



T7M SERIES

SMART ELECTRONIC MULTIPOINT TEMPERATURE TRANSMITTER



DESCRIPTION

T7M is an electronic multipoint temperature transmitter with a SMART-HART® electronic and a built-in multiplexer that can accept up to 15 resistance thermometers PT100 (3-wires). The multipoint solution offers great advantages for its mounting simplicity and for connection cables saving. Output is analog 4÷20mA for averaging temperature measurement or HART® protocol for single point's values and average. In T7M series with display version the average and intermediate single temperature points can be displayed locally. Accuracy is depending on class of the sensors utilized such as DIN A, DIN B, 1/3 DIN, 1/5 DIN and 1/10 DIN.

APPROVALS



APPLICATIONS

- Suitable for Oil & Gas, Chemical, Petrochemical, Pharma, Water, Food and Marine Industries
- Measure of temperature in storage tanks
- Measure of temperature with remote digital display visualization.
- Measure of temperature in open tanks

SPECIAL FEATURES

- Possibility to have either 14 resistance thermometers plus 1 interface or 14 resistance thermometers plus level sensor.
- Ex protection per ATEX.
- For SIL 2 applications
- Wetted parts in special materials
- Full construction in SS AISI 316

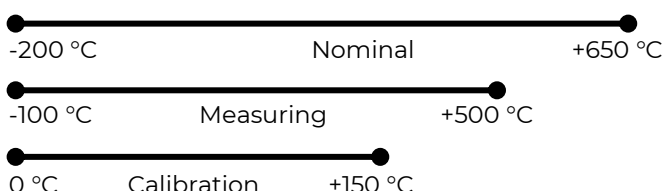


DEFINITIONS

Nominal Range: the temperature range, defined by a minimum value and a maximum value, for which the sensor mounted within the instrument has been designed. (Ex. -200 / +650 °C).

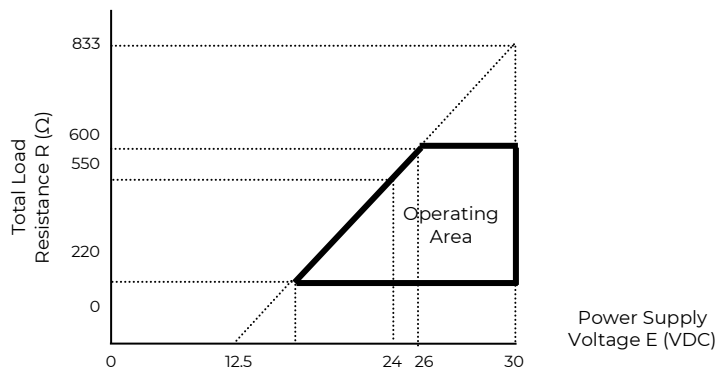
Measuring Range: the temperature range, defined by a minimum value and a maximum value, within which the transmitter can be calibrated. The Measuring Range values must be within the Nominal Range values. (Ex. -100 / +500 °C) Limits of the Measuring Range are fixed and cannot be configured by the User.

Calibration Range: the temperature range, defined by a minimum value and a maximum value, at which the instrument is actually calibrated. The Calibration Range values must be within the Measuring Range values. (Ex. 0 / +150 °C). The Calibration Range can always be configured by the User within the Measuring Range values.



ELECTRICAL PARAMETERS

- Supply:** 12.5 ÷ 30 Vdc
- Output signal:** 4 ÷ 20 mA + Hart®, 2 wires
- Alarm values:** 3.85 mA \ 21 mA
- Response time (63% FS):** < 256 ms (Standard Hart®)
- Measured value update frequency:**
 4 ÷ 20 mA + Hart®: ≈ 1 s
 Hart® output only: ≈ 500 ms (On request)
- Polling time:**
 4 ÷ 20 mA + Hart®: ≈ 800 ms
 Hart® output only: ≈ 500 ms (On request)
- Load resistance:** 220 Ω < RL < 600 Ω (Hart®)
 The total load resistance includes both the line resistance of the connection cable and the load resistance of the reading or receiving units



MEASUREMENT PERFORMANCE

- Total accuracy (εTOT):** εDGT + εPT100
- Digital accuracy (εDGT):** 0.1% FS / 100 °C
- Thermo element accuracy (εPT100):** see "Tolerance classes for PT100 thermocouples (IEC751)"
- Output resolution:** < 0.01% nominal range (at 20 °C)
- Dead band:** negligible
- Display resolution:** 0.1
- Power supply effect:** negligible between 12.5÷30 Vdc
- Allowable de-range:** Down to 30 times the Nominal Range
- Damping:** 0 ÷ 60 sec

Tolerance classes for PT100 thermocouples (IEC751)					
Temp. [°C]	CLASS B [± °C]	CLASS A [± °C]	1/3 DIN [± °C]	1/5 DIN [± °C]	1/10 DIN [± °C]
-200	1.3	0.55	0.44	0.26	0.13
-100	0.8	0.35	0.27	0.16	0.08
0	0.3	0.15	0.1	0.06	0.03
100	0.8	0.35	0.27	0.16	0.08
200	1.3	0.55	0.44	0.26	0.13
300	1.8	0.75	0.6	0.36	0.18
400	2.3	0.95	0.77	0.46	0.23
500	2.8	1.15	0.94	0.56	0.28
600	3.3	1.35	1.1	0.66	0.33
650	3.6	1.45	1.2	0.72	0.36

ENVIRONMENTAL CONDITIONS

- Ambient Temperature:** -40 ÷ +85°C
- Process fluid Temperature:** 0 ÷ +300°C
- Storage Temperature:** -40 ÷ +90°C
- Relative Humidity:** 0 ÷ 99% R.H. (not condensating)
- LCD Display reading:** -20 ÷ +75°C



PARAMETER SETTINGS

LRV Setting of Lower Range Value (must be within the Measuring Range and lower than URV)

URV Setting of Upper Range Value (must be within the Measuring Range and higher than LRV)

NUM POINT: define the number of PT100 installed on the device.

SET TAG: define the associated tag to PT100

PV UNIT: Setting the Process Variable measuring unit among 3 different temperature units or % of the Measuring Range

XFR FUNC: Transfer is set as linear

ALARM TYPE: according to NAMUR NE43:

- **Working Zone (WZ)** is between $3.9 < \mathbf{WZ} < 20.5$ and the display shows the value of measured current.

Status	Display Indication	Range [mA]
WZ	[current value]	$3.9 < \mathbf{WZ} < 20.5$

- **Limit Zone (LZ)** between $3.85 < \mathbf{LZ} < 3.9$ mA and $20.5 < \mathbf{LZ} < 21.0$ mA. In this case the display blinks the value of measured current;

Status	Display Indication	Lower Range [mA]	Upper Range [mA]
LZ	[Blinking current value]	$3.85 < \mathbf{LZ} < 3.9$	$20.5 < \mathbf{LZ} < 21.0$

- **Alarm Zone (AZ)** is between $3.85 < \mathbf{AZ} < 21$. The transmitter failure method and relevant output current depends on the configuration type, and can be set in 4 different ways as per below table.

Status	Display Configuration	Display Indication
AZ	[NONE]	Random current value
	[21]	AZ = 21 (default configuration)
	[3.85]	AZ = 3.85
	[LAST]	Output to Last read current Value before breakdown

DAMP VALUE: damping digitally adjustable from 0 to 60 sec. (minimum response time ~ 0,1 sec.)

SET LRV: Fixes the current value to 4 mA (without changing the displayed value)

SET URV: Fixes the current value to 20 mA (without changing the displayed value)

LOOP TEST: Simulates the current output at a selectable fixed value

CAL 4-20mA: Calibration of the Analog output 4-20mA

ADDRESS: setting of the HART polling address

INFO: scrolling of general transmitters' info (Polling, LSL, USL e Firmware Revision)

PASSWORD: setting of a protection password

OFFSET: Allows Zero Re-setting
Zero Elevation

PHYSICAL SPECIFICATIONS

Housing:

- Die cast aluminum alloy EN AB-44100 finished with epoxy resin (RAL 7024). It is dust and sand tight and protected against sea wave effects as defined by IEC IP66. Suitable for tropical climate operation as defined by DIN 50015.
- SS AISI 316 defined by IEC IP67.

Covers O-ring: EPDM.

Nameplate: Stainless Steel, firmly fixed or engraved on housing.

Calibration:

- **Standard:** at nominal range, direct action, linear.
- **Optional:** at the conditions specified within the purchase order.

Electrical connections: two cable entries on electronic housing: M20 x 1.5 and cable gland PG 13.5 for 7 to 12 mm diameter cable as a standard.

Terminal board: 2 terminals for signal wiring up to 1.5 mm² (14 AWG). Connection for ground and cable shield.

Mounting position: any position.

Net weight: minimum 5 kg

PROCESS WETTED PARTS

The wetted parts such as process connection and flexible sondaflex are, usually, manufactured in SS AISI 316.

OPTIONS

- Bracket for 2 inch pipe mounting;
- Housing with radial or back mounting: AISI 316 (IP67);
- Others on request

EXTRA CERTIFICATES

- Material Test Certificates as per UNI EN 10204, 3.1;
- Material Test Certificates as per UNI EN 10204, 3.2 by ISO 17025 Third Party Laboratory;
- Wetted parts in compliance with NACE MR0175 / ISO 15156 and MR0103 / ISO 17945;
- Wetted parts testes with ASTM A262 Pr. E or ASTM G28 (Intergranular Corrosion Test);
- Special materials (Nickel based alloys and SDSS) tested with ASTM G48 (Pitting);
- HIC Test as per NACE TM0284;
- SSC Test as per NACE TM0177;
- PMI Standard;
- PMI with Carbon content examination (For SS AISI 316 / 316L only);
- Hydrostatic test as per 2014/68/EU Directive;
- Hydrostatic test as per ASME Standard.



APPROVALS

Directive 2014/34/EU (ATEX)

- II 1G Ex ia IIC T6, T5 Ga and
- II 1D Ex ia IIIC T85°C, T100°C Da or
- II 1/2G Ex ia IIC T6, T5 Ga/Gb

Power supply parameters:

If $T_a < 60^\circ\text{C}$

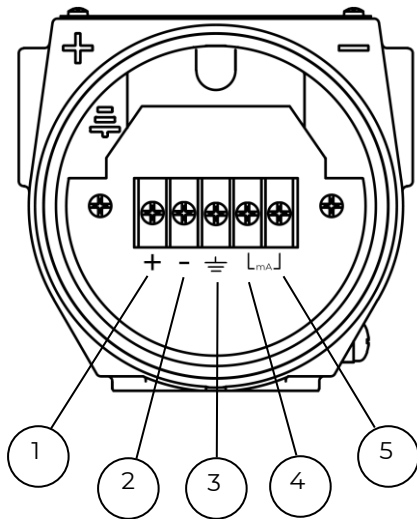
$U_i = 30\text{V}$, $I_i = 100\text{mA}$; $P_i = 0.75\text{W}$; $C_i = 10\text{nF}$; $L_i \approx 0.2\text{ mH}$

If $60 < T_a < 75^\circ\text{C}$

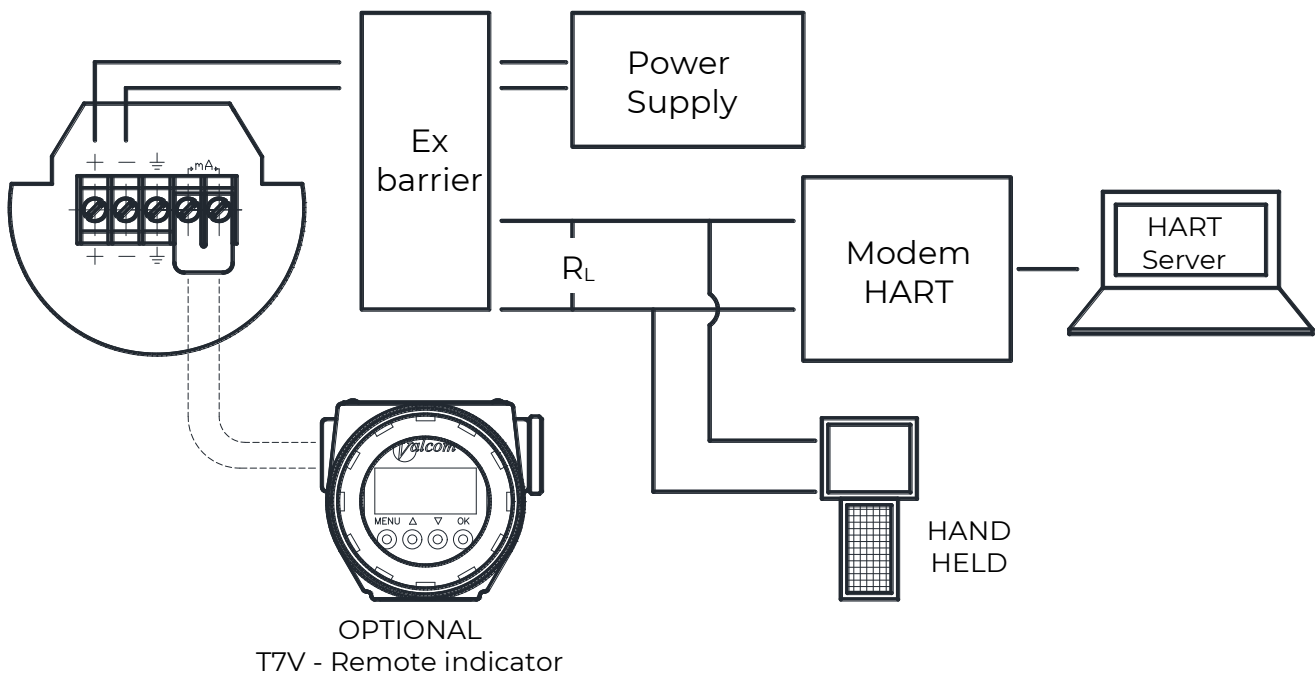
$U_i = 25.2\text{V}$, $I_i = 100\text{mA}$; $P_i = 0.62\text{W}$; $C_i = 10\text{nF}$; $L_i \approx 0.2\text{ mH}$

The transmitter must be supplied with associated apparatus certified according to EN 60079-0 and EN 60679-11 with the electrical characteristics described

TERMINAL CONFIGURATION



WIRING EXAMPLE



Directive 2014/30/EU (EMC)

Adequate level of electromagnetic compatibility

Directive EN 50581 (RoHS)

In compliance

Functional Safety (IEC 61508:2010)

λ_{DD}	λ_{DU}	λ_S	λ_{TOT}	SFF
1,7053E-07	5,2470E-08	3,1482E-07	5,3782E-07	94,83%

- Level SIL 2 capable for single transmitter use
- Level SIL 3 capable for dual transmitter use.

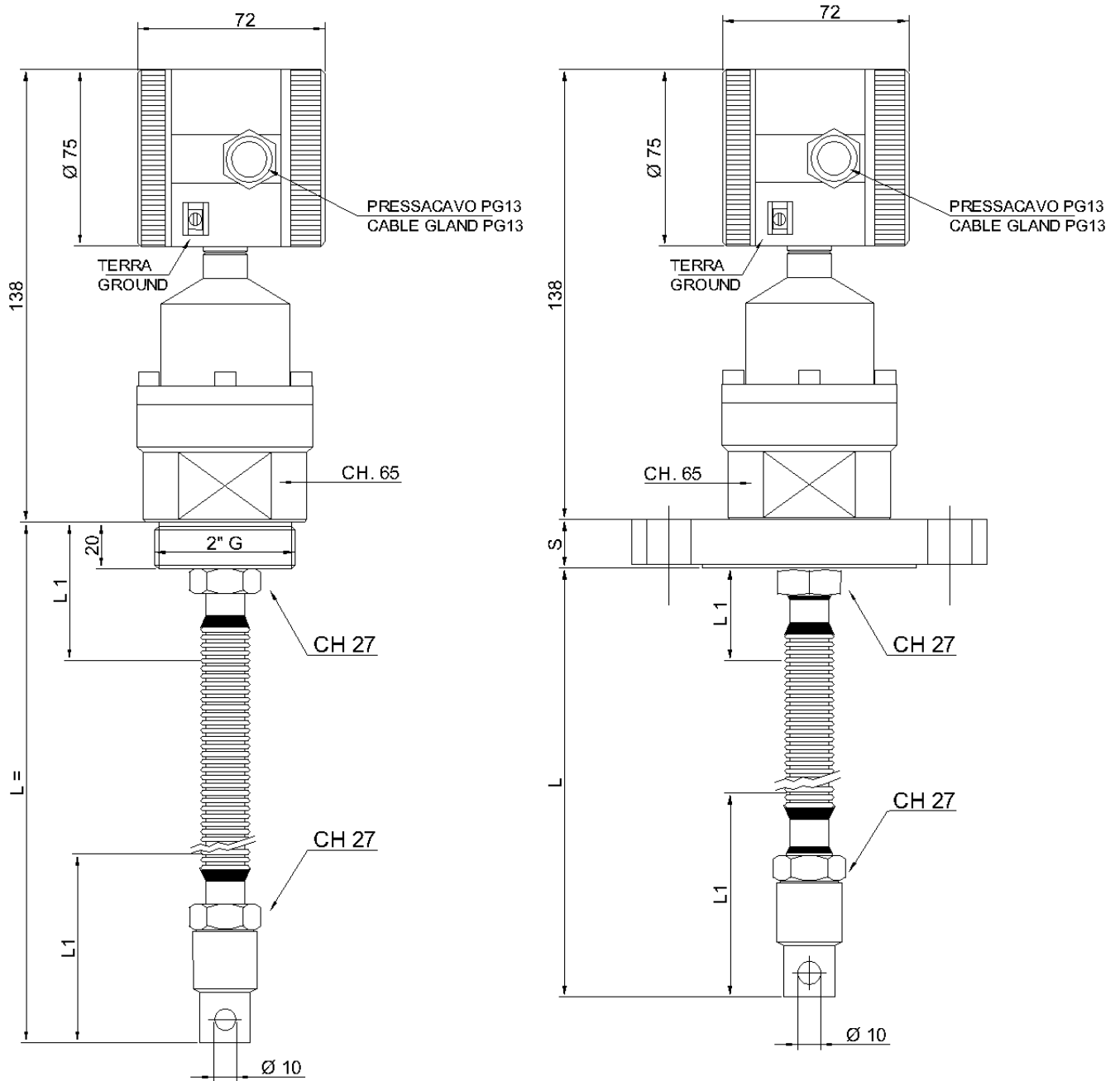
TERMINAL WIRING

	TERMINALS	SCOPE
SUPPLY & OUTPUT	1 (+) 2 (-)	Power supply and 4-20mA + HART Output Signal
GROUNDING	3	Ground Terminal
OPTIONAL REMOTE INDICATOR	4 5	Remote Indicator Loop Connection (no polarity)

- When Remote Indicator is not connected to the instrument, Terminals 4 and 5 **must be short-circuited** (default configuration)
- When connecting Remote Indicator or check meter to Terminals 4 and 5, the internal resistance must be $10\ \Omega$ or less.



DIMENSIONAL DRAWINGS





CODIFICATION

00 SERIES

T7M	Smart electronic level multipoint transmitter
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01 TYPE OF MEASURE

F	Temperature
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02 SENSOR TYPE

T1	PT100 MGO Ø 3 - 6 mm AISI 316 classe DIN A
T2	PT100 MGO Ø 3 - 6 mm AISI 316 classe DIN B
T3	PT100 MGO Ø 3 - 6 mm AISI 316 classe 1/4 DIN

03 MEASURING RANGE

	NUMBER of SENSORS	RANGE
T01	1	0÷50...150°C
T02	2	0÷50...150°C
T03	3	0÷50...150°C
T04	4	0÷50...150°C
T05	5	0÷50...150°C
T06	6	0÷50...150°C
T07	7	0÷50...150°C
T08	8	0÷50...150°C
T09	9	0÷50...150°C
T10	10	0÷50...150°C
T11	11	0÷50...150°C
T12	12	0÷50...150°C
T13	13	0÷50...150°C
T14	14	0÷50...150°C
T15	15	0÷50...150°C
T21	1	0÷100...300°C
T22	2	0÷100...300°C
T23	3	0÷100...300°C
T24	4	0÷100...300°C
T25	5	0÷100...300°C
T26	6	0÷100...300°C
T27	7	0÷100...300°C
T28	8	0÷100...300°C
T29	9	0÷100...300°C
T30	10	0÷100...300°C
T31	11	0÷100...300°C
T32	12	0÷100...300°C
T33	13	0÷100...300°C
T34	14	0÷100...300°C
T35	15	0÷100...300°C
ZZZ	Special	

04 FILLING OIL

N	No filling
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05 PROCESS TEMPERATURE LIMITS

B	Standard -40 ÷ 85°C
Z	Special

06 HOUSING MATERIAL AND TYPE

A16	SS AISI 316
D04	Aluminum housing



07 PROCESS CONNECTION

	TYPE	DN	PRESSURE CLASS	FACE / TYPE
S70	Screwed	1"1/2	-	G-M
S81	Screwed	2"	-	G-M
F29	Flanged	40	PN 10/16	Raised Face
F32	Flanged	40	PN 25/40	Raised Face
F33	Flanged	50	PN 10/16	Raised Face
F35	Flanged	50	PN 25/40	Raised Face
F41	Flanged	65	PN 10/40	Raised Face
F44	Flanged	80	PN 10/16	Raised Face
F49	Flanged	80	PN 25/40	Raised Face
F73	Flanged	1"1/2	Class 150	Raised Face
F75	Flanged	2"	Class 150	Raised Face
F79	Flanged	3"	Class 150	Raised Face
F83	Flanged	3"	Class 300	Raised Face
F85	Flanged	4"	Class 150	Raised Face
F87	Flanged	4"	Class 300	Raised Face
F89	Flanged	6"	Class 150	Raised Face
Z99	Special			

08 EXTENSION LENGHT

XA1	Flexible sondaflex DN16 5/8" AISI 316 OVP 25 < 1 m
XA_	Flexible sondaflex DN16 5/8" AISI 316 OVP 25 < _ m
XAF	Flexible sondaflex DN16 5/8" AISI 316 + Interface Level OVP 4
XB1	Flexible sondaflex DN10 3/8" AISI 316 OVP 40 < 1 m
XB_	Flexible sondaflex DN10 3/8" AISI 316 OVP 40 < _ m
XBF	Flexible sondaflex DN10 3/8" AISI 316 + Interface Level OVP 4
Z99	Special

09 SENSOR MATERIAL

A	SS AISI 316L
Z	Special

10 PROCESS GASKET MATERIAL

D	FKM
T	All welded

11 WETTED PARTS MATERIAL

A	SS AISI 316
Z	Special

12 ELECTRICAL CONNECTION

01	2 x Screwed 1/2" NPT-F
02	2 x Screwed M20 x 1.5
03	1 x Screwed 1/2" NPT-F
04	1 x Screwed M20 x 1.5
05	1 x Nipple AISI 316 SS PG16-F
06	1 x Nipple AISI 316 SS 1/2" G-F
07	1 x Nipple AISI 316 SS 1/2" NPT-F
08	1 x Nipple AISI 316 SS 3/4" G-F
09	1 x Nipple AISI 316 SS M20 x 1,5 F
10	1 x Nipple AISI 316 SS M24 x 1,5 F
11	1 x Nipple AISI 316 SS M3/4" G-F
12	1 x Nipple AISI 316 SS M3/4" NPT-F
13	2 x Nipple AISI 316 SS PG16-F
14	2 x Nipple AISI 316 SS 1/2" G-F
15	2 x Nipple AISI 316 SS 1/2" NPT-F
16	2 x Nipple AISI 316 SS 3/4" G-F
17	2 x Nipple AISI 316 SS M20 x 1,5 F



18	2 x Nipple AISI 316 SS M24 x 1,5 F
19	2 x Nipple AISI 316 SS M3/4" G-F
20	2 x Nipple AISI 316 SS M3/4" NPT-F
21	1 x AISI 316 SS Gland PG9 IP67 for cable \varnothing 5÷7 mm
22	1 x AISI 316 SS Gland PG13 IP67 for cable \varnothing 8÷12 mm
23	2 x AISI 316 SS Gland PG9 IP67 for cable \varnothing 5÷7 mm
24	2 x AISI 316 SS Gland PG13 IP67 for cable \varnothing 8÷12 mm
25	NICKEL BRASS Gland PG9 IP67 for cable \varnothing 5÷7 mm
26	NICKEL BRASS Gland PG13 IP67 for cable \varnothing 8÷12 mm

13 ELECTRICAL OUTPUT

R	4 ÷ 20 mA + HART With LCD and blind cover
S	4 ÷ 20 mA + HART With LCD and transparent cover

14 EX TYPE APPROVAL

A1	ATEX II 1G Ex ia IIC T6, T5 Ga and II 1D Ex ia IIIC T85°C, T100°C Da
A5	ATEX II 1/2G Ex ia IIC T6, T5 Ga/Gb
NN	None

15 OPTIONS AND ACCESSORIES

01	Test and material report according to EN 10204
10	Calibration report on 5 points
21	SIL Certificate
NN	No options



ACCESSORIES



Cod. XAF / XBF
With Float for Interface measure



Cod. XAF / XBF
With Float for Level measuring



Cod. ZZ
Flexible temperature elements



Cod. T7T
Temperature transmitter



Cod. TRT
Temperature transmitters without display

And more

- Various type of floats
- Suitable for integration in Tank Gauging systems
- Nipple-Union-Nipple versions



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