

Safety Instructions

iTHERM SurfaceLine TM611

Ex ia IIC T6...T1 Ga

Ex ia IIC T6...T1 Gb

Ex ia IIIC T₂₀₀85 °C...T₂₀₀450 °C Da

Ex ia IIIC T85 °C...T450 °C Db



iTHERM SurfaceLine TM611

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About this document

The document number of these Safety Instructions (XA) must match the information on the nameplate.

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:

www.endress.com/<product code>, e.g. iTHERM TM611

Supplementary documentation

Explosion protection brochure: CP00021Z

The explosion protection brochure is available on the Internet:

www.endress.com/Downloads

Certificates and declarations**Korean certificate**

Certificate number:

25-KA4BO-0395X

25-KA4BO-0396X

25-KA4BO-0397X

25-KA4BO-0398X

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

Protect Device Safety Certification Notice No. 2021-22



Please refer to Korean certificates for conditions of safe use.

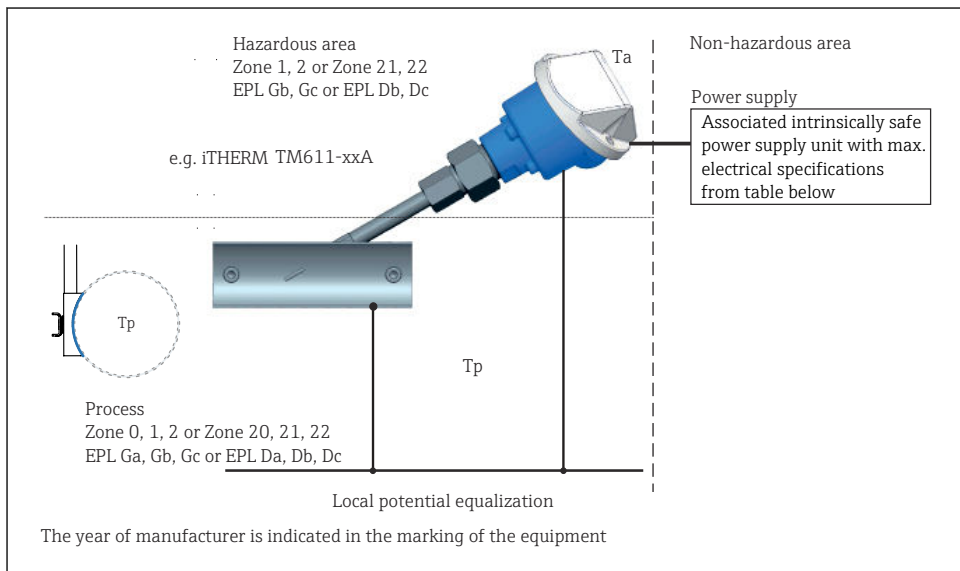
Manufacturer address

Endress+Hauser Wetzer GmbH + Co. KG

Obere Wank 1

87484 Nesselwang, Germany

Safety instructions



A0057180

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 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

- Seal the cable entries tight with certified cable glands (min. IP6X) according to IEC/EN 60529.
- The used glands shall be certificated also according to EN/IEC 60079-0.
- The provided cable entries to option code glands are suitable ATEX/IECEx Ex certified glands with a temperature range of -20 to +95 °C.

- For operating the thermometer at an ambient temperature under -20°C , appropriate cables, cable entries and sealing facilities permitted for this application must be used.
- For ambient temperatures higher than $+65^{\circ}\text{C}$, use suitable heat-resisting cables or wires, cable entries and sealing facilities for $T_a +5\text{ K}$ above surrounding.
- 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 for intrinsic safety: Installation

- 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).
- 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.
- The sensors with dual circuits with 3 mm are not isolated to the metallic sheath in conformance with IEC/EN 60079-11 chapter 6.3.13.
- When connecting dual sensors make sure that the potential equalizations are at the same local potential equalization.
- For sensors with 3 mm diameter or grounded inserts, e.g. type iTHERM TM611-xxC, must be connected to the local potential equalization.
- For sensors with 3 mm diameter or grounded inserts, e.g. type iTHERM TM611-xxC, an intrinsically safe supply with galvanic isolation must be used.
- Install the temperature sensor suitable for its marking with a IP rating of at least IP20 according to EN/IEC 60529.

Safety instructions:
Specific conditions of use

- From the safety point of view, the circuit of versions of the following temperature sensors and inserts shall be considered to be connected to earth (for details, the instruction manual, provided with the equipment, shall be observed):
Type iTHERM TM611 with diameter 3 mm, single or dual
- 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.
- When the coupling element, type TT611, is made of aluminum, if it is mounted in an area where the use of EPL Ga and Da apparatus is required, it must be installed such, that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.
- For Temperature Sensors Type iTHERM TM611-xxB and iTHERM TM611-xxC, if intended for use in explosive gas atmospheres where the use of apparatus of Equipment Protection Level Ga is required, electrostatic charges on the cable shall be avoided.

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 ¹⁾	Maximum surface temperature housing
iTHERM TM611	iTEMP TMT84, iTEMP TMT85	T6	-40 °C ≤ Ta ≤ +55 °C	T85 °C
		T5	-40 °C ≤ Ta ≤ +70 °C	T100 °C
		T4	-40 °C ≤ Ta ≤ +85 °C	T135 °C
	iTEMP TMT71, iTEMP TMT72, iTEMP TMT86 ²⁾	T6	-50 °C ≤ Ta ≤ +55 °C	T85 °C
		T5	-50 °C ≤ Ta ≤ +70 °C	T100 °C
		T4	-50 °C ≤ Ta ≤ +85 °C	T135 °C
	iTEMP TMT82 ²⁾	T6	-50 °C ≤ Ta ≤ +58 °C	T85 °C
		T5	-50 °C ≤ Ta ≤ +75 °C	T100 °C
		T4	-50 °C ≤ Ta ≤ +85 °C	T135 °C
	iTEMP TMT8x, iTEMP TMT7x with display	T6	-40 °C ≤ Ta ≤ +55 °C	T85 °C
		T5	-40 °C ≤ Ta ≤ +70 °C	T100 °C
		T4	-40 °C ≤ Ta ≤ +85 °C	T135 °C

1) For thermometer with two mounted head transmitters the allowed ambient temperature is up to 12 K lower than each head transmitters certified ambient temperature.
2) 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
iTHERM TM611	iTEMP TMT8x, iTEMP TMT7x	3 mm	$-50\text{ °C} \leq T_p \leq +66\text{ °C}$	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



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 assembly without transmitter (terminal block) or cable thermometer:

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	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

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 ≤ 1 000 mW	
3 mm	T1/T450 °C	320 °C	312 °C	280 °C	$-40\text{ °C} \leq T_a \leq +130\text{ °C}$
	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	$-40\text{ °C} \leq T_a \leq +116\text{ °C}$

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 ≤ 1 000 mW	
	T5/T100 °C	-25 °C	-33 °C	-	-40 °C ≤ Ta ≤ +81 °C
	T6/T85 °C	-40 °C	-	-	-40 °C ≤ Ta ≤ +66 °C

- 1)
- The ambient temperature at the terminal head may be directly influenced by the process temperature, but its restricted to the range -40 to +130 °C, besides tor types TA30A, TA30D and TA30H with a restricted range -50 to +130 °C. The lower temperature of -60°C is possible with marking Ex ia IIC 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 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
iTEMP TMT71, iTEMP TMT72	30 V	100 mA	800 mW	0	0
iTEMP TMT82	30 V	130 mA	800 mW	0	0
iTEMP TMT84, iTEMP TMT85, iTEMP TMT86	FISCO field device				
Terminal block	30 V	140 mA	1 000 mW	See tables below	
Flying leads ¹⁾	30 V	140 mA	1 000 mW	See tables below	

- 1)
- Also applies for cable thermometer, type iTHERM TM611-xxB and iTHERM TM611-xxC

Thermometer, type iTHERM TM611-xxA, wtih terminal block or flying leads:

Sensor type	Neck length E		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 and terminal block only:

- C_i = C_i Neck length E x E + C_i Flying leads
- L_i = L_i Neck length E x E + L_i Flying leads

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

Thermometer, type iTHERM TM611-xxB and iTHERM TM611-xxC:

Sensor type	Neck length E		Connection		Length extension wires L	
	C _i /F/m	L _i /H/m	C _i /F	L _i /H	C _i /F/m	L _i /H/m
Single	2,00E-10	1,00E-06	2,50E-11	1,25E-07	2,00E-10	1,00E-06
Dual	4,00E-10	2,00E-06	5,00E-11	2,50E-07	4,00E-10	2,00E-06

Calculation formula for cable thermometer:

- $C_i = C_{i \text{ Neck length E}} \times E + C_{i \text{ Connection}} + C_{i \text{ Extension wires L}} \times L$
- $L_i = L_{i \text{ Neck length E}} \times E + L_{i \text{ Connection}} + L_{i \text{ Extension wires L}} \times L$



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