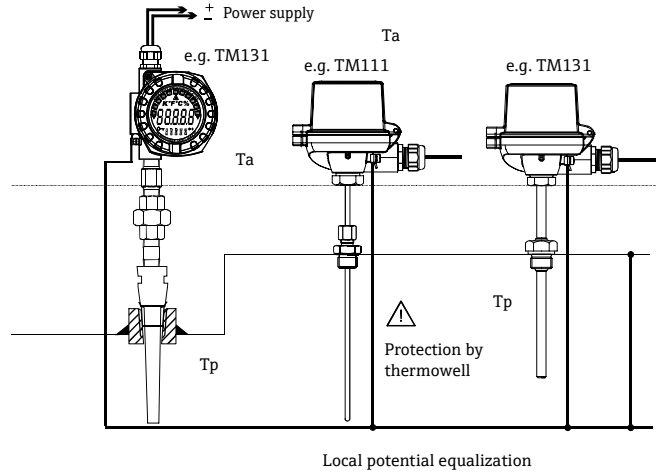


Hazardous (Classified) Location
 Class I / Division 1 / Groups ABCD
 Class I / Zone 0 / Ex ia IIC / AEx ia IIC
 Class II / Division 1 / Groups EFG
 Class III / Division 1 / Hazardous Locations



Nonhazardous Locations

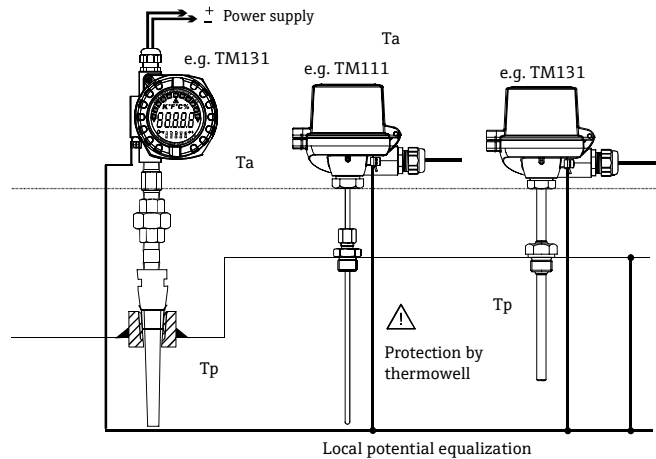
Non-hazardous area

Power supply

CSA certified Associated Apparatus or supply with suitable barrier

Local potential equalization

Hazardous (Classified) Location
 Class I / Division 2 / Groups ABCD
 Class II / Division 1 / Groups EFG
 Class III / Division 1 / Hazardous Locations



Nonhazardous Locations

Non-hazardous area

Power supply

see also installation notes for using power supply

Local potential equalization

Installation Notes TM111, TM112, TM131, TM151, TM152

- CSA approved apparatus must be installed in accordance with manufacturer's instructions.
- Install per Canadian Electrical Code (CEC) Part I or National Electrical Code (NEC) (ANSI/NFPA70) and ISA RP 12.06.01, as applicable for the country in use.
- The sensor is to be installed in a suitable enclosure accepted by local authority having jurisdiction.
- Install per temperature transmitter's control drawing when supplied with transmitter.



DUST IGNITION PROOF

**Class II / Div. 1 / Groups EFG
 Class III**

- A dust tight seal must be used for conduit entry when the temperature assembly is used in a Class II or Class III location.

INTRINSICALLY SAFE

Class I / Div. 1 / Groups ABCD

Ex ia IIC/AEx ia IIC

- CSA approved associated apparatus or barrier is required.
- Warning: Substitution of components may impair intrinsic safety.
- Avertissement : La substitution de composants peut compromettre la sécurité intrinsèque.

NONINCENDIVE

Class I / Div. 2 / Groups ABCD

- CSA approved associated apparatus or barrier is required.
- Warning: Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- Warning: Substitution of components may impair suitability for Class I, Division 2.
- Avertissement: La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Class I, Division 2.
- Nonincendive field wiring installation:

The Nonincendive Field Wiring Circuit Concept allows interconnection of Nonincendive Field Wiring Apparatus with Associated Nonincendive Field Wiring Apparatus or Associated Intrinsically Safe Apparatus or Associated Apparatus not specifically examined in combination as a system using any of the wiring methods permitted for unclassified locations, when $V_{oc} \leq V_{max}$, $C_a \geq C_i + C_{cable}$, $L_a \geq L_i + L_{cable}$.

For transmitter's or sensor's Nonincendive Field Wiring parameters see parameters below.

For these current controlled circuits, the parameter I_{max} is not required and need not to be aligned with parameter I_{sc} and I_t of the Associated Nonincendive Field Wiring Apparatus or Associated Apparatus.

Associated intrinsically safe power supply unit with max. electrical specifications below the characteristic values for Entity or NIFW of the assembled transmitter:

Transmitter	Ui/Vmax	Ii/Imax	Pi	Ci	Li
TMT71/TMT72	30 V	100 mA	800 mW	0	0
TMT82	30 V	130 mA	800 mW	0	0
TMT142 HART	30 V	300 mA	1000 mW	5 nF	0
TMT162 HART	30 V	300 mA	1000 mW	5.3 nF	0
TMT162 PA/FF	24 V	250 mA	1200 mW	5 nF	10 µH
TMT84, TMT85	24 V	250 mA	1200 mW	5 nF	10 µH
TMT86	17.5 V	380 mA	-	0	0
Terminal block	30 V	140 mA	1000 mW	See tables next page	
Flying leads	30 V	140 mA	1000 mW	See tables next page	

Approved	Pfanzelt	Date (yyyy-mm-dd)	2018-03-21	Drawing No.	10000010341	Dwg.rev.	C	Revision no.	-	Revision date (yyyy-mm-dd)	2023-06-19	Name	MP	Material	71638559 XA01976T/09/EN/04.23-00	Endress+Hauser
Volume (mm³)	Designed	Pfanzelt	Date (yyyy-mm-dd)	2018-03-12	Unit	TM111, TM112, TM131, TM151, TM152	Scale	1:1	Title	CONTROL DRAWING CSA IS, NI, DIP		Series				
Refer to protection notice ISO 16016	Edge of working parts ISO 13715	Geometrical tolerancing ISO 2768-mH-E	Part No.	-	Format	A4	Objekt version	Sheet	1 of 3	Endress + Hauser Wetzlar GmbH+Co. KG Nesselwang / Germany						

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 μF	56.4 pF	282 nH	4.6 pF	23 nF
Dual	400 pF	2 μF	113 pF	564 nH	9.2 pF	46 nF

Calculation formula for options with flying leads and terminal block only:

$$C_i = C_i \text{ Insertion length IL} \times \text{IL} + C_i \text{ Flying leads}$$

$$L_i = L_i \text{ Insertion length IL} \times \text{IL} + L_i \text{ Flying leads}$$

$$C_i = C_i \text{ Insertion length IL} \times \text{IL} + C_i \text{ Terminal block}$$

$$L_i = L_i \text{ Insertion length IL} \times \text{IL} + L_i \text{ Terminal block}$$

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

Type	Assembled transmitter	Temperature class	Ambient temperature range housing Ta
TM111	TMT84, TMT85	T6	-40°C ≤ Ta ≤ +55°C
TM112	TMT162 PA/FF	T5	-40°C ≤ Ta ≤ +70°C
TM131	TMT142 HART	T4	-40°C ≤ Ta ≤ +85°C
TM151	TMT71, TMT72	T6	-50°C ≤ Ta ≤ +55°C
TM152	TMT162 HART	T5	-50°C ≤ Ta ≤ +70°C
		T4	-50°C ≤ Ta ≤ +85°C
	TMT82 (*)	T6	-50°C ≤ Ta ≤ +58°C
		T5	-50°C ≤ Ta ≤ +75°C
		T4	-50°C ≤ Ta ≤ +85°C
	TMT86	T6	-52°C ≤ Ta ≤ +55°C
		T5	-52°C ≤ Ta ≤ +70°C
		T4	-52°C ≤ Ta ≤ +85°C
		T4	-52°C ≤ Ta ≤ +85°C
	TMT8x, TMT7x with display	T6	-40°C ≤ Ta ≤ +55°C
		T5	-40°C ≤ Ta ≤ +70°C
		T4	-40°C ≤ Ta ≤ +85°C

Note: * The maximum ambient temperature range (Ta) with dual seal version TM1x1 should not exceed the range of -20°C to +80°C.

Type	Assembled transmitter	Insert diameter	Temperature class	Process temperature range Tp
TM111	TMT8x	3mm (1/8")	T6	-50°C ≤ Tp ≤ +66°C (64°C)*
TM112	TMT7x	3mm (1/8") dual	T5	-50°C ≤ Tp ≤ +81°C (79°C)*
TM131	TMT162	6mm (1/4") dual	T4	-50°C ≤ Tp ≤ +116°C (114°C)*
TM151	TMT142		T3	-50°C ≤ Tp ≤ +181°C (179°C)*
TM152			T2	-50°C ≤ Tp ≤ +276°C (279°C)*
			T1	-50°C ≤ Tp ≤ +426°C (427°C)*
		6mm (1/4")	T6	-50°C ≤ Tp ≤ +73°C (71°C)*
			T5	-50°C ≤ Tp ≤ +88°C (86°C)*
			T4	-50°C ≤ Tp ≤ +123°C (121°C)*
			T3	-50°C ≤ Tp ≤ +188°C (186°C)*
			T2	-50°C ≤ Tp ≤ +283°C (286°C)*
			T1	-50°C ≤ Tp ≤ +433°C (431°C)*

* Process temperature when sensor is supplied with TMT162

Note: The maximum process temperature for the model with dual seal version TM1x1 should not exceed +400°C

For thermocouple inserts, the temperature class T6...T1 are equal to the process temperature.

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

Insert diameter	Temperature class	Maximum allowed process temperature (sensor) Tp (process)				
		Pi ≤ 50 mW	Pi ≤ 100 mW	Pi ≤ 200 mW	Pi ≤ 500 mW	Pi ≤ 650 mW
3mm (1/8"), 3mm (1/8") dual, 6mm (1/4") dual	T6	66°C	55°C	36°C	-17°C	-27°C
	T5	81°C	70°C	51°C	-2°C	-12°C
	T4	116°C	105°C	86°C	33°C	23°C
	T3	181°C	170°C	151°C	98°C	88°C
	T2	276°C	265°C	246°C	193°C	183°C
6mm (1/4")	T1	426°C	415°C	396°C	343°C	333°C
	T6	73°C	68°C	60°C	38°C	28°C
	T5	88°C	83°C	75°C	53°C	43°C
	T4	123°C	118°C	110°C	88°C	78°C
	T3	188°C	183°C	175°C	153°C	143°C
	T2	283°C	278°C	270°C	248°C	238°C
	T1	433°C	428°C	420°C	398°C	388°C


Insert diameter	Temperature class	Maximum allowed process temperature (sensor) Tp (process)			Ambient temperature (housing), Ta (ambient)**
		Pi ≤ 750 mW	Pi ≤ 800 mW	Pi ≤ 1000 mW	
3mm (1/8"), 3mm (1/8") dual, 6mm (1/4") dual	T6	-40°C			-40°C ≤ Ta ≤ +66°C
	T5	-25°C	-33°C		-40°C ≤ Ta ≤ +81°C
	T4	10°C	2°C	-30°C	-40°C ≤ Ta ≤ +116°C
	T3	75°C	62°C	30°C	-40°C ≤ Ta ≤ +130°C
	T2	320°C	312°C	280°C	-40°C ≤ Ta ≤ +130°C
6mm (1/4") dual	T1	170°C	162°C	130°C	-40°C ≤ Ta ≤ +130°C
	T6	21°C	17°C	1°C	-40°C ≤ Ta ≤ +73°C
	T5	36°C	32°C	16°C	-40°C ≤ Ta ≤ +88°C
	T4	71°C	67°C	51°C	-40°C ≤ Ta ≤ +123°C
	T3	136°C	127°C	111°C	-40°C ≤ Ta ≤ +130°C
	T2	231°C	227°C	211°C	-40°C ≤ Ta ≤ +130°C
	T1	381°C	377°C	361°C	-40°C ≤ Ta ≤ +130°C

For thermocouple inserts, the temperature class T6...T1 are equal to the process temperature.

** The ambient temperature at the terminal head may be directly influenced by the process temperature, but is also restricted to the allowed range of installed terminal head as follows:

Option Terminal head	Ta
A1, D1, H1, H3	-50°C ... +130°C
A3, E2	-40°C ... +130°C
P1	-40°C ... +100°C

For thermometers with two mounted head transmitters the allowed ambient temperature is 12K lower than each head transmitter's certified ambient temperature.

	Approved Pfanzelt	Date (yyyy-mm-dd) 2018-03-21	Drawing No. 10000010341	Dwg.rev. C	Revision no. -	Revision date (yyyy-mm-dd) 2023-06-19	Name MP	Material 71638559 XA01976T/09/EN/04.23-00	Endress+Hauser 
Volume (mm³)	Designed Pfanzelt	Date (yyyy-mm-dd) 2018-03-12	Unit TM111, TM112, TM131, TM151, TM152	Scale 1:1	Title CONTROL DRAWING CSA			Series	
Refer to protection notice ISO 16016	Edge of working parts ISO 13715	Geometrical tolerancing ISO 2768-mH-E	Part No. -	Format A4	IS, NI, DIP			Objekt version Sheet 2 of 3	Endress + Hauser Wetzlar GmbH+Co. KG Nesselwang / Germany

The dependency of the ambient and process temperatures upon the maximum surface temperature for Class II and Class III

Type	Assembled transmitter	Ambient temperature range housing Ta	Maximum surface temperature
TM111	TMT84, TMT85	-40°C ≤ Ta ≤ +55°C	85°C
TM112	TMT162 PA/FF	-40°C ≤ Ta ≤ +70°C	100°C
TM131	TMT142	-40°C ≤ Ta ≤ +85°C	135°C
TM151	TMT71, TMT72	-50°C ≤ Ta ≤ +55°C	85°C
TM152	TMT162 HART	-50°C ≤ Ta ≤ +70°C	100°C
		-50°C ≤ Ta ≤ +85°C	135°C
	TMT82 (*)	-50°C ≤ Ta ≤ +58°C	85°C
		-50°C ≤ Ta ≤ +75°C	100°C
		-50°C ≤ Ta ≤ +85°C	135°C
	TMT86	-52°C ≤ Ta ≤ +55°C	85°C
		-52°C ≤ Ta ≤ +70°C	100°C
		-52°C ≤ Ta ≤ +85°C	135°C
	TMT8x, TMT7x with display	-40°C ≤ Ta ≤ +55°C	85°C
		-40°C ≤ Ta ≤ +70°C	100°C
		-40°C ≤ Ta ≤ +85°C	135°C

Type	Assembled transmitter	Insert diameter	Process temperature range Tp	Maximum surface temperature
TM111	TMT8x	3mm (1/8")	-50°C ≤ Tp ≤ +66°C (64°C)*	85°C
TM112	TMT7x	3mm (1/8") dual,	-50°C ≤ Tp ≤ +81°C (79°C)*	100°C
TM131	TMT162	6mm (1/4") dual	-50°C ≤ Tp ≤ +116°C (114°C)*	135°C
TM151	TMT142		-50°C ≤ Tp ≤ +146°C (146°C)*	165°C
TM152		6mm (1/4")	-50°C ≤ Tp ≤ +71°C (71°C)*	85°C
			-50°C ≤ Tp ≤ +86°C (86°C)*	100°C
			-50°C ≤ Tp ≤ +121°C (121°C)*	135°C
			-50°C ≤ Tp ≤ +151°C (153°C)*	165°C

* Process temperature when sensor is supplied with TMT162

For thermocouple inserts, the maximum surface temperature is equal to the process temperature.

The dependency of the ambient and process temperatures upon maximum surface temperature for assembly without transmitter (terminal block) for Group II and Group III:

Insert diameter	Maximum allowed process temperature (sensor) Tp (process)					Maximum surface temperature
	Pi ≤ 50 mW	Pi ≤ 100 mW	Pi ≤ 200 mW	Pi ≤ 500 mW	Pi ≤ 650 mW	
3mm (1/8"),	66°C	55°C	36°C	-17°C	-27°C	85°C
3mm (1/8") dual,	81°C	70°C	51°C	-2°C	-12°C	100°C
6mm (1/4") dual	116°C	105°C	86°C	33°C	23°C	135°C
	146°C	133°C	105°C	23°C	-18°C	165°C
6mm (1/4")	73°C	68°C	60°C	38°C	28°C	85°C
	88°C	83°C	75°C	53°C	43°C	100°C
	123°C	118°C	110°C	88°C	78°C	135°C
	153°C	146°C	131°C	88°C	66°C	165°C


Insert diameter	Maximum allowed process temperature (sensor) Tp (process)			Maximum surface temperature	Ambient temperature (housing), Ta (ambient)**
	Pi ≤ 750 mW	Pi ≤ 800 mW	Pi ≤ 1000 mW		
3mm (1/8"),	-40°C			85°C	-40°C ≤ Ta ≤ +66°C
3mm (1/8") dual,	-25°C	-33°C		100°C	-40°C ≤ Ta ≤ +81°C
6mm (1/4") dual	10°C	2°C	-30°C	135°C	-40°C ≤ Ta ≤ +116°C
	-46°C	-59°C	-114°C	165°C	-40°C ≤ Ta ≤ +130°C
6mm (1/4")	21°C	17°C	1°C	85°C	-40°C ≤ Ta ≤ +73°C
	36°C	32°C	16°C	100°C	-40°C ≤ Ta ≤ +88°C
	71°C	67°C	51°C	135°C	-40°C ≤ Ta ≤ +123°C
	52°C	45°C	16°C	165°C	-40°C ≤ Ta ≤ +130°C

For thermocouple inserts, the maximum surface temperature is equal to the process temperature.

** The ambient temperature at the terminal head may be directly influenced by the process temperature, but is restricted to the range -40° C ... +130°C, besides for types TA30A, TA30D and TA30H with a restricted range -50°C ... +130°C.

For thermometers with two mounted head transmitters the allowed ambient temperature is 12K lower than each head transmitter's certified ambient temperature.

For the dual seal version of TM131, the process temperature shall not bring the whole assembly of pressure switch/secondary seal and head transmitters beyond a range of ambient temperature between -20°C to +80°C therefore the pressure switch/secondary seal should be installed with a minimum required length of extension neck of 100mm above the process mounting flange.

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Volume (mm³)	Designed	Pfanzelt	Date (yyyy-mm-dd)	2018-03-12	Unit	TM111, TM112, TM131, TM151, TM152	Scale	1:1	Title	CONTROL DRAWING CSA		Series				
Refer to protection notice ISO 16016	Edge of working parts ISO 13715	Geometrical tolerancing ISO 2768-mH-E	Part No.	-	Format	A4						Objekt version	Sheet	3 of 3	Endress + Hauser Wetzlar GmbH+Co. KG Nesselwang / Germany	