

# Safety Instructions

## **iTEMP TMT162**

HART®, PROFIBUS® PA, FOUNDATION Fieldbus™

1Ex db IIC T6...T4 Gb X

Ex tb IIIC T110 °C Db X



# iTEMP TMT162

HART®, PROFIBUS® PA, FOUNDATION Fieldbus™

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**About this document**

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

**Associated documentation**

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

[www.endress.com/<product code>](http://www.endress.com/<product code>), e.g. TMT162

**Supplementary documentation**

Explosion protection brochure: CP00021Z

The explosion protection brochure is available on the Internet:

[www.endress.com/Downloads](http://www.endress.com/Downloads)

**Certificates and declarations****EAC certificate**

The device meet the fundamental health and safety requirements for the design and construction of devices and protective systems intended for use in potentially explosive atmospheres.

- Certification body: ТОО/Ж ШС "Т-Стандарт"
- Certificate number: EAЭC KZ 7500525.01.01.01840

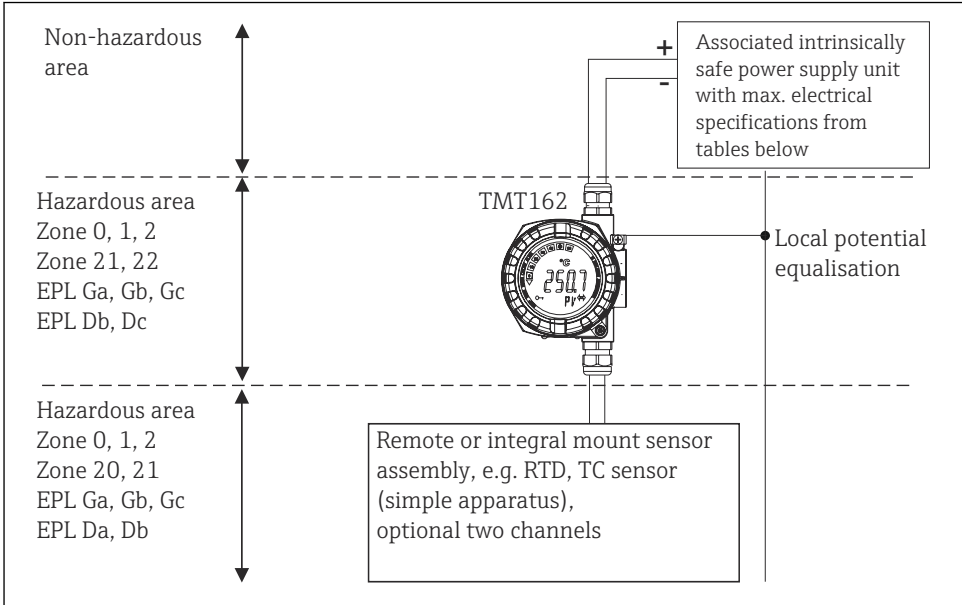
Affixing the certificate number certifies conformity with the following standards:

- GOST 31610.0-2019 (IEC 60079-0:2017)
- GOST IEC 60079-1-2013
- GOST 31610.11-2014 (IEC 60079-11:2011)
- GOST IEC 60079-31-2013

**Manufacturer address**

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

## Safety instructions: Ex i for HART®



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### Safety instructions: 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).
- Connect the device using suitable cable and wire entries of protection type "Intrinsic safety (Ex i)".
- 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 an intrinsically safe ib circuit, do not operate the sensor at Zone 0.
- Continuous duty temperature of the cable  $T_a + 5 \text{ K}$ .
- To maintain the ingress protection of the housing IP66/67 install the housing cover and cable glands correctly.
- Close unused entry glands with sealing plugs.

- The pertinent guidelines must be observed when intrinsically safe circuits are connected together acc. EN/IEC 60079-14 (Proof of Intrinsic Safety).
- The electrical apparatus must be integrated into the local potential equalization.
- When connecting two independent sensors make sure that the potential equalisation cables are at the same potential.

### Safety instructions: Zone 0

- Only operate devices in potentially explosive vapour/air mixtures under atmospheric conditions:
  - $-50\text{ °C} \leq T_a \leq +60\text{ °C}$
  - $0.8\text{ bar} \leq p \leq 1.1\text{ bar}$
- 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: Specific conditions of use

- Unit is may not be used when hybrid mixtures (gas, dust, air) are present.
- The temperature transmitter must be installed 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.
- Use for integral temperature sensors only approved sensors certified for category 1D or 2D marked not less than II1/2D Ex ia IIIC T110 °C Da/Db or II2D Ex ia IIIC T110 °C Db for use in Zone 20 or Zone 21.
- Use for remote temperature sensors only approved sensors certified for category 2D marked not less than II2D Ex ia IIIC T110 °C Db for use in Zone 21.

### Temperature tables

*The ambient temperature range is depending on temperature class and maximum temperature of the enclosure  $T_{xx}\text{°C}$ , applicable to the maximum dust layer thickness of 5 mm, listed in the following table:*

Type	Temperature class	Ambient temperature	
		Zone 1 EPL Gb	Zone 0 EPL Ga
iTEMP TMT162 (HART®)	T6	$-50\text{ °C} \leq T_a \leq +55\text{ °C}$	$-50\text{ °C} \leq T_a \leq +40\text{ °C}$
	T5	$-50\text{ °C} \leq T_a \leq +70\text{ °C}$	$-50\text{ °C} \leq T_a \leq +50\text{ °C}$
	T4	$-50\text{ °C} \leq T_a \leq +85\text{ °C}$	$-50\text{ °C} \leq T_a \leq +60\text{ °C}$

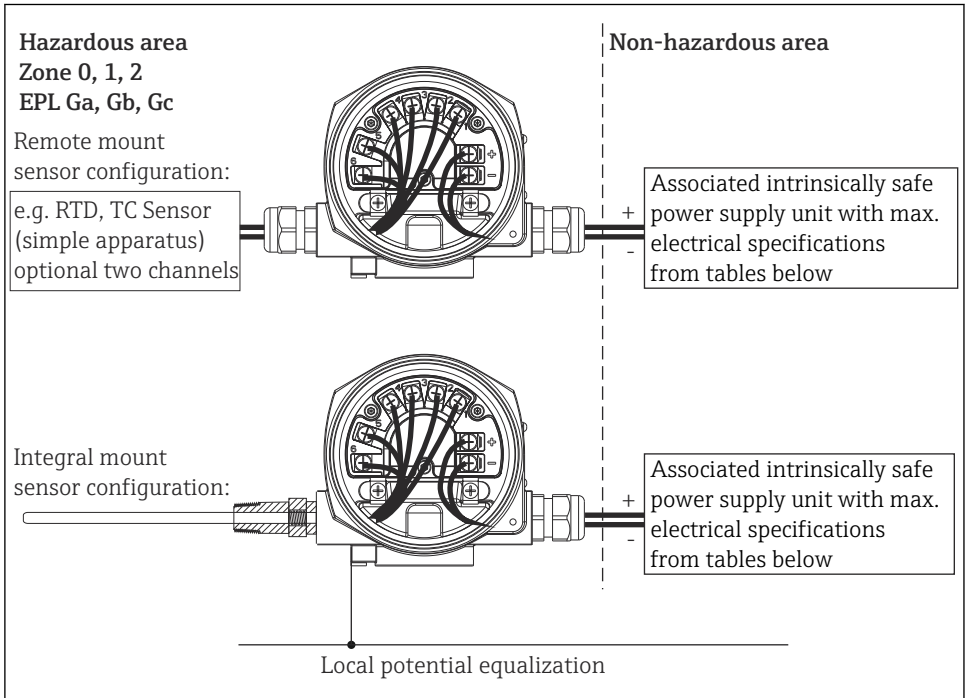
Type	Maximum surface temperature	Ambient temperature Zone 21 EPL Db
iTEMP TMT162 (HART®)	T85 °C	-40 °C ≤ Ta ≤ +55 °C
	T100 °C	-40 °C ≤ Ta ≤ +70 °C
	T110 °C	-40 °C ≤ Ta ≤ +85 °C

### Electrical connection data

Type	Electrical data									
iTEMP TMT162 (HART®)	Supply (terminals + and -):	$U_i \leq 30 V_{DC}$ $I_i \leq 300 \text{ mA}$ $P_i \leq 1000 \text{ mW}$ $C_i \leq 5 \text{ nF}$ $L_i = 0$								
	Sensor circuit (terminals 1 to 6):	$U_o \leq 7.6 V_{DC}$ $I_o \leq 13 \text{ mA}$ $P_o \leq 24.7 \text{ mW}$								
	Maximum connection values:	<table> <tr> <td>Ex ia IIC</td> <td><math>L_o = 40 \text{ mH}</math></td> <td><math>C_o = 10.4 \mu\text{F}</math></td> </tr> <tr> <td>Ex ia IIB/Ex ia IIIC/Ex ia IIIB/Ex ia IIIA</td> <td><math>L_o = 150 \text{ mH}</math></td> <td><math>C_o = 160 \mu\text{F}</math></td> </tr> <tr> <td>Ex ia IIA</td> <td><math>L_o = 300 \text{ mH}</math></td> <td><math>C_o = 1000 \mu\text{F}</math></td> </tr> </table>	Ex ia IIC	$L_o = 40 \text{ mH}$	$C_o = 10.4 \mu\text{F}$	Ex ia IIB/Ex ia IIIC/Ex ia IIIB/Ex ia IIIA	$L_o = 150 \text{ mH}$	$C_o = 160 \mu\text{F}$	Ex ia IIA	$L_o = 300 \text{ mH}$
Ex ia IIC	$L_o = 40 \text{ mH}$	$C_o = 10.4 \mu\text{F}$								
Ex ia IIB/Ex ia IIIC/Ex ia IIIB/Ex ia IIIA	$L_o = 150 \text{ mH}$	$C_o = 160 \mu\text{F}$								
Ex ia IIA	$L_o = 300 \text{ mH}$	$C_o = 1000 \mu\text{F}$								

## Safety

instructions: Ex i  
for PROFIBUS®  
PA, FOUNDATION  
Fieldbus™



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### Safety instructions: Installation

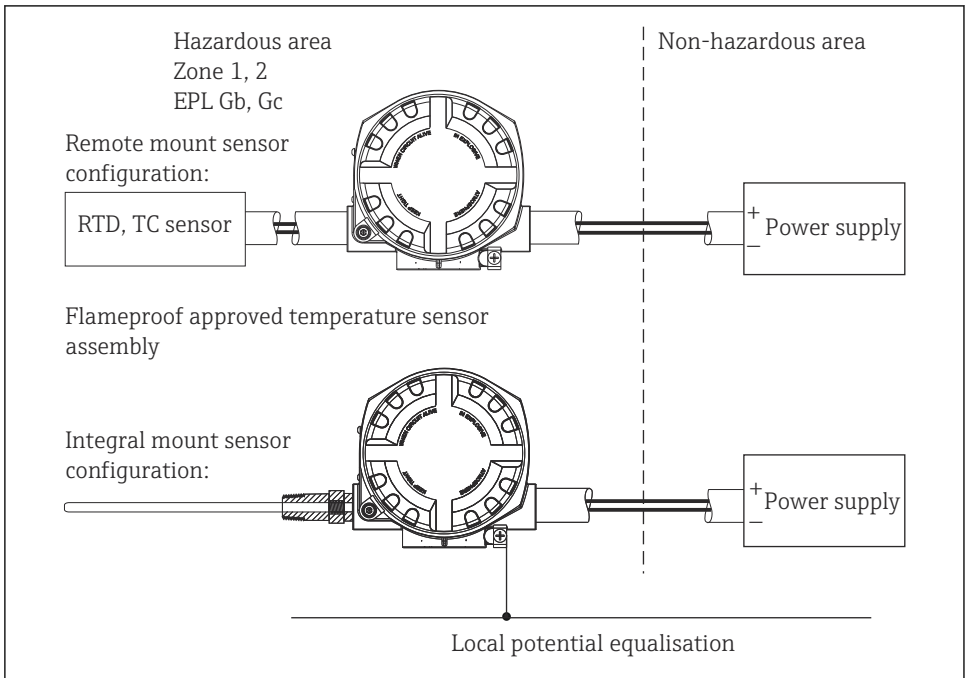
- Comply with the installation and safety instructions in the Operating Instructions.
- Install the device according to the manufacturer's instructions and any other valid standards and regulations (e.g. EN/IEC 60079-14).
- The type of protection changes as follows when the devices are connected to certified intrinsically safe circuits of Category ib: Ex ib IIC. When connecting an intrinsically safe ib circuit, do not operate the sensor at Zone 0.
- When connecting two independent sensors make sure that the potential equalisation cables are at the same potential.
- The circuits of the transmitter are isolated from its enclosure in conformance with EN/IEC 60079-11 chapter 6.3.13.





Type	Electrical data			
iTEMP TMT162 - PROFIBUS® PA - FOUNDATION Fieldbus™	Supply (terminals + and -):	$U_i \leq 17.5 V_{DC}$ $I_i \leq 500 \text{ mA}$ $P_i \leq 5.32 \text{ mW}$ $C_i \leq 5 \text{ nF}$ $L_i = 10 \mu\text{H}$	or	$U_i \leq 24 V_{DC}$ $I_i \leq 250 \text{ mA}$ $P_i \leq 1.2 \text{ W}$
	Applicable for connection to a Fieldbus system according to FISCO-model			
	Sensor circuit (terminals 1 to 6):	$U_o \leq 8.6 V_{DC}$ $I_o \leq 26.9 \text{ mA}$ $P_o \leq 57.6 \text{ mW}$		
	Maximum connection values:			
Ex ia IIC				
Ex ia IIB	$L_o = 48 \text{ mH}$		$C_o = 6.2 \mu\text{F}$	
Ex ia IIA	$L_o = 180 \text{ mH}$		$C_o = 55 \mu\text{F}$	
	$L_o = 380 \text{ mH}$		$C_o = 1000 \mu\text{F}$	

## Safety instructions: Ex d



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### Safety instructions: 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).
- The housing of field transmitter must be connected to the potential matching line.
- Only the approved wire entries as specified in paragraph 10.3 of EN/IEC 60079-14, paragraph 16 of EN/IEC 60079-0, paragraph 13 of EN/IEC 60079-1 must be used.
- For connection through a conduit entry approved for this purpose the associated sealing facility shall be mounted directly to the housing.
- Seal unused entry glands with approved sealing plugs that correspond to the type of protection.
- For operating the transmitter housing at an ambient temperature under -20 °C, appropriate cables and cable entries 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 +5K above surrounding.
- During operation, the cover must be screwed all the way in and the cover's safety catch must be fastened.
- The remote or integral mounted temperature sensor must comply with the requirements according to IEC 60079-1.
- The flameproof joints are not intended to be repaired.

### Safety instructions: Specific conditions of use

#### WARNING

#### Potentially explosive atmospheres

- ▶ Do not open the electrical connection of the supply circuit when energized if there is a potentially explosive atmosphere.
- Use for remote temperature sensors only approved sensors certified for category 2G marked not less than II2G Ex d IIC T6...T4 Gb for use in Zone 1.
- Use for integral temperature sensors only approved sensors certified for category 1G or 2G marked not less than II1/2G Ex d IIC T6...T4 Ga/Gb or II2G Ex d IIC T6...T4 Gb for use in Zone 0 resp. Zone 1.
- The temperature class specified for the certified temperature sensor shall be taken into account.
- The temperature transmitter must be installed 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.

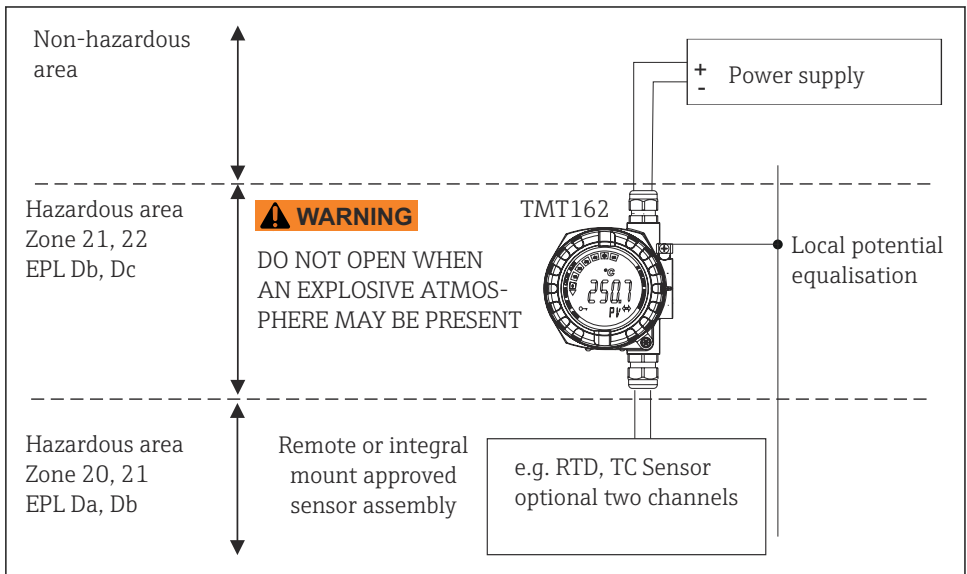
## Temperature tables

Type	Temperature class	Ambient temperature
iTEMP TMT162	T6	$-40\text{ °C} \leq T_a \leq +55\text{ °C}$
	T5	$-40\text{ °C} \leq T_a \leq +70\text{ °C}$
	T4	$-40\text{ °C} \leq T_a \leq +80\text{ °C}$

## Electrical connection data

Type	Electrical Data
iTEMP TMT162 (HART® - protocol)	$U \leq 40\text{ V}_{DC}$ $P \leq 3\text{ W}$
iTEMP TMT162 (PROFIBUS® PA) iTEMP TMT162 (FOUNDATION Fieldbus™)	$U \leq 35\text{ V}_{DC}$ $P \leq 3\text{ W}$

## Safety instructions: Ex t



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## Safety instructions: Installation

### WARNING

#### Explosive atmosphere

- ▶ In an explosive atmosphere, do not open the device when voltage is supplied (ensure that the IP66/67 housing protection is maintained during operation).
- 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).
- Seal the cable entries tight with certified cable glands (min. IP6X) IP6X according to EN/IEC 60529.
- The provided cable entries to option code glands are suitable ATEX/IECEX certified cable glands with a temperature range of  $-20$  to  $+95$  °C.
- For operating the transmitter housing at an ambient temperature under  $-20$  °C appropriate cables and cable entries permitted for this application must be used.
- The housing of the field transmitter must be connected to the potential matching line.
- For ambient temperatures higher than  $+70$  °C, use suitable heat-resisting cables or wires, cable entries and sealing facilities for application temperature  $+5$  K above surrounding.
- For integral temperature sensors use only approved sensors certified for category 1D or 2D marked not less than II1/2D Ex ta/Ex tb IIIC T110 °C Da/Db or II2D Ex tb IIIC T110 °C Db for use in Zone 20 or Zone 21.
- For remote temperature sensors use only approved sensors certified for category 2D marked not less than II2D Ex tb IIIC T110 °C Db for use in Zone 21.
- The maximum surface temperature specified for the certified temperature sensor shall be taken into account.

#### Temperature tables

Type	Temperature class	Ambient temperature
iTEMP TMT162	T6	$-40$ °C $\leq$ Ta $\leq$ $+55$ °C
	T5	$-40$ °C $\leq$ Ta $\leq$ $+70$ °C
	T4	$-40$ °C $\leq$ Ta $\leq$ $+80$ °C

Type	Maximum surface	Ambient temperature
iTEMP TMT162	$+110$ °C	$-40$ °C $\leq$ Ta $\leq$ $+80$ °C

**Electrical connection data**

Type	Electrical Data
iTEMP TMT162 (HART® - protocol)	$U \leq 40 V_{DC}$ $P \leq 3 W$
iTEMP TMT162 (PROFIBUS® PA) iTEMP TMT162 (FOUNDATION Fieldbus™)	$U \leq 35 V_{DC}$ $P \leq 3 W$







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