TecFluid

Instrumentation for fluids

Metal tube flowmeters

Series M21

Metal tube 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% f.s.
- Connections:
  - ¼" ... ¾" BSP / NPT
  - Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Materials: EN 1.4404 (SS 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 T85ºC Da protection, ATEX certified). HART™ protocol available on request
  - Constant flow regulator RCD / RCA

HART COMMUNICATION PROTOCOL

Working principle

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

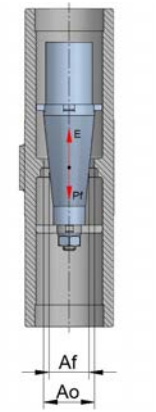
It is based in the principle of variable area, which is obtained by a float that moves up and down inside a calibrated orifice.

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 corresponding 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 and heating-cooling industrial processes
- Control of gas burners and treatment ovens
- Chemical, pharmaceutical and cosmetic industries
- Level control with RCD regulators

Technical data

- Accuracy according to VDI/VDE 3513: ±4% at full scale
- 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)
- Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®.
- Housing: IP65 - coated aluminium, polycarbonate window. IP67 - EN 1.4404 (SS 316L) with glass window, on request.
- ATEX certificate Ex ia IIC T4...T6 Ga / Ex ia IIIC T85ºC Da

Models

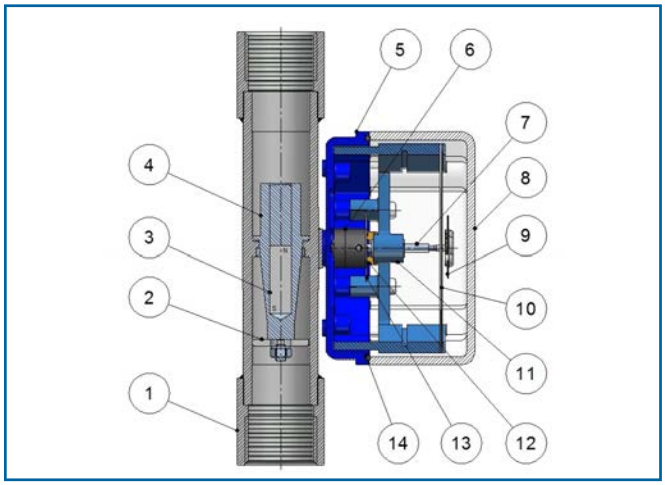
M21-R / N	Vertical connections BSP / NPT
M21-HR / HN	Horiz. conn. BSP / NPT, without valve
M21-HRA / HNA	Horiz. conn. BSP / NPT + valve
M21-1 / 3 / 5 / 7 / 30	Sanitary vertical connections

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 T85ºC Da

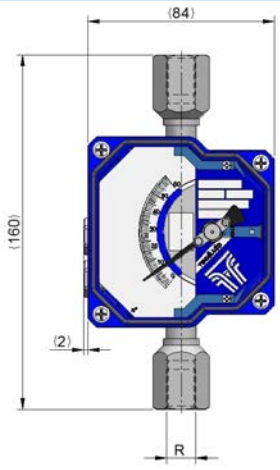
Materials

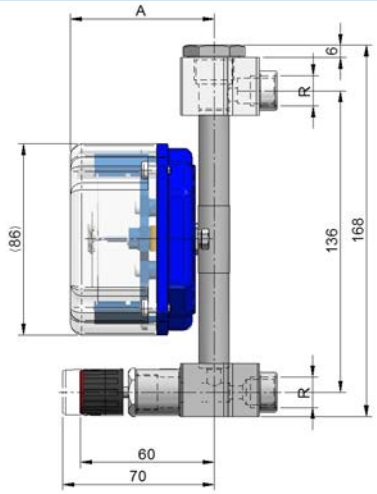


Nº	Description	Materials
1	Connection	EN 1.4404 (SS 316L)
2	Lower float guide	EN 1.4404 (SS 316L)
3	Float magnet	AlNiCo
4	Float	EN 1.4404 (SS 316L)
5	Housing base	Coated aluminium
6	Needle magnet	Neodymium
7	Needle shaft	SS 316
8	Housing cover	Polycarbonate
9	Needle	Aluminium
10	Graduated scale / dataplate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

Dimensions

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



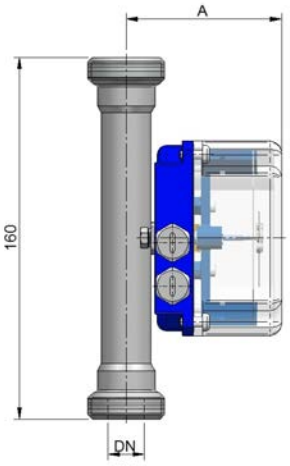


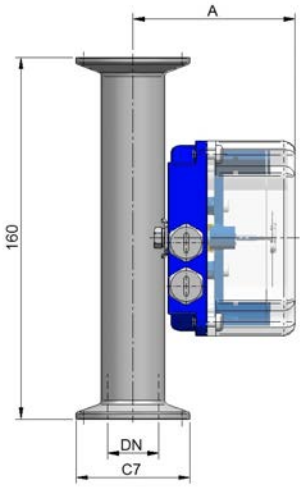
M21-HR (BSP thread)
M21-HN (NPT thread)
M21-HRA (BSP with valve)
M21-HNA (NPT with valve)

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 CLAMP	DN TRI-CLAMP®	A	C_7
12	¾"	65	34
21,3	1"	69	34
22,6	1"	72	50,5

Flow ranges

Float Nº	Flow scales SS 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 available 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.

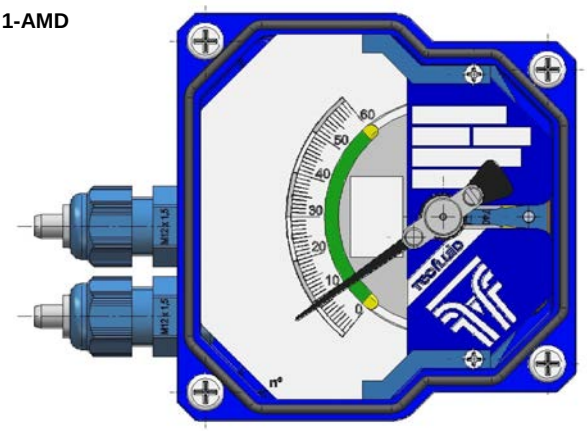
- M1-AMD1 … 2: 1 … 2 adjustable limit switches
- Power supply: 8 VDC
- Ambient temperature: -25°C ... +70°C
- ATEX certification Ex ia IIC T4...T6 Ga / Ex ia IIIC T85ºC Da

Control relay (on request)

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

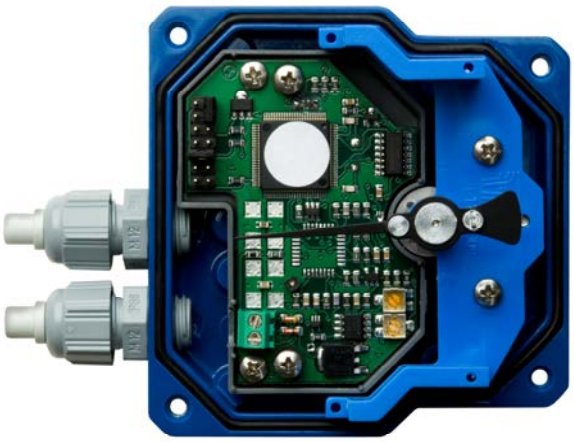
- Power supply: 24 … 253 VAC 50-60 Hz
  24 … 300 VDC
- Input: NAMUR Ex ia IIC
- Output: 1 or 2 relay contacts
- Output rating: 2 A 250 VAC 100 VA / 1 A 24 VDC
- Ambient temperature: -20°C ... +60°C

M1-AMD



Transmitter TH6 4-20 mA

- 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: -5ºC ... +70ºC
- Transmitter connector: Packing gland M12x1,5
- Optional: ATEX certification Ex ia IIC T4...T6 Ga / Ex ia IIIC T85ºC Da , with model TH6 Ex
- Optional: HART™ protocol, with model TH6H

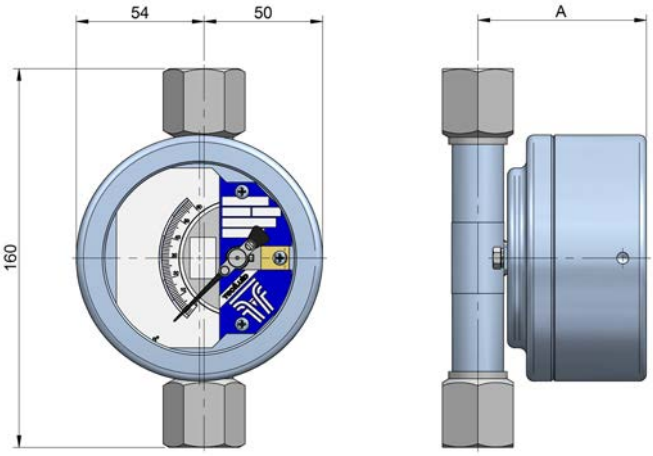


Accessories

Stainless steel housing

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

Rp	¼"	½"	¾
A	67	71	74



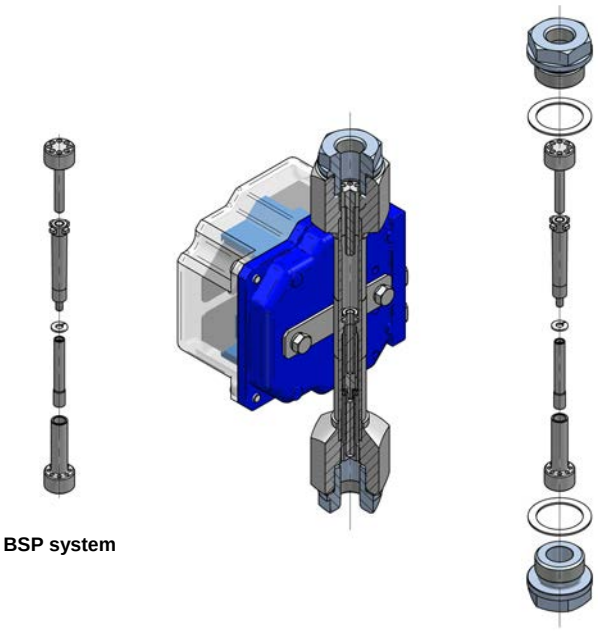
Float damping system (for gas and steam applications)

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 ¼" ... ¾". Components:

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

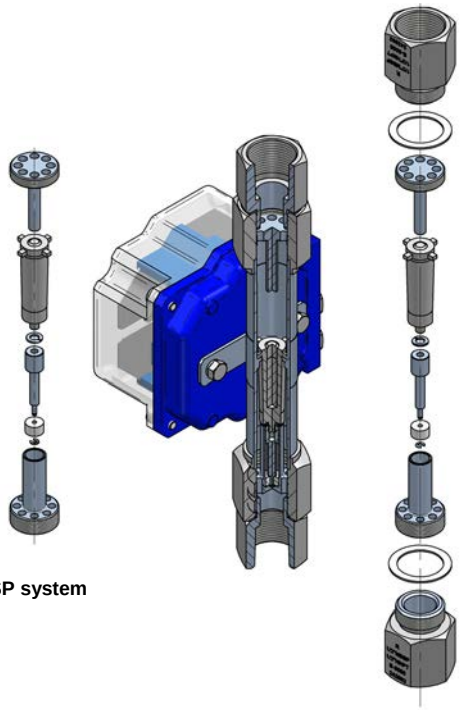
Damping system for M21 ¼"



BSP system

NPT system

Damping system for M21 ½" y ¾"



BSP system

NPT system

Total length M21 with damping system NPT: ¼" = 186 mm ; ½" = 212 mm ; ¾" = 222 mm

Constant flow regulators RCA / RCD

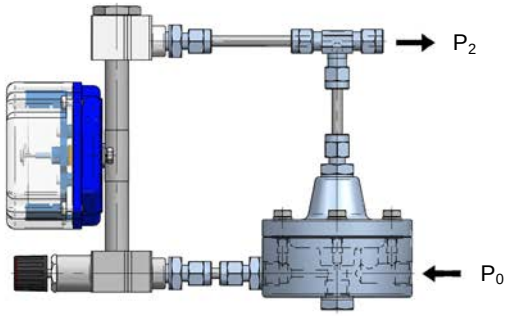
The M21 flowmeters are designed to incorporate the RCA and RCD constant flow regulators, which can make flow rate to be constant when inlet or outlet pressures are variable.

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.

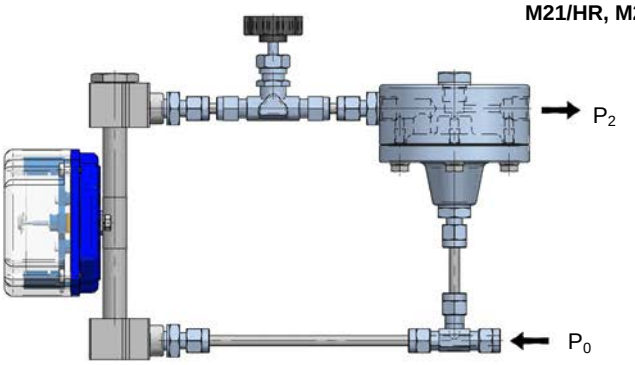
In applications for liquids RCA model is used in all cases.

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 around the world

Quality Assurance System ISO 9001 certified by Applus

Pressure Equipment Directive 97/23/CE certified by Lloyd's Register

ATEX Directive 94/9/CE certified by LOM

R-CT-M21 Rev. 1 english version

TECFLUID, S.A. design and manufacture instrumentation for flow and level measurement using the most advanced techniques.
May you need more information, please contact us.

TECFLUID s.a.

Instrumentation for fluids

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