

Installation Notes TMT 162

- FM Approved Apparatus must be installed in accordance with manufacturer's instructions.
- Use supply wires suitable for 5°C above surroundings.
- Only simple apparatus should be terminated to the sensor connection.
- Simple apparatus are components as defined by the NEC (1.5 V, 0.1 A, 25 mW).
- Warning: Substitution of components may impair intrinsic safety or suitability for Class I, Division 2.

TMT162 is suitable for the connection to a Profibus PA/ Foundation Fieldbus system according to the Entity- or FISCO-concept.

Temperature range

T4 -40°C ... +85°C T5 -40°C ... +70°C T6 -40°C ... +55°C

NONINCENDIVE, FIELD WIRING

NI Class I / Div. 2 / Groups ABCD

Sensor circuits (Terminals 1...6)

Uo or Voc or Vt = 8.6 V	Io or Isc = 26.9 mA	Po = 57.6 mW
Group A, B resp. IIC	Co or Ca = 6.2 μF	Lo or La = 48 mH
Group C, D resp. IIB, IIA	Co or Ca = 55 μF	Lo or La = 180 mH

FISCO-Concept

The FISCO Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination.

The criteria for interconnection is that the voltage (U_i or V_{max}), the current (I_i or I_{max}) and the power (P_i or P_{max}) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (U_o or V_{oc} or V_t), the current (I_o or I_{sc} or I_t) and the power (P_o or P_{max}) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (C_i) and inductance (L_i) of each apparatus (other than the termination) connected to the fieldbus must be less than or equal to 5 nF and 10 μ H respectively.

In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system.

The voltage U_0 (or V_{oc} or V_t) of the associated apparatus has to be limited to the range of 14V to 24V d.c. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except to a leakage current of 50 μA for each connected device.

Separately powered equipment needs a galvanic isolation to assure that the intrinsically safe fieldbus circuit remains passive.

The cable used to interconnect the devices has to meet the following values:

loop resistance R' : 15 ... 150 Ω/km , inductance L' : 0.4 ... 1 mH/km capacitance C' : 80 ... 200 nF/km

$C' = C'$ line/line + 0,5 C' line/screen, if both lines are floating or

$C' = C' \text{ line/line} + C' \text{ line/screen}$, if the screen is connected to one line

length of spur cable: 30 m length of trunk cable: 1 km length of splice: 1 m

At each end of the trunk cable an approved infallible line termination with the following parameters is suitable:

$$R = 90 \dots 100 \, \Omega \quad C = 0 \dots 2.2 \, \mu\text{F}.$$

One of the allowed terminations might already be integrated in the associated apparatus.

The number of passive devices connected to the bus segment is not limited due to I.S. reasons. If the above rules are respected, up to a total length of 1000 m (sum of the length of trunk cable and all spur cables), the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

INTRINSICALLY SAFE

IS Class I / Div. 1 / Groups ABCD AEx ia IIC

- FM Approved associated apparatus must meet the following requirements:
 U_o or V_o or $V_t \leq U_i$ (V_{max}) and I_o or I_{sc} or $I_t \leq I_i$ (I_{max}) and P_o or $P_{max} \leq P_i$ (P_{max})
- The maximum non-hazardous area voltage must not exceed 250 V.
- The installation must be in accordance with the National Electrical Code NFPA 70 and ANSI/ISA - RP 12.06.01 (except chapter 5).
- Be aware of multiple earthing of screen. The screen must be connected in accordance with National Electrical Code.
- The polarity for connecting PA+ (1) and PA- (2) is of no importance due to an internal rectifier.

NONINCENDIVE


NI Class I / Div. 2 / Groups ABCD

- Depending on location install per National Electrical Code (NEC) using wiring methods described in article 500 through article 510.
- Intrinsic safety barrier not required. $V_{max} \leq 35 \text{ V DC}$.
- Warning: Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- 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 $V_{oc} \leq V_{max}$, $C_a \geq C_i + C_{able}$, $L_a \geq L_i + L_{able}$.

Transmitter Nonincendive Field Wiring parameters are as follows: U_i or $V_{max} \leq 35 \text{ V DC}$ $C_i \leq 5 \text{ nF}$ $L_i \leq 10 \text{ }\mu\text{F}$

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.
- Warning: Explosion Hazard- Do not disconnect equipment unless power has been switched off or the area is known to be non hazardous
- The transmitter is suitable to be installed according the FNICO concept.

	Approved Pfanzelt	Date (yyyy-mm-dd) 2005-07-14	Drawing No. 14 12 00 211	Dwg.rev. -	Revision no. -	Revision date (yyyy-mm-dd) -	Name -	Material 71540254 XA02324T/09/EN/01.20	Endress+Hauser 
Volume (mm³)	Designed Meroth	Date (yyyy-mm-dd) 2005-07-14	Unit iTEMP TMT162 FF/PA	Scale 1:1	Title CONTROL DRAWING FM IS, NI			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	