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**JUMO Process Control, Inc.**  
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# JUMO MAERA S29 SW

## Titanium or stainless steel level probe

### Description

The JUMO MAERA S29 SW level probe is used for the continuous hydrostatic level measurement in ventilated tanks. Measuring is carried out unaffected by electrical medium features or any foam formation.

Approvals are needed for particular ship building requirements (exclusively titanium) and explosion protection.

The level probe can be readily used in depths from as low as 1 mWS. The titanium version has been designed for application in liquids with media containing chlorides. These may be found in ship building, swimming pools, or water and sewage water management.

The cost-optimized level probe made of titanium or stainless steel with a front-flush membrane offers an alternative in highly viscous media. The screwable protective cap protects the membrane.

The level probe is equipped with a reverse-polarity protection mechanism, which prevents incorrect polarity during startup.

Another benefit to the measuring system is the extensive range of accessories for an optimum design.

Further information on our level probes from the JUMO MAERA series can be found in the brochure "Limit Level Measurement and Level Measurement" in the documentation.

### Applications

#### Level and level measurements

- In tank and storage systems
- Of clarification, settling and rainwater retention basis
- In sewage lifting and pumping stations
- In splash water containers for swimming pools
- In a ballast water tank for ship building

### Special features

- Measuring ranges from 100 mbar relative pressure and 600 mbar absolute pressure are available
- Explosion protection according to ATEX
- Shipbuilding approval according to DNV (titanium)
- Highly resistant to chemical (titanium)
- Proven piezoresistive silicon sensor

### Customer benefits

- Improved plant availability
- Standardized signal processing
- Resistant to climate due to improved moisture and vibration protection
- Measurements in very harsh and highly viscous media thanks to the front-flush membrane
- Prevention of build up of resistance
- A complete solution for measurement points thanks to the extensive range of accessories
- Reverse-polarity protection mechanism



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## Approval marks and certificates

|                                                                                    |                  |                                           |
|------------------------------------------------------------------------------------|------------------|-------------------------------------------|
|   | Designation      | ATEX                                      |
|                                                                                    | Testing agency   | Eurofins Electrosuisse Product Testing AG |
|                                                                                    | Certificate no.  | SEV 17 ATEX 0136 X                        |
|                                                                                    | Inspection basis | EN 60079-0, EN 60079-11                   |
|                                                                                    | Valid for        | Type 404393/362, Type 404393/662          |
|                                                                                    | Designation      | UKEX                                      |
|                                                                                    | Testing agency   | Bureau Veritas                            |
|                                                                                    | Certificate no.  | EPS 22 UKEX 1 087 X                       |
|                                                                                    | Inspection basis | EN IEC 60079-0, EN 60079-11               |
|                                                                                    | Valid for        | Type 404393/.../085                       |
|   | Designation      | IECEx                                     |
|                                                                                    | Testing agency   | Eurofins Electrosuisse Product Testing AG |
|                                                                                    | Certificate no.  | IECEx SEV 20.0010X                        |
|                                                                                    | Inspection basis | IEC 60079-0, IEC 60079-11                 |
|                                                                                    | Valid for        | Type 404393/362, Type 404393/662          |
|                                                                                    | Designation      | DNV                                       |
|  | Testing agency   | DNV                                       |
|                                                                                    | Certificate no.  | TAA00001TH                                |
|                                                                                    | Inspection basis | DNV GL CG-0339                            |
|                                                                                    | Valid for        | Type 404393/062, Type 404393/662          |

Observe "Special conditions for safe use" in hazardous areas.

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## Technical data

### General Information

|                          |                                                |
|--------------------------|------------------------------------------------|
| Reference conditions     | According to DIN 16086 and DIN 61298           |
| Measuring principle      | Piezoresistive sensor with separating membrane |
| Pressure transfer medium | Synthetic oil                                  |
| Admissible load changes  | > 10 million, 0 % to 100 % measuring range     |
| Mounting position        | Vertical/hanging from the cable                |

### Inputs

#### Measuring range and accuracy

| Measuring range                            | Accuracy at                              |                                   | Long-term stability <sup>a</sup><br>% MSP per year | Overload capacity | Burst pressure |
|--------------------------------------------|------------------------------------------|-----------------------------------|----------------------------------------------------|-------------------|----------------|
|                                            | 20 °C <sup>b</sup><br>% MSP <sup>d</sup> | 10 to 50 °C <sup>c</sup><br>% MSP |                                                    |                   |                |
| 0 to 1 mH <sub>2</sub> O                   | 1.2                                      | 1.9                               | ≤ 0.4                                              | 3                 | 4              |
| 0 to 1.6 mH <sub>2</sub> O                 | 0.8                                      | 1.8                               |                                                    | 4.8               | 6.4            |
| 0 to 2.5 mH <sub>2</sub> O                 | 0.8                                      | 1.7                               | ≤ 0.3                                              | 7.5               | 10             |
| 0 to 4 mH <sub>2</sub> O                   | 0.7                                      | 1.7                               |                                                    | 12                | 16             |
| 0 to 6 mH <sub>2</sub> O                   | 0.7                                      | 1.6                               | ≤ 0.2                                              | 18                | 24             |
| 0 to 10 mH <sub>2</sub> O                  | 0.6                                      | 1.3                               |                                                    | 30                | 40             |
| 0 to 100 mbar relative pressure            | 1.2                                      | 1.9                               | ≤ 0.4                                              | 0.3               | 0.4            |
| 0 to 160 mbar relative pressure            | 0.8                                      | 1.8                               |                                                    | 0.48              | 0.64           |
| 0 to 250 mbar relative pressure            | 0.8                                      | 1.7                               | ≤ 0.3                                              | 0.75              | 1              |
| 0 to 400 mbar relative pressure            | 0.7                                      | 1.7                               |                                                    | 1.2               | 1.6            |
| 0 to 600 mbar relative/absolute pressure   | 0.7                                      | 1.6                               | ≤ 0.2                                              | 1.8               | 2.4            |
| 0 to 1 bar relative/absolute pressure      | 0.6                                      | 1.3                               |                                                    | 3                 | 4              |
| 0 to 1.6 bar relative/absolute pressure    | 0.5                                      | 1.3                               |                                                    | 4.8               | 6.4            |
| 0 to 2.5 bar relative/absolute pressure    | 0.5                                      | 1.2                               |                                                    | 7.5               | 10             |
| 0 to 4 bar sealed gauge/absolute pressure  | 0.5                                      | 1.2                               |                                                    | 12                | 16             |
| 0 to 6 bar sealed gauge/absolute pressure  | 0.5                                      | 1.2                               |                                                    | 18                | 24             |
| 0 to 10 bar sealed gauge/absolute pressure | 0.5                                      | 1                                 |                                                    | 30                | 40             |

<sup>a</sup> Reference conditions EN 61298-1

<sup>b</sup> Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset), and measuring range end

<sup>c</sup> Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset) and measuring range end, thermal influences on measuring range start (offset), and measuring span

<sup>d</sup> MSP = measuring span

### Output

|                        |                                                                |
|------------------------|----------------------------------------------------------------|
| Analog output          |                                                                |
| Current                |                                                                |
| Output 405             | 4 to 20 mA, 2-wire                                             |
| Step response $t_{90}$ | 2 ms                                                           |
| Burden                 |                                                                |
| Current                |                                                                |
| 4 to 20 mA, 2-wire     | $R_L \leq (U_B - 16 \text{ V}) \div 0.022 \text{ A } (\Omega)$ |

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## Electrical data

|                                                                                                                                                      |                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage Supply $U_B$<br>For basic type extension 000<br>For basic type extension 062<br>For basic type extension 362<br>For basic type extension 662 | The voltage peaks must not exceed the specified voltage supply values!<br>DC 16 to 28 V (nominal 24 V)<br>DC 21 to 24 V (nominal 24 V)<br>DC 16 to 28 V (nominal 24 V)<br>DC 21 to 24 V (nominal 24 V) |
| Reverse voltage protection                                                                                                                           | Yes                                                                                                                                                                                                    |
| Max. current consumption                                                                                                                             | 23 mA                                                                                                                                                                                                  |
| Electrical circuit<br>Requirement                                                                                                                    | SELV<br>The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to „Limited-energy circuits“.                                                     |

## Mechanical features

Ensure the medium durability of the material!

|                      | Titanium         | Stainless steel       | Stainless steel with mounted protective cage |
|----------------------|------------------|-----------------------|----------------------------------------------|
| Material             |                  |                       |                                              |
| Protective cap       | PVC              | PVC                   | -                                            |
| Process connection   | Titanium grade 2 | Stainless steel 316 L | Stainless steel 316 L                        |
| Measuring membranes  | Titanium grade 2 | Stainless steel 316 L | Stainless steel 316 L                        |
| Case                 | Titanium grade 2 | Stainless steel 316 L | Stainless steel 316 L                        |
| Shrink tubing        | Polyolefin       | -                     | -                                            |
| Mass (without cable) | 109 g            | 200 g                 | 1700 g (max. freely suspended cable 100 m)   |
| Diameter             | 27 mm            | 27 mm                 | 95 mm                                        |

## Cable

|                         | 6-core, shielded cable with integrated pressure compensation hose, AWG 24 with ferrules | 3-core, remote cable with integrated pressure compensation hose, AWG 24 with ferrules |
|-------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Material                |                                                                                         |                                                                                       |
| Outer sheath            | FEP                                                                                     | PUR                                                                                   |
| Compensation hose       | PA                                                                                      | PA                                                                                    |
| Color                   | Black                                                                                   | Black                                                                                 |
| Outer diameter          | Approx. 8.4 mm                                                                          | Approx. 7.5 mm                                                                        |
| Conductor cross section | 0.25 mm <sup>2</sup>                                                                    | 0.25 mm <sup>2</sup>                                                                  |
| Bending radius          |                                                                                         |                                                                                       |
| Moving                  | min. 140 mm                                                                             | min. 75 mm                                                                            |
| Fixed                   | min. 70 mm                                                                              | min. 37.5 mm                                                                          |
| Tensile force           | 4000 N                                                                                  | 880 N                                                                                 |
| Mass                    | ≈ 90 g/m                                                                                | Approx. 60 g/m                                                                        |
| Admissible temperatures | -10 to +70 °C                                                                           | -10 to +70 °C                                                                         |
| UV resistance           | Yes, according to DIN ISO 4892-2                                                        | Yes, according to DIN ISO 4892-2                                                      |

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## Environmental influences

|                                       |                                                                                                                                  |                                    |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| Reference conditions                  | DIN 16086, DIN 61298                                                                                                             |                                    |
| Admissible temperatures<br><br>Medium | -10 to +60 °C<br>The level probe must <b>not</b> freeze in the medium!<br>A restriction may be required depending on the medium. |                                    |
|                                       | Ignition protection type Gb                                                                                                      |                                    |
|                                       | Temperature class                                                                                                                | Ambient temperature T <sub>A</sub> |
|                                       | T4                                                                                                                               | -40 to +85 °C                      |
|                                       | T5                                                                                                                               | -40 to +70 °C                      |
|                                       | T6                                                                                                                               | -40 to +55 °C                      |
|                                       | Ignition protection type Db                                                                                                      |                                    |
|                                       | Temperature class                                                                                                                | Ambient temperature T <sub>A</sub> |
|                                       | T100 °C                                                                                                                          | -40 to +85 °C                      |
|                                       | T85 °C                                                                                                                           | -40 to +70 °C                      |
|                                       | T70 °C                                                                                                                           | -40 to +55 °C                      |
|                                       | Storage                                                                                                                          | -25 to +70 °C, dry                 |
| Electromagnetic Compatibility (EC)    | DIN EN 61326-2-3:2022                                                                                                            |                                    |
| Interference emission                 | Class B <sup>a</sup>                                                                                                             |                                    |
| Interference immunity                 | Industrial requirements                                                                                                          |                                    |
| Protection type                       | IP68, DIN EN 60529                                                                                                               |                                    |
| Measuring principle                   | Piezoresistive sensor with separating membrane                                                                                   |                                    |
| Pressure transfer medium              | Synthetic oil                                                                                                                    |                                    |
| Admissible load changes               | > 10 million, 0 to 100 % measuring range                                                                                         |                                    |
| Mounting position                     | Vertical/hanging from the cable                                                                                                  |                                    |

<sup>a</sup> The product is suitable for industrial use as well as for households and small businesses.

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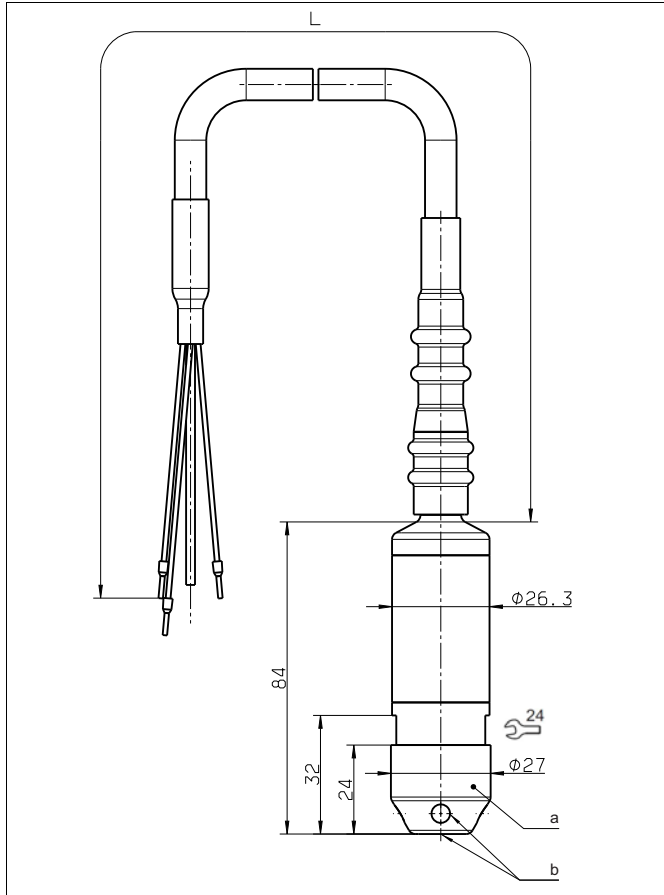
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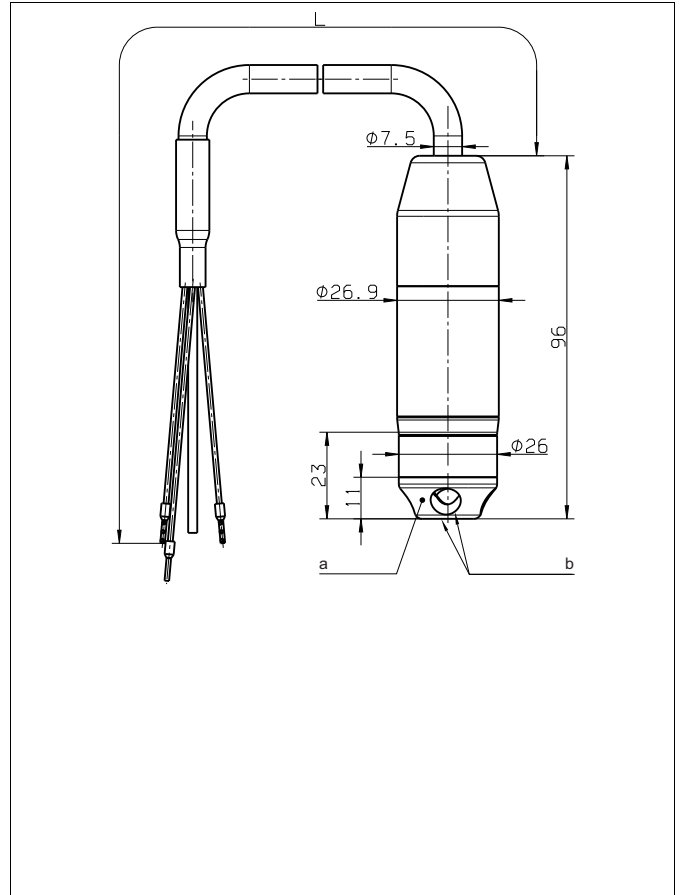
## Dimensions

### Titanium



- L Cable length according to customer preference  
a Protective cap  
b 5 bore holes for every Ø 5 mm

### Stainless steel



- L Cable length according to customer preference  
a Protective cap  
b 5 bore holes for every Ø 5 mm

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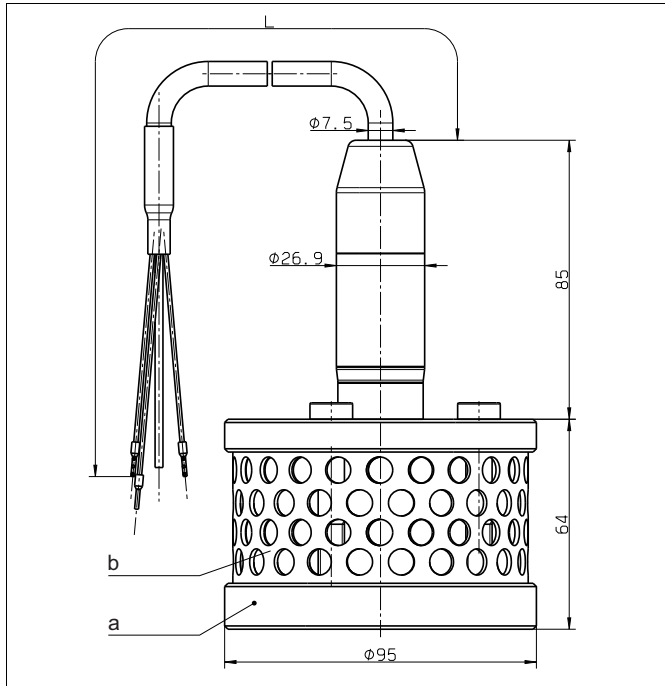
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## Stainless steel with mounted cage



L Cable length according to customer preference

a Protective cage

b Perforated metal grid  $\phi 8$  mm

The stainless steel version with mounted protective cage is designed for difficult level measurements where sludge, turbulence or currents may be present (e.g. pumping stations, wastewater lifting stations).

The additional weight reduces effects on the output signal with strongly moving media.

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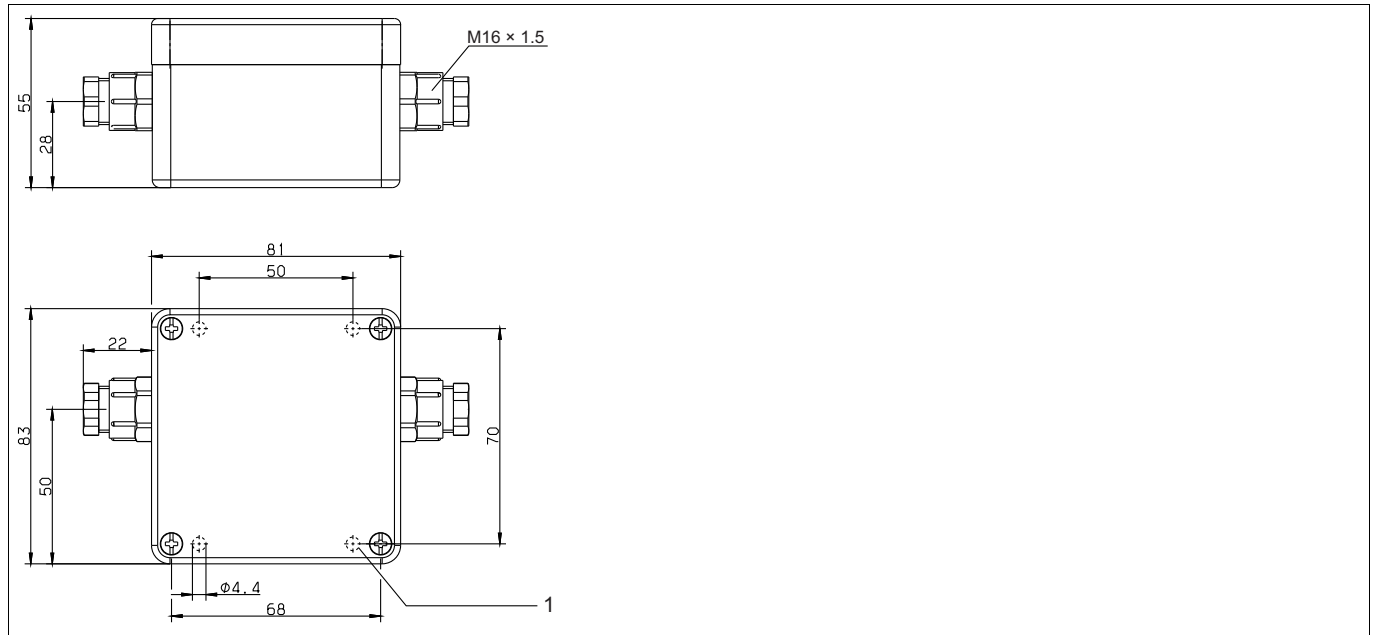
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## Accessories

Terminal box with pressure compensation

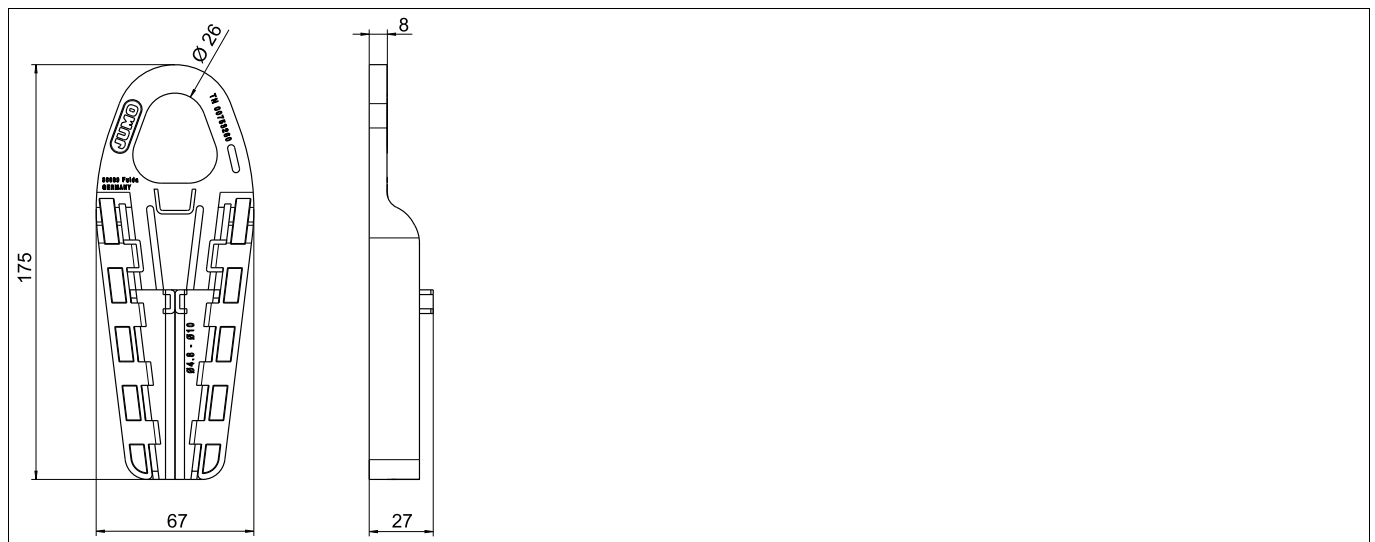
Part no. 00061206



1 Fastening hole

Cable clamp

Part no. 00753260



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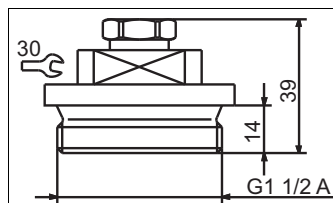
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Sealing screw

Part no. 00333329



## Connection diagram

The connection diagram in the data sheet provides information on product selection.

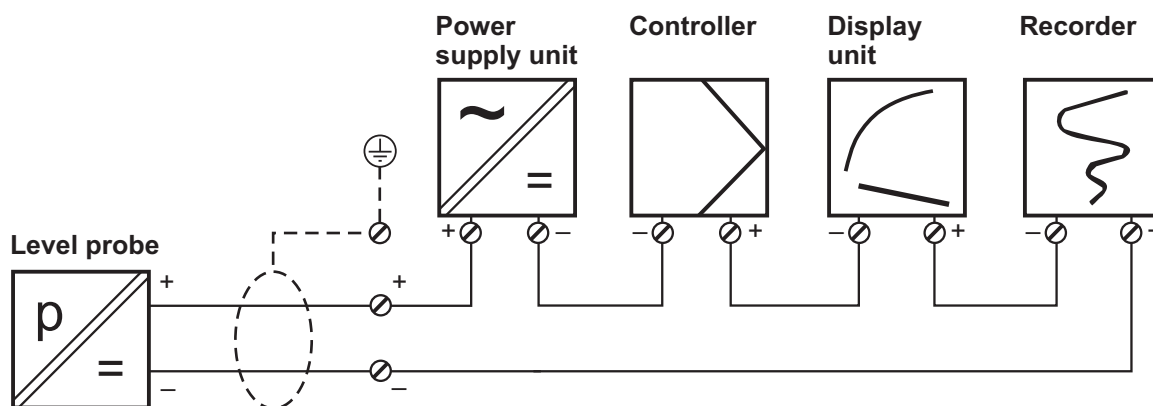
**For the electrical connection, only use the installation instructions or the operating manual.**

| Connection                                                                                                    |                      | Terminal assignment               |                                   |
|---------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------|-----------------------------------|
|                                                                                                               |                      |                                   |                                   |
| Cable                                                                                                         |                      | FEP<br>(electrical connection 25) | PUR<br>(electrical connection 16) |
| <b>4 to 20 mA, 2-wire</b>                                                                                     |                      |                                   |                                   |
| Rated voltage supply DC 24 V                                                                                  | $U_B/S+^a$<br>0 V/S- | White<br>Gray                     | White<br>Brown                    |
| <b>Shielding</b>                                                                                              |                      |                                   |                                   |
| Caution: Ground the device!<br>Ground all connected devices (such as pumps and valves) to the same potential! |                      | Black                             | Black                             |

<sup>a</sup> The voltage peaks must not exceed or fall below the specified voltage supply values!

## Connection example

Current output



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## Order details

|        |                                                                                                               |
|--------|---------------------------------------------------------------------------------------------------------------|
|        | <b>(1) Basic type</b>                                                                                         |
| 404393 | JUMO MAERA S29 SW – Level probe made of titanium or stainless steel                                           |
|        | <b>(2) Basic type extension</b>                                                                               |
| 000    | None                                                                                                          |
| 062    | Shipbuilding approval (only available in titanium version)                                                    |
| 362    | Explosion protection                                                                                          |
| 662    | Shipbuilding approval and explosion protection, intrinsically safe, Ex i (only available in titanium version) |
|        | <b>(3) Input</b>                                                                                              |
| 302    | 0 to 1.6 mH <sub>2</sub> O                                                                                    |
| 303    | 0 to 2.5 mH <sub>2</sub> O                                                                                    |
| 304    | 0 to 4 mH <sub>2</sub> O                                                                                      |
| 305    | 0 to 6 mH <sub>2</sub> O                                                                                      |
| 306    | 0 to 10 mH <sub>2</sub> O                                                                                     |
| 414    | 0 to 100 mbar relative pressure                                                                               |
| 415    | 0 to 160 mbar relative pressure                                                                               |
| 417    | 0 to 250 mbar relative pressure                                                                               |
| 424    | 0 to 400 mbar relative pressure                                                                               |
| 419    | 0 to 600 mbar relative pressure                                                                               |
| 454    | 0 to 1 bar relative pressure                                                                                  |
| 455    | 0 bar to 1.6 bar relative pressure                                                                            |
| 456    | 0 to 2.5 bar relative pressure                                                                                |
| 535    | 0 to 4 bar sealed gauge                                                                                       |
| 536    | 0 to 6 bar sealed gauge                                                                                       |
| 537    | 0 to 10 bar sealed gauge                                                                                      |
| 487    | 0 bar to 0.6 bar absolute pressure                                                                            |
| 488    | 0 to 1 bar absolute pressure                                                                                  |
| 489    | 0 to 1.6 bar absolute pressure                                                                                |
| 490    | 0 to 2.5 bar absolute pressure                                                                                |
| 491    | 0 to 4 bar absolute pressure                                                                                  |
| 492    | 0 to 6 bar absolute pressure                                                                                  |
| 493    | 0 to 10 bar absolute pressure                                                                                 |
| 997    | Special measuring range for sealed gauge                                                                      |
| 998    | Special measuring range for absolute pressure <sup>a</sup>                                                    |
| 999    | Special measuring range for relative pressure <sup>a</sup>                                                    |
|        | <b>(4) Output</b>                                                                                             |
| 405    | 4 to 20 mA, 2-wire                                                                                            |
|        | <b>(5) Process connection</b>                                                                                 |
| 759    | Mounted protection cage Ø 95 mm <sup>b</sup>                                                                  |
| 770    | Front-flush process connection with protective cap                                                            |
|        | <b>(6) Process connection material</b>                                                                        |
| 20     | CrNi (stainless steel) (only available with PUR cable)                                                        |
| 60     | Ti (titanium) (only available with FEP cable)                                                                 |
|        | <b>(7) Electrical connection</b>                                                                              |
| 16     | Cable shielded, fixed, PUR, black, UV-resistant (only available in stainless steel version)                   |
| 25     | Cable shielded, fixed, FEP, black, UV-resistant (only available in titanium version)                          |
|        | <b>(8) Connecting cable length<sup>c</sup></b>                                                                |
| 002    | 2 m                                                                                                           |
| 005    | 5 m                                                                                                           |
| 010    | 10 m                                                                                                          |

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|     |               |
|-----|---------------|
| 020 | 20 m          |
| 030 | 30 m          |
| 040 | 40 m          |
| 050 | 50 m          |
| 060 | 60 m          |
| 070 | 70 m          |
| 080 | 80 m          |
| 090 | 90 m          |
| 100 | 100 m         |
| (9) | Extra codes   |
| 000 | None          |
| 085 | UKEX approval |

<sup>a</sup> The special measuring range is specified in plain text.

<sup>b</sup> Only available in conjunction with process connection material 20.

<sup>c</sup> Other cable length available on request.

|                      | (1)                  | (2)                    | (3)                    | (4)                    | (5)                    | (6)                    | (7)                    | (8)                    | (9)                    |
|----------------------|----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| <b>Order code</b>    | <input type="text"/> | / <input type="text"/> | - <input type="text"/> | - <input type="text"/> | - <input type="text"/> | - <input type="text"/> | - <input type="text"/> | - <input type="text"/> | / <input type="text"/> |
| <b>Order example</b> | 404393               | / 000                  | - 417                  | - 405                  | - 770                  | - 60                   | - 25                   | - 005                  | / 000                  |

## Stock versions

| Order code                           | Part no. |
|--------------------------------------|----------|
| 404393/000-414-405-770-60-25-005/000 | 00640023 |
| 404393/000-417-405-770-60-25-005/000 | 00640030 |
| 404393/000-424-405-770-60-25-010/000 | 00644175 |

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## Accessories

Without DNV approval

| Item                                                                                                                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Part no. |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Terminal box<br>with pressure compensation element<br> | <p>The terminal case, is used for secure installation of the level probe cable. The end of the pressure compensation tube is always protected from deposits and condensation (IP65). The remaining distribution can be performed with a standard cable without a pressure equalization hose.</p> <p>The terminal case should be mounted as close as possible to the medium surface while still outside the medium to ensure the system is implemented cost-effectively and in the best possible way.</p>                                                                                                                                                                    | 00061206 |
| Cable clamp<br>                                       | <p>The cable clamp holds the probe in the liquid at a defined depth and provides strain relief. Use of the cable clamp ensures that the cable is not deformed in an unacceptable manner.</p> <p>The cable clamp is compatible with all JUMO level probes.</p> <p>The clamping range is 4.8 mm to 10 mm. The maximum tensile strength is 390 N. The cable clamp is made of UV-resistant, corrosion-free and fiberglass-reinforced polyamide. The central elongated holes are provided for optional, application-dependent fixing of the cable to prevent the clamping jaws from sliding upwards. The side elongated hole is provided for fixing additional cable length.</p> | 00753260 |
| Sealing screw<br>                                    | <p>For closed containers or water wells with a well head, the cable should be guided through and fastened by a sealing screw.</p> <p>The sealing screw is made up of a G 1 1/2" thread and is used to route the cable.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 00333329 |
| Pressure compensation filter for cable                                                                                                  | <p>The pressure compensation filter is a breathable filter that ensures aeration and exhaust-air ventilation without moisture penetrating. It is fitted at the end of the special cable.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 00382632 |
| Ex-i supply/input isolating amplifier<br>            | <p>The Ex-i repeater power supply / input isolating amplifier is designed for operating intrinsically safe transmitters (Ex-i) and mA current sources installed in potentially explosive (Ex) areas.</p> <p>Two-wire transmitters are supplied with energy and analog 0/4 to 20 mA measured values are transmitted from the Ex-area to the non-Ex-area. The output of the module can be operated actively or passively. Further technical data and the relevant safety requirements are available in the operating manual B 707530.0.</p>                                                                                                                                   | 00577948 |