

Brief Operating Instructions

Solicap M

FTI56

Capacitance point level switch



1 Related documents



A0023555

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.

2.2 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.

2.3 Tool symbols



Flat blade screwdriver



Phillips head screwdriver

2.4 Symbols for certain types of information and graphics

✓ Permitted

Procedures, processes or actions that are permitted

✓✓ Preferred

Procedures, processes or actions that are preferred

✗ Forbidden

Procedures, processes or actions that are forbidden

i 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

2.5 Documentation

2.5.1 Technical Information

EMC test procedures

TI00241F

Nivotester FTL325N

TI00353F

Nivotester FTL375N

TI00361F

2.5.2 Certificates

ATEX safety instructions

Solicap M FTI55

- II 1 D Ex ia IIIc T80°C T₅₀₀ 130°C Da
- II 1/2 D Ex ia IIIc T80°C T₅₀₀ 130°C Da/Db
- II 1/3 D Ex ia IIIc T80°C T₅₀₀ 130°C Da/Dc
- II 1/2 D Ex ia/tb IIIc T90°C Da/Db
- II 1/3 D Ex ia/tc IIIc T90°C Da/Dc

IECEX

Solicap M FTI55

- Ex ia IIIc T80°C T₅₀₀ 130°C Da
- Ex ia IIIc T80°C T₅₀₀ 130°C Da/Db
- Ex ia IIIc T80°C T₅₀₀ 130°C Da/Dc
- Ex ia/tb IIIc T90°C Da/Db
- Ex ia/tc IIIc T90°C Da/Dc

BVS ATEX E 029; IECEX BVS 14.0118

NEPSI safety instructions

Solicap FT55: GY17.1293

Functional safety (SIL2/SIL3)

Solicap FT55

SD00278F

Control Drawings (CSA and FM)

- Solicap M FTI56
FM
ZD00222F
- Solicap M FTI56
CSA IS
ZD00225F

CRN registration

CRN OF12978.5

Other

AD2000: the wetted material (316L) corresponds to AD2000 – W0/W2

2.5.3 Patents

This product is protected by at least one of the patents:

- DE 103 22 279
- WO 2004 102 133
- US 2005 003 9528
- DE 203 13 695
- WO 2005 025 015

Further patents are under development.

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 requirements

5.1 General notes and precautions

NOTICE

Filling the silo.

- ▶ The filling stream must not be directed onto the probe.

NOTICE

Angle of material flow.

- ▶ Take care to the expected angle of the material flow and the outlet funnel when determining the mounting location or probe rod length.

NOTICE

Distance between probes.

- ▶ The minimum distance of 500 mm (19.7 in) between the probes must be observed.

NOTICE

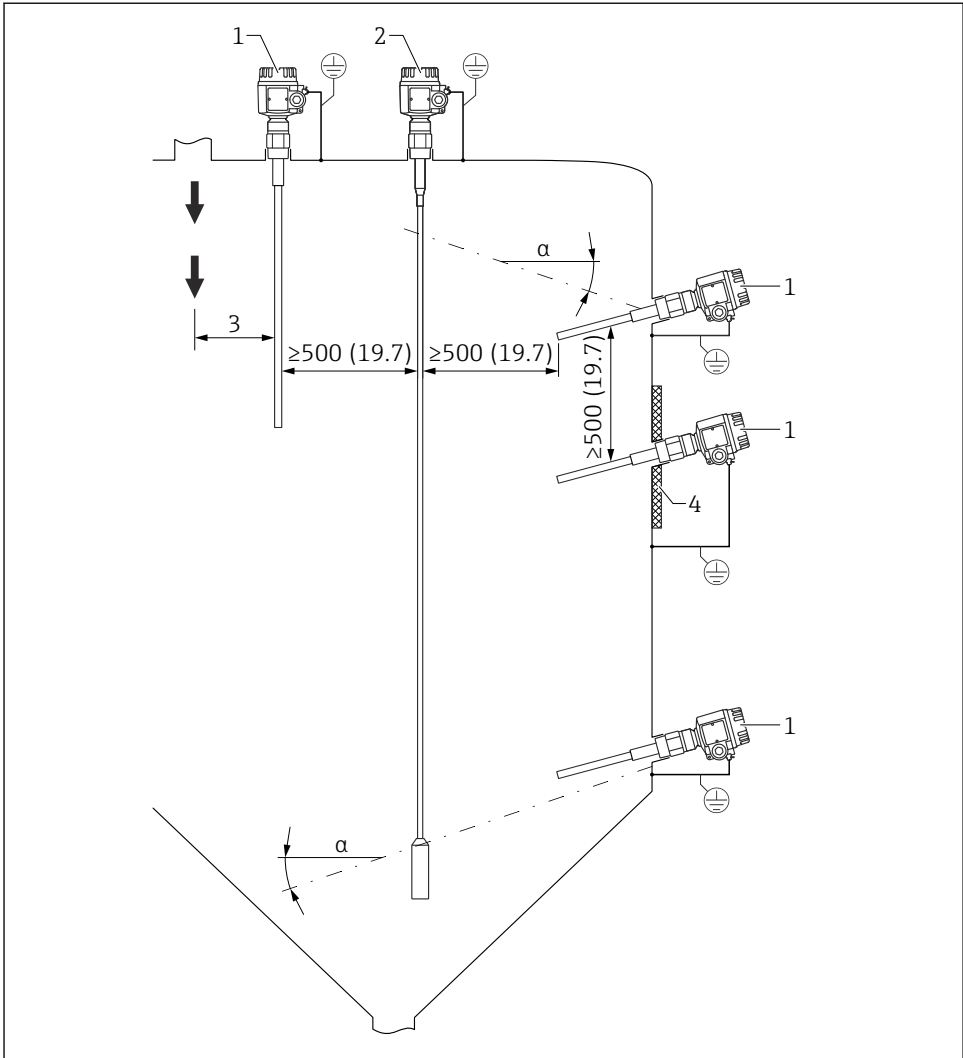
Threaded coupling for mounting.

- ▶ The threaded coupling must be as short as possible. Condensation or product residue can occur in a long threaded coupling and interfere with the correct operation of the probe.

NOTICE

Heat insulation

- ▶ Insulate the external silo wall to avoid exceeding the permitted temperature of the Solicap M housing.
- ▶ Insulate the silo wall to prevent the condensation and reduce buildup in the threaded coupling area.



A0043999

- α Angle of the slope
- 1 FTI55
- 2 FTI56
- 3 Distance from the loading point
- 4 Heat insulation

5.2 Mounting the sensor

NOTICE

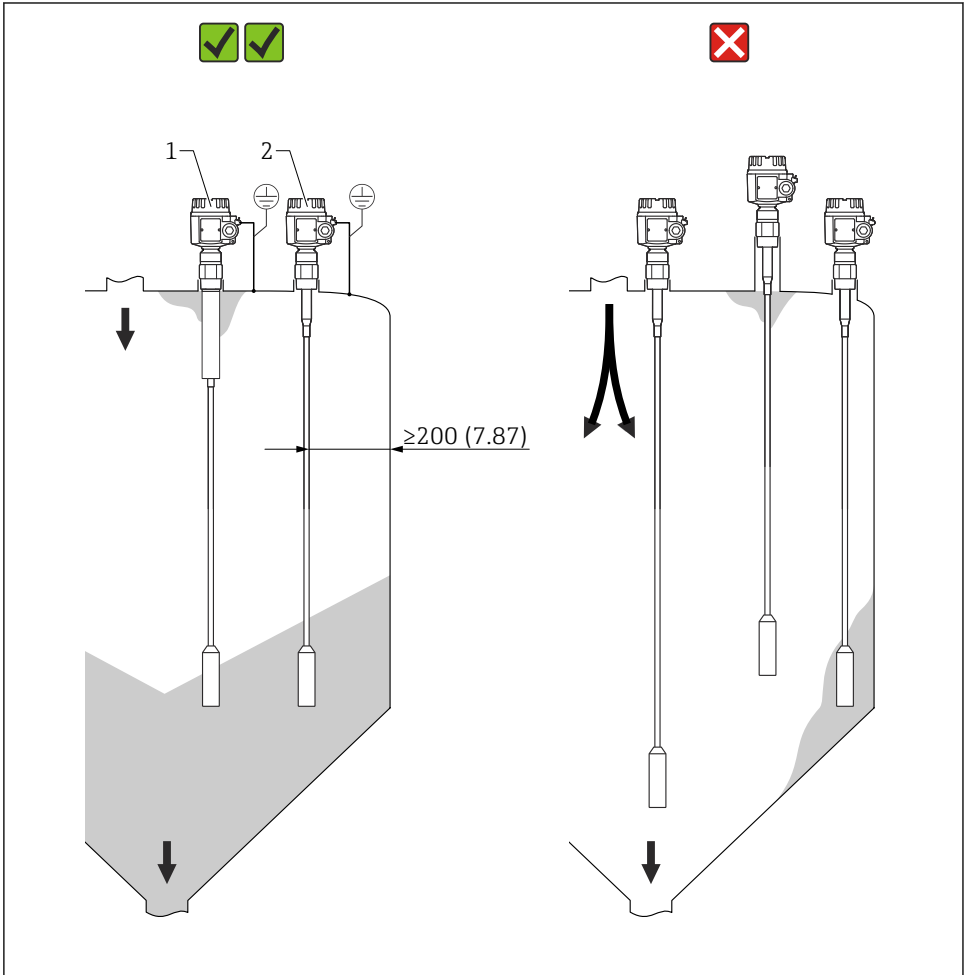
Mounting the probe rope in the loading curtain area can cause the incorrect device operation!

- ▶ Mount the probe away from the loading curtain.

NOTICE

The probe rope cannot touch the metal container wall!

- ▶ Make sure that the probe rope is insulated from the metal container wall.



A0044004

1 Mounting examples. Unit of measurement mm (in)

- 1 FTI56 with inactive length in the event of condensation and material buildup
- 2 The correct distance from the silo wall, the material inlet and the material outlet

5.2.1 Silo roof

Ensure that the silo roof is of a sufficiently stable construction. High tensile forces can occur when material is being extracted, particularly in the case of heavy and powdery bulk solids which have a tendency to form buildup.

5.2.2 Coarse-grained bulk solids

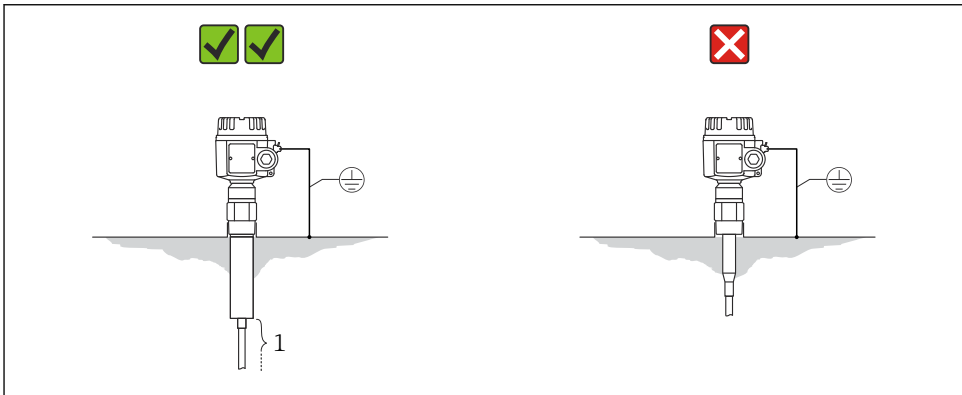
In silos with extremely coarse-grained or extremely abrasive bulk solids, the use of a Solicap M FTI56 is recommended only for maximum detection.

5.2.3 Distance between the rope probes

To rule out mutual probe interference, you must maintain a minimum distance of 0.5 m between the rope probes. This also applies if you are installing several Solicap M units in adjacent silos with nonconductive walls.

5.2.4 Installation in the case of condensation

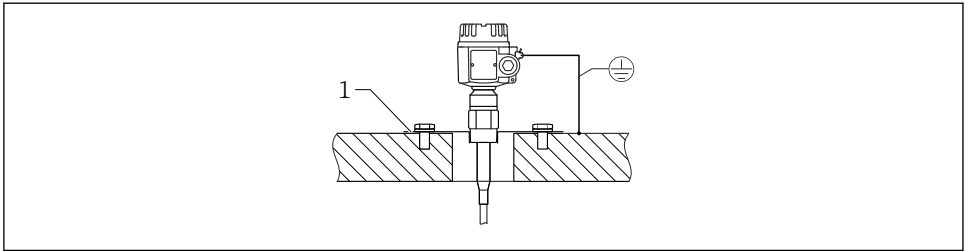
Use the Solicap M with inactive length. The inactive length prevents moisture and buildup forming between the active part of the probe and the silo roof.



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The threaded coupling must be projected into the silo to reduce the effects of condensation and buildup. The maximum thread length is 25 mm (0.98 in).

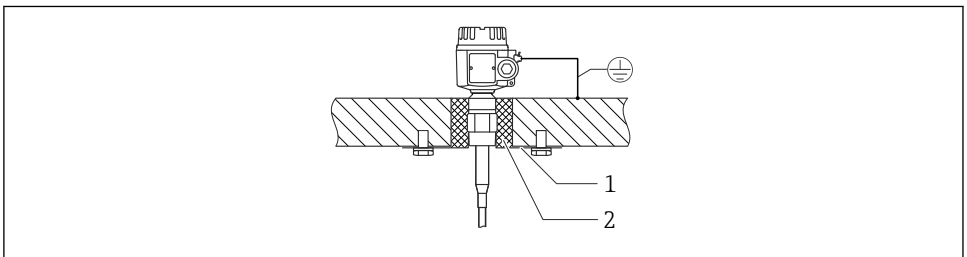
Heat insulation reduces condensation and therefore buildup on the steel plate.



A0044006

2 Mounting in the concrete silo wall

- 1 Steel plate



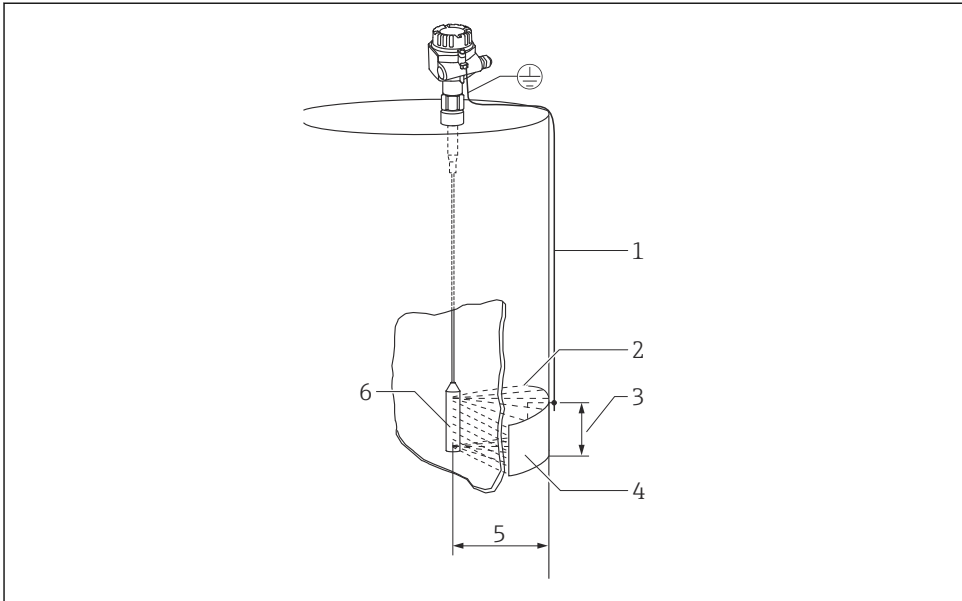
A0044007

3 Mounting in the concrete silo wall in case of condensation

- 1 Steel plate
2 Heat insulation

5.2.5 Installation in plastic tanks

When installing in a silo made of plastic, a counter electrode must be mounted on the silo exterior at the same height as the tensioning weight. The length of the edge of the metal counter electrode should be approximately the same length as the distance between the tensioning weight and the silo wall.



A0044009

4 Mounting the probe in plastic tanks

- 1 Ground connection
- 2 Electrical HF field
- 3 Surface area e.g. 1 m^2 (10.7 ft^2)
- 4 Metal counter electrode
- 5 Distance of 1 m (3.3 ft)
- 6 Tensioning weight

5.3 Installation instructions

NOTICE

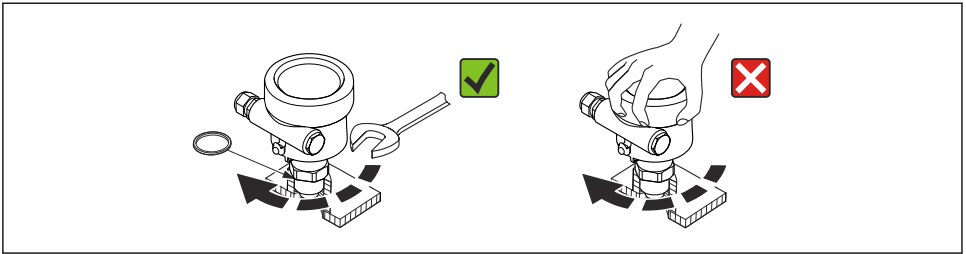
Do not damage the probe insulation during installation!

- ▶ Check the rod insulation.

NOTICE

Do not screw the probe using the probe housing!

- ▶ Use an open-end wrench to screw the probe.

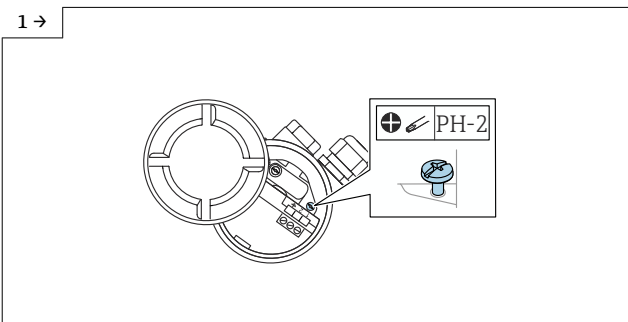


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5.3.1 Aligning the housing

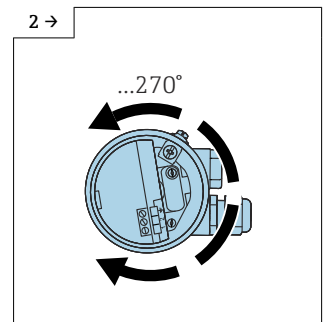
The housing can be rotated 270° to align the cable entry. To prevent moisture penetration, route the connecting cable downwards in front of the cable gland and secure it with a cable tie. This is particularly recommended for outdoor mounting.

Aligning the housing



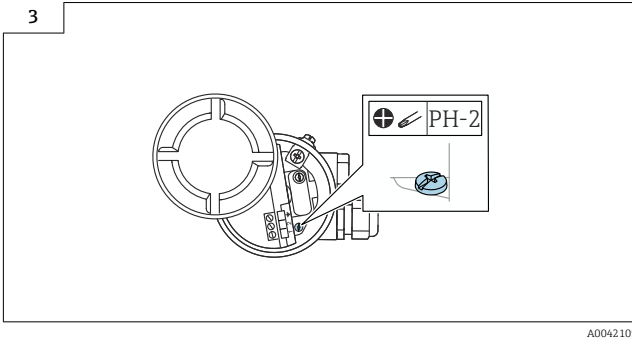
A0042107

- ▶ Loosen the clamping screw.



A0042108

- ▶ Align the housing into the needed position.



- ▶ Tighten the clamping screw with torque <math>< 1 \text{ Nm}</math> (0.74 lbf ft).

i The clamping screw for aligning the housing type T13 is located in the electronics compartment.

5.3.2 Sealing the probe housing

Make sure that the cover is sealed.

NOTICE

- ▶ Never use mineral oil-based grease as this destroys the O-ring.

6 Electrical connection

- i** 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

i 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

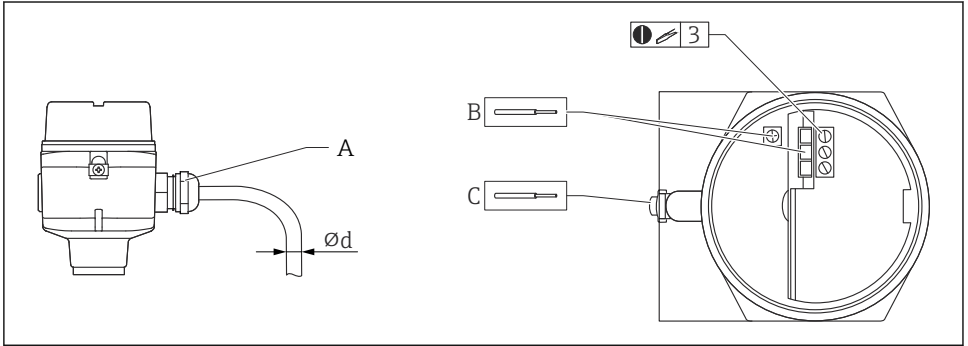
Risk of explosion!

- ▶ 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.



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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

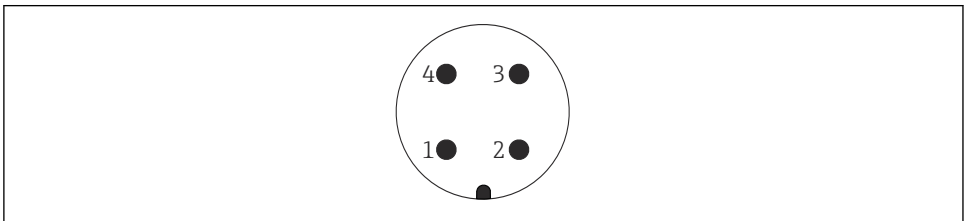
Cable entries

- 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

- G $\frac{1}{2}$
- NPT $\frac{1}{2}$
- NPT $\frac{3}{4}$

6.2 Wiring and connecting

6.2.1 Connection compartment

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

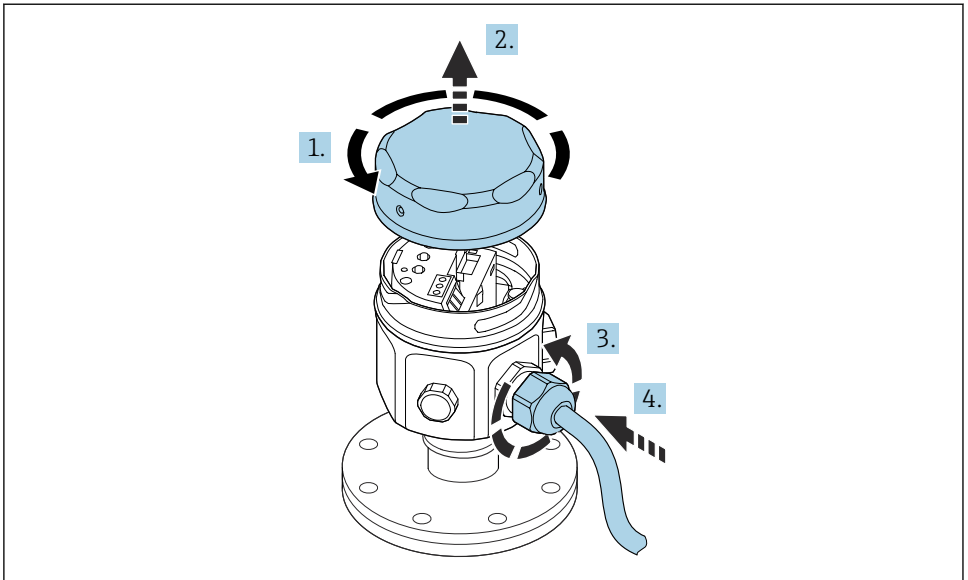
Standard protection, Ex ia protection

- 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

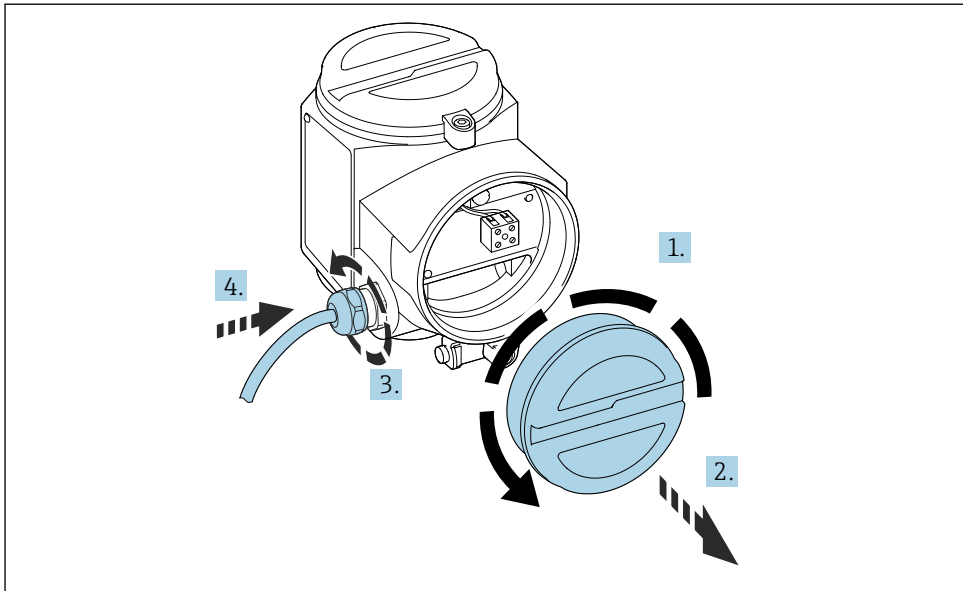
Connecting the electronic insert to the power supply:



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 →  2, chapter "Commissioning".



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