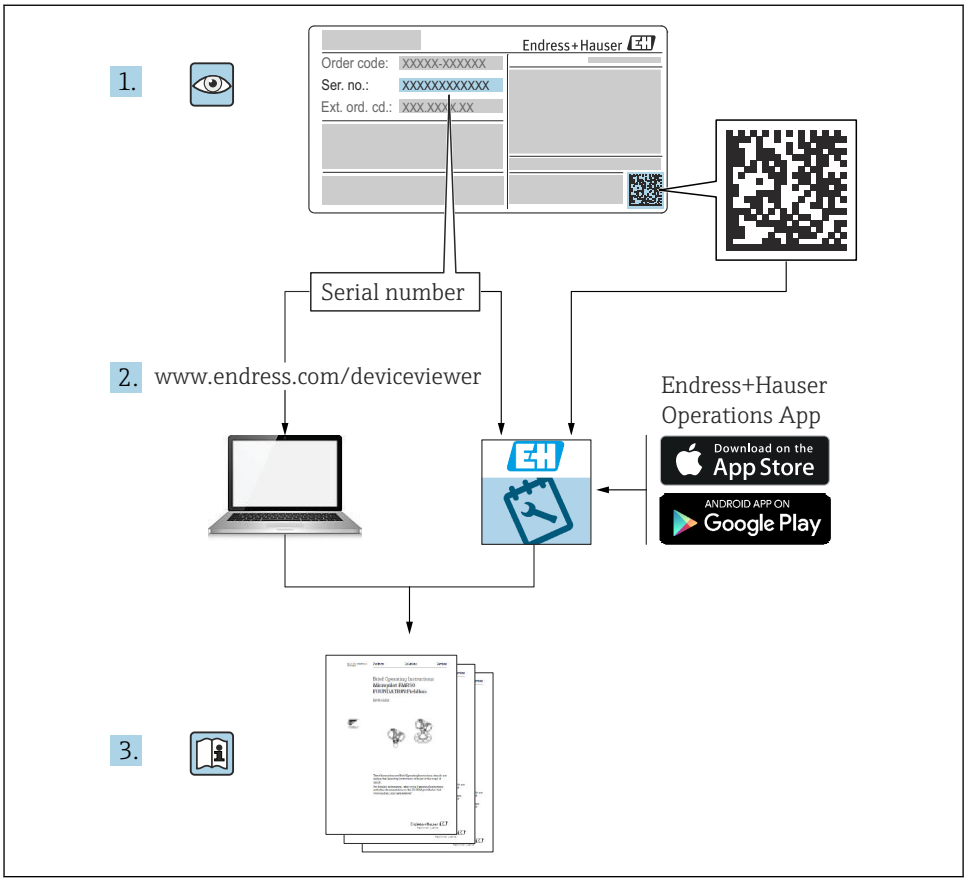
KA01471F/00/EN/01.20
71515330
2021-09-01

Brief Operating Instructions
Liquicap M
FTI51

Capacitance point level switch

Endress+Hauser
People for Process Automation

1 Related documents



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2 About this document

2.1 Document conventions

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

Tip
Indicates additional information


Reference to documentation


Reference to page

▶
Notice or individual step to be observed

1., 2., 3.
Series of steps


Visual inspection

1, 2, 3, ...
Item numbers

A, B, C, ...
Views

⚠ **Hazardous area**
Indicates the hazardous area

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.

- 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 and transport

For storage and transportation, pack the device to protect it against impact. The original packing offers the best protection for this. The permitted storage temperature is −50 to +85 °C (−58 to +185 °F).

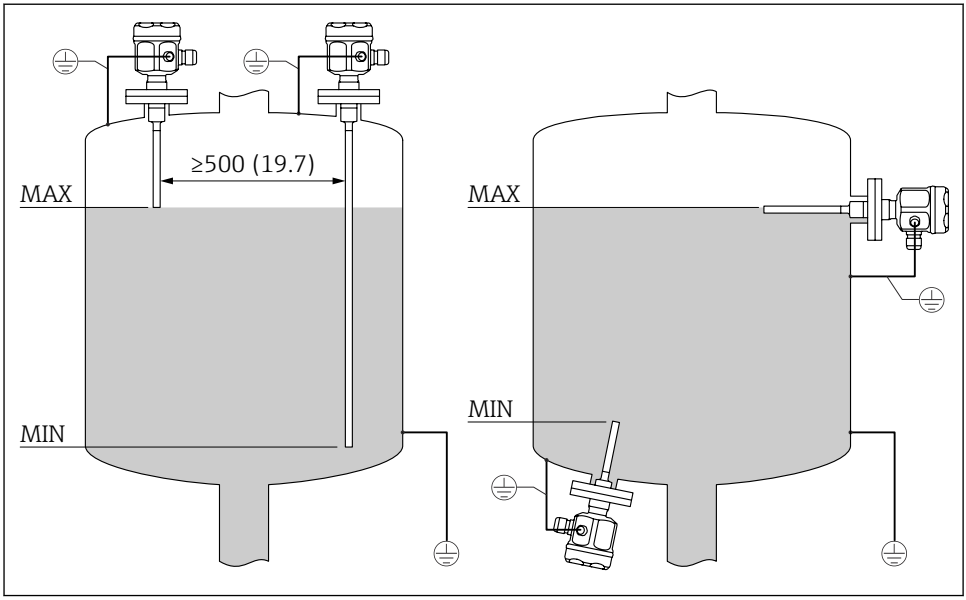
5 Mounting

5.1 Mounting requirements

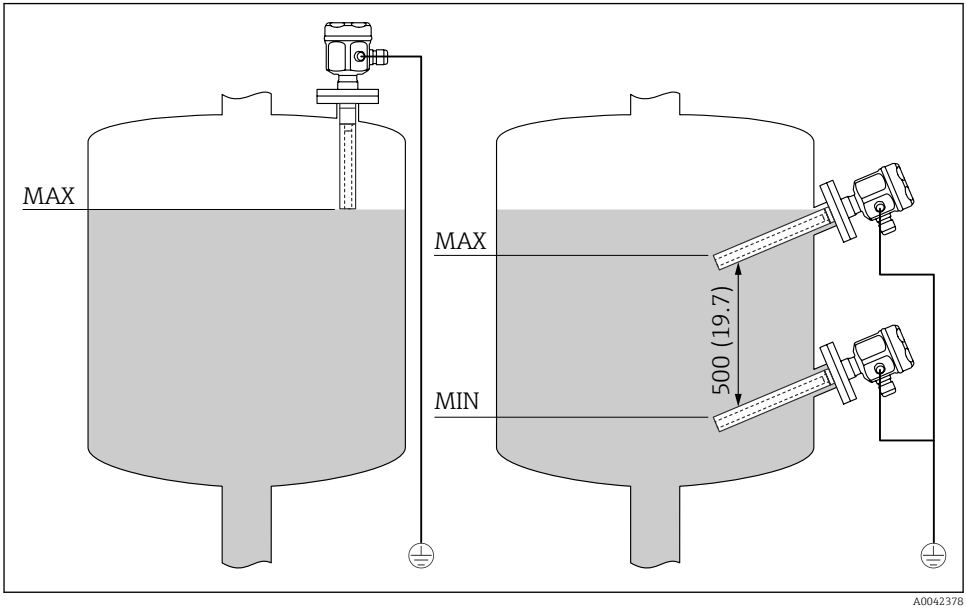
5.1.1 Mounting the sensor

The Liquicap M FMI51 can be installed from the top or the bottom.

Make sure that:
- the probe is not installed in the area of the filling curtain
- the probe is not in contact with the container wall
- the distance from the container floor is ≥10 mm (0.39 in)
- multiple probes are mounted next to each other at the minimum distance between the probes of 500 mm (19.7 in)
- the probe is at a sufficient distance from the agitator if using the probe in agitator tanks
- the rod probes with a ground tube are used in the event of severe lateral load



1 Mounting the sensor in electrically conductive tanks. Unit of measurement mm (in)



2 Mounting the sensor in nonconductive tanks. Unit of measurement mm (in)

5.1.2 Support with marine approval (GL)

See Operating Instructions→ 2

5.2 Installation examples

5.2.1 Rod probes

The probe can be installed in:

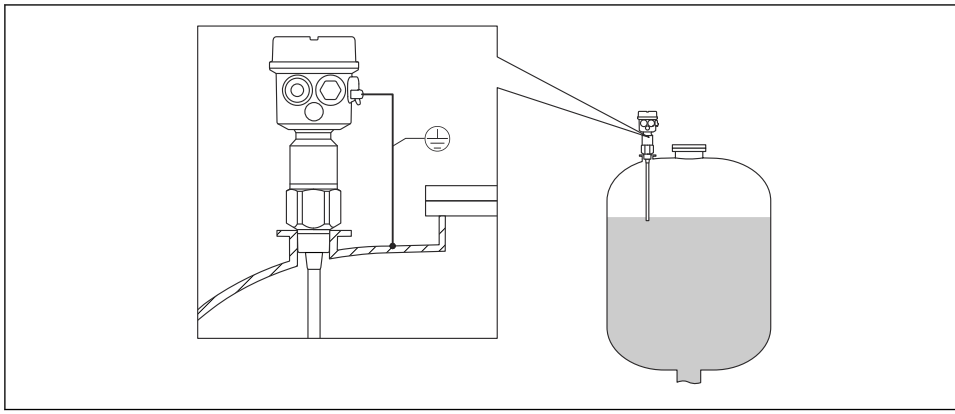
- conductive tanks made from metal
- nonconductive tanks made from plastic

If the process connection of the probe is insulated from the metal tank using a seal material, then the ground connection on the probe housing must be connected to the tank using a short line.

If the probe is installed in a plastic tank, then a probe with the ground tube must be used. The probe housing must be grounded.

- A fully insulated rod probe can not be shortened or extended.
- Damaged insulation of the probe rod causes improper measurements.

The following application examples show the vertical installation for continuous level measurement.



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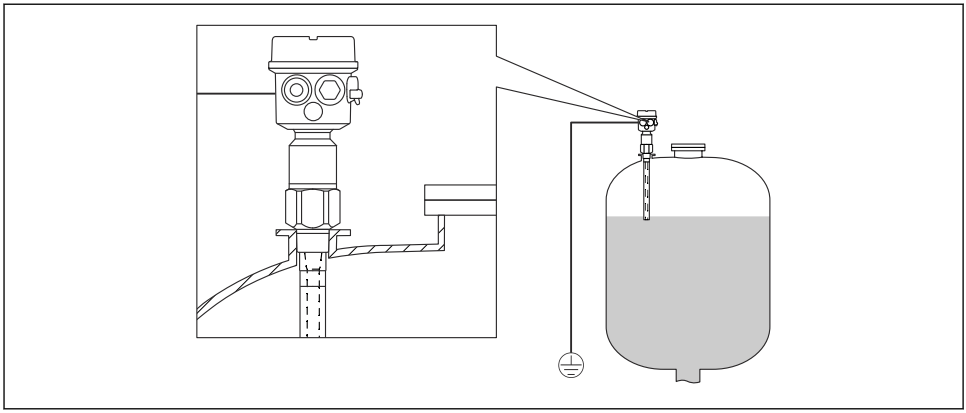
3 *A probe with the conductive tanks*



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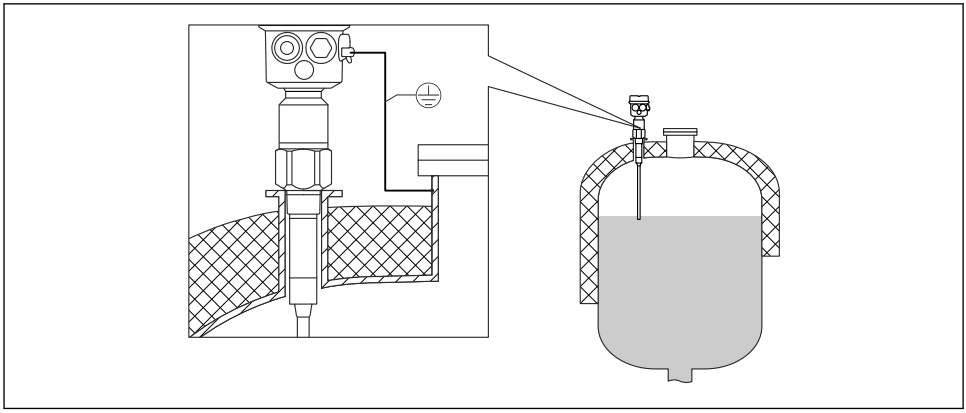
4 A probe with ground tube for the nonconductive tanks



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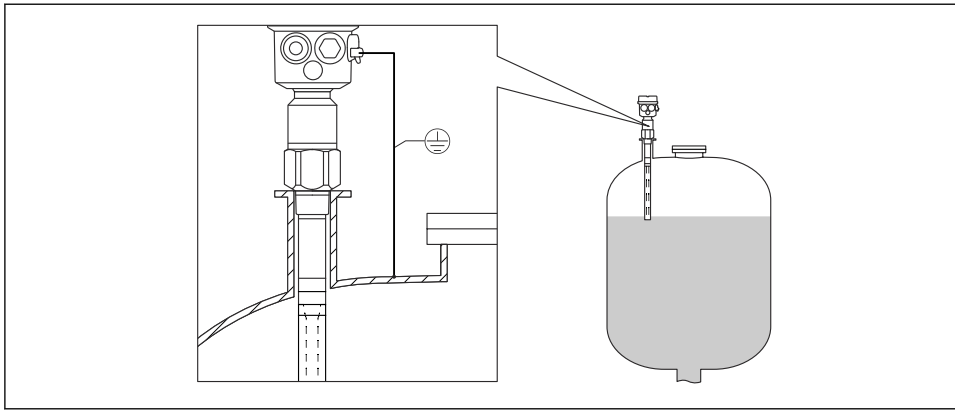
5 A probe with inactive length for the insulated tanks



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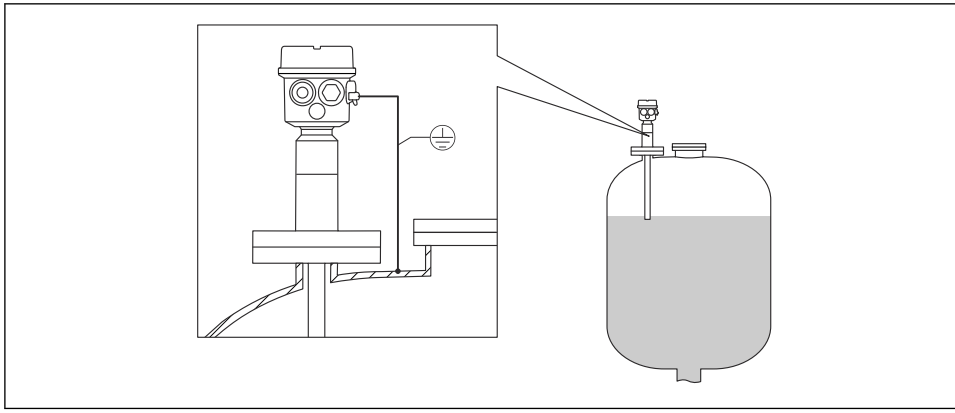
6 A probe with ground tube and inactive length for mounting nozzles



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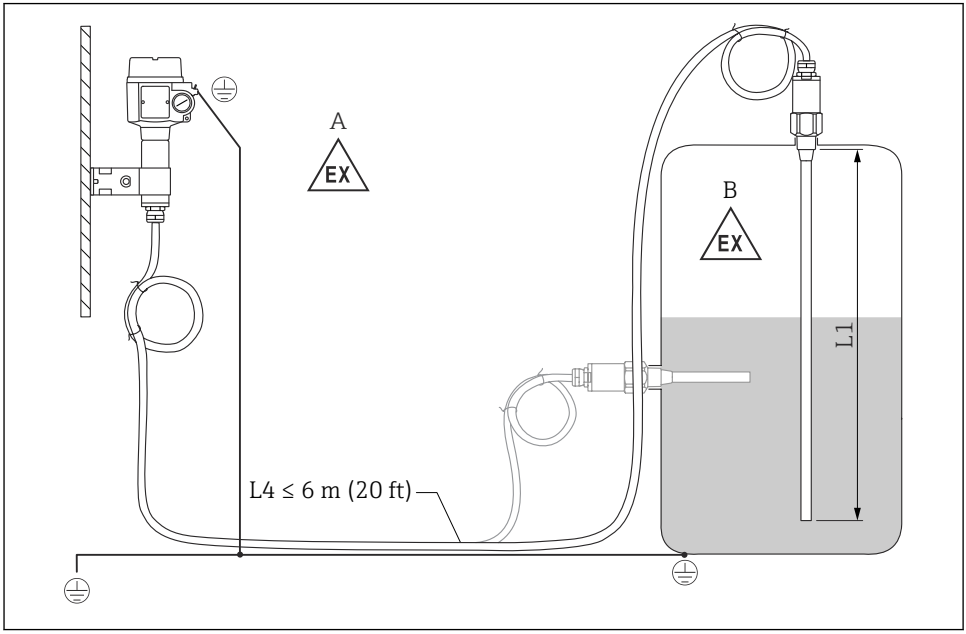
7 A probe fully insulated with clad flange for aggressive media

5.3 Probe with separate housing



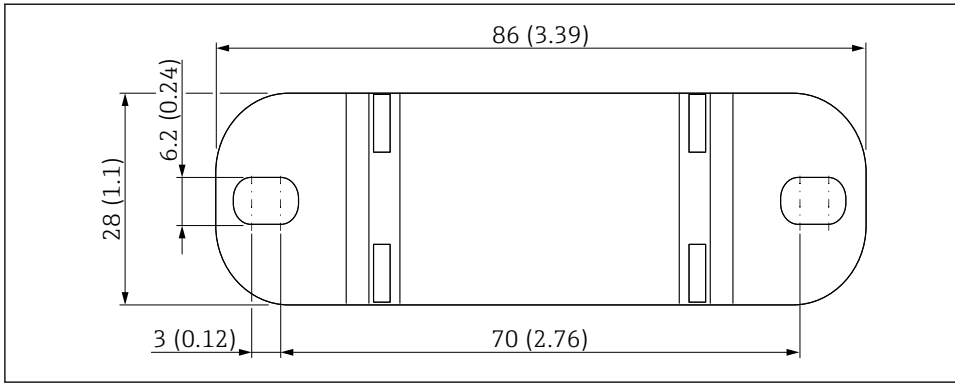
8 Connection of the probe and separate housing

A Explosive zone 1
B Explosive zone 0
L1 Rod length: max. 4 m (13 ft)
L4 Cable length

See Operating Instructions→ 2

5.3.1 Wall bracket

- The wall bracket is a part of the scope of delivery.
- To use the wall bracket as a drill template, the wall bracket must be first screwed to the separate housing.
- The distance between the holes is reduced by screwing it to the separate housing.



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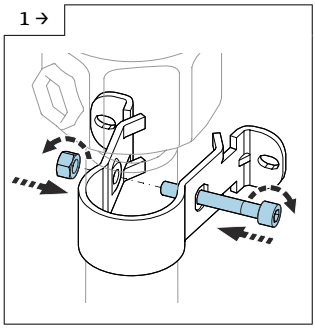
Unit of measurement mm (in)

5.3.2 Wall mounting



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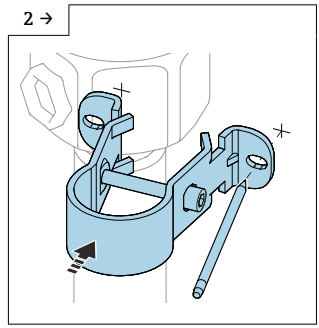
▶ Screw together the wall bracket on the tube.



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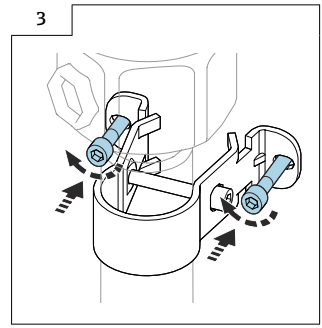
▶ Mark the distance between the holes on the wall before drilling.



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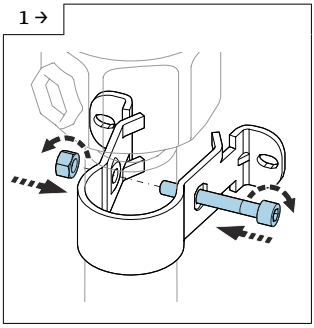
▶ Screw the separate housing on the wall.

5.3.3 Pipe mounting

The maximum pipe diameter is 50.8 mm (2 in).

1 →



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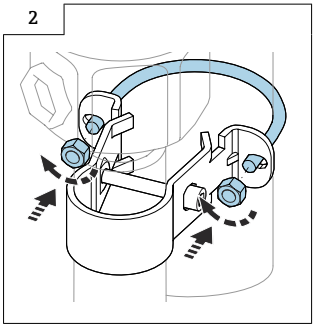
▶ Screw together the wall bracket on the tube.

2



A0042321

▶ Screw the separate housing on a pipe.

5.3.4 Shortening the connecting cable

NOTICE

Risk of damage to connections and cable.

▶ Make sure that neither the connecting cable nor the probe is turning with the pressing screw!

- The maximum total length of the rod L1 and the cable L4 is 10 m (33 ft).
- The maximum connection length between the probe and the separate housing is 6 m (20 ft).
- When ordering a device with separate housing, the desired length must be specified.

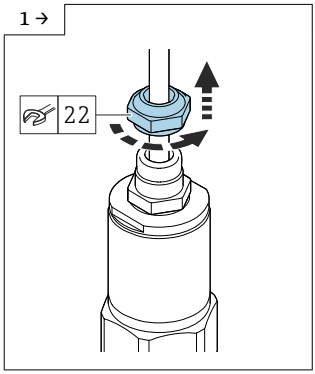
- We recommend reusing all strands with ring terminals in case of shortening the connecting cable.
- To avoid the risk of short-circuiting when the strands are not reused, the connections of the new ring terminals fittings must be isolated with a heat shrinking sleeve.
- Use heat-shrink tubes to insulate all soldered joints.

If the cable connection has to be shortened or led through a wall, it must be separated from the process connection.

Probe without active buildup compensation

Disconnecting the connection cable

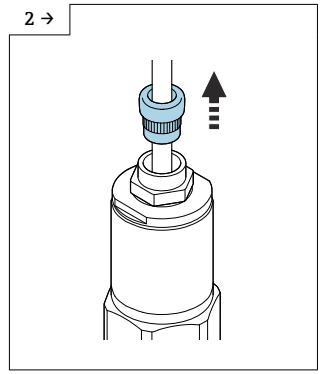
1 →



A0042111

- Loosen the pressing screw with an open-end wrench AF22.

2 →



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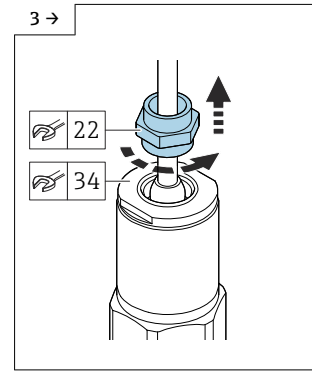
- Pull the insert seal out of the cable gland.

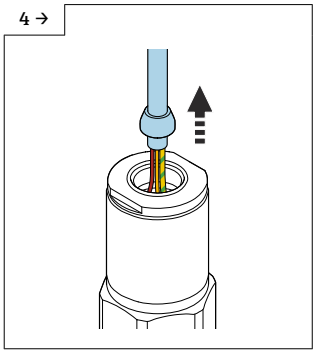
3 →



A0042113

- Block the adapter disk with the open-end wrench AF34 and loosen the cable gland with the open-end wrench AF22.

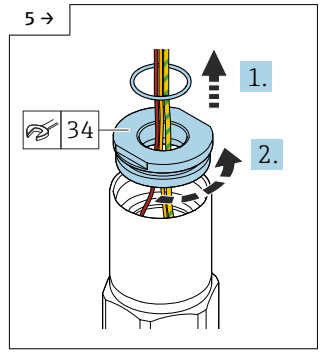
4 →



A0042114

- Pull out the cable with the cone.

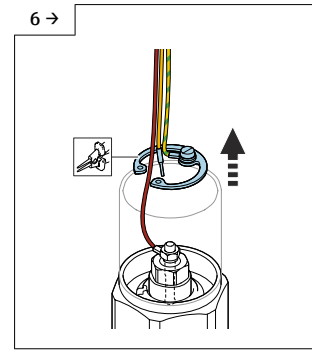
5 →



A0042115

- Remove the seal and loosen the adapter disk with the open-end wrench AF34.

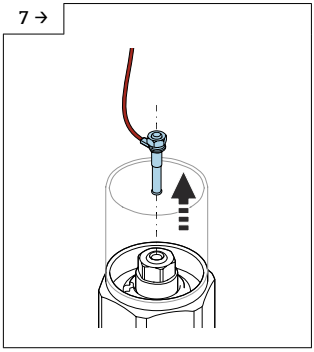
6 →



A0042545

- Remove the snap ring with a snap ring pliers.

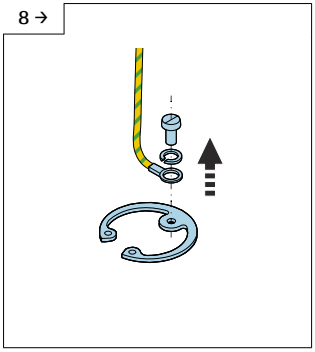
7 →



A0042117

▶ Remove the blade plug from the socket.

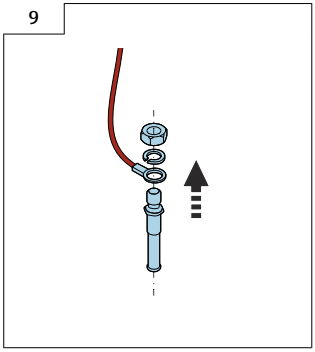
8 →



A0042546

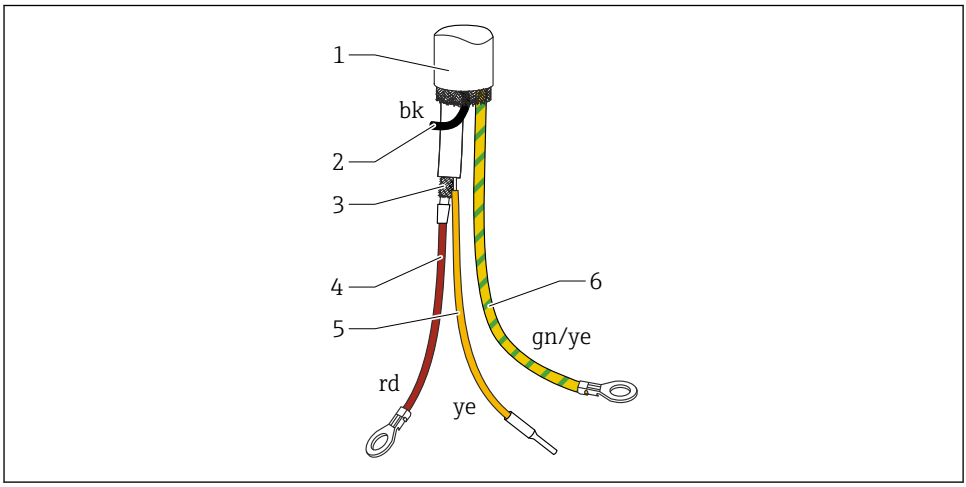
▶ Loosen the screw to disconnect the yellow-green cable.

9



A0042119

▶ Loosen the nut (M4) of the blade plug.



A0042544

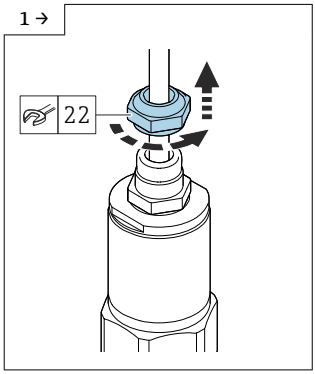
9 Cable connections

1 External screening (not required)
2 Strand black (bk) (not required)
3 Coaxial cable with central core and screen
4 Solder the red (rd) strand with the central core of the coaxial cable (probe)
5 Insulated strand (ye) with the heat shrinking sleeve
6 Strand yellow and green (gn/ye) with a ring terminal

Probe with active buildup compensation

Disconnecting the connection cable

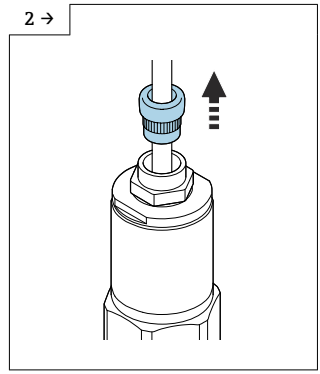
1 →



A0042111

- Loosen the pressing screw with an open-end wrench AF22.

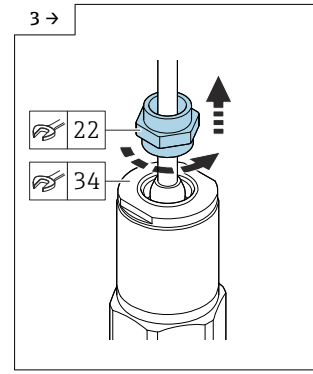
2 →



A0042112

- Pull the insert seal out of the cable gland.

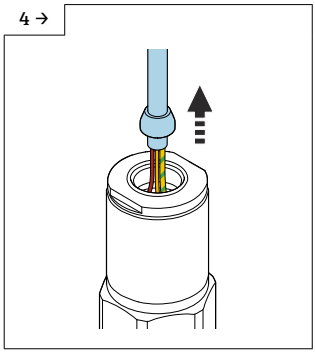
3 →



A0042113

- Block the adapter disk with the open-end wrench AF34 and loosen the cable gland with the open-end wrench AF22.

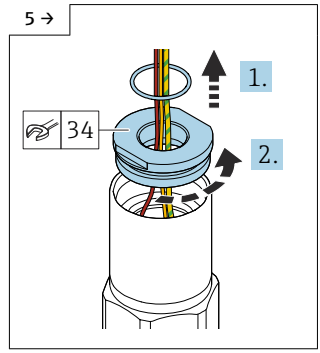
4 →



A0042114

- Pull out the cable with the cone.

5 →



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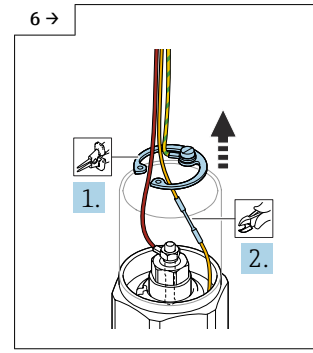
- Remove the seal and loosen the adapter disk with the open-end wrench AF34.

6 →



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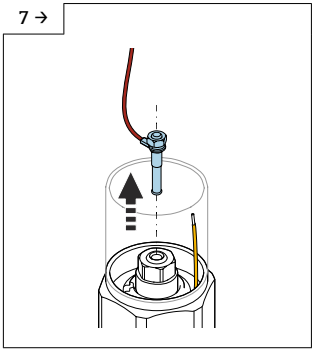
- Remove the snap ring with a snap ring pliers and cut the yellow cable.

7 →



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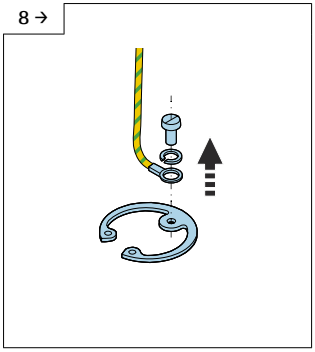
▶ Remove the blade plug from the socket.

8 →



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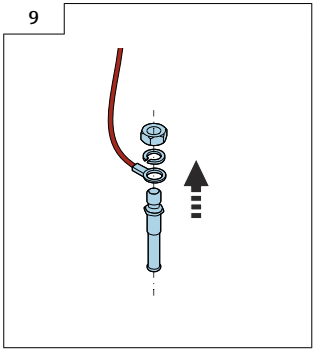
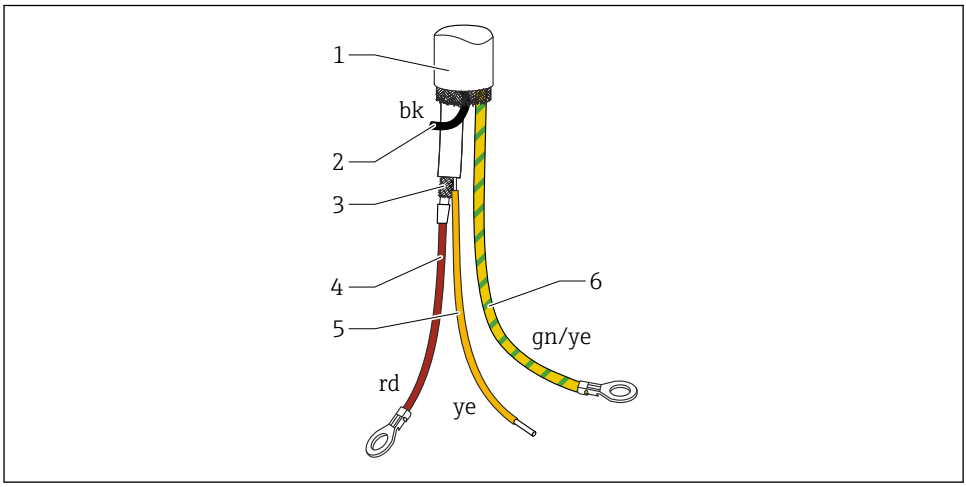
▶ Loosen the screw to disconnect the yellow-green cable.

9



A0042119

▶ Loosen the nut (M4) of the blade plug.



A0042547

10 *Cable connections*

1 *External screening (not required)*
2 *Strand black (bk) (not required)*
3 *Coaxial cable with central core a screening*
4 *Solder the red (rd) strand with the central core of the coaxial cable (probe)*
5 *Solder the strand with the screening of the yellow (ye) coaxial cable (ground)*
6 *Strand yellow and green (gn/ye) with a ring terminal*

6 Electrical connection

Before connecting the power supply, note the following:
- the supply voltage must match the data specified on the nameplate
- switch off the supply voltage before connecting the device
- connect the potential equalization to the ground terminal on the sensor

When using the probe in hazardous areas, the relevant national standards and the information in the safety instructions (XA) must be observed.

Use the specified cable gland only.

6.1 Connecting requirements

6.1.1 Potential equalization

DANGER

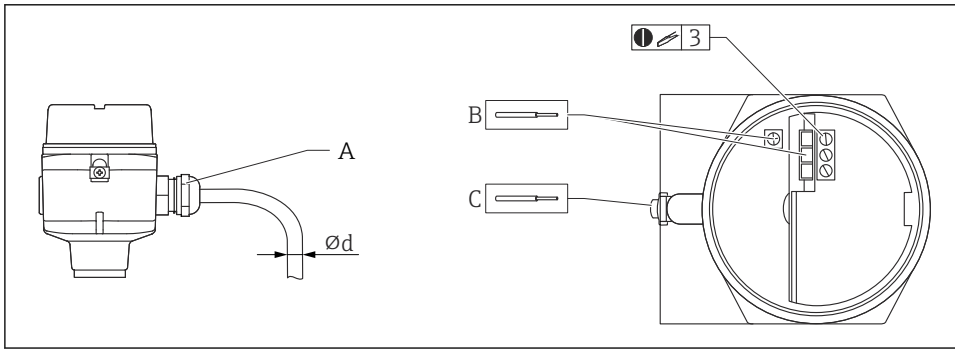
Risk of explosion!

► Connect the cable screen on the sensor side only if installing the probe in Ex-areas!

Connect the potential equalization to the outer ground terminal of the housing (T13, F13, F16, F17, F27). In the case of the stainless steel housing F15, the ground terminal can also be located in the housing. For further safety instructions, please refer to the separate documentation for applications in hazardous areas.

6.1.2 Cable specification

Connect the electronic inserts by using commercially available instrument cables. If a potential equalization is present, and the shielded instrument cables are used, connect the shielding on both sides to optimize the shielding effect.



A0040478

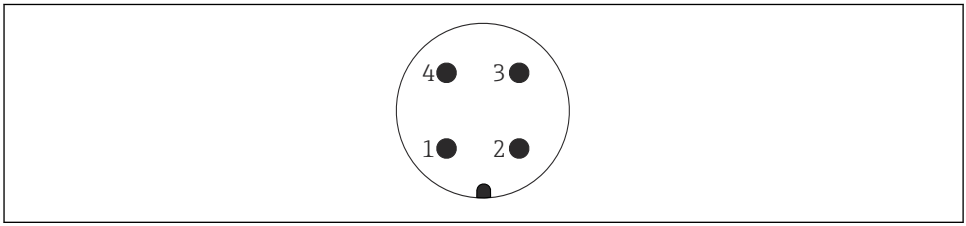
A Cable entry
B Electronic insert connections: cable size max. 2.5 mm² (14 AWG)
C The ground connection outside the housing, cable size max. 4 mm² (12 AWG)
Ød Cable diameter

Cable entries
- Nickel-plated brass: Ød = 7 to 10.5 mm (0.28 to 0.41 in)
- Synthetic material: Ød = 5 to 10 mm (0.2 to 0.38 in)
- Stainless steel: Ød = 7 to 12 mm (0.28 to 0.47 in)

6.1.3 Connector

For the version with a connector M12, the housing does not have to be opened for connecting the signal line.

PIN assignment for M12 connector



A0011175

1 Positive potential
2 Not used
3 Negative potential
4 Ground

6.1.4 Cable entry

Cable gland
M20x1.5 for Ex d only cable entry M20
Two cable glands are included in scope of delivery.

Cable entry
- G½
- NPT½
- NPT¾

6.2 Wiring and connecting

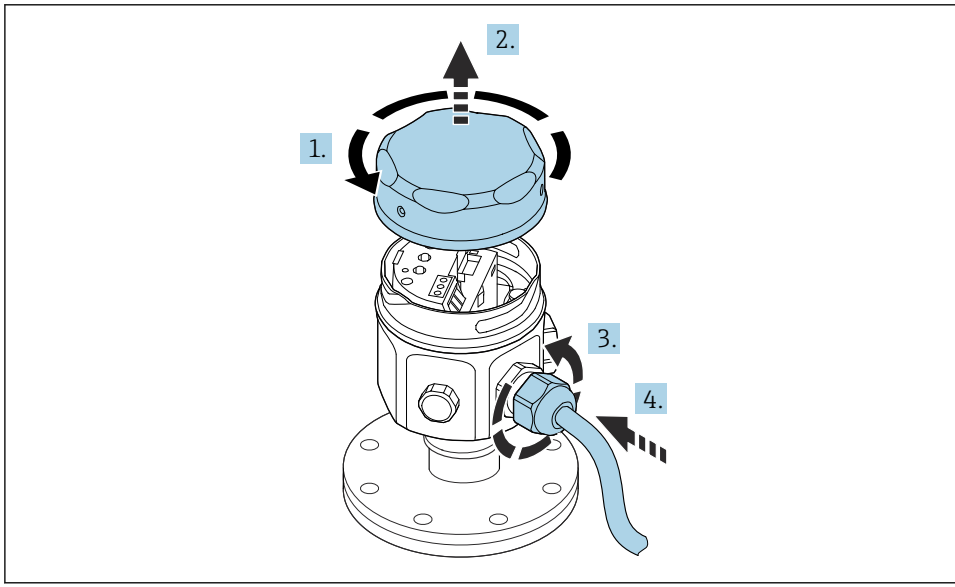
6.2.1 Connection compartment

Depending on explosion protection, the connection compartment is available in the following variants:

Standard protection, Ex ia protection
- polyester housing F16
- stainless steel housing F15
- aluminum housing F17
- aluminum housing F13 with gas-tight process seal
- aluminum housing T13, with the separate connection compartment

Ex d protection, Gas-tight process seal
- aluminum housing F13 with gas-tight process seal
- aluminum housing T13, with the separate connection compartment

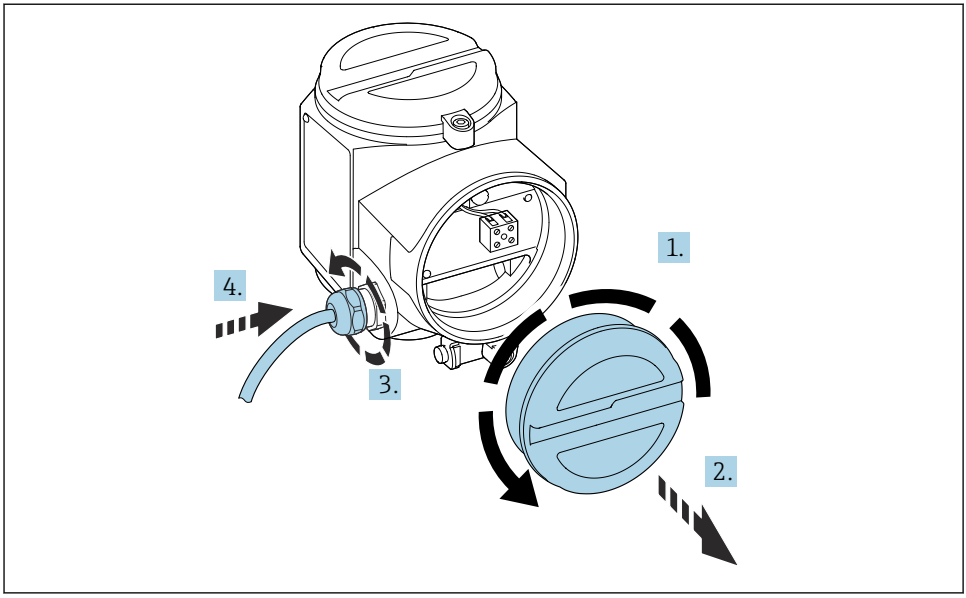
Connecting the electronic insert to the power supply:



A0040635

1. Unscrew the housing cover.
2. Remove the housing cover.
3. Release the cable gland.
4. Insert the cable.

Connecting the electronic insert to the power supply mounted in the housing T13:



A0040637

1. Unscrew the housing cover.
2. Remove the housing cover.
3. Release the cable gland.
4. Insert the cable.

6.3 Connecting the measuring device

Possible measuring devices:
- 2-wire AC electronic insert FEI51
- DC PNP electronic insert FEI52
- 3-wire electronic insert FEI53
- AC and DC with relay output electronic insert FEI54
- SIL2 / SIL3 electronic insert FEI55
- PFM electronic insert FEI57S
- NAMUR electronic insert FEI58

See Operating Instructions → 2

7 Commissioning

7.1 Installation and function check

See Operating Instructions→ 2

7.2 Switching on the measuring device

To switch on the measuring device and set the electronic insert, see Operating Instructions, chapter "Commissioning"→ 2.

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