TECFLUID
the art of measuring

Metal tube flowmeters
Series M21

Variable area flowmeter for low flows of liquids, gases and steam

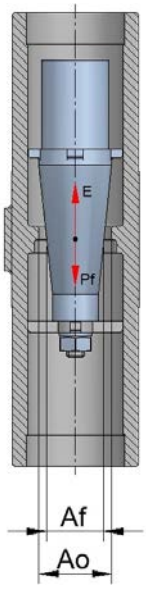
- Metallic tube with a robust construction
- Indication by means of magnetic coupling
- Scales calibrated in l/h, m^3/h, kg/h, t/h, %, etc.
- High performance measurement in extreme working conditions and high resistance to corrosion
- Low pressure drop
- Regulating valve optional
- Vertical or horizontal connections
- Damping mechanism to avoid float bounces in gas and steam applications
- Flow rate:
  - Water: 0.4 l/h ... 1000 l/h
  - Air: 12 Nl/h ... 30 Nm^3/h
- Accuracy: 4% (q_G=50%)
- Connections:
  - ¼" ... ¾" BSP or NPT
  - Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Materials: EN 1.4404 (AISI 316L). Others on request
- Local indication
- Options:
  - 1 or 2 limit switches
  - Electronic transmitter with 4-20 mA output for safe or hazardous area (Ex ia protection, ATEX certified). HART, MODBUS protocol available on request
  - Constant flow regulator RCD / RCA

Working principle

The M21 flowmeter is a metal tube variable area flowmeter for low flows.

It is based in the principle of variable area, which is obtained by a float that moves up and down inside a calibrated orifice. The force from the fluid displaces the float until it reaches an equilibrium point.

Each float position corresponds to a flow rate value. The float magnetic field moves the needle inside the housing by means of magnetic coupling to the corresponding flow rate point on a graduated scale.



Ao= Calibrated orifice area
Af= Float area
Pf= Weight of the float
E= Force of the fluid flow
Al= Ao-Af= Free area of flow

Applications

- Control panels, pilot plants, control and measurement in machinery
- Control and research laboratories
- Water treatment, heating-cooling industrial processes
- Control of gas burners and treatment ovens
- Chemical, pharmaceutical and cosmetic industries
- Level control with RCD regulators

Models

- M21-R / N Vertical connection BSP / NPT
- M21-HR / HN Horiz. conn. BSP / NPT, without valve
- M21-HRA / HNA Horiz. conn. BSP / NPT + valve
- M21-1 / 3 / 7 / 30 Sanitary vertical connection

Technical data

- Accuracy acc. to VDI/VDE 3513 sheet 2 (q_G=50%): 4%
- Direct scales in engineering units or %
- Scale range: 10:1
- Fluid temperature:
  - Without switches: -80ºC ... +250ºC
  - With switches and/or transmitter: -20ºC ... +200ºC
- Ambient temperature: -20ºC ... +80ºC
- Working pressure:
  - PN16 (with regulating valve)
  - PN40 (without regulating valve)

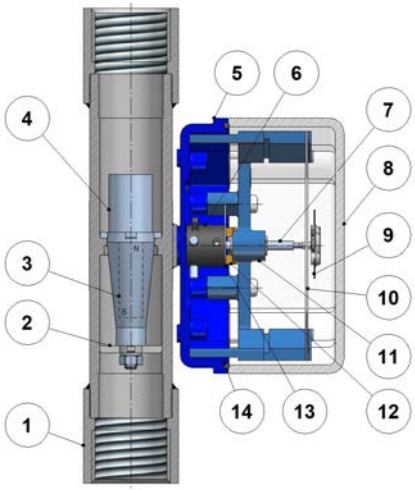
  Others on request
- Connections:
  - ¼" … ¾" BSP or NPT thread
  - Sanitary connections acc. to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Housing: IP65 coated aluminium, polycarbonate window. IP67 AISI 316L (EN 1.4404) with glass window, on request.

Limit switches and transmitters

- M1-AMD1 ... 2: 1 ... 2 adjustable inductive detectors (+ relay on request)
- TH6 ... TH6H: 4-20 mA 2-wire system transmitter. HART protocol with model TH6H

  All switches and transmitters are available with ATEX Ex ia certification. Switches are also available with ATEX / IECEx Ex ia certification
- MT03A: electronic converter. MODBUS RTU RS485 protocol optional

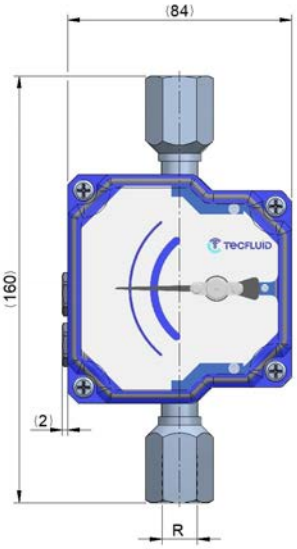
Materials

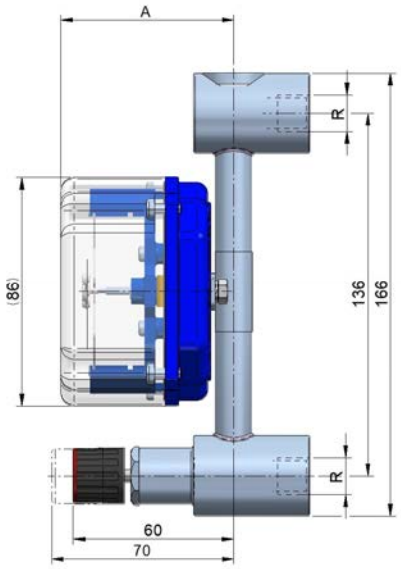


Nº	Description	Materials
1	Connection	EN 1.4404 (AISI 316L)
2	Lower float guide	EN 1.4404 (AISI 316L)
3	Float magnet	AlNiCo
4	Float	EN 1.4404 (AISI 316L)
5	Housing base	Coated aluminium
6	Needle magnet	Neodymium
7	Needle shaft	EN 1.4401 (AISI 316)
8	Housing cover	Polycarbonate
9	Needle	Aluminium
10	Graduated scale	Aluminium
11	Support	Polycarbonate
12	Bearing holder	Brass
13	Brake disk	Aluminium
14	Gasket	NBR

Dimensions

M21-R (BSP thread)
M21-N (NPT thread)



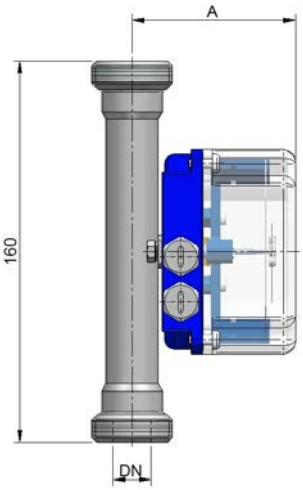


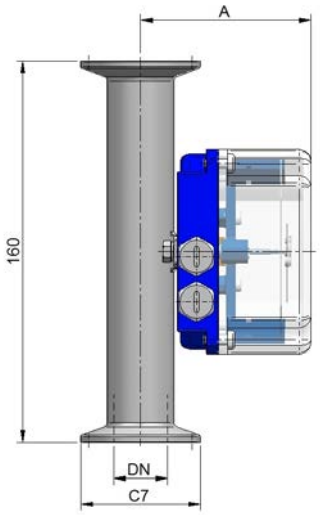
M21-HR (BSP thread)
M21-HN (NPT thread)
M21-HRA (BSP with valve)
M21-HNA (NPT with valve)

R	A
¼"	65
½"	69
¾	72

M21-1 (DIN 11851)
M21-7 (SMS ISO 1145)

DN	A
10	66
15	68
20 / 25	69





M21-3 (CLAMP ISO 2852)
M21-30 (TRI-CLAMP®)

DN		A	C_7
CLAMP	TRI-CLAMP®		
12	¾"	65	34
21.3	1"	69	34
22.6	1"	72	50.5

Flow ranges

Model Nº	Flow scales AISI 316L float 7.95 g/cm³		Δp mbar	DN				BSP / NPT
	l/h water	Nl/h air 1.013 bar abs 20ºC		DIN 11851	TRI-CLAMP®	CLAMP ISO 2852	SMS ISO 1145	
M21004	0.4-4	12-120	28	DN10 Rd28 x 1/8"	¾" Ø15.7 / 25	DN12 / C7=34	-	¼"
M21006	0.6-6	18-180						
M21010	1-10	30-300	30					
M21016	1.6-16	50-490						
M21025	2.5-25	80-770						
M21040	4-40	120-1200	32					
M21060	6-60	160-1800						
M21100	10-100	300-3000						
M21160	16-160	500-4900	34	DN20 Rd44 x 1/6"	1" Ø22.1 / 50,5	DN21.3 / C7=34	DN25 Rd40 x 1/6"	½"
M21250	25-250	800-7700						
M21400	40-400	1200-12000	40					
M21630	60-630	1800-18000						
M21M01	100-1000	3000-30000				DN22,6 / C7=50.5		¾"

Other flow ranges on request

Accessories

Float damping system (for gas and steam applications)

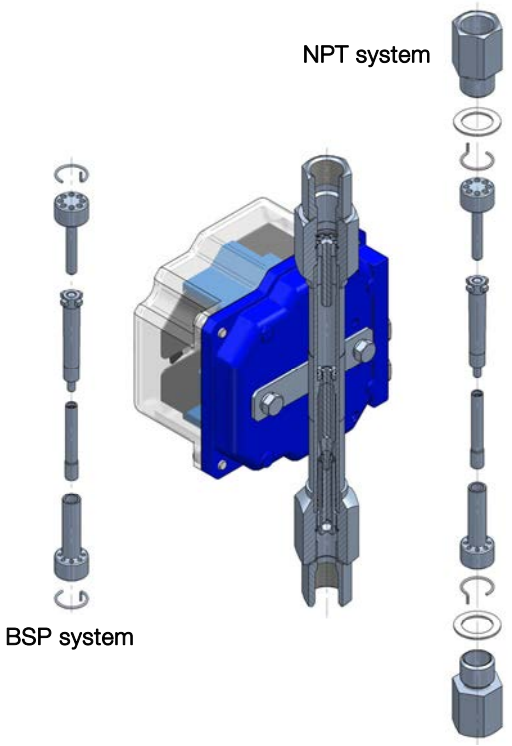
Ceramic, PEEK or metallic piston system for avoiding float oscillations in flowmeters for gas and steam applications, obtaining stable readings even with very low working pressures and low gas densities.

Available for ¼" … ¾"

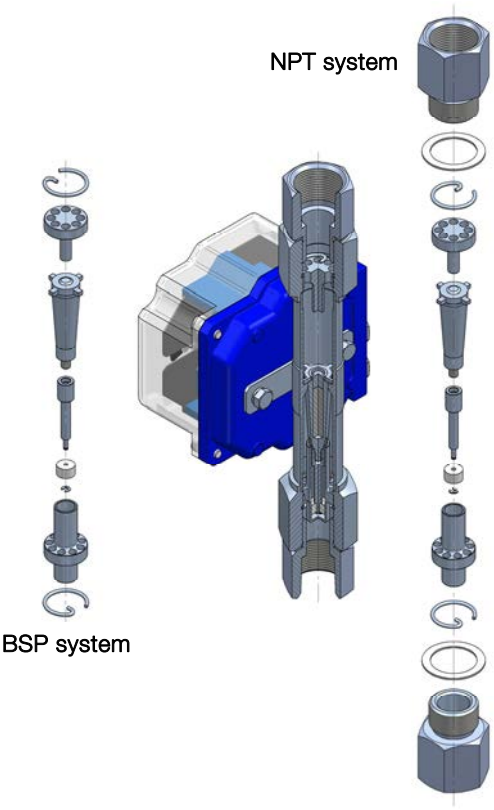
Components:

- Upper float stop and float
- Piston:
  - PEEK: T_{max} 70ºC
  - Ceramic & EN 1.4404 (AISI 316L): T_{max} 250ºC
  - Others: please consult
- Piston locking circlip and guide cylinder

Damping system M21 ¼"



Damping system M21 ½" & ¾"

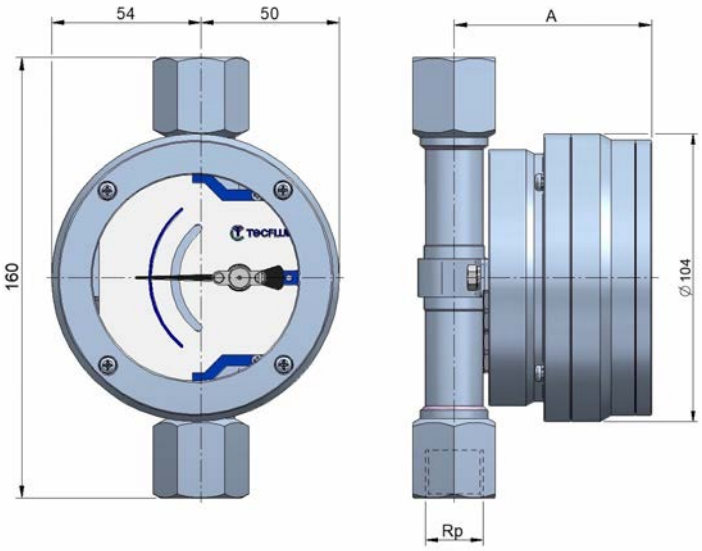


Total length M21 with NPT damping system: ¼" = 201 mm ; ½" = 212 mm ; ¾" = 222 mm

EN 1.4404 (AISI 316L) housing

- Specially indicated for working within sanitary or sterile installations, saline atmospheres (marine platforms), etc.
- All stainless steel construction EN 1.4404 (AISI 316L), with glass window
- Available with switches and transmitters
- Ingress protection: IP67

M21-R with AISI 316L housing



Rp	¼"	½"	¾
A	67	71	74

Constant flow regulators RCA / RCD

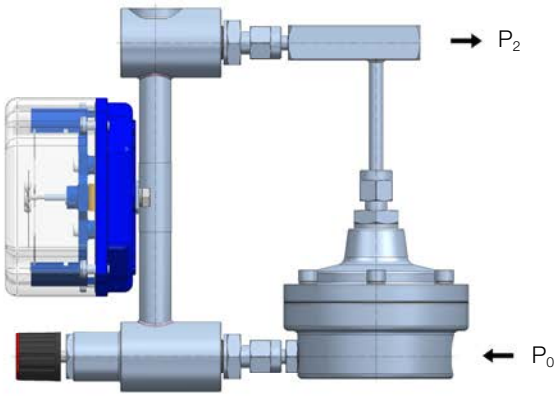
The M21 flowmeters are designed to incorporate the RCA and RCD constant flow regulators, which can make flow rate to be constant when inlet or outlet pressures are variable.

In gas applications, RCA model is used when inlet pressure is variable and outlet pressure or counterpressure is constant; RCD model is used in installations where inlet pressure is constant and outlet pressure or counterpressure is variable.

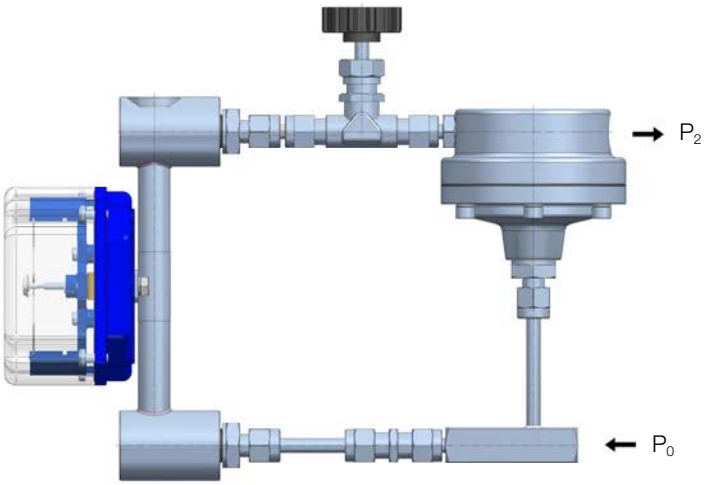
In applications for liquids RCA model is used in all cases.

The differential pressure between P_0 and P_2 must always be higher than 350-450 mbar depending on the model. This is necessary to guarantee a correct performance of the flow regulator.

RCA (use with models M21-HRA, M21-HNA)



RCD (use with models M21-HR, M21-HN)



Limit switches and transmitters

Adjustable limit switch M1-AMD

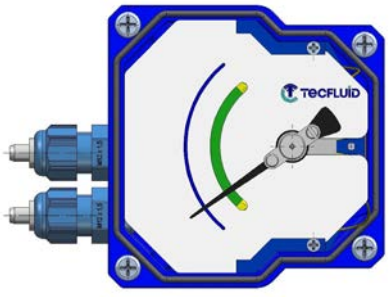
NAMUR (EN 60947-5-6) 3.5 mm slot type inductive detector activated by vane.

- M1-AMD1 … 2: 1 … 2 adjustable limit switches
- Nominal voltage: 8.2 V / Working voltage: 5 … 25 V
- Ambient temperature: -25°C ... +100°C
- ATEX / IECEx certificate Ex ia IIC T6 Ga / Ex ia IIIC T*°C Da

Control relay (on request)

NAMUR (EN 60947-5-6) for 1 or 2 inductive detectors.

- Power supply: 20 … 30 VDC
- Consumption: <1.3 W
- Relay output:
  - Vmax: 253 VAC / 2A // 40 VDC / 2A resistive load
- Ambient temperature: -20°C ... +60°C



M1-AMD

M21-HRA

Transmitter TH6

The TH6 electronic transmitters provide an analog output proportional to the flow rate. They are based on the Hall effect and mounted inside the indicator housing.

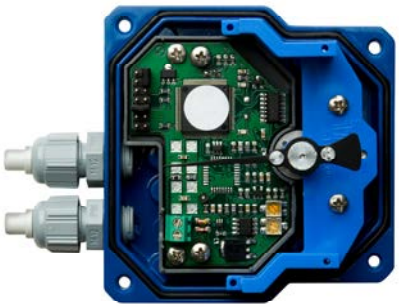
- **TH6** transmitter
- **TH6H** transmitter + HART protocol

Technical data

- Power supply: 12 … 36 VDC (18 … 36 VDC with HART protocol), 2-wire system
- Power consumption: 4-20 mA for 0 … 100% of scale
- 4-20 mA analog output:
  - Error: < 0.6% of the magnet position
  - Maximum load in 4-20 mA loop: 1.1 kΩ (with 36 VDC power supply)
- Ambient temperature: -20ºC ... +70ºC
- Cable entries M12x1,5

ATEX version

- ATEX certificate Ex ia IIC T6 … T4 Ga / Ex ia IIIC T85ºC Da
- Power supply: 14 … 30 VDC, 2-wire system
- Power consumption: 4-20 mA for 0 … 100% of scale
- 4-20 mA analog output:
  - Error: < 0.6% of the magnet position
  - Maximum load in 4-20 mA loop: 900 Ω (with 30 VDC power supply)
- Ambient temperature: -5ºC ... +40ºC



TH6

Electronic converter

Model MT03A

- Electronic converter for flow applications
- Resistance and current inputs
- Programmable via USB cable by means of Tecfluid S.A. Winsmeter MT03 software or by means of keyboard and graphic display with intuitive menus
- Panel mounting with dimensions 96 x 96 mm DIN 43700
- Power supply: 100 … 240 VAC 50 / 60 Hz
  18 … 36 VDC
- Full diagnosis. User selectable password protection
- 5 digits local flow rate indication and 8 digits totalizer and partial totalizer. Possibility of remote reset
- Programmable 4-20 mA analog output
- 2 x relay outputs programmable as flow rate alarms
- Mass flow rate can be measured programming the product density
- Ingress protection: IP50 front, IP30 back
  (Optional IP65 front with silicone cover)
- Ambient temperature: -20ºC ... +60ºC
- MODBUS RTU RS485 protocol on request

MT03A

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Quality Management System ISO 9001 certified by

Pressure Equipment Directive certified by

ATEX European Directive certified by

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