Analogue 3-wire temperature transmitter

The documentation is only complete when used in combination with the relevant documentation for the sensor.
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Safety instructions

1.1 Intended use

**DANGER!**
Neither operate this transmitter in potentially explosive areas, nor connect it to a sensor located in a potentially explosive area! Otherwise the transmitter might cause an explosion that can result in fatal injuries!

**DANGER!**
Responsibility for the correct use of the devices with special regard to suitability, intended use and the field of application lies solely with the operator. To avoid any kind of incorrect use, also note the information in the chapter "Device description".

**DANGER!**
The transmitters do not contain any serviceable parts inside. Always send defective devices to the manufacturer or the local distributor for repair or exchange. If this is the case, attach a clear description of the malfunction for warranty claims.

**INFORMATION!**
The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose. To avoid any kind of incorrect use, also note the information in the chapter "Device description".

The manufacturer has constructed these transmitters only for temperature measurements with single resistance thermometers of the type Pt100 and Pt1000. The main field of application are building services applications.

1.2 Certifications

1.2.1 EC directive compliance

**CE marking**

The device fulfills all applicable statutory requirements of the following EC directives:

- CE Directive 93/68/EEC

The manufacturer certifies successful testing of the product by applying the CE marking.
1.3 Safety instructions from the manufacturer

1.3.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

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The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

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We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

1.3.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.
1.3.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation and operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

1.3.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of underneath icons.
1.3.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.

**DANGER!**
This information refers to the immediate danger when working with electricity.

**DANGER!**
This warning refers to the immediate danger of burns caused by heat or hot surfaces.

**DANGER!**
This warning refers to the immediate danger when using this device in a hazardous atmosphere.

**DANGER!**
These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator’s plant.

**WARNING!**
Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator’s plant.

**CAUTION!**
Disregarding these instructions can result in damage to the device or to parts of the operator’s plant.

**INFORMATION!**
These instructions contain important information for the handling of the device.

**LEGAL NOTICE!**
This note contains information on statutory directives and standards.

- **HANDLING**
  This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

- **RESULT**
  This symbol refers to all important consequences of the previous actions.

1.4 Safety instructions for the operator

**WARNING!**
In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel. This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.
Device description

2.1 Scope of delivery

The scope of delivery always consists of the transmitter and its documentation.

2.2 General description

**TT 11 C**

The TT 11 C is an analogue multi-range 3-wire in-head transmitter for temperature measurements. It works together with measuring resistors of the types Pt100 and Pt1000. The device has an output with the range 0...10 VDC; the manufacturer has designed the transmitter especially for building services applications as HVAC systems often require a signal in the range of 0...10 V.

The in-head transmitter is intended for installation in a “B connection head” or larger according to DIN 43729. As an alternative you can also mount the in-head version on a rail according to DIN EN 50022 with the help of the rail mounting kit (further information on page 14).

**TT 11 R**

The TT 11 R is an analogue 3-wire rail-mount transmitter for temperature measurements with the same features as the in-head version.

The rail-mount transmitter is intended for installation on a rail according to DIN 50022.

**INFORMATION!**

In the standard delivery condition the transmitters are not preset. Therefore you have to make a complete solder pad configuration before using the transmitter for the first time (refer to chapter “Operation”). As an option the manufacturer offers preset transmitters according to the customer’s order.
2.3 Nameplate

**INFORMATION!**

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

The transmitter can be identified by the information on the nameplates.

2.3.1 In-head transmitter

![Nameplate of the in-head transmitter (side)](figure_2-1)

- **Product name**
- **Sensor type**
- **Manufacturer**

![Nameplate of the in-head transmitter (bottom)](figure_2-2)

- **WEEE dustbin symbol**
- **Manufacturer**
- **CE marking (EC conformity)**
- **Address of manufacturer**
- **Part number**
- **Serial number**
- **Batch number**
2.3.2 Rail-mount transmitter

![Nameplate of the rail-mount transmitter](image)

Figure 2-3: Nameplate of the rail-mount transmitter

1. Product name
2. Top down: part number, serial number and batch number
3. Manufacturer and address
4. Printable field, sensor configuration
5. Website of the manufacturer
6. WEEE dustbin symbol and CE marking (EC conformity)
7. CE marking (EC conformity), electronic/electric device waste marking and SIL2 marking
Installation

3 INSTALLATION

3.1 Notes on installation

INFORMATION!
Inspect the cartons carefully for damage or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

INFORMATION!
Check the packing list to check if you received completely all that you ordered.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 In-head transmitter

DANGER!
Neither operate this transmitter in potentially explosive areas, nor connect it to a sensor located in a potentially explosive area! Otherwise the transmitter might cause an explosion that can result in fatal injuries!

CAUTION!
The manufacturer has developed the in-head transmitter for an operating temperature range of -40...+85°C / -40...+185°F. To avoid destruction or damage of the device, always assure that the operating temperature does not exceed the permissible range. Also note that the thermowell transfers the process temperature to the transmitter housing. If the process temperature is close to or exceeds the maximum temperature of the transmitter, then the temperature in the transmitter housing can rise above the maximum permissible temperature!

One way to decrease the heat transfer via the thermowell is to install the transmitter farther away from the heat source. An alternative is to make the thermowell longer. Inversely you can take similar measures if the temperature is below the specified minimum temperature.
The in-head transmitter is intended for installation in DIN B connection heads or larger. The large Ø7 mm / 0.28” center hole facilitates the electrical connection of the measurement sensor and the installation [for detailed information refer to the chapter "Dimensions and weights"]. The following drawing shows the installation of the in-head transmitter with the help of the connection head installation kit:

**INFORMATION!**
The connection head installation kit does not belong to the standard scope of delivery of the transmitter. All devices which are necessary to mount the transmitter on a measuring insert of the manufacturer belong to the scope of delivery of the measuring insert.

![Figure 3-1: Connection head installation kit](image)

1. M4 screw
2. Spring
3. Lock washer
4. Wires of measuring insert
5. Sheath
3.3 Rail mounting kit for in-head transmitters

**DANGER!**
To avoid fatal injuries, destruction or damage of the transmitter, always note the relevant admonitions in the previous section if you install the in-head-transmitter on a rail!

**INFORMATION!**
The rail mounting kit allows to install the in-head transmitter on a rail according to DIN 50022. The kit does not belong to the standard scope of delivery, you have to order it separately. For more information refer to the section about the accessory parts in the chapter "Service".

Rail mounting kit for in-head transmitters

1. Rail
2. Clamp
3. Transmitter
4. Washer
5. Sleeve
6. Screw

**Step 1**

**Step 2**
3.4 Rail-mount transmitter

**DANGER!**

Neither operate this transmitter in potentially explosive areas, nor connect it to a sensor located in a potentially explosive area! Otherwise the transmitter might cause an explosion that can result in fatal injuries!

**CAUTION!**

The manufacturer has developed the in-head transmitter for an operating temperature range of -20...+70° C / -4...+158° F. To avoid destruction or damage of the device, always assure that the operating temperature does not exceed the permissible range.

**INFORMATION!**

The rail-mount transmitter is intended for installation on a rail according to DIN 50022.

---

**Figure 3-2: Installation of the rail-mount version**

1. Hook the upper groove of the transmitter onto the rail.
2. Press the lower part of the transmitter against the rail.
3. When you hear a "click" from the snap fastener, the transmitter is fixed onto the rail (drawing in the centre).
4. To remove the transmitter, use a small screwdriver to push the snap fastener downwards.
5. Carefully move the lower part of the transmitter in the forward direction and then upwards.
4.1 Safety instructions

DANGER!
All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

DANGER!
Observe the national regulations for electrical installations!

CAUTION!
Before you connect and operate a transmitter, always note the following items to avoid an electric shock:

- For all work on the electrical connections use an electrostatic safe (i.e. grounded) workplace! In this way you minimize the risk of electrostatic discharge (ESD).
- Assure that the cover was closed after any work on the device. The cover prevents electrostatic discharge if the solder pads are touched inadvertently; furthermore it protects the solder pads against dirt.

WARNING!
Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

INFORMATION!
The transmitter is protected against polarity reversal. No damage will occur to the device if the polarity of the supply voltage is switched. The output will then indicate 0 mA.

INFORMATION!
The calibration of this transmitter works with potentiometers. Therefore assure that the transmitter is protected against heavy impacts or strong vibrations. Otherwise the calibration data could change.
4.2 Electrical input connections

**CAUTION!**
Always establish the electrical connections according to the following diagrams. Otherwise it can come to destruction or damage of the transmitter.

**INFORMATION!**
To avoid measuring errors, assure that all cables are connected properly and that the screws are tightened correctly.

4.2.1 In-head transmitter

![Diagram of In-head transmitter](image)

Figure 4-1: Pt100...1000, 3-wire input connection

4.2.2 Rail-mount transmitter

![Diagram of Rail-mount transmitter](image)

Figure 4-2: Pt100...1000, 3-wire connection

4.3 Electrical connection diagrams

**CAUTION!**
Always establish the electrical connections according to the following diagrams. Otherwise it can come to destruction or damage of the transmitter.

**INFORMATION!**
To avoid measuring errors, assure that all cables are connected properly and that the screws are tightened correctly.
4.3.1 In-head transmitter

**DANGER!**
Neither operate this transmitter in potentially explosive areas, nor connect it to a sensor located in a potentially explosive area! Otherwise the transmitter might cause an explosion that can result in fatal injuries!

**INFORMATION!**
The transmitter has a polarity protection. Connecting the power supply with a wrong polarity will not damage the transmitter.

**Figure 4-3:** Connection diagram of the in-head transmitter (3-wire configuration)

1. Terminals for input signal (1, 2 and 3)
2. Potentiometer for zero point setting
3. Potentiometer for measuring span setting
4. Power supply (15...30 VDC), here on terminals 5 and 6 for 3-wire configuration
5. Solder pads
6. Load resistance
7. Output signal, terminals 4 and 5 (0...10 V)

**Figure 4-4:** Connection diagram of the in-head transmitter (4-wire configuration)

1. Terminals for input signal (1, 2 and 3)
2. Potentiometer for zero point setting
3. Potentiometer for measuring span setting
4. Power supply (15...30 VDC), here on terminals 6 and 7 for 4-wire configuration (offers a higher accuracy than the 3-wire configuration)
5. Solder pads
6. Load resistance
7. Output signal, terminals 4 and 5 (0...10 V)
4.3.2 Rail-mount transmitter

**DANGER!**

Neither operate this transmitter in potentially explosive areas, nor connect it to a sensor located in a potentially explosive area! Otherwise the transmitter might cause an explosion that can result in fatal injuries!

**INFORMATION!**

The transmitter has a polarity protection. Connecting the power supply with a wrong polarity will not damage the transmitter.

---

**Figure 4-5: Connection diagram of the rail-mount transmitter (3-wire connection)**

1. Output signal (4...20 mA)
2. Power supply
3. Potentiometer for zero point setting (Z)
4. Potentiometer for measuring span setting (S)
5. Terminals for input signal
6. Load resistance
4 ELECTRICAL CONNECTIONS

Figure 4-6: Connection diagram of the rail-mount transmitter (4-wire connection)

1. Output signal (4...20 mA)
2. Power supply
3. Potentiometer for zero point setting (Z)
4. Potentiometer for measuring span setting (S)
5. Terminals for input signal
6. Load resistance
5.1 Configuring the in-head version

DANGER!
To avoid electric shocks and destructions or damages of the device, assure that all electrical connections comply with the instructions within the chapter "Electrical connections".

DANGER!
Only perform the configuration described in this section if no sensor is connected to the transmitter. Otherwise you could damage the cable insulation during soldering, furthermore the cables could handicap during soldering.

INFORMATION!
In the standard delivery condition the transmitters are not preset. Therefore you have to make a complete solder pad configuration before using the transmitter for the first time. Also note the following items:

- The steps in this section show the complete configuration procedure in the correct order for new transmitters. The manufacturer strongly recommends to follow this procedure, otherwise the calibration may not be proper.
- As an option the manufacturer offers preset transmitters according to the customer’s order. Only in this case the solder pad configuration is not necessary. Though the manufacturer strongly recommends to perform a calibration in this case.
- In some cases you have to change the solder pad configuration of a transmitter that has already been in use. This may be the case e.g. if you must define a new zero point or measuring span for a new application.

Step 1: removing the cover

- Take the transmitter with thumb and forefinger (bottom part lies on the forefinger while the thumb grips the terminals).
- Grip the cover with the thumb and the forefinger of the other hand beside the holes for the screws (the cover is not fixed with screws, but it is plugged on the bottom part).
- Pull the cover upwards [refer to previous drawing].
Step 2: setting the zero point

1. Measuring span
2. Zero point

Step 3: setting the measuring span
The setting of the sensor break monitoring is the last step in the configuration procedure. After the configuration is complete, a calibration is necessary to achieve the best possible measuring results.

5.2 Configuration example (in-head version)

The previous drawing shows an example of a configuration with the following parameters:

- Measuring range: -50...+100°C / -58...+212°F
- Measuring span: 150°C / 270°F
- Sensor break: >11 VDC
- Zero point: -50°C / -58°F

CAUTION!

After the solder pad configuration of the sensor break monitoring is complete, assure that the cover is on its original place again! The cover prevents electrostatic discharge if the solder pads are touched inadvertently; furthermore it protects the solder pads against dirt.
5.3 Configuring the rail-mount version

DANGER!
To avoid electric shocks and destructions or damages of the device, assure that all electrical connections comply with the instructions within the chapter "Electrical connections".

DANGER!
Only perform the configuration described in this section if no sensor is connected to the transmitter. Otherwise you could damage the cable insulation during soldering, furthermore the cables could handicap during soldering.

INFORMATION!
In the standard delivery condition the transmitters are not preset. Therefore you have to make a complete solder pad configuration before using the transmitter for the first time. Also note the following items:

- The steps in this section show the complete configuration procedure in the correct order for new transmitters. The manufacturer strongly recommends to follow this procedure, otherwise the calibration may not be proper.
- As an option the manufacturer offers preset transmitters according to the customer’s order. Only in this case the solder pad configuration is not necessary. Though the manufacturer strongly recommends to perform a calibration in this case.
- In some cases you have to change the solder pad configuration of a transmitter that has already been in use. This may be the case e.g. if you must define a new zero point or measuring span for a new application.

Step 1: removing the cover

- Take a screwdriver and press the tip between the housing and the cover as shown in the previous drawing.
- Remove the cover.
Step 2: setting the zero point

1. Measuring span
2. Zero point

Step 3: setting the measuring span

50°C

100°C

150°C

200°C

100°F

200°F

300°F

400°F
5.4 Configuration example (rail-mount version)

- Measuring range: -50...+100°C / -58...+212°F
- Measuring span: 150°C / 270°F
- Sensor break: > 11 VDC
- Zero point: -50°C / -58°F

5.5 Calibration

**DANGER!**
To avoid electric shocks and destructions or damages of the device, assure that all electrical connections comply with the instructions within the chapter “Electrical connections.”
INFORMATION!
The manufacturer recommends checking the calibration annually. To achieve the best possible accuracy, note the following items:

- All calibration instruments (i.e., resistance decade and amperemeter) must have an accuracy of at least 0.02%.
- Ensure that the complete solder pad configuration has taken place before the calibration.
- The calibration has to take place according to the temperature scales ITS 90 (DIN EN 60751). The resistance decade must have a temperature coefficient setting for platinum ($= 0.00385$).
- If you set an input signal that delivers an output signal of 12 mA as described in the following action sequence, wait circa 15 minutes and check the stability of the output signal afterwards. Only if the output signal is stable then, the transmitter is ready for calibration.

Potentiometers of the in-head version

Potentiometers of the rail-mount version
• Connect the power supply and the precision measuring device for current measurement according to the connection diagram in the chapter “Electrical connections” (the typical power supply is 24 VDC).
• Connect the resistance decade according to the connection diagram in the chapter “Electrical connections”.
• Set an input signal that delivers an output signal of 5 V.
• Wait circa 15 minutes and check the stability of the output signal afterwards. Only if the output signal is stable then, the transmitter is ready for calibration and you can go to the next step!
• Use the resistance decade to set an input signal \( T_m \) that corresponds to the selected lower measuring range value (e.g. 100 \( \Omega \) for a measuring span from 0...+100°C / +32...212°F).
• Use the potentiometer for zero point setting to set exactly a voltage of \( U_{\text{out}} = 0 \text{ V} \) (refer to the drawing above).
• Use the resistance decade to set an input signal \( T_m \) that corresponds to the selected upper measuring range value (e.g. 138.5 \( \Omega \) for a measuring span from 0...+100°C / +32...212°F).
• Use the potentiometer for the measuring span setting to set exactly a voltage of \( U_{\text{out}} = 10 \text{ VDC} \).
• Repeat the steps 5 till 8 until all of the signals are set exactly.
• Secure the potentiometers with varnish.
• The calibration is complete now.

INFORMATION!
The following calibration procedure is valid not only for the rail-mount transmitter, but also for the in-head transmitter.
6.1 Accessory parts

<table>
<thead>
<tr>
<th>Accessory part</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection head installation kit</td>
<td>V170ADA00012</td>
</tr>
<tr>
<td>Rail mounting kit for in-head version</td>
<td>V170ADA00013</td>
</tr>
</tbody>
</table>

6.2 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

6.3 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

INFORMATION!

For more precise information, please contact your local representative.
6.4 Returning the device to the manufacturer

6.4.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

**CAUTION!**
Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- Due to statutory regulations on environmental protection and safeguarding the health and safety of our personnel, manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.
- This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.

**CAUTION!**
If the device has been operated with toxic, caustic, flammable or water-endangering products, you are kindly requested:

- to check and ensure, if necessary by rinsing or neutralizing, that all cavities are free from such dangerous substances,
- to enclose a certificate with the device confirming that is safe to handle and stating the product used.
6.4.2 Form (for copying) to accompany a returned device

<table>
<thead>
<tr>
<th>Company:</th>
<th>Address:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Department:</th>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tel. no.:</th>
<th>Fax no.:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manufacturer’s order no. or serial no.:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The device has been operated with the following medium:

This medium is:
- water-hazardous
- toxic
- caustic
- flammable

We checked that all cavities in the device are free from such substances.

We have flushed out and neutralized all cavities in the device.

We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.

<table>
<thead>
<tr>
<th>Date:</th>
<th>Signature:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stamp:

6.5 Disposal

**CAUTION!**

Disposal must be carried out in accordance with legislation applicable in your country.
7.1 Resistance thermometer

The transmitter only works together with a measuring insert that has a Pt100 RTD. This kind of measuring inserts features a temperature-sensitive sensor made from a platinum RTD, whose value at 0°C / +32°F is 100 Ω. That is where the name “Pt100” comes from.

It is generally valid that the electric resistance of metals increases according to a mathematical function as the temperature rises. This effect is taken advantage of by resistance thermometers to measure temperature. The “Pt100” thermometer features a measuring resistance with defined characteristics, standardised in IEC 60751. The same is true for the tolerances. The average temperature coefficient of a Pt100 is $3.85 \times 10^{-3}$ K$^{-1}$ in the range from 0...+100°C / +32...+212°F.

During operation, a constant current $I \leq 1$ mA flows through the Pt100 RTD, which brings about a voltage drop $U$. The resistance $R$ is calculated using Ohm’s Law [$R=U/I$]. As the voltage drop $U$ at 0°C / +32°F is 100 mV, the resulting resistance of the Pt100 thermometer is 100 Ω (100 mV / 1 mA = 100 Ω).

![Figure 7-1: Pt100 resistance thermometer in 4 wire connection at 0°C / +32°F, schematic.](image)
7.2 Technical data

**INFORMATION!**

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local representative.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Download Center).

### Measuring system

**Application range**

Temperature measurements especially in building services applications.

### Design

#### Versions

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT 11 C</td>
<td>In-head transmitter which is optionally available in an intrinsically safe version for installation in potentially explosive areas (zone 0).</td>
</tr>
<tr>
<td>TT 11 R</td>
<td>Rail-mount transmitter, not available as intrinsically safe version.</td>
</tr>
</tbody>
</table>

#### Special feature

- Sensor break monitoring
- User-definable output: ≤ 0 V or > 11 V DC

### Measuring accuracy

**Accuracy**

Typically ±0.15% of temperature span

### Operating conditions

#### Temperature

<table>
<thead>
<tr>
<th>Type</th>
<th>Operating and storage temperature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-head transmitter</td>
<td>-40...+85°C / -40...+185°F</td>
</tr>
<tr>
<td>Rail-mount transmitter</td>
<td>Operating and storage temperature:</td>
</tr>
<tr>
<td></td>
<td>-20...+70°C / -4...+158°F</td>
</tr>
</tbody>
</table>

#### Humidity

5...95% RH (non-condensing)

#### Protection category

<table>
<thead>
<tr>
<th>Type</th>
<th>Protection category</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-head transmitter</td>
<td>IP20 (with cover), IP10 (without cover)</td>
</tr>
<tr>
<td>Rail-mount transmitter</td>
<td>IP20</td>
</tr>
</tbody>
</table>
## Installation conditions

<table>
<thead>
<tr>
<th>Mounting</th>
<th>In-head transmitter: “B connection head” or larger according to DIN 43729; with the help of the rail mounting kit you can also fix this transmitters on a DIN rail according to DIN 50022 / EN 60715 (refer to Rail mounting kit for in-head transmitters on page 14).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rail-mount transmitter: rail according to DIN 50022 / EN 60715, 35 mm / 1.38”. For detailed information refer to chapter “Installation”.</td>
</tr>
</tbody>
</table>
| Weight          | In-head transmitter: 40 g / 0.09 lb  
|                 | Rail-mount transmitter: 55 g / 0.12 lb  |
| Dimensions      | For detailed information refer to Dimensions on page 35. |

## Materials

| Housing         | In-head transmitter: PC  
|-----------------| Rail-mount transmitter: PC |
| Flammability acc. to UL | V0 (all versions) |

## Electrical connections

| Power supply    | In-head transmitter: 15...30 VDC  
|-----------------| Rail-mount transmitter: 15...30 VDC  |
| Current consumption | 12 mA  |
| Galvanic isolation | No  |
| Connection       | Single/stranded wires: max. 1.5 mm² / AWG 16  |
| Polarity protection | Standard for all versions |

## Inputs / Outputs

### Input

| Type of connection: 3-wire | Span: 50/100/150/200°C and 100/200/300/480°F  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero point: -50...+50°C / -60...+120°F</td>
<td>Fine adjustment: ±10%</td>
</tr>
<tr>
<td>Maximum lead resistance</td>
<td>11 Ω per wire</td>
</tr>
</tbody>
</table>

### Output

| Output signal: 0...10 VDC, temperature linear, 3- or 4-wire connection |
| Update time: ≤ 200 ms |
| Permissible load: Min. 10 kΩ |
| NAMUR compliance: Current limitations and failure currents acc. to NAMUR NE 21 (for frequencies ≥ 150 kHz) |
Approvals and certifications

| CE | The device fulfils the statutory requirements of the EC directives. The manufacturer certifies that these requirements have been met by applying the CE marking. |
Harmonized standard EN 61326-1:2006 |

7.3 Dimensions

In-head transmitter (Ex and Non-Ex)

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>[mm]</th>
<th>[inches]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>44</td>
<td>1.73</td>
</tr>
<tr>
<td>b</td>
<td>26</td>
<td>1.02</td>
</tr>
<tr>
<td>c</td>
<td>16</td>
<td>0.63</td>
</tr>
<tr>
<td>d</td>
<td>7</td>
<td>0.28</td>
</tr>
<tr>
<td>e</td>
<td>33</td>
<td>1.30</td>
</tr>
</tbody>
</table>
Rail-mount transmitter (Ex and Non-Ex)

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>[mm]</th>
<th>[inches]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>17.5</td>
<td>0.69</td>
</tr>
<tr>
<td>b</td>
<td>90</td>
<td>3.54</td>
</tr>
<tr>
<td>c</td>
<td>58</td>
<td>2.28</td>
</tr>
<tr>
<td>d</td>
<td>45</td>
<td>1.77</td>
</tr>
<tr>
<td>e</td>
<td>35</td>
<td>1.38</td>
</tr>
</tbody>
</table>
KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature meters
- Pressure meters
- Analysis products
- Measuring systems for the oil and gas industry
- Measuring systems for sea-going tankers

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www.krohne.com