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Safety Instructions
TRxx, TCxx, TS211, iTHERM TS111, TM211, TPx100, TSx310, TM1x1, TM411, TM412

Thermometers and inserts

Ex nA IIC T6...T1 Gc

Document: XA02111T
Safety instructions for electrical apparatus for explosion-hazardous areas → 3

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TRxx, TCxx, TS211, iTHERM TS111, TM211, TPx100, TSx310, TM1x1, TM411, TM412

Thermometers and inserts

Supplementary Documentation

Explosion-protection brochure: CP00021Z/11

The Explosion-protection brochure is available: In the download area of the Endress+Hauser website: www.endress.com → Download → Advanced → Documentation code: CP00021Z

Manufacturer's certificates

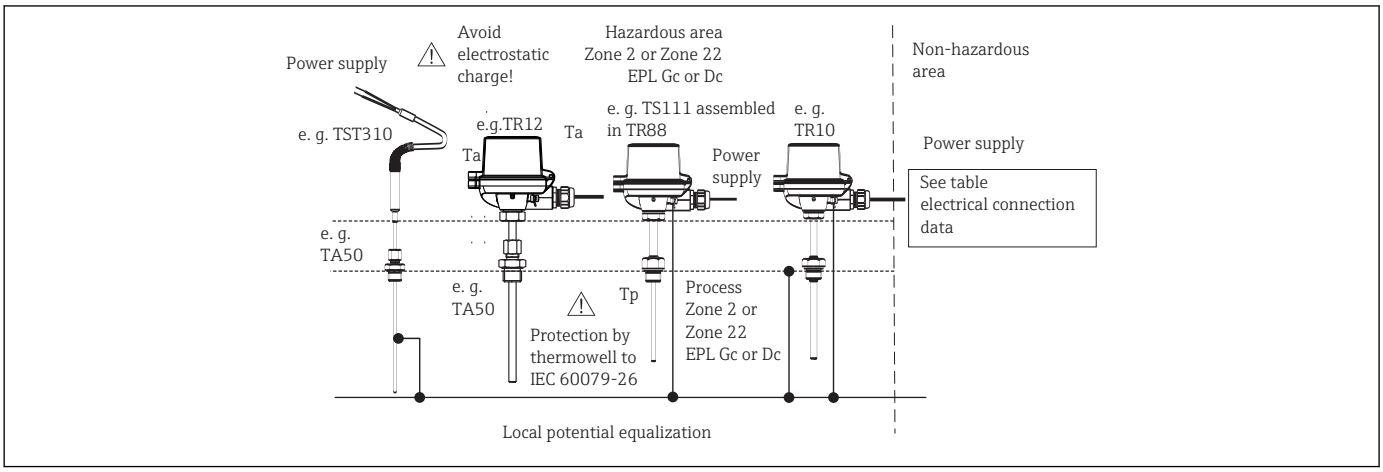
NEPSI certificate of conformity

Certificate number: GYJ18.1353X

Affixing the certificate number certifies conformity with the following standards (depending on the device version).

- GB3836.1:2010
- GB3836.8-2010

Safety instructions



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Safety Instructions: General

- Install the device according to the manufacturer's instructions and any other valid standards and regulations.
- Seal the cable entries with certified cable glands and or blanking elements which have at least type of protection Ex ec or Ex tb suitable for Group IIC and IIIC (degree of protection IP6X).
- The provided cable entries to option code glands are suitable NEPSI certified cable glands with a temperature range of −20 to +95 °C.
- For operating the thermometer at an ambient temperature under −20 °C and above +95 °C, appropriate cables, cable entries and sealing facilities permitted for this application must be used.
- 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.
- Observe the safety instructions for the used transmitters.
- The device should never be used for hybrid mixtures (gas, dust, air).
- Sensors for thermometers without thermowell (e.g. Tx62, TR24, Tx88, TM111) are to be mechanically protected by thermowell suitable for category 3 in compliance with GB3836.1:2010 and its ultimate application.
- When 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.
- Staff must meet the following conditions for mounting, electrical installation, commissioning and maintenance of the device:
  - Be suitably qualified for their role and the tasks they perform
  - Be trained in explosion protection
  - Be familiar with national regulations

- For cable entries, appropriate cable glands or blind plugs for unused holes shall be used which are separated certified; after installation, the product should be at least IP54 according to GB/T 4208-2017.
- The used cable glands, blind plugs and cables should be suitable for the working condition for the application.
- Any maintenance shall be done only when the warning "Keep tight when the circuits are alive" is obeyed or the area known to be non hazardous.
- The user shall not change the configuration in order to maintain/ensure the explosion protection performance of the equipment. Any change may impair safety.
- For installation, use and maintenance of this product, the end user shall observe the instruction manual and the following standards:
  - GB 3836.13-2013 "Explosive atmospheres - Part 13: Equipment repair, overhaul and reclamation".
  - GB/T 3836.15-2017 "Explosive atmospheres - Part 15: Electrical installations design, selection and erection".
  - GB/T 3836.16-2017 "Explosive atmospheres - Part 16: Electrical installations inspection and maintenance".
  - GB 50257-2014 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".

⚠ WARNING

Explosive atmosphere

- ▶ In an explosive atmosphere, do not open the device when voltage is supplied (ensure that at least IP54 is maintained during operation).

Safety instructions: Protection by type of protection "n"

- Install the sensor in thermometer/terminal head enclosure suitable for Group II in compliance with enclosure requirements to GB3836.1:2010.
- When installing the device in an approved housing for category 3, note that the housing ingress protection classification IP54 to IEC 60529 is upheld.

Safety instructions: Dust ignition protection by enclosure "t"

- Sensors for thermometers without thermowell (e.g. TM111) are to be mechanically protected by thermowell providing a degree of protection of at least IP6X and in compliance with the enclosure requirements to GB3836.1:2010.
- In the event of conductive dust, a housing that maintains a degree of protection of at least IP6x as per EN/IEC 60529 must be used.
- In the event of non-conductive dust, a housing that maintains a degree of protection of at least IP54 as per EN/IEC 60529 must be used.
- For ambient temperatures higher than 70 °C, use suitable heat-resisting cables or wires, cable entries and sealing facilities for Ta +5 K above surrounding.
- Clean the housing regularly to avoid a layer of dust accumulating on the housing.

Safety instructions: Specific conditions of use

- The maximum specified ambient temperature Ta at terminal head or field enclosure may not be exceeded.
- Install only head transmitters not exceeding a maximum power dissipation of 2.2 W with a temperature input rating not exceeding 10 V_{DC} and 1 mA.
- 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.
- The suffix "X" placed after the certificate number indicates that this product is subject to special conditions for safe use, that is:
  The cable sensors TST310 and TSC310 should be properly protected for the free end of the cable, and electrostatic charges on the cable shall be avoided.
- From the safety point of view, the circuit of versions of the following temperature sensors and inserts hall be considered to connected to ground (for details, the instruction manual, provided with the equipment, shall be observed):
  - Type TS111, TS211 with diameter 3 mm, single or dual
  - Type TS111, TS211 with diameter 6 mm dual.
- The insert TS111, TS211 shall be provided with a mounting head comply with GB 3836.1-2010 and GB 3836.8-2014 including the cable entry device to ensure a degree of protection of at least IP54 according to GB/T 4208-2017 when in use.
- Product with type of protection nA must guarantee that the rated voltage Un is not exceeded by more than 40 % in the event of temporary faults.

Temperature tables

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)
TR1x TC1x TM4xx TM1x1	TMT181 TMT182 TMT84/TMT85 TMT71, TMT72	T6	−40 °C ≤ Ta ≤ +55 °C	T85 °C
		T5	−40 °C ≤ Ta ≤ +70 °C	T100 °C
		T4	−40 °C ≤ Ta ≤ +85 °C	T135 °C
	TMT82	T6	−40 °C ≤ Ta ≤ +58 °C	T85 °C
		T5	−40 °C ≤ Ta ≤ +75 °C	T100 °C
		T4	−40 °C ≤ Ta ≤ +85 °C	T135 °C
	TMT8x with display TMT7x with display Flying leads	T6	−40 °C ≤ Ta ≤ +55 °C	T85 °C
		T5	−40 °C ≤ Ta ≤ +70 °C	T100 °C
		T4	−40 °C ≤ Ta ≤ +85 °C	T135 °C

Type	Assembled transmitter	Insert diameter	Process temperature	Temperature class/maximum surface temperature (sensor)
TR1x TC1x TM4xx TM1x1	TMT18x TMT8x TMT7x Flying leads	3 mm, 3 mm dual or 6 mm dual	−50 °C ≤ Tp ≤ +66 °C	T6/T85 °C
			−50 °C ≤ Tp ≤ +81 °C	T5/T100 °C
			−50 °C ≤ Tp ≤ +116 °C	T4/T135 °C
			−50 °C ≤ Tp ≤ +181 °C	T3/T200 °C
			−50 °C ≤ Tp ≤ +276 °C	T2/T300 °C
			−50 °C ≤ Tp ≤ +426 °C	T1/T450 °C
		6 mm	−50 °C ≤ Tp ≤ +73 °C	T6/T85 °C
			−50 °C ≤ Tp ≤ +88 °C	T5/T100 °C
			−50 °C ≤ Tp ≤ +123 °C	T4/T135 °C
			−50 °C ≤ Tp ≤ +188 °C	T3/T200 °C
			−50 °C ≤ Tp ≤ +283 °C	T2/T300 °C
			−50 °C ≤ Tp ≤ +433 °C	T1/T450 °C

Type	Assembled transmitter	Insert diameter	Process temperature Tp [1)]	Temperature class/maximum surface temperature (sensor)
TM412 TM131	TMT162	3 mm, 3 mm dual or 6 mm dual	−50 °C ≤ Tp ≤ +64 °C	T6/T85 °C
			−50 °C ≤ Tp ≤ +79 °C	T5/T100 °C
			−50 °C ≤ Tp ≤ +114 °C	T4/T135 °C
			−50 °C ≤ Tp ≤ +179 °C	T3/T200 °C
			−50 °C ≤ Tp ≤ +279 °C	T2/T300 °C
			−50 °C ≤ Tp ≤ +424 °C	T1/T450 °C
		6 mm	−50 °C ≤ Tp ≤ +71 °C	T6/T85 °C
			−50 °C ≤ Tp ≤ +86 °C	T5/T100 °C
			−50 °C ≤ Tp ≤ +121 °C	T4/T135 °C
			−50 °C ≤ Tp ≤ +186 °C	T3/T200 °C

Type	Assembled transmitter	Insert diameter	Process temperature Tp [1]	Temperature class/maximum surface temperature (sensor)
			−50 °C ≤ Tp ≤ +286 °C	T2/T300 °C
			−50 °C ≤ Tp ≤ +431 °C	T1/T450 °C

1) Maximum process pressure see relevant Technical Information. For thermocouple inserts, the temperature class T6 ... T1 and the maximum surface temperature T85 °C ... T450°C are equal to the process temperature. For thermometers with two mounted head transmitters the allowed ambient temperature is 12 K lower than each head transmitter's certified ambient temperature.

The dependency of the ambient and process temperatures upon the temperature class for assembly with terminal block or cable sensor, type TSx310 or TM211

Insert diameter	Temperature class/maximum surface temperature	Tp (process) - maximum allowed process temperature (sensor) [1]
3 mm, 3 mm dual or 6 mm dual	T1/T450 °C	426 °C
	T2/T300 °C	276 °C
	T3/T200 °C	181 °C
	T4/T135 °C	116 °C
	T5/T100 °C	81 °C
	T6/T85 °C	66 °C
6 mm	T1/T450 °C	433 °C
	T2/T300 °C	283 °C
	T3/T200 °C	188 °C
	T4/T135 °C	123 °C
	T5/T100 °C	88 °C
	T6/T85 °C	73 °C

1) Maximum process pressure see relevant Technical Information

Insert diameter	Temperature class/maximum surface temperature	Ta - ambient temperature (housing)
3 mm, 3 mm dual or 6 mm dual	T1/T450 °C	−40 °C ≤ Ta ≤ +120 °C
	T2/T300 °C	
	T3/T200 °C	
	T4/T135 °C	−40 °C ≤ Ta ≤ +116 °C
	T5/T100 °C	−40 °C ≤ Ta ≤ +81 °C
	T6/T85 °C	−40 °C ≤ Ta ≤ +66 °C
6 mm	T1/T450 °C	−40 °C ≤ Ta ≤ +120 °C
	T2/T300 °C	
	T3/T200 °C	
	T4/T135 °C	−40 °C ≤ Ta ≤ +120 °C
	T5/T100 °C	−40 °C ≤ Ta ≤ +88 °C
	T6/T85 °C	−40 °C ≤ Ta ≤ +73 °C

Connection data

Electronic	Supply voltage Ub	Output/Current consumption
TMT181	≤ 35 V_{DC}	4 to 20 mA
TMT182		

Electronic	Supply voltage Ub	Output/Current consumption
TMT82	≤42 V_{DC}	
TMT84, TMT85	≤32 V_{DC}	≤11 mA
TMT71, TMT72	≤ 36 V_{DC}	4 to 20 mA
Terminal block	≤ 10 V_{DC}	≤1 mA

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