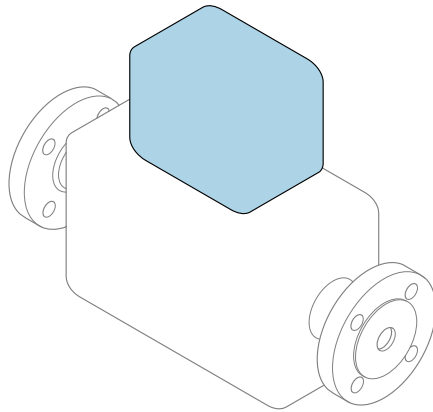


Brief Operating Instructions

Flowmeter

Proline 10

IO-Link transmitter
with electromagnetic 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



A0023555

Brief operating instructions Flowmeter

The device consists of a transmitter and a sensor.

The process of commissioning these two components is described in two separate manuals which together form the Brief Operating Instructions for the flowmeter:

- Brief Operating Instructions Part 1: Sensor
- Brief Operating Instructions Part 2: Transmitter

Please refer to both parts of the Brief Operating Instructions when commissioning the device, as the contents of the manuals 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
- Mounting procedure

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
- Mounting procedure
- Electrical connection
- Operation options
- System integration
- Commissioning
- Diagnostic information

Additional device documentation



These Brief Operating Instructions are **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*

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1 About this document

1.1 Symbols

1.1.1 Warnings

DANGER

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

WARNING

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





CAUTION

This symbol alerts you to a potentially dangerous situation. Failure to avoid the situation may result in a minor or mild injury.





NOTICE

This symbol alerts you to a potentially harmful situation. Failure to avoid the situation may result in damage to the facility or to something in the facility's vicinity.




1.1.2 Electronics

-  Direct current
-  Alternating current
-  Direct current and alternating current
-  Terminal connection for potential equalization



1.1.3 Device communication












-  Bluetooth is enabled.
-  LED is off.
-  LED flashing.
-  LED lit.

1.1.4 Tools

-  Flat blade screwdriver
-  Hexagon wrench
-  Wrench

1.1.5 Types of information

-  Preferred procedures, processes or actions
-  Permitted procedures, processes or actions

-  Forbidden procedures, processes or actions
-  Additional information
-  Reference to documentation
-  Reference to page
-  Reference to graphic
-  Measure or individual action to be observed
-  Series of steps
-  Result of a step
-  Help in the event of a problem
-  Visual inspection
-  Write-protected parameter

2 Safety instructions

2.1 Requirements for specialist personnel

- ▶ Installation, electrical connection, commissioning, diagnostics and maintenance of the device must only be carried out by trained, specialist personnel authorized by the facility's owner-operator.
- ▶ Before commencing work, the trained, specialist personnel must carefully read, understand and adhere to the Operating Instructions, additional documentation and certificates.
- ▶ Comply with national regulations.

2.2 Requirements for operating personnel

- ▶ Operating personnel are authorized by the facility's owner-operator and are instructed according to the requirements of the task.
- ▶ Before commencing work, the operating personnel must carefully read, understand and adhere to the instructions provided in the Operating Instructions and additional documentation.

2.3 Incoming acceptance and transport

- ▶ Transport the device in a correct and appropriate manner.
- ▶ Do not remove protective covers or protective caps on the process connections.

2.4 Adhesive labels, tags and engravings

- ▶ Pay attention to all the safety instructions and symbols on the device.

2.5 Environment and process

- ▶ Only use the device for the measurement of appropriate media.
- ▶ Keep within the device-specific pressure range and temperature range.
- ▶ Protect the device from corrosion and the influence of environmental factors.

2.6 Workplace safety

- ▶ Wear the required protective equipment according to national regulations.
- ▶ Do not ground the welding unit by means of the device.
- ▶ Wear protective gloves if working on and with the device with wet hands.

2.7 Installation

- ▶ Do not remove protective covers or protective caps on the process connections until just before you install the sensor.
- ▶ Do not damage or remove the liner on the flange.
- ▶ Observe tightening torques.

2.8 Electrical connection

- ▶ Comply with national installation regulations and guidelines.
- ▶ Observe cable specifications and device specifications.
- ▶ Check the cable for damage.
- ▶ Provide (establish) potential equalization.
- ▶ Provide (establish) grounding.

2.9 Surface temperature

Media with elevated temperatures can cause the surfaces of the device to become hot. For this reason, note the following:

- ▶ Mount suitable touch protection.
- ▶ Wear suitable protective gloves.

2.10 Commissioning

- ▶ Install the device only if it is in proper technical condition, free from errors and faults.
- ▶ Only put the device into operation once you have performed the post-installation check and post-connection check.

2.11 Modifications to the device

- ▶ Only carry out modifications or repairs after consulting beforehand with an Endress+Hauser service organization.
- ▶ Install spare parts and accessories according to the Installation Instructions.
- ▶ Only use original spare parts and original accessories from Endress+Hauser.

3 Product information

3.1 Intended use

The device is only suitable for flow measurement of liquids with a minimum conductivity of 5 $\mu\text{S}/\text{cm}$.

Depending on the version ordered, the device measures poisonous and oxidizing media.

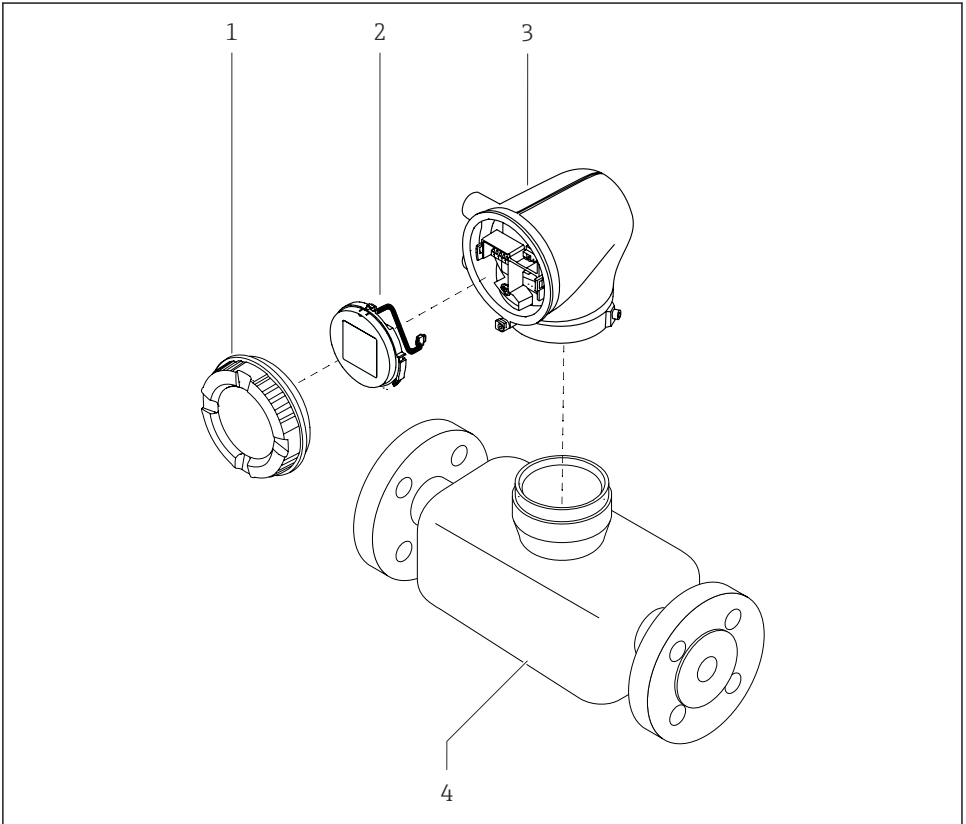
Devices for use in hygienic applications, or where there is an increased risk due to pressure, are labeled accordingly on the nameplate.

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

3.2 Product design

3.2.1 Compact version

The transmitter and sensor form a mechanical unit.



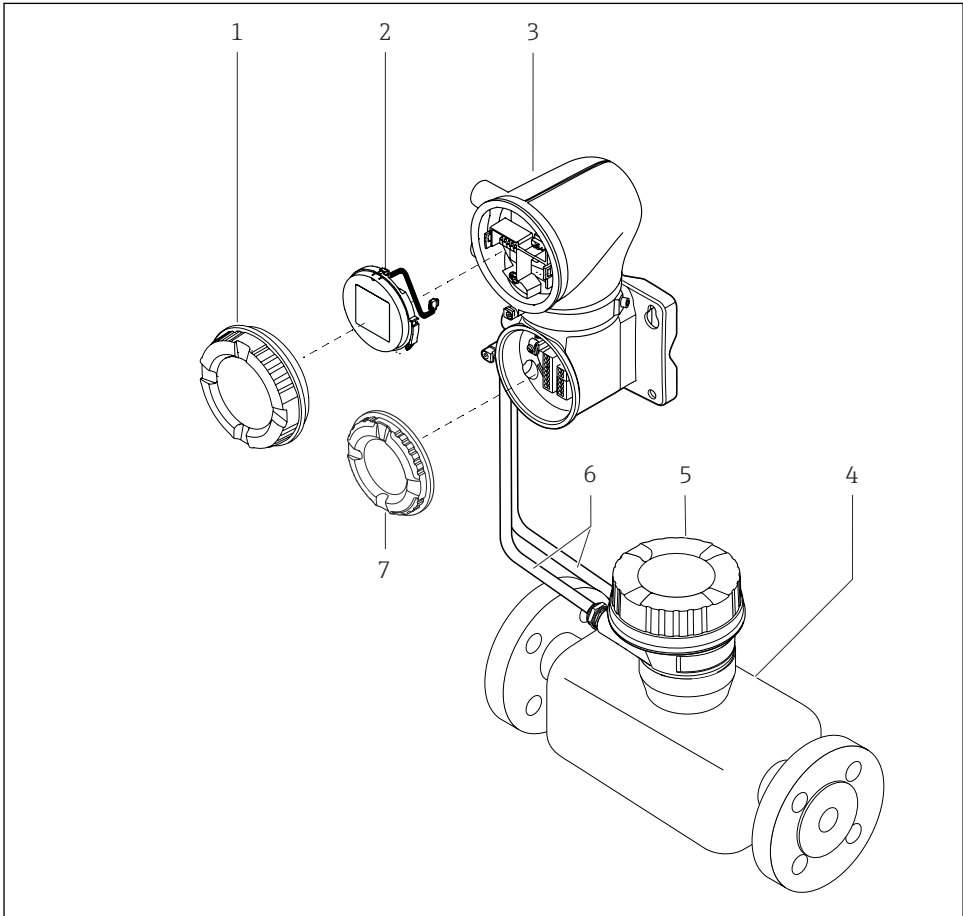
A0043525

1 Main device components

- 1 Housing cover
- 2 Display module
- 3 Transmitter housing
- 4 Sensor

3.2.2 Remote version

The transmitter and sensor are installed in physically separate locations.



A0043524

2 Main device components

- 1 Housing cover
- 2 Display module
- 3 Transmitter housing
- 4 Sensor
- 5 Sensor connection housing
- 6 Connecting cable consisting of coil current cable and electrode cable
- 7 Connection compartment cover

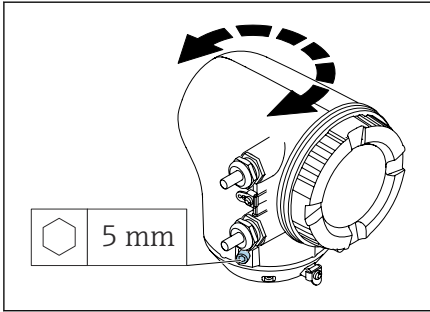
4 Installation



For detailed information about installing the sensor, see the Brief Operating Instructions for the sensor → 3

4.1 Turning the transmitter housing

Order code for "Housing", option "Aluminum"



1. Loosen the fixing screws on both sides of the transmitter housing.

2. **NOTICE**

Overrotation of the transmitter housing!

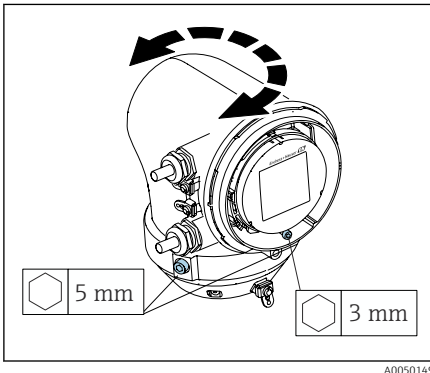
Interior cables are damaged.

- Turn the transmitter housing a maximum of 180° in each direction.

Turn the transmitter housing to the desired position.

3. Tighten the screws in the logically reverse sequence.

Order code for "Housing", option "Polycarbonate"



1. Loosen the screw on the housing cover.

2. Open the housing cover.

3. Loosen the grounding screw (below the display).

4. Loosen the fixing screws on both sides of the transmitter housing.

5. **NOTICE**

Overrotation of the transmitter housing!

Interior cables are damaged.

- Turn the transmitter housing a maximum of 180° in each direction.

Turn the transmitter housing to the desired position.

6. Tighten the screws in the logically reverse sequence.

4.2 Post-installation check

Is the device undamaged (visual inspection)?	<input type="checkbox"/>
Does the device comply with the measuring point specifications?	
For example:	
■ Process temperature	<input type="checkbox"/>
■ Process pressure	
■ Ambient temperature	
■ Measuring range	
Has the correct orientation been selected for the device?	<input type="checkbox"/>
Does the direction of the arrow on the device match the flow direction of the medium?	<input type="checkbox"/>
Is the device protected against precipitation and sunlight?	<input type="checkbox"/>
Are the screws tightened with the correct tightening torque?	<input type="checkbox"/>

5 Electrical connection

5.1 Connecting requirements

5.1.1 Notes on the electrical connection

WARNING


Live parts!

Incorrect work performed on the electrical connections can result in an electric shock.

- ▶ Have electrical connection work carried out by appropriately trained specialists only.
- ▶ Comply with applicable federal/national installation codes and regulations.
- ▶ Comply with national and local workplace safety regulations.
- ▶ Ground the device carefully and provide potential equalization.
- ▶ Connect protective earthing to all outer ground terminals.

5.1.2 Additional protective measures

The following protective measures are required:

- Set up a disconnecting device (switch or power-circuit breaker) to easily disconnect the device from the supply voltage.
- The DC power unit must be tested to ensure it meets technical safety requirements (e.g. PELV, SELV) with limited power sources (e.g. class 2).
- Plastic sealing plugs act as safeguards during transportation and must be replaced by suitable, individually approved installation material.
- Connection examples: →  25

5.2 Requirements for connecting cable

5.2.1 Electrical safety

As per applicable national regulations.

5.2.2 Permitted temperature range

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

5.2.3 Power supply cable (incl. conductor for the inner ground terminal)

- A standard installation cable is sufficient.
- Provide grounding according to applicable national codes and regulations.

5.2.4 Signal cable

IO-Link:

Twisted three- or four-core cable M12 A-coded according to IEC 61076-2-101 recommended with

- Conductor cross-section: 0.34 mm² (AWG22)
- Max. cable length: 20 m

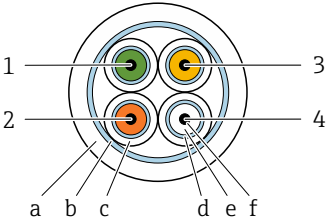
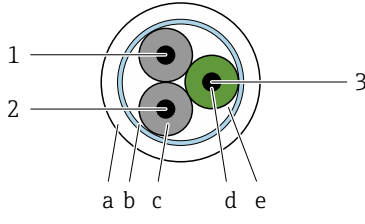
5.3 Ground cable requirements

Copper wire: at least 6 mm^2 (0.0093 in^2)

5.4 Connecting cable requirements



Connecting cable only necessary for remote version.

Electrode cable	Coil current cable
 <p style="text-align: right; font-size: small;">A0054679</p>	 <p style="text-align: right; font-size: small;">A0054680</p>
<p>1 GND (green): Ground-wire 0.38 mm^2 (AWG 21)</p> <p>2 E1 (brown): "Electrode E1" - core 0.38 mm^2 (AWG 21)</p> <p>3 E (yellow): grounding 0.38 mm^2 (AWG 21)</p> <p>4 E2 (white): "Electrode E2" - core 0.38 mm^2 (AWG 21)</p> <p>a Outer jacket</p> <p>b Cable shield</p> <p>c Core jacket</p> <p>d Core shield</p> <p>e Core insulation</p> <p>f Core</p>	<p>1 ER+ (black): coil current core 0.75 mm^2 (AWG 18)</p> <p>2 ER- (black): coil current core 0.75 mm^2 (AWG 18)</p> <p>3 NC (yellow-green): not connected 0.75 mm^2 (AWG 18)</p> <p>a Outer jacket</p> <p>b Cable shield</p> <p>c Core insulation</p> <p>d Core</p> <p>e Core reinforcement</p>

5.4.1 Electrode cable

Design	<p>$3 \times 0.38 \text{ mm}^2$ (21 AWG) with common, braided copper shield ($\varnothing \sim 9.5 \text{ mm}$ (0.37 in)) and individual shielded cores</p> <p>If using the empty pipe detection (EPD) function: $4 \times 0.38 \text{ mm}^2$ (21 AWG) with common, braided copper shield ($\varnothing \sim 9.5 \text{ mm}$ (0.37 in)) and individual shielded cores</p>
Conductor resistance	$\leq 50 \text{ } \Omega/\text{km}$ ($0.015 \text{ } \Omega/\text{ft}$)
Capacitance: core/shield	$\leq 420 \text{ pF/m}$ (128 pF/ft)

Cable length	Depends on the medium conductivity: maximum 200 m (656 ft)
Cable lengths (available for order)	5 m (15 ft), 10 m (30 ft), 20 m (60 ft)
Operating temperature	-20 to +80 °C (-4 to +176 °F)

5.4.2 Coil current cable

Design	3×0.75 mm ² (18 AWG) with common, braided copper shield (∅ ~ 9.5 mm (0.37 in)) and individual shielded cores
Conductor resistance	≤ 37 Ω/km (0.011 Ω/ft)
Capacitance: core/shield	≤ 120 pF/m (37 pF/ft)
Cable length	Depends on the medium conductivity, max. 200 m (656 ft)
Cable lengths (available for order)	5 m (15 ft), 10 m (30 ft), 20 m (60 ft) or variable length up to max. 200 m (656 ft)
Operating temperature	-20 to +80 °C (-4 to +176 °F)
Test voltage for cable insulation	≤ AC 1 433 V rms 50/60 Hz or ≥ DC 2 026 V

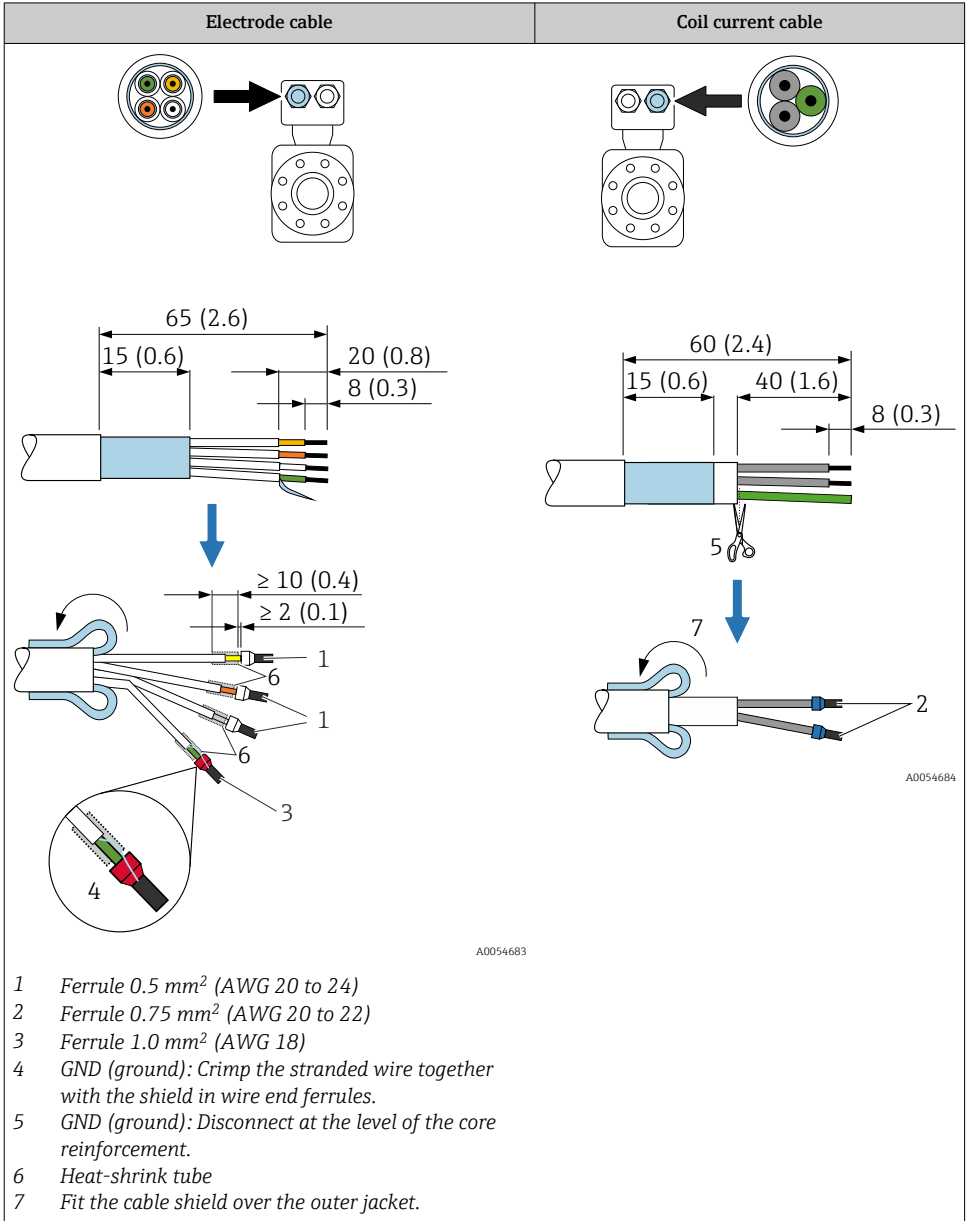
5.5 Connecting cable connection

5.5.1 Preparing the connecting cable

Transmitter

Electrode cable	Coil current cable
<p>A0054681</p> <ol style="list-style-type: none"> 1 Ferrule 0.5 mm² (AWG 20 to 24) 2 Ferrule 0.75 mm² (AWG 20 to 22) 3 Ferrule 1.0 mm² (AWG 18) 4 Ferrule 2.5 mm² (AWG 14) 5 Ferrule 4.0 mm² (AWG 12) 6 GND (ground): Crimp the stranded wire together with the shield in wire end ferrules. 7 GND (ground): Disconnect at the level of the core reinforcement. 	<p>A0054682</p>

Sensor



A0054684

1. Make sure that the ferrules do not touch the cable shields on the sensor side. Minimum distance = 1 mm (exception: green "GND" cable)

2. A: Terminate the electrode cable.
3. B: Fit ferrules over the strands and press in place.
4. Fit the cable shield on the sensor side over the outer jacket.
5. Insulate the cable shield on the transmitter side, e.g. heat shrink tube.

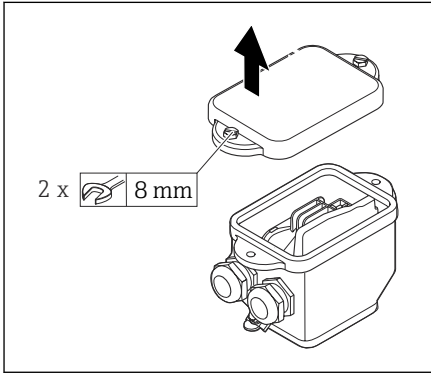
5.5.2 Connecting the connecting cable

Wiring the sensor connection housing

NOTICE**Incorrect wiring can damage the electronic components!**

- ▶ Only connect sensors and transmitters with identical serial numbers.
- ▶ Connect the sensor connection housing and the transmitter housing to the potential equalization of the facility via the outer ground terminal.
- ▶ Connect the sensor and transmitter to the same potential.

Stainless steel sensor connection compartment



A0044737

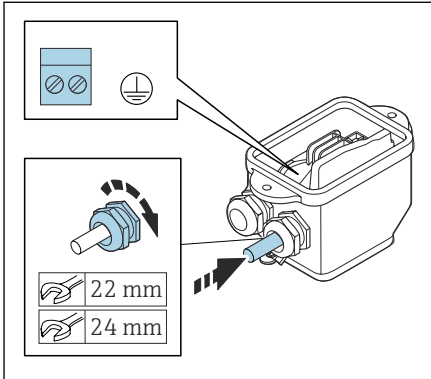
1. Loosen the hexagonal-headed bolt of the connection compartment cover.
2. Remove the connection compartment cover.

NOTICE

If the sealing ring is missing, the housing is not sealed tight!

Damage to the device.

- ▶ Do not remove the sealing ring from the cable entry.



A0044738

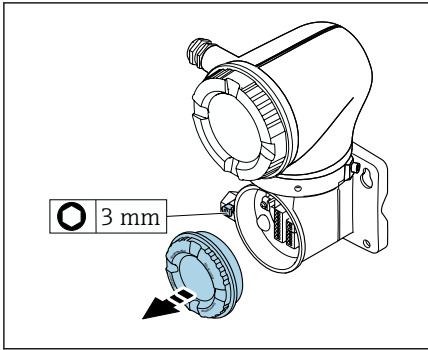
3. Feed the coil current cable and electrode cable through the corresponding cable entry.
4. Adjust the cable lengths.
5. Connect the cable shield to the strain relief clamp.
6. Strip the cable and cable ends.
7. Fit ferrules over the strands and press in place.
8. Connect the coil current cable and the electrode cable as per the terminal assignment.
9. Tighten the cable glands.
10. Close the connection compartment cover.

Wiring the transmitter housing

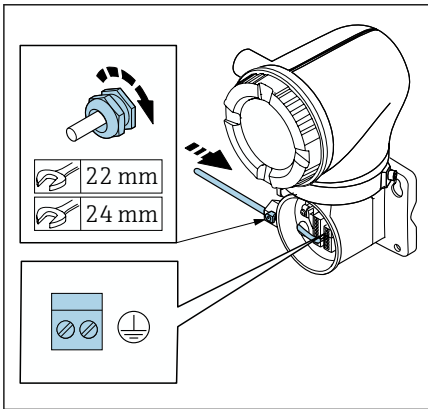
NOTICE

Incorrect wiring can damage the electronic components!

- ▶ Only connect sensors and transmitters with identical serial numbers.
- ▶ Connect the sensor connection housing and the transmitter housing to the potential equalization of the facility via the outer ground terminal.
- ▶ Connect the sensor and transmitter to the same potential.



A0042376



A0042371

1. Loosen the Allen key of the securing clamp.
2. Open the connection compartment cover counterclockwise.

NOTICE

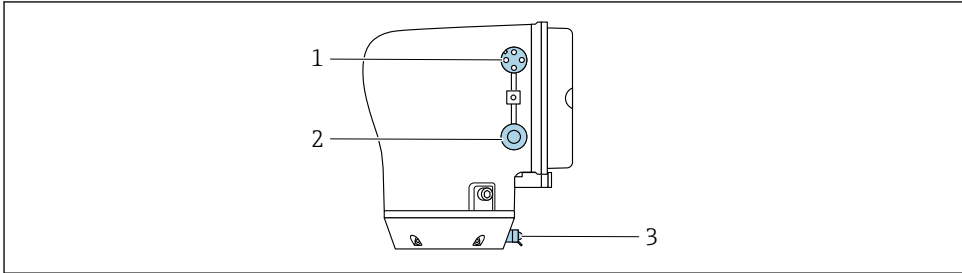
If the sealing ring is missing, the housing is not sealed tight!

Damage to the device.

- ▶ Do not remove the sealing ring from the cable entry.
3. Feed the coil current cable and electrode cable through the corresponding cable entry.
 4. Adjust the cable lengths.
 5. Connect the cable shields to the inner ground terminal.
 6. Strip the cable and cable ends.
 7. Fit ferrules over the strands and press in place.
 8. Connect the coil current cable and the electrode cable as per the terminal assignment.
 9. Tighten the cable glands.
 10. Close the connection compartment cover.
 11. Fasten the securing clamp.

5.6 Transmitter connection

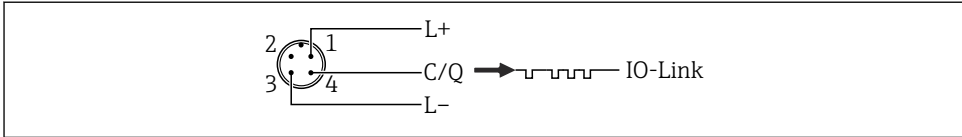
5.6.1 Transmitter terminal connections



A0053767

- 1 M12 plug for power supply (supply voltage) and signals (IO-Link)
- 2 Dummy plug
- 3 Outer ground terminal

Pin assignment of IO-Link device plug



A0053891

- 3 M12 A-coded (IEC 61076-2-101)

- 1 PIN 1: power supply
- 2 PIN 2: not used
- 3 PIN 3: reference potential for power supply/output
- 4 PIN 4: output 1 (IO-link)

5.6.2 Wiring the transmitter

i Pay attention to the requirements for the power supply cable and signal cable → 13 .

- i** ■ Connect protective earthing to the outer signal terminals.
- i** ■ Connect the IO-Link signal cable to M12.

5.7 Ensuring potential equalization Promag H

5.7.1 Metal process connections

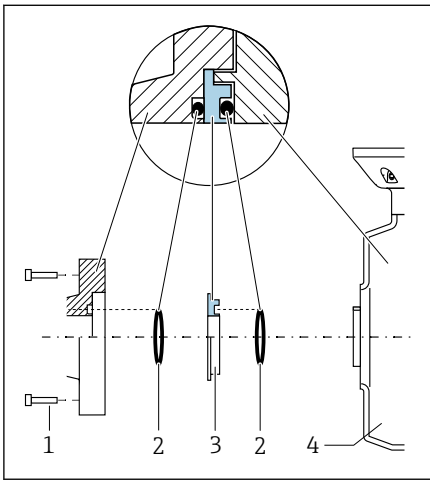
Potential equalization is via the metal process connections that are in contact with the medium and mounted directly on the sensor.

5.7.2 Plastic process connections

Note the following when using grounding rings:

- Depending on the option ordered, plastic disks are used instead of grounding rings on some process connections. The plastic disks act as "spacers" and do not have any potential equalization function. They perform a significant sealing function at the sensor and process connection interfaces. In the case of process connections without metal grounding rings, the plastic disks and seals must never be removed. Plastic disks and seals must always be installed.
- Grounding rings can be ordered separately from Endress+Hauser as an accessory DK5HR* (contains no seals). 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!
- If seals are needed, they can also be ordered with the DK5G* seal set.
- Grounding rings including seals are mounted inside the process connections. This does not affect the installed length.

Connection example for potential equalization with additional grounding ring



A0044196

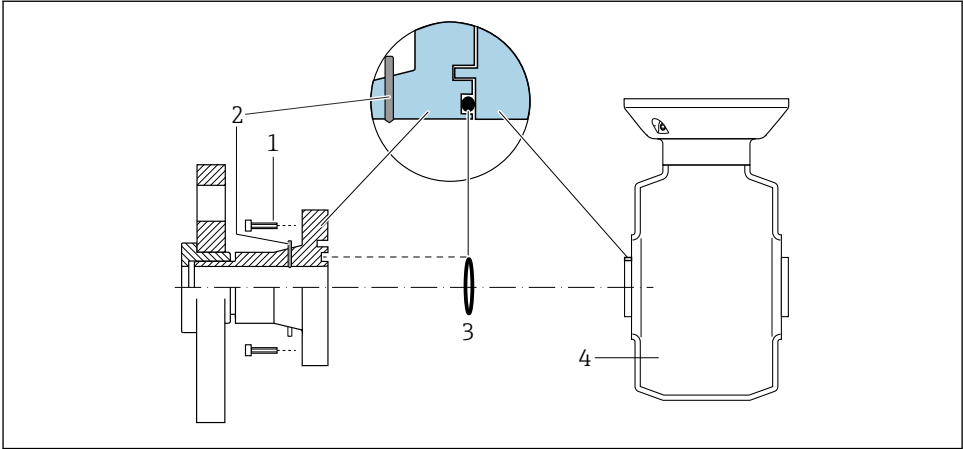
NOTICE

If potential equalization is not provided, this can lead to the electrochemical degradation of the electrodes or affect measurement accuracy!

Damage to the device.

- ▶ Install grounding rings.
 - ▶ Provide (establish) potential equalization.
1. Loosen the hexagonal-headed bolts (1).
 2. Remove the process connection from the sensor (4).
 3. Remove the plastic disk (3), along with the seals (2), from the process connection.
 4. Place the first seal (2) into the groove of the process connection.
 5. Place the metal grounding ring (3) into the process connection.
 6. Place the second seal (2) into the groove of the grounding ring.
 7. Observe the maximum screw tightening torques for lubricated threads:
7 Nm (5.2 lbf ft)
 8. Mount the process connection on the sensor (4).

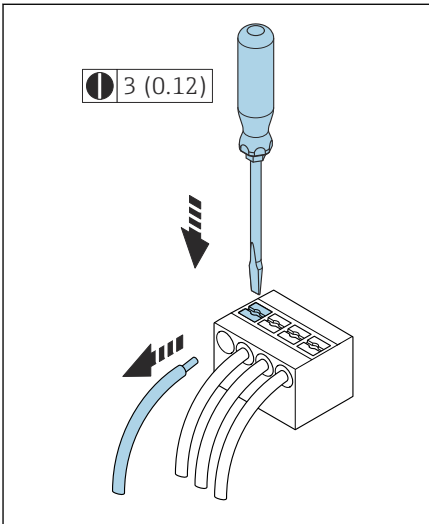
Connection example for potential equalization with grounding electrodes



A0028972

- 1 Hexagonal-headed bolts of process connection
- 2 Integrated grounding electrodes
- 3 Seal
- 4 Sensor

5.8 Removing a cable



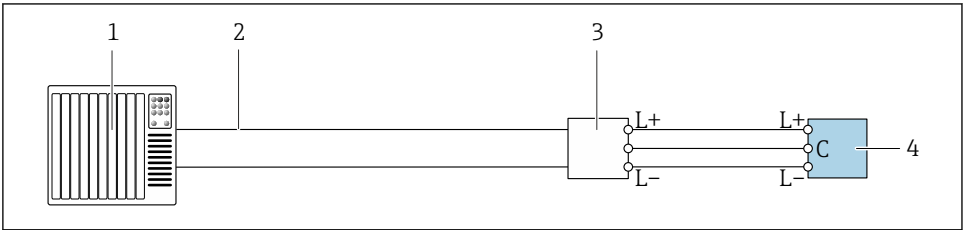
A0044725

1. Use a flat-blade screwdriver to press down on the slot between the two terminal holes and hold.
2. Remove the cable end from the terminal.

4 Engineering unit mm (in)

5.9 Examples of electric terminals

5.9.1 IO-Link



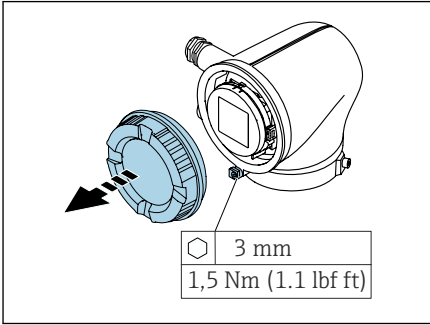
A0055085

5 Connection example for IO-Link, only non-hazardous area

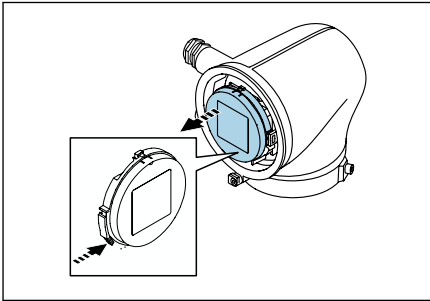
- 1 Automation system (e.g. PLC)
- 2 Industrial Ethernet or fieldbus
- 3 IO-Link master
- 4 Transmitter

5.10 Hardware settings

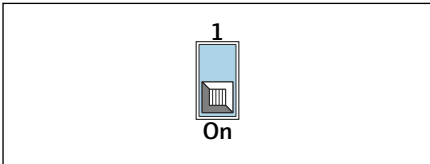
5.10.1 Enabling write protection



A0041094



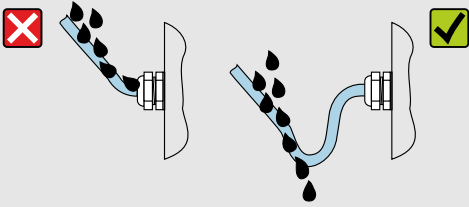
A0041330



A0044412

1. Loosen the Allen key of the securing clamp.
2. Open the housing cover counterclockwise.
3. Press the tab of the display module holder.
4. Remove the display module from the display module holder.
5. Set the write protection switch on the back of the display module to the **On** position.
 - ↳ Write protection is enabled.
6. Follow the sequence in the reverse order to reassemble.

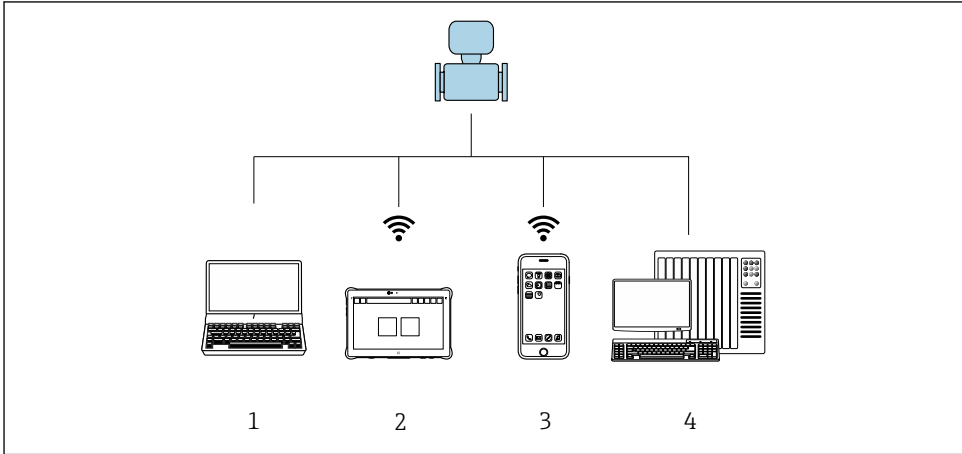
5.11 Post-connection check

Only for remote version: Is the serial number on the nameplates of the connected sensor and transmitter identical?	<input type="checkbox"/>
Is the potential equalization established correctly?	<input type="checkbox"/>
Is the protective earthing established correctly?	<input type="checkbox"/>
Are the device and cable undamaged (visual check)?	<input type="checkbox"/>
Do the cables meet the requirements?	<input type="checkbox"/>
Is the terminal assignment correct?	<input type="checkbox"/>
Have old and damaged seals been replaced?	<input type="checkbox"/>
Are the seals dry, clean and installed correctly?	<input type="checkbox"/>
Are all the cable glands installed, firmly tightened and leak-tight?	<input type="checkbox"/>
Are dummy plugs inserted in unused cable entries?	<input type="checkbox"/>
Are transportation plugs replaced by dummy plugs?	<input type="checkbox"/>
Are the housing screws and housing cover tightened?	<input type="checkbox"/>
Do the cables loop down before the cable gland ("water trap")?	<input type="checkbox"/>
	<input type="checkbox"/>
Does the supply voltage match the specifications on the transmitter nameplate?	<input type="checkbox"/>

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6 Operation

6.1 Overview of the operating options



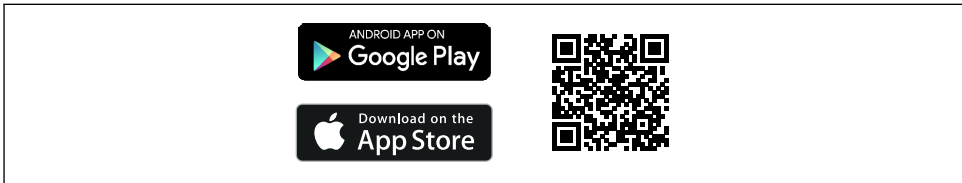
A0054834

- 1 Computer with operating tool, e.g. FieldCare, DeviceCare or IODD operating tools
- 2 Field Xpert SMT70 via Bluetooth, e.g. SmartBlue App
- 3 Tablet or smartphone via Bluetooth, e.g. SmartBlue App
- 4 Automation system, e.g. PLC

6.2 Operation via SmartBlue App

The device can be operated and configured with the SmartBlue App.

- The SmartBlue App must be downloaded onto a mobile device for this purpose.
- For information on the compatibility of the SmartBlue App with mobile devices, see **Apple App Store (iOS devices)** or **Google Play Store (Android devices)**.
- Incorrect operation by unauthorized persons is prevented by means of encrypted communication and password encryption.
- The Bluetooth® function can be deactivated after initial device setup.





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- 6 QR code for free Endress+Hauser SmartBlue App

Download and installation:

1. Scan the QR code or enter **SmartBlue** in the search field of the Apple App Store (iOS) or Google Play Store (Android).
2. Install and start the SmartBlue App.
3. For Android devices: enable location tracking (GPS) (not required for iOS devices).
4. Select a device that is ready to receive from the device list displayed.

Login:

1. Enter the user name: admin
 2. Enter the initial password: serial number of the device
-  Change the password after logging in for the first time.
-  Forgotten your password? Contact Endress+Hauser Service.

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

8 Commissioning

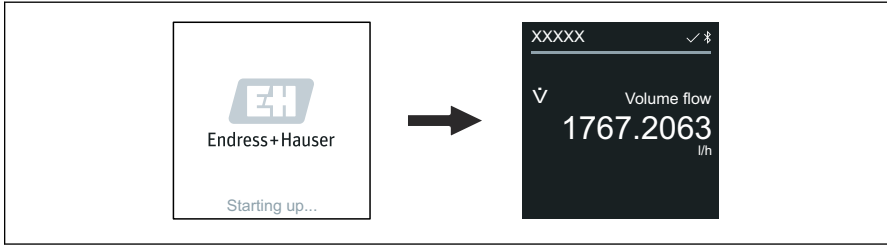
8.1 Post-installation check and post-connection check

Before commissioning the device, make sure that the post-installation and post-connection checks have been performed:

- Post-installation check →  12
- Post-connection check →  27

8.2 Switching on the device

- ▶ Switch on the supply voltage for the device.
 - ↳ The local display switches from the start screen to the operational display.



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i If device startup is not successful, the device displays an error message to this effect .

8.3 Commissioning the device

8.3.1 SmartBlue App



Information on the SmartBlue App: Operating Instructions

Connecting the SmartBlue App to the device

1. Enable Bluetooth on the mobile handheld terminal, tablet or smartphone.
2. Start the SmartBlue App.
 - ↳ A Live List shows all the devices available.
3. Select the desired device.
 - ↳ The SmartBlue App shows the device login.
4. Under user name, enter **admin**.
5. Under password, enter the device's serial number. See nameplate for serial number.
6. Confirm your entries.
 - ↳ The SmartBlue App connects to the device and displays the main menu.

8.4 Backing up or duplicating the device data

The device does not have a memory module. However, using an operating tool based on the FDT technology (e.g. FieldCare) or the SmartBlue App, the following options are available:

- Save/recover configuration data
- Duplicate device configurations
- Transfer all relevant parameters when replacing electronic inserts

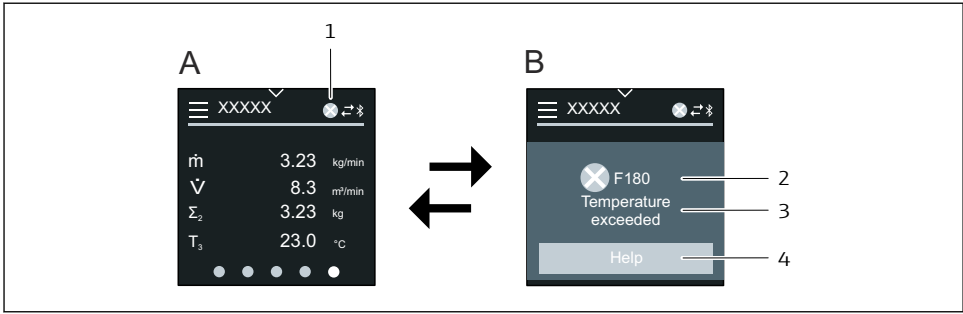
For more information: Operating Instructions

9 Diagnosis and troubleshooting

9.1 Diagnostic information on local display

9.1.1 Diagnostic message

The local display alternates between displaying faults as a diagnostic message and displaying the operational display screen.



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- A Operational display in alarm condition
- B Diagnostic message
- 1 Diagnostic behavior
- 2 Diagnostic behavior with diagnostic code
- 3 Short text
- 4 Open information on remedial measures (HART and Modbus RS485 only)

If two or more diagnostic events are pending simultaneously, the local display only shows the diagnostic message with the highest priority.

- i** Other diagnostic events that have occurred can be opened as follows:
 - Via FieldCare
 - Via DeviceCare
 - Via IO-Link

- i** For detailed information on diagnostic information, see the Operating Instructions for the device



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