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SMART temperature transmitter Series TT352 for use in intrinsically safe area

Description

TT352 series SMART temperature transmitters are microprocessor based instruments that combine the analog signal advantages (4-20 mA) 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 TT352 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.

The Spirax Sarco measuring cell contains the sensor and transmits the temperature value to the electronics.

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

Power supply parameters

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

$U_i = 30\text{V}$, $I_i = 100\text{mA}$; $P_i = 0.75\text{W}$; $C_i = 10\text{nF}$; $L_i \approx 0\text{ mH}$

If $60 < T_a < 80^\circ\text{C}$

$U_i = 25.2\text{V}$, $I_i = 100\text{mA}$; $P_i = 0.62\text{W}$; $C_i = 10\text{nF}$; $L_i \approx 0\text{ mH}$

Performances

Digital accuracy (ϵ_{DGT}): 0.1%FS / 100°C

Thermoelement accuracy (ϵ_{PT100}): see "Tolerance classes for PT100 thermocouples (IEC751)"

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

Total accuracy (ϵ_{TOT}): $\epsilon_{\text{DGT}} + \epsilon_{\text{PT100}}$

Dead band: negligible.

Display resolution: 0.1

Influence of operating conditions

Power supply effect:

Negligible between 12,5 and 30 Vcc

Physical specifications

Housing: die cast aluminum alloy EN AB-44100 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 (14 AWG). Connection for ground and cable shield.

Mounting position: any position.

Net weight: 1.4 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 pipemounting.

Housing with radial mounting: AISI 316.

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)

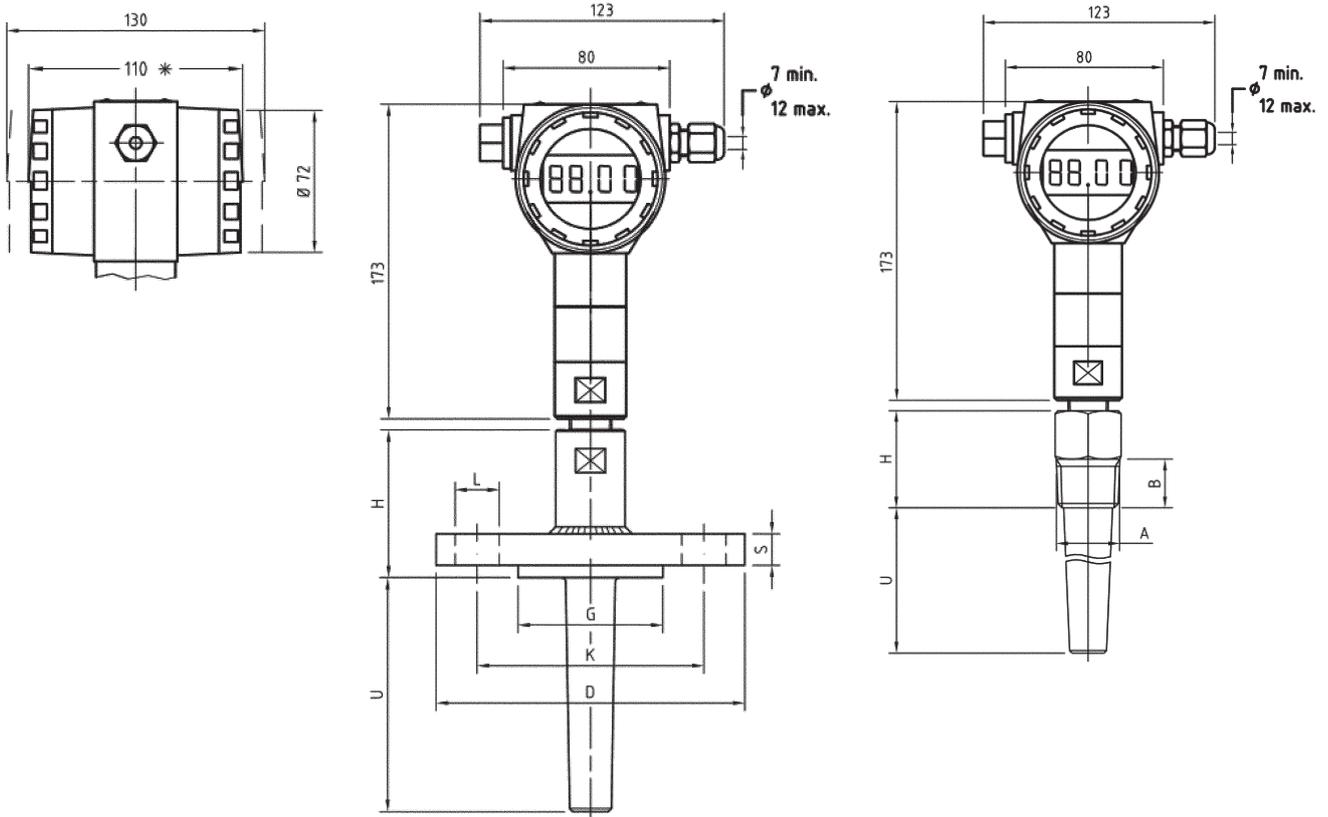
Equipment for explosive atmospheres Group II Category 1G suitable for zones 0, 1, and 2.

Intrinsically safe: Ex ia IIC T6 Ga (-40°C ≥ Tamb ≥ +40°C)
Ex ia IIC T5 Ga (-40°C ≥ Tamb ≥ +55°C)
Ex ia IIC T4 Ga (-40°C ≥ Tamb ≥ +80°C)

Directive 2014/30/EU (EMC)

Equipment with an adequate level of electromagnetic compatibility.

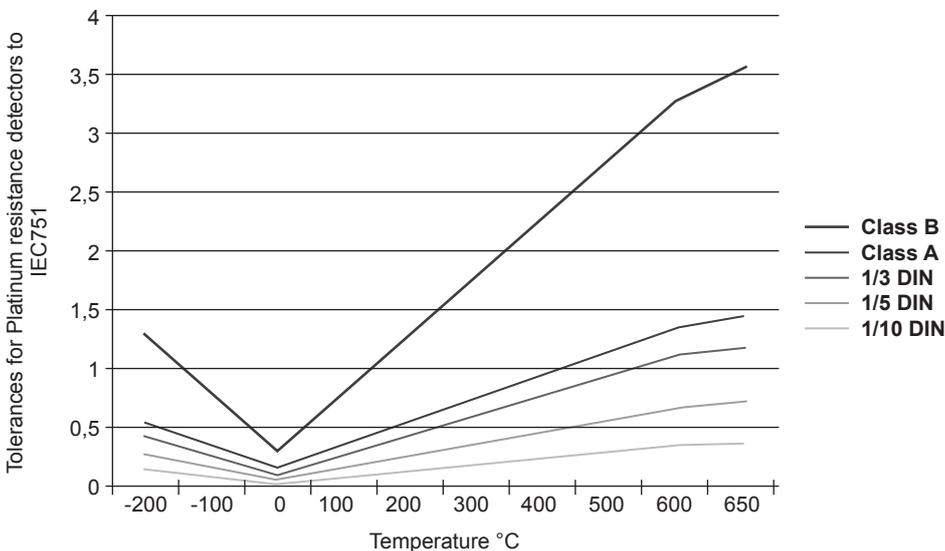
Dimensions (mm)



* 110 mm with both covers mounted.
130 mm is the space required to remove both covers.

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: TT352-H-2-C-2-1-A-1									
Code number		TT352	H	2	C	2	1	A	1		
HART Temperature Transmitter		H									
Process Connection											
1/2" GAS-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 Ø 6mm AISI316 - lenght ≤ 150 mm		C									
Flexible INOX MGO Ø 3-6mm AISI316 - lenght ≤ 150 mm		D									
Wall Plate		E									
To be connected by customer		F									
Special		Z									
Calibration											
0/100 °C		1									
0/200 °C		2									
0/300 °C		3									
Special		9									
RTD Type											
Class A		1									
Class B		2									
1/3 DIN		3									
1/10 DIN		4									
To be connected by customer		9									
Housing Type											
Aluminum		A									
AISI 316		B									
Exia intrinsic safety		1									
In Purchase order, please indicate: pressure and temperature of the process fluid.											