Safety Instructions

Modular RTD assemblies for hygienic applications

iTHERM® TM411

JPN: Ex ia IIC T4 Ga/Gb
Modular RTD assemblies for hygienic applications
iTHERM® TM411

Table of contents

Associated documentation ........................................ 4
Supplementary Documentation ................................. 4
Manufacturer´s certificates ...................................... 4
Safety instructions ...................................................... 5
Safety Instructions: General ........................................ 5
Safety instructions for intrinsic safety: Installation .............. 5
Safety instructions: Zone 0 .............................................. 6
Safety instructions: Special conditions .......................... 6
Safety instructions: Partition wall .................................. 6
Temperature tables ..................................................... 6
**Associated documentation**  
This document is an integral part of the following Operating Instructions:  
iTHERM® TM411: **TI01038T/09**

**Supplementary Documentation**  
Explosion-protection brochure: CP00021Z  
The Explosion-protection brochure is available: In the download area of the Endress+Hauser website: www.endress.com → Downloads → "Brochures and catalogs" → Text Search: CP00021Z

**Manufacturer´s certificates**  
**JPN certificate of conformity**  
Certificate number: CSAUK 19JPN065X  
Affixing the certificate number certifies conformity with the following standards (depending on the device version):  
- JNIOSH-TR46-1:2015  
- JNIOSH-TR46-6:2015
Safety instructions

- 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. JNIOSH-TR-44).
- 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 (e.g. TK40) 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.
- For using of a plug-in connector (e.g. PA-connector by Weidmüller) it is to be observed that the requirements for the respective category and the operating temperature are followed.

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. JNIOSH-TR-44).
- Install the sensor in a thermometer/enclosure suitable for its marking with a IP rating of at least IP20 according to 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 IEC 60079-26.
- When connecting dual sensors make sure that the potential equalizations are at the same local potential equalization.
- Inserts with 3 mm diameter or grounded inserts, e.g. type TS111 must be connected to the local potential equalization.
- For inserts with 3 mm diameter or grounded inserts, e.g. type TS111 an intrinsically safe supply with galvanic isolation must be used.

**Safety instructions: Zone 0**

- Only operate devices in potentially explosive vapour/air mixtures under atmospheric conditions:
  - $-20 \, ^{\circ}C \leq T_a \leq +60 \, ^{\circ}C$
  - $-0.8 \text{ bar} \leq p \leq 1.1 \text{ bar}$
- 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 so, that even in the event of rare incidents, an ignition source due to impact or friction between the housing and iron/steel is excluded.

**Safety instructions: Partition wall**

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

**Temperature tables**

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

<table>
<thead>
<tr>
<th>Transmitter</th>
<th>$U_i$</th>
<th>$I_i$</th>
<th>$P_i$</th>
<th>$C_i$</th>
<th>$L_i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMT82</td>
<td>30 V</td>
<td>130 mA</td>
<td>800 mW</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Type of protection (IEC)</td>
<td>Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ex ia IIC T4 Ga/Gb</td>
<td>iTHERM® TM411</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Assembled Transmitter</th>
<th>Temperature class</th>
<th>Ambient temperature range housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>iTHERM® TM411</td>
<td>TMT82</td>
<td>T4</td>
<td>−50 °C ≤ Ta ≤ +85 °C</td>
</tr>
<tr>
<td></td>
<td>TMT82 with display</td>
<td>T4</td>
<td>−40 °C ≤ Ta ≤ +85 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Assembled Transmitter</th>
<th>Insert diameter</th>
<th>Process temperature range Tp</th>
<th>Temperature class/maximum surface temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>iTHERM® TM411</td>
<td>TMT82</td>
<td>3 mm, 3 mm dual or 6 mm dual</td>
<td>−50 °C ≤ Tp ≤ +116 °C</td>
<td>T4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 mm</td>
<td>−50 °C ≤ Tp ≤ +116 °C</td>
<td>T4</td>
</tr>
</tbody>
</table>

**Determination of process temperature for Pi ≤ 50 mW:**

<table>
<thead>
<tr>
<th>Insert diameter</th>
<th>Thermal resistance (Rth) for Pi ≤ 50 mW</th>
<th>Formula for calculating process temperature (Tp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 mm, 3 mm dual or 6 mm dual</td>
<td>274K/W</td>
<td>Tp &lt; T&lt;sub&gt;class&lt;/sub&gt;&lt;sup&gt;1)&lt;/sup&gt; - Tol.&lt;sup&gt;2)&lt;/sup&gt; - (Rth x P&lt;sub&gt;0&lt;/sub&gt;)&lt;sup&gt;3)&lt;/sup&gt;</td>
</tr>
<tr>
<td>6 mm</td>
<td>144K/W</td>
<td></td>
</tr>
</tbody>
</table>

1) Inserting of temperature class, e.g. 85 °C (K) for T6
2) Inserting of Tolerances to IEC60079-0 chapter 26.5.1.3: 5 K for T6, T5, T4 and T3 10 K for T2 and T1
3) P0 of intrinsic safe temperature input (e.g. measurement circuit TMT182, P0 = 6.6 mW)

Calculation example for T6 and 6 mm insert: Tp < T<sub>class</sub> - Tol. - (Rth x P<sub>0</sub>)
Tp < 85 °C(K) - 5K - (144K/W x 6.6 mW)
Tp < 79.04 °C