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SMART temperature transmitter Series TT372 for use in explosion proof area

Description

TT372 series SMART temperature transmitters are microprocessor based instruments that combine the analog signal advantages (4-20mA) together with the flexibility of digital communication using HART® protocol. They can be remotely configured by a universal hand held terminal (HHT) or by a PC with a dedicated interface. Moreover, it is possible to locally configure the instruments (zero and span) by means of 4 pushbuttons and to display the data on the wide LCD display.

The TT3752 transmitters are able to accept 3 wires Pt 100 ohm resistance thermometers and total accuracy is depending on class of the sensors utilized such as DIN A, DIN B, 1/3 DIN, 1/5 DIN 1/10 DIN etc.

Based on these readings the microprocessor generates the 4-20 mA analog output "two wires system" and displays the pressure measurement on the LCD.

Some of the main characteristics of this microprocessor-based transmitter, are:

- Wide rangeability.
- Automatic temperature compensation.
- Digital communication using HART® protocol.



Functional data

With reference to the following, please note these definitions:

Nominal range: (referred to the sensor mounted in the instrument) the measured temperature range for which the sensor has been designed. Defined as a minimum and maximum value.

Measuring range: the minimum and maximum range values for which the transmitter is to be calibrated.

Measuring span: the interval between minimum and maximum values of the measuring range.

Input scale initial value or zero input: minimum temperature value within in the measuring range.

Input full scale value: maximum temperature value within in the measuring range.

Transmitter parameters

The parameters that are available for display and setting are:

Measuring span: possibility to change from 3,33% to 100% of the nominal span.

Zero adjustment: digital calibration $\pm 15\%$.

Low/upper range values: they can be set within the nominal range provided that the span > minimum span.

Damping: digitally adjustable from 0 to 60 sec. (minimum response time $\sim 0,1$ sec.).

Reverse output: automatically obtained via software.

Transfer function: linear/square root via software.

Self-test: in case of malfunction the analog output is forced to the fail-safe state 3,85 mA or 21 mA.

Measuring units: 3 different temperature units or % of the measuring span, selectable via software.

Physical characteristics

Power supply: 12,5-30 Vdc.

Output signal:

Analog 4-20 mA, 2 wires. Digital using HART® protocol.

Response time: <256 ms (Std Hart®)

Measured value update frequency:

4-20 mA + Hart® output: ~1 s

Polling time:

4-20 mA + Hart® output: ~800 ms

Ambient conditions

Temperature:

Process fluid: -40 ÷ + 400°C (according to the configuration)

Housing: -40 ÷ +80°C

Handling and storage: -40 ÷ 90°C

Relative Humidity: 0 a 100% R.H.

LCD display reading: -10 ÷ 65°C

Performances

Digital accuracy (εDGT): 0.1%FS / 100°C

Thermoelement accuracy (εPT100): see "Tolerance classes for PT100 thermocouples (IEC751)"

Output resolution: < 0,01% nominal range (a 20°C)

Total accuracy (εTOT): εDGT + εPT100

Dead band: negligible.

Display resolution: 0.1

Influence of operating conditions

Power supply effect:

Negligible between 12,5 and 30 Vdc

Physical specifications

Housing: die cast aluminium alloy EN AW-6082 finished with epoxy resin (RAL 5010). 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.

Covers O-ring: EPDM.

Nameplate: stainless steel, fixed on housing.

Electrical connections: two cable entries on electronic housing, M20x1,5 and cable gland PG 13,5 for 7 to 12 mm diameter cable.

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

Mounting position: any position.

Net weight: 2 kg approx.

Calibration

Standard: at nominal range, direct action.

Optional: at the conditions specified with the order.

Process wetted parts

Thermowell: AISI 316 (to be ordered separately).

Options

Bracket: for 2 inch pipe mounting.

Stainless steel housing: AISI 316 (IP66)

EUROPEAN LEGISLATION

Directive 2014/68/EU (PED)

Pressure equipment until Category III, for fluids (gases, liquids and vapors) in Group 1.

Directive 2014/34/EU (ATEX)

Equipment for explosive atmospheres Group II Category 1/2G suitable for zone 0 (process side) and zone 1 (external side).

Explosion proof:

Ex d IIC T6 Ga/Gb (-40°C ≥ Tamb ≥ +60°C)

Ex d IIC T5 Ga/Gb (-40°C ≥ Tamb ≥ +80°C)

Directive 2014/30/EU (EMC)

Equipment with an adequate level of electromagnetic compatibility.

Dimensions (mm)

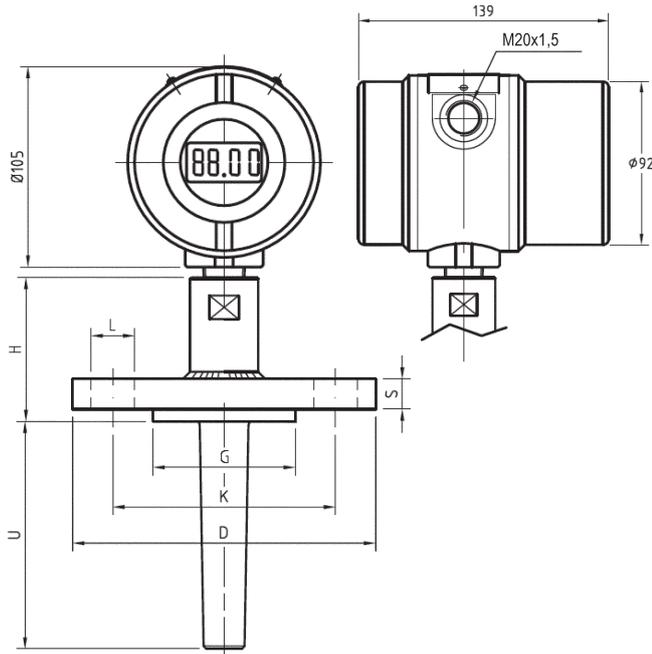


Fig. 1 - TT372 coupled with flanged thermowell

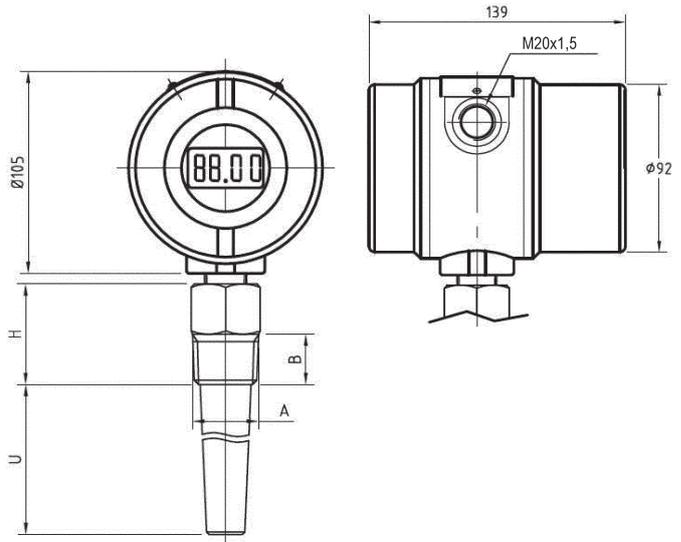
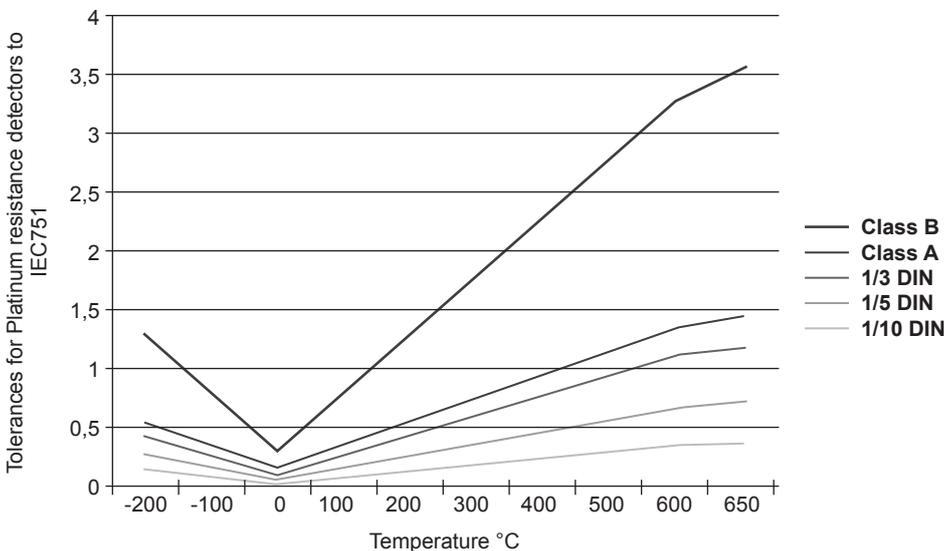


Fig. 2 - TT372 coupled with screwed thermowell

Table 1: 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



The total instrument accuracy s_{TOT} is given by the formula

$$s_{TOT} = s_{PT100} + s_{DGT} [\pm^\circ C]$$

where s_{PT100} is the thermoelement accuracy (see table 1)
 s_{DGT} is the digital accuracy (see performances)

ORDERING INFORMATION		Example: TT372-H-2-D-2-2-2						
Code number	TT372	H	2	D	2	2	2	
HART Temperature Transmitter		H						
Process Connection								
1/2" G-M Sliding			2					
1/2" NPT-M Sliding			4					
Nipple for element 1/2" NPT-F			6					
Special			9					
Type of sensor (Extension Probe)								
Rigid INOX MGO Ø6mm AISI316 - length ≤ 150 mm				C				
Flexible INOX MGO Ø3-6mm AISI316 - length ≤ 150 mm				D				
Wall Plate AISI316				E				
To be connected by customer				F				
Special				Z				
Calibration								
0/100 °C					1			
0/200 °C					2			
0/300 °C					3			
Optional					9			
RTD Type								
Class A						1		
Class B						2		
1/3 DIN						3		
1/10 DIN						4		
To be connected by customer						9		
Explosion protection								
Exd explosion proof feature							2	
In Purchase order, please indicate: pressure and temperature of the process fluid.								