

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, m³/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 Nm³/h ... 30 Nm³/h
- Accuracy: 4% (q_G=50%)
- Connections:
 - ¼" ... ¾" BSP / NPT
 - Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Materials: EN 1.4404 (AISI 316L)
- Local indication
- Options:
 - 1 or 2 limit switches
 - Electronic transmitter with 4-20 mA output for safe or hazardous area (Ex ia IIC T4...T6 Ga / Ex ia IIIC T85°C Da protection, ATEX certified). HART protocol available on request
 - Constant flow regulator RCD / RCA



Working principle

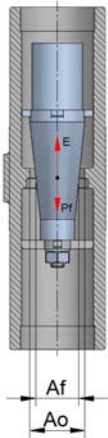
The M21 flowmeter is a metal tube variable area flowmeter for low flows.

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, as it flows from the bottom to the top, displaces the float until it reaches an equilibrium point that is a function of:

- E = force of the fluid flow
- Pf = weight of the float
- Al = free area of flow

(Al = Ao, calibrated orifice area, - Af, float area)

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 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 and 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 connections 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 connections

Technical data

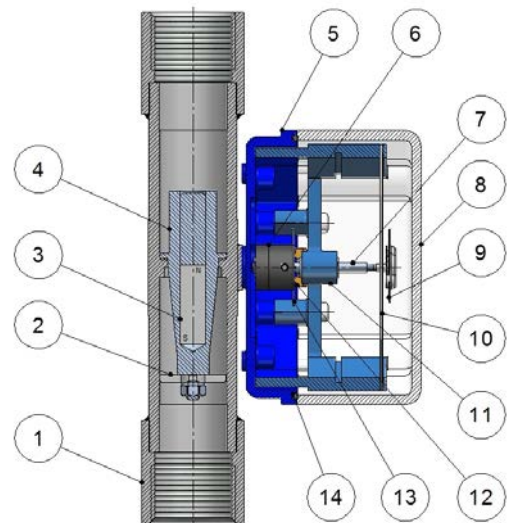
- **Accuracy** acc. to VDI/VDE 3513 sheet 2 ($q_G=50\%$): 4%
- **Direct scales in engineering units or %**
- **Scale range:** 10:1
- **Fluid temperature:**
 - Without switches: -80°C ... +250°C
 - With switches and/or transmitter: -20°C ... +200°C

- **Ambient temperature:** -20°C ... +80°C
- **Working pressure:**
 - PN16 (with regulating valve)
 - PN40 (without regulating valve)
 (others on request)
- **Sanitary connections** according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®.
- **Housing:** IP65 - coated aluminium, polycarbonate window. IP67 - EN 1.4404 (AISI 316L) with glass window, on request.
- **ATEX certificate** Ex ia IIC T4...T6 Ga / Ex ia IIIC T85°C Da

Limit switches and transmitters

- **M1-AMD1 ... 2:** 1 ... 2 adjustable inductive detectors (Relay EN 60947-5-6 or NAMUR, on request)
 - **TH6 ... TH6H:** 4-20 mA 2-wire system transmitter. HART protocol with model TH6H
- All switches and transmitters available with ATEX certification Ex ia IIC T4...T6 Ga / Ex ia IIIC T85°C Da

Materials



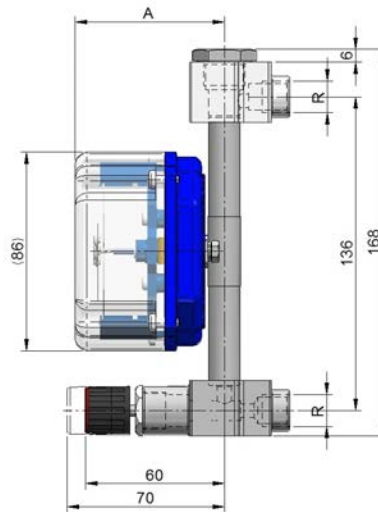
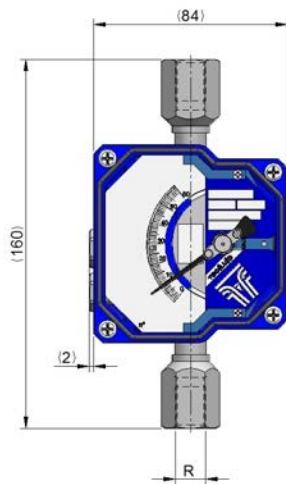
| N° | Description | Materials |
|----|-----------------------------|-----------------------|
| 1 | Connection | EN 1.4404 (AISI 316L) |
| 2 | Lower float guide | EN 1.4404 (AISI 316L) |
| 3 | Float magnet | AlNiCo |
| 4 | Float | EN 1.4404 (AISI 316L) |
| 5 | Housing base | Coated aluminium |
| 6 | Needle magnet | Neodymium |
| 7 | Needle shaft | AISI 316 |
| 8 | Housing cover | Polycarbonate |
| 9 | Needle | Aluminium |
| 10 | Graduated scale / dataplate | Aluminium |
| 11 | Support | Polycarbonate |
| 12 | Bearing holder | Brass |
| 13 | Brake disk | Aluminium |
| 14 | Gasket | NBR |

Metal tube flowmeters

Series M21

Dimensions

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

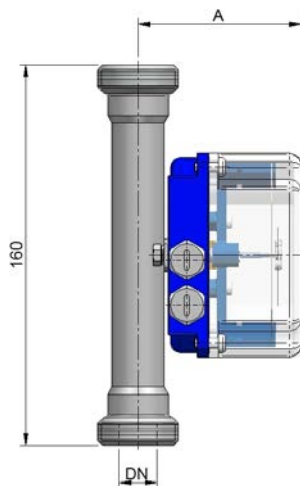


M21-HR (BSP thread)
M21-HN (NPT thread)
M21-HRA (BSP with valve)
M21-HNA (NPT with valve)

| R | A |
|------|----|
| 1/4" | 65 |
| 1/2" | 69 |
| 3/4" | 72 |

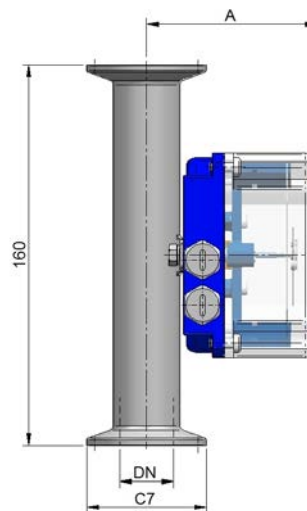
M21-1 (DIN 11851)
M21-7 (SMS ISO 1145)

| DN | A |
|---------|----|
| 10 | 66 |
| 15 | 68 |
| 20 / 25 | 69 |



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

| DN | | A | C7 |
|-------|------------|----|------|
| CLAMP | TRI-CLAMP® | | |
| 12 | 3/4" | 65 | 34 |
| 21.3 | 1" | 69 | 34 |
| 22.6 | 1" | 72 | 50.5 |



Flow ranges

| Model N° | Flow scales AISI 316L float 7.95 g/cm³ | | Δp mbar | DN | | | | BSP / NPT |
|----------|---|--------------------------------|------------|-------------|--------------|-------------------|-----------------|-----------|
| | l/h water | NI/h air 1.013 bar abs 20°C | | DIN 11851 | TRI-CLAMP® | CLAMP ISO 2852 | SMS ISO 1145 | |
| M21004 | 0.4-4 | 12-120 | 28 | | | | | |
| M21006 | 0.6-6 | 18-180 | | | | | | |
| M21010 | 1-10 | 30-300 | 30 | | | | | |
| M21016 | 1.6-16 | 50-490 | | DN10 | 3/4" | DN12 / | - | 1/4" |
| M21025 | 2.5-25 | 80-770 | | Rd28 x 1/8" | Ø15.7 / 25 | C7=34 | | |
| M21040 | 4-40 | 120-1200 | 32 | | | | | |
| M21060 | 6-60 | 160-1800 | | | | | | |
| M21100 | 10-100 | 300-3000 | | | | | | |
| M21160 | 16-160 | 500-4900 | | | | | | |
| M21250 | 25-250 | 800-7700 | 34 | | | DN21.3 / | | |
| M21400 | 40-400 | 1200-12000 | | DN20 | 1" | C7=34 | DN25 | 1/2" |
| M21630 | 60-630 | 1800-18000 | | Rd44 x 1/6" | Ø22.1 / 50,5 | | Rd40 x 1/6" | |
| M21M01 | 100-1000 | 3000-30000 | 40 | | | DN22,6 / | | 3/4" |
| | | | | | | | C7=50.5 | |

Other flow ranges on request

Limit switches and transmitters

Adjustable limit switch M1-AMD

NAMUR (EN 60947-5-6) 3.5 mm slot type inductive detector activated by vane, mounted in the indicator housing.

- M1-AMD1 ... 2: 1 ... 2 adjustable limit switches
- Power supply: 8 VDC
- Ambient temperature: -25°C ... +70°C
- ATEX certification Ex ia IIC T4...T6 Ga / Ex ia IIIC T85°C Da

Control relay (on request)

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

- Power supply: 24 ... 253 VAC 50-60 Hz
24 ... 300 VDC
- Input: NAMUR Ex ia IIC
- Output: 1 or 2 relay contacts
- Output rating: 2 A 250 VAC 100 VA / 1 A 24 VDC
- Ambient temperature: -20°C ... +60°C

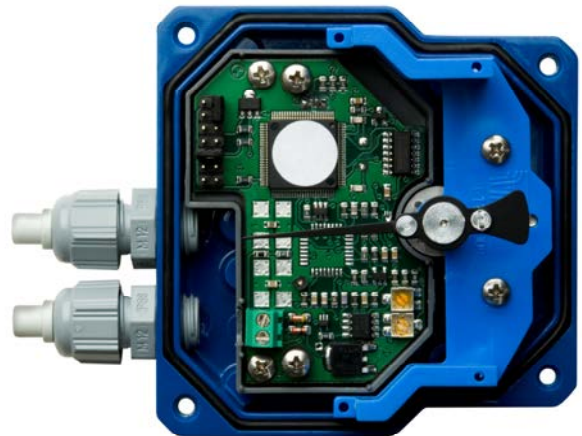
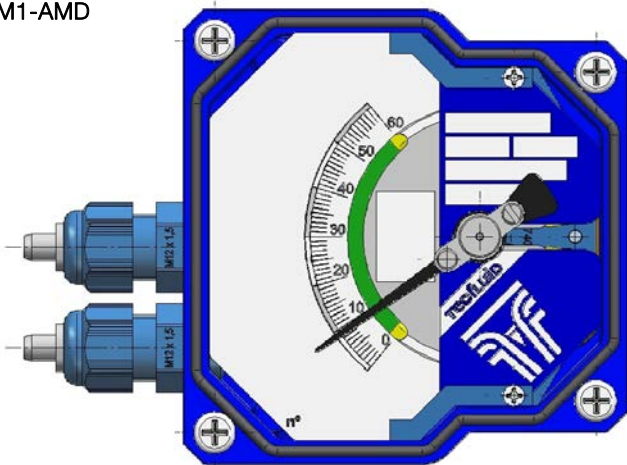


Transmitter TH6

- Power supply: 2-wire system, 12 ... 36 VDC
- Power consumption: max. 20 mA
- Analog output (4-20 mA):
 - Error: < 0,6% of the magnet position
 - Maximum load in 4-20 mA loop: 1,1 kΩ (with 36 VDC power supply)
- Ambient temperature: -5°C ... +70°C
- Transmitter connector: Packing gland M12x1,5
- Optional: ATEX certification Ex ia IIC T4...T6 Ga / Ex ia IIIC T85°C Da , with model TH6 Ex
- Optional: HART protocol, with model TH6H



M1-AMD

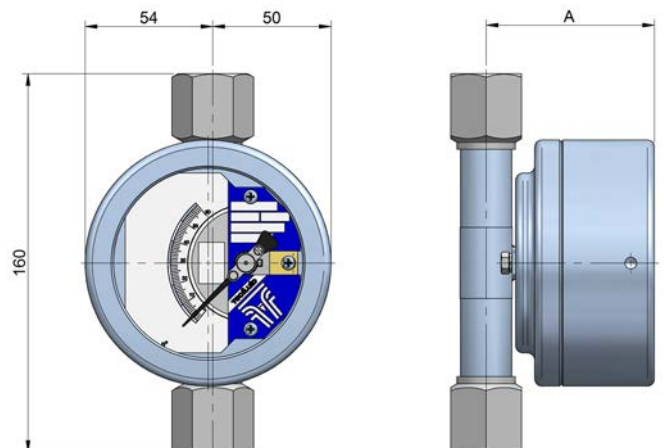


Accessories

Stainless steel 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
- Can fit standard limit switches and Halltec transmitters
- Ingress protection: IP67

| | | | |
|----|----|----|----|
| Rp | ¼" | ½" | ¾" |
| A | 67 | 71 | 74 |



Metal tube flowmeters

Series M21

Float damping system (for gas and steam applications)

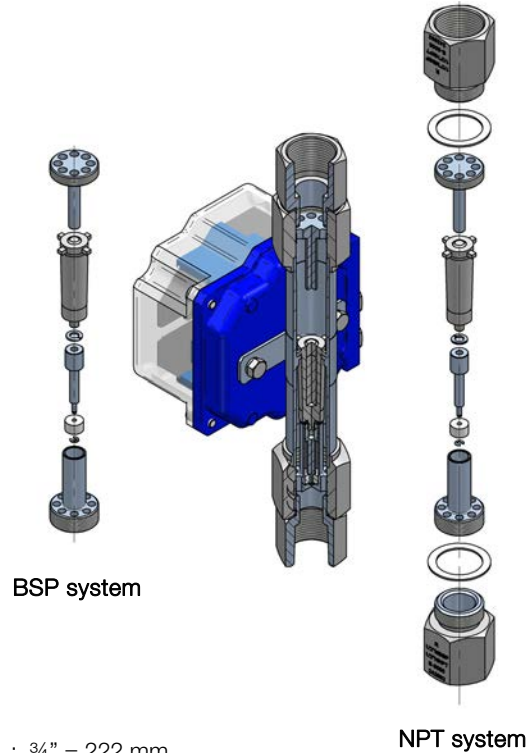
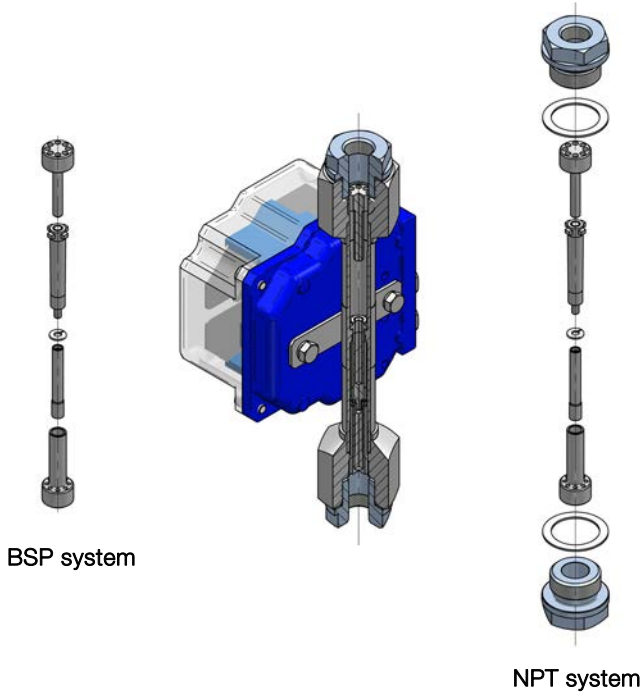
Ceramic, PEEK or metallic piston system for avoiding float oscillations in flowmeters for gas and steam service, obtaining stable readings even with very low working pressures and low gas densities.

Available for 1/4" ... 3/4". Components:

- Upper float stop
- Float
- Piston
- Piston locking circlip
- Guide cylinder

Damping system for M21 1/4"

Damping system for M21 1/2" y 3/4"



Total length M21 with damping system NPT: 1/4" = 186 mm ; 1/2" = 212 mm ; 3/4" = 222 mm

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.

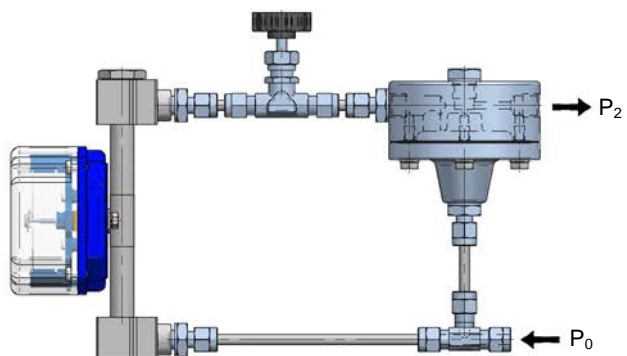
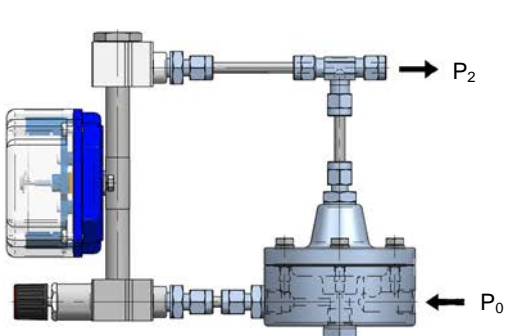
In gas applications, RCA model is used when inlet pressure is variable and outlet pressure or counterpressure is constant; RCD model is used in installations where inlet pressure is constant and outlet pressure or counterpressure is variable.

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 for model M21-HRA, M21-HNA

RCD for model M21-HR, M21-HN



PRESENCE IN MORE THAN 50 COUNTRIES ALL OVER THE WORLD




TECFLUID
The art of measuring



Tecfluid S.A.
Narcís Monturiol 33
08960 Sant Just Desvern
Barcelona
Tel: +34 93 372 45 11
Fax: +34 93 473 08 54
tecfluid@tecfluid.com
www.tecfluid.com

Quality Management System ISO 9001 certified by **Applus[®]**

Pressure Equipment Directive 97/23/CE certified by **Lloyds Register**

ATEX European Directive 94/9/CE certified by 

HART[®] is a registered trademark of HART Communication Foundation

The technical data described in this specification sheet is subject to modification without notification if the technical innovations in the manufacturing processes so require.
TRI-CLAMP[®] is a registered trademark of Alfa Laval Inc.