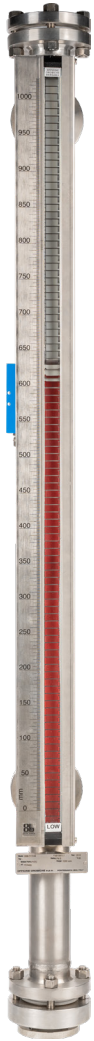


# MAGNETIC LEVEL GAUGE 2000 Series



## DESCRIPTION

The Magnetic Level Gauge 2000 Series consists in a bypass chamber that, on its inside it has a float, containing a magnet that magnetically transmits the liquid level to a housing mounted outside of the chamber. Inside the housing, red and white flags rotate 180° with the movement of the float showing the red face in presence of liquid and the white face in his absence.

It can work as a Level Transmitter or as a Level Switch mounting the appropriate accessories.

The Level Gauge 2000 Series is suitable for harsh process conditions, with corrosive fluids and high temperature and pressure.

## FEATURES

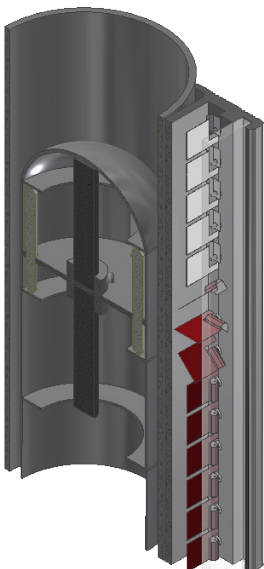
- Complete control on the production which is completely integrated inside the company and highly competent local suppliers.
- Qualified welders and welding procedures compliant with ASME IX and EN ISO 15614.
- Completely customizable on client's needs thanks to the support of our technical and sales departments.
- Over 60 years company experience with instruments installed in the entire world.
- Suitable for the most extreme conditions: highly corrosive fluids, temperature from -160 °C over 400 °C and pressures over 400 bar.

## APPLICATIONS

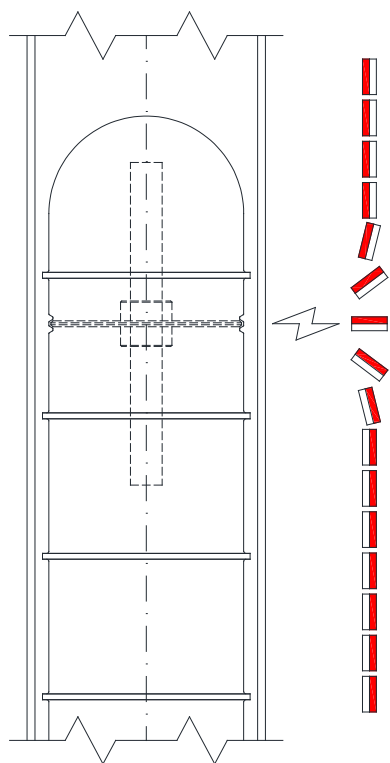
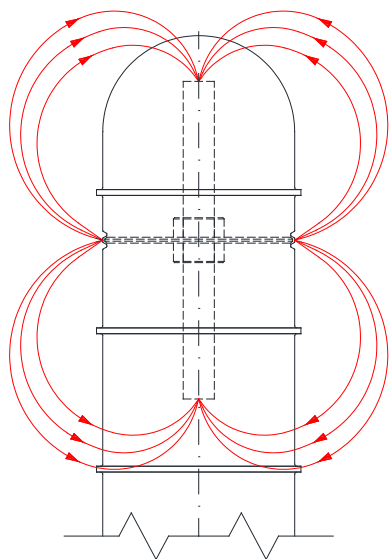
- Chemical and petrochemical
- Oil & Gas On and Off-shore
- Power plants
- Machine construction
- Naval construction
- Water treatment

## TECHNICAL SPECIFICATIONS

- Minimum flow density 0.3 kg/dm<sup>3</sup> for metallic type and 0.7 kg/dm<sup>3</sup> for plastic type.
- Suitable for interface service.
- Accuracy  $\pm 5$  mm, Repeatability  $\pm 2$  mm.
- Ratings up to PN 400, ANSI 2500.
- Maximum temperature over 400 °C on request.
- Lower temperature over -160 °C on request.
- Maximum length 5 m for metallic type and 4 m for plastic type. Over on request.
- Ambient temperature range -50 °C / +85 °C.
- Metallic type mounts upper and lower shock-absorber mechanism to avoid damages to the float due to rapidly level change.
- Suitable for Full-Vacuum use.



## MATERIALS



### BODY:

		CODE
Metallic Type	SS 316-316L dual grade	J or JL
	Hastelloy C-276	HC
	Monel 400	MO
	Alloy 825	825
	Alloy 625	625
Plastic Type	PVC	P
	Polypropylene	M
	PVDF	PF
	ETFE/PTFE*	T

More on request but the body material must be in non ferro-magnetic material, in order to not interfere with the float's magnetic field.

\*Teflon-coated version for highly corrosive fluids with Titanium coated in PFA.

### FLOAT:

		CODE
Metallic Type	SS 316L	2L
	Titanium	TI
	Hastelloy C-276	HC
Plastic Type	PVC	5
	Polypropylene	6
	PVDF	PF
	PFA*	T

The float material choice is made based of fluid density and corrosivity.

\*Teflon-coated version for highly corrosive fluids with body in SS316 coated in ETFE/PTFE.

### HOUSING:

Aluminium or SS316L and soda lime glass or shatter-proof polycarbonate. Flaps in Iron or Ferritic stainless steel on request.

The housing is mounted at 180° from the connections. On request it can be oriented in different positions.

### GASKETS:

MATERIAL	MODELS	CODE
Viton	Plastic Type	V
Graphite	2016-25-40-64	G
PTFE	2016-25-40-64	T
Spiral Wound	2016-25-40-64-100-150	S
Ring Joint	2250-400	R

### BOLTING:

- A193.B7 electrolytically galvanized
- A193.B7M electrolytically galvanized
- A193.B8 in SS 304
- A193.B8M in SS 316
- A320.L7 electrolytically galvanized
- A320.L7M electrolytically galvanized

PTFE coatings on request

## CONNECTIONS PLACEMENTS

The instrument is available with different connections placements:

- Side-Side
- Side-Bottom
- Top-Side
- Top-Bottom

Different connections are available on request, like for example with three Side connections.

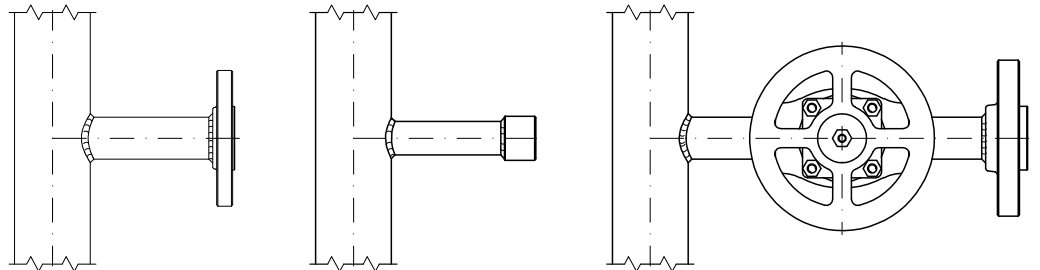
Dimensions B and C are determined by the float dimension and therefore by the fluid's density. In order to reduce them, the visibility and the housing length must be decreased.

A free space large at least like length B must be available under the instrument to ease the float replacement. If this space is not available, it is possible to install the inspection flange on top of the instrument instead of on bottom, or to manufacture a 90° drain or other design changes.

## CONNECTIONS TYPES

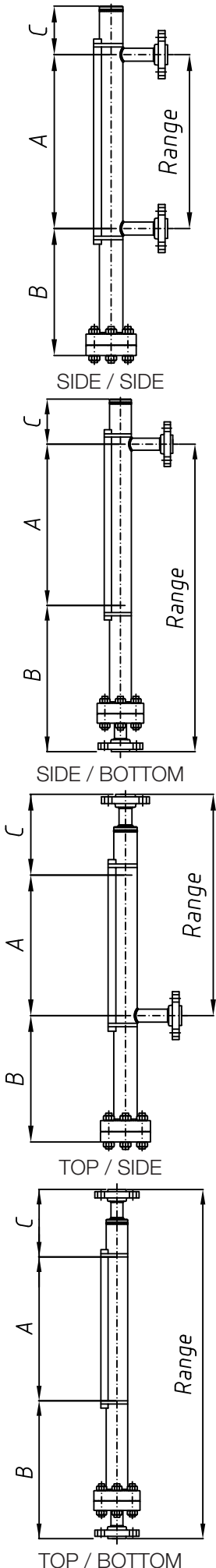
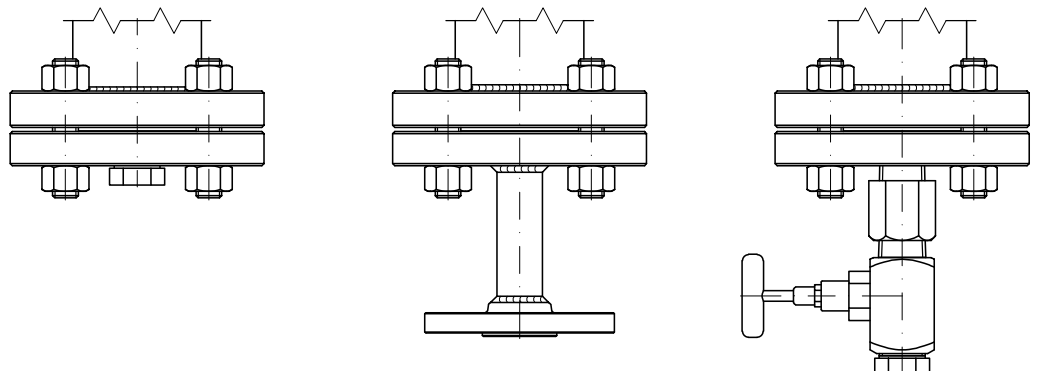
### PROCESS:

- Flanged
- Threaded
- Weld stub



### DRAIN:

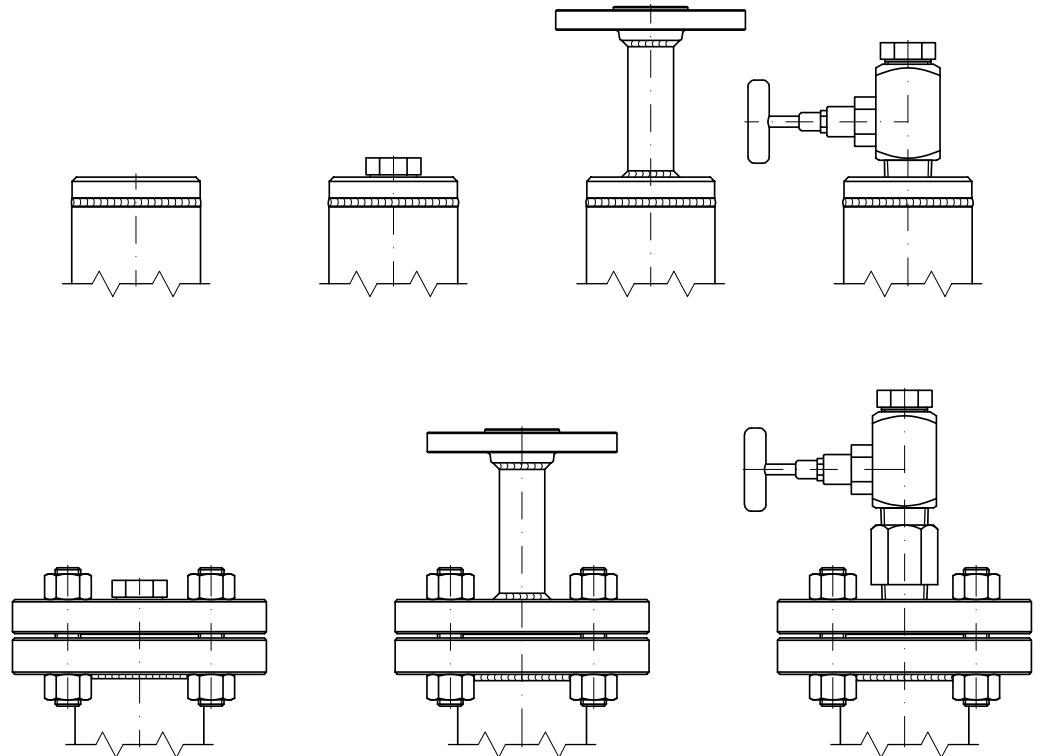
- Flanged
- Threaded
- Weld stub





## VENT:

- Blind flat top
- Flat top with threaded vent
- Flat top with flanged vent
- Inspection flange with threaded vent
- Inspection flange with flanged vent



The standard **flanges** available are:

- ANSI B16.5
- EN 1092/1

Standard faces:

- ANSI RF for metallic type
- ANSI FF for plastic type
- EN B

Face finish: 125/250 AARH, plastic type has no finish.

Other flanges or finishes on request.

Welding neck flanges with full-penetration welds are available on request.

**Threads:**

- NPT-F or NPT-M
- GAS-F or GAS-M

**Weld stub:**

- SW - socket weld
- BW - butt weld

As accessory on the level indicator 2000 Series can be installed vent, drain and shut-off valves; the type choice is made in function of the design temperature and pressure.

**Shut-off:**

- Ball valves
- Globe valves for high temperature and pressure
- Gate valves for high temperature and pressure

**Drain / Vent:**

- Ball valves
- Needle valves for high temperature and pressure
- Globe valves for very high temperature and pressure
- Gate valves for very high temperature and pressure



## MODELS AND OPERATING LIMITS

MODEL	RATING	P max [bar] *			
		38 °C	100 °C	150 °C	200 °C
2006	PN6 (standard plastic type)	**			
2016	PN16	19	16	15	13
	ANSI 150	25	21	19	17
2025	PN25	40	35	31	28
2040	PN40	50	43	39	36
2050	ANSI 300	50	42	39	36
2064	PN64 & PN63	63	63	57	53
2100	PN100	100	100	90	84
	ANSI 600	100	84	77	71
2150	PN160	160	160	145	135
	PN140	140	143	130	121
	ANSI 900	107	127	115	107
2250	PN250	250	250	227	210
	ANSI 1500	248	210	192	178
2400	PN400	400	350	320	297
	ANSI 2500	400	400	364	337

\* For version with SS 316 body

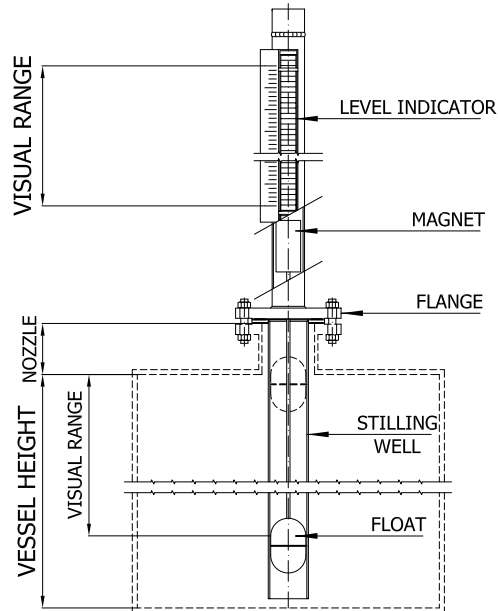
\*\* For plastic type see the following table:

	T min / max [°C]	P max [bar]		
PVC	0 / +60	6 at 25°C	4 at 35°C	1 at 60°C
Polypropylene	0 / +80	6 at 25°C	4 at 45°C	1 at 80°C
PVDF	-10 / +135	6 at 20°C	4 at 65°C	1 at 135°C
ETFE/PTFE	-40 / +150	16 at 20°C	16 at 85°C	14 at 150°C

## MODEL 2000T

Model 2000T is designed for top-mounted applications in underground tanks.

The float trough a metallic rod moves a magnet on the top of the tank that communicates with the housing. It is also available with stillin-well to protect the float and the rod.



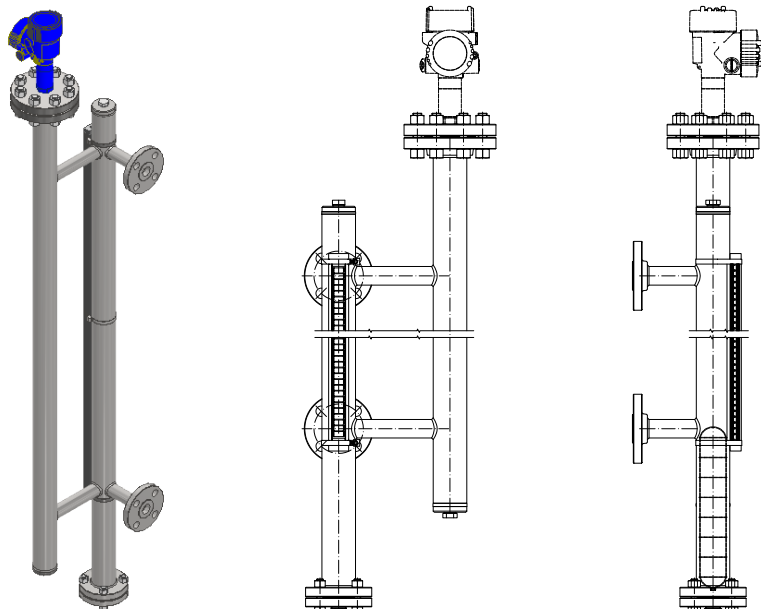
## CHA + 2000 VERSION

The Level Gauge 2000 Series can be coupled with a chamber for the external mounting of radar level transmitters. The gauge and the transmitter works independently to add a redundancy level to the level control.

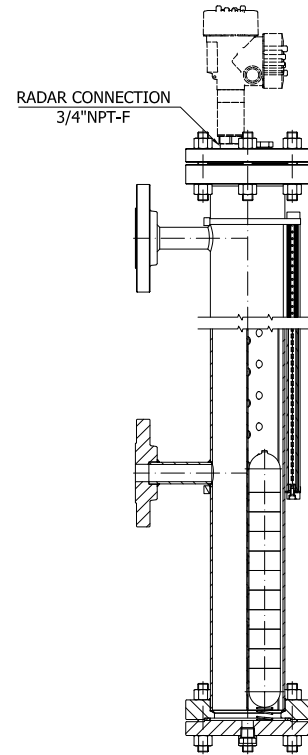
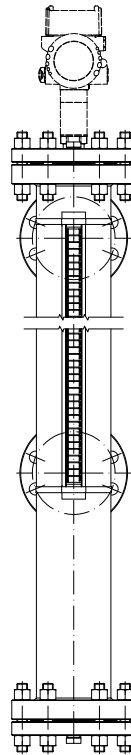
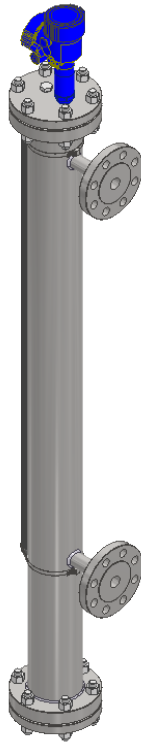
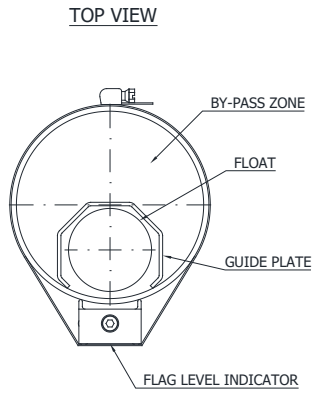
- High reliability and adaptability to different conditions.
- Combination of local indication and continuous measurement in a compact solution.

The coupling is made in two versions:

With **DOUBLE CHAMBER**:



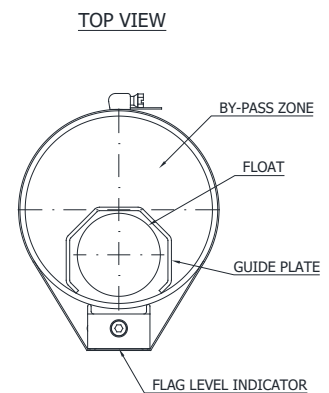
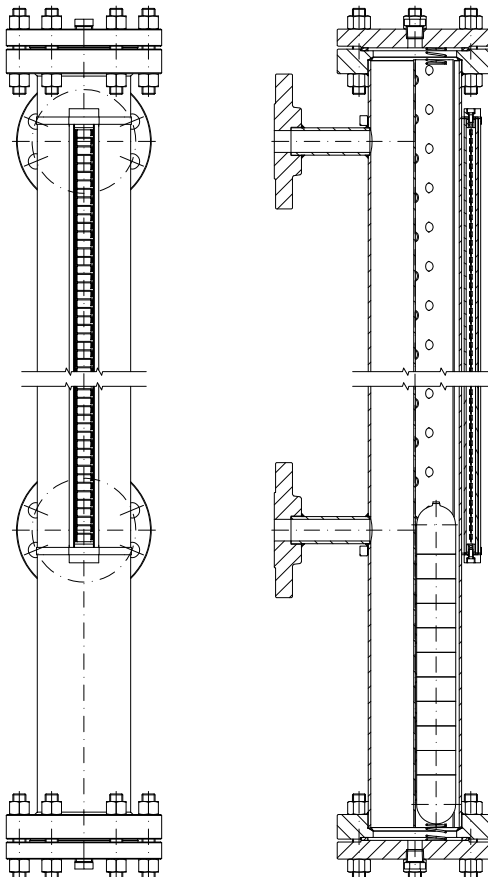
With **INTEGRATED CHAMBER**:



## FLASH-PROOF VERSION

With the potential presence of **boiling fluids** or flash-point vapors it's available, on request, a large chamber version with float guide to not obstruct the potential bubbles passage, improving the float indication and avoiding float damages.

The asymmetric float position ensure the correct transmission of his magnetic field to the flags and the chamber width ensure the correct operating even in case of **solid impurities** in the fluid.



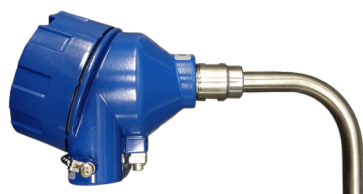
## TRANSMITTERS TL Series & MD Series

A transmitter can be installed on the outside of the 2000 Series Level Gauge's chamber, not in contact with the fluid. Due to the float's radiant magnetic field, the transmitter can be positioned in any position around the body pipe.

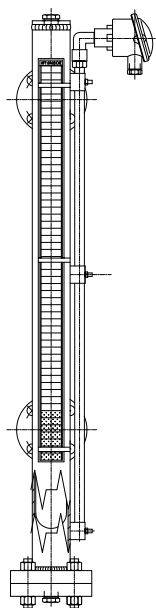
The transmitter is available in two versions: the reed chain type TL Series or magnetostrictive type MD Series.



Standard WP version



Ex d EP version



### TL Series Reed Chain Transmitter

The TL Series Reed Chain Transmitter consists in a chain of resistances and reed contacts. The 2000 Series float's magnetic field closes one of the reeds contacts, creating a resistance variation that is converted in a linear 4/20 mA signal by an electronic circuit.

- Two wires 4-20 mA output
- 10 / 32 V DC power supply for standard version and 28 VDC for Ex i version
- Maximum current 25 mA
- SS316 probe
- Suitable for ambient temperature range from -40 to +85 °C
- Suitable for connection ranges up to 4 m and over on request
- Resolution and accuracy  $\pm 10$  mm
- Explosion-proof Ex d or intrinsically safe Ex i option
- HART option
- SIL 2 option
- PROFIBUS PA or FOUNDATION FIELDBUS option

The transmitter is available with the following housings:



Standard WP  
painted aluminium



Explosion-proof EP Ex d  
Die-cast painted aluminium



Explosion-proof EP Ex d  
SS316

The instrument is usually mounted with the housing on top-right. On request it can be mounted in any other position.

The transmitter is available with the following electrical connections:

- 1/2" NPT F
- M20 x 1.5 ISO
- 1/2" GAS F
- Double electrical connection option
- Adapter, reductions and cable glands on request

The Transmitter TL Series can be supplied with a **local display** two wires, 4 digits, 7 segments, LED or LCD, mounted inside a Die-cast painted aluminium or SS316 housing with a glass window.

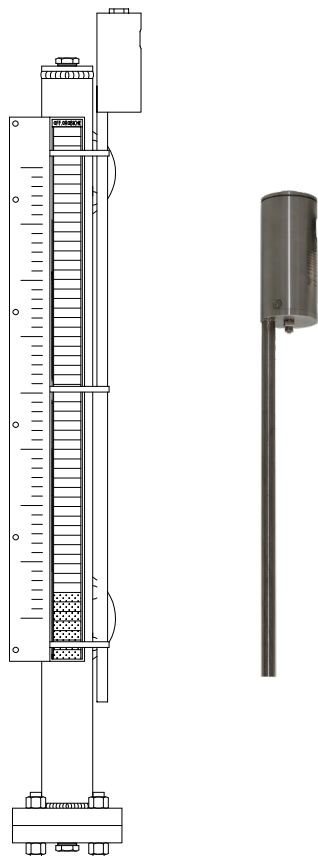




## MD Series Magnetostrictive Transmitter

As alternative, when higher resolutions are required, the Transmitter can be supplied in the Magnetostrictive Version MD Series.

In this version, the probe contains a magnetostrictive wire that generates a circular magnetic field. The interaction between the 2000 Series float's magnetic field and the probe magnetic field twists the probe's wire. The electrical part, in the transmitter's head, uses this torsion to detect the float position and transform it in a proportional 4-20 mA output.

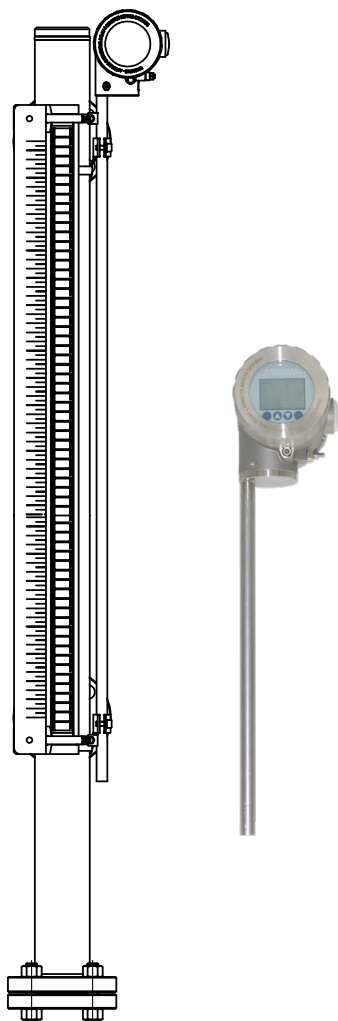


Standard / Ex i version

- Probe material: SS316Ti, option SS316L
- Head material: SS303, option SS316L
- Two wires 4-20 mA output
- Ingress protection IP68
- Electrical connection ISO M20 x 1.5, reduction and adapters on request.
- Intrinsically safe ATEX or IECEx Ex i certificate on request
- 8 - 30 V DC, 10 - 30 V DC for Ex i version
- Suitable for ambient temperature from -40 °C up to 85 °C
- For C to C connections up to 6 m
- Accuracy  $\pm 0.5$  mm, Resolution 0.1 mm
- HART signal

The Magnetostrictive Transmitter MD Series can be available with **display model**, that can be certified ATEX or IECEx Ex d on request.

- Probe material: SS316Ti
- Housing material: SS316
- Ingress protection IP68
- ATEX or IECEx, Ex i or d, certificate on request
- 12 - 50 V DC
- Suitable for ambient temperature from -20 °C up to 85 °C
- Accuracy  $\pm 0.3$  mm, Resolution 0.1 mm
- HART signal



Display / Ex i or d version

MODEL CODE *		TYPE	DESCRIPTION	*
TL.	N	Reed	Standard safe area	+I Local Display Indicator
	EX		Intrinsically safe Ex i	
	XD		Explosionproof Ex d	
	HR		HART Safe area	
	HX		HART Intrinsically safe Ex i	
	HD		HART Explosionproof Ex d	
	FX		Fieldbus Intrinsically safe Ex i	
	FD		Fieldbus Explosionproof Ex d	
	PX		Profibus Intrinsically safe Ex i	
	MG	Magnetostrictive	HART IP68 safe area	
	MX		HART Intrinsically safe Ex i	
	MG+I		HART IP68 with Display safe area	
	MX+I		HART with Display intrinsically safe Ex i	
	MD+I		HART with Display explosion-proof Ex d	

## REMOTE INDICATOR BAR20WP

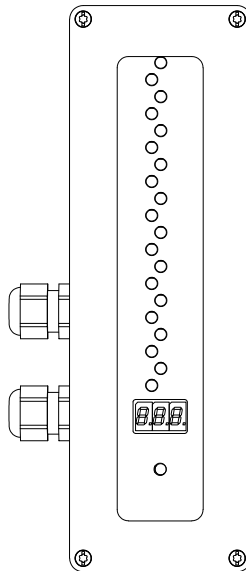
The Level Gauge 2000 Series Transmitters (TL Series and MD Series) can be provided with the remote indicator BAR20WP.

The remote display BAR20WP receive the transmitter's 4-20 mA signal and it shows its percentage value through n° 20 green/red bicolor LEDs and a 3 digits, 8 segments display. An additional yellow LED shows the 4-20 mA loop fail status.

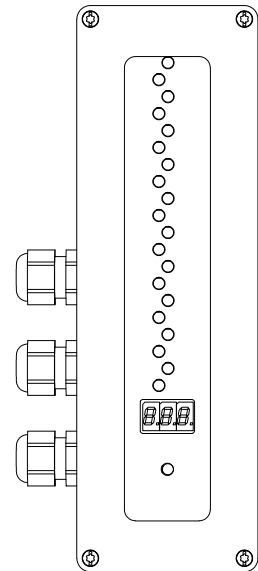
The indicator is available with a painted die cast aluminium housing. On request it's available in explosion-proof Ex d version or in a version without housing, to be mounted on a control panel.

The indicator can be supplied with an additional 4-20 mA output, to be used, for example, to connect a second BAR20WP indicator.

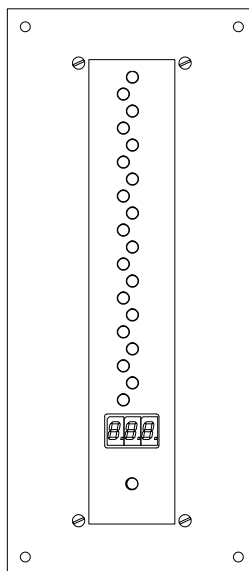
- Power supply: 24 Vdc +/-10 % nominal - 115/230 Vac - 47/63 Hz
- Max. power consumption: 5W
- Circuit resistance: 340 Ω
- Max. cable distance 1000 m
- Active or passive device (selection through a jumper switch)
- Electrical connection ISO M20 x 1.5, reduction and adapters on request.



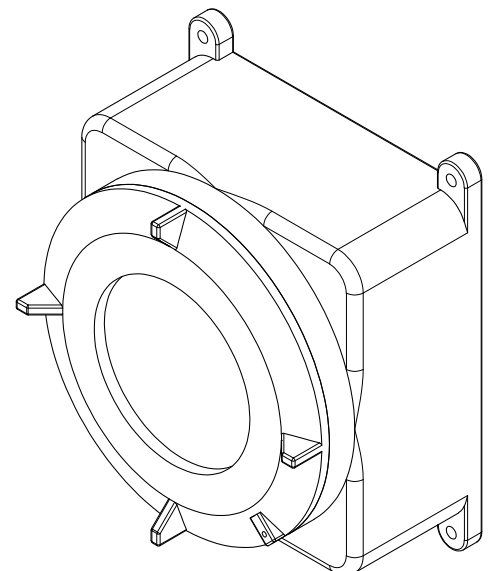
Standard version



Additional output version



Panel version



Ex d version

## SWITCHES T25 Series

On the 2000 Series Level Gauge can be installed one or more level switches T25 Series: a bi-stable SPDT reed contact.

The switch is mounted with stainless steel brackets on the side of the instrument to provide a low or high level alarm triggered by the float's magnetic field. Due to the float's radiant magnetic field, the switches can be positioned in any position around the body pipe.



DWG 1



DWG 2



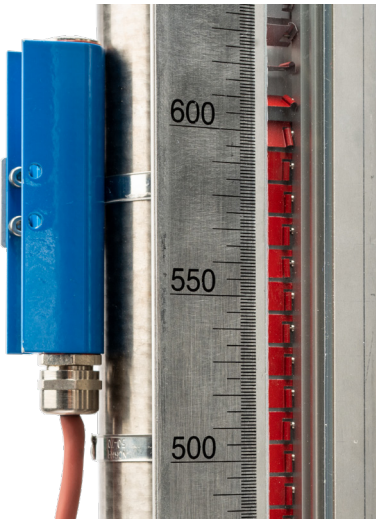
DWG 3



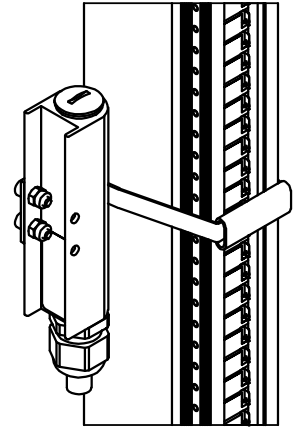
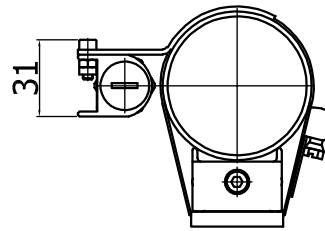
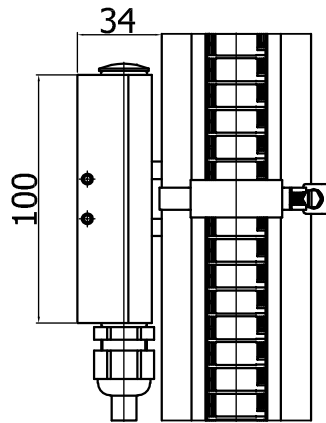
DWG 5

- Approvals Ex d and Ex i (ATEX, IECeC or EAC Ex), SIL, IP66
- Pneumatic option, model T25PN
- Namur option, model T25NR
- Cable up to 10 m or electrical connection NPT-F or ISO M20x1.5. Reduction and adapters on request
- Fluid temperature up to 350 °C
- Ambient temperature from -50 °C up to +70 °C
- Option explosionproof version or intrinsically safe version with cable or junction box
- Housing in diecast painted aluminium or stainless steel

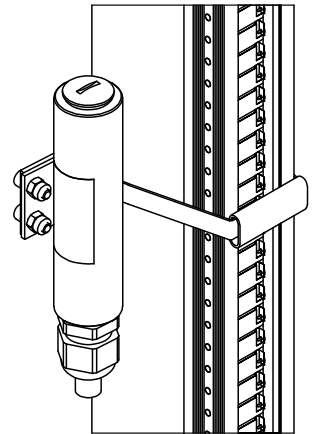
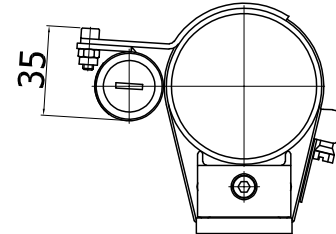
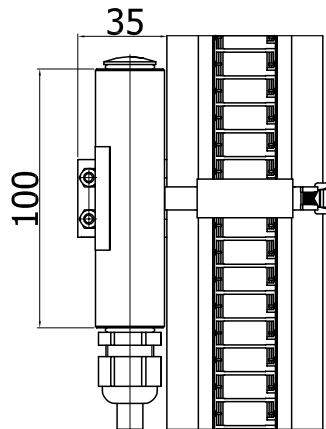
MODEL	HOUSING MATERIAL	AMBIENT T RANGE °C	FLUID max. T °C	CERT.	RATING	CONN.	DWG
T25	Aluminium or SS	-50 / +70	250	SIL 2	230VAC / 0.5A / 40VA 200VDC / 0,5A / 40W	Cable 1 or 10 m	1 and 1SS
T25XI	Aluminium or SS	-50 / +70	250	SIL 2 ATEX Ex i IECEX Ex i EAC Ex i	U <sub>i</sub> = 28V I <sub>i</sub> = 100 mA L <sub>i</sub> = negl. C <sub>i</sub> = negl. P <sub>i</sub> = 700 mW	Cable 1 or 10 m	1 and 1SS
T25XD	Aluminium or SS	-50 / +70	250	SIL 2 ATEX Ex d IECEX Ex d EAC Ex d	230VAC / 0.5A / 40VA 200VDC / 0,5A / 40W	Cable 1 or 10 m	1 and 1SS
T25WH	Diecast aluminium	-50 / +70	250	SIL 2	230VAC / 0.5A / 40VA 200VDC / 0.5A / 40W	Junction box ISO M20x1.5	2
T25WHXI	Diecast aluminium	-50 / +70	250	SIL 2 ATEX Ex i IECEX Ex i EAC Ex i	U <sub>i</sub> = 28V I <sub>i</sub> = 100 mA L <sub>i</sub> = negl. C <sub>i</sub> = negl. P <sub>i</sub> = 700 mW	Junction box ISO M20x1.5	2
T25HT	Diecast aluminium	-50 / +70	350	SIL 2	230VAC / 0.5A / 30VA 200VDC / 0.35A / 30W	Junction box ISO M20x1.5	3
T25HTXI	Diecast aluminium	-50 / +70	350	SIL 2 ATEX Ex i EAC Ex i	U <sub>i</sub> = 28V I <sub>i</sub> = 100 mA L <sub>i</sub> = negl. C <sub>i</sub> = negl. P <sub>i</sub> = 700 Mw	Junction box ISO M20x1.5	3
T25NR	Diecast aluminium	-50 / +70	250	SIL 2 ATEX Ex i IECEX Ex i	NAMUR type	Junction box ISO M20x1.5	3
T25PN	Diecast aluminium	-15 / +60	250		0 / 40 psi	1/4 NPTF	4
T25XD2	Diecast aluminium	-40 / +70	250	SIL 2	230VAC / 1A / 40VA 200VDC / 0,5A / 40W	ISO M20x1.5 or 1/2 NPTF	5



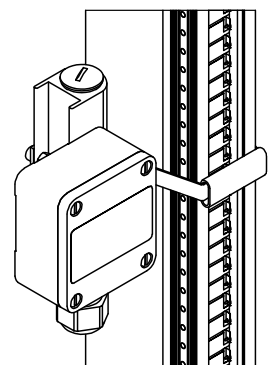
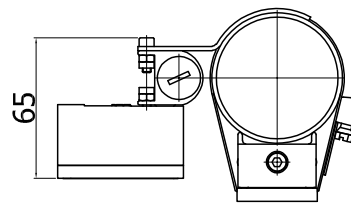
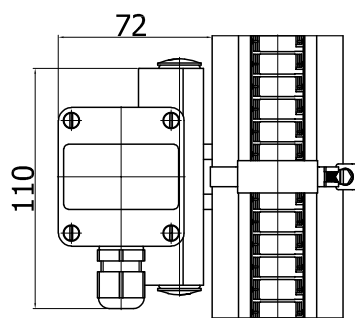
DWG 1



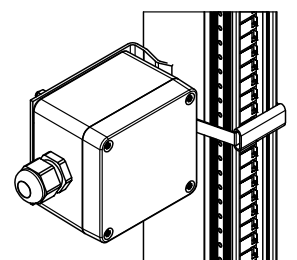
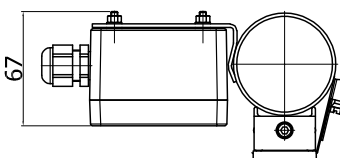
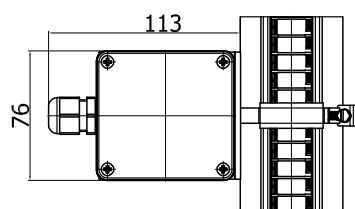
DWG 1SS

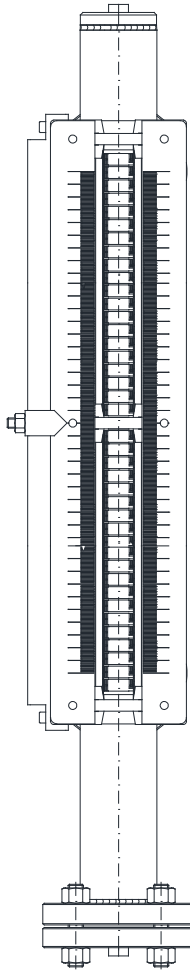


DWG 2



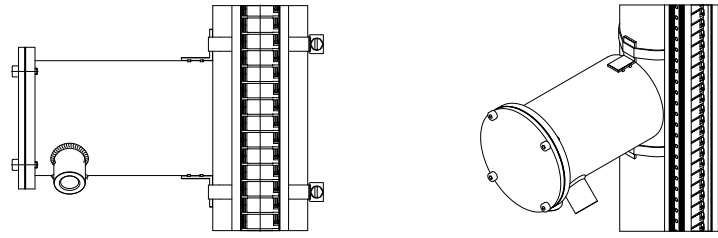
DWG 3



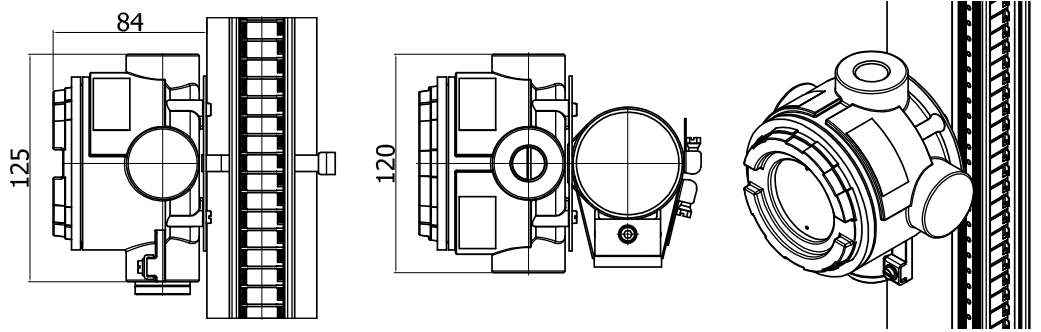


Double graduated scale with pointer

#### DWG 4



#### DWG 5



### HOUSING ACCESSORIES

- Shatter-proof polycarbonate window
- SS 316 version
- Hermetically sealed version in glass or polycarbonate
- Neutral gas flow version for critical applications
- Antifrost version with plexiglas plate for cryogenic applications up to -195 °C
- Flags in ferromagnetic stainless steel
- Broken float indicator: Red/Yellow flags that, in case the float sinks, they will show the yellow face

### GRADUATED SCALE

On request on the Level Gauge 2000 Series can be installed a graduated scale in SS 316L in percentage, mm or other unit of measure on request, both of volume (m<sup>3</sup>, L, etc.) and of length (ft, inch, etc.).

On request, a double graduated scale can be installed with two different units of measure on the two sides of the housing (for example mm and inch).

On the scale can be installed adjustable pointers.

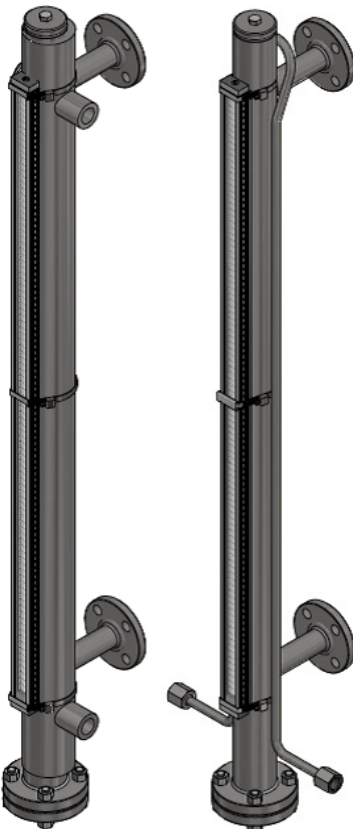
### HEAT EXCHANGE AND INSULATION

As accessory the Level Indicator 2000 Series can be supplied with:

- Insulation
- Electric tracing
- Tubes steam tracing
- Jacket steam tracing

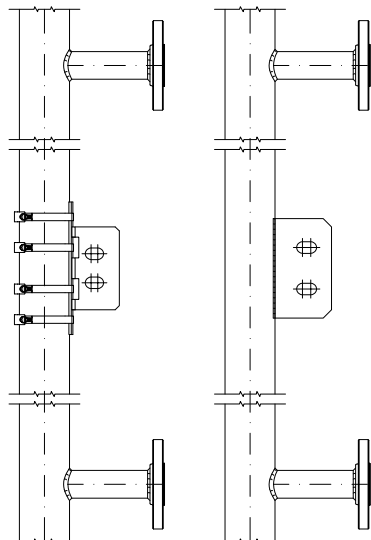
### TESTS AVAILABLE

- Penetrant liquid test
- Hydrostatic test
- RX test on full-penetration welds
- Tests on painting
- PMI test
- Hardness test
- Ferrite test



Jacket steam tracing

Tubes steam tracing



Adjustable and welded brackets

## OTHER ACCESSORIES

- Welded or adjustable brackets to reduce the connection stress in case on high length. In plastic type included in standard version.
- Execution with full-penetration welds.
- Standard Officine Orobiche paintings or compliant to customer specifications.

## APPROVALS

On request the following approvals are available:

- PED 2014/68 UE
- ATEX Ex II GD c IIC TX, II GD c IIB TX
- EAC CUTR032
- EAC CUTR012
- NACE MR-0175 or MR-0103

For **TL Series** Transmitter:

ATEX explosion-proof: II 2G Ex db IIC T6 Gb / II 2D Ex tb IIIC T85°C Db

ATEX intrinsically safe: II 1 G Ex ia IIC T4...T6 Ga / II 1 D Ex ia IIIC Da / II 1 M Ex ia I Ma

EAC CUTR012: 1Ex d IIC T6 / Ex tb IIIC T85°C Db

0Ex ia IIC <<T1 ... T6>> Ga

IECEx explosion-proof: Ex db IIC T6 Gb / Ex tb IIIC T 85°C Db

IECEx intrinsically safe: Ex ia IIC T4 ... T6 Ga / Ex ia IIIC Da / Ex ia I Ma

IEC 61508 SIL 2

For **MD Series** Transmitter:

Models MX & MX+I

ATEX intrinsically safe: II 1 G Ex ia IIC T6...T1 Ga

II 1/2 G Ex ia IIC T6...T1 Ga/Gb

II 2 G Ex ia IIC T6...T1 Gb

II 2 D Ex ia IIIC TX °C Db

IECEx intrinsically safe Ex i

Model MD+I

ATEX:

II 1/2 G Ex ia/db IIC/B T6...T1 Ga/Gb

II 2 G Ex db ia IIC/B T6...T1 Gb

II 2 D Ex ia tb IIC/B TX °C Db

IECEx intrinsically safe Ex i or explosion-proof Ex d

For **T25 Series** Switches:

IEC 61508 SIL 2

ATEX, IECEx and EAC as per the following table:

MODEL	ATEX	IECEx	EAC
<b>T25XI</b>	II 2G Ex ia IIC T6...T4 Gb	Ex ia IIC T6...T4 Gb	1Ex ia IIC T6...T4 Gb X
<b>T25XI SS</b>	II 2D Ex ia IIIC T85°C...T135°C Db	Ex ia IIIC T85°C...T135°C Db	Ex ia IIIC T85 °C...T135°C Db X
<b>T25WHXI</b>	II 2G Ex ia IIC T6...T4 Gb	Ex ia IIC T6...T4 Gb	1Ex ia IIC T6...T4 Gb X
<b>T25HTXI</b>	II 2G Ex ia IIC T6...T3 Gb		1Ex ia IIC T6...T4 Gb X
<b>T25XD</b>	II 2G Ex db IIC T6...T4 Gb	Ex db IIC T6...T4 Gb	1Ex d IIC T6...T4 Gb X
<b>T25XD SS</b>	II 2D Ex tb IIIC T85°C...T135°C Db	Ex tb IIIC T85°C...T135°C Db	Ex tb IIIC T85 °C...T135°C Db X
<b>T25XD2</b>	II 2G Ex db IIC T6 Gb II 2D Ex tb IIIC T85°C Db	Ex db IIC T6 Gb Ex tb IIIC T85°C Db	1Ex d IIC T6 Gb X Ex tb IIIC T85 °C Db X





## SPARE PARTS

The Level Gauge 2000 Series comes without spare parts because it is designed to operate for his entire life without changing any part.

Our company database contains information about the instruments manufactured in 60 years and allows us to provide as spare parts:

- Closing flange's gasket
- Float
- Housing with eventual graduated scales
- Transmitter and switches
- Complete instruments

It's also possible to upgrade an already installed instrument with:

- Transmitter
- Switches
- Different housing
- Floats suitable for a different fluid's density value

To request spare parts for an installed instrument, state the F number written in the top-right of the label:



## MODEL CODE

2AAA	T	BB	CC	D	TL.EEEE	XX
Model	TOP mounted model*	Body material	Float material	Gasket material	Transmitter*	Any variation from standard*

\* These digits are written only if they're applicable

**Examples:** 2016.J.2L.G, 2100T.J.TI.XX, 2006.PF.PF.T.TL.XD+I.XX

To request a quotation please state:

- Fluid density
- Operating and design conditions
- Range and connections type
- Accessories
- Safe or classified area

Our technical and commercial departments are available to discuss any variation or customization not mentioned in this catalogue.



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