

Brief Operating Instructions

Levelflex FMP55

FOUNDATION Fieldbus

Guided wave radar



These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

Detailed information about the device can be found in the Operating Instructions and the other documentation:
Available for all device versions via:

- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*

1 Associated documentation



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2 About this document

2.1 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.

ℹ 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 inside and outside of the device.

- Inner ground terminal; protective earth is connected to the mains supply.
- Outer ground terminal; device is connected to the plant grounding system.

2.1.3 Tool symbols



Flat-blade screwdriver



Allen key



Torx 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



Result of a step



Visual inspection

1, 2, 3, ...

Item numbers

A, B, C, ...

Views

2.1.5 Symbols on the device



→ Safety instructions

Observe the safety instructions contained in the associated Operating Instructions



Temperature resistance of the connection cables

Specifies the minimum value of the temperature resistance of the connection cables

3 Basic safety instructions

3.1 Requirements for personnel

The personnel must fulfill the following requirements for its tasks:

- ▶ Trained, qualified specialists must have a relevant qualification for the specific function and task
- ▶ Are authorized by the plant owner/operator
- ▶ Are familiar with federal/national regulations
- ▶ Must have read and understood the instructions in the manual and supplementary documentation
- ▶ Follow instructions and comply with conditions

3.2 Intended use

Application and media

The measuring device described in this manual is intended only for the level and interface measurement of liquids. Depending on the version ordered, the measuring device can also measure potentially explosive, flammable, poisonous and oxidizing media.

If the limit values specified in the "Technical data" and the conditions listed in the manual and additional documentation are observed, the measuring device may be used for the following measurements only:

- ▶ Measured process variables: level and/or interface height
- ▶ Calculable process variables: volume or mass in any shape of vessel (calculated from the level by the linearization functionality)

To ensure that the measuring device remains in proper condition for the operation time:

- ▶ Use the measuring device only for media to which the process-wetted materials have an adequate level of resistance.
- ▶ Observe the limit values in the "Technical data".

Incorrect use

The manufacturer is not liable for damage caused by improper or non-intended use.

Verification for borderline cases:

- ▶ For special fluids and fluids for cleaning, Endress+Hauser is glad to provide assistance in verifying the corrosion resistance of fluid-wetted materials, but does not accept any warranty or liability.

Residual risks

Due to heat transfer from the process as well as power loss in the electronics, the temperature of the electronics housing and the assemblies contained therein (e.g. display module, main electronics module and I/O electronics module) may rise up to 80 °C (176 °F). When in operation, the sensor may reach a temperature close to the medium temperature.

Danger of burns from contact with surfaces!

- ▶ In the event of high medium temperatures, ensure protection against contact to prevent burns.

3.3 Workplace safety

When working on and with the device:

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

3.4 Operational safety

Risk of injury!

- ▶ Operate the device only if it is in proper technical condition, free from errors and faults.
- ▶ The operator is responsible for the interference-free operation of the device.

Modifications to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers:

- ▶ If modifications are nevertheless required, consult with the manufacturer.

Repair

To ensure continued operational safety and reliability:

- ▶ Carry out repairs on the device only if they are expressly permitted.
- ▶ Observe federal/national regulations pertaining to the repair of an electrical device.
- ▶ Use only original spare parts and accessories from the manufacturer.

Hazardous area

To eliminate danger to persons or the installation when the device is used in the hazardous area (e.g. explosion protection, pressure vessel safety):

- ▶ Check the nameplate to verify whether the ordered device can be put to its intended use in the hazardous area.
- ▶ Observe the specifications in the separate supplementary documentation, which is an integral part of this manual.

3.5 Product safety

This measuring device is designed in accordance with 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 the general safety standards and legal requirements.

NOTICE

Loss of degree of protection by opening of the device in humid environments

- ▶ If the device is opened in a humid environment, the degree of protection indicated on the nameplate is no longer valid. This may also impair the safe operation of the device.

3.5.1 CE mark

The measuring system meets the legal requirements of the applicable EU directives. These are listed in the corresponding EU Declaration of Conformity together with the standards applied.

The manufacturer confirms successful testing of the device by affixing to it the CE mark.

3.5.2 EAC conformity

The measuring system meets the legal requirements of the applicable EAC guidelines. These are listed in the corresponding EAC Declaration of Conformity along with the standards applied.

The manufacturer confirms successful testing of the device by affixing to it the EAC mark.

4 Incoming acceptance and product identification

4.1 Incoming acceptance

Check the following during incoming acceptance:

- Are the order codes on the delivery note and the product sticker identical?
- Are the goods undamaged?
- Do the nameplate data match the ordering information on the delivery note?
- If required (see nameplate): are the Safety Instructions (XA) provided?



If one of these conditions is not met, please contact your Endress+Hauser sales office.

4.2 Product identification

The device can be identified in the following ways:

- Nameplate specifications
- Extended order code with breakdown of the device features on the delivery note
- ▶ Enter serial number from nameplates in *W@M Device Viewer* (www.endress.com/deviceviewer)
 - ↳ All of the information on the measuring device and on the scope of the technical documentation pertaining to the device is displayed.
- ▶ Enter the serial number from the nameplate in the *Endress+Hauser Operations app* or scan the 2-D matrix code on the nameplate with the camera
 - ↳ All of the information on the measuring device and on the scope of the technical documentation pertaining to the device is displayed.

4.3 Storage and transport

4.3.1 Storage temperature

- Permitted storage temperature: -40 to +80 °C (-40 to +176 °F)
- Use original packaging.

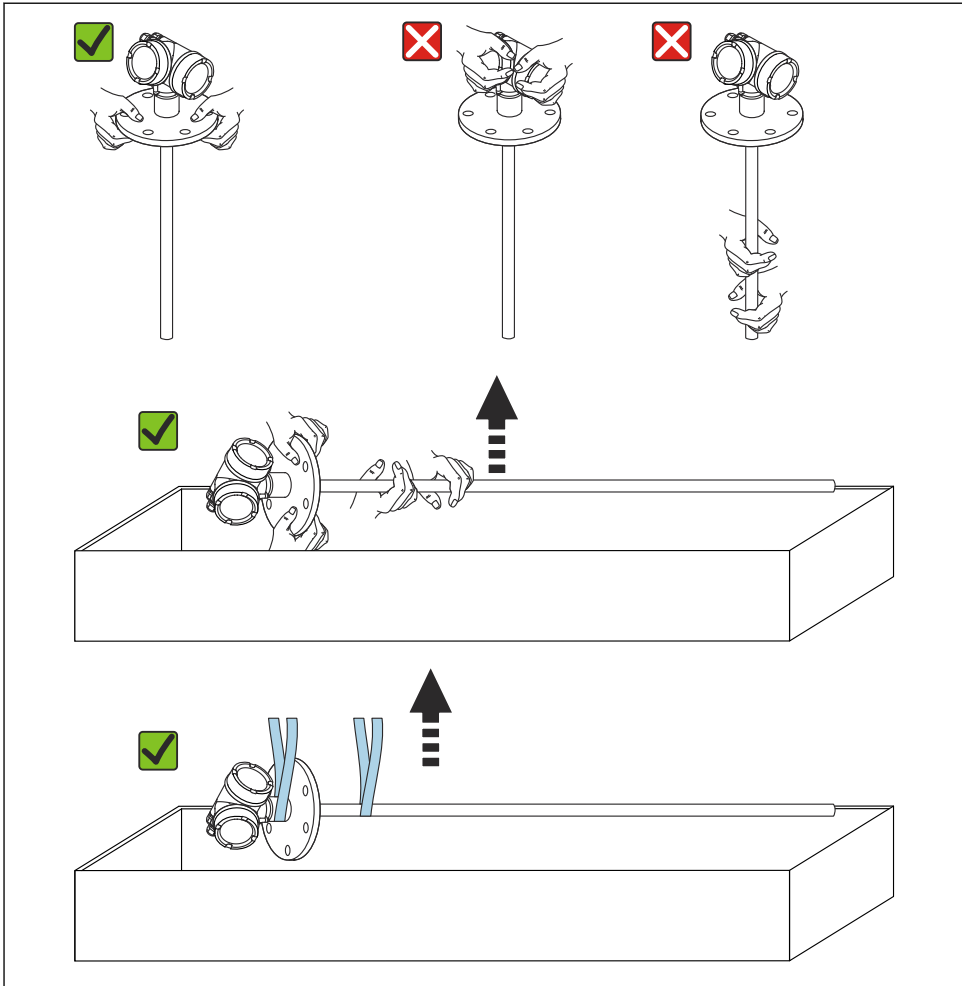
4.3.2 Transporting the product to the measuring point

WARNING

Housing or rod may become damaged or pull off.

Risk of injury!

- ▶ Transport the measuring device to the measuring point in its original packaging or by the process connection.
- ▶ Always secure lifting equipment (slings, eyes, etc.) at the process connection and never lift the device by the electronic housing or probe. Pay attention to the center of gravity of the device so that it does not tilt or slip unintentionally.
- ▶ Follow the safety instructions and transport conditions for devices weighing more than 18 kg (39.6 lbs) (IEC 61010).

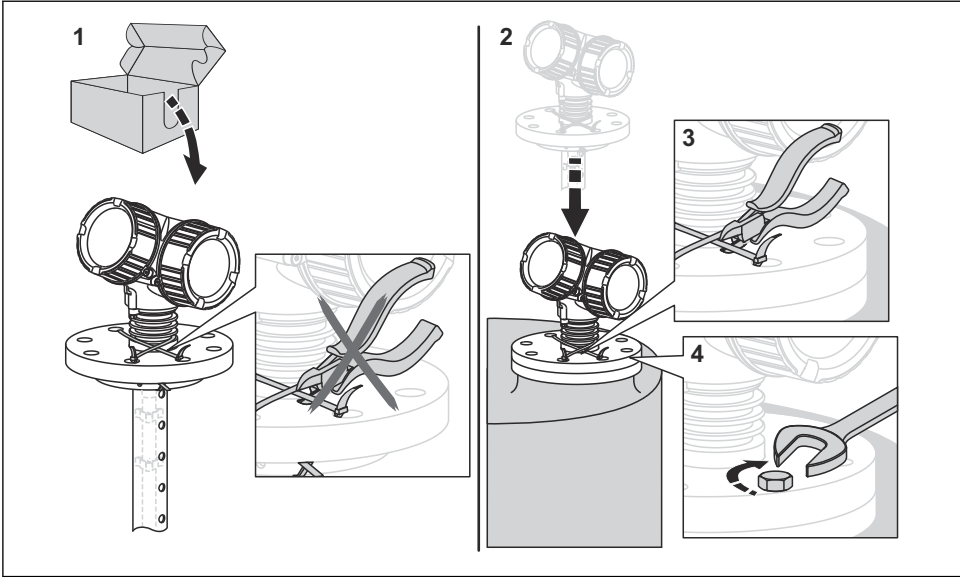


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NOTICE

Transport lock in the FMP55 with coax probe

- The coax tube is not firmly connected to the electronics housing in the FMP55 with coax probe. It is fixed onto the mounting flange with two cable ties during transportation. These cable ties must not be released during transportation or installation of the device to prevent the spacer from sliding at the probe rod. They may only be removed immediately before screwing the process connection flange into place.

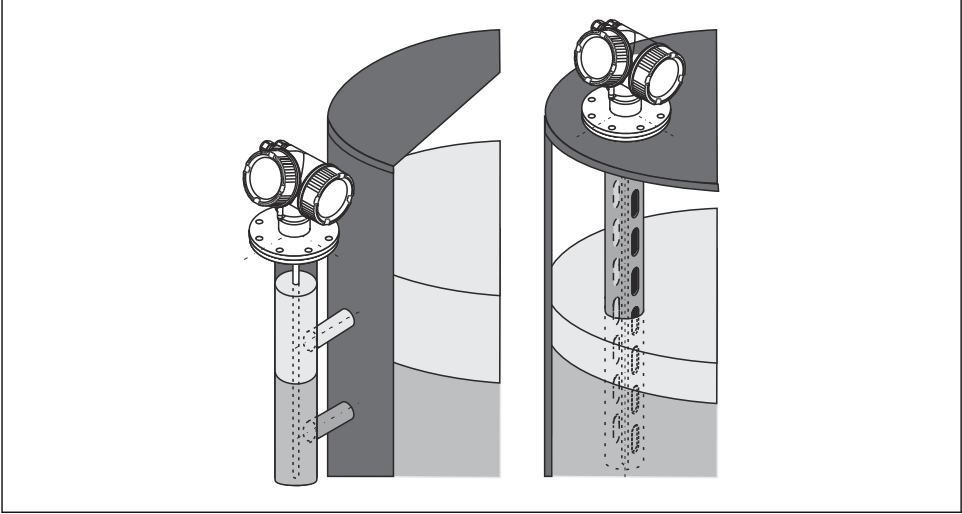


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5 Mounting

5.1 Mounting requirements

5.1.1 Suitable mounting position



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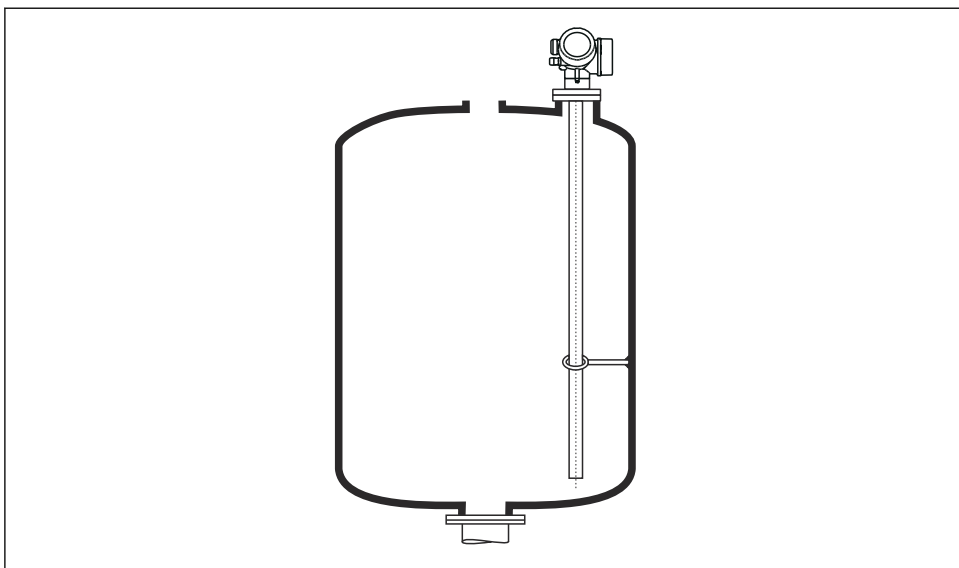
 1 Mounting position of Levelflex FMP55

- Rod probes/rope probes: mount in the bypass/stilling well.
- Coax probes can be mounted at any distance from the wall.
- When mounting outdoors, a weather protection cover can be used to protect the device against extreme weather conditions.
- Minimum distance from the end of the probe to the bottom of the vessel: 10 mm (0.4 in)

5.1.2 Securing the probe

Securing coax probes

For WHG approval: a support is required for probe lengths ≥ 3 m (10 ft).



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Coax probes can be secured (fixed) at any point in the ground tube.

5.2 Mounting the device

5.2.1 Mounting devices with a flange

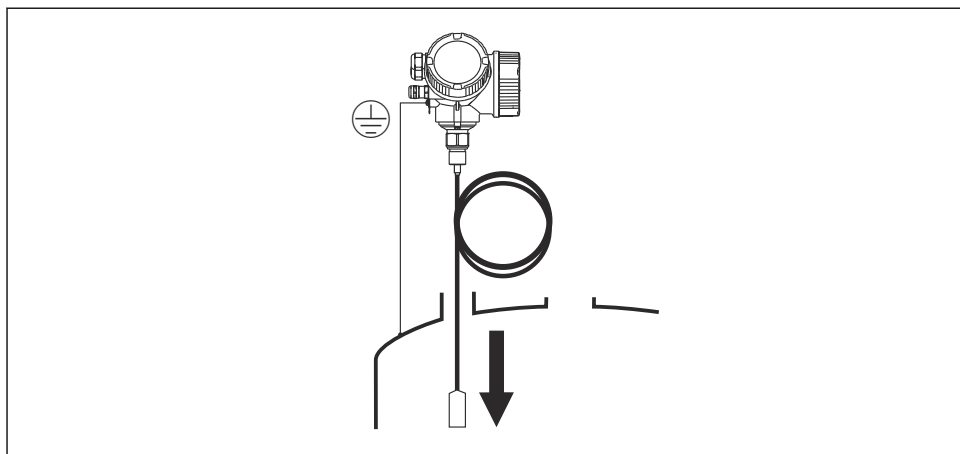
If a seal is used to mount the device, use uncoated metal screws to ensure good electrical contact between the process flange and the probe flange.

5.2.2 Mounting rope probes

NOTICE

Electrostatic discharge can damage the electronics.

- Ground the housing before lowering the rope probe into the vessel.



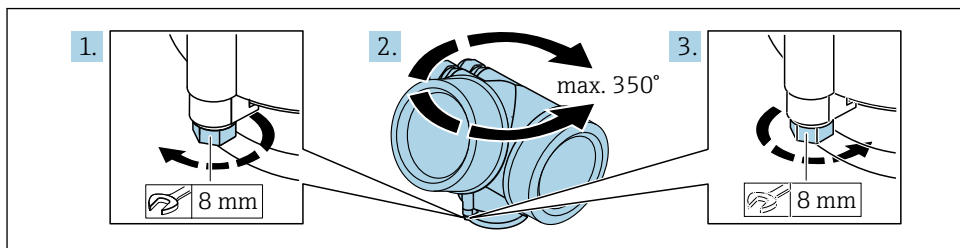
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Pay attention to the following when introducing the rope probe into the vessel:

- Uncoil the rope slowly and lower it carefully into the vessel.
- Make sure the rope does not bend or buckle.
- Avoid uncontrolled swinging of the weight, as this could damage internal fittings in the vessel.

5.2.3 Turning the transmitter housing

To provide easier access to the connection compartment or display module, the transmitter housing can be turned:

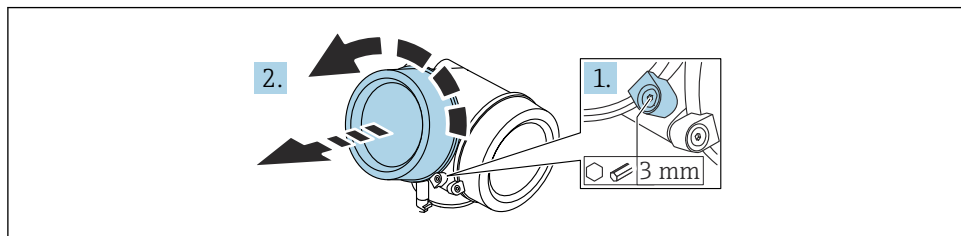


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1. Unscrew the securing screw using an open-ended wrench.
2. Rotate the housing in the desired direction.
3. Tighten the securing screw (1.5 Nm for plastic housing; 2.5 Nm for aluminum or stainless steel housing).

5.2.4 Turning the display

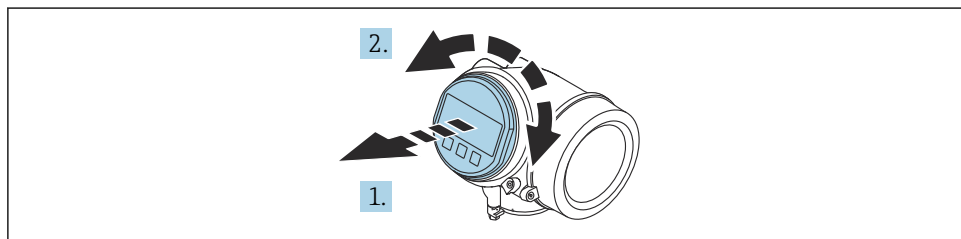
Opening the cover



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1. Loosen the screw of the securing clamp of the electronics compartment cover using an Allen key (3 mm) and turn the clamp 90 ° counterclockwise.
2. Unscrew the electronics compartment cover and check the cover seal; replace it if necessary.

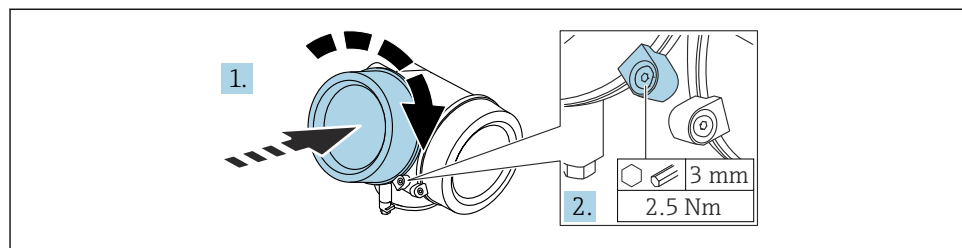
Turning the display module



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1. Pull out the display module with a gentle rotational movement.
2. Turn the display module to the desired position: Max. $8 \times 45^\circ$ in each direction.
3. Feed the coiled cable into the gap between the housing and main electronics module and plug the display module into the electronics compartment until it engages.

Closing the cover of the electronics compartment



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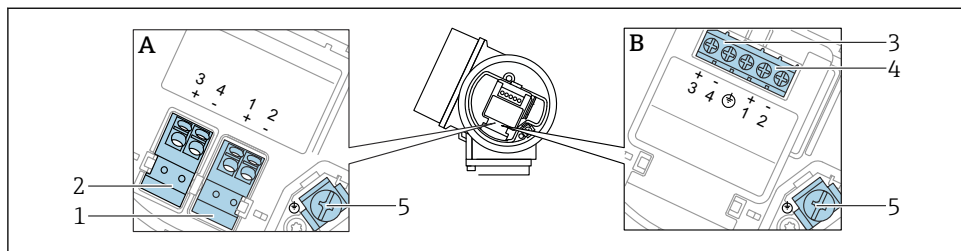
1. Screw down the cover of the electronics compartment.
2. Turn the securing clamp 90 ° in the clockwise direction and, using an Allen key (3 mm), tighten the screw of the securing clamp on the electronics compartment cover with 2.5 Nm.

6 Electrical connection

6.1 Connecting requirements

6.1.1 Terminal assignment

Terminal assignment PROFIBUS PA / FOUNDATION Fieldbus

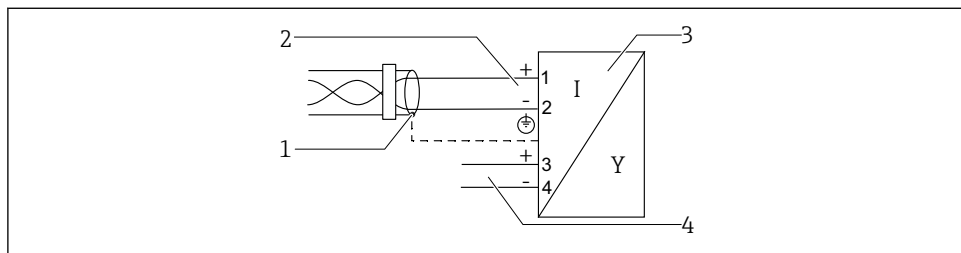


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2 Terminal assignment PROFIBUS PA / FOUNDATION Fieldbus

- A Without integrated overvoltage protection
- B With integrated overvoltage protection
- 1 Connection, PROFIBUS PA / FOUNDATION Fieldbus: terminals 1 and 2, without integrated overvoltage protection
- 2 Connection, switch output (open collector): terminals 3 and 4, without integrated overvoltage protection
- 3 Connection, switch output (open collector): terminals 3 and 4, with integrated overvoltage protection
- 4 Connection, PROFIBUS PA / FOUNDATION Fieldbus: terminals 1 and 2, with integrated overvoltage protection
- 5 Terminal for cable shield

Block diagram PROFIBUS PA / FOUNDATION Fieldbus



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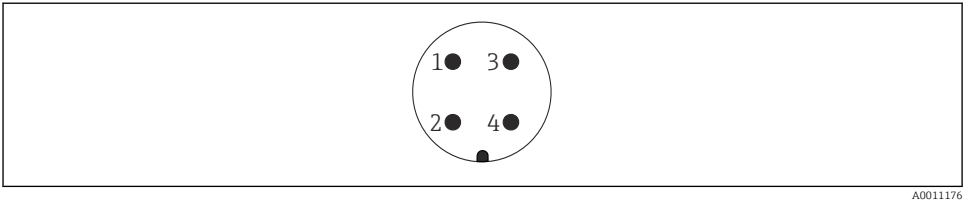
3 Block diagram PROFIBUS PA / FOUNDATION Fieldbus

- 1 Cable screen; observe cable specification
- 2 Connection PROFIBUS PA / FOUNDATION Fieldbus
- 3 Measuring device
- 4 Switch output (open collector)

6.1.2 Device plug



In the case of the device versions with a plug, the housing does not need to be opened to connect the signal cable.



4 Pin assignment of 7/8" plug

- 1 Signal -
- 2 Signal +
- 3 Not assigned
- 4 Shielding

6.1.3 Supply voltage

PROFIBUS PA, FOUNDATION Fieldbus

"Power supply; output" ¹⁾	"Approval" ²⁾	Terminal voltage
E: 2-wire; FOUNDATION Fieldbus, switch output G: 2-wire; PROFIBUS PA, switch output	<ul style="list-style-type: none">Non-hazardousEx nAEx nA[ia]Ex icEx ic[ia]Ex d[ia] / XPEx ta / DIPCSA GP	9 to 32 V ³⁾
	<ul style="list-style-type: none">Ex ia / ISEx ia + Ex d[ia] / IS + XP	9 to 30 V ³⁾

- 1) Feature 020 in the product structure
- 2) Feature 010 in the product structure
- 3) Input voltages up to 35 V do not destroy the device.

Polarity-dependent	No
FISCO/FNICO compliant according to IEC 60079-27	Yes

6.1.4 Overvoltage protection

See Operating Instructions.

6.2 Connecting the device

⚠ WARNING

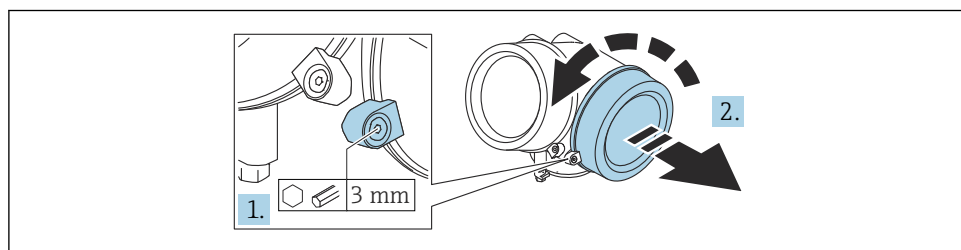
Explosion Hazard!

- ▶ Observe applicable national standards.
- ▶ Comply with the specifications in the Safety Instructions (XA).
- ▶ Use specified cable glands only.
- ▶ Check to ensure that the power supply matches the information on the nameplate.
- ▶ Switch off the power supply before connecting the device.
- ▶ Connect the potential matching line to the outer ground terminal before applying the power supply.

Required tools/accessories:

- For devices with a cover lock: Allen key AF3
- Wire stripper
- When using stranded cables: One ferrule for every wire to be connected.

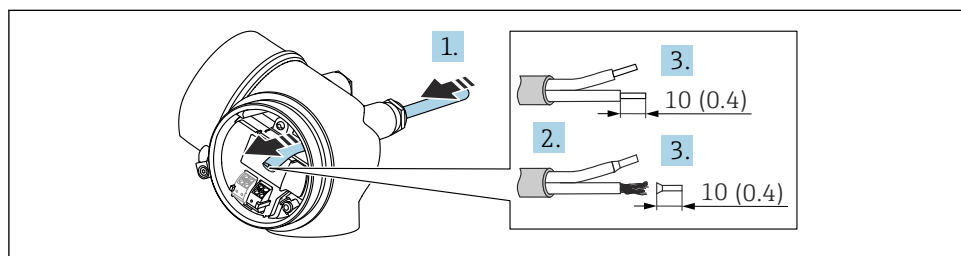
6.2.1 Opening cover



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1. Loosen the screw of the securing clamp of the connection compartment cover using an Allen key (3 mm) and turn the clamp 90 ° counterclockwise.
2. Unscrew the connection compartment cover and check the cover seal; replace it if necessary.

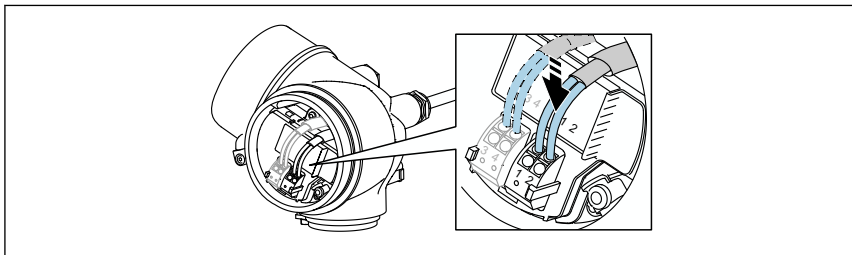
6.2.2 Connecting



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5 Engineering unit: mm (in)

1. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
2. Remove the cable sheath.
3. Strip the cable ends 10 mm (0.4 in). In the case of stranded cables, also fit ferrules.
4. Firmly tighten the cable glands.
5. Connect the cable according to the terminal assignment.

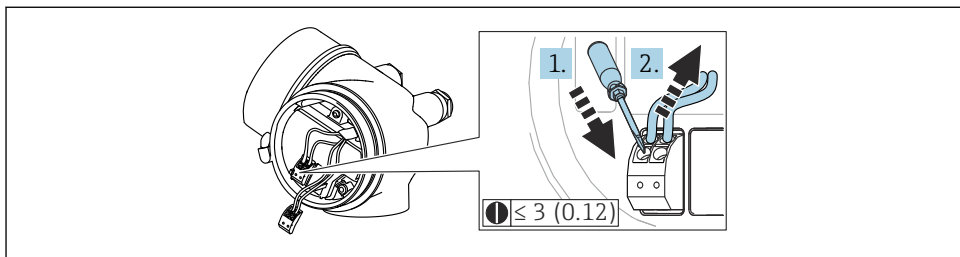


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6. If using shielded cables: Connect the cable shield to the ground terminal.

6.2.3 Plug-in spring-force terminals

The electrical connection of device versions without an integrated overvoltage protection is via plug-in spring-force terminals. Rigid conductors or flexible conductors with ferrules can be inserted directly into the terminal without using the lever, and create a contact automatically.



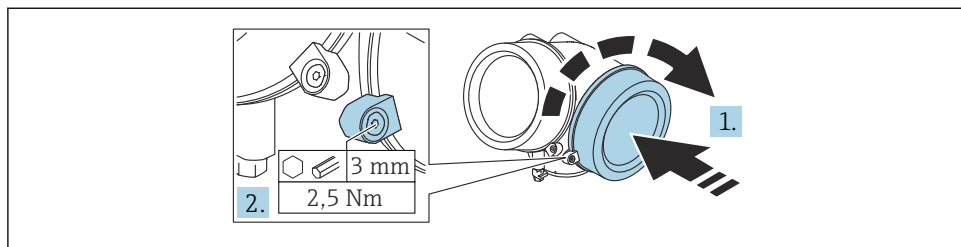
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6 Engineering unit: mm (in)

To remove the cable from the terminal again:

1. Using a flat-blade screwdriver ≤ 3 mm, press down on the slot between the two terminal holes
2. Simultaneously pull the cable end out of the terminal.

6.2.4 Closing the cover of the connection compartment



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1. Screw down the cover of the connection compartment.
2. Turn the securing clamp 90 ° in the clockwise direction and, using an Allen key (3 mm), tighten the screw of the securing clamp on the connection compartment cover with 2.5 Nm.

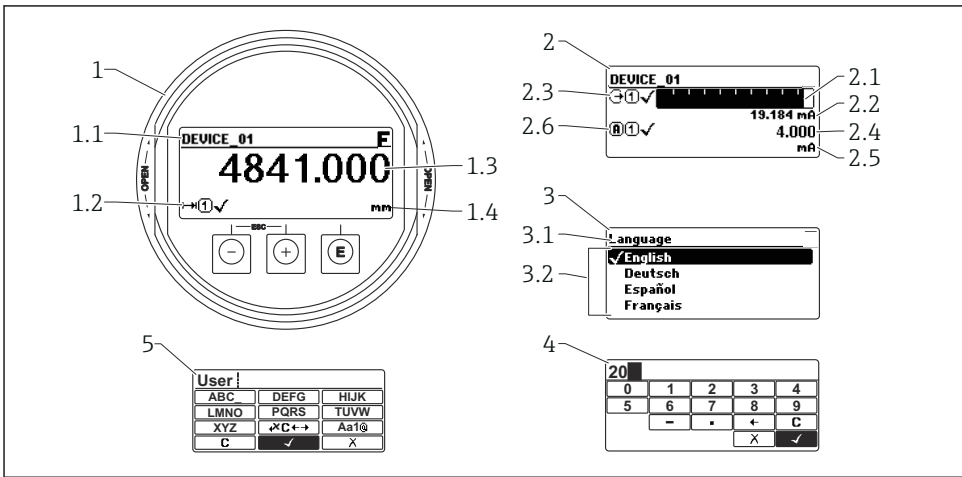
7 Operation options

The device can be operated as follows:

- Operation via operating menu (display)
- DeviceCare and Fieldcare, see Operating Instructions
- SmartBlue (app), Bluetooth (optional), see Operating Instructions

7.1 Structure and function of the operating menu

7.1.1 Display



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7 Display format on the display and operating module

- 1 Measured value display (1 value max. size)
 - 1.1 Header containing tag and error symbol (if an error is active)
 - 1.2 Measured value symbols
 - 1.3 Measured value
 - 1.4 Unit
- 2 Measured value display (bar graph + 1 value)
 - 2.1 Bar graph for measured value 1
 - 2.2 Measured value 1 (including unit)
 - 2.3 Measured value symbols for measured value 1
 - 2.4 Measured value 2
 - 2.5 Unit for measured value 2
 - 2.6 Measured value symbols for measured value 2
- 3 Visualization of a parameter (here: parameter with picklist)
 - 3.1 Header containing parameter name and error symbol (if an error is active)
 - 3.2 Picklist; ☒ marks the current parameter value.
- 4 Input matrix for numbers
- 5 Input matrix for alphanumeric and special characters

7.1.2 Operating elements

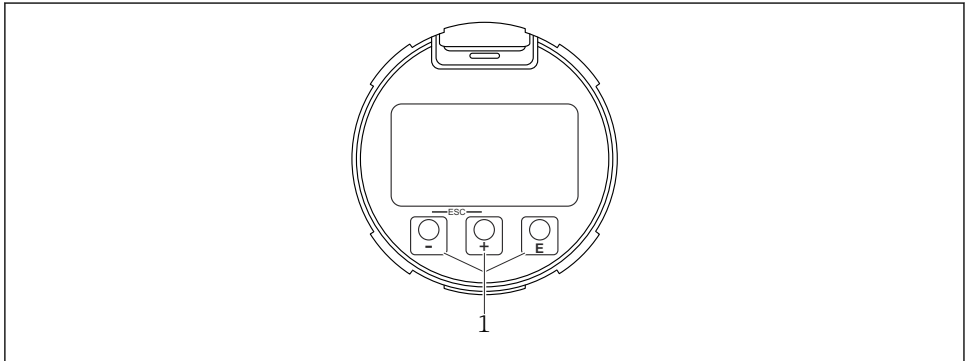
Functions

- Display of measured values and fault and notice messages
- Background lighting, which switches from green to red in the event of an error
- The device display can be removed for easier operation



The device displays are available with the additional option of Bluetooth® wireless technology.

Backlighting is switched on or off depending on the supply voltage and the current consumption.



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8 Display module

1 Operating keys

Key assignment

- Key
- Navigate down in the picklist
- Edit the numerical values or characters within a function
- Key
- Navigate up in the picklist
- Edit the numerical values or characters within a function
- Key
- *In the measured value display:* Pressing the key briefly opens the operating menu.
- Pressing the key for 2 s opens the context menu.
- *In the menu, submenu:* Pressing the key briefly:
- Opens the selected menu, submenu or parameter.
- Pressing the key for 2 s in a parameter:
- If present, opens the help text for the function of the parameter.
- *In a text and numeric editor:* Pressing the key briefly:
- Opens the selected group.
- Carries out the selected action.
- Carries out the selected action.

- **⊕** key and **⊖** key (ESC function - press keys simultaneously)
 - *In the menu, submenu:* Pressing the key briefly:
 - Exits the current menu level and takes you to the next higher level.
 - If help text is open, closes the help text of the parameter.
 - Pressing the key for 2 s returns you to the measured value display ("home position").
 - *In a text and numeric editor:* Closes the text or numeric editor without applying changes.
- **□** key and **⌂** key (press keys simultaneously)
Reduces the contrast (brighter setting).
- **⊕** key and **⌂** key (press and hold keys simultaneously)
Increases the contrast (darker setting).

7.2 Access to the operating menu via the local display

Parameter/submenu	Meaning	Description
Language ¹⁾	Defines the operating language of the local display	BA01054F
Setup	Once values have been set for the setup parameters, the measurement should generally be completely configured.	
Setup→Mapping	Mapping of interference echos	
Setup→Advanced setup	Contains additional submenus and parameters <ul style="list-style-type: none"> ■ For more customized configuration of the measurement (adaptation to special measuring conditions) ■ For converting the measured value (scaling, linearization). ■ For scaling the output signal. 	
Diagnostics	Contains the most important parameters for diagnosing the condition of the device	GP01015F
Expert ²⁾	Contains all the parameters of the device (including those that are already contained in one of the other menus). This menu is organized according to the function blocks of the device.	

- 1) If you are operating via operating tools (e.g. FieldCare), the Language parameter is located under "Setup→Advanced setup→Display"
- 2) When you call up the "Expert" menu, you are always asked for an access code. If a customer-specific access code has not been defined, "0000" must be entered.


7.2.1 Opening the context menu

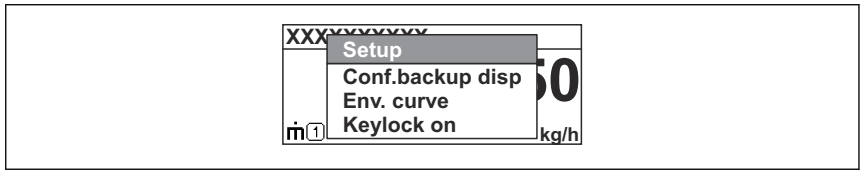
Using the context menu, the user can call up the following menus quickly and directly from the operational display:

- Setup
- Conf. backup disp.
- Envelope curve
- Keylock on



Calling up and closing the context menu

The user is in the operational display.



1. Press  for 2 s.
 - The context menu opens.



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2. Press  +  simultaneously.
 - The context menu is closed and the operational display appears.

Calling up the menu via the context menu

1. Open the context menu.
2. Press  to navigate to the desired menu.
3. Press  to confirm the selection.
 - The selected menu opens.

8 Commissioning

8.1 Switching on the device

- Switch on the mains voltage (fuse box).

The device is switched on.

8.1.1 Disabling write protection

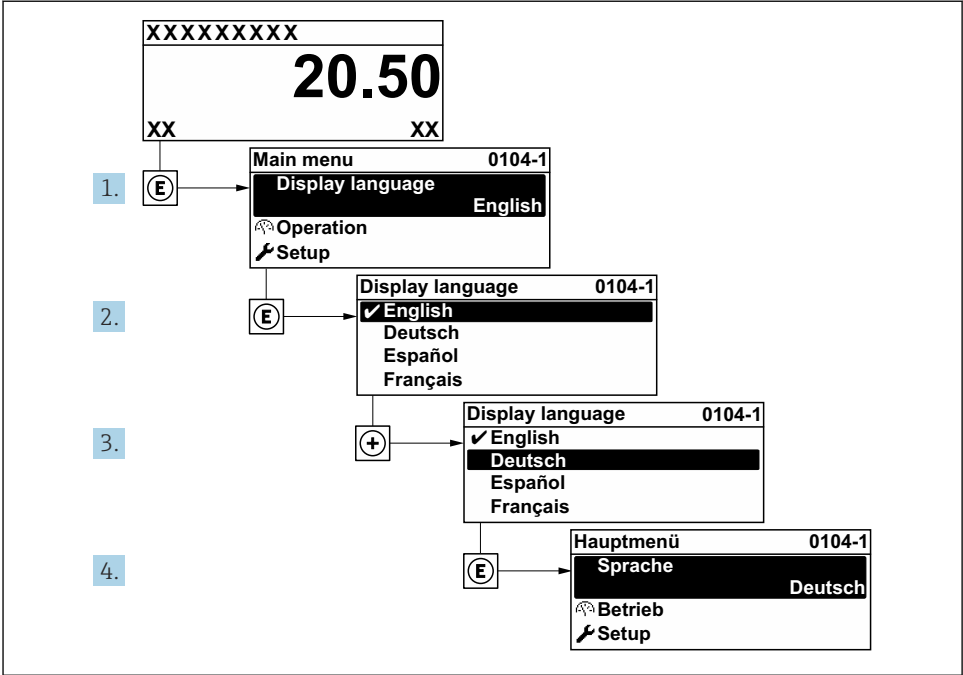
If the device is write-protected, write protection must first be disabled.



See the Operating Instructions of the device for this purpose:
BA01054F (FMP55, FOUNDATION Fieldbus)

8.2 Setting the operating language

Factory setting: English or ordered local language

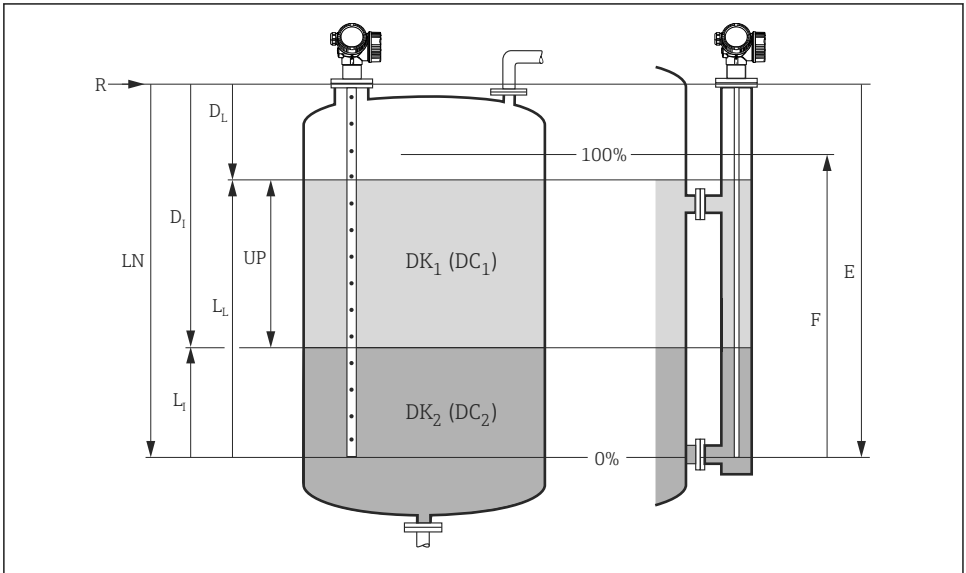


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9 Taking the example of the local display

8.3 Device configuration

8.3.1 Configuring interface measurement



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10 Configuration parameters for interface measurement

R = Reference point of measurement

E = Empty calibration (= zero point)

F = Full calibration (= span)

LN = probe length

UP = Measured thickness upper layer

D_1 = Interface distance (distance from flange to DK_2)

L_1 = Interface

D_2 = Distance

L_2 = Level

1. Setup → Device tag

↳ Enter device tag.

2. Setup → Operating mode

↳ Select **Interface with capacitance** option.

3. Setup → Distance unit

↳ Select the length unit.

4. Setup → Tank type

↳ Select tank type.

5. Setup → Tube diameter (only for "Tank type" = "Bypass / pipe")

↳ Specify the diameter of the bypass or stilling well.

6. **Setup → DC value**
 - ↳ Specify the dielectric constant of the upper medium
7. **Setup → Empty calibration**
 - ↳ Specify the empty distance E (distance from the reference point R to the 0% mark).
8. **Setup → Full calibration**
 - ↳ Specify the full distance F (distance from the 0% mark to the 100% mark).
9. **Setup → Level**
 - ↳ Displays the measured level L_L .
10. **Setup → Interface**
 - ↳ Displays the interface height L_I .
11. **Setup → Distance**
 - ↳ Displays the distance D_L between the reference point R and the level L_L .
12. **Setup → Interface distance**
 - ↳ Displays the distance D_I between the reference point R and the interface L_I .
13. **Setup → Signal quality**
 - ↳ Displays the signal quality of the analyzed level echo.
14. **Setup → Mapping → Confirm distance**
 - ↳ Make sure the vessel is completely empty. Then select **Tank empty** option.

NOTICE

Wrong measurement due to incorrect dielectric constant of the lower medium

- If, for Operating mode = **Interface with capacitance**, the lower medium is not water, the dielectric constant (DC value) of the medium must be specified: Setup → Advanced setup → Interface → DC value lower medium

NOTICE

Wrong measurement due to incorrect empty capacitance

- In the case of rod and rope probes in the bypass and if **Operating mode = Interface with capacitance**, a correct measurement is only possible once the empty capacitance has been determined. For this purpose, select **Confirm distance = Tank empty** after installing the probe when the tank is completely empty (Step 13 in the table above).



The empty capacitance is always calibrated ex works in the case of coax probes.



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