BA02380C/07/EN/02.26-00
71763541
2026-04-01

Operating Instructions
Liquiline CM42B

Two-wire transmitter
Field device
Measurement with digital or analog sensors

Endress+Hauser
People for Process Automation

Table of contents

1 About this document

1.1 Safety information

Structure of information	Meaning
DANGER **Causes (/consequences)** If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation **will** result in a fatal or serious injury.
WARNING **Causes (/consequences)** If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation **can** result in a fatal or serious injury.
CAUTION **Causes (/consequences)** If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.
NOTICE **Cause/situation** If necessary, Consequences of non-compliance (if applicable) ▶ Action/note	This symbol alerts you to situations which may result in damage to property.

1.2 Symbols

- Additional information, tips
- Permitted
- Recommended
- Not permitted or not recommended
- Reference to device documentation
- Reference to page
- Reference to graphic
- Result of an individual step

1.3 Symbols on the device

- Reference to device documentation
- Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

1.4 Documentation

In addition to these Operating Instructions , the following manuals are available on the product pages on our website:
Brief Operating Instructions, KA01730C

2 Basic safety instructions

2.1 Requirements for the personnel

- Installation, commissioning, operation and maintenance of the measuring system may be carried out only by specially trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions contained therein.
- Faults at the measuring point may only be rectified by authorized and specially trained personnel.

Repairs not described in the Operating Instructions provided must be carried out only directly at the manufacturer's site or by the service organization.

2.2 Intended use

2.2.1 Areas of application

The device is a two-wire transmitter for connecting digital sensors with Memosens technology or analog sensors (configurable). It features a 4 to 20 mA current output with optional HART communication and can be operated via an onsite display or optionally using a smartphone or other mobile devices via Bluetooth.

The device is designed for use in the following industries:
- Chemical industry
- Pharmaceutical industry
- Water and wastewater
- Food and beverage production
- Power stations
- Applications in hazardous areas
- Other industrial applications

2.2.2 Non-designated use

Any use other than that intended puts the safety of people and the measuring system at risk. Therefore, any other use is not permitted.

The manufacturer is not liable for harm caused by improper or unintended use.

2.3 Workplace safety

The operator is responsible for ensuring compliance with the following safety regulations:
- Installation guidelines
- Local standards and regulations
- Regulations for explosion protection

Electromagnetic compatibility
- The product has been tested for electromagnetic compatibility in accordance with the applicable international standards for industrial applications.
- The electromagnetic compatibility indicated applies only to a product that has been connected in accordance with these Operating Instructions.

2.4 Operational safety

Before commissioning the entire measuring point:

1. Verify that all connections are correct.
2. Ensure that electrical cables and hose connections are undamaged.

Procedure for damaged products:

1. Do not operate damaged products, and protect them against unintentional operation.
2. Label damaged products as defective.

During operation:

- If errors cannot be rectified,
  take products out of service and protect them against unintentional operation.

2.5 Product safety

The product is designed 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. The relevant regulations and international standards have been observed.

2.6 IT security

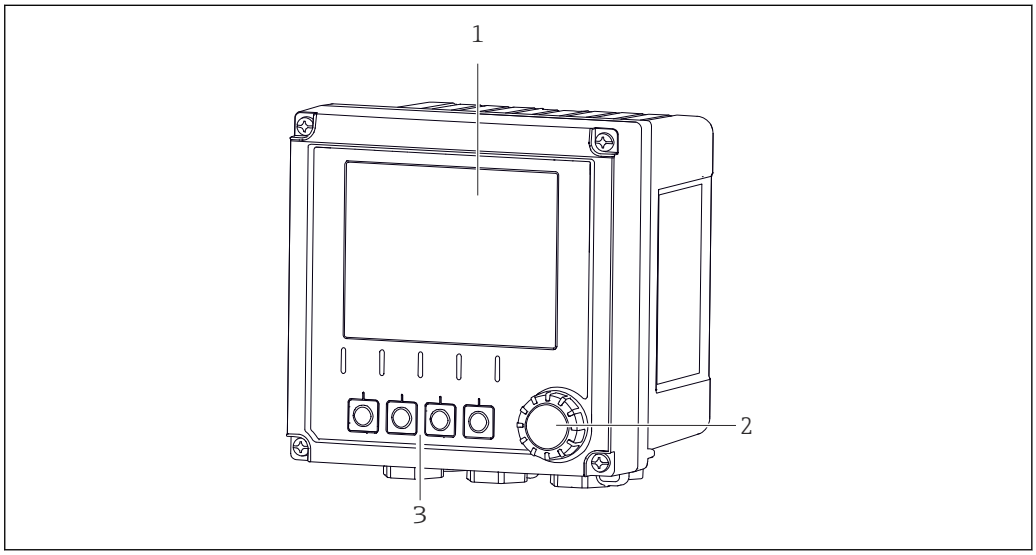
We only provide a warranty if the device is installed and used as described in the Operating Instructions and the Security Manual. The device is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

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. For more information, see the Security Manual.

3 Product description

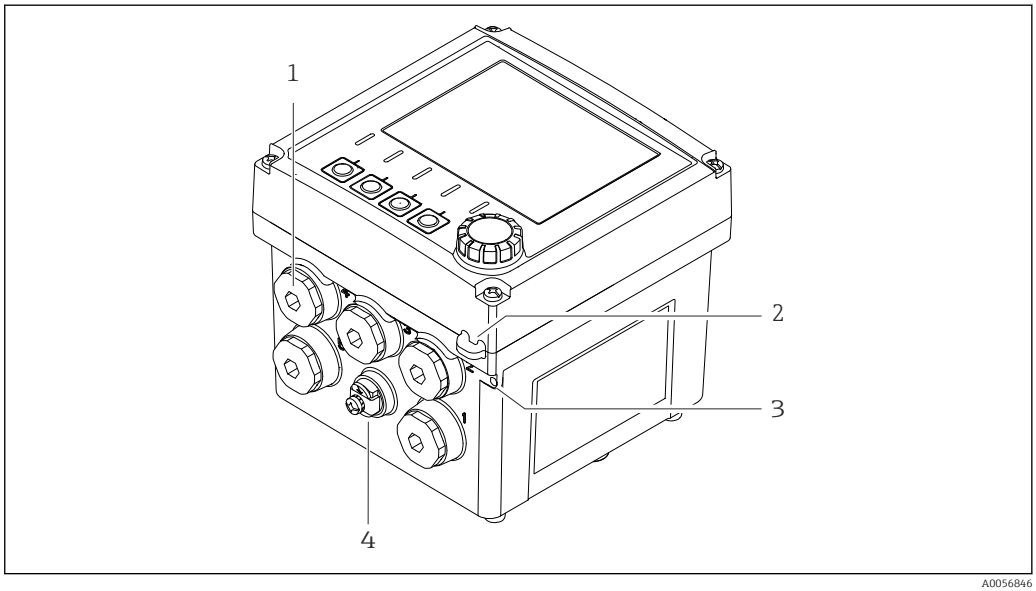
3.1 Product design

3.1.1 Housing closed



1 Exterior view

1 Display
2 Navigator
3 Soft keys, assignment depends on menu

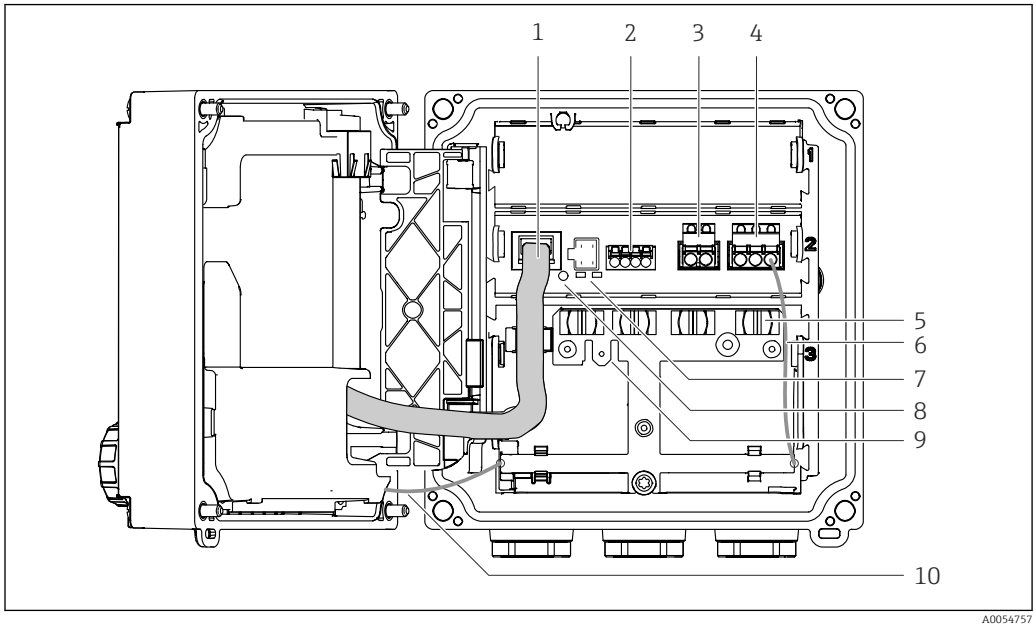


2 Exterior view

1 Connections for cable glands
2 Eyelet for security seal
3 Eyelet for Tagging (TAG)
4 Connection for potential equalization or functional ground

3.1.2 Housing open

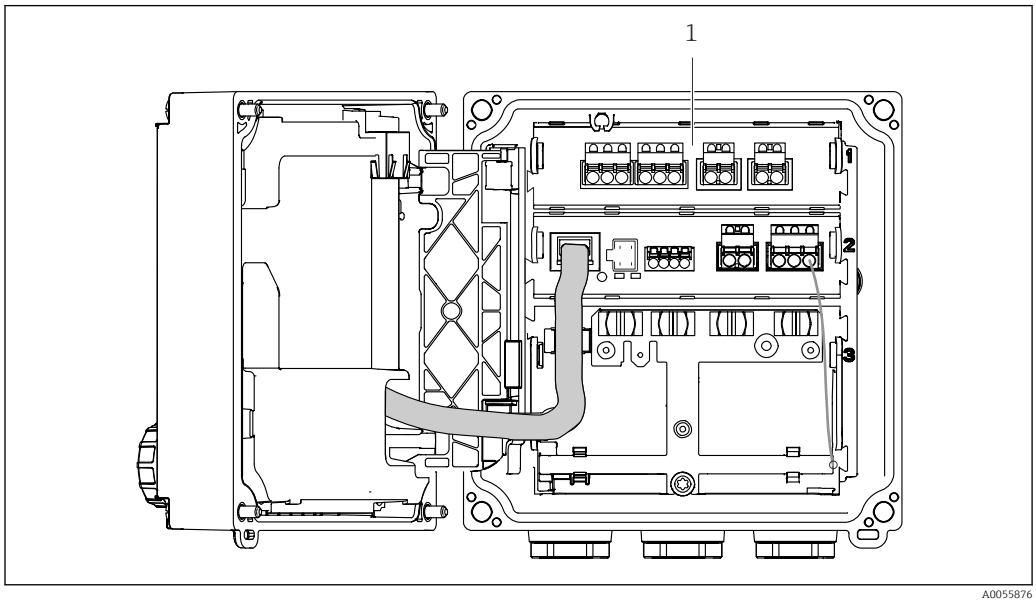
Design of Memosens sensors



1 *Display cable*
2 *Memosens input*
3 *Current output 1: 4 to 20 mA, passive/optional HART*
4 *Current output 2 (optional):4 to 20 mA, passive*
5 *Cable mounting rail*
6 *Internal ground cable, wired at the factory*
7 *Status LEDs*
8 *Reset button*
9 *Internal grounding connection for blade receptacle 6.35 mm x 0.8 mm (0.25 in x 0.032 in), usage optional*
10 *Internal ground cable for display (only for devices with a stainless steel housing), wired at the factory*

The status LEDs are only active if the display is not connected.

Design of analog sensors (pH/ORP, inductive/conductive conductivity)



1 *Connection area for analog sensors (different layout depending on the design)*

3.1.3 Measuring parameters

Depending on the order, the transmitter is designed for digital Memosens sensors or for analog sensors. A transmitter for analog sensors can be reconfigured to Memosens. This requires an activation code and the analog input module must be removed.

A device for Memosens sensors cannot be retrofitted for analog sensors.

The following measuring parameters are possible with Memosens sensors:
- pH/ORP
- Conductivity, measured conductively
- Conductivity, measured inductively
- Dissolved oxygen, measured amperometrically
- Dissolved oxygen, measured optically

The measuring parameters and sensor type can be switched via the user interface.

The following measuring parameters are possible with analog sensors:
- pH/ORP
- Conductivity, measured conductively
- Conductivity, measured inductively

For a list of compatible sensors, see the "Accessories" section (link).

4 Incoming acceptance and product identification

4.1 Incoming acceptance

1. Verify that the packaging is undamaged.
   ↳ Notify the supplier of any damage to the packaging.
   Keep the damaged packaging until the issue has been resolved.
2. Verify that the contents are undamaged.
   ↳ Notify the supplier of any damage to the delivery contents.
   Keep the damaged goods until the issue has been resolved.
3. Check that the delivery is complete and nothing is missing.
   ↳ Compare the shipping documents with your order.
4. Pack the product for storage and transportation in such a way that it is protected against impact and moisture.
   ↳ The original packaging offers the best protection.
   Make sure to comply with the permitted ambient conditions.

If you have any questions, please contact your supplier or your local Sales Center.

4.2 Product identification

4.2.1 Nameplate

The following information on the device can be found on the nameplate:
- Manufacturer identification
- Product designation
- Serial number
- Ambient conditions
- Input and output values
- Safety information and warnings
- Ex markings
- Certification information
- Warnings

▶ Compare the information on the nameplate with the order.

4.2.2 Identifying the product

Manufacturer address

Endress+Hauser Conducta GmbH+Co. KG
Dieselstraße 24
70839 Gerlingen
Germany

Product page

www.endress.com/CM42B

Interpreting the order code

The order code and serial number of your product can be found in the following locations:
- In the delivery papers
- On the internal label
- Serial number: on the nameplate
- Order code via the device menu: **Menu/System/Information/Device**

Obtaining information on the product

1. Scan the QR code on the product.
2. Open the URL in a web browser.
3. Click the product overview.
   ↳ A new window opens. Here you will find information pertaining to your device, including the product documentation.

Obtaining information on the product (if there is no option for scanning the QR code)

1. Go to www.endress.com.
2. Page search (magnifying glass symbol): Enter valid serial number.
3. Search (magnifying glass).
   ↳ The product structure is displayed in a popup window.
4. Click the product overview.
   ↳ A new window opens. Here you will find information pertaining to your device, including the product documentation.

4.3 Scope of delivery

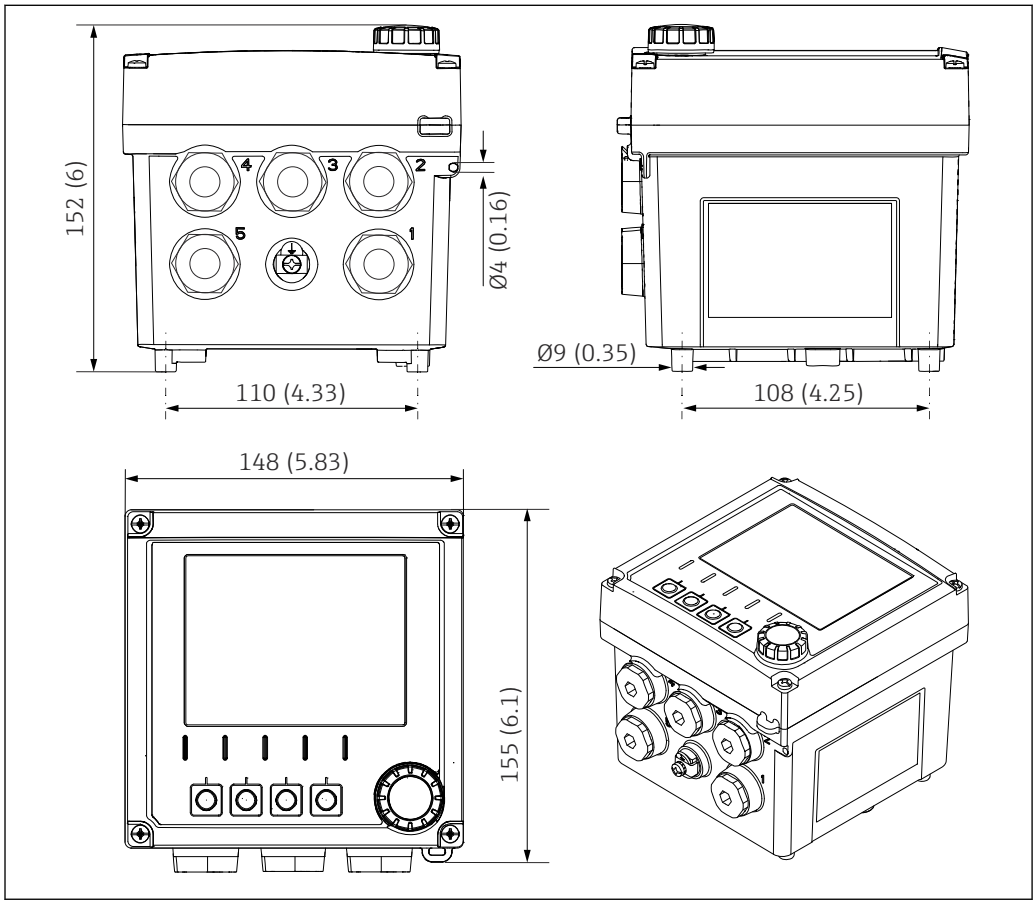
The scope of delivery includes:
- Liquiline CM42B
- Cable glands depending on order
- Field device mounting plate
- Brief Operating Instructions
- Safety instructions for hazardous area (for Ex versions)

▶ If you have any queries:
Please contact your supplier or local sales center.

5 Installation

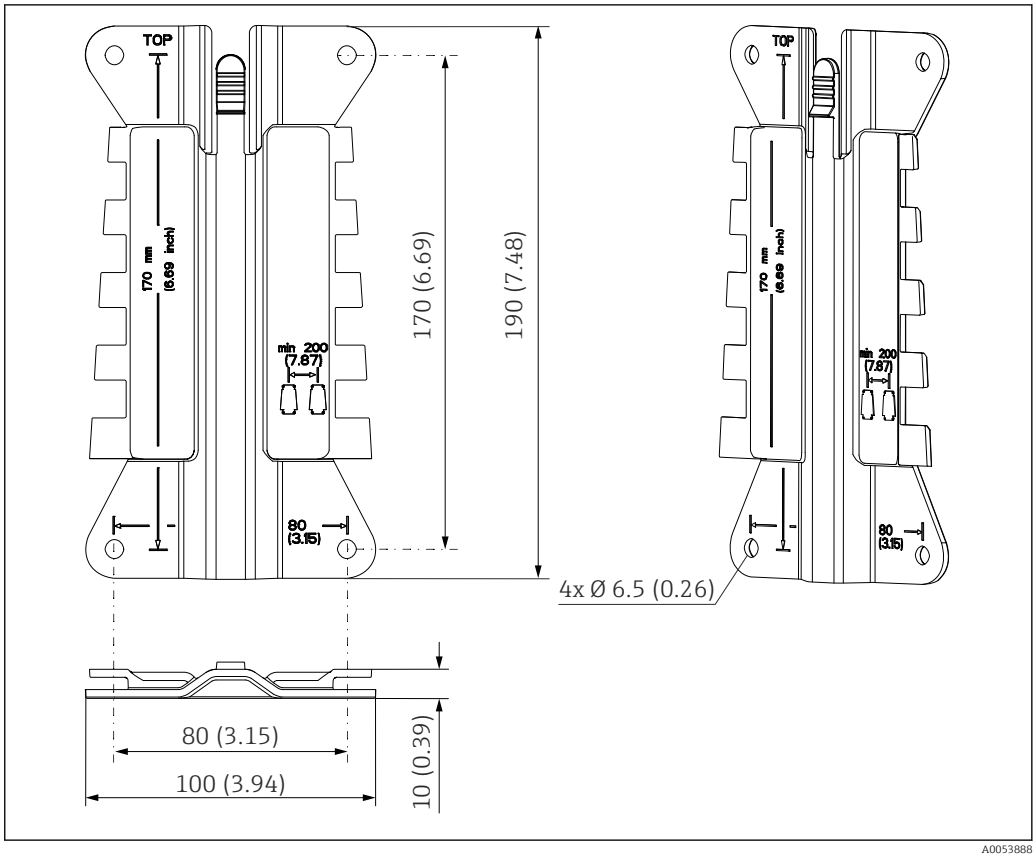
5.1 Installation requirements

5.1.1 Dimensions



3 Dimensions of field housing in mm (in)

5.1.2 Mounting plate (included in the delivery)



4 *Dimensions of mounting plate in mm (in)*

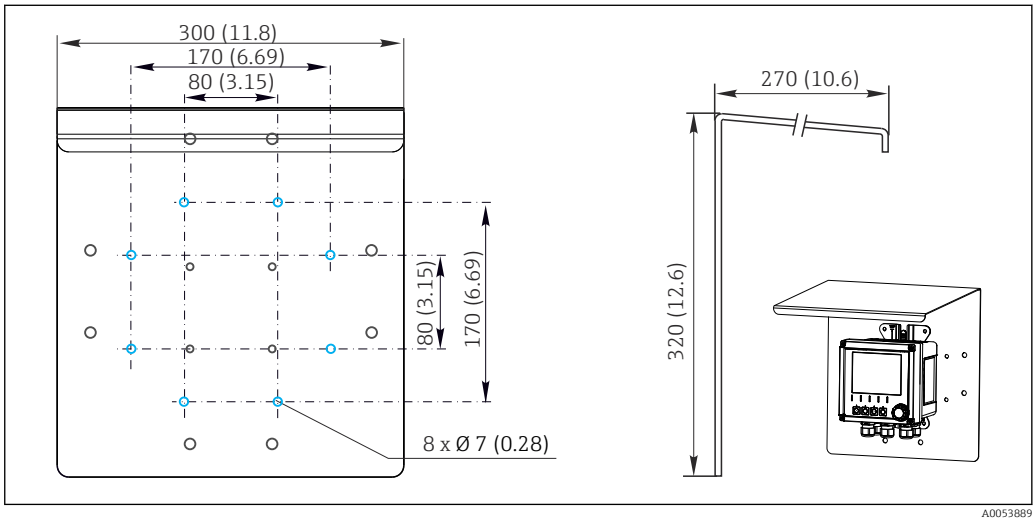
5.1.3 Weather protection cover CYY101 (optional)

NOTICE

Effect of climatic conditions (rain, snow, direct sunlight etc.)

Impaired operation to complete transmitter failure are possible!

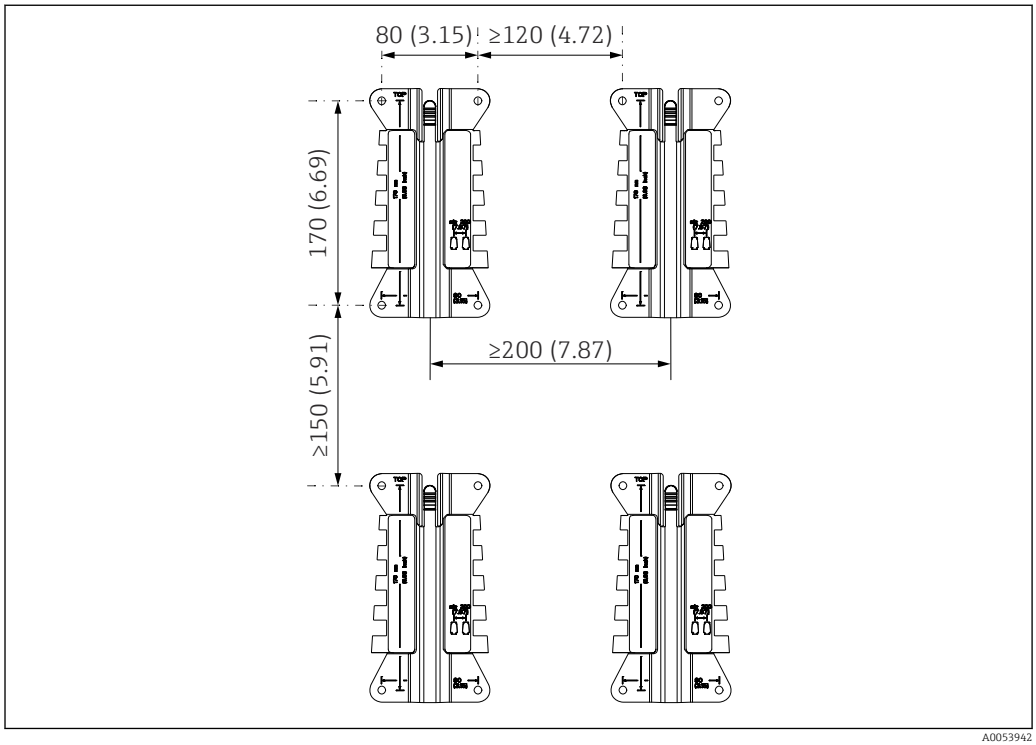
- Always use weather protection cover CYY101 (available as an accessory) when installing the device outdoors.



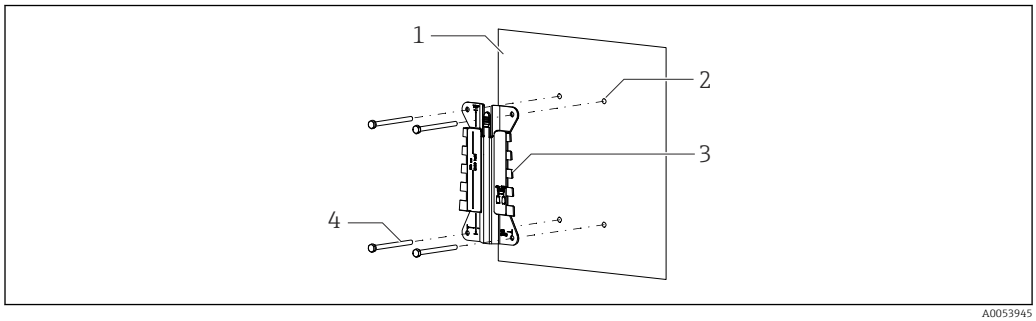
5 *Dimensions of weather protection cover CYY101 in mm (in)*

5.2 Installing the device

5.2.1 Wall mounting



6 Mounting clearances in mm (in)

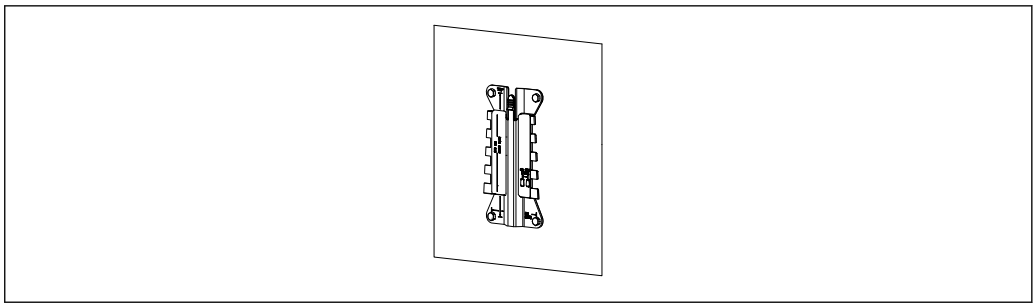


7 Wall mounting

1 Wall
2 4 drill holes
3 Mounting plate
4 Screws (not included in the scope of delivery)

The size of the drill holes depends on the mounting material used. Mounting material must be provided by the customer.

Screw diameter: max. 6 mm (0.23 in)



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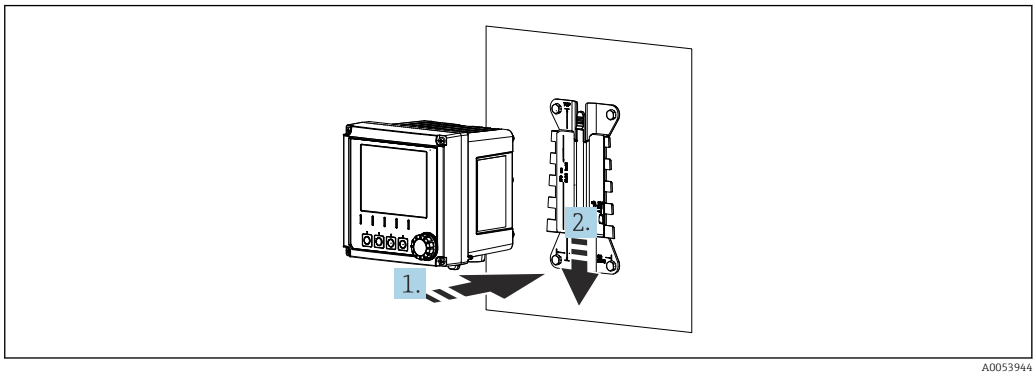
8 *Mounting plate mounted on wall*



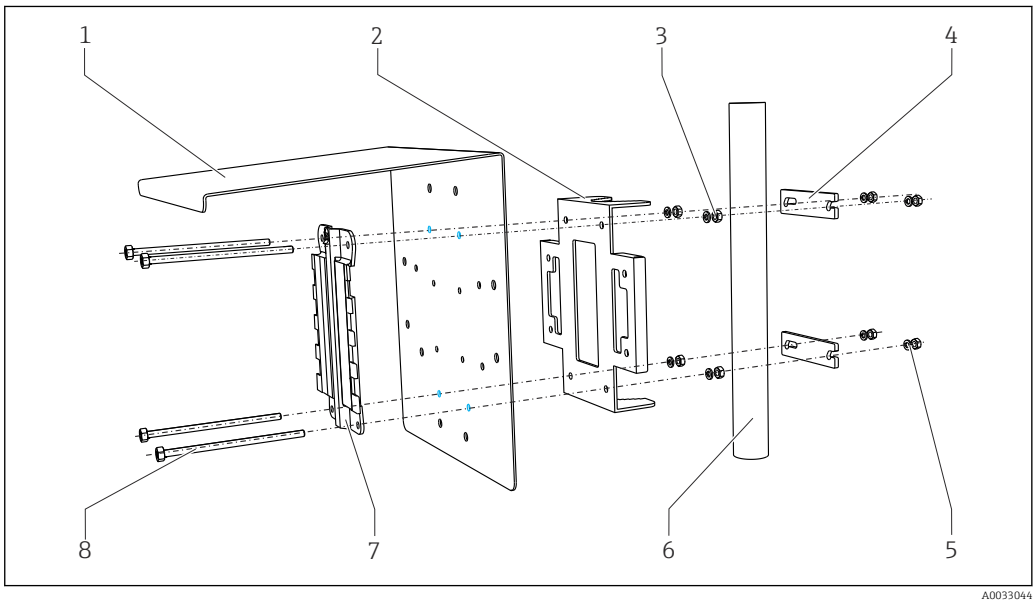
A0053944

9 *Attach the device and click it into place*

1. Place the device on the mounting plate.
2. Slide the device downwards in the guide on the mounting rail until it clicks into place.

5.2.2 Post mounting

You require the post mounting kit (optional) to mount the unit on a pipe, post or railing (square or circular, clamping range 20 to 61 mm (0.79 to 2.40")).



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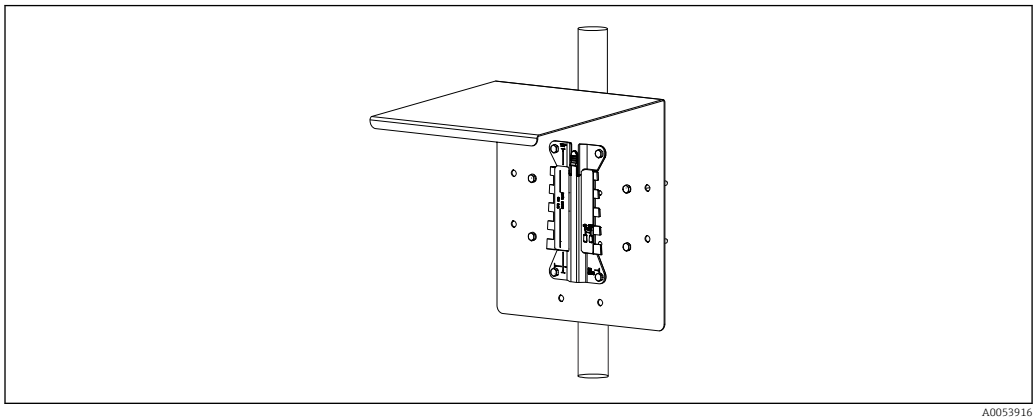
10 *Post mounting*

1	*Weather protection cover (optional)*	5	*Spring washers and nuts (post mounting kit)*
2	*Post mounting plate (post mounting kit)*	6	*Pipe or post (circular/square)*
3	*Spring washers and nuts (post mounting kit)*	7	*Mounting plate*
4	*Pipe clamps (post mounting kit)*	8	*Screws (post mounting kit)*



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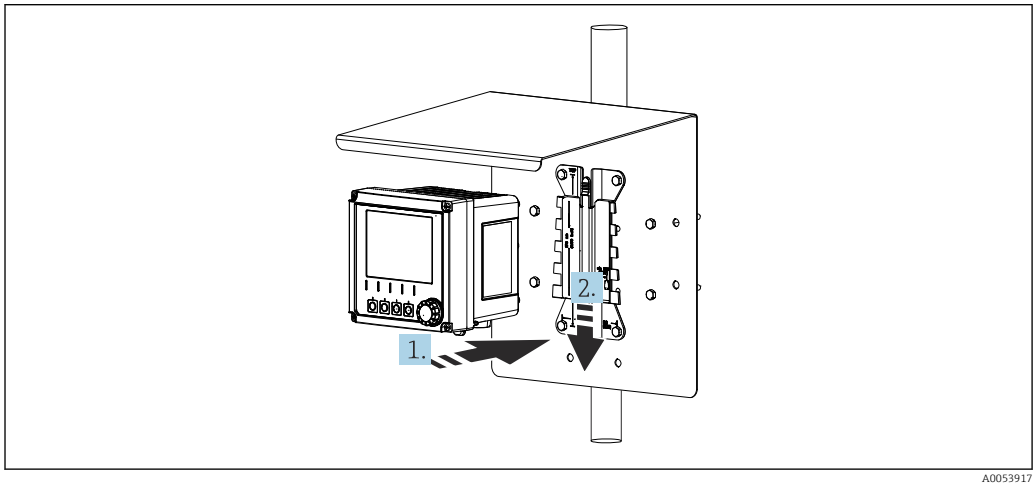
11 Post mounting



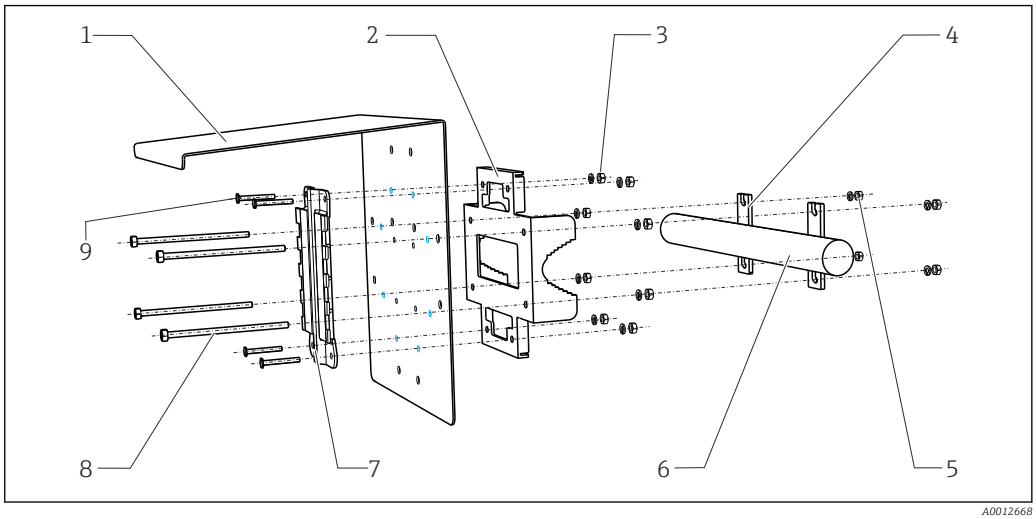
A0053917

12 Attach the device and click it into place

1. Place the device on the mounting plate.
2. Slide the device downwards in the guide on the mounting rail until it clicks into place.

5.2.3 Rail mounting

You require the post mounting kit (optional) to mount the unit on a pipe, post or railing (square or circular, clamping range 20 to 61 mm (0.79 to 2.40")).



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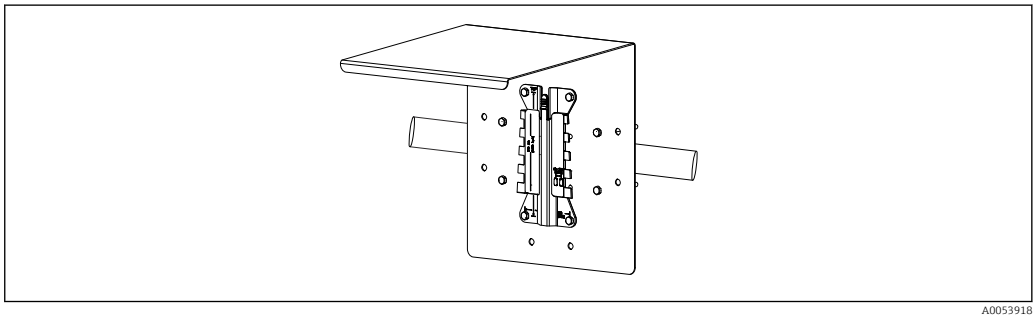
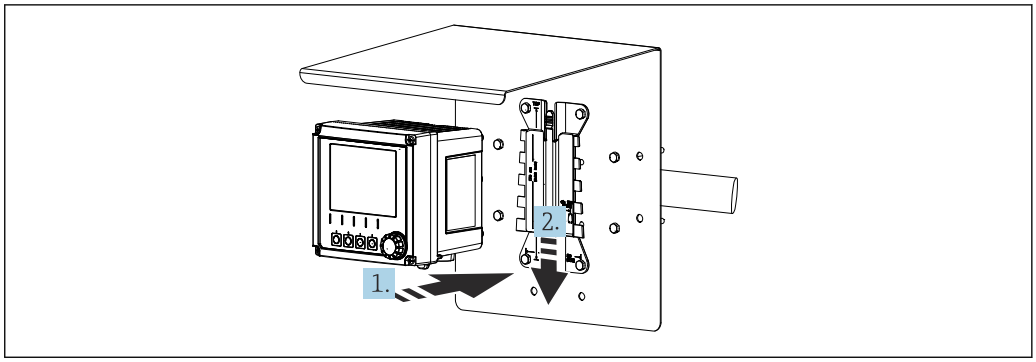
13 *Rail mounting*

1	*Weather protection cover (optional)*	6	*Pipe or railing (circular/square)*
2	*Post mounting plate (post mounting kit)*	7	*Mounting plate*
3	*Spring washers and nuts (post mounting kit)*	8	*Threaded rods (post mounting kit)*
4	*Pipe clamps (post mounting kit)*	9	*Screws (post mounting kit)*
5	*Spring washers and nuts (post mounting kit)*		



A0053918

14 *Rail mounting*



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15 *Attach the device and click it into place*

1. Place the device on the mounting plate.
2. Slide the device downwards in the guide on the mounting rail until it clicks into place.

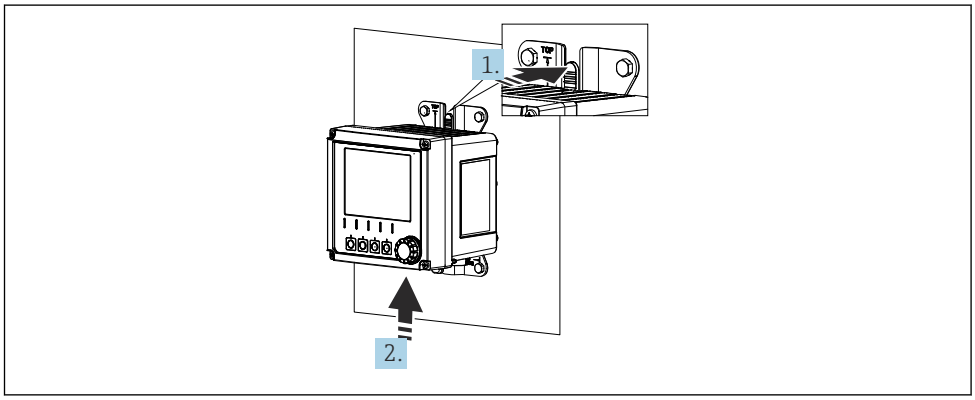
5.2.4 Disassembly (for conversion, cleaning etc.)

CAUTION

Risk of injury and damage to the device if the device is dropped

- When pushing the housing out of the holder, secure the housing to prevent it from falling.

1.

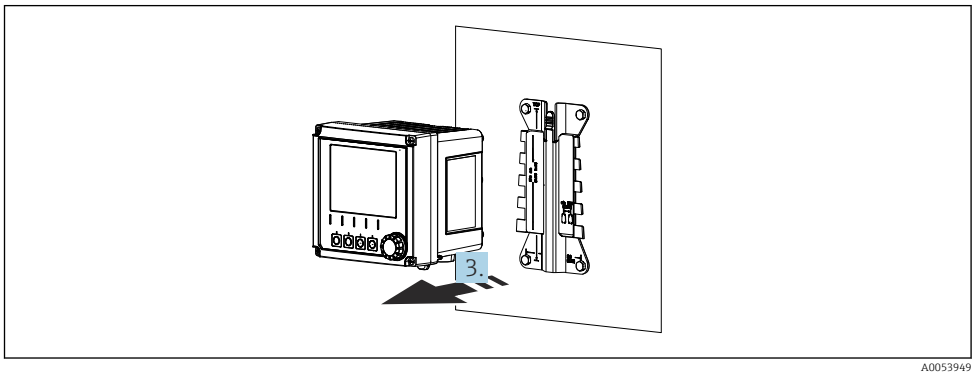


16 *Disassembly*

All cables have been removed.
Hold down the latch.

2. Push up the device to remove it from the holder.

3.



17 *Disassembly*

Remove the device towards the front.

5.3 Post-mounting check

1. Check the device for damage following mounting.
2. Check whether the device is protected against precipitation and direct sunlight (e.g. by the weather protection cover).
3. Verify that the specified installation clearances have been observed.
4. Ensure that the temperature limits are observed at the mounting location.

6 Electrical connection

6.1 Connecting requirements

6.1.1 Supply voltage

- Connect the device to a Safety Extra Low Voltage (SELV) or Protective Extra Low Voltage (PELV) system only.

6.1.2 Power units

- Use power units according to IEC 60558-2-16, IEC 62368-1 Class ES1 or IEC 61010-1.

6.1.3 Electrostatic discharge (ESD)

NOTICE

Electrostatic discharge (ESD)

Risk of damaging the electronic components

- Take personal protective measures to avoid ESD, such as discharging beforehand at PE or permanent grounding with a wrist strap, for example.

6.1.4 Unconnected cable cores

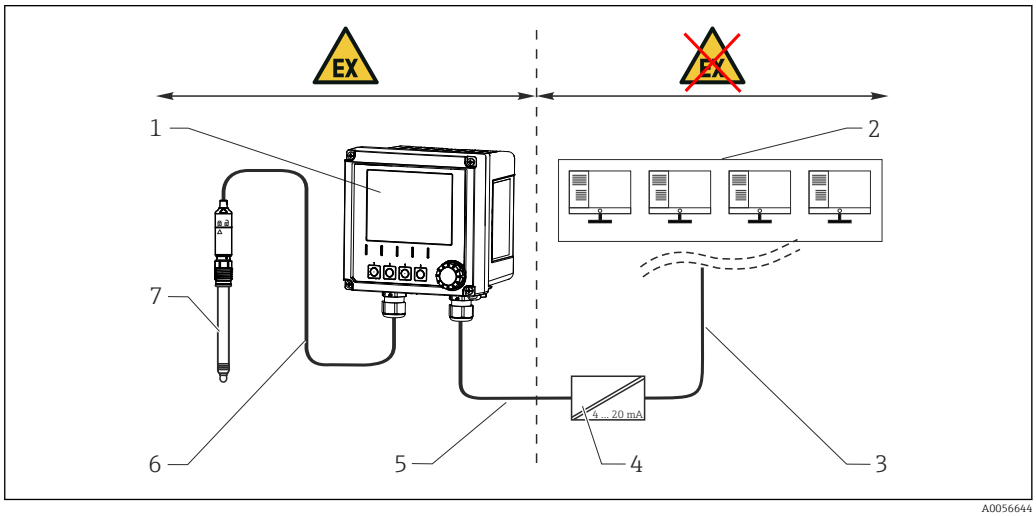
NOTICE

Unconnected cable cores can lead to malfunctions or damage to the device if they come into contact with connections, terminals and other conductive parts.

- Ensure that unconnected cable cores are sufficiently insulated from earth and from other cores by suitable terminations, e.g. by using heat-shrink tubing.

6.1.5 Installation in hazardous areas

Installation in hazardous area Ex ia Ga



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1 *Hazardous area version of Liquiline CM42B*
2 *Control station*
3 *4 to 20 mA signal line/optional HART*
4 *Ex ia active barrier*
5 *Supply and signal circuit Ex ia, 4 to 20 mA (HART optional)*
6 *Intrinsically safe sensor circuit Ex ia*
7 *Hazardous area version of sensor*

6.2 Connecting the device

6.2.1 Opening the housing

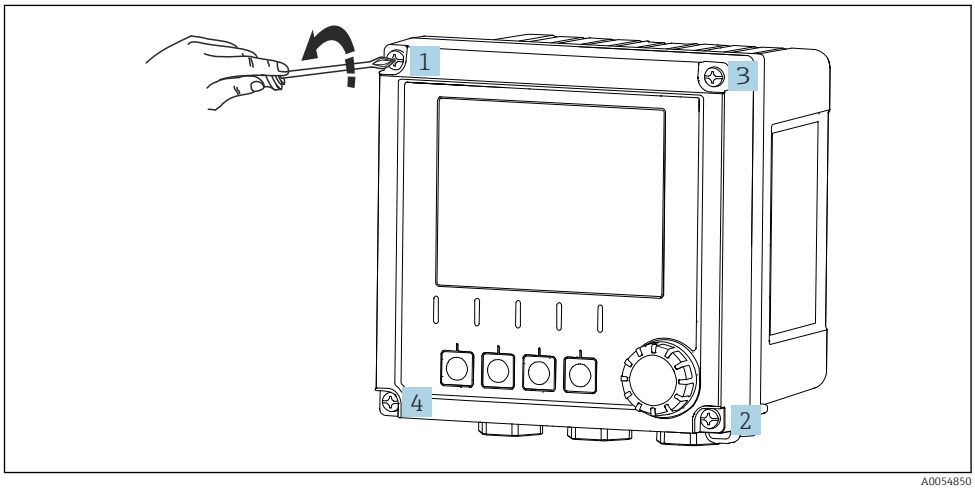
NOTICE

Use of cordless screwdrivers, screw drillers, pointed or sharp objects can damage the device

The use of a cordless screwdriver or screw driller can cause damage to the threads and impair the leak-tightness of the housing. If unsuitable tools are used, they can scratch the housing or damage the seal, and thus have a negative impact on the leak-tightness of the housing.

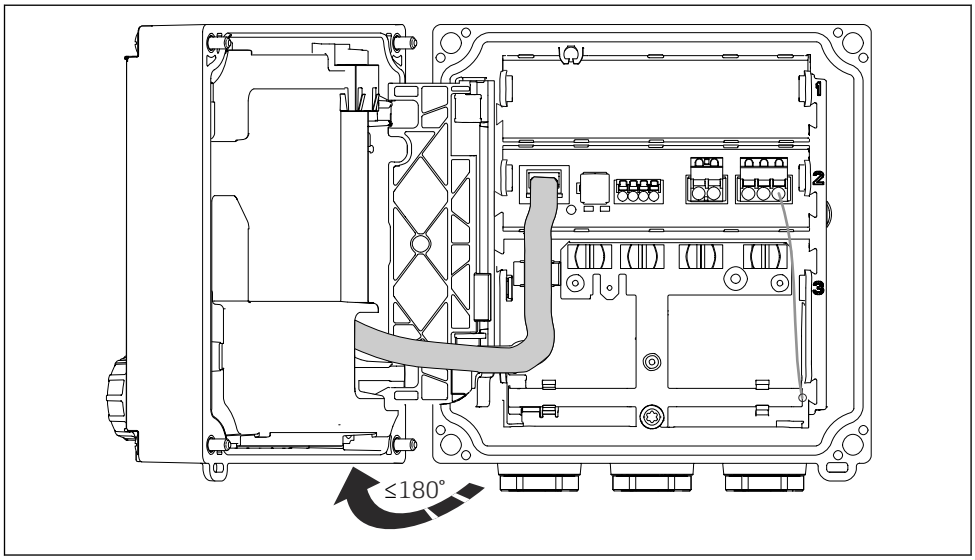
- Do not use a cordless screwdriver or screw driller to release and tighten the housing screws.
- Do not use any sharp or pointed objects, e.g. a knife, to open the housing.
- Use a suitable handheld screwdriver only.

1.



Slacken the housing screws crosswise.

2.



Open the cover by a maximum of 180° (depending on the orientation).

3. When closing the housing: Tighten the housing screws gradually and crosswise. Tightening torque 1 Nm

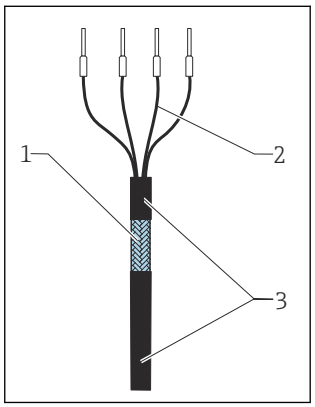
6.2.2 Connecting the cable shield

The descriptions of each of the connections specify which cables must be shielded.

Only use terminated original cables where possible.

Clamping range of grounding clamps: 4 to 11 mm (0.16 to 0.43 in)

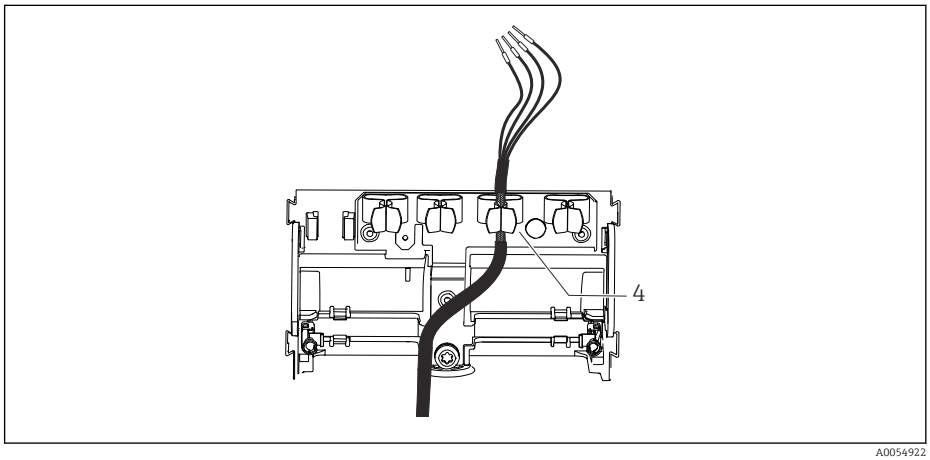
Sample cable (does not necessarily correspond to the original cable supplied)



18 *Terminated cable*

1 Outer shield (exposed)
2 Cable cores with ferrules
3 Cable sheath (insulation)

1. Remove one sealing plug at the bottom of the housing.
2. Screw in a suitable cable gland.
3. Attach the gland to the cable end, making sure the gland is facing the right direction.
4. Pull the cable through the gland and into the housing.
5. Route the cable in such a way that the exposed cable shield fits into one of the grounding clamps and the cable cores can be easily routed as far as the terminal plugs.
6. Clamp the cable shield into the clamp.



19 *Cable into grounding clamp*

4 Grounding clamp

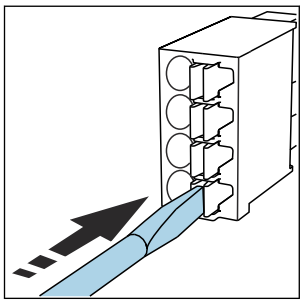
The cable shield is grounded by the grounding clamp. [1)]

7. Connect cable cores as per the wiring diagram.

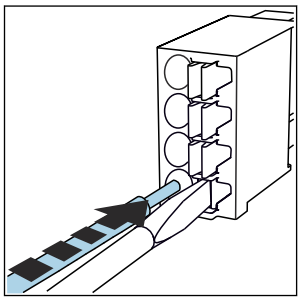
1) Refer to the instructions provided in the "Ensuring the degree of protection" section.→ 41

8. Tighten the cable gland with the required torque.

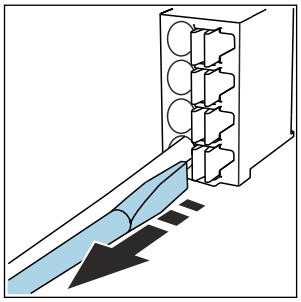
6.2.3 Cable terminals

1. 

Press the screwdriver against the clip (opens the terminal).

2. 

Insert the cable until the limit stop.

3. 

Remove the screwdriver (closes the terminal).

4. After connecting, check all the cable cores to ensure they are secure.

6.2.4 Installing the cable glands

NOTICE

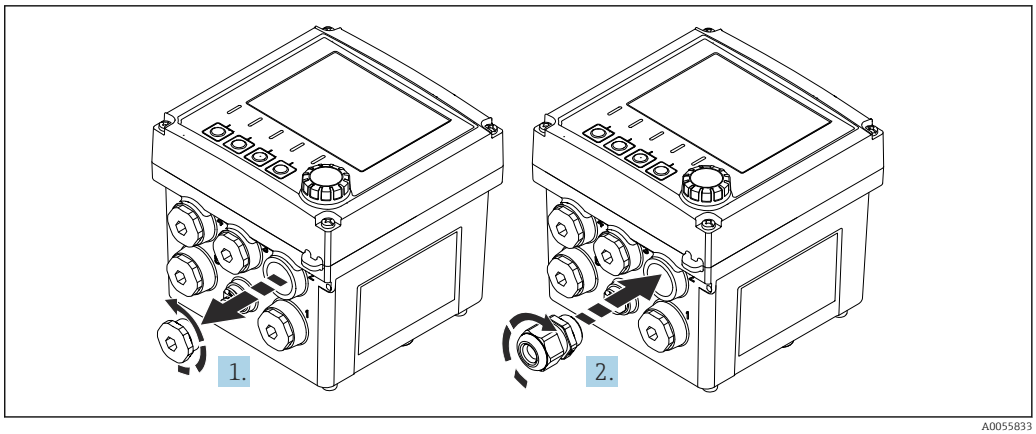
Unused cable glands installed

Housing not leak-tight

- ▶ Only fit cable glands at the positions where cables are fed through.
- ▶ Do not remove the sealing plugs at any of the other positions.

Cable glands with M20 thread

The cable glands are included in the scope of delivery in accordance with the order.

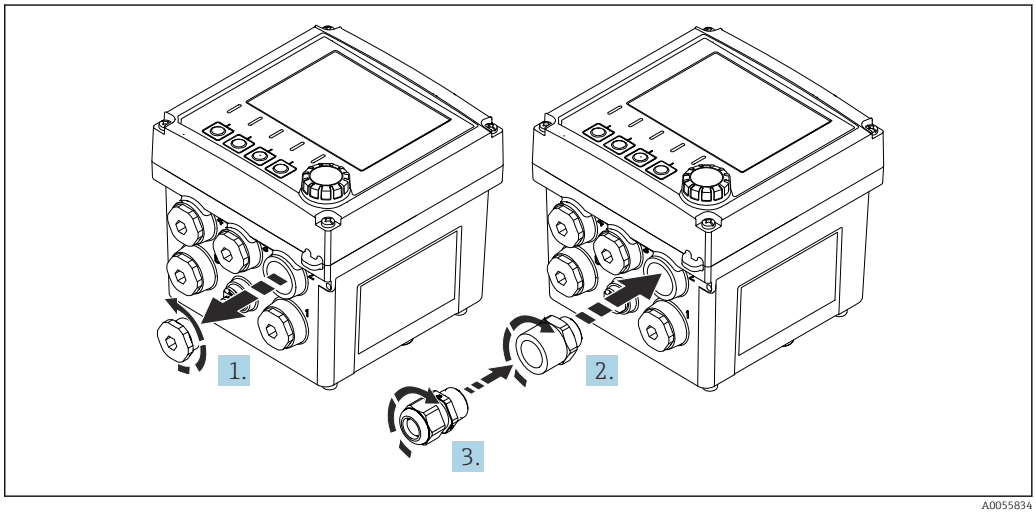


A0055833

1. Remove the sealing plug.
2. Screw in the cable gland. Tightening torque 2.5 to 3 Nm.

Cable glands with G1/2 thread or NPT1/2 thread

The cable glands and adapters are included in the delivery in accordance with the order.



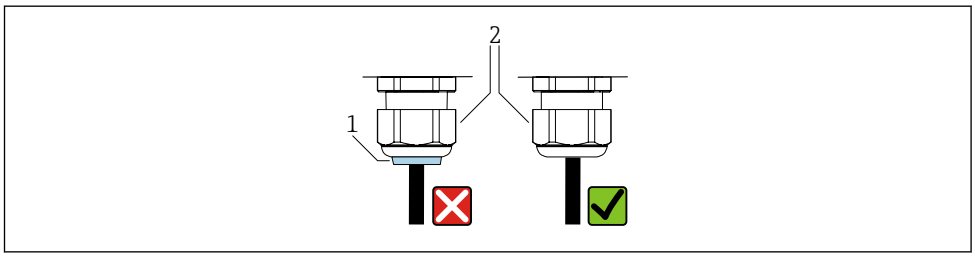
A0055834

1. Remove the sealing plug.
2. Screw in the adapter. Tightening torque 2.5 to 3 Nm.
3. Screw the cable gland into the adapter. Tightening torque 2.5 to 3 Nm.

Assignment of the cable glands

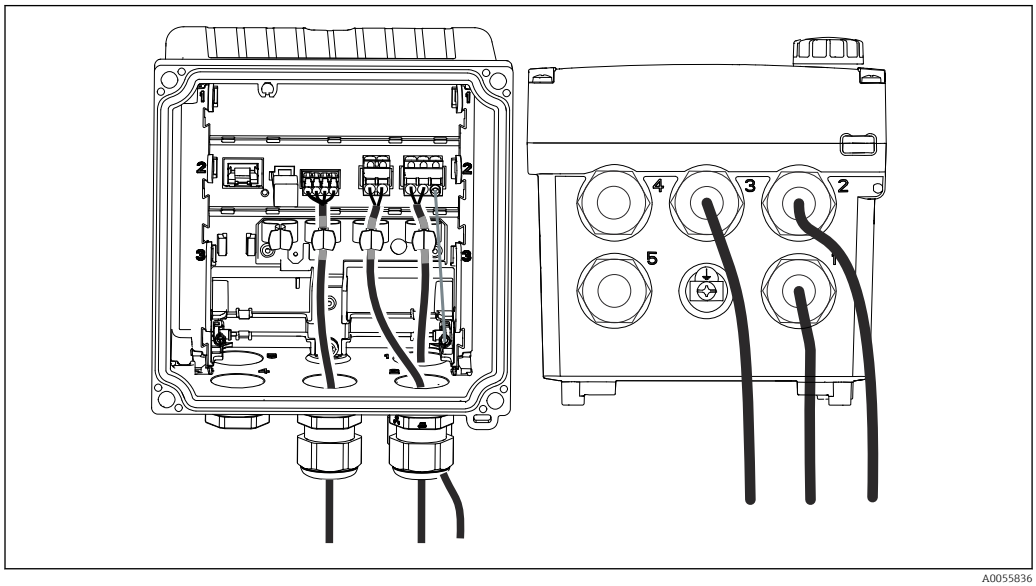
1. Feed the cables through the cable glands and connect. The illustration shows an example of how the cable glands are assigned.

2.



Tighten the cable gland again after the cable has been fed through. Make sure that the sealing insert (1) does not protrude from the pressure screw (2).

Feed through only one cable per cable gland.



20 *Example: Current outputs 1 and 2 through cable glands 1 and 2, Memosens cable through cable gland 3*

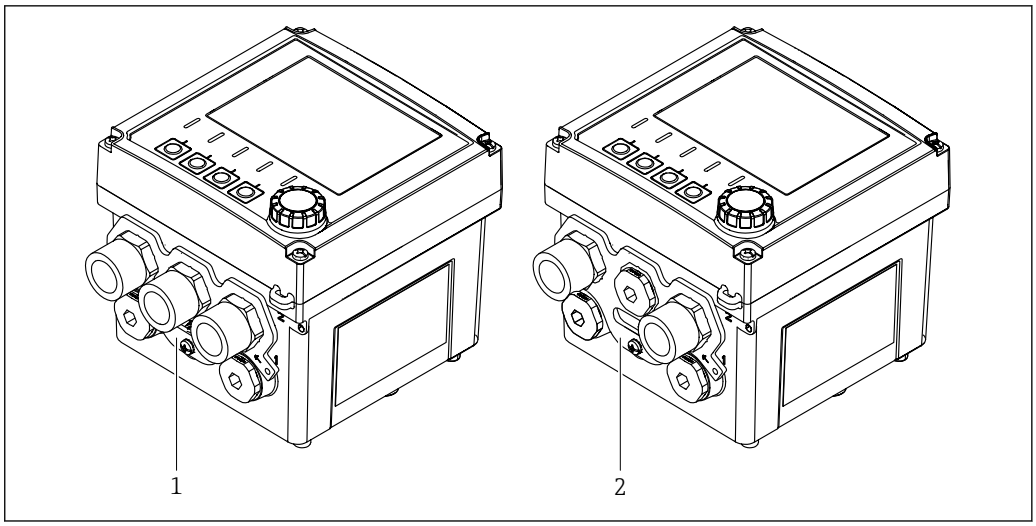
6.2.5 Installing the adapters for conduit installation

The adapters are included in the scope of delivery in accordance with the order.

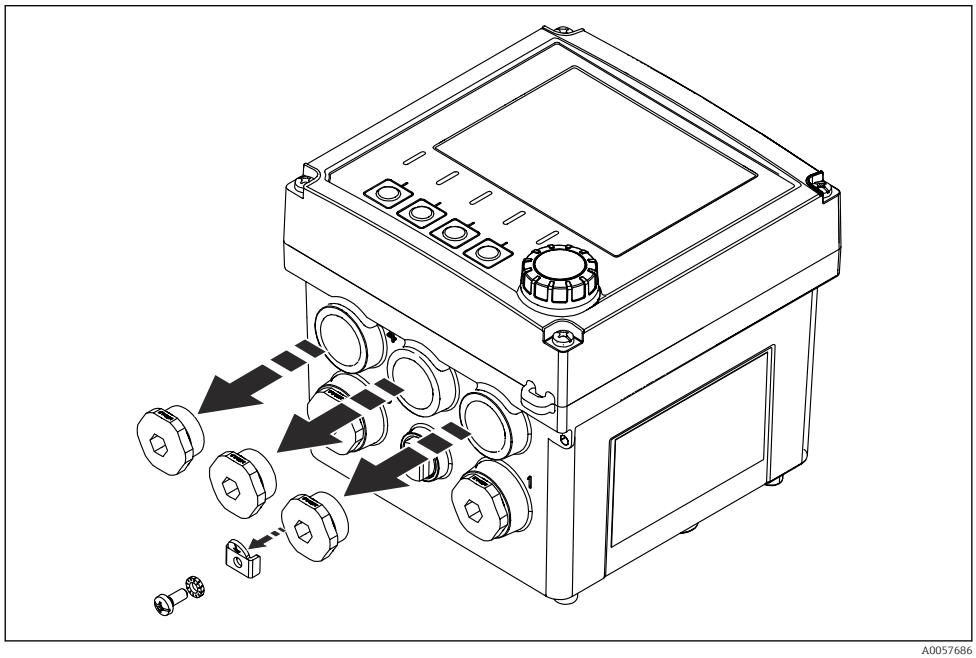
NOTICE

Leaks due to conduit adapter without connected pipe

- With two pipes: Mount adapters at positions 2 and 4. Leave the sealing plugs at all the other positions.
- With three pipes: Mount adapters at positions 2, 3 and 4. Leave the sealing plugs at all the other positions.
- If a non-piped conduit adapter is mounted, seal it with a sealing plug (customer-supplied).

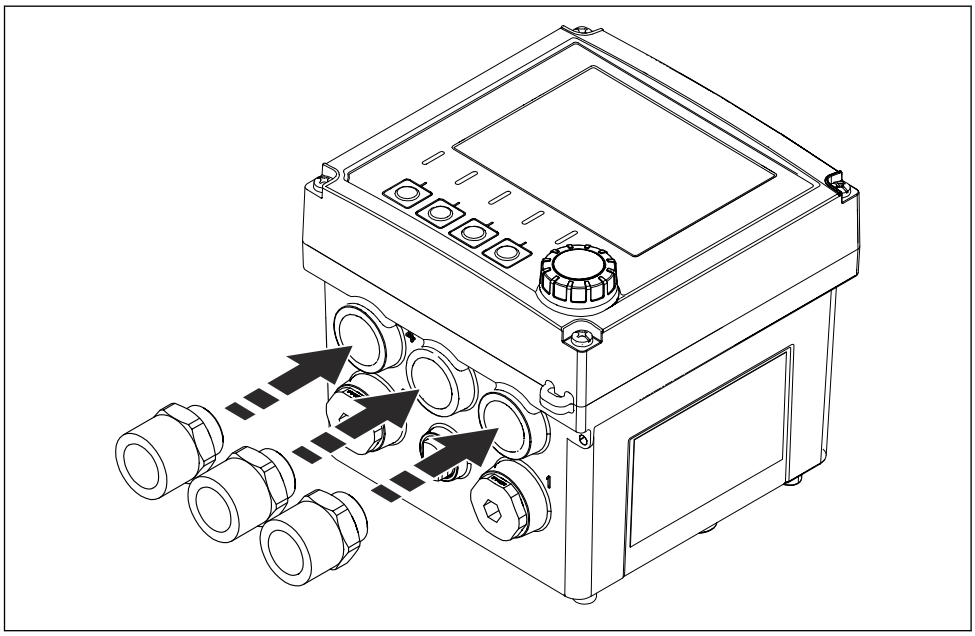


1 Example: Three conduit adapters mounted at positions 2, 3 and 4
2 Example: Two conduit adapters mounted at positions 2 and 4

1. 

   Remove the sealing plug.
2. Remove the screw, securing disk and retaining plate from the potential equalization connection.

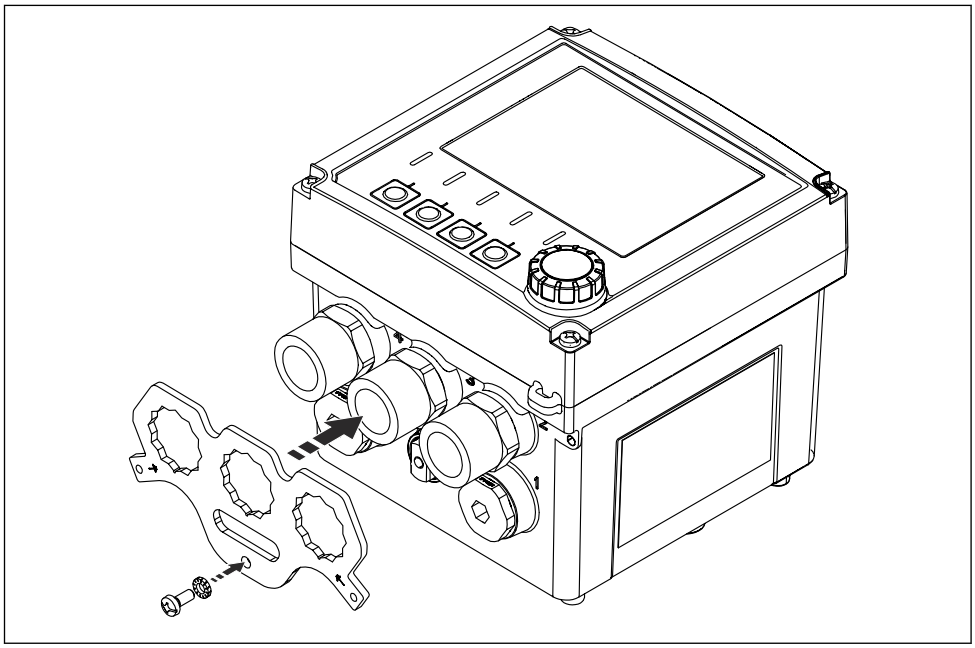
3.



A0057687

Screw in the conduit adapter. Tightening torque 2.5 to 3 Nm.

4.



A0057690

Fit the conduit adapter support on the adapters or sealing plugs. Where necessary, align the adapters or sealing plugs by turning them.

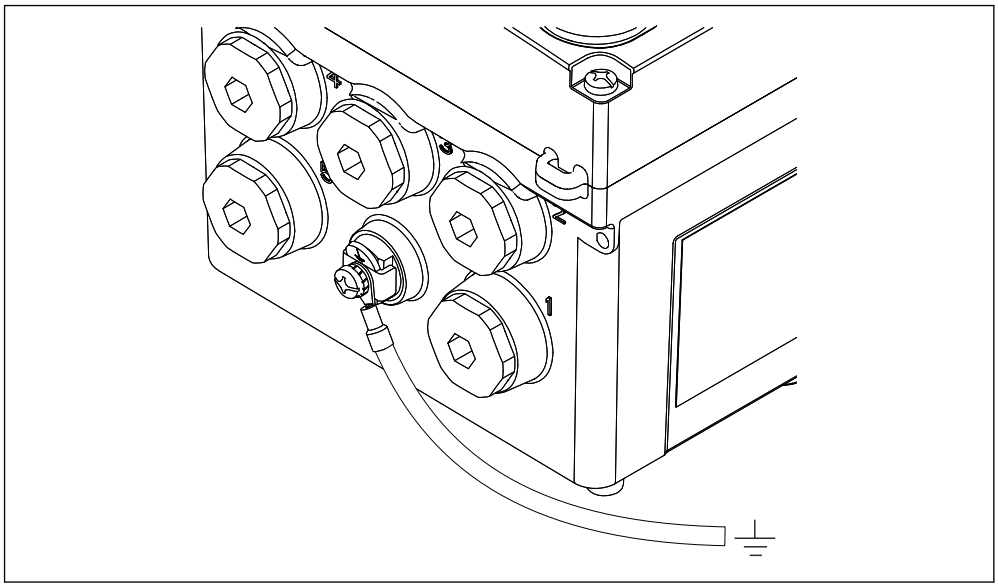
5. Screw the conduit adapter bracket onto the equipotential bonding terminal using the screw and lock washer.

6. Bolt the piping with the adapters.

6.2.6 Connecting the potential equalization

Connecting the potential equalization – Installation without a conduit

▶

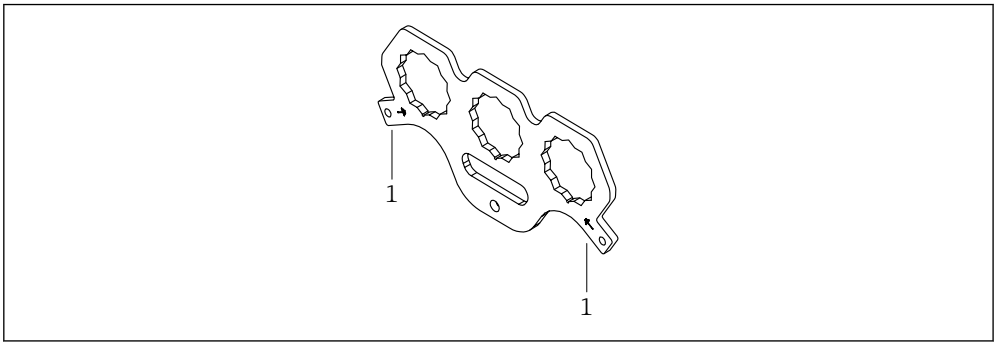


21 Potential equalization connection

Attach the potential equalization connection of the housing to the earth or to the potential equalization system with a separate line. Cable cross-section max. 6 mm^2 (0.009 in^2). Where necessary, use a cable lug.

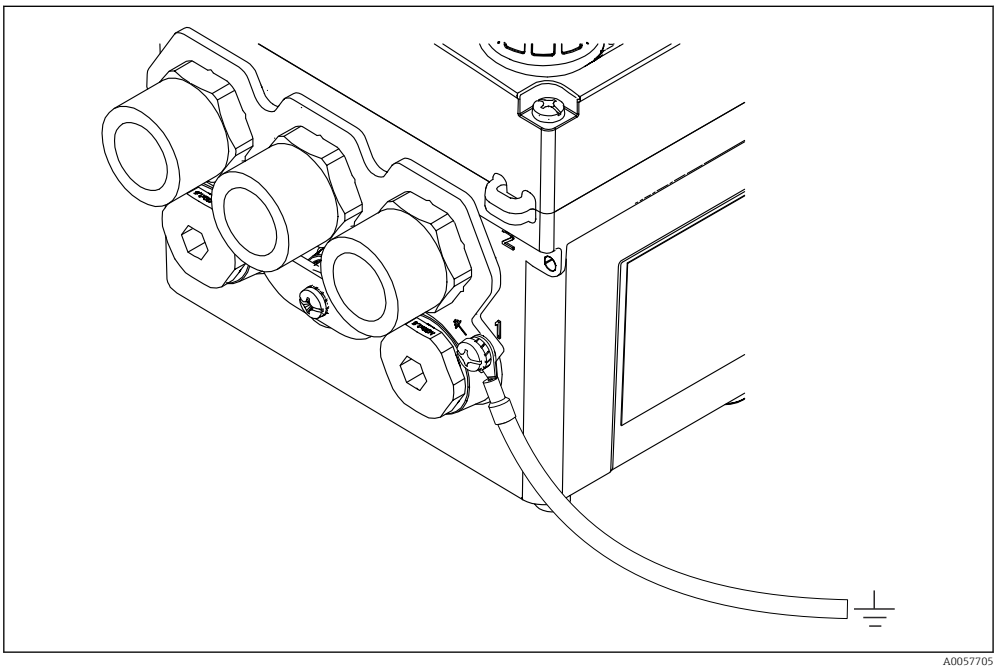
Connecting the potential equalization for conduit installation

▶



22 *Conduit adapter support*

1 Connections for potential equalization



23 *Potential equalization connection for conduit mounting*

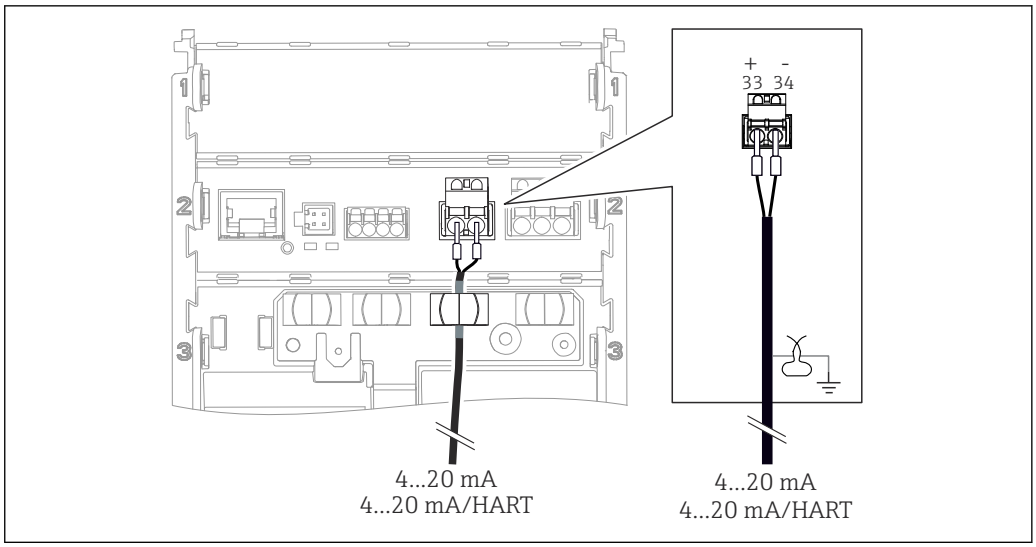
For conduit mounting, connect the ground cable to a potential equalization connection of the conduit adapter support. The conduit adapter support has two potential equalization connections.

6.2.7 Connecting the power supply and signal circuit

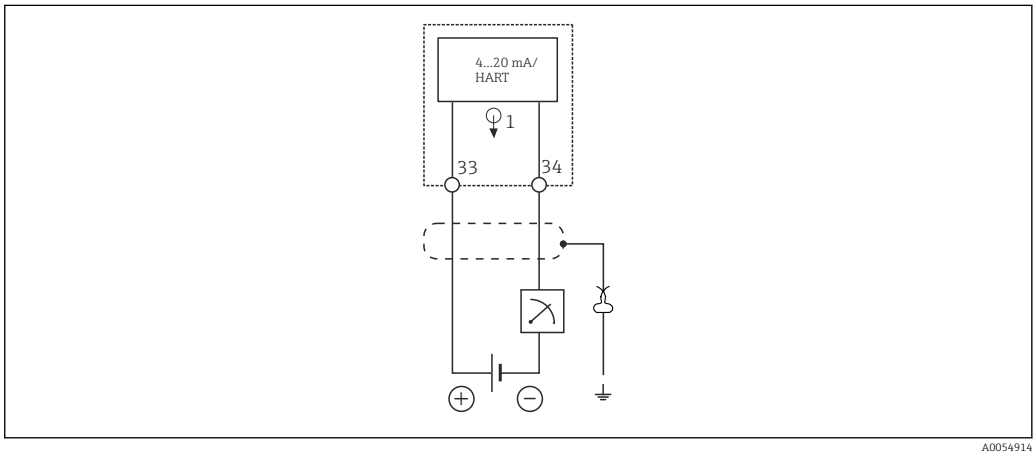
Shielded cables are required if HART (optional for current output 1) is used. If HART is not used, unshielded cables can also be used.

▶ Connect the current outputs with shielded two-wire cables as described in the following illustrations.

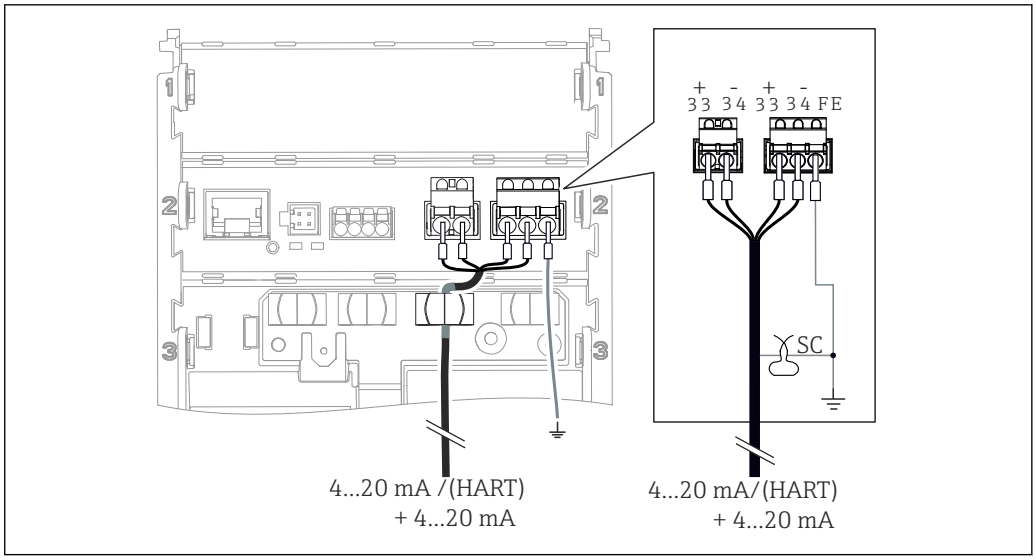
The type of shield connection depends on the anticipated interference influence. Grounding one side of the shield is sufficient to suppress electrical fields. To suppress interference due to an alternating magnetic field, the shield must be earthed on both sides.



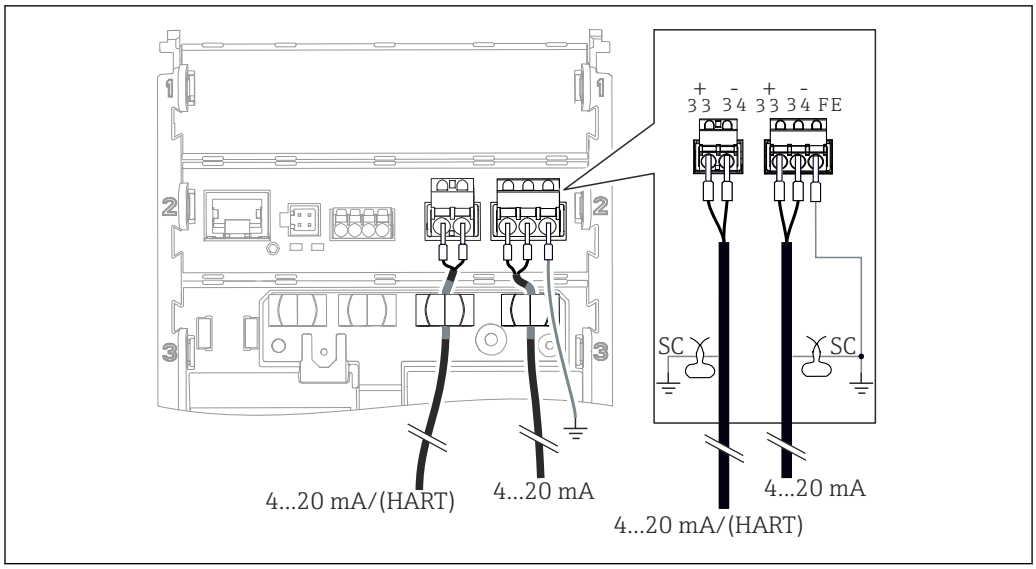
24 *Connection of 1 current output (example: device with HART)*



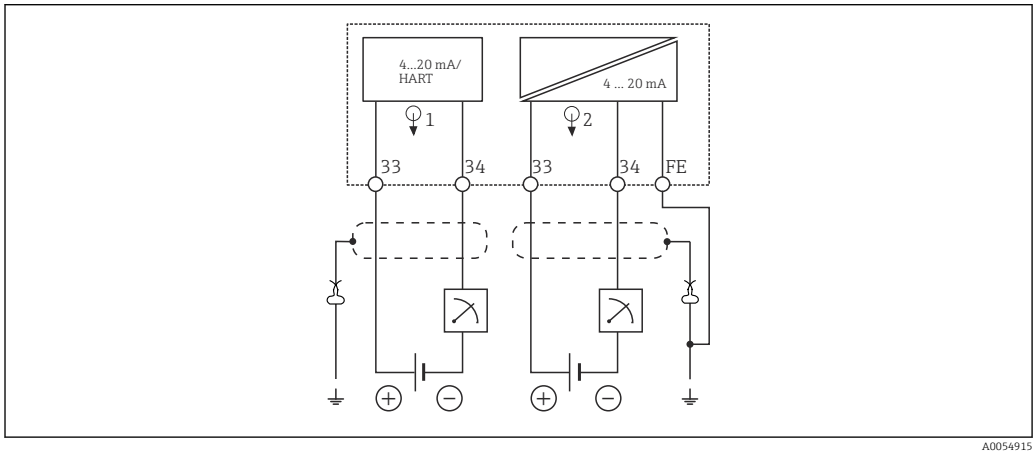
25 *Wiring diagram: 1 current output (current output with HART)*



26 *Connection of 2 current outputs via 1 shielded cable (current output 1 with HART)*



27 Connection of 2 current outputs via 2 shielded cables (current output 1 with HART)



28 Wiring diagram: 2 current outputs (current output 1 with HART)

6.2.8 Connecting the sensor

Abbreviations and color codes used

Explanation of abbreviations and labels used in the following illustrations:

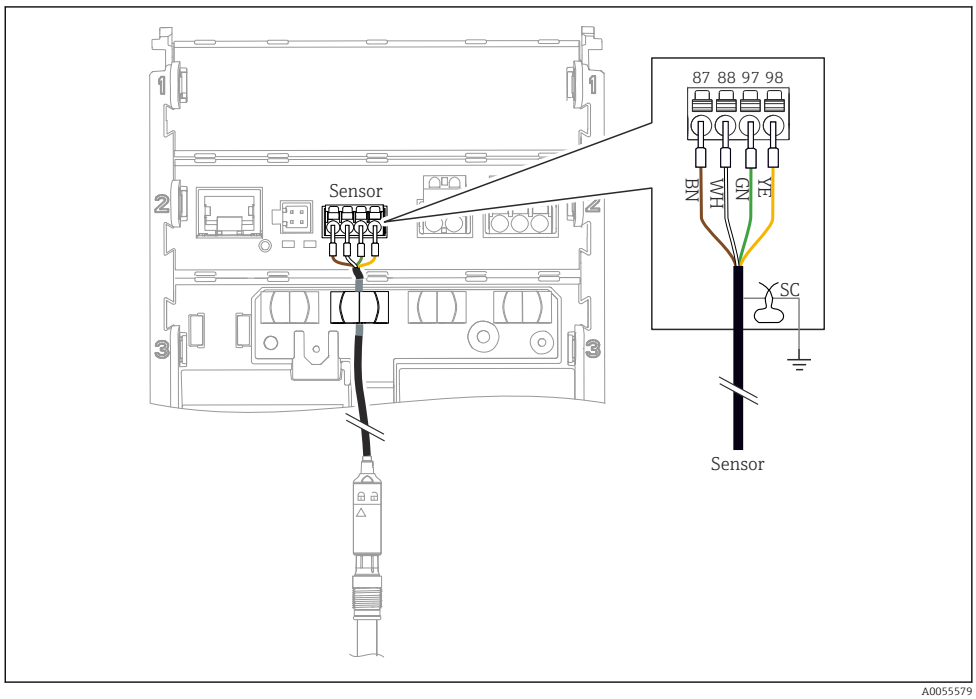
Abbreviation	Meaning
pH	pH signal
Ref	Signal from reference electrode
PM	Potential Matching = Potential equalization (PAL)
Sensor	Sensor
ϑ	Signal of temperature sensor
d.n.c.	do not connect!
 A0056947	Cable shield grounding clamp

Explanation of color codes in the following illustrations:

Color code	Meaning
BK	Black
BN	Brown
BU	Blue
GN	Green
OG	Orange
RD	Red
YE	Yellow
VT	Violet
WH	White
TR	Transparent
SC	Braided shield/silver

Memosens sensors

Connecting sensors with Memosens plug-in head (via Memosens cable) and sensors with a fixed cable and Memosens protocol

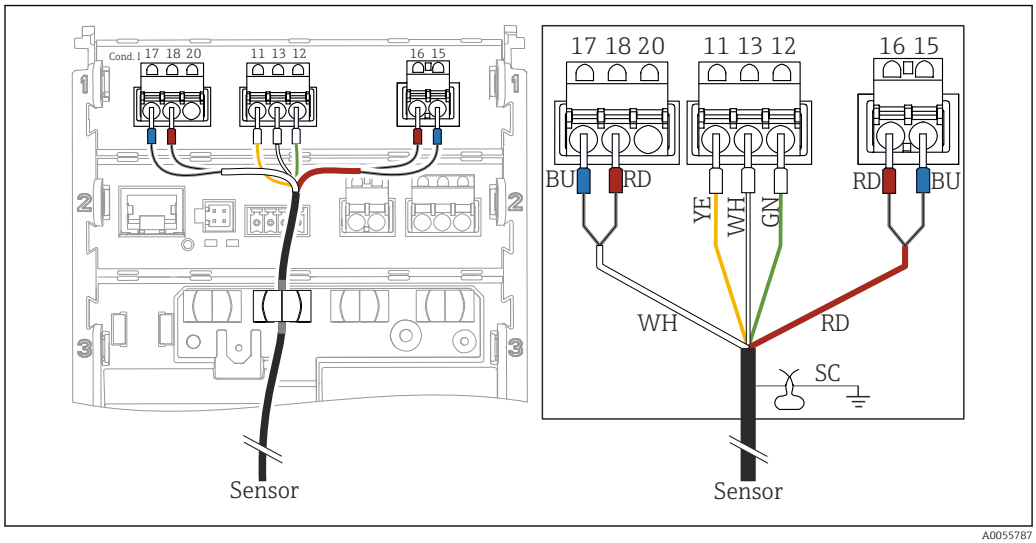
1. 

29 *Connecting Memosens sensors*

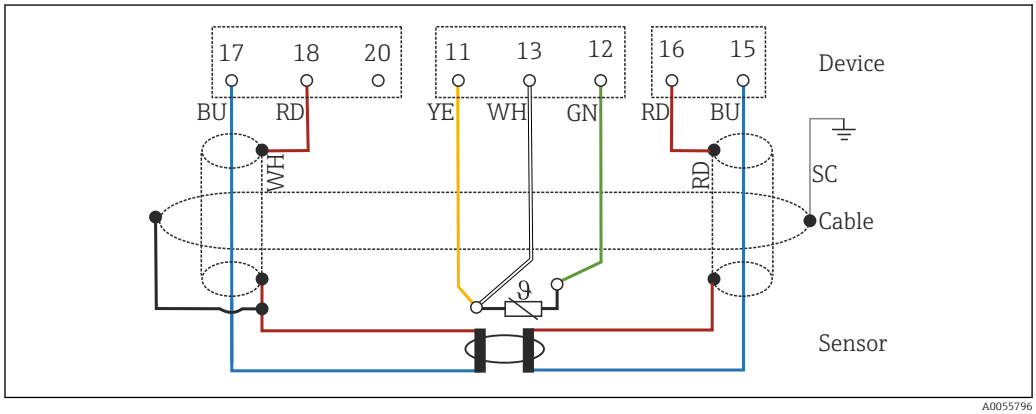
Connect the sensor cable as shown in the illustration.

2. Ground the cable shield via the ground terminal.

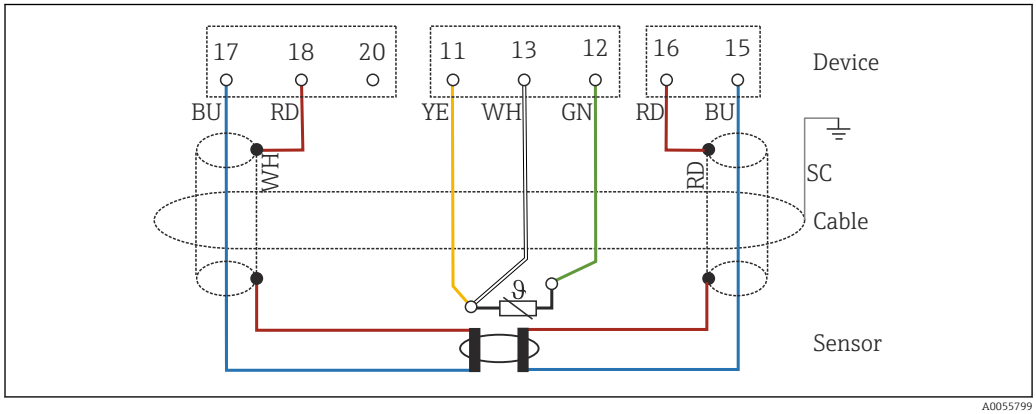
Analog conductivity sensors (inductive)



30 *Device view*



31 *Wiring diagram CLS50*

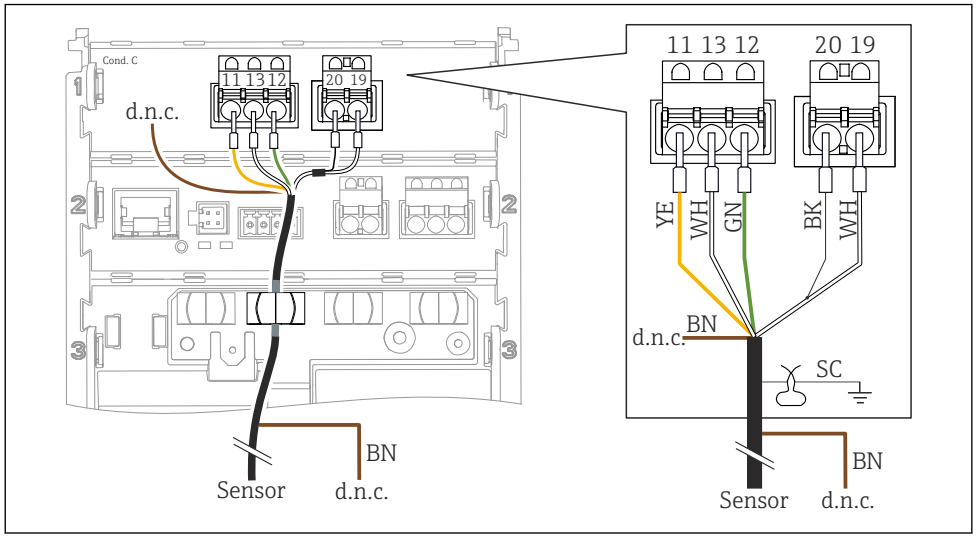


32 *Wiring diagram CLS54*

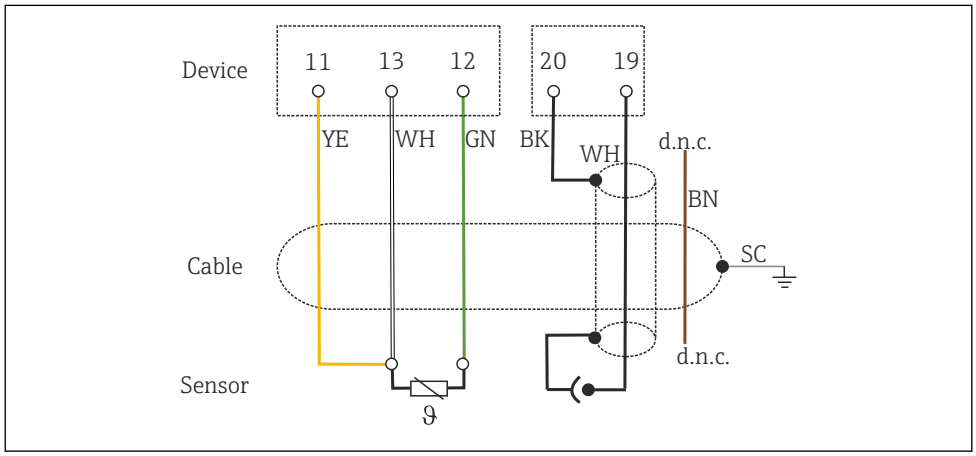
1. Connect the sensor as shown in the illustration.
2. Ground the cable shield via the ground terminal.

Analog conductivity sensors (conductive)

1.



33 *Device view*



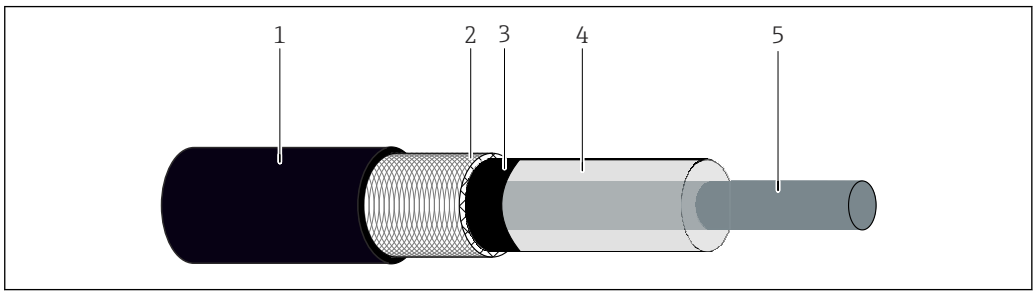
34 *Wiring diagram*

Connect the sensor as shown in the illustration.

2. Ground the cable shield via the ground terminal.

analog pH sensors

Note on connecting coaxial cables



35 *Coaxial cable structure*

1 *Protective sheath*
2 *Shield/outer conductor of the coaxial cable*
3 *Semi-conductive polymer layer*
4 *Inner insulation*
5 *Inner conductor*

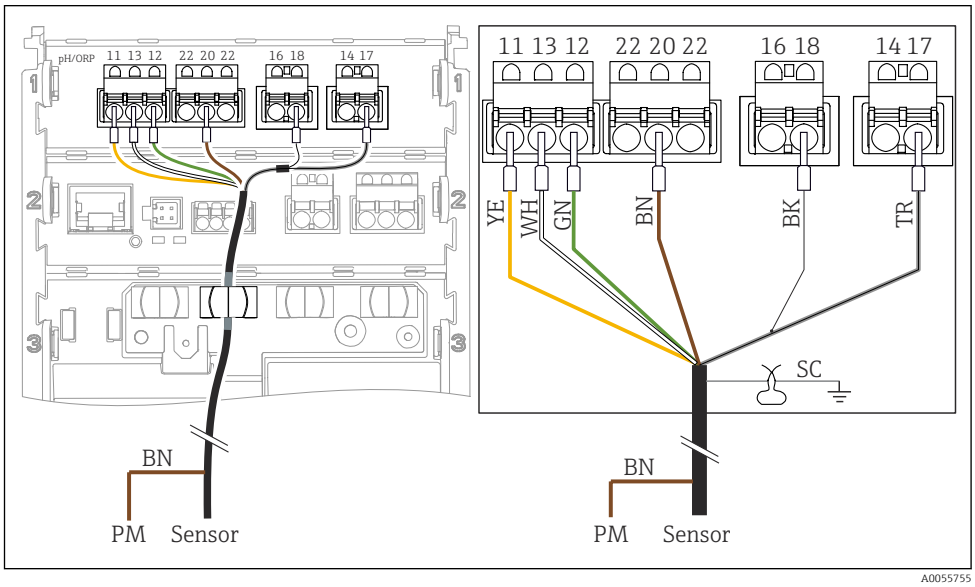
1. Completely remove the semi-conductive polymer layer (3) up to the end of the shield.
2. Ensure that the inner insulation (4) of the coaxial cable is not in contact with other components. Ensure there is an air gap around all components; otherwise, measurement errors may occur.

Unconnected cables

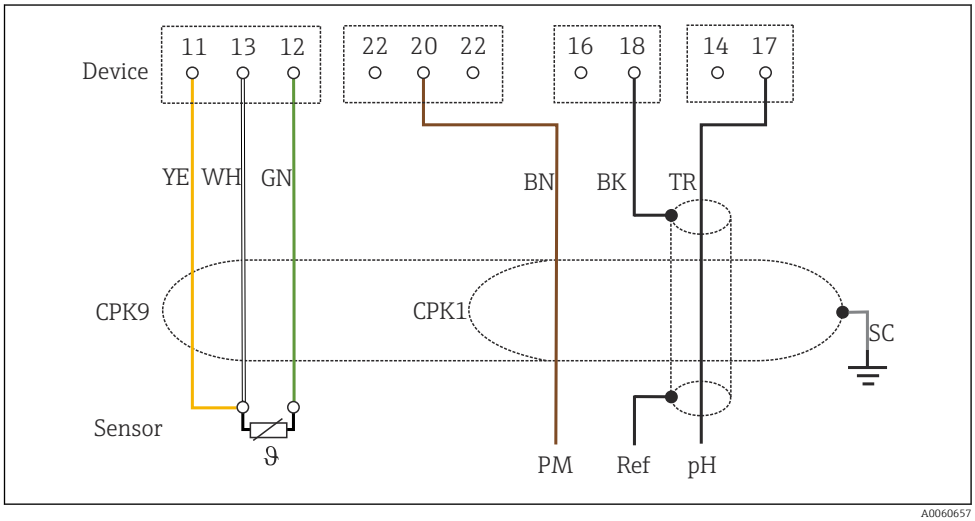
- Route unconnected cables (marked with d.n.c.) in such a way that they are not in contact with other connections.

Connecting pH glass electrodes with PML (symmetrical)

1.



36 *Device view*



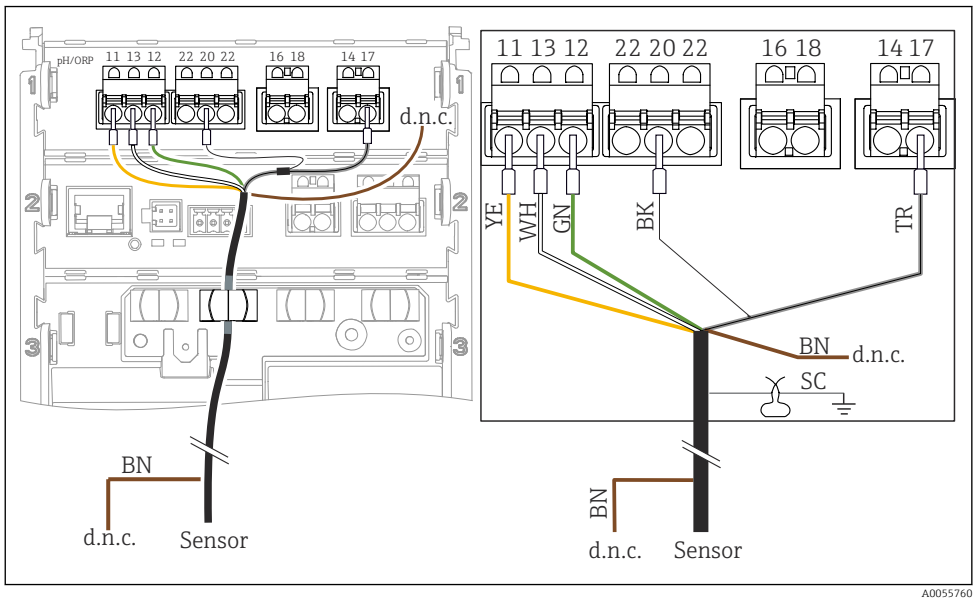
37 *Wiring diagram*

Connect the sensor as shown in the illustration.

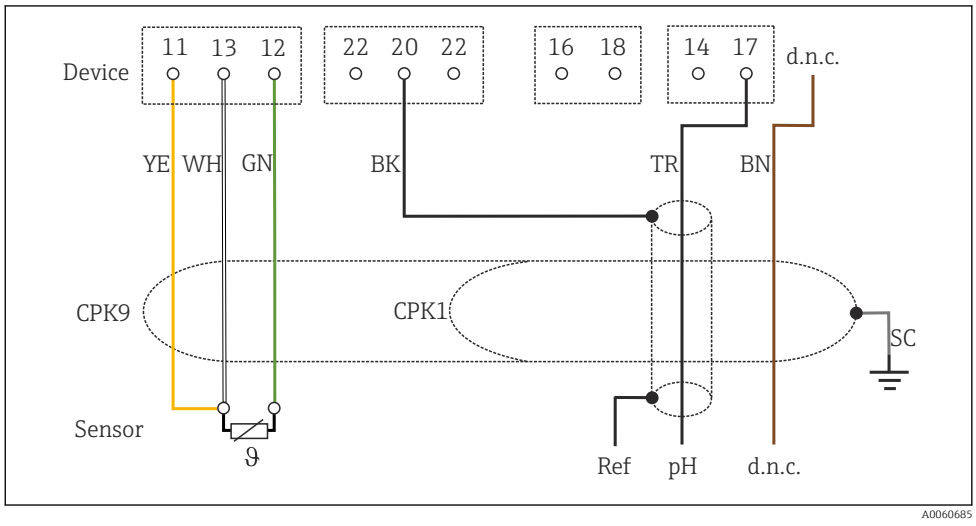
2. Ground the cable shield via the shield clamp.

Connecting glass sensors without PML (asymmetrical)

1.



38 *Device view*

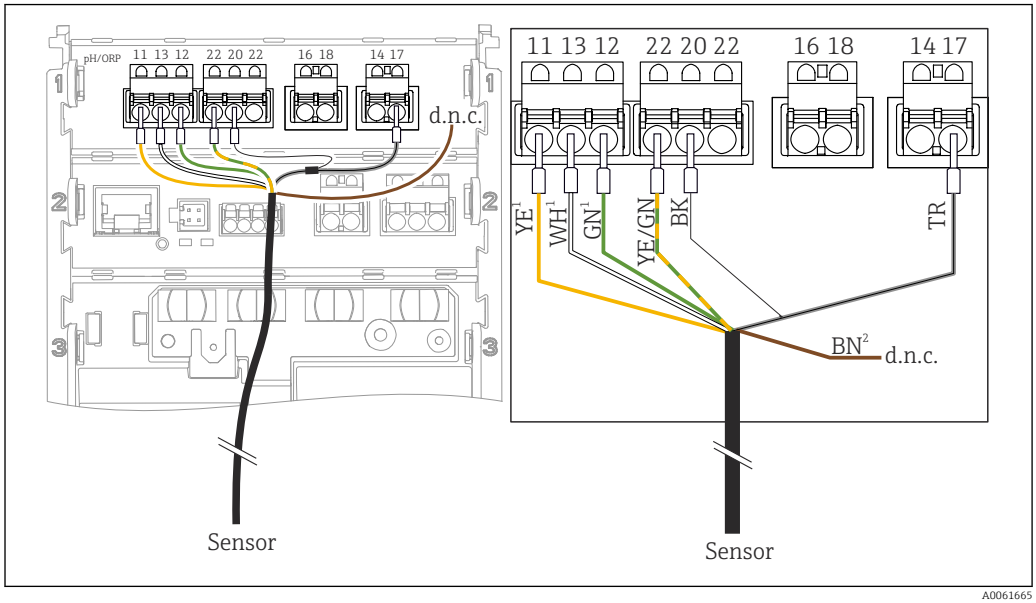


39 *Wiring diagram*

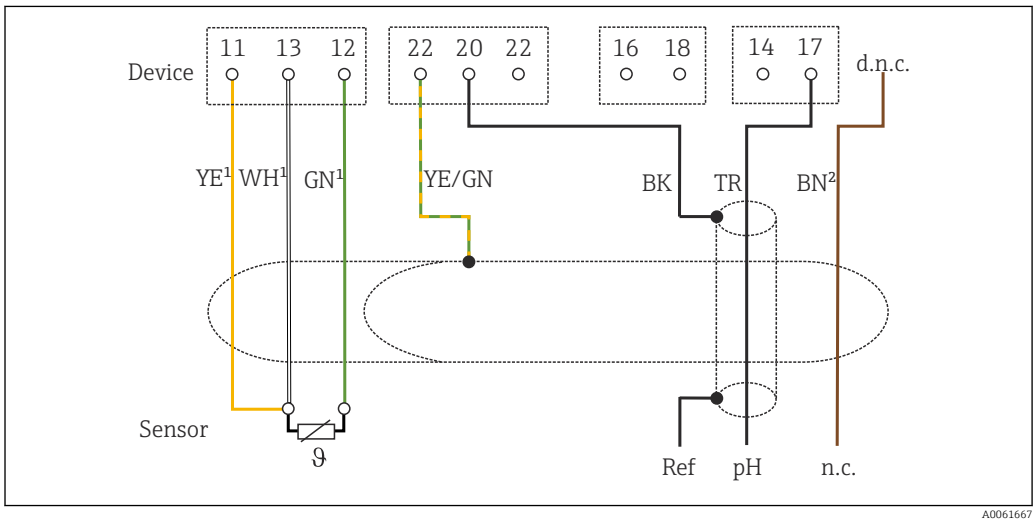
Connect the sensor as shown in the illustration.

2. Ground the cable shield via the shield clamp.

Connecting ORP sensor CPF82 and pH sensor CPF81, without PML (asymmetrical) in each case with a fixed cable



40 *Device view*



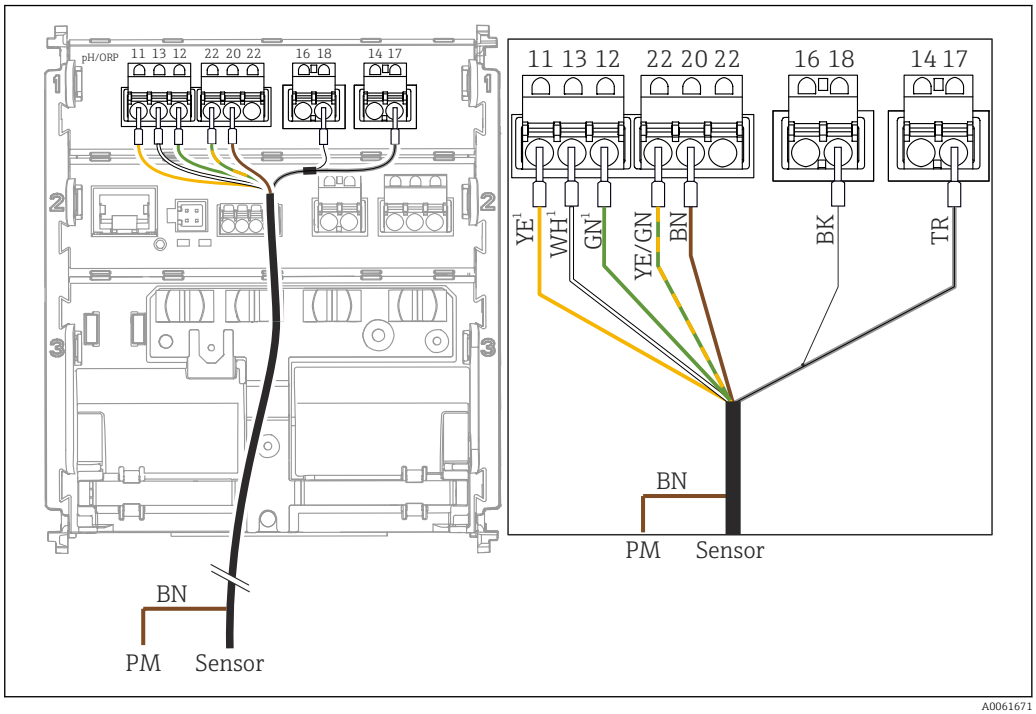
41 *Wiring diagram*

[1]: Only available for version with temperature sensor

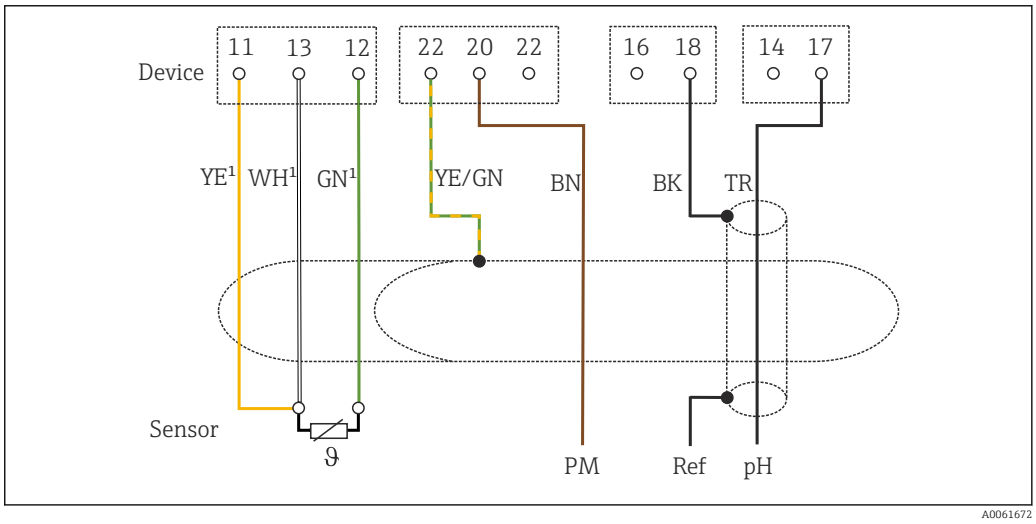
[2]: Not available depending on the version

► Connect the sensor as shown in the illustration.

Connecting pH sensor CPF81 with PAL (asymmetrical) with a fixed cable



42 *Device view*



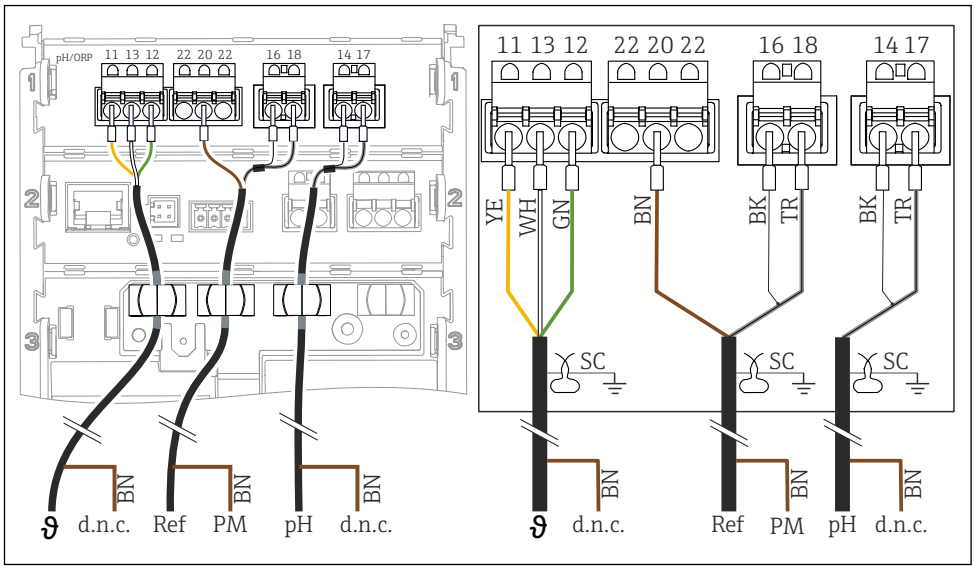
43 *Wiring diagram*

[1]: Only available for version with temperature sensor

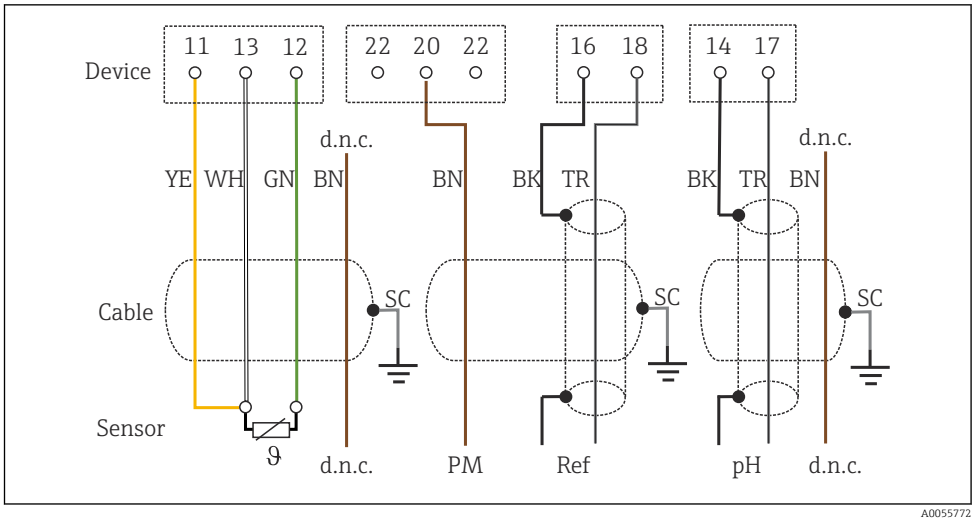
▶ Connect the sensor as shown in the illustration.

Connecting pH single electrodes with PML (symmetrical) and separate reference electrode and separate temperature sensor

1.



44 *Device view*



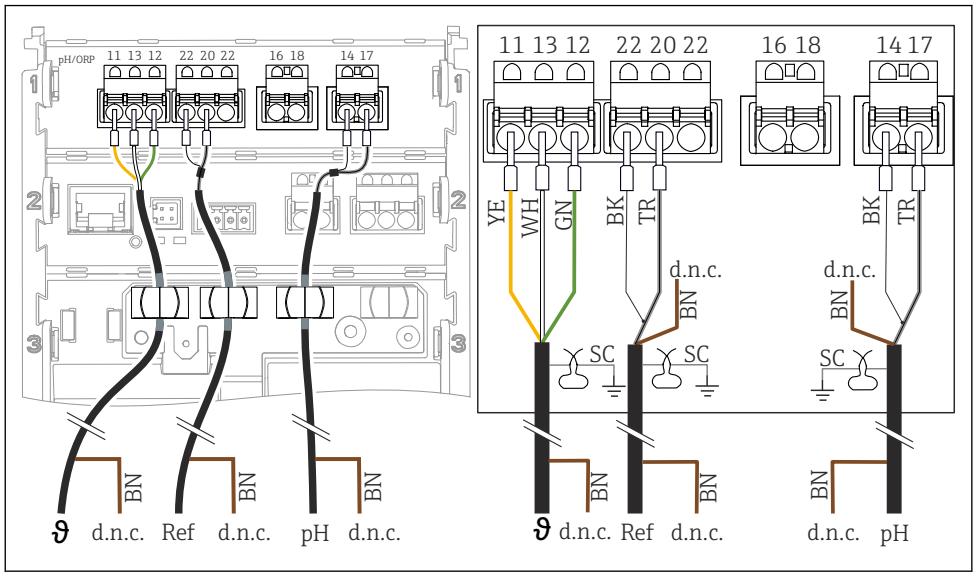
45 *Wiring diagram*

Connect the sensor as shown in the illustration.

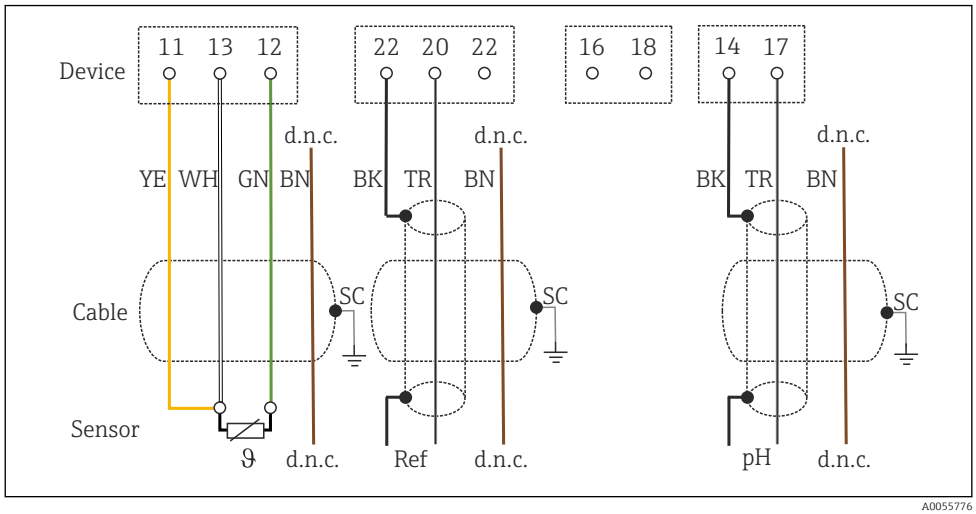
2. Ground cable shields via shield clamps.

Connecting pH single electrodes without PML (asymmetrical) and separate reference electrode and separate temperature sensor

1.



46 *Device view*



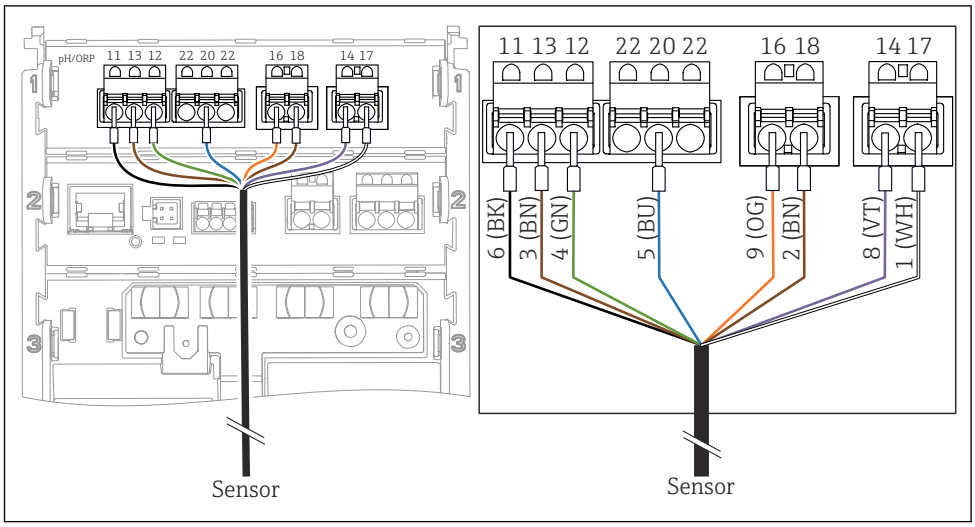
47 *Wiring diagram*

Connect the sensor as shown in the illustration.

2. Ground cable shields via shield clamps.

Connecting pH enamel electrodes

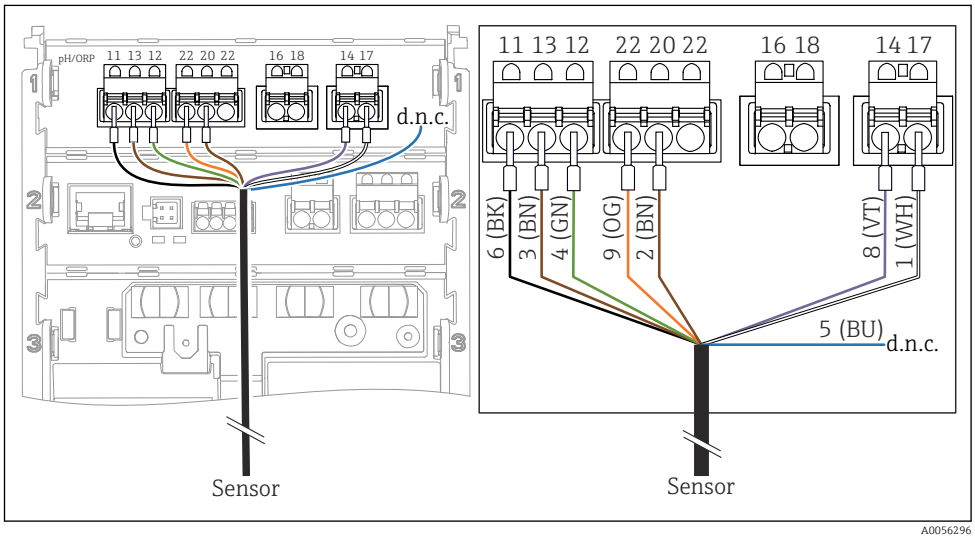
Pfaudler electrode, absolute (type 03/type 04) with PML (symmetrical) with LEMOSA cable

1. 

   Connect the sensor as shown in the illustration.

2. Only ground the cable shield on the sensor side.

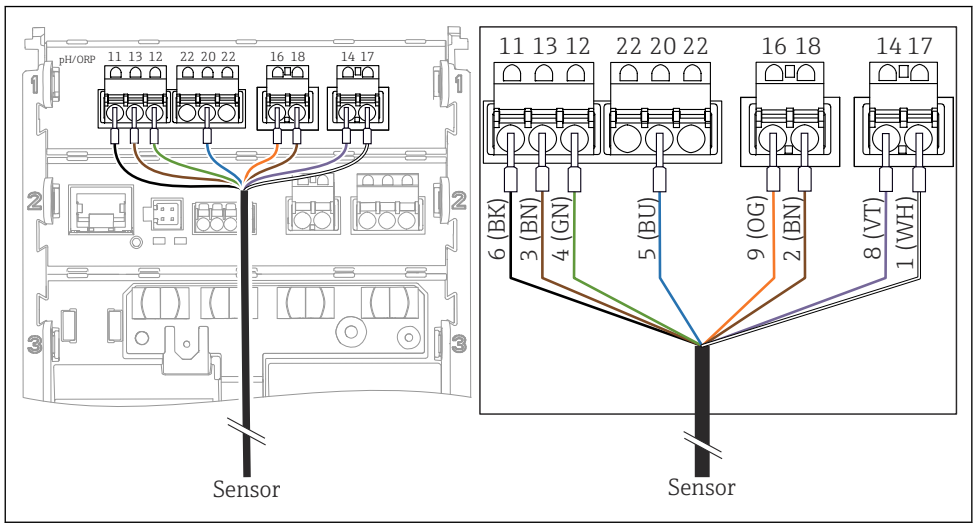
Pfaudler electrode, absolute (type 03/type 04) without PML (asymmetrical) with LEMOSA cable

1. 

   Connect the sensor as shown in the illustration.

2. Only ground the cable shield on the sensor side.

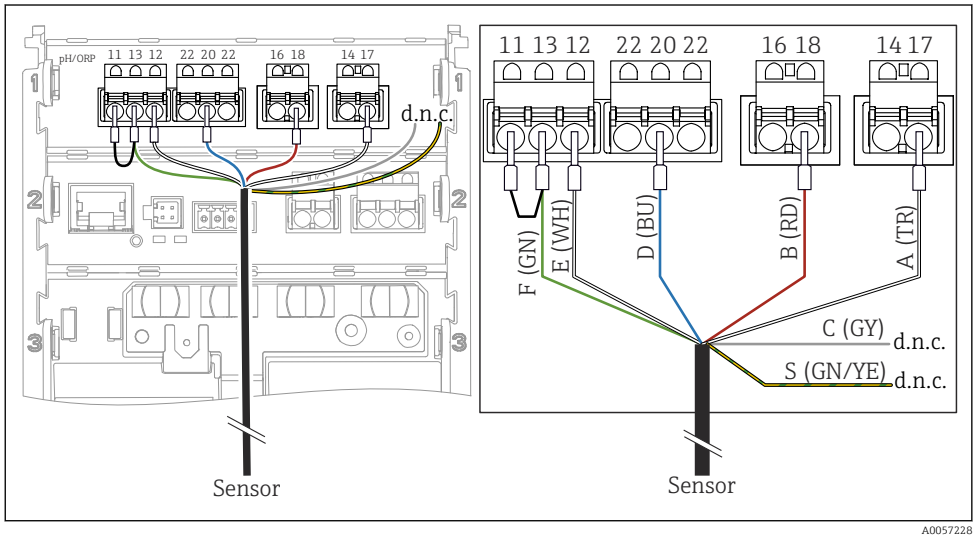
Pfaudler electrode, relative (type 18/type 40) with PML (symmetrical) with LEMOSA cable

1. 

   Connect the sensor as shown in the illustration.

2. Only ground the cable shield on the sensor side.

pH-Reiner Pfaudler electrode with PML (symmetrical) with VARIOPIN cable

1. 

   Connect the sensor as shown in the illustration.

2. Only ground the cable shield on the sensor side.

6.3 Ensuring the degree of protection

Only the mechanical and electrical connections which are described in these instructions, and which are necessary for the required designated application, may be established on the device delivered.

- ▶ Exercise care when carrying out the work.

Individual types of protection permitted for this product (impermeability (IP), electrical safety, EMC interference immunity, explosion protection) can no longer be guaranteed if, for example:

- Covers are left off
- Different power units from the ones permitted are used
- Cable glands are not tightened sufficiently

- Unsuitable cable diameters are used for the cable glands
- The housing cover is not properly secured (danger of moisture entering due to inadequate sealing)
- Cables/cable ends are loose or insufficiently tightened
- Cable shields not grounded using grounding clamp in accordance with the instructions
- Grounding is not ensured via the connection for potential equalization

6.4 Post-connection check

⚠ WARNING

Connection errors

The safety of people and of the measuring point is under threat. The manufacturer does not accept any responsibility for errors that result from failure to comply with the instructions in this manual.

▶ Put the device into operation only if you can answer **yes** to **all** the following questions.

- Are the device and cable undamaged (visual inspection)?
- Do the cables have adequate strain relief?
- Are the cables routed without loops and cross-overs?
- Does the supply voltage match the information on the nameplate?
- No reverse polarity?
- Correct terminal assignment?

7 Operation options

7.1 Overview of operation options

Operation and settings via:
- Operating elements on the device
- SmartBlue app (The full range of functions can be enabled by entering an activation code).
- Control station via HART (The full range of functions can be enabled by entering an activation code).

7.2 Access to the operating menu via the local display

7.2.1 User management

The local display menu offers user management functions with 2 user roles:
- Operator
- Maintenance

Both roles can be protected via a PIN as an option.

Set PINs

It is recommended to set PINs after initial commissioning.

1. Navigate to the path: **Menu/System/Security/Device PINs**
2. Set 4-digit PINs for the user roles. Only one PIN can be set for the **Operator** role if a PIN has already been set for the **Maintenance** role.

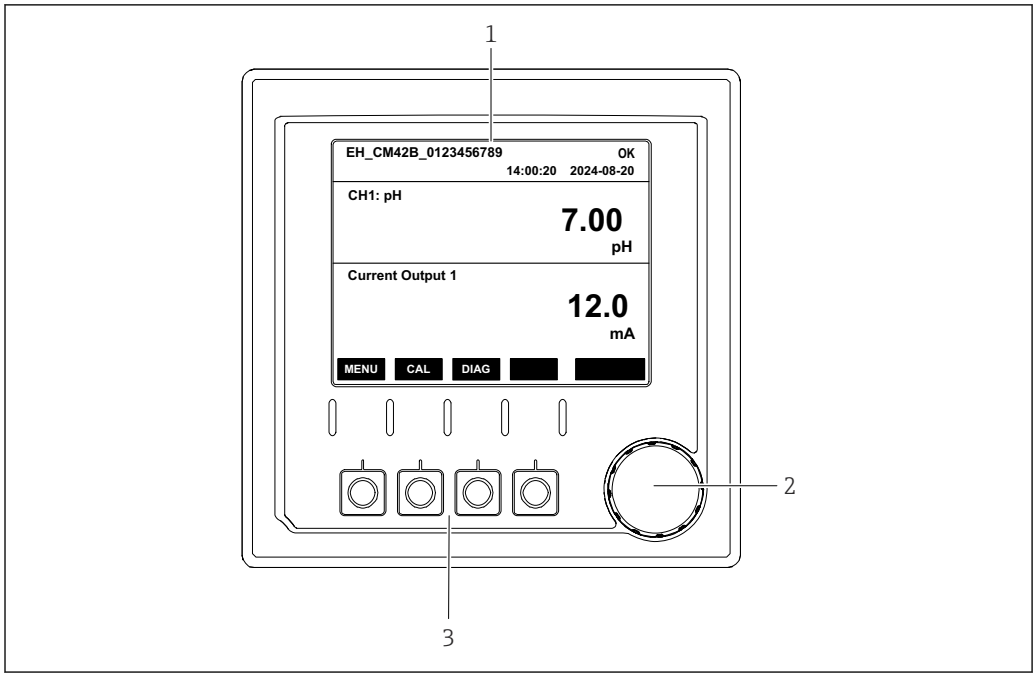
Overview of function access

PIN status	Device operation
No PINs set (as-delivered state)	Full access to the device menu is possible without login.
PIN set for **Maintenance** user role	▪ The **Operator** user role functions can be accessed without login. ▪ Login with a PIN is required for the **Maintenance** user role functions. ▪ When the menu is called up, the **Operator** user role functions are displayed. ▪ Login with a PIN is required to access the **Maintenance** user role functions.
PIN set for **Maintenance** and **Operator** user roles	▪ Measured values are displayed without logging in ▪ To access additional features, you must log in to a user role using the corresponding PIN. ▪ The login options for both user roles are displayed when you call up the menu.

Overview of user role access rights

User role	Access rights
Operator	▪ Operating ▪ Calibration and adjustment functions ▪ Change and reset your PIN
Maintenance	▪ Operating ▪ Calibration and adjustment functions ▪ Configuration and maintenance ▪ Change and reset your PIN and **Operator** user role PIN

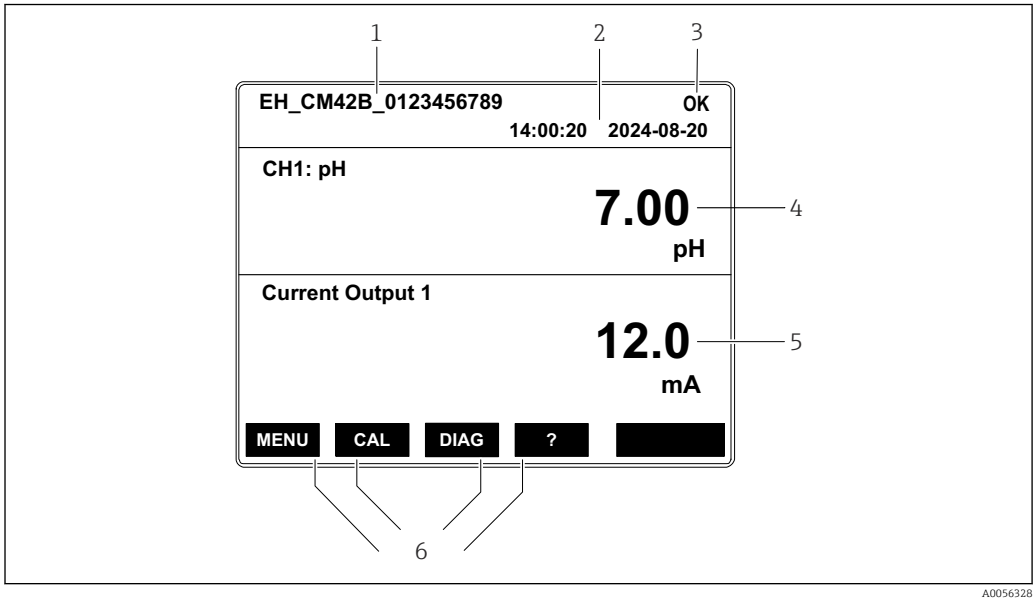
7.2.2 Operating elements



48 Operating elements

1 *Display*
2 *Navigator*
3 *Soft keys*

7.2.3 Structure of the display

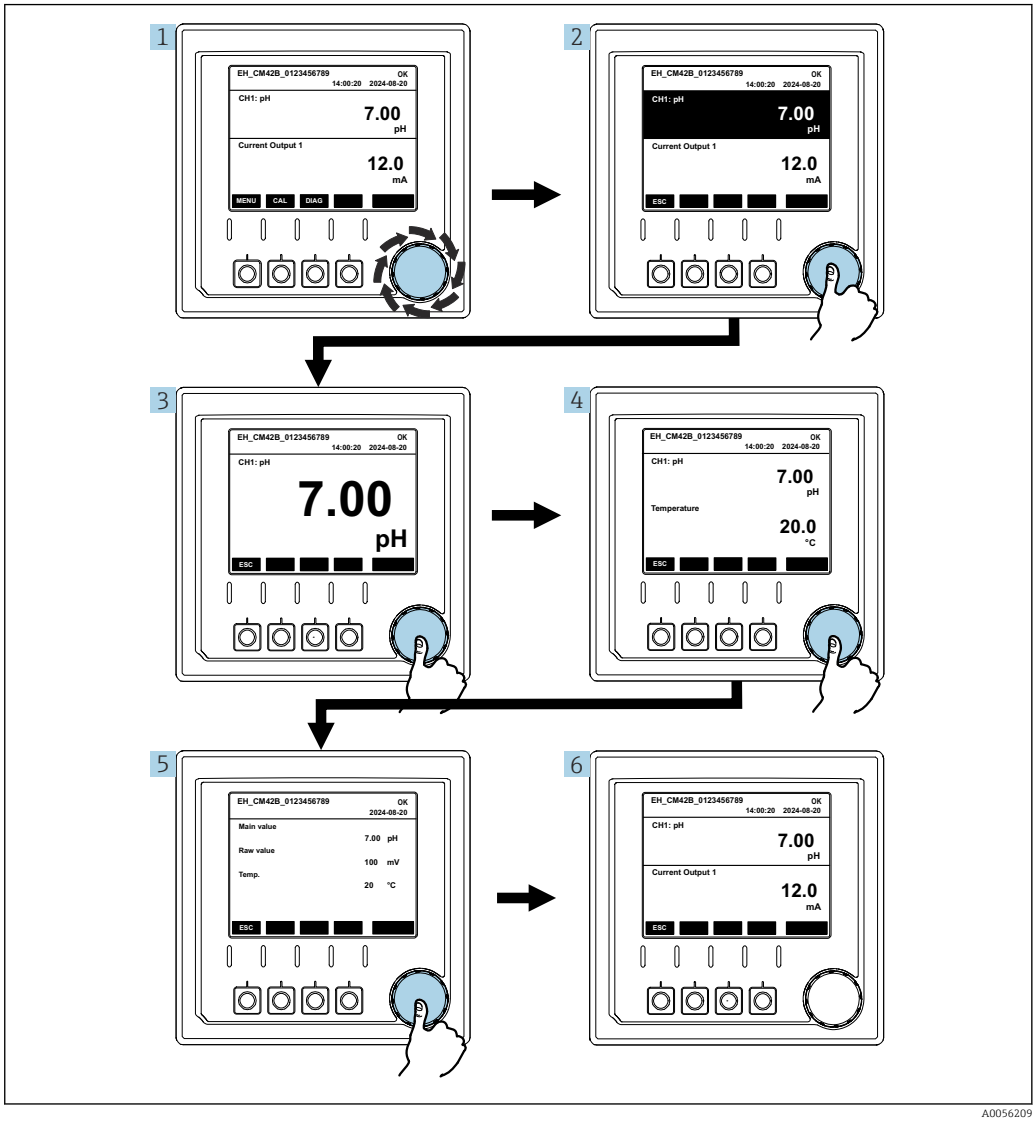


49 Structure of the display: Start screen (device with one current output)

1 *Device name or menu path*
2 *Date and time*
3 *Status symbols*
4 *Primary value display*
5 *Display of current output value (depending on the order, the device has 1 or 2 current outputs, the illustration shows a device with one current output)*
6 *Assignment of the soft keys*

7.2.4 Navigating through the display

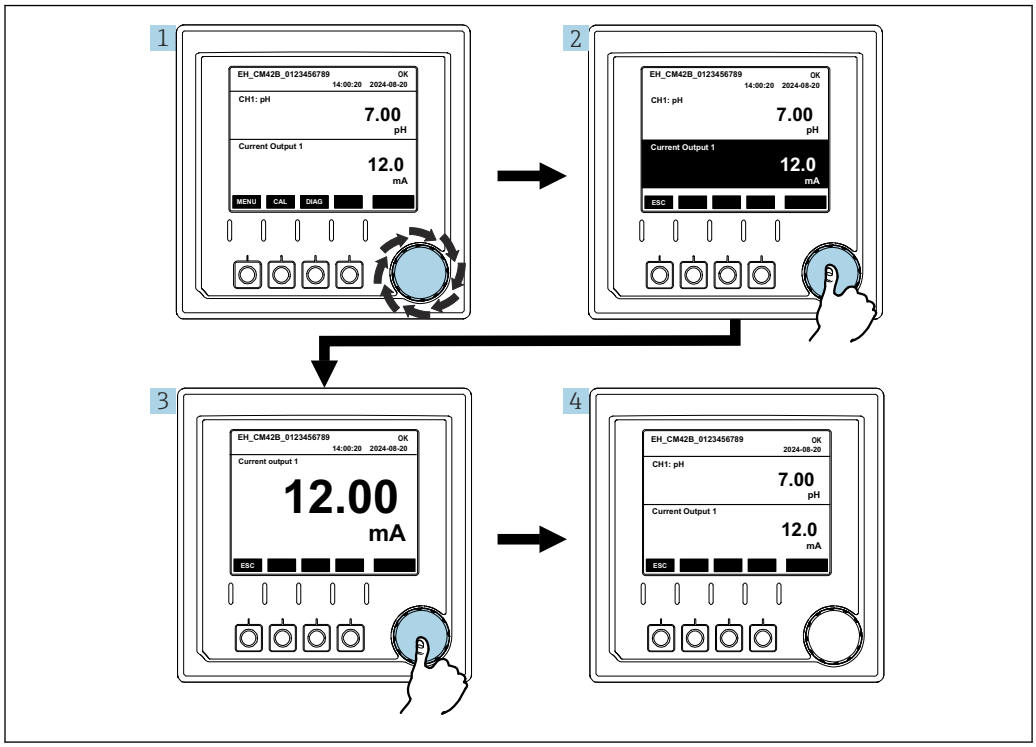
Measured values



50 *Navigating through measured values*

1. Press the navigator, or turn the navigator and continue turning.
   ↳ Measured value is selected (inverted display).
2. Press the navigator.
   ↳ The display shows the primary value.
3. Press the navigator.
   ↳ The display shows the primary value and temperature.
4. Press the navigator.
   ↳ The display shows the primary value, temperature and secondary measured values.
5. Press the navigator.
   ↳ The display shows the primary value and current outputs.

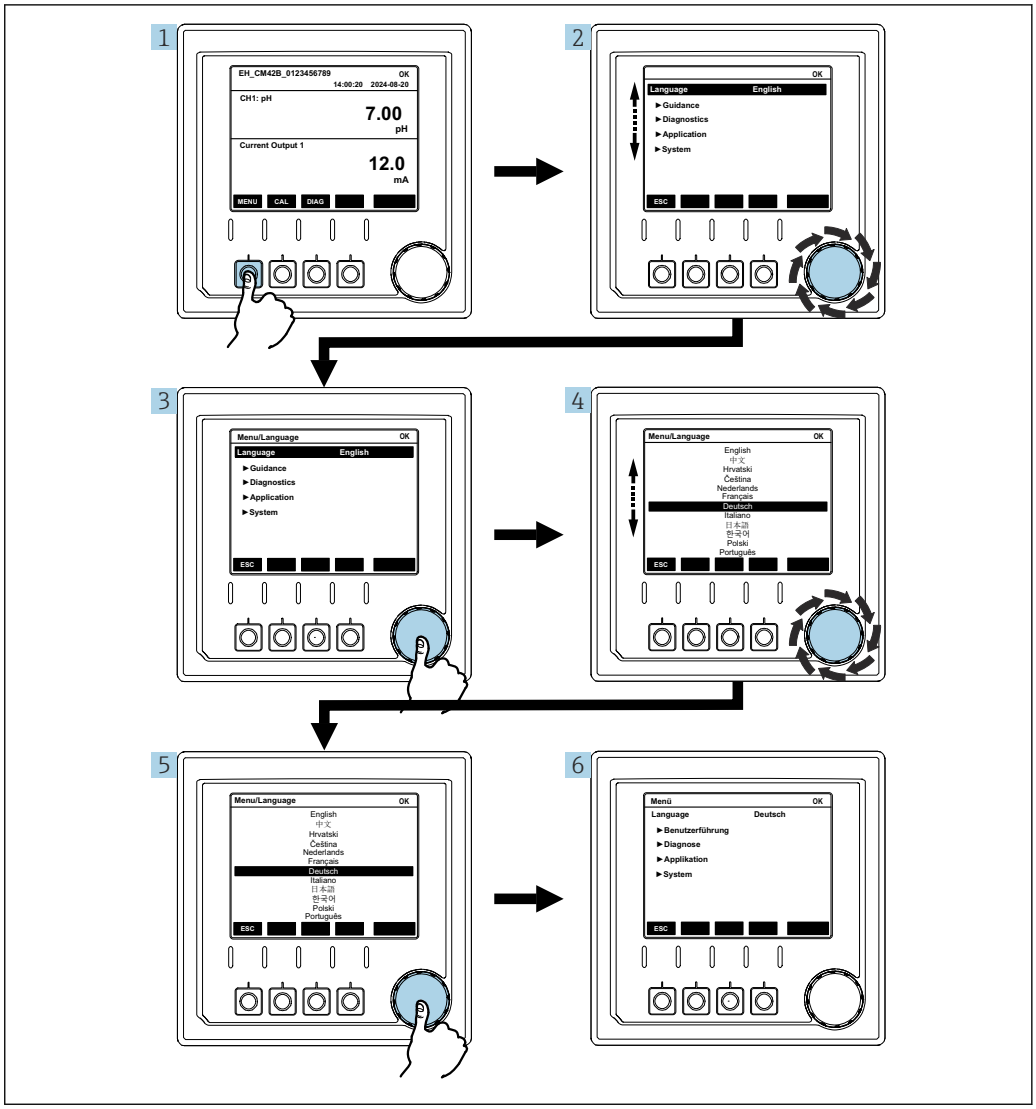
Current output



51 *Navigation, displaying a current output*

1. Press the navigator, or turn the navigator and continue turning.
   ↳ Current output is selected (black background).
2. Press the navigator.
   ↳ The display shows the current output details.
3. Press the navigator.
   ↳ The display shows the primary value and current outputs.

7.2.5 Operation concept menus



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The options available in the menu depend on the specific user authorization.

1. Press the soft key.
   ↳ The menu is called up.
2. Turn the navigator.
   ↳ The menu item is selected.
3. Press the navigator.
   ↳ The function is called up.
4. Turn the navigator.
   ↳ The value is selected (e.g. from a list).
5. Press the navigator.
   ↳ The setting is adopted.

7.3 Access to the operating menu via the operating tool

7.3.1 Access to the operating menu via the SmartBlue app

The SmartBlue app is available to download from the Google Play Store for Android devices and from the Apple App Store for iOS devices.

System requirements
- Mobile device with Bluetooth® 4.0 or higher
- Internet access

Download the SmartBlue app:

▶

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Download the SmartBlue app via a QR code.

Connect the device to the SmartBlue app:

1. Bluetooth is enabled on the mobile device.
   Activate Bluetooth on the device: **Menu/System/Connectivity/Bluetooth**
2. 

   A0029747

   Launch the SmartBlue app on the mobile device.
   ↳ The live list displays all of the devices that are within range.
   The device in question is identified by the serial number: EH_CM42B_serial number
3. Tap the device to select it.
4. Log in with username and password.

Initial access data:
- Username: admin
- Default password: Serial number of the device

After logging in for the first time, the password can be changed and other user accounts activated.

You can drag additional information (e.g. main menu) onto the screen by swiping across the screen.

If the mainboard of the device is replaced, the default password of the admin account may change.

This is the case if a generic kit that was not ordered for the serial number of the device was used when replacing the mainboard.

In this case, the module serial number of the mainboard is the default password.

The serial number of the mainboard is saved in the device menu under: **Menu/System/Information/Modules/Mainboard**

7.3.2 Activating additional accounts in the SmartBlue app

The SmartBlue app is protected against unauthorized access by means of password-protected accounts. The authentication options of the mobile device can be used to log into the accounts.

The following accounts are available:
- Admin
- Operator
- Maintenance
- Auditor
- Recovery

The **Admin** and Recovery accounts are activated in the device as-delivered state.

Activating other user accounts

▶ Navigate to the path: **Menu/System/Security**

Overview of user account access rights

User account	Access rights
admin	▪ Activate/deactivate user accounts ▪ Change your password and passwords of **Operator**, **Maintenance** and **Auditor** user accounts ▪ Security settings ▪ All other access rights for **Operator**, **Maintenance** and **Auditor** user accounts
Operator	▪ Operating ▪ Calibration and adjustment functions ▪ Change your password
Maintenance	▪ Operating ▪ Calibration and adjustment functions ▪ Configuration and maintenance ▪ Change your password
Auditor	▪ Read access and export logbooks ▪ Change your password
Recovery	Reset admin password. In order to do this, please contact Endress+Hauser Service.

7.3.3 Changing passwords

Every user account can change their own password.

1. Log in with the relevant user account.
2. Navigate to the path: **Menu/System/Security**

7.3.4 Functions via the SmartBlue app

An activation code is required for full operation of the device via the SmartBlue app.

Without this activation code, the SmartBlue app offers the following functions:
- Firmware update
- **Security** menu
- Export of information for the service

7.3.5 Access to the operating menu via HART and FDI

A connection can be established to Field Device Integration (FDI) via HART (optional). FDI provides access to the device's operating menu and is installed on a control station, for

example. The access rights correspond to the **Maintenance** user group. The FDI packages are available in the download area of the product page.

www.endress.com/CM42B

8 System integration

8.1 Integrating the measuring instrument into the system

Interfaces for measured value transmission (depending on order):
- 4 to 20 mA current output (passive)
- Bluetooth® LE wireless technology
- HART

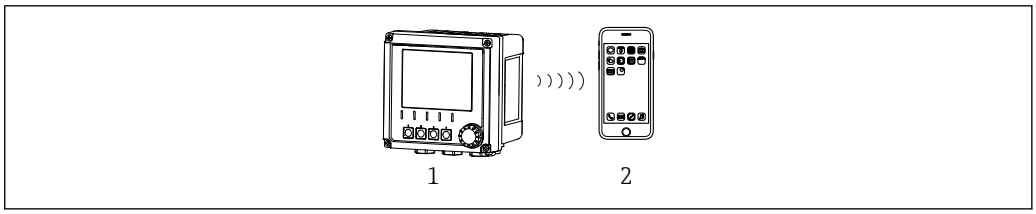
8.1.1 Current output

Depending on the order, the device has 1 or 2 current outputs.

- Signal range 4 to 20 mA (passive)
- The assignment of a process value to a current value is configurable within the signal range.
- Failure current can be configured from list.

8.1.2 Bluetooth® LE wireless technology

With the Bluetooth® LE wireless technology (energy-efficient wireless transmission) option that can be ordered, the device can be controlled via mobile devices.

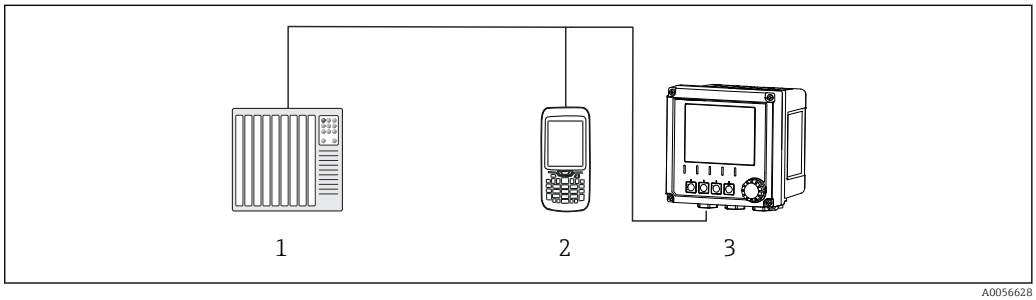


52 Options for remote operation via Bluetooth® LE wireless technology

1 Transmitter with Bluetooth® LE wireless technology
2 Smartphone/tablet with SmartBlue app

8.1.3 HART

HART operation is possible via different hosts.



53 Wiring options for remote operation via HART protocol

1 PLC (programmable logic controller)
2 HART operating device (e.g. SFX350), optional
3 Transmitter

The device can communicate via the HART protocol using current output 1 (depending on the order).

Follow the steps below to integrate the device into the system for this purpose:

1. Connect the HART modem or HART handheld terminal to current output 1 (communication load 250–500 Ohm).
2. Establish a connection via the HART device.
3. Operate the transmitter via the HART device. To do so, follow the HART device Operating Instructions.

9 Commissioning

9.1 Preliminaries

- Connect the device.
  - The device starts and displays the measured value.

Bluetooth® must be enabled on the mobile device for operation via the SmartBlue app.

9.2 Function check

Incorrect connection, incorrect supply voltage

Safety risks for staff and device malfunctions!
- Check that all connections have been established correctly in accordance with the wiring diagram.
- Ensure that the supply voltage matches the voltage indicated on the nameplate.

9.2.1 LED indicators

The displays use the status LEDs. The status LEDs are only active if no display is connected to the device.

LED behavior	Status
Green Continuous	Device is in normal operating mode.
Green Flashes quickly	Starting process for the device
Red Continuous	Category F diagnostic message is present. The complete message can be seen via HART or the SmartBlue app. For information on the status signals, see → 67
Red Flashes slowly	Category M, C or S diagnostic message is present. The complete message can be seen via HART or the SmartBlue app. For information on the status signals, see → 67
Alternating 2x red flashes and 2x green flashes	Squawk mode is enabled. See also → 66
Alternating 1x red flash and 1x green flash	Error during the starting process. Contact service.

9.3 Time and date

▶ Configure the time and date under the following path: **Menu/System/Date and time**

If you are using the Smartblue app, the date and time can also be automatically adopted from the mobile device.

9.4 Configuring the operating language

▶ Configure the operating language under the following path: **Menu/Language**

9.5 Transferring device parameters to other devices

The parameters of one device can be transferred to other devices with the same measuring task using the SmartBlue app or via HART.

Prerequisite(s):
- For SmartBlue app: SmartBlue app operation fully enabled via activation code.
- For HART: HART is activated and FDI (field device integration) is installed on the remote station.

Account data, passwords and logbooks are not transferred.

Downloading the parameters from the device

1. Log in to the SmartBlue app on the device from which you want to transfer the parameters using the "**Admin**" or "**Maintenance**" user account. For HART, connect to the device via FDI.
2. Navigate to the path: **Menu/Guidance/Export/Import/Parameter save**:
3. Follow the instructions in the wizard.
   ↳ The parameters are saved on the mobile device or the remote station.

Loading the parameters onto another device

1. Log in to the SmartBlue app on the device to which you want to transfer the parameters using the "**Admin**" or "**Maintenance**" account. For HART, connect to the device via FDI.
2. Navigate to the path: **Menu/Guidance/Export/Import/Parameter load**:
3. Follow the instructions in the wizard.
   ↳ The parameters are loaded onto the device.

Diagnostic messages F100 and C413 are enabled during the import.

The measuring function is disabled during the import.

Enable device hold if necessary.

10 Operation

10.1 Reading off measured values

Reading measured values via the display : → 📄 43

Reading measured values via the SmartBlue app (Bluetooth operation fully enabled via activation code): → 📄 48

Reading measured values via the HART connection (HART is enabled by entering activation code): → 📄 51

10.2 Adapting the device to process conditions

10.2.1 Calibrating the sensor

1. Navigate to the path: **Menu/Guidance/Calibration** or press the **CAL** soft key.
2. Select the desired calibration method.
3. Follow the instructions in the wizard.

Different calibration methods are available depending on the measuring parameter and the connected sensor.

10.2.2 Damping

Damping causes smoothing of the measured value with the entered time constant.

Configuration options:
Enter the time constant (the time over which the measured value is smoothed) for the primary value and temperature.

▶ Navigate to the path: **Menu/Application/Sensor/Damping**

10.2.3 Calibration settings

Adjustment monitoring

Displays
- Number of sensor calibrations
- Operating hours of the sensor since last calibration

Configuration options:
- Enable calibration monitoring when operating/enable during the connection process/ disable
- Define the warning limit and the alarm limit for the time after the last calibration.

▶ Navigate to the path: **Menu/Application/Sensor/Calibration settings/Adjustment monitoring**

Stability criteria (configurable for the pH, ORP, and dissolved oxygen measuring parameters only)

The stability criteria are permitted measured value fluctuations which must not be exceeded in a certain timeframe during calibration. If the permitted fluctuation is exceeded, calibration cannot be started. It is then possible to regenerate the measured value.

Configuration options:
Depending on the measuring parameter

▶ Navigate to the path: **Menu/Application/Sensor/Calibration settings/Stability criteria**

Slope monitoring (only for pH sensors and amperometric oxygen sensors)

The slope characterizes the sensor condition.

In pH sensors, the greater the deviation from the ideal value (59 mV/pH), the poorer the sensor condition.

In amperometric oxygen sensors, decreasing values indicate electrolyte consumption.

It is possible to control when the sensor or electrolyte should be replaced by specifying warning limits which cause the system to trigger diagnostic messages.

Configuration options:
- Enter warning limits for slope monitoring
- Enter warning limits for the delta slope
- Configure diagnostic behavior if a warning limit is reached

▶ Navigate to the path: **Menu/Application/Sensor/Calibration settings/Slope monitoring**:

Zero point monitoring (only for pH sensors and amperometric oxygen sensors)

In pH sensors, the zero point characterizes the condition of the sensor reference. The greater the deviation from the ideal value (pH 7.00), the poorer the condition. This can be caused by KCl dissolving away or reference contamination, for example.

In amperometric oxygen sensors, the zero point corresponds to the sensor signal that is measured in a medium in the absence of oxygen. Zero point calibration is possible in oxygen-free water or high-purity nitrogen. This improves measurement accuracy in the trace range.

Configuration options:
- Enter the upper and lower warning limit for zero point monitoring
- Enter the warning limit for the delta zero point
- Configure diagnostic behavior if a warning limit is reached

▶ Navigate to the path: **Menu/Application/Sensor/Calibration settings/Zero monitoring**:

Calibration methods

Different calibration methods are available depending on the measuring parameter and the sensor used.

Configuration options:
Select the calibration methods that are displayed under **Menu/Guidance/Calibration**

▶ Navigate to the path: **Menu/Application/Sensor/Calibration settings/Calibration methods**

Further calibration settings

Further calibration settings are available depending on the measuring parameter and connected sensor.

10.2.4 Operating time monitoring (Memosens sensors only)

The total operating time of the sensor and its use under extreme conditions are recorded. If the operating time exceeds the defined threshold values, the device issues a corresponding diagnostic message.

Configuration options:
- Activate/deactivate operating time monitoring
- Enter the limit value for total operating time
- Configure diagnostic behavior if an operating time upper limit is exceeded

▶ Navigate to the path: **Menu/Application/Sensor/Operating time monitoring**

10.2.5 Tag control (Memosens sensors only)

Tag control specifies which sensors the device allows.

If tag control is enabled, the device only allows sensors with the same channel tag/tag group or identical and brand-new sensors.

Configuration options:
- Enable/disable tag control for specific channel tag or tag group.
- Enter the channel tag
- Enter the name for the tag group

▶ Navigate to the path: **Menu/Application/Sensor**:

German umlauts are replaced with question marks in the channel tag.

10.2.6 Cleaning in place (CIP) (Memosens sensors only)

Displays:
Number of CIP cycles performed by the sensor

Configuration options:
- Enable/disable CIP detection
- Configure parameters for CIP detection
- Enable/disable CIP monitoring (CIP cycle counter)
- Configure warning limit and diagnostic behavior for CIP monitoring.

▶ Navigate to the path: **Menu/Application/Sensor/Cleaning in place (CIP)**

10.2.7 Sterilization (Memosens sensors only)

Information displayed:
Number of sterilization cycles performed by the sensor

Configuration options:
- Configure parameters for sterilization detection
- Enable/disable sterilization monitoring
- Configure warning limit and diagnostic behavior for sterilization monitoring.

▶ Navigate to the path: **Menu/Application/Sensor/Sterilization**

10.2.8 Specifying the primary value

Different primary values can be displayed depending on the sensor.

▶ Navigate to the path: **Menu/Application/Operating mode / units**.

10.2.9 Specifying units and decimal places

▶ Navigate to the path: **Menu/Application/Operating mode / units**.

The units and decimal places can be automatically defined by the device for conductivity sensors (with a large measuring range). The device automatically selects the unit and the number of decimal places that are optimal for the display.

▶ Select the value **auto** for **Unit** or **Format** in **Menu/Application/Operating mode / units/Main measurement value settings**.

10.2.10 Add activation code

Activation codes are required to enable optional features.

Adding an activation code

1. Navigate to the path: **Menu/System/Software configuration/Add activation code**.
2. Enter the activation code and confirm.
   ↳ Depending on the activation code, you are prompted to restart the device.
3. Restart the device under **Menu/System/Device management/Restart device** when this prompt appears.

10.2.11 Displaying active activation codes

▶ Navigate to the path: **Menu/System/Software configuration/Active activation codes**

10.2.12 Changing measuring parameters

Changing measuring parameters on Memosens devices

The measuring parameter can be changed via the user interface in Memosens devices. The following measuring parameters are possible:

- pH, ORP, pH/ORP
- Conductivity (conductive or inductive measurement)
- Dissolved oxygen (measured optically or amperometrically)

1. Navigate to the path: **Menu/Guidance/Measurement parameter change**:
2. Follow the instructions in the wizard.
3. Connect the appropriate Memosens sensor.

Changing measuring parameters in analog devices

In analog devices, the extension module must be swapped to slot 1 to change the measuring parameter. Retrofit kits with extension modules are available for the following measuring parameters:

- Conductivity (inductive measurement)
- Conductivity (conductive measurement)
- pH, ORP, pH/ORP

1. De-energize the device.
2. Install the extension module using the installation instructions provided.

It is also possible to convert the device from analog to Memosens using a retrofit kit.

10.2.13 Entering a measuring point name

Enter a name for the device or the measuring point. The measuring point name is shown on the display and is the device name in the SmartBlue app and other remote access options.

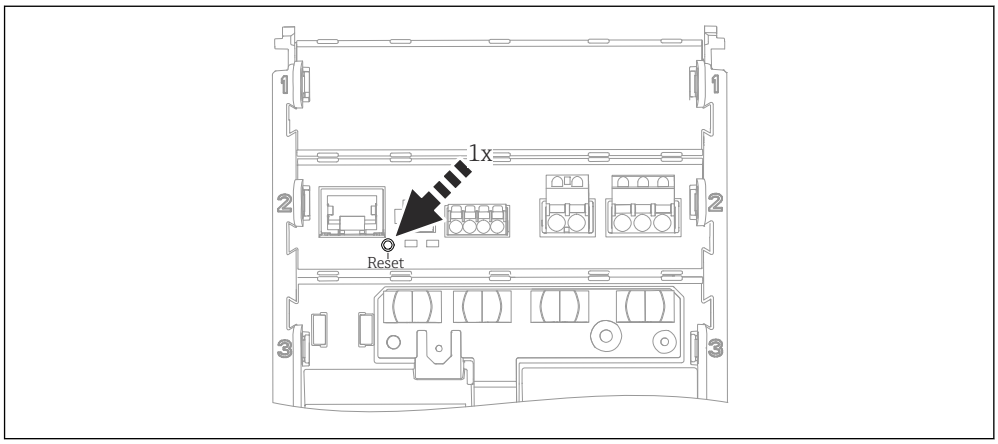
▶ Navigate to the path: **Menu/System/Device management/Device tag**.

10.2.14 Restarting the device

▶ Navigate to the path: **Menu/System/Device management/Restart device**

or

▶



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Press the reset button once briefly.

The reset button can be deactivated. It is activated/deactivated in the **Security** menu.

10.2.15 Resetting the device to the default settings

User-specific parameters/data are reset:
- Units
- Settings for the current outputs
- Fieldbus settings (except identification data and address)

The following parameters/data are retained:
- Access data for user accounts
- Activation codes
- Measuring point tags
- Non-editable diagnostic data such as operating hours counter, logbooks

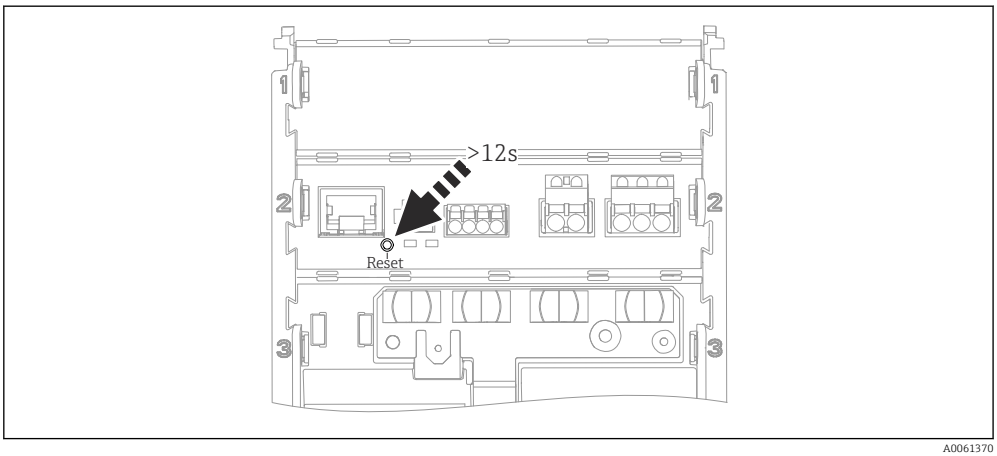
▶ Navigate to the path: **Menu/System/Device management/Reset device to std. deliv. sett.**

10.2.16 Resetting the device for decommissioning or resale

The device is reset to the factory settings and all parameters and data are deleted.

The hardware history and firmware history are retained.

▶



A0061370

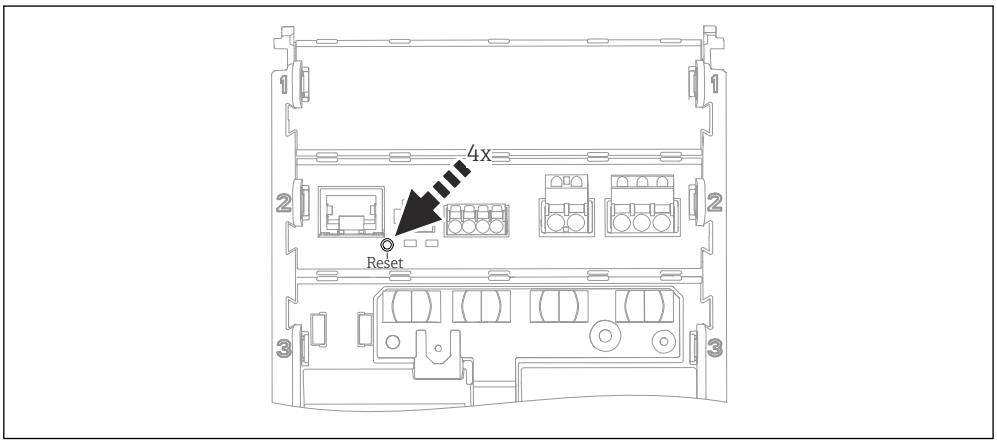
Press and hold the reset button for a min. of 12 seconds.

The reset button can be deactivated. It is activated/deactivated in the **Security** menu.

10.2.17 Resetting user access

The user access PINs are reset to the factory settings.

▶



A0061378

Press the reset button briefly 4 times.

The reset button can be deactivated. It is activated/deactivated in the **Security** menu.

10.2.18 Temperature compensation in pH sensors

The measured value is compensated for via temperature compensation in the event of fluctuating temperatures. Temperature compensation can be entered automatically via the temperature probe of the sensor, or manually via the entered medium temperature.

Configuration options:
Select the type of temperature compensation
- **Automatic (ATC)**: Temperature compensation is carried out based on the medium temperature that the temperature probe of the sensor measures.
- **Manual (MTC)**: Temperature compensation is carried out based on a medium temperature entered.

▶ Navigate to the path: **Menu/Application/Sensor/Compensation**

This temperature compensation only refers to compensation during measuring mode, not during calibration. Temperature compensation for the calibration is carried out in the **Menu/Application/Sensor/Calibration settings/Temperature comp. during calibr.** menu.

10.2.19 Medium compensation in pH sensors

Medium compensation is used to determine the pH value of a sample at different temperatures in the laboratory. Medium compensation is possible via two points or via several points in a table.

Configuration options:

Select the type of medium compensation
- Off
- Two-point
- Table

▶ Navigate to the path: **Menu/Application/Sensor/Compensation**

10.2.20 Temperature compensation for conductivity sensors

The temperature coefficient depends both on the chemical composition of the medium and the temperature itself.

Configuration options:
Select the type of temperature compensation
- **Automatic (ATC)**: Temperature compensation is carried out based on the medium temperature that the temperature probe of the sensor measures.
- **Manual (MTC)**: Temperature compensation is carried out based on a medium temperature entered.

Select the temperature compensation method
- Off
- Linear
- NaCl (IEC 746-3)
- Water ISO7888 (20°C)
- Water ISO7888 (25°C)
- UPW NaCl
- UPW HCl
- User table

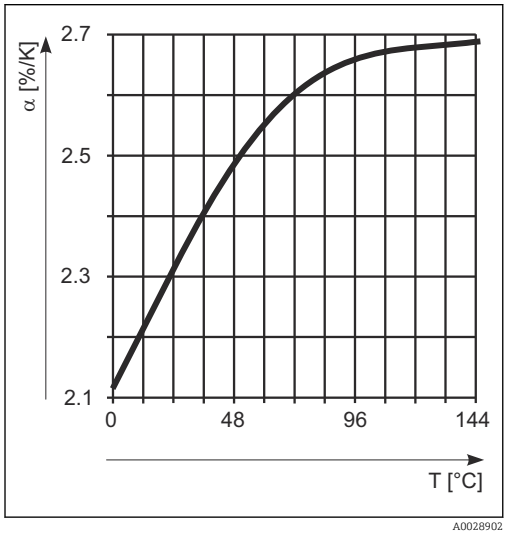
▶ Navigate to the path: **Menu/Application/Sensor/Compensation**

Temperature coefficient α
Temperature coefficient α = change in the conductivity per degree of temperature change:
$\kappa(T) = \kappa(T_0)(1 + \alpha(T - T_0))$
$\kappa(T)$ ... conductivity at process temperature T
$\kappa(T_0)$ ... conductivity at reference temperature T_0

Linear temperature compensation
The change between two temperature points is taken to be constant, i.e., α = const.

Reference temperature and alpha coefficient (only for linear temperature compensation)
The alpha coefficients and alpha reference temperatures of your process medium must be known. Typical alpha coefficients at a reference temperature of 25 °C are:
- Salts (e.g. NaCl): approx. 2.1 %/K
- Bases (e.g. NaOH): approx. 1.7 %/K
- Acids (e.g. HNO_3): approx. 1.3 %/K

NaCl compensation
In the case of NaCl compensation (as per IEC 60746), a fixed non-linear curve specifying the relationship between the temperature coefficient and temperature is saved in the device. This curve applies to low concentrations of up to approx. 5 % NaCl.



Compensation for natural water in accordance with ISO 7888
A non-linear function in accordance with ISO 7888 is saved in the device for temperature compensation in natural water.

Ultrapure water compensation (for conductive sensors)
Algorithms for pure and ultrapure water are stored in the device. These algorithms take the dissociation of the water and its temperature dependency into account. They are used up to conductivity levels of approx. 10 µS/cm.
- UPW HCl
  Optimized for measuring the acid conductivity downstream of a cation exchanger. Also suitable for ammonia (NH_3) and caustic soda (NaOH).
- UPW NaCl
  Optimized for pH-neutral contamination.

User table
You can save a function that takes the properties of your specific process into account. To do so, determine the value pairs made up of the temperature T and conductivity κ with:
- $\kappa(T_0)$ for the reference temperature T_0
- $\kappa(T)$ for the temperatures that occur in the process
- Use the following formula to calculate the α values for the temperatures that are relevant in your process:

$$\alpha = \frac{100\%}{\kappa(T_0)} \cdot \frac{\kappa(T) - \kappa(T_0)}{T - T_0} \; ; T \neq T_0$$

Values must be constantly increasing or decreasing.

10.2.21 Temperature compensation, medium pressure compensation and salinity compensation for oxygen sensors

Configuration options:
Select the type of temperature compensation
- **Automatic (ATC)**: Temperature compensation is carried out based on the medium temperature that the temperature probe of the sensor measures.
- **Manual (MTC)**: Temperature compensation is carried out based on a medium temperature entered.

Select the type of process pressure compensation and enter the compensation value
- **Process pressure**: The process pressure is known and higher than atmospheric pressure.
- **Air pressure**: The ambient air pressure is known.
- Altitude: The altitude of the measuring station above sea level is known.

Enter salt content for salt content compensation

▶ Navigate to the path: **Menu/Application/Sensor/Compensation**

10.2.22 Glass monitoring (for pH/ORP glass sensors only)

Glass monitoring monitors the high resistance of the sensor glass. An alarm occurs if a minimum impedance value is undershot or a maximum impedance value is exceeded.

Glass breakage or a worn glass membrane is the main reason for a drop in high impedance values.

The reasons for increasing impedance values include:
- Dry sensor
- Buildup on the glass membrane

Information displayed
- Current glass impedance
- Diagnostic codes if limit values are exceeded/undershot

Configuration options:
- Activating/deactivating warning limits and alarm limits (upper and lower limit values can be activated and deactivated separately)
- Enter limit values for warning limits and alarm limits
- Configure diagnostic behavior for warning limits and alarm limits

▶ Navigate to the path: **Menu/Application/Sensor/Glass monitoring**

10.2.23 Enter offset (pH sensors only)

The offset compensates for a difference between a laboratory measurement and an online measurement which is caused by interference ions.

▶ Navigate to the path: **Menu/Application/Sensor/Extended settings/Offset pH**

10.2.24 Specifying the temperature offset (ORP sensors only)

The offset compensates for a difference between a laboratory measurement and an online measurement which is caused by interference ions.

▶ Navigate to the path: **Menu/Application/Sensor/Temperature offset**

10.2.25 Configuring ORP value monitoring (ORP sensors only)

Configuration options:
- Activate/deactivate ORP value monitoring
- Define the upper and lower warning limit
- Configure diagnostic behavior if warning limit is exceeded or undershot

▶ Navigate to the path: **Menu/Application/Sensor/ORP value monitoring**

10.2.26 Monitoring of pharmaceutical water (only for conductivity sensors with 2 electrodes)

The pharmaceutical water monitoring system issues a diagnostic message if a conductivity value defined by the USP (United States Pharmacopeia 645) standards or EP (European Pharmacopoeia 169) standards is exceeded.

In addition, a warning limit in % can be defined for this value.

Configuration options:
- Activate and deactivate pharmaceutical water monitoring according to USP (United States Pharmacopeia 645) or EP (Pharmacopeia of Eurpoaea 169) standards.
- Enter a limit value for the warning limit

▶ Navigate to the path: **Menu/Application/Sensor/Pharma water monitoring**

10.2.27 Cable compensation (only for analog pH/ORP sensors)

The length of the sensor cable influences the measured value. This is compensated for by means of cable compensation.

Configuration options:
- Activate/deactivate cable compensation
- Enter the cable length

▶ Navigate to the path: **Menu/Application/Sensor/Analog sensor configuration/Cable compensation**

10.2.28 Cable compensation (only for analog conductive conductivity sensors)

The length or resistance of the sensor cable influence the measured value. This is compensated for by cable compensation.

Configuration options:
- Select the sensor cable type (Endress+Hauser cable or cable from third-party manufacturer)
- Enter the cable length (for Endress+Hauser cable)
- Enter the cable resistance (for cable from third-party manufacturer)

▶ Navigate to the path: **Menu/Application/Sensor/Analog sensor configuration/Cable compensation**

10.2.29 Operating time monitoring, cap (oxygen sensors only)

Configuration options:
- Enable/disable cap operating time monitoring
- Enter the limit value for total operating time
- Configure diagnostic behavior if an operating time upper limit is exceeded

▶ Navigate to the path: **Menu/Application/Sensor**

10.2.30 Electrolyte consumption monitoring (only for oxygen sensors with amperometric measurement)

Configuration options:
- Activate/deactivate electrolyte consumption monitoring
- Specify the warning limit
- Define the diagnostic behavior

▶ Navigate to the path: **Menu/Application/Sensor**

10.2.31 Select the measured value filter (for oxygen sensors with optical measurement only)

Configuration options:
Activate/deactivate the measured value filter

▶ Navigate to the path: **Menu/Application/Sensor/LED and filter settings**

The following measured value filters are available:
- **Off**: Signals are not filtered.
- **Low**: Signal filtering is weak.
- **Medium**: Signal filtering is normal.
- **High**: Signal filtering is strong.
- **Very high**: Signal filtering is very strong. Widely fluctuating raw signals are greatly attenuated by the sensor.
- **Advanced low**: Optimized filter for use of the sensor in fermenter applications
- **Advanced high**: High-performance filter for use with the sensor in fermentation applications where oxygen control is hindered by the accumulation of small air bubbles on the sensor due to the consistency of the medium

10.2.32 LED settings (only for oxygen sensors with optical measurement)

Configuration options:
- Activate/deactivate the LED temperature mode. If the LED temperature mode is activated, the LED is switched off as of a defined medium temperature. This increases the service life of the LEDs. The temperature is entered if the LED temperature mode is activated. This mode is recommended for processes with high cleaning temperatures.
- Select the LED measuring interval. The LED measuring interval influences the response time on the one hand and the operating life of the sensor cap on the other. Shorter intervals improve the response time but reduce the operating life of the sensor cap. Set according to process requirements.

▶ Navigate to the path: **Menu/Application/Sensor/LED and filter settings**

10.3 Settings of the current output

Configuration options:
- Failure current
  - Select from list
  - The current outputs provide the selected current if an error occurs.
- Process variable
  Measured value provided by the current output
- Output mode
  - **Linear**: The current output provides a signal that is linear to the measured value.
  - **Table**: An output signal is defined in a table for the individual measured values of the measuring range.
- **Lower range value**: Process value for which 4 mA is output
- **Upper range value**: Process value for which 20 mA is output
- Hold behavior
  - Freeze current
  - Fixed current
  - Ignore

▶ Navigate to the path: **Menu/Application/Current output**

10.4 HART settings

Configuration options:
- Enable/disable HART communication
- Configure the HART interface

▶ Navigate to the path: **Menu/Application/HART output**

10.5 Activate, deactivate and configure hold

Configuration options:
- Enable/disable device hold
- Define the hold delay. The hold delay determines how long the device remains in the hold state after hold is deactivated before it switches back to measuring mode.
- Enable/disable automatic calibration hold

▶ Navigate to the path: **Menu/Application/Hold**:

The hold response for the current outputs is configured under:

Menu/Application/Current output/Current output 1/Hold settings

Menu/Application/Current output/Current output 2/Hold settings

10.6 Enable/disable squawk

Squawk mode makes the device easier to find in larger installations.

Squawk mode can be enabled via the SmartBlue app.

When squawk mode is enabled, the display screen flashes (alternates between normal display and inverted display). If no display is connected, squawk mode is indicated via the status LEDs (alternates between 2 green flashes and 2 red flashes).

Configuration options:
Squawk mode can be enabled/disabled via the SmartBlue app (connection via Bluetooth LE) or FDI (connection via HART).

▶ Navigate to the path: **Menu/System/Device management**

Squawk mode is enabled briefly when the connection is established with the SmartBlue app.

11 Diagnostics and troubleshooting

11.1 General troubleshooting

The transmitter continuously monitors its functions itself.

If a diagnostic message occurs, the display alternates between the diagnostic message and the measured value in the measuring mode .

Detailed information on the current diagnostic messages is available under **Menu/ Diagnostics/Diagnostic list**.

In accordance with NAMUR specification NE 107, the diagnostic messages are characterized by:

- Event number
- Status signal (letter in front of the event number)
  - **F** = (Failure) a malfunction has been detected
    The measured value is no longer reliable. The cause of the malfunction is to be found in the measuring point. Set any controller connected to manual mode.
  - **C** = (Function check), (no error)
    Maintenance work is being performed on the device. Wait until the work has been completed.
  - **S** = (Out of specification), the measuring point is being operated outside its specification
    Operation is still possible. However, there is a risk of increased wear, a shorter operating life or reduced measurement accuracy. The cause of the problem is to be found outside the measuring point.
  - **M** = Maintenance required. Action must be taken as soon as possible
    The device still measures correctly. Immediate measures are not necessary. However, proper maintenance efforts would prevent a possible malfunction in the future.
- Event text

Only forward the event number to the Endress+Hauser service department. Since the assignment to a status signal can be changed on a case-by-case basis, this information is not used by the service department.

11.2 Diagnostic information via LEDs

See LED displays in the "Commissioning" section. → 53

11.3 Diagnostic information on local display

Current diagnostic events appear on the display. In the measuring mode, the display shows the diagnostic message with what is currently the highest priority. If a menu is currently open, you have to navigate to the diagnostic list.

11.4 Diagnostic information via SmartBlue app

If the SmartBlue app is fully operational (access code required), diagnostic events, status signal and additional information are displayed in the SmartBlue app.

11.5 Diagnostic information via communication interface

Diagnostic events, status signals and more information are transmitted according to the definitions and technical capability of the respective fieldbus systems.

11.6 Adapting the diagnostic information

Configuration options:
- Specify the status signal for the diagnostic messages as per NAMUR NE 107 (F, C, S, M).
- Specify the diagnostic behavior for the diagnostic messages.

▶ Navigate to the path: **Menu/Diagnostics/Diagnostic settings**

11.7 Overview of diagnostic information

No.	Factory setting	Message	Tests or remedial action
2	F - Alarm, bad	Sensor unknown	Sensor unknown ▶ Replace sensor
4	F - Alarm, bad	Sensor defective	Sensor defective ▶ Replace sensor
5	F - Alarm, bad	Invalid sensor data	Invalid sensor data 1. Check the software compatibility of sensor and transmitter. Update the transmitter and sensor, if applicable. 2. Perform factory default sensor and power cycle sensor afterwards 3. Update the date of the transmitter 4. Replace sensor
12	F - Alarm, bad	Writing data failed	Writing data to sensor failed 1. Repeat writing 2. Replace sensor
13	F - Alarm, bad	Sensor type wrong	Sensor type wrong ▪ The sensor does not fit the device configuration ▪ The device configuration may be changed to a new sensor type 1. Change to a sensor of configured type 2. Change device configuration to connected sensor
18	F - Alarm, bad	Sensor not ready	Sensor communication blocked Possible reasons: ▪ Connected sensor failed sensor check ▪ Internal software error ▶ Replace sensor
22	F - Alarm, bad	Temperature sensor	Temperature sensor defective ▶ Replace sensor
61	F - Alarm, bad	Sensor electronics	Sensor electronics defective 1. Check sensor connections 2. Replace sensor electronics
100	F - Alarm, bad	Sensor communication	Sensor no communication Possible reasons: ▪ Sensor disconnected ▪ Faulty sensor connection ▪ Short-circuit in sensor cable ▪ Short-circuit in next channel ▪ Faulty sensor FW update 1. Check sensor cable connection 2. Check for short-circuit of the cables 3. Replace sensor 4. Update the sensor FW again

No.	Factory setting	Message	Tests or remedial action
101	F - Alarm, bad	Sensor incompatible	The sensor firmware and the device firmware are incompatible. 1. Replace sensor 2. Update device firmware
104	M - Warning, good	Calibration validity	Validity of last calibration expired. Date of last calibration of the sensor is too long ago. Measurement is still possible. Possible reasons: Long storage of sensor 1. Calibrate sensor 2. Check the configuration of the calibration validity
105	M - Warning, good	Calibration validity	Validity of last calibration expires soon. Date of last calibration of the sensor is long ago. Measurement is still possible. Possible reasons: Long storage of sensor 1. Calibrate sensor 2. Check the configuration of the calibration validity
106	F - Alarm, bad	Sensor TAG	Sensor TAG control The connected sensor has an invalid TAG or TAG group 1. Change sensor 2. Use new sensor of same type 3. Deactivate the TAG control
107	C - Warning, good	Calibration active	Sensor calibration is active, please wait.
108	M - Warning, good	SIP, CIP sensor	The configured max. number of sterilizations / cleanings is reached. Measurement is still possible. ► Replace sensor
109	M - Warning, good	SIP, CIP sensor cap	The configured max. number of sensor cap sterilizations / cleanings is reached. Measurement is still possible. ► Replace sensor cap
111	M - Warning, good	Operating time cap	Sensor cap operating time warning Measurement is still possible. The configured limit of the sensor cap operating time is reached. 1. Replace sensor cap 2. Adjust limit
113	F - Alarm, bad	Incompatible filter	Filter setting in sensor is incompatible 1. Switch to valid measurement filter in the sensor setup 2. Update device firmware 3. Contact service
118	F - Alarm, bad	Sensor glass break	Sensor glass breakage alarm Glass membrane impedance too low 1. Check glass electrode for cracks 2. Check the temperature of the medium 3. Replace sensor
120	F - Alarm, bad	Sensor reference	Sensor reference alarm Reference impedance too low 1. Check glass electrode for cracks 2. Check the temperature of the medium 3. Replace sensor

No.	Factory setting	Message	Tests or remedial action
122	F - Alarm, bad	Sensor glass	Sensor glass limit lower value exceeded Glass membrane impedance too low 1. Check the pH sensor, clean as needed 2. Check the configured glass limit value, correct as needed 3. Replace sensor
123	M - Warning, good	Sensor glass	Sensor glass limit lower value reached Glass membrane impedance low Measurement is still possible until alarm message 1. Check the pH sensor, clean as needed 2. Check the configured glass limit value, correct as needed 3. Replace sensor
124	F - Alarm, bad	Sensor glass	Sensor glass limit upper value exceeded Glass membrane impedance too high 1. Check the pH sensor, replace as needed 2. Check the glass limit value, correct as needed 3. Replace sensor
125	M - Warning, good	Sensor glass	Sensor glass limit upper value reached Glass membrane impedance high Measurement is still possible until alarm message 1. Check the pH sensor, clean as needed 2. Check the configured glass limit value, correct as needed 3. Replace sensor
128	F - Alarm, bad	Sensor leakage	Sensor leakage current alarm Sensor defective due to abrasion or damage ► Replace sensor
129	M - Warning, good	Sensor leakage current	Sensor leakage current warning Sensor defective due to abrasion or damage Measurement is still possible until alarm message ► Replace sensor
130	F - Alarm, bad	Sensor supply	Sensor check Sensor power supply bad 1. Check cable connections 2. Replace sensor
131	M - Warning, good	Sensor calibration	Sensor relaxation time underrange Measurement is still possible Possible reasons: ▪ High oxygen content ▪ Wrong calibration data 1. Repeat the calibration 2. Replace sensor cap
132	M - Warning, good	Sensor calibration	Sensor relaxation time overrange Measurement is still possible Possible reasons: ▪ Low oxygen content ▪ Wrong calibration data 1. Repeat the calibration 2. Replace sensor cap
133	F - Alarm, bad	Sensor signal	Sensor low signal decay ► Replace sensor cap
134	M - Warning, good	Sensor signal	Sensor low signal amplitude Measurement is still possible ► Replace sensor cap

No.	Factory setting	Message	Tests or remedial action
142	N - Disabled, good	Sensor signal	Sensor check No conductivity indication Possible reasons: ▪ Sensor in air ▪ Sensor defective 1. 2. Replace sensor
144	N - Disabled, good	Conductivity range	Conductivity out of meas. range Possible reasons: Sensor with wrong cell constant ► Use sensor with appr. cell constant
146	N - Disabled, good	Sensor temperature	Sensor temperature out of spec. range 1. Check temperature 2. Check measurement 3. Change sensor type
151	M - Warning, good	Sensor buildup	Sensor check High pollution degree 1. Clean sensor 2. Replace sensor
152	N - Disabled, good	Sensor data invalid	Sensor data No calibration data available ► Carry out air-set calibration
154	N - Disabled, good	Sensor data invalid	Sensor data No calibration data of sensor, factory settings are used. 1. Check calibration information of sensor 2. Calibrate cell constant
158	F - Alarm, bad	Sensor check	Measurement value invalid 1. Check sensor power supply 2. Restart device
160	M - Warning, good	Sensor data invalid	No calibration data available Possible reasons: Customer calibration data erased 1. Calibrate sensor 2. Choose other data set 3. Use factory calibration data set
164	N - Disabled, good	Sensor data invalid	Sensor data No calibration data of temperature sensor, factory settings are used. 1. Check calibration information of sensor 2. Calibrate temperature sensor
199	M - Warning, good	Operating time	Operating time warning Measurement is still possible. The configured limit of operating time is reached. 1. Replace sensor 2. Adjust limit
201	F - Alarm, bad	Electronics faulty	1. Restart device 2. Replace electronics
202	F - Alarm, bad	Selftest active	Selftest active, please wait

No.	Factory setting	Message	Tests or remedial action
243	F - Alarm, bad	Firmware failure	Firmware failure - internal 1. Update firmware 2. Replace backplane board 3. Contact service and report the indicated number
262	F - Alarm, bad	Module connection	Electronics module no communication 1. Check module connection 2. Replace electronics module 3. Check internal cable to module
263	F - Alarm, bad	Incomp. detected	Incompatibility detected The device configuration does not match the parameterization. 1. Check device settings 2. Check electronic module type 3. Update firmware
284	F - Alarm, bad	Firmware update	Firmware update active, please wait.
302	M - Warning, good	Battery low	Battery of real-time clock low In case of power outage time and date will be lost. ▶ Replace battery
384	F - Alarm, bad	Unspecific failure	Unspecific failure 1. Update software 2. Check external fieldbus configuration 3. Check connected sensors 4. Contact service and report the indicated number
412	C - Warning, good	Download active	Download active, please wait.
413	C - Warning, good	Upload active	Upload active, please wait. Measurement is still not possible. User interface is locked.
436	M - Warning, good	Date/time incorrect	Check date and time settings
445	C - Warning, good	Housing open	Transmitter housing open ▶ Close housing and tighten the screws.
460	S - Warning, uncertain	Output below limit	Current output below limit Measurement value out of spec. range Possible reasons: ▪ Sensor / sample line in air ▪ Air cushion in assembly ▪ Wrong sensor inflow ▪ Sensor / sample line dirty 1. Check application 2. Check the current output parameterization 3. Clean sensor / sample line
461	S - Warning, good	Output above limit	Current output above limit Measurement value out of spec. range Possible reasons: ▪ Sensor / sample line in air ▪ Air cushion in assembly ▪ Wrong sensor inflow ▪ Sensor / sample line dirty 1. Check application 2. Check configuration of current output 3. Clean sensor / sample line

No.	Factory setting	Message	Tests or remedial action
488	C - Warning, good	Simulation active	Simulation active, please wait. Simulation can be stopped in the device settings, or by restarting the device
505	M - Warning, good	Sensor calibration	Max. zero point (pH/Disinfection (Di)/DO) / offset (ORP) warning Measurement is still possible until alarm message. Possible reasons: ▪ Sensor aged or defective ▪ pH/ORP: diaphragm blocked ▪ pH/ORP: buffer solution expired or contaminated ▪ Di/DO: electrolyte consumed ▪ Di/DO: sensor pin damaged 1. Check sensor, replace as necessary 2. Check buffer or electrolyte, replace as necessary 3. Repeat the calibration
507	M - Warning, good	Sensor calibration	Min. zero point (pH/Disinfection (Di)/DO) / offset (ORP) warning Measurement is still possible until alarm message. Possible reasons: ▪ Sensor aged or defective ▪ pH/ORP: diaphragm blocked ▪ pH/ORP: buffer solution expired or contaminated ▪ Di/DO: electrolyte consumed ▪ Di/DO: sensor pin damaged 1. Check sensor, replace as necessary 2. Check buffer or electrolyte, replace as necessary 3. Repeat the calibration
509	M - Warning, good	Sensor calibration	Min. slope warning Measurement is still possible until alarm message. Possible reasons, depending on sensor type: ▪ Sensor aged or defective ▪ Diaphragm blocked ▪ Buffer solution expired or contaminated ▪ Electrolyte consumed ▪ Sensor pin damaged 1. Check sensor, replace as necessary 2. Check buffer or electrolyte, replace as necessary 3. Repeat the calibration
511	M - Warning, good	Sensor calibration	Max. slope warning Measurement is still possible until alarm message. Possible reasons, depending on sensor type: ▪ Sensor aged or defective ▪ Diaphragm blocked ▪ Buffer solution expired or contaminated ▪ Electrolyte consumed ▪ Sensor pin damaged 1. Check sensor, replace as necessary 2. Check buffer or electrolyte, replace as necessary 3. Repeat the calibration

No.	Factory setting	Message	Tests or remedial action
515	M - Warning, good	Sensor calibration	Max. operation point warning Measurement is still possible until alarm message. Possible reasons: ▪ Sensor aged or defective ▪ Diaphragm blocked ▪ Buffer solution expired or contaminated 1. Check sensor, replace as necessary 2. Check buffer, replace as necessary 3. Repeat the calibration
517	M - Warning, good	Sensor calibration	Min. operation point warning Measurement is still possible until alarm message. Possible reasons: ▪ Sensor aged or defective ▪ Diaphragm blocked ▪ Buffer solution expired or contaminated 1. Check sensor, replace as necessary 2. Check buffer, replace as necessary 3. Repeat the calibration
518	M - Warning, good	Sensor calibration	Delta slope warning Measurement is still possible. The calibration shows a large change of sensor slope. 1. Check sensor, replace as necessary 2. Check buffer or electrolyte, replace as necessary 3. Repeat the calibration
520	M - Warning, good	Sensor calibration	Delta zero point warning Measurement is still possible. The calibration shows a large change of sensor zero point. 1. Check sensor, replace as necessary 2. Check buffer or electrolyte, replace as necessary 3. Repeat the calibration
522	M - Warning, good	Sensor calibration	Delta working point warning Measurement is still possible The calibration shows a large change of sensor working point 1. Check sensor, replace as necessary 2. Check buffer, replace as necessary 3. Repeat the calibration
534	M - Warning, good	Electrolyte warning	Electrolyte consumption warning The configured limit of electrolyte consumption is reached. Measurement is still possible. 1. Replace electrolyte and if applicable membrane cap. Reset counters. 2. Replace sensor
535	M - Warning, good	Sensor check	The configured max. number of sensor cap calibrations reached Measurement is still possible. ▶ Replace sensor cap
550	S - Warning, good	Process temperature	Concentration measurement: Process temperature below concentration table Possible reasons: Process value out of specification If custom table: Concentration table not complete ▶ Expand concentration table

No.	Factory setting	Message	Tests or remedial action
551	S - Warning, good	Process temperature	Concentration measurement: Process temperature above concentration table Possible reasons: Process value out of specification If custom table: Concentration table not complete ► Expand concentration table
552	S - Warning, good	Conductivity low	Concentration measurement: Process conductivity below concentration table Possible reasons: Process value out of specification If custom table: Concentration table not complete ► Expand concentration table
553	S - Warning, good	Conductivity high	Concentration measurement: Process conductivity above concentration table Possible reasons: Process value out of specification If custom table: Concentration table not complete ► Expand concentration table
554	S - Warning, good	Concentration low	Concentration measurement: Process concentration below concentration table Possible reasons: Process value out of specification If custom table: Concentration table not complete ► Expand concentration table
555	S - Warning, good	Concentration high	Concentration measurement: Process concentration above concentration table Possible reasons: Process value out of specification If custom table: Concentration table not complete ► Expand concentration table
556	S - Warning, good	Temperature low	Conductivity measurement: Process temperature below compensation table Possible reasons: ▪ Process value out of specification ▪ Concentration table not complete ► Expand concentration table
557	S - Warning, good	Temperature high	Conductivity measurement: Process temperature above compensation table Possible reasons: ▪ Process value out of specification ▪ Concentration table not complete ► Expand concentration table
558	S - Warning, good	Conductivity low	Conductivity measurement: Process conductivity below compensation table Possible reasons: ▪ Process value out of specification ▪ Concentration table not complete ► Expand concentration table

No.	Factory setting	Message	Tests or remedial action
559	S - Warning, good	Conductivity high	Conductivity measurement: Process conductivity above compensation table Possible reasons: ▪ Process value out of specification ▪ Concentration table not complete ► Expand concentration table
560	S - Warning, good	Conduc. compensation	Conductivity measurement: Conductivity compensation below compensation table Possible reasons: ▪ Process value out of specification ▪ Concentration table not complete ► Expand concentration table
561	S - Warning, good	Conduc. compensation	Conductivity measurement: Conductivity compensation above compensation table Possible reasons: ▪ Process value out of specification ▪ Concentration table not complete ► Expand concentration table
703	F - Alarm, bad	Temp. sensor wiring	Temperature sensor wiring wrong ► Correct wiring of temperature sensor
724	F - Alarm, bad	Sensor reference	Sensor reference limit upper value exceeded Reference membrane impedance too high 1. Check the sensor, replace as needed 2. Check the reference limit value, correct as needed 3. Replace sensor
725	M - Warning, good	Sensor reference	Sensor reference limit upper value reached Reference membrane impedance high Measurement is still possible until alarm message 1. Check the sensor, replace as needed 2. Check the reference limit value, correct as needed 3. Replace sensor
734	M - Warning, good	Calibration quality	Min. calibration quality warning Measurement is still possible. The calibration quality shows a large change since last calibration. 1. Repeat the calibration 2. Check sensor, replace as necessary
740	F - Alarm, bad	Sensor defective	Sensor defective Internal sensor connection broken 1. Replace sensor 2. Contact service
801	F - Alarm, bad	Supply voltage	Supply voltage too low. ► Increase supply voltage.
816	C - Warning, good	Hold active	Hold active, please wait. Operation mode with modified measurement output Output and status of all channels on hold
832	N - Disabled, good	Temp. range exceeded	Out of temperature range 1. Check application 2. Check sensor
841	N - Disabled, good	Operating range	Process value out of operating range 1. Check application 2. Check sensor

No.	Factory setting	Message	Tests or remedial action
892	F - Alarm, bad	Internal failure	Internal failure with device restart
914	M - Warning, good	USP / EP Alarm	USP / EP Alarm Conductivity limit for USP or EP exceeded ► Check process
915	M - Warning, good	USP / EP warning	USP / EP warning Conductivity value close to the limit for USP or EP ► Check process
942	N - Disabled, good	Process value	Process value high Possible reasons: ▪ Sensor in air ▪ Air cushion in assembly ▪ Wrong sensor installation ▪ Sensor defective 1. No process value increase 2. Check measurement 3. Change sensor type
943	N - Disabled, good	Process value	Process value low Possible reasons: ▪ Sensor in air ▪ Air cushion in assembly ▪ Wrong sensor installation ▪ Sensor defective 1. No process value increase 2. Check measurement 3. Change sensor type
984	S - Warning, good	Process temperature	Process temperature out of specified range 1. Check process temperature 2. Check measurement
987	M - Warning, good	Calibration required	Due to a sensor maintenance a calibration is required.

11.8 Diagnostic list

Displays:
List of active diagnostic messages

► Navigate to the path: **Menu/Diagnostics/Diagnostic list**

11.9 Simulation

Certain parameters can be simulated for test purposes:
- Current value of the current outputs
- Primary value
- Temperature

► Navigate to the path: **Menu/Diagnostics/Simulation**

An activation code is required for the simulation of current output 2. In addition, the current output has to be enabled in the following menu path:

Menu/Application/Current output/Current output 2

11.10 Firmware history

Date	Version	Changes to firmware	Documentation
02/2025	01.00.00	Release	BA02380C/07/EN/01.25
05/2026	01.01.00	Full operation via Bluetooth Support for analog sensors	BA02380C/07/EN/02.26

11.10.1 Firmware update

Firmware updates are installed via a mobile device and the SmartBlue app.

The current firmware version and device type can be found under: **Menu/System/Information/Device**

Information about firmware updates can be found in the sales office or on the www.endress.com/CM42B product page.

Preliminaries

1. Download the firmware update package (.zip) and save it to the mobile device. The current firmware update package can be found in the Download area on the product page at www.endress.com/CM42B.
2. Unpack the zip archive. A separate app is required for this depending on the operating system of the mobile device.
3. Open the unpacked file (ends with*. sfu) using the SmartBlue app. To do this, tap the file at the storage location. If the mobile device offers multiple apps to open, select the SmartBlue app.

Installing the firmware update

The device does not display any measured values during installation of the firmware update.

NOTICE

The firmware update can take up to one hour to install depending on the device configuration and the mobile device.

Malfunction due to incomplete firmware installation

- Ensure the mobile device has sufficient battery charge. Connect to the power supply if necessary.
- Do not disconnect the Bluetooth connection when installing.

1. Connect the device with the SmartBlue app (see → 48) and log in with the "admin" account or another account with the required authorization.
   ↳ Navigate to the path: **Menu/System/Device management/Firmware update**:
2. Follow the instructions.
   ↳ The firmware update is installed.
   The device restarts following the installation.

11.11 Exporting service data

Service information (device data, logbooks) can be exported to a zip archive via the SmartBlue app. Logbooks are* .xlsx files. Device data are* .csv files.

Exporting service data

1. Launch the SmartBlue app and log in with the "admin" account.
   ↳ Navigate to the path: **Menu/Guidance/Export/Import/Service data export**:

2. Follow the instructions in the wizard.
   ↳ The service data are saved to the mobile device.

12 Maintenance

The maintenance of the measuring point comprises:
- Sensor calibration
- Cleaning the transmitter, assembly and sensor
- Checking cables and connections.

⚠ WARNING

Process pressure and temperature, contamination

Risk of serious or fatal injury

▶ If the sensor has to be removed during maintenance work, avoid dangers posed by pressure, temperature and contamination.

NOTICE

Electrostatic discharge (ESD)

Risk of damaging the electronic components

▶ Take personal protective measures to avoid ESD, such as discharging beforehand to earth or permanent grounding with a wrist strap.

12.1 Maintenance tasks

12.1.1 Cleaning the device

▶ Clean the front of the housing using commercially available cleaning agents only.

The front is resistant to:
- Ethanol (for a short time)
- Diluted acids (max. 2% HCl)
- Diluted bases (max. 3% NaOH)
- Soap-based household cleaning agents

Cleaning agents not permitted

Damage to the housing surface or housing seal possible!

▶ Never use concentrated mineral acids or alkaline solutions for cleaning.
▶ Never use organic cleaners such as acetone, benzyl alcohol, methanol, methylene chloride, xylene or concentrated glycerol cleaner.
▶ Never use high-pressure steam for cleaning.

12.1.2 Replacing the sensor on Memosens devices

1. Navigate to the path: **Menu/Guidance/Sensor change**:
2. Follow the instructions in the wizard.

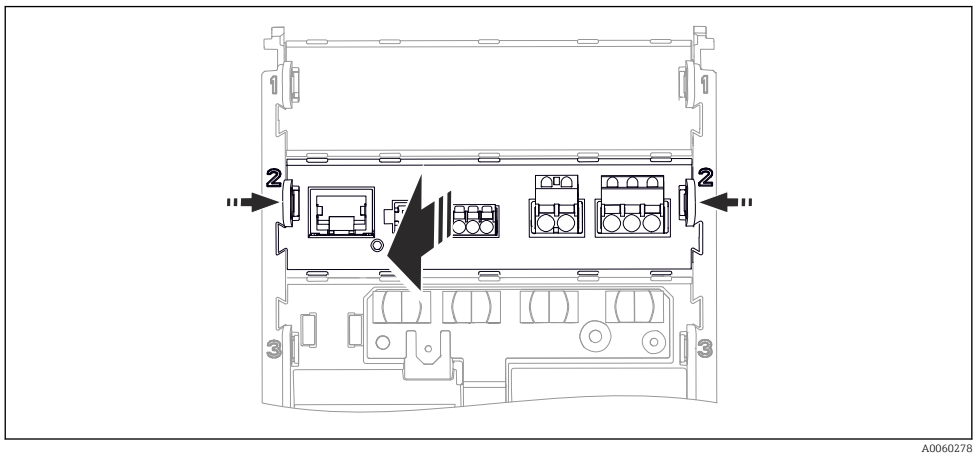
12.1.3 Replacing the sensor on analog devices

1. De-energize the device. To do this, disconnect all the current input and current output cables.
2. Replace the sensor. For sensor connection, see → 30
3. Reconnect the device.
4. Perform commissioning. To do so, run the wizard under **Menu/Guidance/Analog sensor commissioning**.

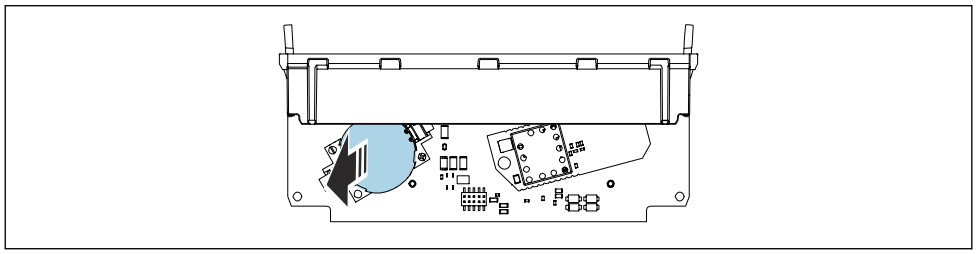
12.1.4 Replacing the battery

Only use battery types approved by the manufacturer.

The approved battery types are specified on the internal label of the base module.

1. Disconnect all the cables that are connected to slot 2 of the base module.
   ↳ to de-energize the device.
2. 

A0060278

   Remove the base module from slot 2. To do this, press the locking clips on the sides together.
3. 
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   Remove the battery at the bottom of the base module.
4. Insert the new battery.
5. Plug the base module back in.
6. Reconnect the device.

13 Repair

13.1 General information

- Only use spare parts from Endress+Hauser to guarantee the safe and stable functioning of the device.

Detailed information on the spare parts is available at:
www.endress.com/device-viewer

13.2 Return

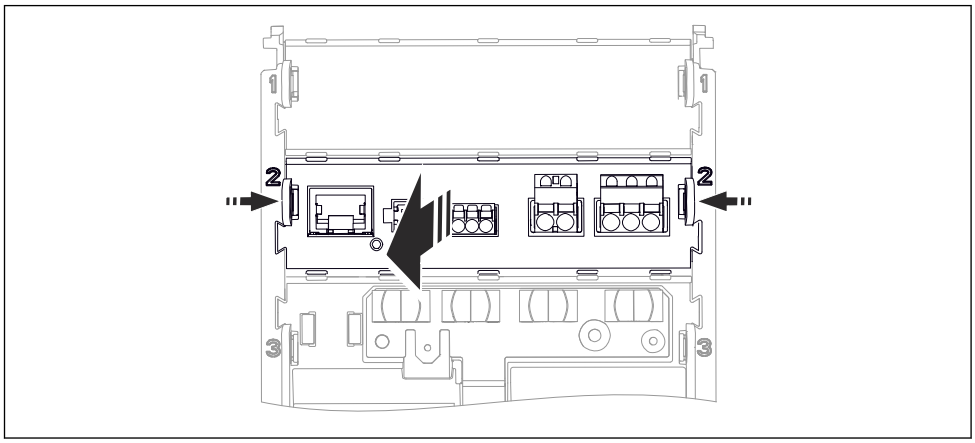
The product must be returned if repairs or a factory calibration are required, or if the wrong product was ordered or delivered. As an ISO-certified company and also due to legal regulations, Endress+Hauser is obliged to follow certain procedures when handling any returned products that have been in contact with medium.

www.endress.com/support/return-material

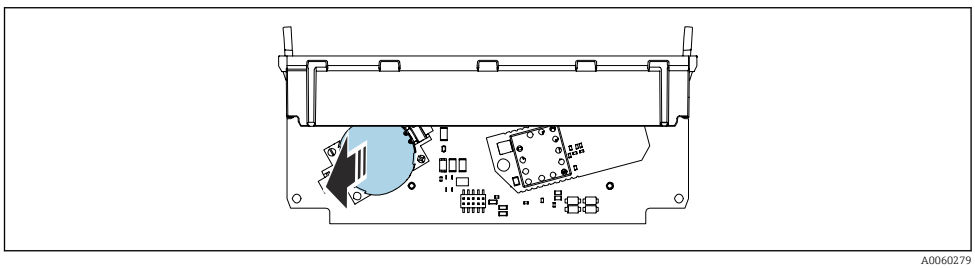
13.3 Disposal

The device contains electronic components. The product must be disposed of as electronic waste.

- Observe the local regulations.

1. Disconnect all the cables that are connected to slot 2 of the base module.
   ↳ to de-energize the device.
2. 

A0060278

   Remove the base module from slot 2. To do this, press the locking clips on the sides together.
3. 

A0060279

   Remove the battery at the bottom of the base module.

If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

- Follow the instructions in the Security Manual to ensure safe disposal in accordance with cybersecurity guidelines.
- If necessary, reset the device for decommissioning or for resale to delete all data before disconnecting it from the power supply. See → 59

14 Accessories

The latest list of accessories, all compatible sensors and activation codes is provided on the product page: www.endress.com/CM42B

15 Technical data

15.1 Input

Measured variable

- pH
- ORP
- pH/ORP
- Conductivity
- Dissolved oxygen

Measuring range

→ Documentation of the connected sensor

Type of input

Depending on the ordered variant, the device has one of the following types of input:
- Digital sensor input for Memosens sensors
- Sensor input for analog sensors
  - pH/ORP
  - Conductivity, inductive
  - Conductivity, conductive

Memosens input

Cable specifications

- Memosens data cable or fixed sensor cable, in each case with ferrules
- Cable length max. 100 m (330 ft)

pH/ORP analog input

Cable specifications

Analog pH sensors and analog ORP sensors from Endress+Hauser
- Recommended cable length max. 30 m (98 ft)
- For cable types, see the documentation of the connected sensor

Pfaudler electrodes type 03/04, type 18, type 40, pH Reiner
Cable length max. 10 m

Temperature sensors

- Pt100
- Pt1000

Input impedance

> 10^{12} Ω (at rated operating conditions)

Input leakage current

< 10^{-13} A (at rated operating conditions)

Analog input of conductivity, measured inductively

Cable specifications

- Cable length max. 55 m (180 ft)
- For cable types, see the documentation of the connected sensor

Temperature sensors

- Pt100
- Pt1000

Analog input of conductivity, measured conductively

Cable specifications

- Cable length max. 15 m (49.2 ft)
- For cable types, see the documentation of the connected sensor

Temperature sensors

- Pt100
- Pt1000

15.2 Output

Output signal

Passive current output

Current output 1
- 4 to 20 mA, optionally with HART support
- Galvanic isolations
  - Against current output 2
  - Depends on the device version against the analog sensor input

Current output 2 (optional)
- 4 to 20 mA
- Galvanic isolations
  - Against current output 1
  - Depends on the device version against the analog sensor input or against the Memosens input

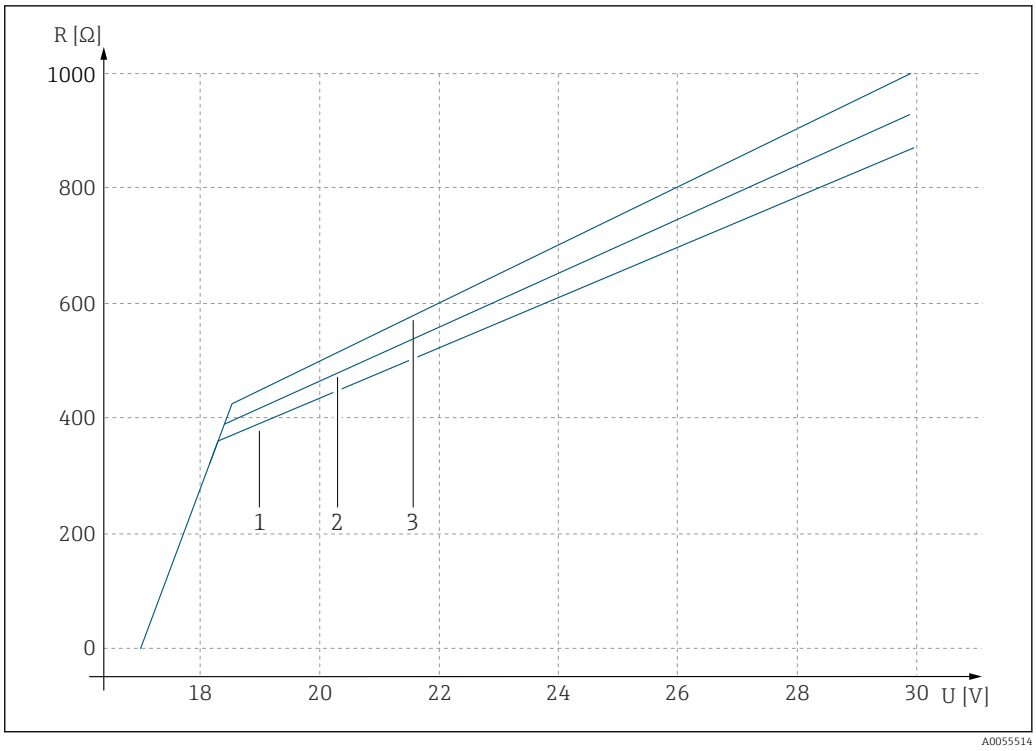
HART	
Signal encoding	FSK ± 0.5 mA above current signal
Data transmission	1200 baud
Galvanic isolation	See current output 1
Load (communication resistor)	250 Ω

Signal on alarm as per NAMUR NE 43

The following values can be selected:
- < **3.6 mA**
- 21.5 mA
- 22.0 mA
- 22.5 mA
- 23.0 mA

Load

For load, see characteristic curve.



U Supply voltage [V]
R Load [Ω]
1 Max. load with configured failure current 23 mA
2 Max. load with configured failure current 21.5 mA
3 Max. load with configured failure current < 3.6 mA

Output span 3.6 to 23 mA

15.3 Protocol-specific data

HART

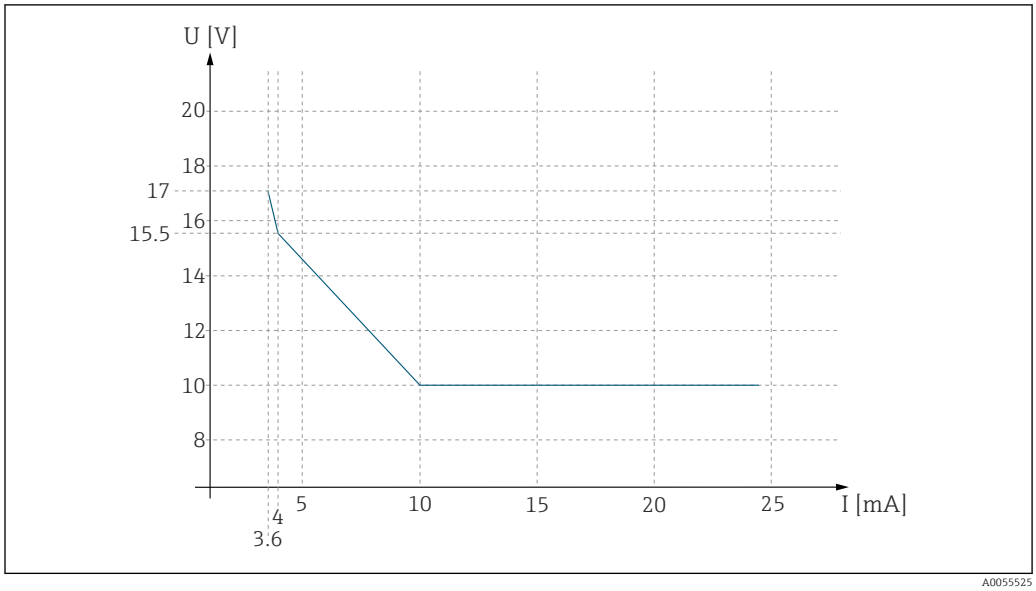
Manufacturer ID	0x0011
Device type	0x11A4 (pH), 0x11A5 (conductivity), 0x11A6 (oxygen)
Device revision	1
Manufacturer name	Endress+Hauser
Model name	Depends on the measuring principle
HART version	7.9
Device description files (DD/DTM)	www.endress.com/hart https://www.fieldcommgroup.org/registered-products Device Integration Manager DIM
Device variables	PV, SV, TV and QV can be selected from all device variables. All measured values are each available as a device variable.
Supported features	FDI packages

15.4 Power supply

Supply voltage

The power supply must comply with the relevant safety requirements and be separated from the mains voltage by double or reinforced insulation. (ELV)

- For supply voltage, see characteristic curve
- Max. supply voltage: 30 V DC



54 *Min. supply voltage at the transmitter depending on the output current*

U Supply voltage [V DC]
I Output current [mA]

Cable specification

Qualified cable glands

Cable gland	Clamping area, permitted cable diameter
M20x1.5	6 to 12 mm (0.24 to 0.47 in) 5 to 9 mm (0.2 to 0.35 in)
NPT1/2 via M20x1.5 to NPT1/2 adapter	6 to 12 mm (0.24 to 0.47 in) 5 to 9 mm (0.2 to 0.35 in)
G1/2 via M20x1.5 to G1/2 adapter	7 to 12 mm (0.28 to 0.47 in) 4 to 9 mm (0.16 to 0.35 in)

Cable cross-section

Terminal connector is suitable for strands and ferrules.

Cable cross-section: 0.25 mm^2 (≙23 AWG) to 2.5 mm^2 (≙12 AWG)

15.5 Performance characteristics

Response time of current output

t_{90} = max. 500 ms for an increase from 4 to 20 mA

Memosens measurement error

Thanks to digital data transmission, the measured value supplied by the sensor is passed on exactly at the sensor input. The accuracy depends solely on the connected sensor and the quality of its adjustment.

Tolerance, current outputs

Tolerance at ambient temperature 20 °C (77 °F):
- At output current 20 mA: ±50 µA
- At output current 4 mA: ±20 µA

15.6 Environment

Ambient temperature	**Non-Ex version** -30 to 70 °C (-20 to 160 °F) For Ex versions, please refer to the relevant safety instructions (XA) on the online product pages.
Storage temperature	-40 to +80 °C (-40 to 176 °F)
Operating height	<3000 m (6500 ft)
Relative humidity	10 to 95 %, non-condensing
Degree of protection	IP66/67 as per IEC 60529 Housing protection rating NEMA Type 4X as per UL 50E
Electromagnetic compatibility	According to IEC 61326-1 ▪ Interference immunity: Table 2 (industrial environments) ▪ Interference emission: Class B (residential environments)
Pollution degree	The product is suitable for pollution degree 3 according to EN 61010-1.

15.7 Mechanical construction

Dimensions	See → 🖹 12
Weight	**Plastic housing** 1.5 kg (3.3 lbs) **Stainless steel housing** 4 kg (8.8 lbs)

Materials

Plastic housing	
Housing	PC-FR (polycarbonate, flame-retarding)
Mounting plate	PC-FR (polycarbonate, flame-retarding)
Housing seals	EPDM

Stainless steel housing	
Housing	Stainless steel 1.4408
Mounting plate	Stainless steel 1.4408
Housing seals	EPDM

Other materials	
Cable glands	PA
Sealing plug	PA
Adapter for G or NPT cable glands (plastic housing)	PA
Adapter for G or NPT cable glands (stainless steel housing)	Stainless steel 1.4404

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