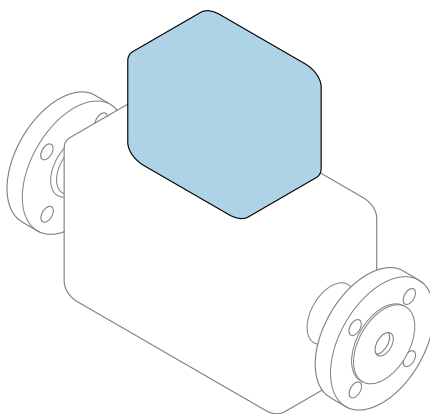


# Brief Operating Instructions


## Proline 500

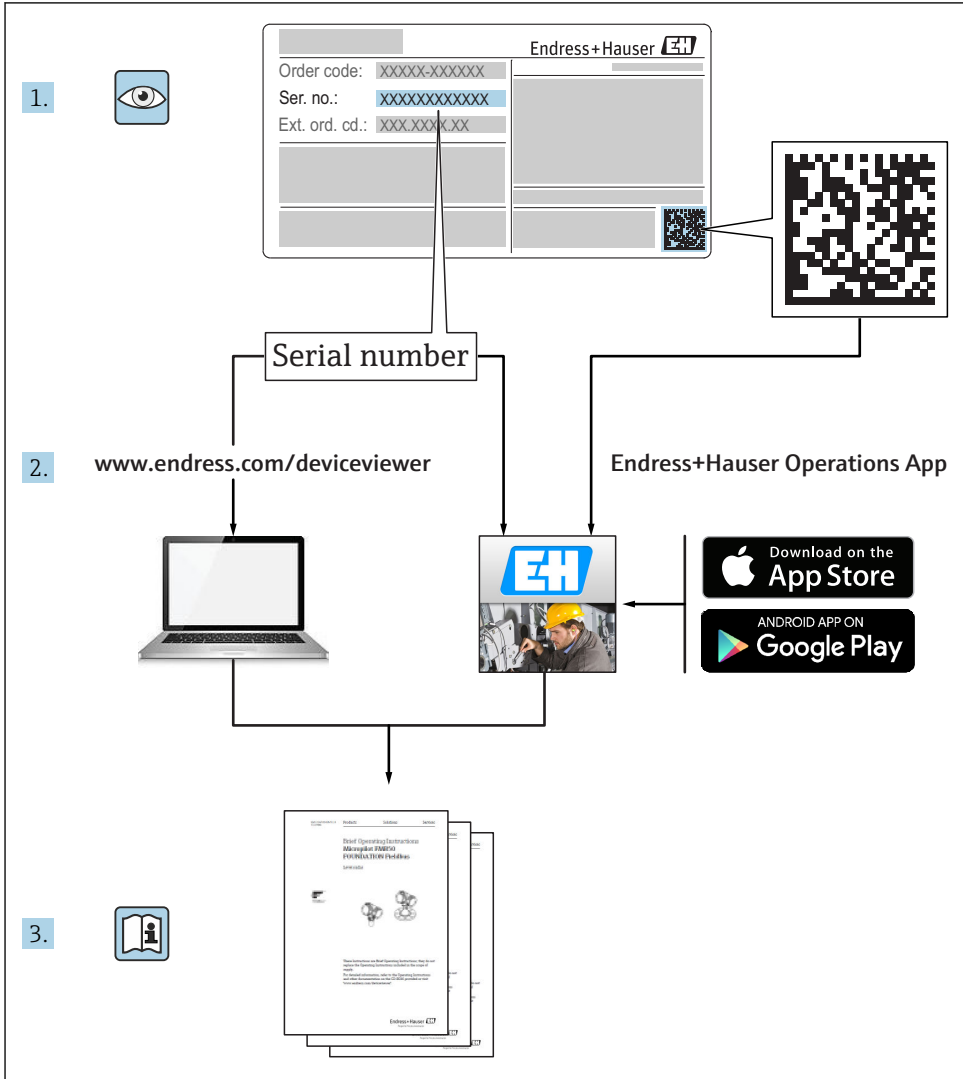
### Modbus RS485

Part 2 of 2  
Transmitter



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

These Brief Operating Instructions contain all the information for the transmitter. When commissioning, please also refer to the "Sensor Brief Operating Instructions" →  3.



A0023555

## Brief Operating Instructions for the device

The device consists of a transmitter and a sensor.

The process of commissioning these two components is described in two separate manuals:

- Sensor Brief Operating Instructions
- Transmitter Brief Operating Instructions

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

### Sensor Brief Operating Instructions

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

### Transmitter Brief Operating Instructions

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 **Transmitter Brief Operating Instructions**.

The "Sensor Brief Operating Instructions" are available via:

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





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


# 1 Document information

## 1.1 Symbols used





### 1.1.1 Safety symbols



Symbol	Meaning
	<b>DANGER!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
	<b>WARNING!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
	<b>CAUTION!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
	<b>NOTE!</b> 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
	<b>Permitted</b> Procedures, processes or actions that are permitted.		<b>Preferred</b> Procedures, processes or actions that are preferred.
	<b>Forbidden</b> Procedures, processes or actions that are forbidden.		<b>Tip</b> Indicates additional information.
	Reference to documentation		Reference to page
	Reference to graphic		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		<b>Ground connection</b> A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

Symbol	Meaning
	<b>Protective ground connection</b> A terminal which must be connected to ground prior to establishing any other connections.
	<b>Equipotential connection</b> A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.





1.1.4 Communication symbols

Symbol	Meaning	Symbol	Meaning
	<b>Wireless Local Area Network (WLAN)</b> Communication via a wireless, local network.		<b>Bluetooth</b> Wireless data transmission between devices over a short distance.
	<b>LED</b> Light emitting diode is off.		<b>LED</b> Light emitting diode is on.
	<b>LED</b> 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		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 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**

The measuring device described in these Operating Instructions is intended only for the following applications:

- *Applies for Proline Promass and Cubemass:*  
Flow measurement of liquids and gases.
- *Applies for Proline Promag:*  
Flow measurement of liquids with a minimum conductivity of 5  $\mu\text{S}/\text{cm}$ .

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:

- ▶ 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.

*Only applies for Proline Promass E, F, O, X and Cubemass C*

**⚠ WARNING****Danger of housing breaking due to measuring tube breakage!**

- ▶ In the event of a measuring tube breakage for a device version without rupture disk it is possible for the pressure loading capacity of the sensor housing to be exceeded. This can lead to rupture or failure of the sensor housing.

## 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 measuring system consists of a transmitter and a sensor.

The transmitter and sensor are mounted in physically separate locations. They are interconnected by one or two connecting cable(s).

Two versions of the transmitter are available:

- Proline 500 – digital
- Proline 500



The Promag W 500 device is **not** available with the "Proline 500 – digital" transmitter.

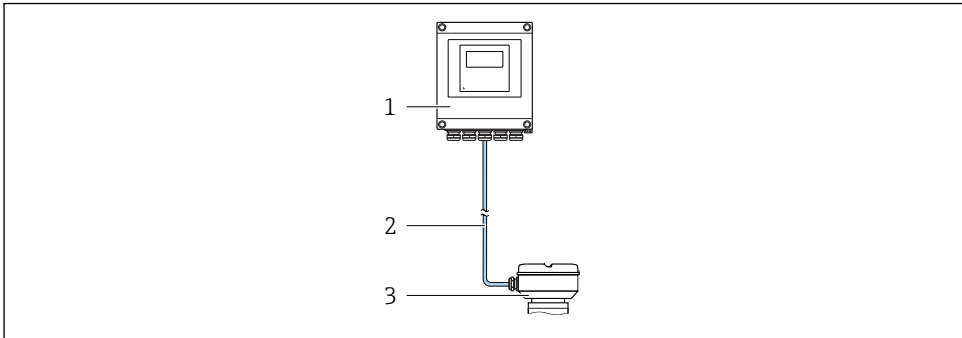


For detailed information on the product description, see the Operating Instructions for the device.

#### 3.1 Proline Promass, Cubemass and Promag 500 – digital

For use in applications not required to meet special requirements due to ambient or operating conditions. Electronics in the transmitter housing, ISEM (intelligent sensor electronics module) in the sensor connection housing.

- Flexible and cost-effective separate installation.
- A standard cable can be used as the connecting cable.
- Signal transmission: digital.



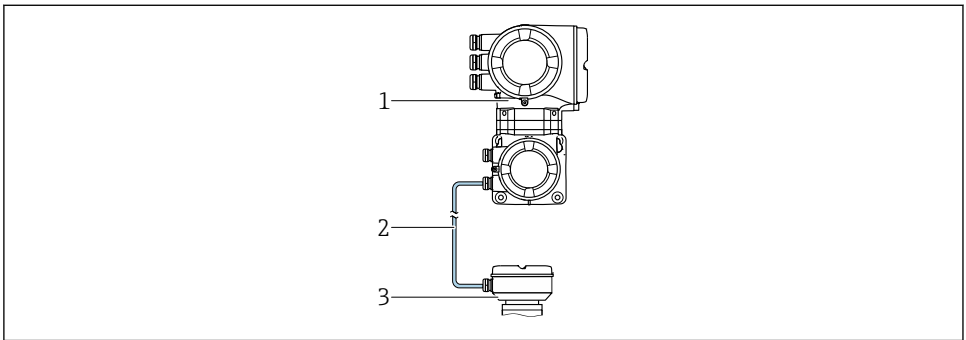
- 1 Transmitter
- 2 Connecting cable: cable, separate, standard
- 3 Sensor connection housing with integrated ISEM (intelligent sensor electronics module)

## 3.2 Proline Promass, Cubemass and Promag 500

For use in applications required to meet special requirements due to ambient or operating conditions. Electronics and ISEM (intelligent sensor electronics module) in the transmitter housing.

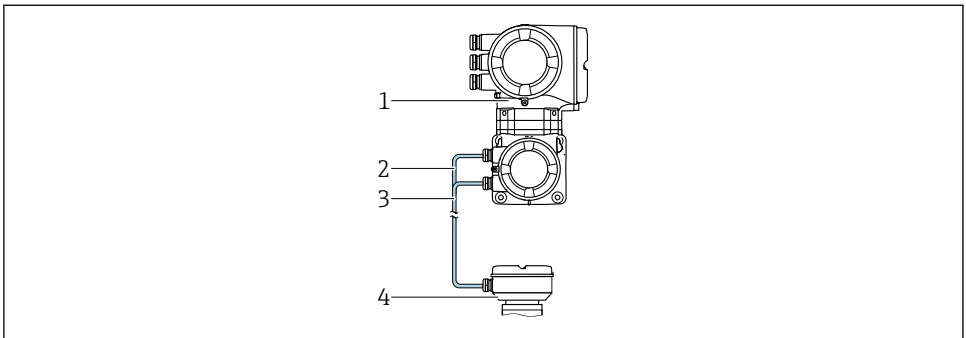
- Strong vibrations at the sensor.
- Sensor in underground installations.
- Permanent immersion of sensor in water, IP68 ingress protection.
- Signal transmission: analog.

### 3.2.1 Proline Promass and Cubemass 500



- 1 Transmitter with integrated ISEM (intelligent sensor electronics module)
- 2 Connecting cable: cable, separate
- 3 Sensor connection housing

### 3.2.2 Proline Promag 500



- 1 Transmitter with integrated ISEM (intelligent sensor electronics module)
- 2 Coil current cable
- 3 Signal cable
- 4 Sensor connection housing

## 4 Installation



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

### 4.1 Mounting the transmitter housing: Proline 500 – digital

#### 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.

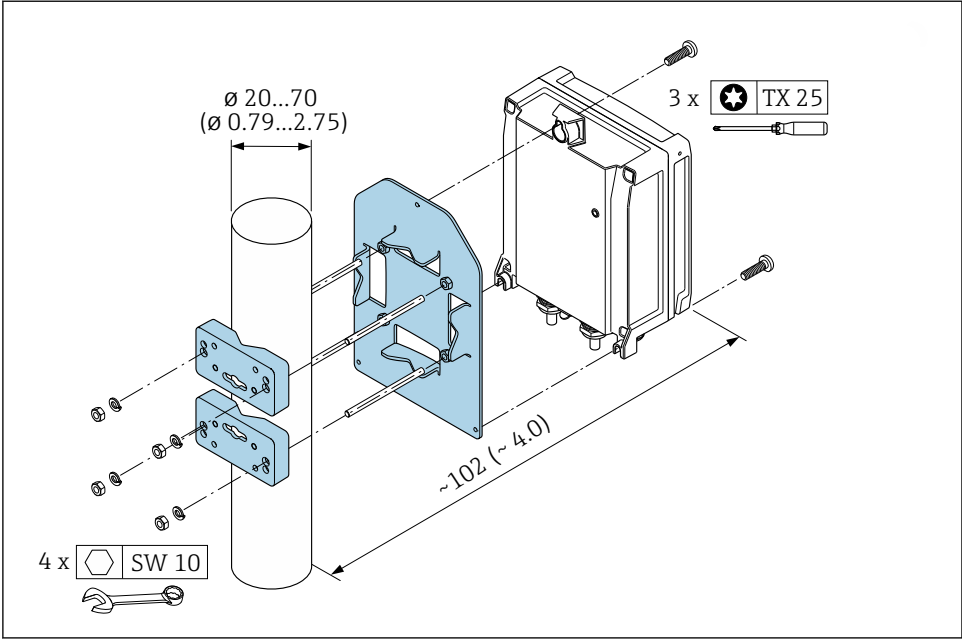
#### 4.1.1 Post mounting

#### WARNING

##### **Excessive tightening torque applied to the fixing screws!**

Risk of damaging the plastic transmitter.

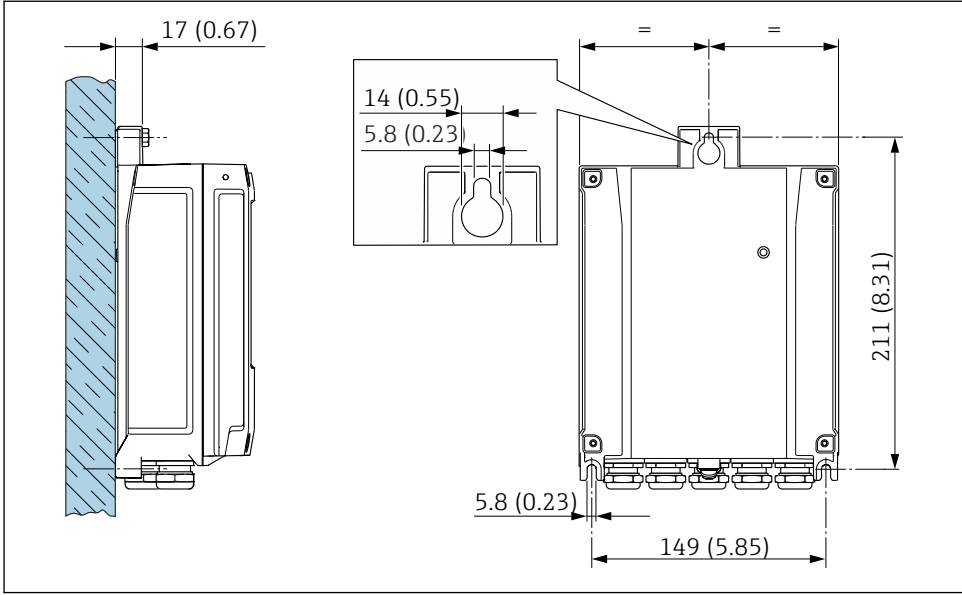
- ▶ Tighten the fixing screws as per the tightening torque: 2 Nm (1.5 lbf ft).



A0029051

1 Engineering unit mm (in)

### 4.1.2 Wall mounting



2 Engineering unit mm (in)

## 4.2 Mounting the transmitter housing: Proline 500

### ⚠ 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.

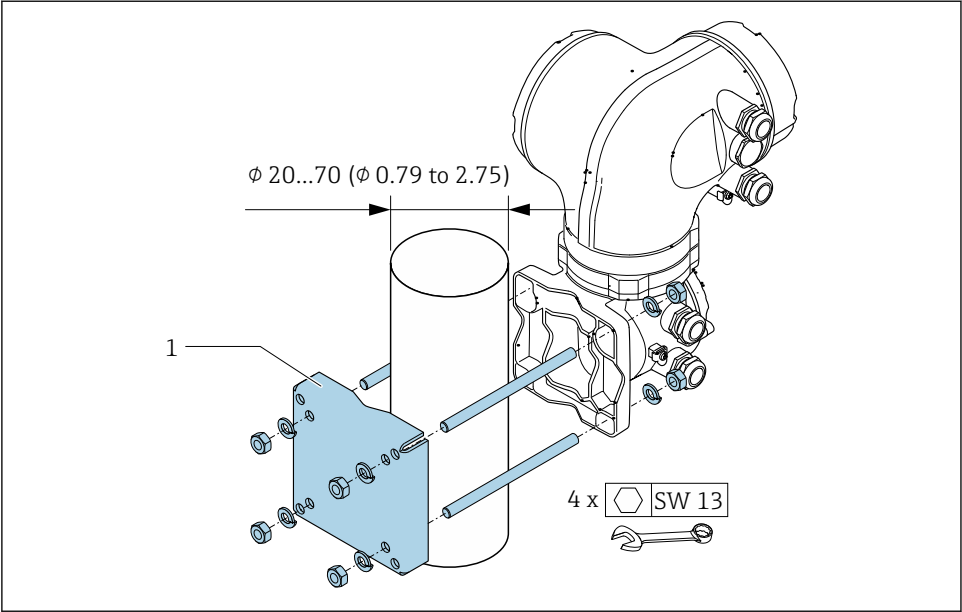
### 4.2.1 Post mounting

### ⚠ WARNING

Order code for "Transmitter housing", option L "Cast, stainless": cast transmitters are very heavy.

They are unstable if they are not mounted on a secure, fixed post.

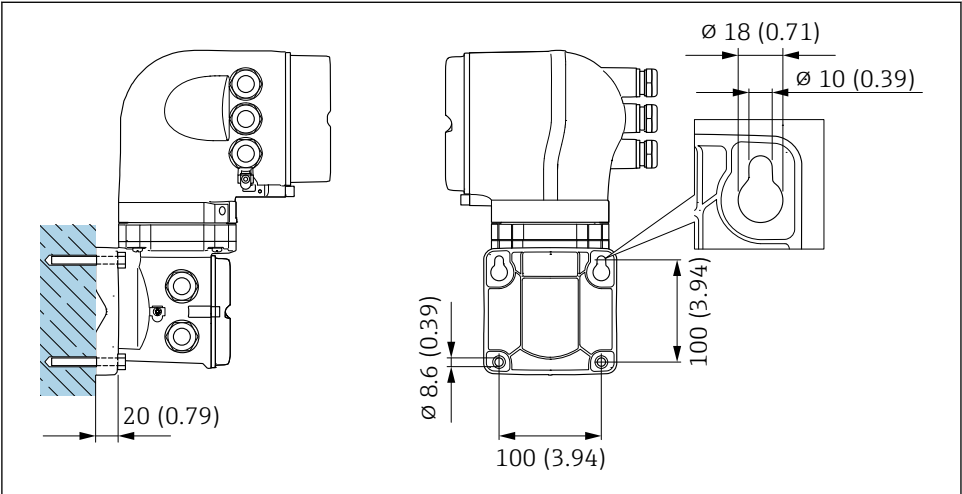
- ▶ Only mount the transmitter on a secure, fixed post on a stable surface.



A0029057

 3     Engineering unit mm (in)

4.2.2     Wall mounting

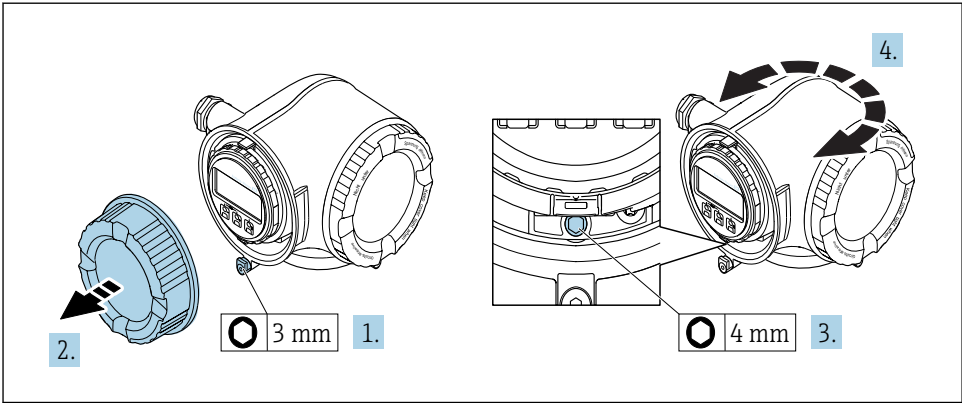


A0029068

 4     Engineering unit mm (in)

### 4.3 Turning the transmitter housing: Proline 500

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



A0029993

1. Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Release the fixing screw.
4. Turn the housing to the desired position.
5. Firmly tighten the securing screw.
6. Screw on the connection compartment cover
7. Fit the securing clamp of the connection compartment cover.

### 4.4 Transmitter post-installation check

The post-installation check must always be performed after the following tasks:

- Mounting the transmitter housing:
  - Post mounting
  - Wall mounting
- Turning the transmitter housing

Is the device undamaged (visual inspection)?	<input type="checkbox"/>
Proline 500 – digital post-mounting: Have the fixing screws been tightened with the correct tightening torque?	<input type="checkbox"/>
Proline 500 post- and wall-mounting, Proline 500 - digital wall-mounting: Are the securing screws tightened securely?	<input type="checkbox"/>
Turning the Proline 500 transmitter housing: Are the securing screw and the securing clamp tightened securely?	<input type="checkbox"/>

## 5 Electrical connection

### NOTICE

**The measuring device does not have an internal circuit breaker.**

- ▶ For this reason, assign the measuring device a switch or power-circuit breaker so that the power supply line can be easily disconnected from the mains.
- ▶ Although the measuring device is equipped with a fuse, additional overcurrent protection (maximum 10 A) should be integrated into the system installation.

### 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  $\leq 3$  mm (0.12 in)

#### 5.1.2 Requirements for connecting cable

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

#### Electrical safety

In accordance with applicable federal/national regulations.

#### Protective ground cable

Cable:  $2.1 \text{ mm}^2$  (14 AWG)

The grounding impedance must be less than  $1 \Omega$ .

#### Permitted temperature range

Minimum requirement: cable temperature range  $\geq$  ambient temperature  $+20 \text{ K}$

#### Power supply cable

Standard installation cable is sufficient.

#### Cable diameter

- Cable glands supplied:  
M20  $\times$  1.5 with cable  $\varnothing$  6 to 12 mm (0.24 to 0.47 in)
- Spring terminals:  
Conductor cross-section  $0.2$  to  $2.5 \text{ mm}^2$  (24 to 12 AWG)

## Signal cable

### *Modbus RS485*

The EIA/TIA-485 standard specifies two types of cable (A and B) for the bus line which can be used for every transmission rate. Cable type A is recommended.



For detailed information about the specification of the connecting cable, see the Operating Instructions for the device.

### *Current output 0/4 to 20 mA*

Standard installation cable is sufficient.

### *Pulse/frequency/switch output*

Standard installation cable is sufficient.

### *Double pulse output*

Standard installation cable is sufficient.

### *Relay output*

Standard installation cable is sufficient.

### *Current input 0/4 to 20 mA*

Standard installation cable is sufficient.

### *Status input*

Standard installation cable is sufficient.

### 5.1.3 Connecting cable for Proline Promass and Cubemass 500 – digital

#### Non-hazardous area, Ex Zone 2, Class I, Division 2

##### Standard cable

A standard cable can be used as the connecting cable.

<b>Standard cable</b>	4 cores (2 pairs); pair-stranded with common shield
<b>Shielding</b>	Tin-plated copper-braid, optical cover $\geq 85\%$
<b>Loop resistance</b>	Power supply line (+, -): maximum $10\ \Omega$
<b>Cable length</b>	Maximum 300 m (1 000 ft), see the following table.

Cross-section	Cable length
0.34 mm <sup>2</sup> (AWG 22)	80 m (270 ft)
0.50 mm <sup>2</sup> (AWG 20)	120 m (400 ft)
0.75 mm <sup>2</sup> (AWG 18)	180 m (600 ft)
1.00 mm <sup>2</sup> (AWG 17)	240 m (800 ft)
1.50 mm <sup>2</sup> (AWG 15)	300 m (1 000 ft)

#### Hazardous area, Ex Zone 1, Class I, Division 1

##### Standard cable

A standard cable can be used as the connecting cable.

<b>Standard cable</b>	4, 6, 8 cores (2, 3, 4 pairs); pair-stranded with common shield
<b>Shielding</b>	Tin-plated copper-braid, optical cover $\geq 85\%$
<b>Capacitance C</b>	Maximum 730 nF IIC, maximum 4.2 $\mu\text{F}$ IIB
<b>Inductance L</b>	Maximum 26 $\mu\text{H}$ IIC, maximum 104 $\mu\text{H}$ IIB
<b>Inductance/resistance ratio (L/R)</b>	Maximum 8.9 $\mu\text{H}/\Omega$ IIC, maximum 35.6 $\mu\text{H}/\Omega$ IIB (e.g. in accordance with IEC 60079-25)
<b>Loop resistance</b>	Power supply line (+, -): maximum $5\ \Omega$
<b>Cable length</b>	Maximum 150 m (500 ft), see the following table.

Cross-section	Cable length	Termination
2 x 2 x 0.50 mm <sup>2</sup> (AWG 22)	50 m (165 ft)	<ul style="list-style-type: none"><li>■ +, - = 0.5 mm<sup>2</sup></li><li>■ A, B = 0.5 mm<sup>2</sup></li></ul>
3 x 2 x 0.50 mm <sup>2</sup> (AWG 22)	100 m (330 ft)	<ul style="list-style-type: none"><li>■ +, - = 1.0 mm<sup>2</sup></li><li>■ A, B = 0.5 mm<sup>2</sup></li></ul>
4 x 2 x 0.50 mm <sup>2</sup> (AWG 22)	150 m (500 ft)	<ul style="list-style-type: none"><li>■ +, - = 1.5 mm<sup>2</sup></li><li>■ A, B = 0.5 mm<sup>2</sup></li></ul>

### 5.1.4 Connecting cable for Proline Promag 500 – digital

#### Standard cable

A standard cable can be used as the connecting cable.

<b>Standard cable</b>	4 cores (2 pairs); pair-stranded with common shield
<b>Shielding</b>	Tin-plated copper-braid, optical cover $\geq 85\%$
<b>Cable length</b>	Maximum 300 m (1 000 ft), see the following table.

Cross-section	Cable lengths for use in	
	Non-hazardous area, Ex Zone 2, Class I, Division 2	Hazardous area, Ex Zone 1, Class I, Division 1
0.34 mm <sup>2</sup> (AWG 22)	80 m (270 ft)	50 m (165 ft)
0.50 mm <sup>2</sup> (AWG 20)	120 m (400 ft)	60 m (200 ft)
0.75 mm <sup>2</sup> (AWG 18)	180 m (600 ft)	90 m (300 ft)
1.00 mm <sup>2</sup> (AWG 17)	240 m (800 ft)	120 m (400 ft)
1.50 mm <sup>2</sup> (AWG 15)	300 m (1 000 ft)	180 m (600 ft)
2.50 mm <sup>2</sup> (AWG 13)	300 m (1 000 ft)	300 m (1 000 ft)

### 5.1.5 Connecting cable for Proline Promass and Cubemass 500

<b>Standard cable</b>	6 × 0.38 mm <sup>2</sup> PVC cable with common shield and individual shielded cores
<b>Conductor resistance</b>	$\leq 50\ \Omega/\text{km}$ (0.015 $\Omega/\text{ft}$ )
<b>Capacitance: core/shield</b>	$\leq 420\ \text{pF/m}$ (128 pF/ft)
<b>Cable length (max.)</b>	20 m (65 ft)
<b>Cable lengths (available for order)</b>	5 m (15 ft), 10 m (32 ft), 20 m (65 ft)
<b>Operating temperature</b>	max. 105 °C (221 °F)

### 5.1.6 Connecting cable for Proline Promag 500

#### Signal cable

<b>Standard cable</b>	3 × 0.38 mm <sup>2</sup> (20 AWG) with common, braided copper shield ( $\varnothing \sim 9.5\ \text{mm}$ (0.37 in)) and individual shielded cores
<b>Cable for empty pipe detection (EPD)</b>	4 × 0.38 mm <sup>2</sup> (20 AWG) with common, braided copper shield ( $\varnothing \sim 9.5\ \text{mm}$ (0.37 in)) and individual shielded cores
<b>Conductor resistance</b>	$\leq 50\ \Omega/\text{km}$ (0.015 $\Omega/\text{ft}$ )
<b>Capacitance: core/shield</b>	$\leq 420\ \text{pF/m}$ (128 pF/ft)

<b>Cable length (max.)</b>	Depends on the medium conductivity, max. 200 m (656 ft)
<b>Cable lengths (available for order)</b>	5 m (15 ft), 10 m (32 ft), 20 m (65 ft) or variable length up to max. 200 m (656 ft)
<b>Operating temperature</b>	−20 to +80 °C (−68 to +176 °F)

Coil current cable

<b>Standard cable</b>	3 × 0.75 mm <sup>2</sup> (18 AWG) with common, braided copper shield (Ø ~ 9 mm (0.35 in)) and individual shielded cores
<b>Conductor resistance</b>	≤37 Ω/km (0.011 Ω/ft)
<b>Capacitance: core/core, shield grounded</b>	≤120 pF/m (37 pF/ft)
<b>Cable length (max.)</b>	Depends on the medium conductivity, max. 200 m (656 ft)
<b>Cable lengths (available for order)</b>	5 m (15 ft), 10 m (32 ft), 20 m (65 ft) or variable length up to max. 200 m (656 ft)
<b>Operating temperature</b>	−20 to +80 °C (−68 to +176 °F)
<b>Test voltage for cable insulation</b>	≤ AC 1433 V rms 50/60 Hz or ≥ DC 2026 V

### 5.1.7 Terminal assignment

#### Transmitter: supply voltage, input/outputs

The terminal assignment of the inputs and outputs depends on the individual order version of the device. The device-specific terminal assignment is documented on an adhesive label in the terminal cover.



Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)

Device-specific terminal assignment: adhesive label in terminal cover.

#### Transmitter and sensor connection housing: connecting cable

The sensor and transmitter, which are mounted in separate locations, are interconnected by a connecting cable. The cable is connected via the sensor connection housing and the transmitter housing.

Terminal assignment and connection of the connecting cable:

- Proline 500 – digital →  30
- Proline 500 →  38

Terminal assignment and connection of the connecting cable →  38

### 5.1.8 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 .

5.1.9      **Preparing the connecting cable: Proline 500 – digital**

The connecting cable only needs to be specially prepared for the following devices:

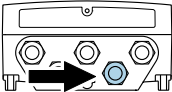
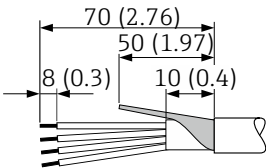
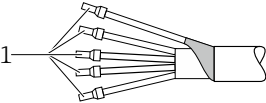
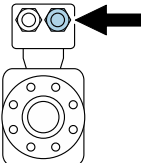
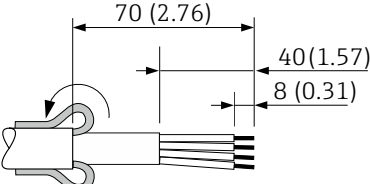
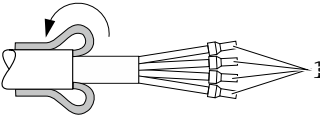
- Proline Promag H 500 – digital
- Proline Promag P 500 and Promag W 500 – digital

No special preparation work is necessary for all Proline Promass and Cubemass 500 – digital devices.

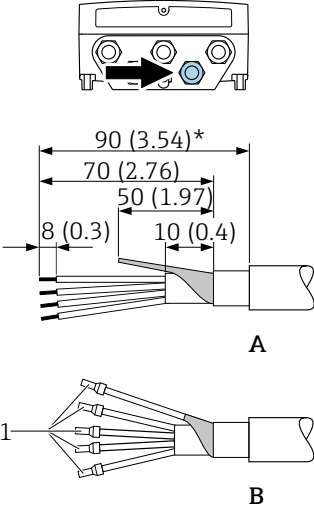
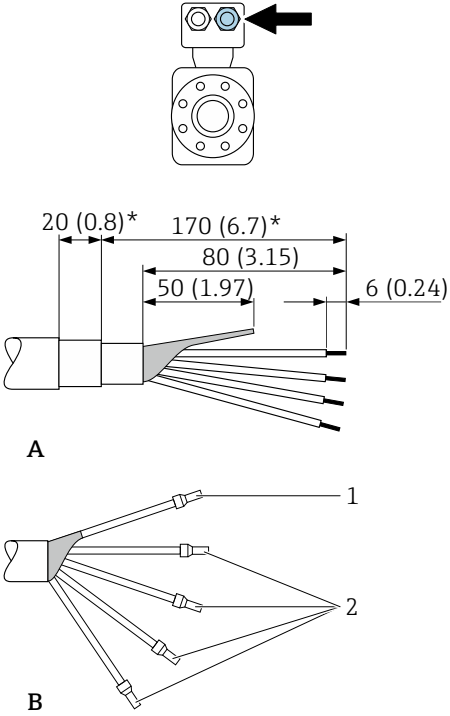
When terminating the connecting cable, pay attention to the following points:

- For cables with fine-wire cores (stranded cables):  
    Fit the cores with ferrules.

**Preparing the connecting cable: Promag H 500 – digital**

Transmitter	Sensor
<div>   <div>A0029546</div></div>	<div>   <div>A0029442</div></div>
<div>Engineering unit mm (in) A = Terminate the cable B = Fit ferrules on cables with fine-wire cores (stranded cables) 1 = Red ferrules, <math>\phi</math> 1.0 mm (0.04 in)</div>	

Preparing the connecting cable: Promag P and W 500 – digital

Transmitter	Sensor
<div><p>A0029330</p></div>	<div><p>A0029443</p></div>
<div><p>Engineering unit mm (in)</p><p>A = Terminate the cable</p><p>B = Fit ferrules on cables with fine-wire cores (stranded cables)</p><p>1 = Red ferrules, <math>\phi</math> 1.0 mm (0.04 in)</p><p>2 = White ferrules, <math>\phi</math> 0.5 mm (0.02 in)</p><p>* = Stripping only for reinforced cables</p></div>	

5.1.10 Preparing the connecting cable: Proline 500

The connecting cable only needs to be specially prepared for the following devices:

- Proline Promag H 500
- Proline Promag P 500 and Promag W 500

No special preparation work is necessary for all Proline Promass and Cubemass 500 devices.

When terminating the connecting cable, pay attention to the following points:

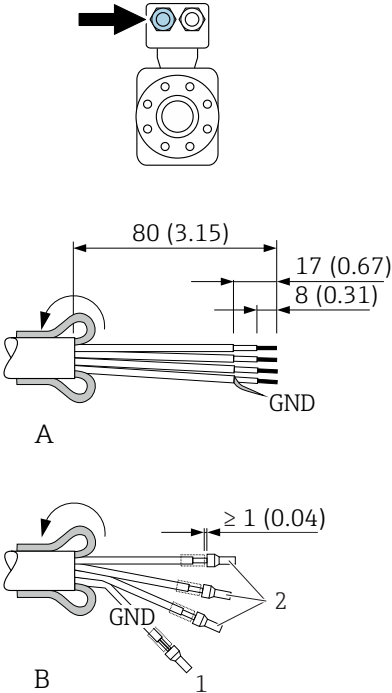
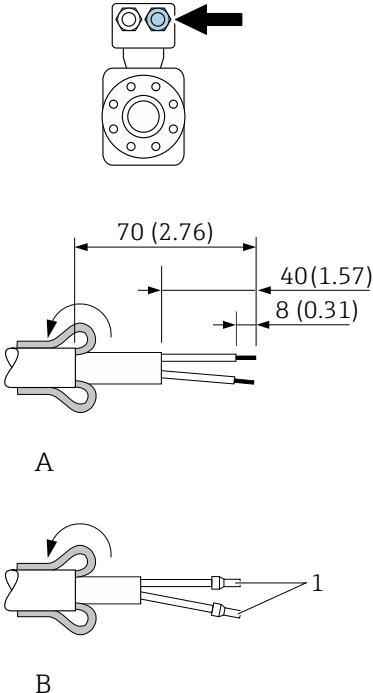
1. In the case of the electrode cable:  
Make sure that the ferrules do not touch the core shields on the sensor side. Minimum distance = 1 mm (exception: green “GND” cable)
2. In the case of the coil current cable:  
Insulate one core of the three-core cable at the level of the core reinforcement. You only require two cores for the connection.
3. For cables with fine-wire cores (stranded cables):  
Fit the cores with ferrules.

Preparing the connecting cable: Promag H

Transmitter

Electrode cable	Coil current cable
<div><p>80 (3.15) 17 (0.67) 8 (0.3) 50 (1.97) A B 1 2 1 2 1 2 GND</p></div>	<div><p>70 (2.76) 50 (1.97) 8 (0.3) 10 (0.4) A B 1</p></div>
<div>Engineering unit mm (in) A = Terminate the cable B = Fit ferrules on cables with fine-wire cores (stranded cables) 1 = Red ferrules, <math>\phi</math> 1.0 mm (0.04 in) 2 = White ferrules, <math>\phi</math> 0.5 mm (0.02 in)</div>	

Sensor

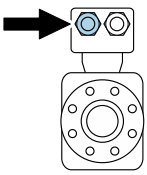
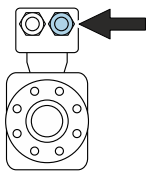
Electrode cable	Coil current cable
<div><p>A</p><p>B</p><p>1</p><p>2</p><p>GND</p><p>80 (3.15)</p><p>17 (0.67)</p><p>8 (0.31)</p><p>≥ 1 (0.04)</p></div> <div>A0029438</div>	<div><p>A</p><p>B</p><p>1</p><p>70 (2.76)</p><p>40 (1.57)</p><p>8 (0.31)</p></div> <div>A0029439</div>
<p>Engineering unit mm (in)</p> <p>A = Terminate the cable</p> <p>B = Fit ferrules on cables with fine-wire cores (stranded cables)</p> <p>1 = Red ferrules, <math>\phi</math> 1.0 mm (0.04 in)</p> <p>2 = White ferrules, <math>\phi</math> 0.5 mm (0.02 in)</p>	

Preparing the connecting cable: Promag P and Promag W

Transmitter

Electrode cable	Coil current cable
<div><p>100 (3.94)* 80 (3.15) 50 (1.97) 17 (0.67) 8 (0.3) 1 2 1 2 1 2 1 2 2 GND A B</p></div>	<div><p>90 (3.54)* 70 (2.76) 50 (1.97) 8 (0.3) 10 (0.4) 1 A B</p></div>
<div>Engineering unit mm (in)</div> <div>A = Terminate the cable</div> <div>B = Fit ferrules on cables with fine-wire cores (stranded cables)</div> <div>1 = Red ferrules, <math>\phi</math> 1.0 mm (0.04 in)</div> <div>2 = White ferrules, <math>\phi</math> 0.5 mm (0.02 in)</div> <div>* = Stripping only for reinforced cables</div>	

Sensor

Transmitter	Coil current cable
<div><p>Diagram showing the Transmitter sensor connection. A black arrow points to the top terminal block. Below, a cable cross-section diagram shows dimensions: 20 (0.8)*, 170 (6.7)*, 80 (3.15), 50 (1.97), 18.5 (0.73), and 6 (0.24). Below this, two connection methods are shown: A (Terminate the cable) and B (Fit ferrules on cables with fine-wire cores (stranded cables)). Method B shows a GND connection and numbered wires (1, 2, 2, 2, 1).</p></div> <div><p>A0029336</p></div>	<div><p>Diagram showing the Coil current cable connection. A black arrow points to the top terminal block. Below, a cable cross-section diagram shows dimensions: 20 (0.8)*, 160 (6.30)*, 70 (2.76), 50 (1.97), 10 (0.4), and 8 (0.3). Below this, two connection methods are shown: A and B. Method B shows numbered wires (1, 1, 1, 1).</p></div> <div><p>A0029337</p></div>
<p>Engineering unit mm (in)</p> <p>A = Terminate the cable</p> <p>B = Fit ferrules on cables with fine-wire cores (stranded cables)</p> <p>1 = Red ferrules, <math>\phi</math> 1.0 mm (0.04 in)</p> <p>2 = White ferrules, <math>\phi</math> 0.5 mm (0.02 in)</p> <p>* = Stripping only for reinforced cables</p>	

## 5.2 Connecting the measuring device: Proline 500 – digital

### NOTICE

#### Limitation of electrical safety due to incorrect connection!

- ▶ Have electrical connection work carried out by correspondingly 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.

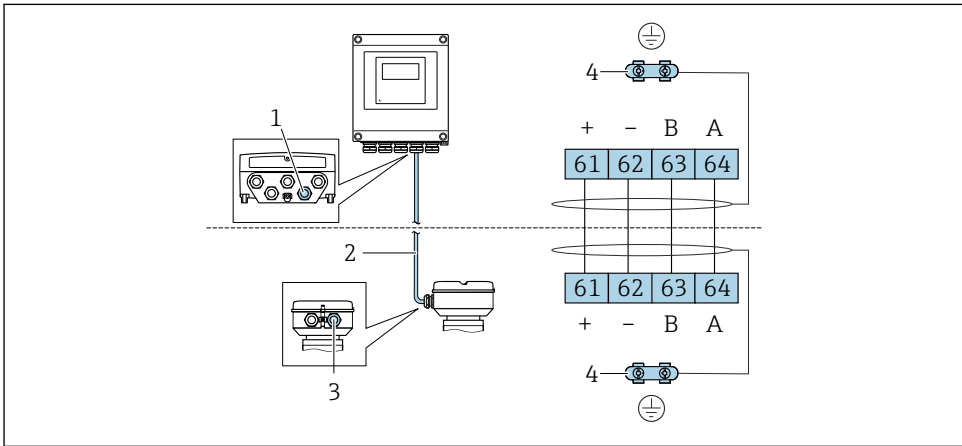
### 5.2.1 Connecting the connecting cable

#### ⚠ 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.
- ▶ Ground the connection housing of the sensor via the external screw terminal.





#### Terminal assignment



A0028198

- 1 Cable entry for connecting cable on transmitter housing
- 2 Connecting cable ISEM communication
- 3 Cable entry for connecting cable or connector on sensor connection housing
- 4 Grounding via cable strain relief

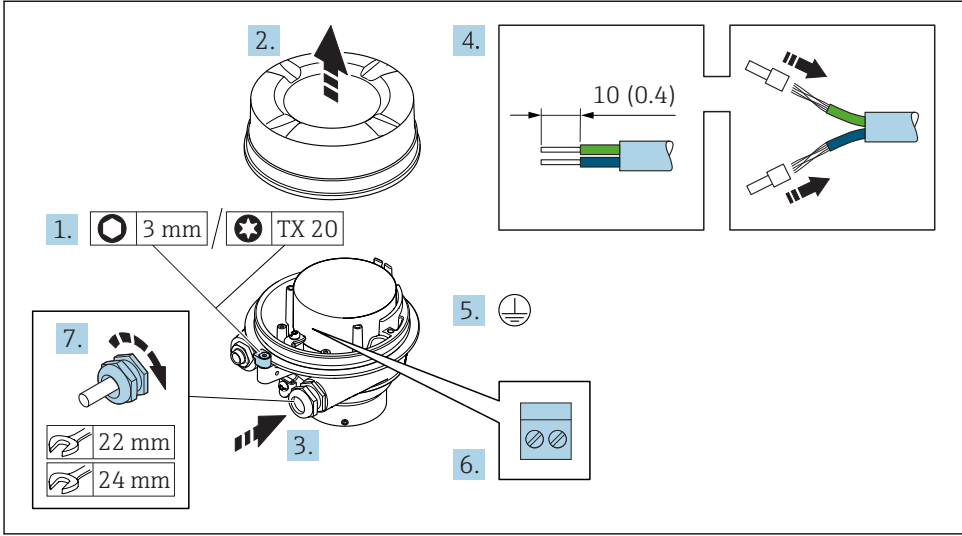
*Connecting the connecting cable to the sensor connection housing*

- Connection via terminals with order code for "Sensor connection housing":
  - Option **A** "Aluminum, coated" →  32
  - Option **B** "Stainless, hygienic" →  33
  - Option **L** "Cast, stainless" →  32
- Connection via connectors with order code for "Sensor connection housing":
  - Option **C** "Ultra-compact hygienic, stainless" →  34

*Connecting the connecting cable to the transmitter*

The cable is connected to the transmitter via terminals →  35.

## Connecting the sensor connection housing via terminals



A0029616

1. Loosen the securing clamp of the housing cover.
2. Unscrew the housing 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, fit ferrules.
5. Connect the protective ground.
6. Connect the cable in accordance with the terminal assignment → 30.
7. Firmly tighten the cable glands.
  - ↳ This concludes the process for connecting the connecting cable.

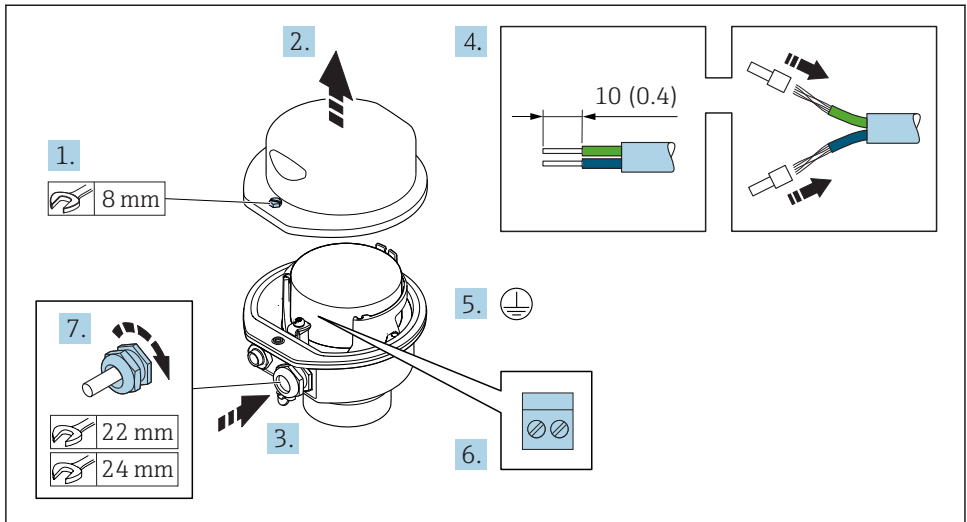
### **⚠ WARNING**

#### **Housing degree of protection voided due to insufficient sealing of the housing.**

- ▶ Screw in the thread on the cover without using any lubricant. The thread on the cover is coated with a dry lubricant.

8. Screw on the housing cover.
9. Tighten the securing clamp of the housing cover.

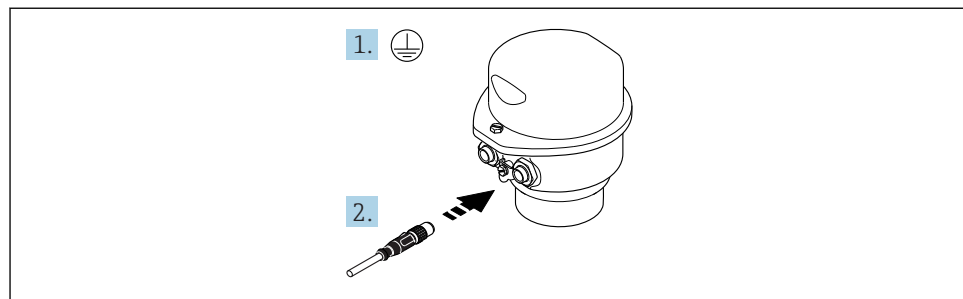
## Connecting the sensor connection housing via terminals



A0029613

1. Release the securing screw of the housing cover.
2. Open the housing 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, fit ferrules.
5. Connect the protective ground.
6. Connect the cable in accordance with the terminal assignment → 30.
7. Firmly tighten the cable glands.
  - ↳ This concludes the process for connecting the connecting cable.
8. Close the housing cover.
9. Tighten the securing screw of the housing cover.

## Connecting the sensor connection housing via the connector

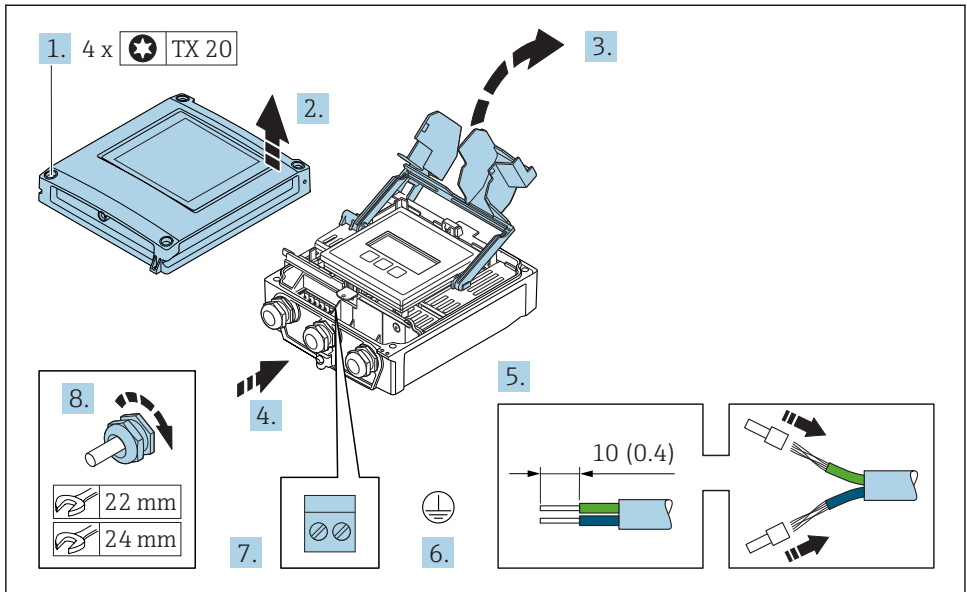


A0029615

1. Connect the protective ground.

2. Connect the connector.

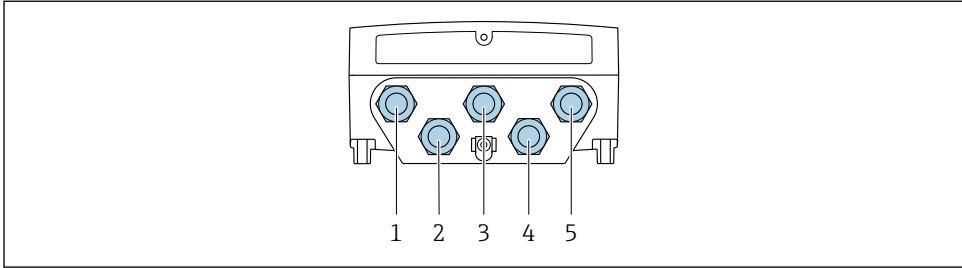
## Connecting the connecting cable to the transmitter



A0029597

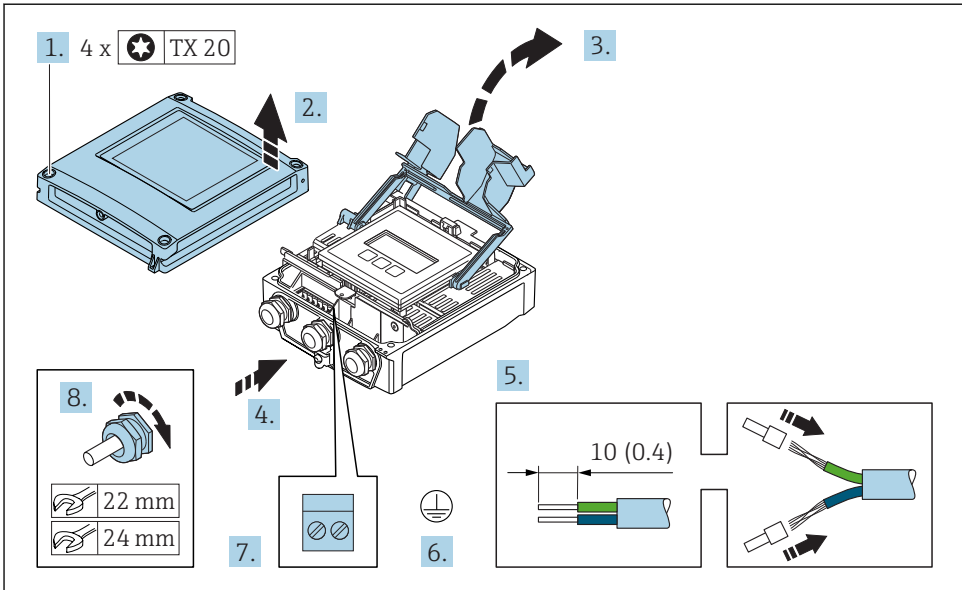
1. Loosen the 4 fixing screws on the housing cover.
2. Open the housing cover.
3. Fold open the terminal cover.
4. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
5. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
6. Connect the protective ground.
7. Connect the cable in accordance with the terminal assignment → 30.
8. Firmly tighten the cable glands.
  - ↳ This concludes the process for connecting the connecting cable.
9. Close the housing cover.
10. Tighten the securing screw of the housing cover.
11. After connecting the connecting cable:
  - Connect the signal cable and the supply voltage cable → 36.

### 5.2.2 Connecting the signal cable and the supply voltage cable




A0028200

- 1 Cable entry for supply voltage
- 2 Cable entry for cable or connection of device plug for signal transmission
- 3 Cable entry for cable or connection of device plug for signal transmission
- 4 Cable entry for sensor - transmitter connecting cable
- 5 Cable entry for cable or connection of device plug for signal transmission, optional: connection of external WLAN antenna or service connector



A0029597

1. Loosen the 4 fixing screws on the housing cover.
2. Open the housing cover.
3. Fold open the terminal cover.
4. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.

5. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
6. Connect the protective ground.
7. Connect the cable in accordance with the terminal assignment .
  - ↳ **Signal cable terminal assignment:** The device-specific terminal assignment is documented on an adhesive label in the terminal cover.
  - Supply voltage terminal assignment:** Adhesive label in the terminal cover or  
→  23.
8. Firmly tighten the cable glands.
  - ↳ This concludes the cable connection process.
9. Close the terminal cover.
10. Close the housing cover.

 **WARNING**

**Housing degree of protection may be voided due to insufficient sealing of the housing.**

- ▶ Screw in the screw without using any lubricant.

 **WARNING**

**Excessive tightening torque applied to the fixing screws!**

Risk of damaging the plastic transmitter.

- ▶ Tighten the fixing screws as per the tightening torque: 2 Nm (1.5 lbf ft).

11. Tighten the 4 fixing screws on the housing cover.

## 5.3 Connecting the measuring device: Proline 500

### NOTICE

#### Limitation of electrical safety due to incorrect connection!

- Have electrical connection work carried out by correspondingly 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.

### 5.3.1 Connecting the connecting cable

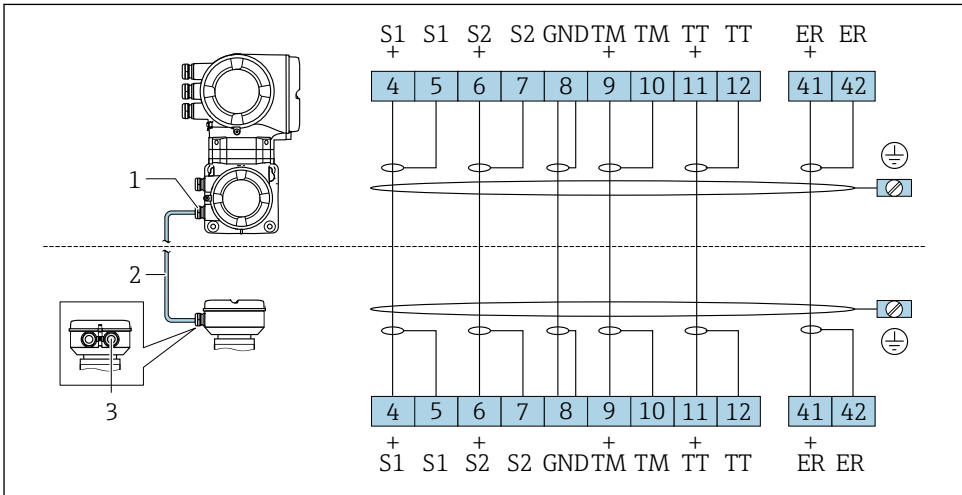
#### ⚠ WARNING

#### 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.
- Ground the connection housing of the sensor via the external screw terminal.

#### Terminal assignment

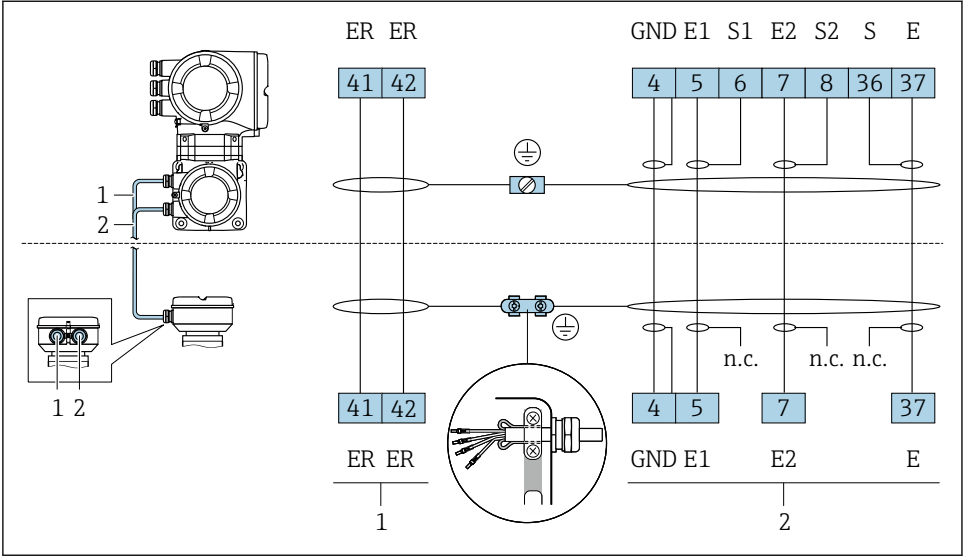
*Proline Promass and Cubemass*



A0028197

- 1 Cable entry for connecting cable on transmitter connection housing
- 2 Connecting cable
- 3 Cable entry for connecting cable on sensor connection housing

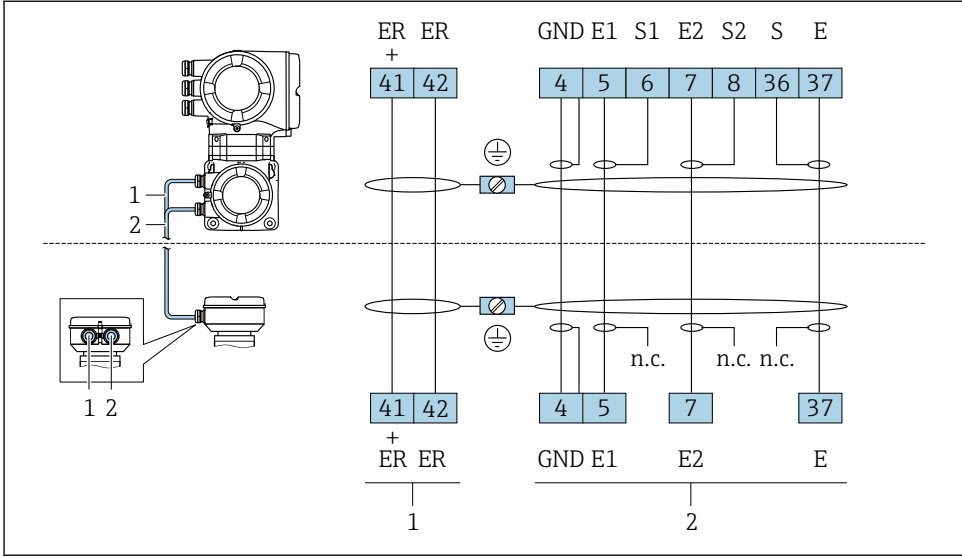
Proline Promag H



A0029444

- 1 Coil current cable
- 2 Signal cable

# Proline Promag P and W



A0029145

- 1 Coil current cable
- 2 Signal cable

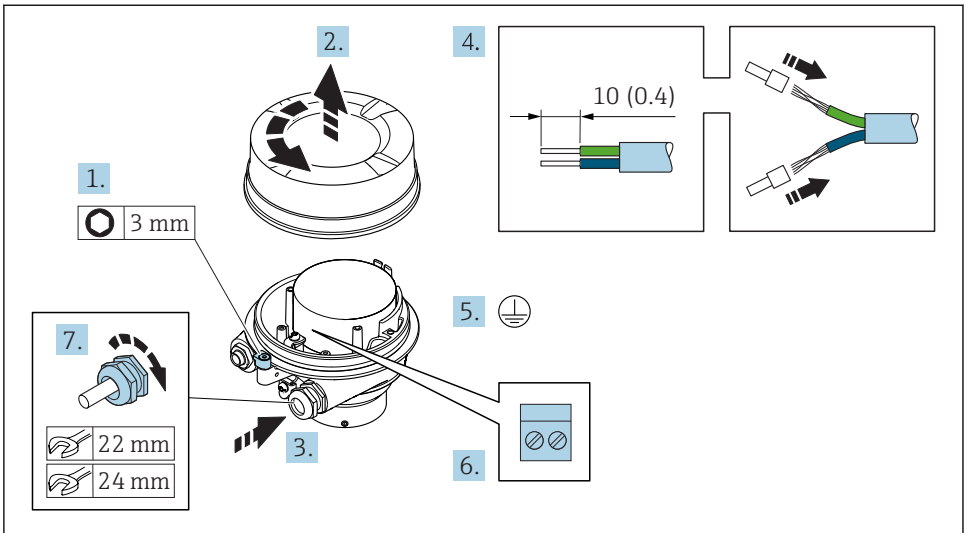
## Connecting the connecting cable to the sensor connection housing

- Connection via terminals with order code for "Housing":
  - Option A "Aluminum coated" → 41
  - Option B "Stainless" → 42
  - Option D "Polycarbonate" → 41
  - Option L "Cast, stainless" → 41
- Connection via terminals with order code for "Sensor connection housing":
  - Option B "Stainless, hygienic" → 43

## Connecting the connecting cable to the transmitter

The cable is connected to the transmitter via terminals → 44.

## Connecting the sensor connection housing via terminals



A0029612

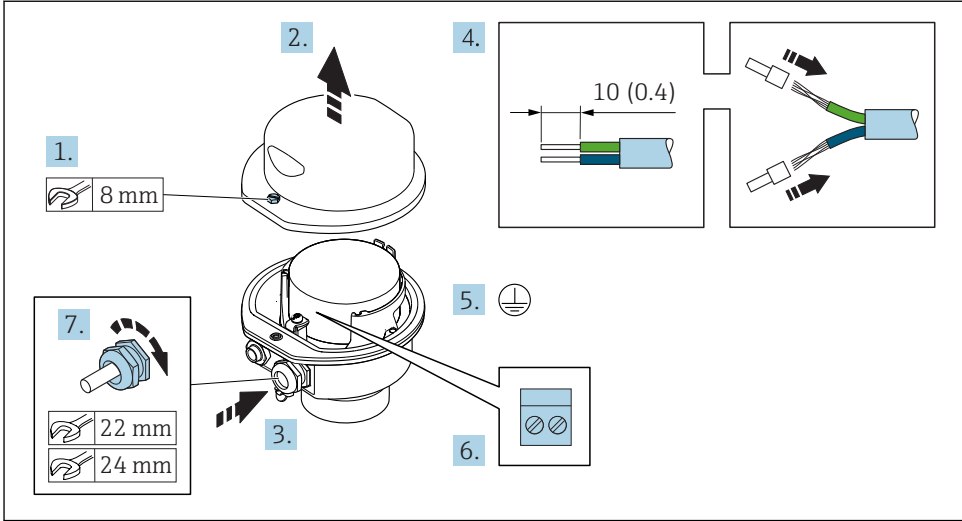
1. Loosen the securing clamp of the housing cover.
2. Unscrew the housing cover.
3. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
4. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
5. Connect the protective ground.
6. Connect the cable in accordance with the terminal assignment .
7. Firmly tighten the cable glands.
  - ↳ This concludes the process for connecting the connecting cable.
  - ↳ This concludes the process for connecting the connecting cables.

### **⚠ WARNING**

#### **Housing degree of protection voided due to insufficient sealing of the housing.**

- ▶ Screw in the thread on the cover without using any lubricant. The thread on the cover is coated with a dry lubricant.
8. Screw on the housing cover.
  9. Tighten the securing clamp of the housing cover.

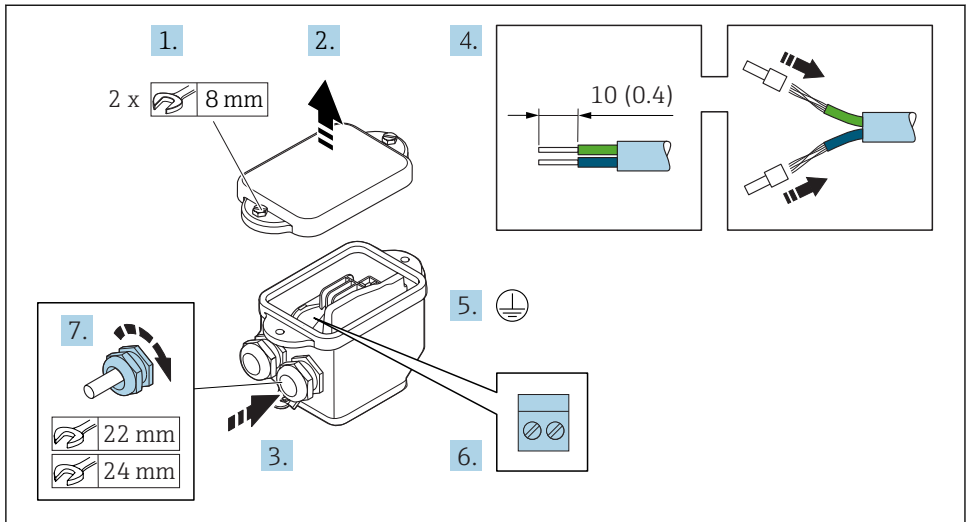
## Connecting the sensor connection housing via terminals



A0029613

1. Release the securing screw of the housing cover.
2. Open the housing 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, fit ferrules.
5. Connect the protective ground.
6. Connect the cable in accordance with the terminal assignment .
7. Firmly tighten the cable glands.
  - ↳ This concludes the process for connecting the connecting cable.
  - This concludes the process for connecting the connecting cables.
8. Close the housing cover.
9. Tighten the securing screw of the housing cover.

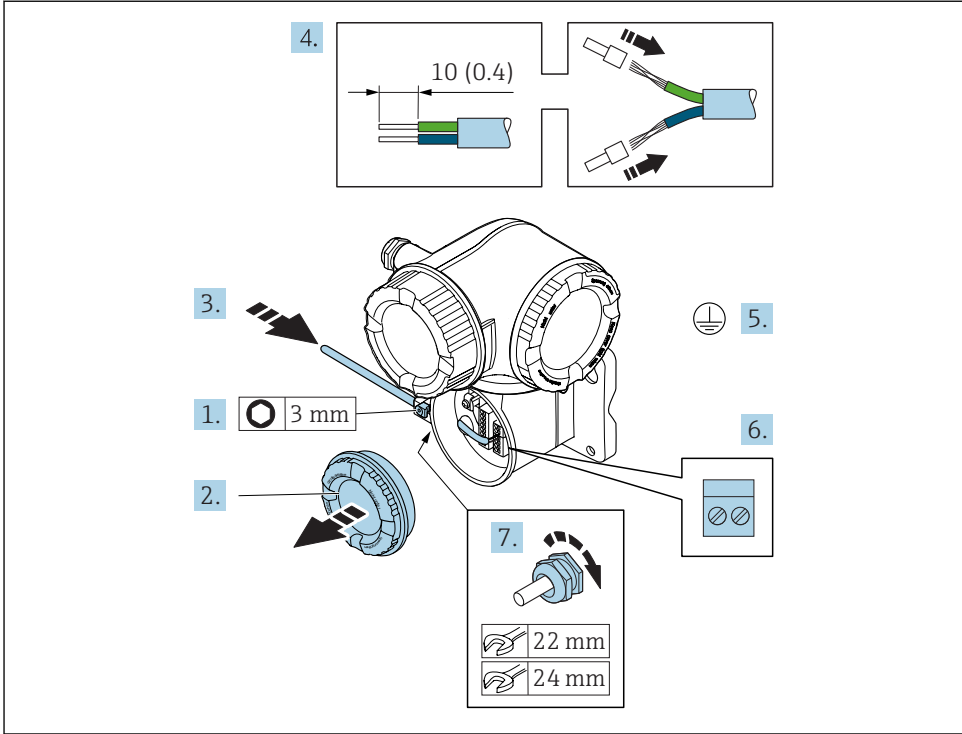
## Connecting the sensor connection housing via terminals



A0029617

1. Release the securing screw of the housing cover.
2. Open the housing 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, fit ferrules.
5. Connect the protective ground.
6. Connect the cable in accordance with the terminal assignment .
7. Firmly tighten the cable glands.
  - This concludes the process for connecting the connecting cables.
8. Close the housing cover.
9. Tighten the securing screw of the housing cover.

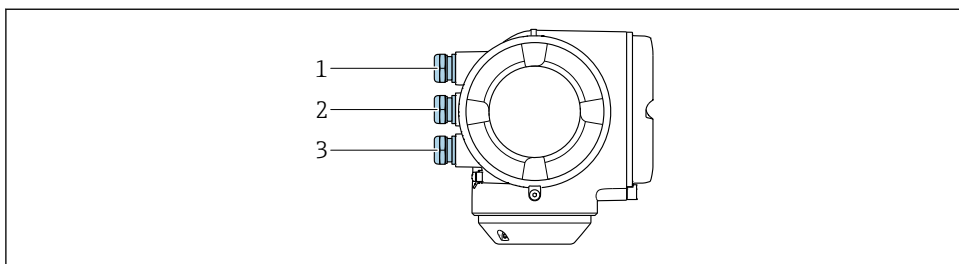
## Connecting the connecting cable to the transmitter



A0029592

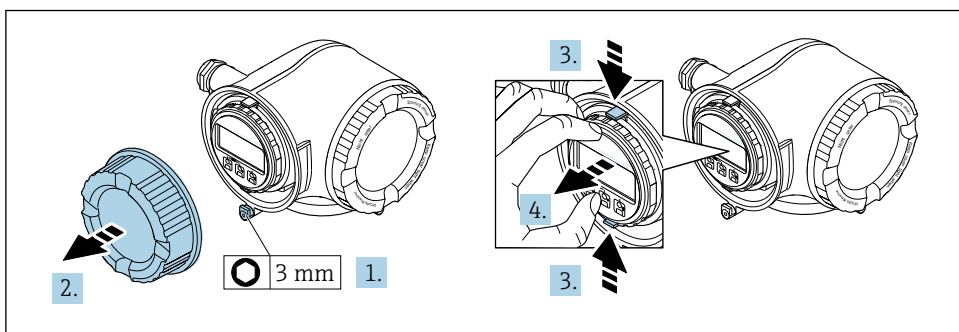
1. Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
4. Strip the cable and cable ends. In the case of stranded cables, also fit ferrules.
5. Connect the protective ground.
6. Connect the cable in accordance with the terminal assignment .
7. Firmly tighten the cable glands.
  - ↳ This concludes the process for connecting the connecting cable.
  - This concludes the process for connecting the connecting cables.
8. Screw on the connection compartment cover.
9. Tighten the securing clamp of the connection compartment cover.
10. After connecting the connecting cable: After connecting the connecting cables: Connect the signal cable and the supply voltage cable → 45.

### 5.3.2 Connecting the signal cable and the supply voltage cable



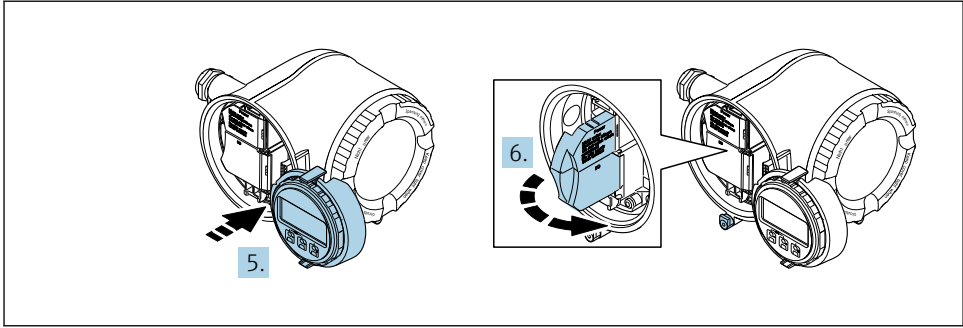
A0026781

- 1 Cable entry for supply voltage
- 2 Cable entry for signal transmission, input/output 1 and 2
- 3 Cable entry for input/output signal transmission; Optional: connection of external WLAN antenna or service plug



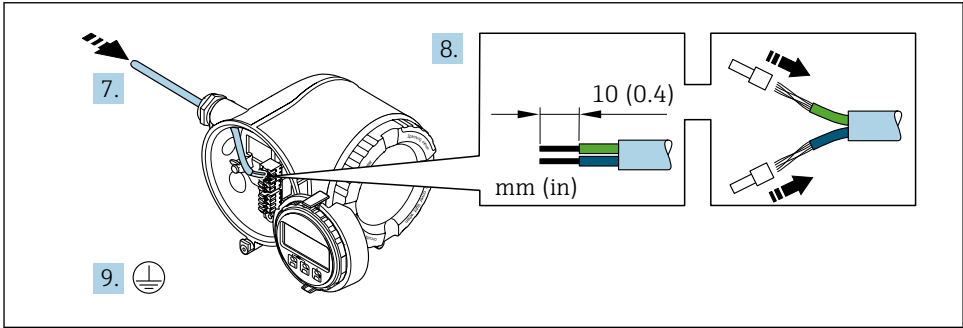
A0029813

1. Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Squeeze the tabs of the display module holder together.
4. Remove the display module holder.



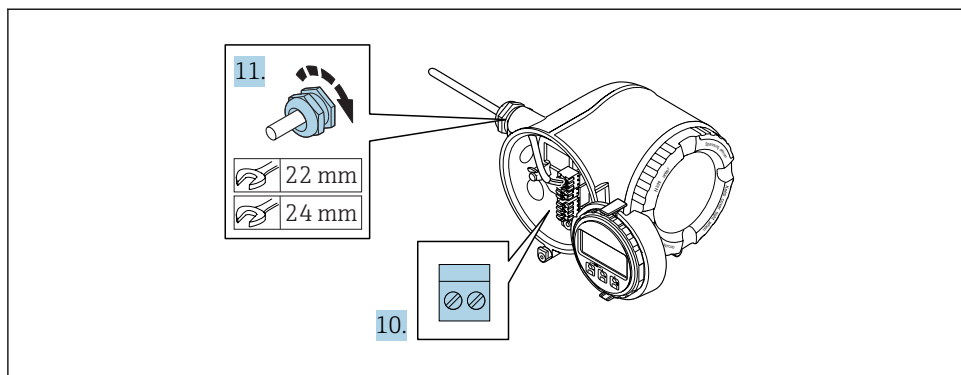
A0029814

5. Attach the holder to the edge of the electronics compartment.
6. Open the terminal cover.



A0029815

7. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
8. Strip the cable and cable ends. In the case of stranded cables, also fit ferrules.
9. Connect the protective ground.



A0029816

10. Connect the cable in accordance with the terminal assignment .
  - ↳ **Signal cable terminal assignment:** The device-specific terminal assignment is documented on an adhesive label in the terminal cover.
  - Supply voltage terminal assignment:** Adhesive label in the terminal cover or → 23.
11. Firmly tighten the cable glands.
  - ↳ This concludes the cable connection process.
12. Close the terminal cover.
13. Fit the display module holder in the electronics compartment.
14. Screw on the connection compartment cover.
15. Secure the securing clamp of the connection compartment cover.

## 5.4 Ensuring potential equalization

### 5.4.1 Proline Promass and Cubemass

#### Requirements



For devices intended for use in hazardous locations, please observe the guidelines in the Ex documentation (XA).

### 5.4.2 Proline Promag H



For devices intended for use in hazardous locations, please observe the guidelines in the Ex documentation (XA).

#### Metal process connections

Potential equalization is generally via the metal process connections that are in contact with the medium and mounted directly on the sensor. Therefore there is generally no need for additional potential equalization measures.

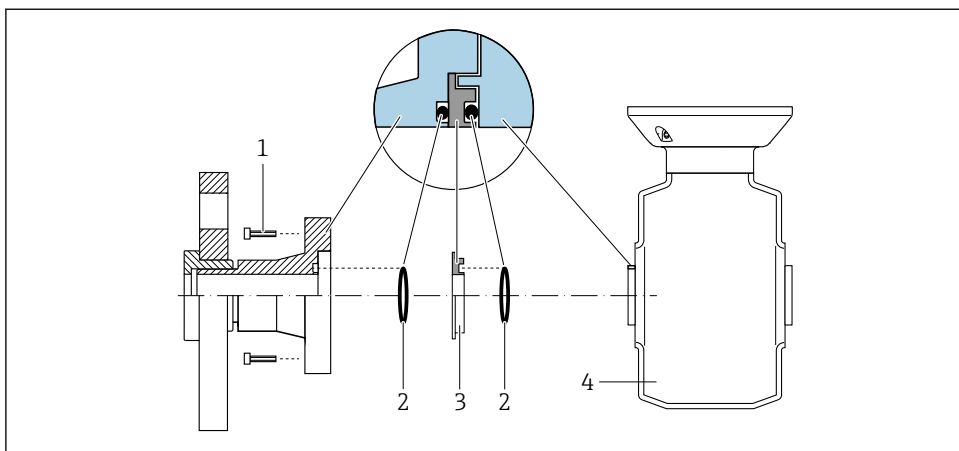
#### Plastic process connections

In the case of plastic process connections, additional grounding rings or process connections with an integrated grounding electrode must be used to ensure potential matching between the sensor and the fluid. If there is no potential matching, this can affect the measuring accuracy or cause the destruction of the sensor as a result of the electrochemical decomposition of the electrodes.

Note the following when using grounding rings:

- Depending on the option ordered, plastic disks are used instead of grounding rings on some process connections. These plastic disks only act as "spacers" and do not have any potential matching function. Furthermore, they also perform a significant sealing function at the sensor/connection interface. Therefore, in the case of process connections without metal grounding rings, these plastic disks/seals should never be removed and should always be installed!
- Grounding rings can be ordered separately as an accessory from Endress+Hauser . When ordering make sure that the grounding rings are compatible with the material used for the electrodes, as otherwise there is the danger that the electrodes could be destroyed by electrochemical corrosion!
- Grounding rings, including seals, are mounted inside the process connections. Therefore the installation length is not affected.

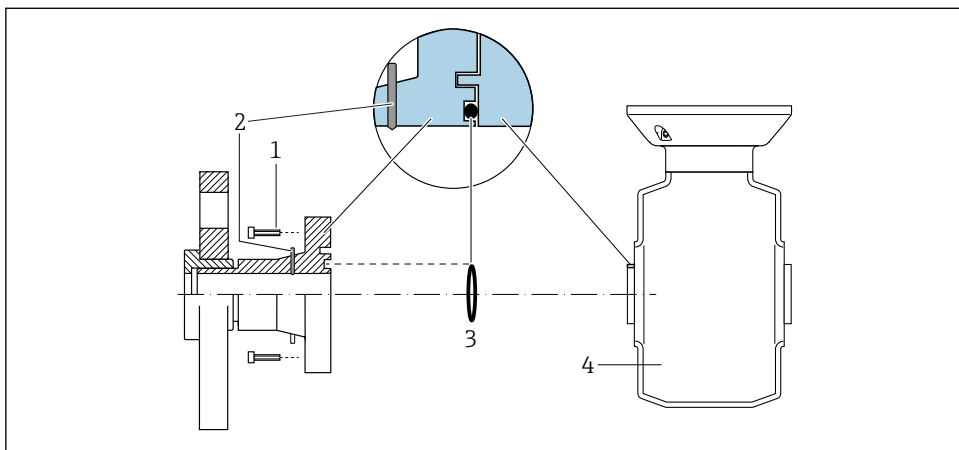
### Potential equalization via additional grounding ring



A0028971

- 1 Hexagonal-headed bolts of process connection
- 2 O-ring seals
- 3 Plastic disk (spacer) or grounding ring
- 4 Sensor

### Potential equalization via grounding electrodes on process connection



A0028972

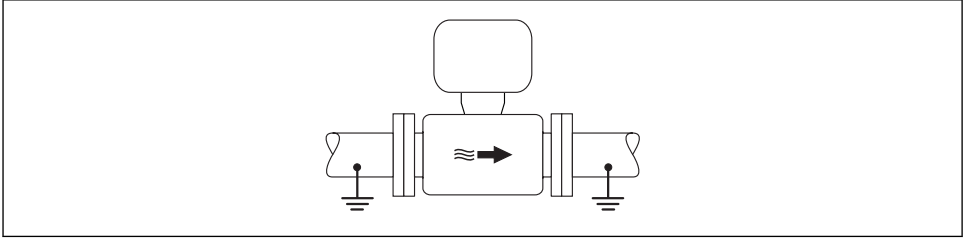
- 1 Hexagonal-headed bolts of process connection
- 2 Integrated grounding electrodes
- 3 O-ring seal
- 4 Sensor

### 5.4.3 Promag P and Promag W



For devices intended for use in hazardous locations, please observe the guidelines in the Ex documentation (XA).

#### Metal, grounded pipe



A0016315

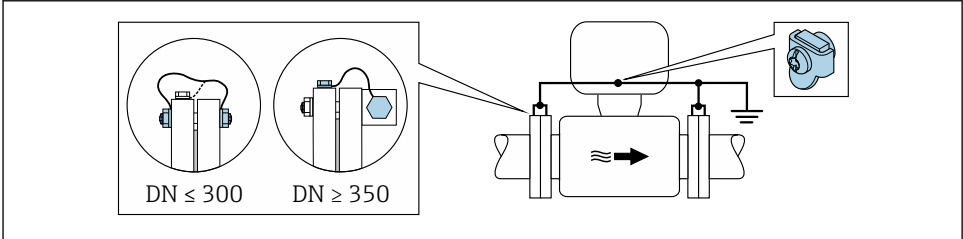
#### 5 Potential equalization via measuring tube

#### Unlined and ungrounded metal pipe

This connection method also applies in situations where:

- The customary potential equalization is not used
- Equalizing currents are present

Ground cable	Copper wire, at least 6 mm <sup>2</sup> (0.0093 in <sup>2</sup> )
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A0029338

#### 6 Potential equalization via ground terminal and pipe flanges

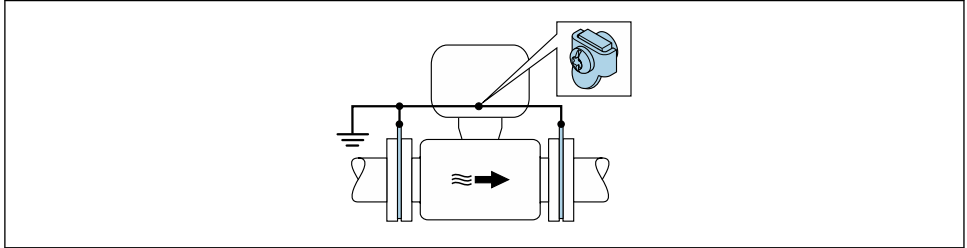
1. Connect both sensor flanges to the pipe flange via a ground cable and ground them.
2. If  $DN \leq 300$  (12"): Mount the ground cable directly on the conductive flange coating of the sensor with the flange screws.
3. If  $DN \geq 350$  (14"): Mount the ground cable directly on the metal transport bracket. Observe screw tightening torques: see the Sensor Brief Operating Instructions.
4. Connect the connection housing of the transmitter or sensor to ground potential by means of the ground terminal provided for the purpose.

## Plastic pipe or pipe with insulating liner

This connection method also applies in situations where:

- The customary potential equalization is not used
- Equalizing currents are present

<b>Ground cable</b>	Copper wire, at least 6 mm <sup>2</sup> (0.0093 in <sup>2</sup> )
---------------------	---



A0029339

7 Potential equalization via ground terminal and ground disks

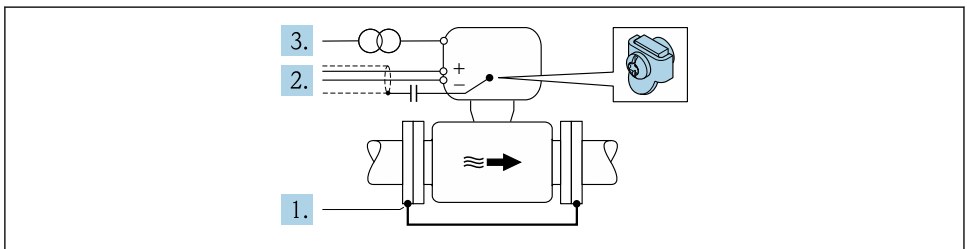
1. Connect the ground disks to the ground terminal via the ground cable.
2. Connect the ground disks to ground potential.

## Pipe with a cathodic protection unit

This connection method is only used if the following two conditions are met:

- Metal pipe without liner or pipe with electrically conductive liner
- Cathodic protection is integrated in the personal protection equipment

<b>Ground cable</b>	Copper wire, at least 6 mm <sup>2</sup> (0.0093 in <sup>2</sup> )
---------------------	---



A0029340


Prerequisite: The sensor is installed in the pipe in a way that provides electrical insulation.

1. Connect the two flanges of the pipe to one another via a ground cable.
2. Guide the shield of the signal lines through a capacitor.

3.
- Connect the measuring device to the power supply such that it is floating in relation to the protective ground (isolation transformer).

5.5

Hardware settings

 For detailed information on hardware settings, see the Operating Instructions for the device.

Setting the device address

– Hardware addressing

– Software addressing

Enabling the terminating resistor

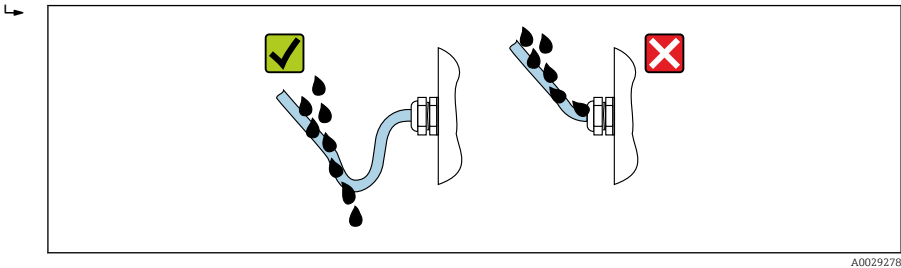
5.6

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.

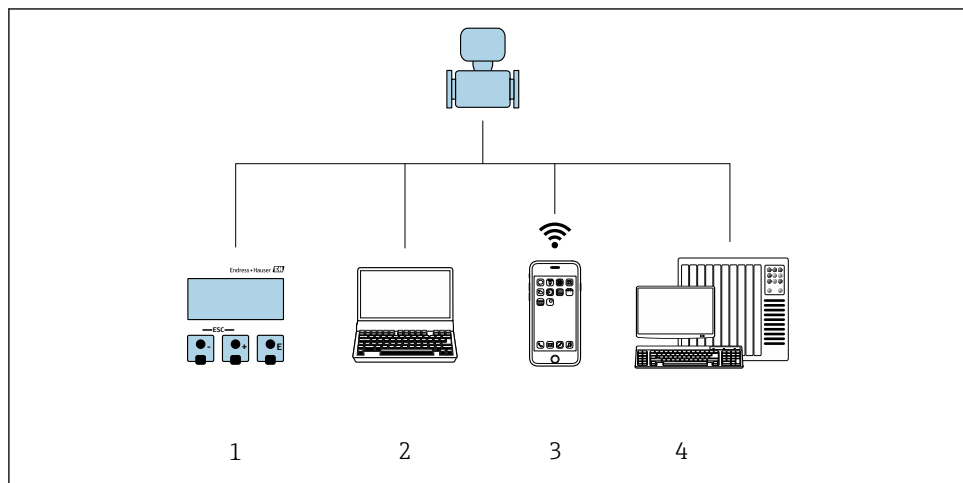
5.7

Post-connection check

Are cables or the device undamaged (visual inspection)?	<input type="checkbox"/>
Do the cables used meet the requirements?	<input type="checkbox"/>
Do the cables have adequate strain relief?	<input type="checkbox"/>
Are all the cable glands installed, firmly tightened and leak-tight? Cable run with "water trap" →  52 ?	<input type="checkbox"/>
Is the potential equalization established correctly ?	<input type="checkbox"/>

## 6 Operation options

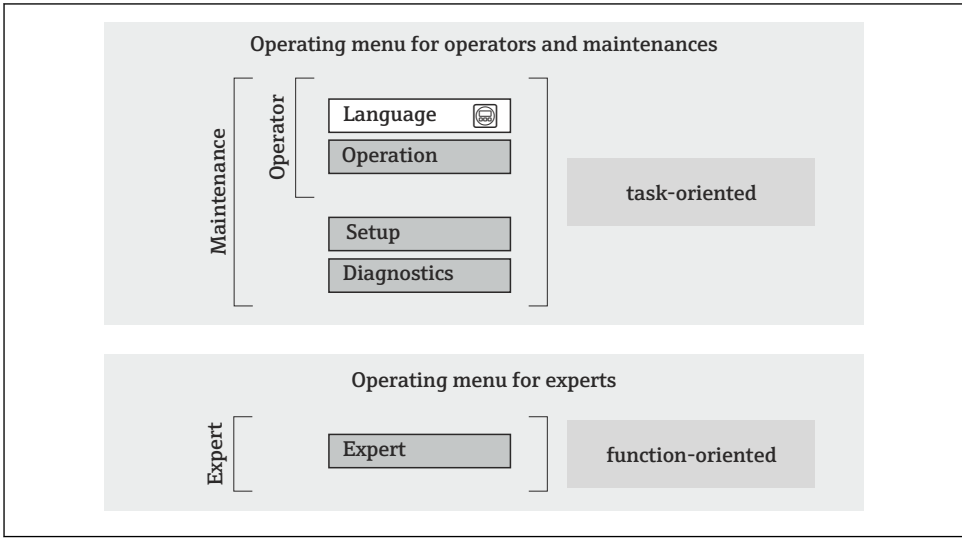
### 6.1 Overview of operation options




- 1 Local operation via display module
- 2 Computer with Web browser (e.g. Internet Explorer) or with operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM)
- 3 Mobile handheld terminal
- 4 Control system (e.g. PLC)

## 6.2 Structure and function of the operating menu

### 6.2.1 Structure of the operating menu





A0014058-EN

 8 Schematic structure of the operating menu

### 6.2.2 Operating philosophy

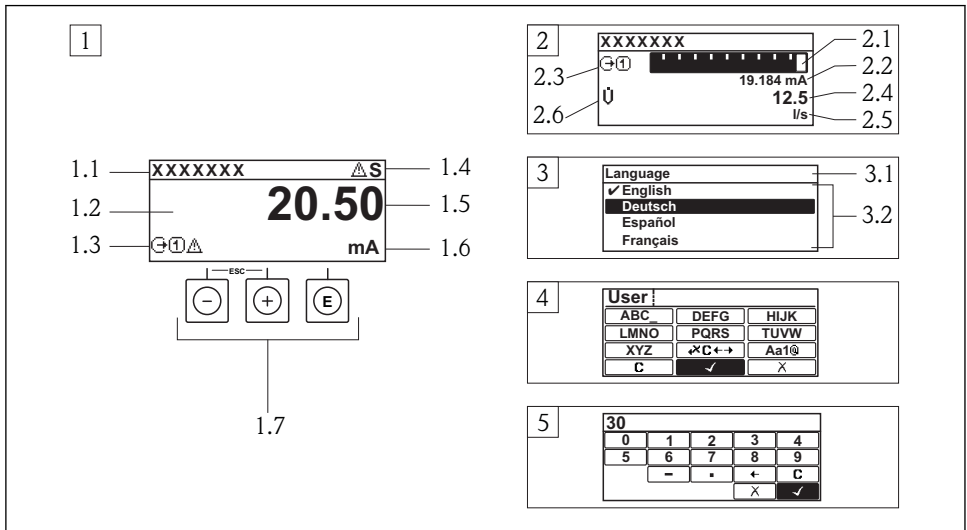
The individual parts of the operating menu are assigned to certain user roles (operator, maintenance etc.). Each user role contains typical tasks within the device lifecycle.

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

 *Only applies for Proline Promass F, O, Q and X*

For custody transfer, once the device has been put into circulation or sealed, its operation is restricted.

## 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
<ul style="list-style-type: none"> <li>■ Depends on the device version, e.g.: <ul style="list-style-type: none"> <li>– : Volume flow</li> <li>– : Mass flow</li> <li>– : Density</li> <li>– : Conductivity</li> <li>– : Temperature</li> </ul> </li> <li>■ : Totalizer</li> <li>■ : Output</li> <li>■ : Input</li> <li>■ : Measurement channel number <sup>1)</sup></li> <li>■ Diagnostic behavior <sup>2)</sup> <ul style="list-style-type: none"> <li>– : Alarm</li> <li>– : Warning</li> </ul> </li> </ul>	<p>The following symbols appear in the status area of the operational display at the top right:</p> <ul style="list-style-type: none"> <li>■ Status signals <ul style="list-style-type: none"> <li>– <b>F</b>: Failure</li> <li>– <b>C</b>: Function check</li> <li>– <b>S</b>: Out of specification</li> <li>– <b>M</b>: Maintenance required</li> </ul> </li> <li>■ Diagnostic behavior <ul style="list-style-type: none"> <li>– : Alarm</li> <li>– : Warning</li> </ul> </li> <li>■ : Locking (locked via hardware))</li> <li>■ : Communication via remote operation is active.</li> </ul>







- 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
<p>The following appears in the status area of the navigation view in the top right corner:</p> <ul style="list-style-type: none"> <li>■ In the submenu <ul style="list-style-type: none"> <li>– The direct access code for the parameter you are navigating to (e.g. 0022-1)</li> <li>– If a diagnostic event is present, the diagnostic behavior and status signal</li> </ul> </li> <li>■ In the wizard <ul style="list-style-type: none"> <li>– If a diagnostic event is present, the diagnostic behavior and status signal</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ Icons for menus <ul style="list-style-type: none"> <li>– : Operation</li> <li>– : Setup</li> <li>– : Diagnostics</li> <li>– : Expert</li> </ul> </li> <li>■ : Submenus</li> <li>■ : Wizards</li> <li>■ : Parameters within a wizard</li> <li>■ : Parameter locked</li> </ul>






### 6.3.3 Editing view

Text editor	Correction symbols under
Confirms selection.	Clears all entered characters.
Exits the input without applying the changes.	Moves the input position one position to the right.
Clears all entered characters.	Moves the input position one position to the left.
Switches to the selection of the correction tools.	Deletes one character immediately to the left of the input position.
Toggle <ul style="list-style-type: none"> <li>■ Between upper-case and lower-case letters</li> <li>■ For entering numbers</li> <li>■ For entering special characters</li> </ul>	


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

### 6.3.4 Operating elements


Keys and meaning
<p> <b>Enter key</b></p> <p><i>For operational display</i></p> <ul style="list-style-type: none"> <li>Pressing the key briefly opens the operating menu.</li> <li>Pressing the key for 2 s opens the context menu.</li> </ul> <p><i>In a menu, submenu</i></p> <ul style="list-style-type: none"> <li>Pressing the key briefly <ul style="list-style-type: none"> <li>Opens the selected menu, submenu or parameter.</li> <li>Starts the wizard.</li> <li>If help text is open: <ul style="list-style-type: none"> <li>Closes the help text of the parameter.</li> </ul> </li> </ul> </li> <li>Pressing the key for 2 s for parameter: <ul style="list-style-type: none"> <li>If present, opens the help text for the function of the parameter.</li> </ul> </li> </ul> <p><i>With a wizard:</i> Opens the editing view of the parameter.</p> <p><i>With a text and numeric editor:</i></p> <ul style="list-style-type: none"> <li>Pressing the key briefly <ul style="list-style-type: none"> <li>Opens the selected group.</li> <li>Carries out the selected action.</li> </ul> </li> <li>Pressing the key for 2 s: <ul style="list-style-type: none"> <li>Confirms the edited parameter value.</li> </ul> </li> </ul>
<p> <b>Minus key</b></p> <ul style="list-style-type: none"> <li><i>In a menu, submenu:</i> Moves the selection bar upwards in a choose list.</li> <li><i>With a wizard:</i> Confirms the parameter value and goes to the previous parameter.</li> <li><i>With a text and numeric editor:</i> Moves the selection bar to the left (backwards) in an input screen.</li> </ul>
<p> <b>Plus key</b></p> <ul style="list-style-type: none"> <li><i>In a menu, submenu:</i> Moves the selection bar downwards in a choose list.</li> <li><i>With a wizard:</i> Confirms the parameter value and goes to the next parameter.</li> <li><i>With a text and numeric editor:</i> Moves the selection bar to the right (forwards) in an input screen.</li> </ul>
<p> <b>Escape key combination (press keys simultaneously)</b></p> <p><i>In a menu, submenu</i></p> <ul style="list-style-type: none"> <li>Pressing the key briefly <ul style="list-style-type: none"> <li>Exits the current menu level and takes you to the next higher level.</li> <li>If help text is open, closes the help text of the parameter.</li> </ul> </li> <li>Pressing the key for 2 s for the parameter: Returns you to the operational display ("home position").</li> </ul> <p><i>With a wizard:</i> Exits the wizard and takes you to the next higher level.</p> <p><i>With a text and numeric editor:</i> Closes the text or numeric editor without applying changes.</p>
<p> <b>Minus/Enter key combination (press the keys simultaneously)</b></p>

Keys and meaning
Reduces the contrast (brighter setting).
 +  <b>Plus/Enter key combination (press and hold down the keys simultaneously)</b>
Increases the contrast (darker setting).
 +  +  <b>Minus/Plus/Enter key combination (press the keys simultaneously)</b>
<i>For operational display:</i> 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.

## 6.5 Access to the operating menu via the Web server

-  The operating menu can also be accessed via the Web server. 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
  - Compatibility with previous model
  - Modbus RS485 information
    - Function codes
    - Response time
    - Modbus data map

## 8 Commissioning

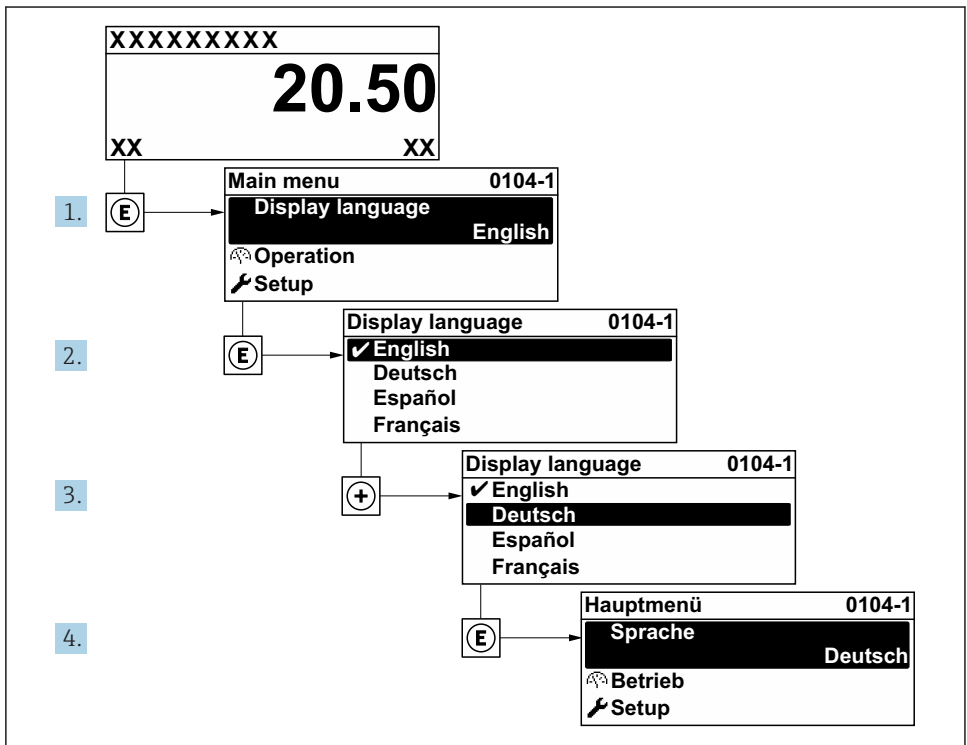
### 8.1 Function check

Before commissioning the measuring device:

- ▶ Make sure that the post-installation and post-connection checks have been performed.
- "Post-installation check" checklist → 16
- "Post-connection check" checklist → 52

### 8.2 Setting the operating language

Factory setting: English or ordered local language




A0029420

9 Taking the example of the local display


### 8.3 Configuring the measuring device

The **Setup** menu with its submenus and guided wizards is used for fast commissioning of the device. They contain all the parameters required for configuration, such as for measurement or communication.

 Depending on the device version, not all submenus and parameters are available in every device. The selection can vary depending on the order code.

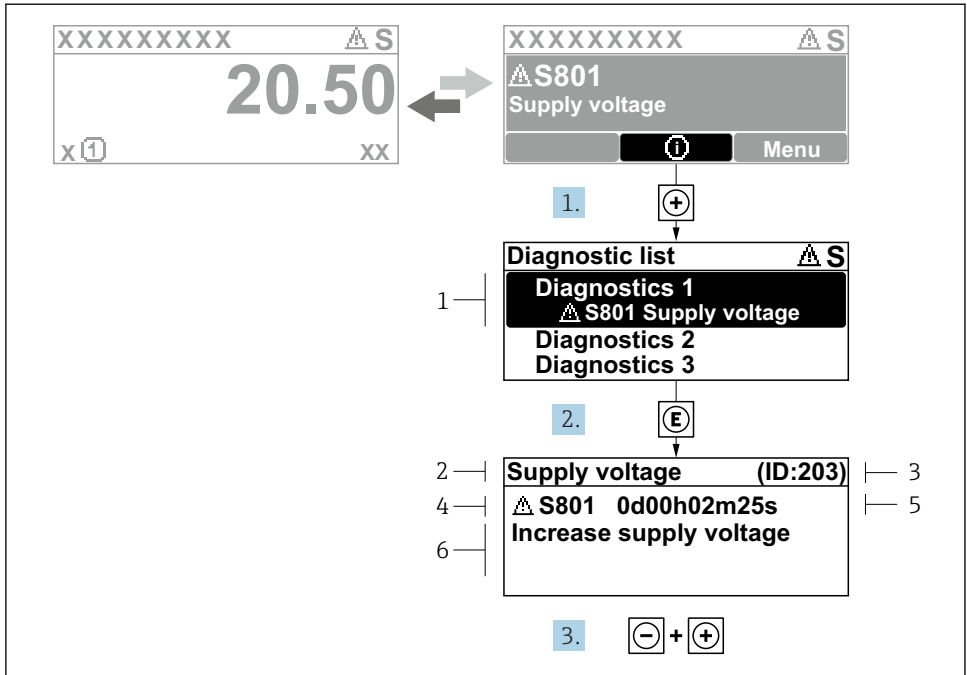
Example: Available submenus, wizards	Meaning
System units	Configure the units for all measured values
Medium selection	Define the medium
Current input	Configuration of the input/output type
Status input	
Current output 1 to n	
Pulse/frequency/switch output 1 to n	
Relay output	
Double pulse output	
Display	Configure the display format on the local display
Low flow cut off	Set the low flow cut off
Partially filled pipe detection	Configure partial and empty pipe detection
Advanced setup	Additional parameters for configuration: <ul style="list-style-type: none"> <li>■ Calculated values</li> <li>■ Sensor adjustment</li> <li>■ Totalizer</li> <li>■ WLAN settings</li> <li>■ Data backup</li> <li>■ Administration</li> </ul>

### 8.4 Protecting settings from unauthorized access

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

## 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.



A0029431-EN

#### 10 Message for 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

The user is in the diagnostic message.

1. Press  $\oplus$  (① symbol).
  - ↳ The **Diagnostic list** submenu opens.
2. Select the desired diagnostic event with  $\oplus$  or  $\ominus$  and press  $\boxplus$ .
  - ↳ The message for the remedial measures for the selected diagnostic event opens.
3. Press  $\ominus + \oplus$  simultaneously.
  - ↳ The message for the remedial measures closes.

## 9.1 General troubleshooting

### *For local display*

Error	Possible causes	Solution
Local display dark and no output signals	Supply voltage does not match the value indicated on the nameplate.	Apply the correct supply voltage .
Local display dark and no output signals	The polarity of the supply voltage is wrong.	Correct the polarity.
Local display dark and no output signals	No contact between connecting cables and terminals.	Check the connection of the cables and correct if necessary.
Local display dark and no output signals	Terminals are not plugged into the I/O electronics module correctly. Terminals are not plugged into the main electronics module correctly.	Check terminals.
Local display dark and no output signals	I/O electronics module is defective. Main electronics module is defective.	Order spare part .
Local display dark and no output signals	The connector between the main electronics module and display module is not plugged in correctly.	Check the connection and correct if necessary.
Local display dark and no output signals	The connecting cable is not plugged in correctly.	<ol style="list-style-type: none"> <li>1. Check the connection of the electrode cable and correct if necessary.</li> <li>2. Check the connection of the coil current cable and correct if necessary.</li> </ol>
Local display is dark, but signal output is within the valid range	Display is set too bright or too dark.	<ul style="list-style-type: none"> <li>▪ Set the display brighter by simultaneously pressing <math>\boxed{+}</math> + <math>\boxed{E}</math>.</li> <li>▪ Set the display darker by simultaneously pressing <math>\boxed{-}</math> + <math>\boxed{E}</math>.</li> </ul>
Local display is dark, but signal output is within the valid range	The cable of the display module is not plugged in correctly.	Insert the plug correctly into the main electronics module and display module.
Local display is dark, but signal output is within the valid range	Display module is defective.	Order spare part .
Backlighting of local display is red	Diagnostic event with "Alarm" diagnostic behavior has occurred.	Take remedial measures
Text on local display appears in a foreign language and cannot be understood.	Incorrect operating language is configured.	<ol style="list-style-type: none"> <li>1. Press <math>\boxed{-}</math> + <math>\boxed{+}</math> for 2 s ("home position").</li> <li>2. Press <math>\boxed{E}</math>.</li> <li>3. Set the desired language in the <b>Display language</b> parameter.</li> </ol>
Message on local display: "Communication Error" "Check Electronics"	Communication between the display module and the electronics is interrupted.	<ul style="list-style-type: none"> <li>▪ Check the cable and the connector between the main electronics module and display module.</li> <li>▪ Order spare part .</li> </ul>

*For output signals*

Error	Possible causes	Solution
Signal output outside the valid range	Main electronics module is defective.	Order spare part .
Device shows correct value on local display, but signal output is incorrect, though in the valid range.	Configuration error	Check and correct the parameter configuration.
Device measures incorrectly.	Configuration error or device is operated outside the application.	1. Check and correct parameter configuration. 2. Observe limit values specified in the "Technical Data".

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