

Safety Instructions

iTHERM TS111, iTHERM TS211

Insert for installation in thermometers

ATEX, IECEx: Ex ia IIC T6 Ga



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Table of contents

Associated documentation	4
Supplementary documentation	4
Manufacturer's certificates	4
Manufacturer address	4
Safety instructions	5
Safety instructions: General	5
Safety instructions: Installation in equipment of Group III	5
Safety instructions: Intrinsic safety	6
Safety instructions: Zone 0	7
Safety instructions: Special conditions	7
Safety instructions: Partition wall	7
Temperature tables	7
Electrical connection data	10

Associated documentation

All documentation is available on the Internet:
www.endress.com/Deviceviewer
(enter the serial number from the nameplate).



If not yet available, a translation into EU languages can be ordered.

To commission the device, please observe the Operating Instructions pertaining to the device:

Technical Information:

- TIO1014T (Insert iTHERM TS111)
- TIO1411T (Insert iTHERM TS211)

Supplementary documentation

Explosion protection brochure: CP00021Z

The explosion protection brochure is available on the Internet:
www.endress.com/Downloads

Manufacturer's certificates**IECEX certificate**

Certificate number: IECEX EPS 18.0074X

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

- IEC 60079-0: 2017
- IEC 60079-11: 2011
- IEC 60079-26: 2014

ATEX certificate

Certificate number: EPS 18 ATEX 1 152 X

EU Declaration of Conformity

Declaration number: EC_00735

The EU Declaration of Conformity is available on the Internet:
www.endress.com/Downloads

UKCA certificate

Certificate number: CML 21UKEX21238X

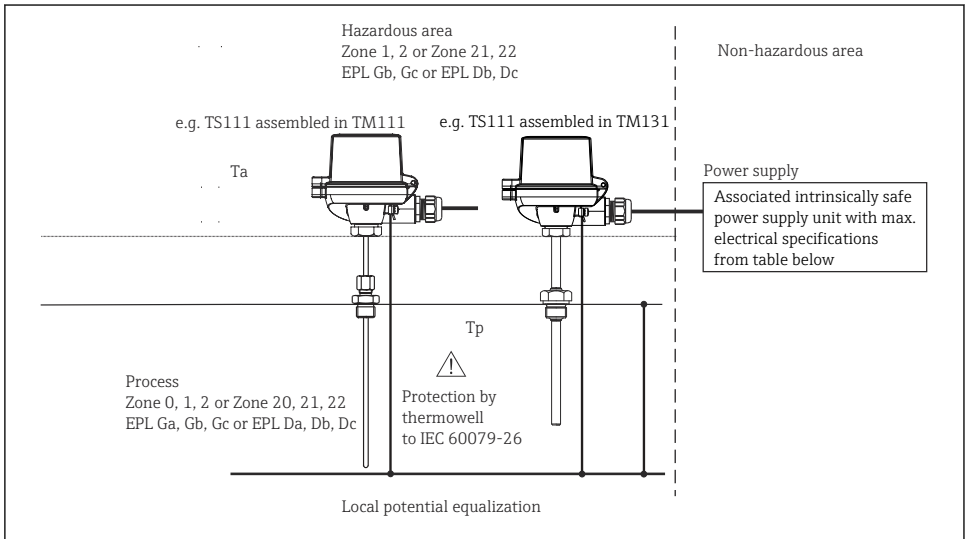
UKCA Declaration of Conformity

Declaration number: UK_00426

Manufacturer address

Endress+Hauser Wetzler GmbH + Co. KG
Obere Wank 1
87484 Nesselwang, Germany

Safety instructions



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. EN/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 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 EN/IEC 60079-0.
- Install the sensor in thermometer/enclosure suitable for Group III in compliance with IEC/EN 60079-11 and IEC/EN 60079-0 and its ultimate application.
- Seal the cable entries tight with certified cable glands (min. IP6X) IP6X according to EN/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 °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 enclosure and iron/steel is excluded.

⚠ WARNING

Explosive atmosphere

- ▶ In an explosive atmosphere, do not open the device when voltage is supplied (ensure that the IP6x housing protection is maintained during operation).

**Safety
instructions:
Intrinsic safety**

- 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. EN/IEC 60079-14).
- Install the sensor in a thermometer/housing suitable for its marking with a IP rating of at least IP20 according to EN/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 EN/IEC 60079-26.

- The inserts with dual circuits (3 mm and 6 mm) and $\varnothing 3$ mm are not isolated to the metallic sheath in conformance with EN/IEC 60079-11 chapter 6.3.13.
- When connecting dual sensors make sure that the potential equalizations are at the same local potential equalization.
- Inserts with 3 mm or grounded inserts, e. g. type TS111, must be connected to the local potential equalization.
- For inserts with 3 mm or grounded inserts, e. g. type TS111, 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:
 - $-40\text{ °C} \leq T_a \leq +60\text{ °C}$
 - $-0.8\text{ bar} \leq p \leq 1.1\text{ bar}$
- 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 and maintained so, that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron/steel is excluded.

Safety**instructions:****Partition wall**

Install the sensor in a partition wall which is in compliance with EN/IEC 60079-26 in reference to its ultimate application.

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
TS111	TMT84, TMT85	T6	$-40\text{ °C} \leq T_a \leq +55\text{ °C}$	T85 °C
		T5	$-40\text{ °C} \leq T_a \leq +70\text{ °C}$	T100 °C
		T4	$-40\text{ °C} \leq T_a \leq +85\text{ °C}$	T135 °C
	TMT71, TMT72, TMT86 ¹⁾	T6	$-50\text{ °C} \leq T_a \leq +55\text{ °C}$	T85 °C
		T5	$-50\text{ °C} \leq T_a \leq +70\text{ °C}$	T100 °C
		T4	$-50\text{ °C} \leq T_a \leq +85\text{ °C}$	T135 °C
	TMT82 ¹⁾	T6	$-50\text{ °C} \leq T_a \leq +58\text{ °C}$	T85 °C
		T5	$-50\text{ °C} \leq T_a \leq +75\text{ °C}$	T100 °C
		T4	$-50\text{ °C} \leq T_a \leq +85\text{ °C}$	T135 °C
TMT8x, TMT7x with display	T6	$-40\text{ °C} \leq T_a \leq +55\text{ °C}$	T85 °C	

Type	Assembled Transmitter	Temperature class	Ambient temperature range housing	Maximum surface temperature housing
		T5	$-40\text{ °C} \leq T_a \leq +70\text{ °C}$	T100 °C
		T4	$-40\text{ °C} \leq T_a \leq +85\text{ °C}$	T135 °C

1) lower temperature of -52 °C is possible with marking Ex ia IIC Ga/Gb only

Type	Assembled Transmitter	Insert diameter	Process temperature range	Temperature class/maximum surface temperature sensor
TS111	TMT8x, TMT7x,	3 mm, 3 mm dual or 6 mm dual	$-50\text{ °C} \leq T_p \leq +66\text{ °C}$	T6/T85 °C
			$-50\text{ °C} \leq T_p \leq +81\text{ °C}$	T5/T100 °C
			$-50\text{ °C} \leq T_p \leq +116\text{ °C}$	T4/T135 °C
			$-50\text{ °C} \leq T_p \leq +181\text{ °C}$	T3/T200 °C
			$-50\text{ °C} \leq T_p \leq +276\text{ °C}$	T2/T300 °C
			$-50\text{ °C} \leq T_p \leq +426\text{ °C}$	T1/T450 °C
		6 mm	$-50\text{ °C} \leq T_p \leq +73\text{ °C}$	T6/T85 °C
			$-50\text{ °C} \leq T_p \leq +88\text{ °C}$	T5/T100 °C
			$-50\text{ °C} \leq T_p \leq +123\text{ °C}$	T4/T135 °C
			$-50\text{ °C} \leq T_p \leq +188\text{ °C}$	T3/T200 °C
			$-50\text{ °C} \leq T_p \leq +283\text{ °C}$	T2/T300 °C
			$-50\text{ °C} \leq T_p \leq +433\text{ °C}$	T1/T450 °C



For thermocouple inserts, the temperature class T6...T1 and the maximum surface temperature T85 °C...T450 °C are equal to the process temperature.

The dependency of the ambient and process temperatures upon the temperature class for sensors, type TS111 or TS211, without transmitter (terminal block or flying leads):

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
	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

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
	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) ¹⁾
		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	-50 °C ≤ 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	-50 °C ≤ Ta ≤ +116 °C
	T5/T100 °C	-25 °C	-33 °C	-	-50 °C ≤ Ta ≤ +81 °C
	T6/T85 °C	-40 °C	-	-	-50 °C ≤ Ta ≤ +66 °C
6 mm	T1/T450 °C	381 °C	377 °C	361 °C	-50 °C ≤ 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	-50 °C ≤ Ta ≤ +123 °C
	T5/T100 °C	36 °C	32 °C	16 °C	-50 °C ≤ Ta ≤ +88 °C
	T6/T85 °C	21 °C	17 °C	1 °C	-50 °C ≤ Ta ≤ +73 °C

- 1) The ambient temperature at the terminal head may be directly influenced by the process temperature, but its restricted to the range -50 to +130 °C. The lower temperature of -60 °C is possible with marking Ex ia IIC Ga/Gb only.



For thermocouple inserts, the temperature class T6...T1 and the maximum surface temperature T85 °C...T450 °C are equal to the process temperature.

Electrical connection data

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

Transmitter	Ui	Ii	Pi	Ci	Li
TMT71/TMT72	30 V	100 mA	800 mW	0	0
TMT82	30 V	130 mA	800 mW	0	0
TMT84, TMT85, TMT86	FISCO field device				
Terminal block	30 V	140 mA	1 000 mW	See tables below	
Flying leads	30 V	140 mA	1 000 mW	See tables below	

Sensor type	Insertion Length IL		Flying leads		Terminal block	
	C _i /m	L _i /m	C _i	L _i	C _i	L _i
Single	200 pF	1 µH	56.4 pF	282 nH	4.6 pF	23 nH
Dual	400 pF	2 µH	113 pF	564 nH	9.2 pF	46 nH

Calculation formula for options with flying leads only:

- $C_i = C_{i \text{ Insertion length IL}} \times IL + C_{i \text{ Flying leads}}$
- $L_i = L_{i \text{ Insertion length IL}} \times IL + L_{i \text{ Flying leads}}$

Calculation formula for options with terminal block only:

- $C_i = C_{i \text{ Insertion length IL}} \times IL + C_{i \text{ Terminal block}}$
- $L_i = L_{i \text{ Insertion length IL}} \times IL + L_{i \text{ Terminal block}}$

Category	Type of protection (ATEX/IECEx)	Type
II1G	Ex ia IIC T6...T1 Ga	iTHERM TS111, iTHERM TS211



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