

Safety Instructions

TPx100, TSx310,

iTHERM TS111

RTD/TC inserts and cable thermometers

OEx ia IIC T6...T1 Ga X

Ga/Gb Ex ia IIC T6...T1 X

Ex ia IIIC 85 °C...450 °C Da X

Ex ia IIIC 85 °C...450 °C Da/Db X



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Associated documentation

This document is an integral part of the following instructions:

- RTD measuring insert TPR100:
Technical Information: TI268T/02
- TC measuring insert TPC100:
Technical Information: TI278T/02
- RTD cable thermometer TST310:
Technical Information: TI00085T/09
- TC cable thermometer TSC310:
Technical Information: TI00255T/09
- iTHERM TS111:
Technical information: TI01014T/09

Supplementary Documentation

The Explosion-protection brochure is available:

In the download area of the Endress+Hauser website:

www.endress.com -> Downloads -> "Brochures and catalogs" ->

Text Search: CP00021Z

EAC certificate of conformity

The RTD/TC inserts and cable thermometers meet the fundamental health and safety requirements for the design and construction of devices and protective systems intended for use in potentially explosive atmospheres in accordance with TR CU 012/2011.

Certification body: НАННО "ЦСБЭ"

Certificate number: EAЭC RU C-DE.AA87.B.00331/20 for TPx100, TSx310

EAЭC RU C-DE.AA87.B.00595/20 for TS111

Affixing the certificate number certifies conformity with the following standards:

GOST 31610.0-2014 (IEC 60079-0:2011)

GOST 31610.11-2014 (IEC 60079-11:2011)

GOST 31610.26-2012 (IEC 60079-26)

Manufacturer address

Endress+Hauser Wetzler GmbH + Co KG

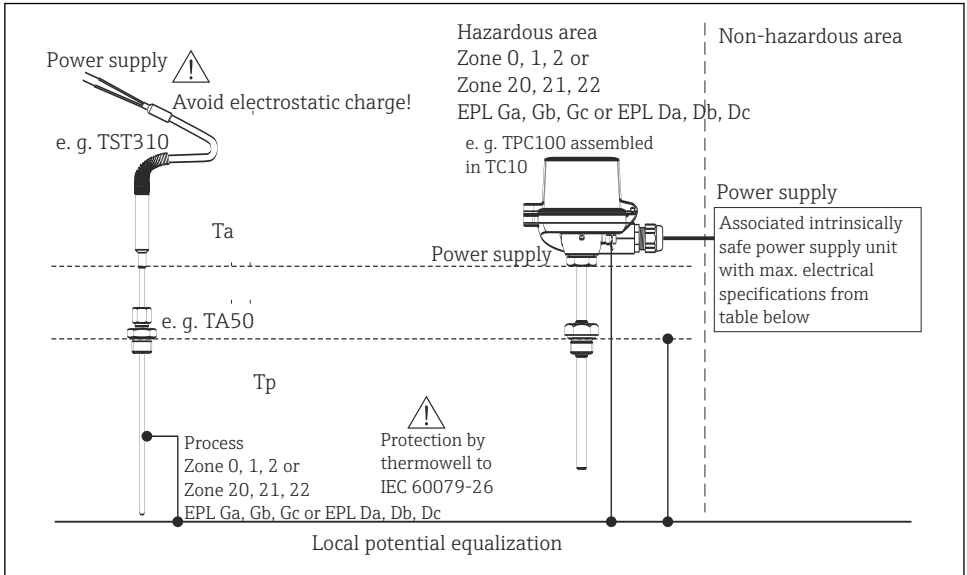
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Safety instructions Ex ia



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Safety instructions: General

- Comply with the installation and safety instructions in the Operating Instructions.
- Install the device according to the manufacturer's instructions and any other valid standards and regulations (e.g. GOST 30852.13, IEC 60079-14).
- The sensor/housing of the thermometer must be connected to the local potential equalization or installed in a grounded metallic piping or tank respectively.
- It cannot be taken for granted that when using compression fittings (e.g. TA50, TA60, TA70) with non metallic olives that there is a secure grounding when installing in a metal system. This means that an additional safe connection to the local potential equalization needs to be used.

Safety Instructions: Installation in equipment of Group III

- Install the sensor in thermometer/enclosure providing a degree of protection of at least IP5X and in compliance with the enclosure requirements to GOST 31610.0 (IEC 60079-0).
- Seal the cable entries tight with certified cable glands (min. IP6X) IP6X according to IEC 60529.
- For operating the thermometer at an ambient temperature under $-20\text{ }^{\circ}\text{C}$, appropriate cables, cable entries and sealing facilities permitted for this application must be used.
- For ambient temperatures higher than $+70\text{ }^{\circ}\text{C}$, use suitable heat-resisting cables or wires, cable entries and sealing facilities for Ta +5 K above surrounding.
- For using of a plug-in connector (e.g. PA-connector by Weidmüller) is to be observed that the requirements for the respective category and the operating temperature are followed.
- The thermometer must be installed and maintained so, that even in the event of rare incidents, an ignition source due to impact or friction between the terminal head and iron/steel is excluded.

WARNING

Explosive atmosphere

- ▶ In an explosive atmosphere, do not open the device when voltage is supplied (ensure that IP6X is maintained during operation).

Safety instructions: Intrinsic safety

- Comply with the installation and safety instructions in the Operating Instructions.
- Install the sensor according to the manufacturer's instructions and any other valid standards and regulations (e.g. GOST 30852.13, IEC 60079-14).
- Install the sensor in a thermometer/housing suitable for its marking with a IP rating of at least IP20 according to IEC 60529.
- Observe the safety instructions for the used transmitters.
- The display, type TID10, may only be installed in Zone 1 (EPL Gb) or Zone 2 (EPL Gc).
- The type of protection changes as follows when the devices are connected to certified intrinsically safe circuits of Category ib: Ex ib IIC.
- When connecting to an intrinsically safe ib circuit, do not operate the sensor at Zone 0 without any thermowell according to GOST 31610.26 (IEC 60079-26).

- When connecting dual sensors make sure that the potential equalizations are at the same local potential equalization.
- Inserts with 3 mm diameter or grounded inserts, e.g. type TPC100 must be connected to the local potential equalization.
- For inserts with 3 mm diameter or grounded inserts, e.g. type TPC100 an intrinsically safe supply with galvanic isolation must be used.

Safety instructions: Zone 0

- Install sensor in a grounded metallic connection head or grounded housing. Only operate devices in potentially explosive vapour/air mixtures under atmospheric conditions:
 - $-40\text{ °C} \leq T_a \leq +130\text{ °C}$ (see table Ta housing)
 - $-0.8\text{ bar} \leq p \leq 1.1\text{ bar}$
- If no potentially explosive mixtures are present, or if additional protective measures have been taken, according to EN 1127-1, the transmitters may be operated under other atmospheric conditions in accordance with the manufacturer's specifications.
- Associated apparatus with galvanic isolation between the intrinsically safe and non-intrinsically safe circuits are preferred.

Safety instructions: Special conditions

- The thermometer must be installed so, that even in the event of rare incidents, an ignition source due to impact or friction between the terminal head and iron/steel is excluded.
- When installing and commissioning the cable sensor type TSx310, make sure that an electrostatic charge of the connection cable is avoided.

Safety instructions: Partition wall

Install the sensor in a partition wall which is in compliance with GOST 31610.26 (IEC 60079-26) in reference to its ultimate application.

Temperature tables Ex ia

The dependency of the ambient and process temperatures upon the temperature class for assembly with transmitters:

Type	Assembled transmitter	Temperature class	Ambient temperature range housing	Maximum surface temperature housing
TPR100 TPC100 TS111	TMT181	T6	$-40 \leq T_a \leq +55\text{ °C}$	T85 °C
	TMT182	T5	$-40 \leq T_a \leq +70\text{ °C}$	T100 °C
	TMT84/TMT85	T4	$-40 \leq T_a \leq +85\text{ °C}$	T135 °C

Type	Assembled transmitter	Temperature class	Ambient temperature range housing	Maximum surface temperature housing
	TMT82	T6	$-40 \leq T_a \leq +58 \text{ }^\circ\text{C}$	T85 °C
		T5	$-40 \leq T_a \leq +75 \text{ }^\circ\text{C}$	T100 °C
		T4	$-40 \leq T_a \leq +85 \text{ }^\circ\text{C}$	T135 °C
	TMT8x with display	T6	$-40 \leq T_a \leq +55 \text{ }^\circ\text{C}$	T85 °C
		T5	$-40 \leq T_a \leq +70 \text{ }^\circ\text{C}$	T100 °C
		T4	$-40 \leq T_a \leq +85 \text{ }^\circ\text{C}$	T135 °C

Type	Assembled transmitter	Insert diameter	Process temperature range	Temperature class/maximum surface temperature sensor
TPR100 TPC100 TS111	TMT18x TMT8x	3 mm, 3 mm (dual) or 6 mm dual	$-50 \leq T_p \leq +66 \text{ }^\circ\text{C}$	T6/T85 °C
			$-50 \leq T_p \leq +81 \text{ }^\circ\text{C}$	T5/T100 °C
			$-50 \leq T_p \leq +116 \text{ }^\circ\text{C}$	T4/T135 °C
			$-50 \leq T_p \leq +181 \text{ }^\circ\text{C}$	T3/T200 °C
			$-50 \leq T_p \leq +276 \text{ }^\circ\text{C}$	T2/T300 °C
			$-50 \leq T_p \leq +426 \text{ }^\circ\text{C}$	T1/T450 °C
		6 mm	$-50 \leq T_p \leq +73 \text{ }^\circ\text{C}$	T6/T85 °C
			$-50 \leq T_p \leq +88 \text{ }^\circ\text{C}$	T5/T100 °C
			$-50 \leq T_p \leq +123 \text{ }^\circ\text{C}$	T4/T135 °C
			$-50 \leq T_p \leq +188 \text{ }^\circ\text{C}$	T3/T200 °C
			$-50 \leq T_p \leq +283 \text{ }^\circ\text{C}$	T2/T300 °C
			$-50 \leq T_p \leq +433 \text{ }^\circ\text{C}$	T1/T450 °C

The dependency of the ambient and process temperatures upon the temperature class for assembly without transmitter (terminal block):

Insert diameter	Temperature class/ Maximum surface temperature	Tp (process) - maximum allowed process temperature (sensor)				
		Pi ≤ 50 mW	Pi ≤ 100 mW	Pi ≤ 200 mW	Pi ≤ 500 mW	Pi ≤ 650 mW
3 mm, 3 mm (dual) or 6 mm dual	T1/T450 °C	426 °C	415 °C	396 °C	343 °C	333 °C
	T2/T300 °C	276 °C	265 °C	246 °C	193 °C	183 °C
	T3/T200 °C	181 °C	170 °C	151 °C	98 °C	88 °C

Insert diameter	Temperature class/ Maximum surface temperature	Tp (process) - maximum allowed process temperature (sensor)				
		Pi ≤ 50 mW	Pi ≤ 100 mW	Pi ≤ 200 mW	Pi ≤ 500 mW	Pi ≤ 650 mW
	T4/T135 °C	116 °C	105 °C	86 °C	33 °C	23 °C
	T5/T100 °C	81 °C	70 °C	51 °C	-2 °C	-12 °C
	T6/T85 °C	66 °C	55 °C	36 °C	-17 °C	-27 °C
6 mm	T1/T450 °C	433 °C	428 °C	420 °C	398 °C	388 °C
	T2/T300 °C	283 °C	278 °C	270 °C	248 °C	238 °C
	T3/T200 °C	188 °C	183 °C	175 °C	153 °C	143 °C
	T4/T135 °C	123 °C	118 °C	110 °C	88 °C	78 °C
	T5/T100 °C	88 °C	83 °C	75 °C	53 °C	43 °C
	T6/T85 °C	73 °C	68 °C	60 °C	38 °C	28 °C

Insert diameter	Temperature class/Maximum surface temperature	Tp (process) - maximum allowed process temperature (sensor)			Ta (ambient) - ambient temperature (housing)
		Pi ≤ 750 mW	Pi ≤ 800 mW	Pi ≤ 1000 mW	-
3 mm, 3 mm (dual) or 6 mm dual	T1/T450 °C	320 °C	312 °C	280 °C	-40 ≤ Ta ≤ +130 °C
	T2/T300 °C	170 °C	162 °C	130 °C	
	T3/T200 °C	75 °C	62 °C	30 °C	
	T4/T135 °C	10 °C	2 °C	-30 °C	-40 ≤ Ta ≤ +116 °C
	T5/T100 °C	-25 °C	-33 °C	-	-40 ≤ Ta ≤ +81 °C
	T6/T85 °C	-40 °C	-	-	-40 ≤ Ta ≤ +66 °C
6 mm	T1/T450 °C	381 °C	377 °C	361 °C	-40 ≤ Ta ≤ +130 °C
	T2/T300 °C	231 °C	227 °C	211 °C	
	T3/T200 °C	136 °C	127 °C	111 °C	
	T4/T135 °C	71 °C	67 °C	51 °C	-40 ≤ Ta ≤ +123 °C
	T5/T100 °C	36 °C	32 °C	16 °C	-40 ≤ Ta ≤ +88 °C
	T6/T85 °C	21 °C	17 °C	1 °C	-40 ≤ Ta ≤ +73 °C

Determination of process temperature for $P_i \leq 50$ mW:

Insert diameter	Thermal resistance (Rth) for $P_i \leq 50$ mW in K/W	Formula for calculating process temperature (T_p)
3 mm, 3 mm (dual) or 6 mm dual	274	$T_p < T_{class}^{1)} - Tol.^{2)} - (R_{th} \times P_0)^{3)}$
6 mm	144	

- 1) Inserting of temperature class (e.g. 85 K for T6)
- 2) Inserting of tolerances to GOST 30852.0-2002 (IEC 60079-0: 1998) chapter 26.5.1.3: 5 K for T6, T5, T4 and T3, 10 K for T2 and T1
- 3) P_0 of intrinsic safe temperature input (e.g. measurement circuit TMT182, $P_0 = 6.6$ mW)

Calculation example for T6 and 6 mm insert:

$$T_p < T_{class} - Tol. - (R_{th} \times P_0)$$

$$T_p < 85 \text{ K} - 5 \text{ K} - (144 \text{ K/W} \times 6.6 \text{ mW})$$

$$T_p < 79.04 \text{ }^\circ\text{C}$$

Electrical connection data

Ex ia

Associated intrinsically safe power supply unit with maximum electrical specifications below the characteristic values of the assembled transmitter:

Transmitter	U _i	I _i	P _i	C _i	L _i
TMT181	30 V	100 mA	760 mW	0	0
TMT182			750 mW		
TMT82		130 mA	800 mW		
TMT84, TMT85	17.5 V	500 mA	5.5 W	5 nF	-
without	30 V	140 mA	1000 mW	1 nF	1 mH

Type of protection

Type of protection (EAC)	Type
OEx ia IIC T6...T1 Ga X Ga/Gb Ex ia IIC T6...T1 X Ex ia IIIC 85 °C...450 °C Da X Ex ia IIIC 85 °C...450 °C Da/Db X	iTHERM® TS111 Omniset TPR100, TPC100 TST310, TSC310



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