

# Brief Operating Instructions iTEMP TMT142B

Temperature transmitter

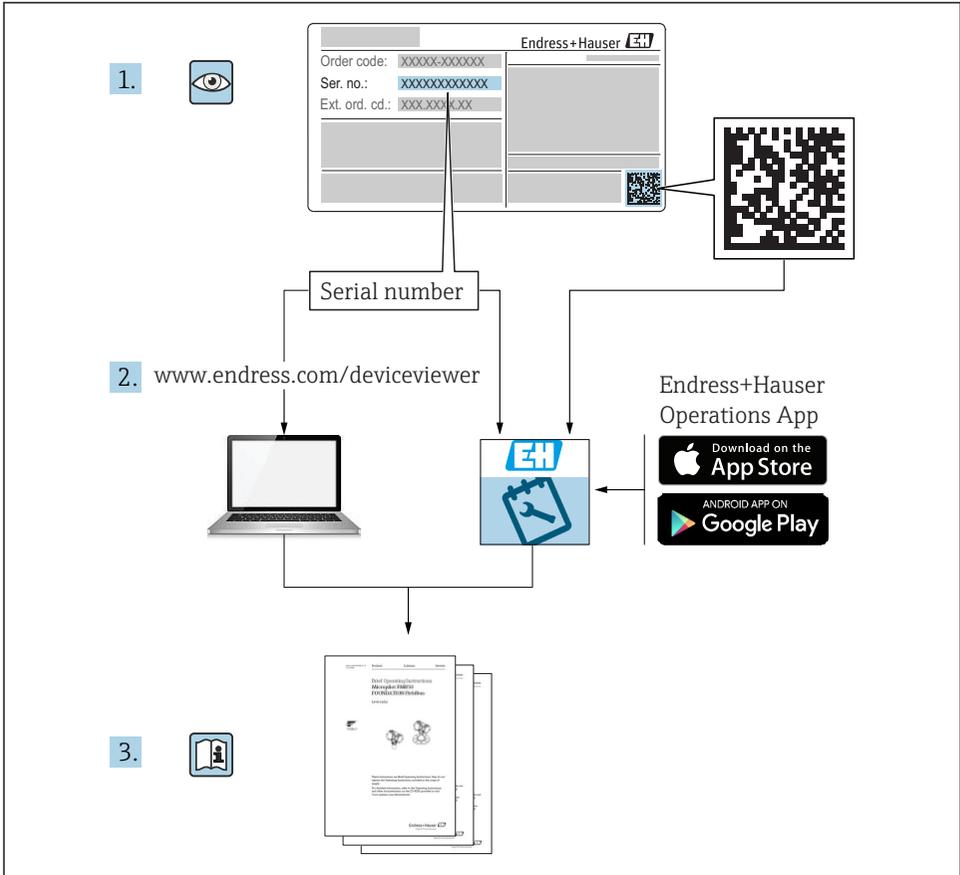


These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

For detailed information, refer to the Operating Instructions and other documentation.

Available for all device versions via:

- Internet: [www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)
- Smart phone/Tablet: Endress+Hauser Operations App



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# Table of contents

<b>1</b>	<b>About this document</b> .....	<b>3</b>
1.1	Safety Instructions (XA) .....	3
1.2	Symbols .....	4
1.3	Tool symbols .....	4
1.4	Registered trademark .....	4
<b>2</b>	<b>Basic safety instructions</b> .....	<b>5</b>
2.1	Requirements for personnel .....	5
2.2	Designated use .....	5
2.3	Operational safety .....	5
<b>3</b>	<b>Incoming acceptance and product identification</b> .....	<b>6</b>
3.1	Incoming acceptance .....	6
3.2	Product identification .....	6
3.3	Scope of delivery .....	7
3.4	Certificates and approvals .....	8
<b>4</b>	<b>Installation</b> .....	<b>8</b>
4.1	Mounting requirements .....	8
4.2	Mounting the transmitter .....	8
4.3	Post-installation check .....	10
<b>5</b>	<b>Electrical connection</b> .....	<b>11</b>
5.1	Connection conditions .....	11
5.2	Connecting the sensor .....	12
5.3	Connecting the measuring device .....	13
5.4	Special connection instructions .....	15
5.5	Ensuring the degree of protection .....	16
5.6	Post-connection check .....	16
<b>6</b>	<b>Operation options</b> .....	<b>17</b>
6.1	Overview of operation options .....	17
6.2	Transmitter configuration .....	18
6.3	Access to the operating menu via the SmartBlue App .....	18
<b>7</b>	<b>Commissioning</b> .....	<b>19</b>
7.1	Switching on the transmitter .....	19

## 1 About this document

### 1.1 Safety Instructions (XA)

When using in hazardous areas, compliance with national regulations is mandatory. Separate Ex-specific documentation is provided for measuring systems that are used in hazardous areas. This documentation is an integral part of these Operating Instructions. The installation specifications, connection data and safety instructions it contains must be strictly observed! Make sure that you use the right Ex-specific documentation for the right device with approval for use in hazardous areas! The number of the specific Ex documentation (XA...) is provided on the nameplate. If the two numbers (on the Ex documentation and the nameplate) are identical, then you may use this Ex-specific documentation.

## 1.2 Symbols

### 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 dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

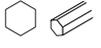
#### CAUTION

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

#### NOTICE

This symbol contains information on procedures and other facts which do not result in personal injury.

## 1.3 Tool symbols

Symbol	Meaning
 A0011219	Phillips head screwdriver
 A0011221	Allen key
 A0011222	Open-ended wrench

## 1.4 Registered trademark

### HART®

Registered trademark of the FieldComm Group, Austin, Texas, USA

### Bluetooth®

The *Bluetooth*® word mark and logos are registered trademarks owned by the Bluetooth SIG, Inc. and any use of such marks by Endress+Hauser is under license. Other trademarks and trade names are those of their respective owners.

## 2 Basic safety instructions

### 2.1 Requirements for 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.
- ▶ Personnel must be authorized by the plant owner/operator.
- ▶ Be familiar with federal/national regulations.
- ▶ Before starting work: personnel must read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- ▶ Personnel must follow instructions and comply with general policies.

The operating personnel must fulfill the following requirements:

- ▶ Personnel are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- ▶ Personnel follow the instructions in this manual.

### 2.2 Designated use

The device is a universal and user-configurable temperature transmitter with one sensor input for a resistance thermometer (RTD), thermocouples (TC), resistance and voltage transmitters. The device is designed for installation in the field.

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-designated use.

### 2.3 Operational safety

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

#### Electromagnetic compatibility

The measuring system complies with the general safety requirements and EMC requirements as per the IEC/EN 61326 series and NAMUR recommendation NE 21.

**NOTICE**

- ▶ The device may only be powered by a power unit with an energy-limited circuit in accordance with UL/EN/IEC 61010-1, Section 9.4 and the requirements of Table 18.

## 3 Incoming acceptance and product identification

### 3.1 Incoming acceptance

1. Unpack the temperature transmitter carefully. Is the packaging or content damaged?
  - ↳ Damaged components may not be installed as the manufacturer can otherwise not guarantee compliance with the original safety requirements or the material resistance, and can therefore not be held responsible for any resulting damage.
2. Is the delivery complete or is anything missing? Check the scope of delivery against your order.
3. Does the nameplate match the ordering information on the delivery note?
4. Are the technical documentation and all other necessary documents provided? If applicable: are the Safety Instructions (e.g. XA) for hazardous areas provided?

 If one of these conditions is not satisfied, contact the Endress+Hauser Sales Center.

### 3.2 Product identification

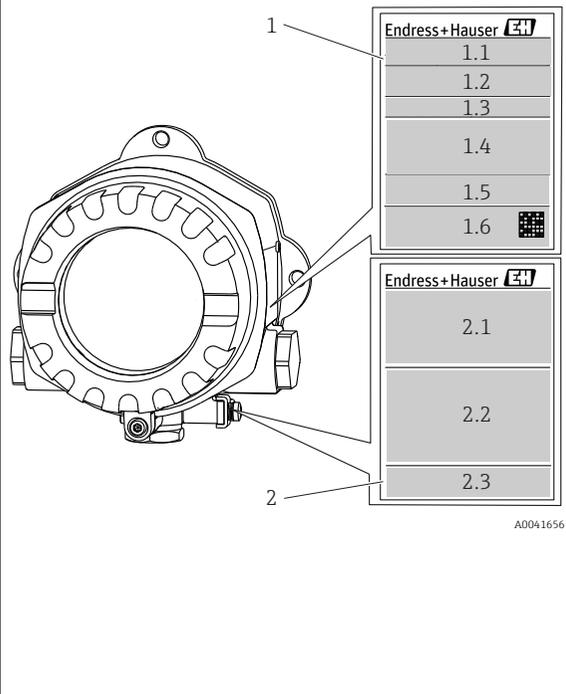
The following options are available for identification of the device:

- Nameplate specifications
- Extended order code with breakdown of the device features on the delivery note
- Enter the serial number from the nameplate in the *W@M Device Viewer* ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)): all data relating to the device and an overview of the Technical Documentation supplied with the device are displayed.
- Enter the serial number on 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

#### The right device?

Compare and check the data on the nameplate of the device against the requirements of the measuring point:

 <p>1</p> <p>2</p> <p>A0041656</p>	<table border="1"> <tr> <td>1:</td> <td><b>Nameplate of the transmitter (example):</b></td> </tr> <tr> <td>1.1:</td> <td>Device name and manufacturer ID</td> </tr> <tr> <td>1.2:</td> <td>Order code, extended order code and serial number</td> </tr> <tr> <td>1.3:</td> <td>Power supply, output, current consumption, device revision, firmware and hardware version, degree of protection</td> </tr> <tr> <td>1.4:</td> <td>Radio approval (Bluetooth®), optional - depending on the configuration</td> </tr> <tr> <td>1.5:</td> <td>2 lines for the TAG name</td> </tr> <tr> <td>1.6:</td> <td>Approvals with symbols and 2D DataMatrix</td> </tr> </table>	1:	<b>Nameplate of the transmitter (example):</b>	1.1:	Device name and manufacturer ID	1.2:	Order code, extended order code and serial number	1.3:	Power supply, output, current consumption, device revision, firmware and hardware version, degree of protection	1.4:	Radio approval (Bluetooth®), optional - depending on the configuration	1.5:	2 lines for the TAG name	1.6:	Approvals with symbols and 2D DataMatrix
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### 3.2.2 Name and address of manufacturer

<b>Name of manufacturer:</b>	Endress+Hauser Wetzler GmbH + Co. KG
<b>Address of manufacturer:</b>	Obere Wank 1, D-87484 Nesselwang or <a href="http://www.endress.com">www.endress.com</a>
<b>Address of manufacturing plant:</b>	See nameplate

## 3.3 Scope of delivery

The scope of delivery of the device comprises:

- Temperature transmitter
- Pipe mounting bracket, optional
- Dummy plug
- Hard copy of multi-language Brief Operating Instructions
- Additional documentation for devices which are suitable for use in hazardous areas, e.g. Safety Instructions (XA...), Control or Installation Drawings (ZD...).

## 3.4 Certificates and approvals

### 3.4.1 CE/EAC mark, Declaration of Conformity

The device meets the legal requirements of the EU/EEU guidelines. The manufacturer confirms that the device is compliant with the relevant guidelines by applying the CE/EAC mark.

### 3.4.2 HART® protocol certification

The temperature transmitter is registered by the HART® FieldComm Group. The device meets the requirements of the HART® Communication Protocol Specifications.

## 4 Installation

### 4.1 Mounting requirements

#### 4.1.1 Mounting location

When using in hazardous areas, the limit values of the certificates and approvals must be observed, please see Ex certificates.

#### 4.1.2 Important ambient conditions

- Ambient temperature:
  - Without display: -40 to +85 °C (-40 to +185 °F)
  - With display: -40 to +80 °C (-40 to +176 °F)
  - With overvoltage protection module: -40 to +85 °C (-40 to +185 °F)
- Climate class as per IEC 60654-1, Class Dx
- Humidity: permitted maximum 0 to 95 %
- Degree of protection IP 66/67, Type 4X
- Altitude up to 4 000 m (13 123 ft)
- Overvoltage category: 2
- Degree of contamination: 2

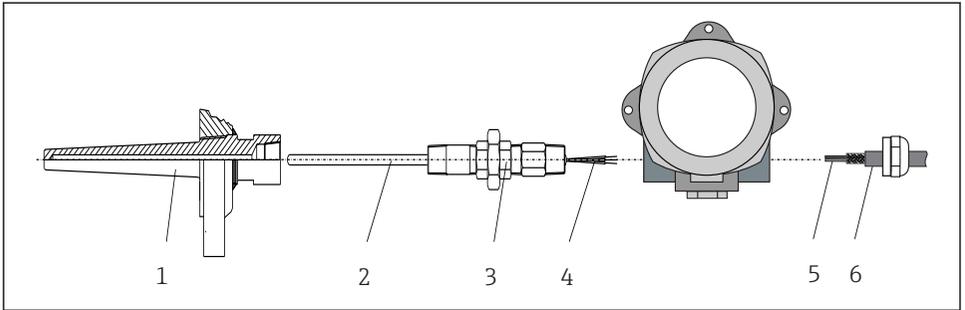


The display can react slowly at temperatures < -20 °C (-4 °F). The legibility of the display cannot be guaranteed at temperatures < -30 °C (-22 °F).

### 4.2 Mounting the transmitter

#### 4.2.1 Direct sensor mounting

If the sensor is stable, the device can be fitted directly on the sensor. If the sensor is to be mounted at a right angle to the cable gland, swap the dummy plug and cable gland.



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### 1 Direct field transmitter mounting on sensor

- 1 Thermowell
- 2 Insert
- 3 Neck tube nipple and adapter
- 4 Sensor cables
- 5 Fieldbus cables
- 6 Fieldbus shielded cable

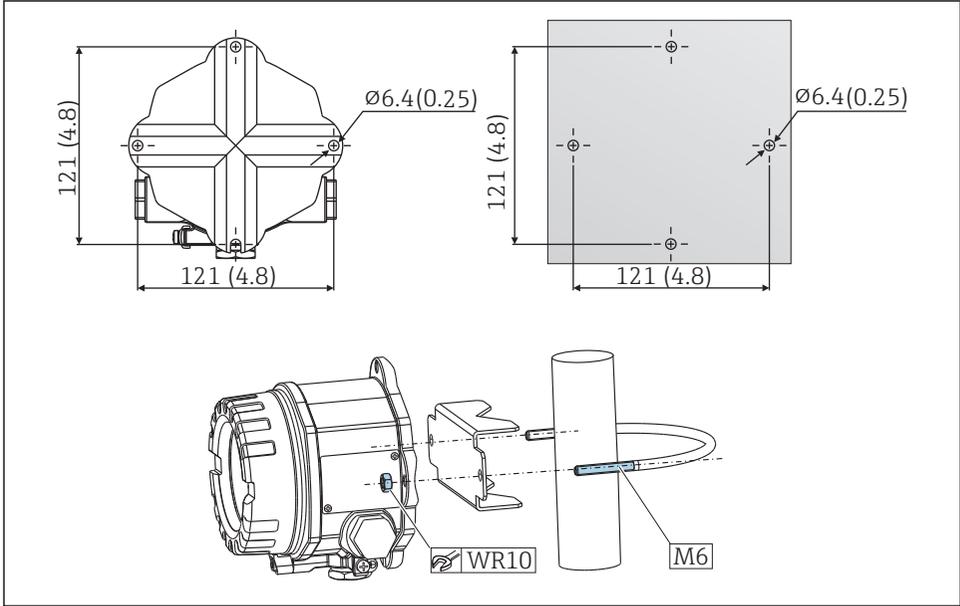
1. Mount the thermowell and screw down (1).
2. Screw the insert with the neck tube nipple and adapter into the transmitter (2). Seal the nipple and adapter thread with silicone tape.
3. Guide the sensor cables (4) through the cable gland of the fieldbus transmitter housing into the connection compartment.
4. Fit the field transmitter with the insert on the thermowell (1).
5. Mount the fieldbus shielded cable or fieldbus connector (6) on the opposite cable gland.
6. Guide the fieldbus cables (5) through the cable gland of the fieldbus transmitter housing into the connection compartment.
7. Screw the cable gland tight as described in the *Ensuring the degree of protection* section. The cable gland must meet explosion protection requirements. → 16

#### 4.2.2 Remote mounting

##### NOTICE

**Do not overtighten the mounting screws of the 2" pipe mounting bracket in order to prevent any damage.**

- ▶ Maximum torque = 6 Nm (4.43 lbf ft)



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- 2 Installation of the field transmitter via direct wall mounting or with a 2" pipe mounting bracket (316L), see the 'Accessories' section. Dimensions in mm (in)

### 4.3 Post-installation check

After installing the device, carry out the following checks:

Device condition and specifications	Notes
Is the device undamaged (visual inspection)?	-
Do the ambient conditions match the device specification (e.g. ambient temperature, degree of protection, etc.)?	

## 5 Electrical connection

### 5.1 Connection conditions

#### **CAUTION**

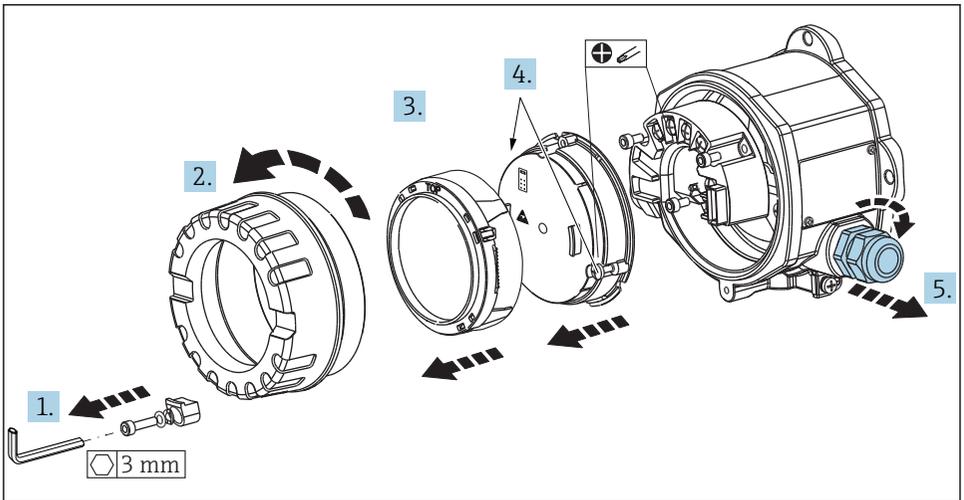
The electronics could be destroyed

- ▶ Switch off power supply before installing or connecting the device. Failure to observe this may result in destruction of parts of the electronics.
- ▶ When connecting Ex-certified devices, please take special note of the instructions and connection schematics in the Ex-specific supplement to these Operating Instructions. Contact the supplier if you have any questions.
- ▶ 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 = 1 Nm ( $\frac{3}{4}$  lbf ft).



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General procedure for terminal connection:

1. Loosen the cover clamp.
2. Unscrew the housing cover together with the O-ring.
3. Remove the display module from the electronics unit.
4. Loosen the two fixing screws on the electronics unit and then remove the unit from the housing.
5. Open the side cable glands of the device.
6. Feed the corresponding connecting cables through the openings of the cable gland.

7. Wire the sensor cables and fieldbus/power supply as specified in the 'Connecting the sensor' and 'Connecting the measuring device' sections. →  12, →  13

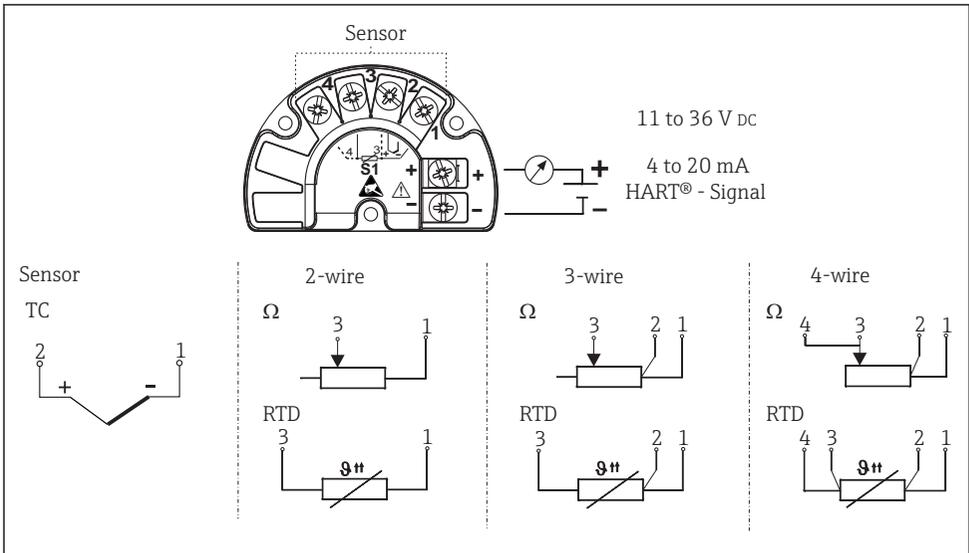
On completion of the wiring, screw the screw terminals tight. Tighten the cable glands again and reassemble the device by following the reverse order of steps. Refer to the information provided in the 'Ensuring the degree of protection' section. Screw the housing cover tight again, fit the cover clamp and fasten.

## 5.2 Connecting the sensor

### 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.

### Terminal assignment



### 3 Quick wiring guide

 In the event of a thermocouple (TC) measurement, an RTD Pt100 2-wire sensor can be connected to measure the reference junction temperature. This is connected to terminals 1 and 3. The reference junction used is selected in the menu: **Application** → **Sensor** → **Reference junction**

 For detailed information on the parameter description, see the document BA00191R/09 for the device.

## 5.3 Connecting the measuring device

### 5.3.1 Cable glands or entries

#### **CAUTION**

#### Risk of damage

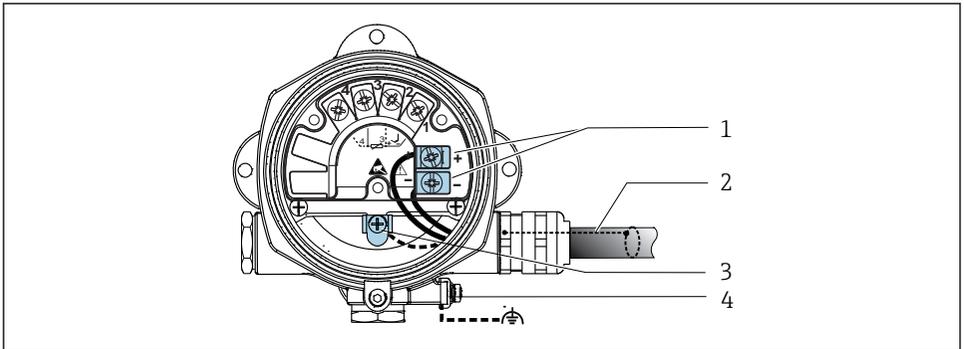
- ▶ If the device has not been grounded as a result of the housing being installed, we recommend grounding it via one of the ground screws. Observe the grounding concept of the plant! Keep the cable shield between the stripped fieldbus cable and the ground terminal as short as possible! Connection of the functional grounding may be needed for functional purposes. Compliance with the electrical codes of individual countries is mandatory.
- ▶ If the shielding of the fieldbus cable is grounded at more than one point in systems that do not have additional potential equalization, mains frequency equalizing currents can occur that damage the cable or the shielding. In such cases the shielding of the fieldbus cable is to be grounded on one side only, i.e. it must not be connected to the ground terminal of the housing. The shield that is not connected should be insulated!



#### Cable specification

- A normal device cable suffices if only the analog signal is used.
- A shielded cable is recommended for HART® communication. Observe grounding concept of the plant.
- The terminals for the fieldbus connection have integrated polarity protection.
- Cable cross-section: max. 2.5 mm<sup>2</sup>

Follow the general procedure. → 11



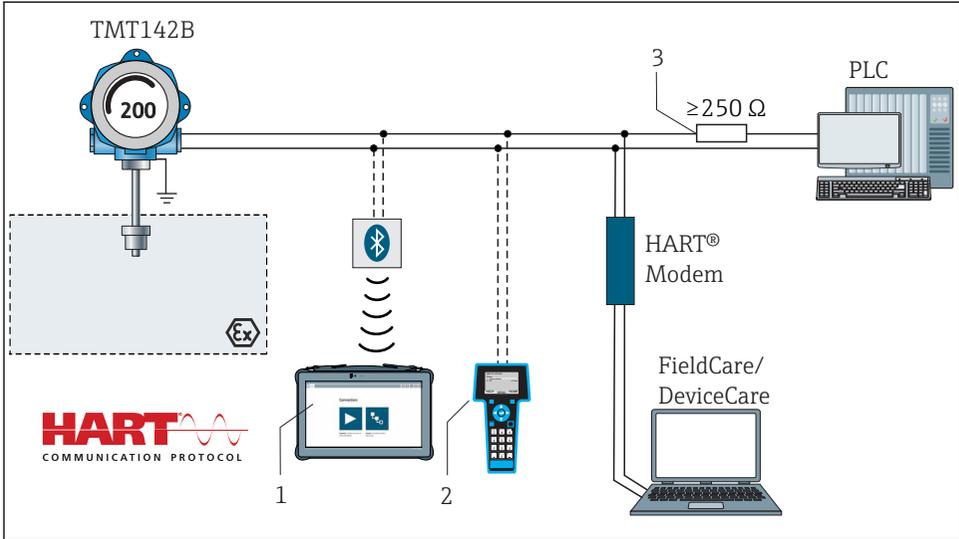
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#### 4 Connecting the device to the fieldbus cable

- 1 Fieldbus terminals - fieldbus communication and power supply
- 2 Shielded fieldbus cable
- 3 Ground terminals, internal
- 4 Ground terminal, external

### 5.3.2 Connecting the HART® communication resistor

**i** If the HART® communication resistor is not integrated into the power supply unit, it is necessary to incorporate a communication resistor of  $250\ \Omega$  into the 2-wire cable. For the connection, also refer to the documentation published by the HART® FieldComm Group, particularly HCF LIT 20: “HART, a technical summary”.



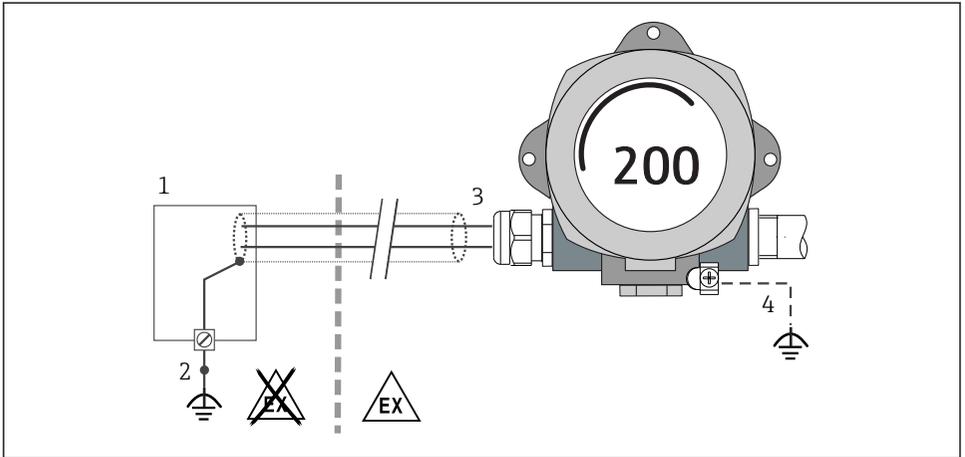
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**5** *HART® connection with other power supply units that do not have a built-in HART® communication resistor*

- 1 *Configuration via Field Xpert SMT70*
- 2 *HART® handheld communicator*
- 3 *HART® communication resistor*

### 5.3.3 Shielding and grounding

The specifications of the FieldComm Group must be observed during installation.



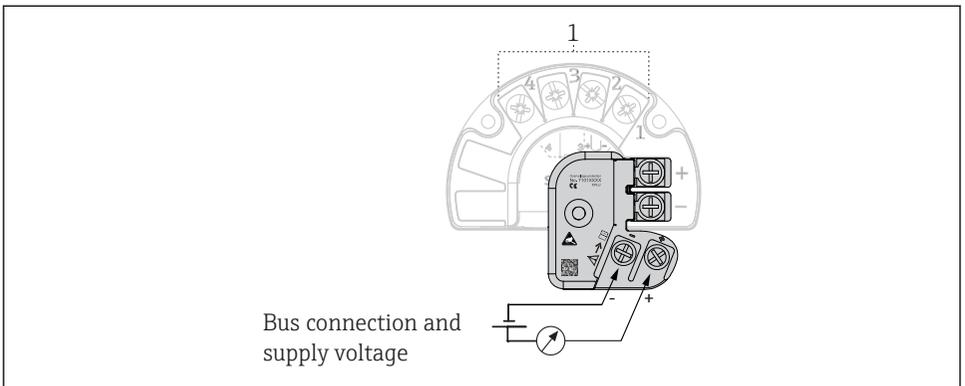
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#### 6 Shielding and grounding the signal cable at one end with HART® communication

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

## 5.4 Special connection instructions

If the device is fitted with a surge arrester module, the bus is connected and the power is supplied via the screw terminals on the surge arrester module.



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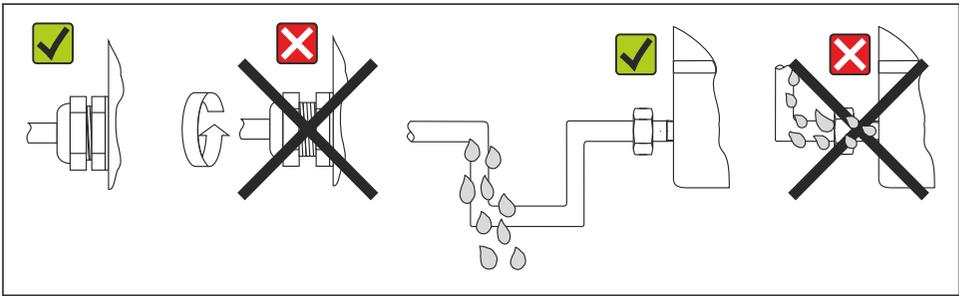
#### 7 Electrical connection of surge arrester

- 1 Sensor connection

## 5.5 Ensuring the degree of protection

The measuring system meets all the requirements of IP67 protection. Compliance with the following points is mandatory following installation in the field or servicing in order to ensure that IP67 protection is maintained:

- The housing seals must be clean and undamaged when inserted into their grooves. The seals must be dried, cleaned or replaced if necessary.
- The cables used for connection must be of the specified outside diameter (e.g. M20x1.5, cable diameter 8 to 12 mm).
- Firmly tighten the cable gland. →  8,  16
- The cables must loop down before they enter the cable glands ("water trap"). This means that any moisture that may form cannot enter the gland. Install the device in such a way that the cable glands are not facing upwards. →  8,  16
- Replace unused cable glands with dummy plugs.
- Do not remove the grommet from the cable gland.



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 8 Connection tips to retain IP67 protection

## 5.6 Post-connection check

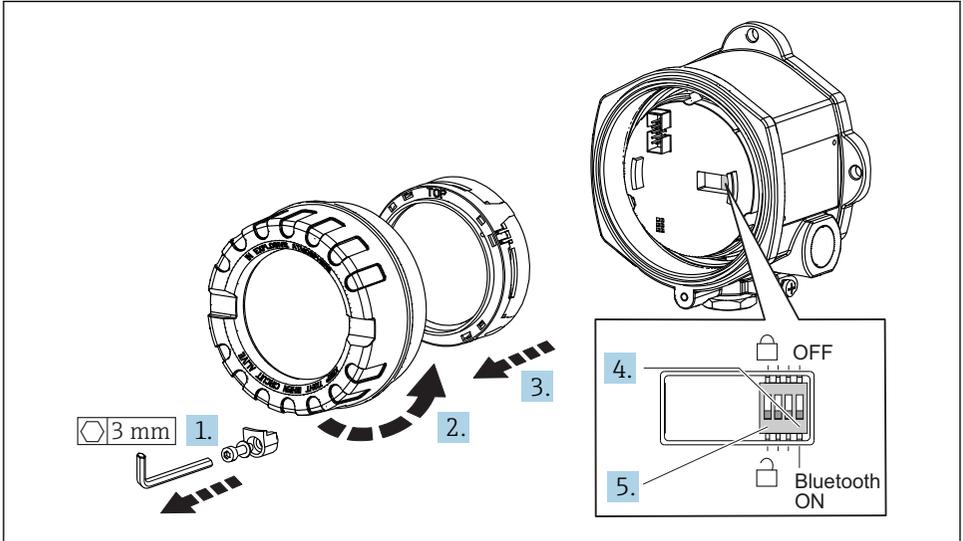
Device condition and specifications	Notes
Is the device or cable undamaged (visual check)?	--
Electrical connection	Notes
Does the supply voltage match the information on the nameplate?	$U = 11 \text{ to } 36 \text{ V}_{\text{DC}}$
Do the cables have adequate strain relief?	Visual inspection
Are the power supply and signal cables connected correctly?	→  11
Are all the screw terminals sufficiently tightened?	
Are all cable entries mounted, tightened and leak-tight?	
Housing cover installed and firmly tightened?	

## 6 Operation options

### 6.1 Overview of operation options

#### 6.1.1 Measured value display and operating elements

##### Local operation



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Procedure for setting the DIP switch:

1. Remove the cover clamp.
2. Unscrew the housing cover together with the O-ring.
3. If necessary, remove the display with the fitting kit from the electronics module.
4. Configure the Bluetooth® function accordingly using the DIP switch. In general, the following applies: switch to ON = function enabled, switch to OFF = function disabled.
5. Configure the hardware write protection accordingly using the DIP switch. In general, the following applies: switch set to closed lock symbol = function enabled, switch set to open lock symbol = function disabled.

Once the hardware setting has been made, re-assemble the housing cover in the reverse order.

## 6.2 Transmitter configuration

The transmitter and measured value display are configured via the HART® protocol or CDI (= Endress+Hauser Common Data 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)	Field Communicator TREX, 475 (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

### Bluetooth® wireless technology

Signal transmission via Bluetooth® wireless technology uses a cryptographic technique tested by the Fraunhofer Institute

The device is not visible via Bluetooth® wireless technology without the SmartBlue App, DeviceCare or FieldXpert SMT70

Only one point-to-point connection is established between a measuring device and a smartphone or tablet

The Bluetooth® wireless technology interface can be disabled via SmartBlue, FieldCare and DeviceCare or a hardware DIP switch

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

Directly to the app with the QR code:



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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.



To facilitate the device identification in the field, the device display flashes for 60 seconds, when the connection has been established successfully.

Navigate through the various items of information about the device: swipe the screen to the side.

## 7 Commissioning

### 7.1 Switching on the transmitter

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. Normal measuring mode commences as soon as the switch-on procedure is completed. Measured values and status values appear on the display.



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