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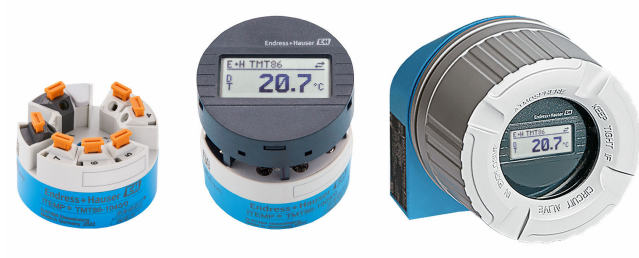
2021-11-30

Brief Operating Instructions
iTEMP TMT86

Dual-input temperature transmitter
PROFINET® protocol

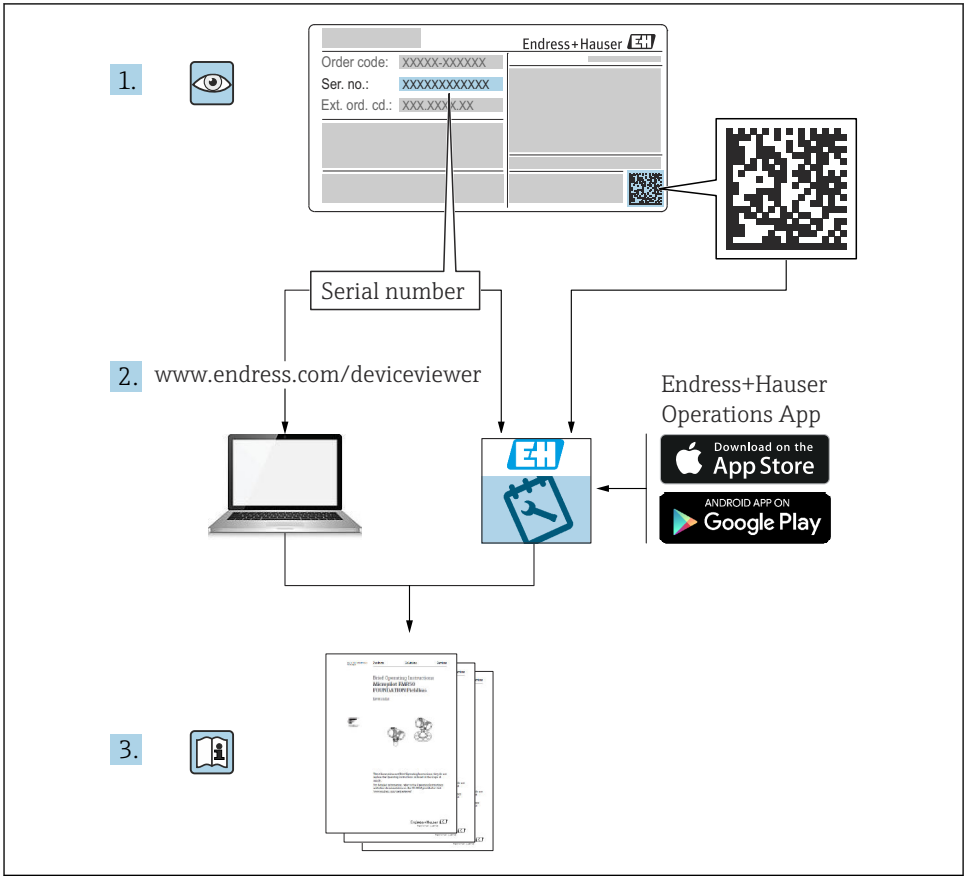


These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

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

Available for all device versions via:
- Internet: www.endress.com/deviceviewer
- Smart phone/Tablet: Endress+Hauser Operations App

Endress+Hauser
People for Process Automation


1.
Endress+Hauser
Order code: XXXXX-XXXXXX
Ser. no.: XXXXXXXXXXXX
Ext. ord. cd.: XXX.XXX-XXX
Serial number
2.
www.endress.com/deviceviewer
Endress+Hauser
Operations App
Download on the
App Store
ANDROID APP ON
Google Play
3.

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1 About this document

1.1 Symbols used

1.1.1 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.

1.2 Tool symbols

Symbol	Meaning
 A0011219	Phillips head screwdriver

1.3 Registered trademarks

PROFINET®
Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

2 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 Intended use

The device is a universal and user-configurable temperature transmitter with either one or two sensor inputs for a resistance thermometer (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. The device is also optionally available in a version that is integrated into a field housing. It is also possible to mount the device on a DIN rail using the optional DIN rail clip.

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 using the device incorrectly or for purposes for which it was not intended.

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 ensuring trouble-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 and EMC requirements of the IEC/EN 61326 series and the APL EMC Test Specification.

2.5 Product safety

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

2.6 IT security

Our warranty is valid only if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the device and associated data transfer, must be implemented by the operators themselves in line with their security standards.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

1. Unpack the temperature transmitter carefully. Are the contents or packaging undamaged?
   ↳ Do not install damaged components, as otherwise the manufacturer cannot guarantee the material resistance or ensure compliance with the original safety requirements, and therefore cannot 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 order 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 met, please contact the manufacturer's sales office.

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): 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.

Approval in hazardous areas: Ensure that the information on the nameplate matches the enclosed Ex documentation (XA...).

3.2.1 Name and address of manufacturer

Name of manufacturer:	Endress+Hauser Wetzer GmbH + Co. KG
Model/type reference:	TMT86
Address of manufacturer:	Obere Wank 1, D-87484 Nesselwang or www.endress.com

3.3 Certificates and approvals

For certificates and approvals valid for the device: see the data on the nameplate

Approval-related data and documents: www.endress.com/deviceviewer → (enter the serial number)

3.4 Storage and transport

Storage temperature: −52 to +100 °C (−61.6 to +212 °F)

Humidity
- Condensation permitted with head transmitter
- Max. rel. 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 provides optimum protection.

Avoid the following environmental influences during storage and transport:
- Direct sunlight
- Vibration
- Aggressive media

4 Installation

4.1 Mounting requirements

4.1.1 Mounting location

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

For use in hazardous areas, the limit values specified on the certificates and approvals must be observed (see Ex Safety Instructions).

4.1.2 Important ambient conditions

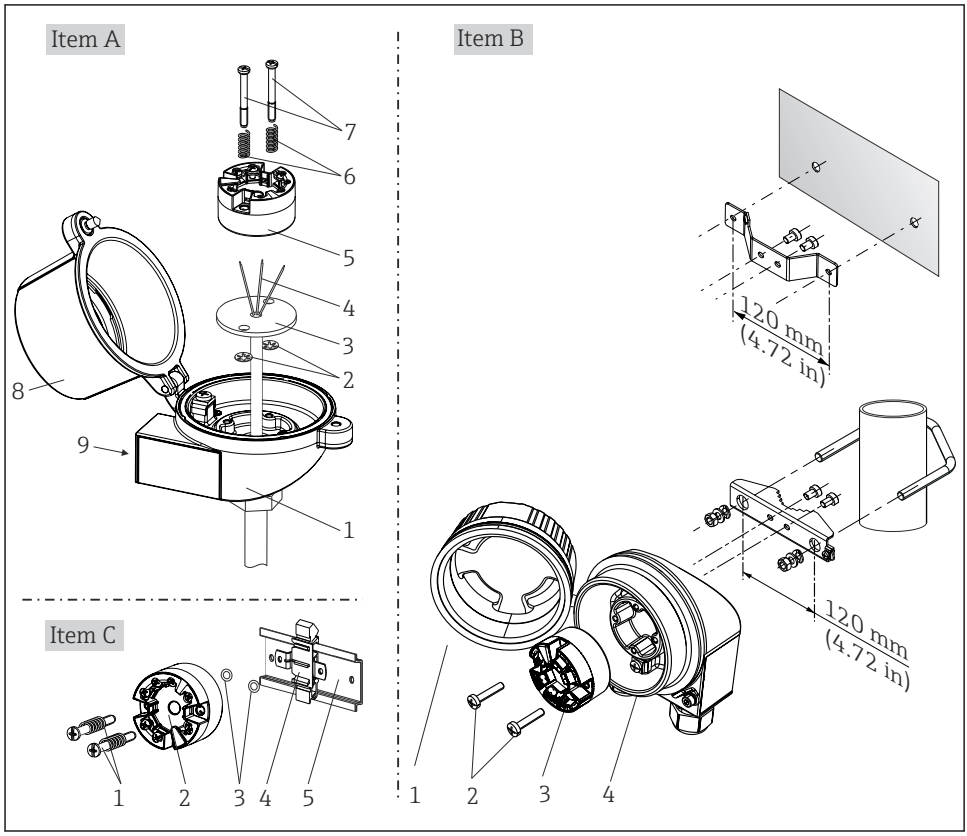
- Operating height: up to 4000 m (4374.5 yards) above mean sea level
- Overvoltage category: overvoltage category II
- Pollution degree: 2
- Insulation class: class III
- Ambient temperature: −40 to +85 °C (−40 to 185 °F);
  Optional −50 to +85 °C (−58 to 185 °F), −52 to +85 °C (−61.6 to 185 °F)
- Head transmitter climate class: C1 (−5 to +45 °C (23 to 113 °F), 5 to 95 % r.h.) as per IEC 60654-1

- Condensation permitted with head transmitter
- Max. rel. humidity: 95 % as per IEC 60068-2-30
- Degree of protection:
  - Head transmitter with screw terminals: IP00, with push-in terminals: IP30. When installed, the degree of protection depends on the terminal head or field housing used.
  - When installing in field housing TA30x: IP IP66/68 (NEMA Type 4x encl.)

4.2 Mounting the measuring device

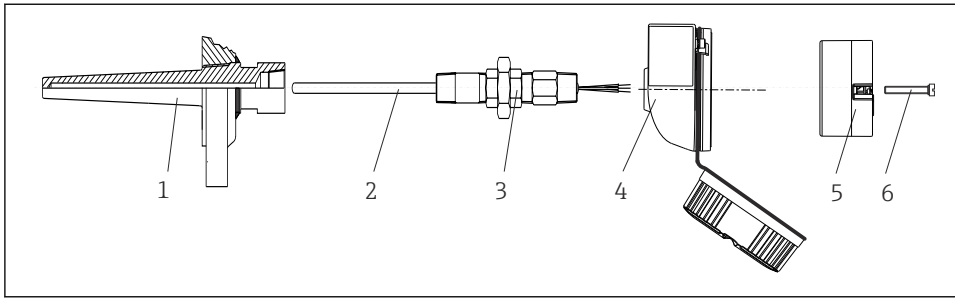
A Phillips head screwdriver is required to mount the device:
- Maximum torque for securing screws = 1 Nm (¾ foot-pound), screwdriver: Pozidriv Z2
- Maximum torque for screw terminals = 0.35 Nm (¼ foot-pound), screwdriver: Pozidriv Z1

4.2.1 Head transmitter mounting



1 Head transmitter mounting (three versions)

Mounting typical of North America



2 Head transmitter mounting

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.

4.3 Post-mounting check

After installing the device, run the following final 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.)?	→ 7

5 Electrical connection

5.1 Connection requirements

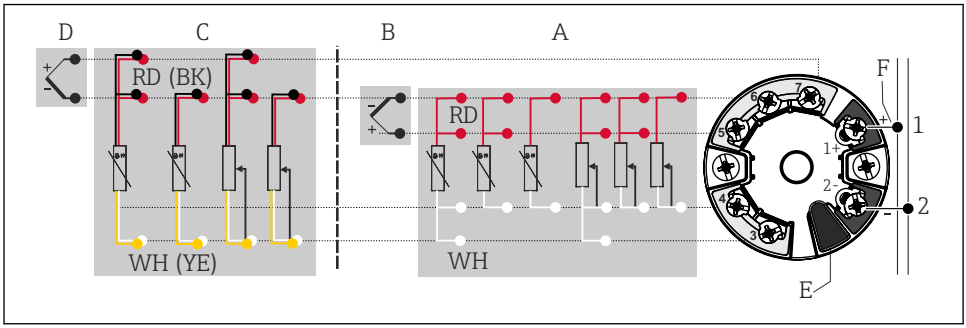
A Phillips head screwdriver is required to wire the head transmitter with screw terminals. No tools are required for the version with push-in terminals.

⚠ CAUTION

- Switch off the power supply before installing or connecting the device. Non-compliance may result in the 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.
- Do not occupy the display connection. An incorrect connection can destroy the electronics.
- Before connecting the power supply, connect the potential equalization line to the external ground terminal.
- 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.

5.2 Connecting the measuring device

Head transmitter:



3 Assignment of terminal connections for head transmitter

A Sensor input 1, RTD and Ω, 4-, 3- and 2-wire
B Sensor input 1, TC and mV
C Sensor input 2, RTD and Ω, 3- and 2-wire
D Sensor input 2, TC and mV
E Display connection, service interface
F Bus terminator and power supply

NOTICE

- ESD - Electrostatic discharge. Protect the terminals from electrostatic discharge. Non-compliance may result in the destruction or malfunction of parts of the electronics.

5.2.1 Fieldbus connection

Devices can be connected to the fieldbus in two ways:

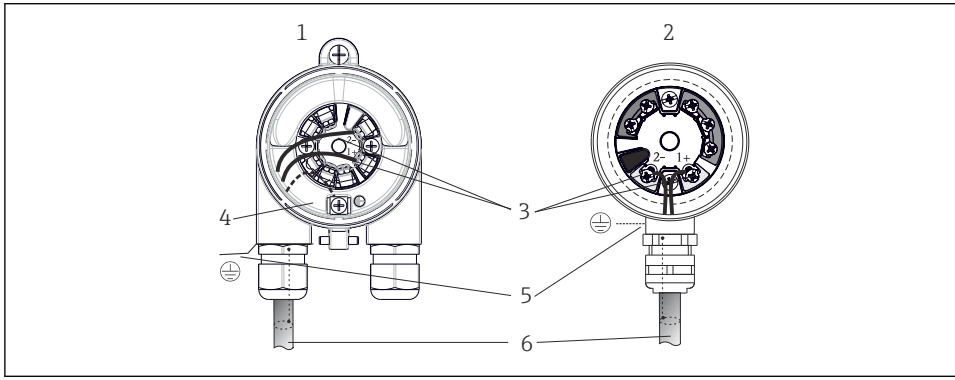
- via conventional cable gland → 🖹 11
- via fieldbus device connector (optional, available as an accessory)

Risk of damage

- Switch off the power supply before installing or connecting the head transmitter. Non-compliance may result in the destruction of parts of the electronics.
- Grounding via one of the grounding screws (terminal head, field housing) is recommended.
- If the shielding of the fieldbus cable is grounded at more than one point in systems without additional potential equalization, mains-frequency equalizing currents may occur and cause damage to the cable or shielding. In such cases, the shielding of the fieldbus cable should be grounded on one side only, i.e. it must not be connected to the ground terminal of the housing (terminal head, field housing). The shield that is not connected should be insulated!
- We recommend that the fieldbus not be looped using conventional cable glands. If you replace even just one measuring device at a later date, the bus communication will have to be interrupted.

Cable glands or entries

Please also follow the general procedure on → 🖹 10.



4 *Connecting the signal cables and power supply*

1 Head transmitter installed in field housing
2 Head transmitter installed in terminal head
3 Terminals for fieldbus communication and power supply
4 Internal ground connection
5 External ground connection
6 Shielded fieldbus cable

Terminals

Choice of screw or push-in terminals for sensor cables and supply cables. The terminals for connecting the fieldbus (1+ and 2-) are protected against reverse polarity. A shielded cable must be used for the connection.

Terminal design	Cable design	Cable cross-section
Screw terminals (with tabs on the fieldbus terminals for easy connection of a handheld terminal, e.g. Field Xpert)	Rigid or flexible	≤ 2.5 mm² (14 AWG)
Push-in terminals (cable design, stripping length = min. 10 mm (0.39 in))	Rigid or flexible [1]	0.2 to 1.5 mm² (24 to 16 AWG)
	Flexible with wire end ferrules with/ without plastic ferrule	0.25 to 1.5 mm² (24 to 16 AWG)

1) In the case of push-in terminals and flexible cables with a cross-section ≤ 0.3 mm² (22 AWG), wire end ferrules must be used.

5.2.2 Supply voltage

Connecting to an APL field switch

The device must be used in accordance with the APL port classification:

Hazardous areas: SLAA or SLAC (details in Ex safety instructions)

Non-hazardous areas: SLAX connection to an APL field switch with maximum voltage of 15 VDC and minimal output power of 0.54 W. This corresponds to an APL field switch with APL port classification SPCC or SPAA, for example.

Connecting to an SPE switch

In non-hazardous areas, the device can be used in accordance with PoDL power class 10: The device can be connected to an SPE switch with a maximum voltage of 30 VDC and a minimum output power of 1.85 W. This corresponds to an SPE switch that supports PoDL power classes 10, 11 or 12, for example.

Ethernet-APL power class A (9.6 to 15 V_{DC}, 540 mW)

Maximum power consumption: 0.7 W

The field switch must be tested to ensure that it meets safety requirements (e.g. PELV, SELV, Class 2).

5.3 Connecting the sensor cables

Terminal assignment of sensor connections

NOTICE

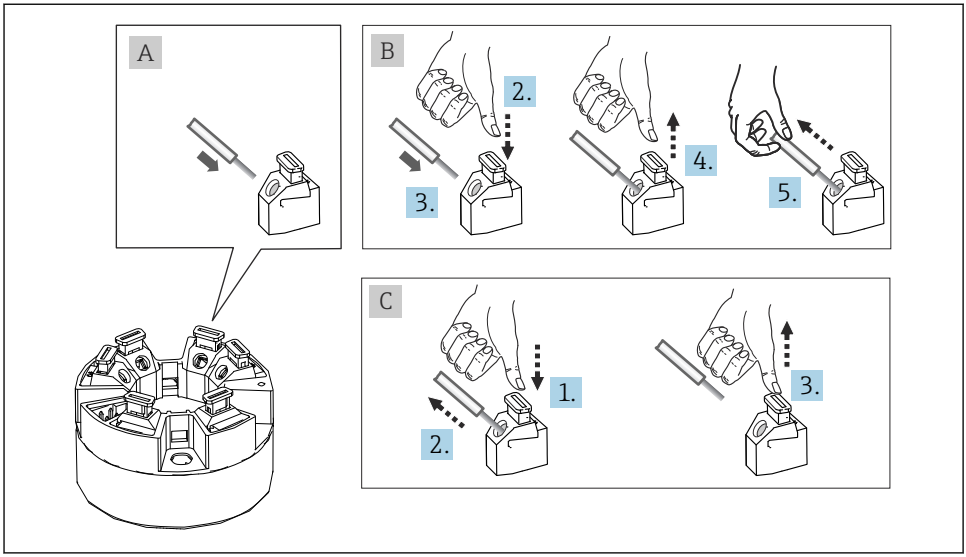
When connecting 2 sensors ensure that there is no galvanic connection between the sensors (e.g. caused by sensor elements that are not isolated from the thermowell). The resulting equalizing currents distort the measurements considerably.

- The sensors must remain galvanically isolated from one another by connecting each sensor separately to a transmitter. The transmitter provides sufficient galvanic isolation (> 2 kV AC) between the input and output.

The following connection combinations are possible when both sensor inputs are assigned:

		Sensor input 1				
Sensor input 2		RTD or resistance transmitter, 2-wire	RTD or resistance transmitter, 3-wire	RTD or resistance transmitter, 4-wire	TC, voltage transmitter, internal CJ	TC, voltage transmitter, external CJ
	RTD or resistance transmitter, 2-wire	✔	✔	-	✔	-
	RTD or resistance transmitter, 3-wire	✔	✔	-	✔	-
	RTD or resistance transmitter, 4-wire	-	-	-	-	-
	TC, voltage transmitter, internal CJ	✔	✔	✔	✔	-
	TC, voltage transmitter, external CJ	✔	✔	-	-	✔

5.3.1 Connecting to push-in terminals

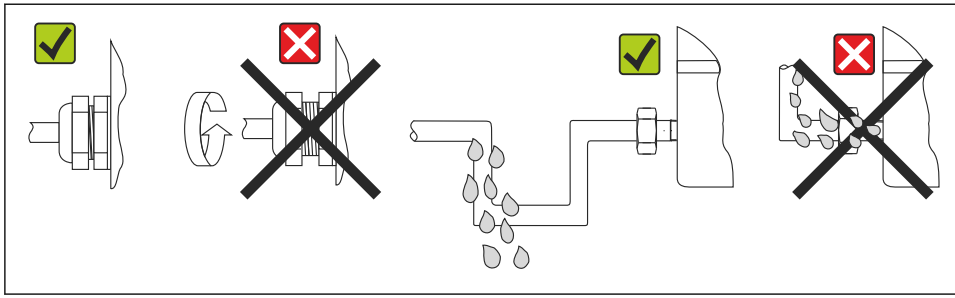


5 Connecting to push-in terminals

5.4 Ensuring the degree of 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 transmitter must be mounted in a terminal head with the appropriate degree of protection.
- The housing seals must be clean and undamaged when inserted into their grooves. The seals must be dried, cleaned or replaced if necessary.
- The connecting cables used must have the specified external diameter (e.g. M20x1.5, cable diameter 8 to 12 mm).
- Firmly tighten the cable gland. → 6, 15
- 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. → 6, 15
- Replace unused cable glands with dummy plugs.
- Do not remove the grommet from the cable gland.



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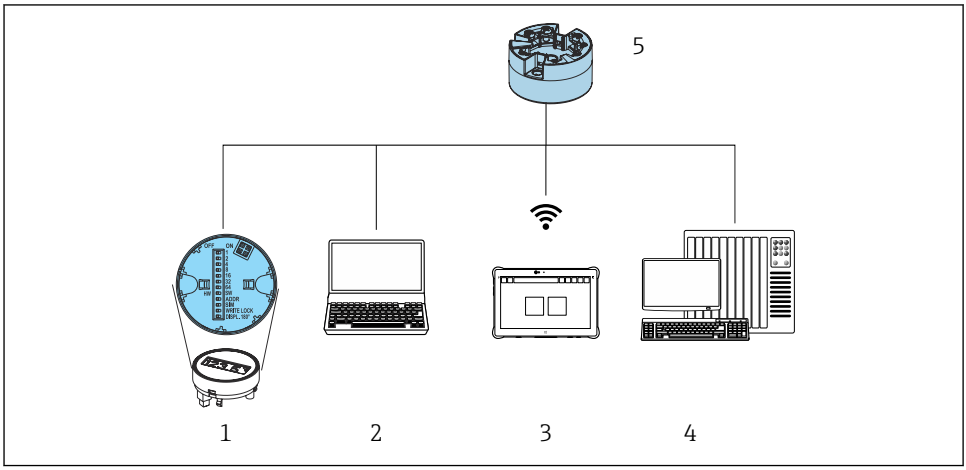
6 *Connection tips to retain IP67 protection*

5.5 Post-connection check

Device health and specifications	Notes
Are the device and cables undamaged (visual check)?	--
Electrical connection	**Notes**
Does the port classification match the information on the nameplate?	Compare the port classification with the information on the nameplate
Do the cables used meet the required specifications?	Fieldbus cable, Sensor cable, → 12
Do the mounted cables have adequate strain relief?	--
Are the power supply and signal cables correctly connected?	→ 10
Are all the screw terminals firmly tightened and have the push-in terminal connections been checked?	→ 14
Are all cable entries mounted, firmly tightened and secure? Cable run with "water trap"?	--
Are all housing covers installed and firmly tightened?	--
Electrical connection of the fieldbus system	**Notes**
Are all connecting components (switch, device connector, etc.) correctly connected to each other?	--
Does the max. length of the fieldbus cable comply with the fieldbus specifications?	For more information, see www.ethernet-apl.org "Ethernet-APL Engineering Guideline"
Does the max. length of the APL spurs match the fieldbus specifications?	
Is the fieldbus cable fully shielded and correctly grounded?	

6 Operation options

6.1 Overview of operation options



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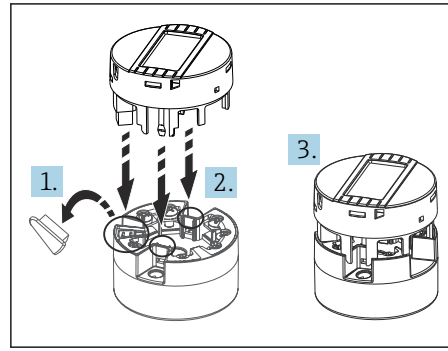
1 *Local operation via DIP switch on display module*
2 *Computer with web browser (e.g. Internet Explorer) or with operating tool (e.g. FieldCare, SIMATIC PDM)*
3 *Field Xpert SMT70*
4 *Control system (e.g. PLC)*
5 *Temperature transmitter*

6.1.1 Measured value display and operating elements

For the head transmitter, display and operating elements are available locally only if the head transmitter was ordered with a display unit!

Option: Display TID10 for head transmitter

The display can also be ordered later, see the "Accessories" section in the Operating Instructions for the device.

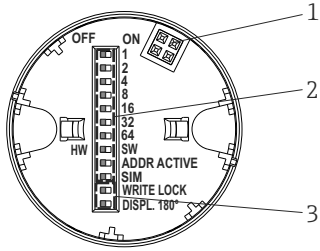


7 *Attach the display to the transmitter*

Local operation

NOTICE

▶ ESD - Electrostatic discharge. Protect the terminals from electrostatic discharge. Non-compliance may result in the destruction or malfunction of parts of the electronics.



8 *Hardware settings via DIP switches*

1:	Connection to head transmitter
2:	DIP switch
3:	DIP switch functions: ADDR ACTIVE: service IP address 192.168.1.212 SIM = simulation mode (no function); WRITE LOCK = write protection; DISPL. 180° = rotate the display monitor 180°

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 remains active even when the display is removed. To disable write protection, the display must be attached to the transmitter with the DIP switch deactivated (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° via a DIP switch.

Setting the service IP address

The service IP address can be set via a DIP switch.

6.2 Access to operating menu via web browser

The device can be operated and configured via a Web browser with the integrated Web server. A web server is enabled when the device is delivered, but can be disabled via an appropriate parameter. For device versions with Industrial Ethernet communication types, the connection can be established at the signal transmission port via the network.

6.3 Access to the operating menu via operating tools

Operating tools

DeviceCare (Endress+Hauser) FieldCare (Endress+Hauser) Field Xpert SMT70 (Endress+Hauser)	SIMATIC PDM (Siemens) Field Device Manager FDM (Honeywell) Fieldbus Information Manager FIM (ABB)

7 Commissioning

7.1 Post-installation check

Before commissioning the measuring point make sure that all final checks have been carried out:
- "Post-installation check" checklist
- "Post-connection check" checklist

7.2 Switching on the device

Switch on the supply voltage after completing the final checks. The transmitter performs a number of internal test functions after power-up. As this procedure progresses, a sequence of device information appears on the display.

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

7.3 Configuring the device

The transmitter is configured and measured values obtained via the Ethernet or CDI (= Common Data Interface) interface.

For detailed information on configuring specific parameters, see the associated Operating Instructions (BA) and Description of Device Parameters (GP)

8 Maintenance

No special maintenance work is required for the device.

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

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