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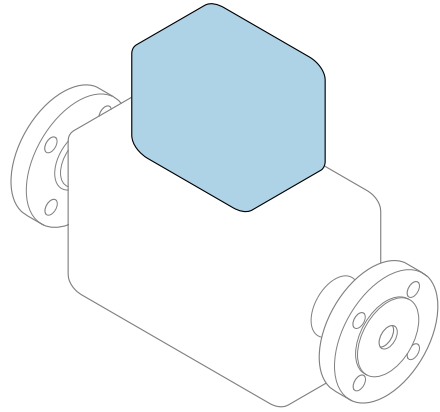
71423498
2018-12-03

Brief Operating Instructions **Flowmeter Proline 200**

Profibus PA transmitter
with vortex flow sensor



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

Brief Operating Instructions part 2 of 2: Transmitter
Contain information about the transmitter.

Brief Operating Instructions part 1 of 2: Sensor → 3

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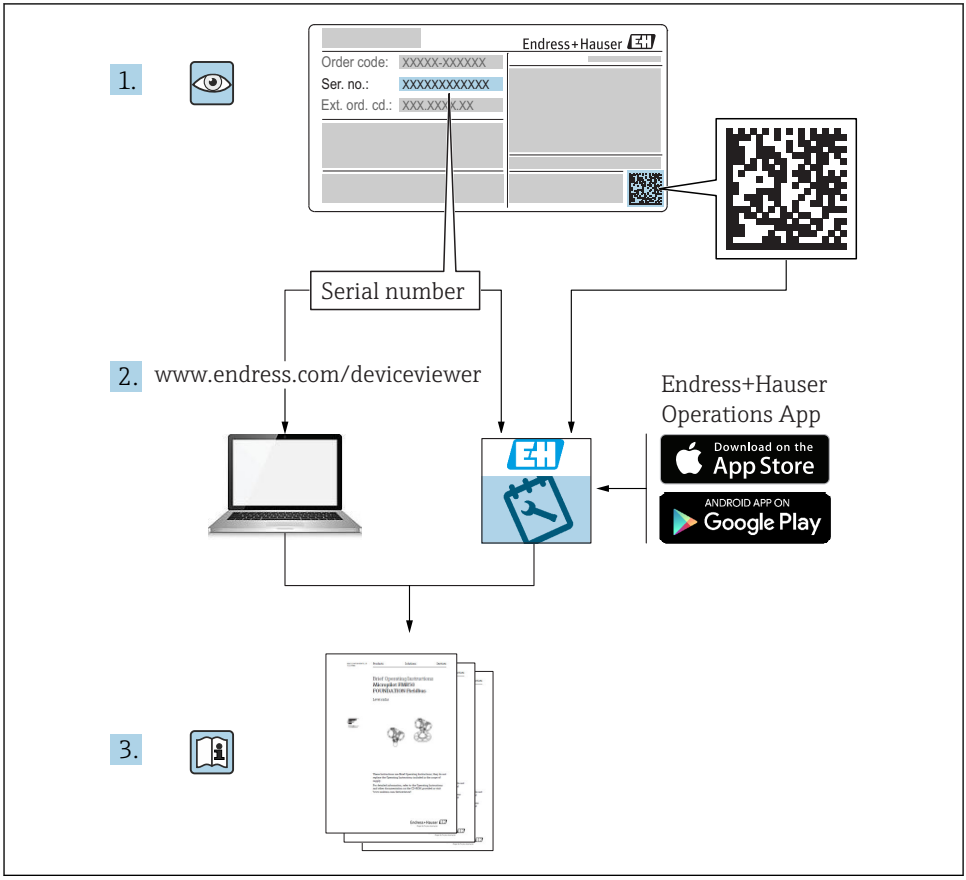
People for Process Automation


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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Brief Operating Instructions for the flowmeter

The device consists of a transmitter and a sensor.

The process of commissioning these two components is described in two separate manuals, that form the Brief Operating Instructions of the flowmeter:
- Brief Operating Instructions part 1: Sensor
- Brief Operating Instructions part 2: Transmitter

Please refer to both Brief Operating Instructions when commissioning the flowmeter as the contents complement one another:

Brief Operating Instructions part 1: Sensor
The Sensor Brief Operating Instructions are aimed at specialists with responsibility for installing the measuring device.
- Incoming acceptance and product identification
- Storage and transport
- Installation

Brief Operating Instructions part 2: Transmitter
The Transmitter Brief Operating Instructions are aimed at specialists with responsibility for commissioning, configuring and parameterizing the measuring device (until the first measured value).
- Product description
- Installation
- Electrical connection
- Operation options
- System integration
- Commissioning
- Diagnostic information

Additional device documentation

These Brief Operating Instructions are the **Brief Operating Instructions part 2: Transmitter**.

The "Brief Operating Instructions part 1: Sensor" are available via:
- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*

Detailed information about the device can be found in the Operating Instructions and the other documentation:
- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*

Table of contents

1 Document information

1.1 Symbols used

1.1.1 Safety symbols

Symbol	Meaning
DANGER	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
WARNING	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
CAUTION	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE	**NOTE!** This symbol contains information on procedures and other facts which do not result in personal injury.

1.1.2 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
	Reference to graphic	1., 2., 3...	Series of steps
	Result of a step		Visual inspection

1.1.3 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
	**Protective Earth (PE)** A terminal which must be connected to ground prior to establishing any other connections. The ground terminals are situated inside and outside the device: ▪ Inner ground terminal: Connects the protectiv earth to the mains supply. ▪ Outer ground terminal: Connects the device to the plant grounding system.

1.1.4 Communication symbols

Symbol	Meaning	Symbol	Meaning
	**Wireless Local Area Network (WLAN)** Communication via a wireless, local network.		**LED** Light emitting diode is off.
	**LED** Light emitting diode is on.		**LED** Light emitting diode is flashing.

1.1.5 Tool symbols

Symbol	Meaning	Symbol	Meaning
	Torx screwdriver		Flat blade screwdriver
	Cross-head screwdriver		Allen key
	Open-ended wrench		

1.1.6 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)
	Flow direction		

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel must fulfill the following requirements for its tasks:
- 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.
- Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- Follow instructions and comply with basic conditions.

2.2 Designated use

Application and media

Depending on the version ordered, the measuring device can also measure potentially explosive, flammable, poisonous and oxidizing media.

Measuring devices for use in hazardous areas, in hygienic applications or where there is an increased risk due to process pressure, are labeled accordingly on the nameplate.

To ensure that the measuring device remains in proper condition for the operation time:
- Keep within the specified pressure and temperature range.
- Only use the measuring device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area (e.g. explosion protection, pressure vessel safety).
- Use the measuring device only for media to which the process-wetted materials are sufficiently resistant.
- If the measuring device is not operated at atmospheric temperature, compliance with the relevant basic conditions specified in the associated device documentation is absolutely essential: "Documentation" section.
- Protect the measuring device permanently against corrosion from environmental influences.

Incorrect use

Non-designated use can compromise safety. The manufacturer is not liable for damage caused by improper or non-designated use.

⚠ WARNING

Danger of breakage due to corrosive or abrasive fluids!
- Verify the compatibility of the process fluid with the sensor material.
- Ensure the resistance of all fluid-wetted materials in the process.
- Keep within the specified pressure and temperature range.

NOTICE

Verification for borderline cases:

- For special fluids and fluids for cleaning, Endress+Hauser is glad to provide assistance in verifying the corrosion resistance of fluid-wetted materials, but does not accept any warranty or liability as minute changes in the temperature, concentration or level of contamination in the process can alter the corrosion resistance properties.

Residual risks

⚠ WARNING

The electronics and the medium may cause the surfaces to heat up. This presents a burn hazard!

- For elevated fluid temperatures, ensure protection against contact to prevent burns.

2.3 Workplace safety

For work on and with the device:

- Wear the required personal protective equipment according to federal/national regulations.

For welding work on the piping:

- Do not ground the welding unit via the measuring device.

If working on and with the device with wet hands:

- Due to the increased risk of electric shock, gloves must be worn.

2.4 Operational safety

Risk of injury.

- Operate the device in proper technical condition and fail-safe condition only.
- The operator is responsible for interference-free operation of the device.

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. Endress+Hauser confirms this by affixing the CE mark to the device.

2.6 IT security

We only provide a warranty 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 device settings.

IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

2.7 Device-specific IT security

The device offers a range of specific functions to support protective measures on the operator's side. These functions can be configured by the user and guarantee greater in-operation safety if used correctly.

For detailed information on device-specific IT security, see the Operating Instructions for the device.

3 Product description

The device consists of a transmitter and a sensor.

Two device versions are available:
- Compact version – transmitter and sensor form a mechanical unit.
- Remote version - transmitter and sensor are mounted in separate locations.

For detailed information on the product description, see the Operating Instructions for the device

4 Installation

For detailed information about mounting the sensor, see the Sensor Brief Operating Instructions → 3

4.1 Mounting the transmitter of the remote version

CAUTION

Ambient temperature too high!

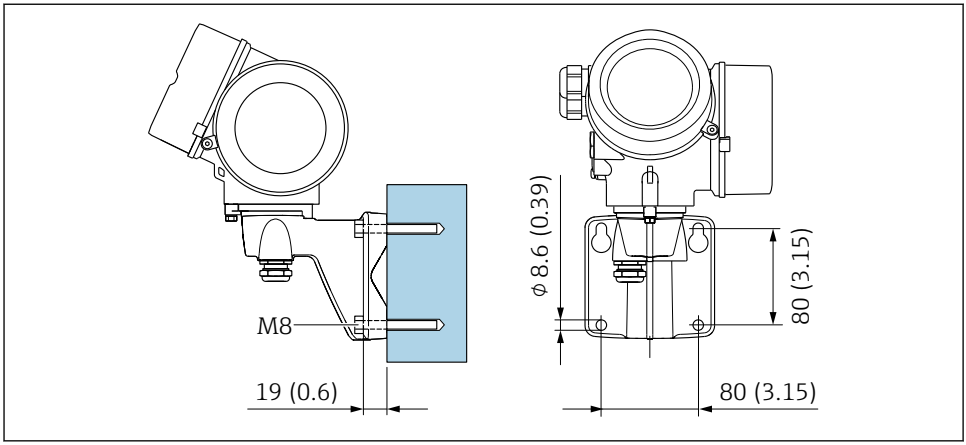
Danger of electronics overheating and housing deformation.
- ▶ Do not exceed the permitted maximum ambient temperature .
- ▶ If operating outdoors: Avoid direct sunlight and exposure to weathering, particularly in warm climatic regions.

CAUTION

Excessive force can damage the housing!
- ▶ Avoid excessive mechanical stress.

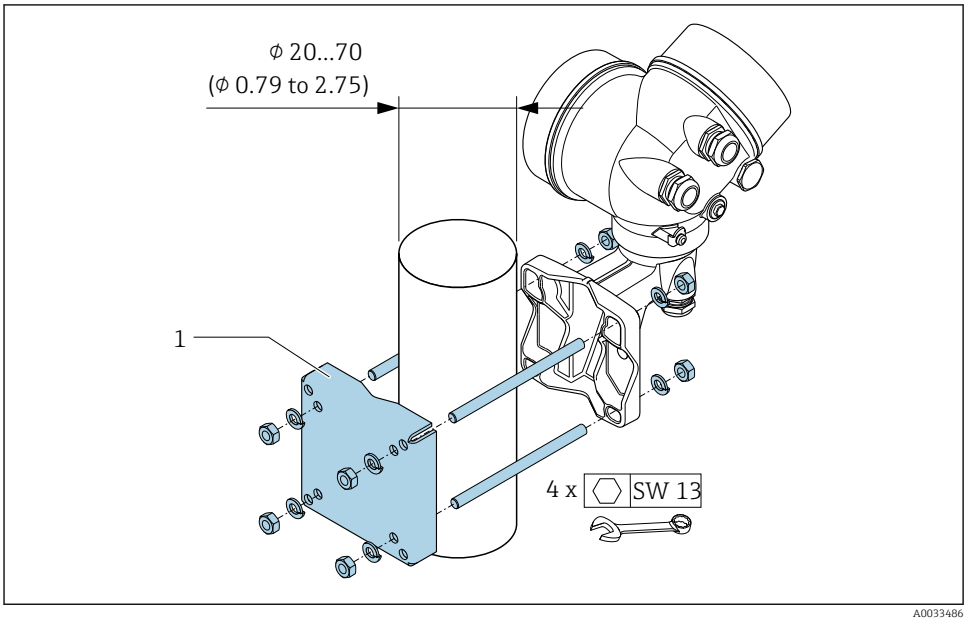
The transmitter of the remote version can be mounted in the following ways:
- Wall mounting
- Pipe mounting

4.1.1 Wall mounting



1 mm (in)

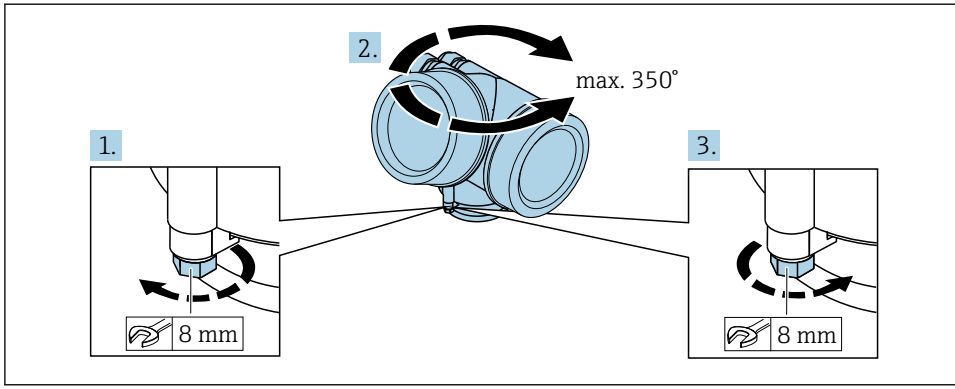
4.1.2 Post mounting



2 mm (in)

4.2 Turning the transmitter housing

To provide easier access to the connection compartment or display module, the transmitter housing can be turned.



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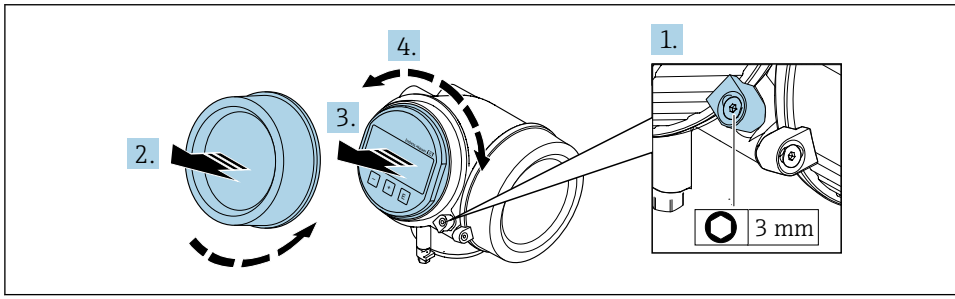
1. Release the fixing screw.
2. Turn the housing to the desired position.
3. Firmly tighten the securing screw.

4.3 Turning the display module

The display module can be turned to optimize display readability and operability.



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1. Loosen the securing clamp of the electronics compartment cover using an Allen key.
2. Unscrew cover of the electronics compartment from the transmitter housing.
3. Optional: pull out the display module with a gentle rotational movement.
4. Turn the display module to the desired position: max. 8 × 45° in every direction.
5. Without display module pulled out:
   Allow display module to engage at desired position.

6. With display module pulled out:
   Feed the cable into the gap between the housing and main electronics module and plug the display module into the electronics compartment until it engages.
7. Reverse the removal procedure to reassemble the transmitter.

4.4 Transmitter post-installation check

The post-installation check must always be performed after the following tasks:
- Turning the transmitter housing
- Turning the display module

Is the device undamaged (visual inspection)?	❑
Are the securing screw and securing clamp tightened securely?	❑

5 Electrical connection

5.1 Connection conditions

5.1.1 Required tools

- For cable entries: Use corresponding tools
- For securing clamp: Allen key 3 mm
- Wire stripper
- When using stranded cables: Crimper for wire end ferrule
- For removing cables from terminal: Flat blade screwdriver ≤ 3 mm (0.12 in)

5.1.2 Connecting cable requirements

The connecting cables provided by the customer must fulfill the following requirements.

Electrical safety

In accordance with applicable federal/national regulations.

Permitted temperature range

- The installation guidelines that apply in the country of installation must be observed.
- The cables must be suitable for the minimum and maximum temperatures to be expected.

Signal cable

Pulse/frequency/switch output

Standard installation cable is sufficient.

PROFIBUS PA

Twisted, shielded two-wire cable. Cable type A is recommended → 🖹 14.

For further information on planning and installing PROFIBUS PA networks see:

- Operating Instructions "PROFIBUS DP/PA: Guidelines for planning and commissioning" (BA00034S)
- PNO Directive 2.092 "PROFIBUS PA User and Installation Guideline"
- IEC 61158-2 (MBP)

Cable diameter

- Cable glands supplied:
  M20 × 1.5 with cable ϕ 6 to 12 mm (0.24 to 0.47 in)
- Plug-in spring terminals for device version without integrated overvoltage protection: wire cross-sections 0.5 to 2.5 mm^2 (20 to 14 AWG)
- Screw terminals for device version with integrated overvoltage protection: wire cross-sections 0.2 to 2.5 mm^2 (24 to 14 AWG)

5.1.3 Connecting cable for remote version

Connecting cable (standard)

Standard cable	2 × 2 × 0.5 mm² (22 AWG) PVC cable with common shield (2 pairs, pair-stranded) [1]
Flame resistance	According to DIN EN 60332-1-2
Oil-resistance	According to DIN EN 60811-2-1
Shielding	Galvanized copper-braid, opt. density approx.85 %
Cable length	5 m (16 ft), 10 m (32 ft), 20 m (65 ft), 30 m (98 ft)
Operating temperature	When mounted in a fixed position: −50 to +105 °C (−58 to +221 °F); when cable can move freely: −25 to +105 °C (−13 to +221 °F)

1) UV radiation may cause damage to the outer jacket of the cable. Protect the cable from exposure to sun as much as possible.

Connecting cable (reinforced)

Cable, reinforced	2 × 2 × 0.34 mm² (22 AWG) PVC cable with common shield (2 pairs, pair-stranded) and additional steel-wire braided sheath [1]
Flame resistance	According to DIN EN 60332-1-2
Oil-resistance	According to DIN EN 60811-2-1
Shielding	Galvanized copper-braid, opt. density approx. 85%
Strain relief and reinforcement	Steel-wire braid, galvanized
Cable length	5 m (16 ft), 10 m (32 ft), 20 m (65 ft), 30 m (98 ft)
Operating temperature	When mounted in a fixed position: −50 to +105 °C (−58 to +221 °F); when cable can move freely: −25 to +105 °C (−13 to +221 °F)

1) UV radiation may cause damage to the outer jacket of the cable. Protect the cable from exposure to sun as much as possible.

5.1.4 Fieldbus cable specification

Cable type

In accordance with IEC 61158-2 (MBP), cable type A is recommended. Cable type A has a cable shielding that guarantees adequate protection from electromagnetic interference and thus the most reliable data transfer.

The electrical data of the fieldbus cable have not been specified. but determine important characteristics of the design of the fieldbus, such as distances bridged, number of users, electromagnetic compatibility, etc.

Cable type	A
Cable structure	Twisted, shielded twin-core cable

Wire cross-section	0.8 mm² (AWG 18)
Loop resistance (direct current)	44 Ω/km
Characteristic impedance at 31.25 kHz	100 Ω ±20%
Attenuation constant at 39.0 kHz	3 dB/km
Capacitive asymmetry	2 nF/km
Envelope delay distortion (7.9 to 39 kHz)	1.7 ms/km
Shield coverage	90 %

The following cable types are suitable for non-hazardous areas, for example:
- Siemens 6XV1 830-5BH10
- Belden 3076F
- Kerpen CEL-PE/OSCR/PVC/FRLA FB-02YS(ST)YFL

Maximum overall cable length

The maximum network expansion depends on the type of protection and the cable specifications. The overall cable length comprises the length of the main cable and the length of all spurs >1 m (3.28 ft).

The maximum overall cable length for cable type A: 1 900 m (6 200 ft)

If repeaters are used, the maximum permitted overall cable length is doubled. A maximum of three repeaters are permitted between the user and master.

Maximum spur length

The line between the distribution box and field device is described as a spur. In the case of applications in non-hazardous areas, the max. length of a spur depends on the number of spurs >1 m (3.28 ft):

Number of spurs	Max. length per spur
1…12	120 m (400 ft)
13…14	90 m (300 ft)
15…18	60 m (200 ft)
19…24	30 m (100 ft)
25…32	1 m (3 ft)

Number of field devices

For systems designed in accordance with the Fieldbus Intrinsically Safe Concept (FISCO) with EEx ia types of protection, the cable length is limited to a maximum of 1 000 m (3 300 ft). A maximum of 32 users per segment in non-hazardous areas or a maximum of 10 users in

hazardous areas (EEx ia IIC) is possible. The actual number of users must be determined during the planning stage.

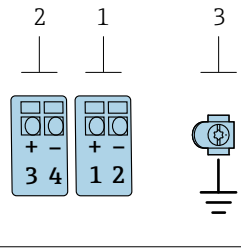
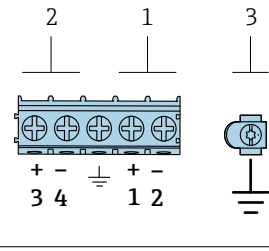
Bus termination

1. Always terminate the start and end of each fieldbus segment with a bus terminator.
2. For different connection boxes (non-hazardous area):
   Bus terminator can be activated via a switch.
3. In all other cases:
   Install a separate bus terminator.
4. For a branched bus segment:
   The device furthest from the segment coupler represents the end of the bus.
5. If the fieldbus is extended with a repeater,
   terminate the extension at both ends.

5.1.5 Terminal assignment

Transmitter

Connection version for PROFIBUS PA, pulse/frequency/switch output

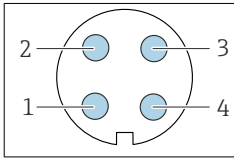
	
Maximum number of terminals	*Maximum number of terminals for order code for "Accessory mounted", option NA "Overvoltage protection"*

1 Output 1: PROFIBUS PA
2 Output 2 (passive: pulse/frequency/switch output
3 Ground terminal for cable shield

Order code for "Output"	Terminal numbers			
	Output 1		Output 2	
	1 (+)	2 (-)	3 (+)	4 (-)
Option **G** [1) 2)]	PROFIBUS PA		Pulse/frequency/switch output (passive)	

1) Output 1 must always be used; output 2 is optional.
2) PROFIBUS PA with integrated reverse polarity protection.

5.1.6 Pin assignment of device plug



Pin	Assignment		Coding	Plug/socket
1	+	PROFIBUS PA +	A	Plug
2		Grounding		
3	-	PROFIBUS PA −		
4		Not assigned		

5.1.7 Shielding and grounding

Optimal electromagnetic compatibility (EMC) of the fieldbus system can be guaranteed only if the system components and, in particular, the lines are shielded and the shield forms as complete a cover as possible. A shield coverage of 90 %is ideal.

1. To ensure optimal EMC protection, connect the shield to the reference ground as often as possible.

2. For reasons concerning explosion protection, it is recommended that grounding be dispensed with.

To comply with both requirements, there are basically three different types of shielding in the fieldbus system:
- Shielding at both ends
- Shielding at one end on the feed side with capacitance termination at the field device
- Shielding at one end on the feed side

Experience shows that the best results with regard to EMC are achieved in most cases in installations with one-sided shielding on the feed side (without capacitance termination at the field device). Appropriate measures with regard to input wiring must be taken to allow unrestricted operation when EMC interference is present. These measures have been taken into account for this device. Operation in the event of disturbance variables as per NAMUR NE21 is thus guaranteed.

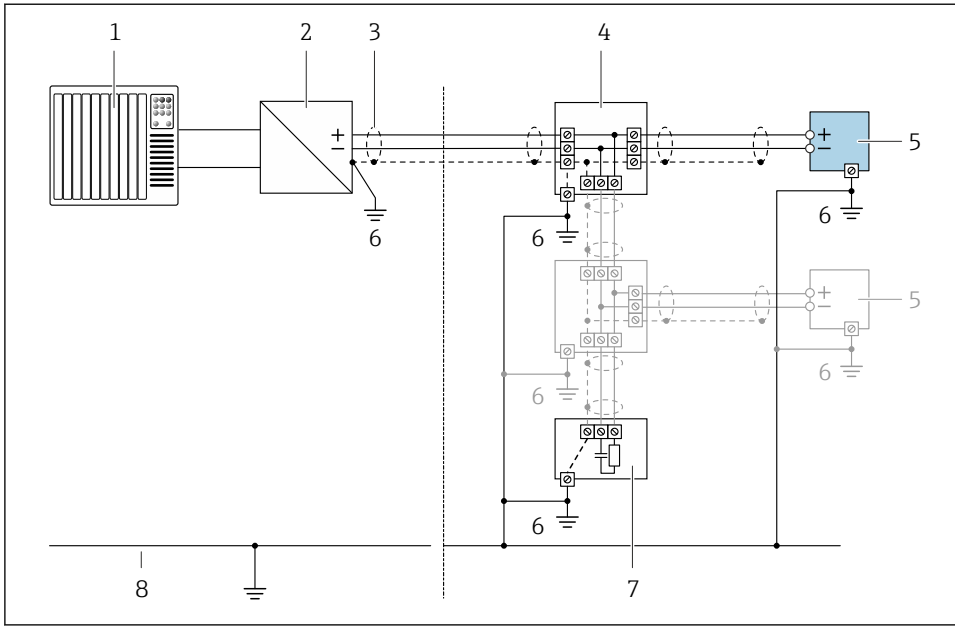
1. Observe national installation requirements and guidelines during installation.
2. Where there are large differences in potential between the individual grounding points, connect only one point of the shielding directly to the reference ground.
3. In systems without potential equalization,
   the cable shielding of fieldbus systems should be grounded on one side only, for example at the fieldbus supply unit or at safety barriers.

NOTICE

In systems without potential matching, the multiple grounding of the cable shield causes mains frequency equalizing currents!

Damage to the bus cable shield.

- ► Only ground the bus cable shield to either the local ground or the protective ground at one end.
- ► Insulate the shield that is not connected.



3 Connection example for PROFIBUS PA

1 *Control system (e.g. PLC)*
2 *PROFIBUS PA segment coupler*
3 *Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications*
4 *T-box*
5 *Measuring device*
6 *Local grounding*
7 *Bus terminator*
8 *Potential equalization conductor*

5.1.8 Requirements for the supply unit

Supply voltage

Transmitter

An external power supply is required for each output.

Supply voltage for a compact version without a local display [1)]

Order code for "Output"	Minimum terminal voltage [2)]	Maximum terminal voltage
Option **G**: PROFIBUS PA, pulse/frequency/ switch output	≥ DC 9 V	DC 32 V

1) In event of external supply voltage of the PROFIBUS DP/PA coupler
2) The minimum terminal voltage increases if local operation is used: see the following table

Increase in minimum terminal voltage

Local operation	Increase in minimum terminal voltage
Order code for "Display; Operation", option **C**: Local operation SD02	+ DC 1 V
Order code for "Display; Operation", option **E**: Local operation SD03 with lighting (backlighting **not used**)	+ DC 1 V
Order code for "Display; Operation", option **E**: Local operation SD03 with lighting (backlighting **used**)	+ DC 3 V

5.1.9 Preparing the measuring device

Carry out the steps in the following order:

1. Mount the sensor and transmitter.
2. Connection housing, sensor: Connect connecting cable.
3. Transmitter: Connect connecting cable.
4. Transmitter: Connect signal cable and cable for supply voltage.

NOTICE

Insufficient sealing of the housing!

Operational reliability of the measuring device could be compromised.

► Use suitable cable glands corresponding to the degree of protection.

1. Remove dummy plug if present.
2. If the measuring device is supplied without cable glands:
   Provide suitable cable gland for corresponding connecting cable.
3. If the measuring device is supplied with cable glands:
   Observe requirements for connecting cables → 🖹 13.

5.2 Connecting the measuring device

NOTICE

Limitation of electrical safety due to incorrect connection!

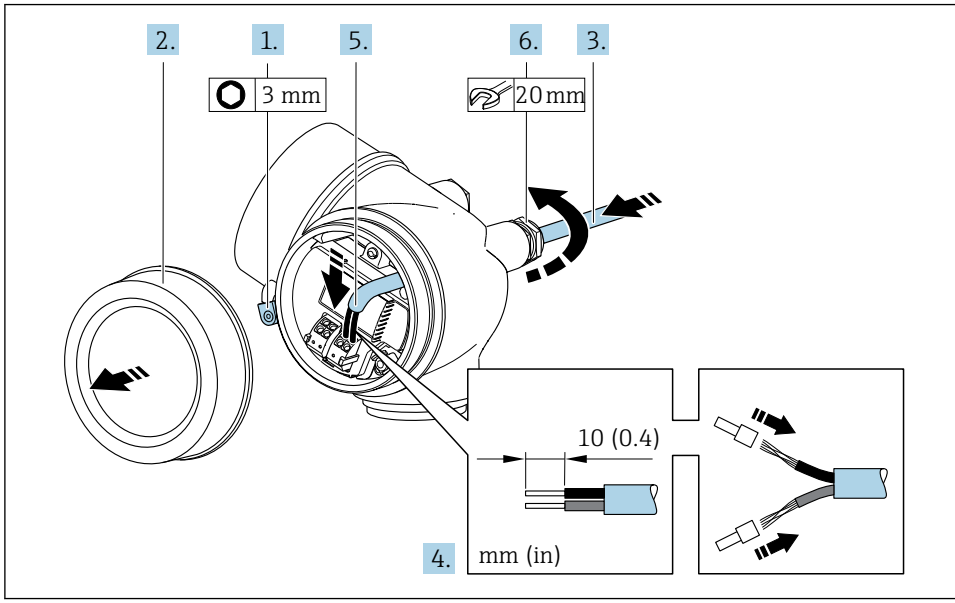
- Have electrical connection work carried out by appropriately trained specialists only.
- Observe applicable federal/national installation codes and regulations.
- Comply with local workplace safety regulations.
- Always connect the protective ground cable ⏚ before connecting additional cables.
- For use in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.

5.2.1 Connecting the compact version

Connecting the transmitter

The connection of the transmitter depends on the following order code:
"Electrical connection":
– Option **A**, **B**, **C**, **D**: terminals
– Option **I**, **M**: device plug

Connection via terminals



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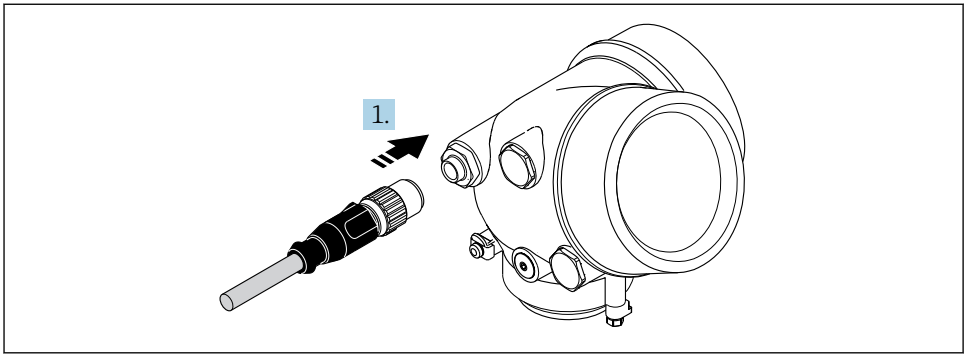
1. Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.

4. Strip the cable and cable ends. In the case of stranded cables, also fit ferrules.
5. Connect cable in accordance with terminal assignment→ 17..
6. **WARNING**

   Housing degree of protection may be voided due to insufficient sealing of the housing.
   - ▶ Screw in the screw without using any lubricant. The threads on the cover are coated with a dry lubricant.

   Firmly tighten the cable glands.
7. Reverse the removal procedure to reassemble the transmitter.

Connection via device plug



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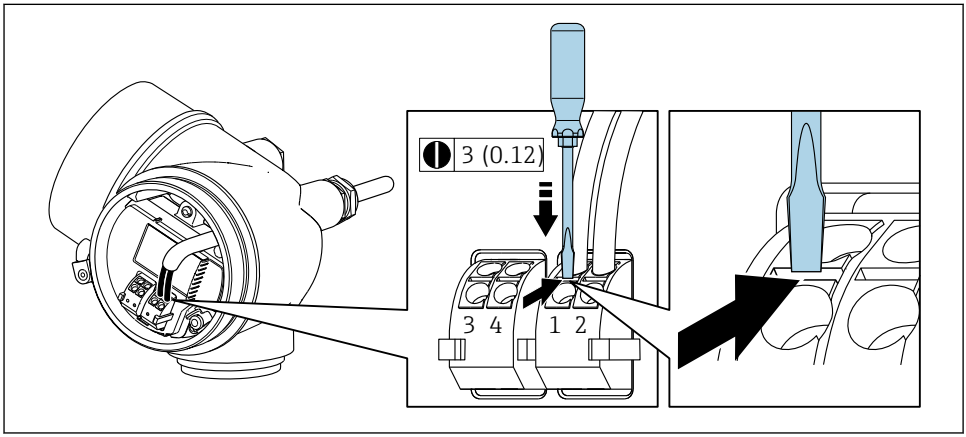
- ▶ Plug in the device plug and tighten firmly.

Removing a cable



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- ▶ To remove a cable from the terminal, use a flat-blade screwdriver to push the slot between the two terminal holes while simultaneously pulling the cable end out of the terminal.

5.2.2 Connecting the remote version

⚠ WARNING

Risk of damaging the electronic components!

- ▶ Connect the sensor and transmitter to the same potential equalization.
- ▶ Only connect the sensor to a transmitter with the same serial number.

The following procedure (in the action sequence given) is recommended for the remote version:

1. Mount the sensor and transmitter.
2. Connect the connecting cable for the remote version.
3. Connect the transmitter.

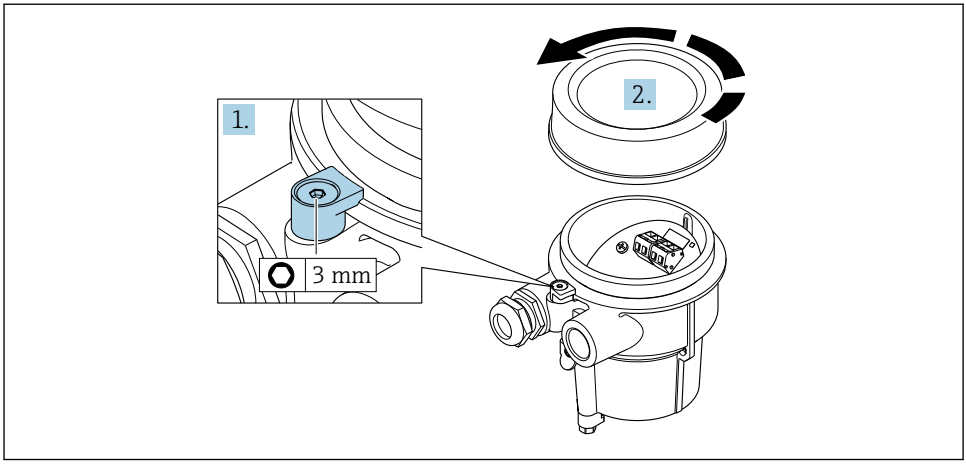
How the connecting cable is connected in the transmitter housing depends on the measuring device approval and the version of the connecting cable used.

In the following versions, only terminals can be used for connection in the transmitter housing:
- Certain approvals: Ex nA, Ex ec, Ex tb and Division 1
- Use of reinforced connecting cable

In the following versions, an M12 device connector is used for connection in the transmitter housing:
- All other approvals
- Use of connecting cable (standard)

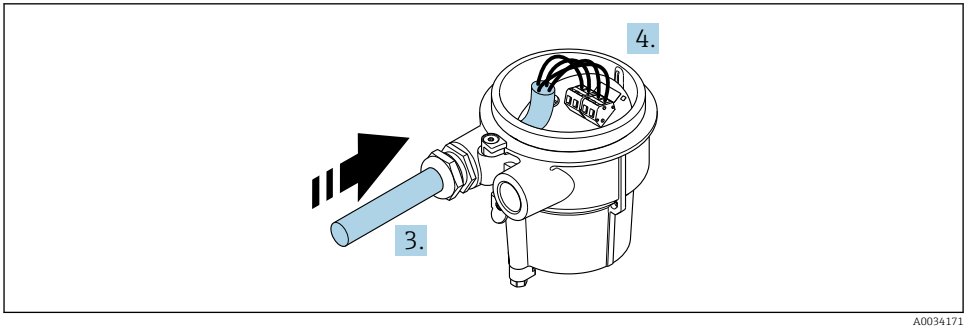
Terminals are always used to connect the connecting cable in the sensor connection housing (tightening torques for screws for cable strain relief: 1.2 to 1.7 Nm).

Connecting the sensor connection housing



A0034167

1. Loosen the securing clamp.
2. Unscrew the housing cover.



A0034171

4 *Sample graphic*

Connecting cable (standard, reinforced)

3. Guide the connecting cable through the cable entry and into the connection housing (if using a connecting cable without an M12 device plug, use the shorter stripped end of the connecting cable).
4. Wire the connecting cable:
   ↳ Terminal 1 = brown cable
   Terminal 2 = white cable
   Terminal 3 = yellow cable
   Terminal 4 = green cable
5. Connect the cable shield via the cable strain relief.

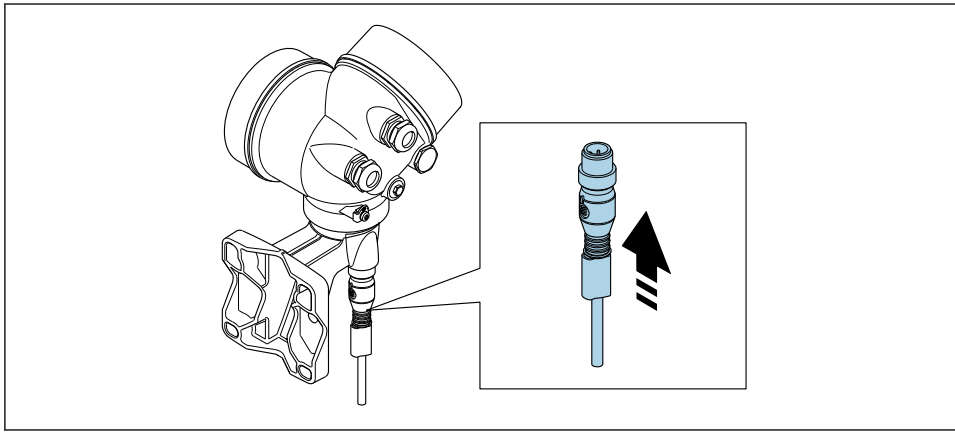
6. Tighten the screws for the cable strain relief using a torque in the range of 1.2 to 1.7 Nm.
7. Reverse the removal procedure to reassemble the connection housing.

Connecting cable (option "mass pressure-/temperature-compensated")

3. Guide the connecting cable through the cable entry and into the connection housing (if using a connecting cable without an M12 device plug, use the shorter stripped end of the connecting cable).
4. Wire the connecting cable:
   ↳ Terminal 1 = brown cable
   Terminal 2 = white cable
   Terminal 3 = green cable
   Terminal 4 = red cable
   Terminal 5 = black cable
   Terminal 6 = yellow cable
   Terminal 7 = blue cable
5. Connect the cable shield via the cable strain relief.
6. Tighten the screws for the cable strain relief using a torque in the range of 1.2 to 1.7 Nm.
7. Reverse the removal procedure to reassemble the connection housing.

Connecting the transmitter

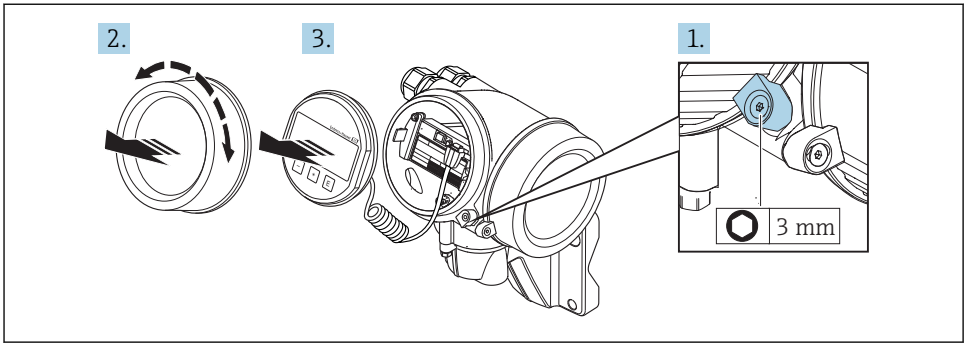
Connecting transmitter via plug



A0034172

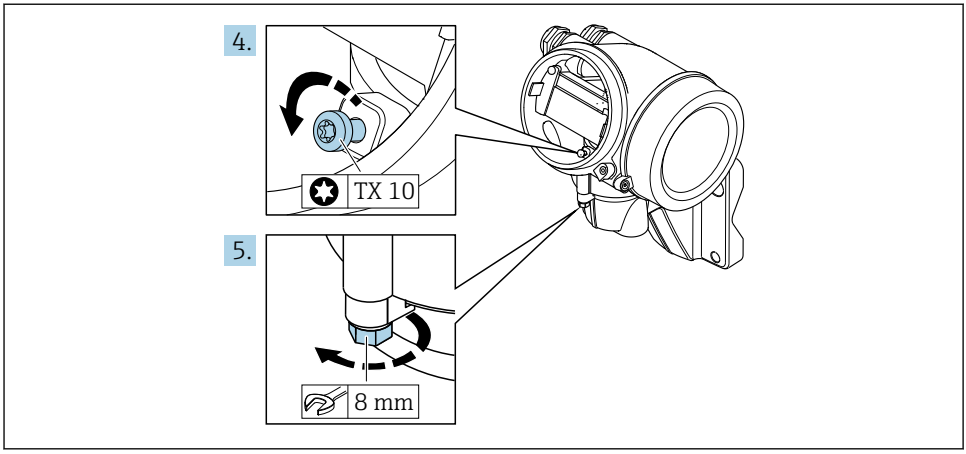
▶ Connect the plug.

Connecting transmitter via terminals



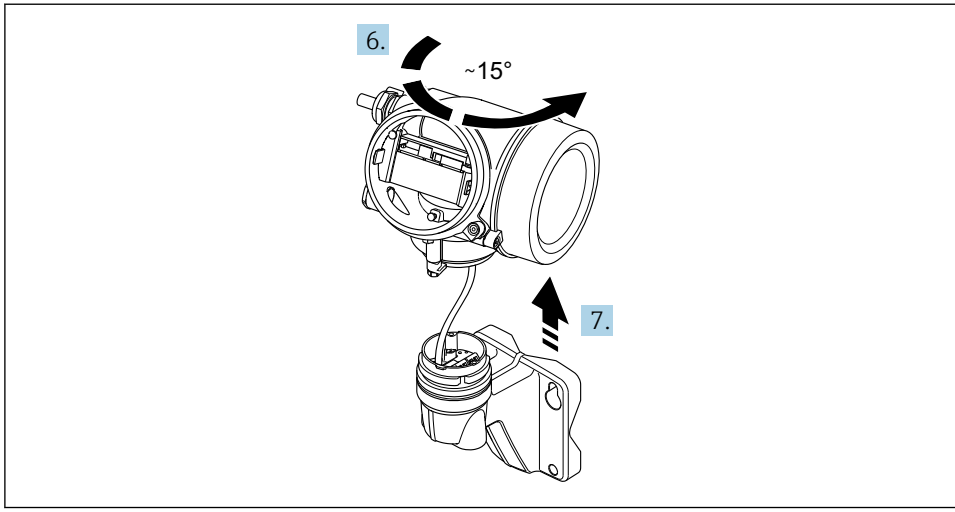
A0034173

1. Loosen the securing clamp of the electronics compartment cover.
2. Unscrew the electronics compartment cover.
3. Pull out the display module with a gentle rotational movement. To make it easier to access the lock switch, attach the display module to the edge of the electronics compartment.



A0034174

4. Loosen the locking screw of the transmitter housing.
5. Loosen the securing clamp of the transmitter housing.



A0034175

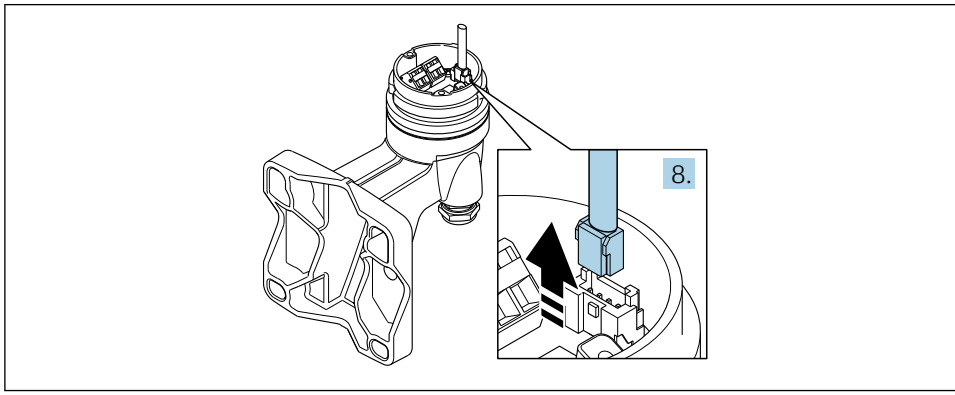
5 Sample graphic

6. Turn the transmitter housing to the right until it reaches the marking.
7. NOTICE

The connection board of the wall housing is connected to the electronics board of the transmitter via a signal cable!

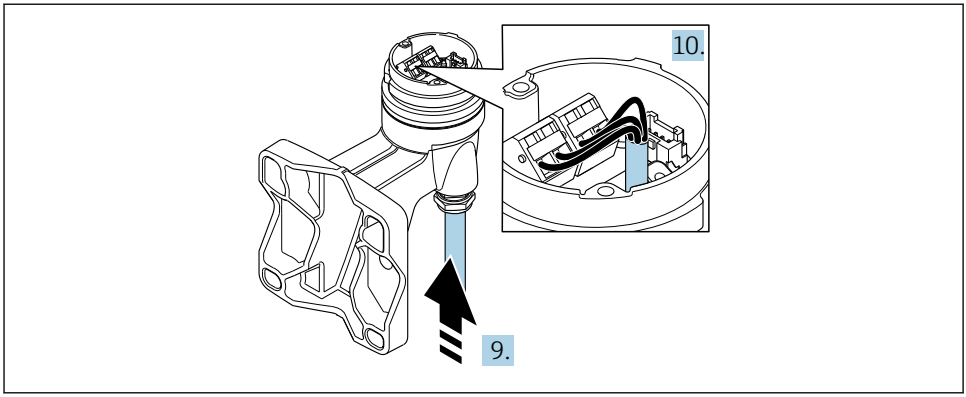
▶ Pay attention to the signal cable when lifting the transmitter housing!

Lift the transmitter housing.



A0034176

6 Sample graphic



A0034177

7 Sample graphic

Connecting cable (standard, reinforced)

8. Disconnect the signal cable from the connection board of the wall housing . by pressing in the locking clip on the connector. Remove the transmitter housing.
9. Guide the connecting cable through the cable entry and into the connection housing (if using a connecting cable without an M12 device plug, use the shorter stripped end of the connecting cable).
10. Wire the connecting cable:
    ↳ Terminal 1 = brown cable
    Terminal 2 = white cable
    Terminal 3 = yellow cable
    Terminal 4 = green cable
11. Connect the cable shield via the cable strain relief.
12. Tighten the screws for the cable strain relief using a torque in the range of 1.2 to 1.7 Nm.
13. Reverse the removal procedure to reassemble the transmitter housing.

Connecting cable (option "mass pressure-/temperature-compensated")

8. Disconnect both signal cables from the connection board of the wall housing. by pressing in the locking clip on the connector. Remove the transmitter housing.
9. Guide the connecting cable through the cable entry and into the connection housing (if using a connecting cable without an M12 device plug, use the shorter stripped end of the connecting cable).

10. Wire the connecting cable:
    ↳ Terminal 1 = brown cable
    Terminal 2 = white cable
    Terminal 3 = green cable
    Terminal 4 = red cable
    Terminal 5 = black cable
    Terminal 6 = yellow cable
    Terminal 7 = blue cable
11. Connect the cable shield via the cable strain relief.
12. Tighten the screws for the cable strain relief using a torque in the range of 1.2 to 1.7 Nm.
13. Reverse the removal procedure to reassemble the transmitter housing.

5.2.3 Ensuring potential equalization

Requirements

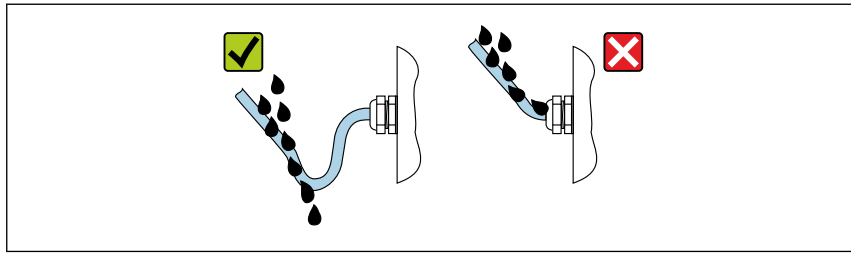
Please consider the following to ensure correct measurement:
- Same electrical potential for the medium and sensor
- Remote version: same electrical potential for the sensor and transmitter
- Company-internal grounding concepts
- Pipe material and grounding

5.3 Ensuring the degree of protection

The measuring device fulfills all the requirements for the IP66/67 degree of protection, Type 4X enclosure.

To guarantee IP66/67 degree of protection, Type 4X enclosure, carry out the following steps after the electrical connection:

1. Check that the housing seals are clean and fitted correctly.
2. Dry, clean or replace the seals if necessary.
3. Tighten all housing screws and screw covers.
4. Firmly tighten the cable glands.
5. To ensure that moisture does not enter the cable entry:
   Route the cable so that it loops down before the cable entry ("water trap").
   ↳



A0029278

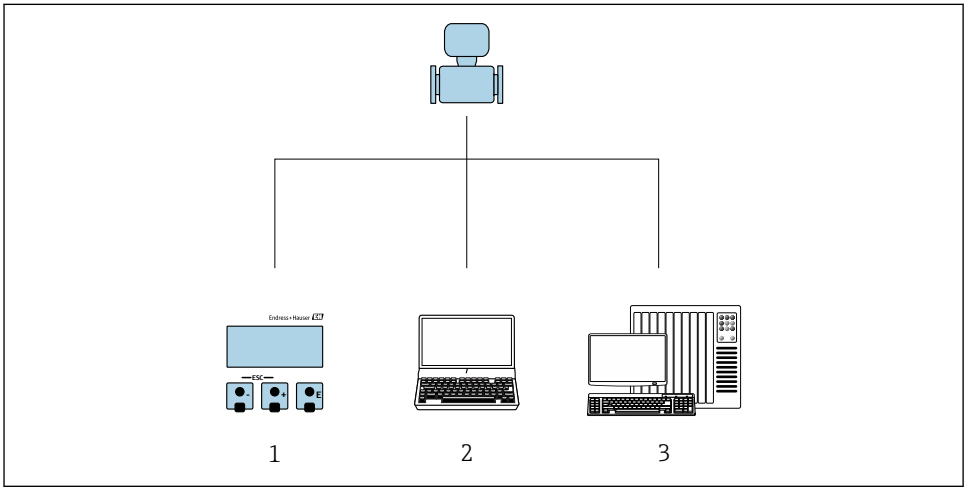
6. Insert dummy plugs into unused cable entries.

5.4 Post-connection check

Are cables or the device undamaged (visual inspection)?	❑
Do the cables used meet the requirements→ 🖹 13?	❑
Do the mounted cables have adequate strain relief?	❑
Are all cable glands installed, securely tightened and leak-tight? Cable run with "water trap" → 🖹 29?	❑
Depending on the device version, are all the device plugs firmly tightened→ 🖹 21?	❑
Only for remote version: is the sensor connected to the right transmitter? Check the serial number on the nameplate of the sensor and transmitter.	❑
Does the supply voltage match the specifications on the transmitter nameplate→ 🖹 19?	❑
Is the terminal assignment correct ?	❑
If supply voltage is present, do values appear on the display module?	❑
Are all the housing covers installed and tightened?	❑
Is the securing clamp tightened correctly?	❑
Have the screws for the cable strain relief been tightened using the correct torque→ 🖹 23?	❑

6 Operation options

6.1 Overview of operation options

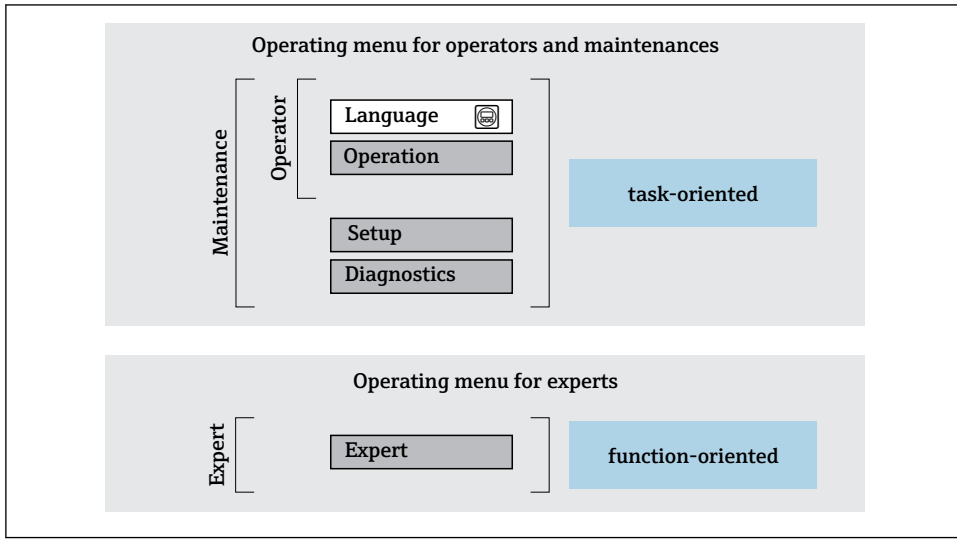


A0032227

1 Local operation via display module
2 Computer with operating tool (e.g. FieldCare, SIMATIC PDM)
3 Control system (e.g. PLC)

6.2 Structure and function of the operating menu

6.2.1 Structure of the operating menu



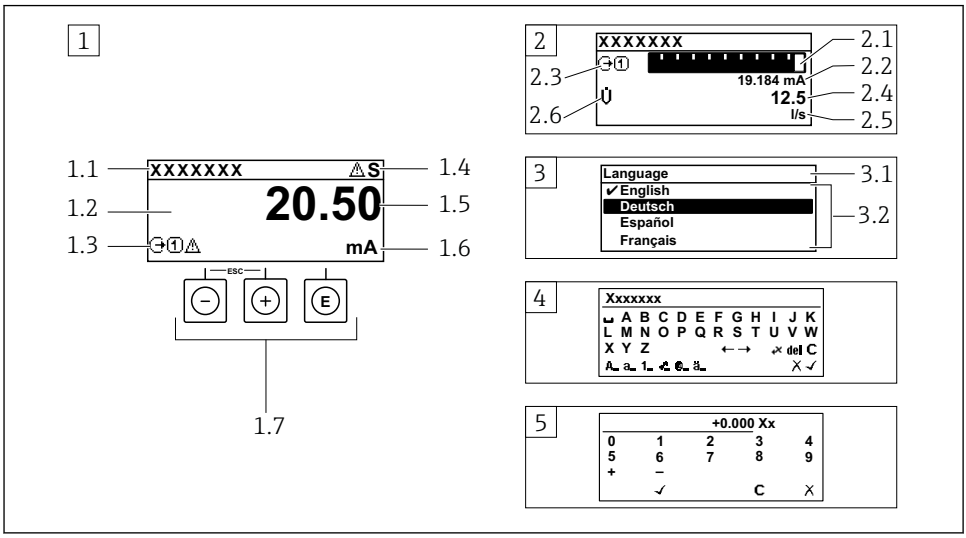
8 *Schematic structure of the operating menu*

6.2.2 Operating philosophy

The individual parts of the operating menu are assigned to certain user roles (operator, maintenance etc.). Each user role contains typical tasks within the device lifecycle.

For detailed information on the operating philosophy, see the Operating Instructions for the device.

6.3 Access to the operating menu via the local display



A0014013

1 Operational display with measured value shown as "1 value, max." (example)
1.1 Device tag
1.2 Display area for measured values (4-line)
1.3 Explanatory symbols for measured value: Measured value type, measuring channel number, symbol for diagnostic behavior
1.4 Status area
1.5 Measured value
1.6 Unit for the measured value
1.7 Operating elements
2 Operational display with measured value shown as "1 bar graph + 1 value" (example)
2.1 Bar graph display for measured value 1
2.2 Measured value 1 with unit
2.3 Explanatory symbols for measured value 1: measured value type, measuring channel number
2.4 Measured value 2
2.5 Unit for measured value 2
2.6 Explanatory symbols for measured value 2: measured value type, measuring channel number
3 Navigation view: picklist of a parameter
3.1 Navigation path and status area
3.2 Display area for navigation: ✔ designates the current parameter value
4 Editing view: text editor with input mask
5 Editing view: numeric editor with input mask

6.3.1 Operational display

Explanatory symbols for the measured value	Status area
▪ Depends on the device version, e.g.: – V̇: Volume flow – ṁ: Mass flow – ρ: Density – **G**: Conductivity – 🌡: Temperature ▪ Σ: Totalizer ▪ ⊖: Output ▪ ⊕: Input ▪ ①..④: Measurement channel number [1] ▪ Diagnostic behavior [2] – ⊗: Alarm – ⚠: Warning	The following symbols appear in the status area of the operational display at the top right: ▪ Status signals – **F**: Failure – **C**: Function check – **S**: Out of specification – **M**: Maintenance required ▪ Diagnostic behavior – ⊗: Alarm – ⚠: Warning ▪ 🔒: Locking (locked via hardware)) ▪ ⇆: Communication via remote operation is active.

1) If there is more than one channel for the same measured variable type (totalizer, output etc.).
2) For a diagnostic event that concerns the displayed measured variable.

6.3.2 Navigation view

Status area	Display area
The following appears in the status area of the navigation view in the top right corner: ▪ In the submenu – The direct access code for the parameter you are navigating to (e.g. 0022-1) – If a diagnostic event is present, the diagnostic behavior and status signal ▪ In the wizard If a diagnostic event is present, the diagnostic behavior and status signal	▪ Icons for menus – 🔧: Operation – 🔧: Setup – 🔧: Diagnostics – 🔧: Expert ▪ ▸: Submenus ▪ 🔧: Wizards ▪ 🔧: Parameters within a wizard ▪ 🔒: Parameter locked

6.3.3 Editing view

Text editor		Correction symbols under ✓C←	
✓	Confirms selection.	C	Clears all entered characters.
X	Exits the input without applying the changes.	→	Moves the input position one position to the right.
C	Clears all entered characters.	←	Moves the input position one position to the left.
✓C←	Switches to the selection of the correction tools.	⌫	Deletes one character immediately to the left of the input position.
Aa1@	Toggle ▪ Between upper-case and lower-case letters ▪ For entering numbers ▪ For entering special characters		

Numeric editor			
✓	Confirms selection.	←	Moves the input position one position to the left.
X	Exits the input without applying the changes.	·	Inserts decimal separator at the input position.
−	Inserts minus sign at the input position.	C	Clears all entered characters.

6.3.4 Operating elements

Keys and meaning
Enter key *For operational display* ▪ Pressing the key briefly opens the operating menu. ▪ Pressing the key for 2 s opens the context menu. *In a menu, submenu* ▪ Pressing the key briefly – Opens the selected menu, submenu or parameter. – Starts the wizard. – If help text is open: Closes the help text of the parameter. ▪ Pressing the key for 2 s for parameter: If present, opens the help text for the function of the parameter. *With a wizard:* Opens the editing view of the parameter. *With a text and numeric editor:* ▪ Pressing the key briefly – Opens the selected group. – Carries out the selected action. ▪ Pressing the key for 2 s: Confirms the edited parameter value.
Minus key ▪ *In a menu, submenu:* Moves the selection bar upwards in a choose list. ▪ *With a wizard:* Confirms the parameter value and goes to the previous parameter. ▪ *With a text and numeric editor:* Moves the selection bar to the left (backwards) in an input screen.
Plus key ▪ *In a menu, submenu:* Moves the selection bar downwards in a choose list. ▪ *With a wizard:* Confirms the parameter value and goes to the next parameter. ▪ *With a text and numeric editor:* Moves the selection bar to the right (forwards) in an input screen.
Escape key combination (press keys simultaneously) *In a menu, submenu* ▪ Pressing the key briefly – Exits the current menu level and takes you to the next higher level. – If help text is open, closes the help text of the parameter. ▪ Pressing the key for 2 s for the parameter: Returns you to the operational display ("home position"). *With a wizard:* Exits the wizard and takes you to the next higher level. *With a text and numeric editor:* Closes the text or numeric editor without applying changes.
Minus/Enter key combination (press the keys simultaneously)

Keys and meaning
Reduces the contrast (brighter setting).
⊕+Ⓔ **Plus/Enter key combination (press and hold down the keys simultaneously)** Increases the contrast (darker setting).
⊖ + ⊕ + Ⓔ **Minus/Plus/Enter key combination (press the keys simultaneously)** *For operational display:* Enables or disables the keypad lock.

6.3.5 Further information

For further information on the following topics, see the Operating Instructions for the device
- Calling up help text
- User roles and related access authorization
- Disabling write protection via access code
- Enabling and disabling the keypad lock

6.4 Access to the operating menu via the operating tool

The operating menu can also be accessed via the FieldCare and DeviceCare operating tools. See the Operating Instructions for the device.

7 System integration

For detailed information on system integration, see the Operating Instructions for the device.
- Overview of device description files:
  - Current version data for the device
  - Operating tools
- Device master file (GSD)
  - Manufacturer-specific GSD
  - Profile GSD
- Compatibility with previous model
- Using the GSD modules of the previous model
- Cyclic data transmission
  - Block model
  - Description of the modules

7.1 Overview of device description files

7.1.1 Current version data for the device

Firmware version	01.01.02	▪ On the title page of the Operating Instructions ▪ On the transmitter nameplate ▪ **Firmware version** parameter Diagnostics → Device information → Firmware version
Release date of firmware version	01.2018	---
Manufacturer ID	0x11	**Manufacturer ID** parameter Diagnostics → Device information → Manufacturer ID
Device type ID	0x1564	**Device type** parameter Diagnostics → Device information → Device type
Profile version	3.02	---

For an overview of the different firmware versions for the device

7.1.2 Operating tools

The suitable device description file for the individual operating tools is listed in the table below, along with information on where the file can be acquired.

Operating tool via PROFIBUS protocol	Sources for obtaining device descriptions
FieldCare	▪ www.endress.com → Download Area ▪ CD-ROM (contact Endress+Hauser) ▪ DVD (contact Endress+Hauser)
DeviceCare	▪ www.endress.com → Download Area ▪ CD-ROM (contact Endress+Hauser) ▪ DVD (contact Endress+Hauser)
SIMATIC PDM (Siemens)	www.endress.com → Download Area

7.2 Device master file (GSD)

In order to integrate field devices into a bus system, the PROFIBUS system needs a description of the device parameters, such as output data, input data, data format, data volume and supported transmission rate.

These data are available in the device master file (GSD) which is provided to the PROFIBUS Master when the communication system is commissioned. In addition device bit maps, which appear as icons in the network structure, can also be integrated.

With the Profile 3.0 device master file (GSD) it is possible to exchange field devices made by different manufacturers without having to reconfigure.

Generally speaking two different GSD versions are possible with Profile 3.0 and higher.

- Before configuring, the user must decide which GSD should be used to operate the system.
- The setting can be changed via a Class 2 master.

7.2.1 Manufacturer-specific GSD

This GSD guarantees the unrestricted functionality of the measuring device. Device-specific process parameters and functions are therefore available.

Manufacturer-specific GSD	ID number	File name
PROFIBUS PA	0x1564	EH3x1564.gsd

The fact that the manufacturer-specific GSD should be used is specified in the **Ident number selector** parameter by selecting the **Manufacturer** option.

Where to acquire the manufacturer-specific GSD:
www.endress.com → Downloads area

7.2.2 Profile GSD

Differs in terms of the number of Analog Input blocks (AI) and the measured values. If a system is configured with a Profile GSD, it is possible to exchange devices made by different manufacturers. However, it is essential to ensure that the order of the cyclic process values is correct.

ID number	Supported blocks	Supported channels
0x9740	▪ 1 Analog Input ▪ 1 Totalizer	▪ Channel Analog Input: volume flow ▪ Channel totalizer: volume flow
0x9741	▪ 2 Analog Input ▪ 1 Totalizer	▪ Channel Analog Input 1: volume flow ▪ Channel Analog Input 2: mass flow ▪ Channel totalizer: volume flow
0x9742	▪ 3 Analog Input ▪ 1 Totalizer	▪ Channel Analog Input 1: volume flow ▪ Channel Analog Input 2: mass flow ▪ Channel Analog Input 3: corrected volume flow ▪ Channel totalizer: volume flow

The Profile GSD that is to be used is specified in the **Ident number selector** parameter by selecting the **Profile 0x9740** option, **Profile 0x9741** option or **Profile 0x9742** option.

7.2.3 Compatibility with other Endress+Hauser measuring devices

The Prowirl 200 PROFIBUS PA guarantees compatibility during cyclic data exchange with the automation system (Class 1 master) for the following measuring devices:
- Prowirl 72 PROFIBUS PA (Profile version 3.0, ID number 0x153B)
- Prowirl 73 PROFIBUS PA (Profile version 3.0, ID number 0x153C)

It is possible to replace these measuring devices with a Prowirl 200 PROFIBUS PA without the need to reconfigure the PROFIBUS network in the automation unit even though the names and ID numbers of the measuring devices differ. Once replaced, the device is either identified automatically (factory setting) or device identification can be set manually.

Automatic identification (factory setting)

The Prowirl 200 PROFIBUS PA automatically identifies the measuring device configured in the automation system (Prowirl 72 PROFIBUS PA or Prowirl 73 PROFIBUS PA) and makes the same input and output data and measured value status information available for cyclic data exchange.

Automatic identification is set in the **Ident number selector** parameter using the **Auto** option (factory setting).

Manual setting

The manual setting is made in the **Ident number selector** parameter via the option Prowirl 72 (0x153B) or Prowirl 73 (0x153C).

Afterwards, the Prowirl 200 PROFIBUS PA makes the same input and output data and measured status information available for cyclic data exchange.

- If the Prowirl 200 PROFIBUS PA is acyclically configured via an operating program (Class 2 master), access is directly via the block structure or the parameters of the measuring device.
- If parameters have been changed in the device to be replaced (Prowirl 72 PROFIBUS PA or Prowirl 73 PROFIBUS PA) (parameter setting no longer corresponds to the original factory setting), these parameters must be changed accordingly in the new replacement Prowirl 200 PROFIBUS PA via an operating program (Class 2 master).
  Example
  The setting for low flow cut off has been changed from mass flow (factory setting) to corrected volume flow in a Prowirl 72 PROFIBUS PA currently in operation. This device is now replaced by a Prowirl 200 PROFIBUS PA device. After replacing the device, the assignment for the low flow cut off must be changed manually in the Prowirl 200 PROFIBUS, i.e. to corrected volume flow, to ensure the measuring device behaves identically.

Replacing the measuring devices without changing the GSD file or restarting the controller

In the procedure described below, the device can be replaced without interrupting ongoing operation or restarting the controller. However with this procedure the measuring device is not fully integrated!

1. Replace the measuring device Prowirl 72 or 73 PROFIBUS PA by a Prowirl 200 PROFIBUS PA device.
2. Set the device address: The same device address that was set for the Prowirl 72, Prowirl 73 or PROFIBUS PA Profile GSD must be used.
3. Connect the Prowirl 200 PROFIBUS PA.

If the factory setting had been changed on the replaced device (Prowirl 72 or Prowirl 73), the following settings may need to be changed:

1. Configuration of the application-specific parameters.
2. Choice of process variables to be transmitted via the CHANNEL parameter in the Analog Input or Totalizer function block.

3. Setting of the units for the process variables.

7.3 Cyclic data transmission

For detailed information on cyclic data transmission, see the Operating Instructions

8 Commissioning

8.1 Function check

Before commissioning the measuring device:

- Make sure that the post-installation and post-connection checks have been performed.

- "Post-installation check" checklist→ 12
- "Post-connection check" checklist → 30

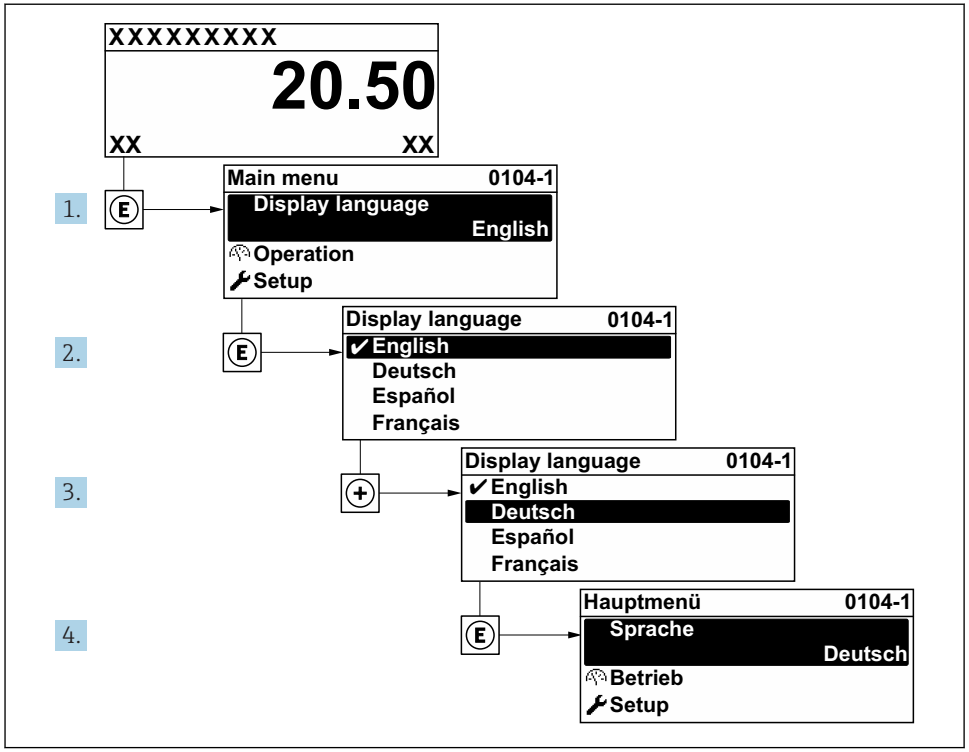
8.2 Switching on the measuring device

- After a successful function check, switch on the measuring device.
  - After a successful startup, the local display switches automatically from the startup display to the operational display.

If nothing appears on the local display or a diagnostic message is displayed, refer to the Operating Instructions for the device → 2

8.3 Setting the operating language

Factory setting: English or ordered local language



9 *Taking the example of the local display*

8.4 Configuring the measuring device

The **Setup** menu with its **System units** submenu and various guided wizards enable fast commissioning of the measuring device.

The desired units can be selected in the **System units** submenu. The wizards systematically guide the user through all the parameters required for configuration, such as parameters for measurement or outputs.

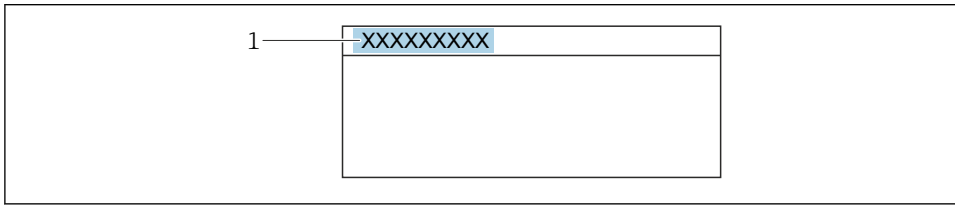
The wizards available in the particular device can vary on account of the device version (e.g. sensor).

Wizard	Meaning
System units	Configure the units for all measured variables
Medium selection	Define the medium
Pulse/frequency/switch output	Configure the selected output type
Communication	Configuration of the communication interface

Wizard	Meaning
Analog inputs	Configure the analog inputs
Display	Configure the measured value display
Low flow cut off	Set the low flow cut off
Advanced setup	Additional parameters for configuration: ▪ Medium properties ▪ External compensation ▪ Sensor adjustment ▪ Totalizer 1 to n ▪ Heartbeat ▪ Configuration backup display ▪ Administration

8.5 Defining the tag name

To enable fast identification of the measuring point within the system, you can enter a unique designation using the **Device tag** parameter and thus change the factory setting.



A0029422

10 Header of the operational display with tag name

1 Tag name

Navigation

"Setup" menu → Device tag

Parameter overview with brief description

Parameter	Description	User entry	Factory setting
Device tag	Enter the name for the measuring point.	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).	Prowirl 200 PA

8.6 Protecting settings from unauthorized access

The following write protection options exist in order to protect the configuration of the measuring device from unintentional modification:
- Protect access to parameters via access code
- Protect access to local operation via key locking
- Protect access to measuring device via write protection switch

For detailed information on protecting the settings against unauthorized access, see the Operating Instructions for the device.

8.7 Application-specific commissioning

8.7.1 Steam application

Select medium

Navigation:

Setup → Medium selection

1. Call up the **Medium selection** wizard.
2. In the **Select medium** parameter, select the **Steam** option.
3. When pressure measured value is read in [1]:
   In the **Steam calculation mode** parameter, select the **Automatic (p-/T-compensated)** option.
4. If pressure measured value is not read in:
   In the **Steam calculation mode** parameter, select the **Saturated steam (T-compensated)** option.
5. In the **Steam quality value** parameter, enter the steam quality present in the pipe.
   ↳ Without Wet Steam Detection/Measurement application package: Measuring device uses this value to calculate the mass flow of the steam.
   With Wet Steam Detection/Measurement application package: Measuring device uses this value if the steam quality cannot be calculated (steam quality is not compliant with basic conditions).

Configuring the analog input (AI)

6. Configuring the analog input (AI).

Configuring the external compensation

7. With Wet Steam Detection/Measurement application package:
   In the **Steam quality** parameter, select the **Calculated value** option.

For detailed information on the basic conditions for wet steam applications, see the Special Documentation.

1) Sensor version option "mass (integrated pressure and temperature measurement)", Pressure read in via PA

8.7.2 Liquid application

User-specific liquid, e. g. heat carrier oil

Select medium

Navigation:

Setup → Medium selection

1. Call up the **Medium selection** wizard.
2. In the **Select medium** parameter, select the **Liquid** option.
3. In the **Select liquid type** parameter, select the **User-specific liquid** option.
4. In the **Enthalpy type** parameter, select the **Heat** option.
   ↳ **Heat** option: Non-flammable liquid that serves as a heat carrier.
   Calorific value option: Flammable liquid whose combustion energy is calculated.

Configuring fluid properties

Navigation:

Setup → Advanced setup → Medium properties

5. Call up the **Medium properties** submenu.
6. In the **Reference density** parameter, enter the reference density of the fluid.
7. In the **Reference temperature** parameter, enter the fluid temperature associated with the reference density.
8. In the **Linear expansion coefficient** parameter, enter the expansion coefficient of the fluid.
9. In the **Specific heat capacity** parameter, enter the heat capacity of the fluid.
10. In the **Dynamic viscosity** parameter, enter the viscosity of the fluid.

8.7.3 Gas applications

For accurate mass or corrected volume measurement, it is recommended to use the pressure-/temperature-compensated sensor version. If this sensor version is not available, read in the pressure via the PA. If neither of these two options is possible, the pressure can also be entered as a fixed value in the **Fixed process pressure** parameter.

Flow computer available only with the order code for "Sensor version", option "mass" (integrated temperature measurement)" or option "mass (integrated pressure/ temperature measurement)".

Single gas

Combustion gas, e. g. methane CH_4

Select medium

Navigation:

Setup → Medium selection

1. Call up the **Medium selection** wizard.
2. In the **Select medium** parameter, select the **Gas** option.
3. In the **Select gas type** parameter, select the **Single gas** option.
4. In the **Gas type** parameter, select the **Methane CH4** option.

Configuring fluid properties

Navigation:

Setup → Advanced setup → Medium properties

5. Call up the **Medium properties** submenu.
6. In the **Reference combustion temperature** parameter, enter the reference combustion temperature of the fluid.
7.

Configuring the analog input (AI)

8. Configure the Analog Input (AI) for the "energy flow" process variable..

Configuring optional fluid properties for output of corrected volume flow

Navigation:

Setup → Advanced setup → Medium properties

9. Call up the **Medium properties** submenu.
10. In the **Reference pressure** parameter, enter the reference pressure of the fluid.
11. In the **Reference temperature** parameter, enter the reference temperature of the fluid.

Gas mixture

Forming gas for steel mills and rolling mills, e. g. N_2/H_2

Select medium

Navigation:

Setup → Medium selection

1. Call up the **Medium selection** wizard.
2. In the **Select medium** parameter, select the **Gas** option.
3. In the **Select gas type** parameter, select the **Gas mixture** option.

Configuring gas composition

Navigation:

Setup → Advanced setup → Medium properties → Gas composition

4. Call up the **Gas composition** submenu.

5. In the **Gas mixture** parameter, select the **Hydrogen H2** option and the **Nitrogen N2** option.
6. In the **Mol% H2** parameter, enter the quantity of hydrogen.
7. In the **Mol% N2** parameter, enter the quantity of nitrogen.
   ↳ All quantities must add up to 100 %.
   The density is determined according to NEL 40.

Configuring optional fluid properties for output of corrected volume flow

Navigation:

Setup → Advanced setup → Medium properties

8. Call up the **Medium properties** submenu.
9. In the **Reference pressure** parameter, enter the reference pressure of the fluid.
10. In the **Reference temperature** parameter, enter the reference temperature of the fluid.

Air

Select medium

Navigation:

Setup → Medium selection

1. Call up the **Medium selection** wizard.
2. In the **Select medium** parameter, select the **Gas** option.
3. In the **Select gas type** parameter, select the **Air** option.
   ↳ The density is determined according to NEL 40.
4. Enter the value in the **Relative humidity** parameter.
   ↳ The relative humidity is entered as a %. The relative humidity is converted internally to absolute humidity and is then factored into the density calculation according to NEL 40.
5. In the **Fixed process pressure** parameter, enter the value of the process pressure present.

Configuring fluid properties

Navigation:

Setup → Advanced setup → Medium properties

6. Call up the **Medium properties** submenu.
7. In the **Reference pressure** parameter enter the reference pressure for calculating the reference density.
   ↳ Pressure that is used as a static reference for combustion. This makes it possible to compare combustion processes at different pressures.

8. In the **Reference temperature** parameter enter the temperate for calculating the reference density.

Endress+Hauser recommends the use of active pressure compensation. This fully rules out the risk of measured errors due to pressure variations and incorrect entries .

Natural gas

Select medium

Navigation:

Setup → Medium selection

1. Call up the **Medium selection** wizard.
2. In the **Select medium** parameter, select the **Gas** option.
3. In the **Select gas type** parameter, select the **Natural gas** option.
4. In the **Fixed process pressure** parameter, enter the value of the process pressure present.
5. In the **Enthalpy calculation** parameter, select one of the following options:
   ↳ AGA5
   ISO 6976 option (contains GPA 2172)
6. In the **Density calculation** parameter, select one of the following options.
   ↳ AGA Nx19
   ISO 12213- 2 option (contains AGA8-DC92)
   ISO 12213- 3 option (contains SGERG-88, AGA8 Gross Method 1)

Configuring fluid properties

Navigation:

Setup → Advanced setup → Medium properties

7. Call up the **Medium properties** submenu.
8. In the **Calorific value type** parameter, select one of the options.
9. n the **Reference gross calorific value** parameter, enter the reference gross calorific value of the natural gas.
10. In the **Reference pressure** parameter enter the reference pressure for calculating the reference density.
    ↳ Pressure that is used as a static reference for combustion. This makes it possible to compare combustion processes at different pressures.
11. In the **Reference temperature** parameter enter the temperate for calculating the reference density.
12. In the **Relative density** parameter, enter the relative density of the natural gas.

Endress+Hauser recommends the use of active pressure compensation. This fully rules out the risk of measured errors due to pressure variations and incorrect entries .

Ideal gas

The unit "corrected volume flow" is often used to measure industrial gas mixtures, in particular natural gas. To do so, the calculated mass flow is divided by a reference density. To calculate the mass flow, knowledge of the exact composition of the gas is essential. In practice, however, this information is often not available (e. g. as it varies over time). In this case, it can be useful to regard the gas as an ideal gas. This means that only the operating temperature and operating pressure variables as well as the reference temperature and reference pressure variables are needed to calculate the corrected volume flow. The error resulting from this assumption (typically 1 to 5 %) is often considerably smaller than the error caused by inaccurate composition data. This method should not be used for condensing gases (e. g. saturated steam).

Select medium

Navigation:

Setup → Medium selection

1. Call up the **Medium selection** wizard.
2. In the **Select medium** parameter, select the **Gas** option.
3. In the **Select gas type** parameter, select the **User-specific gas** option.
4. For non-flammable gas:
   In the **Enthalpy type** parameter, select the **Heat** option.

Configuring fluid properties

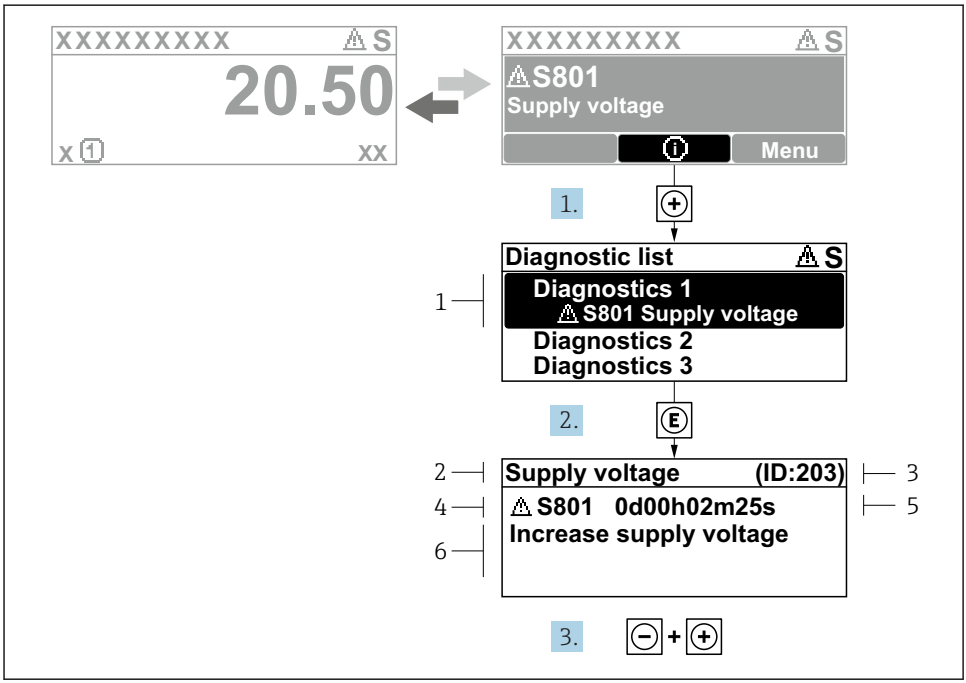
Navigation:

Setup → Advanced setup → Medium properties

5. Call up the **Medium properties** submenu.
6. In the **Reference density** parameter, enter the reference density of the fluid.
7. In the **Reference pressure** parameter, enter the reference pressure of the fluid.
8. In the **Reference temperature** parameter, enter the fluid temperature associated with the reference density.
9. In the **Reference Z-factor** parameter, enter the value **1**.
10. If specific heat capacity is to be measured:
    In the **Specific heat capacity** parameter, enter the heat capacity of the fluid.
11. In the **Z-factor** parameter, enter the value **1**.
12. In the **Dynamic viscosity** parameter, enter the viscosity of the fluid under operating conditions.

9 Diagnostic information

Faults detected by the self-monitoring system of the measuring device are displayed as a diagnostic message in alternation with the operational display. The message on remedial measures can be called up from the diagnostic message, and contains important information on the fault.



11 *Message about remedial measures*

1 *Diagnostic information*
2 *Short text*
3 *Service ID*
4 *Diagnostic behavior with diagnostic code*
5 *Operation time of occurrence*
6 *Remedial measures*

1. The user is in the diagnostic message.
   Press ⊞ (ⓘ symbol).
   ↳ The **Diagnostic list** submenu opens.
2. Select the desired diagnostic event with ⊞ or ⊟ and press Ⓔ .
   ↳ The message about the remedial measures opens.
3. Press ⊟ + ⊞ simultaneously.
   ↳ The message about the remedial measures closes.

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