Operating Instructions

Temperature Transmitter Model T31

1 Models

<table>
<thead>
<tr>
<th>1 Models</th>
<th>2 Safety warnings</th>
<th>3 Mounting</th>
<th>4 Electrical connections</th>
<th>5 Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>T31.10, 1P0</td>
<td>Head mounting</td>
<td>3.1 Mounting on measuring insert</td>
<td>4.3 Connect 4...20 mA-loop</td>
<td>5.0 General</td>
</tr>
<tr>
<td>1P2</td>
<td>Ex protection</td>
<td>3.2 Mounting in connection head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1P4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1P9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 Safety warnings

When mounting, initiating and operating these transmitters it is important to observe the safety precautions and regulations (e.g. IEC 60364-6-1). Nonobservance of the applicable regulations may cause severe injury to persons or damage to equipment. Only staff with suitable qualification should work with these transmitters.

We draw your attention to the following which must be observed with transmitters with Ex protection:

- Observe the applicable regulations for the use of Ex-class instruments (e.g.: EN 50014, EN 50020, EN 50021, EN 50284).
- Observe the notes for mounting and operating in hazardous area described in section 6.
- It is forbidden to use a transmitter that is damaged externally.
- Repairs are forbidden.

3 Mounting

3.1 Mounting on measuring insert

These transmitters are designed to be mounted on a measuring insert in a DIN connecting head with form B. The connecting wires of the measuring insert must be approx. 40 mm long and insulated.

Mounting example:

- Insert the measuring insert with the sheath and affix in the connecting head using screws in pressure springs.

3.2 Mounting in connection head

Insert the measuring insert with the mounted transmitter in the protective sheath and affix in the connecting head using screws in pressure springs.

4 Electrical connections

4.1 Input Pt100 2 wire

Set a jumper between the input terminals and verify additional length of 4 mm!

4.2 Input Pt100 3 wire

- The transmitter will be demaged if the screw length is incorrect, the permissible screw length can be calculated as follows:

\[ l_{\max} = s + 4 \text{ mm} \]

Dimensions in mm:

- \( l \) length of screw
- \( s \) thickness of circular plate

Circular plate

Check the screw length before affixing the transmitter to the measuring insert: stick the screw in the circular plate and verify additional length of 4 mm!

4.3 Connect 4...20 mA-loop

Load diagamm

The electrical connection is made through the terminals (1) and (2).

- maximum permissible terminal voltage: 30 V
- maximum permissible load \( R_s \) (dependent upon the loop power supply voltage \( U_{\text{in}} \))

Load diagramm

- \( U_k \) at 30 V power supply \( U_{\text{in}} \)
- \( 925 \Omega \) at 24 V power supply \( U_{\text{in}} \)

\[ R_s \leq \left( \frac{U_{\text{in}}}{11.5 \text{ V}} \right) / 0.02 \text{ A} \]

with \( R_s \) in \( \Omega \) and \( U_{\text{in}} \) in V

5 Maintenance

The temperature transmitters described here are totally maintenance-free!

The electronics are completely encapsulated and incorporate no components which could be repaired or replaced.

Specifications according to WIKA data sheet TE 31.01. Technical alteration rights observed.

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Note

Before initial operation check the suitability for the intended application. In particular, it is important to fulfill the ambient and operation conditions as specified in the WIKA data sheet TE 31.01.
### 6 Notes for mounting and operating in hazardous area

#### 6.0 General
Use only such a transmitter in a hazardous area that have the corresponding approval for this hazardous area.

The transmitter Model T31.10.1P2 correspond to ignition protection type intrinsically safe apparatus II 1G Ex ia IIC T4 / T5 / T6.

The transmitter Model T31.10.1P4 correspond to ignition protection type intrinsically safe apparatus II 2G Ex ib IIC T4 / T5 / T6.

The transmitter Model T31.10.1P9 correspond to ignition protection type non-sparking apparatus II 3G Ex nA IIC T4 / T5 / T6.

Model, Ex protection class, Approval No. and Symbol are stated on the rating plate. Example:

- **T31.10.1P2**
  - II 1G Ex ia IIC
  - T4 / T5 / T6
  - DMT 02 ATEX E 106 X

Model, Ex protection class, Approval No. and Symbol are stated on the rating plate.

Example:

- **T31.10.1P2**
  - II 1G Ex ia IIC
  - T4 / T5 / T6
  - DMT 02 ATEX E 106 X

### 6.1 Special conditions for safe use

#### 6.1.1 Mounting in the hazardous area

**T31.10.1P2** ***T31.10.1P4*** ***T31.10.1P9*** Transmitters in a hazardous area are supplied only with associated intrinsically safe apparatus that are approved for this hazardous area. These transmitters must be mounted in a case that must at least correspond to following ingress protection IP 20 according to EN 60 529 / IEC 529.

**T31.10.1P2** ***T31.10.1P4*** ***T31.10.1P9*** (Use as energy-limited equipment II 3G Ex nL): The supply current circuit must fulfill the requirements for ignition protection type II 3G Ex nL energy-limited (EN 50 021). These transmitters must be mounted in a case that must at least correspond to following ingress protection IP 54 according to EN 60 529 / IEC 529.

**T31.10.1P2** ***T31.10.1P4*** ***T31.10.1P9*** (Use as non-incentive equipment II 3G Ex nA): Disconnection of power supply is forbidden inside the hazardous area. When connecting or disconnecting the terminals ensure the power supply is disconnected outside the hazardous area. These transmitters must be mounted in a case that must at least correspond to following ingress protection IP 54 according to EN 60 529 / IEC 529.

When during use in circuits with the safety class nA (non-incentive) the permissible connected loads have been exceeded for a short term,(1), the use of these transmitters in circuits with the safety class Ex nA (energy limited) is not permitted any more.

1) When the transmitters are used in circuits with the safety class nA, it is permissible to exceed the maximum supply voltage by up to 40 % for a short term.

#### 6.1.2 Operating transmitter in Zone 0

The temperature transmitter may be operated only in areas that require apparatus of category 1 when following atmospheric conditions exist:

- Temperature: -20 °C ... +60 °C
- Pressure: 0.8 bar ... 1.1 bar

#### 6.1.3 Operating the transmitter in Zone 1 and Zone 2

The transmitter may be used only in the following ambient temperature range according to the temperature class:

- **T31.10.1P2** II 1G Ex ia
- **T31.10.1P4** II 2G Ex ib

**T4**: -50 °C ≤ T ≤ +85 °C
**T5**: -50 °C ≤ T ≤ +75 °C
**T6**: -50 °C ≤ T ≤ +60 °C

**T31.10.1P9** 3G Ex nL/nA

**T4**: -40 °C ≤ T ≤ +85 °C
**T5**: -40 °C ≤ T ≤ +70 °C
**T6**: -40 °C ≤ T ≤ +50 °C

### 7 Safety-engineering values

#### 7.1 Power Supply / 4 ... 20 mA-loop

The following safe technical maximum values must not be exceeded:

- **T31.10.1P2** II 1G Ex ia
- **T31.10.1P4** II 2G Ex ib

**Voltage**
- $U_I = DC \ 30 \ V$
- **Current**
- $I_I = 100 \ mA$
- **Power**
- $P_O = 800 \ mW$

**T31.10.1P9** 3G Ex nL/nA

**Voltage**
- $U_I = DC \ 30 \ V$

Following have an outward effect at the connection terminals $\oplus$ and $\ominus$ of the transmitter

**Model T31.10.1P2** and **T31.10.1P4**:
- effective internal capacity $C = 6.2 \ nF$
- effective internal inductivity $L = 110 \ \mu H$

**Model T31.10.1P9**:
- effective internal capacity $C = 1.2 \ nF$
- effective internal inductivity $L = 100 \ \mu H$

#### 7.2 Sensor (terminal 1 to 3)

Connect the sensor according to section 4 to the terminals $\ominus$, $\ominus$ and $\ominus$.

The connected sensor must not warm up inadmissibly according to the temperature class of the respective hazardous area for the following values for voltage, current and power:

- **T31.10.1P2** II 1G Ex ia
- **T31.10.1P4** II 2G Ex ib

**maximum possible values**
- $U_O = DC \ 6.4 \ V$
- $I_O = 100 \ mA$
- $P_O = 426 \ mW$

**T31.10.1P9** 3G Ex nL/nA

**effective values during operation**
- $U_O = DC \ 2.5 \ V$
- $I_O = 1.2 \ mA$

The sum of the values of the connected sensor and the connection line must not exceed the following values for the maximum permissible capacity and inductivity:

- **T31.10.1P2** II 1G Ex ia
- **T31.10.1P4** II 2G Ex ib

**$C_{sensor} + C_{line} < C_{O}$**
- $C_O = 500 \ \mu F$

**$L_{sensor} + L_{line} < L_{O}$**
- $L_O = 10 \ \mu H$

(to be continued, see next column)