika PLC HMI SV INV LVS MC
Nagibina str. 40a, office 105, 344018 Rostov-na-Donu, Russia
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HP hhtp://www.rps-a.ru LANGUAGE Russian, English

Rivkora PLC HMI SV INV RB LVS
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HP http://www.rivkora.ru LANGUAGE Russian, English

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HP http://www.inea.rs LANGUAGE Serbian, English

SLOVAKIA
SIMAP SK, s.r.o. PLC HMI SV INV RB LVS MC
Jána Derku 1671/1A, 911 01 Trenčín, Slovakia
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HP http://www.simap.sk LANGUAGE Slovak, English

SLOVENIA
INEA RBT d.o.o. PLC HMI SV INV RB LVS MC
Stegne 11, SI-1000 Ljubljana, Slovenia
TEL +386-1-5138-116 FAX +386-1-5138-170
HP http://www.inea-rbt.si LANGUAGE Slovenian, English

* English is available at each local distributors. If you require Japanese correspondence, please contact our Europe FA Center.

RB Industrial Robots CNC Computerized Numerical Controllers LVS Low-voltage Circuit Breakers MC Contactors and Motor Starters * For repairing or after-sales technical support, please contact your nearest FA Center.

Europe

Distributors

SWEDEN

Euro Energy Components AB LVS MC
Järnvägsgatan 36, Box 10348, SE-434 24 Kungsbacka, Sweden
TEL +46-300-69-00-40 FAX +46-300-16475
HP http://www.euroenergy.se LANGUAGE Swedish, English

SWITZERLAND

Omni Ray AG PLC HMI SV INV
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HP http://www.omniray.ch LANGUAGE English, German, French

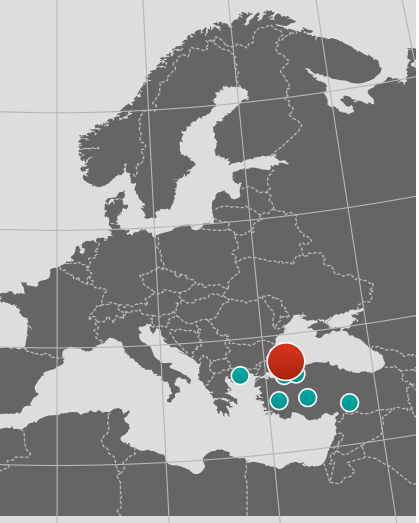
Robotronic AG PLC HMI SV INV RB
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HP http://www.robotronic.ch LANGUAGE English, German, French

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HP http://www.trielec.ch LANGUAGE German, English

UKRAINE

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HP http://www.kck.ua LANGUAGE Ukrainian, Russian, English

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HP http://www.kck.ua LANGUAGE Russian, English



Turkey

Turkey

Turkey FA Center

PLC HMI SV INV RB CNC LVS MC

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Distributors

ETA ELEKTROTEKNİK SAN. TİC. LTD. ŞTİ. PLC HMI SV INV LVS MC
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LANGUAGE Turkish, English

ESO ENDÜSTRİYEL ELEKT.SİST. OTOMASYON SAN.TİC.LTD.ŞTİ. PLC HMI SV INV LVS MC
İzmit Sanayi Sitesi 3.Cadde 202. Blok No:27 İzmit / Kocaeli
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HP http://www.esoendustriyel.com
LANGUAGE Turkish, English

GEOTEK ELEKTRİK ELEKTRONİK OTOMASYON SAN.VE TİC.LTD.ŞTİ. PLC HMI SV INV LVS MC
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HP http://www.geotekotomasyon.com/iletisim.html
LANGUAGE Turkish, English

BİRMAG MÜHENDİSLİK SAN.TİC.LTD.ŞTİ. PLC HMI SV INV LVS MC
Gazi Muhtarpaşa Bulvari Mücahi Tler MH. 54 Nolu SK.
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HP http://www.birmag.com LANGUAGE Turkish, English

GENFOTEK GENEL FABRİKA OTOMASYON TEKNOLOJİLERİ SAN. TİC. LTD.ŞTİ. PLC HMI SV INV LVS MC
Zafer Mah. Yeni San.Sitesi M-7 Blok No:21Çorlu / Tekirdağ
TEL +90-282-651-3486 FAX +90-282-651-3496
HP http://www.genfotek.com
LANGUAGE Turkish, English

OPTİMAS ELK.MÜH.İNŞ.TUR.ORG.SAN.VE TİC.LTD.ŞTİ. PLC HMI SV INV LVS MC
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HP http://www.optimas.com.tr
LANGUAGE Turkish, English

* If you need any information regarding countries or regions other than listed above, please contact Europe FA center.



Middle East/Africa

Middle East/Africa

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LANGUAGE English

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Distributors

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HP http://www.sherfmotion.co.il
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GIRIT CELADON LTD. PLC HMI
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TEL +972-9-8633980 FAX +972-3-7537802
HP http://www.girit.co.il
LANGUAGE Hebrew, English

ILAN&GAVISH Automation PLC HMI RB
24 Shenkar St., Kiryat Arie, IL-49001 Petah-Tikva, Israel
TEL +972-3-9221824 FAX +972-3-9240761
HP http://www.ilan-gavish.co.il
LANGUAGE Hebrew, English

LEBANON
CEG Liban - Comptoir d'Electricité Générale Liban
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Cebaco Center - Block A, Autostrade Dora, Beirut, Lebanon
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TEL +966-11 2051240 FAX +966-11 2051967
LANGUAGE Arabic, English

Other Middle East Arab Countries/Cyprus
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LANGUAGE Arabic, French, English

Africa

ALGERIA
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HP http://www.mec-casa.com
LANGUAGE Arabic, French, English

MOROCCO
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HP http://www.schielemaroc.com LANGUAGE French, English

SENEGAL
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HP http://www.avangreen.com LANGUAGE French, English

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HP http://www.motiontronix.co.za LANGUAGE English

CBI-electric LVS MC
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HP http://www.cbi-electric.com LANGUAGE English

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HP http://www.adroit.co.za LANGUAGE English

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TEL +216-71-474-599 FAX +216-71-474-671
HP http://www.motra-electric.com LANGUAGE French, English

RB Industrial Robots CNC Computerized Numerical Controllers LVS Low-voltage Circuit Breakers MC Contactors and Motor Starters * For repairing or after-sales technical support, please contact your nearest FA Center.

Warranty

Warranty Information

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter “Failure”) found to be the responsibility of Mitsubishi occur during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative. However, if repairs are required onsite, actual expenses to send an engineer will be borne by the customer. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be between 12 months[*1] and 36 months[*2] after the date of purchase or delivery to a designated place.

Note that the product shall be distributed for a maximum period of 6 months after shipment, and the longest gratis warranty term after manufacturing shall be between 18 months[*1] and 42 months[*2]. In addition, the gratis warranty term of the product repaired shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The customer shall be responsible for the primary failure diagnosis unless otherwise specified.

If requested by the customer, Mitsubishi Electric Corporation or its representative firm may carry out the primary failure diagnosis at the customer’s expense.

The primary failure diagnosis will, however, be free of charge should the cause of failure be attributable to Mitsubishi Electric Corporation.

(2) The warranty shall apply only to the product used under normal situations such as when the usage state, method and/or environment conform to the conditions / precautions stated in the instruction manual, the user’s manual, the caution labels on the product, etc. The range shall be limited to normal use within the usage state, usage methods, usage environment, etc. which follow the conditions, precautions, etc. given in the instruction manual, user’s manual, caution labels on the product, etc.

(3) Even within the gratis warranty term, repairs shall be charged in the following cases.

①Any failure occurring from inappropriate storage or handling of the product, carelessness or negligence of the customer. Failure caused by the customer’s hardware or software design.

②Any failure caused by unapproved modifications, etc., to the product by the customer.

③When the Mitsubishi product is assembled into the customer’s device, any failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the customer’s device is subject to or judged as necessary by industry standards, had been provided.

④Any failure that could have been avoided if consumable parts designated in the user’s manual etc. had been correctly serviced or replaced.

⑤Replacement of consumable parts.

⑥Any failure caused by external irresistible forces such as fires or abnormal voltages, and any failure caused by force majeure such as earthquakes, lightning, wind and water damage.

⑦Any failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.

⑧Any other failure found not to be the responsibility of Mitsubishi or admitted not to be so by the customer.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for 7 years (4 years for the safety controller) after production of the product is discontinued.

Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi’s local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the customer by failures of Mitsubishi products, special damages and secondary damages, whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the customer, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi product, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the product, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi product has been designed and manufactured for applications in general industries, etc.

Thus, the product should not be used in applications that could affect the public, such as use in nuclear power plants or other power plants operated by respective power companies, and that require a special quality assurance system, such as use for railway companies or public sectors.

Also, the product should not be used in applications that could have significant impact on human life or property, such as use in aircraft, medical or railway services, incineration / fuel devices, manned transportation equipment, equipment for recreation / amusement, or safety devices.

However, Mitsubishi Electric Corporation may consider the possibility of using the product even in these fore-mentioned applications, if the customer acknowledges that the product has only limited application and that any special quality is not required.

(3) Depending on the product, because there shall be other terms defined that are not included in this context, please confirm when you place an order.

*1: The products (Safety controller / Inverter / Low-voltage circuit breaker / Magnetic contactors and starters / Power management measuring devices) whose gratis warranty term is either 12 months after delivery or 18 months after manufacturing.

*2: The products (Programmable controller (including C language controller) / Servo system controller / GOT / Energy-saving support device) whose gratis warranty term is either 36 months after delivery or 42 months after manufacturing.

*3: The gratis warranty term of the industrial robot shall be for either 12 months after delivery or 2000 operating hours (possible operating hours of 8 hours per day × 250 days).

*4: Oil mist environment for industrial robots

As a result of tests conducted using cutting oils shown in the table on the right, Mitsubishi confirms that the product satisfies IP (Ingress Protection) specifications. Using the product in an environment where any cutting oils other than those shown in the table on the right may cause the product to decrease in IP performance. Also, the warranty does not apply if a failure occurs in the product used in an atmosphere where any cutting oil other than those shown in the table on the right is used or where a robot is directly exposed to water, oil or dust beyond IP specs limits. If the customer wants to use a type of cutting oil, other than the applicable oils confirmed, Mitsubishi is ready to conduct a verification test of the oil on the behalf of the customer. For the latest information about any types of cutting oils, other than those listed in the table on the right, which have been confirmed as applicable, visit the website “Mitsubishi FA Site” (URL<http://www.mitsubishielectric.co.jp/fa>).

Cutting oils for oil mist environmental test

No.	Oil name	Manufacturer	Property	Operating condition
1	Castrol hysol X	Castrol	Water soluble	20 fold dilution
2	Castrol Syntilo 9954	Castrol	Water soluble	20 fold dilution
3	Yushiro oil CE	Yushiro Chemical Industry	Water-insoluble	–
4	Yushiroken E10	Yushiro Chemical Industry	Water soluble	20 fold dilution
5	Yushiroken synthetic 770TG	Yushiro Chemical Industry	Water soluble	20 fold dilution
6	Yushiroken FX90	Yushiro Chemical Industry	Water soluble	20 fold dilution
7	SUNCUT ES-50N	Nippon Grease	Water-insoluble	–
8	Searching cut SG555	Kyowa Oil Lubricants	Water-insoluble	–
9	Emul cut FA-800	Kyodo Yushi	Water soluble	–

*5: Usage environment for Magnetic contactors and starters

Do not use the product in the following locations, as it may cause the product to malfunction or shorten its operation life.

① Where the ambient temperature exceeds the range of -5 to +40°C.
② Where the average daily temperature exceeds 35°C.
③ Where the altitude exceeds 1000m.
④ Where abnormal vibration or shock happens.
⑤ Where there is the excessive amount of dust.
⑥ Where hazardous gases such as explosive, corrosive and flammable gases are generated.
⑦ Where there is the excessive amount of moisture or oil mist.
⑧ Where there is too much snow and ice.
⑨ Where it is always wet.
⑩ Where it is directly exposed to sea breeze.

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