

Brief Operating Instructions

iTEMP TMT71, TMT72

Temperature transmitter

iTEMP TMT71 with 4 to 20 mA analog output

iTEMP TMT72 with HART® communication



These Brief Operating Instructions are not a substitute for the Operating Instructions pertaining to the device.

Detailed information can be found in the Operating Instructions and the additional documentation.

Available for all device versions via:

- Internet: www.endress.com/deviceviewer
- Smartphone/tablet: Endress+Hauser Operations app



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1 About this document

1.1 Document function

The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

1.2 Symbols used

1.2.1 Safety symbols

DANGER

This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

WARNING

This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in serious or fatal injury.





CAUTION


This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE







This symbol alerts you to a potentially harmful situation. Failure to avoid this situation can result in damage to the product or something in its vicinity.




1.2.2 Electrical symbols

Symbol	Meaning	Symbol	Meaning
	Direct current		Alternating current
	Direct current and alternating current		Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.



Symbol	Meaning
	Potential equalization connection (PE: protective earth) Ground terminals that must be connected to ground prior to establishing any other connections. The ground terminals are located on the interior and exterior of the device: <ul style="list-style-type: none"> ▪ Interior ground terminal: potential equalization is connected to the supply network. ▪ Exterior ground terminal: device is connected to the plant grounding system.

1.2.3 Symbols for certain types of information


Symbol	Meaning	Symbol	Meaning
	Permitted Procedures, processes or actions that are permitted.		Preferred Procedures, processes or actions that are preferred.
	Forbidden Procedures, processes or actions that are forbidden.		Tip Indicates additional information.
	Reference to documentation		Reference to page

Symbol	Meaning	Symbol	Meaning
	Reference to graphic	1, 2, 3...	Series of steps
	Result of a step		Visual inspection

1.2.4 Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3,...	Item numbers	1, 2, 3...	Series of steps
A, B, C, ...	Views	A-A, B-B, C-C, ...	Sections
	Hazardous area		Safe area (non-hazardous area)

1.3 Tool symbols

Symbol	Meaning
 A0011219	Phillips head screwdriver

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:

- ▶ Trained, qualified specialists: must have a relevant qualification for this specific function and task
- ▶ Are authorized by the plant owner/operator
- ▶ Are familiar with federal/national regulations
- ▶ They must have read and understood the instructions in the manual, supplementary documentation and certificates (depending on the application) prior to starting work
- ▶ Follow instructions and comply with basic conditions

The operating personnel must fulfill the following requirements:

- ▶ Must be suitably trained and authorized by the plant operator to meet the requirements of the task
- ▶ Follow the instructions in this manual

2.2 Intended use

The device is a universal and user-configurable temperature transmitter with one sensor input for resistance thermometers (RTD), thermocouples (TC), resistance and voltage transmitters. The head transmitter version of the device is intended for mounting in a terminal head (flat face) as per DIN EN 50446. It is also possible to mount the device on a DIN rail using the optional DIN rail clip. The device is also optionally available in a version suitable for DIN rail mounting as per IEC 60715 (TH35).

If the device is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

The manufacturer is not liable for damage caused by improper or non-intended use.

2.3 Workplace safety

When working on and with the device:

- ▶ Wear the required personal protective equipment as per national regulations.

2.4 Operational safety

- ▶ Operate the device only if it is in proper technical condition, free from errors and faults.
- ▶ The operator is responsible for the interference-free operation of the device.

Hazardous area

To eliminate a danger for persons or for the facility when the device is used in the hazardous area (e.g. explosion protection or safety equipment):

- ▶ Based on the technical data on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area. The nameplate can be found on the side of the transmitter housing.
- ▶ Observe the specifications in the separate supplementary documentation that is an integral part of these instructions.

Electromagnetic compatibility

The measuring system complies with the general safety requirements as per EN 61010-1, the EMC requirements as per the IEC/EN 61326 series and the NAMUR recommendations NE 21.

NOTICE

- ▶ The device must only be powered by a power unit that operates using an energy-limited electric circuit according to UL/EN/IEC 61010-1, Section 9.4 and the requirements in Table 18.

2.5 Product safety

This measuring device is designed in accordance with good engineering practice to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate.

It meets general safety standards and legal requirements. It also complies with the EU directives listed in the device-specific EU Declaration of Conformity. The manufacturer confirms this by affixing the CE mark to the device.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

On receipt of the delivery:

1. Check the packaging for damage.
 - ↳ Report all damage immediately to the manufacturer.
Do not install damaged components.
2. Check the scope of delivery using the delivery note.
3. Compare the data on the nameplate with the order specifications on the delivery note.
4. Check the technical documentation and all other necessary documents, e.g. certificates, to ensure they are complete.



If one of the conditions is not satisfied, contact the manufacturer.

3.2 Product identification

The device can be identified in the following ways:

- Nameplate specifications
- Enter the serial number from the nameplate into *Device Viewer* (www.endress.com/deviceviewer): all the information about the device and an overview of the Technical Documentation supplied with the device are displayed.
- Enter the serial number from the nameplate into the *Endress+Hauser Operations App* or scan the 2-D matrix code (QR code) on the nameplate with the *Endress+Hauser Operations App*: all the information about the device and the technical documentation pertaining to the device is displayed.

3.2.1 Nameplate

Do you have the correct device?

The nameplate provides you with the following information on the device:

- Manufacturer identification, device designation
- Order code
- Extended order code
- Serial number
- Tag name (TAG) (optional)
- Technical values, e.g. supply voltage, current consumption, ambient temperature, communication-specific data (optional)

- Degree of protection
 - Approvals with symbols
 - Reference to Safety Instructions (XA) (optional)
- Compare the information on the nameplate with the order.

3.2.2 Name and address of manufacturer

Name of manufacturer:	Endress+Hauser Wetzer GmbH + Co. KG
Address of manufacturer:	Obere Wank 1, D-87484 Nesselwang or www.endress.com

3.3 Storage and transport

Storage temperature

Head transmitter	-50 to +100 °C (-58 to +212 °F)
DIN rail transmitter	-50 to +100 °C (-58 to +212 °F)

Maximum relative humidity: < 95 % as per IEC 60068-2-30



Pack the device for storage and transportation in such a way that it is reliably protected against impact and external influences. The original packaging offers the best protection.

4 Mounting

4.1 Mounting requirements

4.1.1 Installation point

- Head transmitter:
 - in the terminal head, flat face, as per DIN EN 50446, direct mounting on insert with cable entry (middle hole 7 mm)
 - in the field housing, separated from the process
 - with DIN rail clip on DIN rail as per IEC 60715, TH35
- DIN rail transmitter:
 - On DIN rail as per IEC 60715, TH35

NOTICE

When using DIN rail transmitters with a thermocouple/mV measurement, increased measurement errors may occur depending on the installation situation and ambient conditions.

- If the DIN rail transmitter is mounted on the DIN rail without any adjacent devices, this may result in deviations of up to ± 1.3 °C. If the DIN rail transmitter is mounted in series between other DIN rail devices (reference operating conditions: 24 V, 12 mA), deviations of up to + 2.9 °C may occur.

4.1.2 Important ambient conditions

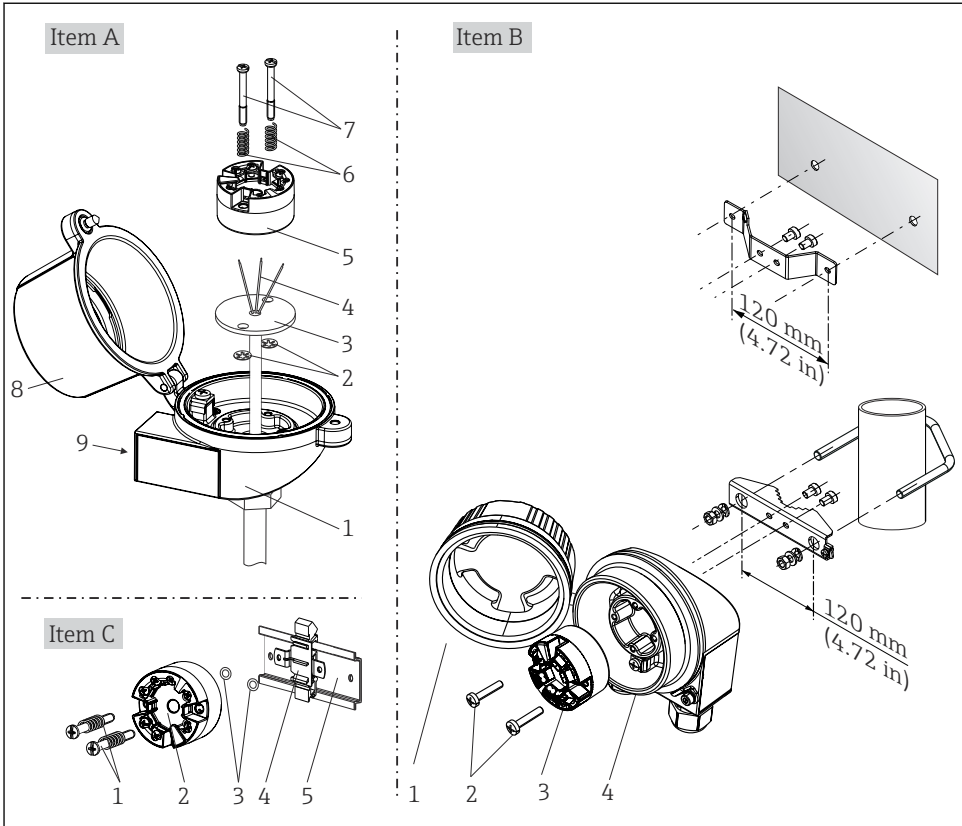
Ambient temperature range	-40 to +85 °C (-40 to 185 °F).
Operating altitude	Up to 4 000 m (13 123 ft) above sea level.
Overvoltage category	II
Pollution degree	2
Protection class	III
Condensation	Condensation as per IEC 60068-2-33 permitted for head transmitter, not permitted for DIN rail transmitter
Climate class	Head transmitter in accordance with climate class C1, DIN rail transmitter in accordance with B2 as per IEC 60654-1
Degree of protection	<ul style="list-style-type: none"> ▪ Head transmitter with screw terminals: IP 20, with push-in terminals: IP 30. When the device is installed, the degree of protection depends on the terminal head or field housing used. ▪ When installing in field housing TA30x: IP 66/68 (NEMA Type 4x encl.) ▪ DIN rail transmitter: IP 20
Shock and vibration resistance	<p>Vibration resistance as per DNVGL-CG-0339: 2015 and DIN EN 60068-2-27</p> <ul style="list-style-type: none"> ▪ Head transmitter: 2 to 100 Hz at 4g (increased vibration stress) ▪ DIN rail transmitter: 2 to 100 Hz at 0.7g (general vibration stress) <p>Shock resistance as per KTA 3505 (section 5.8.4 Shock test)</p>

4.2 Mounting the device

A Phillips head screwdriver is required to mount the head transmitter.

- Maximum torque for securing screws = 1 Nm ($\frac{3}{4}$ foot-pound), screwdriver: Pozidriv Z2
- Maximum torque for screw terminals = 0.35 Nm ($\frac{1}{4}$ foot-pound), screwdriver: Pozidriv Z1

4.2.1 Mounting the head transmitter

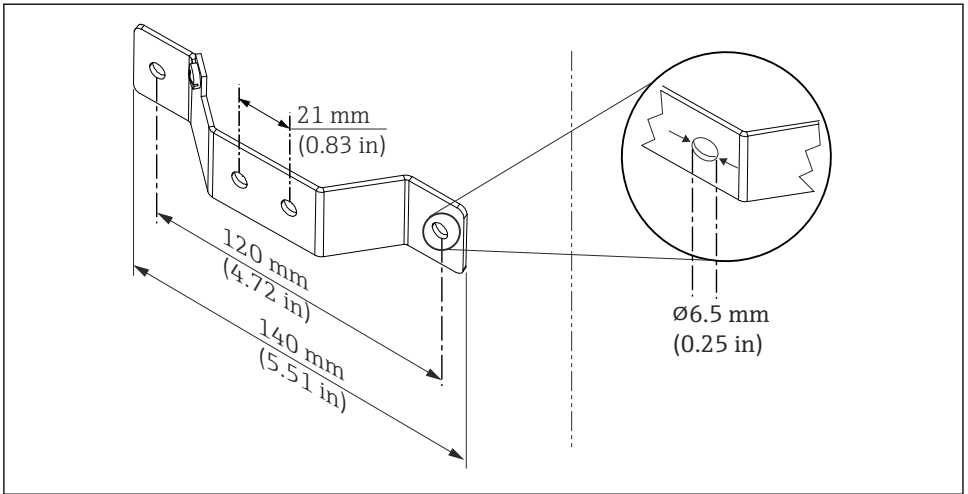


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1 Head transmitter mounting (three versions)

Procedure for mounting in a terminal head, pos. A:


1. Open the terminal head cover (8) on the terminal head.
2. Guide the connection wires (4) of the insert (3) through the center hole in the head transmitter (5).
3. Fit the mounting springs (6) on the mounting screws (7).
4. Guide the mounting screws (7) through the side boreholes of the head transmitter and the insert (3). Then fix both mounting screws with the snap rings (2).
5. Then tighten the head transmitter (5) along with the insert (3) in the terminal head.
6. After wiring, close the terminal head cover (8) tightly again. → 14



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 2 Dimensions of angle bracket for wall mount (complete wall mounting set available as accessory)

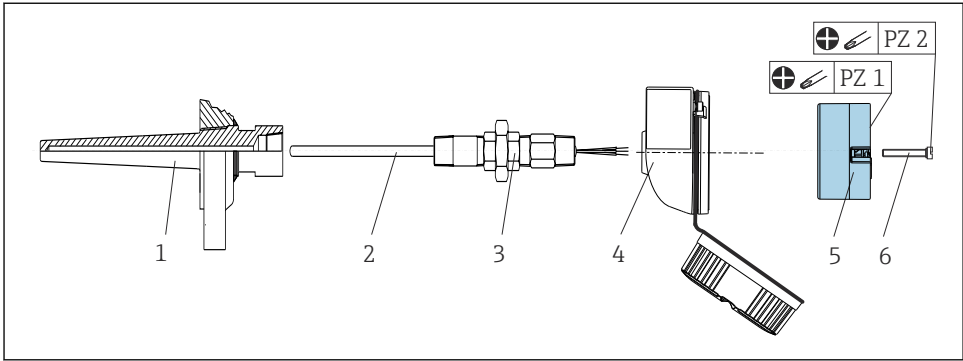
Procedure for mounting in a field housing, pos. B:

1. Open the cover (1) of the field housing (4).
2. Guide the mounting screws (2) through the lateral bores in the head transmitter (3).
3. Screw the head transmitter to the field housing.
4. After wiring, close the field housing cover (1) again. →  14

Procedure for mounting on a DIN rail, pos. C:

1. Press the DIN rail clip (4) onto the DIN rail (5) until it engages with a click.
2. Fit the mounting springs on the mounting screws (1) and guide the screws through the side boreholes of the head transmitter (2). Then fix both mounting screws with the snap rings (3).
3. Screw the head transmitter (2) onto the DIN rail clip (4).

Mounting for North America



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3 Head transmitter mounting

Thermometer design with thermocouples or RTD sensors and head transmitter:

1. Fit the thermowell (1) on the process pipe or the container wall. Secure the thermowell according to the instructions before the process pressure is applied.
2. Fit the necessary neck tube nipples and adapter (3) on the thermowell.
3. Make sure sealing rings are installed if such rings are needed for harsh environmental conditions or special regulations.
4. Guide the mounting screws (6) through the lateral bores of the head transmitter (5).
5. Position the head transmitter (5) in the terminal head (4) in such a way that the bus cable (terminals 1 and 2) point to the cable entry.
6. Using a screwdriver, screw down the head transmitter (5) in the terminal head (4).
7. Guide the connection wires of the insert (3) through the lower cable entry of the terminal head (4) and through the middle hole in the head transmitter (5). Wire the connection wires up to the transmitter. → 15
8. Screw the terminal head (4), with the integrated and wired head transmitter, onto the ready-mounted nipple and adapter (3).

NOTICE

The terminal head cover must be secured properly to meet the requirements for explosion protection.

- After wiring, securely screw the terminal head cover back on.

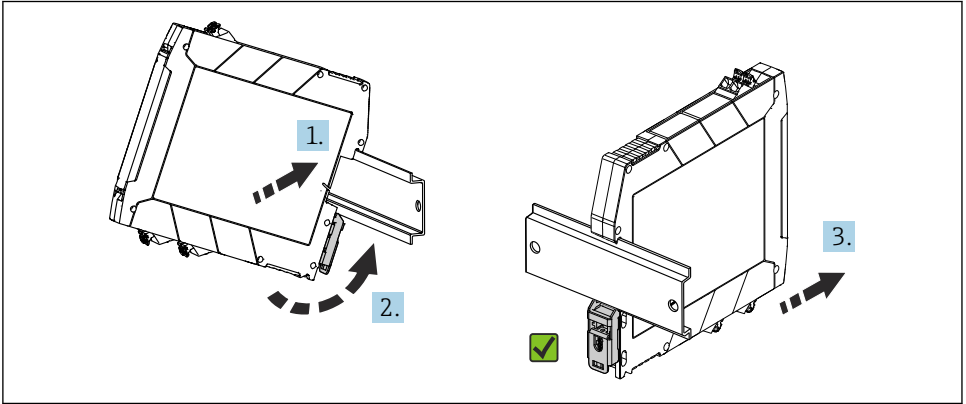
4.2.2 Mounting the DIN rail transmitter

NOTICE

Wrong orientation

Measurement deviates from the maximum measurement accuracy when a thermocouple is connected and the internal reference junction is used.

- ▶ Mount the device vertically and ensure it is correctly oriented.



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4 Mounting the DIN rail transmitter

1. Position the top DIN rail groove at the top end of the DIN rail.
2. Slide the bottom of the device over the bottom end of the DIN rail until you can hear the lower DIN rail clip click into place on the DIN rail.
3. Pull gently on the device to check if it is correctly mounted on the DIN rail.

If it doesn't move, the DIN rail transmitter is correctly mounted.

4.3 Post-mounting checks

After installing the device, always perform the following checks:

Device health and specifications	Notes
Is the device undamaged (visual inspection)?	-
Do the ambient conditions match the device specification (e.g. ambient temperature, measuring range, etc.)?	→ 9

5 Electrical connection

CAUTION

- ▶ Switch off the power supply before installing or connecting the device. Failure to observe this may result in the destruction of parts of the electronics.
- ▶ Do not occupy the display connection. An incorrect connection can destroy the electronics.

NOTICE



Do not overtighten the screw terminals, as this could damage the transmitter.

- ▶ Maximum torque = 0.35 Nm ($\frac{1}{4}$ lbf ft), screwdriver: Pozidriv PZ1.

5.1 Connection requirements

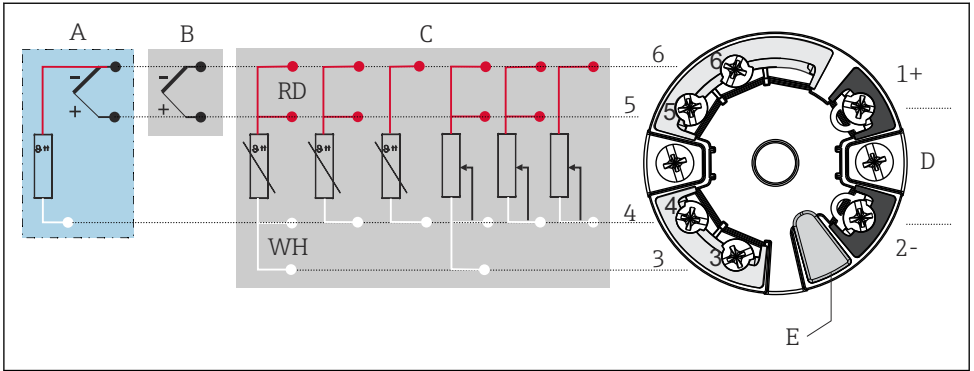
A Phillips head screwdriver is required to wire the head transmitter with screw terminals. A flat-blade screwdriver must be used for the DIN rail transmitter version with screw terminals. The push-in terminal version can be wired without any tools.

Proceed as follows to wire a head transmitter mounted in the terminal head or field housing:

1. Open the cable gland and the housing cover on the terminal head or the field housing.
2. Feed the cables through the opening in the cable gland.
3. Connect the cables as shown in →  15. If the head transmitter is fitted with push-in terminals, pay particular attention to the information in the "Connecting to push-in terminals" section. →  16
4. Tighten the cable gland again and close the housing cover.

In order to avoid connection errors always follow the instructions in the post-connection check section before commissioning!

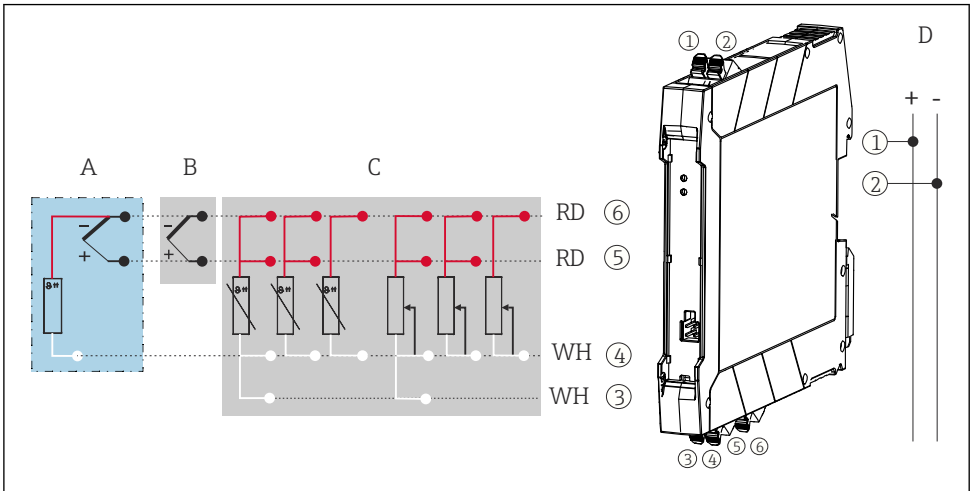
5.2 Quick wiring guide



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5 Terminal assignment of head transmitter

- A Sensor input, TC and mV, external reference junction (CJ) Pt100
- B Sensor input, TC and mV, internal reference junction (CJ)
- C Sensor input, RTD and Ω , 4-, 3- and 2-wire
- D Bus connection and power supply 4 to 20 mA
- E Display connection and CDI interface



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6 Terminal assignment of DIN rail transmitter


- A Sensor input, TC and mV, external reference junction (CJ), Pt100
- B Sensor input, TC and mV, internal reference junction (CJ)
- C Sensor input, RTD and Ω , 4-, 3- and 2-wire
- D Bus connection and power supply 4 to 20 mA

An unshielded installation cable is sufficient for using the analog signal. In case of increased EMC influences, the use of shielded cables is recommended. For the DIN rail transmitter, a shielded cable must be used for sensor cable lengths of 30 m (98.4 ft) or more.

A shielded cable is recommended for HART communication. Observe grounding concept of the plant. A minimum load of 250 Ω is required in the signal circuit in order to operate the HART transmitter via the HART protocol (terminals 1 and 2).

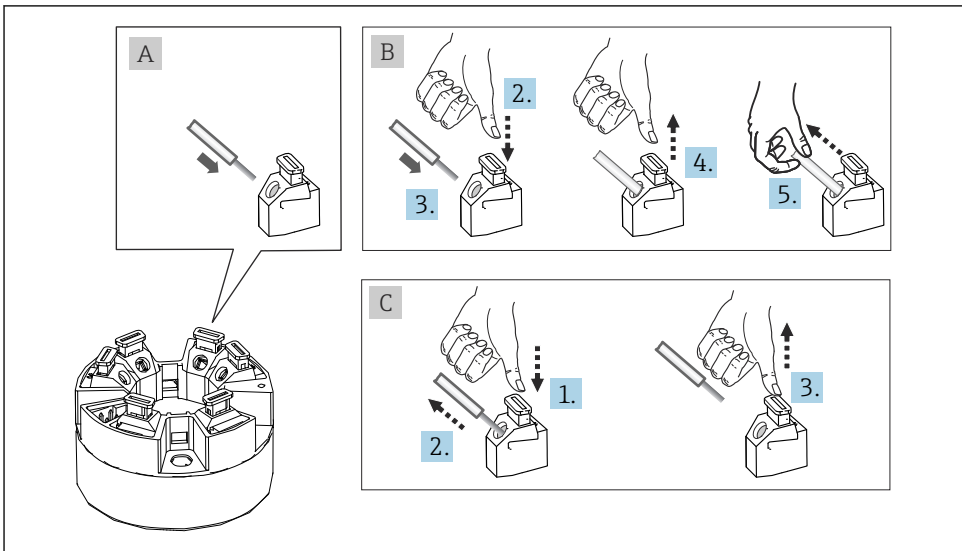
In the case of a thermocouple measurement (TC), a 2-wire RTD can be connected to measure the reference junction temperature. This is connected to terminals 4 and 6.

NOTICE

- ▶  ESD – Electrostatic discharge. Protect the terminals from electrostatic discharge. Failure to observe this may result in the destruction or malfunction of parts of the electronics.

5.3 Connecting the sensor

5.3.1 Connecting to push-in terminals



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- ▶ 7 Push-in terminal connection, using the example of a head transmitter

Fig. A, solid wire:

1. Strip wire end. Minimum stripping length 10 mm (0.39 in).
2. Insert the wire end into the terminal.

3. Pull the wire gently to ensure it is connected correctly. Repeat starting from step 1 if necessary.


Fig. B, fine-strand wire without ferrule:

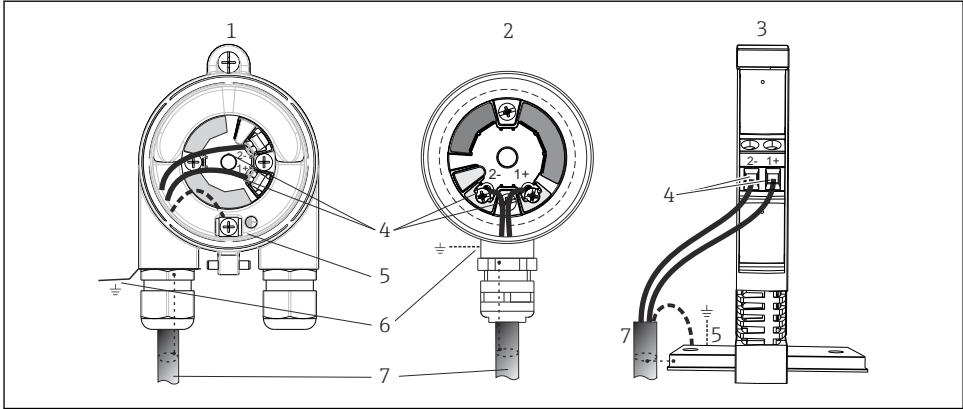
1. Strip wire end. Minimum stripping length 10 mm (0.39 in).
2. Press down on the lever opener.
3. Insert the wire end into the terminal.
4. Release lever opener.
5. Pull the wire gently to ensure it is connected correctly. Repeat starting from step 1 if necessary.

Item C, releasing the connection:

1. Press down on the lever opener.
2. Remove the wire from the terminal.
3. Release lever opener.

5.4 Connecting the transmitter

Also observe the general procedure on →  14.

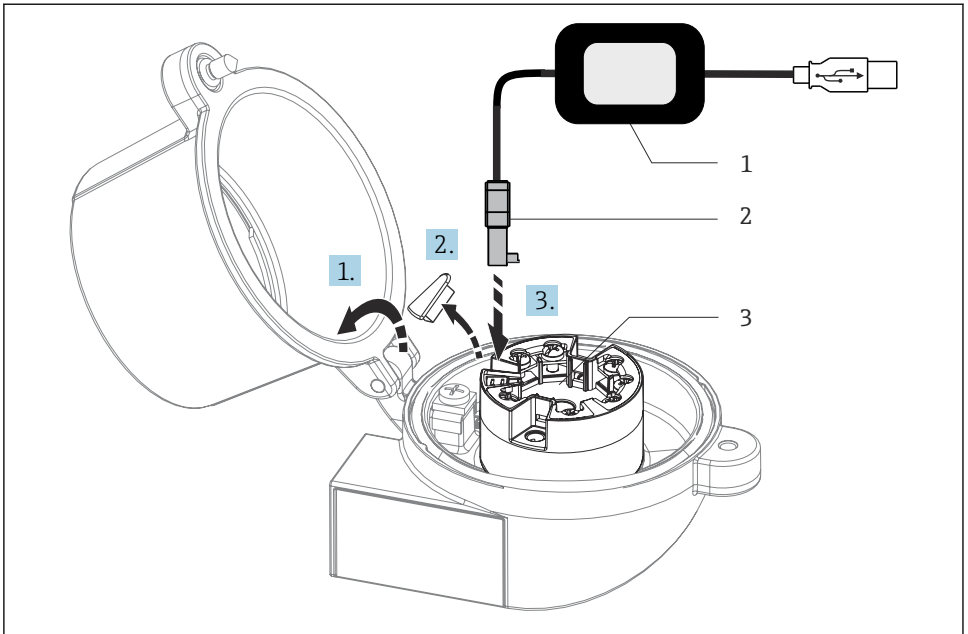


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8 Connecting the signal cables and power supply

- 1 Head transmitter installed in field housing
- 2 Head transmitter installed in terminal head
- 3 DIN rail transmitter mounted on DIN rail
- 4 Terminals for HART protocol and power supply
- 5 Internal ground connection
- 6 External ground connection
- 7 Shielded signal cable (recommended for HART protocol)

- i** The terminals for the power supply the signal cable connection (1+ and 2-) are protected against reverse polarity.
- Conductor cross-section:
 - max. 2.5 mm² (0.004 in²) for screw terminals
 - max. 1.5 mm² (0.0023 in²) for push-in terminals Min. stripping length of wire 10 mm (0.39 in)



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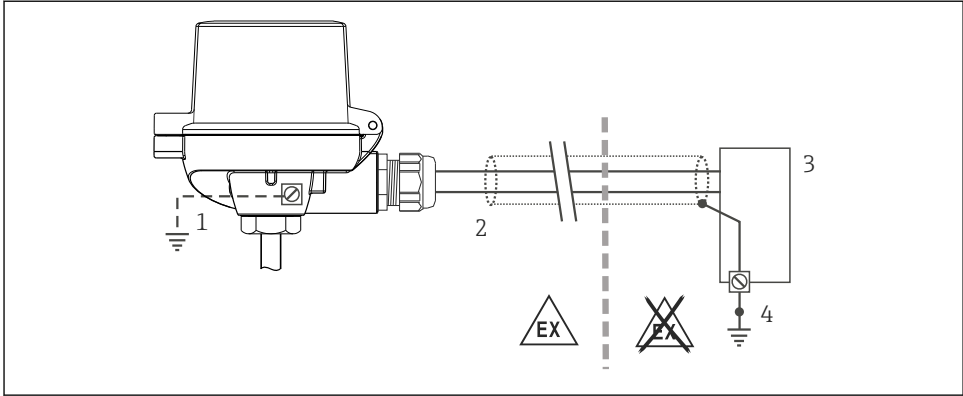
- 9 *Fitting the CDI connector of the configuration kit for configuration, visualization and maintenance of the head transmitter via PC and configuration software*

- 1 *Configuration kit with USB port*
- 2 *CDI connector*
- 3 *Installed head transmitter with CDI interface*

5.5 Special connection instructions

Shielding and grounding

The specifications of the FieldComm Group must be observed when installing the HART transmitter.



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10 Shielding and grounding the signal cable at one end with HART communication

- 1 Optional grounding of the field device, isolated from cable shielding
- 2 Grounding of the cable shield at one end
- 3 Supply unit
- 4 Grounding point for HART communication cable shield

5.6 Post-connection check

Device condition and specifications	Notes
Is the device or cable undamaged (visual check)?	--
Electrical connection	Notes
Does the supply voltage match the specifications on the nameplate?	<ul style="list-style-type: none"> ▪ Head transmitter: $U = 10$ to $36 V_{DC}$ ▪ DIN rail transmitter: $U = 11$ to $36 V_{DC}$ ▪ Other values apply in the hazardous area; see the corresponding Ex Safety Instructions.
Are the mounted cables relieved of tension?	--
Are the power supply and signal cables connected correctly?	→ 15
Are all the screw terminals firmly tightened and have the push-in terminal connections been checked?	--
Are all the cable entries installed, tightened and leak-tight?	--
Are all housing covers installed and securely tightened?	--

6 Operation options

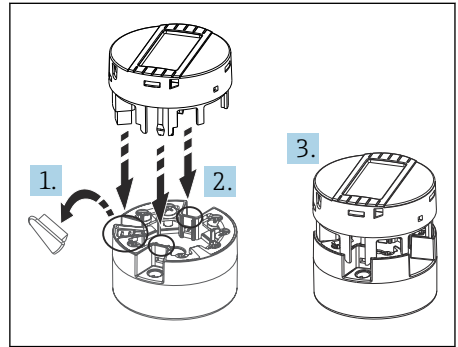
6.1 Overview of operation options

6.1.1 Measured value display and operating elements

Option: Display TID10 for head transmitter



The display may also be subsequently ordered at any time after purchasing the transmitter, see the 'Accessories' section in the Operating Instructions for the device.

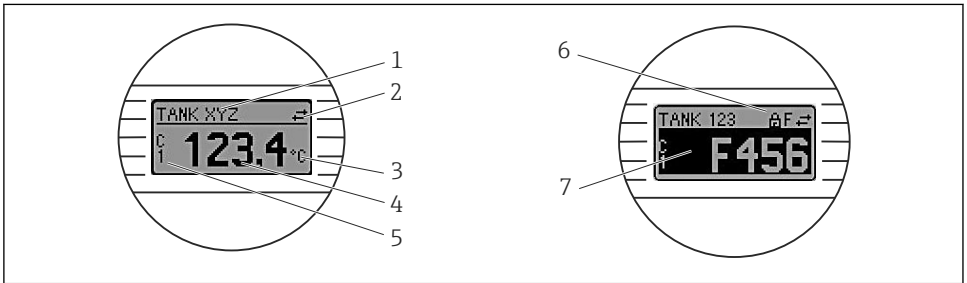


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11 Attach the display to the transmitter

Display elements

Head transmitter



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12 Optional LC display for head transmitter

Item no.	Function	Description
1	Displays the TAG	TAG, 32 characters long.
2	'Communication' symbol	The communication symbol appears when read and write-accessing via the fieldbus protocol.
3	Unit display	Unit display for the measured value displayed.
4	Measured value display	Displays the current measured value.

Item no.	Function	Description
5	Value/channel display DT, PV, I, %	e.g. PV for a measured value from channel 1 or DT for the device temperature
6	'Configuration locked' symbol	The 'configuration locked' symbol appears when configuration is locked via the hardware.
7	Status signals	

DIN rail transmitter

Two LEDs on the front indicate the device status.

Type	Function and characteristic
Status LED (red)	When the device is operating without errors, the device status is displayed. This function can no longer be guaranteed in the event of an error. <ul style="list-style-type: none"> ■ LED off: without diagnostic message ■ LED is lit: diagnostic display, category F ■ LED flashing: diagnostic display of categories C, S or M
Power LED (green) 'ON'	When the device is operating without errors, the operating status is displayed. This function can no longer be guaranteed in the event of an error. <ul style="list-style-type: none"> ■ LED off: Power failure or insufficient supply voltage ■ LED is lit: Supply voltage is OK (either via CDI or via supply voltage, terminals 1+, 2-)

i The DIN rail transmitter version does not have an interface to the LC display and therefore does not have a local display either.

Local operation

NOTICE

- ▶ **⚡** ESD - Electrostatic discharge Protect the terminals from electrostatic discharge. Failure to observe this may result in the destruction or malfunction of parts of the electronics.

	<p>1: Connection to head transmitter</p> <p>2: DIP switches (1 - 64, SW/HW, ADDR and SIM = simulation mode) have no function for this head transmitter</p> <p>3: DIP switch (WRITE LOCK = write protection; DISPL. 180° = switch, turn the display monitor 180°)</p>
<small>A0014562</small>	
<p>13 Hardware settings via DIP switches</p>	

Procedure for setting the DIP switch:

1. Open the cover of the terminal head or field housing.

2. Remove the attached display from the head transmitter.
3. Configure the DIP switch on the rear of the display accordingly. In general: switch to ON = function enabled, switch to OFF = function disabled.
4. Fit the display onto the head transmitter in the correct position. The head transmitter accepts the settings within one second.
5. Secure the cover back onto the terminal head or field housing.

Switching write protection on/off

Write protection is switched on and off via a DIP switch on the rear of the optional attachable display. When write protection is active, parameters cannot be modified. A lock symbol on the display indicates that write protection is on. Write protection prevents any write access to the parameters. Write protection remains active even when the display is removed. To deactivate write protection, the display must be attached to the transmitter with the DIP switch switched off (WRITE LOCK = OFF). The transmitter adopts the setting during operation and does not need to be restarted.

Turning the display

The display can be rotated 180° using the "DISPL. 180°" DIP switch.

6.2 Transmitter configuration

The transmitter and the measured value display are configured via the HART protocol or the CDI (= Endress+Hauser Common Data Interface) interface. The following operating tools are available for this purpose:

Operating tools

FieldCare, DeviceCare, Field Xpert SMT70 (Endress+Hauser)	SIMATIC PDM (Siemens)
AMS Device Manager (Emerson Process Management)	AMS Trex Device Communicator (Emerson Process Management)



The configuration of device-specific parameters is described in detail in the Operating Instructions for the device.


6.3 Access to the operating menu via the SmartBlue app

The device can be operated and configured via the SmartBlue app. In this case, the connection is established via the Bluetooth interface.

The SmartBlue app is available for free download for Android devices (Google Playstore) and iOS devices (iTunes Apple Shop) : *Endress+Hauser SmartBlue*



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 14 *Directly to the app with the QR code*

System requirements

- Devices with iOS:
 - iPhone 4S or higher, from iOS9.0
 - iPad2 or higher, from iOS9.0
 - iPod Touch 5th generation or higher, from iOS9.0
- Devices with Android:
 - Android 4.4 KitKat or higher

Download the SmartBlue app:

1. Install and start the SmartBlue app.
 - ↳ A Live List shows all the devices available.
2. Select the device from the Live List.
 - ↳ The Login dialog box opens.

Logging in:



3. Enter the user name: **admin**
4. Enter the initial password: serial number of the device.
5. Confirm your entry.
 - ↳ The device information opens.

 The transmitter's optional Bluetooth interface is only active if a display unit is not attached or the CDI interface is not used for device configuration.

7 Commissioning

7.1 Function check

Before commissioning the measuring point, make sure that all final checks have been carried out:

- "Post-mounting check" checklist →  13
- "Post-connection check" checklist →  20

7.2 Switching on the device

Once you have completed the post-connection checks, switch on the supply voltage. The transmitter performs a number of internal test functions after power-up. During this process, a sequence containing device information appears on the display.

The device works after approx. 7 seconds, including the attached display. Normal measuring mode commences as soon as the switch-on procedure is completed. Measured values and status values appear on the display.



If the display is attached when the Bluetooth interface is activated, display initialization is performed twice and Bluetooth communication is disabled simultaneously.

8 Maintenance and cleaning

No special maintenance work is required for the device.

A clean, dry cloth can be used to clean the device.



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