

## LG01 Guided Wave Radar Level Meter



The LevelWave LG01 is designed to perform continuous level measurement in a wide range of industries and applications. Foxboro Eckardt is known for more than 50 years of experience in level measurement as a leading supplier of extremely robust, durable and reliable level measurements. Unaffected by changes in temperature, specific gravity, pressure and with no need to recalibrate, offering a highly available measurement at low maintenance cost. With the LevelWave LG01 you achieve a highly modular system which is designed for the requirements of the modern industry.

### FEATURES

- 2-wire Loop powered TDR technology
- 360° rotatable housing with snap solution
- Housing and cover with bayonet connectors
- Horizontal or vertical housing position
- Remote electronics (up to 100 m / 328 ft)
- Weather protection cap
- Measuring range up to 40 m / 130 ft
- Measurements down to 1.1 DK possible
- Quick Noise Scanning (QNS) function
- HART Communication, 4 to 20 mA
- Configuration via FDT-DTM
- Continuous self-diagnostics, Status and diagnostic messages, acc. to NE 107
- Process temperature from -50 to +300 °C
- Process pressure from -1 to 40 bar
- SIL2-compliant acc. to IEC 61508 for safety related systems
- Local multilingual full graphic LCD, configurable in %, mA or physical units
- Display with external keypad



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# 1 Safety instructions

## Warnings and symbols used



### **DANGER!**

*This information refers to the immediate danger when working with electricity.*



### **DANGER!**

*These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.*



### **WARNING!**

*Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.*



### **CAUTION!**

*Disregarding these instructions can result in damage to the device or to parts of the operator's plant.*



### **INFORMATION!**

*These instructions contain important information for the handling of the device.*



### **HANDLING**

- This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

### ➔ **RESULT**

This symbol refers to all important consequences of the previous actions.

## Safety instructions for the operator



### **CAUTION!**

*Installation, assembly, start-up and maintenance may only be performed by appropriately trained personnel. The regional occupational health and safety directives must always be observed.*



### **LEGAL NOTICE!**

*The responsibility as to the suitability and intended use of this device rests solely with the user. The supplier assumes no responsibility in the event of improper use by the customer. Improper installation and operation may lead to loss of warranty. In addition, the "Terms and Conditions of Sale" apply which form the basis of the purchase contract.*



### **INFORMATION!**

- Further information can be found in the handbook and on the data sheet. These documents can be downloaded from the website.
- If you need to return the device to the manufacturer or supplier, please fill out the device return form and send it with the device. Unfortunately, the manufacturer cannot repair or inspect the device without the completed form.

## 2 Installation

### 2.1 Intended use



**CAUTION!**

Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.



**INFORMATION!**

The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

This level meter with guided radar measures distance, level, mass and volume of liquids, pastes, slurries, granulates and powders.

It can be installed on tanks, silos and open pits.

### 2.2 Scope of delivery



**INFORMATION!**

Do a check of the packing list to make sure that you have all the elements given in the order.

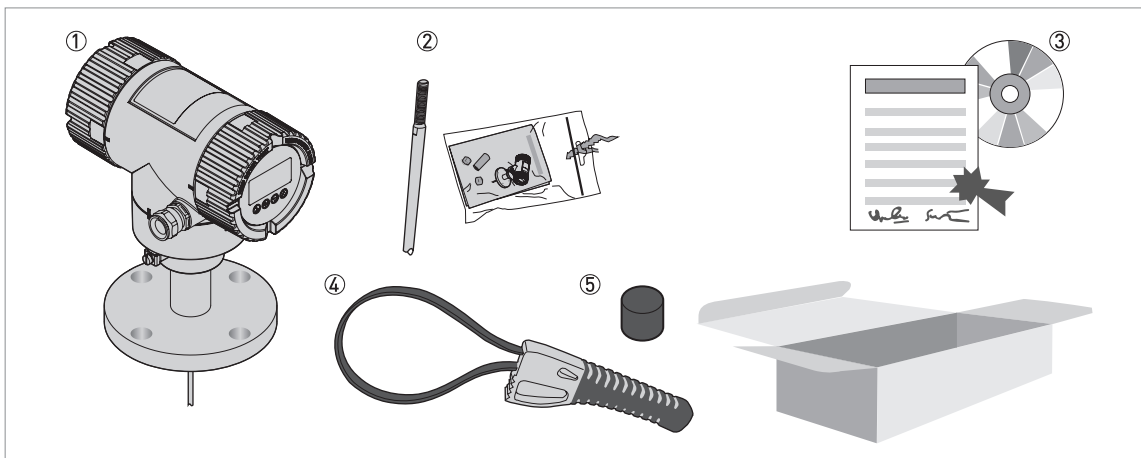


Figure 2-1: Scope of delivery

- ① Signal converter and probe.
- ② Probe segments. For the assembly procedure of the single rod probe, refer to the instructions that are supplied with the device. If a single rod or coaxial probe is attached and you ordered the "segmented probe" option, only part of the probe is attached to the device. For the assembly procedure of the segmented single rod probe, refer to the instructions that are supplied with the device. For the assembly procedure of the segmented coaxial probe, refer to the instructions that are supplied with the device.
- ③ DVD-ROM. This contains the Handbook, the Quick Guide, Product Specification Sheet (PSS) and related software.
- ④ Strap wrench
- ⑤ Probe assembly cover



**INFORMATION!**

No training required!



## 2.4 Storage

**WARNING!**

*Do not keep the device in a vertical position. This will damage the probe and the device will not measure correctly.*

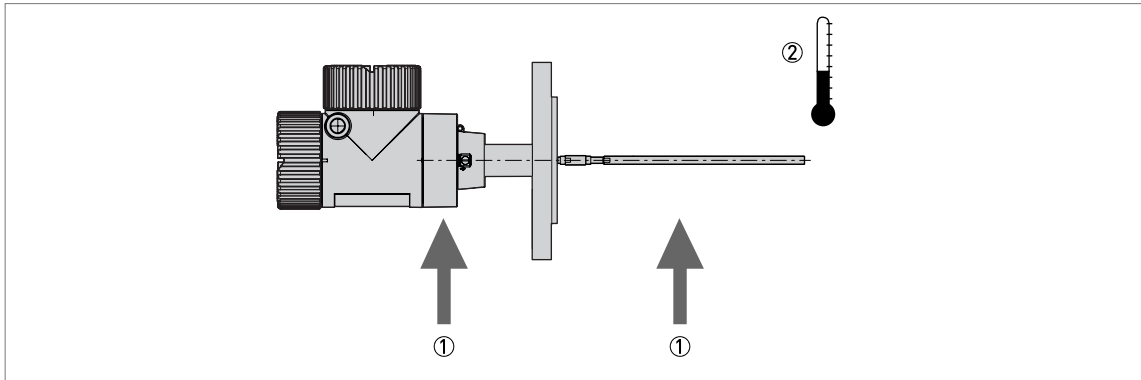


Figure 2-4: Storage conditions

- ① Do not bend rod and coaxial probes - support here
- ② Storage temperature range: -50...+85°C / -60...+185°F (min. -40°C / -40°F for devices with the integrated LCD display option)

- Store the device in a dry and dust-free location.
- Store the device in its original packing.



## 2.5 Transport

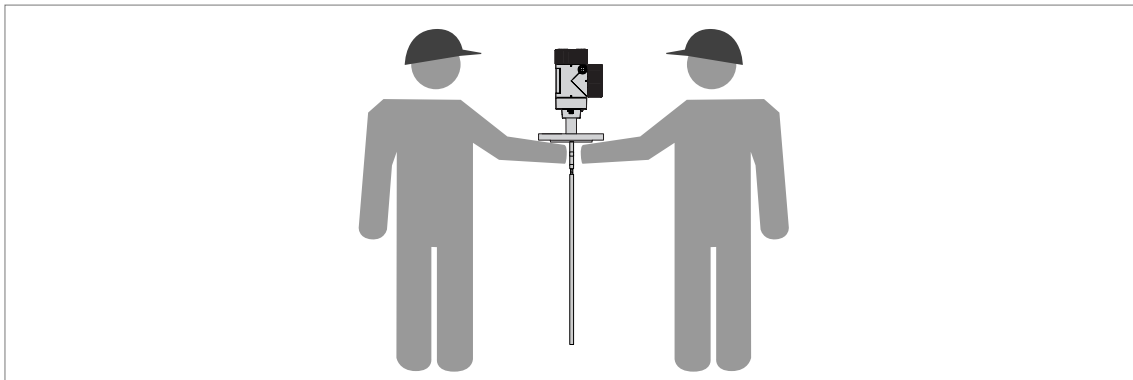


Figure 2-5: How to hold the device

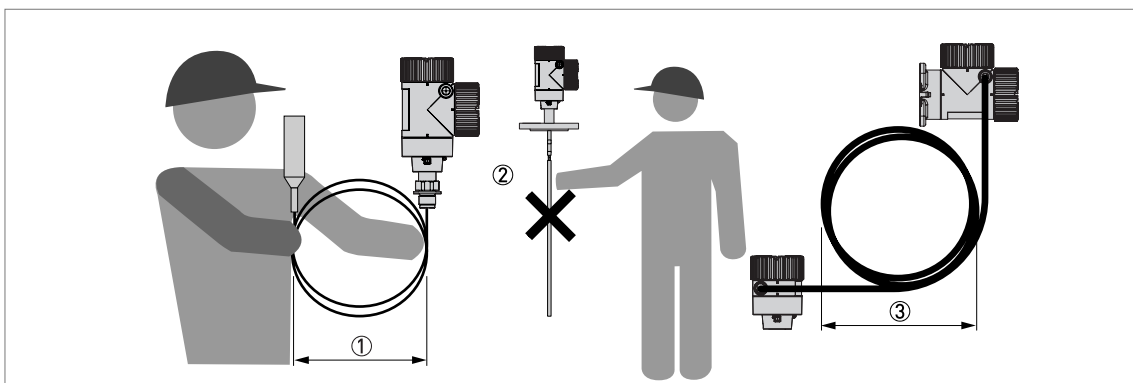


Figure 2-6: How to hold the device

- ① Wind cable probes greater than 400 mm / 16" in diameter.
- ② Do not hold the probe when you lift the device.
- ③ Do not wind the electrical cable less than 330 mm / 13" in diameter.



**WARNING!**

*If you do not lift the device carefully, you can cause damage to the probe.*

## 2.6 Pre-installation requirements



**INFORMATION!**

*Obey the precautions that follow to make sure that the device is correctly installed.*

- Make sure that there is sufficient space on all sides.
- Protect the signal converter from direct sunlight. The device has a weather protection option.
- Do not subject the signal converter to heavy vibrations.

## 2.7 How to prepare the tank before you install the device



### CAUTION!

To avoid measuring errors and device malfunction, obey these precautions.

### 2.7.1 Pressure and temperature ranges

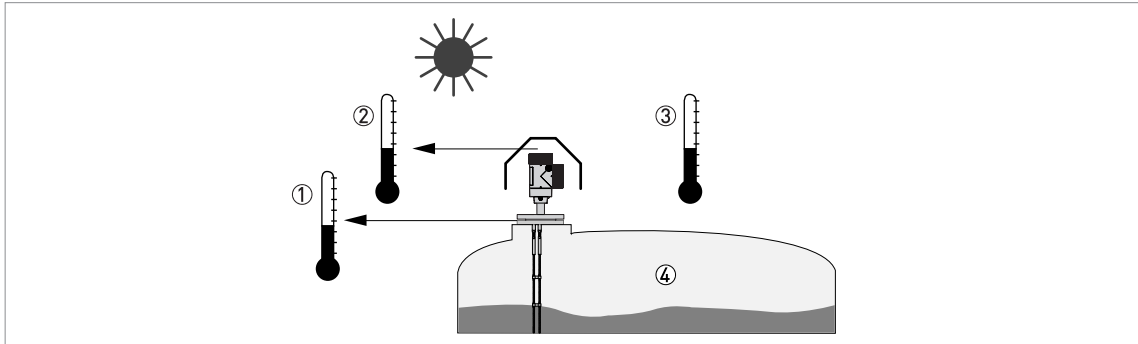


Figure 2-7: Pressure and temperature ranges

- ① Temperature at the process connection  
The temperature at the process connection must stay in the temperature range of the gasket material unless the device is a High-Temperature version. Refer to the table "Permitted temperature ranges for gaskets" that follows and to "Technical data" in the handbook.  
Devices with Hazardous Location approvals: see supplementary instructions
- ② Ambient temperature for operation of the display  
-20...+60°C / -4...+140°F  
If the ambient temperature is not between these limits, the display screen switches off automatically
- ③ Ambient temperature  
Non-Ex devices: -40...80°C / -40...176°F  
Devices with Hazardous Location approvals: see supplementary instructions
- ④ Process pressure  
-1...40 barg / -14.5...580 psig



### WARNING!

The process connection temperature range must agree with the temperature limits of the gasket material.

### Permitted temperature ranges for gaskets

Gasket material	Permitted temperature ranges for gaskets			
	Standard version		High-Temperature version	
	[°C]	[°F]	[°C]	[°F]
FKM/FPM	-40...+150	-40...+302	-40...+300	-40...+572
Kalrez® 6375	-20...+150	-4...+302	-20...+300	-4...+572
EPDM	-50...+150	-58...+302	-50...+250	-58...+482

2.7.2 General information for nozzles



**CAUTION!**

Follow these recommendations to make sure that the device measures correctly. They have an effect on the performance of the device.



**CAUTION!**

Do not put the process connection near to the product inlet. If the product that enters the tank touches the probe, the device will measure incorrectly.

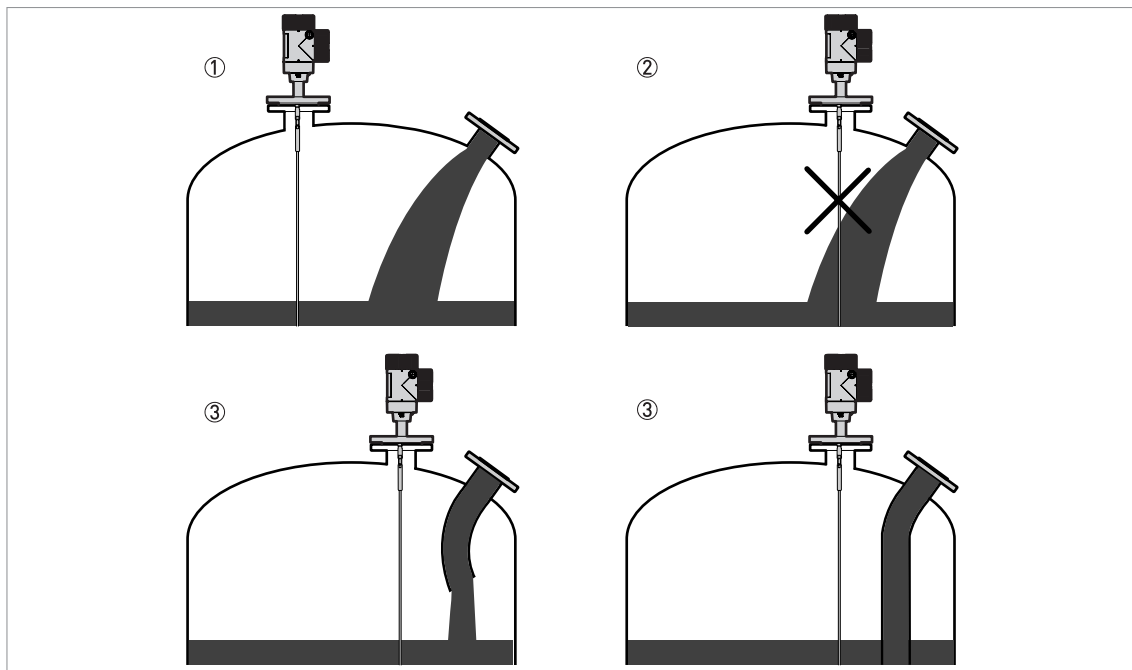


Figure 2-8: Do not put the device near to a product inlet

- ① The device is in the correct position.
- ② The device is too near to the product inlet.
- ③ If it is not possible to put the device in the recommended position, install a deflector pipe.

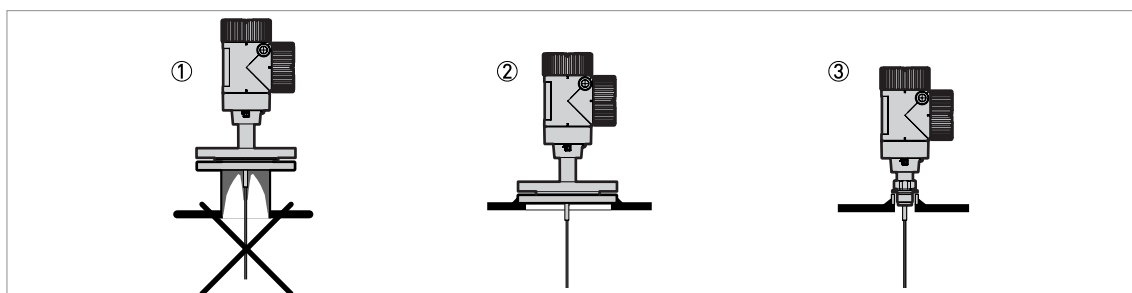


Figure 2-9: How to prevent build up of product around the process connection

- ① If product particles are likely to collect in holes, a nozzle is not recommended.
- ② Attach the flange directly to the tank.
- ③ Use a threaded connection to attach the device directly to the tank.

For single cable and single rod probes:

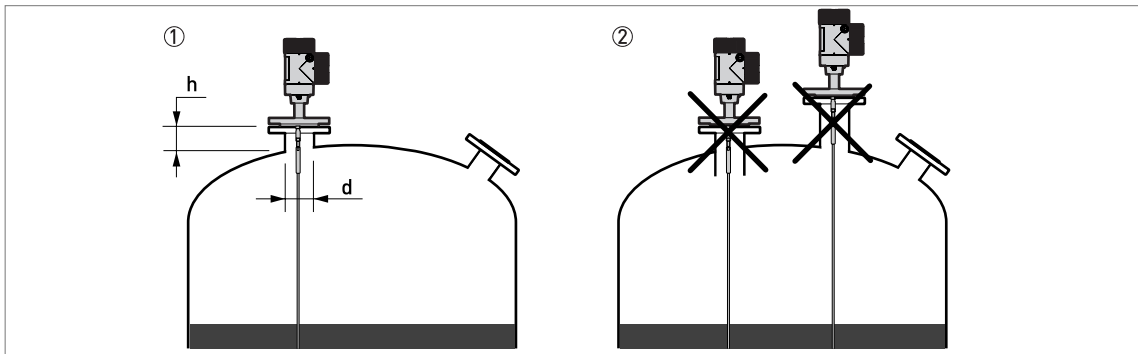


Figure 2-10: Recommended nozzle dimensions for single rod and single cable probes

- ① Recommended conditions:  $h \leq d$ , where  $h$  is the height of the tank nozzle and  $d$  is the diameter of the tank nozzle.
- ② The end of the nozzle must not have an extension into the tank. Do not install the device on a high nozzle.



**CAUTION!**

*If the device is installed on a high nozzle, make sure that the probe does not touch the side of the nozzle (attach the probe end, ...).*

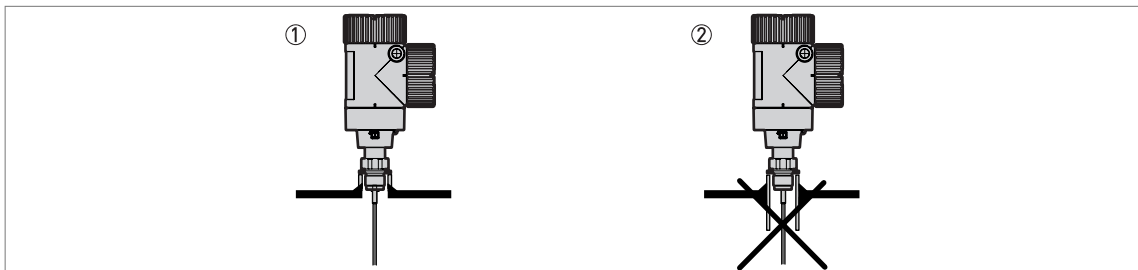


Figure 2-11: Sockets for threaded process connections

- ① Recommended installation
- ② The end of the socket must not have an extension into the tank

For double cable and double rod probes:

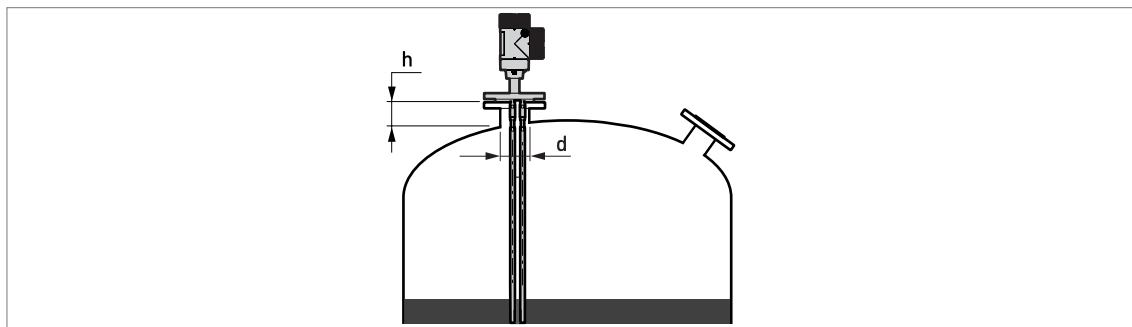


Figure 2-12: Recommended nozzle dimensions for double rod and double cable probes  
 $d \geq 50 \text{ mm} / 2''$ , where  $d$  is the diameter of the tank nozzle

For coaxial probes:

If your device has a coaxial probe, you can ignore these installation recommendations.



**CAUTION!**

*Install coaxial probes in clean liquids that are not too viscous.*

2.7.3 Installation requirements for concrete roofs

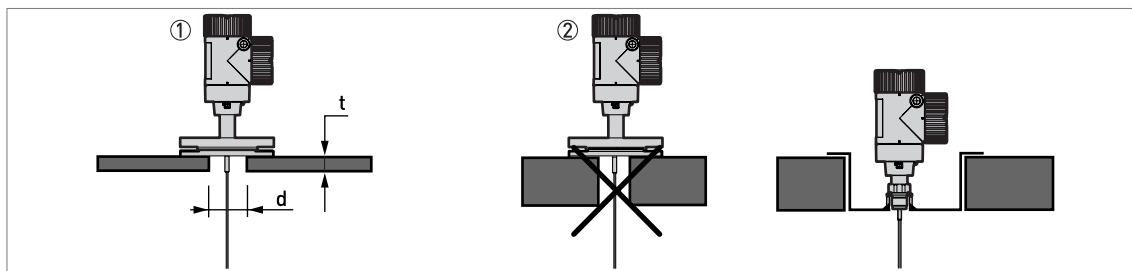


Figure 2-13: Installation on a concrete roof

- ① The diameter,  $d$ , of the hole must be greater than the thickness,  $t$ , of the concrete.
- ② If the thickness,  $t$ , of the concrete is greater than the diameter,  $d$ , of the hole, install the device in a recess.

## 2.8 Installation recommendations for liquids

### 2.8.1 General requirements

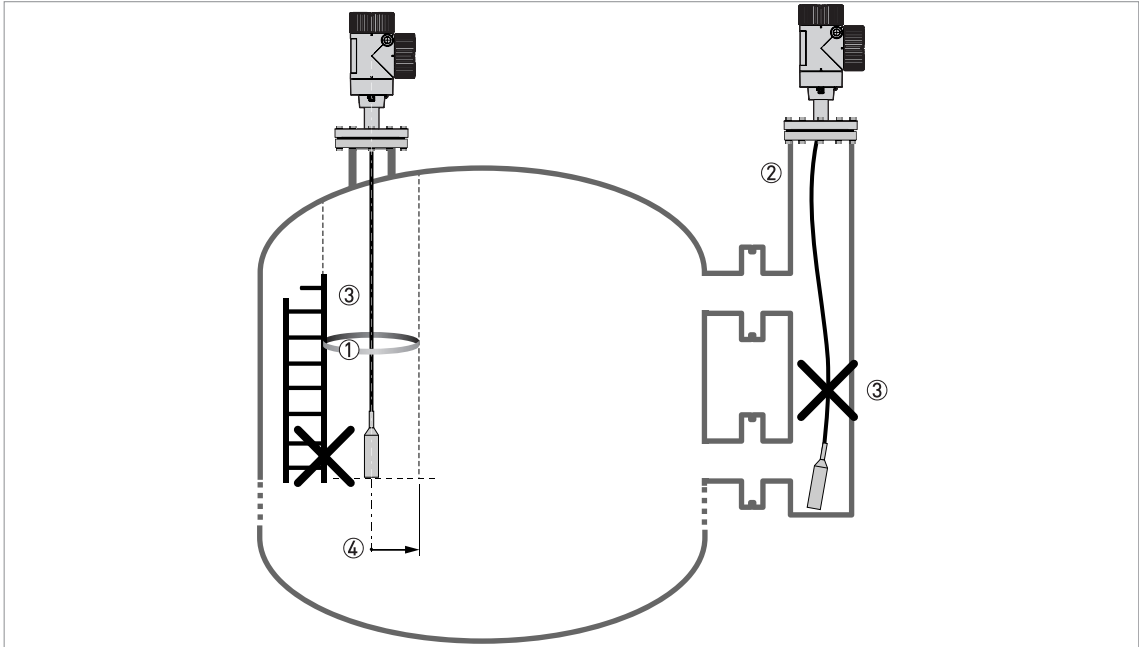


Figure 2-14: Installation recommendations for liquids

- ① The electromagnetic (EM) field generated by the device. It has a radius of  $R_{min}$ . Make sure that the EM field is clear of objects and product flow. Refer to the table that follows.
- ② If there are too many objects in the tank, install a bypass chamber or stilling well.
- ③ Keep the probe straight. If the probe is too long, shorten the probe length. Make sure that the device is configured with the new probe length. For more data on the procedure, refer to the handbook.
- ④ Empty space. Refer to the table that follows.

#### Clearance between the probe and other objects in the tank

Probe type	Empty space (radius, $R_{min}$ ), around the probe	
	[mm]	[inches]
Coaxial	0	0
Double rod / cable	100	4
Single rod / cable	300	12

## 2.8.2 Installation in standpipes (stilling wells and bypass chambers)

Use a standpipe if:

- The liquid is very turbulent or agitated.
- There are too many other objects in the tank.
- The device is measuring a liquid in a tank with a floating roof.

For more data, refer to the Handbook.

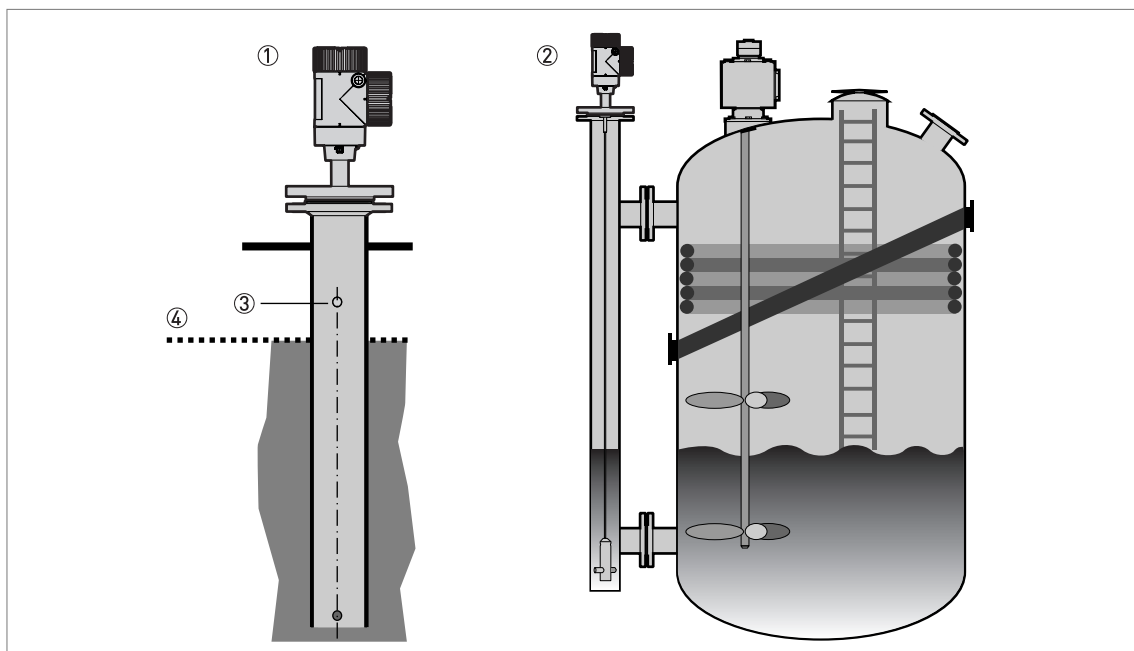


Figure 2-15: Installation recommendations for standpipes (stilling wells and bypass chambers)

- ① Stilling well
- ② Bypass chamber
- ③ Vent
- ④ Level of the liquid



### **INFORMATION!**

*Stilling wells are not necessary for devices with coaxial probes. But if there is a sudden change in diameter in the stilling well, we recommend that you install a device with a coaxial probe.*

## 2.9 Installation recommendations for solids

### 2.9.1 Nozzles on conical silos

We recommend that you prepare the installation when the silo is empty.



**DANGER!**

*Risk of electrostatic discharge (ESD): The device is resistant to electrostatic discharges of up to 30 kV, but it is the responsibility of the fitter and the user to prevent ESD.*



**CAUTION!**

*Install the device at the correct location to measure level correctly and prevent too much bending and traction. If necessary, attach the probe to the bottom of the tank.*

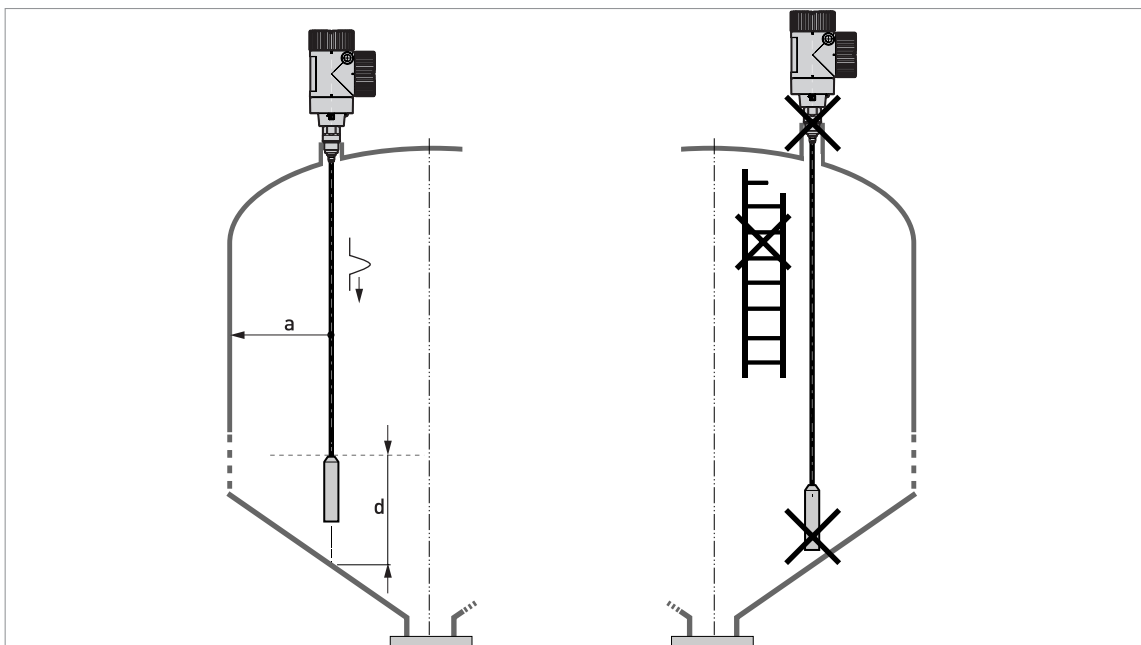


Figure 2-16: Installation recommendations for solids

$a \geq 300 \text{ mm} / 12''$

$d \geq 300 \text{ mm} / 12''$

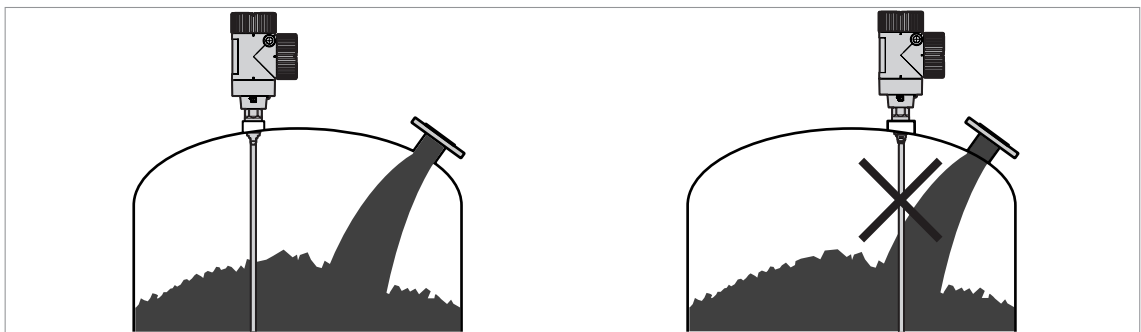


Figure 2-17: Do not install the probe near to a product inlet



## 2.10 How to install the device on the tank

### 2.10.1 How to assemble the single rod probe (single-piece probe)



**INFORMATION!**

*This procedure is for devices with single rod probes that are not segmented (single-piece probes).*

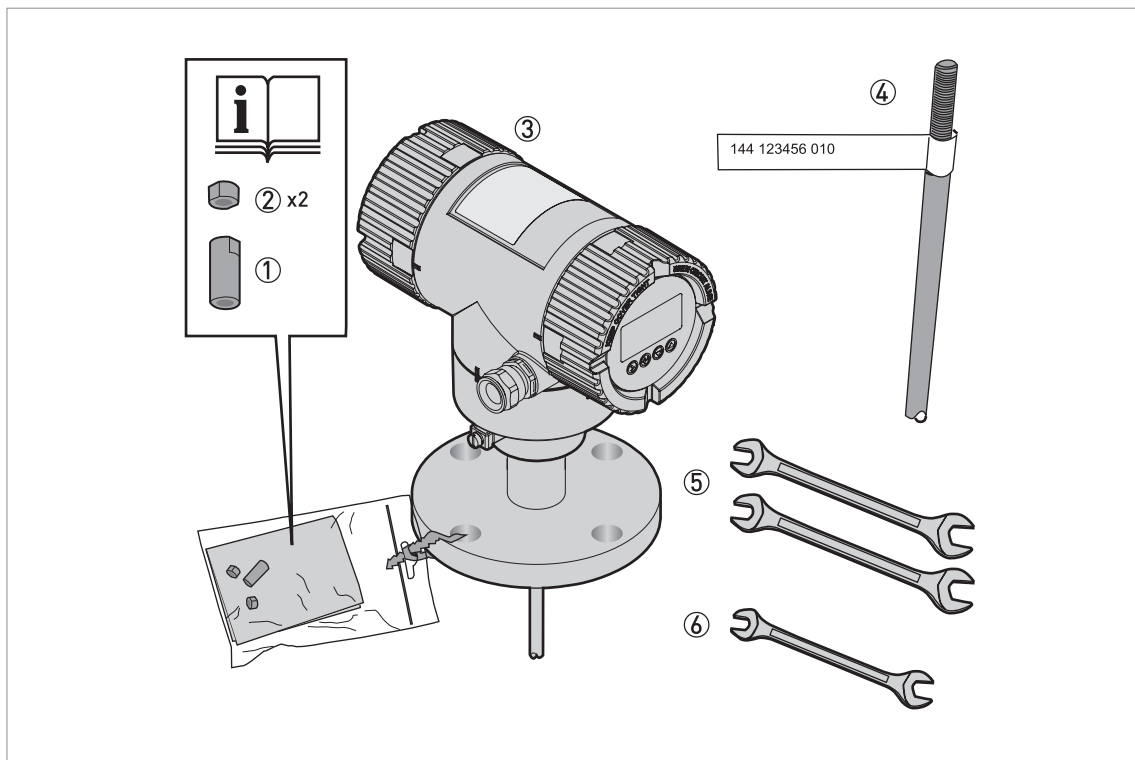


Figure 2-18: Equipment needed to assemble the device

- ① Union nut
- ② 2 locking nuts
- ③ Housing assembly
- ④ Single rod probe
- ⑤ Tools: two 8 mm open-ended wrenches (not supplied)
- ⑥ Tools: one 7 mm open-ended wrench (not supplied)



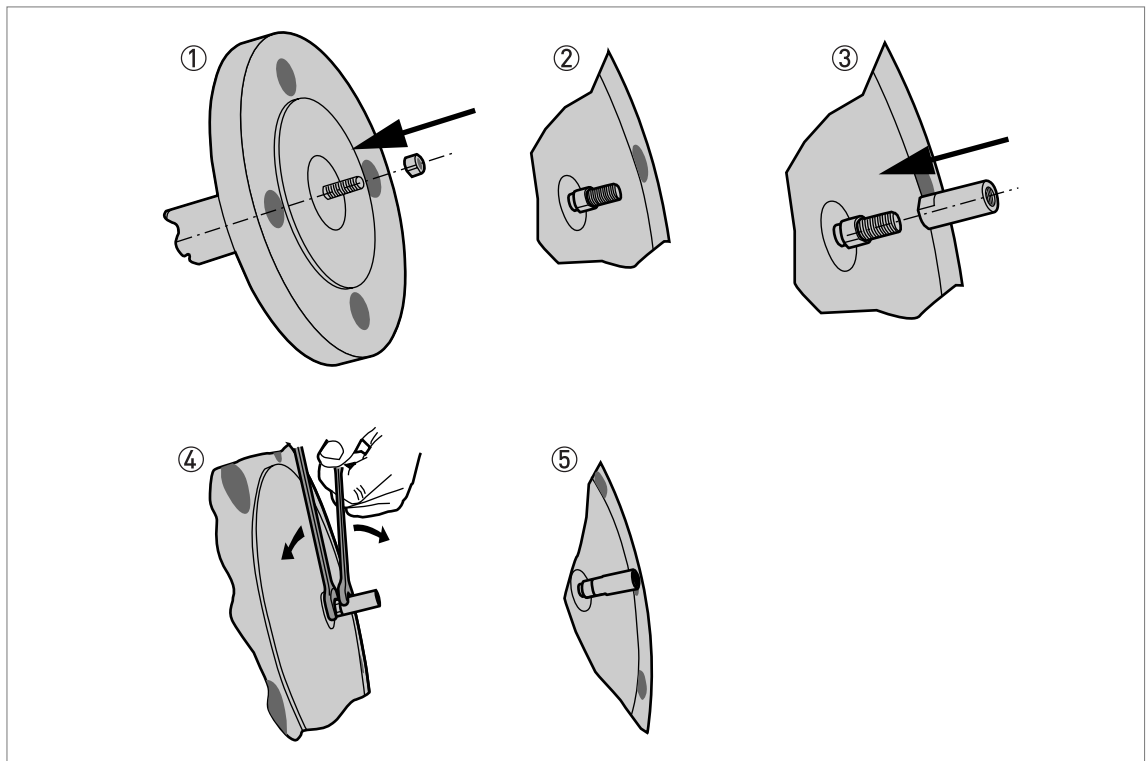


Figure 2-20: How to attach the locking nut and union nut



- Attach a locking nut to the housing assembly.
- Make sure that the nut is fully engaged on the thread.
- Attach the union nut to the housing assembly.
- Tighten these nuts with the two 8 mm open-ended wrenches.
- Continue the assembly procedure on the page that follows.

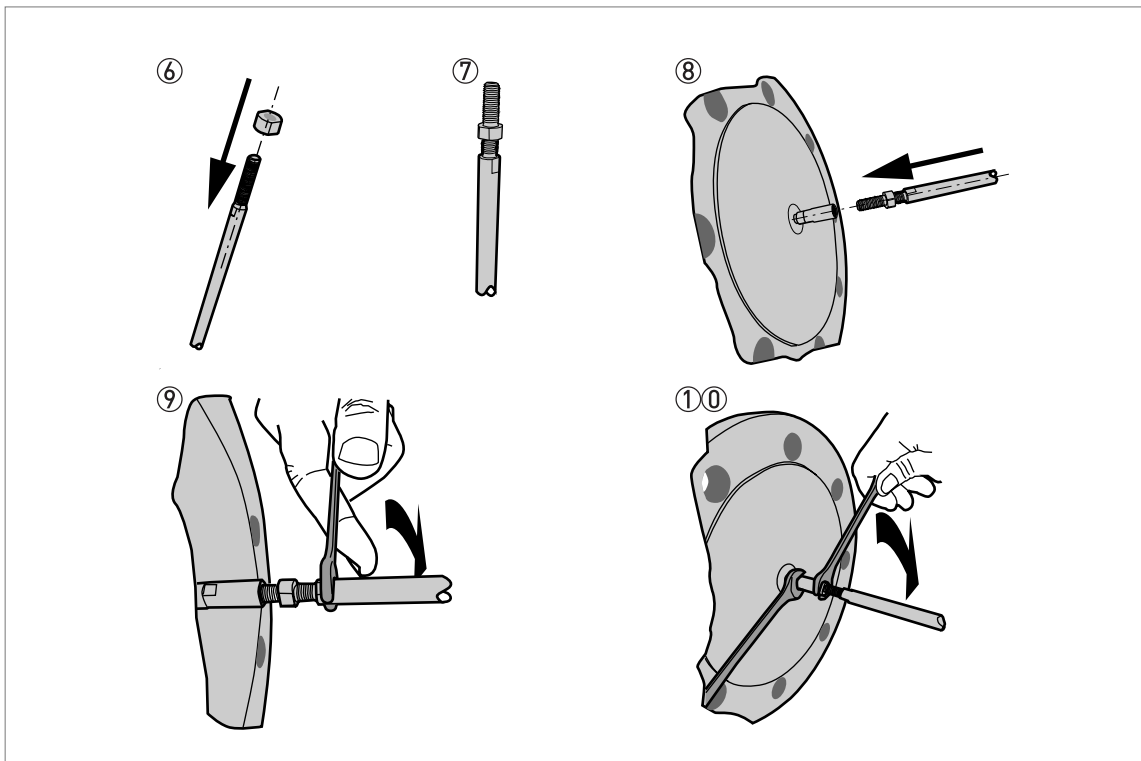


Figure 2-21: How to attach the single rod probe to the flange assembly



**CAUTION!**  
*Support the probe.*



- Attach a locking nut to the single rod.
- Make sure that the locking nut is engaged  $\frac{3}{4}$  along the length of the thread.
- Attach the single rod to the union nut. Make sure the probe touches the housing assembly.
- Tighten the single probe with a 7 mm open-ended wrench (step 9).
- Tighten the locking nut against the union nut with two 8 mm open-ended wrenches (step 10).

## 2.10.2 How to assemble the single rod probe (segmented probe)

**INFORMATION!**

*This procedure is for devices with single rod probes that are segmented.*

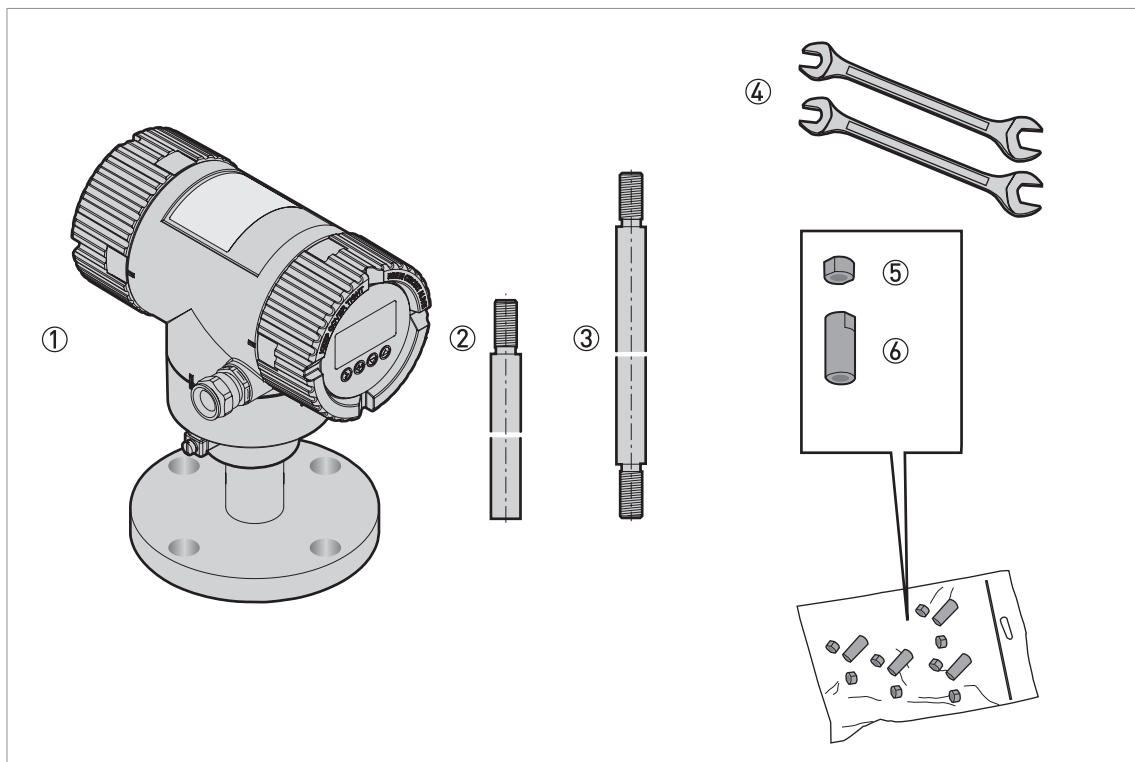


Figure 2-22: Equipment needed to assemble the single rod probe (segmented)

- ① Converter and process connection
- ② Bottom (quantity: 1) segment of the rod probe
- ③ Top and middle (if more than one) segments of the rod probe
- ④ Tools: two 8 mm open-end wrenches (not supplied)
- ⑤ Lock nuts (2 lock nuts per segment)
- ⑥ Union nut (1 union nut per segment)

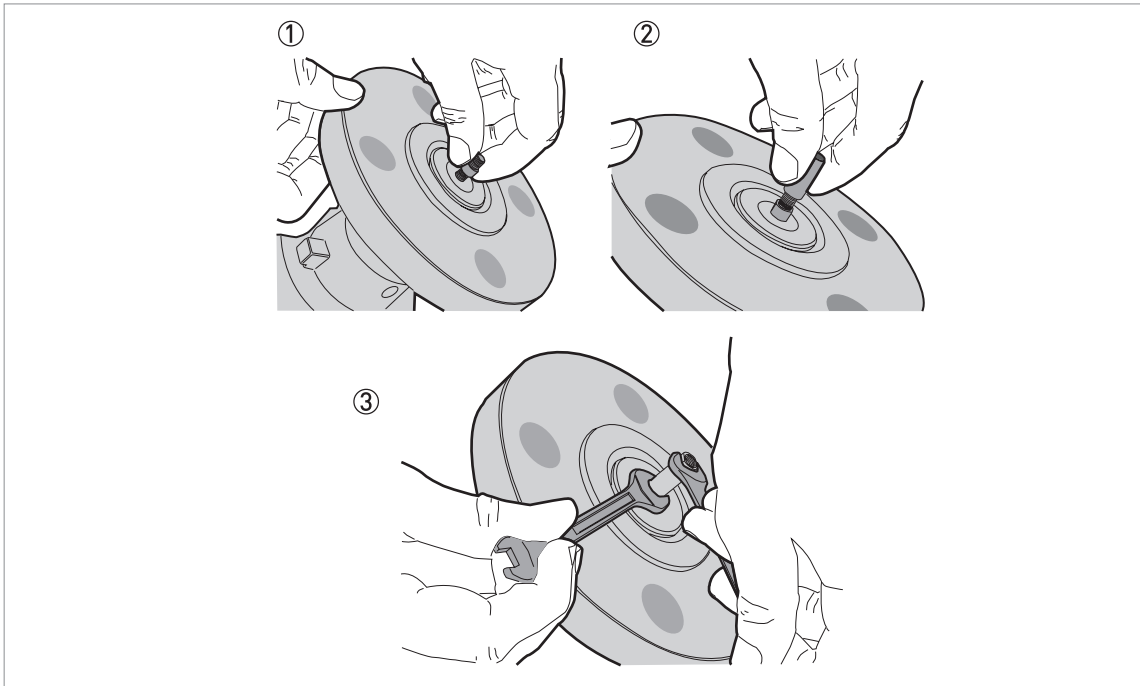


Figure 2-23: How to assemble the segmented single rod probe: part 1



**CAUTION!**

*Make sure that the nuts are tight and the rod probe cannot loosen.*



- Attach a lock nut to the threaded rod below the process connection. Turn the nut until it is  $\frac{3}{4}$  along the length of the rod.
- Attach a union nut to the threaded rod below the process connection.
- Use two 8 mm open-end wrenches to tighten the union nut against the lock nut.

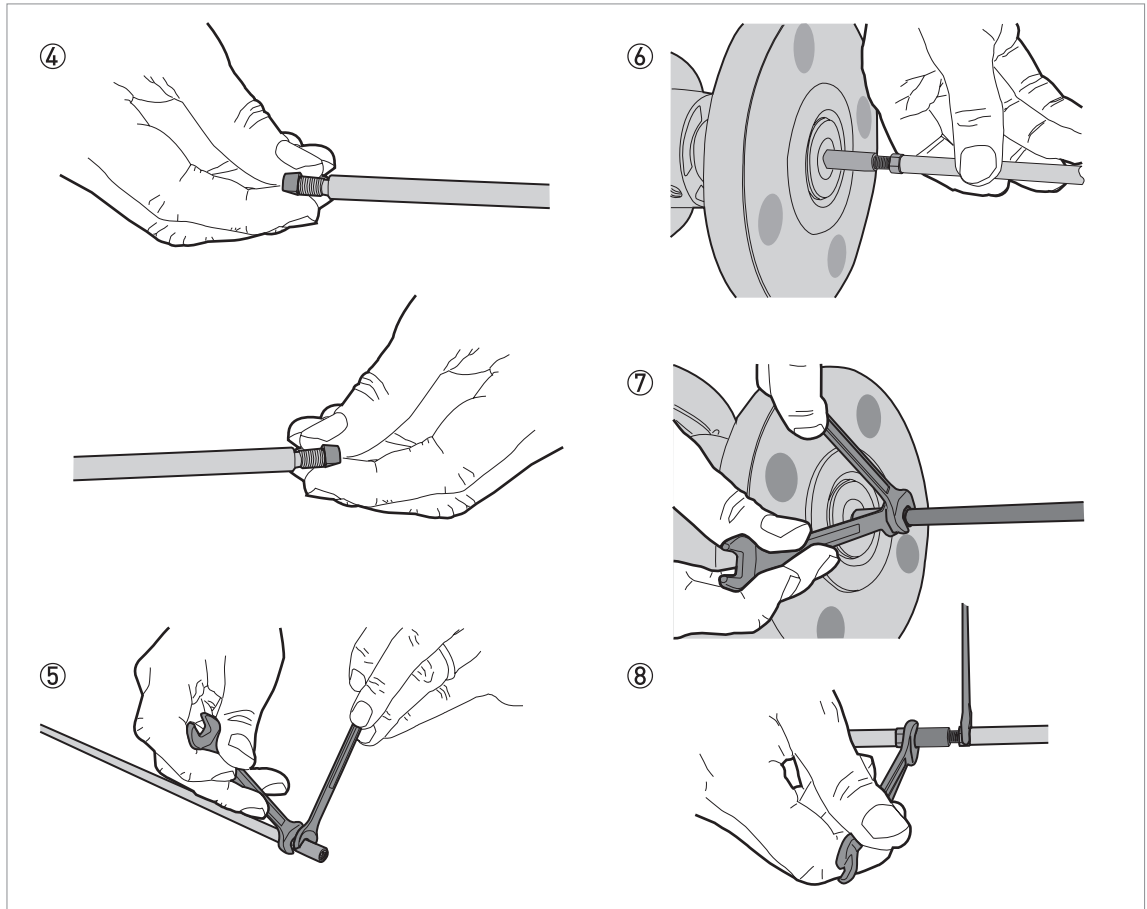


Figure 2-24: How to assemble the segmented single rod probe: part 2



**WARNING!**

*Put a support below the probe to prevent deformation.*



**CAUTION!**

*Make sure that the nuts are tight and the rod probe cannot loosen.*



- Attach a lock nut to each end of the rod probe segments.
- Attach a union nut to the bottom end of each rod probe segment, but not to the bottom segment. Use two 8 mm open-end wrenches to tighten the union nut against the lock nut.
- Attach the top segment of the rod probe to the union nut below the process connection. Use two 8 mm open-end wrenches to tighten the union nut against the lock nut on the rod probe.
- Attach the middle segment of the rod probe to the union nut on the top segment (if there are middle segments). Use two 8 mm open-end wrenches to tighten the union nut against the lock nut. Repeat this step for the other segments.
- Attach the bottom segment of the rod probe to the union nut on the top segment. Use two 8 mm open-end wrenches to tighten the union nut against the lock nut.



**CAUTION!**

*Make sure that the length of the probe is correct. If the probe is too long, refer to "How to decrease the length of probes" in the handbook.*

## 2.10.3 How to assemble the segmented coaxial probe

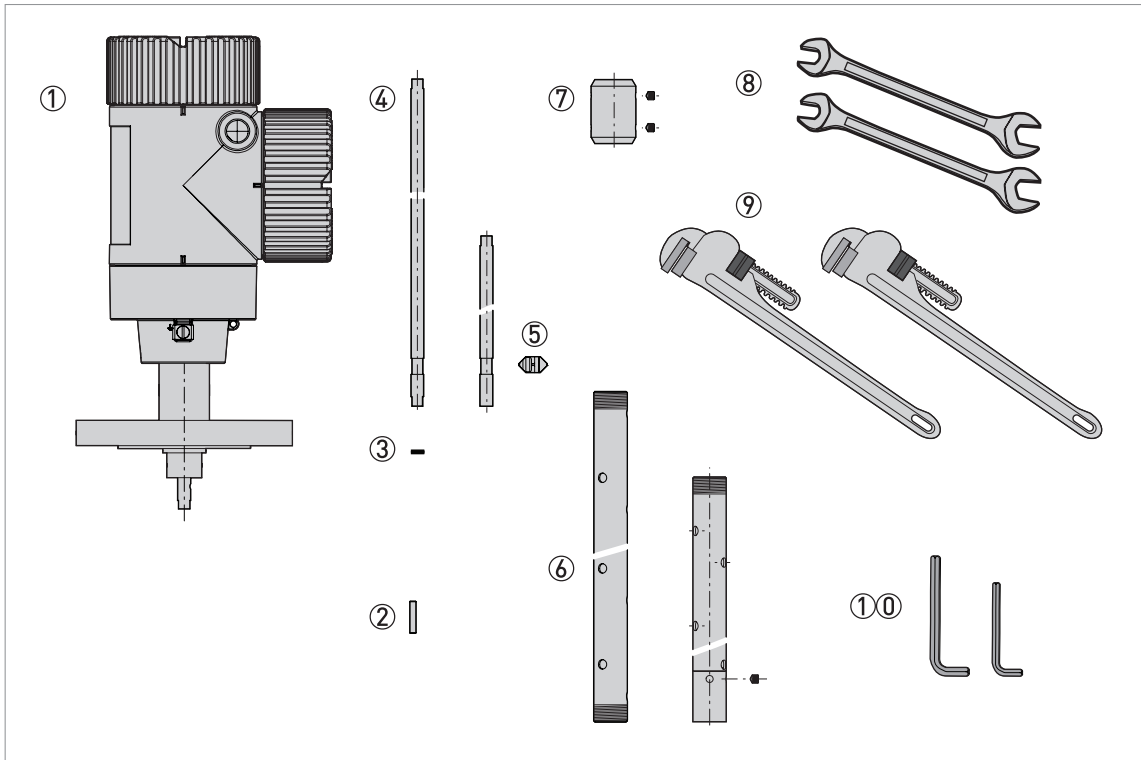


Figure 2-25: Equipment needed to assemble the coaxial probe

- ① Converter and process connection
- ② HC M4x20 screws (1 screw per probe segment)
- ③ Lock washers (1 pair of washers per probe segment)
- ④ Top (quantity: 1), middle (quantity: 1 or more) and bottom (quantity: 1 - with 1 socket set screw M5x5) segments of the signal rod
- ⑤ PTFE spacer (1 spacer per probe segment)
- ⑥ Middle (quantity: 1 or more) and bottom (quantity: 1) segments of the coaxial tube
- ⑦ Union nut with 2 socket set screws M5x5 (1 union nut per segment of the coaxial tube)
- ⑧ Tools: two 7 mm open-end wrenches (not supplied)
- ⑨ Tools: two pipe (Stillson) wrenches (not supplied)
- ⑩ Tools: one 2.5 mm Allen wrench and one 2 mm Allen wrench (not supplied)



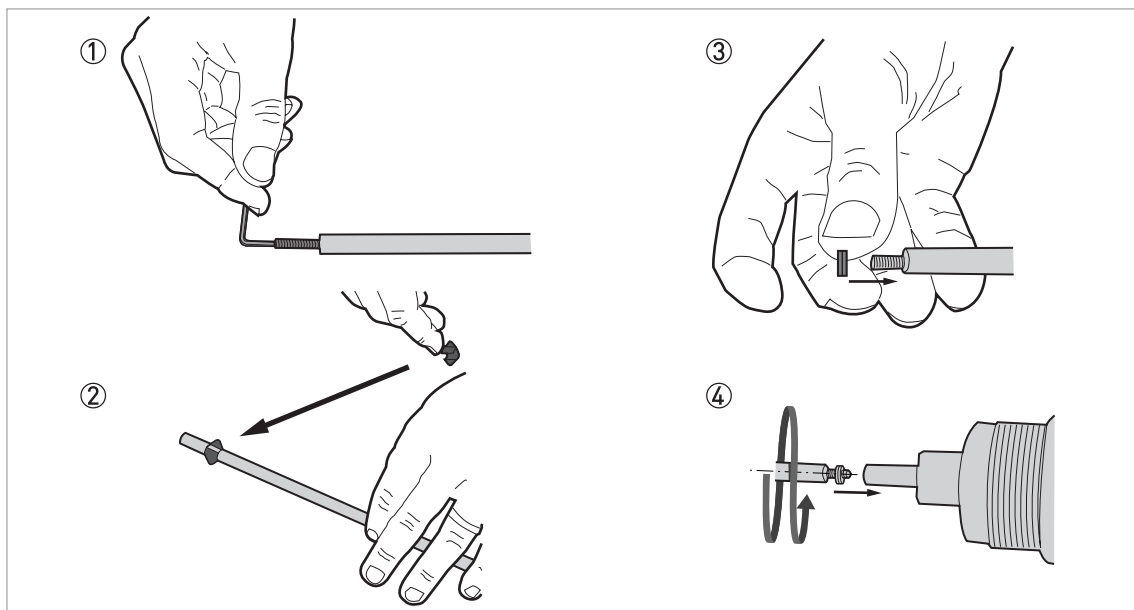


Figure 2-26: How to assemble the segmented coaxial probe: part 1



**CAUTION!**

*Do not attach the screw to the end of the rod segment that has a groove for the attachment of a PTFE spacer.*



- Use a 2 mm Allen wrench to attach and tighten a HC M4x20 screw at the top of each rod segment (intermediary and end rod segments)
- Attach a PTFE spacer to the end of each rod segment that has a groove.
- Attach a pair of lock washers at the top of each rod segment (intermediary and end rod segments)
- Assemble one of the middle rod segments (with a pair of lock washers on the attached screw) and the signal rod below. Use two 7 mm open-ended wrenches to tighten the assembled parts to a torque of 2...3 Nm.

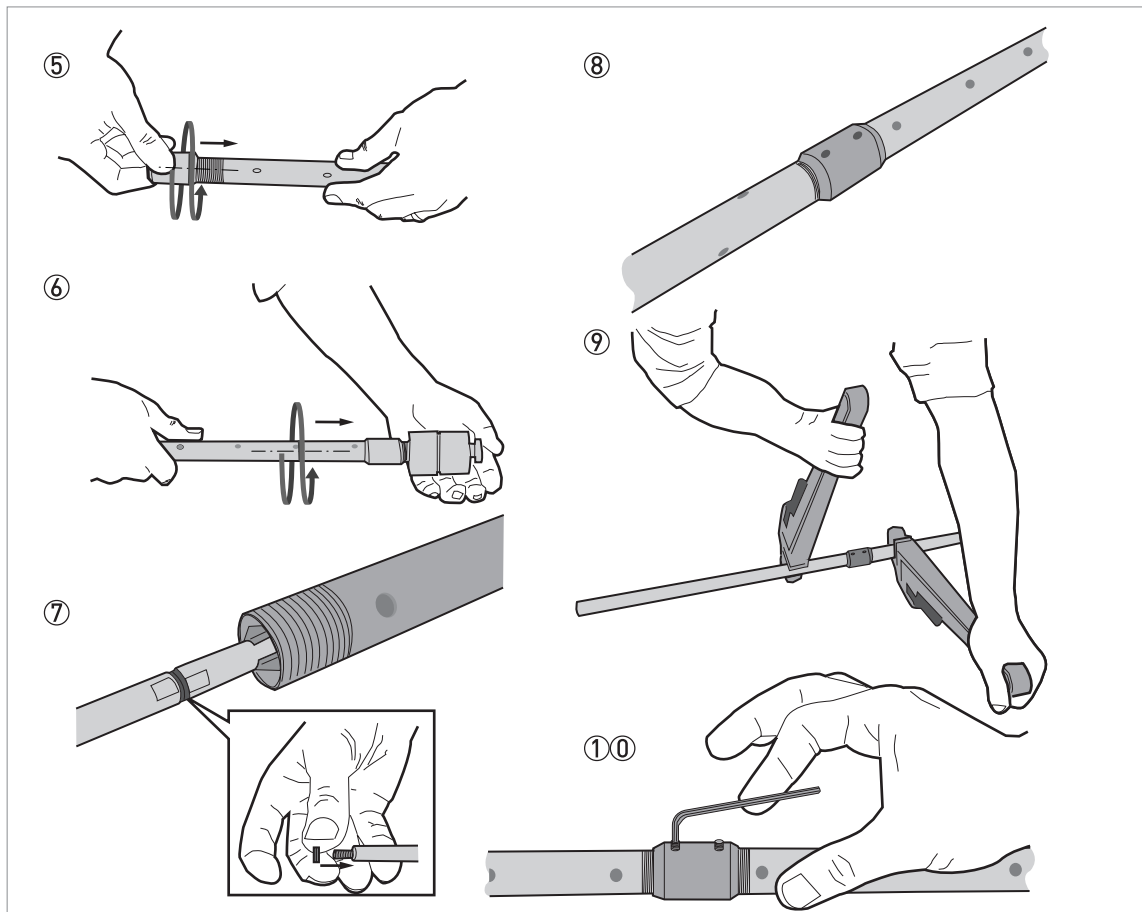


Figure 2-27: How to assemble the segmented coaxial probe: part 2



**WARNING!**

*Be careful when you use the pipe wrenches. Make sure that the measuring tubes have no deformation.*



**CAUTION!**

- *Make sure that the screws are tight and the measuring tube cannot loosen.*
- *Make sure that the fitting for the lock screw is not aligned with a hole in the coaxial tube.*



- Attach a union nut to each coaxial tube (middle and end tubes)
- Attach a middle tube segment to the coaxial probe stem. Do not use tools to tighten the assembled parts.
- Assemble the next middle rod segment (with a pair of lock washers on the attached screw) and the top rod segment. Use two 7 mm open-ended wrenches to tighten the assembled parts to a torque of 2...3 Nm.
- Assemble the next coaxial tube segment and the top coaxial tube segment. Do not use tools to tighten the assembled parts. Do steps (9) thru (10) again until the end rod segment and end coaxial tube are attached.
- Use the 2 pipe wrenches to tighten the coaxial tubes in the lock nuts.
- Use a 2.5 mm Allen wrench to attach and tighten the two HC M5x5 screws (lock screws) to the union nut.

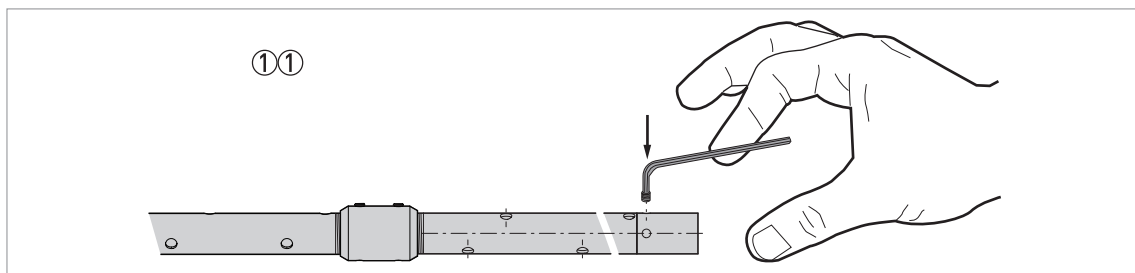


Figure 2-28: How to assemble the segmented coaxial probe: part 3



**CAUTION!**  
If the lock screw is not tight, the device will not measure correctly.



- Use a 2.5 mm Allen wrench to attach and tighten a HC M5x5 screw (lock screw) to the bottom segment of tube.

### 2.10.4 How to install a device with a flange connection

Equipment needed:

- Device
- Gasket (not supplied)
- Wrench (not supplied)

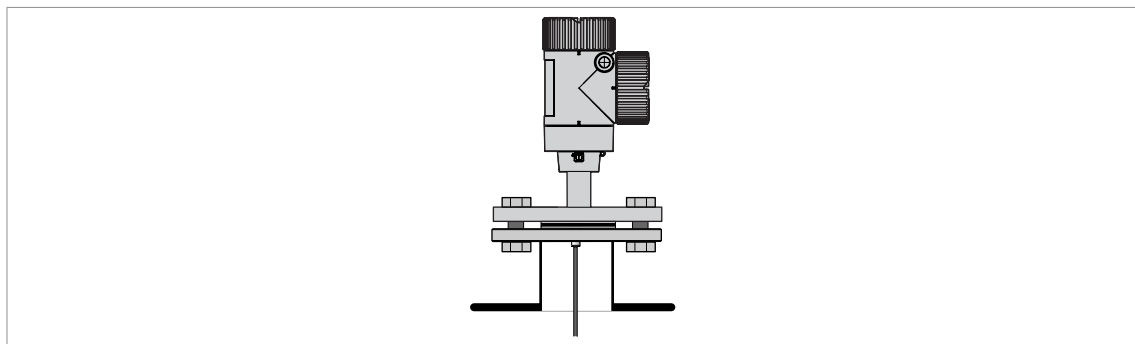


Figure 2-29: Flange connection



- Make sure that the flange on the nozzle is level.
- Make sure that you use the applicable gasket for the flange and the process.
- Align the gasket correctly on the flange facing of the nozzle.
- Lower the probe carefully into the tank.
- ➡ For more data on cable probes, refer to *How to install a cable probe in the tank* on page 29.
- Tighten the flange bolts.
- ➡ Refer to local rules and regulations for the correct torque to apply to the bolts.

### 2.10.5 How to install a device with a threaded connection

#### Equipment needed:

- Device
- Gasket (not supplied)
- 50 mm / 2" wrench (not supplied)

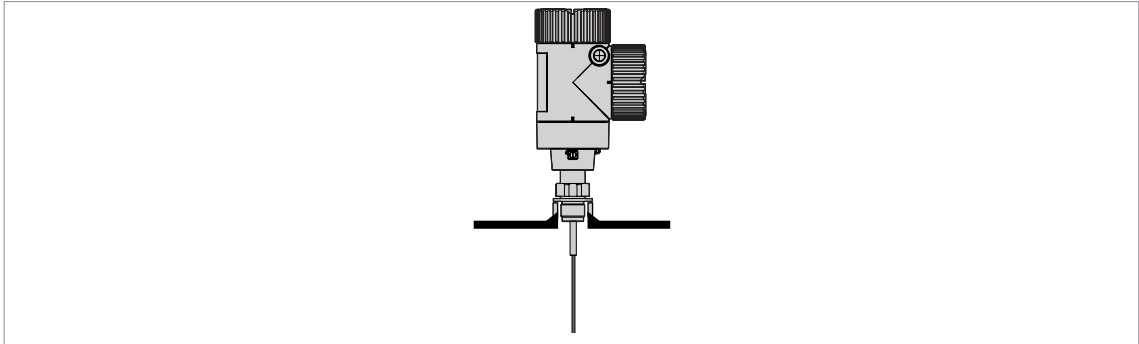


Figure 2-30: Threaded connection



- Make sure the tank connection is level.
- Make sure that you use the applicable gasket for the connection and the process.
- Align the gasket correctly.
- If the device is installed on a tank made of plastic or other non-conductive material, refer to *Recommendations for pits and tanks made of non-conductive materials* on page 31.
- Lower the probe carefully into the tank.
- ➡ For more data on cable probes, refer to *How to install a cable probe in the tank* on page 29.
- Use 50 mm / 2" wrench to attach the process connection to the tank.
- Tighten the nut.
- ➡ Refer to local rules and regulations for the correct torque to apply to the connection.



#### **INFORMATION!**

*If there is not sufficient clearance to install the device, remove the housing. Install the probe and then put the housing back on the process connection. For more data, refer to *How to turn or remove the signal converter* on page 30.*

2.10.6 How to install a cable probe in the tank

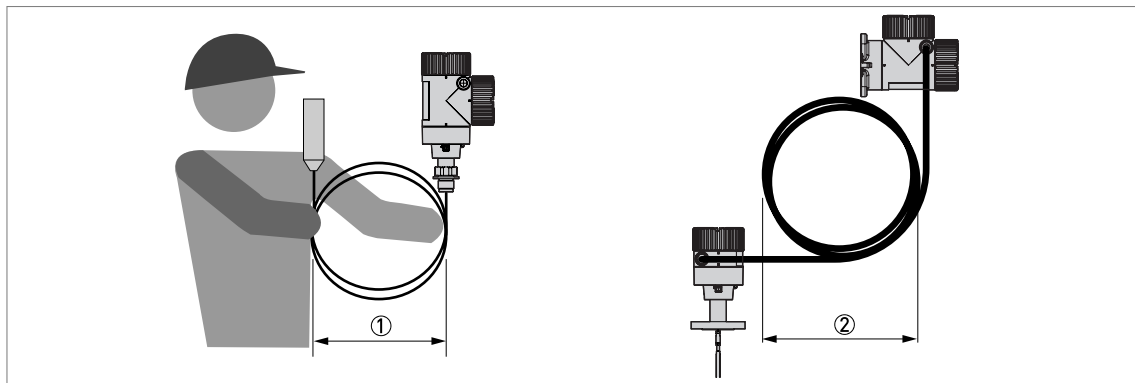


Figure 2-31: Wind cable probes and electrical cables carefully



**WARNING!**

*If you bend the probe too much, you will damage the device and it will not measure accurately.*

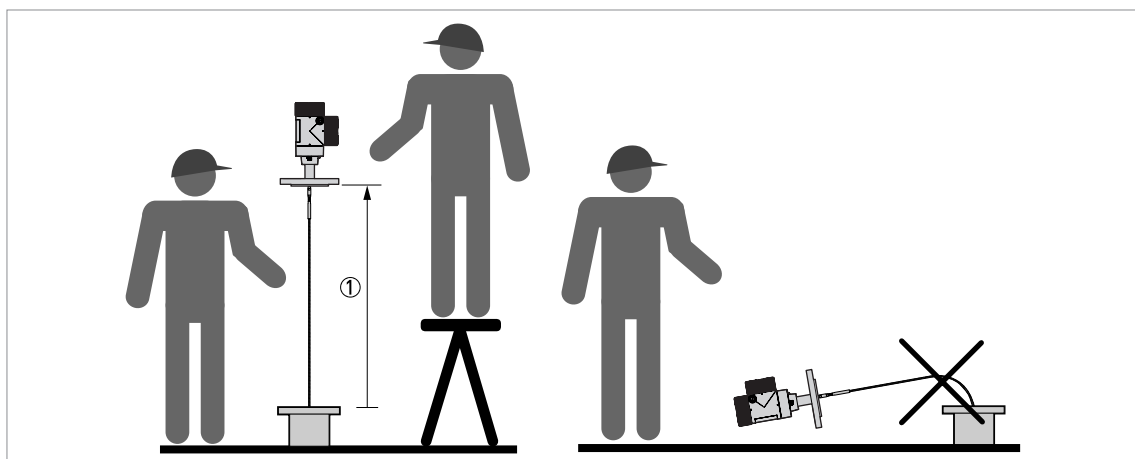


Figure 2-32: Installation of devices with cable probes

① >1 m / 3½ ft



- Use two persons to lift the housing and the probe above the process connection.
- Hold the device 1 m / 3½ ft above the tank.
- Unwind the probe carefully into the tank.

### 2.10.7 How to turn or remove the signal converter

The converter turns 360°. The converter can be removed from the process connection assembly under process conditions.

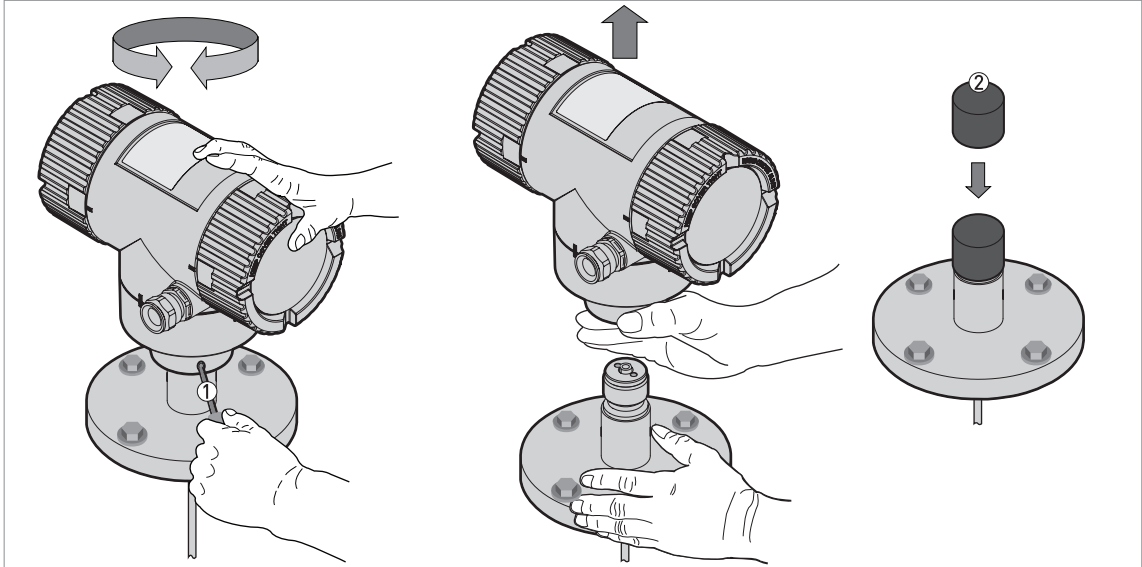


Figure 2-33: How to turn or remove the signal converter

- ① Tool: 5 mm Allen wrench (not supplied) for the lock screw on the signal converter
- ② Cover for the coaxial hole on top of the process connection assembly



**CAUTION!**

*Do not loosen the 4 socket head screws on the process connection assembly.*

*If you remove the housing, put a cover on the the coaxial hole on top of the process connection assembly.*

*When the housing is attached to the process connection assembly, tighten the lock screw with the 5 mm Allen wrench ①.*

### 2.10.8 Recommendations for pits and tanks made of non-conductive materials



If you have a device with a single rod or a single cable probe and a thread connection, obey these instructions:

- Put a metal sheet between the device and the process connection.
- It must have a diameter greater than 200 mm / 8".
- Make sure that the metal sheet is in contact with the thread stop on the device.

We recommend that you use  $DN \geq 200$  /  $\geq 8''$  for flange connections.

If you have a device with a double rod, double cable or coaxial probe, you can ignore these instructions.

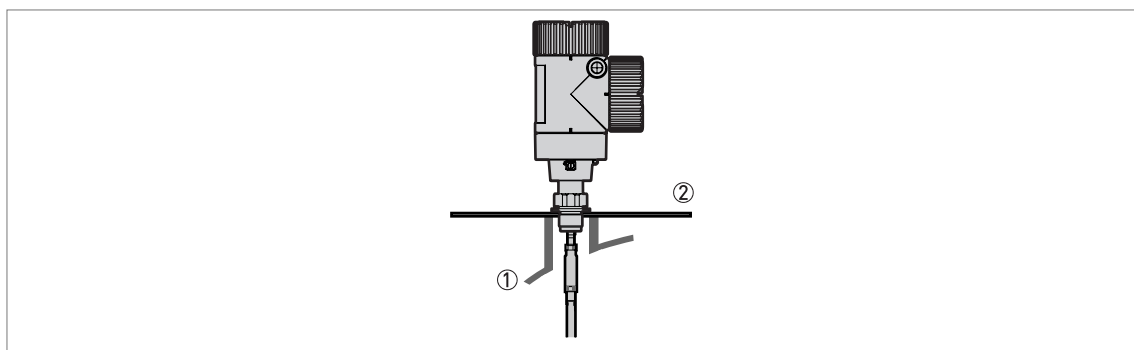


Figure 2-34: Installation in a non-metallic tank or pit with a thread connection

- ① Non-metallic (plastic...) tank or pit
- ② Metal sheet,  $\varnothing \geq 200$  mm / 8"



**CAUTION!**

*When the device is installed, make sure that the tank roof has no deformation.*

### 2.10.9 Wall support for the remote version

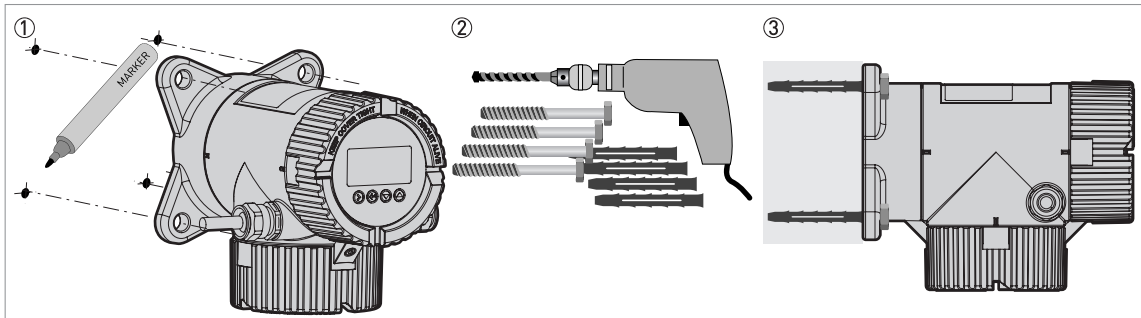


Figure 2-35: Wall support for the remote version (attached to the remote converter)



- ① Use marks on the wall to help you put the wall support in the correct position. For more data, refer to "Dimensions and Weights" in the handbook.
- ② Use equipment and tools that agree with health and safety regulations and good engineering practice.
- ③ Make sure the wall support is correctly attached to the wall.

### 2.10.10 How to attach the weather protection to the device

The device and the weather protection option are supplied disassembled in the same box. You must attach the weather protection when you install the device.

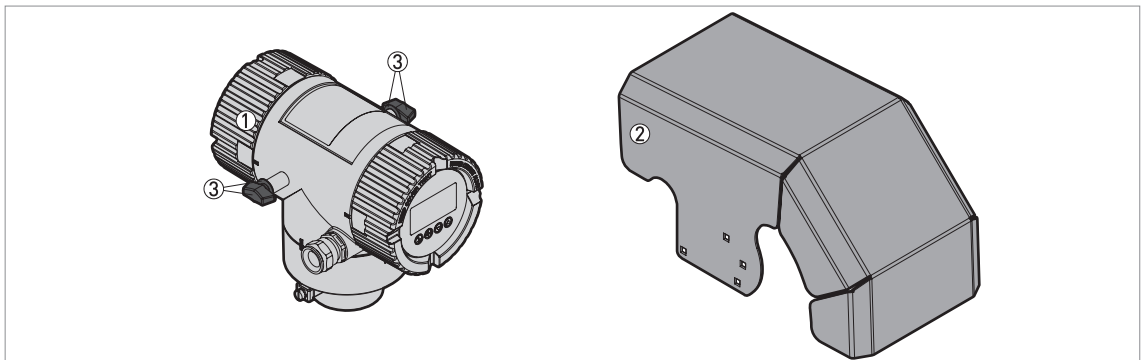


Figure 2-36: Equipment needed

- ① Device
- ② Weather protection (option).
- ③ 2 butterfly screws and spring washers. The manufacturer attaches these parts to the device before delivery.



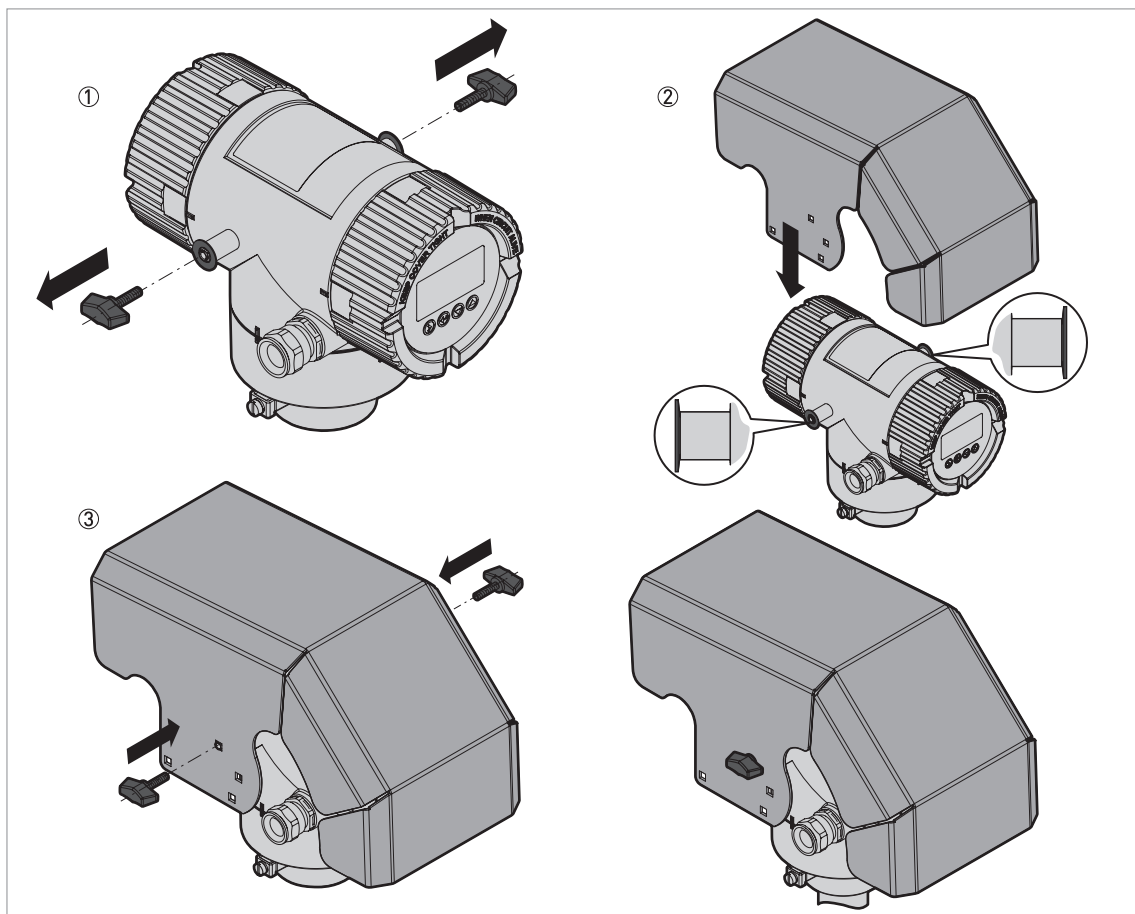


Figure 2-37: Installation of the weather protection (general procedure)



- ① Remove the 2 butterfly screws from the housing. Make sure that spring washer is attached correctly to the housing (on the weather protection fixture).
- ② Lower the weather protection onto the device.
- ③ Attach the 2 butterfly screws. Make sure that you use the correct holes to attach the weather protection. The holes must agree with the housing option used (compact vertical (non-Ex or Ex i-approved etc.)). For more data, refer to the illustration that follows:

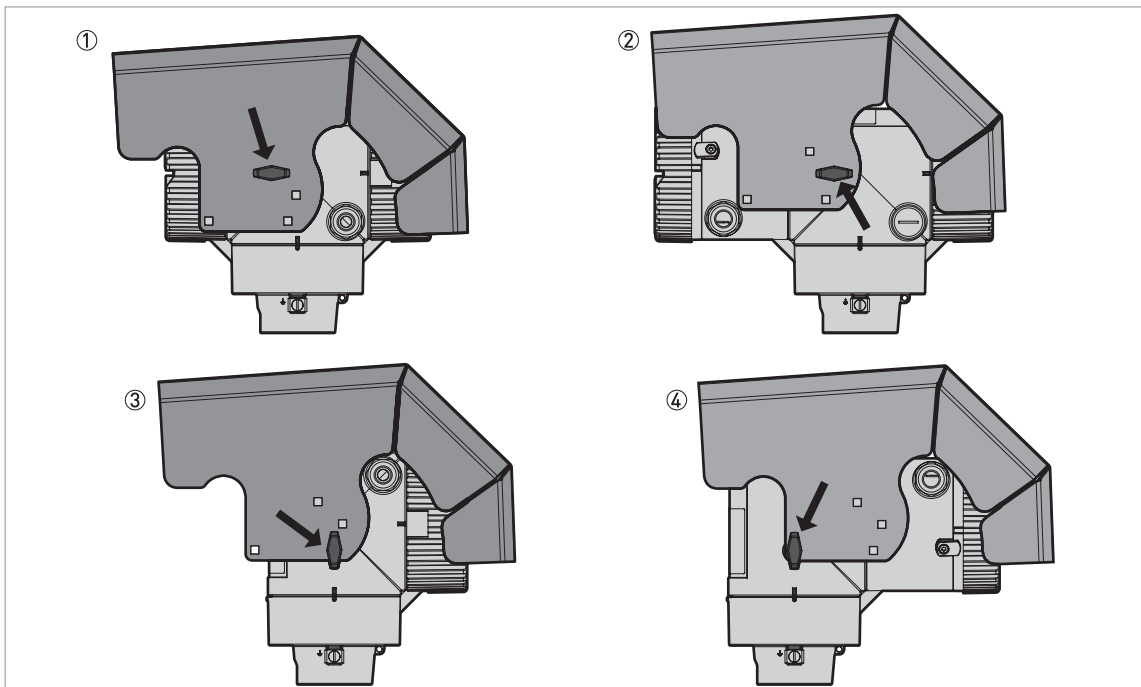


Figure 2-38: Holes for installation of the weather protection (housing versions)

- ① Compact horizontal housing (non-Ex and Ex i-approved devices)
- ② Compact horizontal housing (Ex d-approved devices)
- ③ Compact vertical housing (non-Ex and Ex i-approved devices)
- ④ Compact vertical housing (Ex d-approved devices)

The overall dimensions of the weather protection are in "Dimensions and weight" in the handbook.

### 2.10.11 How to open the weather protection

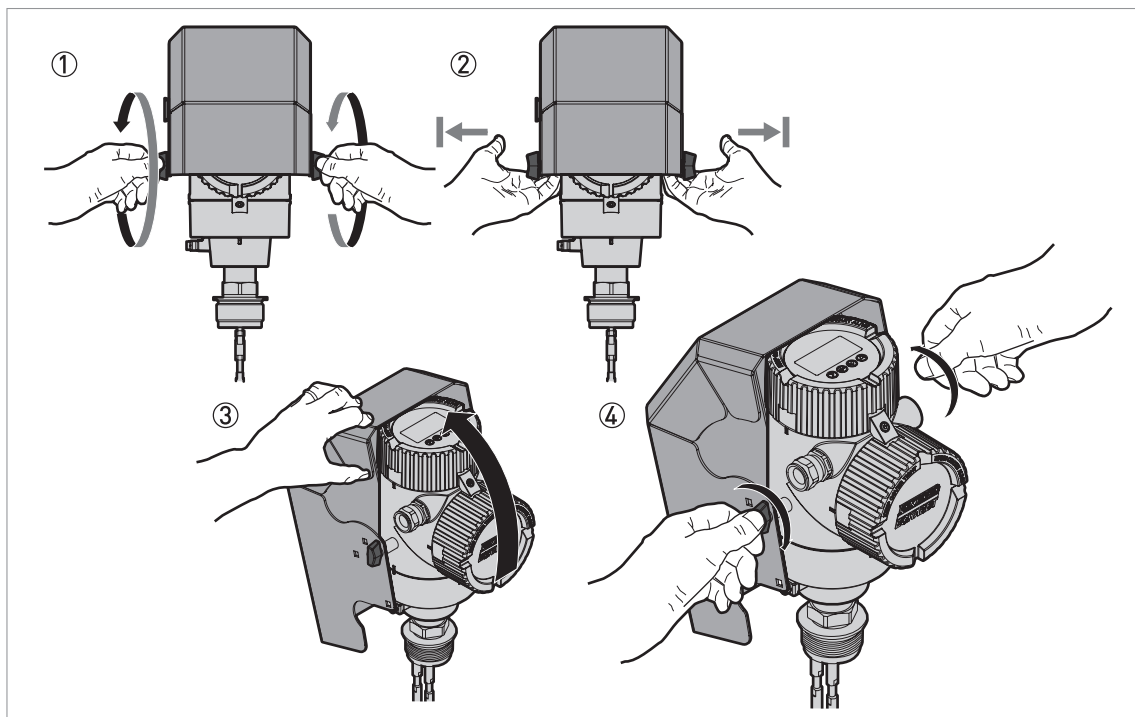


Figure 2-39: How to open the weather protection



- ① Loosen the bolt on each side of the weather protection.
- ② Pull the sides of the weather protection out of the notch for the closed position.
- ③ Pull the weather protection up and back.
- ➡ This will open the weather protection.
- ④ Tighten the bolts to lock the weather protection in its open position.

## 2.11 Electromagnetic compatibility

The device design agrees with European Standard EN 61326-1 when installed in metallic tanks.

You can install the device on open-air tanks and tanks that are not made of metal. Refer also to the note that follows.



### CAUTION!

*If you install a device with a cable probe in a non-metallic tank or open-air pit, a strong electromagnetic field near to the device can have an unwanted effect on the accuracy. Use a device with a coaxial probe for this type of installation.*



### INFORMATION!

*Device operation agrees with residential-class (class B) emissions and industrial-class for immunity requirements if:*

- *the device has a single or double probe (rod or cable probe) and is used in a closed tank made of metal or*
- *the device has a coaxial probe.*

## 3 Electrical connections

### 3.1 Electrical installation: 2-wire, loop-powered

#### 3.1.1 Compact version

##### Terminals for electrical installation

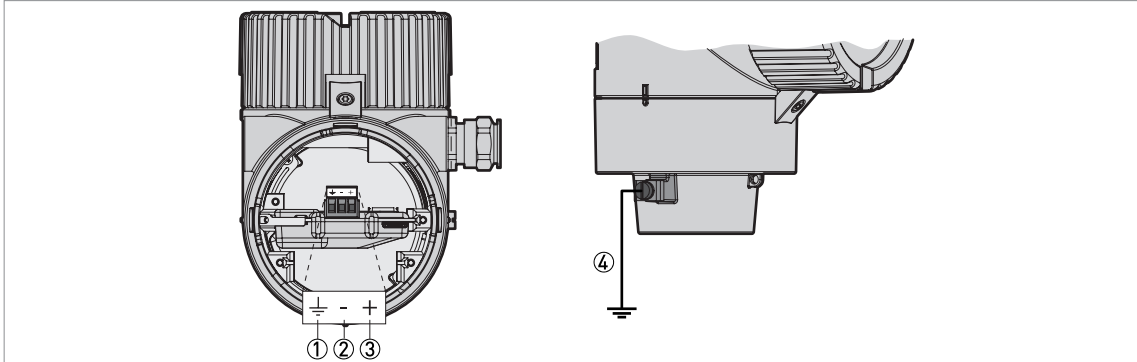


Figure 3-1: Terminals for electrical installation

- ① Grounding terminal in the housing (if the electrical cable is shielded)
- ② Current output -
- ③ Current output +
- ④ Location of the external grounding terminal (at the bottom of the converter)



#### INFORMATION!

Electrical power to the output terminal energizes the device. The output terminal is also used for HART® communication.



#### CAUTION!

- Use the applicable electrical cables with the cable glands.
- Make sure that the power supply does not have a current more than 5 A or that there is 5 A-rated fuse in the electrical circuit that energizes the device.
- Make sure that the polarity of the power supply is correct. If the polarity is incorrect, you will not cause damage to the device but the device will not operate.

#### Open the terminal compartment cover

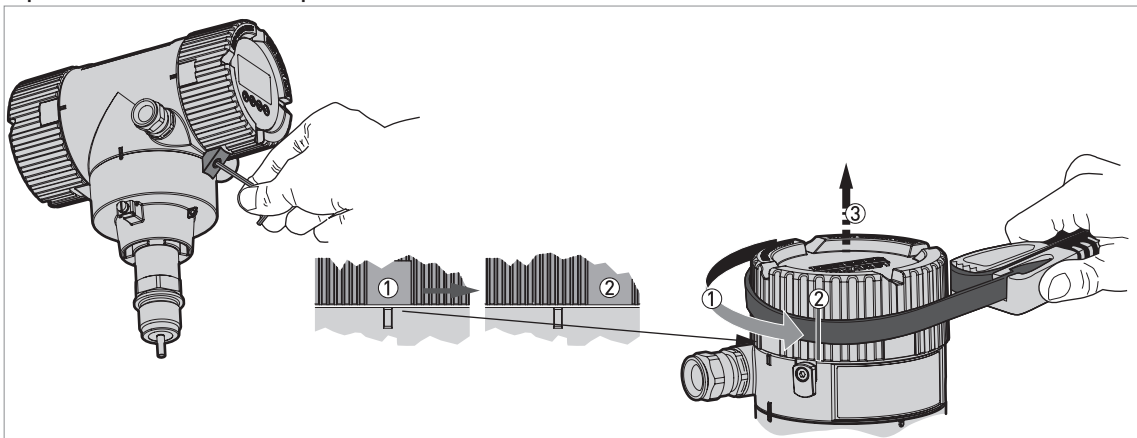


Figure 3-2: How to open the terminal compartment cover



- Loosen the lock screw with a 2.5 mm Allen wrench.
- Turn the cover counterclockwise with a strap wrench.
- Remove the cover.

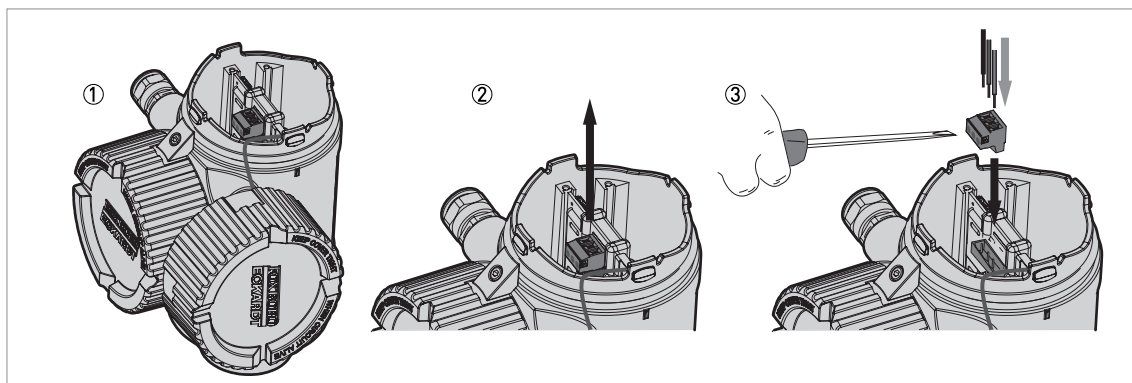


Figure 3-3: Procedure for electrical installation

**Equipment needed:**

- Small slotted tip screwdriver (not supplied)



**Procedure:**

- ① Do not disconnect the safety cord from the terminal compartment cover. Put the terminal compartment cover adjacent to the housing.
- ② Remove the connector from the circuit board.
- ③ Connect the electrical wires to the connector. Attach the connector to the circuit board. Tighten the cable entry glands.

**Close the terminal compartment cover**

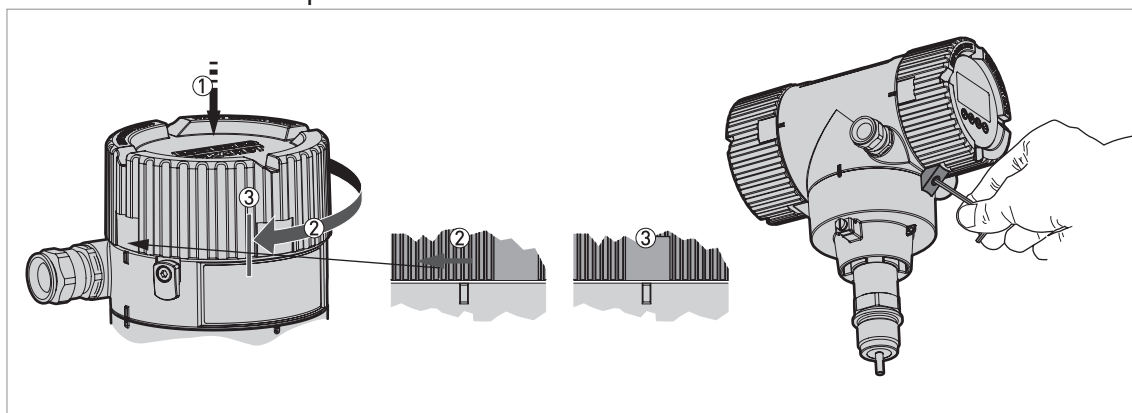


Figure 3-4: How to close the terminal compartment cover



- Put the cover on the housing and push it down.
- Turn the cover clockwise until it is fully engaged.
- Tighten the lock screw.

## 3.1.2 Remote version

### Terminals for electrical installation

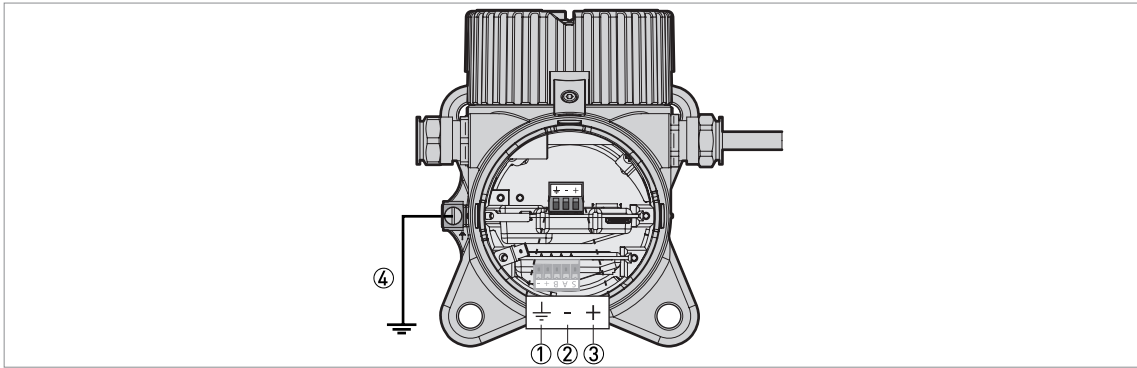


Figure 3-5: Terminals for electrical installation

- ① Grounding terminal in the housing (if the electrical cable is shielded)
- ② Current output -
- ③ Current output +
- ④ Location of the external grounding terminal (on the wall support)



#### INFORMATION!

Electrical power to the output terminal energizes the device. The output terminal is also used for HART® communication.



#### CAUTION!

- Use the applicable electrical cables with the cable glands.
- Make sure that the power supply does not have a current more than 5 A or that there is 5 A-rated fuse in the electrical circuit that energizes the device.
- Make sure that the polarity of the power supply is correct. If the polarity is incorrect, you will not cause damage to the device but the device will not operate.

### Connections between the remote converter and the probe housing

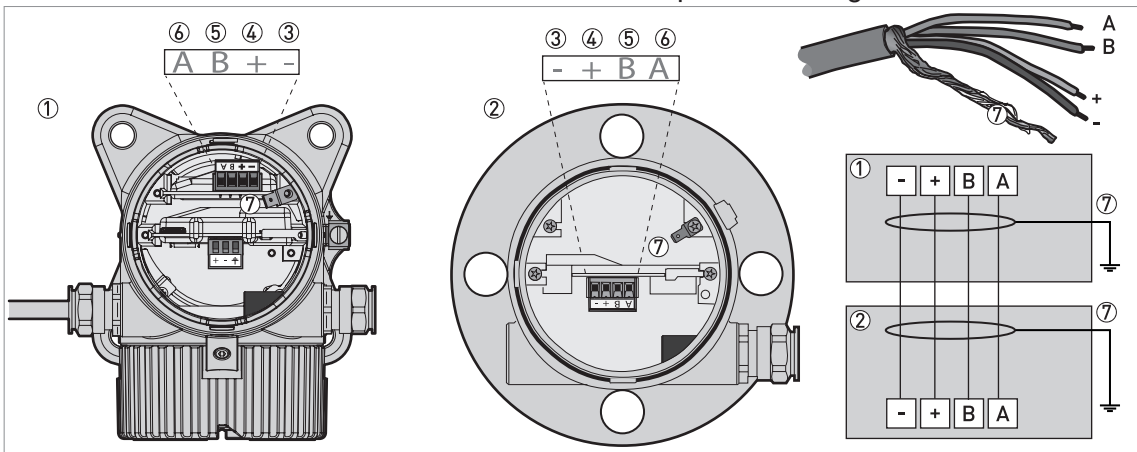


Figure 3-6: Connections between the remote converter and the probe housing

- ① Remote converter
- ② Probe housing
- ③ Power supply: voltage in -
- ④ Power supply: voltage in +
- ⑤ Signal cable B
- ⑥ Signal cable A
- ⑦ Shielding wire (attached to Faston connectors in the housings of the remote converter and the probe housing)

For more electrical installation data, refer to *Compact version* on page 36.

For more data about the communication cable between the remote converter and the probe housing, refer to the handbook.

## 3.2 Non-Ex devices

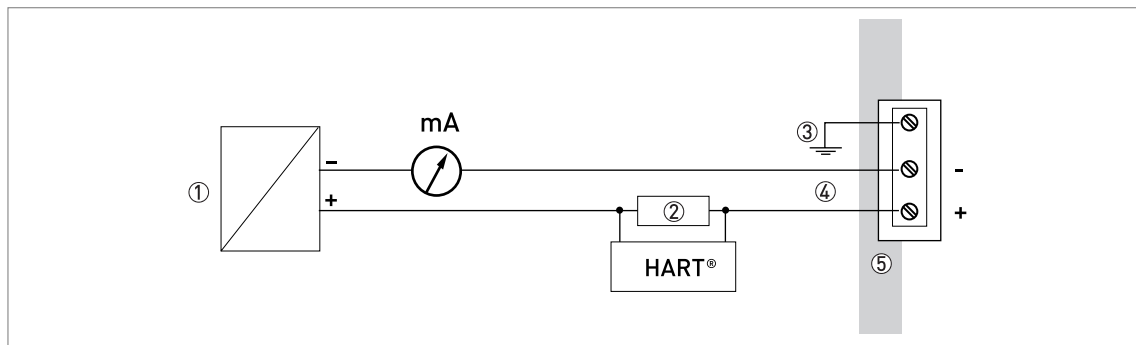


Figure 3-7: Electrical connections for non-Ex devices

- ① Power supply
- ② Resistor for HART® communication
- ③ Optional connection to the grounding terminal
- ④ Output: 12...30 VDC for an output of 22 mA at the terminal
- ⑤ Device

## 3.3 Devices for hazardous locations



### **DANGER!**

For electrical data for device operation in hazardous locations, refer to the related certificates of compliance and supplementary instructions (ATEX, cFMus, ...). This documentation can be downloaded from our website.

### 3.4 Minimum power supply voltage

Use these graphs to find the minimum power supply voltage for a given current output load.

#### Non-Ex and Hazardous Location approved (Ex i / IS) devices

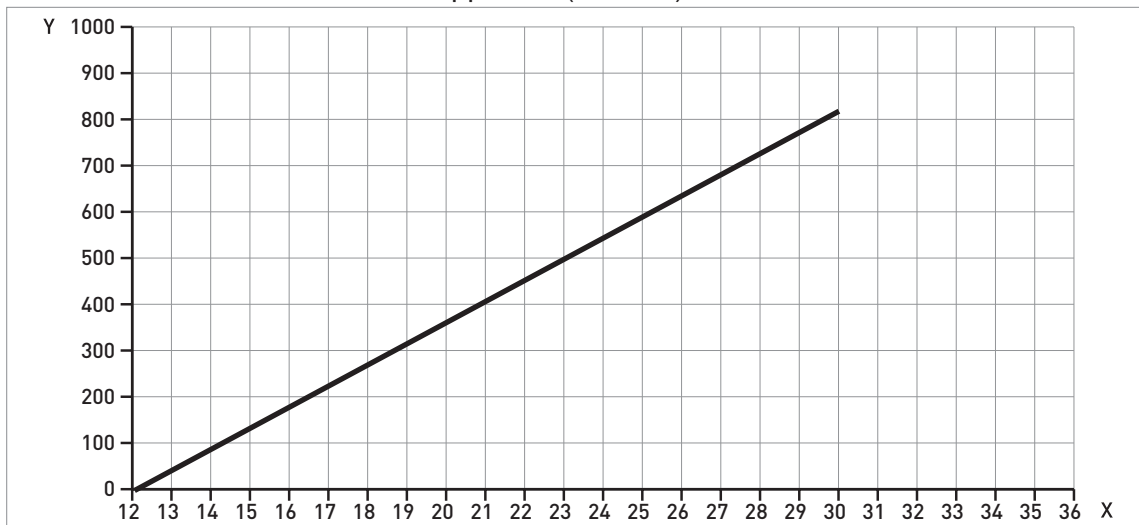


Figure 3-8: Minimum power supply voltage for an output of 22 mA at the terminal (Non-Ex and Hazardous Location approval (Ex i / IS))

X: Power supply U [VDC]

Y: Current output load  $R_L$  [ $\Omega$ ]

#### Hazardous Location (Ex d / XP/NI) approved devices

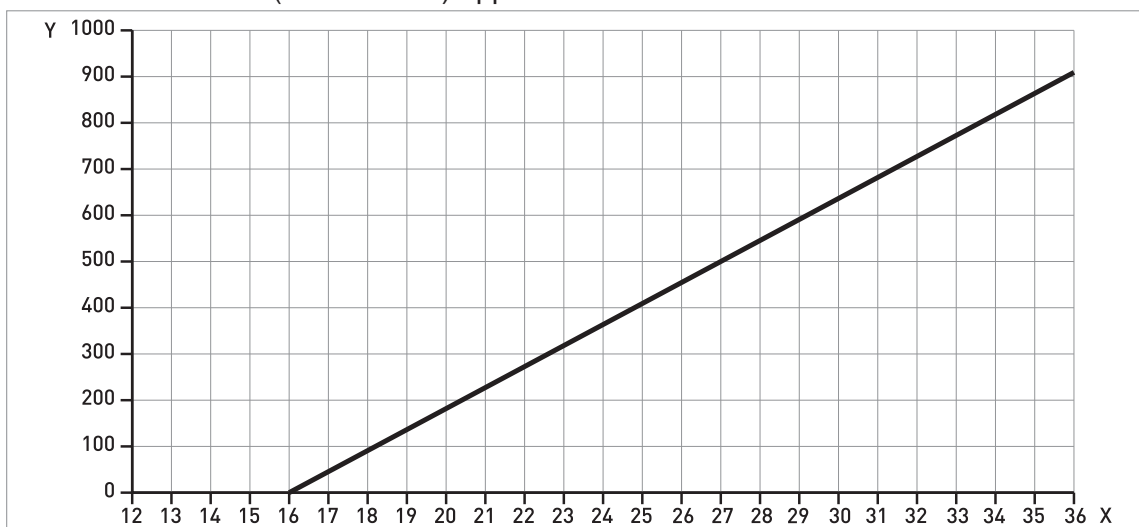


Figure 3-9: Minimum power supply voltage for an output of 22 mA at the terminal (Hazardous Location approval (Ex d / XP/NI))

X: Power supply U [VDC]

Y: Current output load  $R_L$  [ $\Omega$ ]



### 3.5 Protection category

**INFORMATION!**

The device fulfills all requirements per protection category IP 66/67. It also fulfills all requirements per NEMA type 4X (housing) and type 6P (probe).

**DANGER!**

Make sure that the cable gland is watertight.

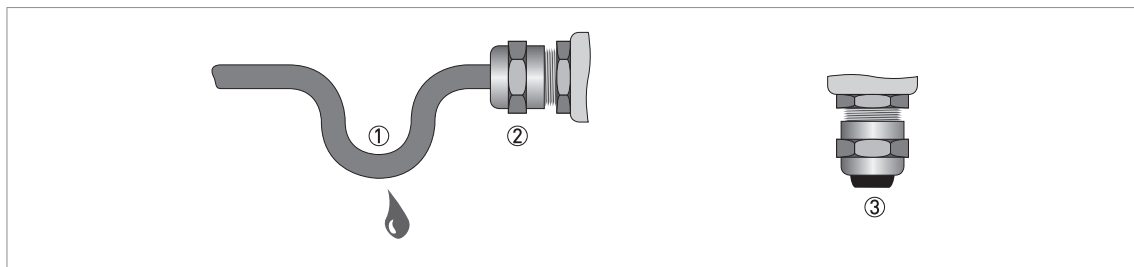


Figure 3-10: How to make the installation agree with protection category IP 67



- Make sure that the gaskets are not damaged.
- Make sure that the electrical cables are not damaged.
- Make sure that the electrical cables agree with the national electrical code.
- The cables are in a loop in front of the device ① so water does not go into the housing.
- Tighten the cable feedthroughs ②.
- Close unused cable feedthroughs with dummy plugs ③.

The diameter of the outer sheath of the electrical cable and must be 6...10 mm or 0.2...0.39".

## 3.6 Networks

### 3.6.1 General information

The device uses the HART<sup>®</sup> communication protocol. This protocol agrees with the HART<sup>®</sup> Communication Foundation standard. The device can be connected point-to-point. It can also operate in a multi-drop network of up to 15 devices.

The device output is factory-set to communicate point-to-point. To change the communication mode from **point-to-point** to **multi-drop**, refer to "Network configuration" in the handbook.

### 3.6.2 Point-to-point networks

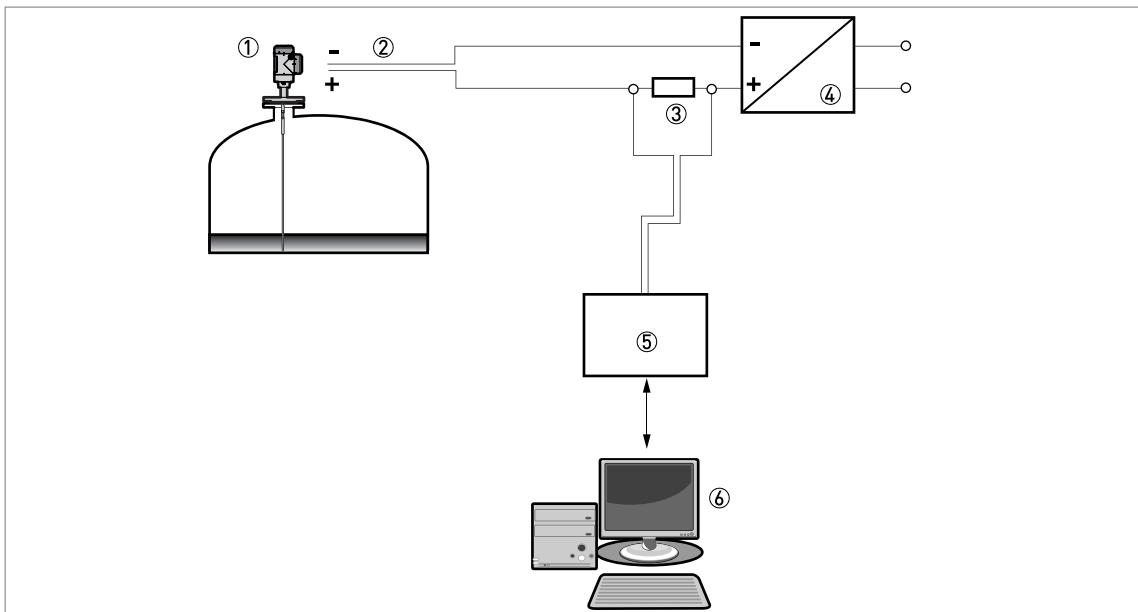


Figure 3-11: Point-to-point connection (non-Ex)

- ① Address of the device (0 for a point-to-point connection)
- ② 4...20 mA + HART<sup>®</sup>
- ③ Resistor for HART<sup>®</sup> communication
- ④ Power supply
- ⑤ HART<sup>®</sup> modem
- ⑥ HART<sup>®</sup> communication device

3.6.3 Multi-drop networks

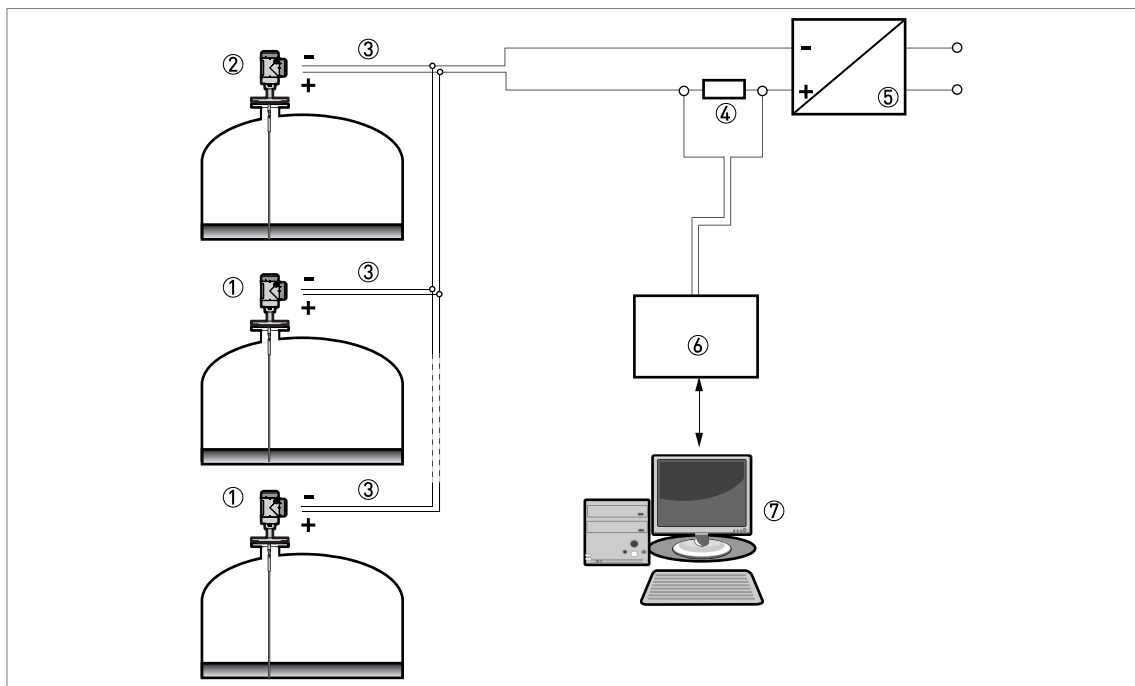


Figure 3-12: Multi-drop network (non-Ex)

- ① Address of the device (n+1 for multidrop networks)
- ② Address of the device (1 for multidrop networks)
- ③ 4 mA + HART<sup>®</sup>
- ④ Resistor for HART<sup>®</sup> communication
- ⑤ Power supply
- ⑥ HART<sup>®</sup> modem
- ⑦ HART<sup>®</sup> communication device

## 3.6.4 Fieldbus networks

**INFORMATION!**

Fieldbus options are available for the compact version of the device.

For more data, refer to the supplementary instructions for FOUNDATION™ fieldbus and PROFIBUS PA.

## FOUNDATION™ fieldbus network (non-Ex)

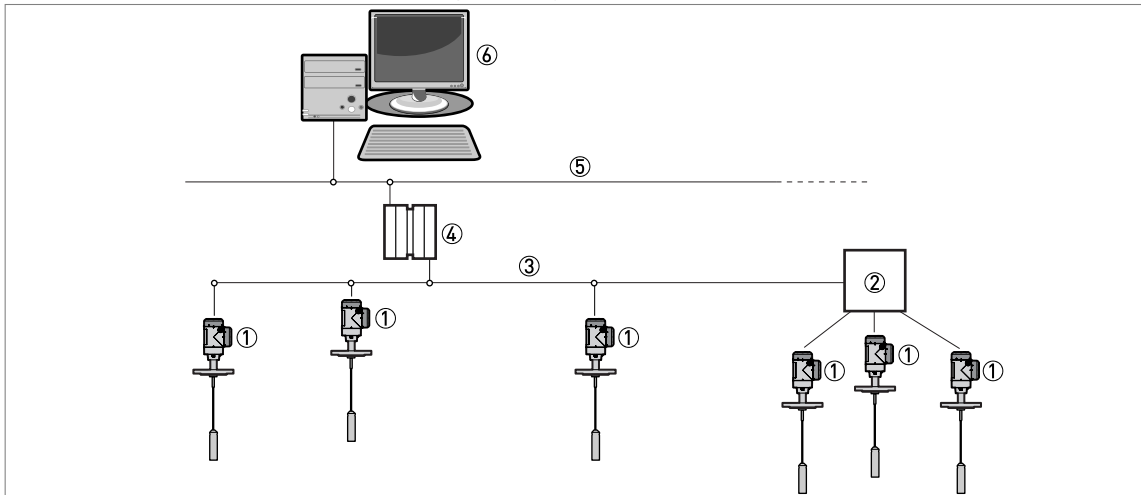


Figure 3-13: FOUNDATION™ fieldbus network (non-Ex)

- ① Field device
- ② Junction box
- ③ H1 network
- ④ H1/HSE converter
- ⑤ High Speed Ethernet (HSE)
- ⑥ Workstation

PROFIBUS PA/DP network (non-Ex)

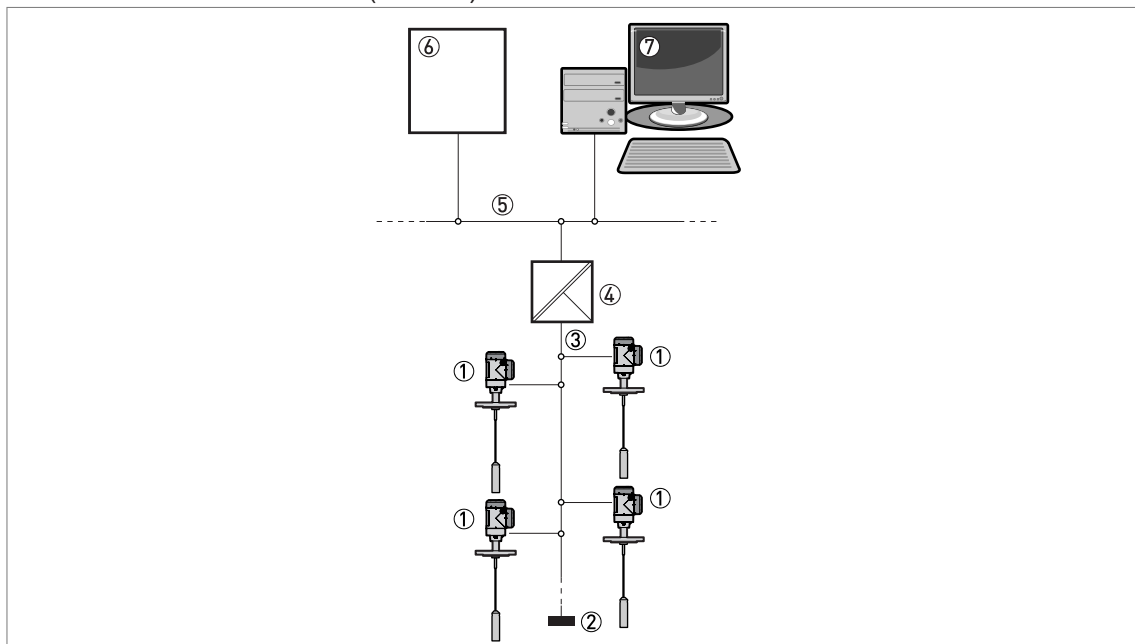


Figure 3-14: PROFIBUS PA/DP network (non-Ex)

- ① Field device
- ② Bus termination
- ③ PROFIBUS PA bus segment
- ④ Segment coupler (PA/DP link)
- ⑤ PROFIBUS DP bus line
- ⑥ Control system (PLC / Class 1 master device)
- ⑦ Engineering or operator workstation (Control tool / Class 2 master device)

## 4 Operation

### 4.1 General notes

For more data about device configuration, refer to the handbook.

### 4.2 Digital display screen

#### 4.2.1 Local display screen layout

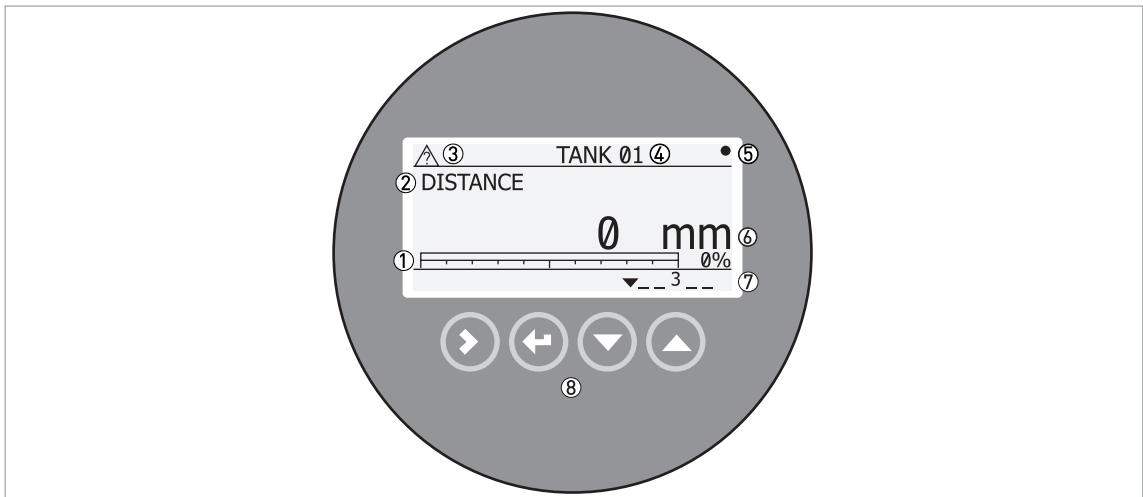


Figure 4-1: Local display screen layout in Normal mode

- ① Current output percentage (bar graph and text — only shown if the current output function is the same as the measurement on the screen in normal mode)
- ② Measurement type (in this example, distance)
- ③ Device status (NE 107 symbols)
- ④ Device tag name
- ⑤ Updated measurement data symbol (the symbol flashes each time the measurement data is updated)
- ⑥ Measurement value and units
- ⑦ Device status (markers)
- ⑧ Keypad buttons (refer to the table in the section that follows)

#### 4.2.2 Functions of keypad buttons

Keypad button	Function
[Right]	<b>Normal mode:</b> Enter Information menu (Enter Configuration mode) <b>Configuration mode:</b> Move cursor to the right
[Return / Escape]	<b>Normal mode:</b> Change units (m, cm, mm, in, ft) <b>Configuration mode:</b> Exit
[Down]	<b>Normal mode:</b> Change measurement type (distance, level , output (%), output (mA), conversion, ullage conversion) ① <b>Configuration mode:</b> Decrease value or change parameter
[Up]	<b>Normal mode:</b> Change measurement type (distance, level , output (%), output (mA), conversion, ullage conversion) ① <b>Configuration mode:</b> Increase value or change parameter


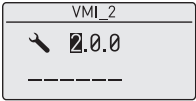
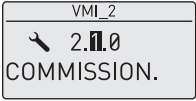

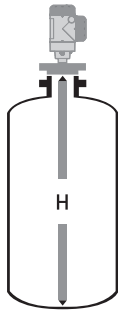
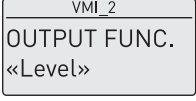
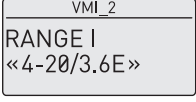
① If you have made a strapping table in menu item 2.8.1 INPUT TABLE for volume or mass measurement, "Conversion" and "Ullage Conv." will be shown in the list of measurement types

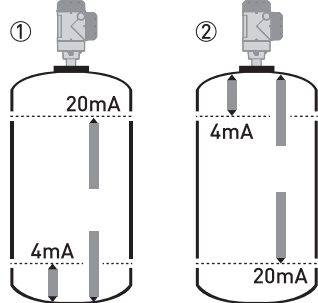
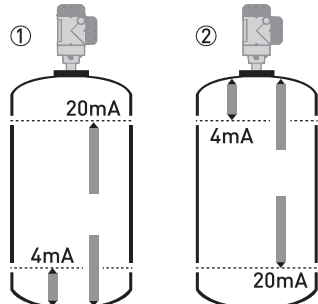
For data on keypad functions, refer to the **Operation** section in the handbook.

### 4.3 Quick Setup

Use this procedure to change the probe length and give the top and bottom measuring limits. « xx » in the illustrations shows that you can change the value or the parameter. Push the keypad buttons in the correct sequence:

#### Procedure

Screen	Steps	Description
	<ul style="list-style-type: none"> <li>[&gt;], [▲] and [&gt;].</li> </ul>	Default screen. Enter configuration mode (2.0.0 SUPERVISOR).
	<ul style="list-style-type: none"> <li>[&gt;], [←], [▼], [▲], [&gt;] and [←].</li> </ul>	Enter the password (the default password is shown). If it is necessary to change the password, refer to the handbook.
	<ul style="list-style-type: none"> <li>[&gt;]</li> </ul>	Push this button to start the quick set-up procedure.
	<ul style="list-style-type: none"> <li>[&gt;] to change the tank height (H).</li> <li>[&gt;] to change the position of the cursor.</li> <li>[▼] to decrease the value or [▲] to increase the value.</li> <li>[←] to confirm.</li> </ul>	
	<ul style="list-style-type: none"> <li>[▲] or [▼] for the selection of the measurement name (Distance, Level, Conversion or Ullage Conv.).</li> <li>[←] to confirm.</li> </ul>	The manufacturer sets the output function to "Level" before delivery. If it is necessary to measure volume, ullage volume, mass or ullage mass (Conversion or Ullage Conv.), refer to the handbook.
	<ul style="list-style-type: none"> <li>[▲] or [▼] for the selection of the current output range (4-20 mA/3.6E, 4-20, 3.8-20.5/3.6E, etc.).</li> <li>[←] to confirm.</li> </ul>	

Screen	Steps	Description
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>VMI_2</p> <p>SCALE 4 mA</p> <p>«0000»</p> </div>	<ul style="list-style-type: none"> <li>• [&gt;] to change Scale 4 mA.</li> <li>• [&gt;] to change the position of the cursor.</li> <li>• [▼] to decrease the value or [▲] to increase the value.</li> <li>• [←] to confirm.</li> </ul>	<p>Use this step to give the 4 mA output setting (0% limit) in the tank. Refer to the illustrations that follow. Illustration ① shows the settings for level. Illustration ② shows the settings for distance.</p> 
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>VMI_2</p> <p>SCALE 20 mA</p> <p>«3350»</p> </div>	<ul style="list-style-type: none"> <li>• [&gt;] to change Scale 20 mA.</li> <li>• [&gt;] to change the position of the cursor.</li> <li>• [▼] to decrease the value or [▲] to increase the value.</li> <li>• [←] to confirm.</li> </ul>	<p>Use this step to give the 20 mA output setting (100% limit) in the tank. Refer to the illustrations that follow. Illustration ① shows the settings for level. Illustration ② shows the settings for distance.</p> 
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>VMI_2</p> <p>ERROR DELAY</p> <p>«10 S»</p> </div>	<ul style="list-style-type: none"> <li>• [▲] or [▼] for the selection of the error delay (0 s, 10 s, 20 s, 30 s, 1 mn, 2 mn, 5 mn or 15 mn).</li> <li>• [←] to confirm.</li> </ul>	<p>The time after which the current output changes to an error value. The error value shows that there is a measurement error.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>TANK 01</p> <p>TAG NAME</p> <p>«TANK 01»</p> </div>	<ul style="list-style-type: none"> <li>• [&gt;] to change the tag name.</li> <li>• [&gt;] to change the position of the cursor.</li> <li>• [▼] to decrease the alphanumeric value (A, B, ..., 1, 2, ...) or [▲] to increase the alphanumeric value.</li> <li>• [←] to confirm.</li> </ul>	
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>VMI_2</p> <p>2.0.0</p> <p>«STORE NO»</p> </div>	<ul style="list-style-type: none"> <li>• 2 x [←] to confirm.</li> <li>• [▲] or [▼] for the selection of the save option (STORE NO or STORE YES).</li> <li>• [←] to confirm.</li> </ul>	<p>Set to STORE YES to save and use the data. Set to STORE NO to cancel the changes to the device settings.</p>



## Product Specifications for Intelligent Level Transmitters

Product Specification: Device:

### LevelWave Radar Transmitters

PSS EML3010	LG01	Guided Wave Radar Level Meter
PSS EML3020	LR01	Free-Space Radar Level Meter

### LevelStar Buoyancy Transmitters

<a href="#">PSS EML0710</a>	244LD	Intelligent Buoyancy Transmitter for Liquid Level, Interface and Density with Displacer and Torque Tube
<a href="#">PSS EML1710</a>	244LVP	Intelligent Buoyancy Transmitter for Liquid Level, Interface and Density with Displacer
<a href="#">PSS EML0901</a>	204xx	Accessories for Buoyancy Transmitters
PSS EMO0100		Accessories for Devices with HART-Protocol

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