TecfluiD

MORE THAN 40 YEARS MANUFACTURING FLOW AND LEVEL INSTRUMENTATION

www.tecfluid.nt-rt.ru

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TECFLUID
The art of measuring

INTRODUCTION

Tecfluid began the activity on January 2nd, 1974 in Barcelona. It has been 40 years now and if something has distinguished us from the first day, is our way of understanding the relationship with customers, our willingness to listen, to collaborate and help. In many cases we have established a natural and personal relationship that goes beyond the purely commercial one, something that we are deeply grateful of.

This way of collaborating and adapting ourselves to customer needs has helped us to improve year after year.

- Expanding our product range, incorporating many of the suggestions received from our customers.
- Finding unique solutions in the projects developed in more than 50 countries.
- Developing products and technical solutions in our R + D + I department, for example, the control and communication systems we implement in our products, which allow to diagnose their performance, to update their programs with continuous improvement and, through global communication systems, facilitate customer care in a fast and effective way.
- Adapting our facilities to the ISO 9001 standard to ensure the proper performance of the product in real conditions.

Today our greatest wish is to keep this philosophy of cooperation and confidence with our customers that definitely are our reason for being.

With this book we want to provide you with a detailed overview of the many possibilities of collaboration that we can offer you now and in the future, thanking for trusting in our products and the service we offered during these 40 years.

COLLABORATION WITH OUR CUSTOMERS GIVES US THE CHANCE TO ADAPT OURSELVES TO THEIR TECHNICAL NEEDS

TECFLUID, INNOVATION AND COMPREHENSIVE SERVICE OF QUALITY

Tecfluid is based in Barcelona, in the city of Sant Just Desvern. Research, development, production and marketing are carried out there for all the measuring flow and level equipment supplied worldwide for more than 40 years.

Tecfluid also have a subsidiary in Saint Ouen l'Aumone near Paris, in France.

BARCELONA IS A CITY WITH A LONG INDUSTRIAL TRADITION THAT BEGAN MORE THAN TWO CENTURIES AGO

BARCELONA, ONE OF THE INDUSTRIAL AND ECONOMIC ENGINES OF SOUTHERN EUROPE

Barcelona is a city with a long industrial tradition that began more than two centuries ago, becoming one of the main economic engines of the country. Today it has a specialized and competitive industrial base, focused on exportation and with a high relative weight, comparing it to other major European metropolitan areas.

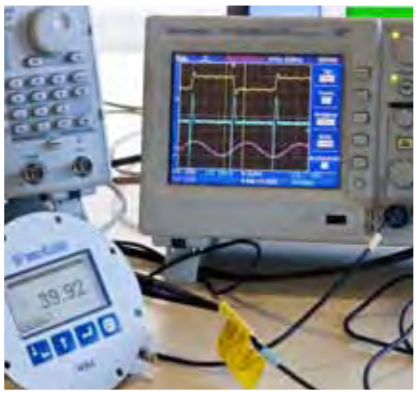
Barcelona is also a global city for its cultural, financial, commercial and tourist importance and it has been the scene of several global events like the Olympic Games in 1992, which contributed to set the current city projection and international presence.

A LONG JOURNEY THROUGH OVER 40 YEARS OF EXPERIENCE IN THE MANUFACTURE OF OUR PRODUCTS

OUR ORIGINS

Tecfluid began operations in 1974 in the industrial area of Sant Andreu in Barcelona to cover the growing demand of industrial products in general, and of flowmeters and level instruments in particular.

In 1982 we moved to our current headquarters in Sant Just Desvern, just 6 km far from the city, in a time when Barcelona takes on its most international projection and industries are moving out of the city.



OUR PRODUCTS ARE DEVELOPED AND UPDATED IN OUR R + D + I DEPARTMENT

R&D, THE CORNERSTONE OF OUR BUSINESS

Since 1982, the year of their creation, our R & D department has received a continued investment, making it one of our key departments.

The main function is the creation of new products, improvement of existing ones and development of non-standard mechanical or electronic solutions, to fit the particular needs of each customer.

All our products have been developed by our R & D department and manufactured in our facilities with our own in-house technology, following quality standards such as the ISO 9001. This allows us to guarantee a reliable and durable product with an after sales service of certified quality.

SINCE 1996 OUR DESIGN, MANUFACTURE AND AFTER SALES SERVICE ARE CERTIFIED ACCORDING TO ISO 9001 STANDARD

OWN PRODUCTION ACCORDING TO QUALITY STANDARDS

Since 1996 our design, manufacture and after sales service activities are certified according to ISO 9001. The compliance with other specific standards such as the Pressure Equipment Directive (PED) supports our commitment to manufacturing quality products.

Technical knowledge of our R&D department has also permitted to add other certificates as for the ATEX Directive, which allows the equipment to work in hazardous areas, Lloyd's Type Approval, for general industry, shipbuilding and "offshore", and HART®, as communication protocol.

The traceability process of our products is guaranteed by international norms and standards, including calibration of equipment in our facilities prior to shipment.

COMPREHENSIVE SERVICE AND CUSTOMIZED SOLUTIONS

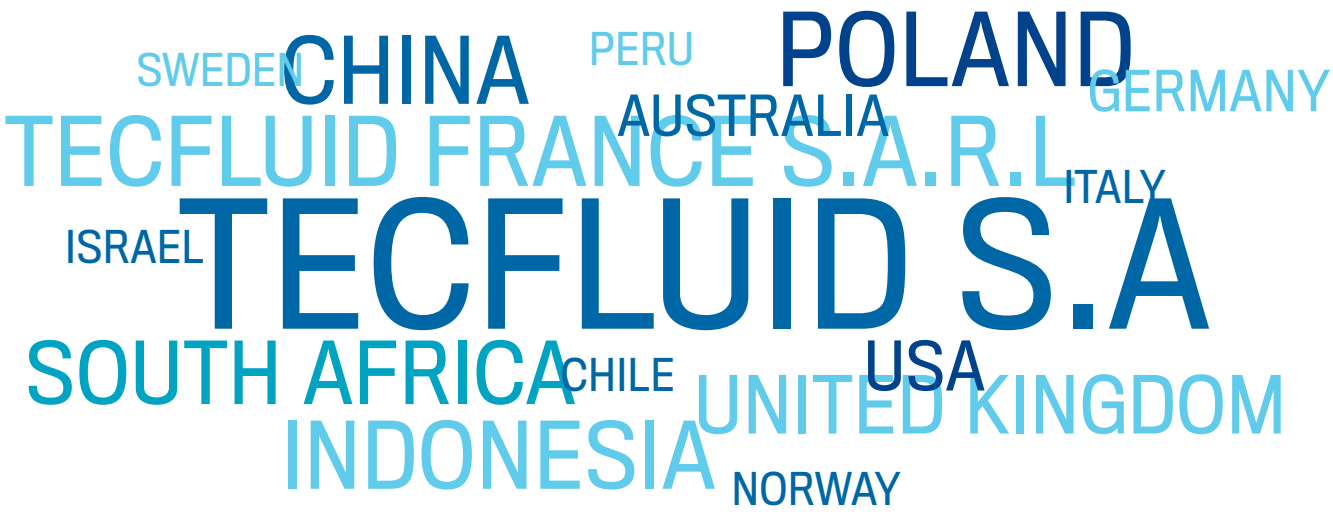
Tecfluid offers a comprehensive service highly valued by our customers, which includes the whole processes of design, development, production, marketing and after sales service of our products.

TECFLUID OFFER A COMPREHENSIVE SERVICE HIGHLY VALUED BY OUR CUSTOMERS

Control over the entire process allows us to guarantee the possibility of adapting products to industrial processes or creating new products that are customized to fit the specific requirements of the system or application.

The experience gained during the past 40 years allows us to collaborate on each project both with standard products or with products specifically designed for getting reliable measurements in all kind of environments, even in extreme conditions.

Through the technical sales department, integrated by engineers with a high level of product knowledge, Tecfluid give answer to the requests for flow and level applications and work with customers to find the most appropriate solution for their needs, with the aim of improving the performance of the installation and ensure a proper operation and control.



NOWADAYS TECFLUID ARE PRESENT IN MORE THAN 50 COUNTRIES ALL OVER THE WORLD

PRESENCE IN ALL CONTINENTS

Our willingness to work directly with the customer to give him a customized response to his needs, prompted us to initiate a progressive international expansion over 25 years ago.

Nowadays Tecfluid are present in more than 50 countries in all continents directly or through distributors, allowing us to offer assistance and guidance to find or develop the right equipment that meets your technical needs.

PRODUCT RANGE

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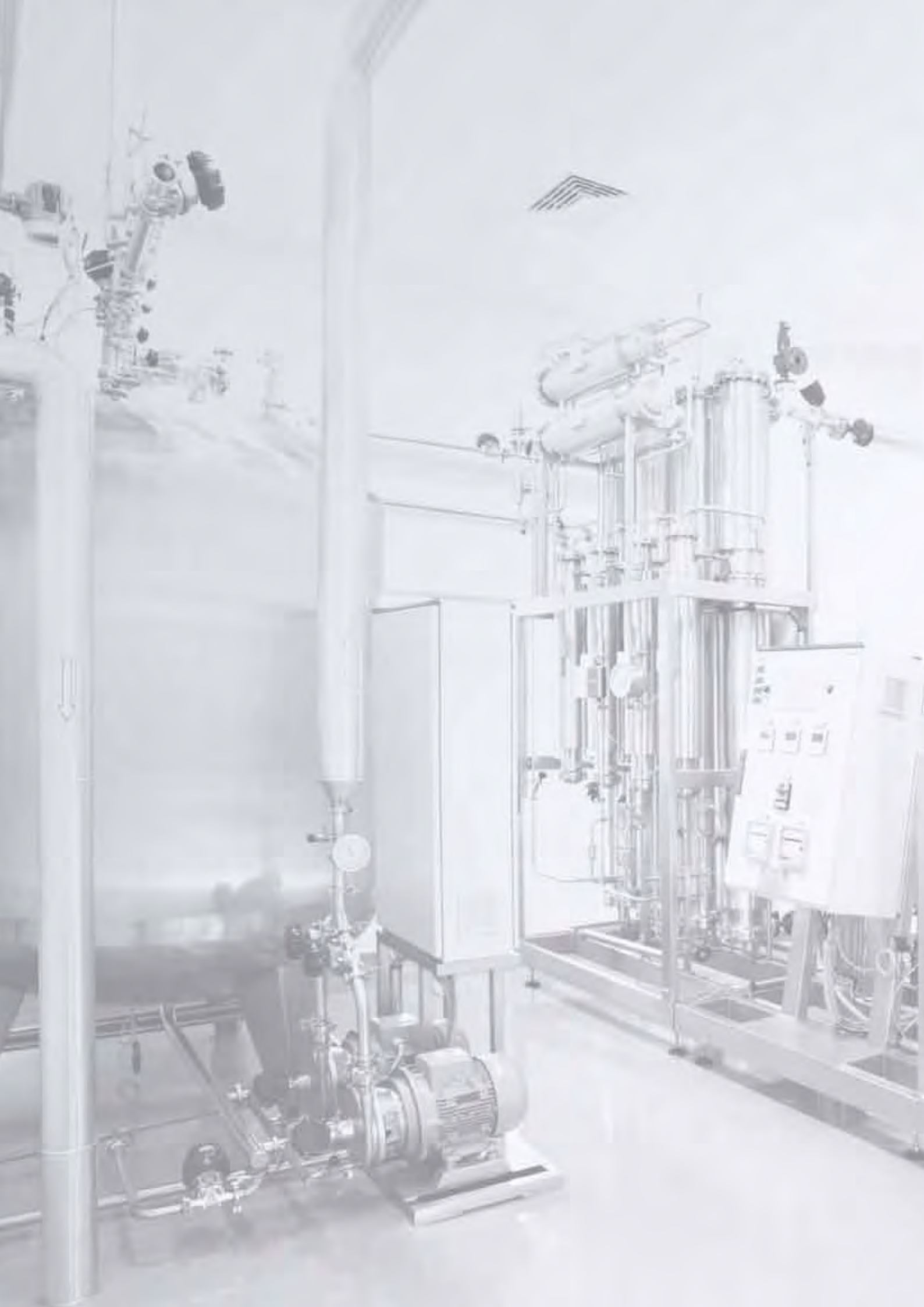
TECFLUID

The art of measuring

1. FLOW



1.1
VARIABLE AREA

1.1
VARIABLE AREA

PT/PS
2000
60M1
6000
M21
SC250

Plastic tube flowmeters
Series PT/PS

Variable area flowmeter for liquids and gases

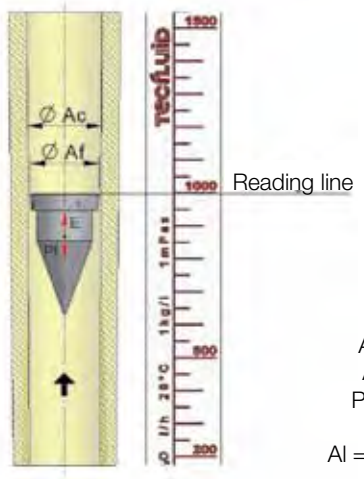
- Low cost, excellent readability and light weight
- Simple installation (flanged, threaded or socket ends for solvent or fusion welding connections)
- Wide range of operating temperatures with several combinations of tube and fittings materials
- Scaled directly in l/h, m^3/h, %,... Special scales for liquids and gases on request
- Flow rate:
  - Water: 4 l/h ... 50 m^3/h
  - Air: 200 Nl/h ... 1500 Nm^3/h
- Accuracy:
  - Models PT/PS: 4% (q_G=50%)
  - Models PTM/PSM: 6% (q_G=50%)
- Connections:
  - DIN flanges DN15 ... DN80
  - BSP or NPT threaded connections ½" ... 3"
  - Solvent weld socket PVC connections
  - Stainless steel & PP connections for welding
- Materials:
  - Measuring tube: Polysulfone and NAS®. Trogamid® T available on request
  - Fittings: PVC, steel, EN 1.4404 (AISI 316L), PP
  - Float: EN 1.4404 (AISI 316L), aluminium, PVC, PVDF, PTFE,...
  - Gaskets: NBR, VITON®, EPDM
- Local indication
- Options:
  - 1 or 2 limit switches
  - Electronic transmitter with 4-20 mA analog output (18 points max.). Ex version and HART, PROFIBUS or FIELDBUS protocols available on request

Working principle

Variable area flowmeter using a float in a tapered tube made of special plastic materials.

The fluid flows up through the tapered tube forcing the float to a position with sufficient free area to enable the flow to pass. This free area is related to the flow rate, the weight of the float and the density and viscosity of the fluid.

The pressure drop across the flowmeter remains constant over the entire flow range, since it is related to the fluid density and the float weight and dimensions. Flow indication is achieved since the area of flow increases as the flow rate increases.



Ac = Tube area
Af = Float area
Pf = Float weight
E = Fluid force
Al = Ac-Af= Free area

Applications

- **Water & waste water treatment**
- **Chemical & petrochemical industry**
- **Paper industry**
- **Pharmaceutical, cosmetics & synthesis**
- **Refrigeration & air conditioning**
- **Refining**
- **Osmosis**
- **Gas processes**

Models

- **PS/PSM** Polysulfone tube: PSU (polysulfone)
- **PT/PTM** Trogamid® T tube: PA (polyamide)
- **PTM03** NAS® tube: PS (polyestyrene)

Technical data

- **Accuracy**, acc. to VDI/VDE 3513 sheet 2 (q_G=50%):
  - PT / PS: 4%
  - PTM / PSM: 6%
- **Scales calibrated in l/h, m³/h, %**
  Special scales for liquids and gases on request
- **Scale range:** 10:1
- **Scale length:**
  - PT / PS: 160 ± 5 mm
  - PTM / PSM: 100 ± 5 mm
- **Fluid temperature:**
  - Models PT/PTM: max. 60ºC
  - Models PS/PSM, with connections in:
    - PVC: max. 60ºC
    - PP: max. 90ºC
    - EN 1.4404 / Steel:
      NBR gaskets: max. 100ºC
      VITON® gaskets: max. 110ºC
  - Model PTM03: max. 40ºC
- **Working pressure:** depending on size, up to 15 bar
- **Connections:**
  - PT11 / PS31: BSP thread or socket ends for solvent welding ½" ... 3"
  - PT12 / PS32: DIN flange DN15 ... DN80
  - PTM01 / PSM21: BSP thread or socket ends for solvent welding ½" ... ¾"
  - PTM02 / PSM22: DIN flange DN15 ... DN20
  - PTM03: BSP thread or socket ends for solvent welding ½" ... ¾"

  Other connections available on request
- **Trogamid® T tubes only available on request**

Operation

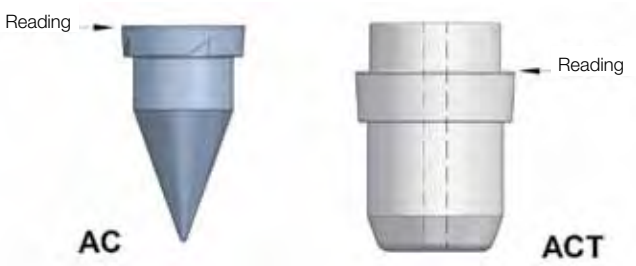
- Vertical with upwards flow

Limit switches and transmitters

- **PT-AMR1 ... 2:** 1 ... 2 magnetic actuated reed switches
- **PT-TMUR:** 0 ... 4-20 mA, 4-wire system
  (16...18 points resolution for models PT/PS)
- **PTM-TMUR:** 0 ... 4-20 mA, 4-wire system
  (11 points resolution for models PTM/PSM)

  Other transmitters on request:
  - 2-wire system
  - Ex protection
  - HART, Profibus or Fieldbus protocols

Float types



Models

PT ... PS ... PTM ... PSM / PVC ... PP

BSP thread ½" ... 3"

Socket ends for welding DN15 ... DN80

PT ... PS ... PTM ... PSM / Fully Steel ... Fully SS EN 1.4404 (AISI 316L)

BSP/NPT thread ½" ... 3"

PT ... PS ... PTM ... PSM / PVC ... PP

DIN flange DN15 ... DN80

Other flange standards available on request with BR flanged models

PT ... PS ... PTM ... PSM / Fully SS EN 1.4404 (AISI 316L)

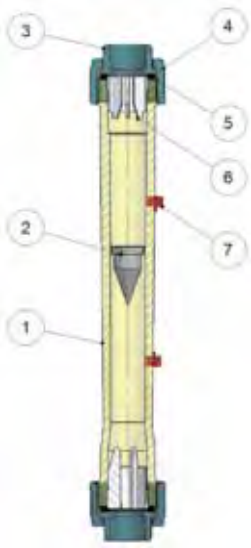
Socket ends for welding DN15 ... DN80

PT ... PS ... PTM ... PSM / Steel ... SS, with PVC nuts and Steel / EN 1.4404 (AISI 316L) end connector:

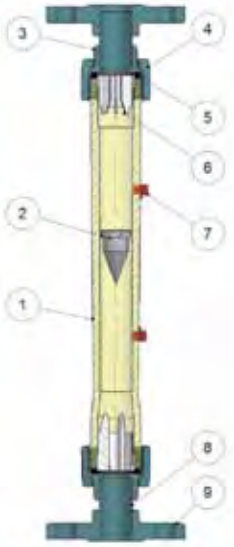
BSP/NPT thread ½" ... 3"

Materials

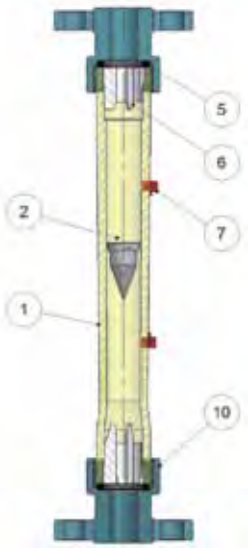
PT11, PS31 / PTM01, PSM21, PTM03



PT12, PS32 / PTM02, PSM22



PT12-BR, PS32-BR



N°	Description	Materials		
		PS31/32, PSM21/22, PS32-BR	PTM03	On request PT11/12, PTM01/02, PT12-BR
1	Flow tube	POLYSULFONE	NAS®	TROGAMID®
2	Float	EN 1.4404 (AISI 316L), PTFE, PTFE+Pb, PVDF, PVDF+Pb, Aluminium, PVC, PVC+Pb	EN 1.4404 (AISI 316L), PTFE, PTFE+Pb, PVDF, PVDF+Pb, Aluminium, PVC, PVC+Pb	Hastelloy, Titanium
3	Fitting	PVC	PVC	PP, Steel, AISI 316L
4	Nut	PVC	PVC	PP, Steel, AISI 316L
5	Gasket	NBR	NBR	VITON®, EPDM
6	Float stop	PVDF	PVDF	-
7	Flow indicator	PVC	PVC	-
8	Tube union	PVC	PVC	PP
9	Flange	PVC	PVC	PP
10	Flange group	PVC	PVC	PP

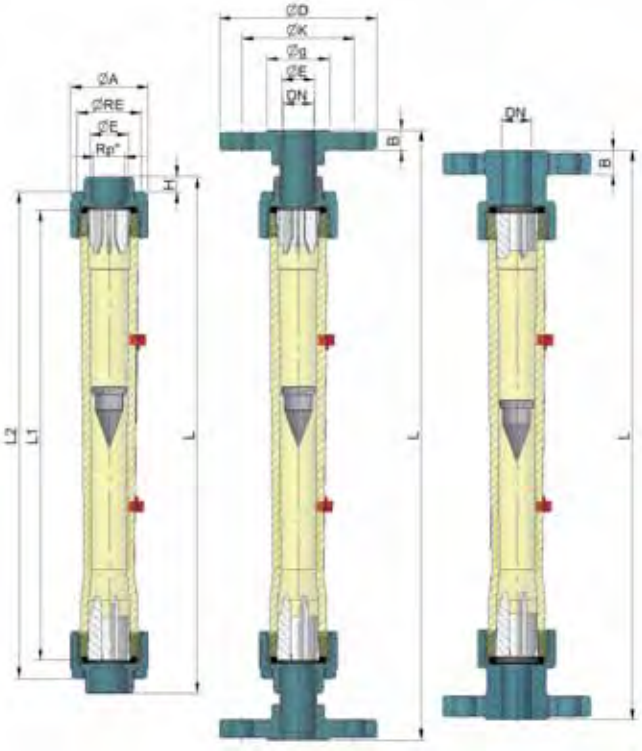
Dimensions

PT11 / PS31

R"	DN	E	RE	A	L	L1	L2	H
½"	15	20	1¼"	52	346	300	326	16
¾"	20	25	1¼"	52	346	300	326	16
1"	25	32	2"	74	366	300	328	20
1 ½"	40	50	2¼"	80	374	300	334	24
2"	50	63	2¾"	100	390	300	340	30
2 ½"	65	75	4"	138	420	300	344	34
3"	80	90	4"	138	420	300	344	34

PT12 / PS32 ... PT12-BR / PS32-BR

DN	E	D	k	g	Ixn°	B	L	L (BR)
15	20	95	65	45	14x4	12	408	378
20	25	105	75	58	14x4	13	408	378
25	32	115	85	68	14x4	15	424	398
40	50	150	110	88	18x4	17	456	400
50	63	165	125	102	18x4	19	476	412
65	75	185	145	122	18x4	21	522	420
80	90	200	160	138	18x8	22	548	420



PT11 / PS31 PT12 / PS32 PT12-BR PS32-BR

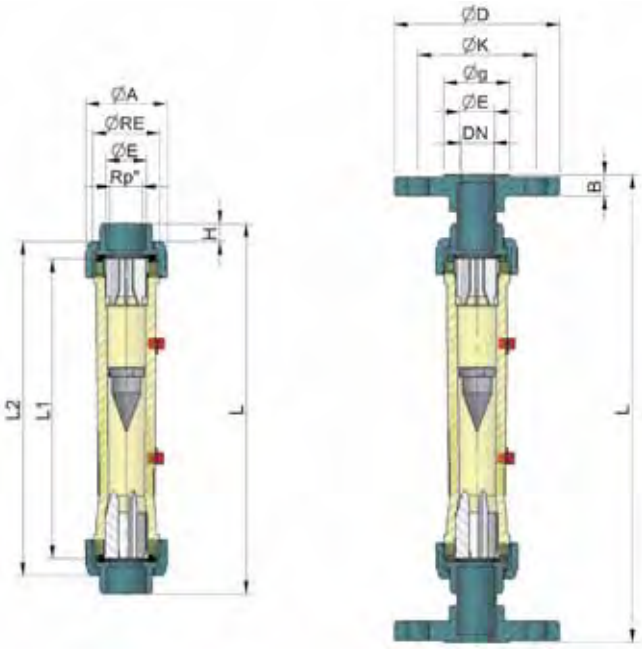
PTM01 / PSM21 / PTM03

R"	DN	E	RE	A	L	L1	L2	H
½"	15	20	1"	43	232	192	212	12
½"	15	20	1¼"	53	232	192	212	15
¾"	20	25	1¼"	53	232	192	212	14

PTM02 / PSM22

DN	E	D	k	g	Ixn°	B	L
15	20	95	65	45	14x4	12	294
15	20	95	65	45	14x4	12	294
20	25	105	75	58	14x4	13	294

All dimensions in mm



PTM01 PSM21 PTM03 PTM02 PSM22

Flow ranges

Model Nº	Flow scales EN 1.4404 float 7.95 g/cm³			Flow scales Aluminium float 2.85 g/cm³		Max. operating pressure	R" (DN)	D_{ext}
	l/h water	Nm³/h air 1.013 bar abs 20ºC	ΔP mbar	Nm³/h air 1.013 bar abs 20ºC	ΔP mbar	bar		
PS-312-0160 [1]	16-160 [1]	-	10 [1]	0.6-6 [1]	-	15	½" (DN15)	20
PS-312-0250 [1]	25-250 [1]	-		1-10 [1]			¾" (DN20)	25
PS-313-0400	40-400	1.2-12	12	0.7-7	5			
PS-313-0630	60-630	1.9-19		1.1-11				
PS-313-1000	100-1000	3-30		1.8-18				
PS-314-1600	160-1600	4.5-45	18	2.5-25	8	10	1" (DN25)	32
PS-314-2500	250-2500	8-75		5-45				
PS-315-4000	400-4000	12-120	23	7-70	10		1 ½" (DN40)	50
PS-315-6300	500-6300	15-190		10-110				
PT-316-6300	500-6300	15-190	30	10-110	12		2" (DN50)	63
PS-316-M010	1000-10000	30-300		20-180				
PS-316-M014	2000-14000	60-430		40-250				
PS-317-M016	1600-16000	50-490	40	30-290	17	8	2 ½" (DN65)	75
PS-317-M020	2000-20000	60-600		40-360				
PS-317-M025	2500-25000	80-770		50-460			3" (DN80)	90
PS-317-M030	3000-30000	90-920		60-550				
PS-317-M040	6000-40000	190-1200		110-730				
PS-317-M050 [2]	9000-50000	280-1500		170-920				

[1] with PTFE float

[2] fits special float to reach higher flow rate

For PT / PS series, all plastic loaded floats are in PVDF+Pb, except for tube models PS-316-M014 ... M050, in PVC+Pb

Model Nº	Flow scales EN 1.4404 float 7.95 g/cm³			Flow scales Aluminium float 2.85 g/cm³		Max. operating pressure	R" (DN)	D_{ext}
	l/h water	Nm³/h air 1.013 bar abs 20ºC	ΔP mbar	Nm³/h aire 1.013 bar abs 20ºC	ΔP mbar	bar		
PSM-312-0040 [1]	4-40 [1]	-	3 [1]	0.2-1.6 [1]	-	15	½" (DN15)	20
PSM-312-0060 [1]	6-60 [1]	-		0.3-2.5 [1]				
PSM-312-0100	10-100	0.3-3	10	0.2-1.8	4			
PSM-312-0160	16-160	0.5-5		0.3-3				
PSM-312-0250	25-250	0.8-7.7		0.5-4.5				
PSM-313-0400	40-400	1.2-12	12	0.7-7	5		½" (DN15)	20
PSM-313-0630	60-630	1.9-19		1.1-11			¾" (DN20)	25
PSM-313-1000	100-1000	3-30		1.8-18				

[1] with PTFE float

Limit switches

Adjustable limit switch PT-AMR

Bi-stable SPST reed switch, actuated by a magnet inside the float and mounted in a PVC enclosure:

- PT-AMR1 ... 2: 1 ... 2 adjustable reed switches

- Standard: normally opened (NO) switches. Normally closed (NC) reed switches are available on request.
- Operation: the standard contact is normally opened. That means:

- Maximum flow: on increasing flow, the contact closes when the float reaches the height of the alarm sensor. It remains closed while the float is above the sensor. It opens again when the flow rate decreases and the float returns to a position below the sensor.

- Minimum flow: on decreasing flow, the contact closes when the float reaches the height of the alarm sensor. It remains closed while the float is below the sensor. It opens again when the flow increases and the float rises to a position above the sensor.

- Enclosure: PVC
- Ambient temperature: -15ºC ... +60ºC
- Contact rating: 0.5 A / 250 VAC / 12 VA
- Hysteresis: ±5% of full scale value
- Ingress protection degree: IP65
- DIN 43650-A connector, PG9 cable gland
- Conforms to 2006-95-EC Directive
- Suitable for hazardous area, considered as “Simple apparatus”

PTM/PSM
with 1 reed switch

PT/PS
with 2 reed switches

Mounting

Once the electrical connection has been made and the cable gland has been tightened, mount the female connector (A) on the male base (C), placing the seal (B) between the two pieces.

To fix the limit switch in its position on the flowmeter, unscrew the screw (E) to release the bracket (D), place the limit switch on the desired point at the tube and reassemble the bracket by tightening the screw (E).

Electrical connection

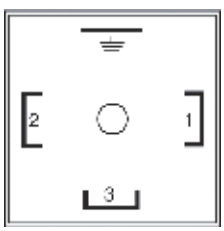
In the female connector (A):

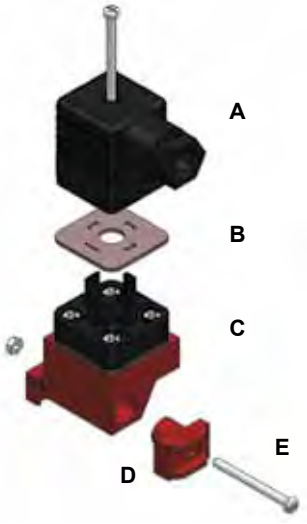
Term. 1: Reed switch contact

Term. 2: Reed switch contact

Term. 3: No connection

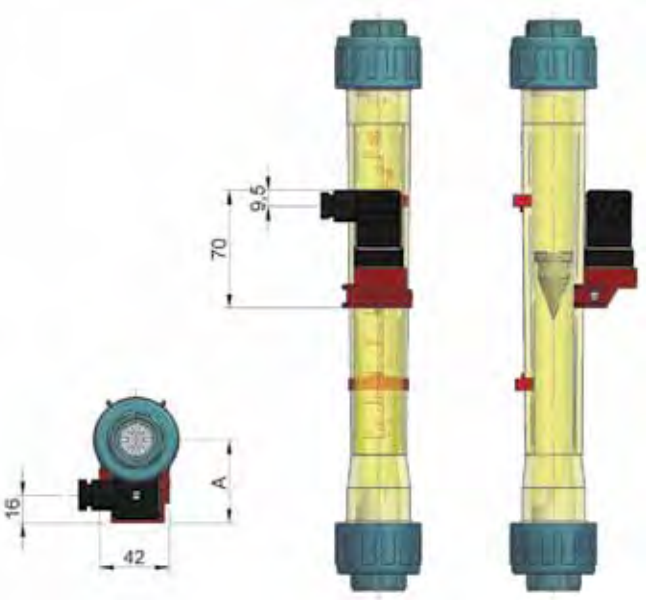
Earth terminal: No connection





Dimensions series PT + limit switch (in mm)

DN	15	20	25	40	50	65	80
R	½"	¾"	1"	1 ½"	2"	2 ½"	3"
A	47	52	62	70	70	90	90



Transmitters

Transmitter PT-TMUR 0 ... 4-20 mA

(18 points, for ½" ... 2")
(16 points, for 2½" ... 3")

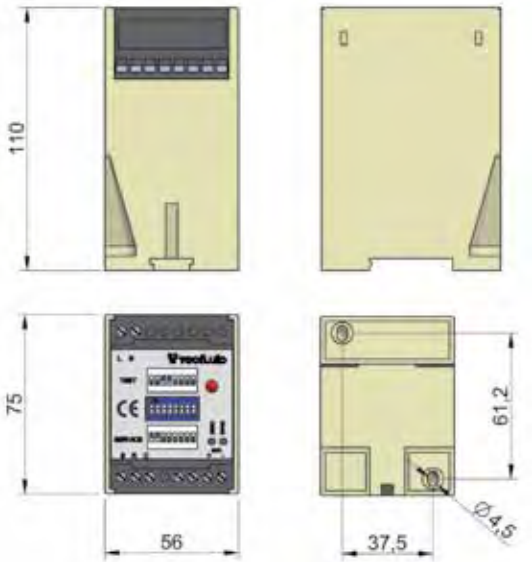
Transmitter PTM-TMUR 0 ... 4-20 mA (11 points)

The TMUR electronic transmitter consists of a reed chain which is mounted inside a plastic enclosure IP65 rated. This device is attached to the side of the flow tube. By means of a converter, the resistance signal is converted in to current (0 ... 4-20 mA).

PT/PS + PT-TMUR

PTM/PSM + PTM-TMUR

TR420
(remote converter
Ω/mA)



TMUR technical data

- Working temperature: +5ºC ... +60ºC
- Resolution: 10 mm

4-wire system

TR420 converter technical data

- DIN 46277 rail mounted
- Power supply: 24, 110, 230, 240 VAC 50/60 Hz / 24 VDC
- Consumption: <1 VA
- Outputs: 0-20 mA, 4-20 mA, 0-5 V, 0-10 V, 1-5 V, 2-10 V

2-wire system
(on request)

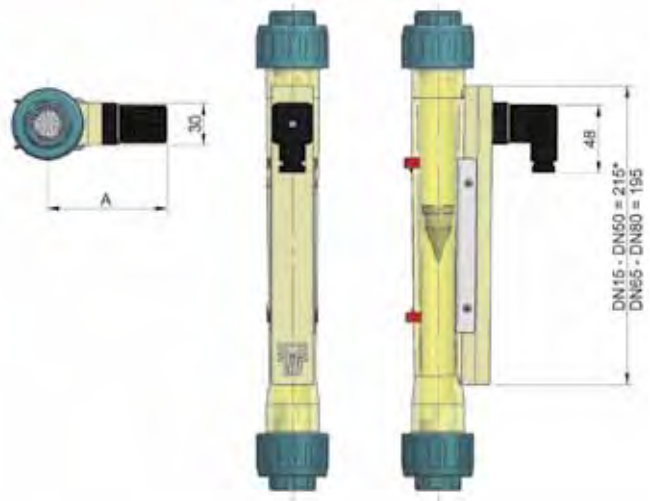
- 24VDC power supply
- Suitable for hazardous area with ATEX certification
- HART, Profibus or Fieldbus protocols

- Power supply:
  - 8 ... 35 VDC, safe area version
  - 8 ... 30 VDC, hazardous area version
- Consumption: 0,8 W
- Output: 4-20 mA
- Hazardous area version ATEX certified Ex ia IIC T6

For 2-wire system, the electrical connection is made directly on terminals mounted in an IP67 housing, compact mounted on the reed chain.

Dimensions series PT + transmitter TMUR (in mm)

DN	15	20	25	40	50	65	80
A	95	105	110	120	130	145	145



*PTM ... PSM 139 mm

TECFLUID

MORE THAN 40 YEARS MANUFACTURING
FLOW AND LEVEL INSTRUMENTATION

TecFluid
The art of measuring

Glass tube flowmeters
Series 2000

Variable area flowmeter for low flows of liquids and gases

- Short mounting length and compact construction, especially indicated for control panels
- Easy installation. No straight pipe run required before or after the flowmeter
- Vertical mounting with upwards flow, rear connections and horizontal inlet and outlet
- Accurate needle valve for flow regulation included (optional without regulating valve)
- Scales calibrated in l/h, l/min, %, etc
- Flow rate:
  - Water: 0.1 l/h ... 1000 l/h
  - Air: 1 Nl/h ... 30 Nm^3/h
- Accuracy:
  - Model 2100: 3.5% (q_G=50%)
  - Model 2150: 3% (q_G=50%)
  - Models 2300 / 2340: 1.6% (q_G=50%)
- Connections:
  - 2100 / 2150 / 2300: ¼" BSP / NPT
  - 2340: ½" BSP / NPT
- Materials:
  - Flow tube: borosilicate glass
  - Wetted parts: EN 1.4404 (AISI 316L)
  - Float: EN 1.4404 (AISI 316L), aluminium, glass, plastic, ceramic
- Local indication
- Options:
  - 1 or 2 limit switches
  - Constant flow regulators RCA or RCD

Working principle

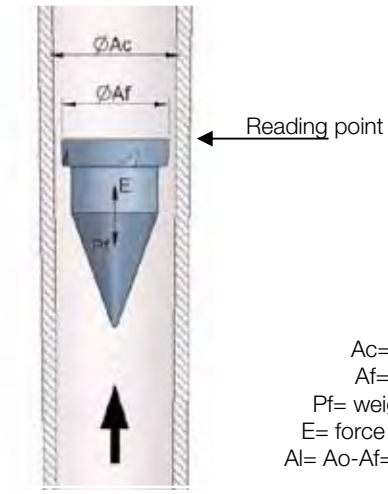
The 2000 series flowmeters work according to variable area principle, which is obtained by a float that moves inside a borosilicate glass tapered tube.

The fluid flows up through the tapered tube forcing the float to a position with sufficient free area to enable the flow to pass, where there is an equilibrium of forces:

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

(Al = Ac, tube area, - Af, float area)

Each position of the float corresponds to a value of flow rate.



Ac= tube 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**
- **Measurement and control in machinery**
- **Research and control laboratories**
- **Water treatment and cooling systems**
- **Control of gas burners and treatment ovens**
- **Chemical, pharmaceutical and cosmetic industry**
- **Control of level with RCD regulators**

Models

- **2100** flow tube length 100 mm
- **2150** flow tube length 150 mm
- **2300** flow tube length 300 mm
- **2340** flow tube length 300 mm

Technical data

- **Accuracy**, acc. to VDI/VDE 3513 sheet 2 (q_G=50%):
  - 2100: 3.5%
  - 2150: 3%
  - 2300 / 2340: 1.6%
- **Direct scales in engineering units or %**
- **Scale range:** 10:1
- **Fluid temperature:** -20ºC ... +80ºC
- **Ambient temperature:** -20ºC ... +80ºC
- **Working pressure:** 15 bar max.
- **Connections:**
  - 2100 / 2150 / 2300: ¼" BSP / NPT
  - 2340: ½" BSP / NPT
- **Regulating valve:**
  - Mounted on the inlet in applications for liquid and gas at atmospheric pressure
  - Mounted on the outlet in applications for pressurized gas

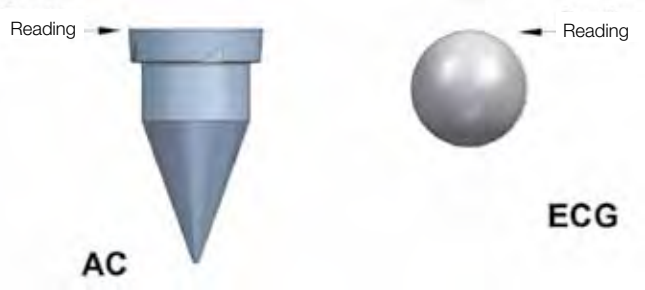
Operation

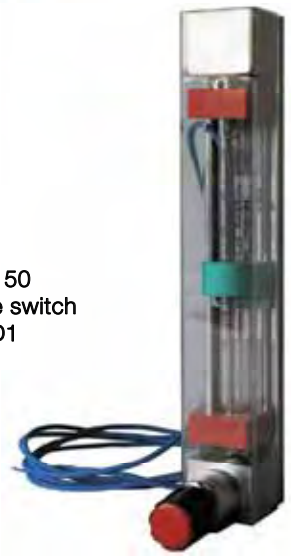
- **Vertical with upwards flow**, with rear connections and horizontal inlet and outlet

Limit switches and accessories

- **20-AMD1 ... 2:** 1 or 2 adjustable inductive switches (EN 60947-5-6 NAMUR relay on request)
- **20-AMO1 ... 2:** 1 or 2 adjustable optical switches (with amplifier relay in an aluminium housing)
- **20-AMR1 ... 2:** 1 or 2 adjustable reed switches
- **Constant flow regulator:**
  - **RCA:** Changes of pressure on the inlet and constant pressure on the outlet
  - **RCD:** Changes of pressure on the outlet and constant pressure on the inlet

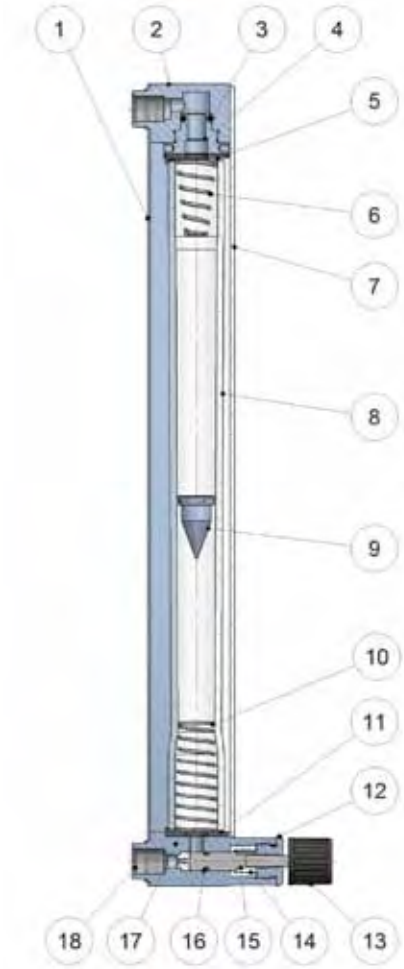
Float types

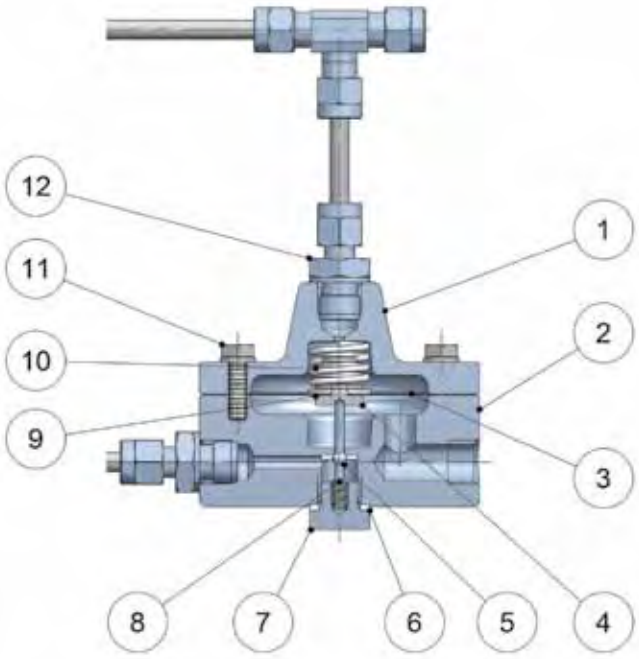




Model 2150
with inductive switch
20-AMD1

Materials





2100 / 2150 / 2300 / 2340

Nº	Description	Materials
1	Frame	EN 1.4404 (AISI 316L)
2	Upper connector	EN 1.4404 (AISI 316L)
3	Piston gasket	NBR / VITON® / EPDM
4	Piston	EN 1.4404 (AISI 316L)
5	Upper tube gasket	NBR / VITON® / EPDM
6	Upper float stop	EN 1.4319 (AISI 302)
7	Protection	Polycarbonate *
8	Flow tube	Borosilicate glass
9	Float	EN 1.4404 (AISI 316L) Glass / Ceramic Plastic / Aluminium
10	Lower float stop	EN 1.4319 (AISI 302)
11	Lower tube gasket	NBR / VITON® / EPDM
12	Lower / valve connector	EN 1.4404 (AISI 316L)
13	Valve knob	Plastic
14	Valve guide	PTFE
15	Valve shaft	EN 1.4404 (AISI 316L)
16	Valve gaskets	NBR / VITON® / EPDM
17	Valve seat	PTFE
18	Lower connector	EN 1.4404 (AISI 316L)

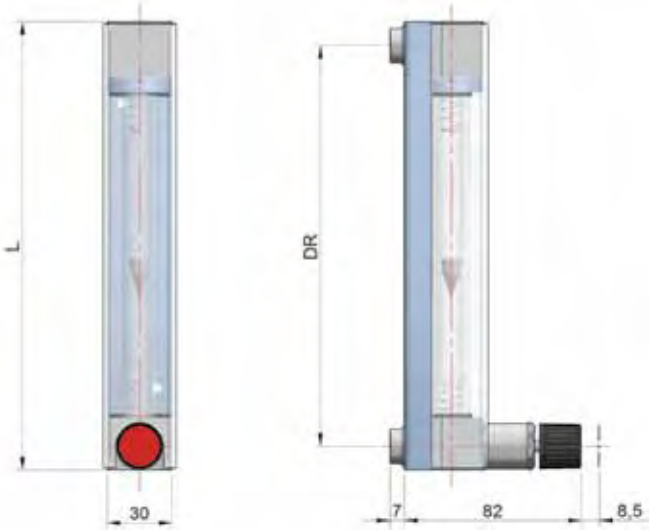
Constant flow regulator RCD / RCA

Nº	Description	Materials
1	Membrane body	EN 1.4404 (AISI 316L)
2	Valve body	EN 1.4404 (AISI 316L)
3	Membrane	NBR / PTFE / VITON®
4	Valve guide	EN 1.4404 (AISI 316L)
5	Regulating valve	EN 1.4404 (AISI 316L)
6	Gasket	NBR / PTFE
7	Spring support	EN 1.4404 (AISI 316L)
8	Valve spring	EN 1.4319 (AISI 302)
9	Membrane disk	EN 1.4404 (AISI 316L)
10	Membrane spring	EN 1.4319 (AISI 302)
11	Screws	EN 1.4401 (AISI 316)
12	Connector union	EN 1.4401 (AISI 316)

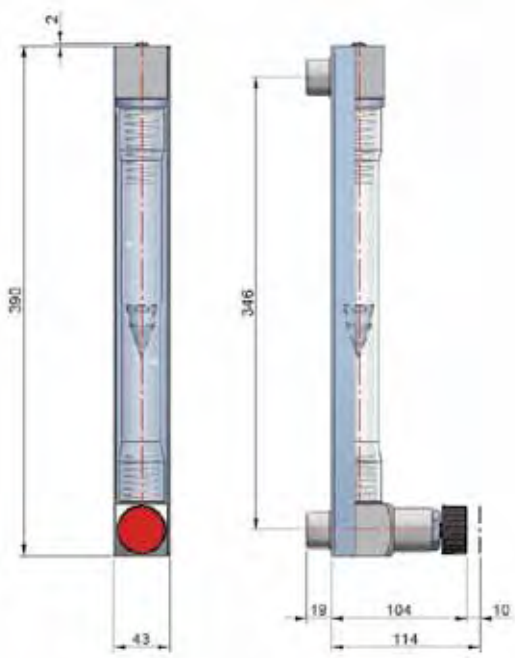
* Model 2340, without protection

Dimensions

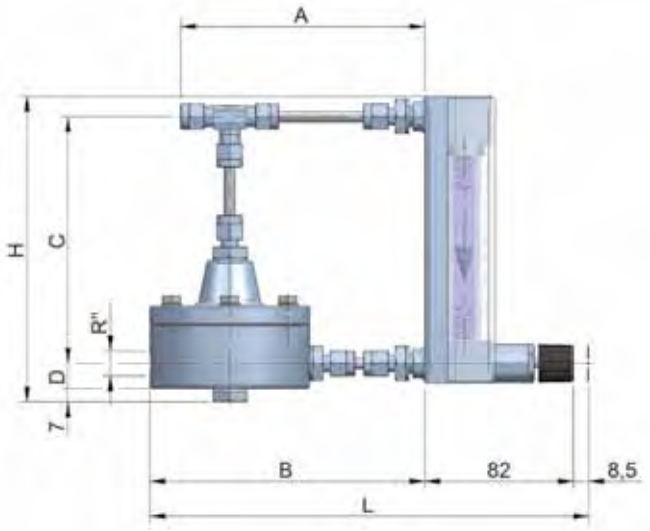
Models 2100 / 2150 / 2300



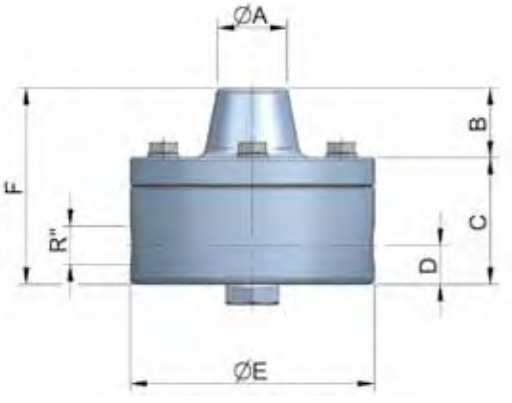
Model 2340



Series 2000 with constant flow regulator



Constant flow regulator



All dimensions in mm

Flowmeter

Model	DR	L	R" BSP/NPT	Weight kg
2100	136	158	¼"	0.70
2150	186	208	¼"	0.85
2300	336	358	¼"	0.85
2340	346	390	½"	1.80

Flowmeter + constant flow regulator

Model	Flow rate l/h water *	A	B	C	D	H	L	R" BSP/NPT
2100 2150	≤ 10-100	150	170	136 186	13	172 222	266	¼"
2300	≤ 25-250	150	170	336	13	372	266	
2340	≤ 60-630	180	200	346	18	397	320	½"

* Also for air equivalent flows, according to chart on page 29

Constant flow regulator

Model	R" BSP/NPT	ØA	B	C	D	ØE	F	Weight kg
RCA RCD	¼"	35	11	52	13	88	63	2,5
RCA * RCD *	½"	40	16	65	18	100	81	3

* for flowmeter model 2340

Flow ranges

Model Nº	Tube length (mm)	Flow scales, float type ECG						ΔP mbar
		l/h water		Nl/h air 1.013 bar abs 20ºC				
		AISI 316L (EN 1.4404)	GLASS	AISI 316L (EN 1.4404)	GLASS	PLASTIC	CERAMIC	
Model 2100								
C110/0001	100	0.1-1	0.05-0.5	4-40	1-15	1-11	2-20	5
C110/0002		0.2-2.5	0.1-1	8-80	4-40	2-16	6-60	10
C111/0005		0.5-5	0.2-2	15-160	7-70	2-25	10-100	15
C111/0010		1-10	0.4-4	30-350	10-210	10-110	30-260	20
C111/0016		1.6-16	0.6-6	40-490	20-250	10-140	30-330	35
C112/0025		2.5-25	1-10	80-840	40-420	20-270	50-560	40
C113/0040		4-40	1.6-16	120-1200	70-700	40-420	80-880	45
C114/0060		6-60	2-20	200-2200	100-1200	70-800	150-1500	50
C115/0100		10-100 *	4-40	300-3500	150-1800	100-1100	200-2400	55
Model 2150								
C210/0001	150	0.1-1	0.05-0.5	3-30	1-12	1-10	2-15	5
C210/0002		0.2-2.5	0.1-1	10-110	4-40	2-16	6-60	10
C211/0005		0.5-5	0.2-2	15-180	8-80	3-30	10-110	15
C211/0010		1-10	0.4-4	30-350	15-180	10-100	20-230	20
C211/0016		1.6-16	0.6-6	50-510	25-260	10-150	30-340	35
C212/0025		2.5-25	1-10	80-830	40-440	20-270	50-540	40
C213/0040		4-40	1.6-16	130-1300	70-700	40-440	80-880	45
C214/0060		6-60	2-20	150-2100	100-1100	70-740	100-1400	50
C215/0100		10-100 *	4-40	300-3600	150-1900	100-1200	100-2400	55

* Also available with AC float

Model Nº	Tube length (mm)	Flow scales, float type AC, except Glass float type ECG						ΔP mbar
		l/h water		Nl/h air 1.013 bar abs 20ºC				
		AISI 316L (EN 1.4404)	GLASS	AISI 316L (EN 1.4404)	ALUMINIUM	PVC	PTFE	
Model 2300								
C311/0025	300	2.5-25	1-10	120-860	60-490	40-340	40-370	55
C311/0040		4-40	1.6-16	150-1300	80-800	50-530	50-630	80
C311/0060		6-60	2-20	150-2000	100-1100	60-800	60-900	110
C312/0100		10-100		300-3000	180-1800			130
C312/0160		16-160		490-4900	300-2900			160
C312/0250		25-250		770-7700	460-4600			180
Model 2340								
C313/0400		40-400		1200-12000	740-7300			90
C313/0630		60-630		1900-19000	1100-11000			200
C313/1000		100-1000		3000-30000	1800-18000			300

Constant flow regulator

The 2000 series flowmeters are built to incorporate the RCA / RCD regulators, which allow keeping a constant flow when working pressure on the inlet or on the outlet are not constant.

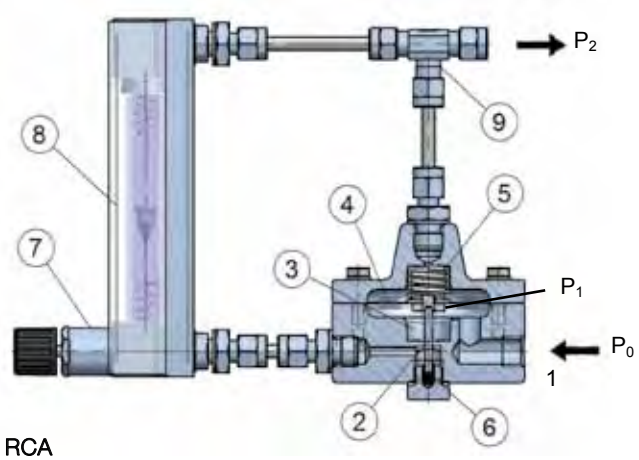
In applications for gases, model RCA is used in installations where inlet pressure changes and outlet pressure or counter pressure is constant, while model RCD is used in installations where inlet pressure is constant and outlet pressure or counterpressure changes. For liquids, model RCA is the commonly used.

Operation RCA regulator: inlet pressure is variable and outlet pressure is constant. The fluid with variable inlet pressure enters through connection (1), passes the regulating valve (2) to the regulator chamber (3), where a new lower pressure P_1 is created, acting on the membrane (4). The regulating valve (2) joined to the membrane (4) is initially open by the action of the regulating spring (5). After the fluid has passed through the regulator chamber (3), it passes through the flowmeter valve (7), then through the measuring tube (8), and goes out by the upper connection (9) against the constant outlet pressure P_2 which also acts on the membrane (4).

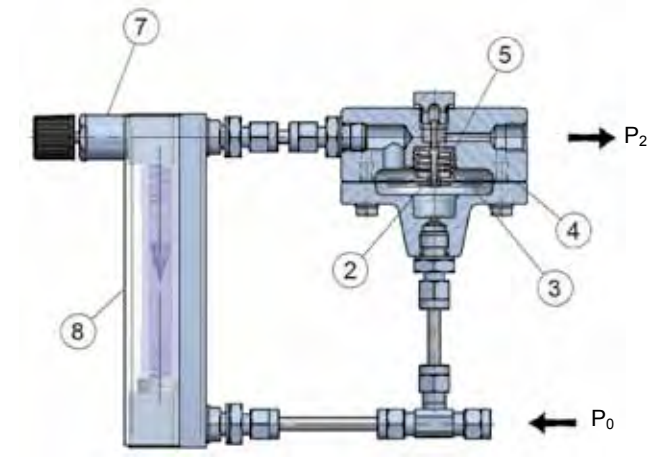
The springs (5 and 6) are built so that the valve (2) gets open when the inlet pressure P_0 decreases and gets closed when P_0 increases. This keeps a constant flow rate value through the regulating valve (7) of the flowmeter.

The differential pressure between P_0 and P_2 must always be higher than 350-450 mbar depending on model, which is the minimum necessary for the correct performance of the springs (5 and 6).

Operation RCD regulator: constant pressure on the inlet and variable pressure on the outlet. These operate in a similar way, modifying the position of the regulating valve (7), according to the drawing below.



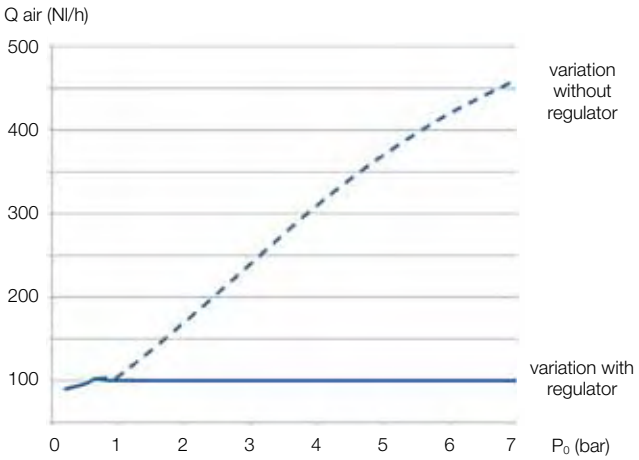
RCA



RCD

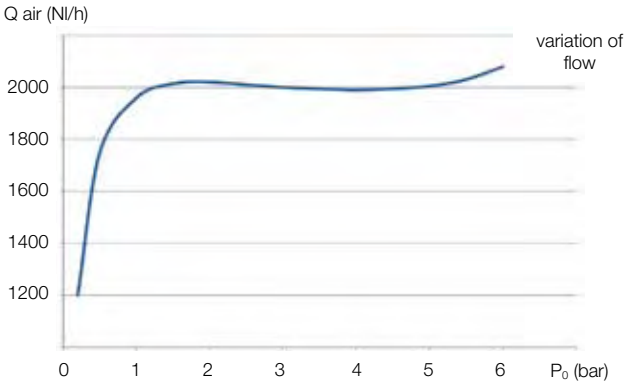
Flow curves

The flow curves show the relationship between the inlet pressure P_0 and the counter pressure P_2 in the RCA regulator. The different flow rates are adjusted by means of the regulating valve (7) of the flowmeter. The counter pressure P_2, in this cases, corresponds to the atmospheric pressure.

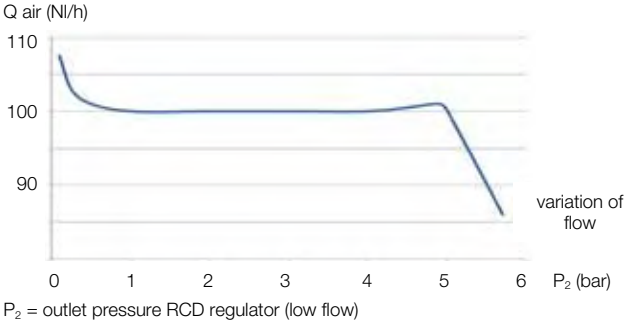


P_0 = inlet pressure RCA regulator (low flow)

The dotted line shows the variation of flow without the action of the constant flow regulator. With constant flow regulator, variations of 100% in the inlet pressure P_0 involve variations of flow of less than 1%.



P_0 = inlet pressure RCA regulator (high flow)



P_2 = outlet pressure RCD regulator (low flow)

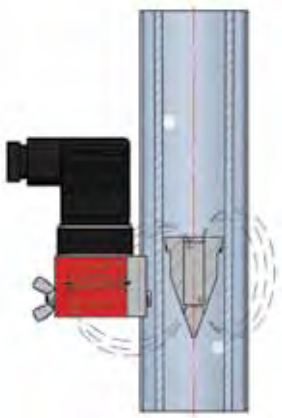
Limit switches

Adjustable limit switch 20-AMR

(Flow rate from 10-100 l/h water and equivalent air ranges)

Bi-stable SPST reed switch, actuated by a magnet inside the float and mounted in a PVC enclosure. Requires magnetic float. The flowmeters with 20-AMR switch are supplied without plastic protection.

- 20-AMR1 ... 2: 1 ... 2 adjustable limit switches
- I_{max}: 0,5 A ; V_{max}: 250 V ; P_{max}: 12 VA
- Hysteresis: ±5% of full scale value
- Ambient temperature: -25ºC ... +80ºC
- Suitable for hazardous area, considered as "Simple apparatus"
- Available for models 2100 and 2150 (20-AMR switch), for 2300 (23-AMR switch) and for 2340 (24-AMR switch)



20-AMR

Adjustable limit switch 20-AMD

(Flow rate up to 6-60 l/h water and equivalent air ranges)

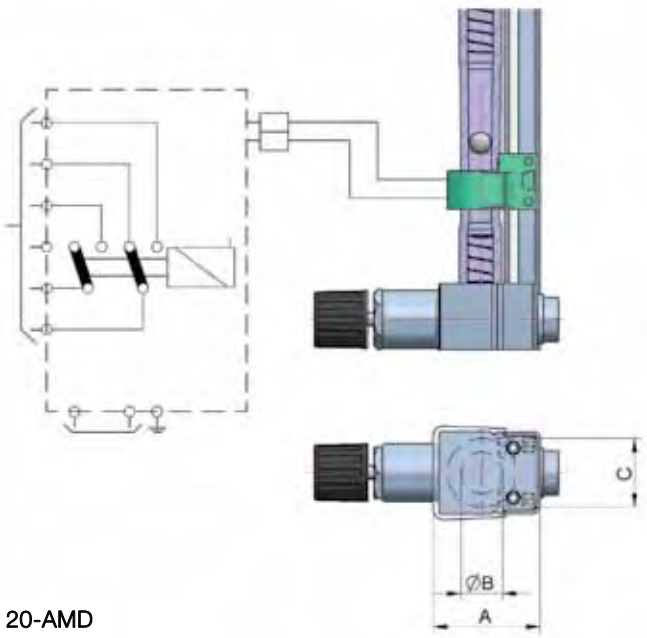
NAMUR (EN 60947-5-6) 3.5 mm slot type inductive detector activated by vane, mounted in the indicator housing. Suitable for AISI 316L float only.

- 20-AMD1 … 2: 1 … 2 adjustable limit switches
- Power supply: 8 VDC
- Ambient temperature: -25°C ... +70°C
- ATEX certificate Ex ia IIC T4...T6 Ga / Ex ia IIIC T85ºC Da
- Available for models 2100 and 2150

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: -25°C ... +70°C



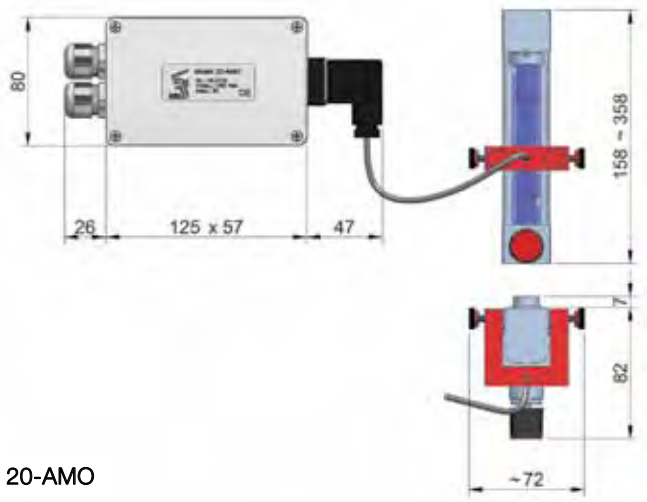
20-AMD

Adjustable limit switch 20-AMO

(Flow rate up to 25-250 l/h water and equivalent air ranges)

Infrared optical switch, actuated by the float when crossing the beam, mounted in a plastic enclosure and supplied together with control relay in an aluminium housing. Suitable for all float materials except glass. The flowmeters with 20-AMO switch are supplied without plastic protection.

- 20-AMO1 ... 2: 1 ... 2 adjustable limit switches
- I_{max}: 1A ; V_{max}: 220 VAC / 50Hz
- Hysteresis: ±5% of full scale value
- Ambient temperature: -10ºC ... +80ºC
- Power supply: 220 VAC / 50Hz or 24 VDC
- Available for models 2100, 2150 and 2300



20-AMO

Applications

Measurement of hydrostatic level

The measurement of hydrostatic by means of bubbling can be used for both open and pressurized tanks.

In open tanks (fig. 1), the probe (not supplied) is fed a constant flow of air or neutral gas at a constant pressure and flow rate, regulated by the flowmeter series 2000+RCD. By means of a manometer (not supplied), the height of the liquid in the tank is measured. This height is equal to the pressure (mmH_2O) in the probe. The measuring system is made up of:

- Probe for level measurement mounted in the tank
- Pressure gauge (or manometer) scaled in mmH_2O
- Series 2000 flowmeter with RCD regulator

In case of pressurized tanks (fig. 2), two probes are required. These are connected to a differential pressure gauge (or manometer) that indicates the height of the liquid in the tank. The measuring system is made up of:

- 2 probes for level measurement mounted in the tank
- Differential pressure gauge (or manometer) scaled in mmH_2O
- 2 series 2000 flowmeters with RCD regulators

Measurement of variation of density

The system described above has other practical applications such as measurement of variation of density. If two probes, a differential pressure gauge and two RCD regulators are used, the measurement of density is independent of the level changes.

As shown in fig. 3, the probes are mounted just below the minimum level, and with a difference of height between both that depends on the liquid density, required precision and differential pressure gauge accuracy. The pressure variation for the same level or height differential is a function of the variations on liquid density. The system sensitivity is given as a function of the height H or pressure differential. The most usual level differential is 200 mm between pressure inlets, since that allows measuring variations of 0.1 g/cm^3 with a good accuracy.

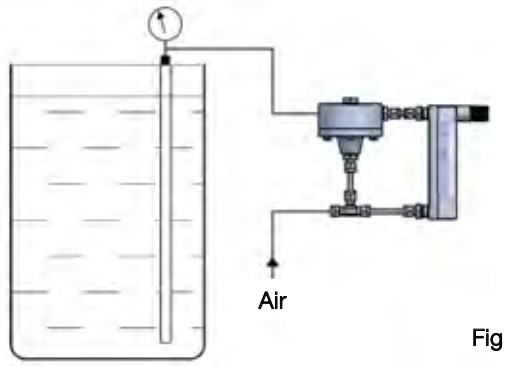


Fig. 1

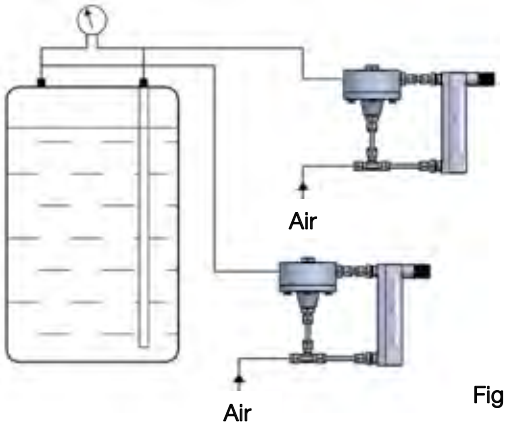


Fig. 2

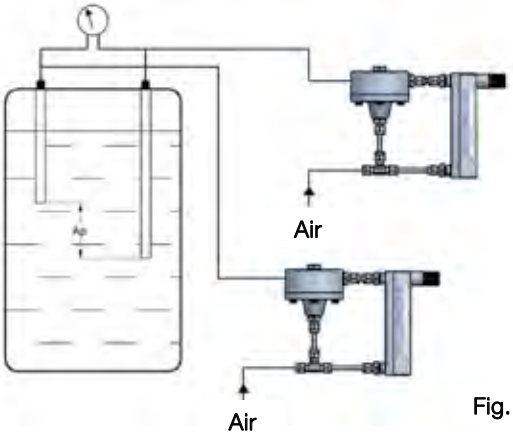


Fig. 3

R-CT-2000 Rev. 1 english version

Glass tube flowmeters
Series 60M1

Glass tube variable area flowmeter for low flows of liquids and gases

- Reduced mounting length and compact construction, specially indicated for control panels
- Easy installation
- Flow measurement in vertical pipes with upwards flow
- Scaled directly in l/h, %
  Other scales for liquids and gases on request
- Flow rate:
  - Water: 0.1 l/h ... 100 l/h
  - Air: 1 Nl/h ... 3600 Nl/h
- Accuracy: 3% (q_G=50%)
- Connections: ¼" or ½" BSP / NPT
- Materials:
  - Flow tube: borosilicate glass
  - Wetted parts: EN 1.4404 (AISI 316L)
  - Float: EN 1.4404 (AISI 316L), glass, plastic, ceramic
  - Gaskets: NBR, VITON®, EPDM
- Local indication

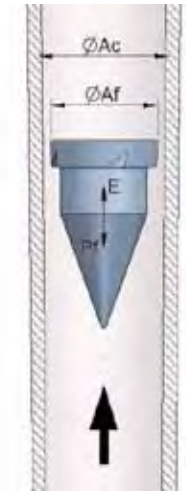
Working principle

A fluid flows upwards through a tapered tube in vertical position and displaces a float until it reaches an equilibrium point that is a function of:

- E = fluid force
- Pf = float weight
- Al = free area

(Al = Ac, tube area - Af, float area)

Each position of the float corresponds to a different flow rate, which is shown by the equivalent scale engraved directly on the tube.



Reading line

Ac = Tube area
Af = Float area
Pf = Float weight
E = Fluid force
Al = Ac-Af= Free area

Applications

- Control panels and pilot plants
- Measurement and control in machinery
- Research and control laboratories
- Water treatment plants
- Cooling and process industries
- Control of gas burners and treatment furnaces
- Chemical, pharmaceutical and cosmetic industries

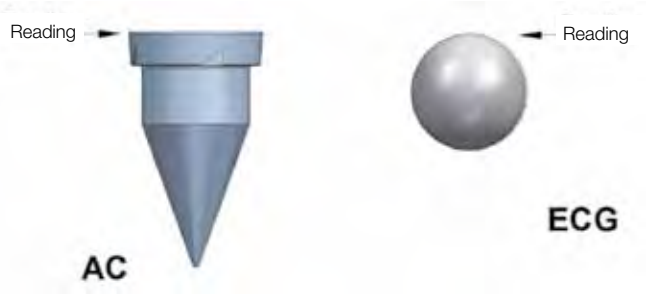
Technical data

- **Accuracy**, acc. to VDI/VDE 3513 sheet 2 (q_G=50%): 3%
- **Scales calibrated directly in l/h, %**. Other units and special scales for liquids and gases on request
- **Scale range:** 10:1
- **Fluid temperature:** 0ºC ... 80ºC
- **Ambient temperature:** 0ºC ... 60ºC
- **Working pressure:** 15 bar max.
- **Connections:** ¼" or ½" BSP / NPT
- **Tube length:** 150 mm

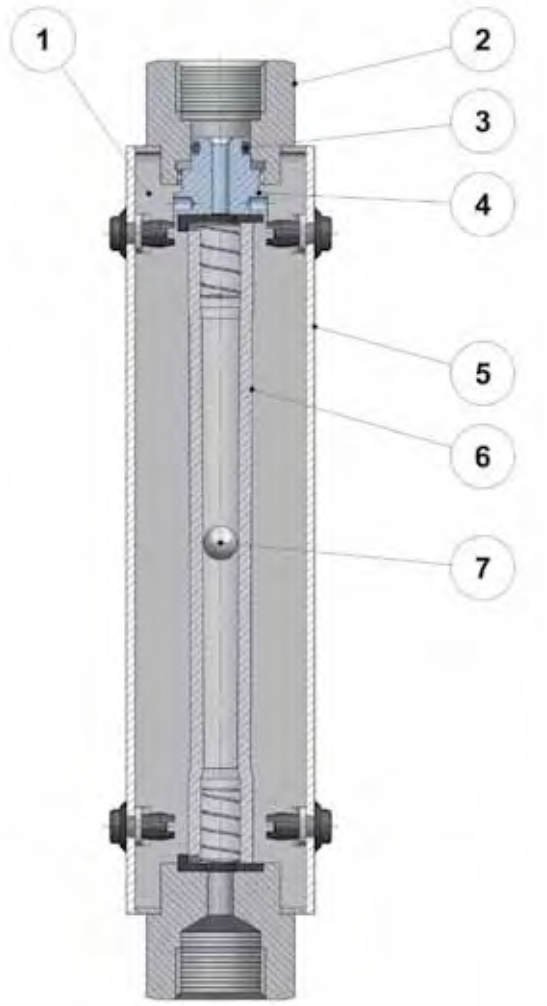
Operation

- Vertical with upwards flow

Float types

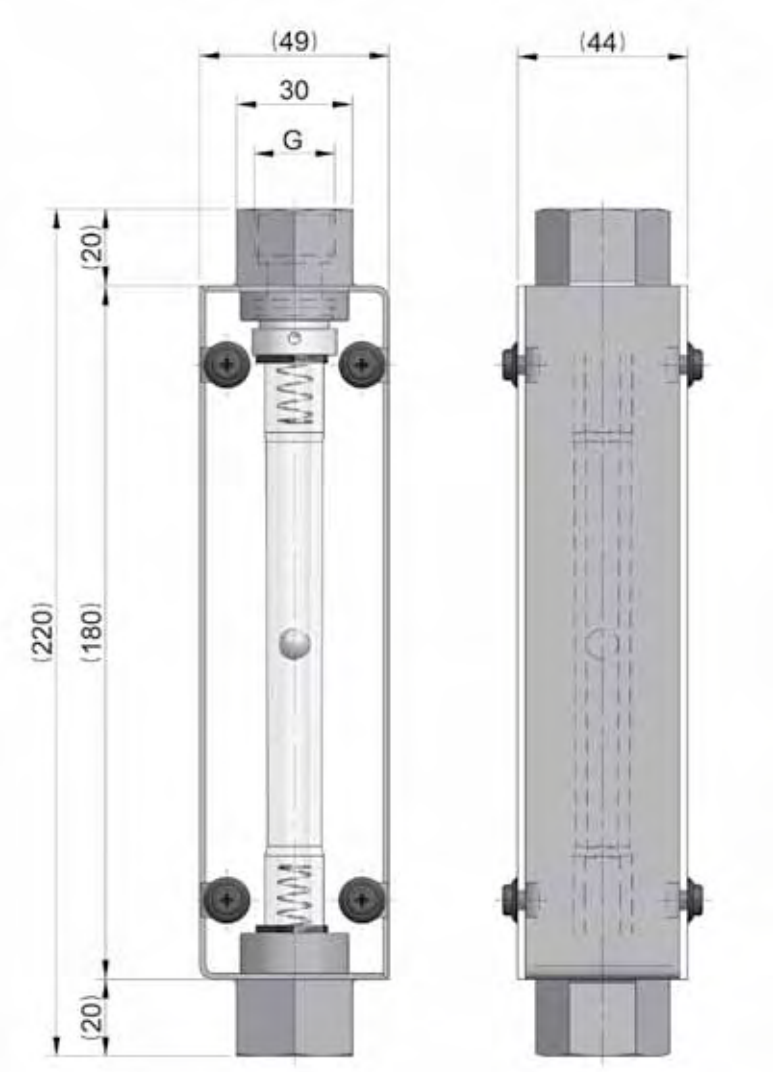


Materials



Nº	Description	Materials
1	Body	EN 1.4404 (AISI 316L)
2	Connections	EN 1.4404 (AISI 316L)
3	Gaskets	NBR / VITON® / EPDM
4	Piston	EN 1.4404 (AISI 316L)
5	Protection shield	Polycarbonate
6	Flow tube	Borosilicate glass
7	Float	EN 1.4404 (AISI 316L) / Glass / Ceramic / Plastic

Dimensions



G = ¼" o ½" BSP / NPT

Flow ranges

Model N°	Tube length (mm)	Flow scales, ECG type float						ΔP mbar
		l/h water		Nl/h air 1.013 bar abs 20°C				
		AISI 316L (EN 1.4404)	GLASS	AISI 316L (EN 1.4404)	GLASS	PLASTIC	CERAMIC	
C210/0001		0.1-1	0.05-0.5	3-30	1-12	1-10	2-15	2
C210/0002		0.2-2.5	0.1-1	10-110	4-40	2-16	6-60	2
C211/0005		0.5-5	0.2-2	15-180	8-80	3-30	10-110	2
C211/0010		1-10	0.4-4	30-350	15-180	10-100	20-230	2
C211/0016	150	1.6-16	0.6-6	50-510	25-260	10-150	30-340	2
C212/0025		2.5-25	1-10	80-830	40-440	20-270	50-540	4
C213/0040		4-40	1.6-16	130-1300	70-700	40-440	80-880	4
C214/0060		6-60	2-20	150-2100	100-1100	70-740	100-1400	4
C215/0100		10-100	4-40	300-3600	150-1900	100-1200	100-2400	5

R-CT-60M1 Rev. 1 english version

TECFLUID

MORE THAN 40 YEARS MANUFACTURING
FLOW AND LEVEL INSTRUMENTATION

Glass tube flowmeters
Series 6000

Variable area flowmeter for liquids and gases

- Easy installation
- Local indication by means of direct reading
- Low pressure drop
- Scales directly in l/h, m^3/h, kg/h, l/min, %, etc.
- Plastic protection against accidental breakage of the glass tube
- Flow rate:
  - Water: 2.5 l/h ... 50 m^3/h
  - Air: 45 Nl/h ... 1500 Nm^3/h
- Accuracy: 1.6% (q_G=50%)
- Connections:
  - BSP or NPT threaded connections: ½" ... 3"
  - EN 1092-1 or ANSI flanges: DN15 ... DN80
    Other flange standards on request
  - Sanitary couplings according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Materials:
  - Measuring tube: borosilicate glass
  - Frame: galvanized and coated steel, EN 1.4301 (AISI 304)
  - Protection shield: metacrylate
  - Wetted parts: galvanized and coated steel, EN 1.4404 (AISI 316L), PVC, PP, PTFE, PVDF
  - Float: EN 1.4404 (SS 316L), PVC, PP, PTFE, PVDF
- Local indication
- Options:
  - 1 or 2 limit switches
  - Electronic transmitter with 4-20 mA analog output for safe or hazardous area (Ex ia IIC T6 protection, ATEX certified). HART, FIELDBUS & PROFIBUS protocols available on request

Working principle

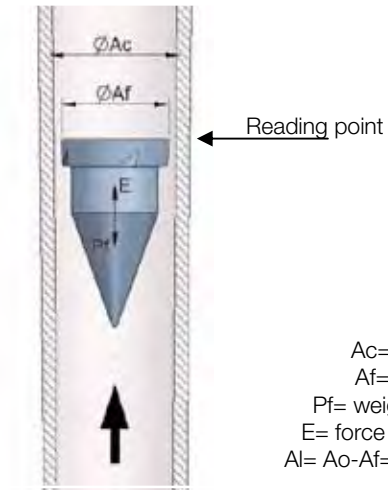
The 6000 series flowmeters work according to variable area principle, which is obtained by a float that moves inside a borosilicate glass tapered tube.

The fluid flows up through the tapered tube forcing the float to a position with sufficient free area to enable the flow to pass, where there is an equilibrium of forces:

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

(Al = Ac, tube area, - Af, float area)

Each position of the float corresponds to a value of flow rate.



Ac= tube area
Af= float area
Pf= weight of the float
E= force of the fluid flow
Al= Ao-Af= free area of flow

Applications

- Water treatment
- Heating-cooling circuits
- Laboratories
- Control of gas burners
- Chemical industry and treatment ovens
- Flow rigs

Models

- 6001 BSP threaded connection. Others on request
- 6002 EN 1092-1 flange connection. Others on request
- 6009 PVC solvent socket or EN 1.4404 for welding
- 6011 DIN 11851 sanitary coupling
- 6013 CLAMP ISO 2852 sanitary coupling
- 6015 SMS 1145 sanitary coupling

- 6000-Fe all components in galvanized and coated steel
- 6000-SS wetted parts in EN 1.4404 (AISI 316L). Other components in galvanized and coated steel
- 6000-FULLY SS all components in EN 1.4404 (AISI 316L), except frame in EN 1.4301 (AISI 304)
- 6000-PVC wetted parts in PVC. Other components in galvanized and coated steel
- 6000-PP wetted parts in PP. Other components in galvanized and coated steel
- 6000-PTFE wetted parts in PTFE. Other components in galvanized and coated steel
- 6000-PVDF wetted parts in PVDF. Other components in galvanized and coated steel

Technical data

- Accuracy, acc. to VDI/VDE 3513 sheet 2 (q_G=50%): 1.6%
- Direct scales in engineering units or %
- Scale range: 10:1
- Fluid temperature: -20ºC ... +80ºC
- Ambient temperature: -20ºC ... +60ºC
- Working pressure: from 5 to 15 bar max., depending on flowmeter size
- Connections:
  - BSP or NPT threaded connections: ½" ... 3"
  - EN 1092-1 or ANSI flanges: DN15 ... DN80 Other standards on request
  - Sanitary couplings according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Measuring tube length: 300 mm

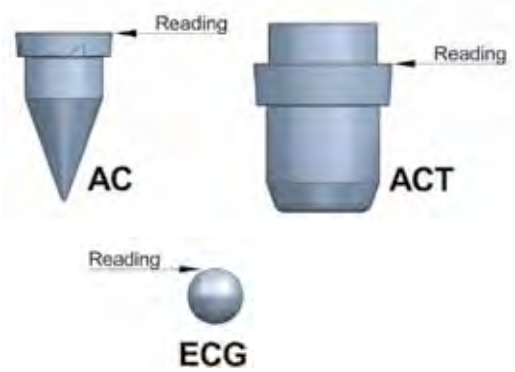
Operation

- Vertical with upwards flow

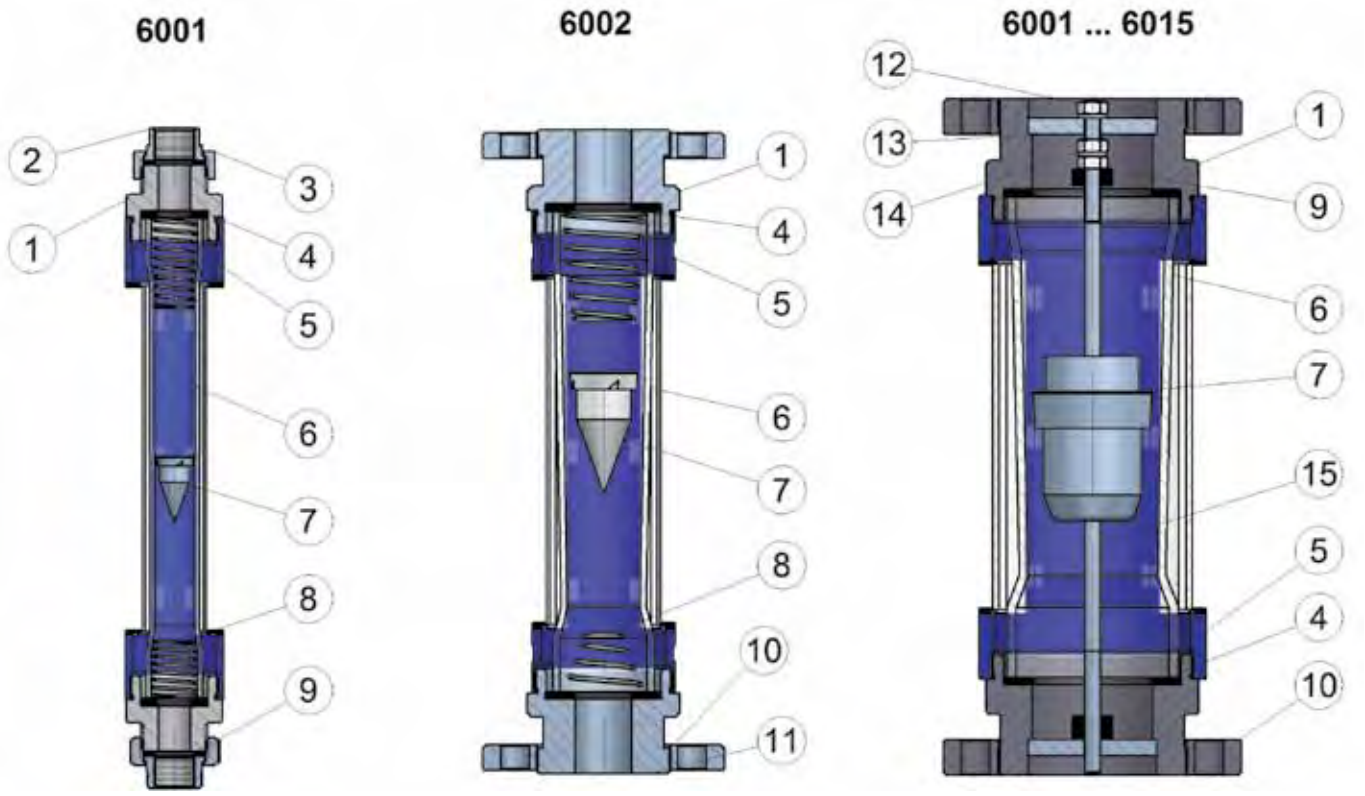
Limit switches and transmitters

- 60-AMM1 ... 2: 1 or 2 adjustable micro-switches (available from 40-400 l/h)
- 60-AMD1 ... 2: 1 or 2 adjustable inductive switches (available from 40-400 l/h)
- PT-AMR1 ... 2: 1 or 2 adjustable reed switches (available from 10-100 l/h)
- 60-TMUR: 4-20 mA transmitter (18 points), 220 VAC 4-wire system with remote converter (24 VDC 2-wire system and Ex intrinsically safe version on request) (available from 40-400 l/h)

Float types



Materials



Flowmeters with guided float

Nº	Description	Materials				
		6000-Fe	6000-SS	6000-FULLY SS	6000-PVC / PP	6000-PTFE
1	End piece	Steel	AISI 316L	AISI 316L	PVC / PP	Steel + PTFE
2	End connector	Steel	AISI 316L	AISI 316L	PVC / PP	PTFE
3	Union nut	Steel	Steel	AISI 316L	PVC / PP	Steel
4	Frame gasket	NBR	NBR	NBR	NBR	PTFE+NBR
5	Frame	Steel	Steel	AISI 304	Steel	Steel
6	Measuring tube	Borosilicate glass				
7	Float *	AISI 316L / Aluminium	AISI 316L / Aluminium	AISI 316L / Aluminium	AISI 316L / Aluminium / PVDF-Pb / PVC-Pb / PP-Pb	PTFE-Pb
8	Springs / Stops	AISI 302	AISI 302	AISI 302	AISI 302 / PVDF	PTFE
9	Connector gasket	NBR	NBR	NBR	NBR	PTFE+NBR
10	Flange	Steel	Steel / AISI 316L	AISI 316L	Steel / PVC / PP	Steel
11	Flange seat	Steel	AISI 316L	AISI 316L	PVC / PP	PTFE
12	Nut	AISI 316	AISI 316	AISI 316	AISI 316, PVC, PP	PTFE
13	Centering ring	AISI 316 (PP, PVDF) **	AISI 316 (PP, PVDF) **	AISI 316 (PP, PVDF) **	AISI 316, PVC, PP	PTFE
14	Washer	AISI 316	AISI 316	AISI 316	AISI 316, PVC, PP	PTFE
15	Guide	AISI 316	AISI 316	AISI 316	AISI 316, PVC, PP	PTFE

In all cases, galvanized and coated steel - Other gasket materials on request: VITON®, EPDM

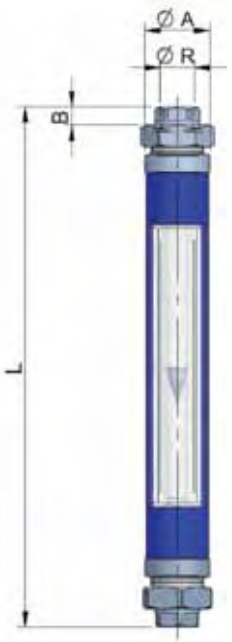
* Only the most usual are shown. Float material might change depending on application requirements.

** For low flows.

Dimensions

Models 6001 (BSP / NPT) - 6009 (socket / welding)

R" NPT	DN	6001				6009	
		A	B	L	Weight kg	A	Weight kg
½"	15	60	15	410	2	49	1
¾"	20	60	15	415	2	49 / 61	1 / 1.3
1"	25	75	20	425	3	61 / 91	1.3 / 3
1 ½"	40	105	20	445	6	91	3
2"	50	120	25	460	10	105	4.5
2 ½"	65	150	25	505	13	130	7.5
3"	80	150	30	510	17	130	7.5



Model 6001

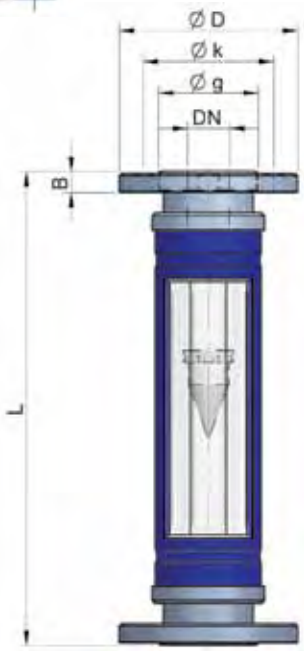
Model 6009

Model 6002 (EN 1092-1)

DN	D	k	g	B	l x nº	L	Weight kg
15	95	65	45	14	14x4	380	2.5
20	105	75	58	14	14x4	380	3.3
25	115	85	68	16	14x4	390	4.8
40	150	110	88	16	18x4	400	8
50	165	125	102	18	18x4	410	11
65	185	145	122	18	18x4	420	15.3
80	200	160	138	20	18x4	420	19.3

Model 6002 (ANSI 150#)

DN	D	k	g	B	l x nº	L	Weight kg
½"	88.9	60.3	34.9	11.1	15.9x4	380	2.5
¾"	98.4	69.8	42.9	12.7	15.9x4	380	3.3
1"	107.9	79.4	50.8	14.3	15.9x4	390	4.8
1 ½"	127.0	98.4	73.0	17.5	15.9x4	400	8
2"	152.4	120.6	92.1	19.1	19x4	410	11
2 ½"	177.8	139.7	104.8	22.2	19x4	420	15.3
3"	190.5	152.4	127.0	23.8	19x4	420	19.3



Model 6002

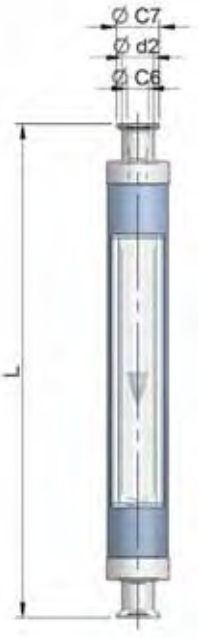
Model 6011 (DIN 11851)

NW	15(M1)	25(M2)	40(M3)	50(M4)	65(M5)	80(M5)	100(M5)
Ø C7	Rd 34 x 1/8"	Rd 52 x 1/6"	Rd 65 x 1/6"	Rd 78 x 1/6"	Rd 95 x 1/6"	Rd 110 x 1/4"	Rd 130 x 1/4"
Ø C6	17	24.8	35.6	45.8	67	82.8	100
Ø d2	21.3	30	42	51	73	88.9	108
L	395	400	405	425	435	480	480

Model 6013 (CLAMP ISO 2852:1993)

NW	15(M1)	25(M2)	40(M3)	50(M4)	65(M5)	80(M5)	100(M5)
Ø C7	34	50.5	50.5	64	91	106	130
Ø C6	17	24.8	35.6	45.8	67	82.8	100
Ø d2	21.3	30	42	51	73	88.9	108
L	395	400	405	425	435	480	480

Model 6011



Model 6013

All dimensions in mm

Model 6015 (SMS 1145)

NW	15(M1)	25(M2)	40(M3)	50(M4)	65(M5)	80(M5)	100(M5)
Ø C7	Rd 40-6	Rd 48-6	Rd 60-6	Rd 70-6	Rd 85-6	Rd 120-4	Rd 140-4
Ø C6	22.5	29.4	35.5	48.5	60.5	86	104
Ø d2	25	42	51	63,5	73	93	108
L	395	400	405	425	435	480	480

All dimensions in mm

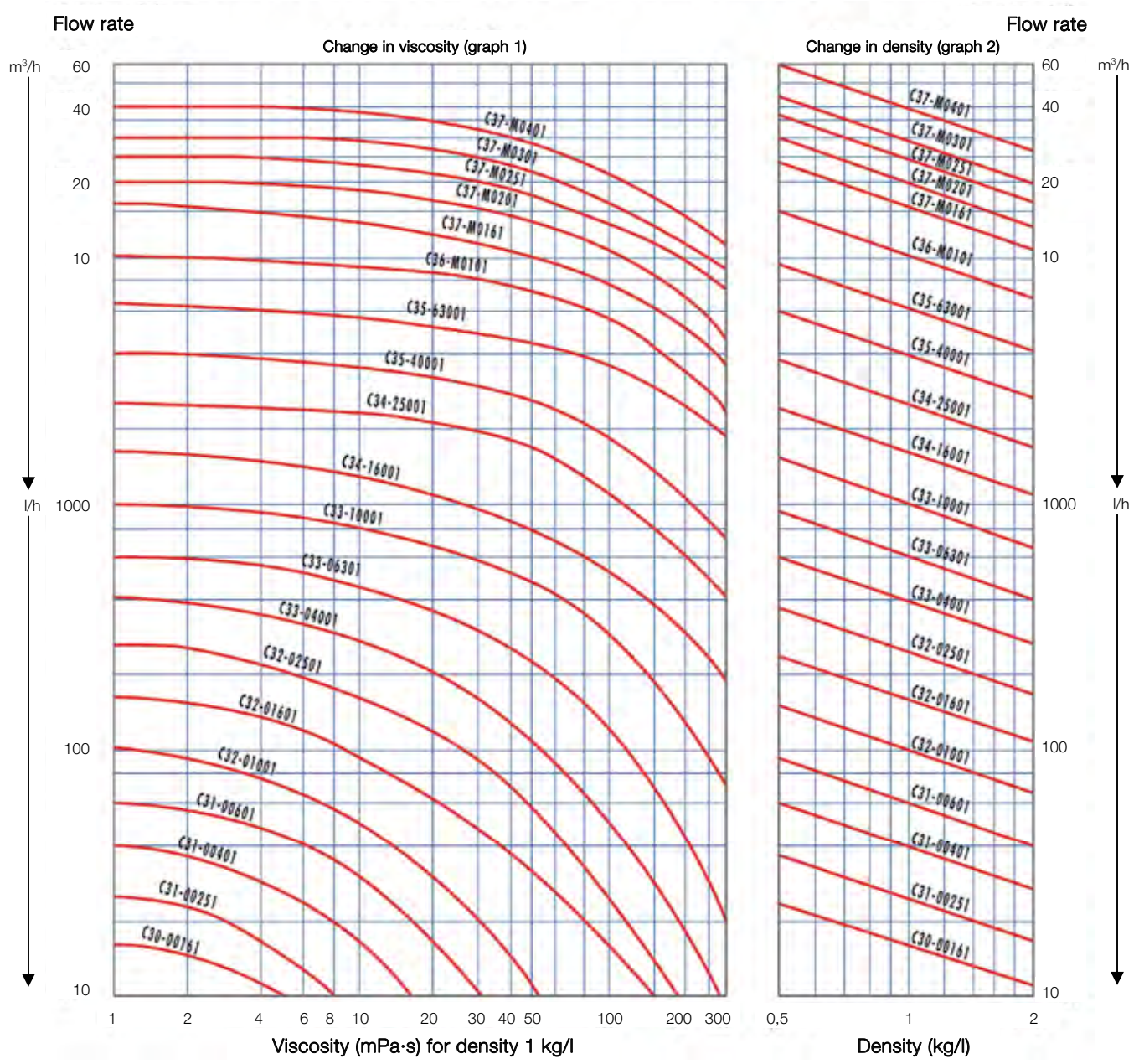
Model 6015

Flow ranges

Model Nº	Flow scales EN 1.4404 float 7.95 g/cm³			Flow scales Aluminium float 2.85 g/cm³		Max. pressure bar	Frame nº	R" (DN)
	l/h water	Nm³/h air 1.013 bar abs 20ºC	ΔP mbar	Nm³/h air 1.013 bar abs 20ºC	ΔP mbar			
C31-00251	2.5-25	0.07-0.7	6	0.04-0.4	2	15	1	½" (DN15) ¾" (DN20)
C31-00401	4-40	0.11-1.1		0.07-0.7				
C31-00601	6-60	0.18-1.8		0.1-1				
C32-01001	10-100	0.3-3	9	0.17-1.7	4			
C32-01601	16-160	0.45-4.5		0.25-2.5				
C32-02501	25-250	0.7-7		0.4-4				
C33-04001	40-400	1.1-11	12	0.7-7	5		2	¾" (DN20) 1" (DN25)
C33-06301	60-630	1.8-18		1.1-11				
C33-10001	100-1000	3-30		1.8-18				
C34-16001	160-1600	4.5-45	18	2.5-25	8	10	3.1	1 ½" (DN40)
C34-25001	250-2500	7-70		5-45				
C35-40001	400-4000	11-110	23	7-70	10	8	3.2	
C35-63001	500-6300	18-180		10-110				
C36-M0101	1000-10000	30-300	30	20-180	12	6	4	2" (DN50)
C36-M0141	2000-14000	120-420		40-250				
C37-M0161	1600-16000	45-450	40	30-290	17	5	5	2 ½" (DN65) 3" (DN80)
C37-M0201	2000-20000	60-600		40-360				
C37-M0251	2500-25000	70-700		50-460				
C37-M0301	3000-30000	90-900		60-550				
C37-M0401	6000-40000	180-1200		110-730				
C37-M0501	8000-50000	250-1500		170-920				

Model Nº	AC float EN 1.4404 float 7.95 g/cm³			ECG float Glass float 2.60 g/cm³		ECG float Plastic float 1.30 g/cm3		Max. pressure bar	R" (DN)
	l/h water	Nl/h air 1.013 bar abs 20ºC	ΔP mbar	l/h water	Nl/h air 1.013 bar abs 20ºC	Nl/h air 1.013 bar abs 20ºC	ΔP mbar		
C30-00251	2.5-25	70-700	3	1-10	40-400	15-150	2	15	½" (DN15)
C30-00401	4-40	120-1200		1.6-16	70-700	25-250			

Flow rate equivalent curves water-liquids (with different density and viscosity)



Nº 1. Changes in density (graph 2)

Required flow rate 1000 l/h, density 1.4 kg/l. Enter the graph at the 1000 l/h point. Move horizontally across to applicable flow tube line (C313-1000), travel the inclined line to the point of the density of the fluid (1.4 kg/l). Travel horizontally to the vertical axis and read the equivalent flow scale 800 l/h.

Nº 2. Changes in viscosity (graph 1)

Required flow rate 1000 l/h, viscosity 50 mPa·s. Enter the graph at the viscosity value and travel vertically to the point where it cuts the horizontal line at 1000 l/h. This point determines the tube selection and if it coincides with one of the curves, it is the value of maximum flow.

If the point lies between two curves, it is optional to select:

- Lower curve:

Move down by the 50 mPa·s curve until the lower curve, then horizontally to the l/h scale on the left. The maximum flow rate value is obtained with C314-1600 tube. In this case, maximum flow rate is 800 l/h.

- Upper curve:

Move up by the 50 mPa·s curve until the upper curve, then horizontally to the l/h scale on the left. The maximum flow rate value is obtained with C314-2500 tube. In this case, maximum flow rate is 1800 l/h.

Nº 3. Changes in viscosity and density (graph 1 & 2)

Follow example nº 2 first and then nº 1.

Limit switches

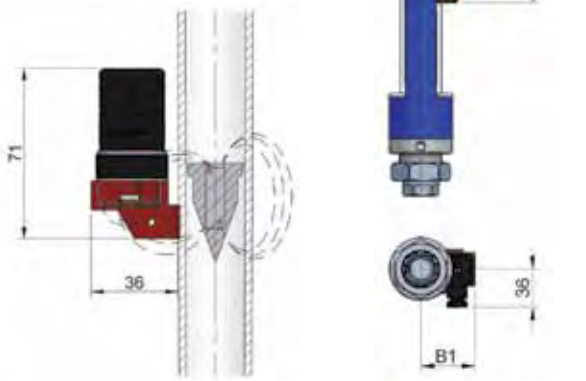
Adjustable limit switch PT-AMR

(Flow rate from 10-100 l/h water and equivalent air ranges. AISI 304 frame is required for flow ranges 10-100, 16-160 and 25-250 l/h water and equivalent air ranges)

Bi-stable SPST reed switch, actuated by a magnet inside the float and mounted in a PVC enclosure.

- PT-AMR1 ... 2: 1 ... 2 adjustable limit switches
- Contact rating: 0.5 A / 250 V / 12 VA
- Hysteresis: ±5% of full scale value
- Ambient temperature: -25ºC ... +80ºC
- DIN 43650-A connector, PG9 cable gland
- Suitable for hazardous area, considered as "Simple apparatus"

Frame	DN	B1
1	15 ... 20	48
2	20 ... 25	51.50
3.1	40	61
3.2	40	67.50
4	50	80
5	65 ... 80	94



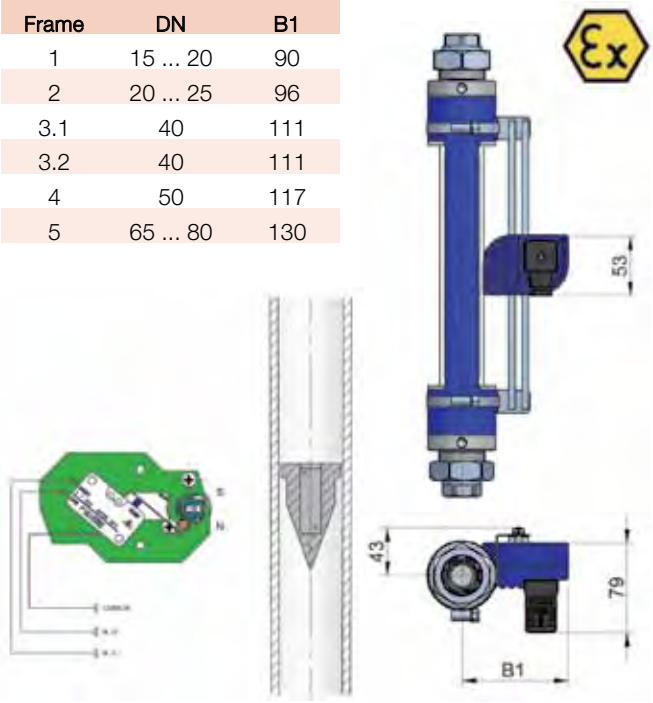
Adjustable limit switch 60-AMM

(Flow rate from 40-400 l/h water and equivalent air ranges)

Electrical micro-switch, mounted in an aluminium housing, actuated by a magnet inside the float.

- 60-AMM1 … 2: 1 … 2 adjustable limit switches
- Contact rating: 3(1) A, 250 V (VDE/CEE)
- Hysteresis: ±10% of full scale value
- Ambient temperature: -25ºC ... +80ºC
- Mechanical life: 10^7 operations
- Suitable for hazardous area, considered as "Simple apparatus"

Frame	DN	B1
1	15 ... 20	90
2	20 ... 25	96
3.1	40	111
3.2	40	111
4	50	117
5	65 ... 80	130



Adjustable limit switch 60-AMD

(Flow rate from 40-400 l/h water and equivalent air ranges)

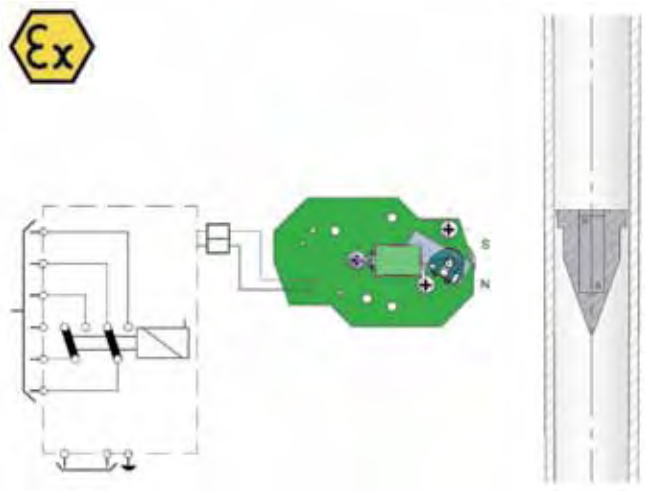
NAMUR (EN 60947-5-6) 3.5 mm slot type inductive detector activated by vane, mounted in the indicator housing.

- 60-AMD1 … 2: 1 … 2 adjustable limit switches
- Power supply: 8 VDC
- Ambient temperature: -25°C ... +70°C
- ATEX certificate 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: -25°C ... +70°C



Dimensions identical to 60-AMM

All dimensions in mm

Adjustable limit switch 60-AMO

(Flow rate up to 25-250 l/h water and equivalent air ranges)

Infrared optical switch, actuated by the float when crossing the beam, mounted in a plastic enclosure and supplied together with control relay in an aluminium housing. Suitable for all float materials except glass.

- 60-AMO1 ... 2: 1 ... 2 adjustable limit switches
- Contact rating: 1A 220 VAC / 50Hz
- Hysteresis: ±5% of full scale value
- Ambient temperature: -10ºC ... +80ºC
- Power supply: 220 VAC / 50Hz or 24 VDC

Transmitters

Transmitter 60-TMUR 0 ... 4-20 mA

(Flow rate from 40-400 l/h water equivalent air ranges)

The TMUR electronic transmitter consists of a reed chain which is mounted inside a plastic enclosure IP65 rated. Installation on the flowmeter frame by means of two screws or SS straps. By means of a converter, the resistance signal is converted in to current (0 ... 4-20 mA).

Technical data TMUR

- Working temperature: +5ºC ... +60ºC
- Resolution: 10 mm

4-wire system

TR420 converter technical data

- DIN 46277 rail mounted
- Power supply: 24, 110, 230, 240 VAC 50/60 Hz / 24 VDC
- Consumption: <1 VA
- Outputs: 0-20 mA, 4-20 mA, 0-5 V, 0-10 V, 1-5 V, 2-10 V

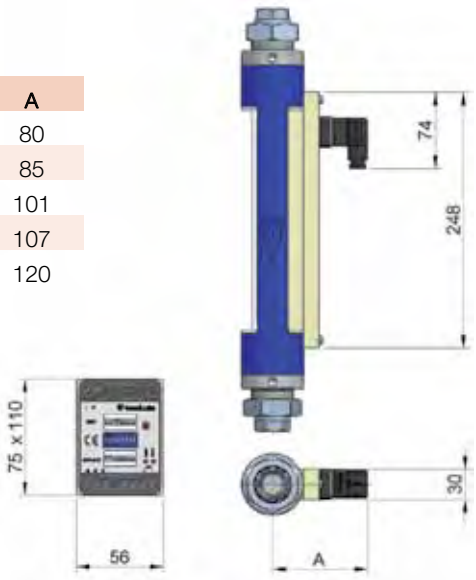
2-wire system (on request)

- 24VDC power supply
- Suitable for hazardous area with ATEX certification
- HART, Profibus or Fieldbus protocols

- Power supply:
  - 8 ... 35 VDC, safe area version
  - 8 ... 30 VDC, hazardous area version
- Consumption: 0,8 W
- Output: 4-20 mA
- Hazardous area version ATEX certified Ex ia IIC T6

For 2-wire system, the electrical connection is made directly on terminals mounted in an IP67 housing, compact mounted on the reed chain.

DN	A
15 ... 20	80
20 ... 25	85
40	101
50	107
65 ... 80	120



R-CT-6000 Rev. 2 english version

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 / 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 T85ºC 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: -80ºC ... +250ºC
  - With switches and/or transmitter: -20ºC ... +200ºC
- **Ambient temperature:** -20ºC … +80ºC
- **Working pressure:**
  - PN16 (with regulating valve)
  - PN40 (without regulating valve)

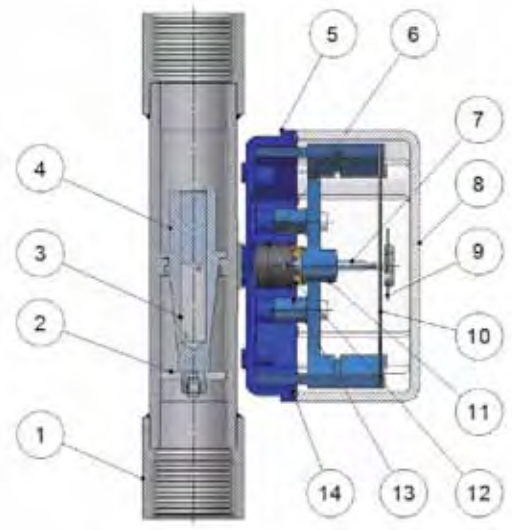
  (others on request)
- **Sanitary connections** according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®.
- **Housing:** IP65 - coated aluminium, polycarbonate window. IP67 - EN 1.4404 (AISI 316L) with glass window, on request.
- ATEX certificate **Ex ia IIC T4...T6 Ga / Ex ia IIIC T85ºC Da**

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 T85ºC Da

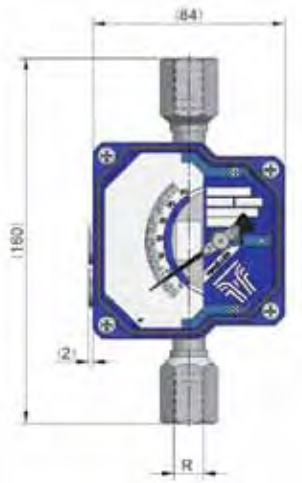
Materials

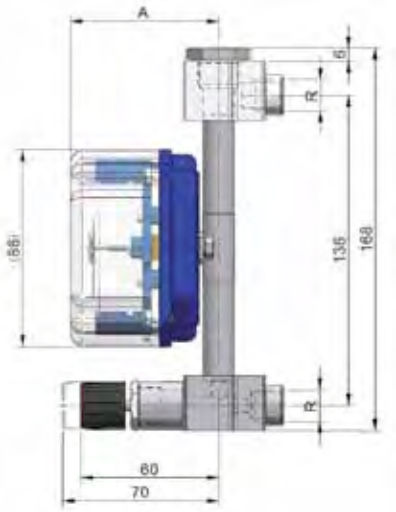


Nº	Description	Materials
1	Connection	EN 1.4404 (AISI 316L)
2	Lower float guide	EN 1.4404 (AISI 316L)
3	Float magnet	AlNiCo
4	Float	EN 1.4404 (AISI 316L)
5	Housing base	Coated aluminium
6	Needle magnet	Neodymium
7	Needle shaft	AISI 316
8	Housing cover	Polycarbonate
9	Needle	Aluminium
10	Graduated scale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

Dimensions

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



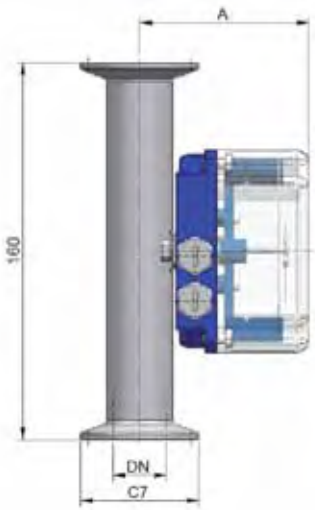


M21-HR (BSP thread)
M21-HN (NPT thread)
M21-HRA (BSP with valve)
M21-HNA (NPT with valve)

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 N°	Flow scales AISI 316L float 7.95 g/cm³		Δp mbar	DN				BSP / NPT
	l/h water	Nl/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	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

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)

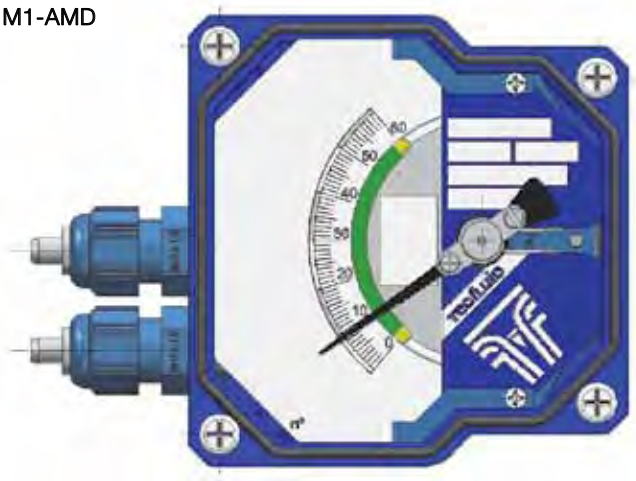
NAMUR (EN 60947-5-6) for 1 or 2 inductive detectors.

- 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

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: -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

M1-AMD

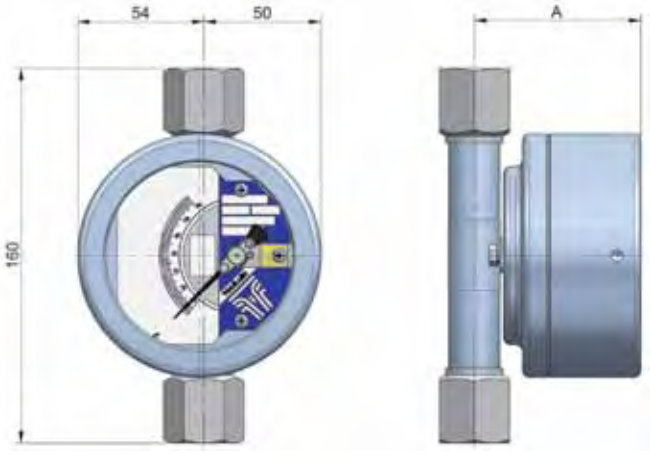


Accessories

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



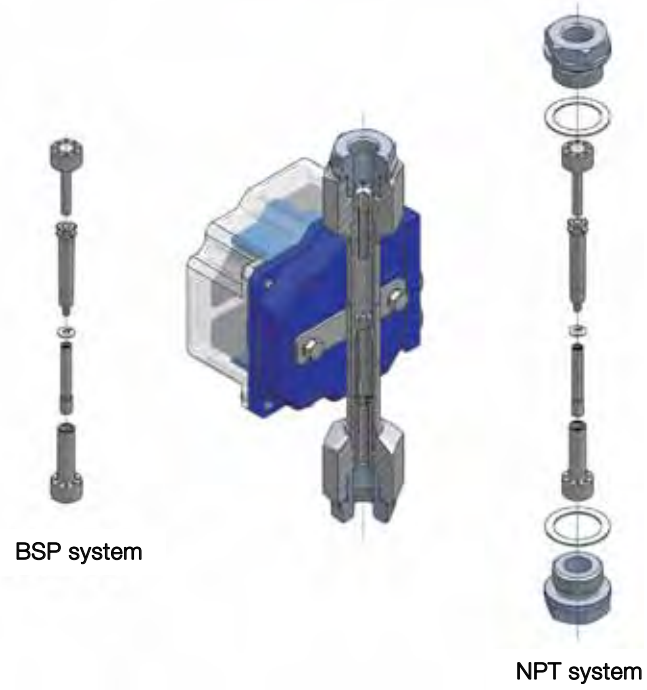
Float damping system (for gas and steam applications)

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

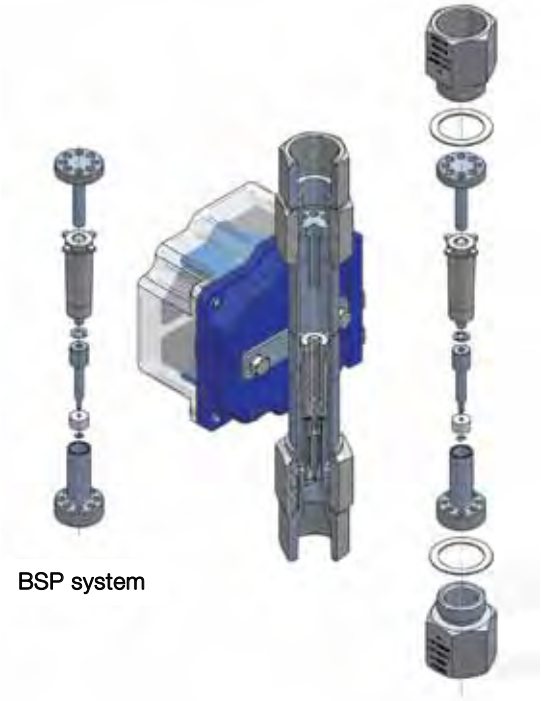
Damping system for M21 ¼"



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

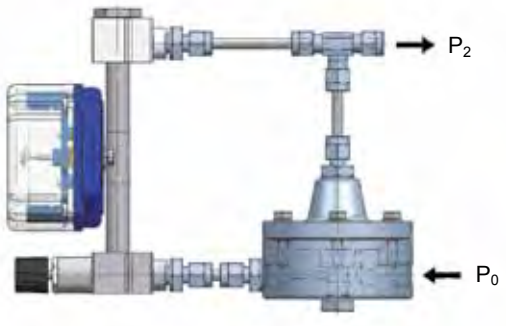
The M21 flowmeters are designed to incorporate the RCA and RCD constant flow regulators, which can make flow rate to be constant when inlet or outlet pressures are variable.

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.

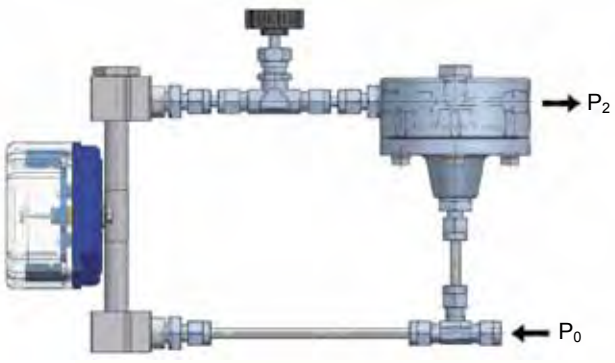
In applications for liquids RCA model is used in all cases.

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



R-CT-M21 Rev. 2 english version

TECFLUID

MORE THAN 40 YEARS MANUFACTURING
FLOW AND LEVEL INSTRUMENTATION

TecFluid
The art of measuring

Metal tube flowmeters
Series SC250

Variable area flowmeter for liquids, gases and steam

- Metallic or plastic 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
- Fully hygienic design available
- Damping mechanism to avoid float bounces in gas and steam applications
- Flow measurement in horizontal pipes with the model SC250H and in vertical pipes with downwards or upwards flow (to increase the flow capacity) with the model SC250V
- Flow rate (model SC250):
  - Water: 2.5 l/h ... 180 m^3/h
  - Air: 75 Nl/h ... 5400 Nm^3/h
- Accuracy: 2.5% (q_G=50%) / 1.6% (q_G=50%) on request
- Connections:
  - Model SC250: DN15 ... DN150
  - Models SC250H ... V / SM250: DN15 ... DN80
  - EN 1092-1 or ANSI flanges. Other flange standards on request (JIS,...)
  - Threaded connections BSP or NPT
  - Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Materials: EN 1.4404 (AISI 316L), PVC, PP, PTFE, Titanium, Hastelloy
- Local indication
- Options:
  - 1 or 2 limit switches
  - Electronic transmitter with 4-20 mA analog output for safe or hazardous area (Ex ia IIC T4 or T6 protection, ATEX certified). HART protocol available on request
  - Local volume totalizer. Remote volume totalizer by means of pulse output (not available for Ex transmitters)

Working principle

Flowmeters based in the variable area principle. audalímetros basados en el principio de área variable. The metering system consists on a calibrated orifice and a conical float. 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 represents an area between the float and the orifice. This area corresponds to a flow rate.

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

- Water treatment plants, pulp & paper and food industry
- Pharmaceutical, chemical and petrochemical industry
- Power plants and nuclear generating plants
- Heating and cooling circuits
- Saturated steam circuits
- Oven treatments and control of gas burners

Models

- SC250 upwards flow direction
- SC250H horizontal flow direction
- SC250V downwards flow direction or upwards flow direction with increased flow capacity
- SM250 for fluids with high viscosity

Model SC250
Technical data

- Accuracy, acc. to VDI/VDE 3513 sheet 2 (q_G=50%): 2.5% / 1.6% on request
- Direct scales in engineering units or in %
- Scale range: 10:1
- Fluid density: no restrictions
- Fluid viscosity: up to 10 mPa·s approx., depending on flow rate
- Fluid temperature:
  - EN 1.4404 (AISI 316L): -50ºC ... +300ºC
    For higher temperatures, see thermal separator p. 61
  - PTFE: -20°C ... +150°C
  - PVC: 0ºC ... +50ºC
  - PP: -5ºC ... +90ºC
- Ambient temperature:
  - EN 1.4404 (AISI 316L) & PTFE: -20°C ... +80°C
  - PVC: 0ºC ... +45ºC
  - PP: -50ºC ... +80ºC
- Working pressure:
  - SC250 / INOX (EN 1.4404 - AISI 316L):
    PN40 DN15 … DN50
    PN16 DN65 … DN150
    Others on request
  - SC250 / PVC / PP / PTFE
    (AISI 316L tube, PVC / PP / PTFE lined):
    PN40 DN15 … DN40
    PN16 DN50 … DN125
    PN10 DN150
    Others on request
  - SC250 / PVC T / PP T (Fully PVC / Fully PP): PN16
- Connections:
  - DN15 … DN150 EN 1092-1 flange or ANSI equivalent. Other flange standards on request (JIS,...)
  - Threaded connections BSP or NPT
  - Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®. Fully hygienic design available on request
- Housing: IP65 - coated aluminium. IP65 - PP or IP67 - EN 1.4404 (AISI 316L) with glass window, on request

Operation

- Vertical with upwards flow (BD)

Limit switches and transmitters

- SC-AMM1 ... 2: 1 or 2 adjustable micro-switches
- SC-AMD1 ... 2: 1 or 2 adjustable inductive detectors (+ relays on request)
- TH7 ... TH7H: 4-20 mA transmitter 2 wires + pulse output. HART protocol with model TH7H
- TH7T ... TH7TH: 4-20 mA transmitter + totalizer 2 wires + pulse output. HART protocol with model TH7TH
- TH7 Ex ... TH7H Ex: 4-20 mA transmitter 2 wires Ex ia IIC T4 or T6 (ATEX). HART protocol with model TH7H Ex
- TH7T Ex ... TH7TH Ex: 4-20 mA transmitter + totalizer 2 wires Ex ia IIC T4 or T6 (ATEX). HART protocol with model TH7TH Ex

Float types

DN15 ... DN80

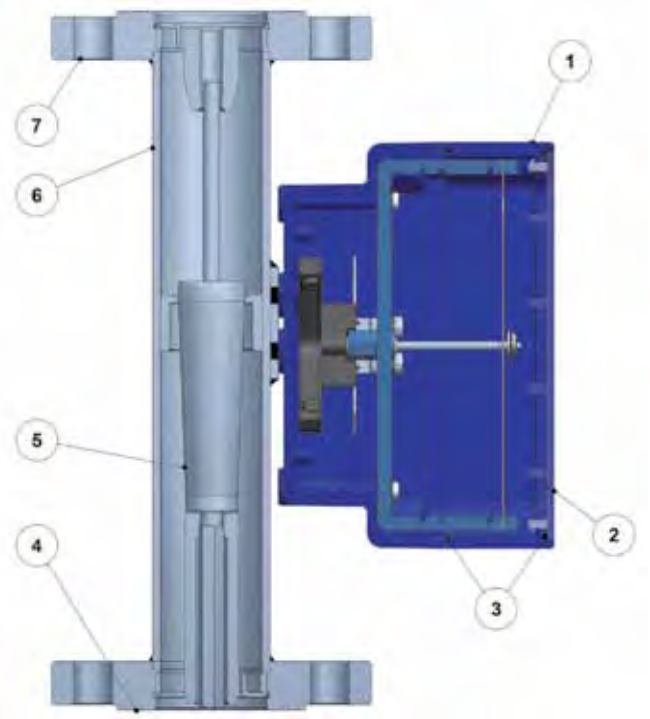
DN100 ... DN150

The tapered floats are constructed in AISI 316L, PVC, PP and PTFE as standard or other materials on request, according to the characteristics of the process fluid.

The maximum working viscosity for these floats is 10 mPa·s approx., depending on flow rate.

Materials

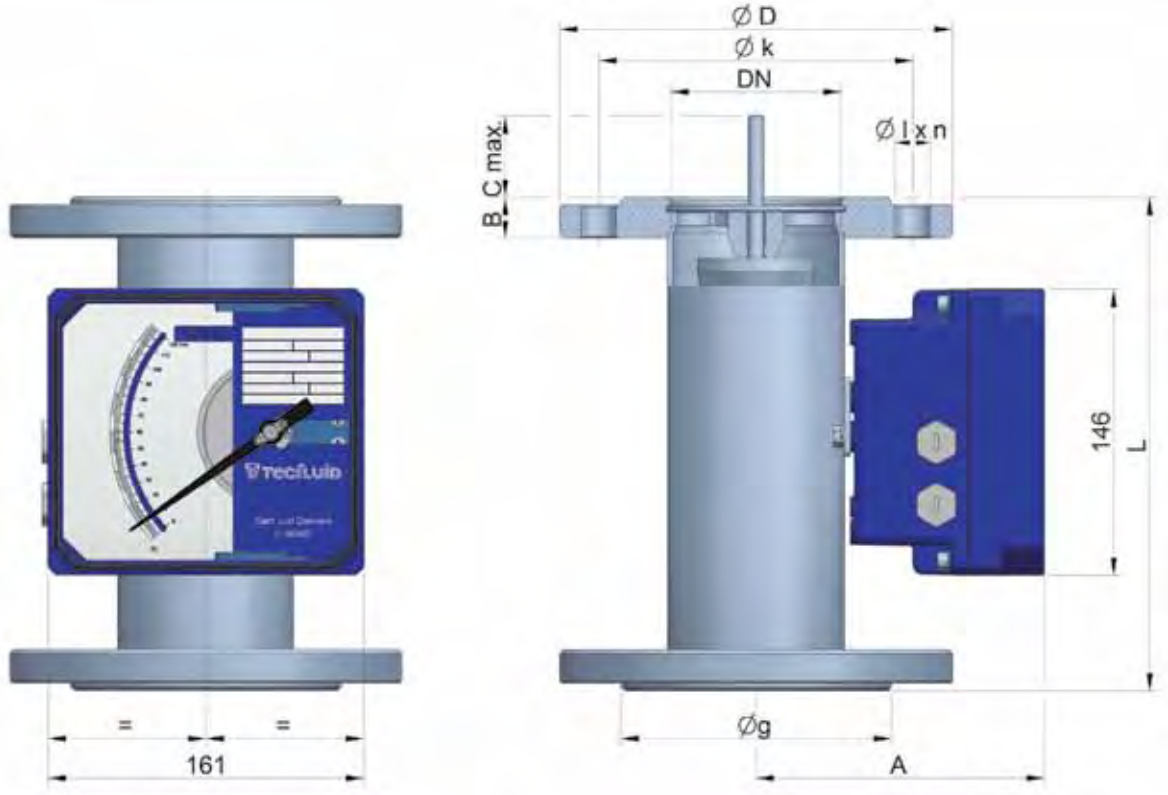
N°	Description	Materials		
		EN 1.4404	PVC / PP	PTFE
1	Enclosure	Coated aluminium		
2	Window	Polycarbonate (UV resistant)		
3	O-rings	NBR		
4	Flange seat	EN 1.4404	PVC / PP	PTFE
5	Float	EN 1.4404	PVC / PP	PTFE
6	Flow tube	EN 1.4404	PVC / PP	PTFE/SS
7	Flanges	EN 1.4404	PVC / PP	EN 1.4404



Dimensions

EN 1092-1 flanges (dimensions in mm)

DN	PN	Ø D	Ø k	Ø g	Ø l x n	B	A		C max		L	Weight kg
							SC250	SM250	SC250	SM250		
15	40	95	65	49	14 x 4	16	133	136	45	45	250	3,5
25	40	115	85	68	14 x 4	18	146	154	45	45	250	4,5
40	40	150	110	88	18 x 4	18	154	167	45	45	250	7,3
50	40	165	125	102	18 x 4	20	167	176	45	45	250	8,3
65	16	185	145	122	18 x 8	18	176	192	45	45	250	10
80	16	200	160	138	18 x 8	20	192	211	45	45	250	12
100	16	220	180	158	18 x 8	20	211	-	45	-	250	15
125	16	250	210	188	18 x 8	22	236	-	45	-	250	20
150	16	285	240	212	22 x 8	22	262	-	45	-	300	32



ANSI flanges (dimensions in mm)

DN	Pressure class lbs	Ø D	Ø k	Ø g	Ø l x n	B	A		C max		L	Weight kg
							SC250	SM250	SC250	SM250		
½"	150	88,9	60,3	44,0	15,90 x 4	11,1	122	122	45	45	250	3,5
¾"	150	98,4	69,8	42,9	15,90 x 4	12,7	133	146	45	45	250	4,5
1"	150	107,9	79,4	50,8	15,90 x 4	14,3	146	154	45	45	250	7,3
1 ¼"	150	117,5	88,9	63,5	15,90 x 4	15,9	146	154	45	45	250	8,3
1 ½"	150	127,0	98,4	73,0	15,90 x 4	17,5	154	167	45	45	250	10
2"	150	152,4	120,6	92,1	19,05 x 4	19,1	167	176	45	45	250	12
2 ½"	150	177,8	139,7	104,8	19,05 x 4	22,2	176	192	45	45	250	15
3"	150	190,5	152,4	127,0	19,05 x 4	23,8	192	211	45	45	250	20
4"	150	228,6	190,5	157,2	19,05 x 8	23,8	211	-	45	-	250	32
5"	150	254,0	215,9	185,7	22,20 x 8	23,8	236	-	45	-	250	20
6"	150	279,4	241,3	215,9	22,20 x 8	25,4	262	-	45	-	300	32

Flow ranges

Size DIN (ANSI)	Float Nº	Flow scales EN 1.4404 (AISI 316L) float (7.95 g/cm³)			Flow scales PVC float			
		l/h water	Nm³/h air 1.013 bar abs 20ºC	ΔP mbar	l/h water	ΔP mbar	Nm³/h air 1.013 bar abs 20ºC	ΔP mbar
15 (½")	15025	2.5-25	0.07-0.7	40	2.5-25	20	0.1-1	30
	15040	4-40	0.12-1.2	40	6-60	15	0.2-2	25
	15060	6-60	0.18-1.8	40	10-100	15	0.4-4	25
	15100	10-100	0.3-3	40	16-160	15	0.6-6	25
	15160	16-160	0.5-5	50	25-250	15	1-10	25
	15250	25-250	0.7-7.5	50	40-400	15	1.6-16	25
15 (¾")	15400	40-400	1.2-12	50	60-600	15	2-20	25
	15600	60-600	1.8-18	50				
	15800 *	80-800 *	2.4-24 *	60 *				
25 (1")	25100	100-1000	3-30	60	16-160	10	0.6-6	20
	25160	160-1600	5-50	70	25-250	10	1-10	20
	25250	250-2500	7-75	90	40-400	10	1.6-16	20
	25400	400-4000	12-120	110	60-600	10	2.5-25	20
	25101				100-1000	10	4-40	20
	25161				160-1600	10	6-60	20
	25251				240-2400	10	9-96	20
40 (1 ½")	40400	400-4000	12-120	45	150-1500	20	5-50	25
	40600	500-6300	15-180	55	250-2500	20	8-80	25
	40800	800-8000	24-240	90	400-4000	20	14-140	25
	40100 *	1000-10000 *	30-300 *	120 *				
50 (2")	50800	800-8000	24-240	70	250-2500	15	9-90	25
	50100	1000-10000	30-300	90	400-4000	15	15-150	25
	50150	1500-15000	45-450	100	600-6000	15	20-200	25
	50200 *	2000-20000 *	60-600 *	130 *				
	50101				1000-10000	15	35-350	25
65 (2 ½")	65150	1500-15000	45-450	70	800-8000	15	25-250	25
	65200	2000-20000	60-600	100	1000-10000	15	40-400	25
	65300 *	3000-30000 *	90-900 *	140 *				
80 (3")	80020	2000-20000	60-600	80	1000-10000	15	40-400	25
	80025	2500-25000	75-750	100	1600-16000	15	60-600	25
	80030	3000-30000	90-900	120				
	80040 *	4000-40000 *	120-1200 *	160 *				
	80050 *	5000-50000 *	150-1500 *	190 *				
	80060 *	6000-60000 *	180-1800 *	220 *				
100 (4")	81040	4000-40000	120-1200	100	1600-16000	20	60-600	25
	81050	5000-50000	150-1500	120	2000-20000	20	100-1000	25
	81060	6000-60000	180-1800	150				
	81085 *	8500-85000 *	260-2600 *	190 *				
	81095 *	10000-95000 *	300-2900 *	220 *				
125 (5")	82080	8000-80000	240-2400	120	3000-30000	20	150-1500	30
	82100	10000-100000	300-3000	150	4000-40000	20	200-2000	30
	82120	12000-120000	360-3600	180	6000-60000	20	220-2200	30
150 (6")	83150	15000-150000	450-4500	220	8000-80000	25	250-2500	35
	83180	18000-180000	500-5400	220	10000-100000	25	300-3200	35

* Special flow ranges. Please consult factory

Models SC250H ... V

The SC250H...V are versions of the SC250 flowmeter that can be installed in horizontal pipes with flow from left to right or right to left, in vertical pipes with downwards flow or in vertical pipes with upwards flow to increase the standard flow capacity.

Working principle

The metering system is made up of a calibrated orifice, a conical float and a spring.

The force from the fluid, as it flows through the flowmeter, displaces the float and compresses the spring, reaching an equilibrium point which corresponds to a specific flow.

Technical data

The accuracy is 2.5% (q_G=50%) or optionally 1.6% (q_G=50%) according to VDI / VDE 3513 sheet 2.

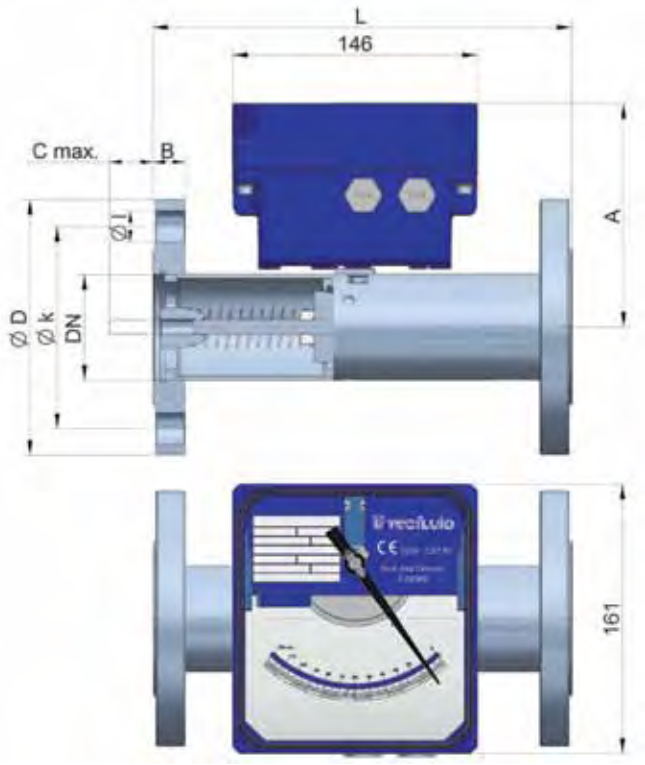
The SC250H...V is suitable for the flow measurement of liquids or gases and can be equipped with additional switches, transmitters and options like the SC250 series.

The standard materials for the floats are PVC, PP, PTFE and EN 1.4404 (AISI 316L). Versions for high pressure and temperature applications are also available.

For more details about pressure and temperature limits, materials, etc. please refer to model SC250.

Operation

- **Vertical, with SC250V:**
  - Upwards flow (BD)
  - Downwards flow (DAB)
- **Horizontal, with SC250H:**
  - Left to right flow (ED)
  - Right to left flow (DES)



Please refer to p. 54 for dimensions

Flow ranges

Size DIN (ANSI)	Flow scales l/h water			Δp mbar
	Spring nº 1	Spring nº 2	Spring nº 3	
15 (½")	10-100	25-250		390
	16-160			290
	25-250			290
	40-400	60-600		200 / 350
15 (¾")	100-1000			350
	150-1500	250-2500		350 / 600
25 (1")	60-600 (1)			90
	100-1000 (1)			90
	160-1600	250-2500		290
	400-4000			290
	600-6000			290
	800-8000 (1)			120
	1000-10000			300
40 (1 ½")	400-4000 (1)			90
	650-6500	800-8000		130 / 160
	1000-10000			150
	1600-16000	2000-20000		180 / 270
50 (2")	600-6000			120
	1100-11000			120
	1800-18000			150
	2300-23000*	3000-30000*	4000-40000	170* / 280
65 (2 ½")	1800-18000			110
	2400-24000*	3000-30000*	4000-40000	150* / 220
80 (3")	2500-25000 (1)	3000-30000 (1)		50 / 60
	4000-40000	5000-50000		140
	6000-60000			220

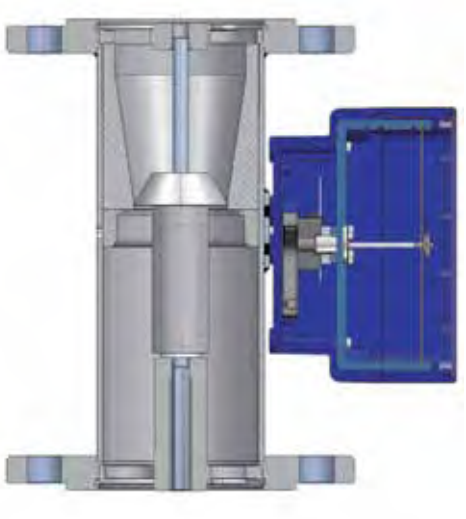
(1) Flow ranges available only with plastic float (PP / PVC / PTFE)

Other flow ranges available, with different float materials

Scales for air, liquids or gases available

Model SM250

The SM250 is a version of the SC250 flowmeter that is suitable for liquids with high viscosities, which cannot be measured with the standard SC250. This is achieved thanks to its internal design and special floats.



Working principle

The metering system consists of a conical tube and a special T or V float. In this model, there is no calibrated orifice inside the tube. The force from the fluid, as it flows from the bottom to the top, displaces the float until it reaches an equilibrium point.

Technical data

The standard accuracy is 1.6% (q_G=50%).

This model can be equipped with the same electronic devices and accessories as the model SC250. The standard material is EN 1.4404 (AISI 316L) for both the flow tube and the float. Plastic versions (PP, PVC, PTFE) and special instruments for high pressure and temperature applications are also available on request.

For more details about pressure and temperature limits, materials, etc. please refer to model SC250.

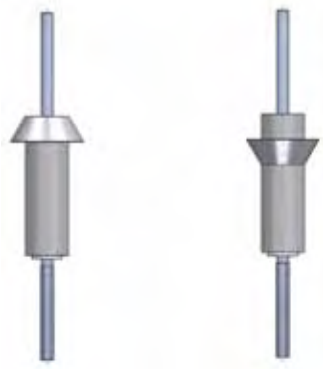
Operation

- Vertical with upwards flow (BD)

Flow ranges

Size DIN (ANSI)	Flow scales EN 1.4404 float (7.95 g/cm³) l/h water		Δp mbar	
	Type T	Type V	Type T	Type V
15 (½")	6-60		55	
	12-120		55	
	16-160		55	
	25-250	30-300	55	55
15 (¾")	25-250	30-300	55	55
	40-400	50-500	55	55
	60-630	80-800	55	55
	80-800	100-1000	60	60
25 (1")	25-250	30-300	60	70
	40-400	50-500	60	70
	60-630	80-800	60	70
	80-800	100-1000	60	70
	100-1000	130-1300	60	70
	120-1200	160-1600	70	80
	160-1600	200-2000	70	100
	200-2000	250-2500	90	120
	250-2500	300-3000	110	160
40 (1 ½")	160-1600	200-2000	45	60
	200-2000	250-2500	45	60
	250-2500	300-3000	45	60
	300-3000	400-4000	45	60
	400-4000	500-5300	55	80
50 (2")	300-3000	400-4000	50	60
	400-4000	500-5300	50	60
	500-5000	650-6500	50	60
	600-6000	800-8000	55	80
	750-7500	1000-10000	70	100
65 (2 ½")	600-6000	800-8000	60	80
	750-7500	1000-10000	60	80
	1000-10000	1300-13000	60	80
	1200-12000	1500-15000	70	90
80 (3")	1000-10000	1300-13000	60	80
	1200-12000	1500-15000	60	80
	1600-16000	2000-20000	60	80
	2000-20000	2500-25000	80	100

Float types



Type T Type V

The constant section T & V floats are constructed in AISI 316L, PVC, PP & PTFE as standard or other materials on request, according to the characteristics of the process fluid.

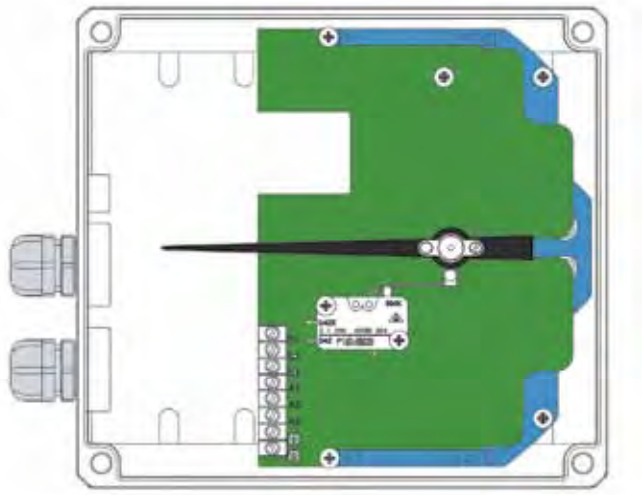
Limit switches

Adjustable limit switch SC-AMM

Electrical micro-switch mounted in the indicator housing.

- SC-AMM1 … 2: 1 … 2 adjustable limit switches
- Ratings: 3(1) A, 250 V (VDE/CEE)
- Hysteresis: ±10% of full scale value
- Ambient temperature: -25ºC ... +80ºC
- Mechanical life: 10^7 operations
- ATEX certificate Ex ia IIC T6

Gold plated contacts on request.



SC-AMM

Adjustable limit switch SC-AMD

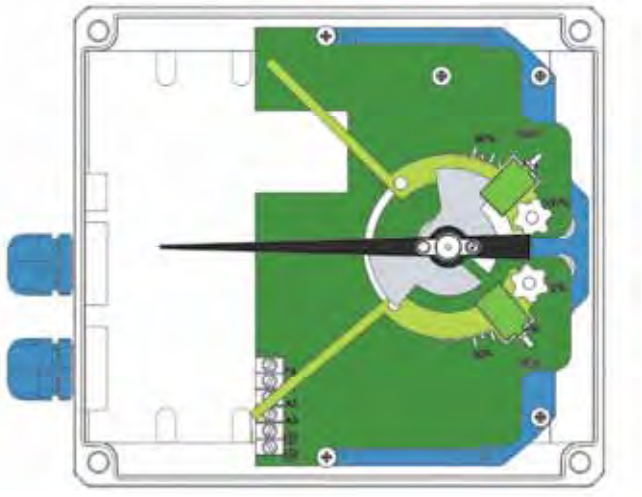
NAMUR (EN 60947-5-6) 3.5 mm slot type inductive detector activated by vane, mounted in the indicator housing.

- SC-AMD1 … 2: 1 … 2 adjustable limit switches
- Power supply: 8 VDC
- Ambient temperature: -25ºC ... +70ºC
- ATEX certificate Ex ia IIC T6

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: -20ºC ... +60ºC



SC-AMD

Modular housing

Transmitters and totalizers

Transmitter TH7

The TH7 electronic transmitters provide an analog output proportional to the flow rate and a digital output selectable either as a pulse or an alarm output (except for the Ex versions). They can also include a display for volume totalization. They are based on the Hall effect and mounted inside the indicator housing.

- **TH7** transmitter
- **TH7H** transmitter + HART protocol
- **TH7T** transmitter + totalizer
- **TH7TH** transmitter + totalizer + HART protocol

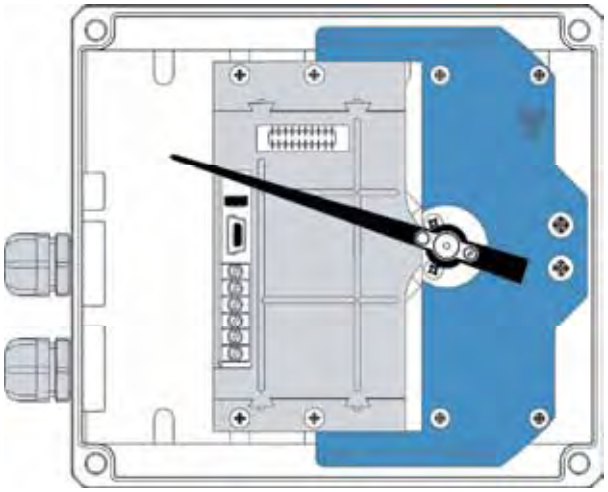
Technical data

- Power supply: 12 … 36 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: 1.1 kΩ (with 36 VDC power supply)
- Digital output: Potential free N channel MOSFET, $I_{max.}$ 200 mA, for either pulse or alarm output:
  - Pulse output:
    - Max. frequency 6 Hz
    - Pulse duration approx. 62.5 ms
  - Alarm output, adjustable in one point of the scale. Programmable by means of Winsmeter TH7 software
- Totalizer: 8 digits, 4.5 mm high
  Reset by potential free contact
- Ambient temperature: -5ºC ... +70ºC

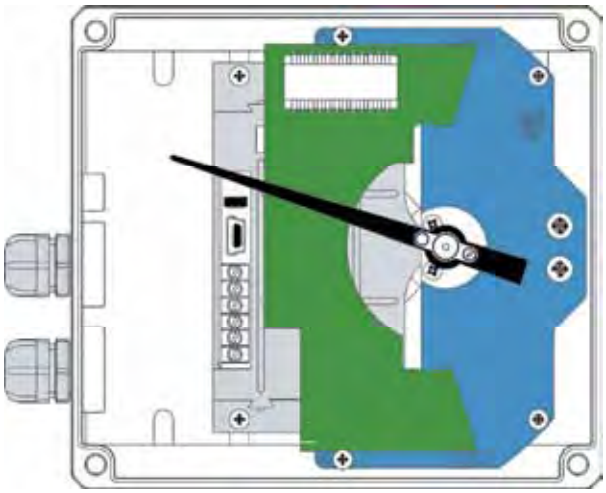
ATEX version (Ex ia IIC T4 or T6)

Technical data

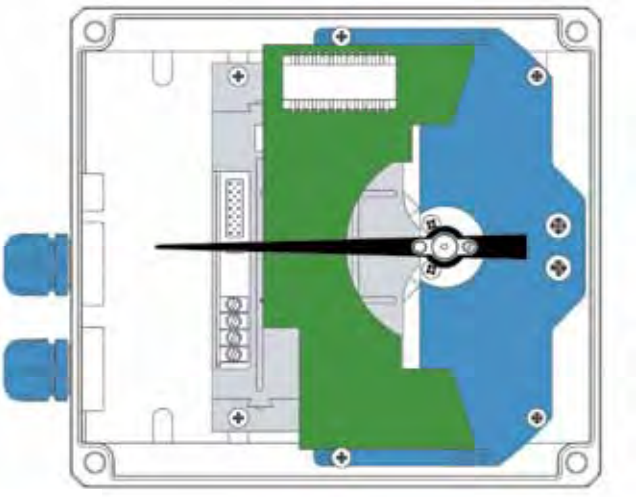
- ATEX certificate Ex II 1 GD
- Power supply: 14 … 30 VDC, 2-wire system
- Power consumption: 4-20 mA for 0 … 100% of scale
- 4-20 mA analog output:
  - Error: <0.6% of the magnet position
  - Maximum load in 4-20 mA loop: 900 Ω (with 30 VDC power supply)
- Totalizer: 8 digits, 4.5 mm high
  Reset by potential free contact
- Ambient temperature: -5ºC ... +40ºC



TH7



TH7T



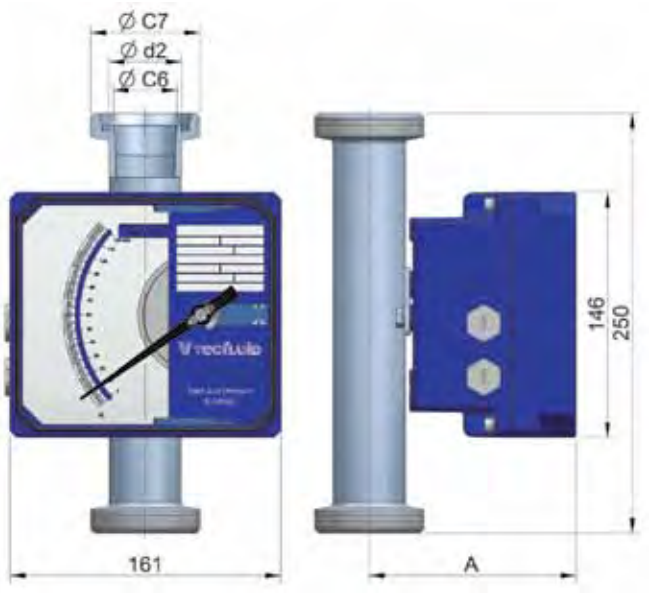
TH7T Ex

Both limit switches AMM or AMD and electronic transmitters TH7 or TH7T can be mounted together in the same housing.

The TH7 Ex and TH7T Ex transmitters belong to group II. They are intended for use in potentially explosive atmospheres, except in mining

Models SC250 — other connection types

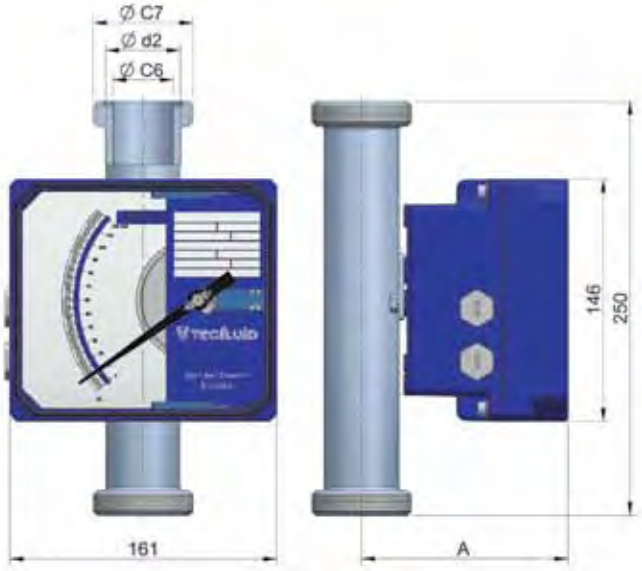
Sanitary connection DIN 11851 (EN 1.4404)



NW - DN	15	25	40	50	65	80	100
Ø C_7	Rd 34 x 1/8"	Rd 52 x 1/6"	Rd 65 x 1/6"	Rd 78 x 1/6"	Rd 95 x 1/6"	Rd 110 x 1/4"	Rd 130 x 1/4"
Ø C_6	17	24.8	35.6	45.8	67	82.8	100
Ø d_2	21.3	30	42	51	73	88.9	108
A	114	118	124	129	140	148	157
DIN EQ.	15(PC)*	15	25	40	50-65	80	100

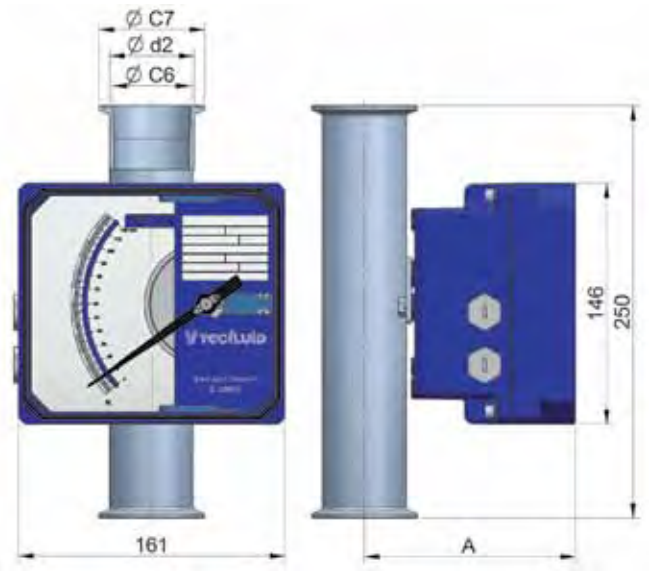
* Max flow rate 250 l/h H_2O

Sanitary connection SMS 1145 (EN 1.4404)



NW - DN	15	25	40	50	65	100
Ø C_7	40	60	70	85	98	125
Ø C_6	22.5	35.5	48.5	60.5	72	100
Ø d_2	25	42	51	63.5	73	108
A	115	124	129	135	140	157
DIN EQ.	15	25	40	50	65	100

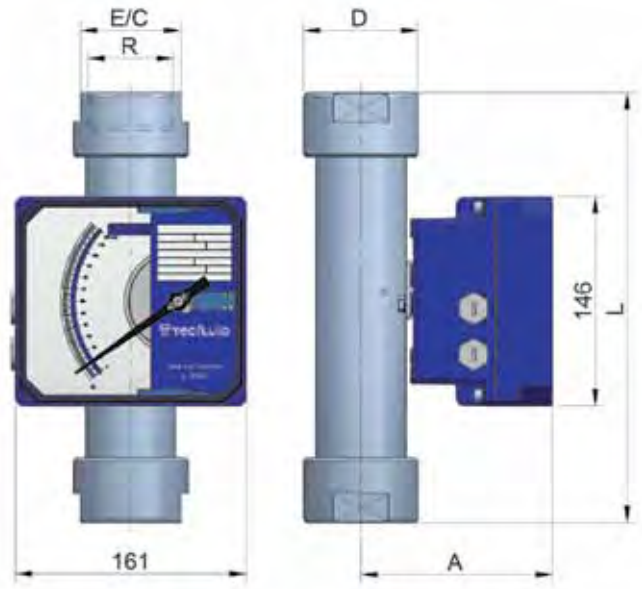
Sanitary connection CLAMP ISO 2852 (EN 1.4404)



Ø C_7	34	50.5	50.5	64	77.5	91	106	130
Ø C_6	17	24.8	35.6	45.8	58.3	67	82.8	100
Ø d_2	21.3	30	42	51	63.5	73	88.9	108
A	114	118	124	129	135	140	148	157
DIN EQ.	15(PC)*	15	25	40	50	65	80	100

* Max flow rate 250 l/h H_2O

Threaded connection BSP / NPT (EN 1.4404)

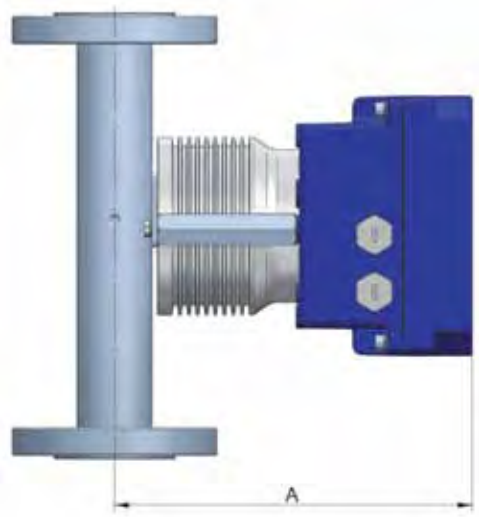


R	½"	¾"	1"	1 ½"	2"	2 ½"	3"	4"
L	275	275	285	300	300	310	310	310
D	35	40	50	65	80	90	110	130
A	114	118	124	129	135	140	146	156
E/C	30	35	45	60	70	84	104	124
DIN EQ.	15 (PC)*	15	25	40	50	65	80	100

* Max flow rate 250 l/h H_2O

Accessories

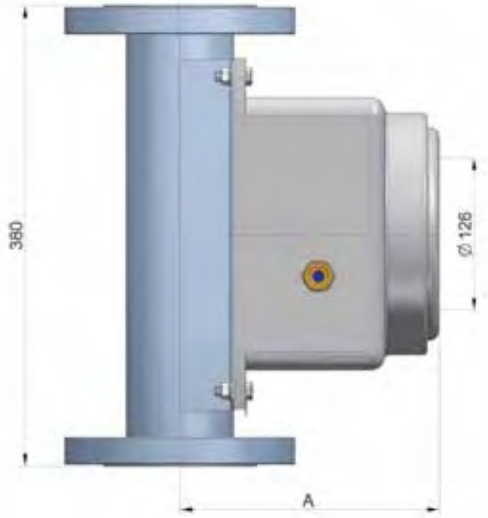
Thermal separator



DN	15	25	40	50	65	80	100	125	150
A	177	183	187	194	198	207	216	228	241

- Standard in aluminium, optional in EN 1.4404 (AISI 316L)
- For working with fluids at high and low temperatures
- With electronics DN15 ... DN65: -180°C ... +300ºC
  DN80 ... DN150: -180°C ... +260°C
- Without electronics: DN15 ... DN150: -180°C ... +400°C
- Reference ambient temperature: 20°C

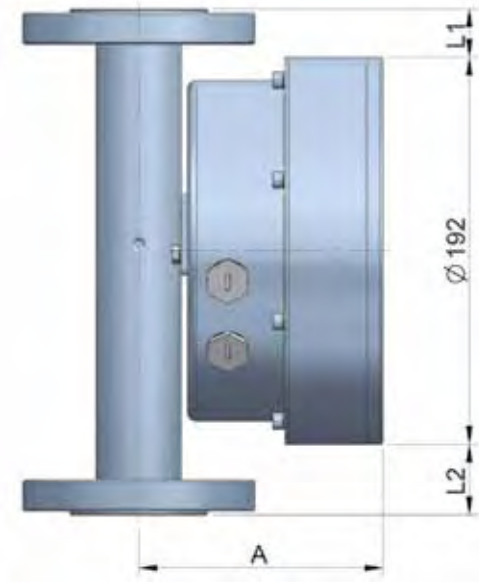
Explosion proof enclosure Ex d IIC T6



DN	15	25	40	50	65	80	100	125	150
A	195	201	205	212	216	224	234	246	260

- Porthole with glass for viewing the flow rate
- In the inside, the SC250 ... SM250 housing with standard limit switches and transmitters
- Explosion proof protection: Ex d IIC T6
- Ingress protection: IP65
  (Pending of certification)

Stainless steel housing



DN	15	25	40	50	65	80	100	125	150
L1	30	30	30	30	30	30	35	35	60
L2	40	40	40	40	40	40	35	35	60
A	115	121	125	132	137	145	154	167	180

- 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 TH transmitters
- Ingress protection: IP67

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.

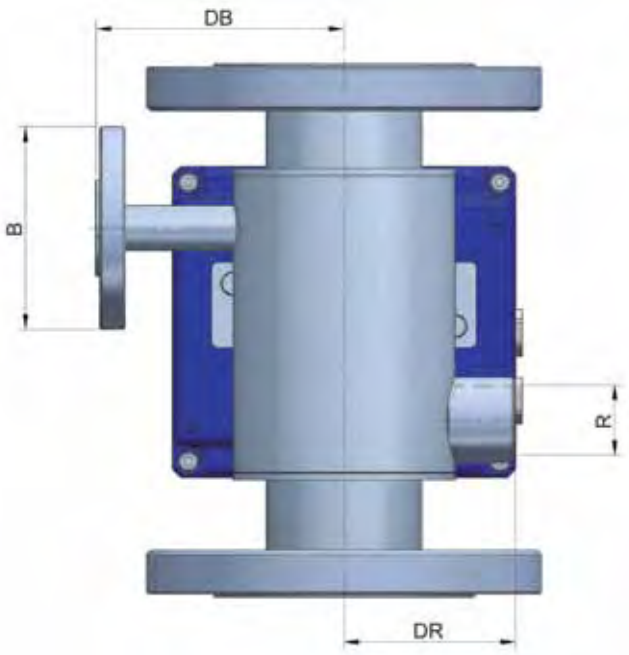
Available for DN15 ... DN80

1. Upper float stop
2. Float
3. Piston
4. Piston locking circlip
5. Guide cylinder
6. Circlips for locking upper float stop & guide cylinder

Heating-cooling chamber

For installations that require maintaining the process fluid temperature by means of the circulation of a heating or cooling fluid through the double chamber of the flowmeter.

- Without contact with the process fluid
- Flanged or threaded pipe fittings (BSP, NPT, EN 1092-1) Other standards on request
- Pipe fitting diameters according to the table below
- Stainless steel EN 1.4404 (AISI 316L) Other materials on request



DN	15 (PC)	15	25	40	50	65	80	100	125	150
R	½"			¾"		1"				
B*	DN15			DN20		DN25				
DR	35	39	45	50	50	56	70	80	91	104
DB	77	77	88	105	112	122	130	140	155	172

* EN 1092-1 PN16 flange (others on request)

R-CT-SC250 Rev. 3 english version

1.2
ORIFICE PLATE

1.2
ORIFICE PLATE

PR

Orifice plate flowmeters

Series PR

By-pass flowmeter for liquids, gases and steam

- By-pass flowmeter with orifice plate (compact system PRC and separate system PR) for big flow ranges
- Flow indication by means of by-pass flowmeter
- Scales calibrated in l/h, m^3/h, kg/h, %, etc.
- Suitable for vertical and horizontal pipe
- Minimum straight pipe run required of 10 x DN and 7 x DN before and after the orifice plate
- Suitable for flow measurement of liquids, gases and steam
- Flow rate: 2 ... 20000 m^3/h water
- Accuracy: ±4% f.s.
- Connections:
  - Orifice plates DN50 ... DN1000
    Pressure inlets: ¾" BSP
  - By-pass flowmeters:
    - Model 6001/PR: ¾" BSP thread
    - Model 6002/PR: EN 1092-1N DN20 flange
    - Model SC250/PR: EN 1092-1 DN15 flange
    - Model PS31/PR: ¾" BSP thread or solvent weld socket DN20/25E
- Materials: plastic coated steel, EN 1.4404 (AISI 316L), PVC, PP
- Local indication
- Options:
  - 1 or 2 limit switches
  - Model PR25 / PR31 / PRC31: electronic transmitter with 4-20 mA analog output for safe or hazardous area (Ex ia IIC T4 or T6 protection, ATEX certified). HART protocol available on request
  - Model PR25: Local volume totalizer. Remote volume totalizer by means of pulse output (not available for Ex transmitters)

Working principle

By means of variable differential pressure according to flow rate, obtained thanks to an orifice plate with constant section.

An orifice plate mounted in a pipe where fluid flows causes a differential pressure that changes according to a square function of the flow rate. A small section circuit with a flowmeter is connected to the pressure inlets of the orifice plate. The differential pressure makes the fluid flow by this circuit, so the flowmeter provides a local indication of the main pipe flow rate.

Applications

- **Fire protection systems and cooling circuits**
- **Natural gas installations**
- **Desalination plants and process industry**
- **Checking of flow rate in pumps**

Models

Separate system: The orifice plate and its carrier assembly are separate from the by-pass flowmeter. The union between both devices is made on site by means of pipe of 15/20 mm of diameter, connecting the positive pressure (+) of the orifice plate to the inlet (lower connector) of the by-pass flowmeter and the negative pressure (-) of the orifice plate to the outlet (upper connector) of the by-pass flowmeter:

- **PR61** by-pass flowmeter model 6001/PR
- **PR62** by-pass flowmeter model 6002/PR
- **PR31** by-pass flowmeter model PS31/PR
- **PR25** by-pass flowmeter model SC250/PR

For more info regarding the by-pass flowmeters, please refer to series PT/PS, 6000 and SC250 datasheets.

Compact system: The orifice plate and its carrier assembly are mounted together with the by-pass flowmeter:

- **PRC61** by-pass flowmeter model 6001/PR
- **PRC31** by-pass flowmeter model PS31/PR

Models PR61 ... 62 ... 31 ... 25 Technical data

- **Accuracy:** ±4% full scale
- **Direct scales in engineering units or in %**
- **Minimum straight pipe run required of 10 x DN and 7 x DN before and after** the orifice plate
- **Scale range:** 7:1
- **Fluid temperature:**
  - PR61 ... 62 / Fe ... SS: -20ºC ... 80ºC
  - PR31 / Fully Fe … Fully SS: 0ºC ... 100ºC
  - PR61 ... 62 … 31 / PVC: 0ºC ... 60ºC
  - PR61 ... 62 / PP: -20ºC ... 80ºC
  - PR31 / PP: 0ºC ... 80ºC
  - PR25 / SS: -50ºC ... 300ºC
    (on request -180ºC ... 400ºC)
- **Working pressure:**
  - PR61 ... 62 … 31: 15 bar max.
  - PR25: PN16 (others on request)
- **Connections:**
  - Orifice plates DN50 ... DN1000
    Pressure inlets: ¾" BSP
  - By-pass flowmeters:
    - Model 6001/PR: ¾" BSP thread
    - Model 6002/PR: EN 1092-1N DN20 flange
    - Model SC250/PR: EN 1092-1 DN15 flange
    - Model PS31/PR: ¾" BSP thread or solvent weld socket DN20/25E
- **Mounting in both vertical and horizontal pipes**
- **By-pass circuit and isolation valves not supplied**

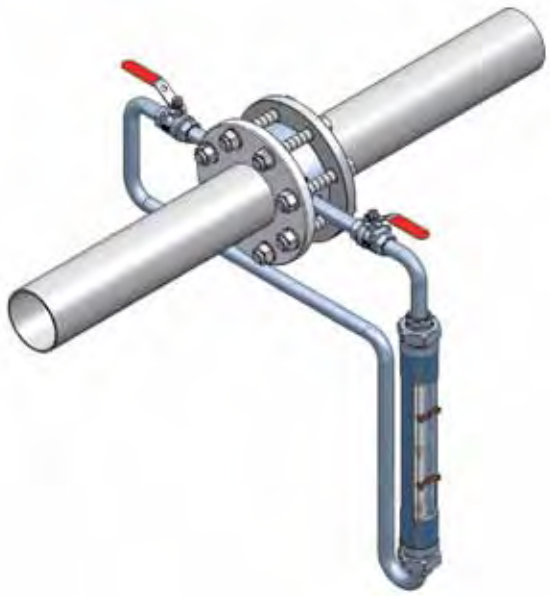
Limit switches and transmitters

Models PR61 ... 62 ... 31

- **PT-AMR1 ... 2:** 1 or 2 adjustable reed switches
- **PT-TMUR:** 4-20 mA output transmitter (only for PR31)

Model PR25

- **SC-AMM1 ... 2:** 1 or 2 adjustable micro-switches
- **SC-AMD1 ... 2:** 1 or 2 adjustable inductive detectors (+ relays on request)
- **TH7 ... TH7H:** 4-20 mA transmitter 2 wires + pulse output. HART protocol with model TH7H
- **TH7T ... TH7TH:** 4-20 mA transmitter + totalizer 2 wires + pulse output. HART protocol with model TH7TH
- **TH7 Ex ... TH7H Ex:** 4-20 mA transmitter 2 wires Ex ia IIC T4 or T6 (ATEX). HART protocol with model TH7H Ex
- **TH7T Ex ... TH7TH Ex:** 4-20 mA transmitter + totalizer 2 wires Ex ia IIC T4 or T6 (ATEX). HART protocol with model TH7TH Ex

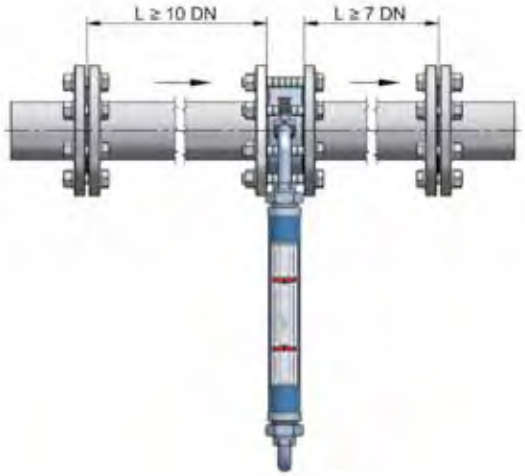


Mounting

In the orifice plate flowmeters series PR it is necessary to keep a minimum straight pipe run of 10 x DN before and 7 x DN after the flowmeter. The required distance depends on the flow profile, which can be affected by the disturbing elements found in the installation before and after the flowmeter.

Likewise, in the separate orifice plate flowmeters models PR61 / PR62 / PR31 / PR25 mounting must be made by means of a by-pass circuit and isolation valves (not supplied). The length of this circuit must be the minimum possible in order to avoid increasing the pressure drop caused by the orifice plate and therefore provide false readings.

In the separate mounting, the by-pass flowmeter must always be installed below the orifice plate position.

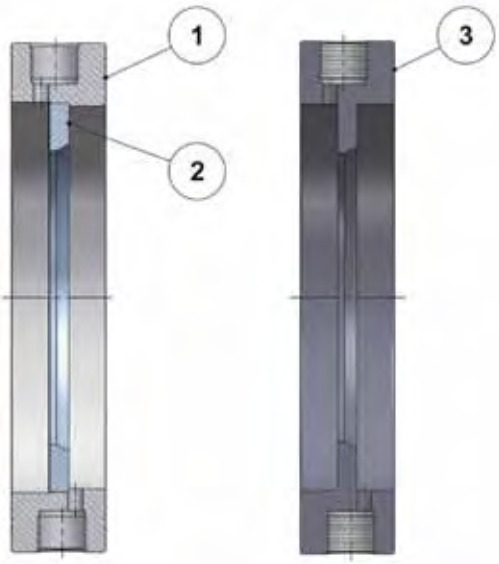


Materials

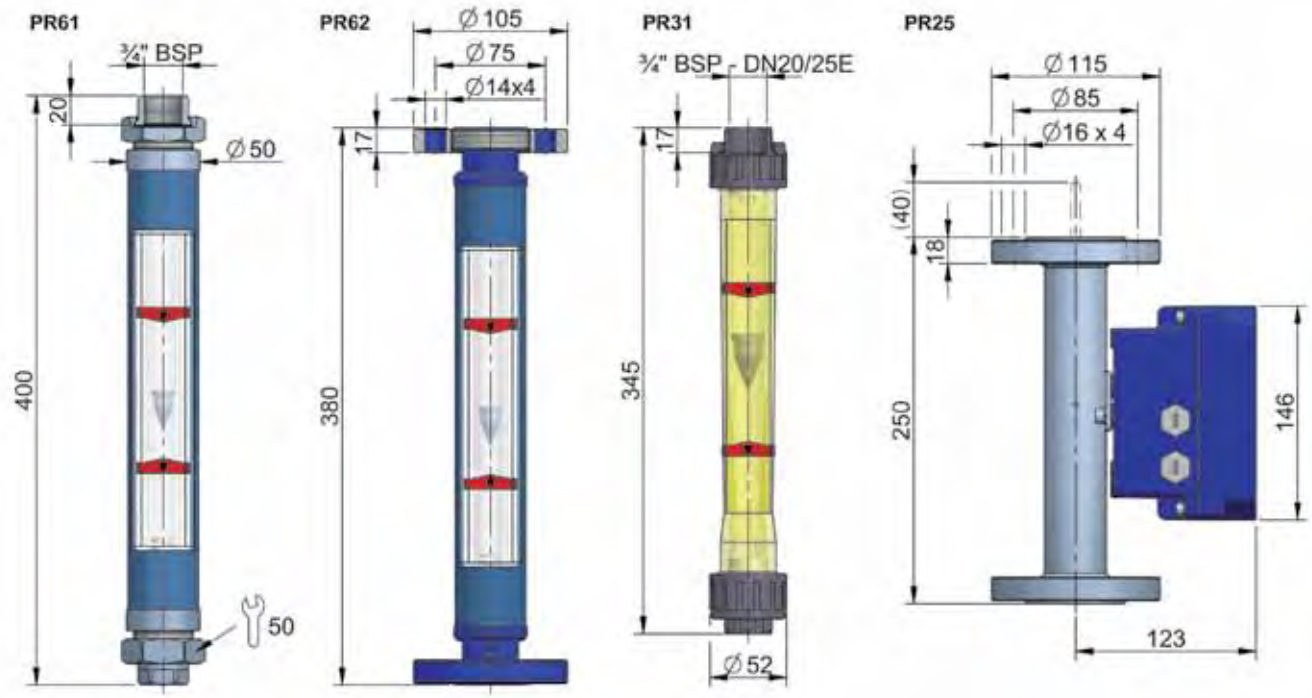
Orifice plate

Nº	Description	Materials		
		Fe	EN 1.4404	PVC / PP
1	Carrier assembly	Plastic coated steel	— — —	— — —
2	Orifice	EN 1.4404 (AISI 316L)	— — —	— — —
3	Carrier + orifice	— — —	EN 1.4404 (AISI 316L)	PVC / PP

Materials for by-pass flowmeters, please refer to series PT/PS, 6000 and SC250 datasheets



Dimensions



Flow ranges

DN	External Ø carrier assembly		Flow scales m³/h water						
	PN10	PN16	Approximate differential pressure at maximum flow rate (mmH_2O)						
			2000	2600	4000	5000 (1)	6000	8000	10000
50		107	2-15	3-20	5-30	6-35	7-40	8-45	10-50
65		127	6-30	6-40	8-50	10-60	10-70	12-80	14-90
80		142	5-30	8-50	10-70	12-90	14-100	14-110	20-120
100		162	6-40	10-60	12-80	14-100	14-110	16-120	20-140
125		192	18-100	20-130	25-150	30-200	40-260	50-300	60-400 *
150		218	20-160	25-200	40-250	50-300	50-350	60-400	60-450
200		273	40-280	50-350	80-460	80-560	80-600	100-700	120-800
250		329	60-400	70-500	90-680	120-800	150-900	160-1060	180-1200
300	378		70-500	90-650	150-1000	180-1100	200-1300	250-1500	300-1700
350	438		120-800	150-1000	180-1400	200-1600	250-1800	300-2100	400-2400
400	489		170-1200	250-1500	350-1800	360-2100	400-2300	450-2600	500-3000
450	539		230-1600	300-2000	400-2500	500-2800	550-3000	600-3500	650-4000
500	594		350-2000	400-2500	500-3100	600-3500	650-3800	700-4400	800-5000
600	695		550-3000	600-3600	700-4200	800-4800	900-5200	1000-6000	1100-7000
700	810		800-3800	800-4600		1000-6000		1100-7500	1500-9000
800	917		1000-5000	1000-6200	1300-7500	1400-8200	1500-9000		2000-12000
900	1017		1000-6800	1500-8200	1600-10000		2200-12500		3000-16000
1000	1124		1400-8600	2000-10500	2500-12500		3000-16000		3500-20000
Max. fluid speed m/s			2	3,3	4	5	5,5	6	7

(1) Minimum differential pressure for model PR25: 5000 mmH_2O
For an accurate calculation of the orifice it is necessary to provide the exact inner pipe diameter
* Differential pressure 14000 mmH_2O approx.

Models PRC61 ... 31

The PRC models are compact orifice plate flowmeters. The orifice plate and its carrier assembly are mounted together with the by-pass flowmeter. These flowmeters are delivered already assembled in the position required by the end user, according to the drawings at page 69. This set includes two isolation valves which allow removing the glass tube for maintenance purposes or for replacing under pressure.

Technical data

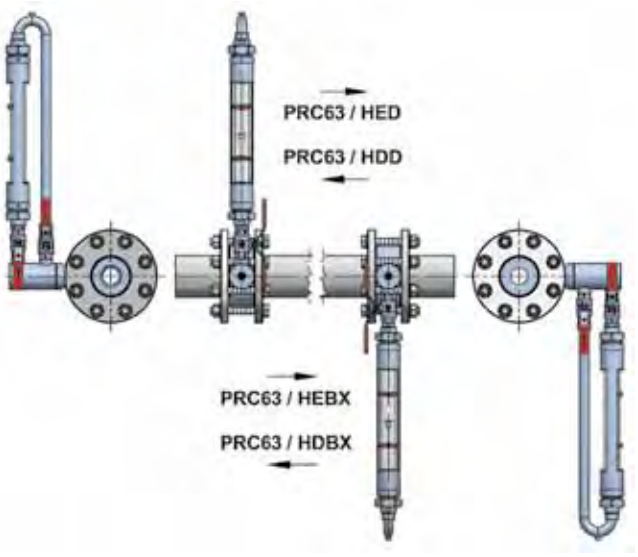
- **Accuracy:** ±4% full scale
- **Direct scales in engineering units or in %**
- **Minimum straight pipe run required of 10 x DN and 7 x DN before and after** the orifice plate
- **Scale range:** 7:1
- **Fluid temperature:**
  - PRC61: -20ºC ... 80ºC
  - PRC31: 0ºC ... 60ºC
- **Working pressure:** 15 bar max.
- **Connections:** direct mounting in main pipe. Orifice plates DN50 ... DN1000
- **Mounting in both vertical and horizontal pipes**

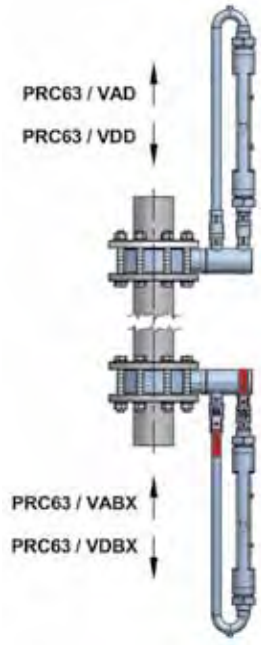
Limit switches and transmitters

- **PT-AMR1 ... 2:** 1 or 2 adjustable reed switches
- **PT-TMUR:** 4-20 mA output transmitter (only for PRC31)

Models PRC31/PVC and PRC61/FULLY SS

Mounting





Model	Pipe	Flow direction	By-pass
HED	Horizontal	ED	Above
HDD		DES	
HEBX		ED	Below
HDBX		DES	
VDD	Vertical	DAB	Above
VAD		BD	
VDBX		DAB	Below
VABX		BD	

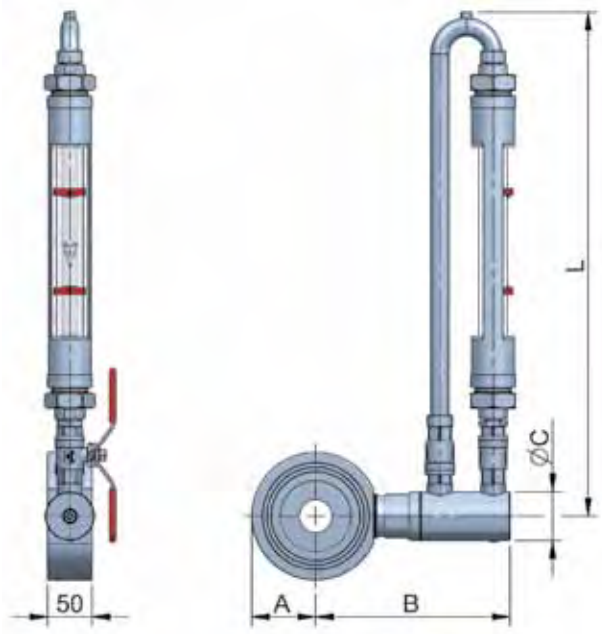
ED: flow from left to right
DES: flow from right to left
DAB: downwards flow
BD: upwards flow

Materials

Please refer to chart page 67

Dimensions

DN	A	B	PRC61		PRC31	
			ØC	L	ØC	L
50	54	201				
65	64	212				
80	72	219				
100	81	229				
125	96	246				
150	109	260				
200	137	288	55	570	90	545
250	165	315				
300	189	341				
350	219	371				
400	245	396				
450	270	422				
500	297	448				



Flow ranges

Please refer to chart page 68

Limit switches

Adjustable limit switch PT-AMR
Available for PR61 ... 62 ... 31 / PRC61 ... 31

Bi-stable SPST reed switch, actuated by a magnet inside the float and mounted in a PVC enclosure. Requires AISI 304 frame.

- PT-AMR1 ... 2: 1 ... 2 adjustable reed switches
- Contact rating: 0.5 A / 250 VAC / 12 VA
- Hysteresis: ±5% of full scale value
- Ambient temperature: -15ºC ... +60ºC
- DIN 43650-A connector, PG9 cable gland
- Suitable for hazardous area, considered as "Simple apparatus"

Adjustable limit switch SC-AMM
Available for PR25

Electrical micro-switch mounted in the indicator housing.

- SC-AMM1 … 2: 1 … 2 adjustable limit switches
- Ratings: 3(1) A, 250 V (VDE/CEE)
- Hysteresis: ±10% of full scale value
- Ambient temperature: -25ºC ... +80ºC
- Mechanical life: 10^7 operations
- ATEX certificate Ex ia IIC T6

Gold plated contacts on request.

Adjustable limit switch SC-AMD
Available for PR25

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

- SC-AMD1 … 2: 1 … 2 adjustable limit switches
- Power supply: 8 VDC
- Ambient temperature: -25ºC ... +70ºC
- ATEX certificate Ex ia IIC T6

Control relay on request

Transmitters and totalizers

Transmitter PT-TMUR
Available for PR31 / PRC31

Technical data available at series PT/PS datasheet

Transmitter TH7
Available for PR25

The TH7 electronic transmitters provide an analog output proportional to the flow rate and a digital output selectable either as a pulse or an alarm output (except for the Ex versions). They can also include a display for volume totalization. They are based on the Hall effect and mounted inside the indicator housing.

- **TH7** transmitter
- **TH7H** transmitter + HART protocol
- **TH7T** transmitter + totalizer
- **TH7TH** transmitter + totalizer + HART protocol

Technical data

- Power supply: 12 … 36 VDC, 2-wire system
- 4-20 mA analog output
- Digital output: for pulse or alarma output
- Totalizer: 8 digits, 4.5 mm high
- Ambient temperature: -5ºC ... +70ºC

ATEX version (Ex ia IIC T4 or T6)

Technical data

- ATEX certificate Ex II 1 GD
- Power supply: 14 … 30 VDC, 2-wire system
- 4-20 mA analog output:
- Totalizer: 8 digits, 4.5 mm high
- Ambient temperature: -5ºC ... +40ºC

R-CT-PR Rev. 1 english version

1.3
TARGET DISK

1.3
TARGET DISK

DP

TecFluid
The art of measuring

Target disk flowmeters

Series DP

Metallic flowmeter for liquids and gases

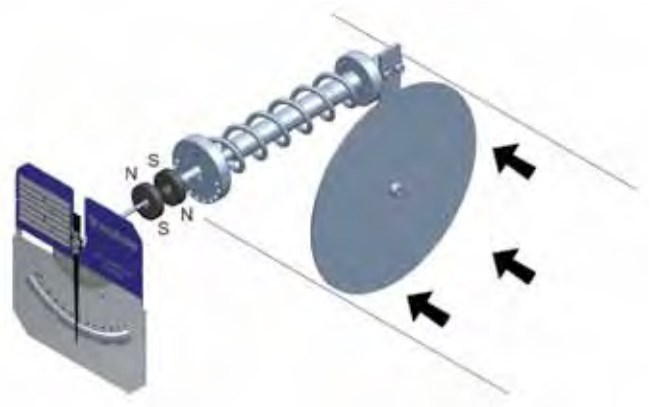
- Metallic, simple and robust construction
- Available for all flow directions
- Suitable for extreme pressure and temperature conditions
- Low pressure drop
- Straight pipe run requirement of only 3 x DN before and after the flowmeter
- Provides a good measurement for fluids containing suspended solids
- Flow rate:
  - Water: 0.8 m³/h ... 1600 m³/h
  - Air: 45 Nm³/h ... 24000 Nm³/h
- Accuracy: ±2.5% f.s. (±1.6% f.s. on request)
- Connections:
  - DP65: DN40 ... DN300, between flanges (wafer)
  - DP500: DN250 ... DN500, with EN 1092-1 flanges

  Other flange standards on request
- Materials: EN 1.4404 (AISI 316L), plastic coated steel
- Local indication
- Options:
  - 1 or 2 limit switches
  - Electronic transmitter with 4-20 mA analog output for safe or hazardous area (Ex ia IIC T4 or T6 protection, ATEX certified). HART protocol available on request
  - Local volume totalizer. Remote volume totalizer by means of pulse output (not available for Ex transmitters)

Working principle

A target disk flowmeter is based on the indirect measurement of the force which is exerted on a disk suspended in the trajectory where a fluid flows at a certain speed.

The disk is held by a shaft which is perpendicular to the fluid direction, so that the force applied by it affects the shaft rotation. At the same time, a spring attached to the shaft is opposed to its turn. When the force applied on the spring is equal to the force exerted by the fluid, an equilibrium point of the turn angle of the disk, which is equivalent to a flow rate, is achieved.



The flow reading is made by means of magnetic coupling with the housing indication system, thus avoiding fluid leakage to it.

Applications

- Water treatment & distribution
- Pharmaceutical, chemical and paper industry
- Heating and cooling circuits
- Swimming pools
- Fire protection systems
- Automotive industry (cutting oil, paint lines and refrigeration systems)
- Power plants and lubrication oil circuits

Models

- DP65 mounting between flanges (wafer)
- DP500 mounting with flanged connection

- DP65 ... DP500/Fe R body in plastic coated steel
- DP65 ... DP500/Fe body in steel
- DP65 ... DP500/INOX body in EN 1.4404 (AISI 316L)

Technical data

- Accuracy:
  - DP65: ± 2.5% full scale
    ± 1.6% full scale on request
  - DP500: ± 4% full scale
- Direct scales in engineering units or in %
- Straight pipe run required of 3 x DN before and after the flowmeter
- Fluid temperature:
  - Body in plastic coated steel: -20ºC ... +130ºC
  - Body in EN 1.4404 (AISI 316L) PTFE bearings: -20ºC ... +150ºC
  - Body in EN 1.4404 (AISI 316L) Bronze bearings: -20ºC ... +300ºC

  For higher temperatures, see thermal separator p. 77
- Ambient temperature: -20ºC ... +80ºC
- Working pressure:
  - DP65:
    - DN40 ... DN80: PN40
    - DN100 ... DN300: PN16
  - DP500:
    - DN250 ... DN500: PN10

  Other pressure ratings available on request
- Connections:
  - DP65: DN40 ... DN300, mounting between flanges Counterflanges and gaskets not supplied
  - DP500: DN250 ... DN500, with EN 1092-1 flanges

  Other flange standards on request
- Mounting length:

- DP65:	DN40 ... DN300:	65 mm
- DP500:	DN250 ... DN300:	500 mm
	DN350 ... DN400:	600 mm
	DN500:	700 mm

- Housing: IP65 - coated aluminium (IP65 - PP or IP67 - EN 1.4404 (AISI 316L) with glass window, on request)

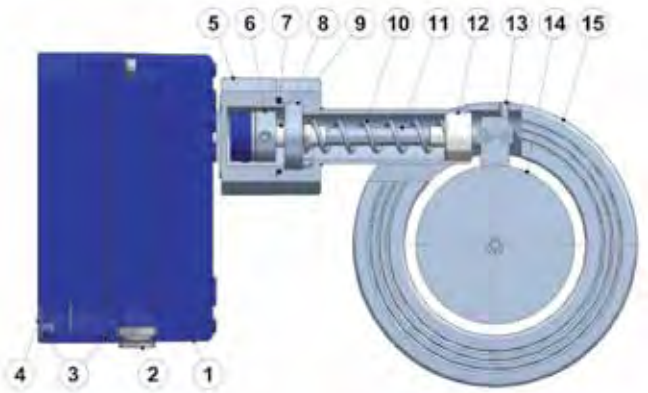
Operation

- Vertical with upwards flow (BD)
- Vertical with downwards flow (DAB)
- Horizontal with left to right flow (ED)
- Horizontal with right to left flow (DES)

Limit switches and transmitters

- DP-AMM1 ... 2: 1 or 2 adjustable micro-switches
- DP-AMD1 ... 2: 1 or 2 adjustable inductive detectors (+ relays on request)
- TH7 ... TH7H: 4-20 mA transmitter 2 wires + pulse output. HART protocol with model TH7H
- TH7T ... TH7TH: 4-20 mA transmitter + totalizer 2 wires + pulse output. HART protocol with model TH7TH
- TH7 Ex ... TH7H Ex: 4-20 mA transmitter 2 wires Ex ia IIC T4 or T6 (ATEX). HART protocol with model TH7H Ex
- TH7T Ex ... TH7TH Ex: 4-20 mA transmitter + totalizer 2 wires Ex ia IIC T4 or T6 (ATEX). HART protocol with model TH7TH Ex

Materials

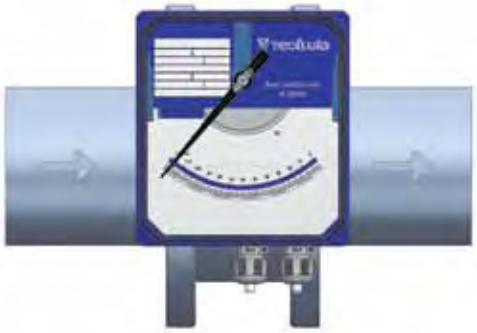


N°	Description	Materials	
		DP65 Fe R DP500 Fe R	DP65 INOX DP500 INOX
1	Scale plate	Coated aluminium	
2	Plug/gland M16 + gasket	Polyamide + NBR	
3	Gasket	NBR	
4	Window	Polycarbonate *	
5	Closing disk	EN 1.4404 (AISI 316L)	
6	Magnet group	EN 1.4404 (AISI 316L) + Alnico (coated)	
7	Gasket	NBR	
8	Bearing	PTFE / Bronze	
9	Shaft support disk	EN 1.4401 (AISI 316)	
10	Spring	EN 1.4310 (AISI 304)	
11	Shaft	EN 1.4401 (AISI 316)	
12	Bearing	PTFE / Bronze	
13	Disk stop	EN 1.4404 (AISI 316L)	
14	Disk	EN 1.4404 (AISI 316L)	
15	Body	Polyamide coated steel	EN 1.4404 (AISI 316L)

* UV resistant

Mounting

Flow direction



ED

DES

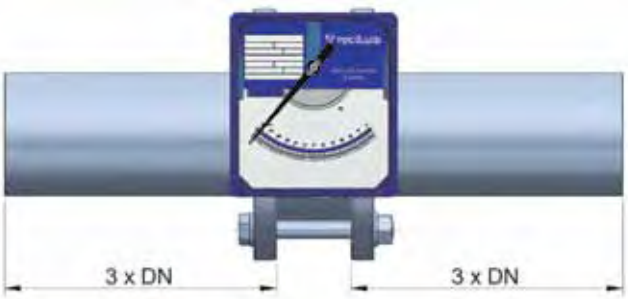
DAB

BD

Mounting

Straight pipe run requirement

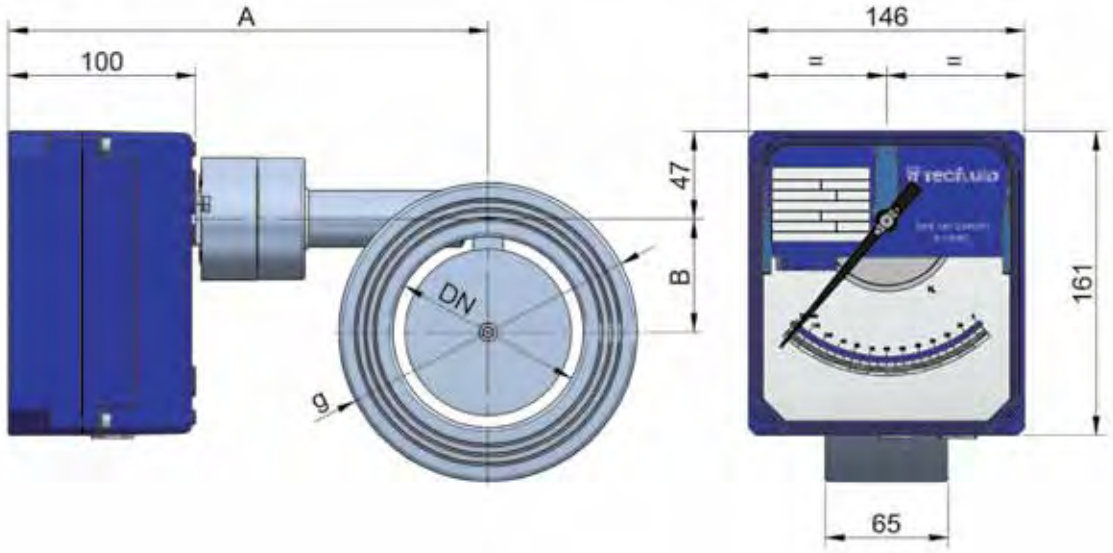
DP65



DP500

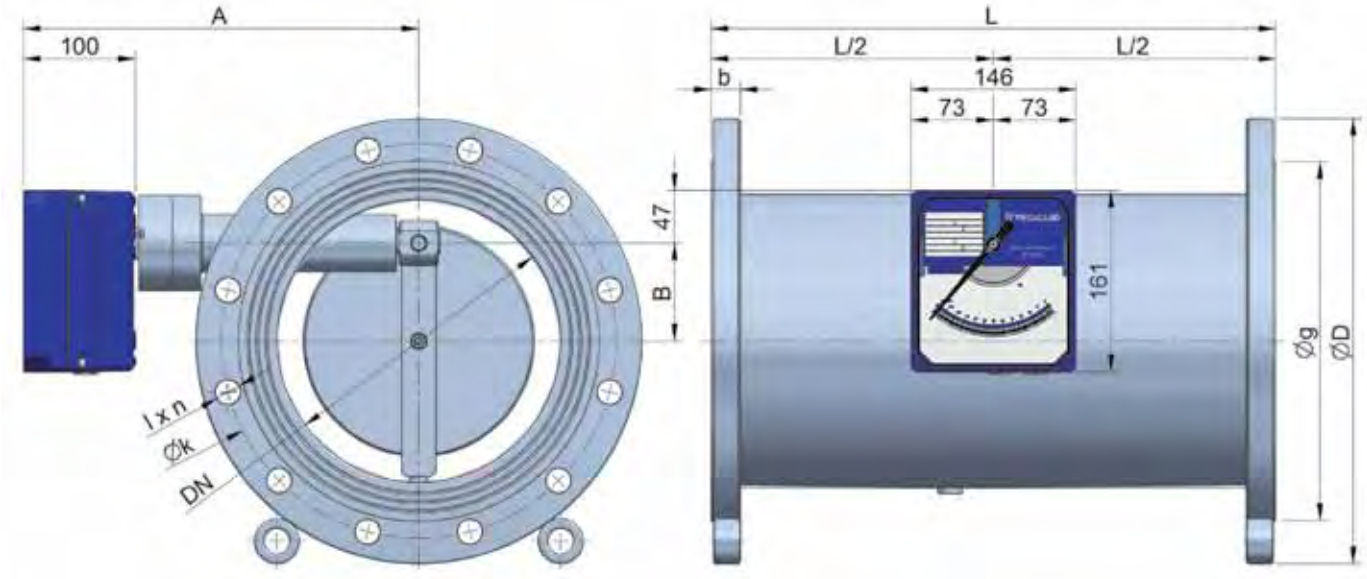
Dimensions

Model DP65 (DN40 ... DN300)



For dimensions g, B y A, please refer to page 77

Model DP500 (DN250 ... DN500)



For dimensions L, A, B, Ø D, Ø k, Ø g, b y l x n, please refer to page 77

Flow ranges

Model DP65 (DN40 ... DN300)

DN	Flow scales m³/h water						Weights and dimensions g	B	A	Weight (kg)
40	0.8-4	0.8-6	1-8	2-10	3-16	-	88	28	250	5
50	0.8-6	1-8	2-10	3-16	3-25	-	102	33	250	6
65	2-10	3-16	3-25	4-30	5-35	6-40	122	40	250	7
80	2-16	3-25	5-40	6-45	8-50	10-60	138	50	250	8
100	5-40	8-60	10-80	12-90	15-100	-	158	60	250	10
125	8-60	15-100	15-120	20-135	-	-	188	70	280	12
150	15-100	20-160	25-200	40-220	50-250	-	212	78	280	14
200	20-160	30-250	40-350	50-400	-	-	268	90	320	20
250	25-200	50-400	60-500	80-600	-	-	320	102	350	29
300	30-250	50-400	80-600	100-800	-	-	370	115	370	35

Equivalent scales for Air @ 1.013 bar abs, 20ºC in Nm³/h = m³/h H_2O x 30 (approx.)

Model DP500 (DN250 ... DN500)

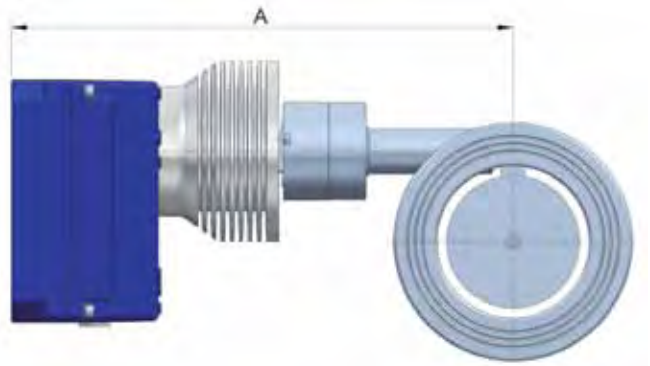
DN	Flow scales m³/h water			Weights and dimensions L	A	B	Ø D	Ø k	Ø g	b	l x n	Weight (kg)
250	25-200	50-400	60-500	500	330	90	395	350	320	26	23 x 12	70
300	30-250	50-400	80-600	500	330	115	445	400	370	26	23 x 12	78
350	40-300	60-500	100-800	600	350	124	505	460	430	26	23 x 16	86
400	50-400	80-600	120-1000	600	350	142	565	515	482	26	27 x 16	97
500	80-600	120-1000	200-1600	700	430	160	670	620	585	28	27 x 20	115

Equivalent scales for Air @ 1.013 bar abs, 20ºC in Nm³/h = m³/h H_2O x 30 (approx.)

Accessories

Thermal separator

- Standard in aluminium, optional in EN 1.4404 (AISI 316L)
- For working with fluids at high and low temperatures
- Body in steel and EN 1.4404 (AISI 316L):
  - With electronics: DN40 ... DN100: +400ºC
    DN125 ... DN150: +320ºC
    DN200 ... DN300: +280ºC
    DN350 ... DN500: +250ºC
  - Without electronics: DN40 ... DN500: +400ºC
- Reference ambient temperature: 20ºC

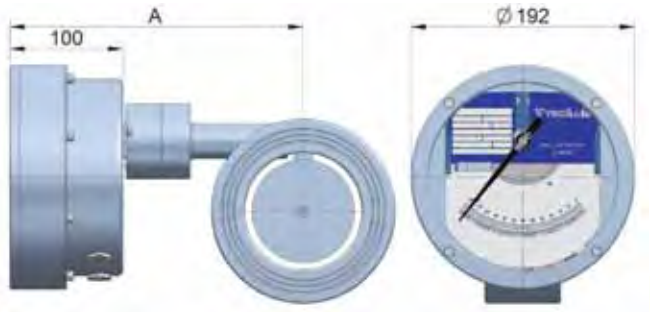


	DN	40 ... 100	125	150	200	250	300	350	400	500
DP65	A	325	355	355	395	425	443			
DP500						405	405	425	425	505

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 TH transmitters
- Ingress protection: IP67

A distance is the same as for standard aluminium housing



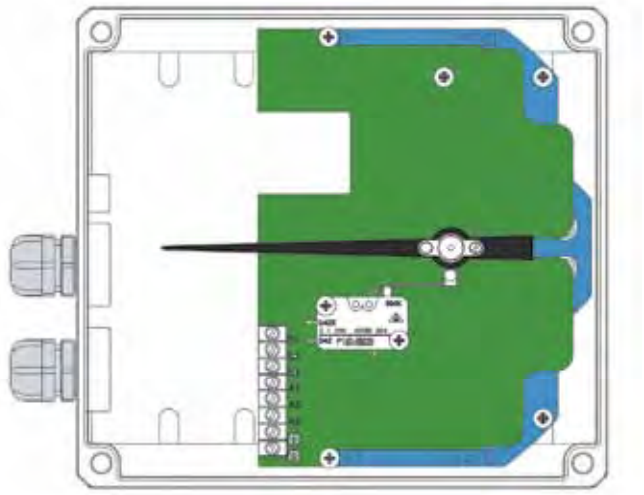
Limit switches

Adjustable limit switch DP-AMM

Electrical micro-switch mounted in the indicator housing.

- DP-AMM1 … 2: 1 … 2 adjustable limit switches
- Ratings: 3(1) A, 250 V (VDE/CEE)
- Hysteresis: ±10% of full scale value
- Ambient temperature: -25ºC ... +80ºC
- Mechanical life: 10^7 operations
- ATEX certificate Ex ia IIC T6

Gold plated contacts on request.



DP-AMM

Adjustable limit switch DP-AMD

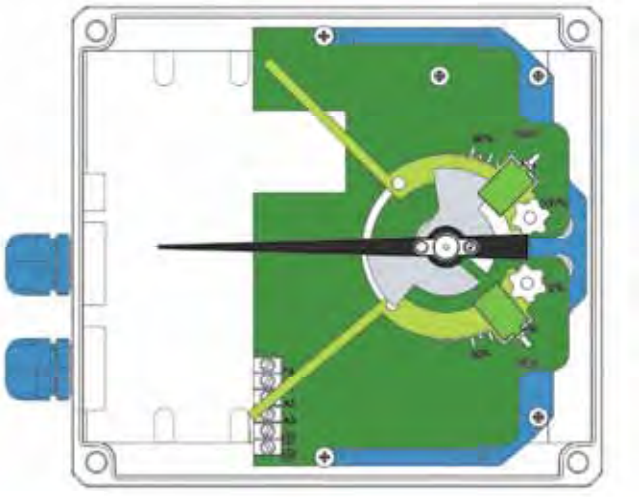
NAMUR (EN 60947-5-6) 3.5 mm slot type inductive detector activated by vane, mounted in the indicator housing.

- DP-AMD1 … 2: 1 … 2 adjustable limit switches
- Power supply: 8 VDC
- Ambient temperature: -25ºC ... +70ºC
- ATEX certificate Ex ia IIC T6

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: -20ºC ... +60ºC



DP-AMD

Modular housing

Transmitters and totalizers

Transmitter TH7

The TH7 electronic transmitters provide an analog output proportional to the flow rate and a digital output selectable either as a pulse or an alarm output (except for the Ex versions). They can also include a display for volume totalization. They are based on the Hall effect and mounted inside the indicator housing.

- **TH7** transmitter
- **TH7H** transmitter + HART protocol
- **TH7T** transmitter + totalizer
- **TH7TH** transmitter + totalizer + HART protocol

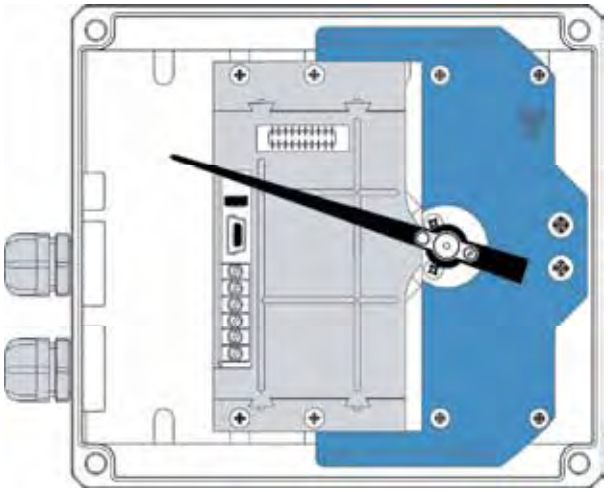
Technical data

- Power supply: 12 … 36 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: 1.1 kΩ (with 36 VDC power supply)
- Digital output: Potential free N channel MOSFET, $I_{max.}$ 200 mA, for either pulse or alarm output:
  - Pulse output:
    - Max. frequency 6 Hz
    - Pulse duration approx. 62.5 ms
  - Alarm output, adjustable in one point of the scale. Programmable by means of Winsmeter TH7 software
- Totalizer: 8 digits, 4.5 mm high
  Reset by potential free contact
- Ambient temperature: -5ºC ... +70ºC

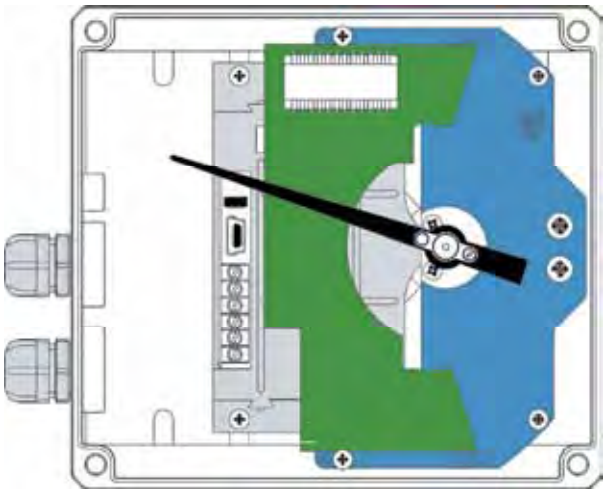
ATEX version (Ex ia IIC T4 or T6)

Technical data

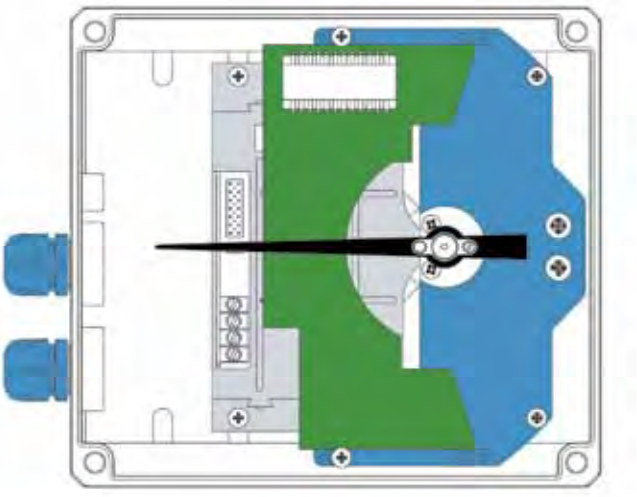
- ATEX certificate Ex II 1 GD
- Power supply: 14 … 30 VDC, 2-wire system
- Power consumption: 4-20 mA for 0 … 100% of scale
- 4-20 mA analog output:
  - Error: <0.6% of the magnet position
  - Maximum load in 4-20 mA loop: 900 Ω (with 30 VDC power supply)
- Totalizer: 8 digits, 4.5 mm high
  Reset by potential free contact
- Ambient temperature: -5ºC ... +40ºC



TH7



TH7T



TH7T Ex

Both limit switches AMM or AMD and electronic transmitters TH7 or TH7T can be mounted together in the same housing.

The TH7 Ex and TH7T Ex transmitters belong to group II. They are intended for use in potentially explosive atmospheres, except in mining

1.4
SWITCHES

1.4 SWITCHES

AD / VH

Flow switches
Series AD/VH

Flow switch and indicator for liquids and gases

- Suitable for clear, opaque or turbid liquids (series AD & VH), and for gases (series AD)
- Flow switching by means of magnetic coupling, watertight, no contact between process fluid and switching, indicator or transmitter systems
- Suitable for installation in horizontal or vertical pipes
- Robust construction
- Scales available for H_2O, air, oil, etc. (series AD)
- Flow rate (for liquids):
  - Series AD: 0.25 ... 270 l/min
  - Series VH: 2 ... 120 m^3/h
- Accuracy for series AD: ±5% f.s.
- Connections:
  - Series AD: ¼" ... 2 ½" BSP / NPT
  - Series VH: G1 / 1" NPT, to be inserted on a DN32 ... DN500 pipe
- Materials:
  - Series AD: EN 1.4404 (AISI 316L), aluminium, brass
  - Series VH: EN 1.4404 (AISI 316L), PTFE
- Flow switching:
  - 1 reed switch (series AD & VH)
  - 2 reed switches (only series AD)
  - 1 or 2 inductive switches (only series AD)

  All switches for series AD are ATEX Ex ia IIC T4...T6 Ga / Ex ia IIIC T85ºC Da certified
- Options for model ADI15:
  - Local flow indication
  - 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

Series AD
Working principle

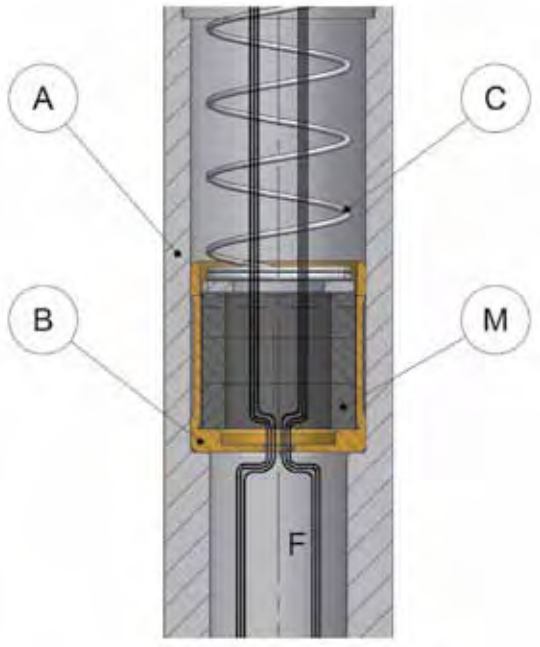
A spring **M** keeps a disk **B** in zero flow rate position. When the fluid flows through the disk at a specific speed, a force is made on the disk **B**, moving it to an equilibrium position.

The distance covered by **B** depends on:

- The force of the fluid flow **F**.
- The relationship between areas **A** & **B**.
- The force in opposition of the spring **C**.

The equilibrium between forces **F** and the one generated by **C** defines the position of the disk **B**, equivalent to flow rate.

The disk **B**, which contains a magnet **M**, acts over the switches and/or the local indicator.



Applications

- **Machine or processes cooling**
- **Hydraulic and lubrication circuits**
- **Thermal oil circuits**
- **Gas flow control**
- **Mechanical fasteners cooling control**

Models

- **AD15** with one or two reed switches
- **ADI15** local flow indication optionally with:
  - one or two reed switches
  - one or two inductive switches
  - 4-20 mA transmitter

Technical data

- **Accuracy:** ±5% full scale
- **Scale range:** according to flow rate chart on page 86
- **Scales in l/h, l/min, l/s, m³/h, %, etc.**
- **Connections:** ¼" ... 2 ½" BSP / NPT
- **Materials:**
  - Brass from ¼" to 2"
  - Aluminium from 1 ¼" to 2 ½"
  - EN 1.4404 (AISI 316L) on request
- **Fluid temperature:** -20ºC ... +100ºC (max. allowable 120ºC)
- **Working pressure:** PN16 (others on request)
- **Vertical or horizontal mounting**, as per customer´s request
- **Ex ia IIC T4...T6 Ga / Ex ia IIIC T85ºC Da ATEX certificate**

Operation

- **Vertical upwards flow (BD)**
- **Vertical downwards flow (DAB)**
- **Horizontal flow from left to right (ED)**
- **Horizontal flow from right to left (DES)**

Limit switches and transmitters

- **Reed switches:** SPDT potential free. Polyamide housing and IP65 connector
  - /1A = 1 reed switch
  - /2A = 2 reed switches

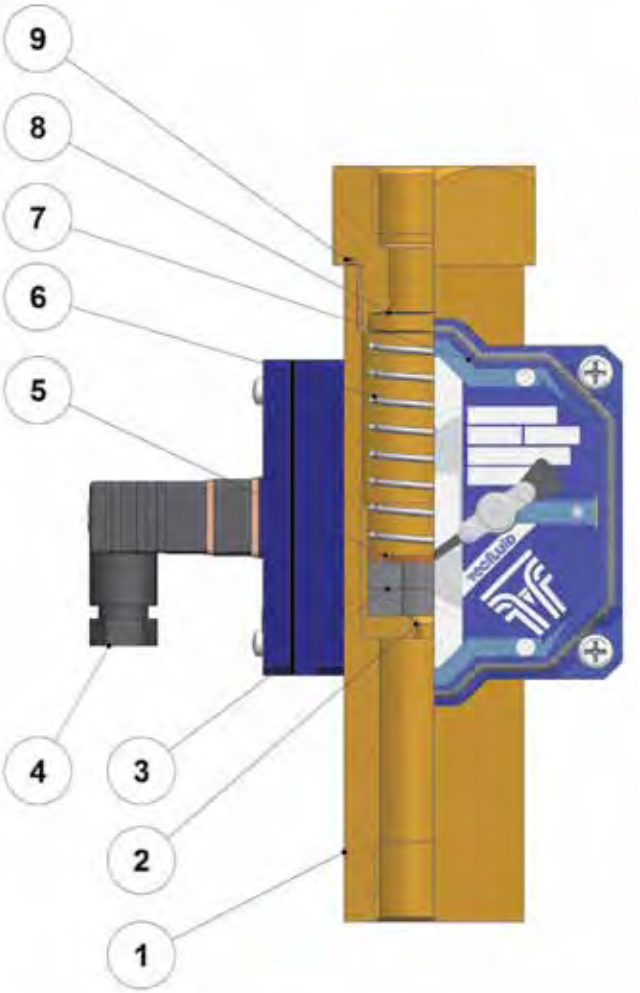
  Reed switch technical data:
  - **ADR01:** for sizes ¼" & ½": 0,25 A 175 VDC 5 W
  - **ADR11:** for sizes ¾" to 2½": 1 A 250 V 60 VA
- **M1-AMD1 ... 2:** 1 ... 2 adjustable inductive switches (+ relays on request)
- **TH6 ... TH6H:** 4-20 mA 2-wire transmitter HART protocol for model TH6H

All switches and transmitters are ATEX available Ex ia IIC T4...T6 Ga / Ex ia IIIC T85ºC Da version

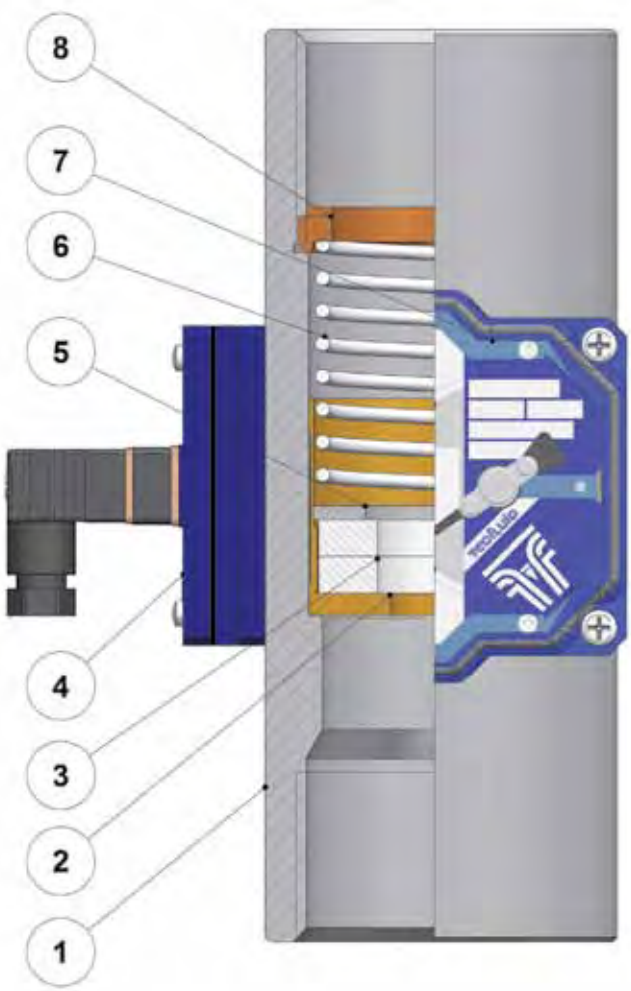
TH6 transmitter

Materials

¼" ... 1"



1 ¼" ... 2 ½"



N°	Description	Materials	
		¼" ... 1"	1 ¼" ... 2 ½"
1	Body	Brass / AISI 316L / Anodized aluminium *	
2	Disk		
3	Magnet	Ferrite **	
4	Switch	Polycarbonate - PVC - NBR	
5	Washer	AISI 316L	
6	Spring	AISI 302	
7	Housing	Polycarbonate - Coated aluminium	
8	Screw	AISI 316	
9	Gasket	NBR ***	— — —

* Materials available for each size:

¼" ... 1" : brass, AISI 316L

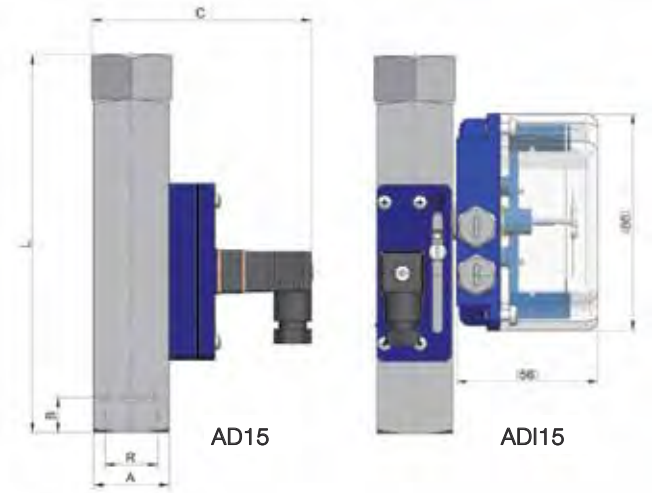
1 ¼" ... 2" : brass, AISI 316L, anodized aluminium

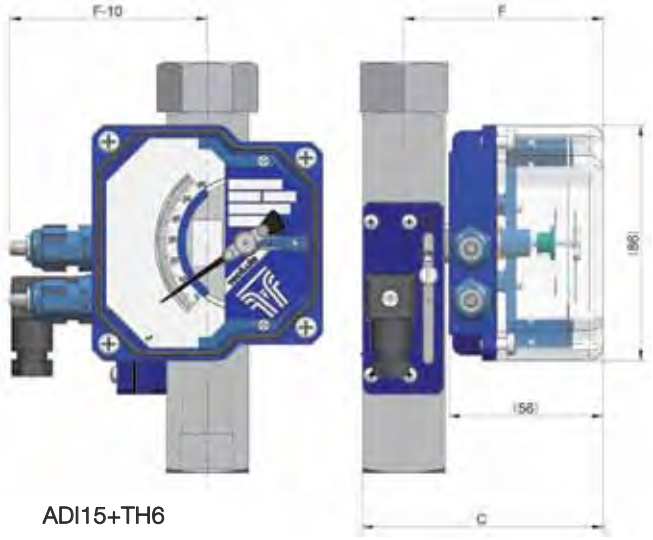
2 ½" : AISI 316L, anodized aluminium

** magnet with plastic coating for applications with corrosive liquids on request

*** other materials on request

Dimensions





R" (BSP / NPT)	A	B	C	F	L	Weight (kg)
¼"	□ 30	14	85	70	151	0.9
½"	□ 30	14	85	70	151	1.2
¾"	□ 40	15	95	75	169	1.6
1"	□ 40	15	95	75	169	1.8
1 ¼"	□ 50	27	105	80	160	2.4
1 ½"	□ 60	27	115	85	180	3
2"	Ø 80	37	134	96	200	3.2
2 ½"	Ø 100	37	147	97	200	3.6

All dimensions in mm

Flow ranges

R" (BSP / NPT)	Flow scales l/min water
¼"	0.25-1 0.5-2.5
½"	1-5 1.5-10 2-17
¾"	5-30 6-40
1"	10-50
1 ¼"	15-70
1 ½"	40-160
2"	70-220
2 ½"	100-270

* Equivalent flow ranges for air at 1 bar abs 20°C in Nl/min: l/min H_2O x 8 (approx.)

Mounting

Vertical upwards

Models AD15/BD
ADI15/BD

Vertical downwards

Models AD15/DAB
ADI15/DAB

Horizontal /
Left to right

Models AD15/ED
ADI15/ED

Horizontal /
Right to left

Models AD15/DES
ADI15/DES

Model AD15

- Flow switch with min-max flow rate reed switches.
- Vertical or horizontal mounting, as per customer´s request.
- Adjustable reed switch for the full flow scale, mounted in a polyamide housing, IP65 ingress protection.
- Flow scale in l/h, l/min, l/s, m^3/h, %, etc.

Model ADI15

- Local flow indicator, with optional min-max flow rate reed switches, adjustable for the full flow scale and mounted in an IP65 polyamide housing; and/or adjustable inductive switches, mounted in the indicator housing.
- Vertical or horizontal mounting, as per customer´s request.
- Aluminium indicator housing with polycarbonate cover, IP65 ingress protection, graduated scale in flow rate units, reading by means of indicating needle.
- Flow and reed switch scale in l/h, l/min, l/s, m^3/h, %, etc.

Model ADI15 + TH6

- Same characteristics as model ADI15, including electronic transmitter with 2-wire 4-20 mA output.

Limit switches and transmitters

Adjustable limit switch M1-AMD

Optional for model ADI15.

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

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: -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

Series VH
Working principle

A liquid flows inside a pipe fast enough to move a paddle, which at the same time moves a permanent magnet that acts over the reed switch. The magnet-reed switch system is isolated from the liquid.

The flow switching point is positioned between 30º and 45º from the zero position.

Applications

- **Hydraulic and heating-cooling circuits**
- **Chemical, petrochemical and pulp & paper industry**
- **Water treatment, power plants**
- **Swimming pools & fire protection systems**

Models

- **VH35 / SS ... PTFE** horizontal pipe
- **VH37 / SS BD** vertical pipe with upwards flow, with spring
- **VH39 / PTFE BD** vertical pipe with upwards flow, with magnetic spring

Technical data

- **Flow detection** by means of oscillating paddle
- **SPDT potential free reed switch**, mounted in the body, not wetted by the liquid
- **Connections:** G1 (1" NPT on request)
- **Materials:** EN 1.4404 (AISI 316L), PTFE
  Others on request
- **Fluid temperature:** -40ºC ... +125ºC (max. allowable 150ºC)
- **Working pressure:**
  - AISI 316L body: PN25 (others on request)
  - PTFE body: PN10
- **Mounting:** horizontal or vertical upwards pipe

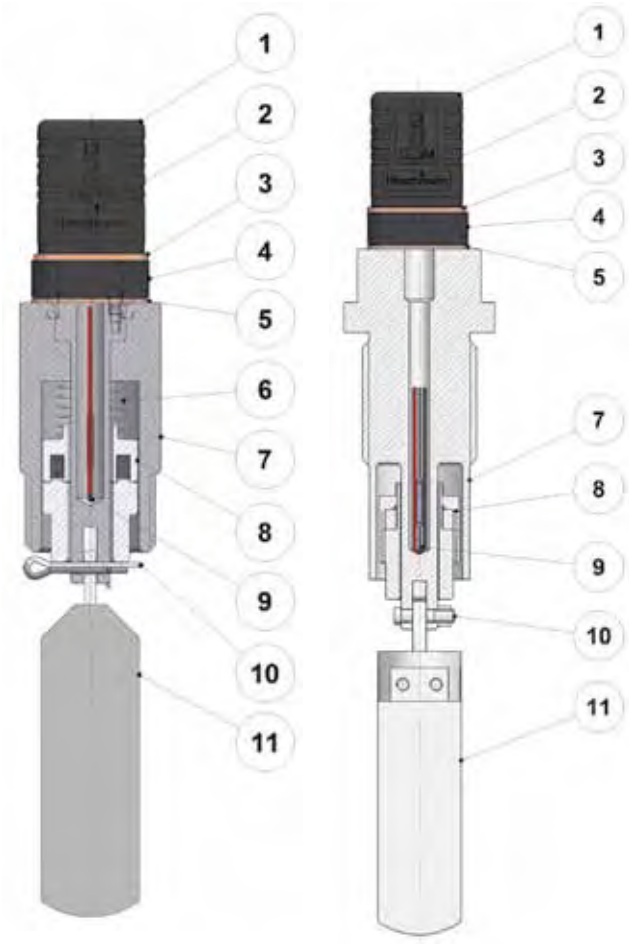
Operation

- **Vertical upwards flow (BD)**
- **Horizontal flow from left to right**
- **Horizontal flow from right to left**

Limit switches

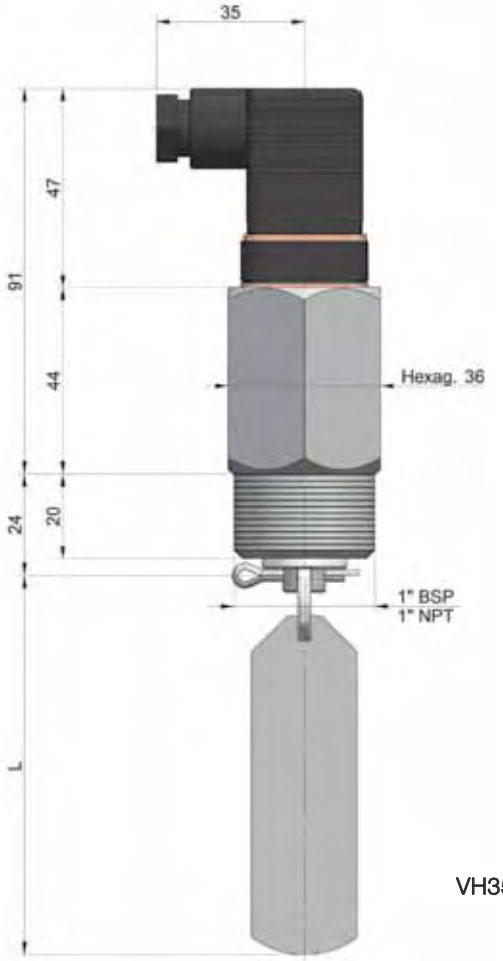
- **Reed switch:** potential free switch
  Contact rating:
  Maximum switching power: 5W
  Maximum switching voltage: 175 VDC
  Maximum switching current: 0.25 A
- Electrical connection: connector IP65 DIN 43 650-A
- Suitable for hazardous area, considered as "Simple apparatus"

Materials

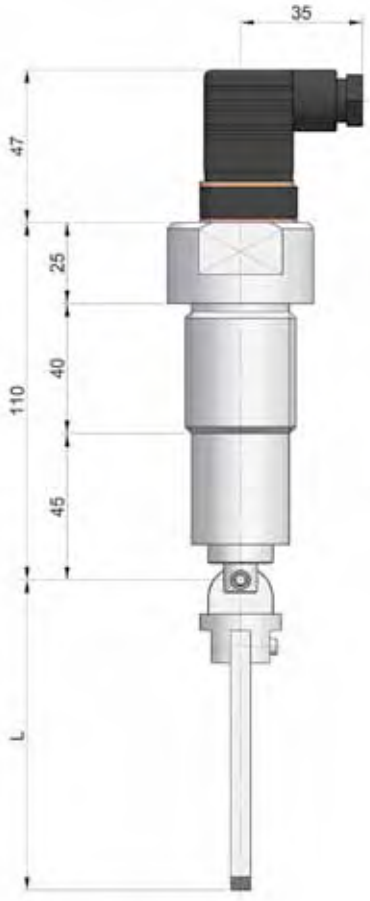


Nº	Description	Materials	
		VH / SS	VH / PTFE
1	Connector	Polyamide	
2	Screw	AISI 304	
3	Gasket	NBR	
4	Connector base	Polyamide	
5	Gasket	NBR	
6	Spring	AISI 304	— — —
7	Body	AISI 316L	PTFE
8	Magnet holder	PVDF	PTFE
9	Reed switch	Glass	
10	Pin	AISI 316	PTFE
11	Paddle	AISI 316L	PTFE

Dimensions



VH35 / SS



VH35 / PTFE

Switching flow rates

DN mm	DN inch	Switching flow rate [1] m³/h	L mm
32	1 ¼"	2	26
40	1 ½"	2.5	34
50	2"	3	40
65	2 ½"	4	55
80	3"	5	65
100	4"	10	90
125	5"	10	115
150	6"	12	140
200	8"	25	185
250	10"	30	230
300	12"	50	280
350	14"	60	330
400	16"	80	380
450	18"	100	415
500	20"	120	450

[1] Approximate flow rates

Mounting

Horizontal / left-right or right-left:
model VH35

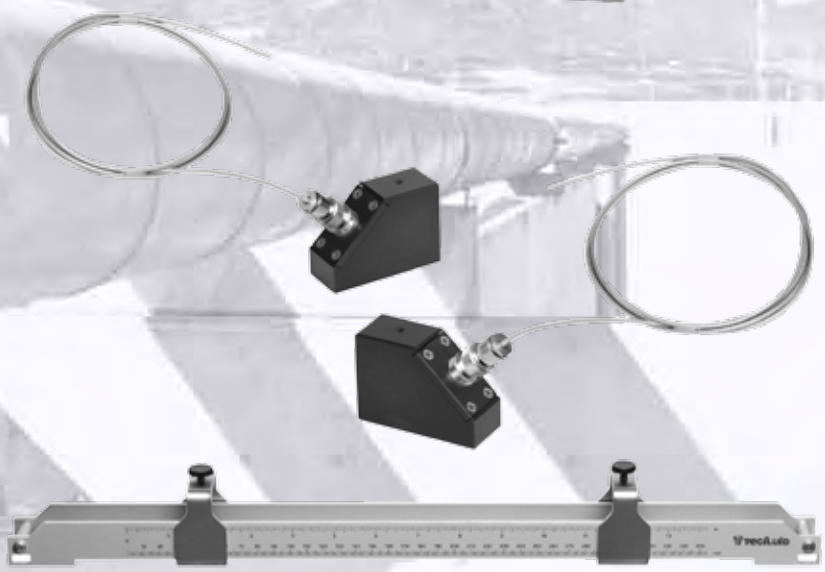
VH35 / SS

VH35 / PTFE

Vertical upwards:
model VH37 / 39 BD

VH37 / SS BD

VH39 / PTFE BD



1.5
ULTRASONIC

1.5 ULTRASONIC

CU

The art of measuring

Ultrasonic flowmeters
Series CU

Non-invasive CLAMP-ON flowmeter for liquids

- Model CU100: non-invasive installation flowmeter, with transducers installed outside the pipe
- Installation in horizontal or vertical pipe
- Easy and inexpensive installation, without interruption in the manufacturing process
- No pressure drop
- No risk of leakage
- No maintenance required
- Allows flow measurement in high pressure processes
- Graphic display with intuitive menus
- Possibility of programming by means of PC and software Winsmeter CU
- Flow speed range: 0.2 ... 12 m/s
- Accuracy: ±1.5% reading value ± 0.02 m/s
- Connections: external mounting in pipes of diameter between DN80 ... DN2000. Optional installation by means of guide or transducer straps
- Materials:
  - Transducers: Anodized aluminium
  - Electronic converter housing: ABS
  - Guide: Anodized aluminium
  - Transducer strap: EN 1.4301 (AISI 304)
- Electronic converter for remote mounting:
  - Power supply: 85 ... 265 VAC
  - Flow rate and speed indication
  - Programmable 4-20 mA output proportional to flow rate
  - Volume totalizer
  - 2 programmable relay outputs

Model CU100
Working principle

The flowmeter model CU100 is an electronic device based on the transmission of ultrasonic signals through a pipe where liquid flows. This working principle is called “transit time”.

Two ultrasonic transducers, acting alternately as transmitter-receiver and properly installed on a pipe, send an ultrasonic signal, first in one direction (A→B) , then in reverse (B→A).

A digital processor measures both transit times. When flow rate is zero, these times (A→B and B→A) are the same, but when there is a flow at a specific speed, the times for coming and going are different (A→B decreases, while B→A increases). The difference between these times is proportional to liquid speed inside the pipe.

An electronic circuit based on digital signal processing converts this difference in transit time into a flow rate value.

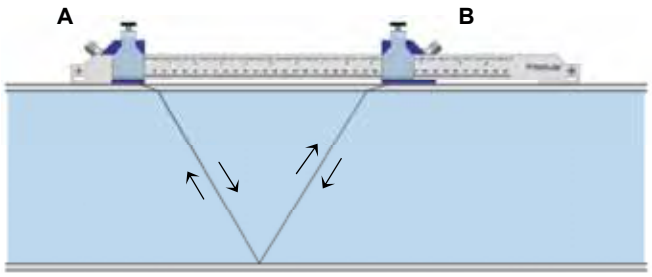


Fig. 1. V-type installation (DN ≤ DN350)

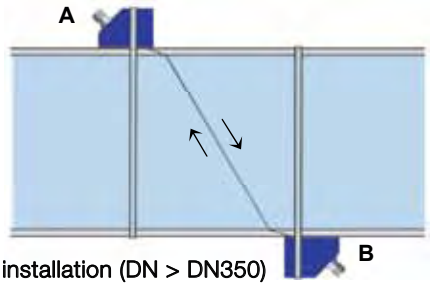


Fig. 2. Z-type installation (DN > DN350)

Applications

- Water treatment and distribution
- Food, pharmaceutical, chemical and paper industry
- Cooling-heating circuits
- Pools and irrigation systems
- Fire protection systems
- Automotive industry
- Power plants

Technical data

- **Accuracy:** ±1.5% reading value ± 0.02 m/s
- **Repeatability:** ±0.25% reading value ± 0.01 m/s
- **Flow rate indication in metric or imperial units**
- **Flow speed range:** 0.2 ... 12 m/s
- **Liquid density and viscosity:** no restrictions
- **Liquid temperature:** -20ºC ... +80ºC
  Others on request
- **Ambient temperature:** -20ºC ... +60ºC
- **Working pressure:** no restrictions
- **Connections:** external mounting on pipe. Optional installation by means of guide or transducer straps. Suitable for pipe size between DN80 ... DN2000
- **Electronic converter:**
  - Housing material: ABS
  - Dimensions: 229 x 203 x 62 mm
  - Ingress protection: IP65
  - Packing glands:
    - Power supply and outputs: 3 x M16x1.5 for cables with diameter between 3.5 and 10 mm
    - Transducers: 2 x PG7 for cables with diameter between 1.5 and 5 mm
  - Display: graphic, 128 x 64 points
  - Keyboard: 12 mechanical keys
  - Cable standard length 5 m for transducers-converter connection, supplied
    Maximum cable length 50 m on request
- **Transducers:**
  - Material: Anodized aluminium
  - Dimensions: 60 x 25 x 44 mm
  - Ingress protection: IP65
- **Installation system:**
  - Materials:
    - Guide: Anodized aluminium
    - Dimensions: 500 x 41 x 65 mm
    - Transducer strap: EN 1.4301 (AISI 304)
- **Power supply:** 85 ... 265 VAC 50 / 60 Hz
- **Power consumption:** ≤ 5 VA
- **Flow rate and speed indication:**
  - nº of digits: 5 (up to 2 configurable decimals)
  - Size of digit: 11 mm
- **Analog output:** 4-20 mA, active or passive.
  Power supply galvanically isolated
- **Relay outputs:** two change over contacts (SPDT).
  - Maximum voltage: 250 VAC
  - Maximum current: 8 A
  - Maximum power: 500 VA
- **Totalizer:**
  - nº of digits: 8 (2 decimals)
  - Size of digit: 8 mm
  - Reset: by means of keyboard
- **Associated software Winsmeter CU** available for download at www.tecfluid.com. USB connection for converter communication

Installation

For an accurate flow measurement, the ultrasonic flowmeter model CU100 requires a straight pipe run of minimum 5 x DN before and after the flowmeter. The required distance depends on the flow profile, which can be affected by the disturbing elements found in the installation before and after the transducers, as shown in the following chart:

Disturbing element	If the element is before the CU100	If the element is alter the CU100
Pump	50 x DN	———
Tee	50 x DN	10 x DN
Valve	40 x DN	10 x DN
Diffuser	30 x DN	5 x DN
Reducer	10 x DN	5 x DN
90º elbow	10 x DN	5 x DN
2 x 90º elbow in one plane	25 x DN	5 x DN
2 x 90º elbow in different planes	40 x DN	5 x DN

In horizontal pipes, it is recommended to install the transducers on the sides of the pipe, and not on the upper and lower sides (Fig. 3), in order to avoid air accumulations or solids sediments that might interfere in flow reading.

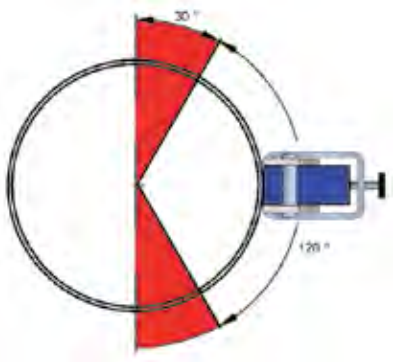


Fig. 3

The installation of the transducers is recommended to be made according to:

- Pipe DN80 ... DN350: by means of graduated guide and guide straps, supplied by Tecfluid (Fig. 4), V-type installation. Optional mounting by means of transducer straps (Fig. 5).

- Pipe DN400 ... DN2000: by means of transducer straps, supplied by Tecfluid (Fig. 5), Z-type installation. For these pipe sizes, the transducers must be installed opposite each other and the guide is not available.

Once the installation parameters have been programmed (pipe material, diameter and thickness, working liquid,...), the converter calculates the distance that must be kept between both transducers. The installation type according to pipe size might change depending on the characteristics of the pipe (material, thickness,…) and the working fluid.

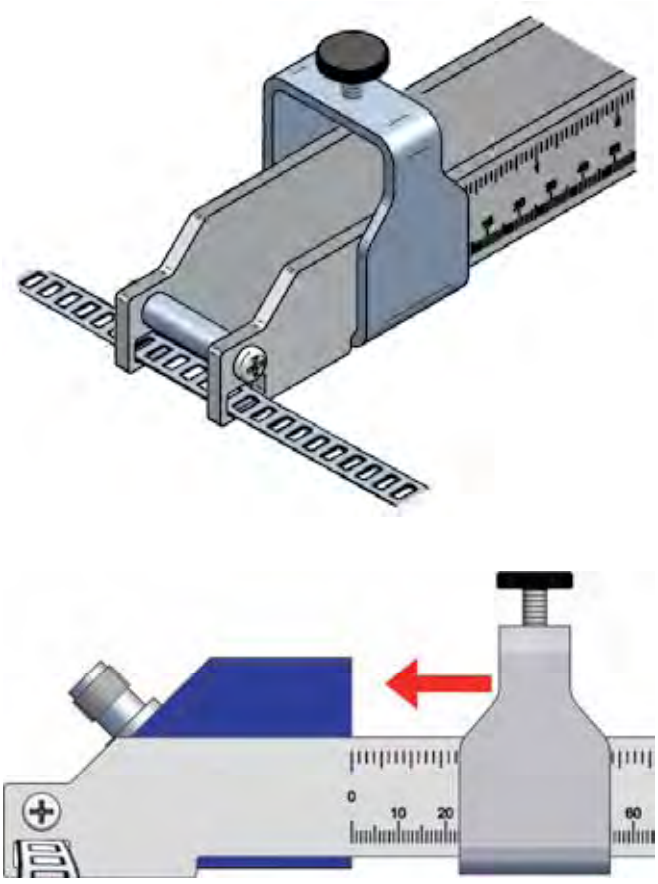


Fig. 4. Guide and guide strap
DN80 ... DN350

Fig. 5. Transducer strap
DN80 ... DN2000

Dimensions

Fig. 6. Transducers

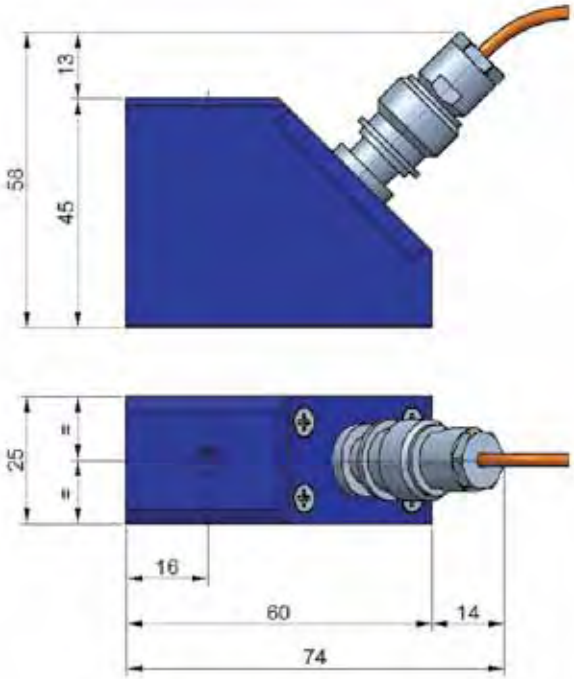
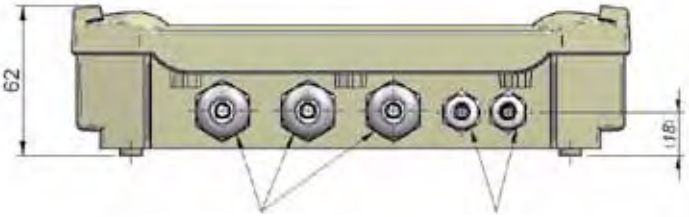


Fig. 7. Converter CU100



Packing glands M16
(plugging Ø3.5-10)

Packing glands PG7
(plugging Ø1-5)

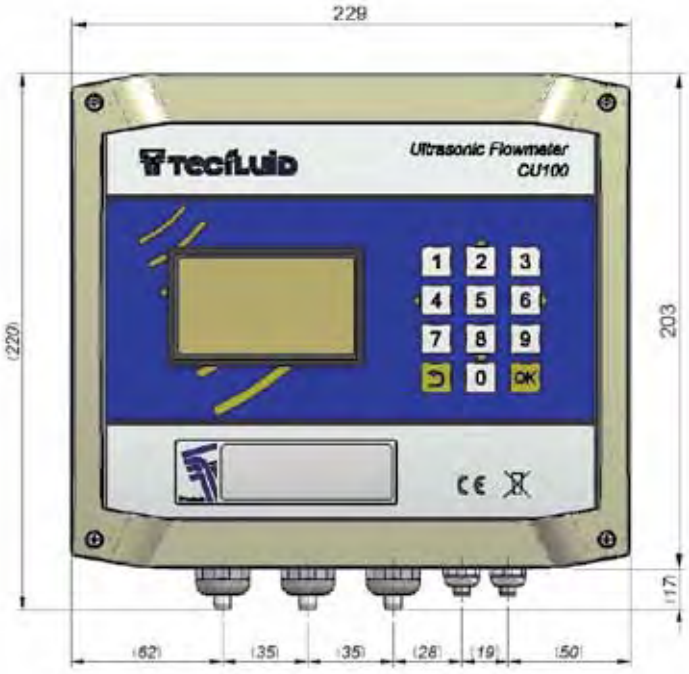
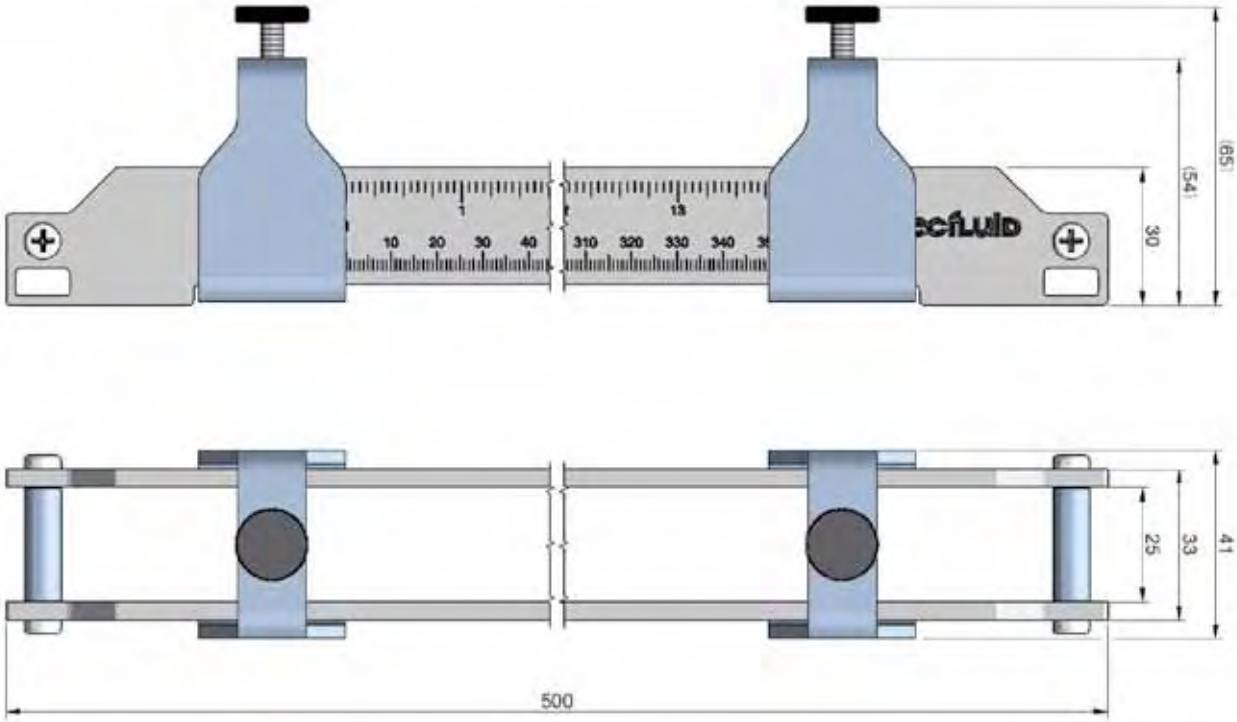
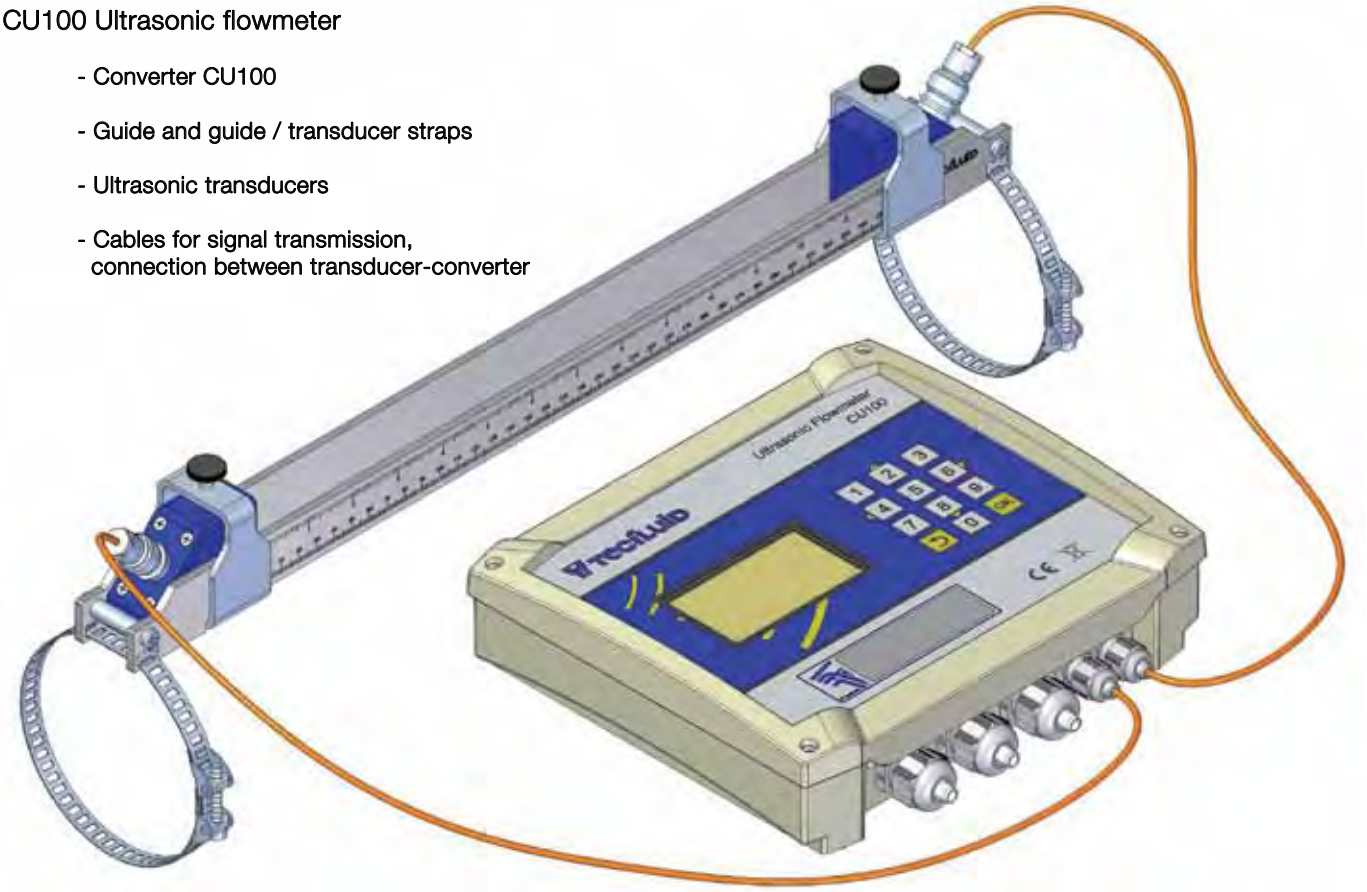


Fig. 8. Guide (DN80 ... DN350)



CU100 Ultrasonic flowmeter

- Converter CU100
- Guide and guide / transducer straps
- Ultrasonic transducers
- Cables for signal transmission, connection between transducer-converter



Programming by means of software

The flowmeter model CU100 can be fully programmed by means of a PC and the software Winsmeter CU.

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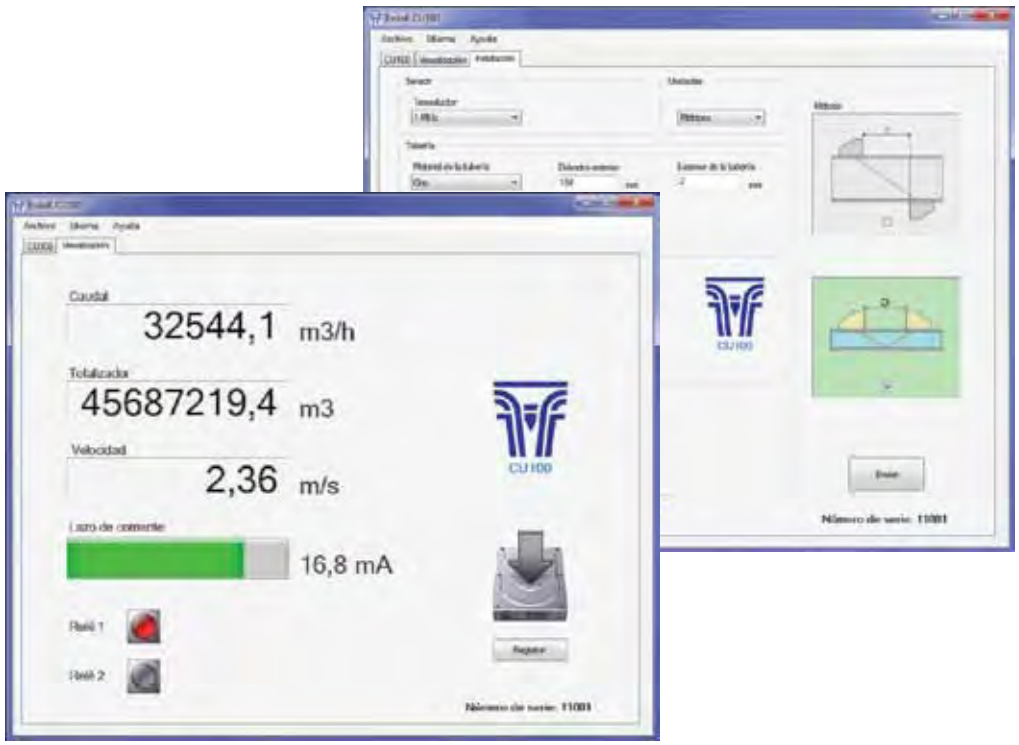
The connection between PC and converter is easily done by means of a USB cable (not supplied).



1.6
ELECTROMAGNETIC

1.6 ELECTROMAGNETIC

FLOMID
FLOMAT

Electromagnetic flowmeters
Series FLOMID

Electromagnetic flowmeter for conductive liquids

- Flow rate measurement is independent of density, temperature, viscosity and pressure
- Pulsed coil excitation to obtain a minimum zero drift
- No moving parts involve low maintenance, low pressure drop and allows the pass of solids
- Can be mounted in any position (full pipe required)
- Can be installed with short straight pipe sections of minimum 5 x DN before and 3 x DN after the flowmeter
- Good chemical resistance
- Flow rate: 10 l/h ... 14100 m^3/h
- Accuracy: ±0.5% reading value
- Minimum electric conductivity: 20 µS/cm
- Connections:
  - Between EN 1092-1 or ANSI flanges: DN3 … DN150
  - EN 1092-1 or ANSI flanges: DN10 … DN1000
  - Sanitary connections: DN10 ... DN100
    According to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®

  Other standards on request
- Materials:
  - Lining in PP, PVDF, PTFE and Ebonite (hard rubber)
  - Electrodes in Hastelloy C22 (UNS-06022), Titanium, EN 1.4404 (AISI 316L), Tantalum, Zirconium
  - Flow tube in EN 1.4301 (AISI 304)
- Local indication, volume totalizer, 4-20 mA and pulse outputs
- Alarms, empty pipe detection, etc. depending on converter model
- Full diagnosis for MX4 converter
- HART and Modbus Communication protocols available on request
- Modular design in two versions:
  - Compact converter, mounted on top of the sensor
  - Remote converter for wall or pipe mounting

Working principle

The measurement principle is based on Faraday`s induction law. A voltage V is induced between a pair of electrodes when a conductive liquid flows in a pipe of diameter D at an average velocity vm, through a magnetic field B (which is perpendicular to the flow direction).

This voltage, proportional to the average velocity of the liquid, is acquired by the electronic converter in order to be processed and converted to a flow rate measurement.

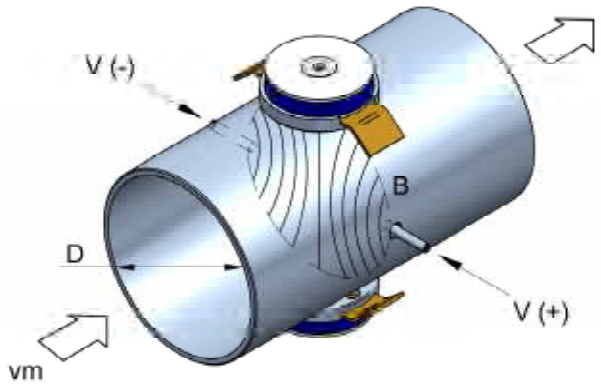
$$V = B \cdot vm \cdot D$$

V = Voltage across the electrodes

vm = Liquid velocity

B = Magnetic field strength

D = Pipe diameter



Applications

- Cooling-heating circuits & water treatment plants
- Food and beverage and pharmaceutical industries
- Petrochemical industry and offshore platforms
- Paper industry and fertilizer plants
- Car industry and machinery testing

Technical data

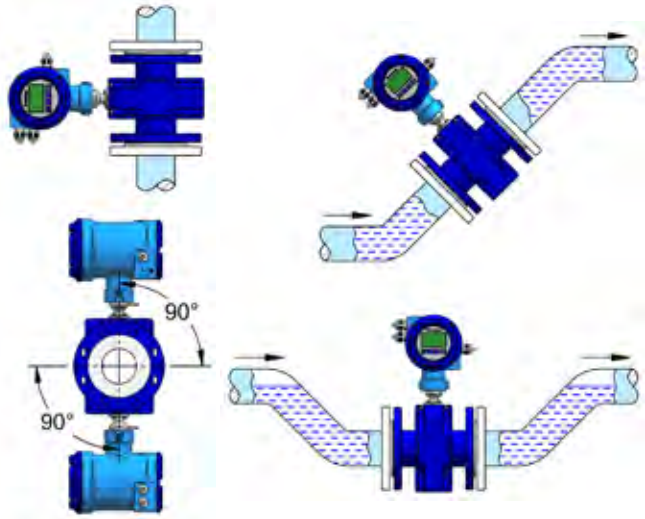
- **Accuracy:** ±0.5% reading value for flow speed ≥ 0.4 m/s
- **Minimum electric conductivity:** 20 µS/cm
- **Connections:**
  - Between EN 1092-1 or ANSI flanges: DN3 … DN150
  - EN 1092-1 or ANSI flanges: DN10 … DN1000
  - Sanitary connections: DN10 ... DN100, according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®

  Other standards on request
- **Materials:**
  - Lining in PP, PVDF, PTFE and Ebonite (hard rubber)
  - Electrodes in Hastelloy C22 (UNS-06022), Titanium, EN 1.4404 (AISI 316L), Tantalum, Zirconium
  - Flow tube in EN 1.4301 (AISI 304)
- **Local indication, volume totalizer, 4-20 mA and pulse outputs**
- **Alarms, empty pipe detection, etc.** depending on converter model
- **Full diagnosis** for MX4 converter
- **HART (MX4H & XT5H converters) and Modbus (MX4B converter) communication protocols** available on request
- **Modular design** in two versions:
  - Compact converter (MX4 or XT5), mounted on top of the sensor
  - Remote converter (MX4M or XT5M) for wall or pipe mounting

Installation

For the mechanical installation the most important factor to be taken into consideration is that the pipe must always be full and the electrodes in contact with the liquid.

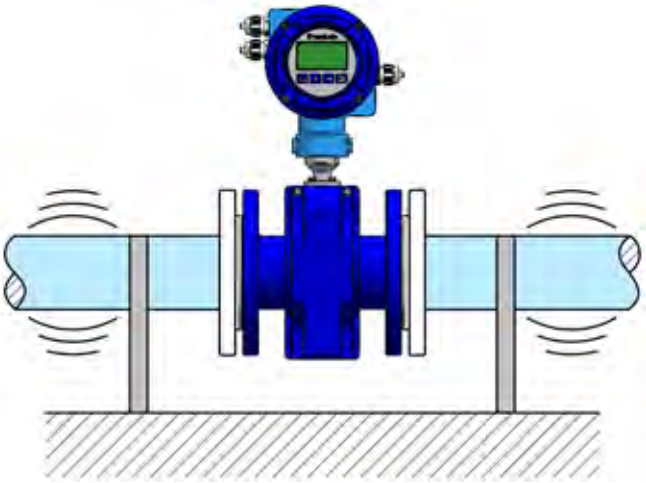
To guarantee this, the sensor should be mounted with the electrodes in a horizontal line and in a place of the installation so that the liquid does not contain air pockets.



Vibration

Fasten the pipe at both sides of the sensor, mainly in cases with free runs of piping over 10 m long, in which mechanical supports are recommended to minimize external forces.

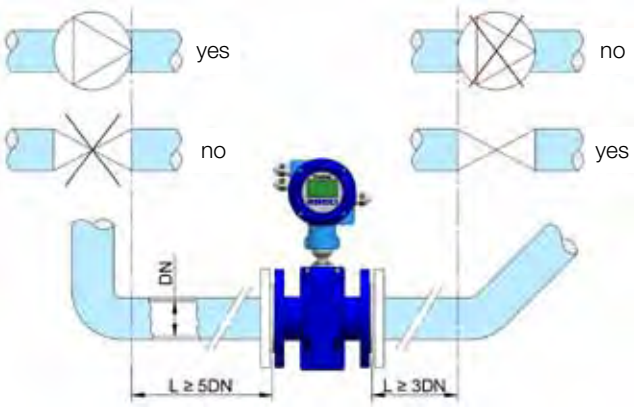
Caution: in plants with excessive vibration, it is recommended to install the electronic converter separate from the sensor.



Straight sections of pipe are necessary for the proper operation of the flowmeter. Required straight pipe run depends on the flow profile, which can be affected by the disturbing elements found in the installation before and after the sensor. A minimum distance of at least 5 x DN upstream and 3 x DN downstream from the flowmeter must be kept.

Valves should be downstream from the flowmeter to keep the pipe full and to avoid vacuums which can damage the flowmeter liner.

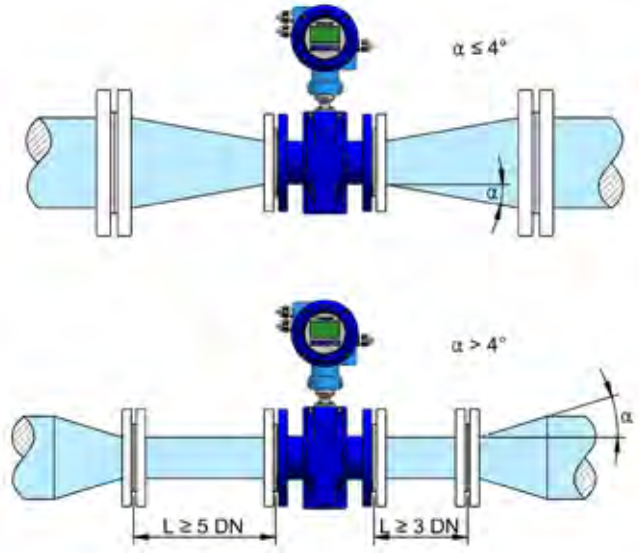
Pumps should be upstream from the flowmeter to avoid vacuums.



In case of mixtures of different liquids, the sensor should be installed a minimum of 30 x DN from the point of mixture to avoid instabilities in the readings.

Pressure loss when reducing the pipe diameter

In installations where, due to the low flow rate, it is necessary to reduce the pipe diameter, this should be done using a reduction cone with an angle of less than 4° in order to avoid turbulences which can give false readings.



Earth connection

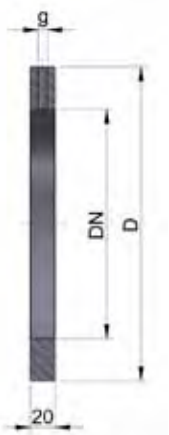
In order that the converter can acquire the signal from the electrodes, it has to be referenced to the same potential as the liquid. This can be considered as the most important factor for the correct working of the unit.

In the event that the pipe is made of electrically conductive material, just connect the two sensor wires to the pipe flanges, one to each side of the sensor.

If the inside of the pipe is plastic (or any other non-conductive material) two earthing rings and two more gaskets, one on each side of the sensor, must be installed. The earth wires will be connected to these earthing rings.

In case of liquids which are not compatible with metallic earthing rings, plastic rings with specific metallic electrodes are also available.

Metallic earthing ring

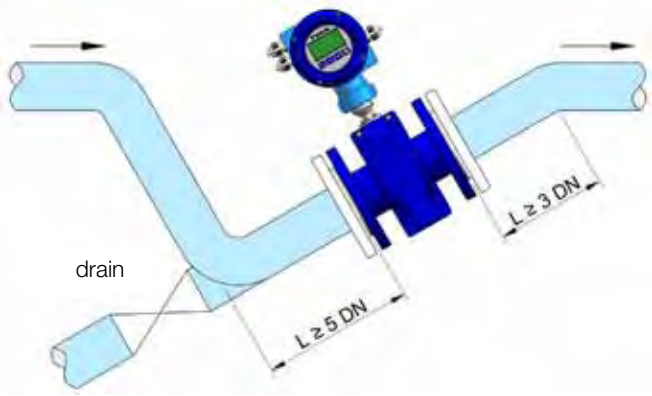


All dimensions in mm

Plastic earthing ring + electrode

Abrasive liquids or liquids containing solids

For abrasive liquids or liquids with particles in suspension, it is recommended to mount the flowmeter in a rising pipe. For a horizontal pipe the installation can be made as in the following drawing with a valve system for cleaning.



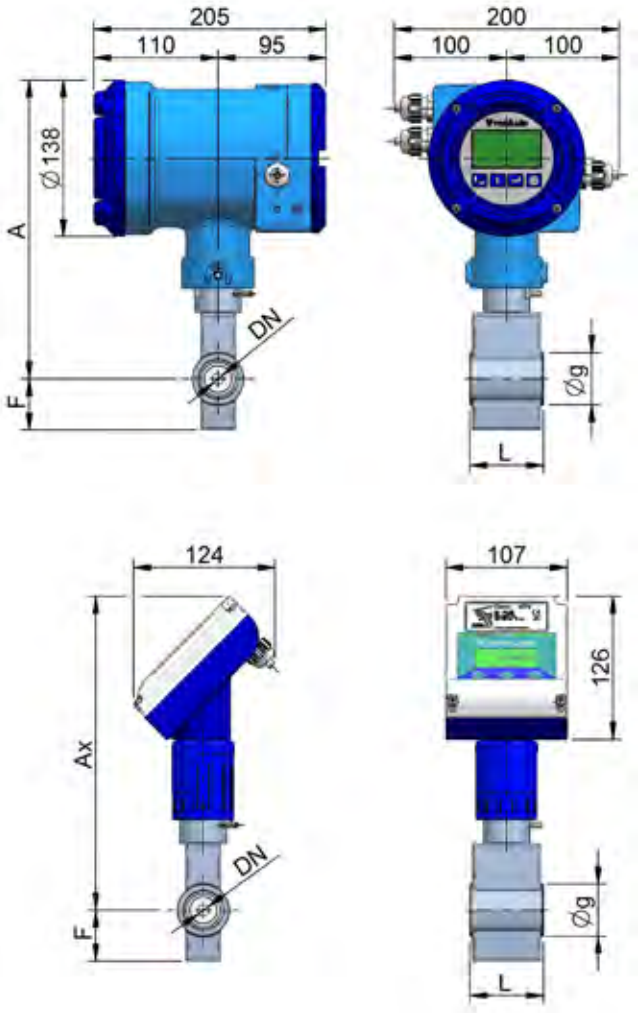
Dimensions

FLOMID-0FX (EN 1092-1 wafer mounted)

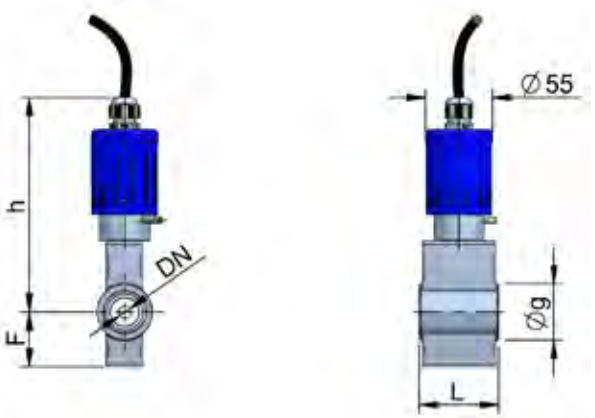
DN	PN (bar)	g	L	F	A	Ax	h	Weight (kg)
3		46	65	45	264	278	176	1.1
6		46	65	45	264	278	176	1.1
10		46	65	45	264	278	176	1.1
15		51	65	48	267	281	179	1.1
20		61	65	54	273	287	185	1.3
25	16	71	80	36	246	260	158	1.3
32		82	80	41	252	266	164	1.5
40		92	100	46	258	272	170	1.9
50		107	100	54	266	280	178	2.4
65		127	120	64	277	291	189	3.3
80		142	120	71	285	299	197	3.7
100		162	165	81	295	309	207	5.8
125	10	192	165	96	310	324	222	7.4
150		218	165	109	323	337	235	8.8

FLOMID-0FX (ANSI B16.5 wafer mounted)

DN	Class	g	L	F	A	Ax	h	Weight (kg)
⅛		46	65	45	264	278	176	1.1
⅜		46	65	45	264	278	176	1.1
½"		46	65	45	264	278	176	1.1
¾"		55	65	48	267	281	179	1.3
1"		65	65	54	273	287	185	1.3
1¼"		74	80	37	246	260	158	1.5
1½"	150#	84	80	42	252	266	164	1.9
2"		103	100	52	258	272	170	2.4
2½"		122	100	61	266	280	178	3.3
3"		135	120	68	277	291	189	3.7
4"		173	165	87	295	309	207	5.8
5"		192	165	96	310	324	222	7.4
6"		218	165	109	323	337	235	8.8



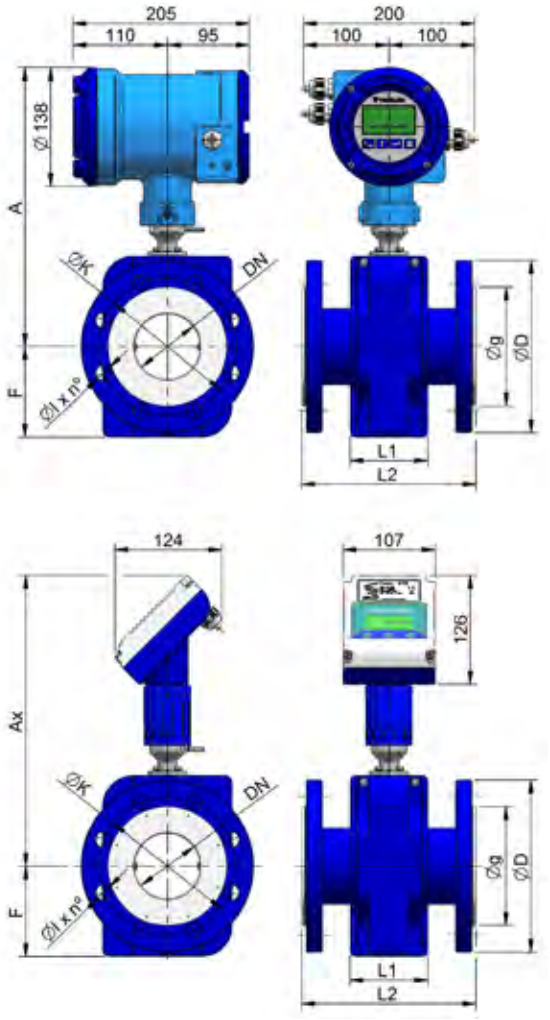
(All dimensions in mm)



FLOMID-0FX with compact MX4 converter

FLOMID sensor flanged mounted, common dimensions

DN	ANSI	PN (Class)	L1	L2	A	Ax	h	Weight (kg)
10	⅜"		85	150	290	304	202	3.0
15	½"		85	150	290	304	202	3.0
20	¾"		85	150	290	304	202	3.4
25	1"		85	150	290	304	202	4.3
32	1¼"		85	150	297	311	209	5.3
40	1½"	16	85	150	297	311	209	5.8
50	2"	(150#)	90	200	324	338	236	7.7
65	2½"		90	200	324	338	236	9.3
80	3"		90	200	324	338	236	10.7
100	4"		110	250	318	332	230	15.0
125	5"		110	250	330	344	242	17.0
150	6"		110	300	344	358	256	19.0
200	8"		110	350	370	384	282	31.0
250	10"		110	400	396	410	308	45.0
300	12"		110	500	418	432	330	52.0
350	14"	10	110	500	444	458	356	62.0
400	16"	(150#)	110	600	469	483	381	76.0
450	18"		300	600	525	539	437	85.0
500	20"		300	600	552	566	464	98.0



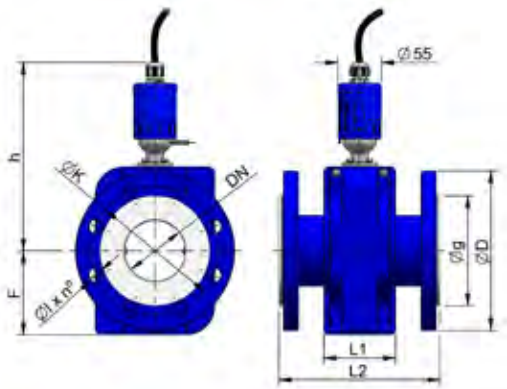
(All dimensions in mm)

FLOMID-2FX (EN 1092-1 flanged mounted)

DN	PN	D	K	l x n°	g	F
10		90	60	14 x 4	40	71
15		95	65	14 x 4	45	71
20		105	75	14 x 4	58	71
25		115	85	14 x 4	68	71
32		140	100	18 x 4	78	78
40	16	150	110	18 x 4	88	78
50		165	125	18 x 4	102	105
65		185	145	18 x 8	122	105
80		200	160	18 x 8	138	105
100		220	180	18 x 8	158	110
125		250	210	18 x 8	188	125
150		285	240	22 x 8	212	143
200		340	295	22 x 8	268	170
250		395	350	22 x 12	320	198
300		445	400	22 x 12	370	223
350	10	505	460	22 x 16	430	253
400		565	515	26 x 16	482	383
450		615	565	26 x 20	532	309
500		670	620	26 x 20	585	336

FLOMID-4FX (ANSI flanged mounted)

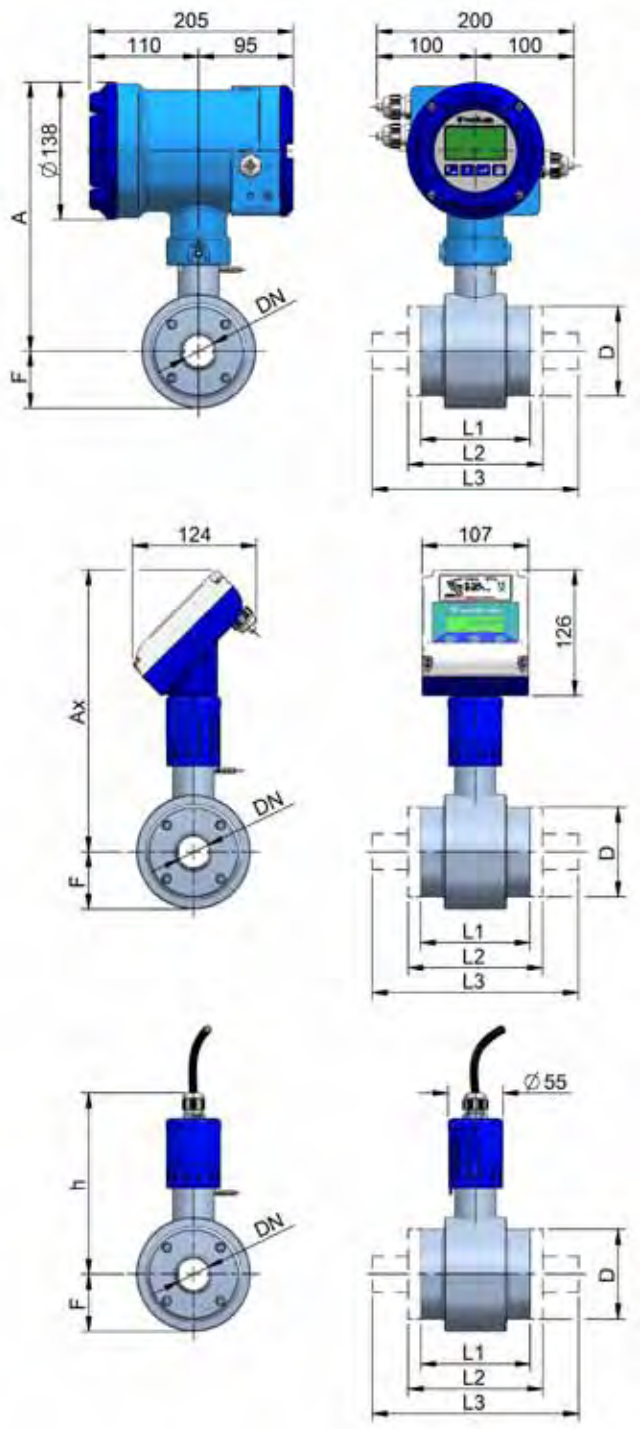
ANSI	Class	D	K	l x n°	g	F
⅜"		88.9	60.3	15.7 x 4	34.9	71
½"		88.9	60.3	15.7 x 4	34.9	71
¾"		98.4	69.8	15.7 x 4	42.9	71
1"		107.9	79.4	15.7 x 4	50.8	71
1¼"		117.5	88.9	15.7 x 4	63.5	78
1½"		127.0	98.4	15.7 x 4	73.0	78
2"		152.4	120.6	19.1 x 4	92.1	105
2½"		177.8	139.7	19.1 x 4	104.8	105
3"		190.5	152.4	19.1 x 4	127.0	105
4"	150#	228.6	190.5	19.1 x 8	157.2	115
5"		254.0	215.9	22.4 x 8	185.7	127
6"		279.4	241.3	22.4 x 8	215.9	140
8"		342.9	298.4	22.4 x 8	269.9	172
10"		406.4	361.9	25.4 x 12	323.8	203
12"		482.6	431.8	25.4 x 12	381.0	242
14"		533.4	476.2	28.4 x 12	412.7	267
16"		596.9	539.7	28.4 x 16	469.9	298
18"		635.0	577.8	31.8 x 16	533.4	318
20"		698.5	635.0	31.8 x 20	584.2	349



Electromagnetic flowmeters with fully hygienic execution

Sensor with PTFE lining and AISI 316L end connectors, suitable for hygienic applications in pharmaceutical and food and beverage industries, among others. Available with MX4 and XT5 converters.

Dimensions



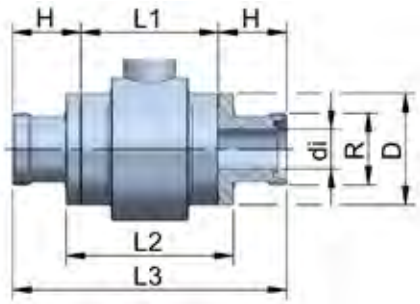
(All dimensions in mm)

FLOMID sensor fully hygienic execution, common dimensions

DN	L1	L2	D	A	Ax	h	F
10	104	120	60	260	274	172	48
15	104	120	65	260	274	172	48
20	104	120	70	262	276	174	50
25	110	134	80	262	276	174	50
32	110	134	90	270	284	182	58
40	130	154	100	270	284	182	58
50	130	154	115	279	293	191	66
65	160	186	145	292	306	204	79
80	160	186	160	300	314	212	86
100	204	234	180	316	330	228	102

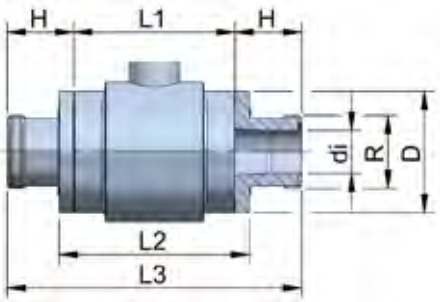
FLOMID-1FX (DIN 11851)

DN	di	R	D	L1	L2	L3	H
10	10	Rd 28 x 1/8"	60	104	120	200	48
15	16	Rd 34 x 1/8"	65	104	120	200	48
20	20	Rd 44 x 1/6"	70	104	120	200	48
25	26	Rd 52 x 1/6"	80	110	134	220	55
32	32	Rd 58 x 1/6"	90	110	134	220	55
40	38	Rd 65 x 1/6"	100	130	154	240	55
50	50	Rd 78 x 1/6"	115	130	154	240	55
65	66	Rd 95 x 1/6"	145	160	186	280	60
80	81	Rd 110 x 1/4"	160	160	186	280	60
100	100	Rd 130 x 1/4"	180	204	234	330	63



FLOMID-3FX (SMS 1145)

DN	di	R	D	L1	L2	L3	H
25	22.5	Rd 40 x 1/6"	80	110	134	220	55
32	29.5	Rd 48 x 1/6"	90	110	134	220	55
40	35.5	Rd 60 x 1/6"	100	130	154	240	55
50	48.5	Rd 70 x 1/6"	115	130	154	240	55
65	60.5	Rd 85 x 1/6"	145	160	186	280	60
80	72.0	Rd 98 x 1/6"	160	160	186	280	60



FLOMID-5IFX (CLAMP ISO 2852)

DN	OD*	di	C	D	L1	L2	L3	H
10	12.0	10.0	34.0	60	104	120	200	48
10	12.7	10.7	34.0	60	104	120	200	48
15	17.2	15.2	34.0	65	104	120	200	48
20	21.3	19.3	34.0	70	104	120	200	48
25	25.0	22.6	50.5	80	110	134	220	55
32	33.7	31.3	50.5	90	110	134	220	55
40	38.6	35.6	50.5	100	130	154	240	55
50	51.0	48.6	64.0	115	130	154	240	55
65	63.5	60.3	77.5	145	160	186	280	60
80	76.1	72.9	91.0	160	160	186	280	60
100	101.6	97.6	119.0	180	204	234	330	63

* OD = pipe outer Ø according to ISO 2037

FLOMID-5DFX (CLAMP DIN 32676)

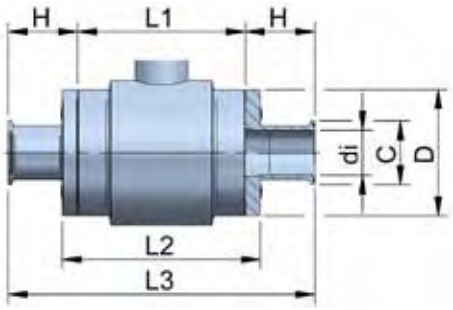
DN	OD*	di	C	D	L1	L2	L3	H
10	13	10	34.0	60	104	120	200	48
15	19	16	34.0	65	104	120	200	48
20	23	20	34.0	70	104	120	200	48
25	29	26	50.5	80	110	134	220	55
32	35	32	50.5	90	110	134	220	55
40	41	38	50.5	100	130	154	240	55
50	53	50	64.0	115	130	154	240	55
65	70	66	91.0	145	160	186	280	60
80	85	81	106.0	160	160	186	280	60
100	104	100	119.0	180	204	234	330	63

* OD = pipe outer Ø according to DIN 11850 (Series 2)

FLOMID-5TFX (TRI-CLAMP®)

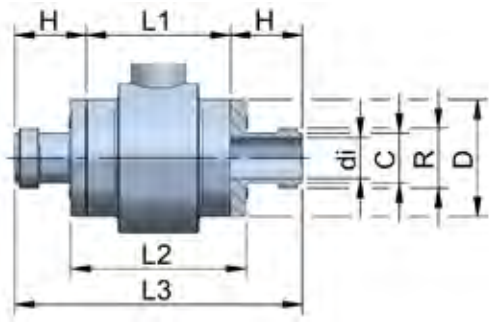
DN	Coup.	OD*	di	C	D	L1	L2	L3	H
10	½"	12.7	9.4	25.0	60	104	120	200	48
15	¾"	19.0	15.7	25.0	65	104	120	200	48
25	1"	25.4	22.1	50.4	80	110	134	220	55
40	1½"	38.1	34.8	50.4	100	130	154	240	55
50	2"	50.8	47.5	63.9	115	130	154	240	55
65	2½"	63.5	60.2	77.4	145	160	186	280	60
80	3"	76.2	72.9	90.9	160	160	186	280	60
100	4"	101.6	97.4	118.9	180	204	234	330	63

* OD = pipe outer Ø according to ASME BPE DT-1



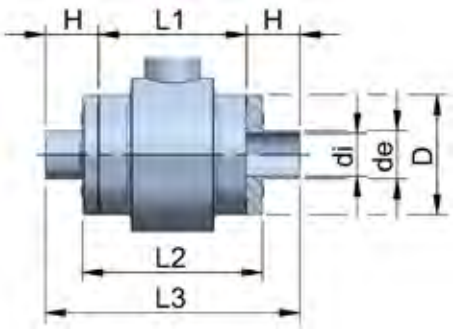
FLOMID-7FX (ISO 2853)

DN	di	R	C	D	L1	L2	L3	H
10	10.0	Tr 22.89 x 1/8"	15.0	60	104	120	200	48
15	15.2	Tr 29.26 x 1/8"	21.2	65	104	120	200	48
20	19.3	Tr 33.53 x 1/8"	25.4	70	104	120	200	48
25	22.6	Tr 37.13 x 1/8"	29.0	80	110	134	220	55
32	31.3	Tr 45.97 x 1/8"	38.0	90	110	134	220	55
40	35.6	Tr 50.65 x 1/8"	42.5	100	130	154	240	55
50	48.6	Tr 64.16 x 1/8"	56.0	115	130	154	240	55
65	60.3	Tr 77.67 x 1/8"	69.7	145	160	186	280	60
80	72.9	Tr 91.19 x 1/8"	82.3	160	160	186	280	60
100	97.6	Tr 118.21 x 1/8"	108.5	180	204	234	330	63



FLOMID-9WDFX (DIN 11850 weld-on connections)

DN	de*	di	D	L1	L2	L3	H
10	13	10	60	104	120	180	38
15	19	16	65	104	120	180	38
20	23	20	70	104	120	180	38
25	29	26	80	110	134	190	40
32	35	32	90	110	134	190	40
40	41	38	100	130	154	210	40
50	53	50	115	130	154	210	40
65	70	66	145	160	186	250	45
80	85	81	160	160	186	250	45
100	104	100	180	204	234	300	48



Also available FLOMID-9WIFX (ISO 2037 weld-on connections)

Also available FLOMID-6BFX (BSP connection) and FLOMID-6NFX (NPT connection)

Flow ranges

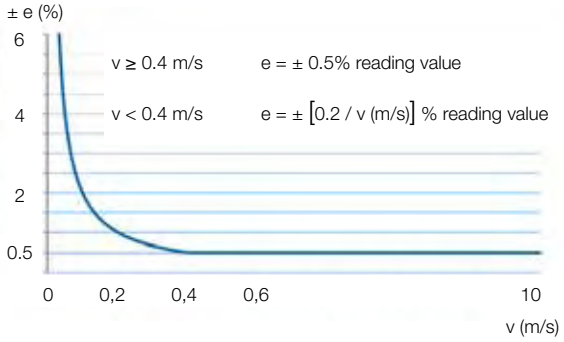
Sensor selection

The diagram shows the correspondance between the liquid velocity and the flow rate for different sensor sizes.

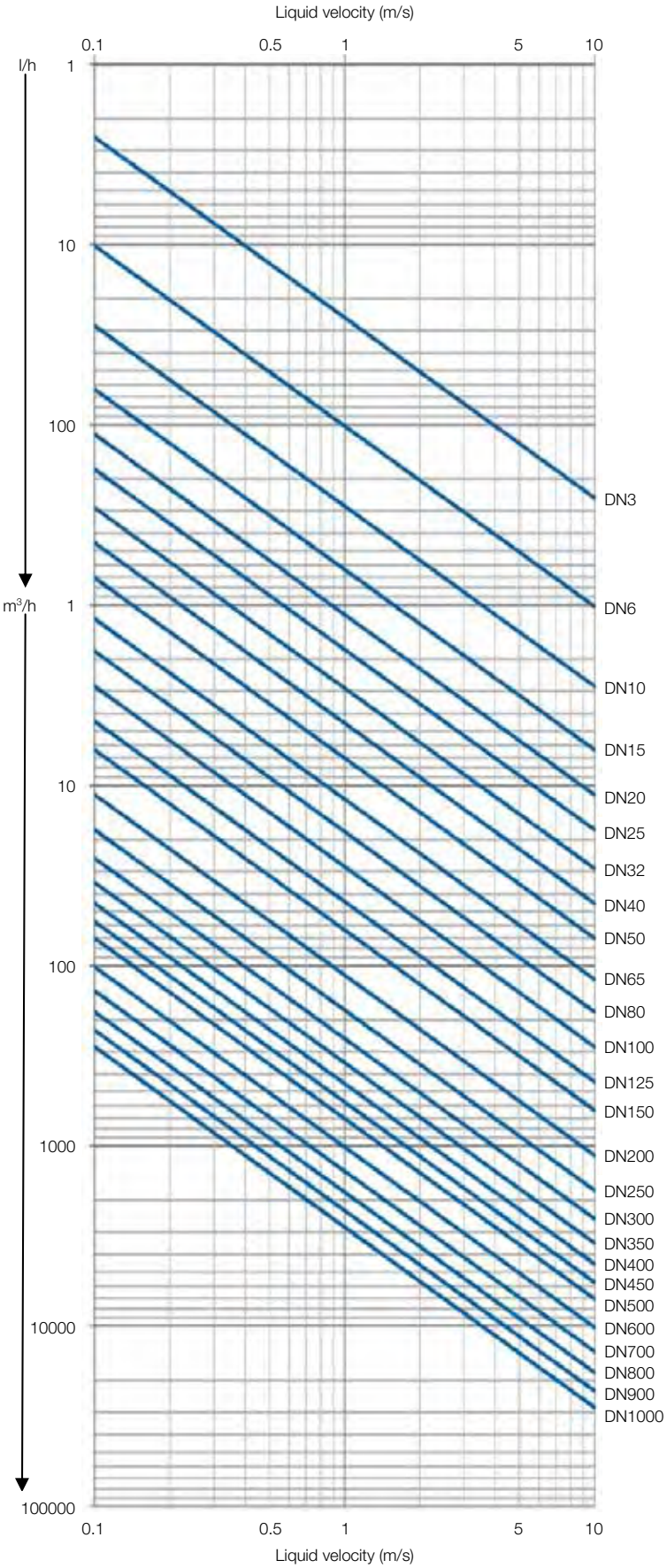
The sensor size should be chosen selecting a liquid velocity of about 3-4 m/s. The minimum liquid velocity should not be below 0.5 m/s.

When the liquid has solids in suspension, it is better to work between 3 and 5 m/s in order to avoid sedimentation in the pipe and sensor.

Accuracy curve (error vs velocity)



FLOMID-2FX with compact XT5 converter



Lining materials. Temperature, pressure and vacuum limits

DN	PTFE FLOMID-2FX / 4FX		PVDF / PTFE FLOMID-0FX / Sanitary		PP FLOMID-0FX		EBONITE (hard rubber) FLOMID-2FX / 4FX		DN
	PN (Class)	Vacuum [1]	PN (Class)	Vacuum [1]	PN (Class)	Vacuum [1]	PN (Class)	Vacuum [1]	
3									3
6									6
10				60 / 500		100 / 600			10
15									15
20									20
25		80 / 500	PN16 (150#)		PN16 (150#)				25
32				100 / 600		180 / 700			32
40	PN16 (150#)							100 / 200	40
50									50
65		150 / 650		150 / 700		200 / 800	PN16 (150#)	120 / 250	65
80									80
100		250 / 750	PN10 (150#)	300 / 800	PN10 (150#)	380 / 900		280 / 400	100
125									125
150		450 / 800		480 / 900		650 / 1000			150
200		450 / 900						300 / 450	200
250		500 / 1000							250
300									300
350								500 / 600	350
400	PN10 (150#)	750 / 1000					PN10 (150#)		400
500									500
600									600
700								1000 / 1000	700
800		1000 / 1000							800
900									900
1000									1000
Temp. range	-20ºC ... +120ºC		-20ºC ... +120ºC		-10ºC ... +80ºC		-20ºC ... +90ºC		Temp. range
Limit [2]	130ºC		130ºC		-		-		Limit [2]

[1] In mbar absolute, 40ºC / 80ºC reference temperature

[2] Maximum 30'

FLOMID-0FX with compact XT5 converter

FLOMID-0FX with remote XT5M converter

Electronic converters

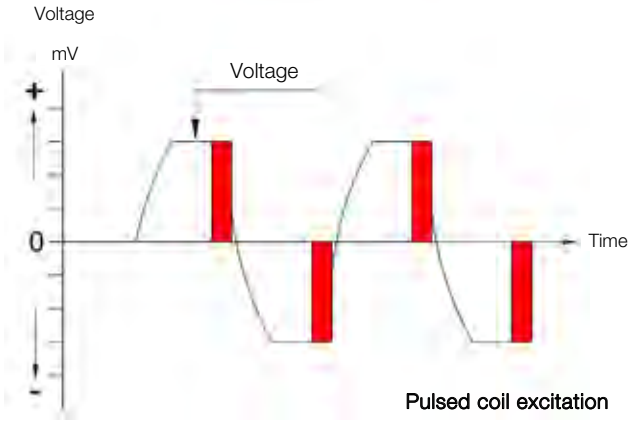
Different models of electronic control units are available to comply with the options of flow indication, maximum / minimum flow rate control, analog and pulse outputs.

All of them are compatible with the different FLOMID-FX sensor models.

These converters can be supplied for compact mounting directly on top of the sensor or for remote mounting. Cable is supplied.

HART protocol is available for both MX4 and XT5 converters.

Modbus RTU protocol is available for MX4 converter.



Pulsed coil excitation

XT5 converter

Technical data

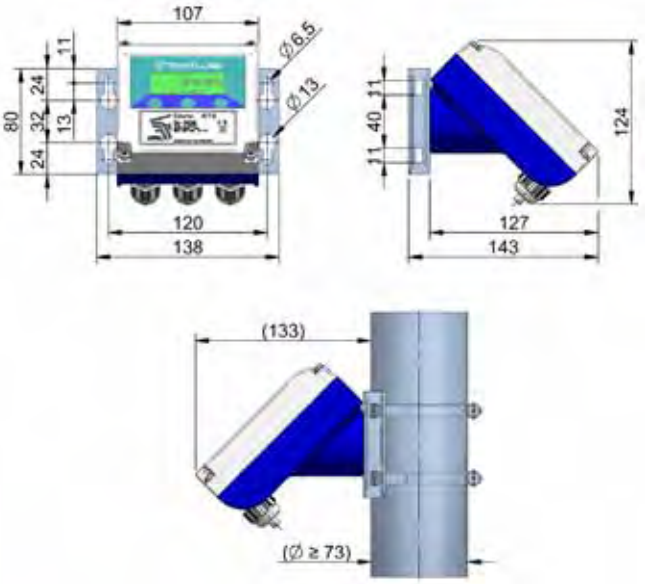
- IP67 polycarbonate enclosure
- Programming via front tactile push buttons
- Linearity: ±0.2% f.s.
- Repeatability: ±0.1% f.s.
- Ambient temperature range: 0ºC ... +60ºC
- Power supply: 24, 115, 230, 240 VAC 50 / 60 Hz
  24 VDC
- Power consumption: ≤ 5 VA
- Flow rate indication:
  - No. of digits: 4 (0 to 2 decimal configuration)
  - Digit size: 5 mm
- Volume totalizer:
  - No. of digits: 7 (2 decimal)
  - Digit size: 8 mm
  - Reset button
- Analog output: 4-20 mA, active or passive, programmable measuring units
- Pulse output: optoisolated:
  - V_{max}: 30 VDC ; I_{max}: 30 mA
  - Maximum frequency in “P/U” mode: 6.25 Hz
  - Frequency in “Hz” mode: 0.04 ... 5000 Hz
- Empty pipe detection
- Flow rate cut off, programmable
- Adaptative flow rate filter: programmable integration time between 0.1 ... 20 seconds
- Zero offset adjustment

HART Communication protocol

XT5H converter has a modem for HART communication. All the features regarding HART communication can be found in the corresponding document “Field Device Specification”. Compatible with HART Server Communication software.

Also available for remote mounted version XT5HM.

Remote mounted converter (model XT5M)



Weight XT5: 700 g

XT5 compact converter

XT5M remote converter

MX4 converter

Technical data

- IP67 coated aluminium enclosure
- Programming via front push buttons
- 128 x 64 graphic display
- Linearity: ±0.2% f.s.
- Repeatability: ±0.1% f.s.
- Ambient temperature range: -20ºC ... +60ºC
- Power supply: 90 … 265 VAC 50 / 60 Hz
  12 … 48 VDC
- Power consumption: ≤ 5 VA
- Flow rate and liquid velocity indication:
  - No. of digits: 5 (0 to 2 decimal configuration)
  - Digit size: 11 mm
- Volume totalizer:
  - No. of digits: 8 (2 decimal)
  - Digit size: 8 mm
  - Reset button
- Analog output: 4-20 mA, active or passive, programmable measuring units
- Pulse output: optoisolated NPN bipolar transistor:
  - V_{max}: 30 VDC ; I_{max}: 30 mA
  - Output frequency: 0.01 ... 5000 Hz
  - Programmable duty cycle
- Relay outputs: 2 relays with potential free contacts.
  - Contact characteristics:
    - Maximum voltage: 250 VAC
    - Maximum current: 8 A
    - Maximum power: 500 VA

  Programmable as flow rate alarms, empty pipe detection or reversed flow indication
- Empty pipe detection
- Flow rate cut off, programmable
- Adaptative flow rate filter: programmable integration time between 0 ... 40 seconds
- Zero offset adjustment
- Full diagnosis of the coil current, the differential voltage on the sensor electrodes and the conductivity of the liquid, as well as detection of an electronic failure in the measuring circuit

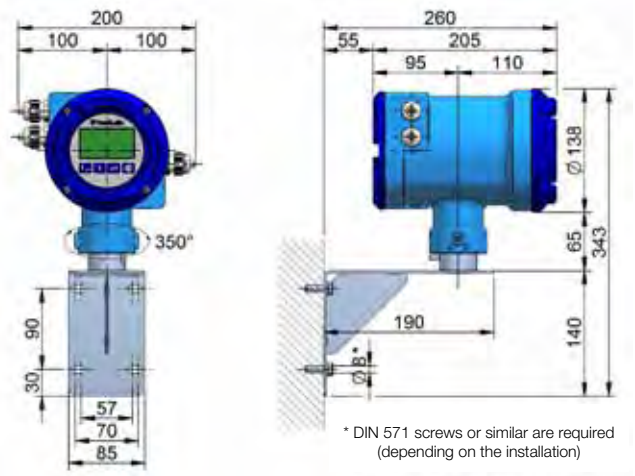
HART and Modbus RTU RS485 Communication protocols

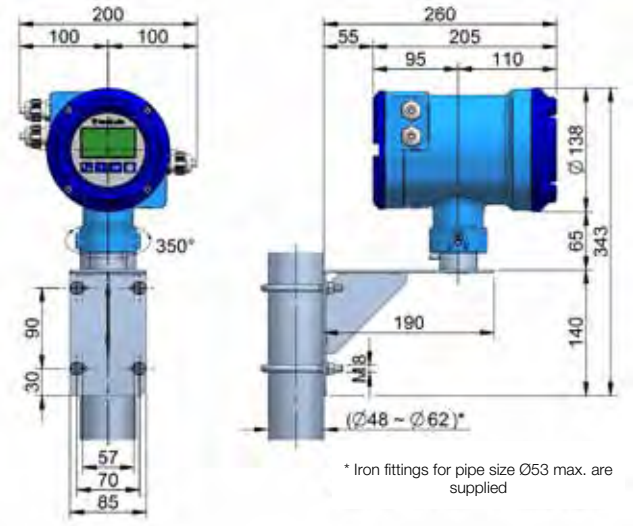
MX4B converter includes a Modbus RTU RS485 Communication protocol module.

MX4H converter has a modem for HART communication. All the features regarding HART communication can be found in the corresponding document “Field Device Specification”. Compatible with HART Server Communication software.

Also available for remote mounted versions MX4BM & MX4HM.

Remote mounted converter (model MX4M)





Weight MX4: 3.3 kg

FLOMID-2FX with compact MX4 converter

TECFLUID

MORE THAN 40 YEARS MANUFACTURING
FLOW AND LEVEL INSTRUMENTATION

Electromagnetic flowmeters
Series FLOMAT

Insertion electromagnetic flowmeter for conductive liquids

- For use in large diameter pipes as an economical solution for flow measurement
- Flow rate measurement is independent of density, temperature, viscosity and pressure
- Pulsed coil excitation to obtain a minimum zero drift
- No moving parts involve low maintenance, low pressure drop and allow the pass of solids
- Low power consumption
- Good chemical resistance
- Flow rate: 2300 l/h ... 110000 m^3/h
- Accuracy: ±3.5% reading value
- Minimum electric conductivity: 20 µS/cm
- Connections: inserted in pipes of DN40 ... DN2000, by means of:
  - TF Tecfluid standard flange
  - 2 ¼" BSP-F
  - DN40 PN16 EN 1092-1 flange
- Materials:
  - Sensor: EN 1.4404 (AISI 316L), PVDF
  - Sensor head: PVDF
  - Insert pipe adaptor: EN 1.4404 (AISI 316L), PE, PVC Others on request
  - Electrodes: EN 1.4404 (AISI 316L), Hastelloy C, Tantalum, Titanium, Zirconium
- Local indication, volume totalizer, 4-20 mA and pulse outputs
- Alarms, empty pipe detection, etc. depending on converter model
- Full diagnosis for MX4 converter
- HART and Modbus Communication protocols available on request
- Modular design in two versions:
  - Compact converter, mounted on top of the sensor
  - Remote converter for wall or pipe mounting

HART COMMUNICATION PROTOCOL

Modbus

Working principle

The measurement principle is based on Faraday's induction law. A voltage V is induced between a pair of electrodes when a conductive liquid flows in a pipe of diameter D at an average velocity v, through a magnetic field B (which is perpendicular to the flow direction).

This voltage, proportional to the average velocity of the liquid, is acquired by the electronic converter in order to be processed and converted to a flow rate measurement.

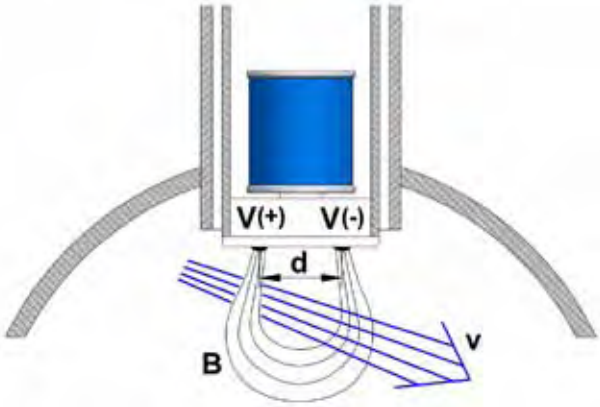
$$V = B \cdot v \cdot D$$

V = Voltage across the electrodes

v = Liquid velocity

B = Magnetic field strength

D = Pipe diameter



Applications

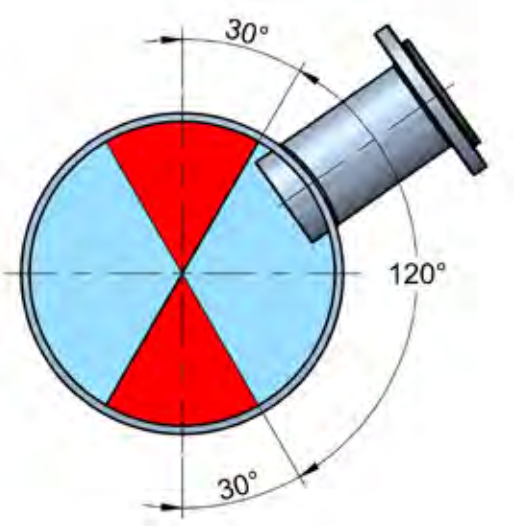
- Water supply & water treatment plants
- Food and beverage industries
- Leak detection in pipelines & chemicals flow monitoring
- HVAC

Technical data

- **Accuracy:** ±3.5% reading value for flow speed ≥ 0.4 m/s
- **Minimum electric conductivity:** 20 µS/cm
- **Liquid temperature:** -20ºC … +120ºC
- **Ambient temperature:** -20ºC ... +60ºC
- **Working pressure:** PN16. Others on request
- **Connections:** inserted in pipes of DN40 ... DN2000, by means of:
  - TF Tecfluid standard flange
  - 2 ¼" BSP-F
  - DN40 PN16 EN 1092-1 flange
- **Materials:**
  - Sensor: EN 1.4404 (AISI 316L), PVDF
  - Sensor head: PVDF
  - Insert pipe adaptor: EN 1.4404 (AISI 316L), PVC, PE Others on request
  - Electrodes: EN 1.4404 (AISI 316L), Hastelloy C, Tantalum, Titanium, Zirconium
- **Local indication, volume totalizer, 4-20 mA and pulse outputs**
- **Alarms, empty pipe detection, etc. depending on converter model**
- **Full diagnosis** for MX4 converter
- **HART** (MX4H & XT5H converters) and **Modbus** (MX4B converter) communication protocols available on request
- **Modular design** in two versions:
  - Compact converter (MX4 or XT5), mounted on top of the sensor
  - Remote converter (MX4M or XT5M) for wall or pipe mounting

Installation

- Sensor must not be installed in the upper or lower parts of the pipe, in order to avoid air bubbles or solids sedimentation.



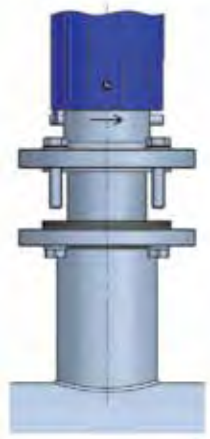
- Pipe must always be full of liquid.
- Required straight pipe run depends on the flow profile, which can be affected by the disturbing elements found in the installation before and after the sensor, as shown in the following chart:

Disturbing element before the sensor	Minimum distance between the element and the sensor
90º elbow or T-bend	50 x DN
Several 90º coplanar bends	50 x DN
Several 90º non-coplanar bends	80 x DN
Total angle convergent 18º to 36º	30 x DN
Total angle divergent 14º to 28º	55 x DN
Fully opened butterfly valve	45 x DN
Fully opened plug valve	30 x DN

After the sensor a minimum straight pipe run of 5 x DN is required.

Models

In case of metallic or plastic pipe where Tecfluid insert pipe adaptor can be supplied (see p. 114), installation can be made by welding or gluing the adaptor as follows:



FLOMAT-FX2
flanged connection

FLOMAT-FX1
threaded connection

In those cases where Tecfluid insert pipe adaptor cannot be used (FRP or similar pipes), installation should be made by means of a CLAMP-ON saddle (not supplied):

CLAMP-ON saddle
for non-metallic pipes

CLAMP-ON saddle
for plastic pipes

Materials

Nº	Description	Materials
1A	MX4 housing	Aluminium
1B	XT5 housing	Polycarbonate
1C	Packing gland	Polyamide
2	Connector	Polycarbonate *
3	Flange / BSP nut	EN 1.4404 (AISI 316L)
4	Insert pipe adaptor	EN 1.4404 (AISI 316L), PVC, PE **
5	Electrodes	EN 1.4404 (AISI 316L), Hastelloy C, Titanium, Tantalum, Zirconium
6	Head	PVDF
7	Sensor body	EN 1.4404 (AISI 316L), PVDF
8	Gasket	NBR, VITON®

* Also available in EN 1.4404 (AISI 316L) on request

** Others on request

Dimensions

Sensor

DN	A	FX *	FM *	FR *
40...400	113,5	340	327	240
500...1000	218,5	445	432	345
1200...2000	368,5	595	582	495

* minimum dimension to remove the flowmeter from the pipe

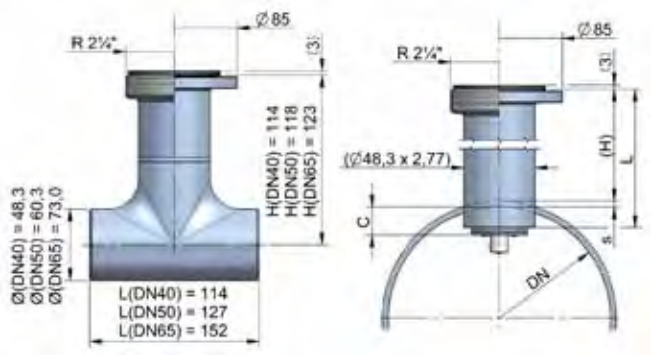
Insert pipe adaptor

There are two different types of insert pipe adaptors. For pipe size DN40 ... DN65, insert pipe adaptor is supplied already welded to short length of pipe that must be just coupled to the pipe by welding or gluing (in the case of PVC).

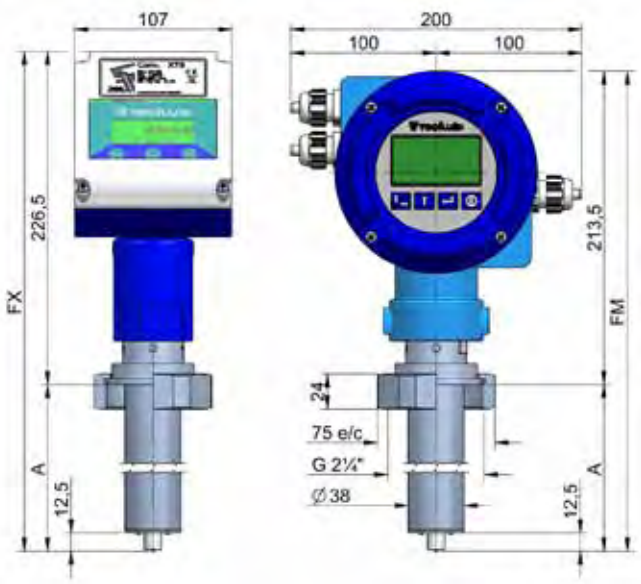
For pipe size of DN80 or bigger, insert pipe adaptor is directly welded (or glued) on the pipe.

DN	C (mm)	Insert pipe adaptor	
		L (mm)	H (mm)
80	10,0	93	88,0 - s
100	12,5		85,5 - s
125	15,5		82,5 - s
150	19,0		79,0 - s
200	25,0		73,0 - s
250	31,0		67,0 - s
300	37,5		60,5 - s
350	44,0		54,0 - s
400	50,0		48,0 - s
500	62,5	145	140,5 - s
600	75,0		128,0 - s
700	87,5		115,5 - s
800	100,0		103,0 - s
900	112,5		90,5 - s
1000	125,0		78,0 - s
1200	150,0	205	203,0 - s
1400	175,0		178,0 - s
1600	200,0		153,0 - s
1800	225,0		128,0 - s
2000	250,0		103,0 - s

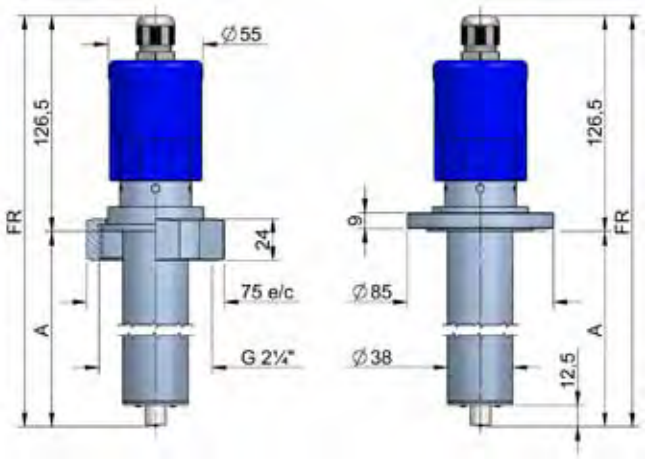
s: pipe thickness (depends on pipe material and pressure rating)
C: penetration depth



Sensor with compact converter



Sensor with remote converter (IP68 10 m H_2O)



Flow ranges

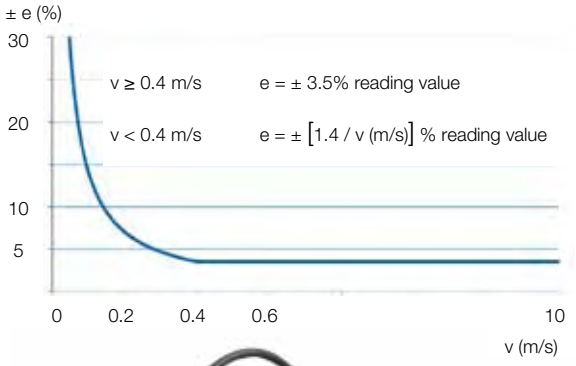
Sensor selection

The diagram shows the correspondance between the liquid velocity and the flow rate for different sensor sizes.

The sensor size should be chosen selecting a liquid velocity of about 3-4 m/s. The minimum liquid velocity should not be below 0.5 m/s.

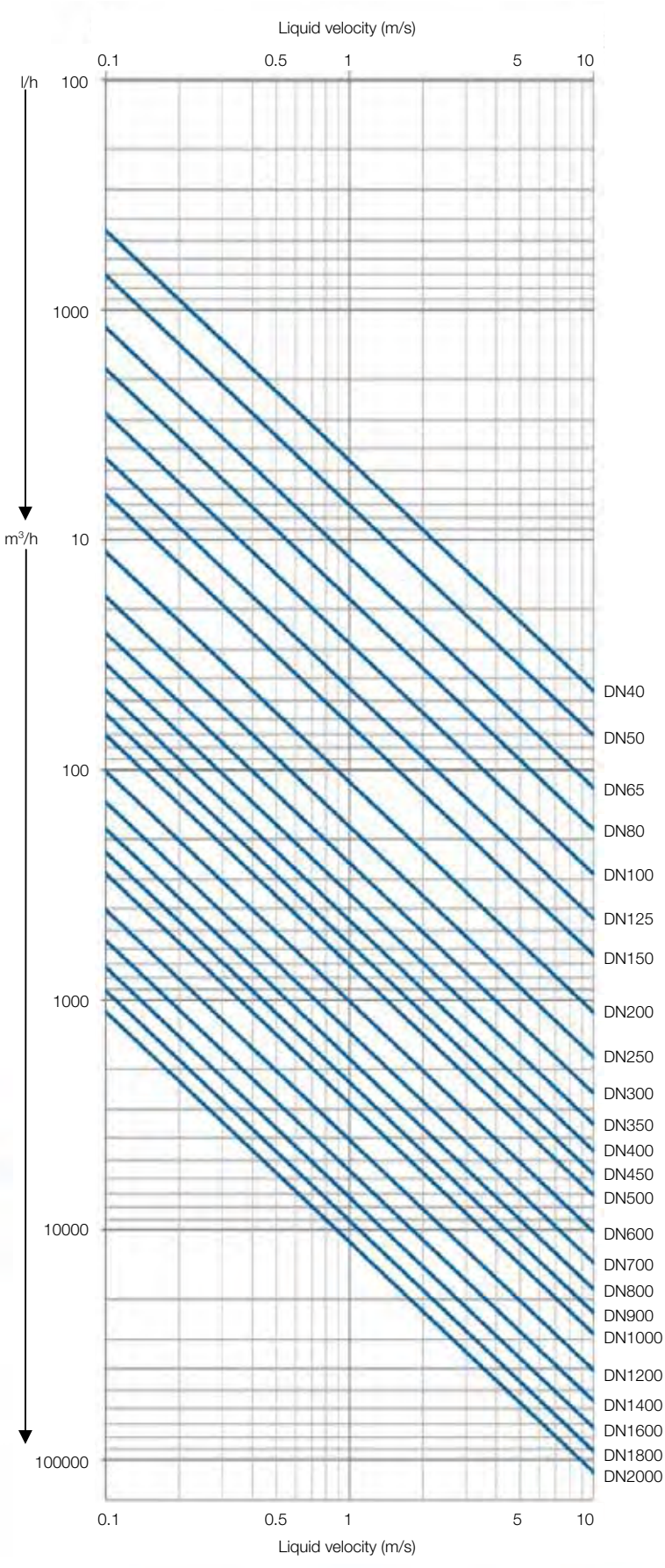
When the liquid has solids in suspension, it is better to work between 3 and 5 m/s in order to avoid sedimentation in the pipe and sensor.

Accuracy curve (error vs velocity)



FLOMAT-FX1 with remote XT5M converter

FLOMAT-FX2 with CLAMP-ON saddle for non-metallic pipes and compact XT5 converter with AISI 316L connector



Electronic converters

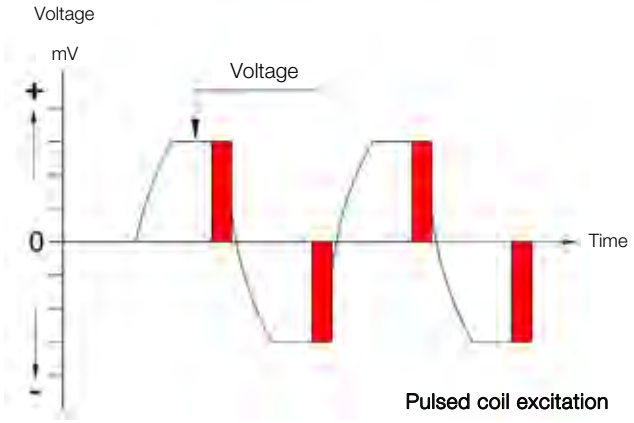
Different models of electronic control units are available to comply with the options of flow indication, maximum / minimum flow rate control, analog and pulse outputs.

All of them are compatible with the different FLOMAT-FX sensor models.

These converters can be supplied for compact mounting directly on top of the sensor or for remote mounting. Cable is supplied.

HART protocol is available for both MX4 and XT5 converters.

Modbus RTU protocol is available for MX4 converter.



Pulsed coil excitation

XT5 converter

Technical data

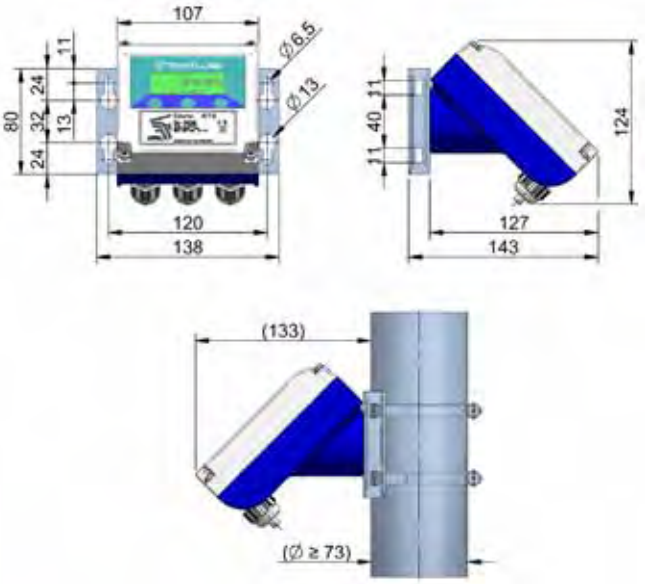
- IP67 polycarbonate enclosure
- Programming via front tactile push buttons
- Linearity: ±0.2% f.s.
- Repeatability: ±0.1% f.s.
- Ambient temperature range: 0ºC ... +60ºC
- Power supply: 24, 115, 230, 240 VAC 50 / 60 Hz
  24 VDC
- Power consumption: ≤ 5 VA
- Flow rate indication:
  - No. of digits: 4 (0 to 2 decimal configuration)
  - Digit size: 5 mm
- Volume totalizer:
  - No. of digits: 7 (2 decimal)
  - Digit size: 8 mm
  - Reset button
- Analog output: 4-20 mA, active or passive, programmable measuring units
- Pulse output: optoisolated:
  - V_{max}: 30 VDC ; I_{max}: 30 mA
  - Maximum frequency in “P/U” mode: 6.25 Hz
  - Frequency in “Hz” mode: 0.04 ... 5000 Hz
- Empty pipe detection
- Flow rate cut off, programmable
- Adaptative flow rate filter: programmable integration time between 0.1 ... 20 seconds
- Zero offset adjustment

HART Communication protocol

XT5H converter has a modem for HART communication. All the features regarding HART communication can be found in the corresponding document “Field Device Specification”. Compatible with HART Server Communication software.

Also available for remote mounted version XT5HM.

Remote mounted converter (model XT5M)



Weight XT5: 700 g

XT5 compact converter

XT5M remote converter

MX4 converter

Technical data

- IP67 coated aluminium enclosure
- Programming via front push buttons
- 128 x 64 graphic display
- Linearity: ±0.2% f.s.
- Repeatability: ±0.1% f.s.
- Ambient temperature range: -20ºC ... +60ºC
- Power supply: 90 … 265 VAC 50 / 60 Hz
  12 … 48 VDC
- Power consumption: ≤ 5 VA
- Flow rate and liquid velocity indication:
  - No. of digits: 5 (0 to 2 decimal configuration)
  - Digit size: 11 mm
- Volume totalizer:
  - No. of digits: 8 (2 decimal)
  - Digit size: 8 mm
  - Reset button
- Analog output: 4-20 mA, active or passive, programmable measuring units
- Pulse output: optoisolated NPN bipolar transistor:
  - V_{max}: 30 VDC ; I_{max}: 30 mA
  - Output frequency: 0.01 ... 5000 Hz
  - Programmable duty cycle
- Relay outputs: 2 relays with potential free contacts.
  - Contact characteristics:
    - Maximum voltage: 250 VAC
    - Maximum current: 8 A
    - Maximum power: 500 VA

  Programmable as flow rate alarms, empty pipe detection or reversed flow indication
- Empty pipe detection
- Flow rate cut off, programmable
- Adaptative flow rate filter: programmable integration time between 0 ... 40 seconds
- Zero offset adjustment
- Full diagnosis of the coil current, the differential voltage on the sensor electrodes and the conductivity of the liquid, as well as detection of an electronic failure in the measuring circuit

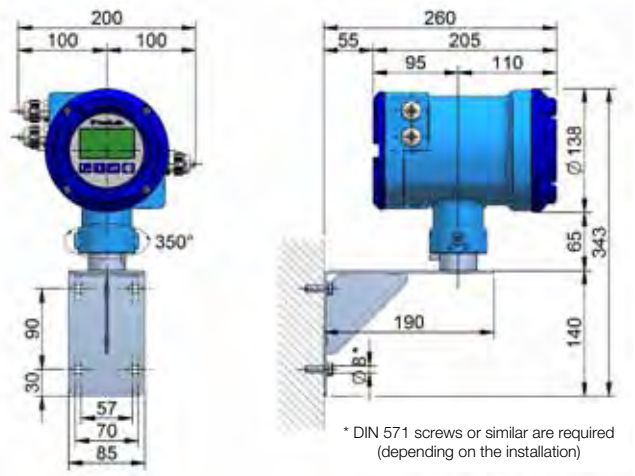
HART and Modbus RTU RS485 Communication protocols

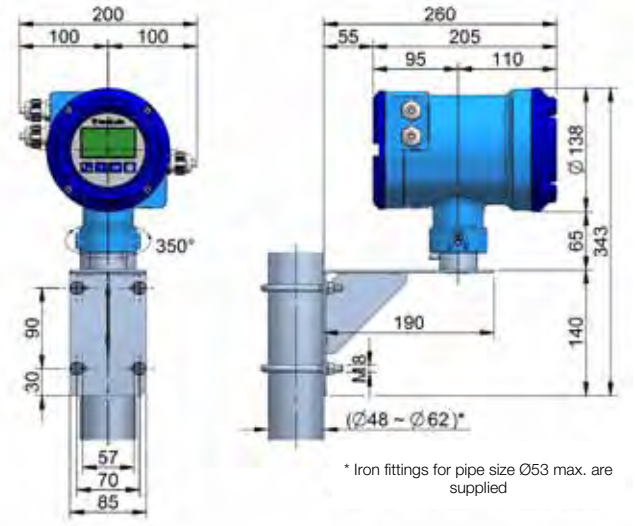
MX4B converter includes a Modbus RTU RS485 Communication protocol module.

MX4H converter has a modem for HART communication. All the features regarding HART communication can be found in the corresponding document “Field Device Specification”. Compatible with HART Server Communication software.

Also available for remote mounted versions MX4BM & MX4HM.

Remote mounted converter (model MX4M)





Weight MX4: 3.3 kg

FLOMAT-FX1 with compact MX4 converter
Installation example

Accessories

FLOMAT-TAP

The FLOMAT-TAP accessory is a useful complement for the FLOMAT sensors in some type of installations.

The key features of the product are:

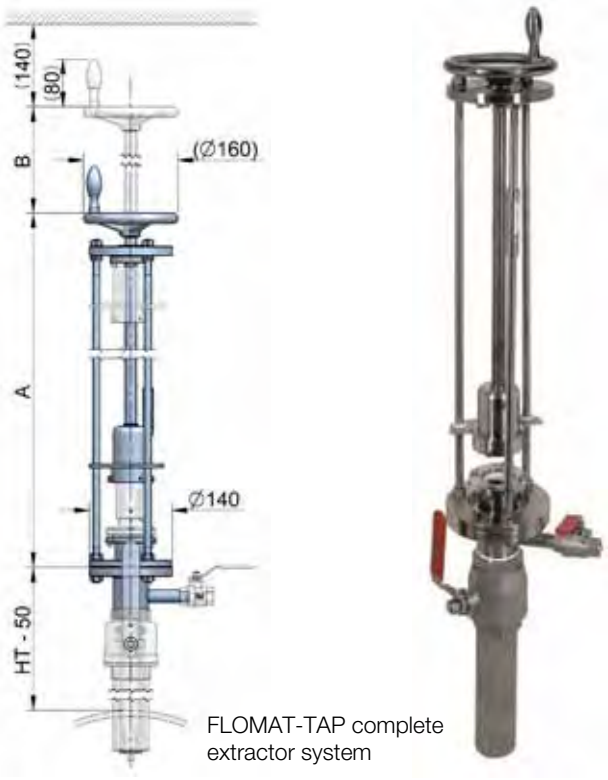
- FLOMAT sensors can be inserted or removed under pressure (pipe full of liquid).
- Designed for obtaining flow measurement in different points of a distribution network with only one FLOMAT sensor.
- Maintenance of FLOMAT sensors without interruption of the flow.

The M-TAP accessory must be installed to the main pipe as an insert pipe adaptor and it is a part of the complete system FLOMAT-TAP.

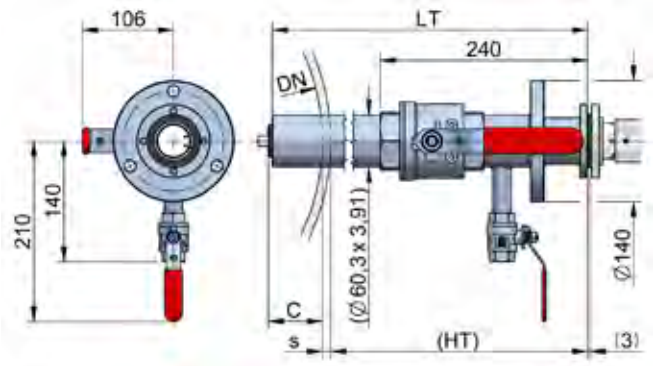
FLOMAT-TAP dimensions

DN	A	B
100 … 600	750	420
700 … 1200	865	535
1300 … 2000	990	660

DN	C (mm)	M-TAP insert pipe adaptor	
		LT (mm)	HT (mm)
100	12.5	365	357.0 - s
125	15.5		354.0 - s
150	19.0		350.5 - s
200	25.0		344.5 - s
250	31.0		338.5 - s
300	37.5		332.0 - s
350	44.0		325.5 - s
400	50.0		319.5 - s
500	62.5		307.0 - s
600	75.0		294.5 - s
700	87.5	450	377.0 - s
800	100.0		364.5 - s
900	112.5		352.0 - s
1000	125.0		339.5 - s
1200	150.0		314.5 - s
1400	175.0	575	414.5 - s
1600	200.0		389.5 - s
1800	225.0		364.5 - s
2000	250.0		339.5 - s



FLOMAT-TAP complete extractor system



M-TAP insert pipe adaptor

1.7
OSCILLATING PISTON

1.7
OSCILLATING PISTON

COVOL

The art of measuring

Oscillating piston flowmeters

Series COVOL

Positive displacement flowmeter for liquids

- Suitable for all kind of liquids
- Viscosity up to 120000 mPa·s
- Excellent performance with changing process conditions
- Easily cleaned and sterilized
- Available with materials and connections suitable for hygienic applications
- Bidirectional flow measurement and installation in all flow directions
- Special design for high pressure available
- Flow rate: 25 l/h ... 60 m^3/h
- Accuracy: ±0.8% measured value
- Repeatability: ±0.3%
- Connections:
  - EN 1092-1 flange DN10 ... DN100
    Other flange standards on request
  - Threaded connections BSP or NPT
  - Sanitary couplings according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Materials:
  - Body: EN 1.4404 (AISI 316L), PVC, PP, PTFE
  - Piston: PTFE+graphite, aluminium, bronze, PVDF
  - Gaskets: NBR / PTFE / EPDM / Viton® / Silicone
- Potential free reed switch output
- Optional:
  - Flow indication, local or remote
  - Volume totalizer, local or remote
  - Electronic transmitter with 4-20 mA analog output. HART protocol available on request
  - Volume preselection for batching applications
  - Exd version

Working principle

By means of oscillating piston and an annular measuring chamber.

1– The first figure shows the COVOL flowmeter at the beginning of a cycle, when the measuring chamber (in blue) is completely full.

2– The flow of the liquid through the flowmeter makes a force on the oscillating piston, so that it starts turning. From this moment the measuring chamber is divided in two parts: inlet (in red) and outlet (in blue).

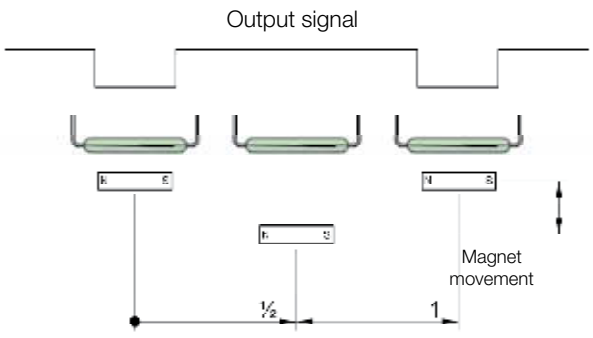
3– The liquid fills progressively the inlet measuring chamber (in red), as it is getting emptied on the outlet (in blue). In the middle of the cycle (see figure) the two chambers are the same size.

4– At this stage the outlet measuring chamber has already emptied almost all the liquid corresponding to a cycle, while on the inlet it is almost filled with the liquid corresponding to the next cycle.

5- At the end of the cycle, the inlet measuring chamber takes all the space. From this moment it can be considered that this is already the outlet chamber, so we are again at the beginning of the cycle.

As one can see, a constant volume of liquid is moved in each cycle.

The piston includes a magnet inside that activates a reed switch each complete turn. The output signal can be treated by means of an electronic converter.



Complete cycle of the piston

Applications

- **Chemical and petrochemical industry**
- **Tank filling and batching applications**
- **Measurement of steam condensates in boilers**
- **Burners, measurement of fuel consumption**

Technical data

- **Accuracy:** ±0.8% measured value
- **Repeatability:** ±0.3%
- **Scale range:** 30:1
- **Liquid viscosity:** up to 120000 mPa·s
- **Liquid temperature:**
  - AISI 316L: -40ºC ... +150ºC
  - PTFE: -20ºC ... +130ºC
  - PP: -10ºC ... +80ºC
  - PVC: 0ºC ... +45ºC
- **Working pressure:**
  - AISI 316L: PN16 (others on request)
  - PTFE / PP / PVC: PN10
- **Connections:**
  - EN 1092-1 flange DN10 ... DN100
    Other flange standards on request
  - Threaded connections BSP or NPT
  - Sanitary couplings according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- **Materials suitable for hygienic applications on request**
- **Mounting in horizontal or vertical pipe, bidirectional flow measurement and installation in all flow directions**

Electronic converters and options

- **CP ... CH420:** flow rate indication, volume totalizer and 4-20 mA output, 2-wire system. Compact or remote mounted. HART protocol with model CH420
- **CIP:** volume totalizer. Battery powered. Compact or remote mounted
- **CIP II:** non-resettable volume totalizer, resettable partial volume totalizer. Battery powered. Compact or remote mounted
- **MC01:** flow rate indication, volume totalizer and volume preselector with relay output for batching applications. 4-20 mA analog output as an option, 4-wire system. Panel mounted
- **MT02:** volume totalizer, partial volume totalizer and volume preselector with relay output for batching applications. Panel mounted
- **DFD2:** frequency divider. DIN rail mounted
- **Options:**
  - Heating / cooling chamber
  - Special connector for other displays (please consult)
  - Exd version for hazardous environments

Mounting

Both in horizontal and vertical position, bidirectional flow measurement and suitable for all flow directions. Straight pipe run before and after the flowmeter is not required.

In order to assure the good performance of a COVOL flowmeter, the installation of a filter prior to the unit is mandatory, with a mesh size between 0.5 and 1 mm, according to the pipe diameter (smaller sizes involve a smaller mesh size).

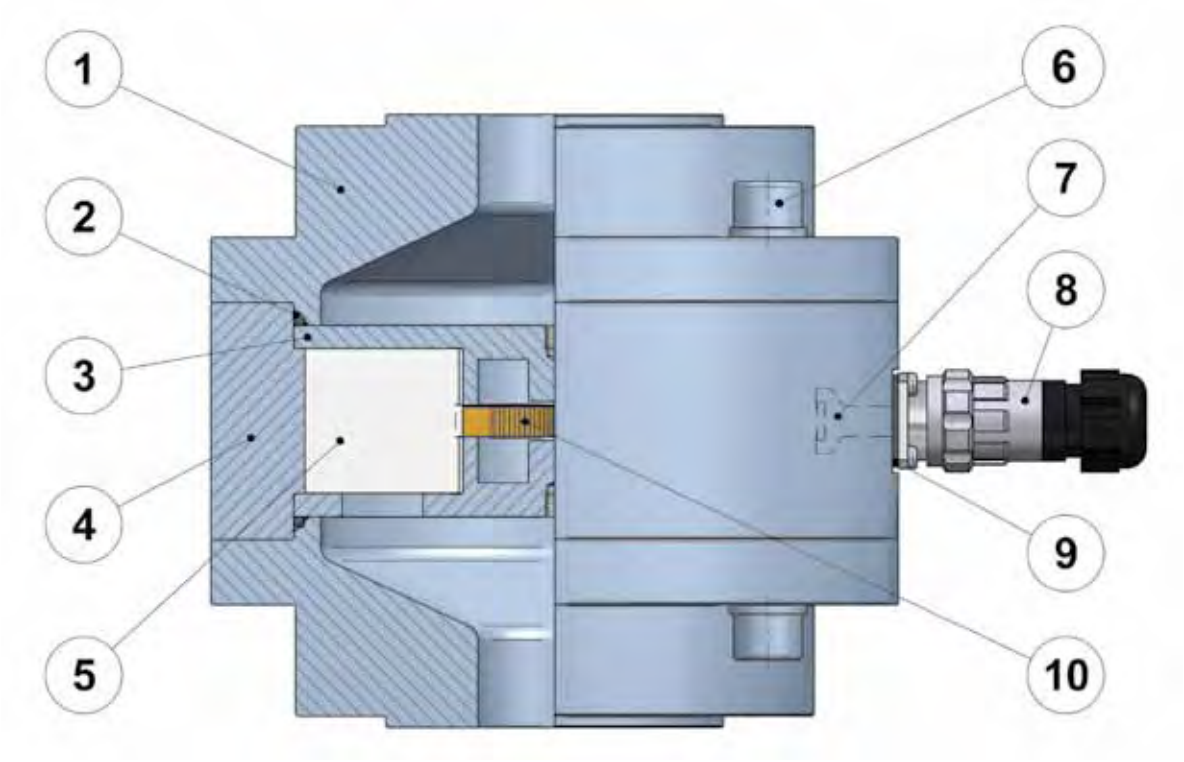
In those processes where air or gases, liquid evaporation, etc. might be present, an air/steam separator must be installed before the flowmeter, in order to obtain a real volume and flow rate measurement.

It is essential to avoid cavitations inside the COVOL flowmeter measuring chamber. In order to do this, the API Std 2534 standard must be taken into account. This standard states that on the outlet of the flowmeter the pressure must be at least twice the pressure drop of the flowmeter, plus 1.25 times the vapour pressure of the liquid or its most volatile components.

The wiring between the COVOL flowmeter and the associated electronic converters must be made so that no mains or power supply cables are placed around the devices, in order to avoid picking up interferences that might affect the reading.

2-wire shielded cable is recommended.

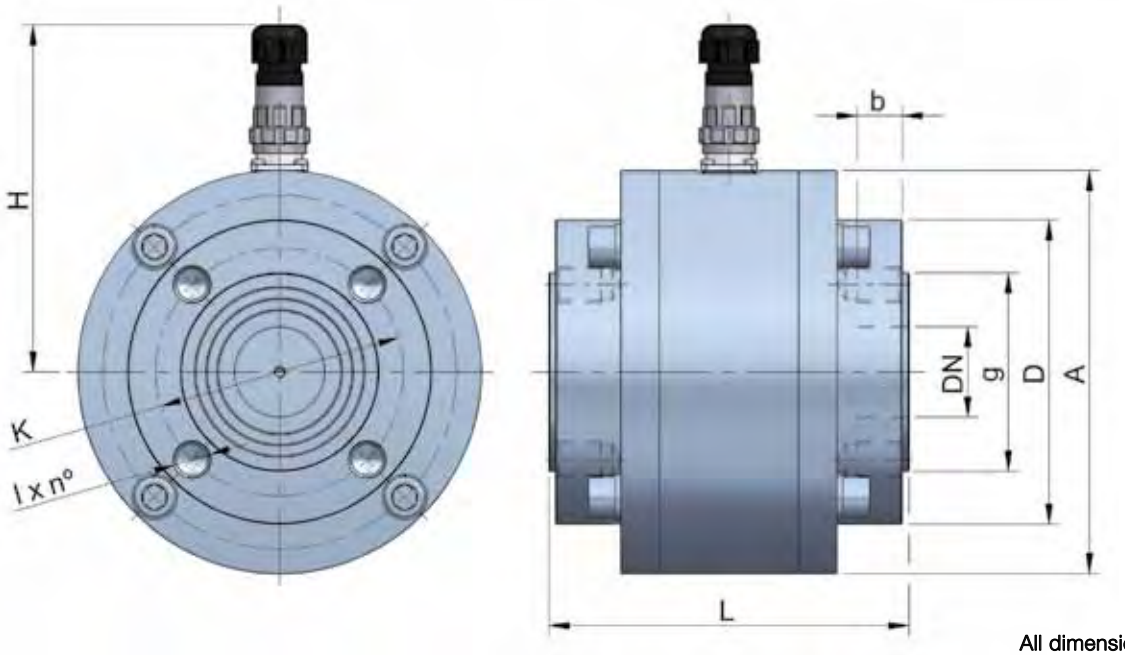
Materials



Nº	Description	Materials	
		AISI 316L	PTFE / PVC / PP
1	Inlet / outlet chamber + connection	EN 1.4404 (AISI 316L)	PTFE / PVC / PP
2	O-ring	NBR / PTFE / EPDM / VITON®	
3	Guide disk	EN 1.4404 (AISI 316L)	PTFE / PVC / PP
4	Measuring chamber	EN 1.4404 (AISI 316L)	PTFE / PVC / PP
5	Separator	EN 1.4404 (AISI 316L)	PTFE / PVC / PP
6	Screws	EN 1.4401 (AISI 316)	
7	Reed sensor group	— — —	
8	Connector	Aluminium alloy + Polyamide	
9	Gasket	NBR	
10	Piston	PTFE + Graphite / Bronze / Aluminium	

On request, materials suitable for hygienic applications: piston in PVDF and silicone seals

Dimensions



All dimensions in mm

Model AISI 316L

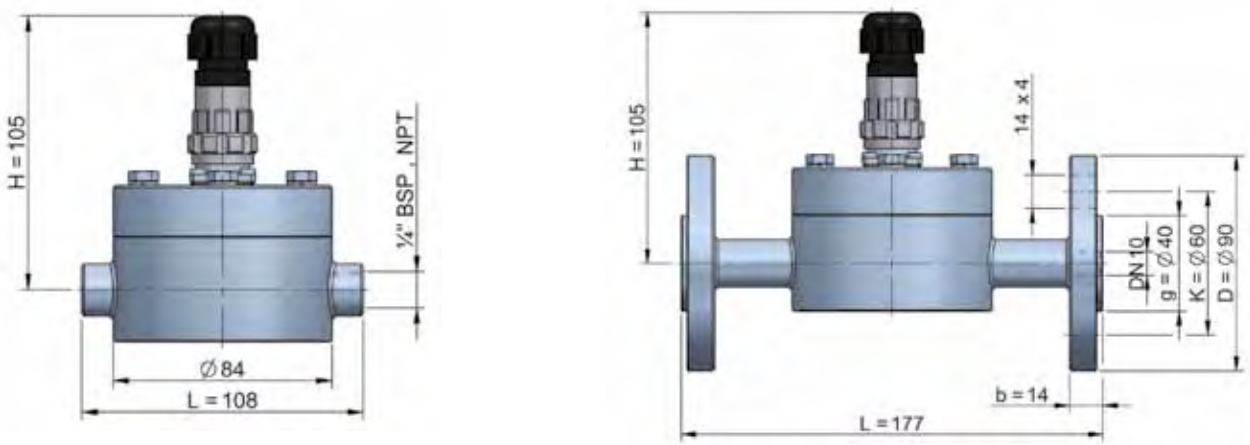
DN	D	g	K	(l x n°) x b	L	A	H
10	77	40	60	(M12 x 4) x 15	90	100	110
15	84	45	65	(M12 x 4) x 15	110	110	115
25	107	68	85	(M12 x 4) x 15	120	140	135
40	135	88	110	(M16 x 4) x 20	150	180	155
50	154	102	125	(M16 x 4) x 20	180	200	165
80	200	138	160	(M16 x 8) x 20	200	250	190

Available for DN100 with special design. Please consult factory

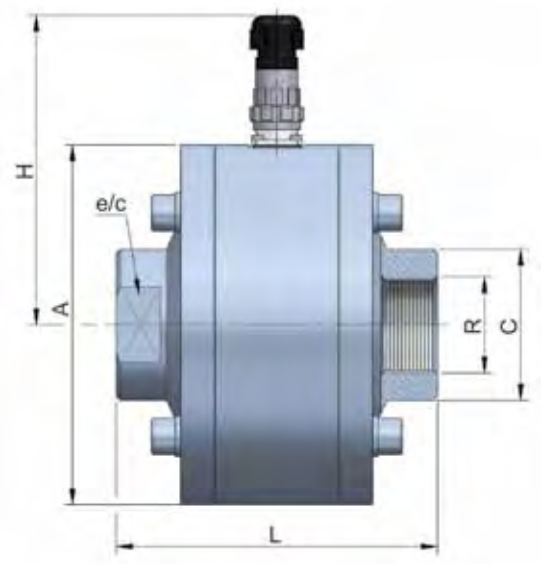
Models PTFE / PVC / PP

DN	D	g	K	(l x n°) x b	L	A	H
10	90	40	60	(M12 x 4) x 18	100	115	120
15	95	45	65	(M12 x 4) x 20	125	125	130
25	115	68	85	(M12 x 4) x 25	140	150	140
40	145	88	110	(M16 x 4) x 25	160	180	155
50	160	102	125	(M16 x 4) x 25	195	200	165
80	200	138	160	(M16 x 8) x 25	235	250	190

COVOL-H DN10 / ¼" low flow, horizontal



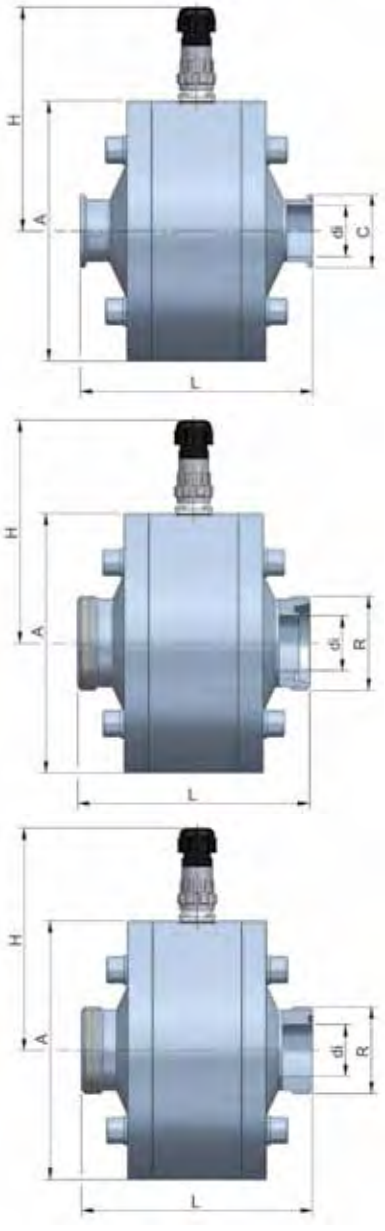
Threaded connection BSP/NPT



DN	R *	C	e/c	L	A	H
10	¼"	36	32	90	100	110
15	½"	42	36	110	110	115
25	1"	60	55	120	140	135
40	1½"	75	65	150	180	155
50	2"	90	80	180	200	165
80	3"	125	115	200	250	190

* Other sizes on request
All dimensions in mm

Sanitary couplings



CLAMP ISO 2852 connection

DN	di	C	OD *	L	A	H
10	10.7	34.0	12.7	90	100	110
15	15.2	34.0	17.2	110	110	115
25	35.6	50.5	25.0	120	140	135
40	35.6	50.5	38.6	150	180	155
50	48.6	64.0	51.0	180	200	165
80	72.9	91.0	76.1	200	250	190

* OD: pipe $Ø_{ext}$ according to ISO 2037
Other standards on request (DIN 32676,TRI-CLAMP®,...)

DIN 11851 connection

DN	di	R	L	A	H
10	10	Rd 28 x 1/8"	90	100	110
15	16	Rd 34 x 1/8"	110	110	115
25	26	Rd 52 x 1/6"	120	140	135
40	38	Rd 65 x 1/6"	150	180	155
50	50	Rd 78 x 1/6"	180	200	165
80	81	Rd 110 x 1/4"	200	250	190

SMS 1145 connection

DN	di	R	L	A	H
25	22.5	Rd 40 x 1/6"	120	140	135
40	35.5	Rd 60 x 1/6"	150	180	155
50	48.5	Rd 70 x 1/6"	180	200	165
80	72.0	Rd 98 x 1/6"	200	250	190

All dimensions in mm

Flow ranges

DN	Flow scales l/h water	Max. intermittent l/h water	pulses / litre approx.
10 / ¼" (H)	25-250	500	100
10	40-350	800	100
15	150-1500	2700	20
25	500-4500	9000	10
40	800-8500	15500	4
50	1500-16000	28000	2
80	3000-28000	50000	1
100	5000-60000	104000	0.2

The COVOL flowmeters are calibrated with water (density 1 kg/l and viscosity 1 mPa·s). After this calibration the pulse / litre factor is obtained. With this factor, the associated electronic converter can make the calculation of the flow rate and/or the volume values.

As shown in the accuracy curve, the area where the maximum accuracy is obtained is by the mid of the flowmeter flow range.

The measurement errors can be corrected in the different associated electronic converters by means of the adjustment of the pulse / litre factor, obtaining a maximum accuracy.

A change in viscosity can modify the pulse / litre factor.

In general, a change in density affect the COVOL flowmeters, only at the beginning of the scale:

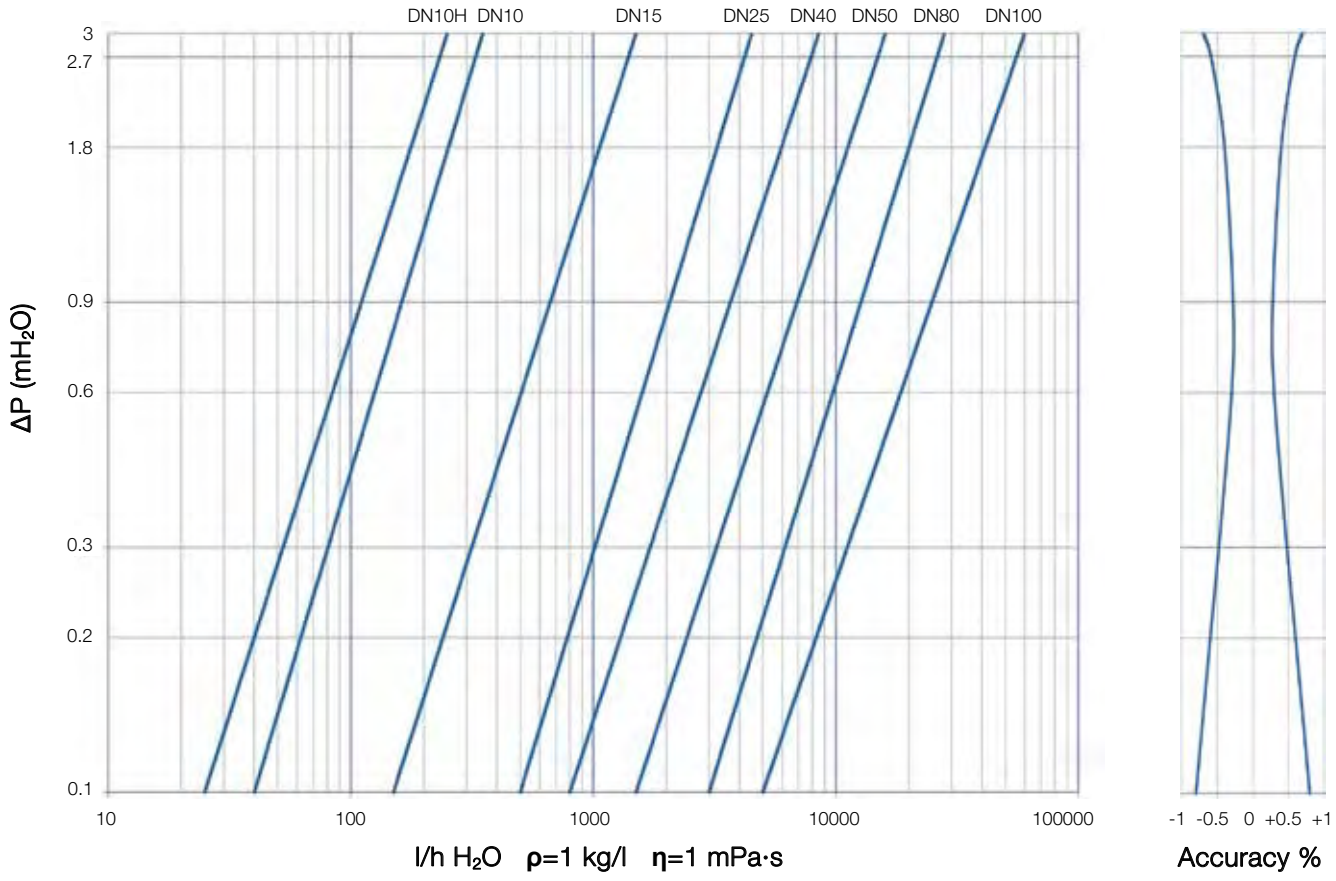
- If the density value is lower than 1 kg/l, the initial flow rate must be higher so that the flowmeter is sensitive to the liquid flow.
- If the value of density is higher than 1 kg/l, the initial flow rate must be lower so that the flowmeter is sensitive to the liquid flow.

In both cases the changes in flow scales are not significant due to the variation of density (not higher than 5% of the measured value with the reference liquid).

With high viscosities (higher than 1000 mPa·s) the scale ranges might change significantly depending on the liquid viscosity.

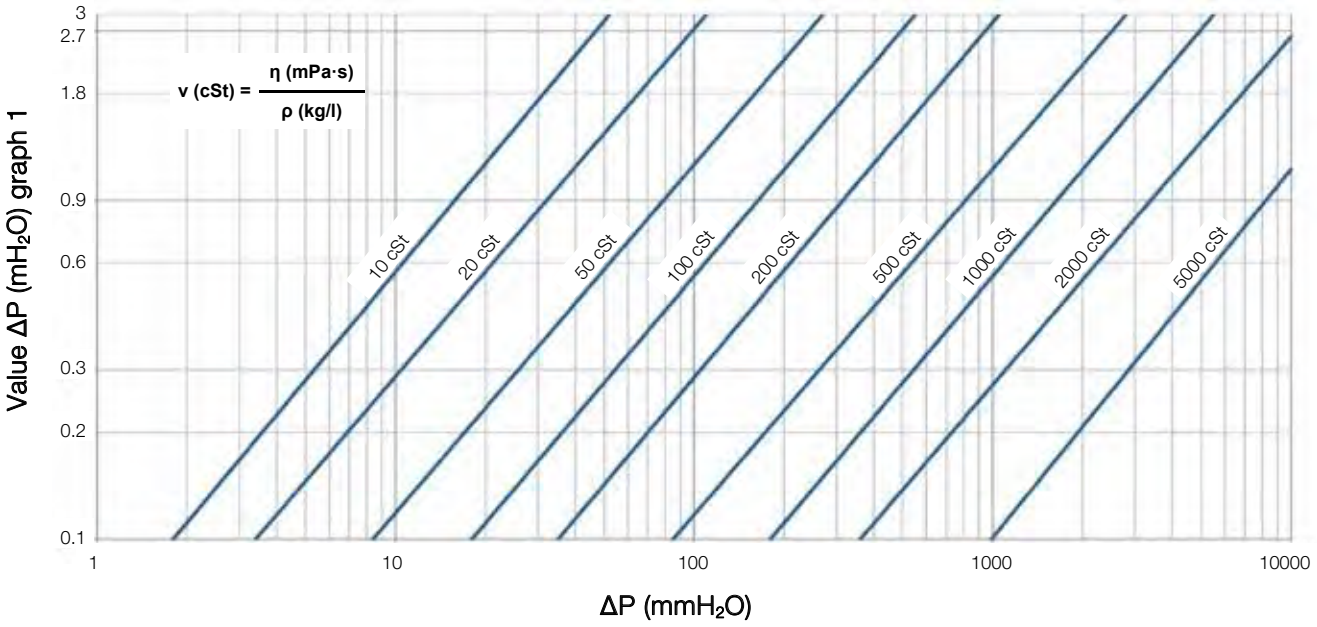
Flow rate and pressure drop curves

Graph 1



ΔP increase (mmH_2O) due to the effect of density and viscosity

Graph 2



Electronic converters

Model CP ... CH420

- 4-20 mA transmitter
- System:
  - Compact (CP ... CH420L)
  - Remote in DIN rail (CP ... CH420R)
  - Remote in panel (CP … CH420P)
- Electronics mounted in a housing with aluminium base and polycarbonate (UV resistant) cover (CP … CH420L)
- Power supply:
  - 2-wire, loop powered
  - Nominal voltage: 8 ... 36 VDC
  - Power consumption: ≤20 mA
- Totalizer:
  - Nº of digits: 7
  - Size of digit: 8 mm
  - Reset: by means of keyboard
- Flow rate indication:
  - Nº of digits: 5
  - Size of digit: 5 mm
- Programmable beginning and end of scale
- Several selectable flow rate indication and totalizer units
- Programmable pulse / litre factor
- Ingress protection:
  - IP65 for CP ... CH420L
  - IP30 for CP ... CH420R
  - Front IP50 (IP65 on request) and back IP30 for CP … CH420P
- Ambient temperature: 0ºC ... +60ºC
- HART protocol available with models CH420L ... R … P

CP ... CH420L

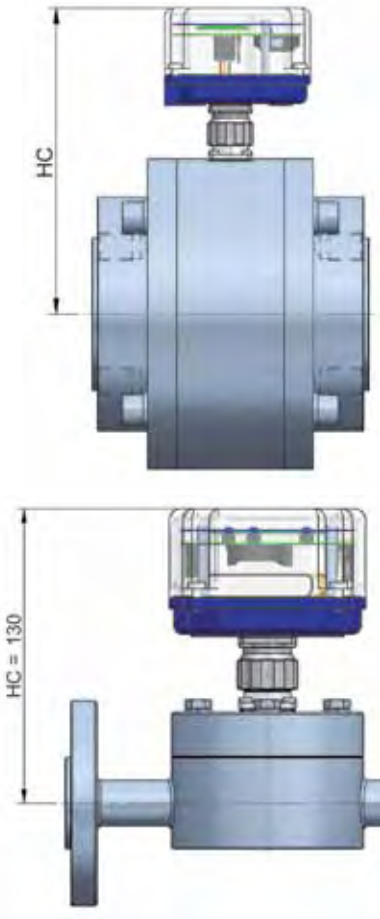
CP ... CH420P

CP ... CH420R

Model CIP ... CIP II

- Volume totalizer:
  - Model CIP: resettable totalizer
  - Model CIP II: non-resettable totalizer and resettable partial totalizer
- Compact or remote system
- Electronics mounted in a housing with aluminium base and polycarbonate (UV resistant) cover
- Battery powered (CR-2450):
  - Nominal voltage: 3 V
  - Load: 560 mAh
  - Power consumption: 8 µA
- Totalizer:
  - Nº of digits: 7
  - Size of digit: 8 mm
  - Reset: by means of key or magnet (non-resettable for CIP II)
- Partial totalizer (only available for CIP II):
  - Nº of digits: 5
  - Size of digit: 5 mm
  - Reset: by means of key or magnet
- Battery life: 5 years approx.
- Programmable pulse / litre factor
- Ingress protection: IP65
- Ambient temperature: 0ºC ... +50ºC

Dimensions COVOL + CIP ... CIP II / CP ... CH420L

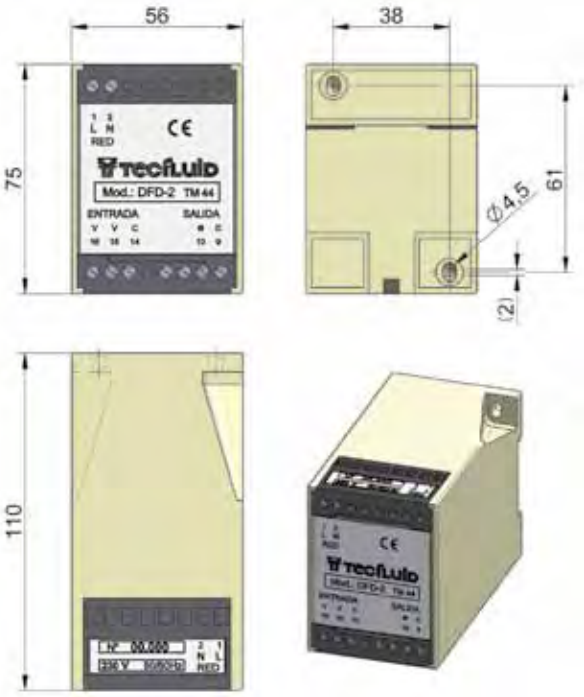


DN	HC *	HC **
10 (H)	130	130
10	135	145
15	140	155
25	160	165
40	180	180
50	190	190
80	215	215

HC * : model AISI 316L ; HC ** : models PVC / PTFE / PP

Model DFD2

- Frequency divider
- Fully programmable by the user
- DIN 46277 rail mounted
- Acts as an interface between the series COVOL flowmeters and systems with frequency limited pulse input, such as some PLCs or mechanical counters.
- Power supply: 24, 110, 220, 240 VAC 50 / 60 Hz, 24 VDC
- Power consumption: 1 VA
- Outputs:
  - TTL (0-5 V)
  - Optoisolated max. 30 V 50 mA
- Special inputs TTL or NAMUR
- Ingress protection: IP40 (terminals IP20)
- Ambient temperature: 0ºC ... +50ºC



Model MC01

- Electronic converter for flow rate indication, volume totalizer, partial volume totalizer and preselector with relay output for batching
- Fully programmable by the user
- Panel mounted
- Power supply: 24, 110, 220, 240 VAC 50 / 60 Hz
  12, 24 VDC
- 2-line LCD display with 16 characters (5 mm height)
- 7 digits totalizer, partial totalizer and volume preselector
- Relay output for batching
- Flow rate indicator in l/h y m^3/h
- Dimensions 96 x 96 mm DIN 43700
- Ingress protection: IP50 front, IP30 back
- Ambient temperature: -10ºC ... +50ºC

Options

- 0 ... 4-20 mA analog input or output, 4-wire system
- Reset and batching start by means of remote button
- Plastic front protection with key and silicone cover, for IP65 rating

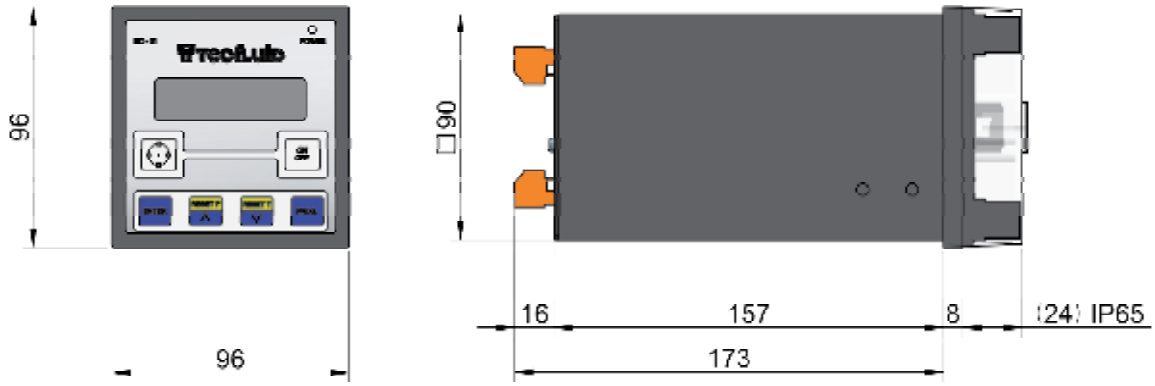
Model MT02

- Electronic converter for volume preselection and totalization
- Fully programmable by the user
- Panel mounted
- Power supply: 24, 110, 220, 240 VAC 50 / 60 Hz
  12, 24 VDC
- 7 digits LED display for total and partial volume and preselection + 1 digit for operation mode
- Relay output for batching
- Dimensions 96 x 96 mm DIN 43700
- Ingress protection: IP50 front, IP30 back
- Ambient temperature: -10ºC ... +50ºC

Options

- Reset and batching start by means of remote button
- Plastic front protection with key and silicone cover, for IP65 rating
- Version with double relay for fast approximation and slow final adjustment for batching processes, model MT02/2

Dimensions converters MC01 / MT02



ATEX version

The COVOL flowmeter is suitable for its installation in ATEX hazardous area, that is, in those zones where a potentially explosive atmosphere can be generated. There are two types of protection available: Exi intrinsically safe or Exd ExProof.

Exia protection

The reed sensor is considered as “simple apparatus” according to EN 60079-11 standard clause 5.7, since it does not contain its own source of ignition.

Reed sensor technical data:

- $V_{max.}$: 30 V ; $I_{max.}$: 20 mA
- Maximum switched power: 0.6 VA
- Max. ambient temperature: 40ºC

According to these data, the flowmeter can be installed in hazardous area when an appropriate zener barrier (please consult) is installed between the hazardous and the safe area. The electronic converters, however, must always be installed in safe area.

Exd protection

These devices conform the 94/9/CE directive (Devices and protection systems for use in potentially explosive atmospheres) as indicated in the CE certificate type LOM 14ATEX and its corresponding marking.

The instrument belongs to group II, therefore it is intended for use in places where there is a risk of generation of an explosive atmosphere, except in mining.

Being category 2GD it can be used in an environment where it is probable to generate an explosive atmosphere due to air and gases mixtures, vapours, mist and dust as well.

Three different types of Exd housings are available:

- Model ADF30: blind housing with reduced dimensions
- Model ADF60V: housing with window, can include the CIP … CIP II or CP ... CH420L converters
- Model ADF60: same as ADF60V but blind housing

Exd version technical data:

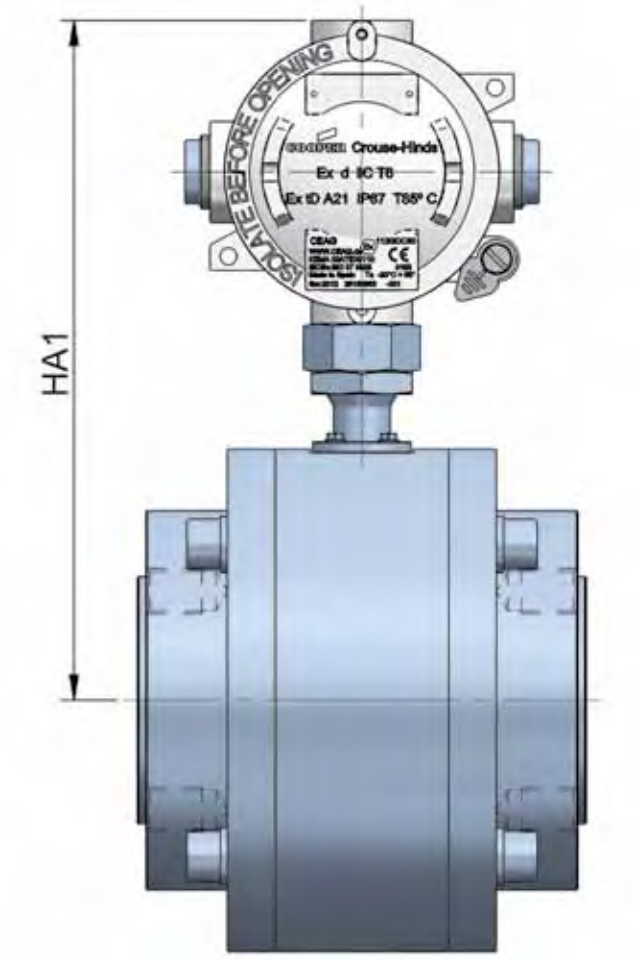
- Ambient temperature: -20ºC ... +60ºC
- Electrical wiring inside the Exd housing
- On request ATEX packing glands for standard or shielded cable
- Associated electronics, for models:
  - CIP ... CIP II: totalizer battery powered
  - CP … CH420: transmitter 2-wire system with flow rate indication, volume totalizer and 4-20 mA output. HART protocol optional
- ATEX certificate Ex d IIC T6 Gb / Ex tb IIIC T85ºC Db

Exd housing model ADF60V with CIP II display

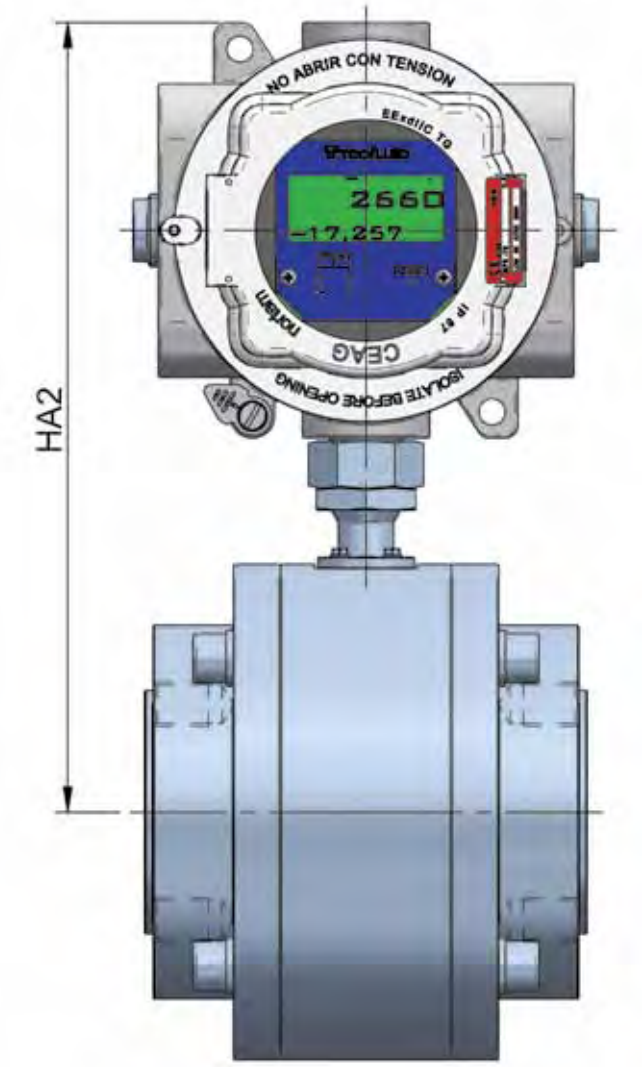
Exd housing model ADF30

Dimensions

Exd housing model ADF30



Exd housing model ADF60V



DN	HA1 AISI 316L	HA1 PP/PVC/PTFE	HA2 AISI 316L	HA2 PP/PVC/PTFE
15	205	220	250	265
25	225	230	270	275
40	245	245	290	290
50	255	255	300	300
80	280	280	325	325

Exd housings are not available for flowmeter sizes DN10 (H) and DN10
DN100 on request

1.8
TURBINE

1.8 TURBINE

TM

TecFluid
The art of measuring

Turbine flowmeters
Series TM

- Suitable for liquids
- Possibility of installation in all flow directions
- Special design for high pressure available
- Excellent relationship flow range / flowmeter size
- Low pressure drop
- Flow rate: 0.3 ... 650 m^3/h
- Accuracy: ±0.5% measured value
- Repeatability: ±0.1%
- Connections:
  - EN 1092-1 DN15 ... DN150 flange
    Other standards on request
  - BSP or NPT threaded connection
  - Sanitary couplings according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Materials:
  - Body: EN 1.4404 (AISI 316L)
  - Propeller: EN 1.4016 (AISI 430)
  - Shaft / Bearings: Tungsten carbide / Graphite
- Optional:
  - Flow rate indication, local or remote
  - Volume totalizer, local or remote
  - Electronic transmitter with 4-20 mA analog output. HART protocol available on request
  - Volume preselector for batching processes
  - ATEX version. Exd protection

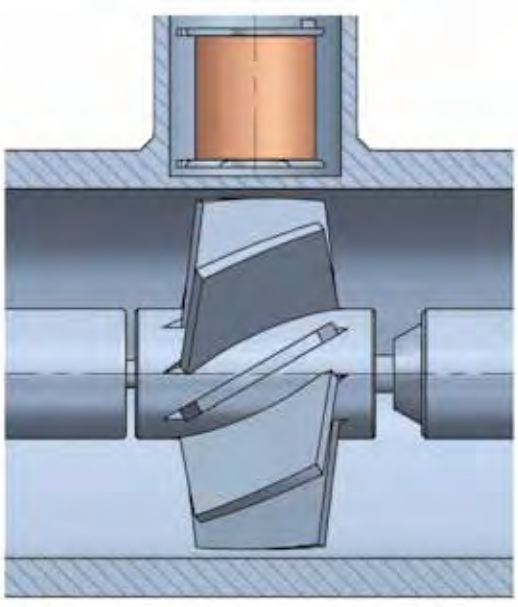
Working principle

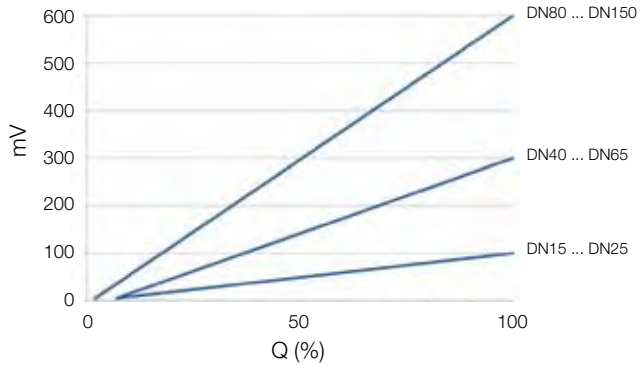
One helicoidal rotor turns freely inside a cylindrical tube.

The working liquid pushes the rotor blades, making them turn at a flow speed which is proportional to the flow rate.

A pick-up coil mounted externally receives the propeller turns and generates an electrical signal which, once treated by the different electronic converters, provides:

- Flow rate indication
- Total or partial volume
- Digital and analog outputs (mA, Hz and V)





Approximate output voltage (without amplifier), depending on flow rate

Applications

- **Chemical and petrochemical industry**
- **Tank filling and batching applications**
- **Measurement of steam condensates in boilers**
- **Burners, measurement of fuel consumption**

Technical data

- **Accuracy:** ±0.5% measured value
- **Repeatability:** ±0.1%
- **Response time:** 10 ms
- **Output signal:** according to graph
- **Scale range:** 10:1
- **Fluid temperature:** -50ºC ... +170ºC
- **Working pressure:**
  - DN15 … DN50: PN40
  - DN65 … DN150: PN16

  Others on request
- **Connections:**
  - EN 1092-1 DN15 ... DN150 flange
    Other flange standards on request
  - BSP or NPT threaded connections
  - Sanitary couplings according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- **Mounting in horizontal or vertical pipe, and installation in all flow directions**

Electronic converters and options

- **CP ... CH420:** flow rate indication, volume totalizer and 4-20 mA output, 2-wire system. Compact or remote mounted. HART protocol with model CH420
- **CIP:** volume totalizer. Battery powered. Compact or remote mounted
- **CIP II:** non-resettable volume totalizer, resettable partial volume totalizer. Battery powered. Compact or remote mounted
- **MC01:** flow rate indication, volume totalizer and volume preselector with relay output for batching applications. 4-20 mA analog output as an option, 4-wire system. Panel mounted
- **MT02:** volume totalizer, partial volume totalizer and volume preselector with relay output for batching applications. Panel mounted
- **DFD2:** frequency divider. DIN rail mounted
- **APTM44:** pulse amplifier. DIN rail mounted
- **Options:**
  - Special connector for other displays (please consult)
  - Exd version for hazardous environments

Mounting

For both horizontal or vertical pipes and installation in all flow directions (horizontal pipe is recommended for DN125 and DN150). A straight pipe run without any disturbing element (elbows, valves, filters, etc) of 10 x DN before and 5 x DN after the turbine flowmeter is required. The upstream distance can be reduced to 5 x DN if a straightener is installed.

In order to avoid that small particles can damage the turbine propeller it is mandatory to install a filter before the flowmeter with a mesh size of 1 mm up to DN100 and 3 mm for bigger sizes.

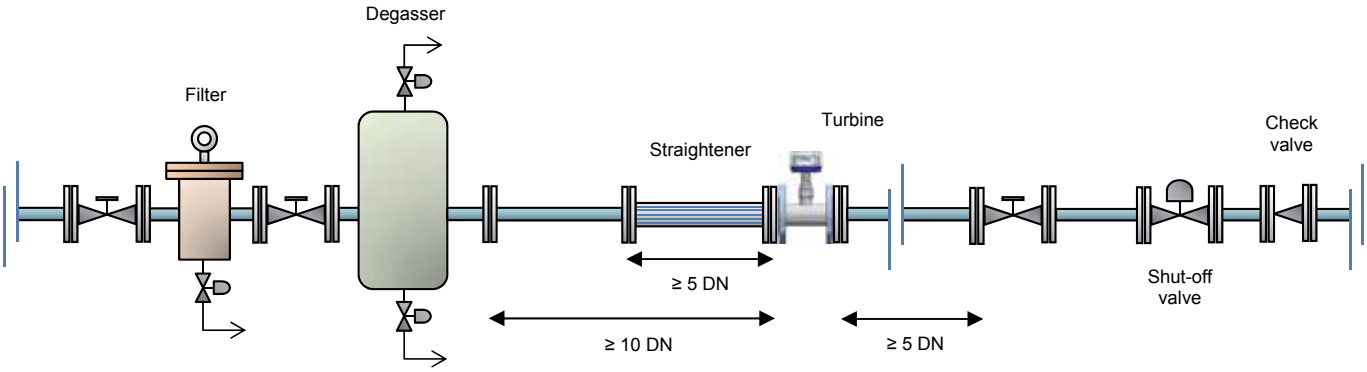
In those processes where air or gases, liquid evaporation, etc. might be present, an air/steam separator must be installed before the turbine flowmeter, in order to avoid measurement errors.

It is essential to avoid cavitations inside the turbine flowmeter. In order to do this, on the outlet of the flowmeter the pressure must be at least twice the pressure drop of the flowmeter, plus 1.25 times the vapour pressure of the liquid.

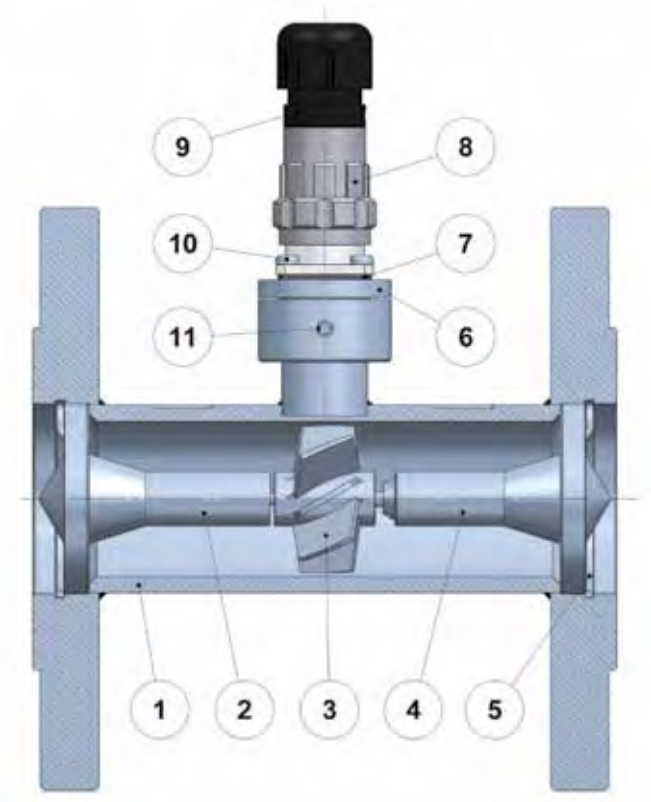
The wiring between the turbine flowmeter and the associated electronic converters must be made so that no mains or power supply cables are placed around the devices, in order to avoid picking up interferences that might affect the reading.

For an optimal signal transmission the following is recommended:

- up to 30 m, 2-wire shielded cable
- up to 100 m, installation of pulse amplifier model APTM44
- up to 3000 m, installation of Hz/mA converter model CP … CH420L



Materials

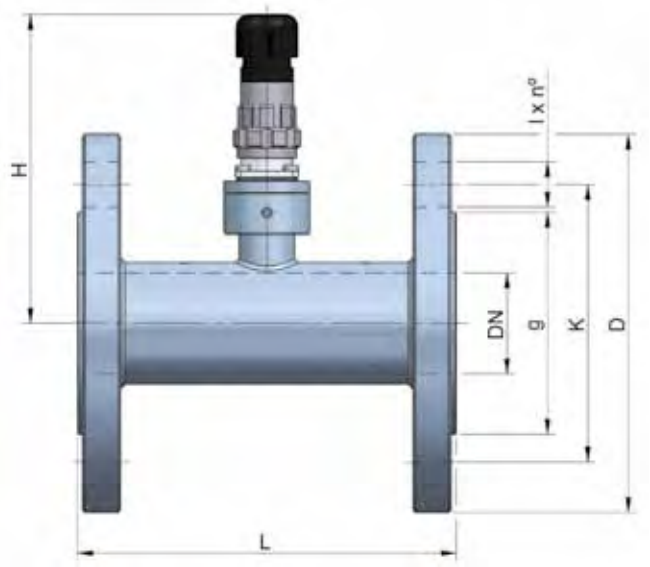


Nº	Description	Materials
1	Measuring body	EN 1.4404
2	Inlet deflector	EN 1.4404 + WC
3	Propeller	EN 1.4016 + Graphite + WC
4	Outlet deflector	EN 1.4404 + WC
5	Circlip	EN 1.4401
6	Coil support	EN 1.4305
7	Gasket	NBR
8	Connector	Anodized aluminium
9	Packing gland	Plastic
10	Screw DIN 7985 M3 x 8	EN 1.4301
11	Screw DIN 913 M4 x 8	EN 1.4301

Note:

EN 1.4404	AISI 316L
EN 1.4016	AISI 430
EN 1.4401	AISI 316
EN 1.4301	AISI 304
EN 1.4305	AISI 303
WC	Tungsten carbide

Dimensions



DN	PN	D	K	g	l x n°	L	H	Weight (kg)
15	40	95	65	45	14 x 4	100	115	2.0
20	40	105	75	58	14 x 4	100	115	2.5
25	40	115	85	68	14 x 4	130	120	3.5
40	40	150	110	88	18 x 4	150	125	5.0
50	40	165	125	102	18 x 4	150	130	7.0
65	16	185	145	122	18 x 8	160	140	10.0
80	16	200	160	138	18 x 8	160	145	12.0
100	16	220	180	158	18 x 8	250	155	17.0
125	16	250	210	188	18 x 8	280	170	21.0
150	16	285	240	212	22 x 8	300	180	27.0

All dimensions in mm

Flow ranges

DN	Flow scales m^3/h water	Max. intermittent m^3/h water	pulses / litre approx.	ΔP mbar at Qmax
15	0.3-3	4	730	750
20	0.6-6	8	500	750
25	0.9-13.6	16	220	700
40	1.9-30	40	60	560
50	5-50	60	20	280
65	9-90	115	10	240
80	15-150	180	5	310
100	28-280	340	3	450
125	45-450	560	1.5	240
150	65-650	820	0.8	250

The TM turbine flowmeters are calibrated with water (density 1 kg/l and viscosity 1 mPa·s).

It is recommended that minimum flow rate is at least 10% of the flow scale in order to obtain the highest accuracy.

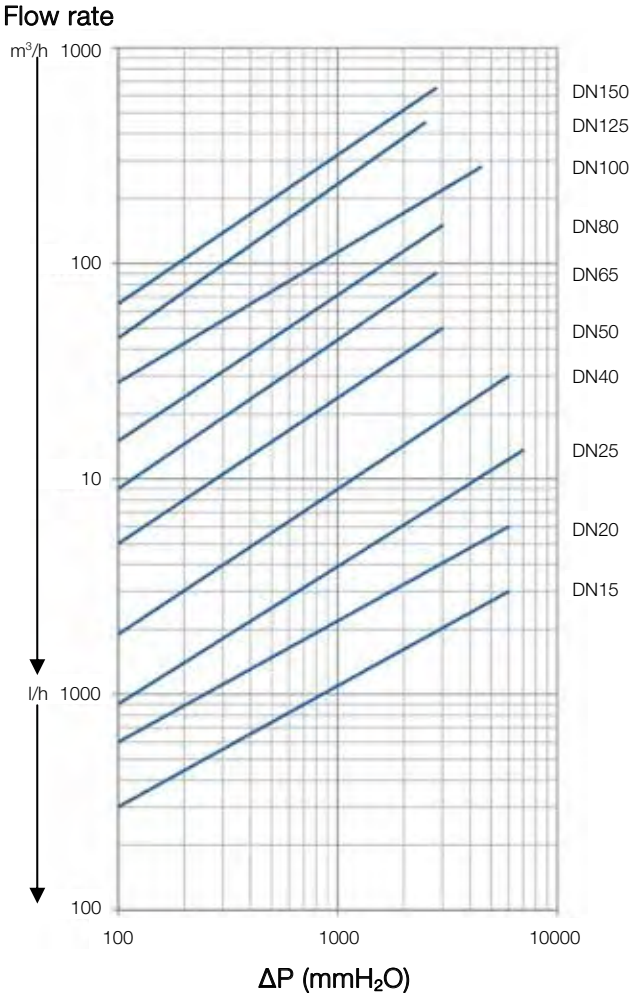
The measurement errors can be corrected in the different associated electronic converters by means of the adjustment of the k factor (pulses / volume unit), obtaining a maximum accuracy.

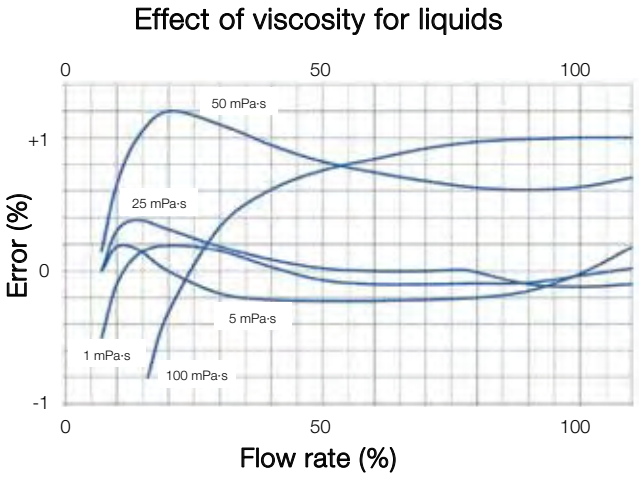
A change in viscosity can modify the k factor. The measurement error due to these changes in viscosity is approximately indicated in the curves on next page.

In general, changes in density and viscosity affect the turbine flowmeters. The higher the density and the viscosity are, the lower the initial flow rate required is so that the propeller starts turning, that is, the lower the beginning of the scale is. In the same way, for lower values of density and viscosity, the beginning of the scale is higher.

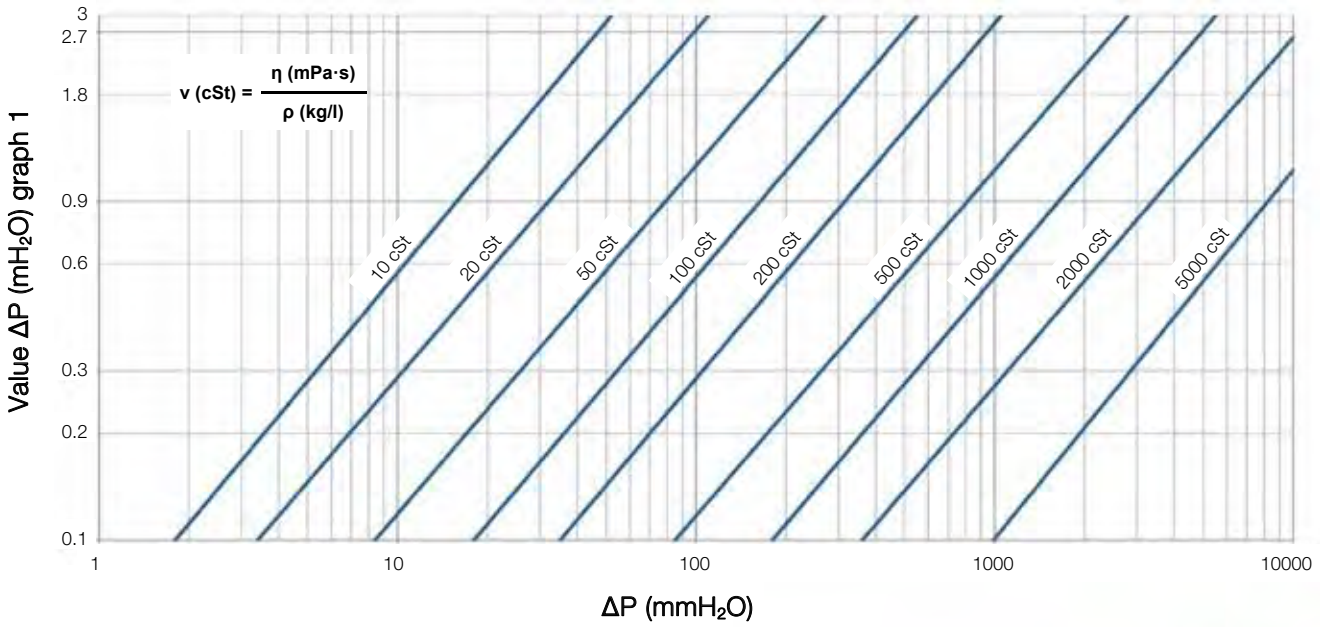
The TM turbine flowmeters are suitable for liquids with viscosities up to 100 mPa·s, although it is very important that liquid viscosity remains unchanged during operation in order to avoid measurement errors.

Flow rate and pressure drop (ΔP) curves





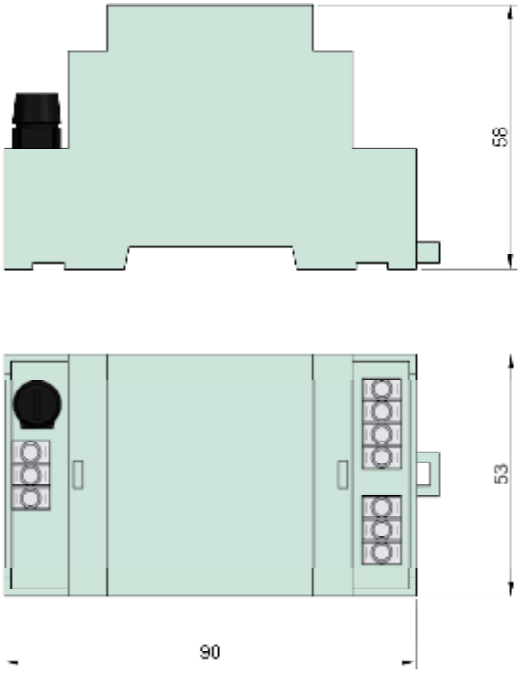
Variations of pressure drop due to the effect of density and viscosity



Electronic converters

Model APTM44

- Pulse amplifier
- DIN 46277 rail mounted
- Adaptable to pulse and mV emitters
- Does not need adjustment on site
- Allows the connection between a turbine flowmeter and a PLC or other devices that do not admit a pick-up type input
- Power supply: 24, 110, 220, 240 VAC 50 / 60 Hz, 24 VDC
- Power consumption: 1 VA
- Output TTL (0-5 V)
- Pulse width: 0.1 ms
- Maximum input frequency: up to 1500 pulses / s
- Ingress protection: IP40 (terminals IP20)
- Ambient temperature: 0ºC ... +50ºC
- Recommended for signal transmission from 30 m and up to 100 m



Model CP ... CH420

- 4-20 mA transmitter
- System:
  - Compact (CP ... CH420L)
  - Remote in DIN rail (CP ... CH420R)
  - Remote in panel (CP … CH420P)
- Electronics mounted in a housing with aluminium base and polycarbonate (UV resistant) cover (CP … CH420L)
- Power supply:
  - 2-wire, loop powered
  - Nominal voltage: 8 ... 36 VDC
  - Power consumption: ≤20 mA
- Totalizer:
  - Nº of digits: 7
  - Size of digit: 8 mm
  - Reset: by means of keyboard
- Flow rate indication:
  - Nº of digits: 5
  - Size of digit: 5 mm
- Programmable beginning and end of scale
- Several selectable flow rate indication and totalizer units
- Programmable pulse / litre factor
- Ingress protection:
  - IP65 for CP ... CH420L
  - IP30 for CP ... CH420R
  - Front IP50 (IP65 on request) and back IP30 for CP … CH420P
- Ambient temperature: 0ºC ... +60ºC
- HART protocol available with models CH420L ... R … P
- Allows the transmission of the 4-20 mA signal up to 3000 m

CP ... CH420L

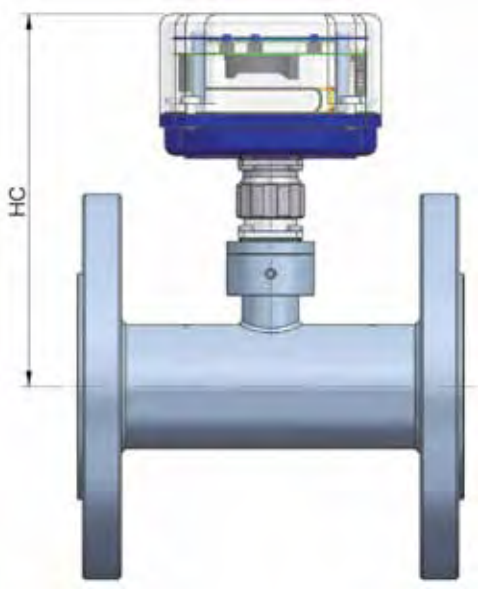
CP ... CH420P

CP ... CH420R

Model CIP ... CIP II

- Volume totalizer:
  - Model CIP: resettable totalizer
  - Model CIP II: non-resettable totalizer and resettable partial totalizer
- Compact or remote system
- Electronics mounted in a housing with aluminium base and polycarbonate (UV resistant) cover
- Battery powered (CR-2450):
  - Nominal voltage: 3 V
  - Load: 560 mAh
  - Power consumption: 8 µA
- Totalizer:
  - Nº of digits: 7
  - Size of digit: 8 mm
  - Reset: by means of key or magnet (non-resettable for CIP II)
- Partial totalizer (only available for CIP II):
  - Nº of digits: 5
  - Size of digit: 5 mm
  - Reset: by means of key or magnet
- Battery life: 5 years approx.
- Programmable pulse / litre factor
- Ingress protection: IP65
- Ambient temperature: 0ºC ... +50ºC

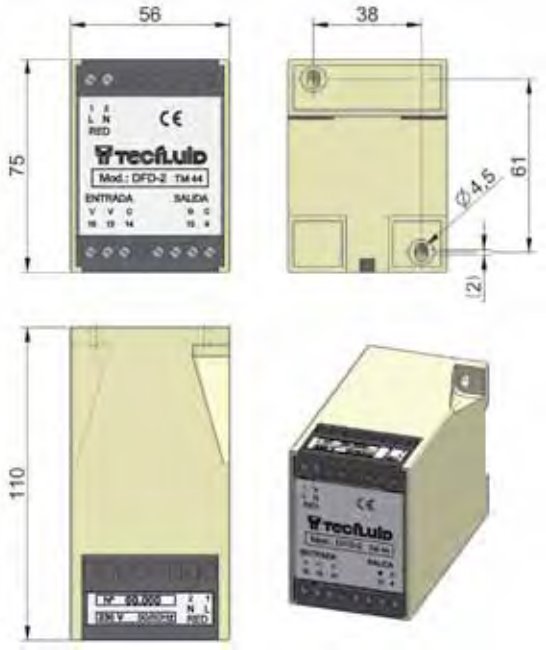
Dimensions TM + CIP ... CIP II / CP ... CH420L



DN	HC
15	140
20	140
25	145
40	150
50	155
65	165
80	170
100	180
125	195
150	205

Model DFD2

- Frequency divider
- Fully programmable by the user
- DIN 46277 rail mounted
- Acts as an interface between the series TM turbine flowmeters and systems with frequency limited pulse input, such as some PLCs or mechanical counters.
- Power supply: 24, 110, 220, 240 VAC 50 / 60 Hz, 24 VDC
- Power consumption: 1 VA
- Outputs:
  - TTL (0-5 V)
  - Optoisolated max. 30 V 50 mA
- Special inputs TTL or NAMUR
- Ingress protection: IP40 (terminals IP20)
- Ambient temperature: 0ºC ... +50ºC



Model MC01

- Electronic converter for flow rate indication, volume totalizer, partial volume totalizer and preselector with relay output for batching
- Fully programmable by the user
- Panel mounted
- Power supply: 24, 110, 220, 240 VAC 50 / 60 Hz
  12, 24 VDC
- 2-line LCD display with 16 characters (5 mm height)
- 7 digits totalizer, partial totalizer and volume preselector
- Relay output for batching
- Flow rate indicator in l/h y m^3/h
- Dimensions 96 x 96 mm DIN 43700
- Ingress protection: IP50 front, IP30 back
- Ambient temperature: -10ºC ... +50ºC

Options

- 0 ... 4-20 mA analog input or output, 4-wire system
- Reset and batching start by means of remote button
- Plastic front protection with key and silicone cover, for IP65 rating

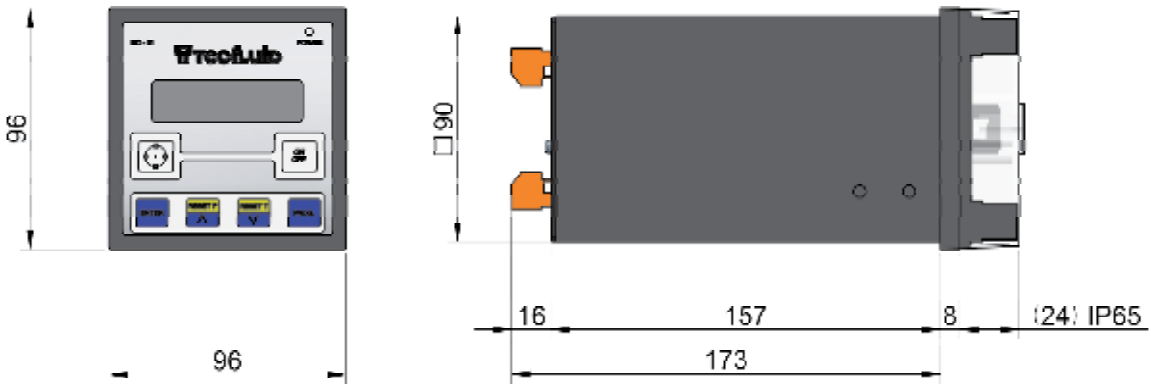
Model MT02

- Electronic converter for volume preselection and totalization
- Fully programmable by the user
- Panel mounted
- Power supply: 24, 110, 220, 240 VAC 50 / 60 Hz
  12, 24 VDC
- 7 digits LED display for total and partial volume and preselection + 1 digit for operation mode
- Relay output for batching
- Dimensions 96 x 96 mm DIN 43700
- Ingress protection: IP50 front, IP30 back
- Ambient temperature: -10ºC ... +50ºC

Options

- Reset and batching start by means of remote button
- Plastic front protection with key and silicone cover, for IP65 rating
- Version with double relay for fast approximation and slow final adjustment for batching processes, model MT02/2

Dimensions converters MC01 / MT02



ATEX version

The TM turbine flowmeter is suitable for its installation in ATEX hazardous area, that is, in those zones where a potentially explosive atmosphere can be generated. There are two types of protection available: Exi intrinsically safe or Exd ExProof.

Exia protection

This device is considered as “simple apparatus” according to EN 60079-11 standard clause 5.7, since it does not contain its own source of ignition.

Pick-up coil technical data:

- Li ≤ 700 mH
- Ci ≤ 30 pF
- Internal resistance > 1700 Ohm
- Ui ≤ 3 V

According to these data, the turbine flowmeter can be installed in hazardous area when an appropriate zener barrier (please consult) is installed between the hazardous and the safe area. The electronic converters, however, must always be installed in safe area.

Exd housing model ADF60V with CIP II display

Exd protection

These devices conform the 94/9/CE directive (Devices and protection systems for use in potentially explosive atmospheres) as indicated in the CE certificate type LOM 14ATEX and its corresponding marking.

The instrument belongs to group II, therefore it is intended for use in places where there is a risk of generation of an explosive atmosphere, except in mining.

Being category 2GD it can be used in an environment where it is probable to generate an explosive atmosphere due to air and gases mixtures, vapours, mist and dust as well.

Three different types of Exd housings are available:

- Model ADF30: blind housing with reduced dimensions
- Model ADF60V: housing with window, can include the CIP … CIP II or CP ... CH420L converters
- Model ADF60: same as ADF60V but blind housing

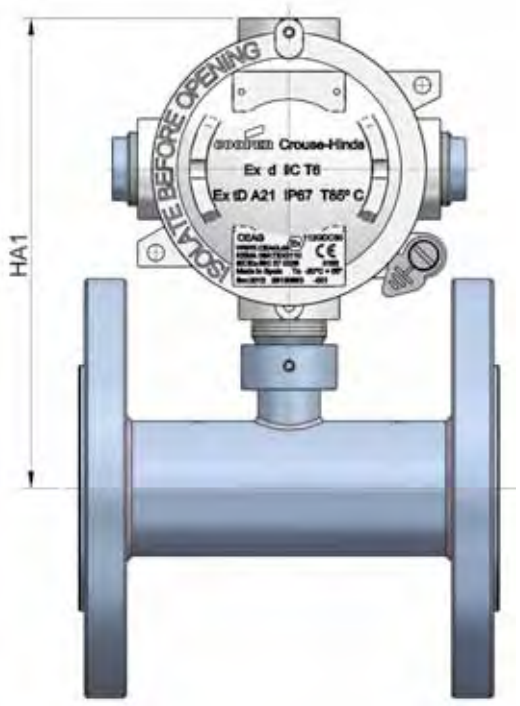
Exd version technical data:

- Ambient temperature: -20ºC ... +60ºC
- Electrical wiring inside the Exd housing
- On request ATEX packing glands for standard or shielded cable
- Associated electronics, for models:
  - CIP ... CIP II: totalizer battery powered
  - CP … CH420: transmitter 2-wire system with flow rate indication, volume totalizer and 4-20 mA output. HART protocol optional
- ATEX certificate Ex d IIC T6 Gb / Ex tb IIIC T85ºC Db

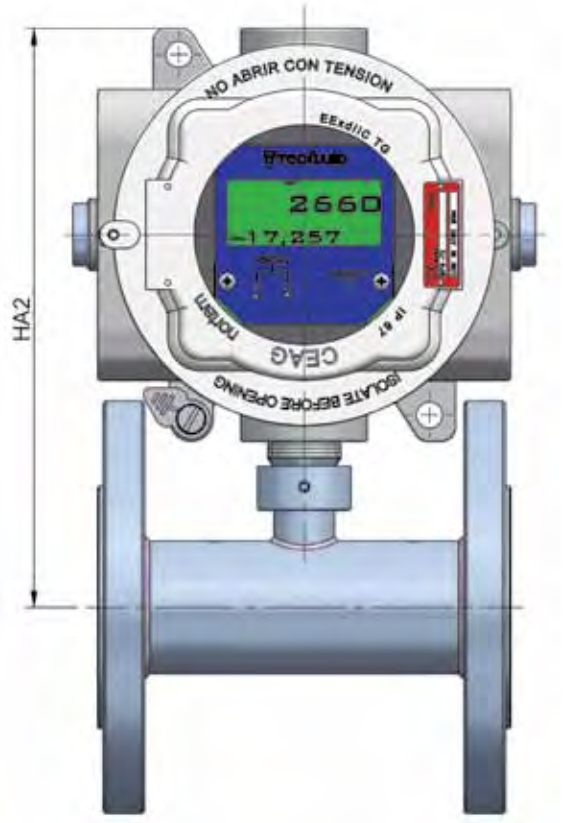
Exd housing model ADF30

Dimensions

Exd housing model ADF30

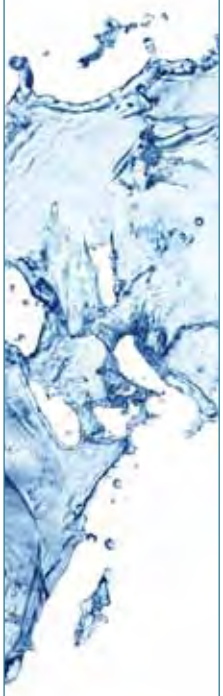


Exd housing model ADF60V



DN	HA1	HA2
15	160	205
20	160	205
25	165	210
40	170	215
50	175	220
65	185	230
80	190	235
100	200	245
125	215	260
150	225	270

R-CT-TM Rev. 1 english version



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2. LEVEL

2.1
BY-PASS LEVEL GAUGES

2.1
BY-PASS LEVEL GAUGES

LT

Level gauges
Series LT

Level indicator, switch and transmitter for liquids

- Simple construction
- Resistant under extreme temperature and pressure conditions
- No risk of leakage
- Excellent chemical resistance
- Measuring range: from 150 mm to 15 m
- Accuracy: ±4 mm measured value
- Connections:
  - EN 1092-1 or ANSI flanges. Other flange standards on request (JIS,...)
  - BSP or NPT threaded connections
  - Sanitary couplings according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Materials: EN 1.4404 (AISI 316L), PVC, PP, PVDF, PTFE, PVC-C. Others on request
- Local indication:
  - By means of external float in a glass tube
  - By means of magnetic strips
- Options:
  - Switches. Optional with Ex d IIC T6 Explosion Proof Enclosure (ATEX certified)
  - Electronic transmitter with 4-20 mA analog output for safe or hazardous area (Ex ia IIC T6 protection, ATEX certified). HART, PROFIBUS, FIELDBUS protocols available on request

Working principle

According to communicating vessels principle. A float submersed in a chamber communicated with the tank whose liquid level needs to be measured floats on liquid surface and moves together with it, as level increases or decreases.

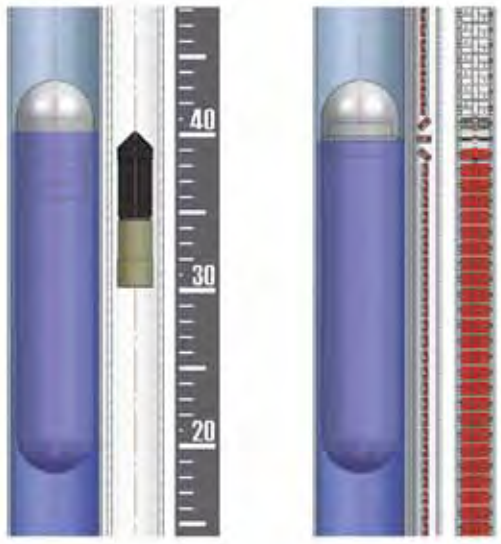
The float is designed for the specific working liquid density and shows the tank level by means of magnetic coupling with an external float or with a magnetic strips rail (depending on model). Both of them are mounted externally and isolated of the level gauge chamber.

Applications

- Chemical and petrochemical industries
- Process industry
- Thermal plants and cryogenic installations
- Ship industry
- Boilers
- Storage installations

Models

- **LT.../ :** indication by means of external float in a borosilicate glass tube. Graduated scale in cm included. Maximum liquid temperature for AISI 316L versions: 400ºC
- **LTL.../ :** indication by means of bi-color magnetic strips (red-white) mounted in an anodized aluminium rail with polycarbonate cover. Optional graduated scale in cm. Maximum liquid temperature for AISI 316L versions: 250ºC



- **LT ... LTL106** body in AISI 316L, flanged connection
- **LT ... LTL116** body in AISI 316L, threaded connection
- **LT ... LTL14** body in PVC, PVC-C, PP or PVDF
- **LT ... LTL15** body in SS 316L with internal PTFE coating

Technical data

- **Accuracy:** ±4 mm measured value
- **Scale in cm** for LT models
  For LTL models, scale in cm available on request
- **Liquid density:** 0.55 ... 2 kg/l (others on request)
- **Liquid viscosity:** 1500 cSt maximum
- **Measuring range:** 150 mm ... 15 m
- **Liquid temperature:**
  - LTL106: -20ºC ... 250ºC
  - LT106: -20ºC ... 400ºC, depending on config.
  - LT ... LTL14 / PVC: 0ºC ... 45ºC
  - LT ... LTL14 / PP: -10ºC ... 90ºC
  - LT ... LTL14 / PVDF: -20ºC ... 145ºC
  - LT ... LTL15 / PTFE: -20ºC ... 150ºC
- **Working pressure:**
  - Models in AISI 316L: PN16 ... PN40 (up to 100 bar max. on request)
  - Models in PVC, PVC-C, PP, PVDF: PN10
  - Models in PTFE: PN16 ... PN40
- **Connections:**
  - EN 1092-1 or ANSI flanges. Other flange standards on request (JIS,...)
  - BSP or NPT threaded connections (for LT … LTL116)
  - Sanitary couplings according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP® (for LT … LTL106)
- **Mounting:** vertical, tank side
- **Certificate Type Approval** for ship, “offshore” and industry in general, models LTL106 and LTL116 (up to PN25 / ANSI 150# RF) by Lloyd´s Register

Limit switches and transmitters

- **LT ... LTL-APR:** adjustable reed switches
- **LT ... LTL-AAR:** adjustable reed switches (high temperature version)
- **LT ... LTL-AMM:** adjustable micro-switches
- **LT ... LTL-AMD:** adjustable inductive switches (+ relays on request)

  All switches can be supplied in Ex d IIC T6 version on request
- **LTE:** Resistive sensor transmitter 0 ... 4-20 mA:
  - TR2420: 24 VDC 2-wire system, compact mounted
  - TR420: 24, 125, 220 VAC, 50/60 Hz / 24 VDC 4-wire system, DIN rail mounted

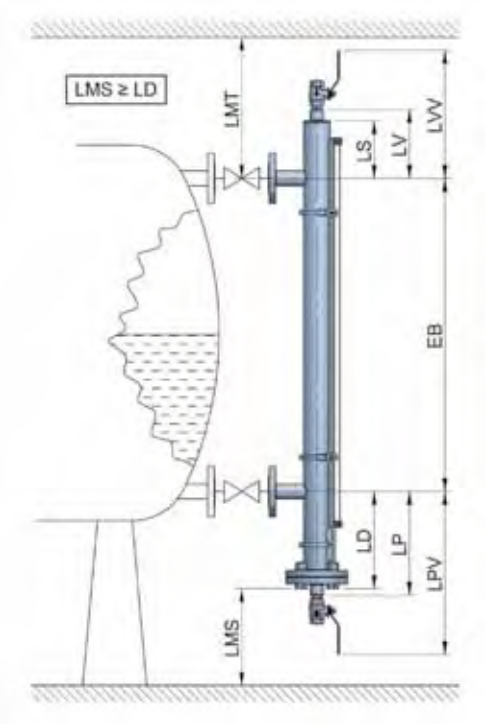
  HART, PROFIBUS, FIELDBUS protocols, and Ex version available on request
- **LTDR:** Guided radar transmitter 4-20 mA, 4-wire system. Ex version available on request

Mounting

The lower dimension LD, LP or LPV of series LT level gauges is variable depending on working liquid density. The lower the density, the longer this dimension.

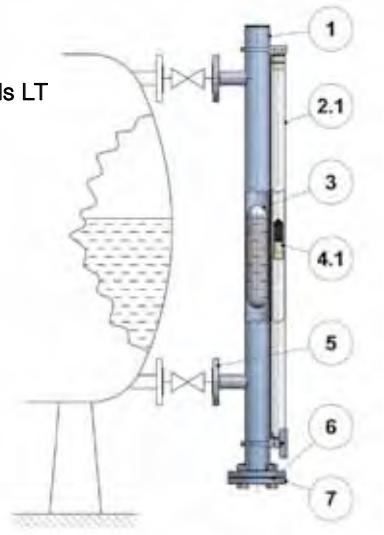
In order to remove the float due to a change in density of for maintenance purposes, a minimum distance LMS, longer or equal to LD distance, must be kept between the lowest side of the level gauge and the floor.

Model	Liquid density kg/l	Lower dimension			Upper dimension		
		Without drain (LD)	With drain (LP)	With drain + valve (LPV)	Without vent (LS)	With vent (LV)	With vent + valve (LVV)
LT ... LTL / SS (PN16 ... 40)	0.55 ... 0.59	430	445	580	130	155	290
	0.60 ... 0.91	340	355	490			
	≥ 0.92	260	275	410			
LT ... LTL / PVC (PN10)	0.60 ... 0.79	400		525	150	140	265
	0.80 ... 0.89	310		435			
	≥ 0.90	240		365			
LT ... LTL / PP (PN10)	≥ 0.75	240		365	150	165	290
LT ... LTL / PVDF (PN10)	0.80 ... 0.99	355		480	150	165	290
	≥ 1.00	245		370			

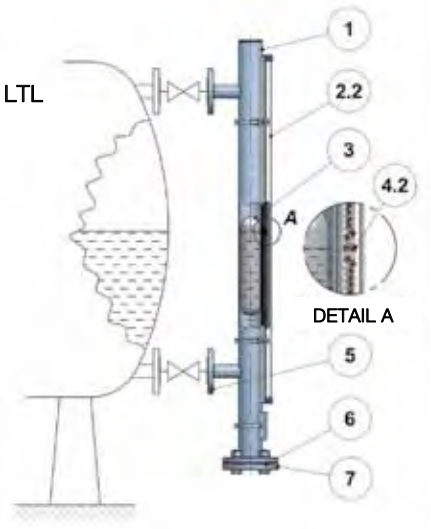


Materials

Models LT



Models LTL



N°	Description	Models LT					Models LTL				
		EN 1.4404	PVC	PP	PVDF	PTFE	EN 1.4404	PVC	PP	PVDF	PTFE
1	Body	EN 1.4404	PVC	PP	PVDF	PTFE + EN 1.4404	EN 1.4404	PVC	PP	PVDF	PTFE + EN 1.4404
2.1	Guide tube	Borosilicate glass					— — —				
2.2	Mag strips rail	— — —					Aluminium + Polycarbonate				
3	Float	EN 1.4404 / Titanium	PVC	PP	PVDF	PTFE	EN 1.4404 / Titanium	PVC	PP	PVDF	PTFE
4.1	External float	PP / Aluminium					— — —				
4.2	Mag strips	— — —					POM resin				
5	Connection	EN 1.4404	PVC	PP	PVDF	PTFE	EN 1.4404	PVC	PP	PVDF	PTFE
6	Gasket	Belpa® CSA-50	NBR / Viton® / EPDM			PTFE	Belpa® CSA-50	NBR / Viton® / EPDM			PTFE
7	End connection	EN 1.4404	PVC	PP	PVDF	PTFE	EN 1.4404	PVC	PP	PVDF	PTFE

Float types

Material	Liquid density kg/l	Maximum pressure bar
Titanium	0.55 ... 0.83	PN40
EN 1.4404	0.84 ... 2.00	PN40
EN 1.4404	0.77 ... 2.00	PN63
EN 1.4404	0.81 ... 2.00	100
PVC	0.60 ... 2.00	PN10
PP	0.75 ... 2.00	PN10
PVDF	0.80 ... 2.00	PN10

EN 1.4404 Titanium Plastic

Dimensions and specific technical data

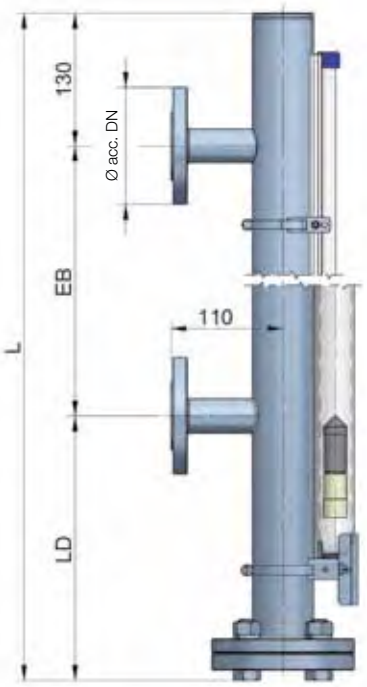
Models LT ... LTL106 ... 116 / LT ... LTL17

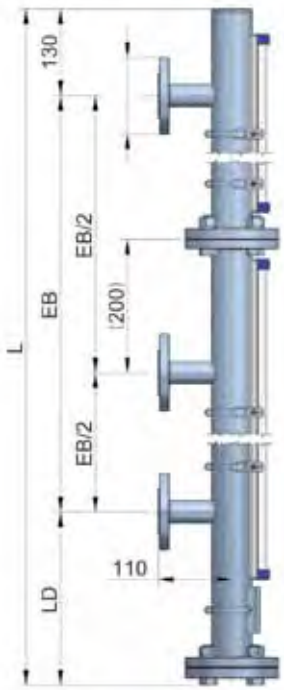
Technical data

- **Material:** EN 1.4404 (AISI 316L)
- **Measuring range:** 150 ... 15000 mm (supplied in separate sections for measuring ranges longer than 5500 mm; one single section on request). Longer ranges on request.
- **Liquid temperature:**
  - -20ºC ... 250ºC: magnetic strips indication
  - -20ºC ... 400ºC: glass tube indication
- **Working pressure:** PN16 ... PN40 (up to 100 bar max. on request)
- **Connections:**
  - LT ... LTL106: DN15 ... DN50 EN 1092-1 flanges (other flange standards and sizes on request)
  - LT ... LTL116: G½ ... G2 threaded connection (other thread standards and sizes on request)
- **Limit switches:** LT ... LTL-APR / AAR / AMM / AMD Ex d IIC T6 version on request
- **Transmitter** LTE 0 ... 4-20 mA or guided radar LTDR

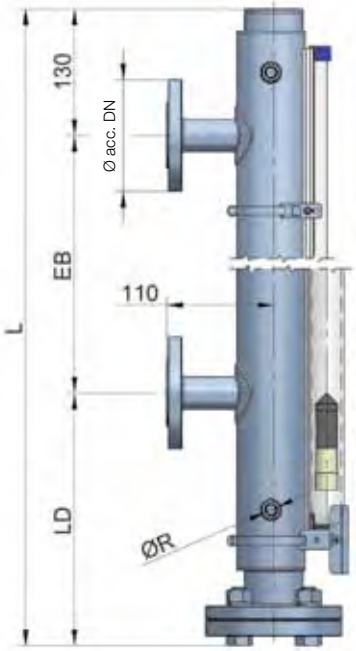
LT ... LTL106

LT ... LTL116



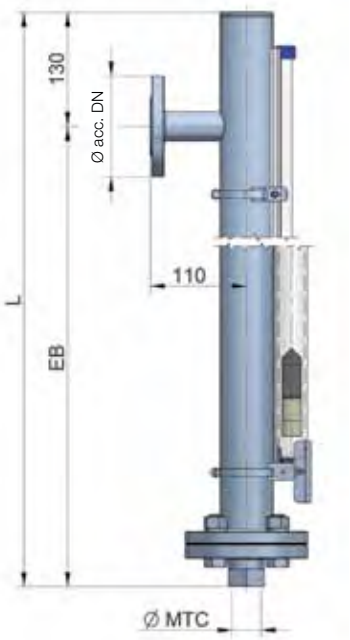


Separate sections

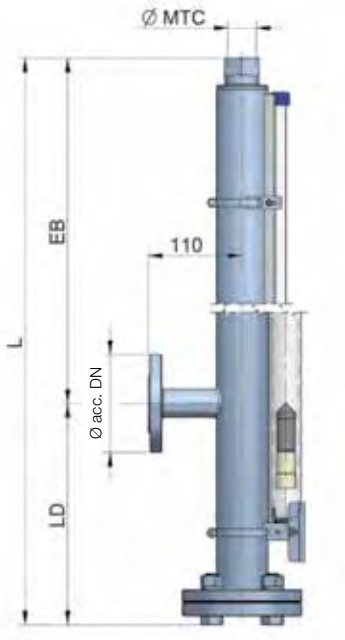


Heating-cooling chamber

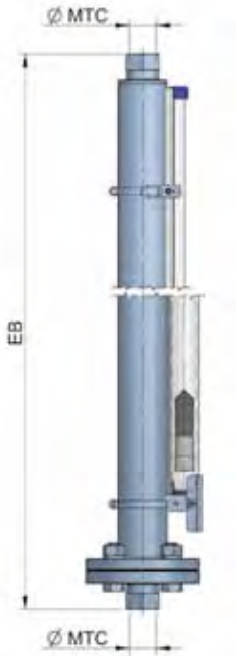
Special models LT ... LTL17



LT ... LTL17P



LT ... LTL17J



LT ... LTL17Y

Models LT ... LTL15 / PTFE

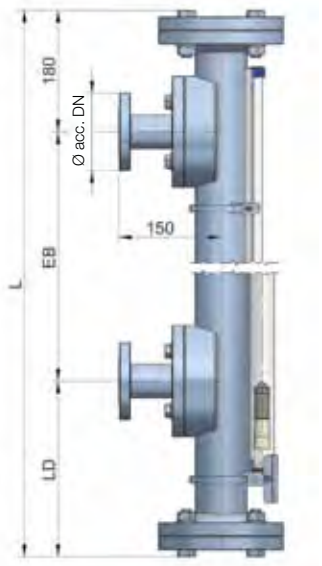
Technical data

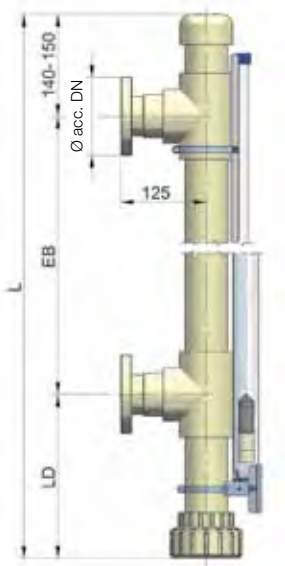
- **Material:** EN 1.4404 (AISI 316L) with internal PTFE coating
- **Measuring range:** 6000 mm max. Longer ranges on request
- **Liquid temperature:**
  -20ºC ... 150ºC
- **Working pressure:** PN16 ... PN40
- **Connections:** DN15 ... DN50 EN 1092-1 flanges
  (other flange standards and sizes on request)
- **Limit switches:** LT ... LTL-APR / AMM / AMD
  Ex d IIC T6 version on request
- **Transmitter** LTE 0 ... 4-20 mA or guided radar LTDR

Models LT ... LTL14 / PP, PVC, PVC-C, PVDF

Technical data

- **Material:** PP, PVC, PVDF
- **Measuring range:** 6000 mm max. Longer ranges on request
- **Liquid temperature:** PVC: 0ºC ... 45ºC
  PP: -10ºC ... 90ºC / PVDF: -20ºC ... 145ºC
- **Working pressure:** PN10
- **Connections:** DN15 ... DN50 EN 1092-1 flanges
  (other flange standards and sizes on request)
- **Limit switches:** LT ... LTL-APR / AMM / AMD
  Ex d IIC T6 version on request
- **Transmitter** LTE 0 ... 4-20 mA or guided radar LTDR





Limit switches

Adjustable switch LT ... LTL-APR

- SPDT bi-stable reed switch
- IP65 polycarbonate housing
- Contact rating: 0.5 A 220 VAC 60 VA
- Hysteresis: ±6 mm
- Liquid temperature: -20ºC ... 200ºC
- Ambient temperature: -10ºC ... 70ºC
- Suitable for hazardous area, considered as “Simple apparatus”

Adjustable switch LT ... LTL-AAR

- SPDT bi-stable reed switch
- Aluminium housing & thermal separator for high temperature
- Contact rating: 0.5 A 220 VAC 60 VA
- Hysteresis: ±6 mm
- Liquid temperature: -20ºC ... 400ºC
- Ambient temperature: -10ºC ... 70ºC
- Suitable for hazardous area, considered as “Simple apparatus”

Adjustable switch LT ... LTL-AMM

- SPDT bi-stable micro-switch
- IP65 coated aluminium housing
- Contact rating: 3 A 220 VAC
- Hysteresis: ±6 mm
- Liquid temperature: -20ºC ... 200ºC
- Ambient temperature: -25ºC ... 80ºC
- Mechanical life: 20 x 10^6 operations
- Suitable for hazardous area, considered as “Simple apparatus”

Adjustable switch LT ... LTL-AMD

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

- Power supply: 8 VDC
- Hysteresis: ±6 mm
- Liquid temperature: -20ºC ... 200ºC
- Ambient temperature: -25ºC ... +70ºC
- ATEX certification Ex ia IIC T6

Control relay (on request)

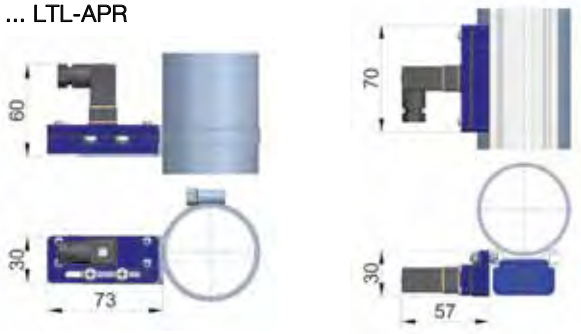
NAMUR (EN 60947-5-6) for 1 or 2 inductive detectors.

- 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: -25ºC ... +70ºC

Ex d IIC T6 version

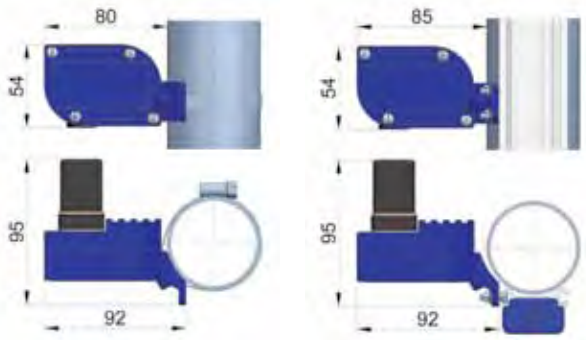
All switches can be supplied with Ex d IIC T6 Explosion Proof Enclosure on request, ATEX certified

LT ... LTL-APR

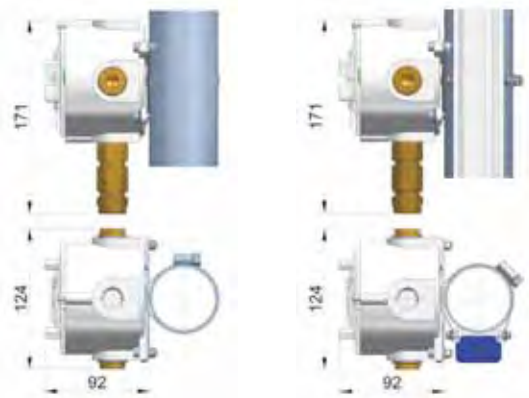


LT ... LTL-AAR

LT ... LTL-AMM / AMD



ATEX version Ex d IIC T6



Transmitters

Transmitter LTE 0 ... 4-20 mA

Transmitter composed of a resistive sensor based on a reed and resistances chain, mounted on a printed circuit placed inside a guide tube. Not wetted by the process liquid.

Variations in level inside the tank move the internal LT or LTL float, which by means of magnetic coupling changes the value of the resistance of the resistive sensor in correspondence to the measured liquid level.

These variations of resistance are processed by an electronic converter in order to obtain a 0 ... 4-20 mA current output proportional to liquid level.

Technical data LTE

- Connection by means of IP65 connector, IP67 polycarbonate housing or IP65 aluminium housing
- Distance between reed switches: 10 mm
- Liquid temperature: -20°C ... 250°C
- Ambient temperature: -20°C ... 60°C

2-wire system

For 2-wire system, the TR2420 resistance/mA converter is supplied, in an IP67 plastic housing or optionally in an IP65 aluminium housing compact mounted on the sensor head.

Technical data TR2420

- Power supply: 12 ... 36 VDC, safe area version
- Power consumption: 0.8 W
- Output: 4-20 mA

Also available with 2-wire system:

- TR2420Ex: hazardous area version ATEX Ex ia IIC T6
  Power supply: 8 ... 30 VDC
- TR2420H (HART protocol), TR2420P (Profibus protocol) or TR2420F (Fieldbus protocol). Also available in combination with their Ex versions

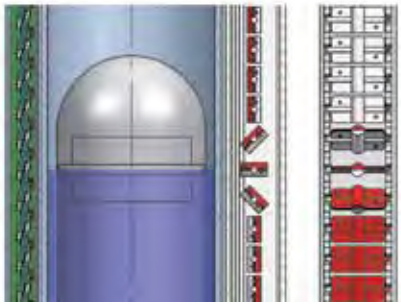
4-wire system

For 4-wire system the TR420 resistance/mA converter is supplied, DIN 46277 rail mounted.

Technical data TR420

- Power supply: 24, 110, 230, 240 VAC 50/60 Hz / 24 VDC
- Power consumption: <1 VA
- Outputs: 0-20 mA, 4-20 mA, 0-5 V, 0-10 V, 1-5 V, 2-10 V

TR420
(remote converter
Ω/mA)



Transmitter LTDR

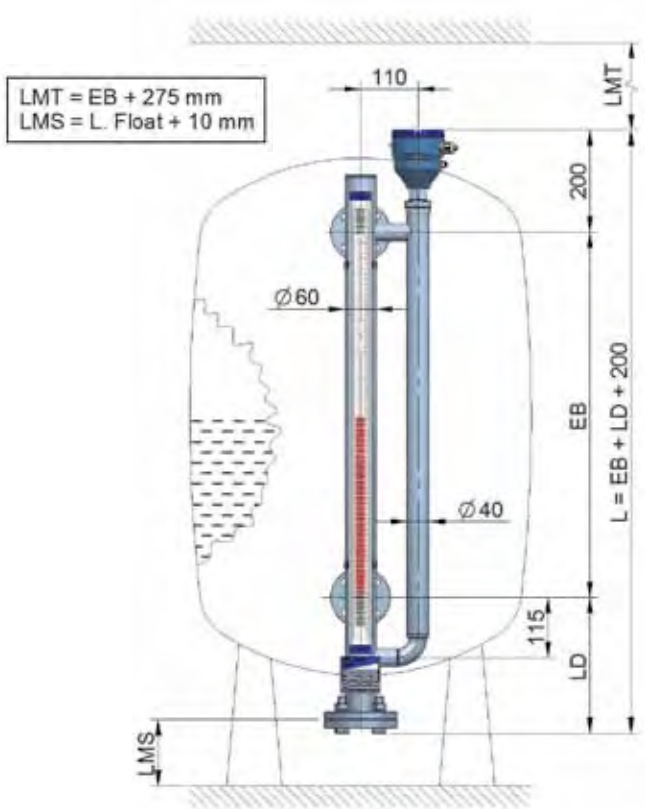
LTDR uses TDR (Time Domain Reflectometry) technology.

Low-energy, high-frequency electromagnetic impulses, generated by the sensor's circuitry, are propagated along the probe which is immerged in the liquid to be measured.

When these impulses hit the surface of the liquid, part of the impulse energy is reflected back up the probe to the circuitry which then calculates the fluid level from the time difference between the impulses sent and the impulses reflected.

The sensor can output the analyzed level as a continuous measurement reading through its analog output, or it can convert the values into freely positionable switching output signals.

LTDR Sensors are also known as Guided Radars or Guided Wave Radars.



2.2
FLOAT

2.2
FLOAT

LC
LE
LC40
NPC

Level switches
Series LC

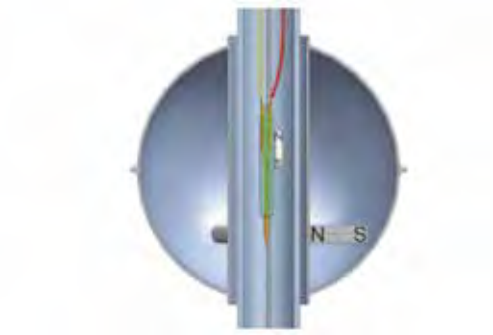
Float level switch for liquids

- Simple construction
- Top mounted, or side mounted by means of external chamber
- Watertight and safe installation
- Excellent chemical resistance
- Accuracy: ±2 mm
- Connections:
  - EN 1092-1 flange. Other flange standards on request (ANSI, JIS,...)
  - Threaded connections BSP or NPT
- Materials: EN 1.4404 (AISI 316L), PVC, PP, PVDF, PTFE
- Level detection:
  - 1 … 6 reed switches, depending on length and model

Working principle

By means of float with magnetic field and reed switches.

One or more reed switches are placed at a specific height inside a guide tube. The changes in liquid level modify the float position in this guide tube, so that when it reaches the switch position, it changes its status, providing an output signal for level detection.



Applications

- **Pumps start-stop**
- **Control of industrial processes and dosing tanks**
- **Storage for food and beverage industry**
- **Level control in shipping industry**
- **Chemical and textile industry**

Models

- **Models LCM:** guide tube length shorter than 2000 mm. Maximum 3 RBC reed switches (or 3 RBC + 1 SPST on request). Minimum liquid density 0.8 kg/l
- **Models LC:** guide tube length longer than 2000 mm or more than 3 RBC reed switches. Minimum liquid density 0.6 kg/l

- **LC ... LCM30** flanged connection
- **LC ... LCM31** threaded connection

Technical data

- **Accuracy:** ±2 mm
- **Hysteresis:** ±4 mm
- **Liquid density:**
  - Models LCM: ≥ 0.8 kg/l
  - Models LC: ≥ 0.6 kg/l
- **Maximum liquid viscosity:** 1500 cSt
- **Measuring range:**
  - Models LCM: 150 ... 2000 mm
  - Models LC:
    - EN 1.4404 (AISI 316L): 150 ... 6000 mm
    - PVC / PP / PTFE / PVDF: 150 ... 2500 mm
    - PVC / PP / PTFE / PVDF, with AISI 316L inside: 150 ... 6000 mm

  Others on request

- **Liquid temperature:**
  - EN 1.4404 (AISI 316L): -20ºC ... +150ºC
  - PTFE, PVDF: -20ºC ... +150ºC
  - PVC: 0ºC ... +50ºC
  - PP: -10ºC ... +90ºC
- **Ambient temperature:**
  - EN 1.4404 (AISI 316L): -20ºC ... +60ºC
  - PTFE, PVDF: -20ºC ... +60ºC
  - PVC: 0ºC ... +50ºC
  - PP: -10ºC ... +60ºC
- **Working pressure:**
  - EN 1.4404 (AISI 316L) and PVC / PP / PTFE with AISI 316L inside: PN16
  - PVC / PP / PTFE: PN10

  Others on request
- **Connections:**
  - Models LCM:
    - EN 1092-1 DN50 flange
    - G1½ or 1 ½" NPT thread
  - Models LC: EN 1092-1 DN100 flange

  Others on request
- **Ingress protection:** IP67 for plastic housing. IP65 for connector DIN43650 and aluminium housing.
- **Mounting:** vertical on top of the tank or in a side chamber
- **Special design** with bent rod on request
- **Suitable for hazardous area**, considered as "Simple apparatus" intrinsically safe

Limit switches

- **Switches RBC or RSC.**

  Technical data:
  - Reed switch 1A 220V 60VA
  - Maximum 6 switches
  - Minimum distance between switches = 70 mm

- **Bi-stable model RBC:** When the float passes the switch position in one direction, it changes its status and keeps it until the float passes again in the opposite direction. This way the switch status shows directly whether the float is above or below the switching position.

One float can activate several switches. Each one will indicate its status independently.

- **Mono-stable model RSC:** The switch changes its status only when the float is at its position. Since the switch must indicate whether the liquid level is above or below the switching point, a float stop that prevents the float to rise above the switching position is mounted.

If the level detector is equipped with more than one switch, one float for each switch is required.

Float types

Type 1

Type 2

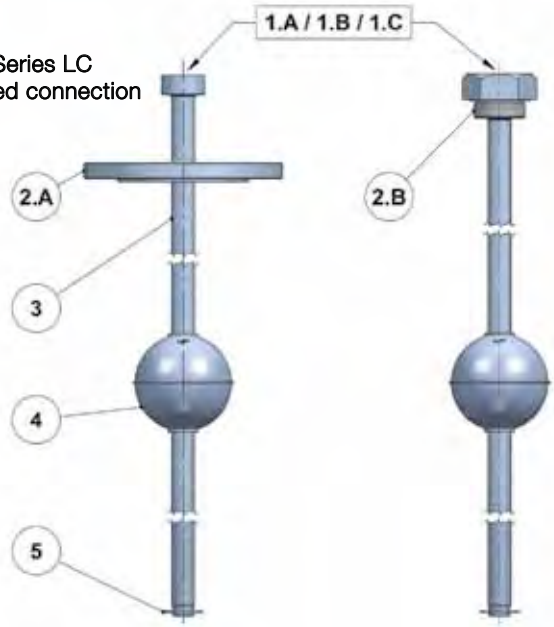
Type 3

	Floats models LC						Floats models LCM				
	Type 1		Type 3				Type 1	Type 2	Type 3		
Material	EN 1.4404	EN 1.4404	PVC	PP	PVDF	PVDF	EN 1.4404	EN 1.4404	PVC	PP	PVDF
PN	25	25	10	10	10	10	25	25	10	10	10
d_{min}	0.6	0.65	0.8	0.7	0.8	1.0	0.75	0.8	0.8	0.7	1.0
T_{max}	150	150	45	90	135	135	150	150	45	90	135
ØD	115	95	63	63	63	63	52	44	45	45	45
H	112	92	90	90	150	90	52	64	70	70	70
Ød	26	26	26.5	26.5	27	27	13.5	13,5	17	21	17

EN 1.4404 = AISI 316L

Materials

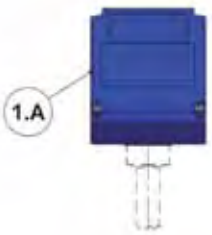
Series LC
flanged connection



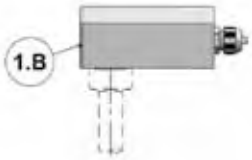
Series LC
threaded connection

Housings

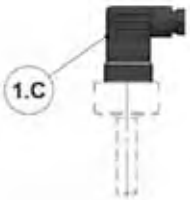
Plastic



Aluminium



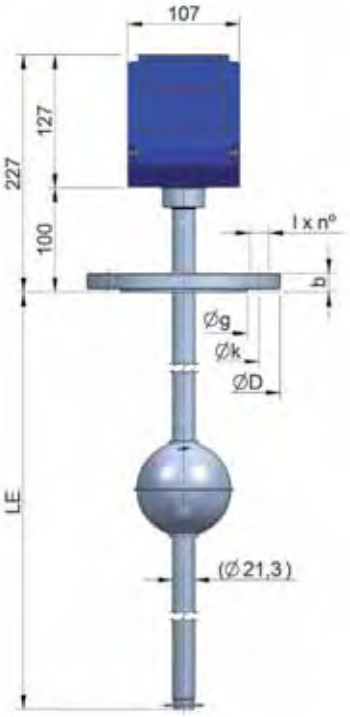
DIN43650 connector

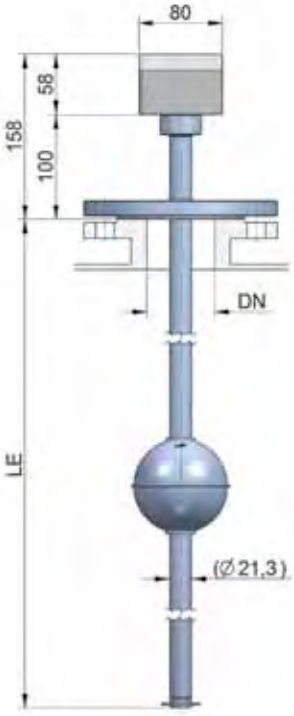


Nº	Description	Materials		
		LC ... LCM / INOX	LC ... LCM / PVC ... PP ... PVDF	LC ... LCM / PTFE
1.A / 1.B	Housing		Polycarbonate / Aluminium	
1.C	Connector		Polyamide	
2.A / 2.B	Flange / Thread	EN 1.4404 (AISI 316L)	PVC ... PP ... PVDF	PTFE
3	Guide tube	EN 1.4404 (AISI 316L)	PVC ... PP ... PVDF	PTFE
4	Float	EN 1.4404 (AISI 316L)	PVC ... PP ... PVDF	PTFE
5	Float stop	EN 1.4404 (AISI 316L)	PVC ... PP ... PVDF	PTFE

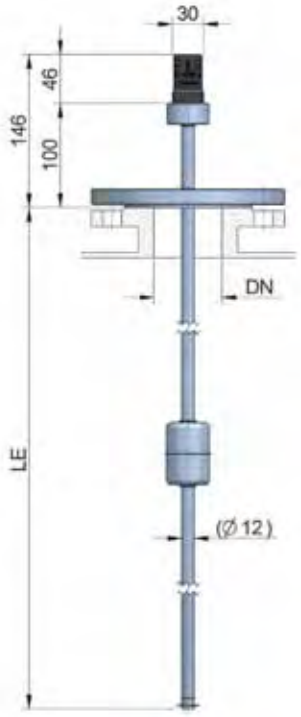
Dimensions

Models LC



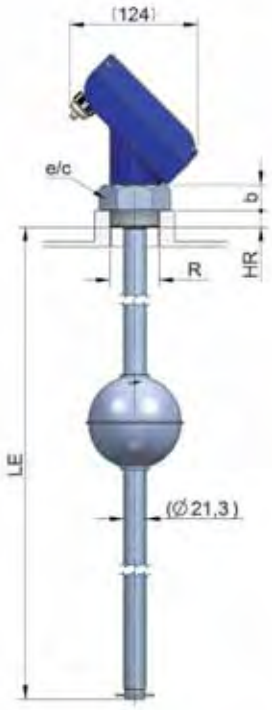


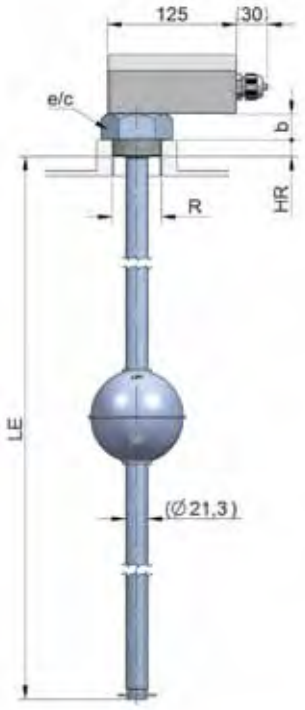
Models LCM



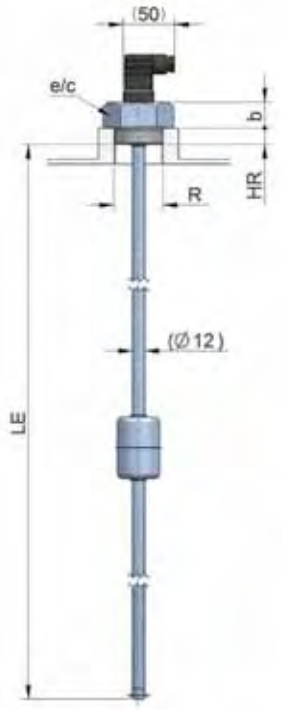
Models	DN	PN	D	g	k	l x n°	b	LE
LCM	50	40	165	102	125	18 x 4	20	Acc. to order
LC	100	16	220	158	180	18 x 8	20	

Models LC





Models LCM



Models	R	e/c	b	HR	LE
LC / LCM	G1½	60	25	16	Acc. to order

The different housings can be used with all models of level switches. Drawings are shown only for dimensional data. Standard connections are shown. Others on request.

R-CT-LC Rev. 1 english version

Level transmitters

Series LE

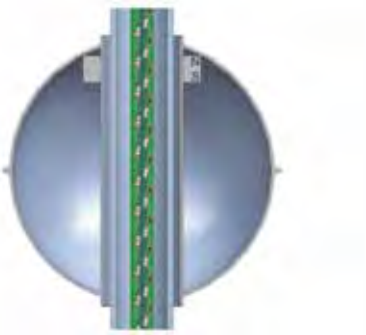
Float level transmitter for liquids

- Simple construction
- Top mounted, or side mounted by means of external chamber
- Watertight and safe installation
- Excellent chemical resistance
- Measuring range: 150 mm … 6 m
- Resolution: 10 mm
- Connections:
  - EN 1092-1 flange. Other flange standards on request (ANSI, JIS,...)
  - Threaded connections BSP or NPT
- Materials: EN 1.4404 (AISI 316L), PVC, PP, PVDF, PTFE
- Level transmitter:
  - 4-20 mA analog output for safe or hazardous area (Ex ia IIC T4 or T6 protection, ATEX certified). HART, PROFIBUS, FIELDBUS protocols available on request

Working principle

By means of float with magnetic field and reed chain.

A reed switches / resistance chain is mounted inside a guide tube. The changes in liquid level modify the float position in this guide tube, so that it activates the reed switches providing an output signal of variation of resistance, which can be later converted into an analog output of voltage or current.



Applications

- Control of industrial processes and dosing tanks
- Storage for food and beverage industry
- Level control in shipping industry
- Chemical and textile industry

Models

- **Models LEM:** guide tube length shorter than 2000 mm. Minimum liquid density 0.8 kg/l
- **Models LE:** guide tube length longer than 2000 mm. Minimum liquid density 0.6 kg/l

- **LE ... LEM70** flanged connection
- **LE ... LEM71** threaded connection

Technical data

- **Resolution:** 10 mm
- **Hysteresis:** ±5 mm
- **Liquid density:**
  - Models LEM: ≥ 0.8 kg/l
  - Models LE: ≥ 0.6 kg/l
- **Maximum liquid viscosity:** 1500 cSt
- **Measuring range:**
  - Models LEM: 150 ... 2000 mm
  - Models LE:
    - EN 1.4404 (AISI 316L): 150 ... 6000 mm
    - PVC / PP / PTFE / PVDF: 150 ... 2500 mm
    - PVC / PP / PTFE / PVDF, with AISI 316L inside: 150 ... 6000 mm

  Others on request

- **Liquid temperature:**
  - EN 1.4404 (AISI 316L): -20ºC ... +150ºC
  - PTFE, PVDF: -20ºC ... +150ºC
  - PVC: 0ºC ... +50ºC
  - PP: -10ºC ... +90ºC
- **Ambient temperature:**
  - EN 1.4404 (AISI 316L): -20ºC ... +60ºC
  - PTFE, PVDF: -20ºC ... +60ºC
  - PVC: 0ºC ... +50ºC
  - PP: -10ºC ... +60ºC
- **Working pressure:**
  - EN 1.4404 (AISI 316L) and PVC / PP / PTFE with AISI 316L inside: PN16
  - PVC / PP / PTFE: PN10

  Others on request
- **Connections:**
  - Models LEM:
    - EN 1092-1 DN50 flange
    - G1½ or 1 ½" NPT thread
  - Models LE: EN 1092-1 DN100 flange

  Others on request
- **Ingress protection:** IP67 for plastic housing. IP65 for connector DIN43650 and aluminium housing.
- **Mounting:** vertical on top of the tank or in a side chamber
- **Special design** with bent rod on request

Transmitters

- **Level transmitter** by means of reed / resistance chain. Output signal 0 ... 4-20 mA:
  - TR2420: 24 VDC, 2-wire system, with compact converter
  - TR420: 24, 125, 220 VAC, 50/60 Hz / 24 VDC, 4-wire system, with remote converter

  HART, PROFIBUS, FIELDBUS,... protocols and ATEX certified Ex ia IIC T6 on request

Model LEM70, flanged connection and polycarbonate housing

Float types

Type 1

Type 2

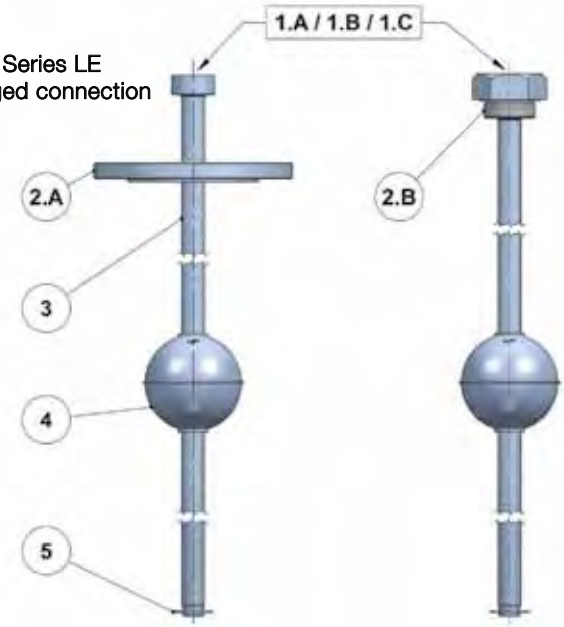
Type 3

	Floats models LE						Floats models LEM				
	Type 1		Type 3				Type 1	Type 2	Type 3		
Material	EN 1.4404	EN 1.4404	PVC	PP	PVDF	PVDF	EN 1.4404	EN 1.4404	PVC	PP	PVDF
PN	25	25	10	10	10	10	25	25	10	10	10
d_{min}	0.6	0.65	0.8	0.7	0.8	1.0	0.75	0.8	0.8	0.7	1.0
T_{max}	150	150	45	90	135	135	150	150	45	90	135
ØD	115	95	63	63	63	63	52	44	45	45	45
H	112	92	90	90	150	90	52	64	70	70	70
Ød	26	26	26.5	26.5	27	27	13.5	13,5	17	21	17

EN 1.4404 = AISI 316L

Materials

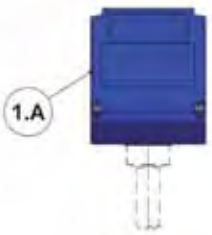
Series LE
flanged connection



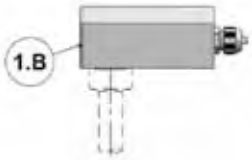
Series LE
threaded connection

Housings

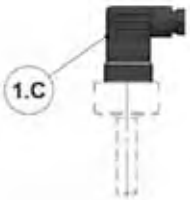
Plastic



Aluminium



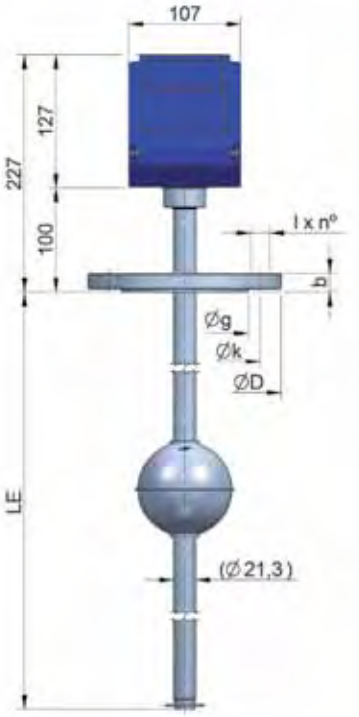
DIN43650 connector

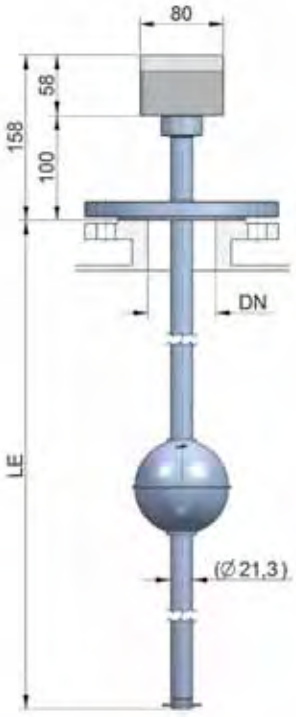


Nº	Description	Materials		
		LE ... LEM / INOX	LE ... LEM / PVC ... PP ... PVDF	LE ... LEM / PTFE
1.A / 1.B	Housing		Polycarbonate / Aluminium	
1.C	Connector		Polyamide	
2.A / 2.B	Flange / Thread	EN 1.4404 (AISI 316L)	PVC ... PP ... PVDF	PTFE
3	Guide tube	EN 1.4404 (AISI 316L)	PVC ... PP ... PVDF	PTFE
4	Float	EN 1.4404 (AISI 316L)	PVC ... PP ... PVDF	PTFE
5	Float stop	EN 1.4404 (AISI 316L)	PVC ... PP ... PVDF	PTFE

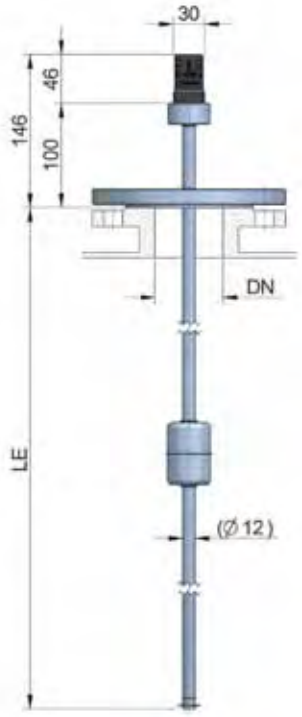
Dimensions

Models LE



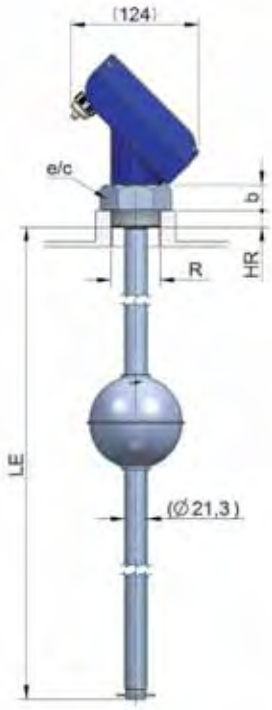


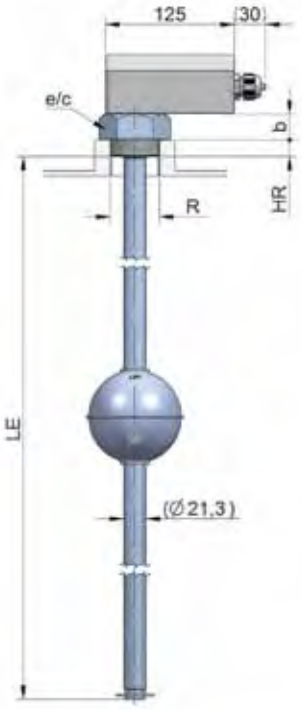
Models LEM



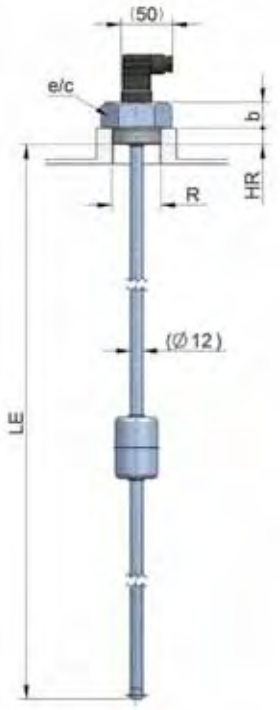
Models	DN	PN	D	g	k	l x n°	b	LE
LEM	50	40	165	102	125	18 x 4	20	Acc. to order
LE	100	16	220	158	180	18 x 8	20	

Models LE





Models LEM



Models	R	e/c	b	HR	LE
LE / LEM	G1½	60	25	16	Acc. to order

The different housings can be used with all models of level transmitters. Drawings are shown only for dimensional data. Standard connections are shown. Others on request.

Transmitters

Transmitter composed of a resistive sensor based on a reed and resistances chain, mounted on a printed circuit placed inside a guide tube.

Variations in level inside the tank move the float, which by means of magnetic coupling changes the value of the resistance of the resistive sensor in correspondence to the measured liquid level.

These variations of resistance are processed by an electronic converter in order to obtain a 0 ... 4-20 mA current output proportional to liquid level.

Technical data LE

- Connection by means of IP65 connector, IP67 polycarbonate housing or IP65 aluminium housing
- Distance between reed switches: 10 mm
- Liquid temperature: depending on material
- Ambient temperature: depending on material

2-wire system

For 2-wire system, the TR2420 resistance/mA converter is supplied, in an IP67 plastic housing or optionally in an IP65 aluminium housing compact mounted on the sensor head.

Technical data TR2420

- Power supply: 12 ... 36 VDC, safe area version
- Power consumption: 0.8 W
- Output: 4-20 mA

Also available with 2-wire system:

- TR2420Ex: hazardous area version ATEX Ex ia IIC T6
  Power supply: 8 ... 30 VDC
- TR2420H (HART protocol), TR2420P (Profibus protocol) or TR2420F (Fieldbus protocol). Also available in combination with their Ex versions

4-wire system

For 4-wire system the TR420 resistance/mA converter is supplied, DIN 46277 rail mounted.

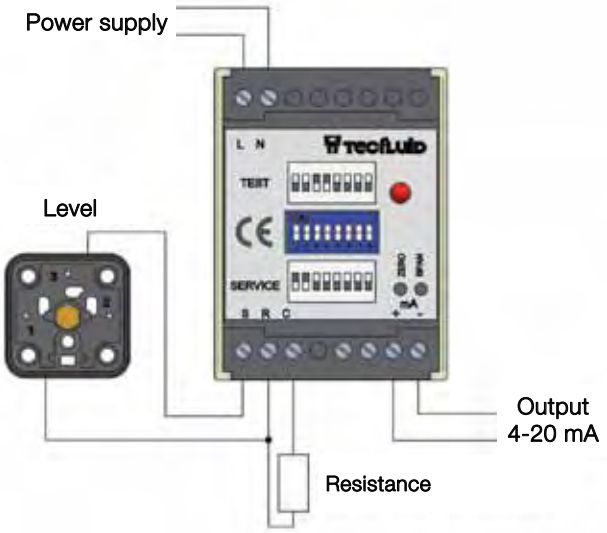
Technical data TR420

- Power supply: 24, 110, 230, 240 VAC 50/60 Hz / 24 VDC
- Power consumption: <1 VA
- Outputs: 0-20 mA, 4-20 mA, 0-5 V, 0-10 V, 1-5 V, 2-10 V

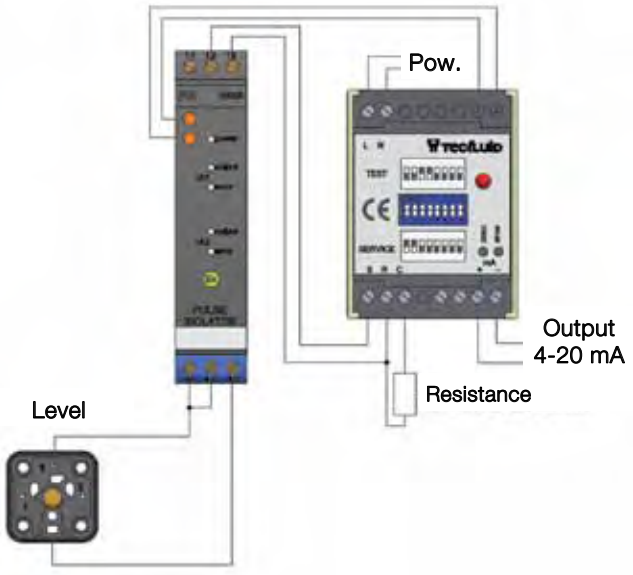
TR420
(remote converter
Ω/mA)

Wiring diagram for 4-wire system level transmitter

without galvanic isolation



with galvanic isolation



MORE THAN 40 YEARS MANUFACTURING
FLOW AND LEVEL INSTRUMENTATION

TECFLUID

The art of measuring

Level switches

Series LC40

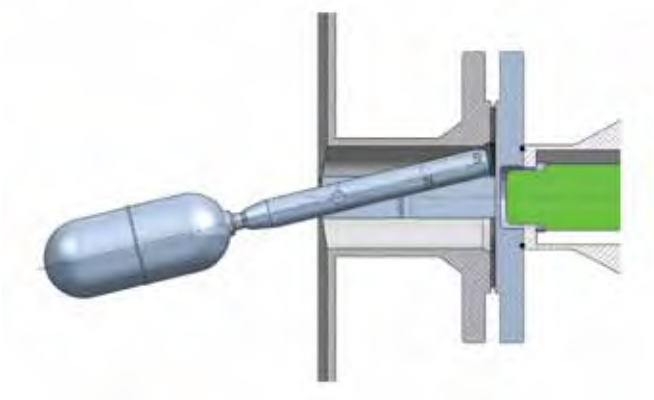
Float level switch for liquids

- Simple and robust construction
- Versatile and easily adaptable to the different control positions of the industrial processes
- Side or top of the tank mounting
- Watertight and safe installation
- Excellent chemical resistance
- Design for high pressure and temperature available
- Connections: EN 1092-1 DN65 flange. Other sizes and flange standards (ANSI, JIS,...) on request
- Materials: EN 1.4404 (AISI 316L), PVC, PP, PVDF, PTFE
- Level detection
- Options:
  - ATEX Ex d IIC T6 version
  - Extended temperature range version
  - Accessories for extended switching differential
  - Chamber for external mounting

Working principle

Float level switches. When a liquid reaches the level where the level switch is positioned, its float follows the level variations in a such way that the articulated rod is moved. A magnet placed in the opposite side of this rod activates a switch.

This switch can be either a micro-switch, a reed switch, an inductive detector or a pneumatic switch, depending on the application requirements.



Applications

- Pumps start-stop
- Control of industrial processes
- Dosing and process tanks
- Tanks in machinery for chemical industry
- Level detection in tanks for food and textile industries,...
- Level control in tanks of steam condensates

Models

- **LC40** side mounting
- **LC40-BA** side mounting
- **LC40-V** top mounting
- **LC40-VR** top mounting

Technical data

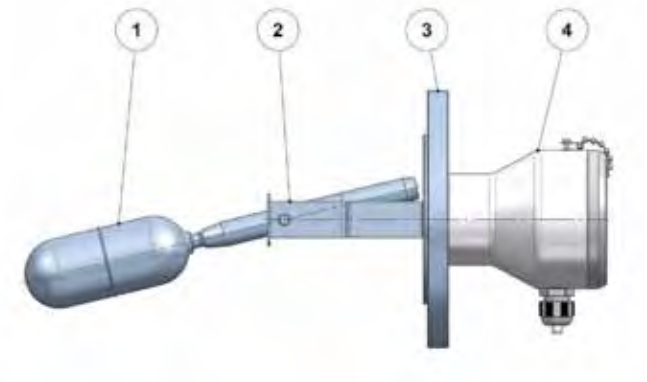
- **Switching differential**: 52 mm
  Up to 1100 mm, depending on the accessories
- **Liquid density:** 0.45 ... 3 kg/l
- **Liquid maximum viscosity:** 3000 mPa·s
- **Liquid temperature:**
  - LC40 / AISI 316L: -50ºC ... +150ºC
    -50ºC ... +300ºC on request
  - LC40 / PVC: 0ºC ... 50ºC
  - LC40 / PP: -20ºC ... 90ºC
  - LC40 / PTFE: -20ºC ... 150ºC
  - LC40 / PVDF: -20ºC ... 150ºC
- **Ambient temperature:** -30ºC ... +80ºC
- **Working pressure:**
  - AISI 316L: PN16
    Up to PN400 on request
  - PP, PVC, PTFE: PN10
- **Connections:** EN 1092-1 DN65 flange
  Other sizes and flange standards on request
  Special square flange 92 x 92 / 108 x 108 mm
- **Mounting:** side of the tank. On top with special models
- **Housing:** IP65 - anodized aluminium.
  EN 1.4404 (AISI 316L), PP, PVC, PTFE on request
- **Accessory A21** for extended switching differential
- **Chamber for external mounting**

Limit switches

- **AMM:** SPDT micro-switch
- **AMD:** inductive detector
- **AMR:** SPDT reed switch
- **AMP:** ON/OFF two-way pneumatic switch

All switches can be supplied in ATEX Ex d IIC T6 version on request

Materials



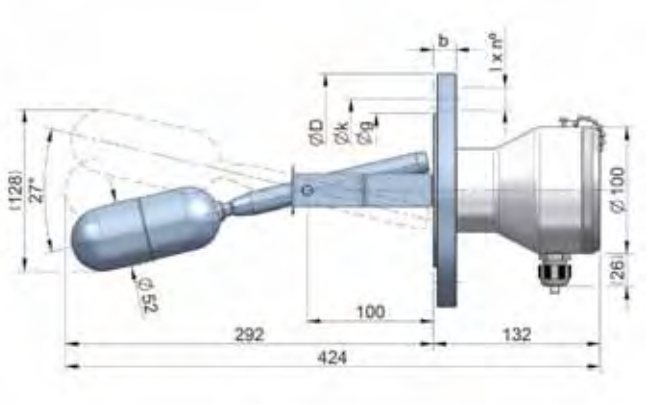
Nº	Description	Materials			
		AISI 316L	PVC	PP	PTFE
1	Float	EN 1.4404 (AISI 316L)	PVC	PP	PTFE
2	Fork	EN 1.4404 (AISI 316L)	PVC	PP	PTFE
3	Flange	EN 1.4404 (AISI 316L)	PVC	PP	PTFE
4	Housing	Aluminium *			

* Others on request

Dimensions

Side mounting

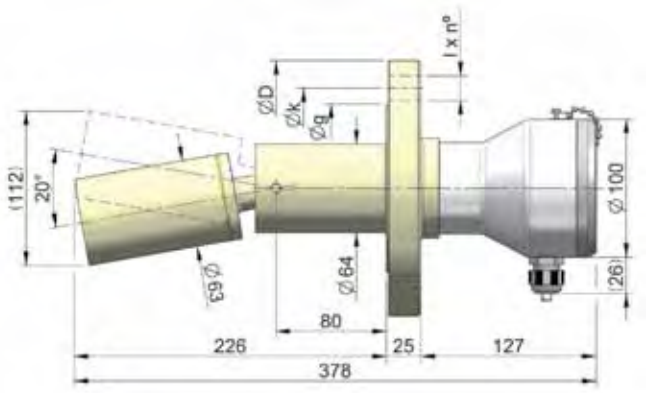
Model LC40 / AISI 316L



PN	EN 1.4404 (AISI 316L)					
	DN	D	g	k	l x n°	b
16	65	185	122	145	18 x 8	18

Other sizes (minimum DN50) and flange standards (ANSI, JIS,...) on request

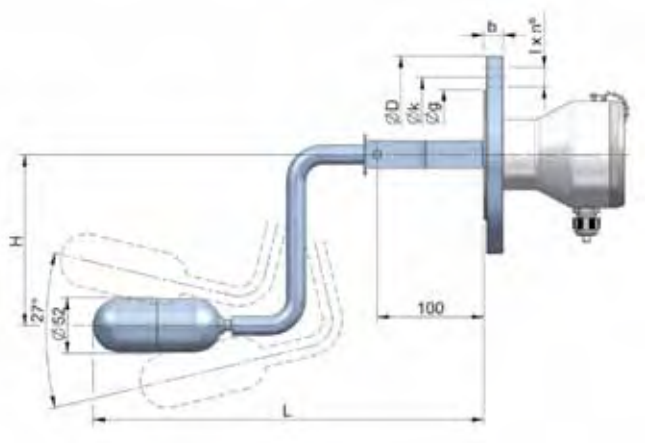
Model LC40 / PP, PVC, PTFE, PVDF



PN	PVC / PTFE / PP / PVDF				
	DN	D	g	k	l x n°
10	65	185	122	145	18 x 4

Flanges in PVC, PTFE, PP and PVDF acc. to DIN 8063 PN10

Model LC40-BA / AISI 316L



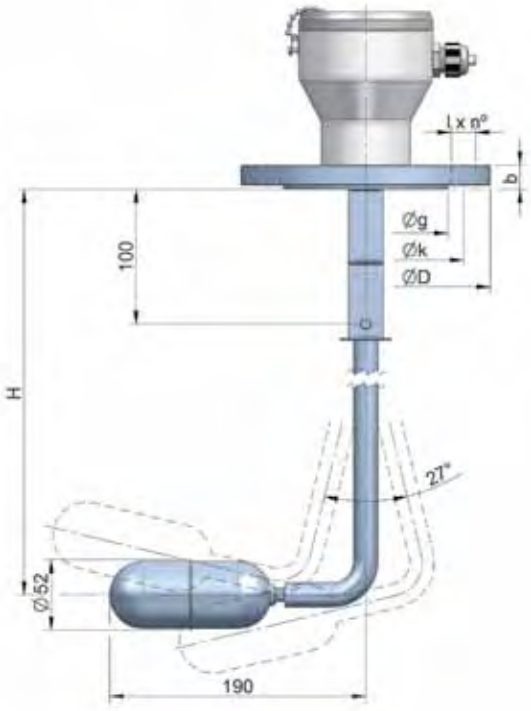
Standard dimensions

H (mm)	150	200	300	400
L (mm)	250	350	450	600

Others on request (H+L maximum 1000 mm)

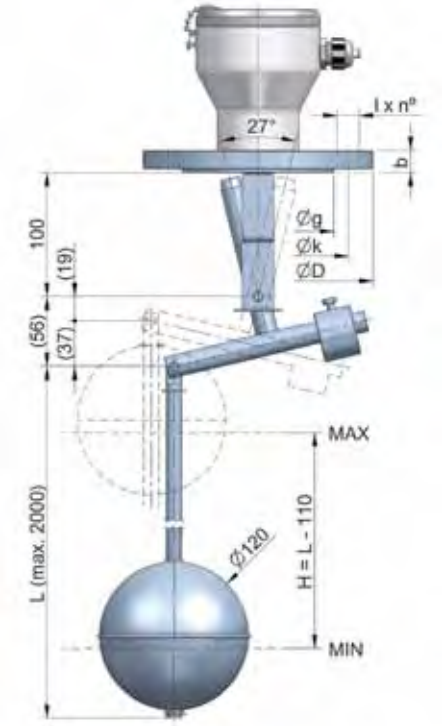
Top mounting

Model LC40-V / AISI 316L



H_{max} = 1000 mm

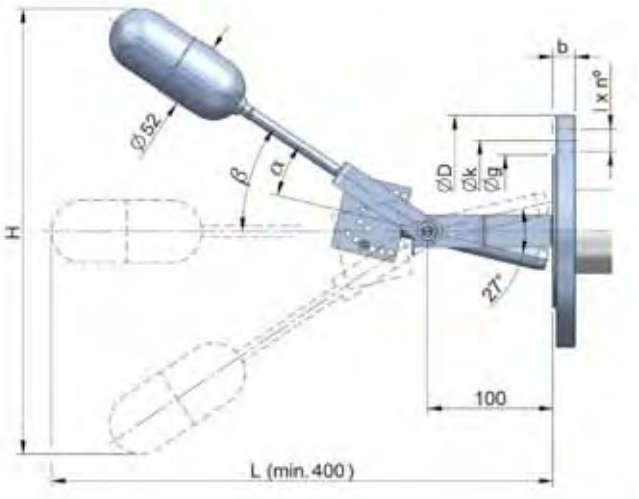
Model LC40-VR / AISI 316L

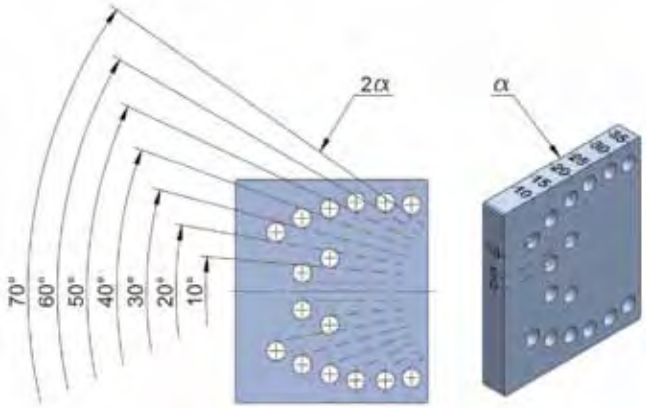


Requires manhole in the tank for the installation

Accessories

Complement A21



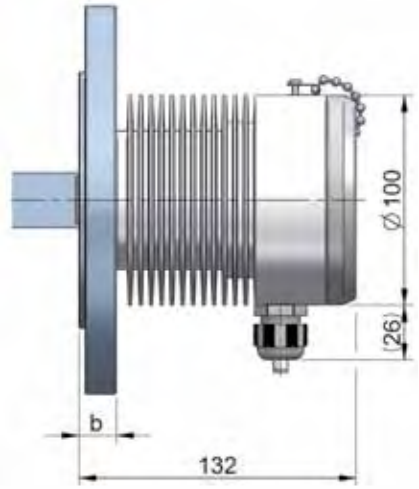


Available for connection size bigger than DN65 (included)

α	2β= 2α+ 27°	H depending on L (mm)						
		L=400	L=500	L=600	L=700	L=800	L=900	L=1000
0°	27°	184	228	276	324	370	418	466
5°	37°	230	292	356	420	484	548	612
10°	47°	276	352	432	514	594	674	754
15°	57°	318	412	506	604	700	796	892
20°	67°	360	466	578	688	800	910	1022
25°	77°	398	520	644	770	894	1020	1144
30°	87°	434	568	706	844	984	1122	1260
35°	97°	468	614	764	914	1064	1214	1366

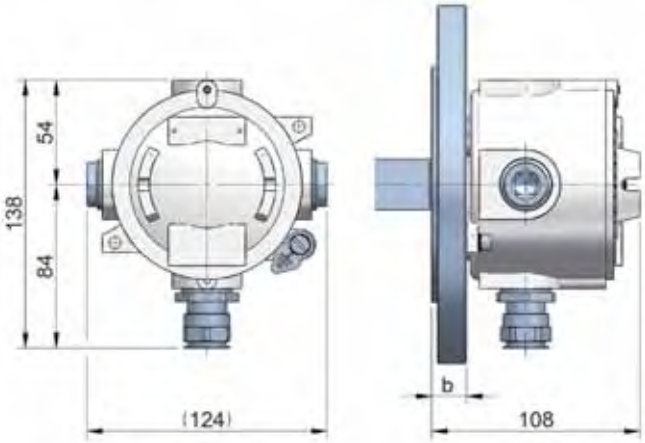
Thermal separator housing

For temperature up to 200ºC.
Special design for temperature up to 400ºC on request.



ATEX version

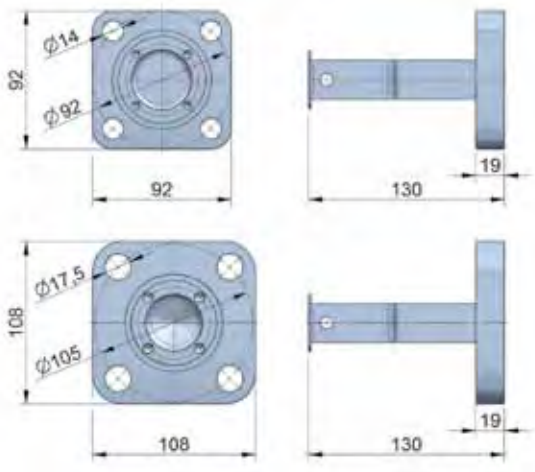
ATEX Ex d IIC T6 certified.
Suitable for temperatures up to 300ºC.



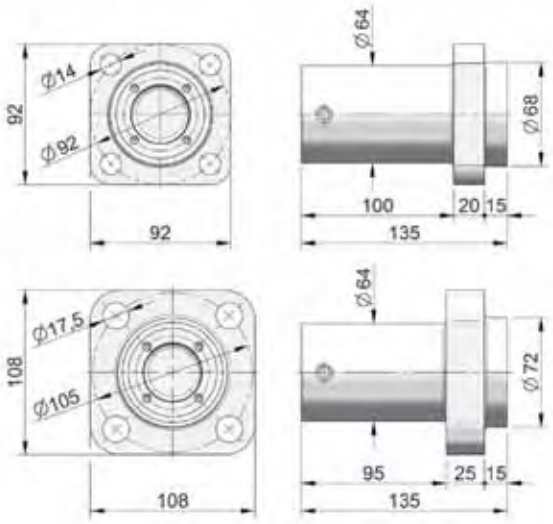
Ex d IIC T6 housing with ATEX packing gland, supplied only on request

Square flange

EN 1.4404 (AISI 316L)



PP / PVC / PTFE / PVDF



Housings

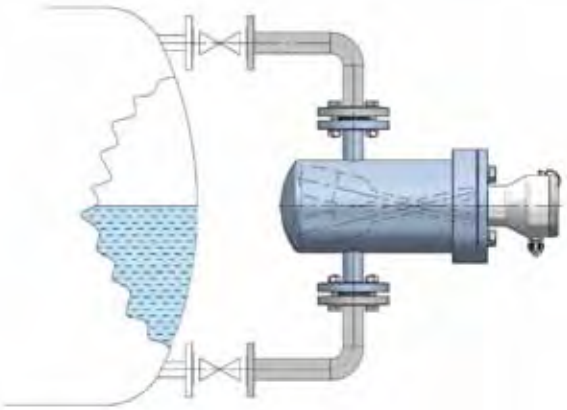
ALUMINIUM (standard)

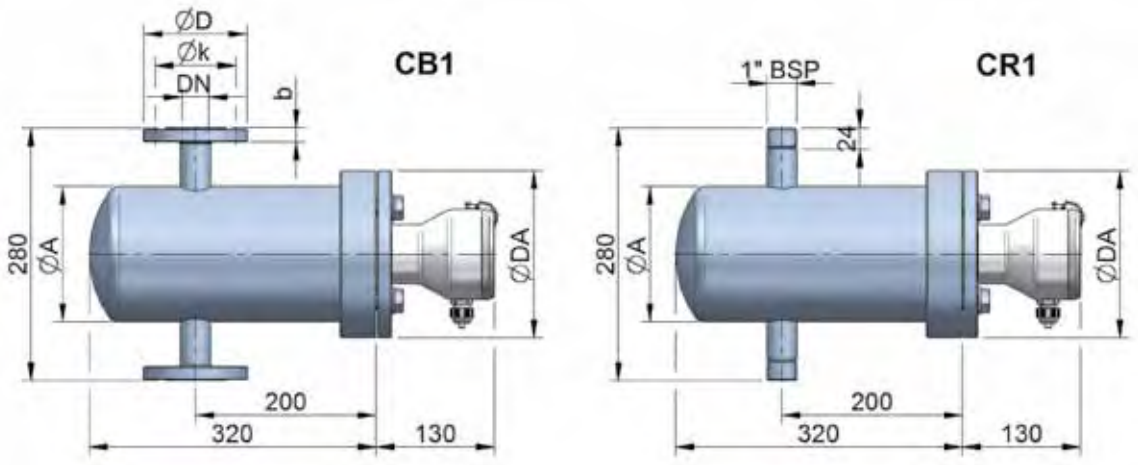
PVC

Other materials on request: EN 1.4404 (AISI 316L), PP,...

External mounting to tank or boiler

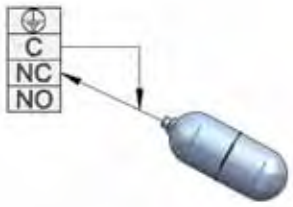
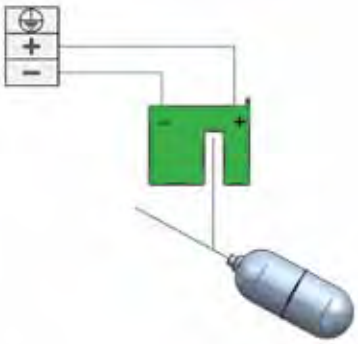
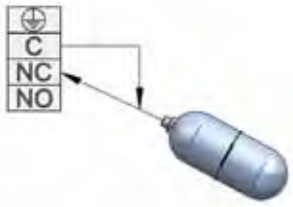
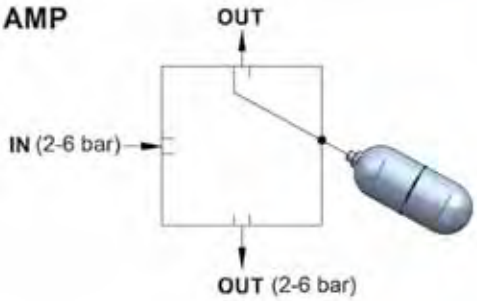
In applications where it is required, an external chamber for side mounting is available as an option.





DN	PN	D	k	l x nº	b	R (BSP / NPT)	Material	A	AD
25	16	115	85	14 x 4	16	1"	AISI 316L / Steel	160	185
	25	115	85	14 x 4	17			160	185
	40	115	85	14 x 4	18			160	185
	64	140	100	18 x 4	18			160	205
	100	140	100	18 x 4	28			165	220

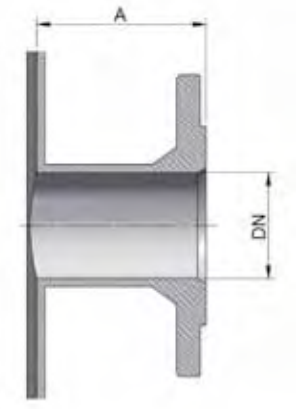
Limit switches

	Switch	Contact rating	Protection	Ambient temperature
AMM 	SPDT micro-switch 20 x 10^6 operations	3 A 220 VAC 0.5 A 24 VDC		
AMD 	Inductive detector	NAMUR (EN 60947-5-6) 8.2 VDC (amplifier relay on request)	IP65	-25°C ... +85°C
AMR 	SPDT reed switch	0.5 A 220 VAC 60 VA		
AMP 	ON/OFF two-way pneumatic switch	2 ... 6 bar		0°C ... +50°C

Recommendation for the installation

LC40 / AISI 316L	A = 90 ... 100 mm
LC40 / PVC, PP, PTFE, PVDF	A = 70 ... 80 mm

Note: for DN50 connection the maximum allowable PN for the flange is PN40



R-CT-LC40 Rev. 1 english version

MORE THAN 40 YEARS MANUFACTURING
FLOW AND LEVEL INSTRUMENTATION

TECFLUID

Level indicators

Series NPC

Indicator by means of pulleys and counterweight system for liquids

- Simple and cheap construction
- Suitable for almost all the liquids, even agressive and corrosive fluids
- No risk of leakage
- Excellent chemical resistance
- Measuring range: up to 15 m
- Connections:
  - DN50 EN 1092-1 flanges. Other sizes on request
  - Solvent weld socket connection
- Materials:
  - Pulleys: PVC
  - Float: PP, PVC, PVDF, EN 1.4404 (AISI 316L)
  - External counterweight-indicator: PVC
- Local indication by means of external counterweight
- Options:
  - Switches
  - Electronic transmitter with 4-20 mA analog output for safe or hazardous area (Ex ia IIC T6 protection, ATEX certified). HART, PROFIBUS, FIELDBUS protocols available on request

Working principle

A PVC counterweight which is joined to a PP, PVC, PVDF or EN 1.4404 float by means of a cable, moves along two protected pulleys and show the tank level externally. Changes in tank level displace the float up and down. This movement is transferred to the external counterweight.

The float is always wetted by process fluid. A magnet inside the counterweight allows this instrument to fit alarm switches or electronical transmitters.

Applications

- Water treatment plants
- Storage of chemicals and petrochemical industry
- Paper industry
- Car industry

Technical data

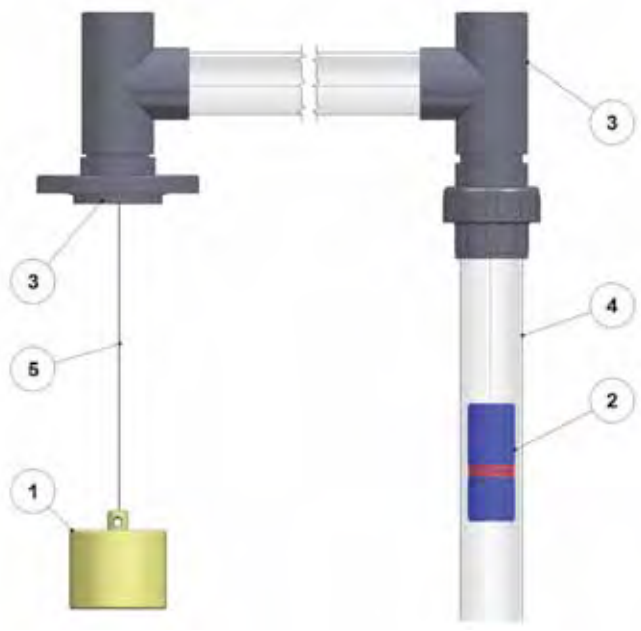
- Scale in cm available on request
- **Liquid density:** ≥ 0.8 kg/l
- **Measuring range:** up to 15 m
- **Liquid temperature:** 0ºC … +60ºC
- **Ambient temperature:** 0ºC … +60ºC
- **Working pressure:** Ambient (PN10 on request)
- **Connections:**
  - DN50 EN 1092-1 flanges. Other sizes available
  - Solvent weld socket connection
- **Mounting:** on top of the tank

Limit switches and transmitters

- **LNPC-APR:** adjustable reed switches
- **LNPC-AMM:** adjustable micro-switches
- **LNPC-AMD:** adjustable inductive switches (+ relays on request)
- **LTE:** Resistive sensor transmitter 0 ... 4-20 mA:
  - TR2420: 24 VDC 2-wire system, compact mounted
  - TR420: 24, 125, 220 VAC, 50/60 Hz / 24 VDC, 4-wire system, DIN rail mounted

HART, PROFIBUS, FIELDBUS protocols, and Ex version available on request

Materials



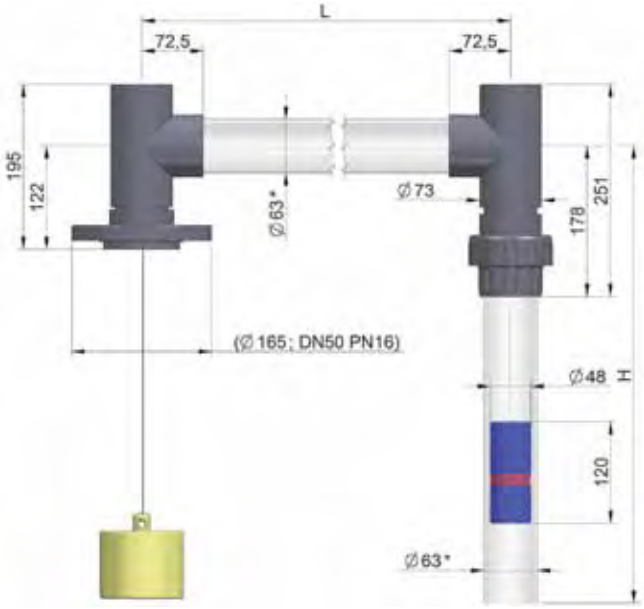
Nº	Description	Materials
1	Float	PP, PVC, EN 1.4404 (AISI 316L)
2	Counterweight-indicator	PVC
3	Pulleys	PVC
4	Tube *	Transparent PVC
5	Cable *	PP, EN 1.4401

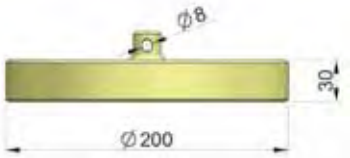
* Supplied on request

Float types

Materials	Dimensions mm	Liquid density kg/l
EN 1.4404	Ø 120	≥ 0.8
EN 1.4404	Ø 90 x 110	≥ 0.96
PP	Ø 98 x 80	≥ 0.93
PP	Ø 98 x 110	≥ 0.93
PP	Ø 200 x 30	≥ 0.93
PVC	Ø 98 x 80	≥ 0.93

Dimensions





Other flange sizes on request
* Supplied on request

Limit switches

Adjustable switch LNPC-AMM

- SPDT bi-stable micro-switch
- IP65 coated aluminium housing
- Contact rating: 3 A 220 VAC
- Hysteresis: ±6 mm
- Liquid temperature: 0ºC ... 60ºC
- Ambient temperature: -25ºC ... 80ºC
- Mechanical life: 20 x 10^6 operations
- Suitable for hazardous area, considered as "Simple apparatus"

Adjustable switch LNPC-APR

- SPDT bi-stable reed switch
- IP65 polycarbonate housing
- Contact rating: 0.5 A 220 VAC 60 VA
- Hysteresis: ±6 mm
- Liquid temperature: 0ºC ... 60ºC
- Ambient temperature: -10ºC ... 70ºC
- Suitable for hazardous area, considered as "Simple apparatus"

Adjustable switch LNPC-AMD

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

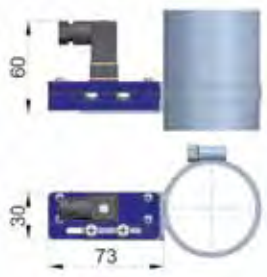
- Power supply: 8 VDC
- Hysteresis: ±6 mm
- Liquid temperature: 0ºC ... 60ºC
- Ambient temperature: -25ºC ... +70ºC
- ATEX certification Ex ia IIC T6

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: -25ºC ... +70ºC

LNPC-APR



LNPC-AMM / AMD

Transmitters

Transmitter LTE 0 ... 4-20 mA

Transmitter composed of a resistive sensor based on a reed and resistances chain, mounted on a printed circuit placed inside a guide tube. Not wetted by the process liquid.

Variations in level inside the tank move the external NPC counterweight, which by means of magnetic coupling changes the value of the resistance of the resistive sensor in correspondance to the measured liquid level.

These variations of resistance are processed by an electronic converter in order to obtain a 0 ... 4-20 mA current output proportional to liquid level.

Technical data LTE

- Connection by means of IP65 connector, IP67 polycarbonate housing or IP65 aluminium housing
- Distance between reed switches: 10 mm
- Liquid temperature: 0ºC ... 60ºC
- Ambient temperature: 0ºC ... 60ºC

2-wire system

For 2-wire system, the TR2420 resistance-mA converter is supplied, in an IP67 plastic housing or optionally in an IP65 aluminium housing compact mounted on the sensor head.

Technical data TR2420

- Power supply: 12 ... 36 VDC, safe area version
- Power consumption: 0,8 W
- Output: 4-20 mA

Also available with 2-wire system:

- TR2420Ex: hazardous area version ATEX Ex ia IIC T6
  Power supply: 8 ... 30 VDC
- TR2420H (HART protocol), TR2420P (Profibus protocol) or TR2420F (Fieldbus protocol). Also available in combination with their Ex versions

4-wire system

For 4-wire system the TR420 resistance-mA converter is supplied, DIN 46277 rail mounted.

Technical data TR420

- Power supply: 24, 110, 230, 240 VAC 50/60 Hz / 24 VDC
- Power consumption: <1 VA
- Outputs: 0-20 mA, 4-20 mA, 0-5 V, 0-10 V, 1-5 V, 2-10 V

TR420
(remote converter Ω/mA)

R-CT-NPC Rev. 0 english version

2.3
VIBRATING FORK

2.3
VIBRATING FORK

LD

TecFluid
The art of measuring

Level switches
Series LD

Vibrating fork level switch for liquids and solids

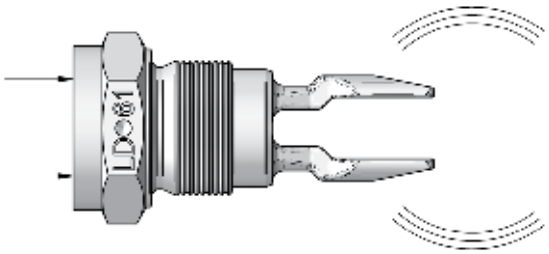
- Robust and compact
- Suitable for liquids (model LD61) and solids (model LD60)
- No moving parts, low maintenance
- Corrosion resistant materials
- Not affected by temperature or pressure changes
- Suitable for liquids with viscosity up to 10000 cSt
- Liquid density higher than 0.6 kg/l
- Solids: depending on application
- Detection length: up to 2 m
- Switching time: 1 s approx.
- Connections:
  - Threaded connections G1 or 1" NPT
  - Flanged connections EN 1092-1 DN40 PN25
    Other flange standards on request
  - Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Materials: EN 1.4404 (AISI 316L). HALAR® coating on request
- Level detection, with LED status indication
- Options:
  - Relay output
  - NAMUR output Ex ia IIC T4 or T6

Working principle

The LD series level switches are based on the variation of the natural resonant frequency of a vibrating fork when it comes into contact with a liquid or a solid.

This variation is detected by the internal electronics and is used to determine the state of the output.

Receiver



Transmitter

Applications

- Pump control
- Open and pressurized tanks, tanks with agitation
- Open channel and empty / full pipe detection
- Distillation columns and evaporators
- Chemical dosing tanks

Models

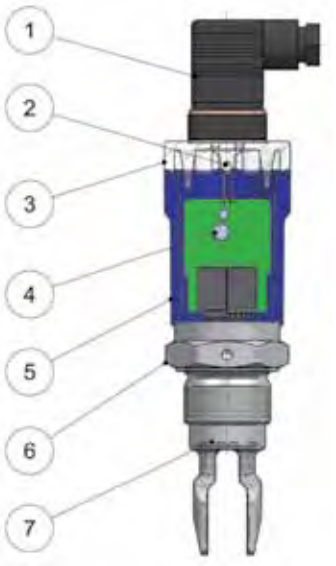
- **LD61** liquids level detection
- **LD60** solids level detection
- **LD6XN** liquids or solids level detection, with NAMUR Ex output
- **LD6XR** liquids or solids level detection, with relay output
- **LD6XML** liquids or solids level detection, with enlarged detection length

Technical data

- **Switching time:** 1 s approx.
- **Hysteresis:** ±2 mm with H_2O
- **Liquid density:** higher than 0.6 kg/l
- **Liquid viscosity:** up to 10000 cSt
- **Solids:** depending on application. Consult factory
- **Detection length**: up to 2 m
- **Fluid temperature:** -30ºC ... 150ºC
- **Ambient temperature:** -20ºC ... 70ºC
- **Working pressure:** PN25 (others on request)
- **Connections:**
  - Threaded connections G1 or 1" NPT
  - Flanged connections EN 1092-1 DN40 PN25 Other flange standards on request
  - Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®

Others on request

Materials



Nº	Description	Materials
1	Connector / Housing	Polyamida
2	LED	Plastic
3	Cover	Polycarbonate
4	Electronics	-
5	Enclosure	Polycarbonate
6	Connection	EN 1.4404 (AISI 316L) *
7	Body	EN 1.4404 (AISI 316L) *

* On request, with HALAR® coating

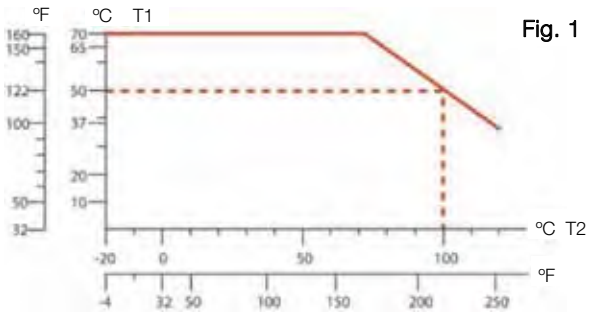


Fig. 1

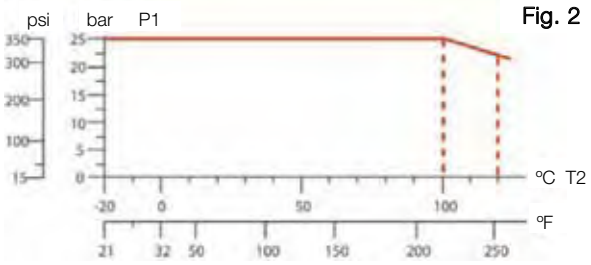


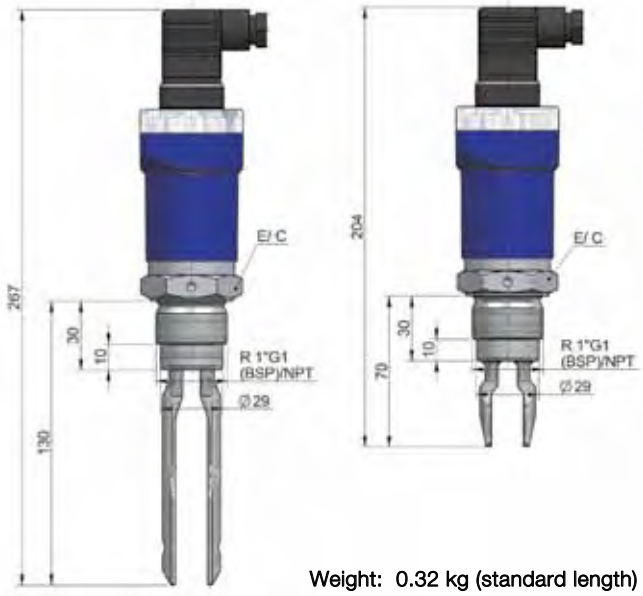
Fig. 2

The maximum working temperature of the inside of the tank (T2) is a function of the ambient temperature on the outside (T1), as shown in Fig. 1.

The maximum working pressure in the tank is a function of the interior temperature, as shown in Fig. 2.

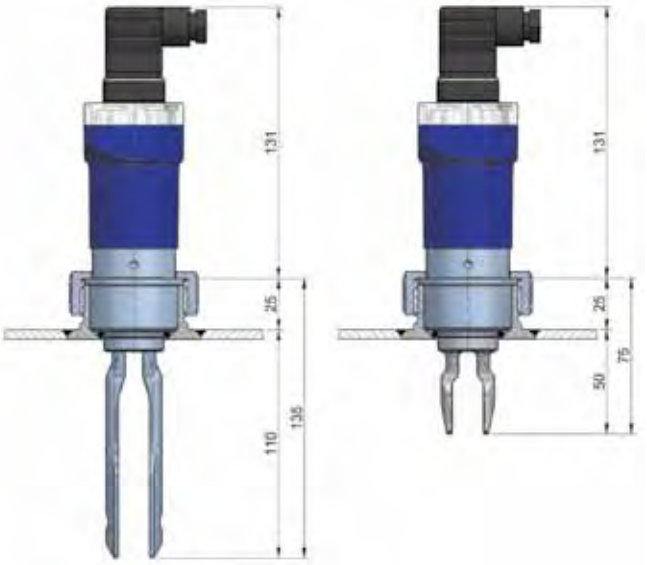
Dimensions

LD60 / LD61 - BSP / NPT threaded connections



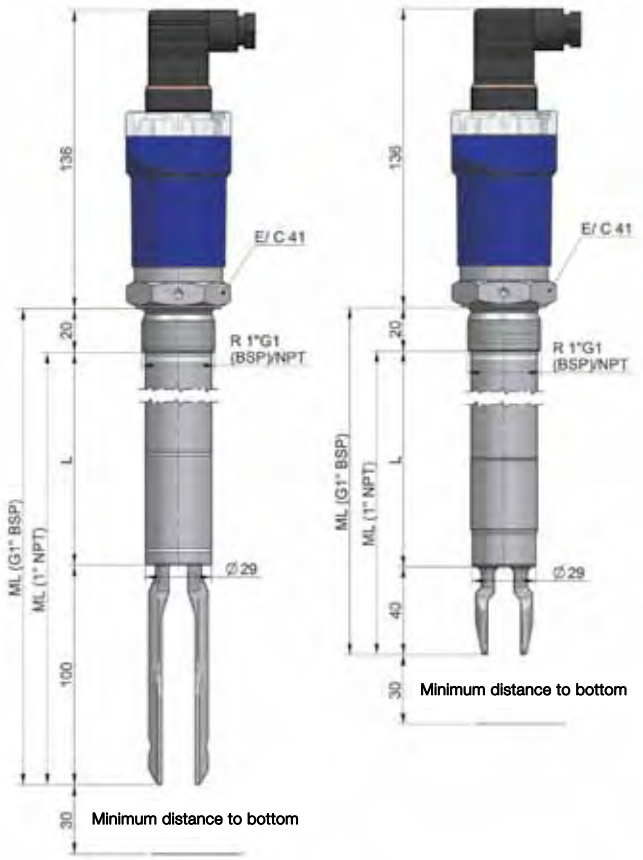
Weight: 0.32 kg (standard length)

LD60 / LD61 - TF DIN405 flush mounting



Fully hygienic design available

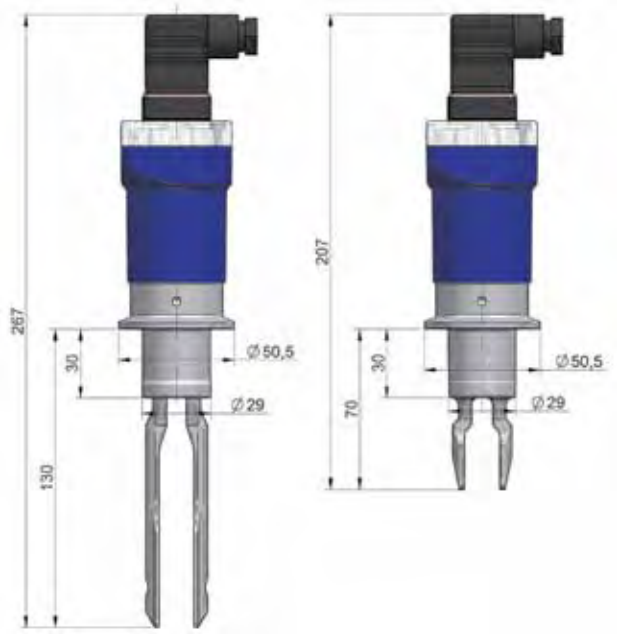
LD60ML / LD61ML - special length



LD60ML / LD61ML (standard length ±1.5 mm)

ML (G1)	260	360	560	860	1060	1260	1560	2060
ML (1" NPT)	240	340	540	840	1040	1240	1540	2040

LD60 / LD61 - CLAMP ISO 2852 connection



Fully hygienic design available

All dimensions in mm

Other sanitary couplings available on request.

Fully hygienic design available for all the models with sanitary couplings.

Model LD60 ... LD61

- Power supply:
  - 2 wires: 24 ... 250 VAC. Max. load 350 mA
  - 3 wires: 12 ... 55 VDC. Max. load 350 mA

  Min. load: 6 mA
- Outputs: PNP transistor for DC power supply; tiristor for AC power supply
- Status indication by means of bicolour LED
- Housing: IP65 DIN 43650-A connector, PG9 cable gland

Model LD60R ... LD61R

- Power supply:
  - 25 ... 250 VAC / VDC
  - Consumption: ≤ 1 W
- Relay status indication by means of bicolour LED
- Housing: IP67 polycarbonate, PG11 cable gland
  Ex d IIC T6 on request, pending of certification
- Fluid temperature: -30ºC … +115ºC
- Ambient temperature: -5ºC ... +40ºC

Relay technical data

Number of contacts and type: double pole, double throw

Maximum switching current: 3 A

Maximum switching voltage: 220 VDC, 250 VAC

Maximum switching power: 60 W, 125 VA

Mechanical resistance: 15.0 x 10^6 operations

Model LD60N ... LD61N

- NAMUR (IEC60947-5-6, EN50227) switch
- Power supply:
  - 8 ... 14 VDC
  - Consumption: from 0.7 mA to 2.3 mA, depending on the status “ON/OFF”
- Status indication by means of LED
- Housing: IP65 DIN 43650-A connector, PG9 cable gland
- Fluid temperature: -30ºC … +115ºC
- Ambient temperature: -5ºC … +40ºC
- ATEX certificate Ex ia IIC T4 (T6 on request)

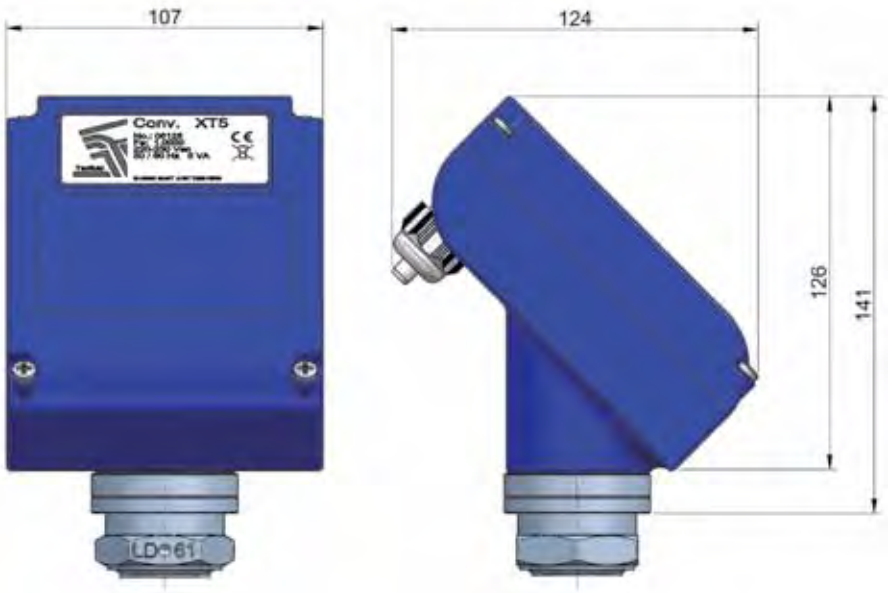
Safety characteristics

Given that this instrument is group II, it is intended for use in places likely to become endangered by explosive atmospheres, but not in mines.

The category is 1G, that is, it is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists are present continuously, for long periods or frequently.

Marking	Ex ia IIC T4	Ex ia IIC T6
Specific parameters	U_i = 14 V P_i = 1.3 W	U_i = 14 V P_i = 1.3 W
Ambient temperature		-5ºC ... +40ºC

Dimensions for LD60R ... LD61R housing



For fork dimensions, please consult p. 189

Mounting

The optimal mounting position depends on the liquid viscosity. Both top of the tank (fig. 3a) and side (fig. 3b) mounting are optimal. In both positions the liquid can flow easily through the fork allowing correct detection of the liquid level.

Connection size

In case of a small connection (smaller than DN50) the fork must be completely outside the neck of the coupling (fig. 4a) in order to make sure that particles inside the neck will not affect the level switch performance.

In cases with big connection sizes (bigger than DN50), the fork can be mounted inside the neck of the coupling, but only when the liquid viscosity allows it to flow out fast (fig. 4b).

Viscous liquids

A minimum distance that ensures a fast flow of the liquid to free the fork is required (fig. 5a & 5b): $D_{minimum}$ = 50 mm (2")

Detection of liquid in pipes

In partially full horizontal pipes, the detector length must be carefully chosen so that forks are wetted by the liquid (fig. 6a).

For control of liquid presence in pipes, for example in pump protection, the detector should be mounted in a vertical section with rising flow (fig. 6b). The switch length must be chosen carefully in order to avoid contact with the pipe.

The minimum recommended pipe size is DN50 (fig. 6c).

The maximum recommended flow speed is 5 m/s for liquids of 1 g/cm^3 and 1 mPa·s (please consult for other working conditions). For this application, the forks must be aligned with the pipe axis.

High temperature applications

High temperatures in the tank may require thermal insulation. The LD can be supplied with required extra length. The standard extra length is 150 mm (fig. 7).

Filling tanks

The mounting position of the level detector should not coincide with the point at which liquid falls inside the tank (fig. 8). If during the filling of the tank strong waves are produced, the level detector must be protected.

Trucks

When controlling level in moving tanks, a guide pipe should be mounted, with a PTFE pushing at the lower end to avoid vibrations that could affect the level detector (fig. 9).

Fig. 9

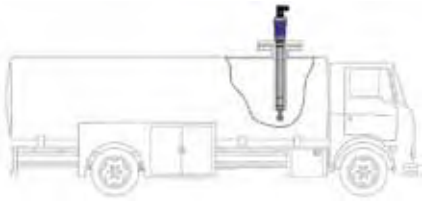


Fig. 3a

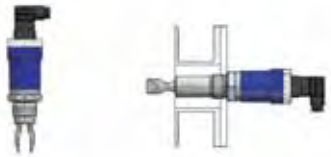


Fig. 3b

Fig. 4a

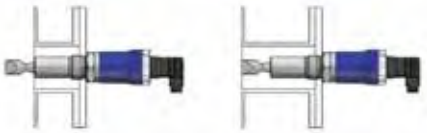


Fig. 4b

Fig. 5a

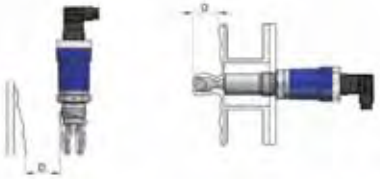


Fig. 5b

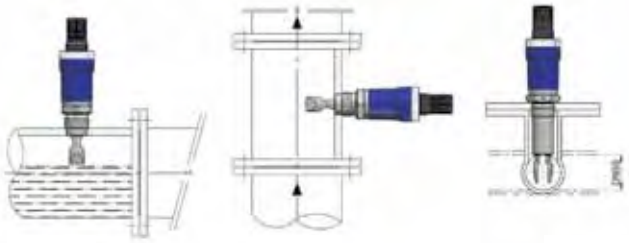


Fig. 6a Fig. 6b Fig. 6c

Fig. 7

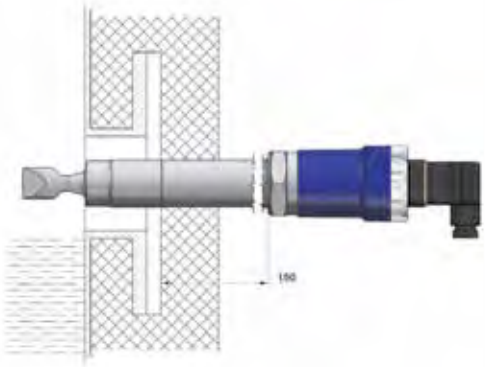
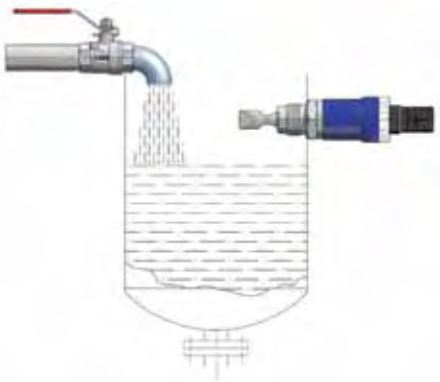


Fig. 8



Control of level in tanks and tanks with agitation

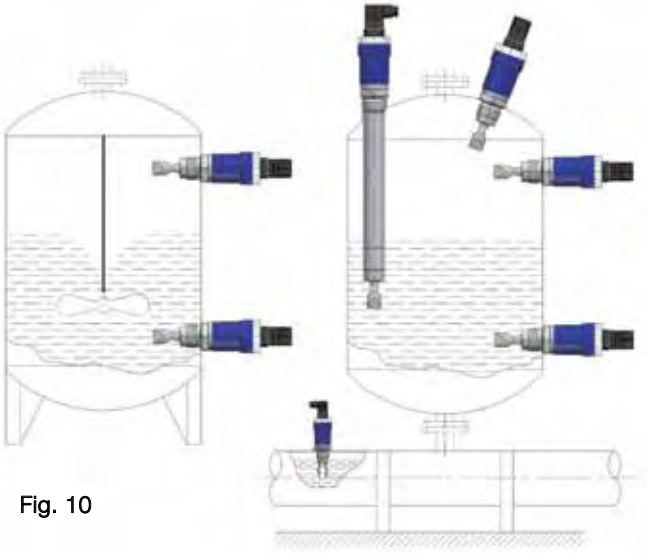


Fig. 10

In tanks with agitators, the LD61ML detector must be protected against the force of the rotating liquid in their whole length.

Dosing tanks

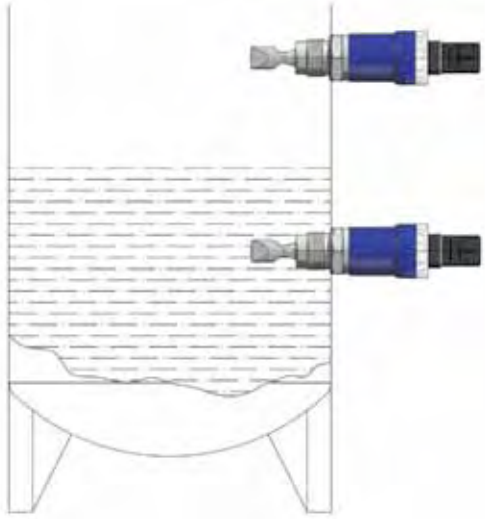


Fig. 11

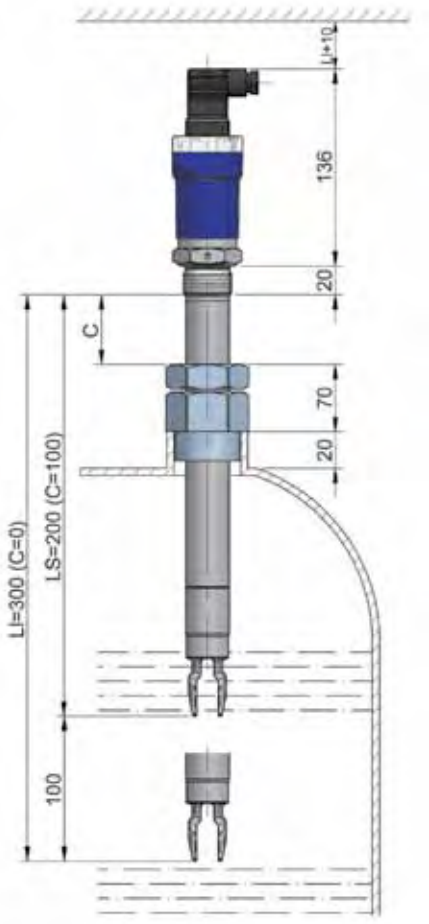
Accessories

The LD series can be supplied with a sliding system to adjust the height of the different maximum or minimum detection points that may be required in different processes in closed tanks.

The stuffing box supplied is fitted with a PTFE gland.

Example

The level differential C between maximum and minimum = 100 mm. In this case length LI (300 mm) is the minimum level. The length LS is the maximum level (200 mm).



2.4
ULTRASONIC

2.4 ULTRASONIC

LU

TecFluid
The art of measuring

Level transmitters and indicators

Series LU

Ultrasonic level transmitter and indicator for liquids and solids

- No contact with the product
- Compact design with polycarbonate housing (electronics and display). Remote display available on request
- Very good resistance in corrosive environments, outdoors applications,...
- Easy to program by means of keyboard-display
- Level indication with automatic compensation of temperature changes
- Low power consumption
- Measuring range:
  - Liquids:
    - Model LU91: 0.30 ... 6 m
    - Model LU921: 0.30 ... 5 m
    - Model LU93: 0.45 ... 12 m
    - Model LU923: 0.45 ... 10 m
  - Solids:
    - Model LU91: 0.30 ... 3.5 m
    - Model LU921: 0.30 ... 2.5 m
    - Model LU93: 0.45 ... 7 m
    - Model LU923: 0.45 ... 5 m
- Accuracy: ±2 mm (between 0.3 and 2 m)
- Connections:
  - Models LU91 / LU921: G2 thread
  - Models LU93 / LU923: G2½ thread

  Others on request
- Materials: PP, PVDF
- Continuous level measurement, with 4-20 mA output
- Maximum-minimum level alarms, in 4-wire version (Models LU91 and LU93)
- Optional: HART communication protocol

Working principle

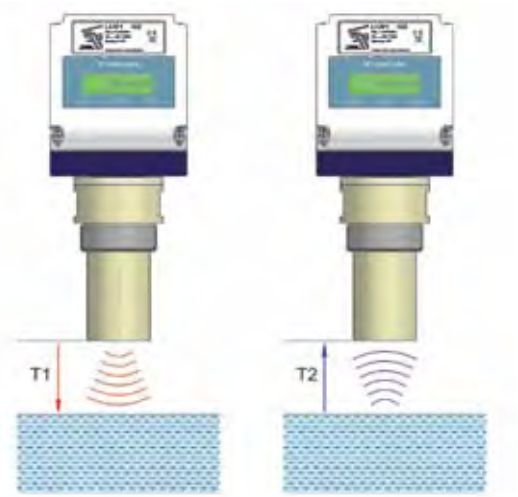
A transducer sends short ultrasonic pulses to a product surface. The reflection of these pulses is received back by the same transducer.

The ultrasonic waves travel at the speed of sound. The time passed since the emission of the signal until it is reflected on the product surface (T1) plus the time necessary to receive the signal back on the transducer (T2) determines the distance between the sensor and the product.

The calculation of this distance is carried out by means of a micro-processor with a powerful and smart software which selects the correct echo level among all the echos produced by the internal elements of the tanks.

A temperature sensor built-in the transducer provides the real working temperature to the micro-processor, that makes the proper calculation corrections of the measured distance.

A change in product does not affect the correct performance of the instrument, so it is not necessary to re-adjust the unit for each new product. The non-invasive level transmitter makes installation and maintenance easier.



Applications

- **Level control in storage tanks of chemical and petrochemical products, treated water, waste water, rainwater,... And food products**
- **Level control in storage silos of powder, granular products,...**
- **Flow measurement in open channels, in combination with the electromagnetic sensor series FLOMAT (signal integration software not supplied)**
- **Control of paper, cardboard, steel and plastic reels**
- **Level control in intermediate tanks for processes such as pumps start-stop, valve opening-closing, etc.**

Models

- **LU91 ... 93** 4-wire system
- **LU91H ... 93H** 4-wire system with HART protocol
- **LU921 ... 923** 2-wire system
- **LU921H** 2-wire system with HART protocol

Technical data

- **Accuracy:** ±2 mm (between 0.3 and 2 m)
- **Resolution:** 1 mm
- **Uncertainty:** <0.25% of the spam
- **Repeatability**: <0.25% of the spam
- **Measuring range:**
  - LU91: liquids: 0.30 ... 6 m ; solids: 0.30 ... 3.5 m
  - LU921: liquids: 0.30 ... 5 m ; solids: 0.30 ... 2.5 m
  - LU93: liquids: 0.45 ... 12 m ; solids: 0.45 ... 7 m
  - LU923: liquids: 0.45 ... 10 m ; solids: 0.45 ... 5 m

  Measuring ranges for solids might change depending on solid type. Please consult.
- **Measurement interval:** 200 ms
- **Ultrasonic beam width:** 14° at -3dB

Reference conditions: Temperature: +18 ... +30ºC

Air relative humidity: 45 ... 75% ; Air pressure: 860 ... 1060 mbar

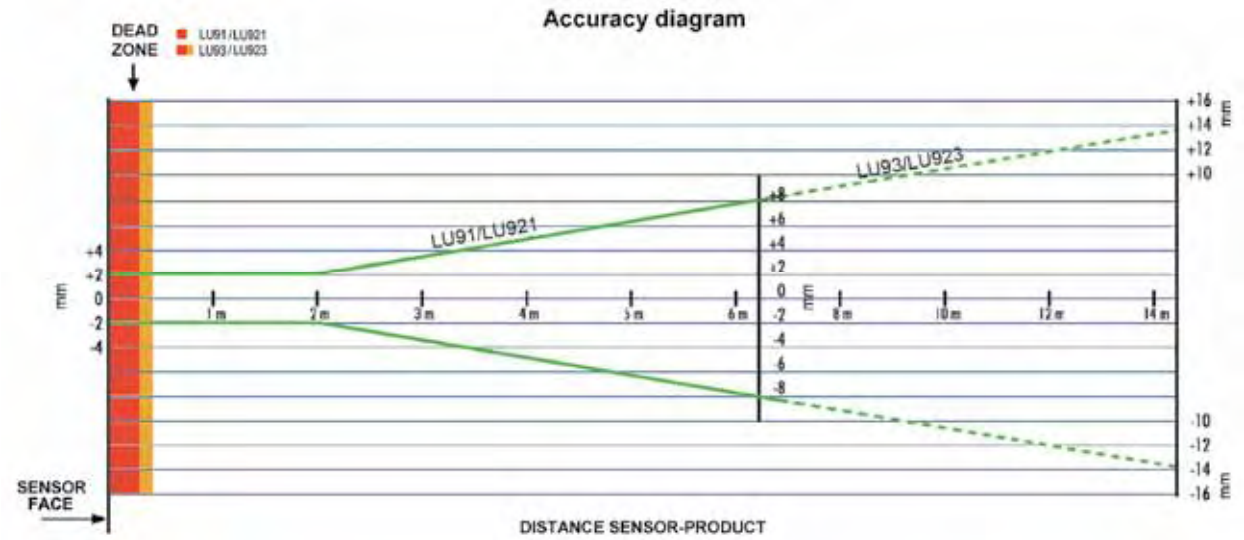
- **Fluid temperature:** -40ºC ... +80ºC
- **Ambient temperature:**
  - Transducer: -40ºC ... +80ºC
  - Electronics: -40ºC ... +60ºC
- **Working pressure:** min. 0.7 bar abs ; max. 4 bar abs
- **Materials:**
  - Sensor: PP / PVDF
  - Housing / Seal Polycarbonate (UV resistant) / NBR
- **Connections:**
  - LU91 / LU921: G2 or 2" NPT
  - LU93 / LU923: G2½ or 2 ½" NPT

  Other connection standards on request
- **Weight:** from 1.8 to 2.5 kg depending on process connection
- **Resistance to mechanical vibrations** of 4G between 5 and 100Hz
- **Ingress protection:** IP67
- **4-20 mA output** active or passive
- **Maximum and minimum level alarms**, full range adjustable, only for 4-wire models.

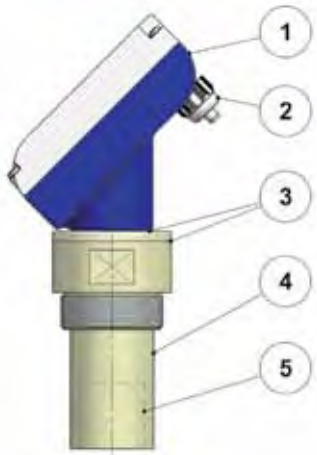
  NPN opto-isolated transistor output: V max.: 30 VDC ; I max.: 30 mA
- **Power supply:**
  - Models LU921 / LU923:

    2-wire: 12 ... 36 VDC
  - Models LU91 / LU93:

    4-wire: 18 ... 30 VDC (special: 14 ... 25 VDC)
- **Power consumption**: < 20 mA (2-wire) ; < 60 mA (4-wire)
- **Cable entries:** 3 x PG11 (cables $Ø_{ext}$ between 6 ... 10 mm)
- **Programming by means of keyboard and display** (remote display available on request)
- **Optional HART protocol (except model LU923)**



Materials

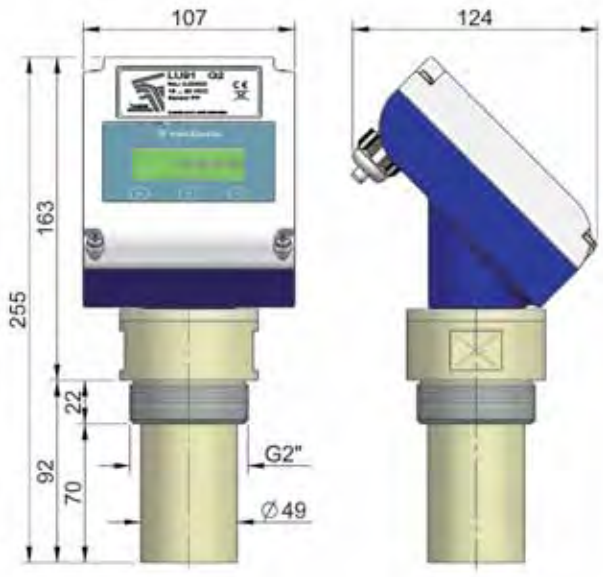


N°	Description	Materials
1	Housing	Polycarbonate *
2	Seal	NBR
3	Sensor	PP PVDF
4	Transducer	PVDF

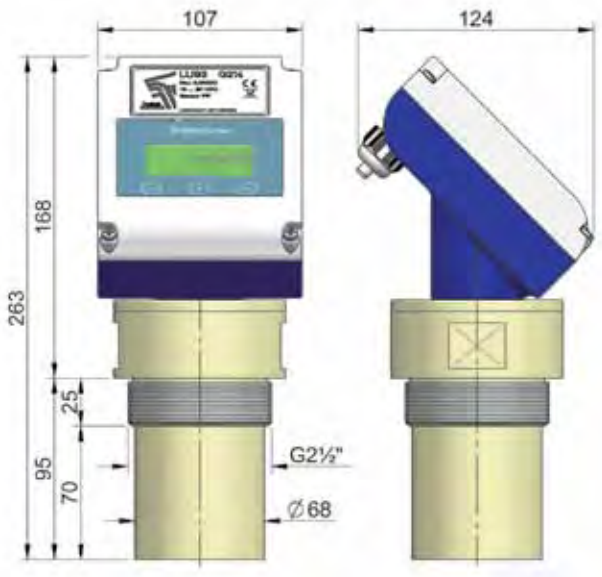
* UV resistant

Dimensions

Models LU91 / LU921



Models LU93 / LU923



Operation

The installation of the level transmitter must be carried out making sure that the transducer flat face is as parallel as possible to the product surface, in order to guarantee a correct measurement.

The minimum distance with respect to the tank wall must be at least 200 mm, avoiding the sensor to be centred in the tank, especially in cases with agitators or formation of emptying cones (Fig. 1).

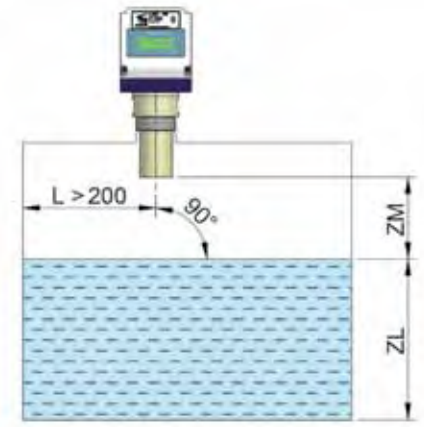


Fig. 1

Dead zone

The dead zone (ZM) is a zone close to the transducer, where the instrument is unable to make any measurement (Fig. 1).

For model LU91 / LU921, dead zone is 300 mm, while for model LU93 / LU923, it is 450 mm.

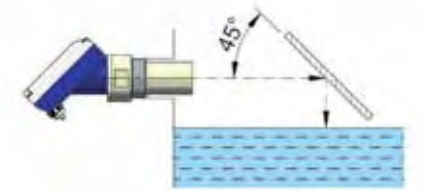


Fig. 2

Reduction of dead zone

In case of being necessary to reduce the dead zone, reflecting elements can be installed. This allows measurements to be made upto the maximum height of the tank (Fig. 2).

Nozzles

The length of the sensor must be taken into account and it must be ensured that it protrudes at least 10 mm from the edge of the nozzle (Fig. 3).

d	l	h max.
50 mm (2”)	> 10 mm	80 mm (3”)
65 mm (2 ½”)	> 10 mm	80 mm (3”)
100 mm (4”)	> 10 mm	300 mm (12”)
150 mm (6”)	> 10 mm	400 mm (16”)

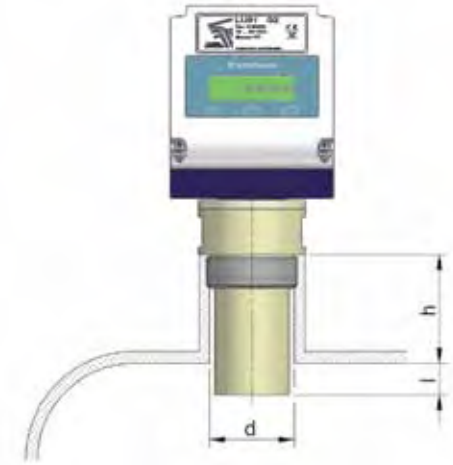


Fig. 3

Common installations

Open channels

Level measurement in open channels.

Open tanks

Classical application of measurement and control of liquid level, even with suspended solid particles (Fig. 4).

Fig. 4

Pressurized tanks

Level control of all kind of liquids, with maximum pressure of 4 bar abs. When working pressure is lower than 0.7 bar abs other measurement systems must be used, such as float type, radar, guided radar, etc..

Tanks with conical bottom

Except in tanks with conical bottom, it can be advantageous to install the sensor in the center of the tank, since in almost all the cases it allows to make closer measurements to the bottom of the tank (depending on tank diameter). The formation of emptying cones must be taken into account (Fig. 5).

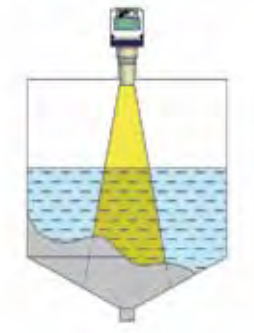


Fig. 5

Mud containers

Control of containers filling, by means of conveyors belts, with mud coming from water treatment processes. The minimum distance to tank walls must be bigger than 200 mm (Fig. 6).

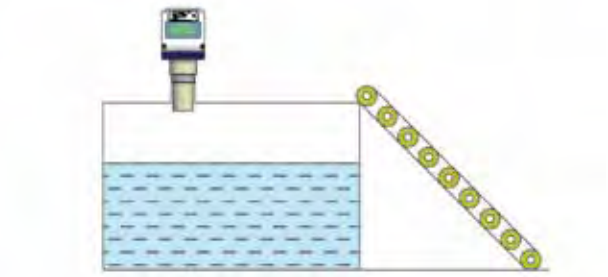


Fig. 6

Product inlets or filling areas

It must be ensured that the sensor is installed above the product surface, and not around the filling area or close to the product inlet (Fig. 7).

In case of partial or total presence of thick foams on the product surface and for open tanks with possible sudden level changes, strong winds or turbulences caused by cyclones, the sensor must be mounted inside a protecting tube with length equal to the minimum measuring level, planning an aeration orifice of around 5 ... 10 mm of diameter (Fig. 8).

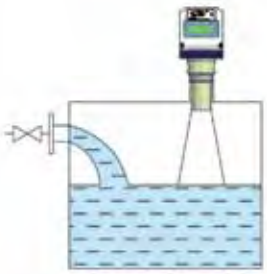


Fig. 7

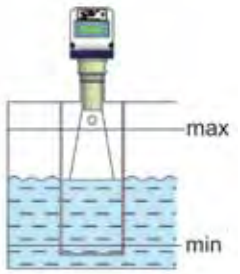


Fig. 8

Agitators

The disturbing echo caused by the agitator must be stored into sensor memory, so it is ensured that the reflections due to the agitator will not be taken into account in the following measurements (Fig. 9).

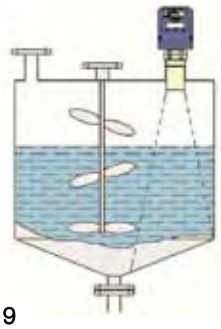


Fig. 9

Tanks internal structures

In tanks where there are internal structures such as steps, heating-cooling coils, struts, etc. disturbing echoes which might interfere with the correct echo may occur.

If disturbing echoes cannot be avoided, they can at least be minimized by means of small metallic or plastic covers which diffuse the wave reflections, avoiding the direct reception of said waves by the transducer (Fig. 10).

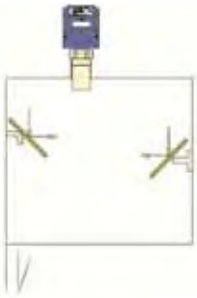
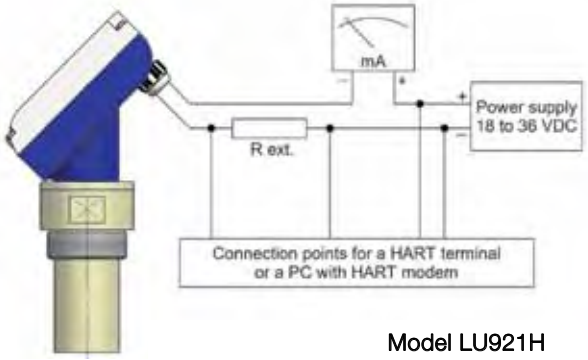


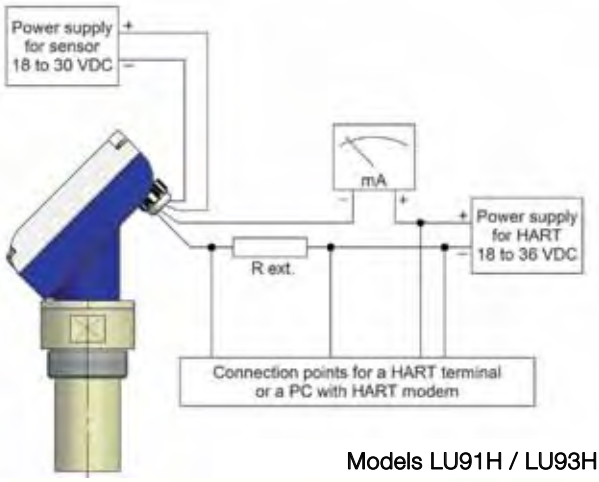
Fig. 10

HART protocol

The level transmitters series LU are compatible with HART communication protocol. The characteristics details are available in the “Field Device Specification” document. In order to proceed with HART communication, an external resistance (R ext.), of between 200 and 500 Ohm, must be connected to the current loop. The positions where a terminal or a PC with modem HART can be connected are shown in the following figure.



Model LU921H



Models LU91H / LU93H

2.5
GUIDED RADAR

2.5
GUIDED RADAR

LTDR

The art of measuring

Level transmitters

Series LTDR

TDR guided radar level transmitter for liquids and solids

- Level measurement independent of changing process conditions (density, conductivity, temperature, pressure,…)
- Innovative signal analysis and disturbance signal suppression
- Almost no installation restrictions
- Different types of probes: single rod, coaxial and rope probe, interchangeable thanks to its modular design
- Suitable for almost every liquid. Exceptional performance in liquids with low dielectric constant (i.e. low reflectivity) such as oils and hydrocarbons
- Suitable for solids, mainly with rope probe version
- Unmatched price / performance ratio
- Measuring range:
  - Single rod probe: 100 ... 3000 mm
  - Coaxial probe: 100 ... 6000 mm
  - Rope probe: 1000 ... 20000 mm
- Connections:
  - Rosca G¾A or G1A threaded connection
  - EN 1092-1 DN40 flange or bigger
- Materials: EN 1.4404 (AISI 316L), PEEK™
- 4-20 mA output
- 1 x programmable transistor output for level detection
- Optional:
  - ATEX version
  - Extended temperature version
  - Single rod PTFE coated

Working principle

LTDR uses TDR (Time Domain Reflectometry) technology.

Low-energy, high-frequency electromagnetic impulses, generated by the sensor's circuitry, are propagated along the probe which is immerged in the liquid to be measured. When these impulses hit the surface of the liquid, part of the impulse energy is reflected back up the probe to the circuitry which then calculates the fluid level from the time difference between the impulses sent and the impulses reflected. The sensor can output the analyzed level as a continuous measurement reading through its analog output, or it can convert the values into freely positionable switching output signals.

LTDR Sensors are also known as Guided Radars or Guided Wave Radars.

Applications

- **Level measurement in tanks/storage silos**
- **Water and waste water treatment**
- **Food and beverage industry**
- **Chemical, petrochemical and car industry**

Models

- **LTDR single rod probe:**
  - 6 mm, G¾ connection
  - 8 mm, G1 connection
- **LTDR rope probe:**
  - 4 mm, G¾ connection
  - 6 mm, G1 connection

Suitable for a very wide range of applications with both liquids and solids (single rod 8 mm and rope probe are specifically indicated for the level measurement of solids).

The signal has wider detection radius around the rod. Thus, it is more responsive for measuring signal disturbances which can be easily overcome by observing a few mounting considerations and making simple configuration adjustments to the sensor.

These are also recommended for installation in metallic bypass chambers, which basically act together with the rod as a big coaxial probe.

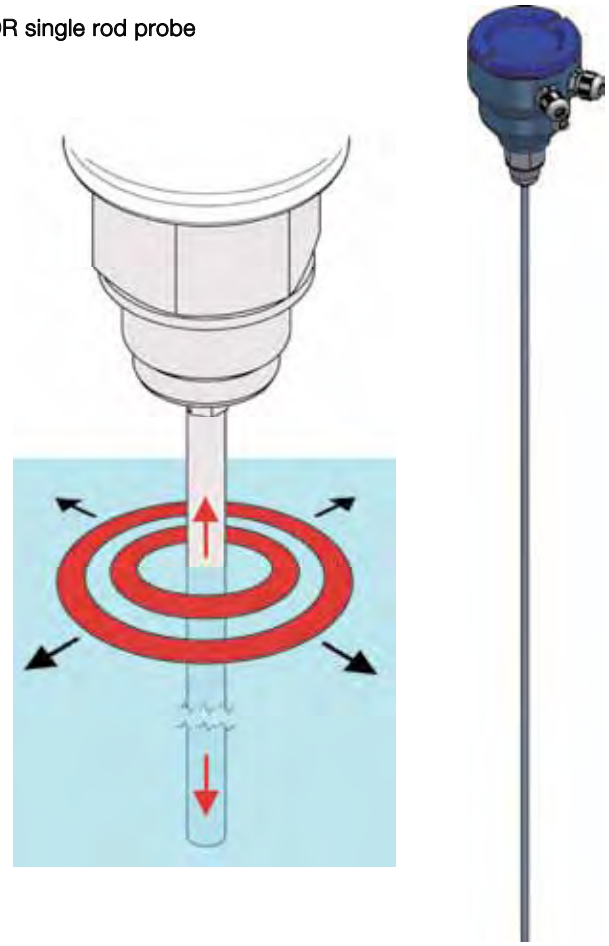
- **LTDR coaxial probe:** G¾ connection

The high frequency measurement signal is completely contained within the outer tube, which provides immunity against any external conditions and interfering objects outside its tube.

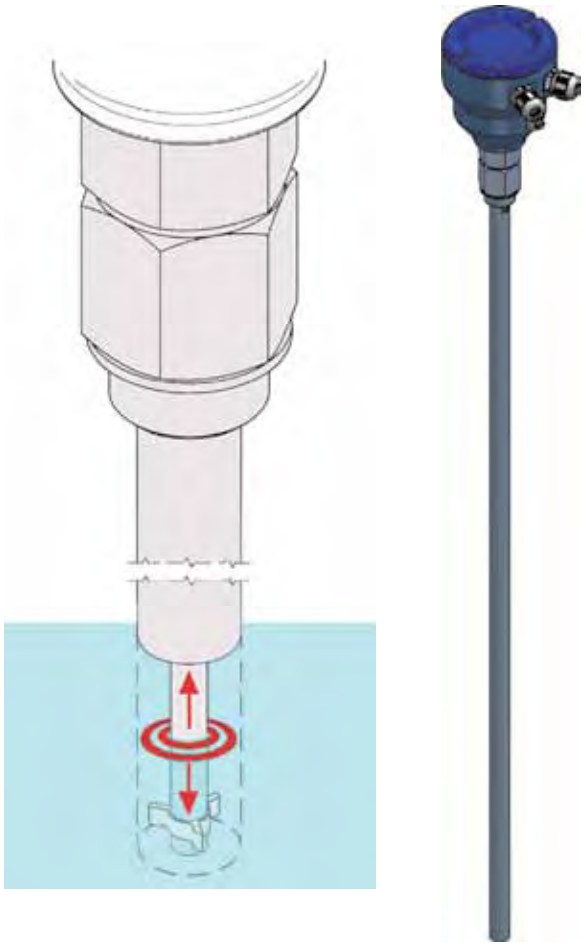
Ideal solution for a hassle-free "drop-in anywhere" installation, ensuring reliable measurement under almost any application condition. Ideal choice for measuring low reflectivity liquids (i.e. low dielectric constant) such as oils and hydrocarbons.

Recommended for the use with clean liquids only. NOT recommended with viscous, crystallizing, adhesive, coating or sticky liquids, fibrous liquids, sludge, slurry, pulp or any liquids containing solid particles. Such liquids might cause build-up, bridging or clogging inside the coaxial probe.

LTDR single rod probe



LTDR coaxial probe



Technical data

- **Accuracy:** ±3 mm
- **Repeatability:** < 2 mm
- **Resolution:** < 1 mm
- **Probe type:**
  - Single rod Ø6 or Ø8 mm
  - Coaxial Ø17.2 mm (standard tube: NPS ⅜ 10S)
  - Rope Ø4 or Ø6 mm
- **Probe length** (L):
  - Single rod probe: 100 … 3000 mm
  - Coaxial probe: 100 … 6000 mm
  - Rope probe: 1000 … 20000 mm
- **Inactive area:**

  - Top (I1):
    - Single rod probe: ε_r=80: 50 mm / ε_r=2: 80 mm
    - Coaxial probe: ε_r=80: 30 mm / ε_r=2: 50 mm
    - Rope probe: ε_r=80: 50 mm / ε_r=2: 80 mm
  - Bottom (I2):
    - Single rod probe: ε_r=80: 10 mm / ε_r=2: 50 mm
    - Coaxial probe: ε_r=80: 10 mm / ε_r=2: 50 mm
    - Rope probe: ε_r=20: 10 mm / ε_r=2: 50 mm
- **Measuring range** (M): probe length less both inactive areas at top and bottom
- **Switching point** (S): freely positionable within measuring range

- **Dielectric constant** (ε_r):
  - Single rod probe: > 1.8
  - Coaxial probe: > 1.4
  - Rope probe: > 1.8
- **Conductivity & density:** no restrictions
- **Dynamic viscosity:**
  - Single rod probe: < 5000 mPa·s = 5000 cP
  - Coaxial probe: < 500 mPa·s = 500 cP
  - Rope probe: < 5000 mPa·s = 5000 cP
- **Fluid temperature:**
  - Single rod / rope probe: -40ºC … +150ºC
  - Single rod PTFE coated: -15ºC … +100ºC
  - Coaxial probe EPDM seal: -40ºC … +130ºC
  - Coaxial probe VITON® seal: -15ºC … +150ºC
  - Special version: -200ºC … +250ºC
    Available for single rod and coaxial probe up to 1000 mm (-150ºC … +250ºC with VITON® seal)
- **Ambient temperature:** -25ºC … +80ºC
  (storage: -40ºC … +85ºC)
- **Working pressure:** -1 bar … 40 bar
  (single rod PTFE coated 0 ... 4 bar)

- **Material exposed to tank atmosphere:**
  - Single rod probe:
    - EN 1.4404 (AISI 316L), PEEK™
    - PTFE coating (VITON® seal)
  - Coaxial probe: EN 1.4404 (AISI 316L), PEEK™
    O-ring seal: EPDM or VITON®
    (other o-ring materials on request)
  - Rope probe: EN 1.4404 (AISI 316L), PEEK™

  Gasket at connection thread: BELPA® CSA-50, 2 mm thick
- **Housing materials:**
  - Housing body and cover: coated aluminium alloy (epoxy coated for ATEX version)
  - Cover o-ring seal: NBR or silicone (ATEX version)

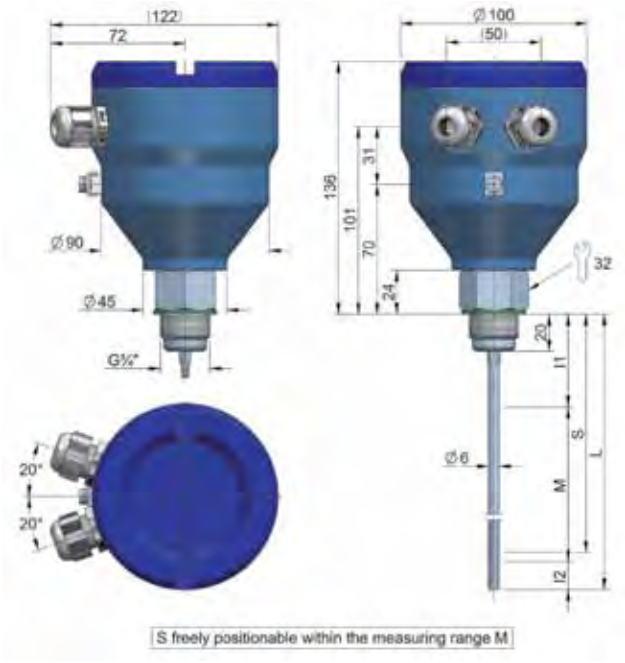
  Other materials on request
- **Ingress protection:** IP65 (standard housing) / IP68 10 m H_2O, NEMA6P (ATEX version)
- **Cable entries:**
  - Standard version: 2 cable entries M16x1.5
  - ATEX version: 2 cable entries M20x1.5

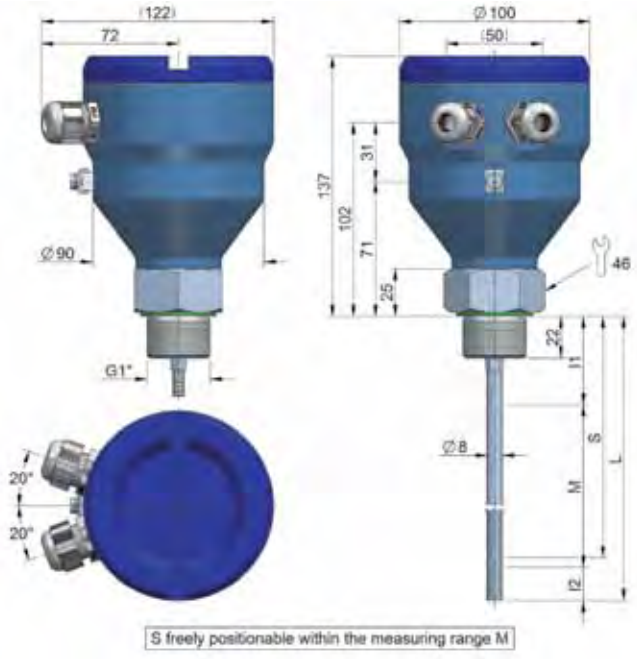
  Other sizes on request
- **Connection thread** (CT), according to selected probe:
  - G¾A: single rod 6 mm, rope probe 4 mm and coaxial probe
  - G1A: single rod 8 mm and rope probe 6 mm

  EN 1092-1 flange or other connections on request
- **Power supply:** 12 … 30VDC (reverse-polarity protected), 4-wire system
- **Power consumption:** < 70 mA at 24VDC (no burden)
- **Electronics completely galvanically insulated** from inputs/outputs and tank potential, thus avoiding any problems from electrochemical corrosion protection of the tank
- **Analog output** (active): current output 4-20mA
  - Total load resistance: < 500 Ω: HART resistor approx. 250 Ω + load resistance approx. 250 Ω.
  - Response time: 0.5 s, 2 s and 5 s (selectable)
  - Temperature drift: < 0.2 mm/K in ambient temperature
- **Switching output DC PNP** (active): NC or NO (shortcircuit protected)
  - Load current: < 200 mA
  - Signal voltage HIGH: supply voltage -2V
  - Signal voltage LOW: 0V … 1V
  - Response time: < 100 ms
- **Start up time:** < 6 s
- **Cable terminals:**
  - Screwless, cage clamp terminal block for tranded and solid wires 0.5 … 2 mm²
  - The usage of cable and sleeves with insulation collar is not recommended
- **ATEX certification**

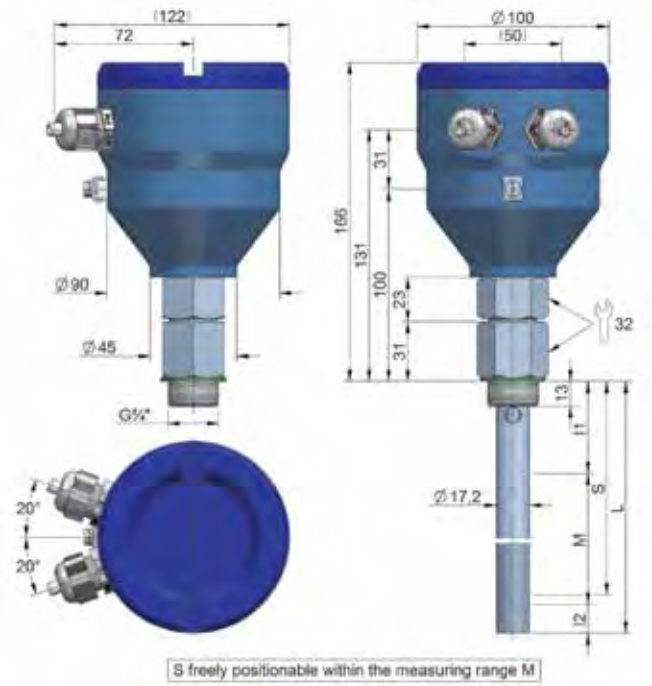
Dimensions

Single rod, threaded connection





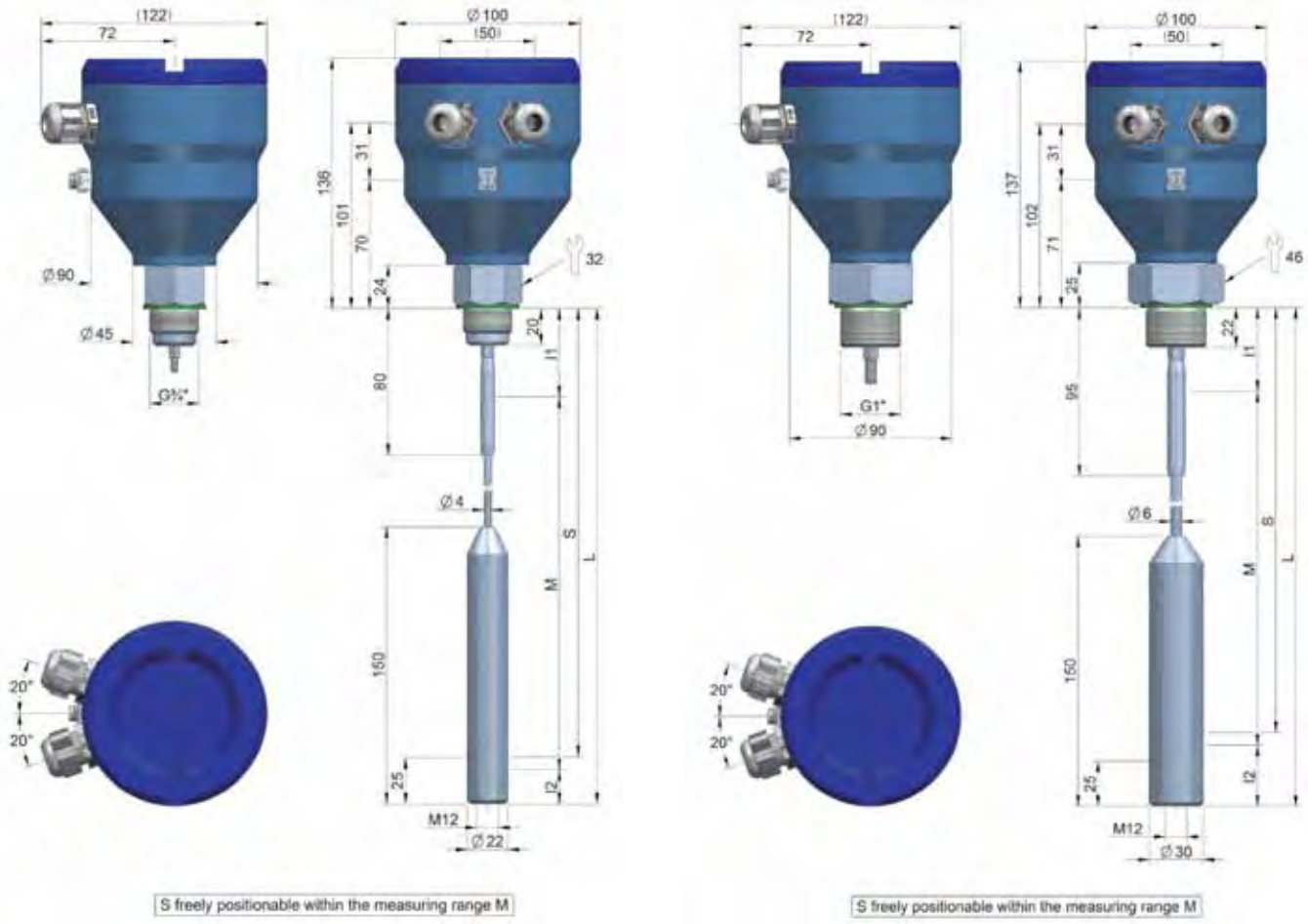
Coaxial probe, threaded connection



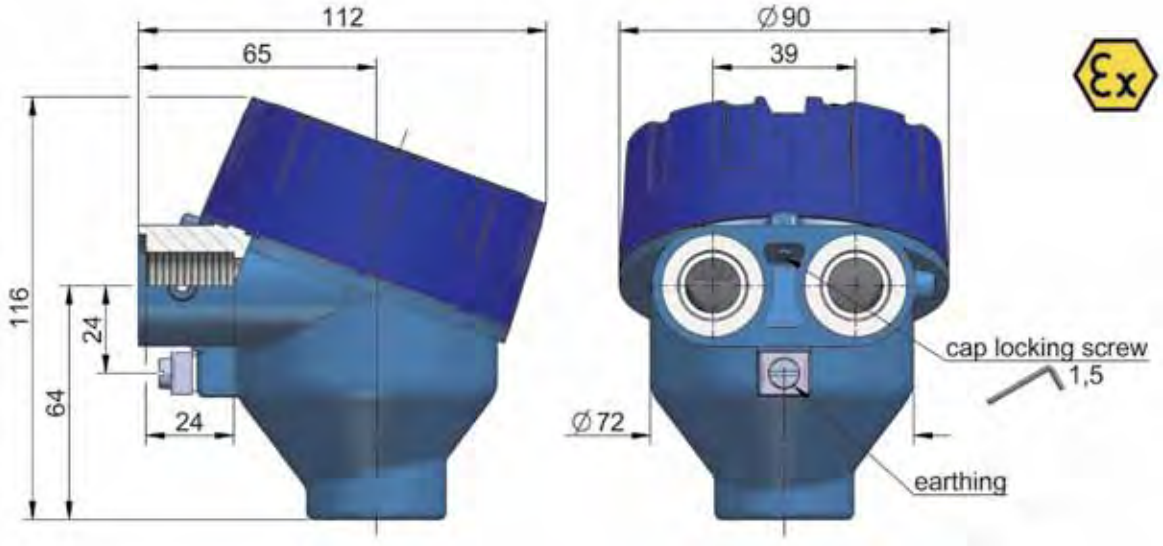
Weight of the components:

- Standard housing: 1240 g
- ATEX housing: 950 g
- Single rod probe, 1m: 230 g
- Complete coaxial probe, 1m: 770 g

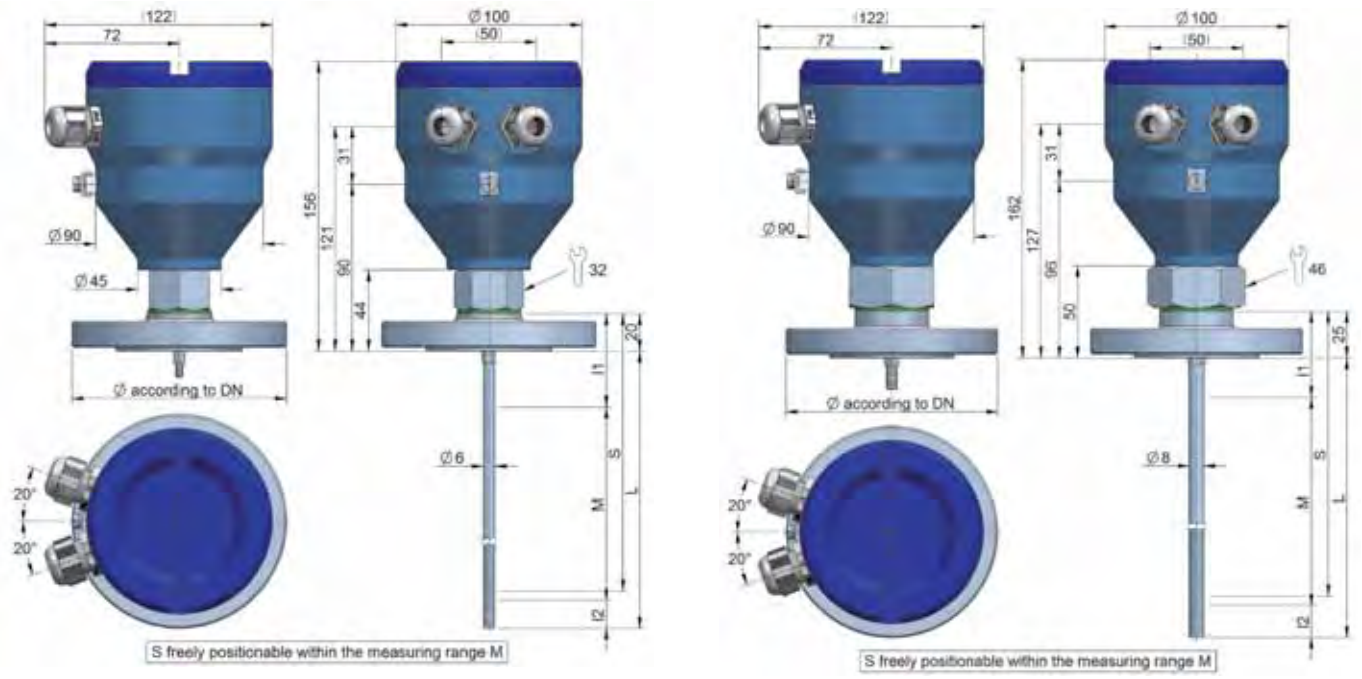
Rope probe, threaded connection



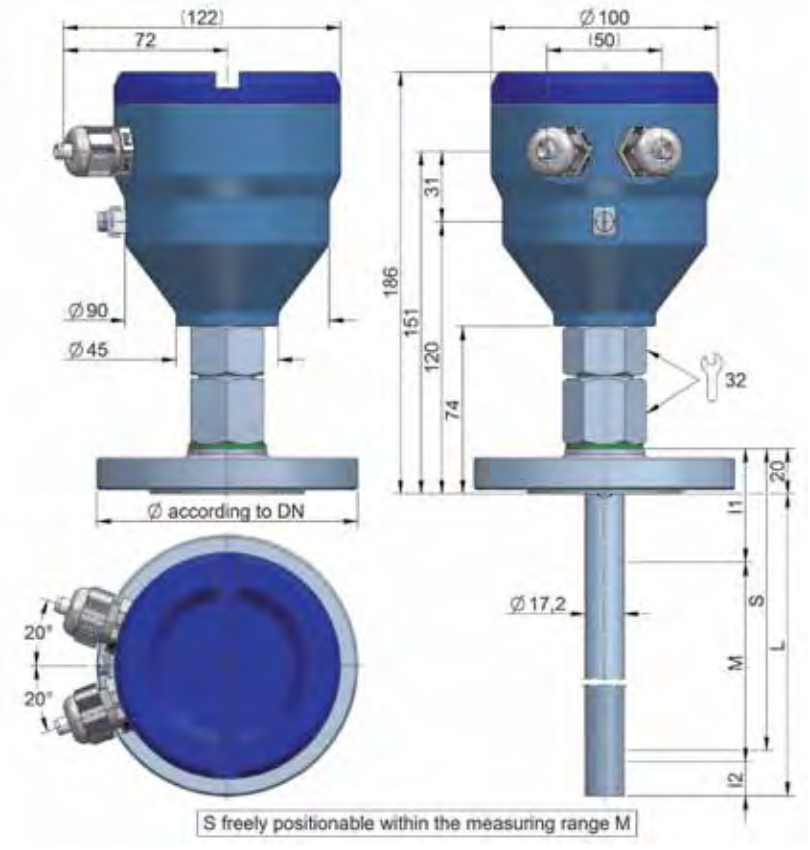
ATEX version



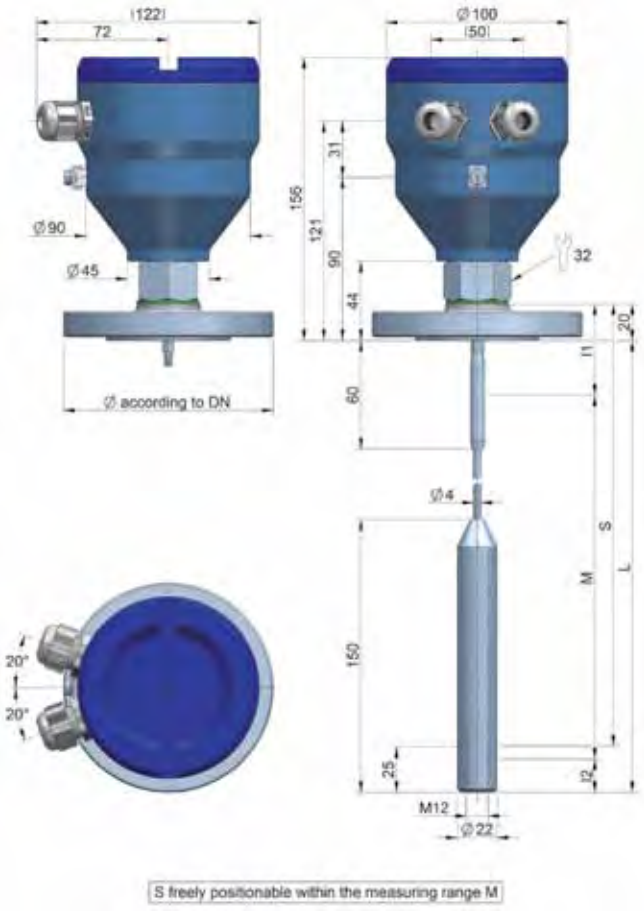
Single rod, flanged connection



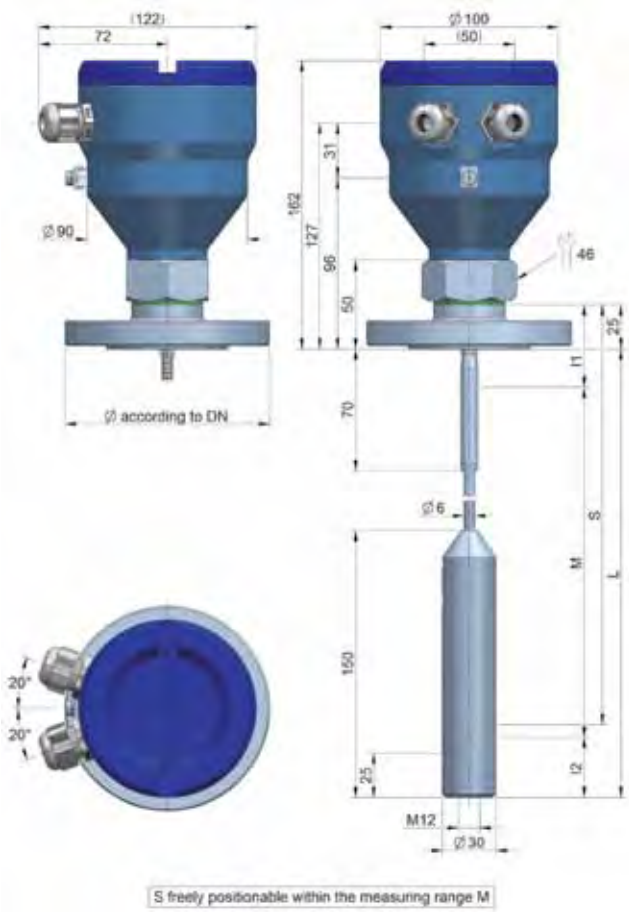
Coaxial probe, flanged connection



Rope probe, flanged connection

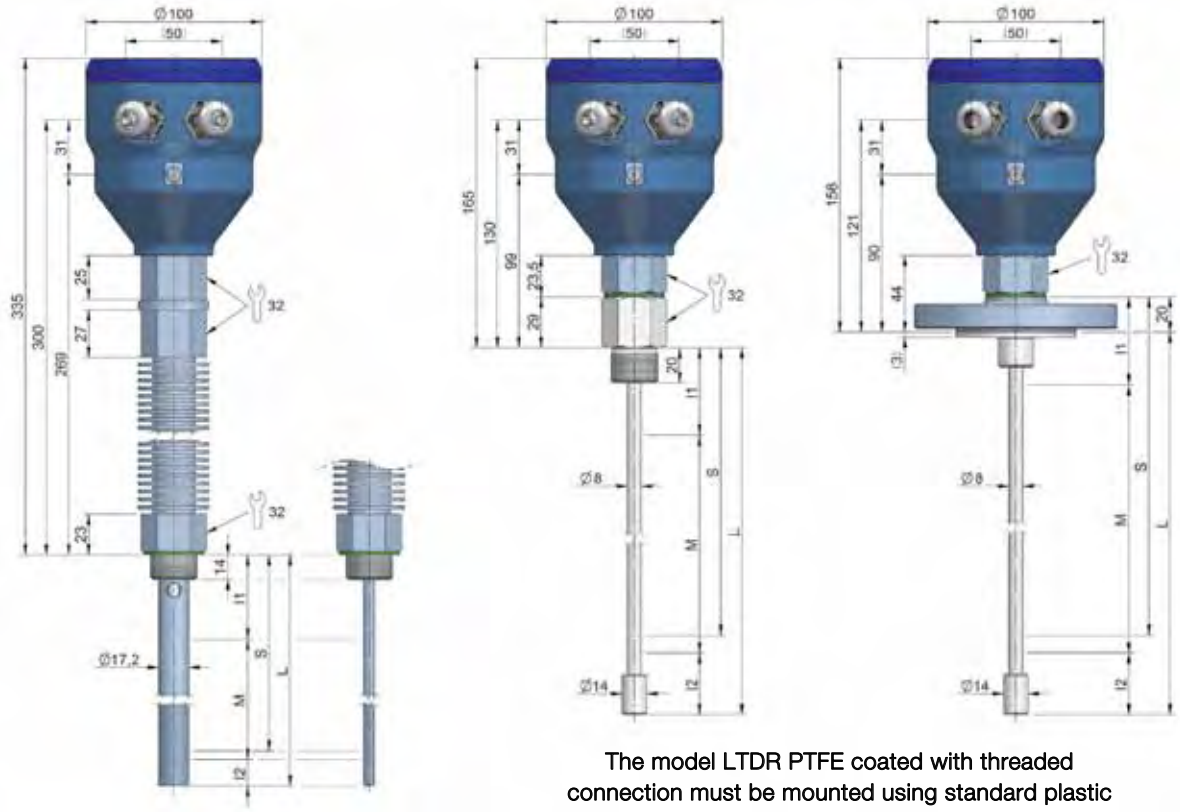


S freely positionable within the measuring range M



S freely positionable within the measuring range M

Extended temperature version, threaded connection, and PTFE coated, threaded and flanged connection



The model LTDR PTFE coated with threaded connection must be mounted using standard plastic connectors. Do not mount in metallic flanges.

ATEX version

The ATEX version of the LTDR is suitable for applications with hazardous gas or dust atmospheres, for applications requiring instruments of category 1/2G, 1/2D or 2G, 2D.

The installation of electrical equipment in hazardous areas must always be carried out by qualified personnel.

The approval certificate is in accordance to:

CE 0158 SEV 09 ATEX 0171 X

and the different markings are:

- II 1/2G Ex ia/d IIC T6
- II 1/2D Ex iaD/tD A20/21 IP68 T86°C
- II 2G Ex ia d IIC T6
- II 2D Ex iaD tD A21 IP68 T86°C
- II 1/2G Ex ia/d IIC T6 Ga/Gb
- II 1/2D Ex ia/t IIIC T86°C Da/Db
- II 2G Ex ia d IIC T6 Gb
- II 2D Ex ia t IIIC T86°C Db

Technical data

- Power supply: U = 12…30 VDC ; U_m = 250 VAC
- Analog output: I = 4-20 mA ; U_m = 250 VAC
- Switch output: U_s = 0…U ; U_m = 250 VAC

Temperatures

Temperature class	Application temperature	Ambient temperature
CATEGORY 1/2G		
T1 ... T6	-20ºC ... +60ºC	-40ºC ...+70ºC
CATEGORY 2G		
T6	-40ºC ... +85ºC	-40ºC ...+70ºC
T5	-40ºC ... +100ºC	
T4	-40ºC ... +135ºC	
T1 ... T3	-40ºC ... +150ºC	
CATEGORY 1/2D Y 2D		
Max. temperature: +86ºC		-40ºC ... +70ºC

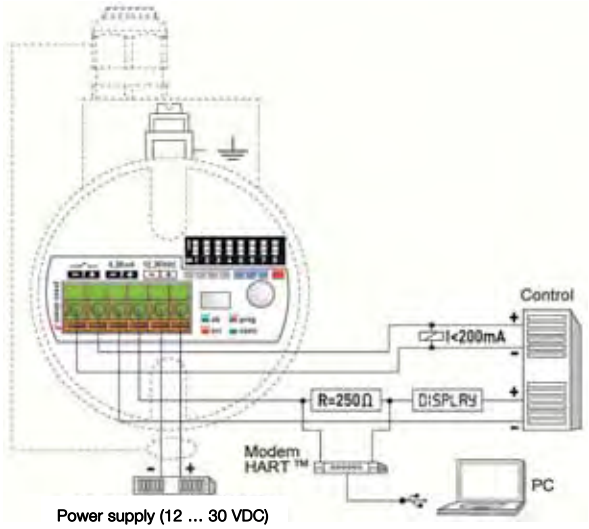
Configuration

Basic configuration of LTDR can be done directly on the device via a DIP switch, a single push button and visual feedback from a LED.

All settings required to get LTDR fully operational can be performed directly on the device. The LTDR can also be ordered completely pre-configured.

For greater convenience, remote configuration, and extensive diagnostics, a simple spread sheet can be provided through which the configuration can be done.

A standard HART modem is required for communication between computer and sensor. Communication is done via a digital HART signal that is superimposed onto the analog 4-20 mA signal of the current output.



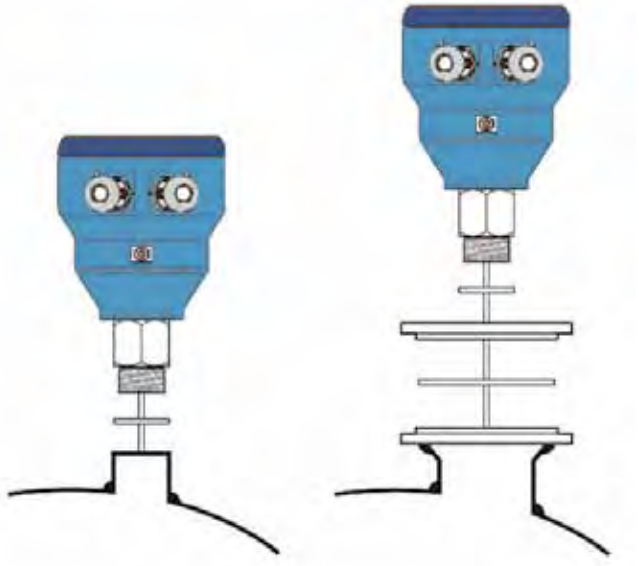
Power supply (12 ... 30 VDC)

Installation

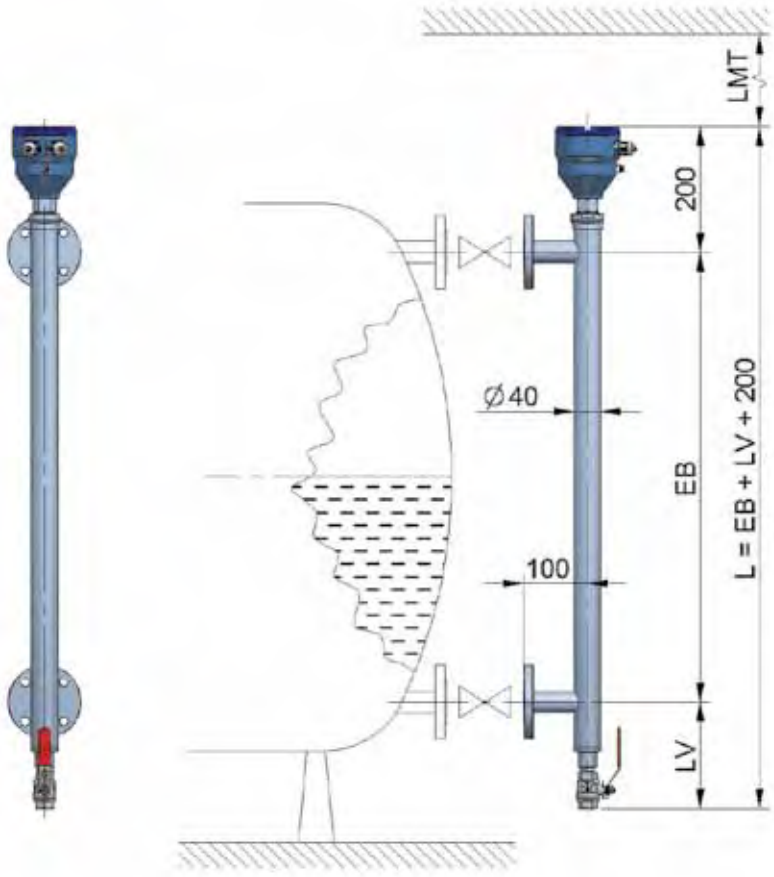
LTDR is mounted vertically to the tank via its connection thread, which is screwed directly into a standard threaded tank connection, i.e. weld in socket, or it can be screwed into a flange, which is then connected to a tank nozzle.

The customer has to ensure proper temperature and pressure ratings for his application and has to select the appropriate seal to connect the sensor (LTDR standard seal material is BELPA® CSA-50 for G¾A connection thread).

LTDR is well suited for side mounting into a tank. In addition, LTDR is also the ideal combination with TECFLUID series LT level gauges, SS models, in order to have a local indication of the level and an associated transmitter. In these cases the recommended probe type is the single rod probe. The chamber acts as an external tube of a coaxial probe (see figures page 211).

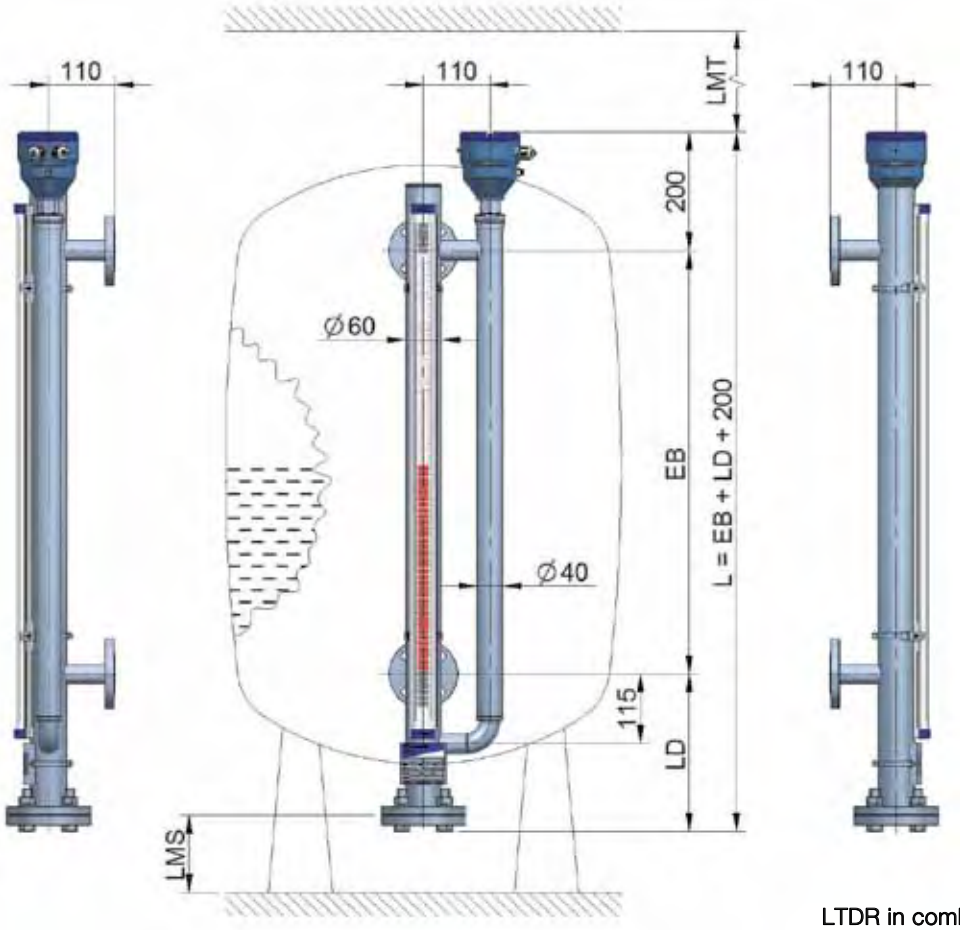


Standard installation LTDR transmitter



LMT = EB + 275 mm
LV standard = 170 (Ball valve G½)

Side mounting



LMT = EB + 275 mm
LMS = L. Float + 10 mm

LTDR in combination with level gauge type LT/SS

For more information, please refer to series LT datasheet

2.6
DISPLACER

2.6 DISPLACER

LP

TecFluid
The art of measuring

Level displacers
Series LP

Level indicator, switch and transmitter for liquids

- Metallic construction, optional with plastic rod
- Provides a reliable level measurement under extreme process conditions (very high temperatures, pressures and with corrosive fluids)
- Indication by means of magnetic coupling
- Scales in % or height
- Liquid density: 0.6 … 2 kg/l
- Measuring range: 300 mm to 6 m
- Interface level measurement
- Accuracy: ±5 mm of the measured value
- Connections:
  - DN40 PN40 EN 1092-1 flanges. Other flange standards on request (ANSI, JIS)
  - Threaded connections BSP or NPT
  - Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®
- Materials:
  - Body: EN 1.4404 (AISI 316L), Hastelloy C, Titanium
  - Rod: EN 1.4404 (AISI 316L), PVC, PP, PVDF, Titanium, Hastelloy C
- Local indication
- Options:
  - 1 or 2 limit switches
  - Electronic transmitter with 4-20 mA analog output for safe or hazardous area (Ex ia IIC T4 or T6 protection, ATEX certified). HART protocol available on request
  - Side mounting with 80ME external chamber

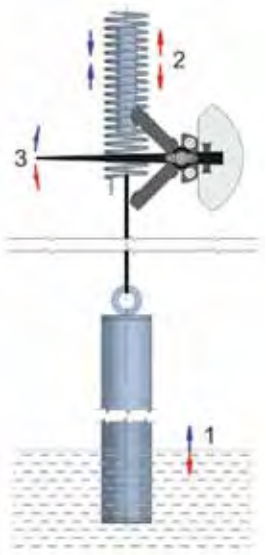
Working principle

According to Archimedes principle of body submerged in a liquid.

A rod with a density similar to the measured liquid is suspended by a spring to maintain an equilibrium with its weight. This rod is always submerged in the liquid (not floating on the surface)

A variation in the liquid level (1) produces a change in the weight of the rod (partially submerged), which can be measured by the extension or compression of the spring that supports the rod (2). The variation in the length of the spring is transmitted to the indicating needle via a magnetic coupling (3).

This measuring principle is well suited to dirty environments.



Applications

- Chemical and petrochemical, oil and gas industries
- Steam and power industries and storage of chemicals
- Food and beverage
- Monitoring and control of common processes

Models

- **LP80** flanged connection
- **LP81** threaded connection

Technical data

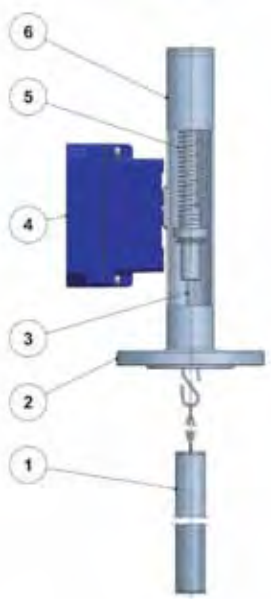
- **Accuracy:** ±5 mm of the measured value
- **Scales** in % or height
- **Liquid density:** 0,6 … 2 kg/l
- **Measuring range**: 300 mm to 6 m
- **Interface level measurement**
- **Fluid temperature:**
  - Standard: -60ºC ... 150ºC
  - Special: -120ºC ... 400ºC (see thermal separator p. 218)
- **Ambient temperature:** -10ºC ... 80ºC
- **Working pressure:** PN40 (others on request)
- **Connections:**
  - EN 1092-1 DN40 PN40 flange
  - Threaded connections G1½ or 1½" NPT
  - Sanitary connections according to ISO 2852, SMS 1145, DIN 11851, TRI-CLAMP®

  Others on request
- **Installation:** Vertically, on top of the tank or side mounted by means of external chamber

Limit switches and transmitters

- **LP-AMM1 ... 2:** 1 or 2 adjustable micro-switches
- **LP-AMD1 ... 2:** 1 or 2 adjustable inductive detectors (+ relays on request)
- **TH7 ... TH7H:** 4-20 mA transmitter 2 wires HART protocol with model TH7H
- **TH7 Ex ... TH7H Ex:** 4-20 mA transmitter 2 wires Ex ia IIC T4 or T6 (ATEX). HART protocol with model TH7H Ex

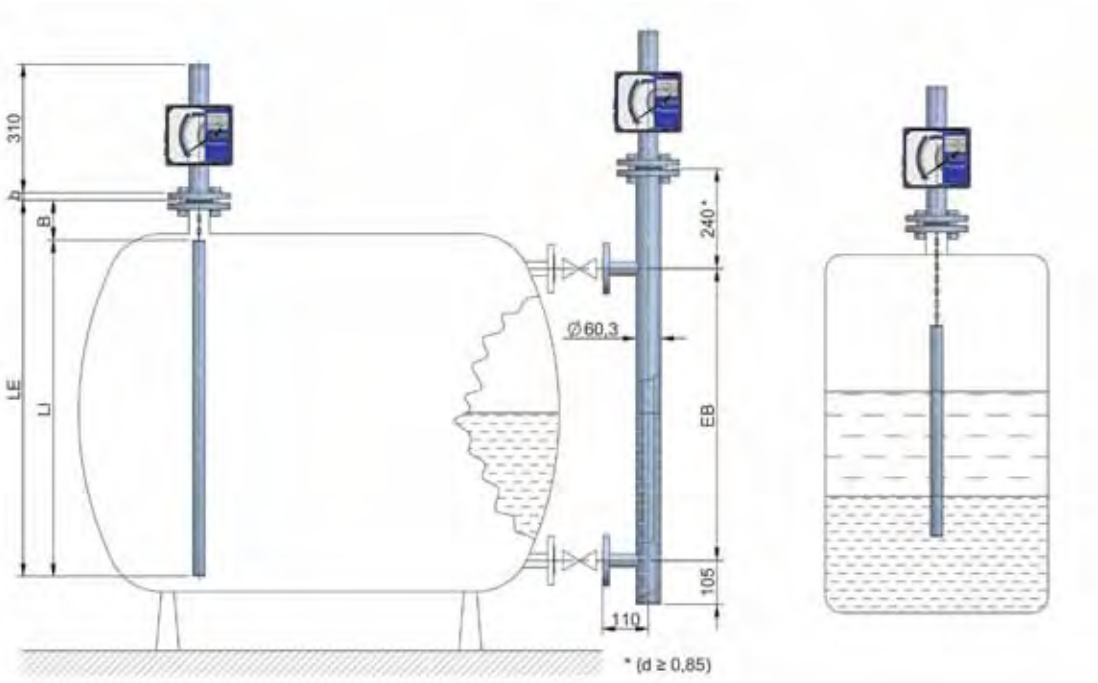
Materials



Nº	Description	Materials		
		LP / SS	LP / Hastelloy	LP / Titanium
1	Rod	EN 1.4404 (AISI 316L) *	Hastelloy C *	Titanium *
2	Connection	EN 1.4404 (AISI 316L)	Hastelloy C	Titanium
3	Rod guide			
4	Housing	Coated aluminium **		
5	Spring	EN 1.4401 (AISI 316)	Hastelloy C	Titanium
6	Body	EN 1.4404 (AISI 316L)	Hastelloy C	Titanium

* PVC, PP, PVDF on request
** EN 1.4404 (AISI 316L) on request

Mounting



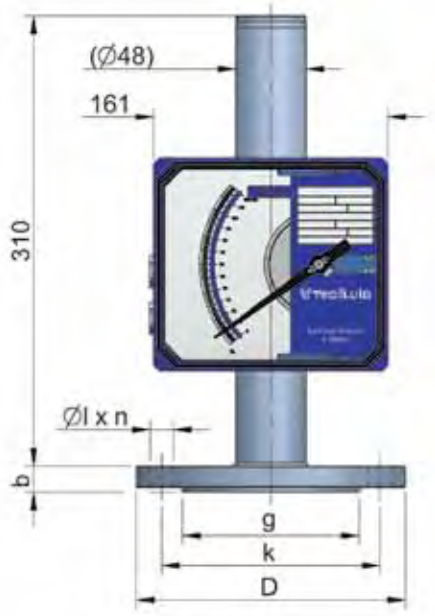
LP80
Mounted on top of vessel

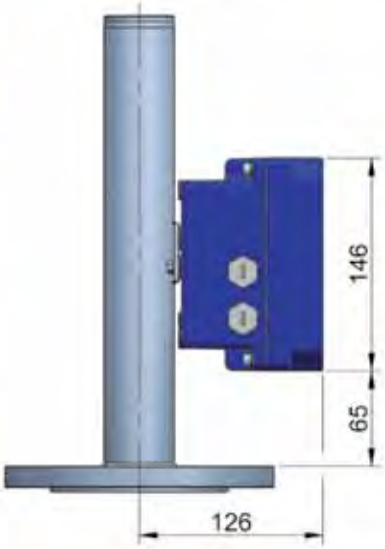
LP80 + 80ME
Side mounted by means of external chamber

Interface level measurement

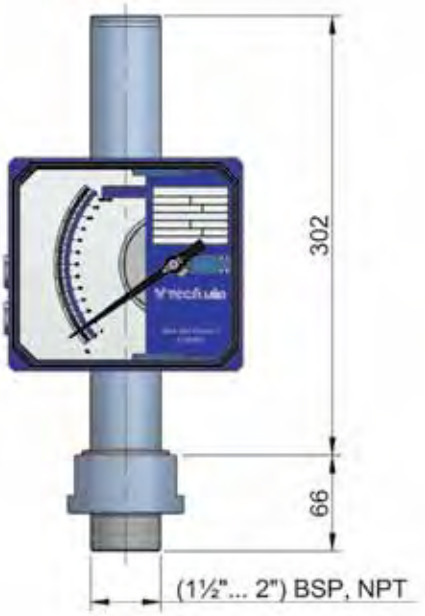
Dimensions

LP80





LP81



All dimensions in mm

Model LP80 / LP80+80ME

DN	PN	D	k	g	Øl x n	b	B	EB	LE	LI
40	40	150	110	88	18 x 4	18	to be specified *			

* Dimensions B, EB, LE and LI according to “Mounting” drawing
Other flange sizes and standards on request

Model LP81

Dimensions according to drawing above.

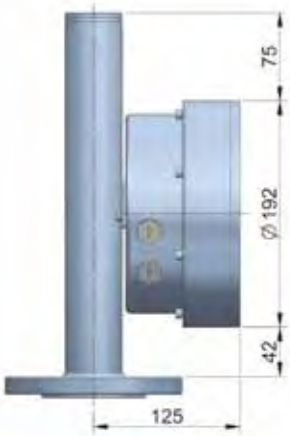
Other connection standards and sizes on request

Accessories

Thermal separator

- Standard in aluminium, optional in EN 1.4404 (AISI 316L)
- For working with fluids at high and low temperatures
- Maximum temperature: 400ºC
- Reference ambient temperature: 20°C

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 TH transmitters
- Ingress protection: IP67

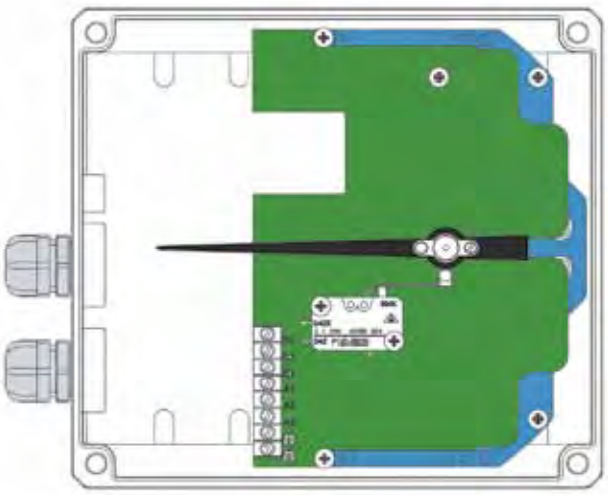
Limit switches

Adjustable limit switch LP-AMM

Electrical micro-switch mounted in the indicator housing.

- LP-AMM1 … 2: 1 … 2 adjustable limit switches
- Ratings: 3(1) A, 250 V (VDE/CEE)
- Hysteresis: ±10% of full scale value
- Ambient temperature: -25°C ... +80°C
- Mechanical life: 10^7 operations
- ATEX certificate Ex ia IIC T6

Gold plated contacts on request.



LP-AMM

Adjustable limit switch LP-AMD

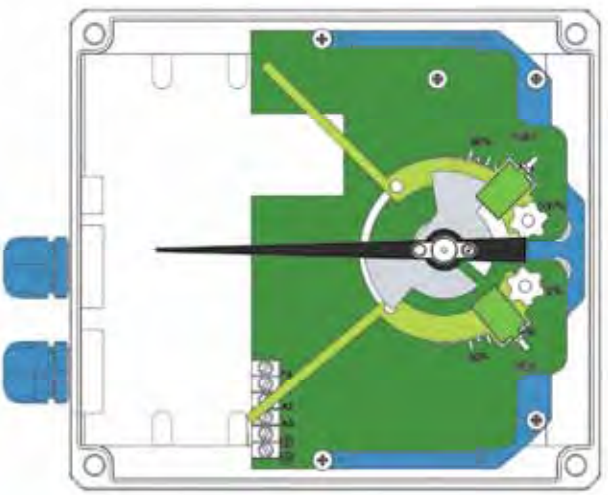
NAMUR (EN 60947-5-6) 3.5 mm slot type inductive detector activated by vane, mounted in the indicator housing.

- LP-AMD1 … 2: 1 … 2 adjustable limit switches
- Power supply: 8 VDC
- Ambient temperature: -25°C ... +70°C
- ATEX certificate Ex ia IIC T6

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



LP-AMD

Transmitters

Transmitter TH7

The TH7 electronic transmitters provide an analog output proportional to the flow rate and a digital output selectable as an alarm (except for the Ex versions). They are based on the Hall effect and mounted inside the indicator housing.

- **TH7** transmitter
- **TH7H** transmitter + HART protocol

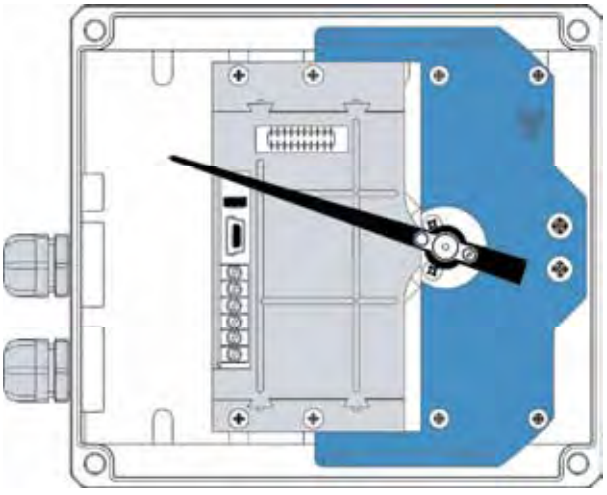
Technical data

- Power supply: 12 … 36 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: 1.1 kΩ (with 36 VDC power supply)
- Digital output: Potential free N channel MOSFET, $I_{max.}$ 200 mA, for alarm output, adjustable in one point of the scale. Programmable by means of Winsmeter TH7 software
- Ambient temperature: -5ºC ... +70ºC

ATEX version (Ex ia IIC T4 or T6)

Technical data

- ATEX certificate Ex II 1 GD
- 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



TH7

Modular housing

Both limit switches AMM or AMD and electronic transmitters TH7 can be mounted together in the same housing.

The TH7 Ex transmitters belong to group II. They are intended for use in potentially explosive atmospheres, except in mining

TECFLUID

The art of measuring

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