

Brief Operating Instructions

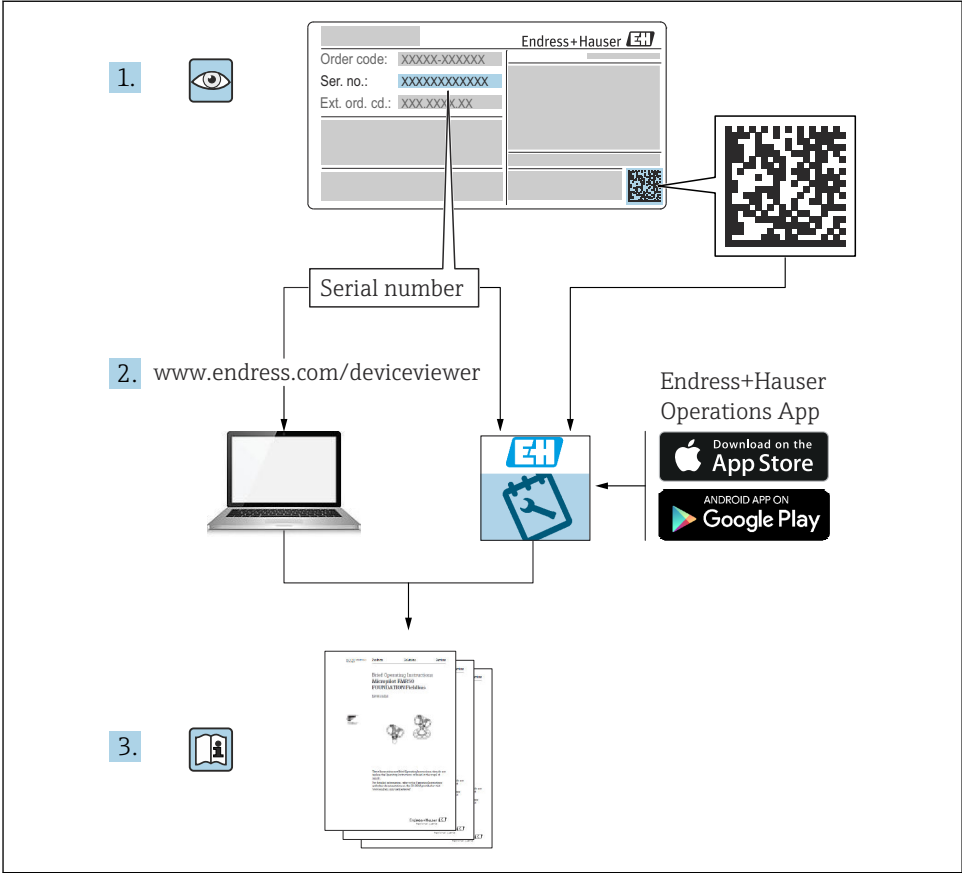
Liquicap T

FMI21

Capacitive
Continuous level measurement for conductive
liquids



1 Related documents



A0023555

2 Document information

2.1 Used symbols

2.1.1 Safety symbols

DANGER

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

⚠ WARNING

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠ CAUTION

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE

This symbol contains information on procedures and other facts which do not result in personal injury.

2.1.2 Electrical symbols**⊕ Protective earth (PE)**

Ground terminals that must be connected to ground prior to establishing any other connections.

The ground terminals are located on the interior and exterior of the device:

- Interior ground terminal: protective earth is connected to the mains supply.
- Exterior ground terminal: device is connected to the plant grounding system.

2.1.3 Tool symbols

Flat blade screwdriver



Open-ended wrench

2.1.4 Symbols for certain types of information and graphics**Permitted**

Procedures, processes or actions that are permitted

**Forbidden**

Procedures, processes or actions that are forbidden

**Tip**

Indicates additional information



Reference to documentation



Reference to graphic



Notice or individual step to be observed

1., 2., 3.

Series of steps

1, 2, 3, ...

Item numbers

A, B, C, ...

Views



LED not lit



LED lit



LED flashes

3 Basic safety instructions

3.1 Requirements for the personnel

The personnel must fulfill the following requirements to carry out the necessary tasks:

- ▶ Are trained, qualified to perform specific functions and tasks.
- ▶ Are authorized by the plant owner or operator to perform specific tasks.
- ▶ Are familiar with federal or national regulations.
- ▶ Have read and understood the instructions in the manual and supplementary documentation.
- ▶ They follow instructions and comply with conditions.

3.2 Workplace safety

For work on and with the device:

- ▶ Wear the required protective equipment according to federal or national regulations.

3.3 Operational safety

When performing configuration, testing, and maintenance work on the device, alternative supervisory measures must be taken to guarantee the operational safety and process safety.

3.3.1 Ex-area

When using the measuring system in Ex-areas, the appropriate national standards and regulations must be observed. Separate Ex-documentation, which constitutes an integral part of this documentation, is supplied with the device. The installation procedures, connection data and safety instructions it contains must be observed.



See Operating Instructions →  2



- Make sure that the technical staff has adequate training.
- The special measuring and safety-related requirements for the measuring points must be observed.

3.4 Product safety

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

It meets general safety standards and legal requirements. It is compliant with the EC directives listed in the device-specific EC Declaration of Conformity. Endress+Hauser confirms this by affixing the CE mark to the device.

4 Incoming acceptance and product identification

4.1 Incoming acceptance

Check whether the packaging or content is damaged. Check that the goods delivered are complete and compare the scope of delivery with the information in your order.

4.2 Product Identification

Check nameplate data.



See Operating Instructions →  2

4.3 Storage temperature

-40 to +80 °C (-40 to +176 °F)

5 Mounting

5.1 Mounting requirements

- Do not handle the probe by the rods!
- Do not bend the rods!
- Do not extend the rods!

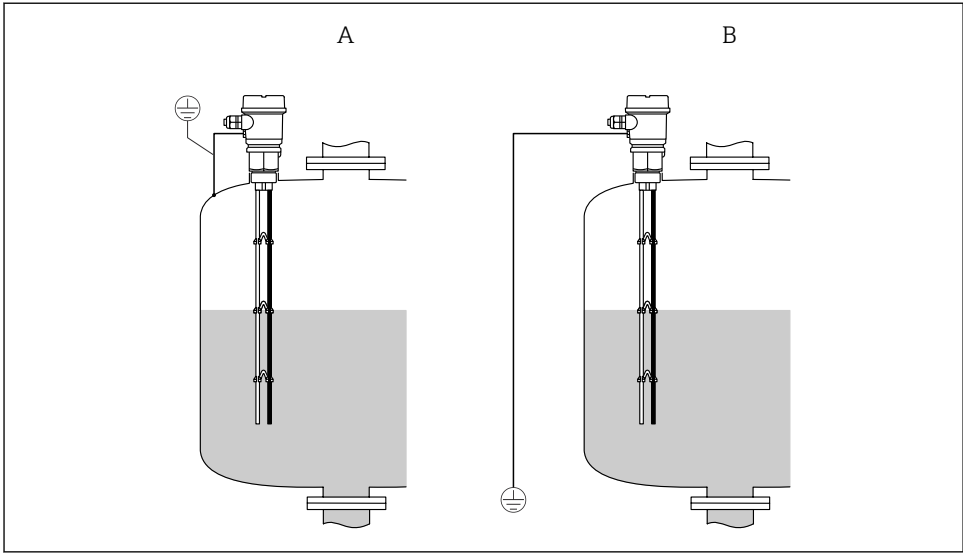


See Operating Instructions →  2

5.2 Mounting the measuring device

Mounting location

The probe can be mounted on top of the tank.

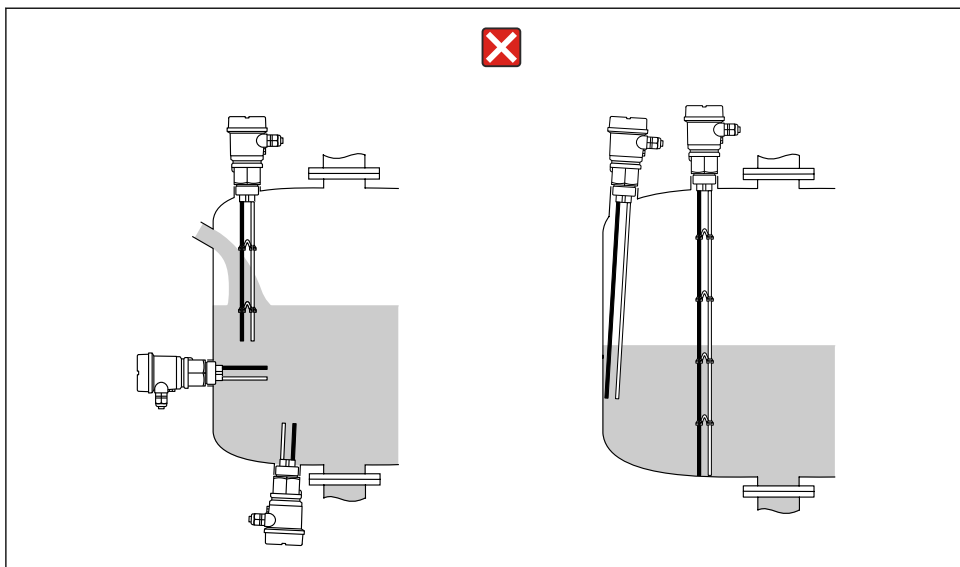


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1 Probe mounting



A Metal tank

B Plastic tank




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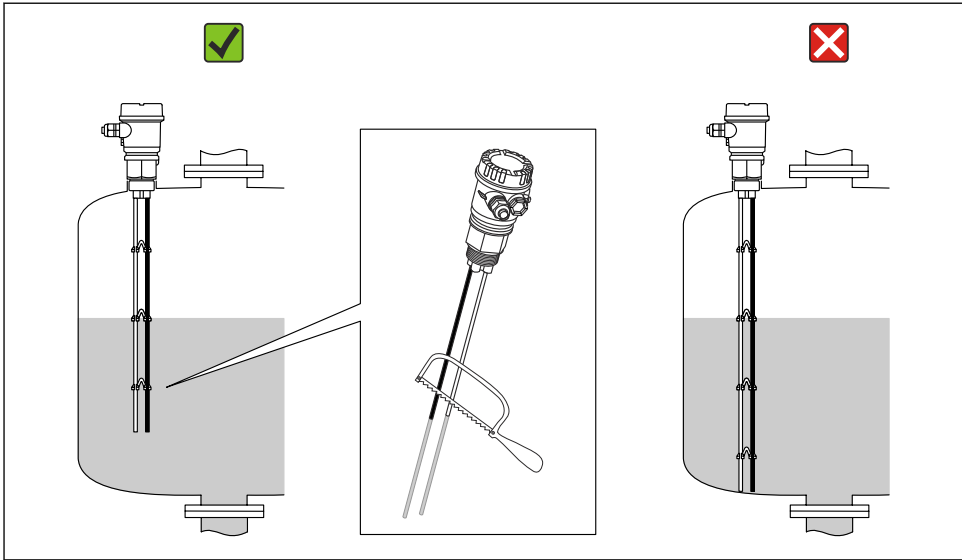
2 *Incorrect mounting*

 See Operating Instructions →  2

5.3 Rods shortening

5.3.1 Shortening

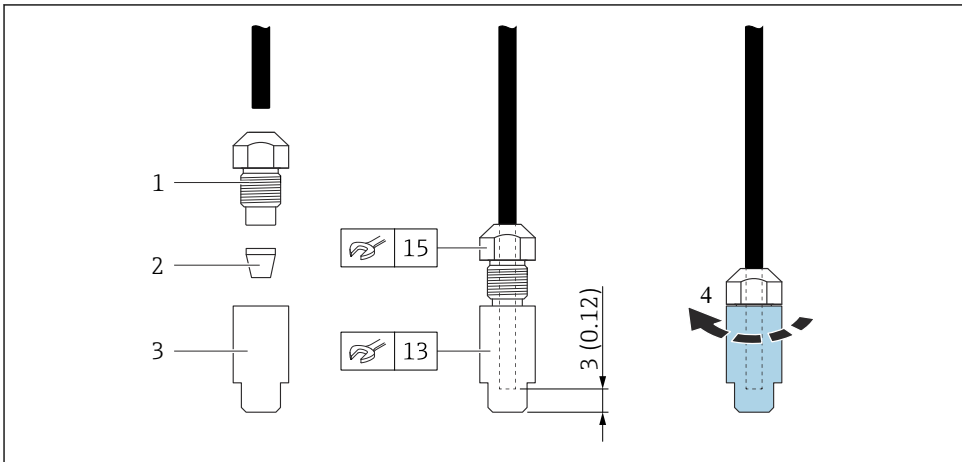
 Do not damage insulation at any other points!



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3 Shortening the rods

5.3.2 Probe shortening set

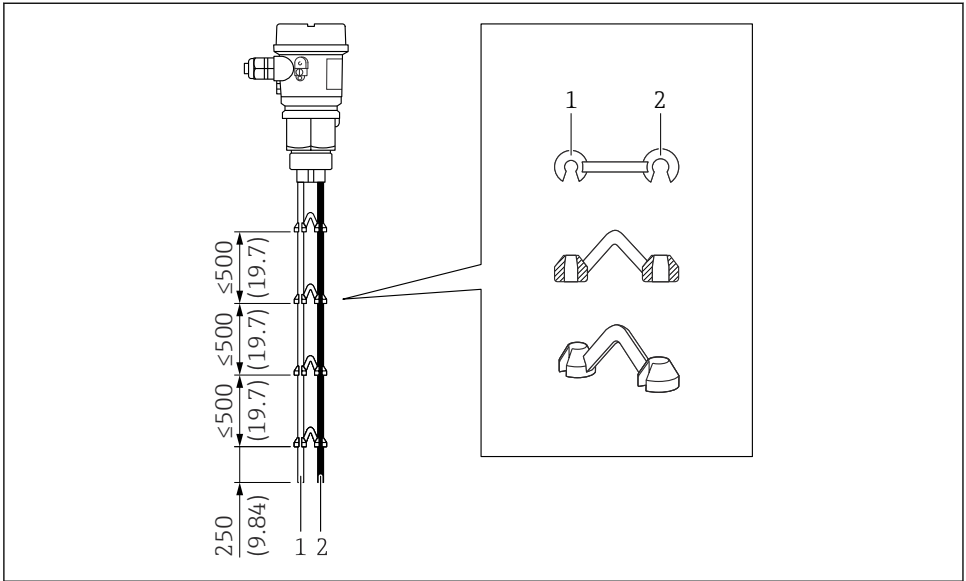


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4 Probe shortening

- 1 Eye screw
- 2 Sealing ring
- 3 Insulating cap
- 4 Tighten to the stop

5.3.3 Rod spacer



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5 Rod spacer

- 1 Metal rod
- 2 Insulated rod

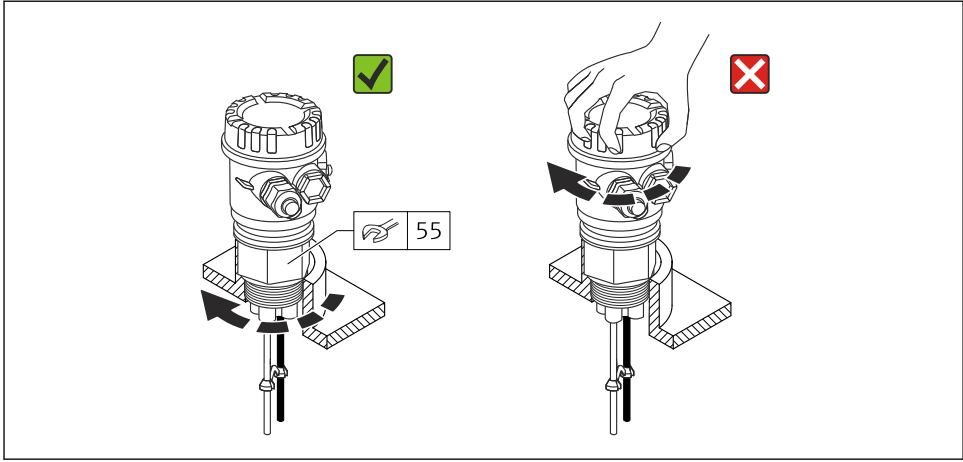
5.3.4 Probe mounting

G 1½



Maximum pressure p_e is 10 bar (145 psi)

Maximum torque 80 to 100 Nm (59.0 to 73.7 lbf ft)

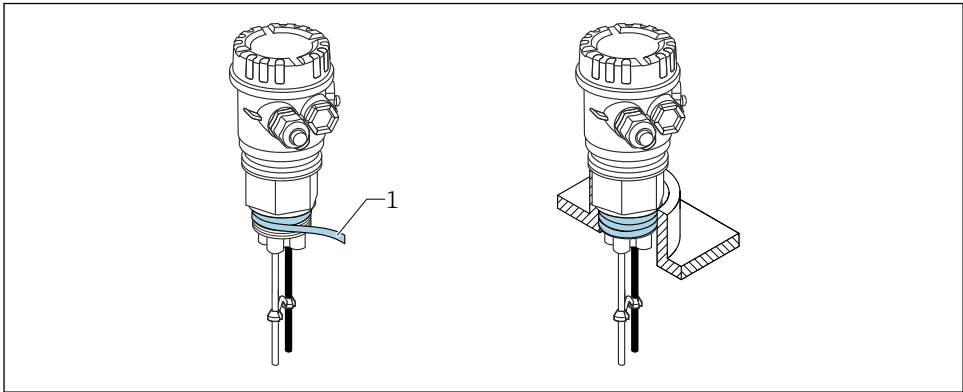


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6 Probe mounting G 1 1/2

NPT 1 1/2

- Maximum pressure p_e is 10 bar (145 psi)
- Maximum torque 40 to 80 Nm (29.5 to 59.0 lbf ft)



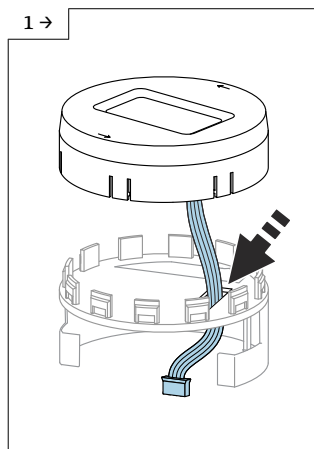
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7 Probe mounting NPT 1 1/2

1 PTFE sealing tape

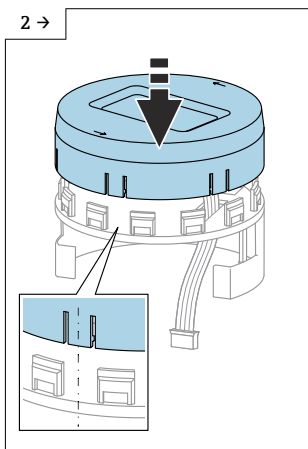
5.4 Mounting the optional display

Mounting the display



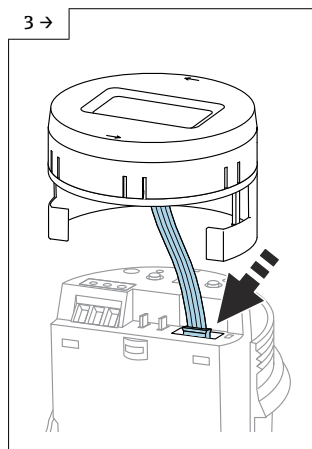
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- Insert the display cable through the slot in the holder.



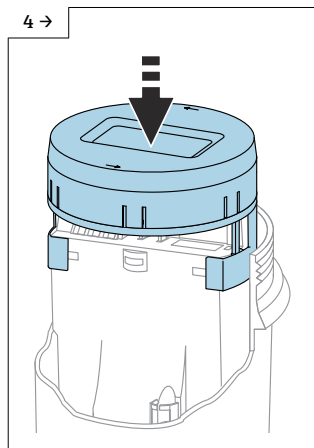
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- Place the display on the holder.



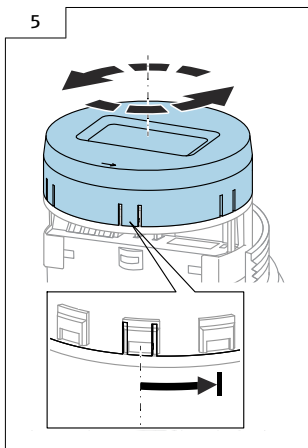
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- Connect the display to the electronic insert.



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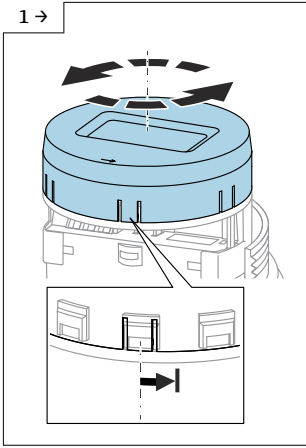
- Place and lock the holder on the electronic insert.



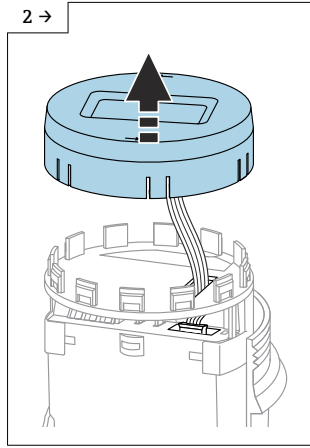
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- Rotate the display by an angle of 30° to the desired position.
- A double clicking sound indicates 30° rotation.

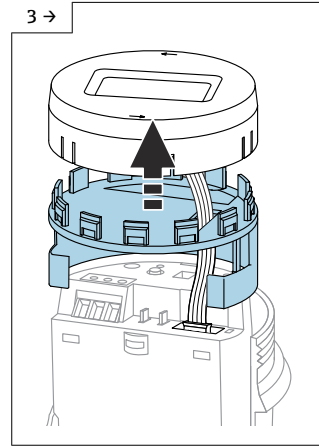
Unmounting the display



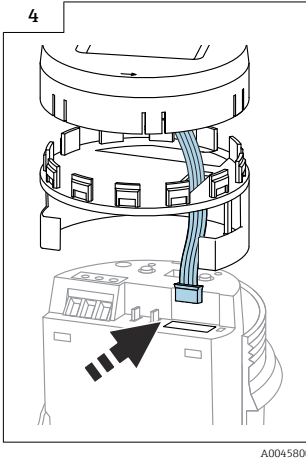
- Rotate the display by an angle of 15°.
- A one clicking sound indicates 15° rotation.



- Pull up the display.



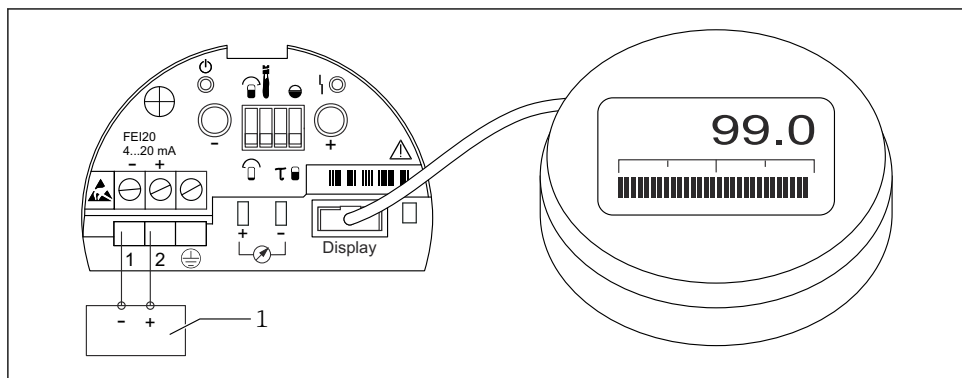
- Pull up the display holder.




- Disconnect the display.

6 Electrical connection



6.1 Connecting the measuring device



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 8 Connection of the electronic insert FEI20

1 Transmitter power supply unit

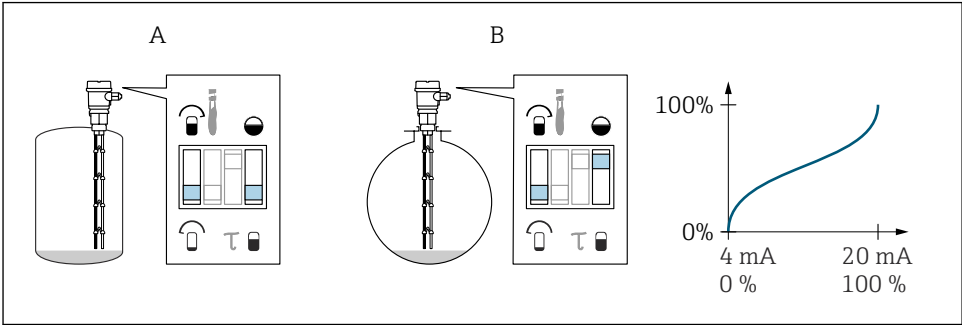
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7 Commissioning

7.1 Operation options

 See Operating Instructions →  2

7.2 Empty calibration



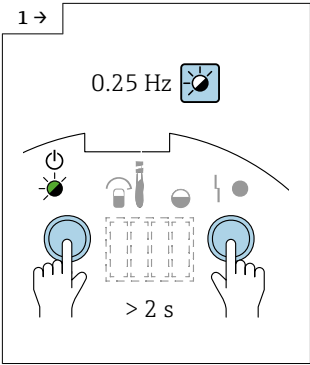
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9 Empty calibration

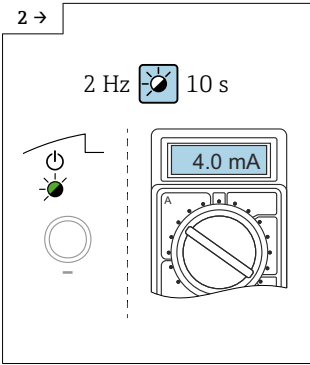
A Vertical tank

B Cylindrical tank in the horizontal position and active linearization

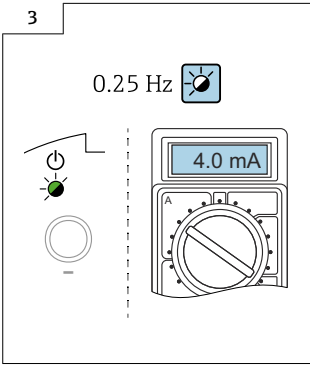
Setting empty calibration without display



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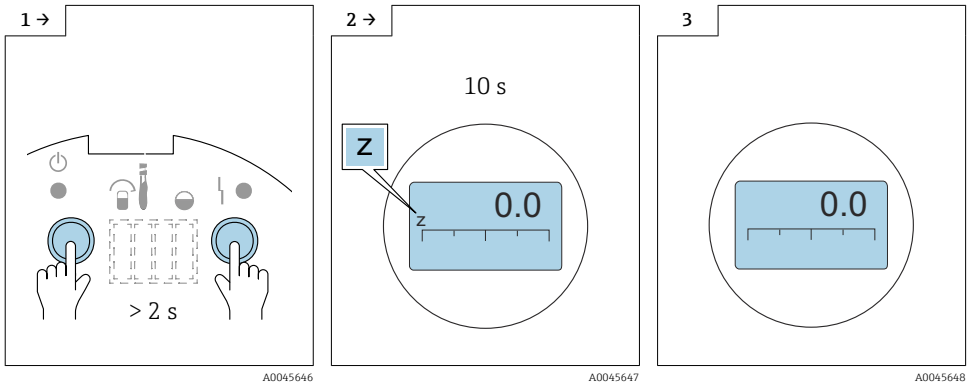


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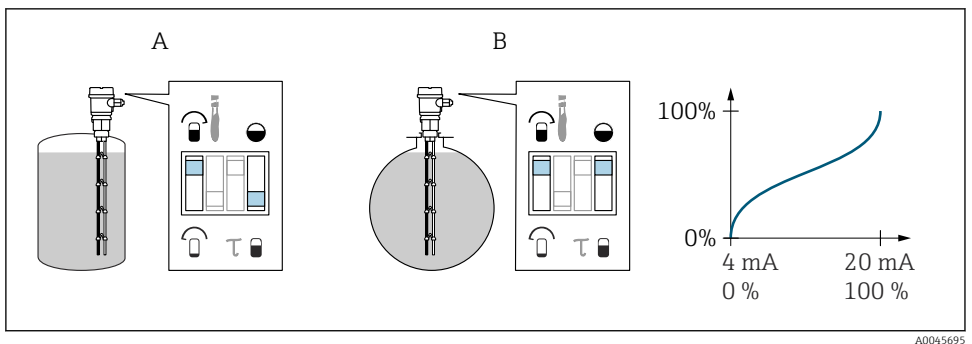


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Setting empty calibration with display



7.3 Full calibration

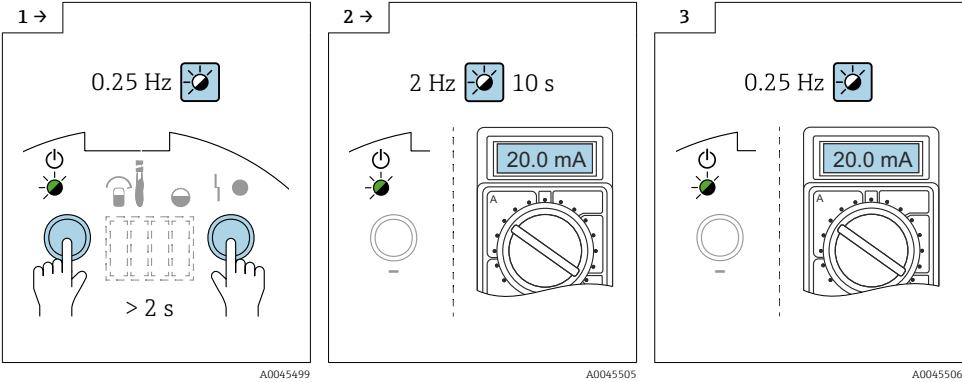


10 Full calibration

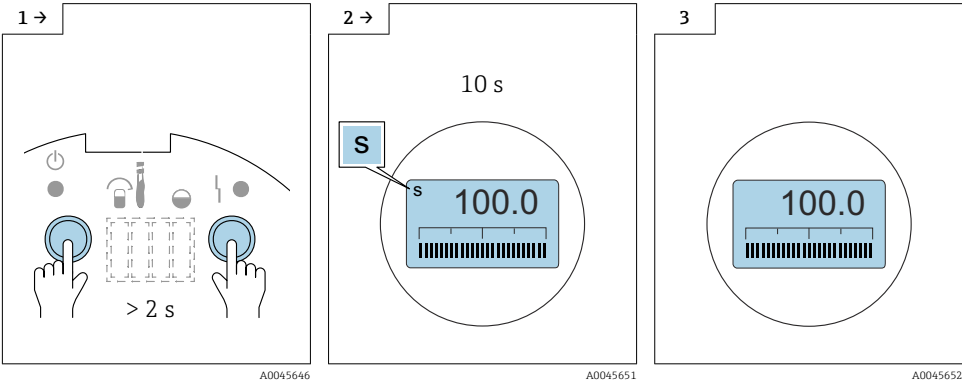
A Vertical tank

B Cylindrical tank in the horizontal position and active linearization

Setting full calibration without display



Setting full calibration with display



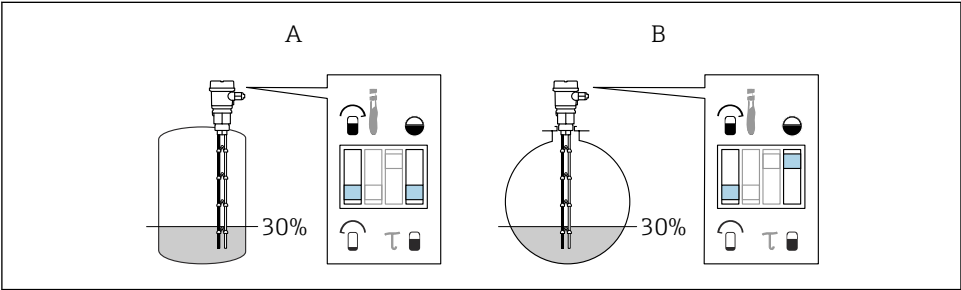
7.4 Shifting empty and full calibration

Approximate value of electric current in relation to the display indications

Value on the display	Value on multimeter
0 %	4.0 mA
10 %	5.6 mA
20 %	7.2 mA
30 %	8.8 mA
40 %	10.4 mA
50 %	12.0 mA
60 %	13.6 mA

Value on the display	Value on multimeter
70 %	15.2 mA
80 %	16.8 mA
90 %	18.4 mA
100 %	20.0 mA

7.4.1 Shifting empty calibration (e.g. 30 %)

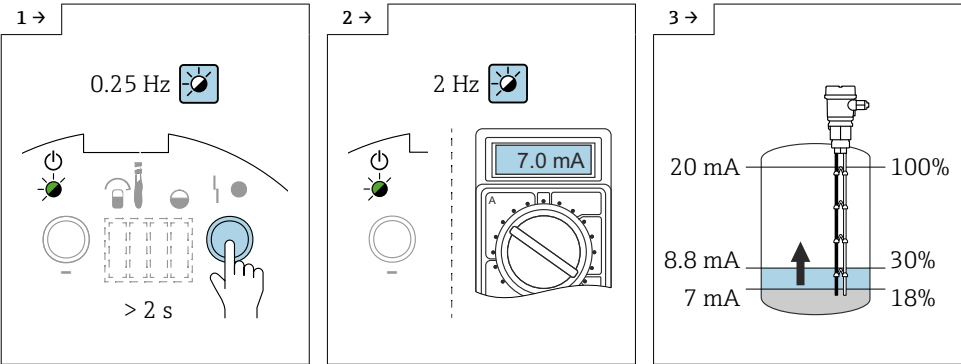


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A Vertical tank

B Cylindrical tank in the horizontal position and active linearization

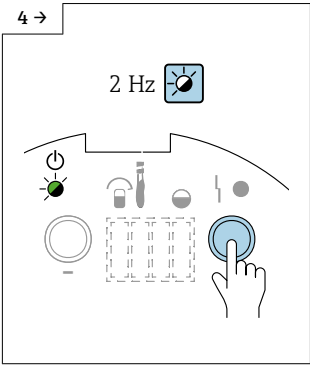
Shifting empty calibration without display



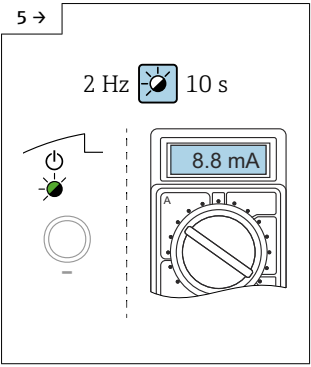
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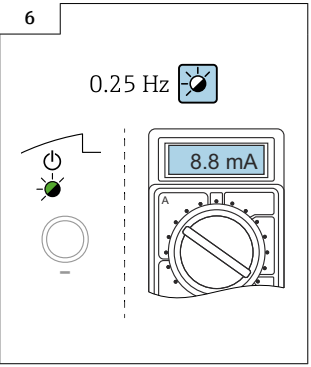
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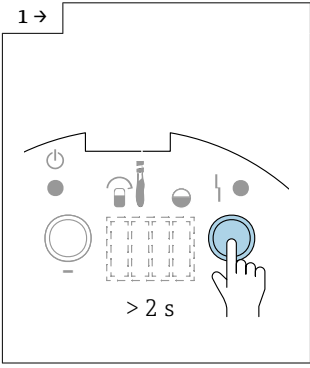


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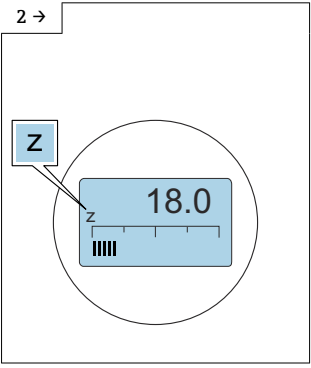


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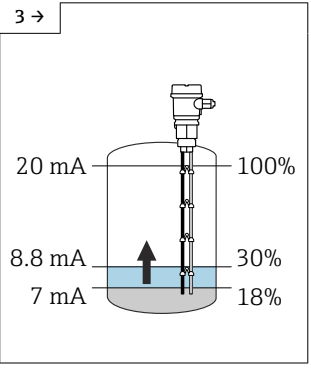
Shifting empty calibration with display



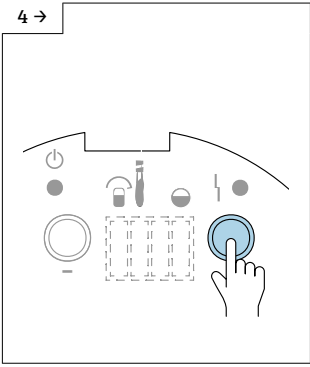
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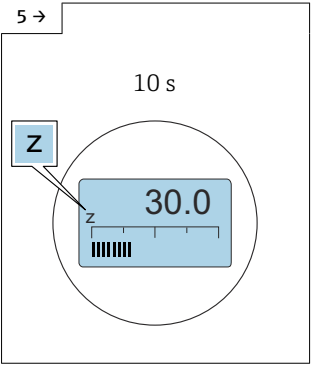
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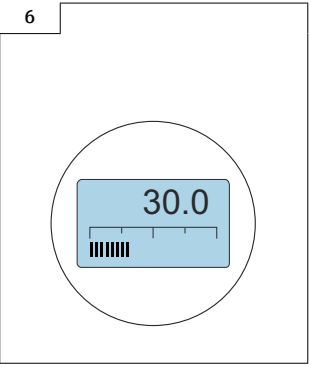
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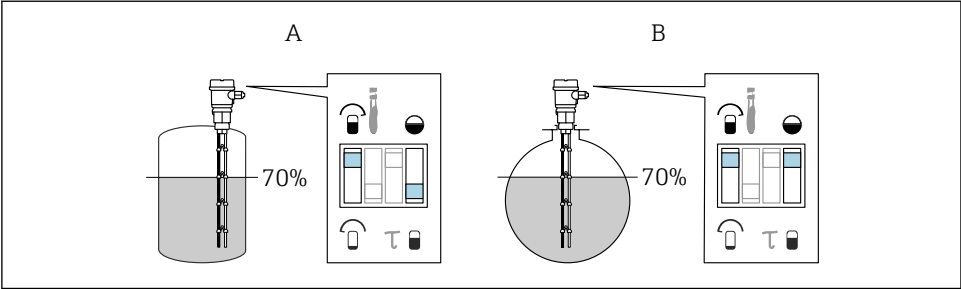


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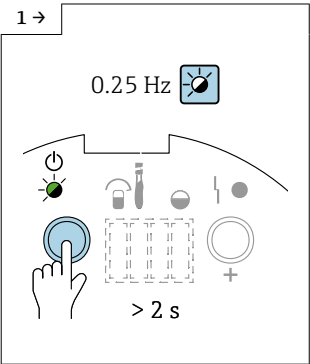
7.4.2 Shifting full calibration (e.g. 70 %)



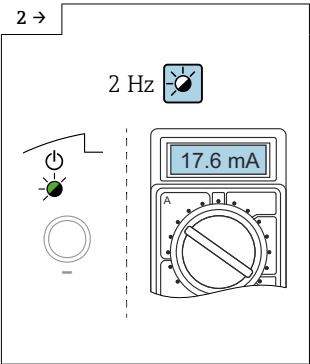
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- A Vertical tank
- B Cylindrical tank in the horizontal position and active linearization

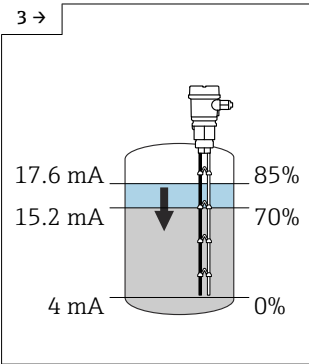
Shifting full calibration without display



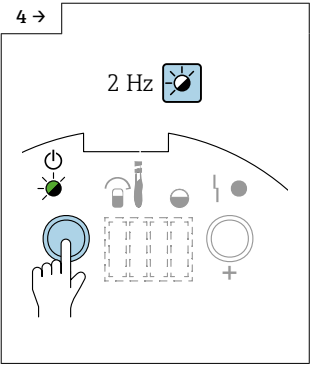
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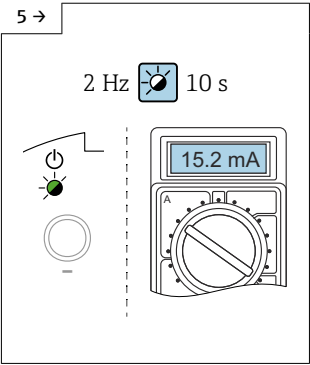
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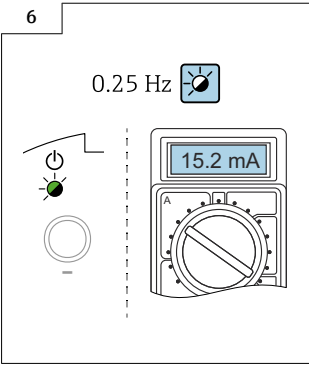
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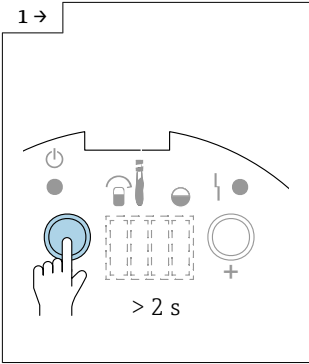


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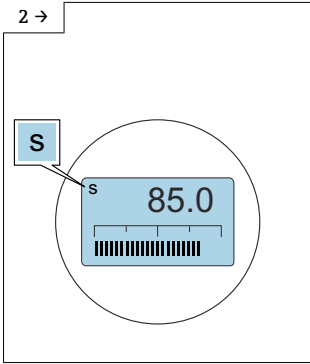


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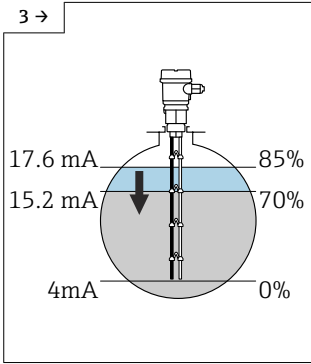
Shifting full calibration with display



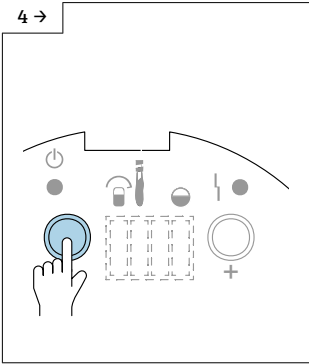
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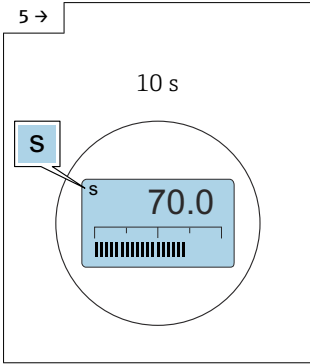
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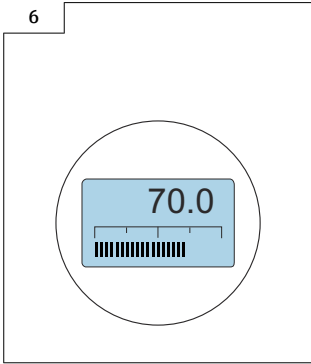
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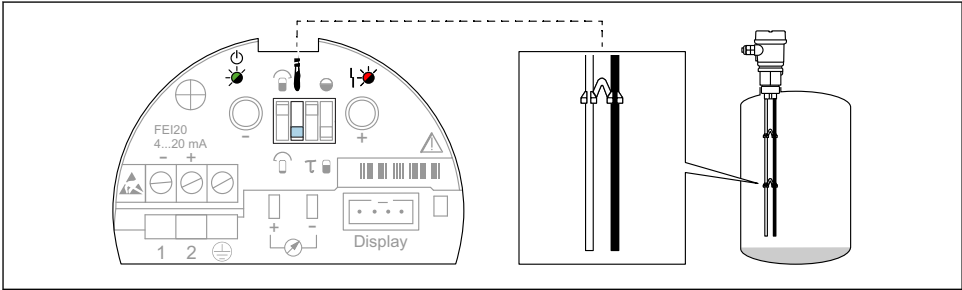


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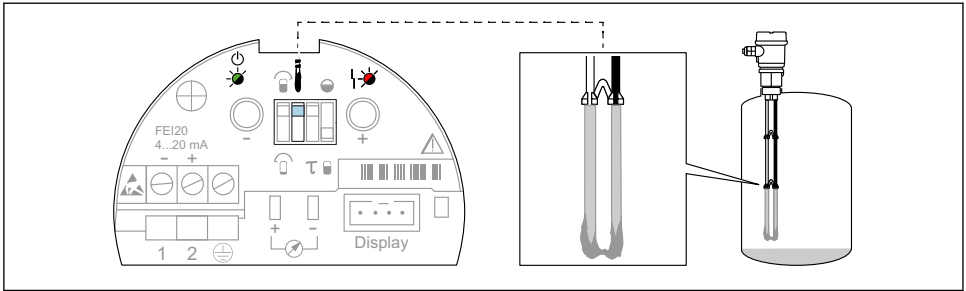
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7.5 Build-up mode



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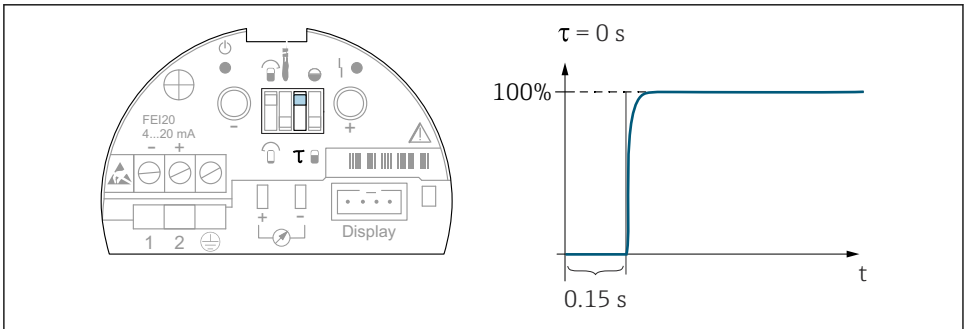
11 Build-up mode off



A0045516

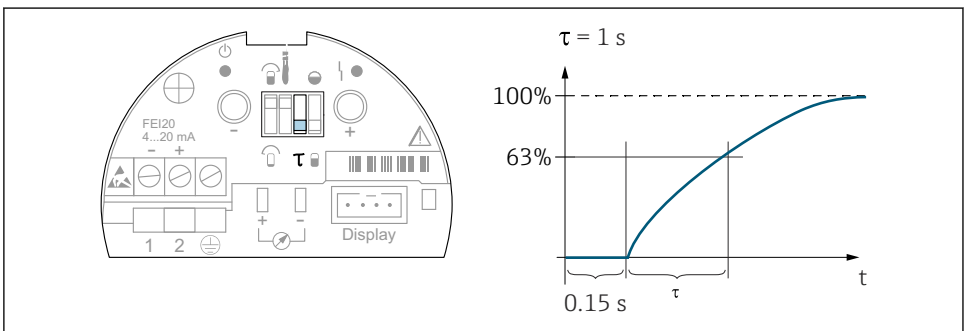
12 Build-up mode on

7.6 Output damping



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13 Delay output signal



A0045518

14 Output signal delayed



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