

BM 26 BASIC/ADVANCED Handbook

Stainless Steel Bypass Level Indicators for applications
up to 40 bar / 580 psi

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1.1 Intended use

This magnetic level indicator measures the level or volume of liquids.

It is installed next to open or pressurized tanks. With the applicable options, it is resistant to difficult service conditions and liquids that are poisonous, flammable, or that cause corrosion.



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.

1.2 Certification



In accordance with KROHNE's commitment to customer service and safety, the level indicators described in this handbook meet the following safety requirements:

- EMC Directive 2004/108/EC in conjunction with EN 61326-1: 2006
- Low Voltage Directive 2006/95/EC in conjunction with EN 61010-1: 2001
- Pressure Equipment Directive 97/23/EC in conjunction with CODAP® 2010



INFORMATION!

The optimized design of the Basic version is not subject to PED test requirements (CE marking is not applicable). The Advanced version agrees with the requirements for CE marking. The Low Voltage Directive is only applicable to limit switches (non-NAMUR option).

1.3 Safety instructions from the manufacturer

1.3.1 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

1.3.2 Product liability and warranty

Bypass level indicators from KROHNE are designed solely for measuring the level and volume of liquids.

Responsibility as to suitability and intended use of these level indicators rests solely with the operator. The supplier does not accept any liability resulting from misuse by the operator. Improper installation and operation of the level transmitters may lead to loss of warranty. In addition, the "General conditions of sale" which forms the basis of the purchase agreement are applicable.

1.3.3 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of underneath icons.

1.3.4 Warnings and symbols used

Safety warnings are indicated by the following symbols.



DANGER!

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



DANGER!

This warning refers to the immediate danger of burns caused by heat or hot surfaces.



DANGER!

This warning refers to the immediate danger when using this device in a hazardous atmosphere.



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.



LEGAL NOTICE!

This note contains information on statutory directives and standards.



• **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.

1.4 Safety instructions for the operator



WARNING!

In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.

2.1 Scope of delivery

**INFORMATION!**

*Check the packing list to see if you have received all that you require.
The device will be delivered in one box.*

**INFORMATION!**

Inspect the cartons carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

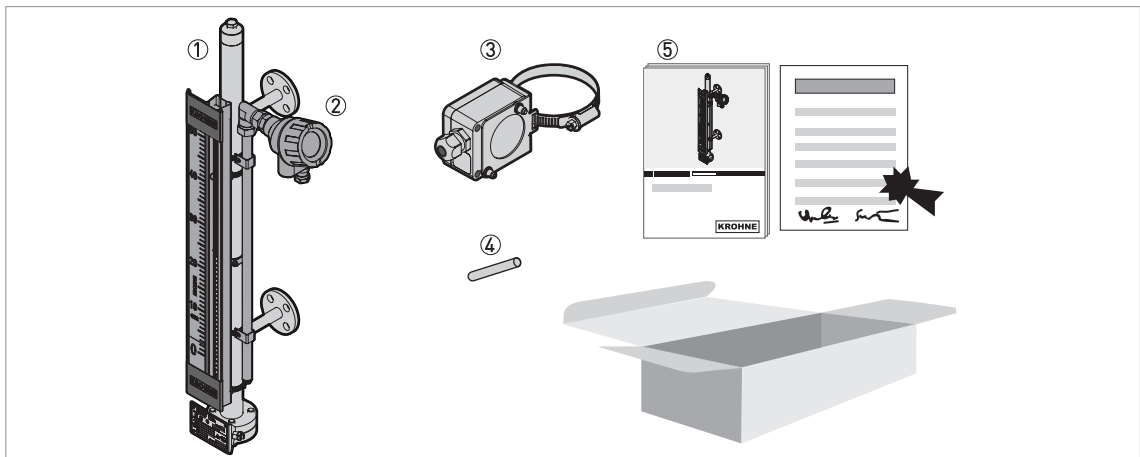


Figure 2-1: Scope of delivery

- ① Measuring chamber with the indicator column and optional indicator scale
- ② Optional analog transmitter
- ③ Optional limit switches (not attached to the device)
- ④ Magnet (to set the indicator column to zero after installation)
- ⑤ Quick Start and Handbook

**INFORMATION!**

No special tools, no training required!

2.2 Device description

Magnetic level indicators have a measuring chamber that contains a magnetic float. It is attached vertically to the side of open or pressurized tanks. A level indicator is attached adjacent to the measuring chamber. As the float moves up and down, it rotates a column of flaps inside the glass tube of the indicator. If an analog level transmitter is also attached adjacent to the measuring chamber, it is possible to have an output current that can be monitored from a remote station. Optional bistable switches let the user monitor important measurement limits.

The measuring chamber of the **Basic** version has a maximum operating pressure of 16 barg / 232 psig (depending on the length of the chamber). It is unnecessary to test the measuring chamber according to PED 97/23/EC as it does not have to comply with CE marking requirements. It is also ideal for measuring liquids with a density ≥ 0.8 kg/l / ≥ 49.9 lb/ft³ and temperatures up to 150°C / 300°F.

The **Advanced** version is ideal for measuring liquids with density range of 0.58...2.0 kg/l / 36.2...124.8 lb/ft³, temperatures up to 300°C / 570°F or pressures up to 40 barg / 580 psig.



WARNING!

Pressure Equipment Directive 97/23/EC data

- *This device is designed to function at near constant pressure conditions. It is not designed for operating conditions where vibration or fatigue stress is present.*
- *Events that are not taken into account in the calculations include exceptional risks such as: earthquakes, bad weather, fire etc.*
- *The standard design calculation does not take into account the theoretical coefficient of corrosion. The product circulating in the device must not have properties that give rise to surface erosion.*
- *Our conformity declaration is limited to the parts of the device that are pressurized. It does not include parts that can be dismantled (valves, ...).*

You can also order these accessories:

- Limit switches

2.3 Nameplates



INFORMATION!

Look at the device nameplate to ensure that the device is delivered according to your order.
Check for the correct supply voltage printed on the nameplate.

2.3.1 Visual Check

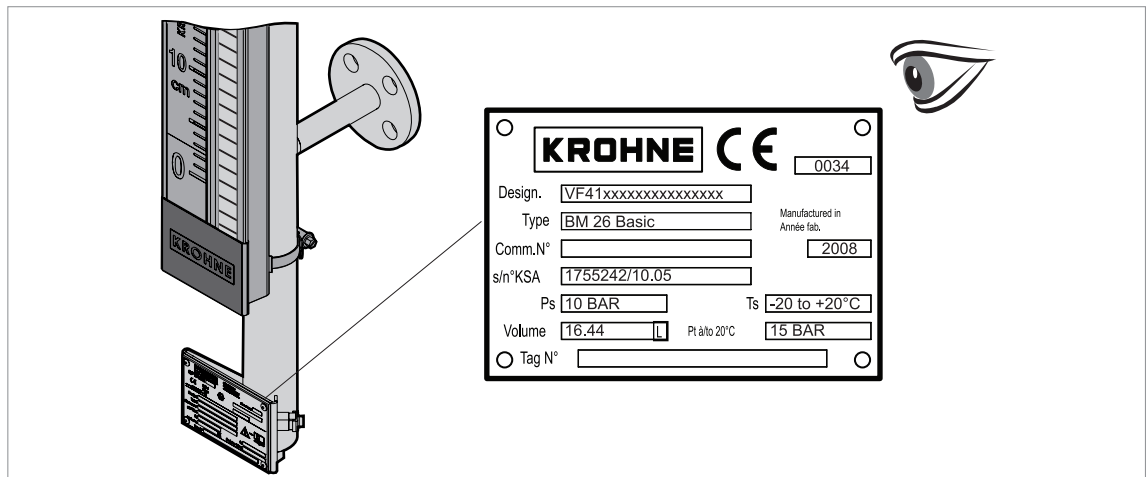


Figure 2-2: Visual check



- Check the delivery for damage.
- Are all the wetted components (chamber, flanges and gaskets) resistant to the product in the tank?
- Compare the data on the nameplate with your order data.

2.3.2 Nameplates

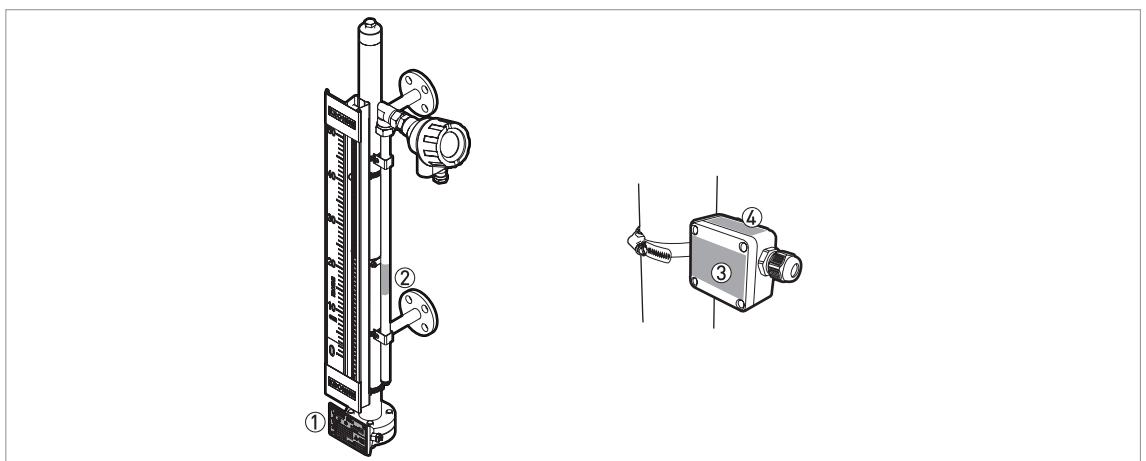


Figure 2-3: Location of device nameplates

- ① Measuring chamber nameplate
- ② Analog transmitter nameplate
- ③ Limit switch nameplate (housing cover)
- ④ Limit switch nameplate (housing)

Figure 2-4: Basic version: Non-Ex nameplate

Figure 2-5: Advanced version: Non-Ex nameplate

- ① Customer tag number
- ② Measuring tube volume in litres
- ③ Maximum allowable pressure (P_s)
- ④ Factory serial number
- ⑤ Purchase order number
- ⑥ Model name and number
- ⑦ Designation code (VF code given in the order)
- ⑧ Year of manufacture
- ⑨ Maximum allowable temperature (T_s)
- ①⑩ Test pressure (P_t at 20°C) - if the device agrees with the requirements of Categories I, II or III of the Pressure Equipment Directive 97/23/EC.

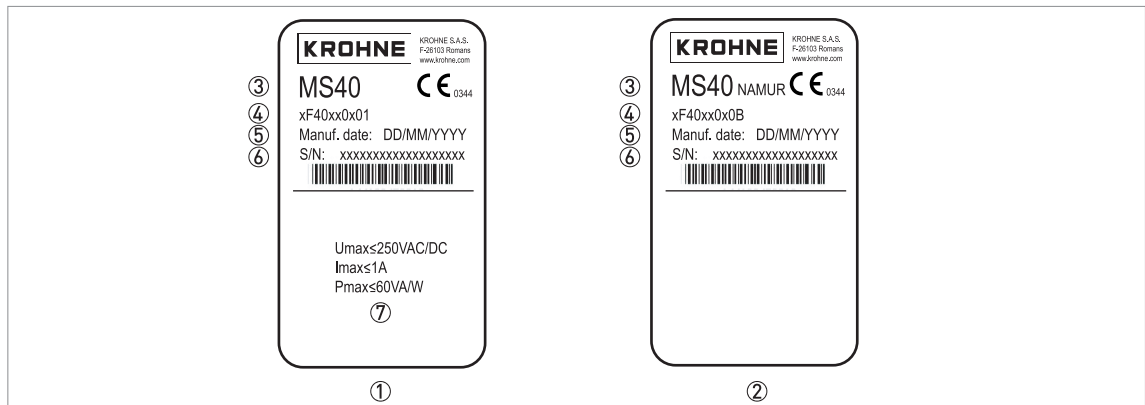


Figure 2-6: Limit switch: Non-Ex nameplate (housing cover)

- ① Non-NAMUR option
- ② NAMUR option
- ③ Model
- ④ Designation code (VF code given in the order)
- ⑤ Date of manufacture
- ⑥ Factory serial number and bar code
- ⑦ Electrical data

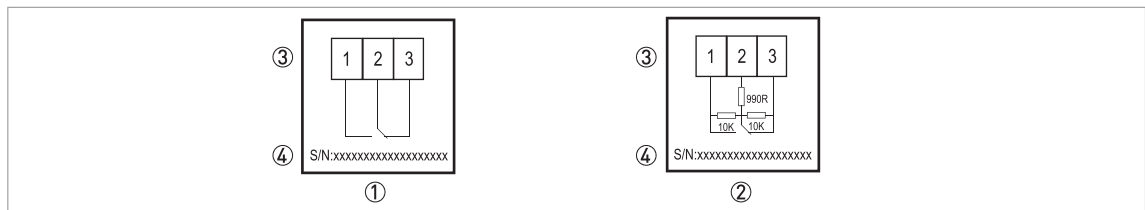


Figure 2-7: Limit switch: Non-Ex nameplate (housing)

- ① Non-NAMUR option
- ② NAMUR option
- ③ Electrical schema
- ④ Factory serial number



Figure 2-8: Analog transmitter: Non-Ex nameplate

- ① Model
- ② Designation code (VF code given in the order)
- ③ Date of manufacture
- ④ Factory serial number
- ⑤ Input voltage

2.3.3 Other device data

The supplier's bottom logo plate has a sticker:

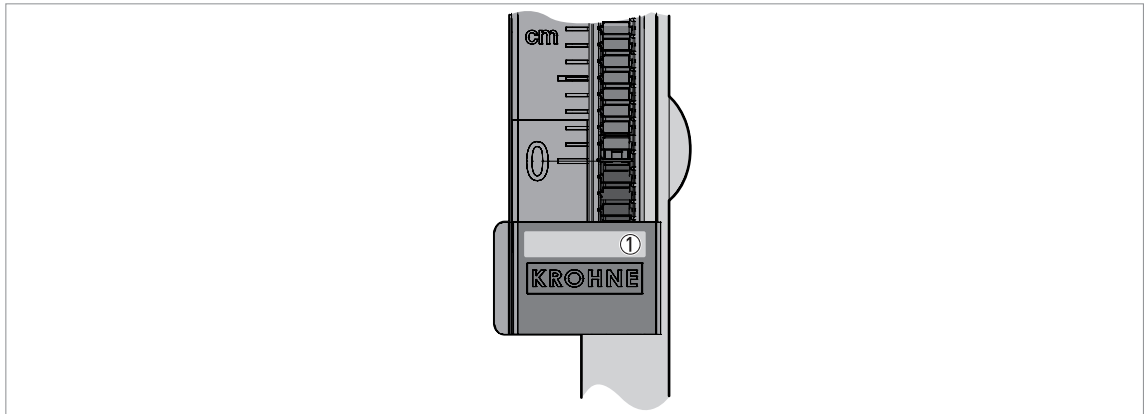


Figure 2-9: Other device data

① Float data sticker

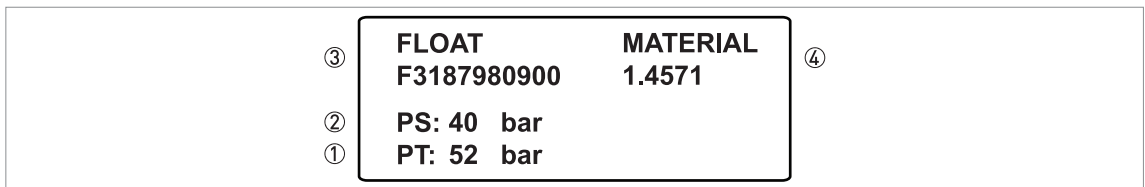


Figure 2-10: Float data sticker

- ① Test pressure, PT, in bar
- ② Maximum allowable pressure, PS, in bar
- ③ Float drawing number
- ④ Float material

3.1 Storage

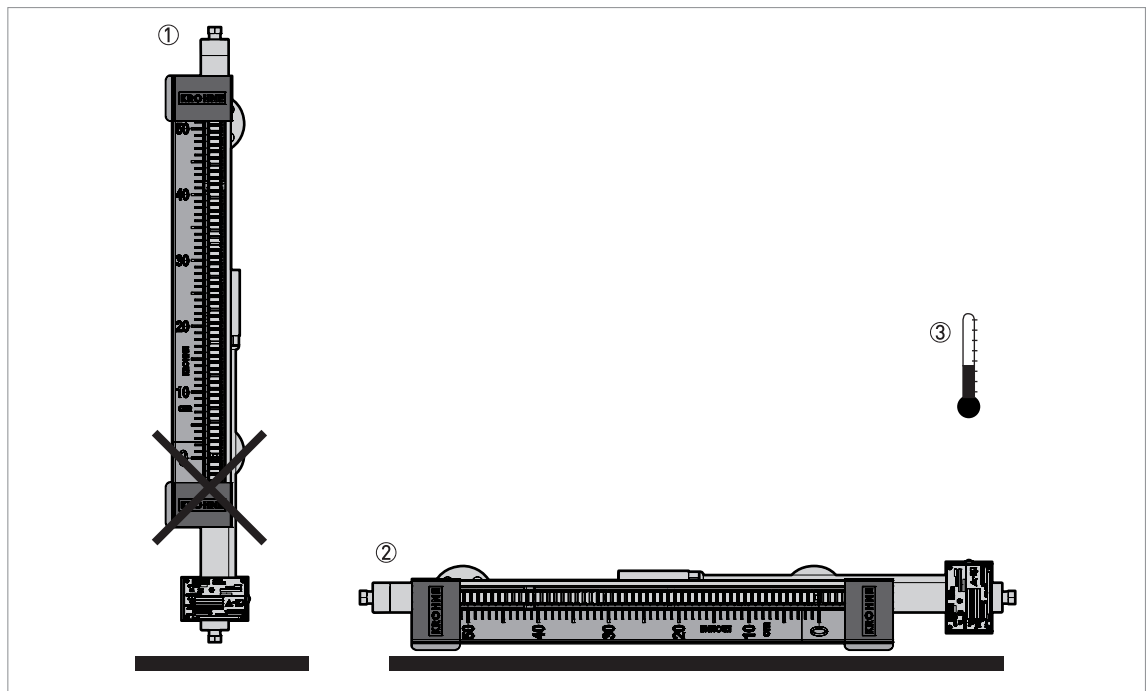


Figure 3-1: Storage conditions

- ① Do not keep the device in a vertical position before installation.
 - ② Put the device on its side.
 - ③ Storage temperature range: $-50...+80^{\circ}\text{C}$ / $-58...+176^{\circ}\text{F}$
- Store the device in a dry and dust-free location.
 - Store the device in its original packing.

3.2 Transportation

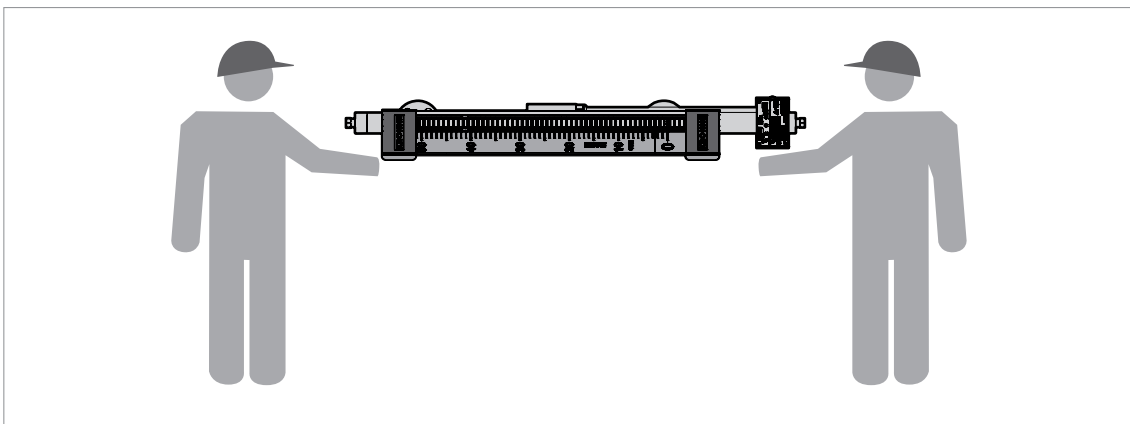


Figure 3-2: Transportation



WARNING!

*The indicator column is made of Pyrex® glass.
If you do not lift the device carefully, you can cause damage to the device.*

3.3 Remove all packing before installation



CAUTION!

Make sure that the measuring chamber does not contain unwanted objects (dirt etc.)

How to remove the float lock pin (devices with side process connections)

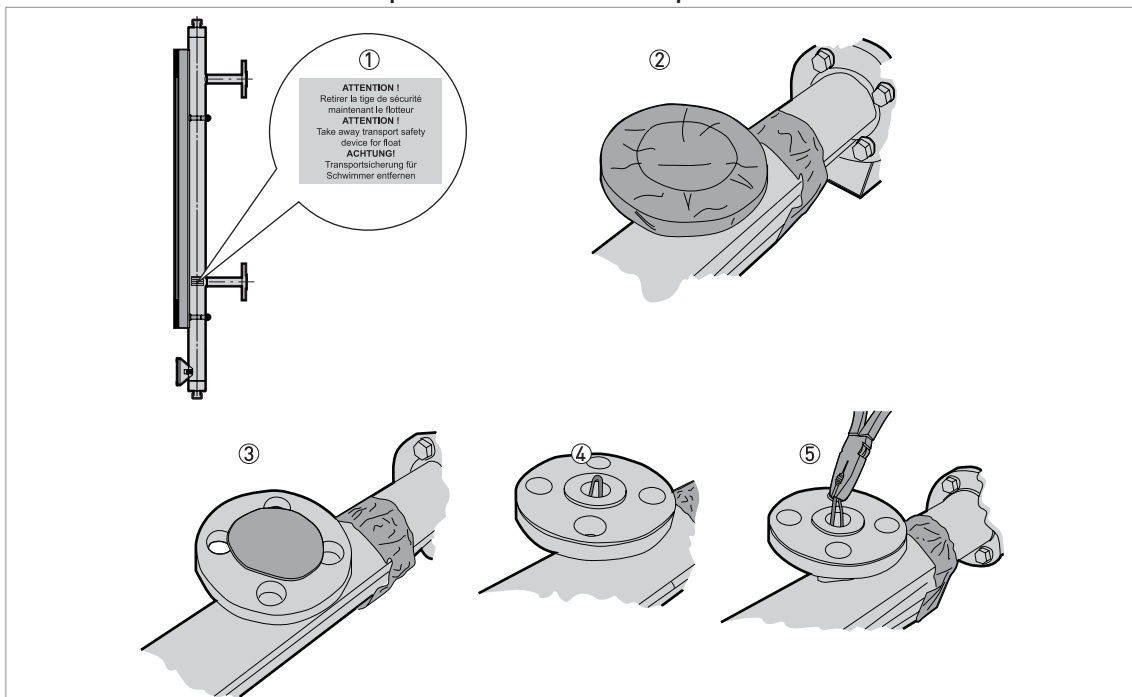


Figure 3-3: How to remove the float lock pin (devices with side process connections)



How to remove the float lock pin (devices with side process connections)

- ① Check the measuring chamber for a red sticker next to the bottom side process connection.
- ➡ Sticker text: ATTENTION! Take away transport safety device for float.
- ② Remove the adhesive tape around the top and bottom process connections.
- ③ Remove the plastic protection from the top and bottom process connections.
- ④ Find the lock pin.
- ⑤ Remove the lock pin with a pair of pliers.

How to put the float in the measuring chamber

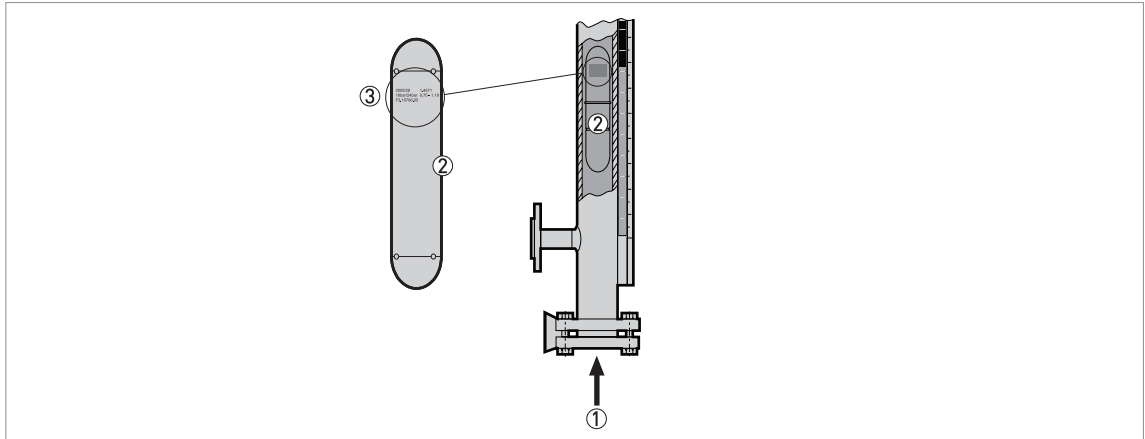


Figure 3-4: How to put the float in the measuring chamber (if it is delivered separately)

- ① Put the float in here
- ② Float
- ③ The float data (date of manufacture, P_s/P_t , float material etc.) must be at the top of the float when you put the float in the measuring chamber

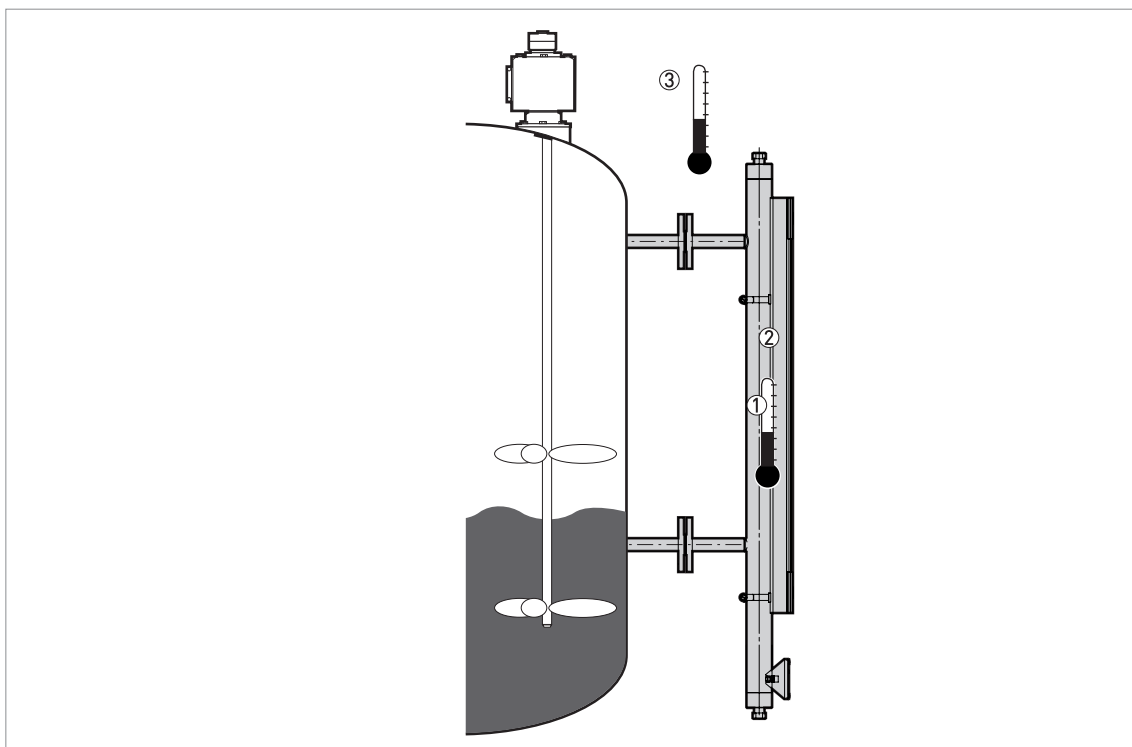


How to put the float in the measuring chamber (if it is delivered separately)

- Remove the bottom blind flange or plug (if the basic version has the 1¼" drain option).
- Put the top of the float (the float data is on the top part of the float) in the measuring chamber first.
- Align the gaskets.
- Tighten the nuts on the blind flange to the correct torque (11 Nm in operating conditions, 23.5 Nm in test conditions). The 1¼" plug must be tightened in agreement with good engineering practice.

3.4 General requirements

3.4.1 Pressure and temperature ranges



- ① Process temperature
Basic version: $-40\dots+150^{\circ}\text{C}$ / $-40\dots300^{\circ}\text{F}$
Advanced version: $-40\dots+300^{\circ}\text{C}$ / $-40\dots570^{\circ}\text{F}$
Ex devices: refer to supplementary instructions
- ② Maximum process pressure
Basic version: 16 barg / 232 psig (depends on the length of the measuring chamber. For more data, refer to *Guidelines for maximum operating pressure* on page 76).
Advanced version: 40 barg / 580 psig (according to the flange pressure rating. For more data, refer to *Guidelines for maximum operating pressure* on page 76).
- ③ Ambient temperature
Non-Ex devices: $-40\dots+80^{\circ}\text{C}$ / $-40\dots+176^{\circ}\text{F}$
Ex devices: refer to supplementary instructions



WARNING!

Refer to the operating conditions data on the device nameplate. The data is applicable to that device.



WARNING!

PED 97/23/EC requirement: *External pressure must be equal to atmospheric pressure.*

3.4.2 How to attach the bypass level indicator to the tank

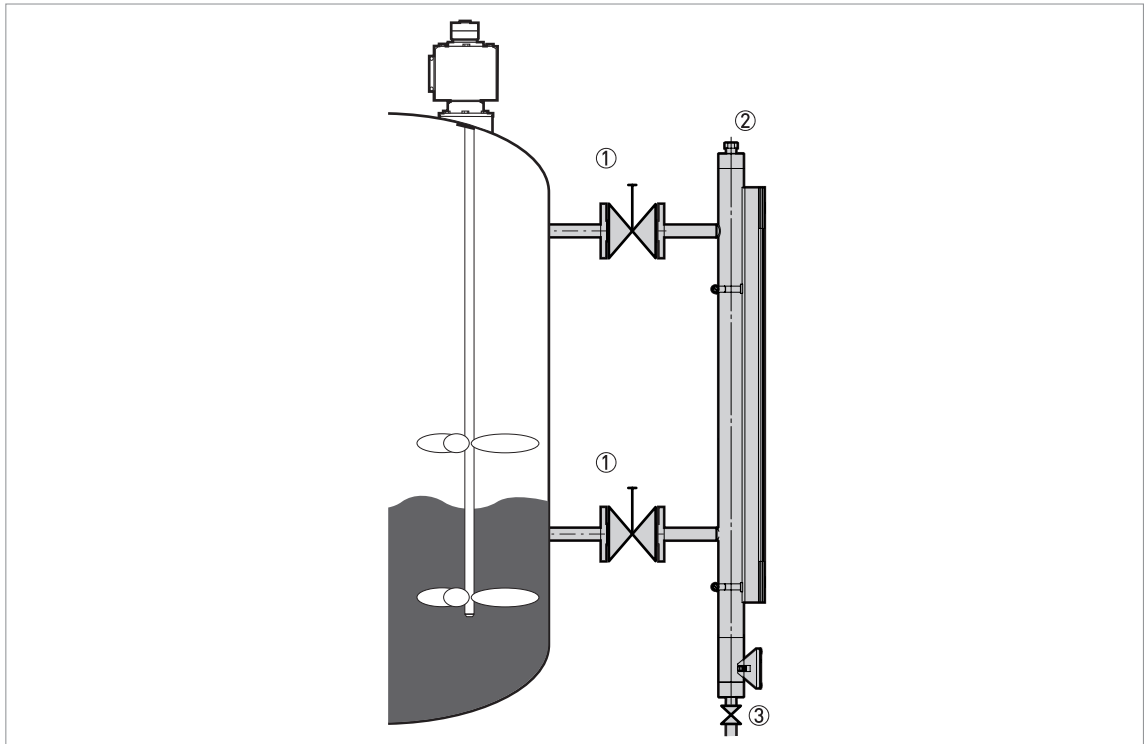


Figure 3-5: How to attach the bypass level indicator to the tank

- ① Optional isolation valve
- ② Optional vent
- ③ Optional drain with isolation valve

Obey the instructions that follow:

- Select bolts and gaskets (not supplied) that agree with the pressure rating of the process connection and the operating pressure.
- Install the bypass level indicator vertically on the tank.
- Make sure that there is no contamination (dirt etc.) or unwanted objects in the measuring chamber.
- Make sure that mechanical loadings do not cause damage to the process connections. If necessary, put supports on the device.
- Install shut-off valves so that the device can be cleaned separately from the tank. Drain the device only when it is isolated from the tank.

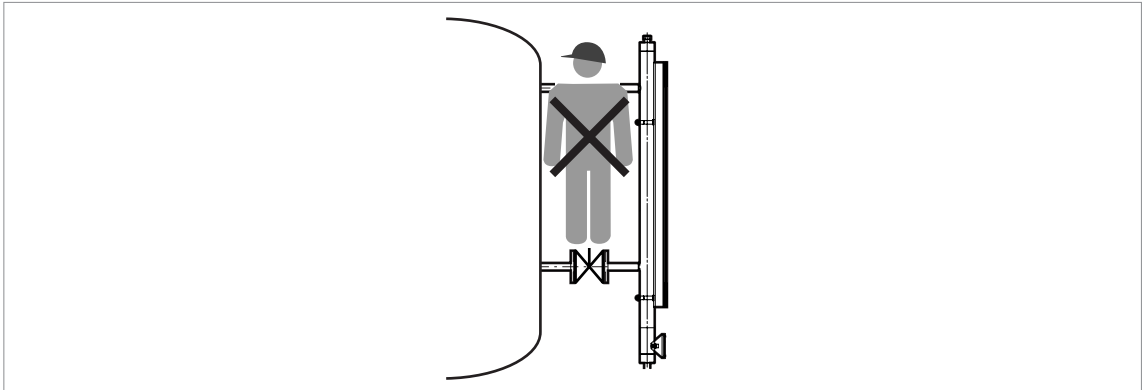


Figure 3-6: Stay away from the process connections



WARNING!

Stay away from the process connections. If you stand on the process connections, you can cause damage to the device and the installation.



DANGER!

Make sure that the outer surface temperature of the device is not more than 60°C / 140°F. If the surface temperature is more than 60°C / 140°F, use the device with precautions that agree with Health and Safety rules and regulations.



WARNING!

Pressure Equipment Directive 97/23/EC data

- *The process connections must be attached correctly to prevent mechanical stress. The axis of the process connection must be parallel to and centred with the axis of the tank's process connections. Tighten the process connections in agreement with the design code.*
- *The user must take necessary steps to protect the installed device from shock waves (water hammer). A pressure limiting valve must protect the installation.*
- *The effective pressure of the installation (the maximum permitted by the pressure limiting valve) must never be greater than the maximum permitted pressure, P_s , marked on the device nameplate.*
- *Make sure that the parts in contact with the fluid are compatible with the fluid and conform to the ageing characteristics of the measurement environment and the fluid used. These have either been recommended in the instructions or form the subject of a particular specification in the contract.*
- *The external pressure, P_{ext} , must be equal to atmospheric pressure, P_{atmos} ($P_{ext} = P_{atmos}$).*
- *If stainless steel devices are more than 6 m / 20 ft high, we recommend more anchoring points.*



CAUTION!

Before you fill the tank, make sure that the column of rotating flaps is set to zero (the flaps are all black). If not, the device may incorrectly indicate the level.

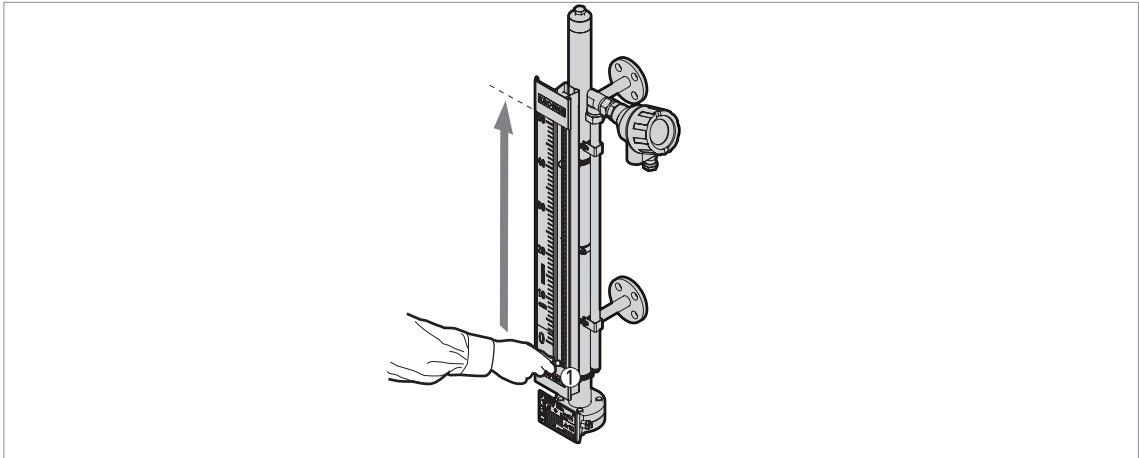


Figure 3-7: Set the indicator column to zero

- ① Magnet - point the red end of the magnet at the glass tube

Equipment needed:

- Magnet (supplied with the device)



How to make sure the column of rotating flaps is set to zero

- Hold the magnet in front of the glass tube at the bottom of the indicator column.
- ➡ Make sure the red end of the magnet points at the glass tube.
- Move the magnet slowly up to the top the glass tube.
- ➡ The flaps all turn to black. The indicator column is set to zero. You can now fill the tank.

3.5 Level indicator column

The level indicator column is attached to the measuring chamber before delivery. Customer order data is used to calibrate its position. No other adjustment is necessary.



CAUTION!

Customer order data is used to calibrate the device. If liquid density changes, the device will not measure correctly. Please contact our nearest sales office for advice.

3.6 Optional analog transmitter

The analog transmitter is attached to the measuring chamber before delivery. Customer order data is used to calibrate its position. No other adjustment is necessary.



WARNING!

Too much heat can cause damage to the analog transmitter. If the process temperature is more than 120°C / 250°F, put insulation between the bypass chamber and the analog transmitter. If the process temperature is more than 150°C / 300°F, do not cover any part of the analog transmitter.

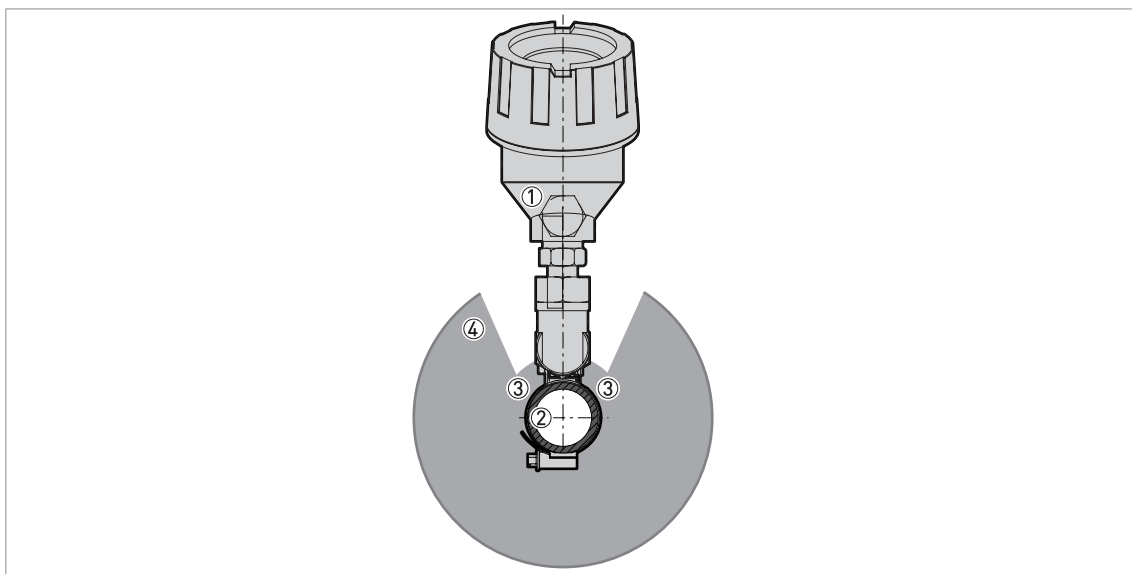


Figure 3-8: Analog transmitter and insulation for the bypass chamber

- ① Analog transmitter
- ② Bypass chamber (cross-section)
- ③ If temperature is more 120°C / 250°F, put insulation between the bypass chamber and the analog transmitter
- ④ Insulation (cross-section). If temperature is more 150°C / 300°F, do not cover any part of the analog transmitter with insulation.



CAUTION!

Do not move the analog transmitter. If you adjust the position of this device, the current output will be incorrect.



CAUTION!

Customer order data is used to calibrate the device. If liquid density changes, the device will not measure correctly. Please contact our nearest sales office for advice.

3.7 Optional limit switch



INFORMATION!

The level switches are not attached to the device before delivery. Remove the switches from the packing and obey the instructions that follow.



WARNING!

Too much heat can cause damage to the limit switch. If you put insulation around the bypass level indicator, do not cover the limit switch housing. Make sure that there is approximately 15 mm / 0.6" of empty space between the limit switch and the insulation.

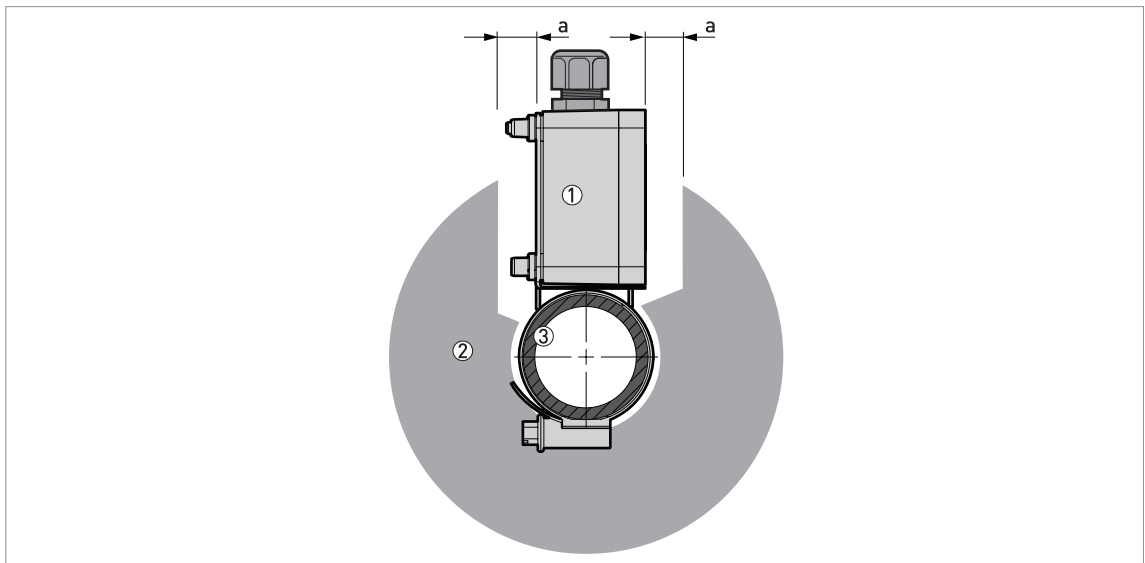


Figure 3-9: Limit switches and insulation for the measuring chamber

① Limit switch housing

② Insulation around the measuring chamber (cross-section)

③ Measuring chamber (cross-section)

Empty space between the limit switch and the insulation for the measuring chamber, $a \geq 15 \text{ mm} / 0.6''$.



CAUTION!

If liquid density changes, the switch will not detect level correctly. Recalculate the position of the switch according to the true liquid density and repeat the installation procedure that follows.



CAUTION!

The switching point of the switch when the level increases is not in the same as the switching point of the switch when the level decreases. Does the limit switch have to be open when the float is above (for HIGH limit switches) or below (for LOW limit switches) the switching point? For more data, refer to **Definition of switching point offset**.



WARNING!

If you put insulation around the bypass level indicator, do not cover the limit switch housing. Too much heat can cause damage to the limit switch.

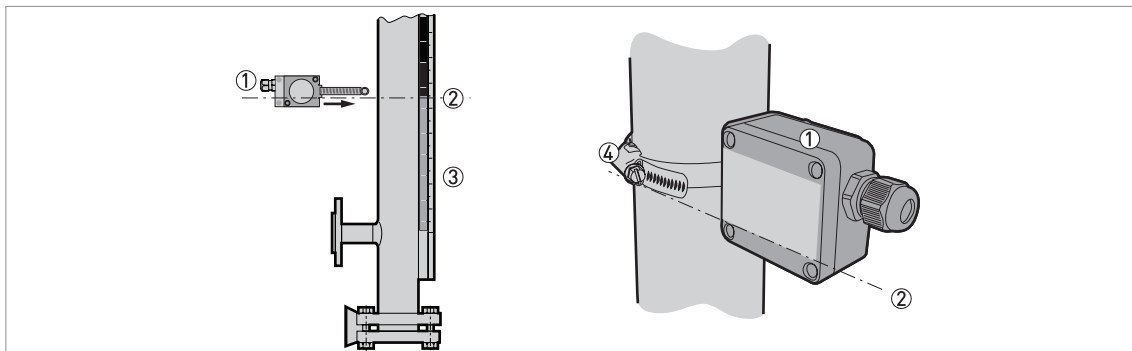


Figure 3-10: How to attach a limit switch

- ① Limit switch
- ② Switching point centreline
- ③ Level indicator and optional measuring scale
- ④ Limit switch clamp

Equipment needed:

- Large slotted tip screwdriver (not supplied)



Installation procedure

- Use the clamp to attach the limit switch to the measuring chamber. Do not tighten the clamp.
 - The cable gland must be at the bottom of the housing.
- Move the limit switch until the switching point centreline is at the level required. Refer to the level indicator scale to help you position the limit switch.
 - If the indicator column does not have the scale option, it will be necessary to calculate the vertical offset of the float magnet in relation to the level of the liquid (depends on the liquid density). Adjust the switch position for the float magnet offset. For the vertical offset tables, refer to the appendix in the Handbook.
- Adjust the switch position for the switching point offset.
 - If the limit switch is set to **LOW limit** (the switch is **open** when the float is below the switching point), move the switch up a small distance to adjust for the offset. If the limit switch is set to **HIGH limit** (the switch is **open** when the float is above the switching point), move the switch down a small distance to adjust for the offset. For more data, refer to **Definition of switching point offset** and **Switching point offset values**.
- Tighten the limit switch clamp.



WARNING!

Make sure the cable gland is on the bottom the housing and is tight to stop liquid entering the housing.



INFORMATION!

Liquid level offset

For a description of the liquid level offset, refer to Liquid level offset: description on page 79. For the graphs and other correction data, refer to Liquid level offset: correction data on page 80.

Definition of switching point offset

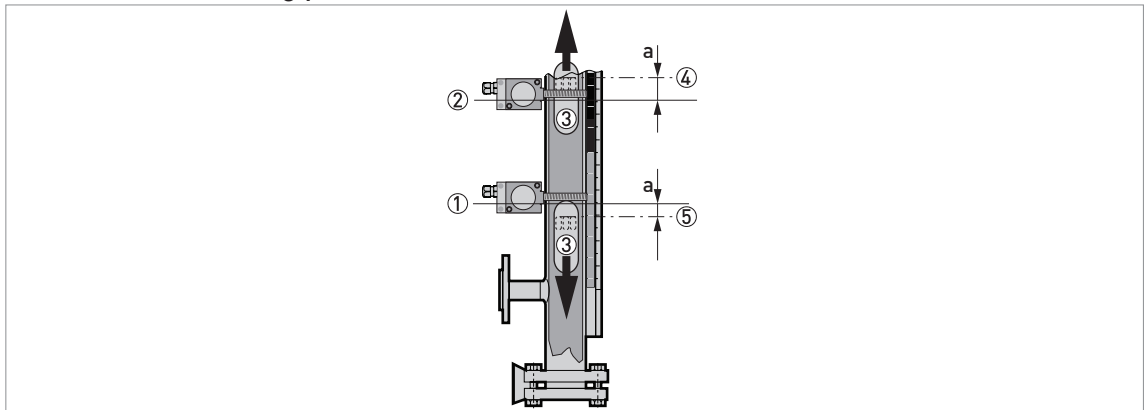


Figure 3-11: Switching point offset

- ① Zero point of the limit switch
- ② Zero point of the limit switch
- ③ Float and float magnet (switching point is in relation to the top of the magnet)
- ④ True switching point above a limit switch (the switch is open when the liquid level goes above this point - a **HIGH limit** switch)
- ⑤ True switching point below the limit switch (the switch is open when the liquid level goes below this point - a **LOW limit** switch)

Switching point offset values

Conditions	Switching point offset, a	
	mm	inches
When the switch must be open above the switching point (a HIGH limit switch), move the switch below the switching point:	15	0.6
When the switch must be open below the switching point (a LOW limit switch), move the switch above the switching point:	0	0



Installation of a limit switch for float failure detection

- Make sure the measuring chamber is empty and the float is in the chamber.
- Attach a limit switch to the bottom of the measuring chamber. Do not tighten the clamp.
- Connect the limit switch to the electrical circuit. Make sure that it is set to **LOW limit**. For more data, refer to *Optional limit switches* on page 29.
- Energize the electrical circuit.
- Lift the limit switch up the measuring chamber until the limit switch status changes to **open**.
- Hold the limit switch tightly in this position and tighten the clamp.
- ➡ The limit switch is in the correct position.



INFORMATION!

The float will go to the bottom of the measuring chamber for the reasons that follow:

- *damaged or corroded float (float failure),*
- *liquid density that does not correspond to the specifications received with the order and*
- *draining the measuring chamber*

For more data, refer to **Errors** on page 37.

3.8 Electromagnetic compatibility

The design of the device agrees with European Standard EN 61326-1 and Immunity and Emissions requirements for industrial environments.

4.1 Optional analog transmitter



- Remove the terminal compartment cover.
- Connect the device to the electrical circuit. Obey the national electrical codes.

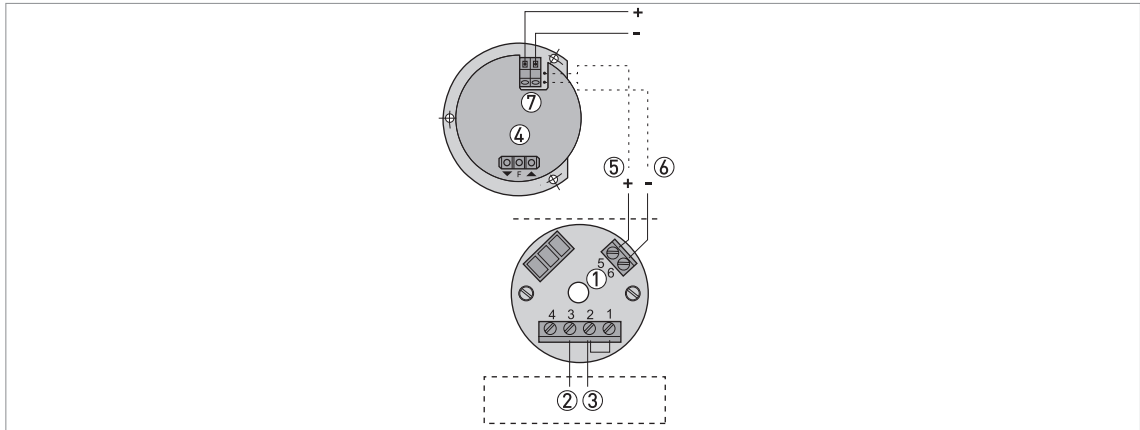


Figure 4-1: Electrical schematic for the 4...20 mA output module

- ① Power supply terminals
- ② Internal wiring - brown wire
- ③ Internal wiring - red wire
- ④ Optional LCD indicator
- ⑤ Power supply (+) - if optional LCD connected - red wire
- ⑥ Power supply (-) - if optional LCD connected - black wire
- ⑦ LCD power supply terminal (10...35 VDC)

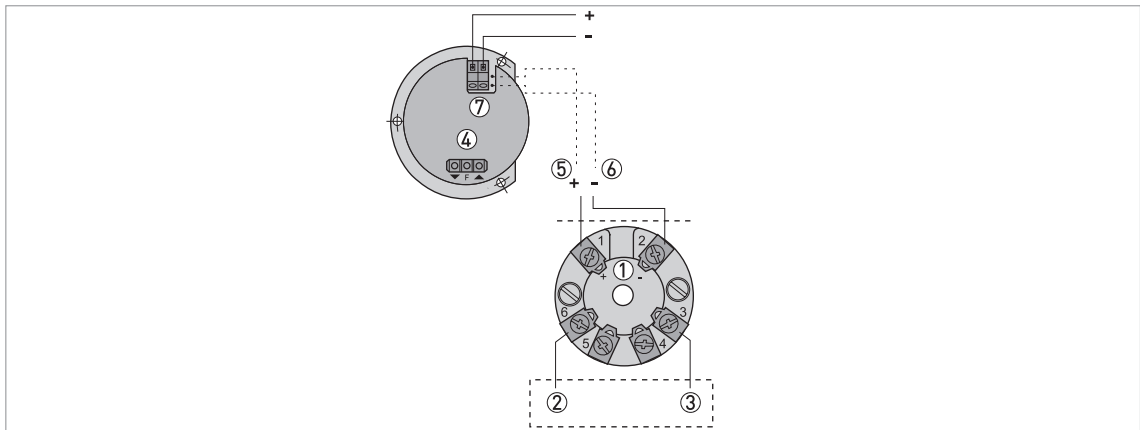


Figure 4-2: Electrical schematic for the 4...20 mA + HART output module

- ① Power supply terminals
- ② Internal wiring - brown wire
- ③ Internal wiring - red wire
- ④ Optional LCD indicator
- ⑤ Power supply (+) - if optional LCD connected - red wire
- ⑥ Power supply (-) - if optional LCD connected - black wire
- ⑦ LCD power supply terminal (10...35 VDC)

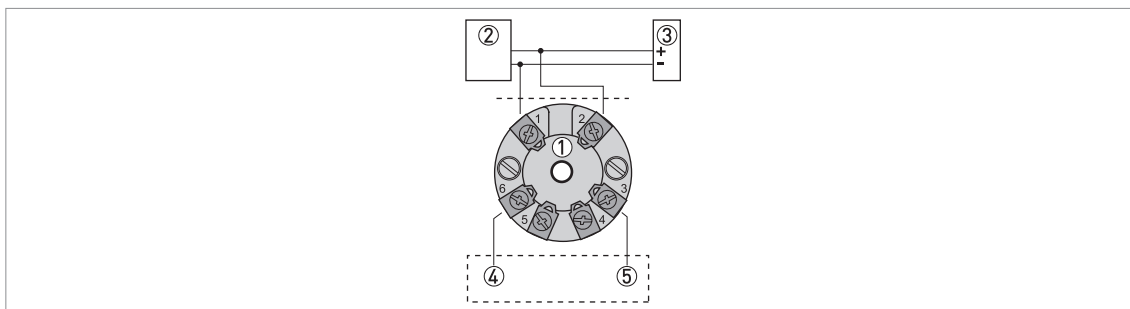


Figure 4-3: Electrical schematic for the FOUNDATION™ Fieldbus / PROFIBUS PA module

- ① Bus connection terminals
- ② Segment coupler
- ③ Bus termination
- ④ Internal wiring - orange wire
- ⑤ Internal wiring - brown wire

For more electrical data, refer to *Technical data: optional analog transmitter* on page 51.

4.2 Optional limit switches

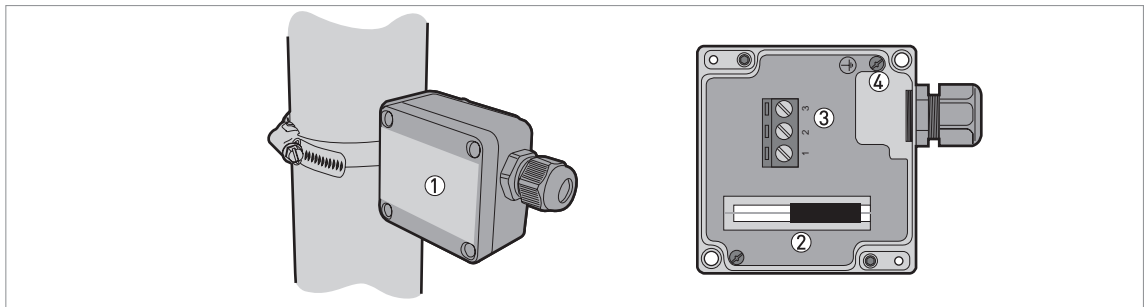


Figure 4-4: Terminal compartment

- ① Terminal compartment cover
- ② Bistable reed switch
- ③ Output terminal



- Remove the terminal compartment cover.
- Connect the device to the electrical circuit. Obey the national electrical codes.



WARNING!

If the switch is set to **LOW limit**, make sure that switch is **open** when the float is below the switch position.

If the switch is set to **HIGH limit**, make sure that switch is **open** when the float is above the switch position.

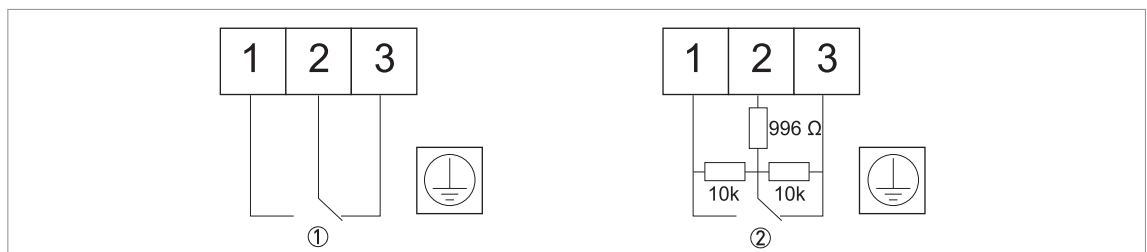


Figure 4-5: Electrical schema

- ① Non-NAMUR version
- ② NAMUR version

For more electrical data, refer to *Technical data: optional limit switches* on page 56.

4.3 Protection category

For the IP categories of the accessories for the device, refer to the table that follows:

Protection categories according to EN 60529

Equipment housing	IP category
-------------------	-------------

Analog transmitter

Non-Ex / Ex i (without indicator)	54
Non-Ex / Ex i (with indicator)	66

Limit switches

Non-Ex / Ex i	66
---------------	----



DANGER!

Make sure the cable gland is watertight.

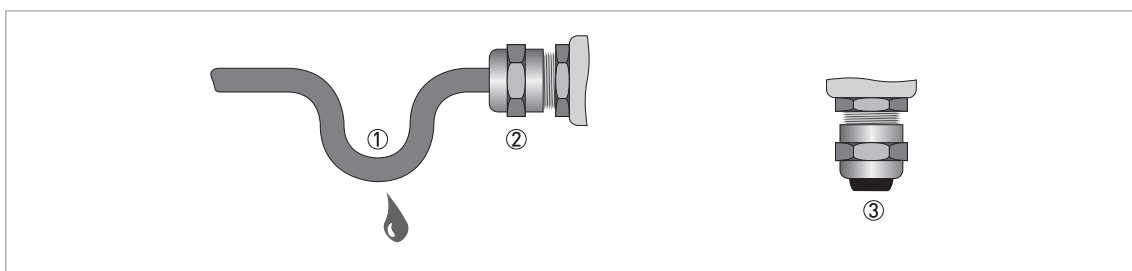


Figure 4-6: Protection category



How to make sure that the electrical installation agrees with the protection category

- 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 cannot enter the housing.
- Tighten the cable glands ②.
- Close unused cable glands with dummy plugs ③.

5.1 Start-up checklist

Check these points before you use the device:

- Are all the wetted components (chamber, flanges and gaskets) resistant to the product in the tank?
- Does the information on the nameplate agree with the operating data?
- Did you correctly install the device on the tank?
- Do the electrical connections agree with the national electrical codes?



DANGER!

Make sure that the device and the installation agrees with the requirements of the Ex certificate of compliance.



Start-up procedure

- Attach the drainage plugs or close the drainage cock.
- Slowly open the shut-off valves on the top and bottom process connections.



WARNING!

Risk of damage to the device from shock waves. Open the valves slowly to prevent damage from water hammer. Use a pressure-limiting valve to prevent damage to the installation.



WARNING!

The device must have regular servicing to agree with rules and regulations of the site it is installed on.



WARNING!

High-temperature versions: risk of burns. Do not go too near to the device.

5.2 Operating concept

You can read measurements in several ways:

- Level is indicated by a column of rotating flaps.
- Level is detected by optional limit switches installed at important points adjacent to the measuring chamber.
- Level is monitored remotely by an optional analog transmitter (2-wire, reed-chain) adjacent to the measuring chamber. There is a large choice of outputs (4...20 mA, 4...20 mA + HART, FF and PROFIBUS PA). An LCD indicator option is also available for this transmitter.



CAUTION!

Customer order data is used to calibrate the device. If liquid density changes, the device will not measure correctly. For more data, refer to Error handling on page 38.

6.1 Local display options

6.1.1 Level indicator column

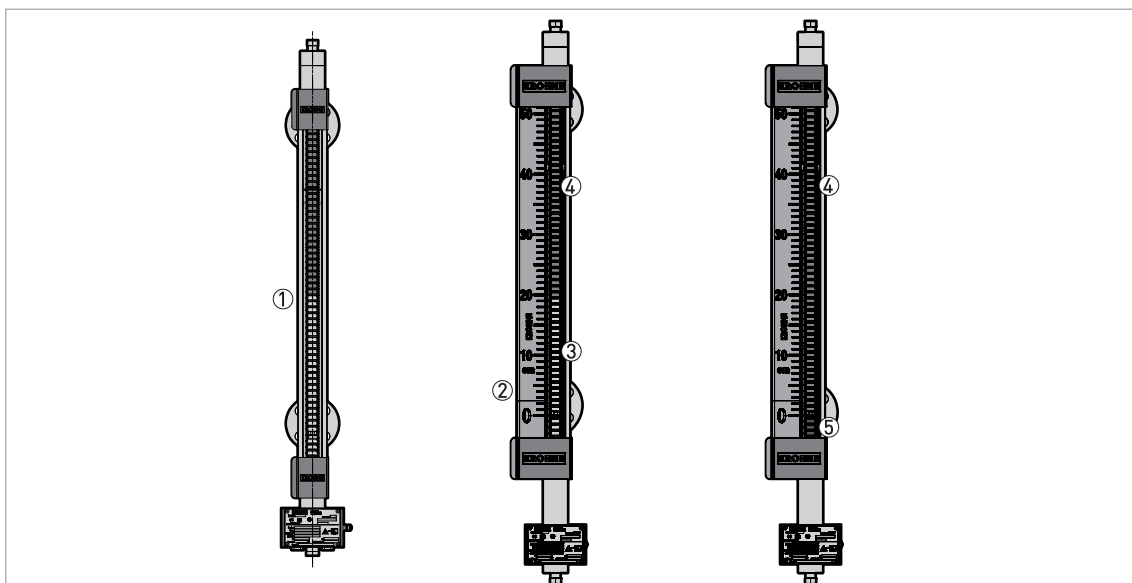


Figure 6-1: Display of data on an indicator column

- ① Standard level indicator without a measuring scale
- ② Optional measuring scale in m/cm, ft/in or m³
- ③ Yellow flaps: level of the liquid in the tank
- ④ Black flaps: empty volume
- ⑤ Red flaps: float failure



WARNING!

If the red flaps are shown, either:

- *the float sunk to the bottom of the measuring chamber,*
- *the measuring chamber has been completely drained or*
- *the product density is less than the value given in the order.*

Contact your nearest sales office for advice.

6.1.2 Analog transmitter (option)

General notes

The analog transmitter has transmitter modules for analog and digital outputs. The user can do the configuration of 4...20 mA + HART®, FOUNDATION™ Fieldbus and PROFIBUS PA® modules. Use the web links in the table that follows to download the software and device description files.

Configuration data for transmitter modules

Transmitter	Manufacturer	User configuration Yes / No?	Software	Device description files
4...20 mA	INOR	No	-	-
4...20 mA + HART®	PR	Yes	PReset ①	"PRetop 5335" HART DD, AMS and DTM files ①
FOUNDATION™ Fieldbus	PR	Yes	PReset ①	"5350" DD files ①
PROFIBUS PA®	PR	Yes	PReset ①	"5350" GSD files ①

① Go to the PR electronics website: www.prelectronics.com (Download Center > Software)

For more data about the configuration of the 4...20 mA + HART®, FOUNDATION™ Fieldbus and PROFIBUS PA® modules, you can download technical documents from the PR electronics website: www.prelectronics.com (Download Center > Manuals - Data Sheets - Certificates).

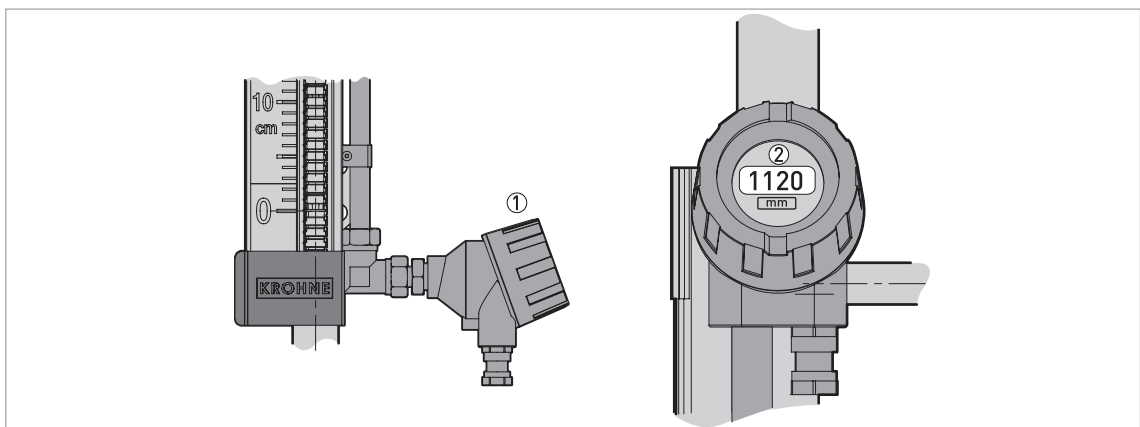


Figure 6-2: Analog transmitter with the optional indicator

- ① Non-Ex and Ex i converter housing option
- ② 4-digit indicator (LCD)

The indications on the LCD are in millimetres by default, but inches and % can also be selected. The configuration of the indicator is given in the procedures that follow:



WARNING!

Do not open the housing and configure the indicator in a hazardous area.

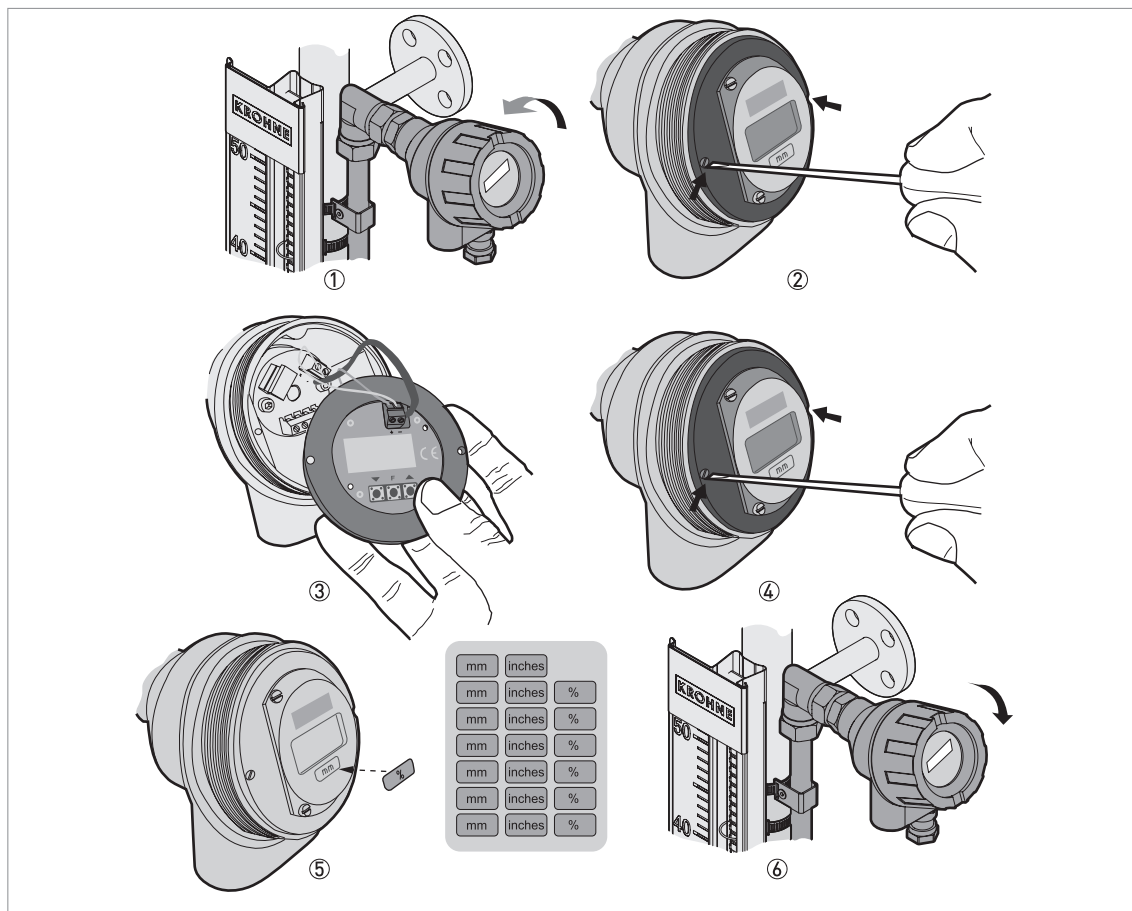


Figure 6-3: Get access to the keypad on the indicator board

Equipment needed

- Sheet of stickers with measurement units (mm, inches and %)
- Small slotted tip screwdriver (not supplied)



Get access to the keypad on the indicator board

- ① Remove the transmitter housing cover.
- ② Remove the screws that hold the indicator board on the housing.
- ③ Turn the indicator board to use the 3-button keypad ([▼], [F] and [▲]) on the back of the board to change the units. Refer to the tables that follow for key functions and the example procedure for configuration of the indicator.
- ④ Attach the indicator board to the housing.
- ⑤ Put the sticker with the correct measurement unit over the default units under the indicator screen.
- ⑥ Attach the transmitter housing cover.

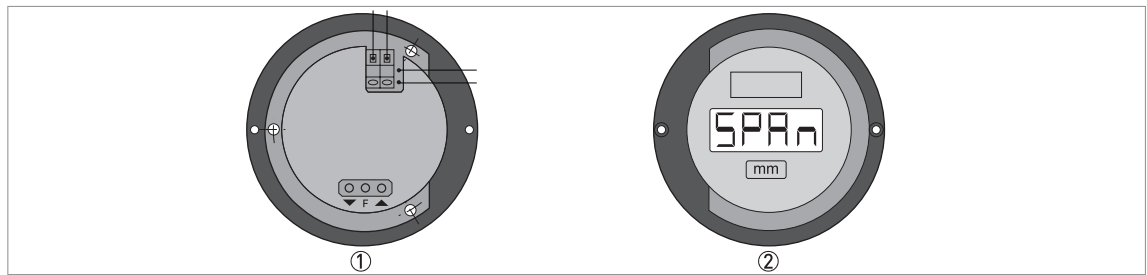


Figure 6-4: Back and front view of the indicator

- ① Back of the indicator board (3-button keypad at the bottom)
 ② Front of the indicator board (span range menu in program mode shown)

Key functions

Key	Menu level	Function level
[F] (3 seconds)	Access to program mode	-
[F] (1 second)	Access to the function.	Confirm the new parameter and go back to the menu.
[▼] (down)	Move down the list of functions	Select parameter / decrease the value of the parameter. Push [▼] intermittently to decrease the value in increments of 0.1. Push [▼] continuously to decrease the value in increments of 1.
[▲] (up)	Move up the list of functions	Select parameter / increase the value of the parameter. Push [▲] intermittently to increase the value in increments of 0.1. Push [▲] continuously to increase the value in increments of 1.
[▼] + [▲]	Escape - go back to the indication	Escape - go back to the menu ①

- ① This does not confirm that you selected a new parameter

Menu overview

Function	Function description	Range/Selection list	Default
Decimal Point (dP)	Push [\blacktriangle] or [\blacktriangledown] to select the decimal point position. Push [F] to confirm.	0...3	1
Zero point (ZEro)	Push [\blacktriangle] or [\blacktriangledown] to select the minimum value. Push [F] to confirm.	-1999...+9999	0.0
Span range (SPAn)	Push [\blacktriangle] or [\blacktriangledown] to select the maximum value. Push [F] to confirm.	-1999...+9999	100.0
Input current limit (Li)	Do not use.	n/a	0
Filter (FiLt)	Do not use.	n/a	2
Resolution (riS)	Do not use.	n/a	1



Example procedure: Change the indicator units from mm to %

- Push [F] for 3 seconds (button on the back of the indicator board) to access **Program mode**.
- ➡ In program mode **dP** is displayed.
- Push [\blacktriangle] 1 time to get to the zero point (**ZEro**) function.
- Push [F] to access the span range parameter. Make sure that the value is 0.0. Push [\blacktriangledown] + [\blacktriangle] (Escape) to go back to the menu.
- Push [\blacktriangle] 1 time to get to the span range (**SPAn**) function.
- Push [F] to access the span range parameter.
- ➡ The current value is 600 (example value).
- Push [\blacktriangledown] to decrease the value to 100.
- Push [F] to confirm the parameter and go back to the menu.
- Push [\blacktriangledown] + [\blacktriangle] (Escape) to go back to the indication.
- ➡ The indication will display a value between 0 and 100 based on a current output of 4...20 mA.
- Put a new sticker (%) on the front of the indicator board.

6.2 Errors

6.2.1 Error indication

Indicator column

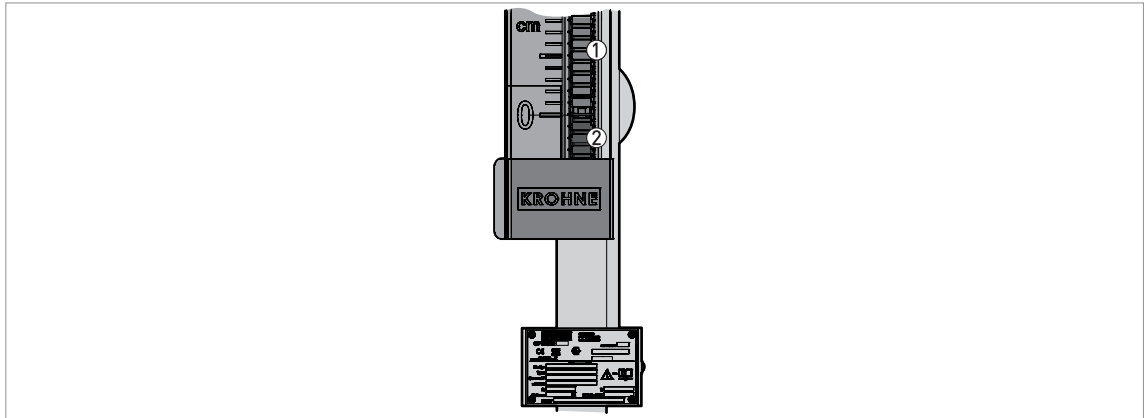


Figure 6-5: Error displayed on the indicator column

- ① Indicator column (rotating flaps)
- ② Red flaps: float failure

Analog transmitter

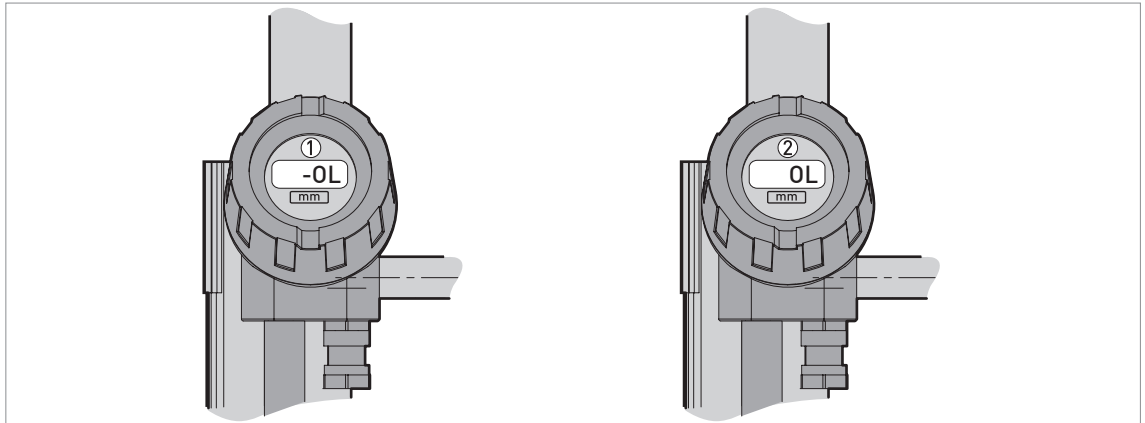


Figure 6-6: Error displayed on the optional LCD indicator for the analog transmitter

- ① Error message if current output is $< 3.6 \text{ mA}$
- ② Error message if current output is $> 22 \text{ mA}$

Limit switches

Limit switches can be used to indicate error conditions (Float failure, level detection etc.). For more data, refer to *Optional limit switch* on page 23.

6.2.2 Error handling

Error	Description	Corrective action
-------	-------------	-------------------

Indicator column

Float failure	The red flaps at the bottom of the indicator column are shown. The float has sunk to the bottom of the measuring chamber.	Make sure the measuring chamber has not been completely drained. Make sure the true density of the liquid corresponds to the value given in the order data. Contact your local sales office to make sure that the float is for the correct density range. If the float is damaged or corroded, it is necessary to replace the float. Order a new float from your local sales office. Isolate the measuring chamber and drain the liquid. Remove the bottom plate flange and the float. If your device is a basic version, you will only be able to remove the float if it has the 1¼ NPT connection at the bottom of the measuring chamber
The level of the liquid is at or above the maximum level, but the indicator column does not indicate that level has reached its maximum limit yet.	The density of the liquid is lower than the value given in the customer order data. The float is too low in the liquid.	Make sure that the density of the liquid is stable. Contact your local sales office for advice.
The indicator column indicates that the liquid is at or below the minimum level, but the level of the liquid is still above the minimum limit.	The density of the liquid is lower than the value given in the customer order data. The float is immersed more than it should be.	Make sure that the density of the liquid is stable. Contact your local sales office for advice.
The level of the liquid is below the maximum level, but the indicator column indicates that level has already reached its maximum limit.	The density of the liquid is higher than the value given in the customer order data. The float is not sufficiently immersed.	Make sure that the density of the liquid is stable. Contact your local sales office for advice.
The indicator column is not yet at the minimum level, but the level of the liquid is at or below the minimum limit.	The density of the liquid is higher than the value given in the customer order data. The float is immersed more than it should be.	Make sure that the density of the liquid is stable. Contact your local sales office for advice.

Error	Description	Corrective action
-------	-------------	-------------------

Analog transmitter

Optional LCD indicator status: OL	Current output is more than 22 mA (more than 20 mA, if this option is selected in the indicator). Overfill. The level of the liquid is above the maximum limit (if the indicator is configured for level indication).	Lower the level of liquid below the maximum limit.
	Current output is more than 22 mA (more than 20 mA, if this option is selected in the indicator). The analog transmitter has been moved. A value more than 20 mA no longer represents the maximum limit.	Contact your local sales office for advice.
	Current output is more than 22 mA (more than 20 mA, if this option is selected in the indicator). The analog transmitter is defective. A value more than 20 mA no longer represents the maximum limit.	Contact your local sales office for advice.
Optional LCD indicator status: -OL	Current output is less than 3.6 mA (less than 4 mA, if this option is selected in the indicator). The level of the liquid is below the minimum limit (if the indicator is configured for level indication).	Increase the level of liquid until it is above the minimum limit.
	Current output is less than 3.6 mA (less than 4 mA, if this option is selected in the indicator). The analog transmitter has been moved. A value less than 4 mA no longer represents the minimum limit.	Contact your local sales office for advice.
	Current output is less than 3.6 mA (less than 4 mA, if this option is selected in the indicator). The analog transmitter is defective. A value less than 4 mA no longer represents the minimum limit.	Contact your local sales office for advice.
The level of the liquid is at or above the maximum level, but the analog transmitter output does not indicate that level has reached its maximum limit yet.	The density of the liquid is lower than the value given in the customer order data. The float is too low in the liquid.	Make sure that the density of the liquid is stable. Contact your local sales office for advice.
The analog transmitter output indicates that the liquid is at or below the minimum level, but the level of the liquid is still above the minimum limit.	The density of the liquid is lower than the value given in the customer order data. The float is too low in the liquid.	Make sure that the density of the liquid is stable. Contact your local sales office for advice.
The level of the liquid is below the maximum level, but the analog transmitter output indicates that level has already reached its maximum limit.	The density of the liquid is higher than the value given in the customer order data. The float is too high in the liquid.	Make sure that the density of the liquid is stable. Contact your local sales office for advice.
The analog transmitter output is not yet at the minimum level, but the level of the liquid is at or below the minimum limit.	The density of the liquid is higher than the value given in the customer order data. The float is too high in the liquid.	Make sure that the density of the liquid is stable. Contact your local sales office for advice.

Error	Description	Corrective action
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Limit switch

The limit switch is in high-high (maximum) position and set to HIGH limit . Status OPEN .	Overfill? The level of the liquid is at or above the maximum limit (if the indicator is configured for level indication).	Lower the level of liquid below the maximum limit.
The limit switch is in low-low (minimum) position and set to LOW limit . Status OPEN .	Tank empty? The level of the liquid is at or below the minimum limit (if the indicator is configured for level indication).	Increase the level of liquid until it is above the minimum limit.
The limit switch is in the float failure position and set to LOW limit . Status OPEN .	Float failure. The float has sunk to the bottom of the measuring chamber.	It is necessary to replace the float. Order a new float from your local sales office. Isolate the measuring chamber and drain the liquid. Remove the bottom plate flange and the float. If your device is a basic version, you will only be able to remove the float if it has the 1¼ NPT connection at the bottom of the measuring chamber.
The level switch does not detect the minimum limit correctly.	The limit switch (set to LOW limit) is open (off), but the level of the liquid is still above the minimum limit. The density of the liquid is lower than the value given in the customer order data.	Make sure that the density of the liquid is stable. Recalculate the liquid density and repeat the installation procedure for the limit switch.
	The limit switch (set to LOW limit) is not yet open (off), but the level of the liquid is at or below the minimum limit. The density of the liquid is higher than the value given in the customer order data.	
The level switch does not detect the maximum limit correctly.	The level of the liquid is at or above the maximum level, but the limit switch (set to HIGH limit) is not yet open (off). The density of the liquid is lower than the value given in the customer order data.	
	The level of the liquid is below the maximum level, but the limit switch (set to HIGH limit) is open (off). The density of the liquid is higher than the value given in the customer order data.	

7.1 Periodic maintenance

This device does not normally need maintenance. If the liquid is contaminated or build-up of deposits is possible, we recommend that you flush the device regularly.



WARNING!

Pressure Equipment Directive 97/23/EC data

The device must be regularly serviced to conform to the rules and regulations applicable to the site that it is installed on.



WARNING!

Follow accident prevention regulations carefully when working with pressurized tanks and dangerous chemical products.



How to flush the device

- Open the drain plug or drain valve.
- Flush the chamber.



WARNING!

If you remove the float, close the shut-off valves.



Float removal procedure (not for basic version without 1¼" plug)

- Close the shut-off valves.
- Remove the bottom process connection counter-flange or plug.
- Remove and clean the float.

7.2 Keep the device clean



DANGER!

If you rub the anti-freeze cover option with a dry cloth, there is a risk of electrostatic discharge. Clean the anti-freeze cover option only with a damp cloth.

7.3 How to replace device components

7.3.1 Service warranty

Maintenance is not necessary for most applications.

Servicing by the customer is limited by warranty to

- The removal and installation of switches. For more data, refer to **Optional limit switch** on page 23.
- The removal and installation of the float. For more data, refer to **Remove all packing before installation** on page 16.

The indicator column and switches can be removed under process conditions.

Use only KROHNE-authorized service staff to repair the device.

7.4 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.



INFORMATION!

For more precise information, please contact your local sales office.

7.4.1 General notes

We supply spare parts and accessories for this device. When you order a spare part or accessory, please give the reference numbers that follow:

7.4.2 List of spare parts

For the measuring chamber:

- Floats

Float designation	Product density		Part number
	[kg/l]	[lb/ft³]	

Basic version

Float 1	0.8...1.19	49.9...74.3	F3187980500
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Advanced version

Float 1	0.58...0.7	36.2...43.7	F3187981900
Float 2	0.7...0.99	43.7...61.8	F3187981600
Float 3	0.99...2	61.8...124.8	F3187980900

For the analog transmitter:

- Transmitter modules. For more data, refer to *Order code* on page 84.



INFORMATION!

Supply this data when you order spare parts:

- *Device serial number*
- *Manufacturer's order number*
- *Floats only: Float material (on the float data sticker at the bottom of the indicator column)*
- *Floats only: Maximum allowable pressure, P_s and test pressure, P_t (on the float data sticker)*

7.4.3 List of accessories

For the measuring chamber:

- Limit switch, non-NAMUR
- Limit switch, NAMUR



INFORMATION!

For more data on the limit switches, refer to Technical data: optional limit switches on page 56.

For the 2-wire, loop-powered analog transmitter:

- AS 24 power supply unit 24 VDC / 230 VAC
- AS 24 power supply unit 24 VDC / 110 VAC
- PROF SI 24075 intrinsically-safe power supply unit (with galvanic separation)
- C 95 Basic universal power supply (Panel mount, 2 relays, 4-digit local indicator and non-Ex)
- C 95 Basic universal power supply (Panel mount, 2 relays, 4...20 mA output, 4-digit local indicator and non-Ex)



INFORMATION!

For more data on the C 95 power supply, refer to the technical datasheet in our download centre.

7.5 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.



INFORMATION!

For more precise information, please contact your local sales office.

7.6 Returning the device to the manufacturer

7.6.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.



CAUTION!

Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of our personnel, manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*



CAUTION!

If the device has been operated with toxic, caustic, flammable or water-endangering products, you are kindly requested:

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that is safe to handle and stating the product used.*

7.6.2 Form (for copying) to accompany a returned device

Company:		Address:	
Department:		Name:	
Tel. No.:		Fax No.:	
The meter enclosed, type:			
Manufacturer's Order or Serial No.:			
has been operated with the following liquid:			
Because this liquid is:	hazardous to water		
	toxic		
	caustic		
	flammable		
	We have checked that all cavities in the unit are free from such substances.		
	We have flushed out and neutralized all cavities in the unit.		
We herewith confirm that in returning this unit there is no risk to man or environment through any residual liquid contained in it.			
Date:		Company stamp:	
Signature:			

7.7 Disposal

**CAUTION!**

Disposal must be carried out in accordance with legislation applicable in your country.

8.1 Measuring principle

The device operates on the principle of communicating tubes. The measuring chamber is connected adjacent to the tank. The process conditions in the measuring chamber are the same as those of the tank.

A float is in the measuring chamber. The float contains magnets that rotate the flaps in the indicator column and operate the optional limit switches and analog transmitter on the side of the measuring chamber. The position of the magnets does not correspond to the level of liquid so the scale is offset at the factory to take into account this difference. The offset of the magnets depends on the liquid density. Refer to the illustration that follows:

Magnet offset

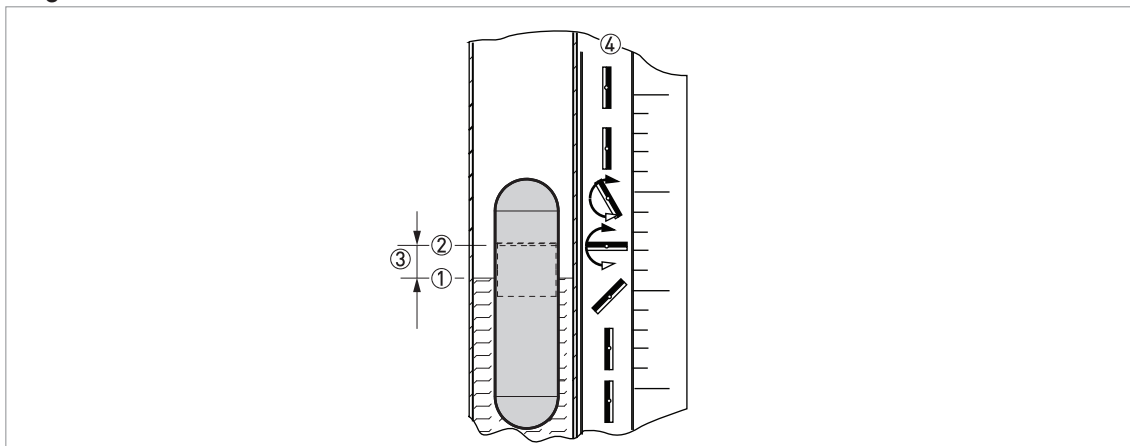


Figure 8-1: Magnet offset

- ① True level of the liquid
- ② Top of the float magnet (which corresponds to the level shown on the indicator column)
- ③ Difference (offset) between the true level of the liquid and the top of the float magnet (depends on the liquid density)
- ④ Indicator column of yellow/black rotating flaps (with the optional scale)

8.2 Technical data: general information



INFORMATION!

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Download Center).

	Basic	Advanced
--	-------	----------

Measuring system

Measuring principle	Bypass level indicator (principle of communicating tubes). A float in the measuring chamber (Ø42 mm / 1.7") is magnetically-coupled to a mechanical level indicator.	
Application range	Level indication of liquids for low-pressure applications and in storage tanks	Level indication of liquids in applications up to 40 barg / 580 psig
Measured value		
Primary measured value	Level of the float magnets in the measuring chamber	
Secondary measured value	Level and volume of the liquid in the measuring chamber	

Design

Options and variants		
Variants	Lateral / lateral process connections	
	Axial / axial process connections	
	Top lateral / bottom axial process connections	
	Top axial / bottom lateral process connections	
Options	Support bracket (a wall support for long bypass level indicators)	
	Analog transmitter without display (converter with 4...20 mA, 4...20 mA + HART®, PROFIBUS PA or FF output module mounted at the top or bottom of the reed chain) ①	
	Analog transmitter with display (4...20 mA or 4...20 mA + HART® converter mounted at the top or bottom of the reed chain)	
	1¼" threaded cover (for installation/ removal of the float)	-
	Anti-freeze cover for glass indicator tube (when the ambient temperature is -40...-20°C / -40...-4°F)	
	-	OPTIFLEX 1300 C with Ø2 mm single cable probe (if ½ BSPP top axial connection is selected)
	-	OPTIFLEX 1300 C (if DN40 PN40 top axial connection is selected)
	-	OPTIWAVE 7300 C (if welded antenna or DN40 PN40 top axial connection is selected)
Accessories	Bistable limit switches (NAMUR or non-NAMUR)	
Measuring range (ML)	0.3...5.3 m / 1...17.4 ft	0.3...5.3 m / 1...17.4 ft (longer on request)

	Basic	Advanced
Display and user interface		
Display	Indicator column with magnetically-coupled yellow/black rotating flaps; no indicator column	
Float failure indication	Red/black rotating flaps at the bottom of the indicator column	
Scale marking options	No scale; m + cm; ft + inches; %	

Measuring accuracy

Accuracy	±10 mm / 0.4"
Repeatability	±10 mm / 0.4" (when density is constant)
Maximum rate of change	2 m/minute / 6.5 ft/minute

Operating conditions

Temperature		
Process	-40...+150°C / -40...+300°F (Ex: see supplementary instructions or approval certificates)	-40...+300°C / -40...+570°F (Ex: see supplementary instructions or approval certificates)
Ambient temperature	-40...+80°C / -40...+176°F (Ex: see supplementary instructions or approval certificates)	
Storage temperature	-50...+80°C / -58...+176°F	
Pressure		
Max. allowable operating pressure	16 barg / 232 psig (according to the length of the measuring chamber. Also refer to <i>Guidelines for maximum operating pressure</i> on page 76.)	40 barg / 580 psig (according to the flange pressure rating. Also refer to <i>Guidelines for maximum operating pressure</i> on page 76.)
Chemical properties		
Density	0.8...1.19 kg/l / 49.9...68.7 lb/ft³	0.58...2 kg/l / 36.2...124.8 lb/ft³
Viscosity	≤ 5000 mPas / ≤ 3.360 lb/ft³	
Other conditions		
Ingress protection	IP 68	

Installation conditions

Recommendations	Mount vertically on the side of tanks	
	Fit isolation valves on process connections to permit maintenance of the bypass chamber (optional)	
Dimensions and weights	Refer to "Technical data: Dimensions and weights"	

Materials

Chamber	Standard: Stainless steel (1.4404 / 316L)	
	-	Option: Hastelloy® C-276 ②
Float	Standard: Stainless steel (1.4404 / 316L)	Stainless steel (1.4404 / 316L); Titanium (for data on material selection, refer to <i>Floats</i> on page 78)
	-	Option: Hastelloy®
Indicator rail	Stainless steel	
Indicator tube	Pyrex® glass (glass tube with a true hermetic seal) ③	
Scale (option)	Stainless steel	

	Basic	Advanced
Process fitting	Standard: Stainless steel (1.4404 / 316L) -	Option: Hastelloy® C-276 (for the wetted parts of EN loose flanges only)
Gaskets	Teflon® tape ④ -	Standard: Aramid; Teflon® tape Options: Graphite; PTFE
Braid insulation	-	Ceramic fibre (insulation between the indicator column and the measuring chamber when the process temperature is +100...+300°C / +210...+570°F)
Anti-freeze cover for glass indicator tube (option)	Plexiglas®	

Process connections

Threaded pipes	½...¾ NPT; G ½...¾	
Smooth pipes, 10S	½"; ¾" in 10S	
Flange version		
EN	DN15...40 (Form B1) in PN16 / 40	DN15...50 (Form B1, C or E) in PN16 / 40; DN15...50 (Form B1, C or E) in PN63 / 100; others are available on request Note: Hastelloy® C-276 flange connections are only available as loose flanges with form B1
ASME	½...1½" (RF) in 150 lb / 300 lb	½...1½" (RF) in 150 lb / 300 lb; others are available on request

Drain and vent connections

Drain options		
Thread	Standard: cover with 3/8 NPT plug	Standard: flange with ½ NPT plug
	Option: cover with 1¼ NPT plug	Options: on page 66
Flange	-	Options: all process connection options
Vent options		
Thread	Standard: without (convex cap)	Standard: 3/8 NPT plug
	Option: cover with 3/8 NPT plug	Options: flange with ½ NPT plug; flange with G ½ plug; DN40 top flange (for radar or TDR level transmitter) with ½ NPT lateral vent plug; welded antenna with ½ NPT lateral vent plug; ½ BSPP screw connection for OPTIFLEX 1300 C and Ø2 mm single cable probe, with ½ NPT lateral vent plug; all process connection options
Flange	-	Options: all process connection options

	Basic	Advanced
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Power supply

Limit switches	Refer to "Technical data: optional level switches"
Analog transmitter	Refer to "Technical data: optional analog transmitter"

Input and output

Parameter	Level detection or indication
Output signal	Refer to "Technical data: optional level switches" and "Technical data: optional analog transmitter"

Approvals and certification

CE	CE marking not applicable (not subject to PED test requirements)	This device fulfils the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.
Explosion protection		
ATEX	II 1 G or II 1/2 G (measuring chamber) Refer also to approvals in "Technical data: optional level switches" and "Technical data: optional analog transmitter"	
Other standards and approvals		
PED	Not subject to PED test requirements	Pressure Equipment Directive 97/23/EC in conjunction with CODAP® 2010
Vibration resistance	Vibration class 4M4 according to EN 60721-3-4	
Construction code	Standard: "CODAP® 2010"	
	Option: NACE MR0175 / ISO 15156	
	On request: EN 13445	

① HART® is a registered trademark of the HART Communication Foundation

② Hastelloy® is a registered trademark of Haynes International, Inc.

③ Pyrex® is a registered trademark of Corning, Inc.

④ Teflon® is a registered trademark of E.I. du Pont de Nemours and Company

8.3 Technical data: optional analog transmitter

Analog output or HART® communication modules

Module output	4...20 mA	4...20 mA / HART®
Order code	xF45xBxxxxx (without LCD indicator) xF45xExxxxx (with LCD indicator)	xF45xWxxxxx (without LCD indicator) xF45xGxxxxx (with LCD indicator)

Measuring system

Measuring principle	A reed resistor chain that is magnetically actuated by a magnetic float in the BM 26 measuring chamber
Primary measured value	Resistance
Secondary measured value	Level and volume of the liquid in the measuring chamber

Design

Description of device	Resistance reed chain with 2-wire loop-powered transmitter module attached adjacent to the measuring chamber of the bypass level indicator. Changes in resistance are converted to an output signal via a transmitter module.	
Description of transmitter module	Changes in resistance are converted to analog current signals.	Changes in resistance are converted to analog or digital current signals. Up to 15 transmitters can be connected to a network that agrees with the HART® communication protocol.
Options	Converter position - The customer must specify the position of the converter at the top or the bottom of the analog transmitter	
	LCD indicator	
Accessories	SU 600 power supply unit 24 V	
	SU 600 power supply unit 24 V with integrated Ex ia barrier	
	PROF SI 24075 intrinsically-safe power supply unit (with galvanic separation)	
	C 95 Basic universal power supply (Panel mount, 2 relays, 4-digit local indicator and non-Ex)	
	C 95 Basic universal power supply (Panel mount, 2 relays, 4...20 mA output, 4-digit local indicator and non-Ex)	
Display and user interface		
Display	Standard: none	
	Option: 2-wire loop-powered LCD indicator	Option: 2-wire loop-powered LCD indicator
Functions	Display of level in mm; inches; % (stickers for optional units of measure are supplied with the device). 4-digit LCD with minus sign, 3-button keypad.	Display of level in mm; inches; % (stickers for optional units of measure are supplied with the device). 4-digit LCD with minus sign, 3-button keypad.
Display	2-wire loop-powered indicator 4-digit LCD with minus sign, 3-button keypad	2-wire loop-powered indicator 4-digit LCD with minus sign, 3-button keypad
Operation	Selectable number of decimals, 0 to 3. Open the housing to configure the device.	Selectable number of decimals, 0 to 3. Open the housing to configure the device.

Module output	4...20 mA	4...20 mA / HART®
Order code	xF45xBxxxxx (without LCD indicator) xF45xExxxxx (with LCD indicator)	xF45xWxxxxx (without LCD indicator) xF45xGxxxxx (with LCD indicator)

Measuring accuracy

Accuracy	$\pm 10 \text{ mm} / 0.4''$ (when density is constant) $\leq \pm 0.1\%$ of span	$\pm 10 \text{ mm} / 0.4''$ (when density is constant) $\leq \pm 0.05\%$ of span
Temperature coefficient	$\leq \pm 0.01\%$ of span/°C	$\leq \pm 0.005\%$ of span/°C
EMC immunity influence	$< \pm 0.1\%$ of span	$< \pm 0.1\%$ of span

Operating conditions

Temperature		
Operating temperature, transmitter module	-40...+85°C / -40...+185°F, if there is insulation around the measuring chamber, specify the temperature in the order. Do not put insulation around the transmitter housing.	
Operating temperature, LCD indicator	-20...+70°C / -4...+158°F ①	
Pressure		
Operating pressure	Atmospheric pressure	
Other conditions		
Warm-up time	5...10 minutes	30 s
Response time	1.5 s	1....60 s ②
Protection category	Transmitter housing without LCD indicator: IP 54 Transmitter housing with LCD indicator: IP 66	

Installation conditions

Notes	The analog transmitter is calibrated at the factory and attached to the measuring chamber before delivery
Dimensions and weight	Refer to the "Technical data: Dimensions and weights" section

Materials

Housing	Polyester-coated aluminium
Reed-chain tube	Stainless steel
Clamp	Stainless steel

Module output	4...20 mA	4...20 mA / HART®
Order code	xF45xBxxxxx (without LCD indicator) xF45xExxxxx (with LCD indicator)	xF45xWxxxxx (without LCD indicator) xF45xGxxxxx (with LCD indicator)

Electrical connections

Power supply		
Voltage	Non-Ex:	
	12...35 VDC	8...30 VDC
	Ex ia, without LCD indicator:	
	Refer to supplementary instructions or approval certificates	
	Ex ia, with LCD indicator:	
	Refer to supplementary instructions or approval certificates	-
LCD indicator; voltage drop	2.5 V	2.5 V
Cable entry	M20 × 1.5	
Intrinsically-safe circuit data for Ex ia-approved devices	Refer to supplementary instructions or approval certificates	

Input and output

Current output		
Output range	4...20 mA	
Error signal	Upper value, selectable	
	21.6 mA	23 mA
	Lower value, selectable	
	3.5 mA	
HART®		
Description	-	HART® protocol via passive current output
Multidrop operation	-	Yes, current output = 4 mA Multidrop address (1...15) adjustable

Module output	4...20 mA	4...20 mA / HART®
Order code	xF45xBxxxxx (without LCD indicator) xF45xExxxxx (with LCD indicator)	xF45xWxxxxx (without LCD indicator) xF45xGxxxxx (with LCD indicator)

Approvals and certifications

CE	This device fulfils the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.	
Explosion protection		
ATEX - without LCD indicator	II 1 G Ex ia IIC T4...T6	II 1 G Ex ia IIC T4 or T6
ATEX - with LCD indicator	II 1 G Ex ia IIC T5	-
Other standards and approvals		
EMC	Electromagnetic Compatibility Directive 2004/108/EC in conjunction with EN 61326-1 (2006)	Electromagnetic Compatibility Directive 2004/108/EC in conjunction with EN 61326-1 (2006) NAMUR NE 21 ③
Vibration resistance	Vibration class 4M4 according to EN 60721-3-4	
NAMUR	NAMUR NE 43 ④	

① If the operating temperature is not in these limits, the display switches off. The transmitter module continues to operate above and below this temperature range.

② This value is programmable

③ Electromagnetic Compatibility of Industrial and Laboratory Control Equipment

④ Standardization of the Signal Level for the Failure Information of Digital Transmitters

Fieldbus modules

Module output	FOUNDATION™ Fieldbus	PROFIBUS PA
Order code	xF45xDxxxxx (PR)	xF45xXxxxxx (PR)

Measuring system

Measuring principle	A reed resistor chain that is magnetically actuated by a magnetic float in the BM 26 measuring chamber
Primary measured value	Resistance
Secondary measured value	Level and volume of the liquid in the measuring chamber

Design

Description of device	Resistance reed chain with 2-wire loop-powered transmitter module attached adjacent to the measuring chamber of the bypass level indicator. Changes in resistance are converted to an output signal via a transmitter module.	
Description of transmitter module	Changes in resistance are converted to signals that agree with the FF communication protocol.	Changes in resistance are converted to signals that agree with the PROFIBUS PA communication protocol.
Options	Converter position ①	
Accessories	SU 600 power supply unit 24 V	

Module output	FOUNDATION™ Fieldbus	PROFIBUS PA
Order code	xF45xDxxxxx (PR)	xF45xXxxxxx (PR)
Display and user interface		
Display	None	

Measuring accuracy

Accuracy	±10 mm / 0.4" (when density is constant)
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Operating conditions

Temperature	
Operating temperature, transmitter module	-40...+85°C / -40...+185°F, if there is insulation around the measuring chamber, specify the temperature in the order. Do not put insulation around the transmitter housing.
Pressure	
Operating pressure	Atmospheric pressure
Other conditions	
Protection category	Transmitter housing without LCD indicator: IP 54 Transmitter housing with LCD indicator: IP 66

Installation conditions

Notes	The analog transmitter is calibrated at the factory and attached to the measuring chamber before delivery
Dimensions and weight	Refer to the "Technical data: Dimensions and weights" section

Materials

Housing	Polyester-coated aluminium
Reed-chain tube	Stainless steel
Clamp	Stainless steel

Electrical connections

Power supply		
Voltage	Non-Ex:	
	9...32 VDC	
	Ex ia:	
	Refer to supplementary instructions or approval certificates	
Cable entry	M20 × 1.5	
Intrinsically-safe circuit data for Ex ia-approved devices	Refer to supplementary instructions or approval certificates	
PROFIBUS PA		
Description	-	PROFIBUS PA protocol Profile A&B, ver.3.0 (EN 50170 vol.2)
FOUNDATION Fieldbus		
Description	FOUNDATION Fieldbus protocol	-

Module output	FOUNDATION™ Fieldbus	PROFIBUS PA
Order code	xF45xDxxxxx (PR)	xF45xXxxxxx (PR)

Approvals and certification

CE	This device fulfills the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.	
Explosion protection		
ATEX	II 1 G Ex ia IIC T4...T6 ②	II 1 G Ex ia IIC T4...T6 ②
	II 2 G Ex ib IIC T4...T6 ③	II 2 G Ex ib IIC T4...T6 ③
Other standards and approvals		
EMC	Electromagnetic Compatibility Directive 2004/108/EC in conjunction with EN 61326-1 (2006)	
Vibration resistance	Vibration class 4M4 according to EN 60721-3-4	

① The customer must specify the position of the converter at the top or the bottom of the analog transmitter

② Conventional or FISCO systems intrinsically-safe systems

③ FISCO systems intrinsically-safe systems

8.4 Technical data: optional limit switches

Version	Non-NAMUR	NAMUR
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Measuring system

Measuring principle	A bistable reed switch that is magnetically actuated by the float in the measuring chamber of the bypass level indicator.
Application range	Level detection

Design

Description of device	Limit switch attached adjacent to the measuring chamber of the bypass level indicator.
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Measuring accuracy

Hysteresis	28 mm / 1.1". For more data, refer to the "Optional limit switch" section.
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Operating conditions

Temperature	
Operating temperature	-40...+120°C / -40...+250°F, if there is insulation around the measuring chamber, specify the temperature in the order. Do not put insulation around the switch housing.
Storage	-40...+120°C / -40...+250°F
Pressure	
Operating pressure	Atmospheric pressure
Other conditions	
Protection category	IP 66

Version	Non-NAMUR	NAMUR
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Installation conditions

Notes	The switch is not attached to the measuring chamber before delivery
	Adjust the switch position for hysteresis and liquid density
Dimensions and weights	Refer to "Technical data: Dimensions and weights"

Materials

Switch housing	Aluminium with epoxy powder paint
Bracket	Stainless steel
Clamp	Stainless steel

Electrical connections

Cable entry	M16 × 1.5	
Control input		
Switching capacity	60 VA/W; 1 A; 250 VAC/VDC	According to NAMUR 19234
Intrinsically-safe circuit data	Refer to supplementary instructions or approval certificates.	

Approvals and certifications

CE	This device fulfils the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.	
Explosion protection		
ATEX	II 1 G Ex ia IIC T6...T4	
Other standards and approvals		
LVD	Low-Voltage Directive 2006/95/EC in conjunction with EN 61010-1 (2001)	-
Vibration resistance	Vibration class 4M5 according to EN 60721-3-4	

8.5 Basic version: Dimensions and weights

Basic version: Lateral / Lateral process connections

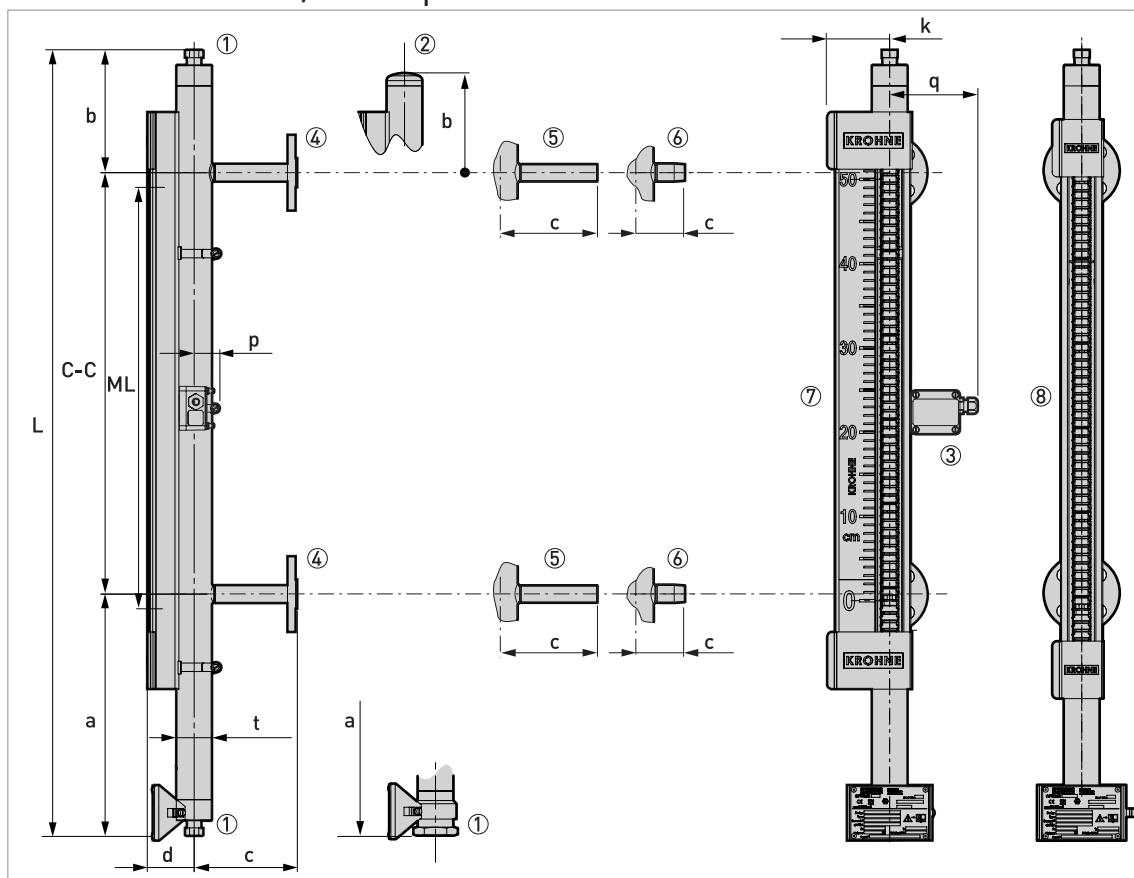


Figure 8-2: Lateral / Lateral process connections

- ① Optional vent with 3/8 NPT connection (with plug). Optional drain with 3/8 NPT - or a 1 1/4 NPT plug for removal of the float from the bottom of the device
- ② Welded cap
- ③ Optional limit switch
- ④ Flange connection
- ⑤ Optional long stud (1/2" or 3/4") connection
- ⑥ Optional male thread (1/2... 3/4 NPT or G 1/2... 3/4) connection
- ⑦ Level indicator with optional scale
- ⑧ Level indicator without optional scale

Note:

- C-C = Centre-to-centre length (process connections)
- ML = Measuring length
- L = Overall length
- a = Distance from the axis of the bottom connection to the bottom of the device;
- b = Distance from the axis of the top connection to the top of the device

Dimensions in mm

	Dimensions [mm]										
	a	b	C-C	ML	c	d	k	L	p	q	Øt
Lateral / Lateral process connections	310 ①	173 ②	③	300... 5300	135 ④	55.5	74	[C-C] +483 ⑤	32	113	42.4

① Optional drain with 1¼" plug: 323 mm

② Welded cap option: 149 mm

③ This is equal to the dimension ML

④ Long stud option: 130 mm. Male thread connection option: 58 mm.

⑤ Welded cap option: [C-C] +459 mm. 1¼" plug option: [C-C] +500 mm. Welded cap + 1¼" plug options: [C-C] +476 mm.

Dimensions in inches

	Dimensions [inches]										
	a	b	C-C	ML	c	d	k	L	p	q	Øt
Lateral / Lateral process connections	12.2 ①	6.8 ②	③	12... 208	5.3 ④	2.2	2.9	[C-C] +19 ⑤	1.3	4.4	1.7

① Optional drain with 1¼" plug: 12.7"

② Welded cap option: 5.9"

③ This is equal to the dimension ML

④ Long stud option: 5.1". Male thread connection option: 2.3".

⑤ Welded cap option: [C-C] +18.1". 1¼" plug option: [C-C] +19.7". Welded cap + 1¼" plug options: [C-C] +18.7".

Weights in kg and lb

	Weights		Weights for every additional 100 mm	Weights for every additional 4 inches
	[kg]	[lb]	[kg]	[lb]
Min.: DN15 PN40 flanges	7.4 ①	16.3 ②	0.3	0.7
Max.: 1½" 300 lb flanges	11.2 ①	24.7 ②	0.3	0.7
Limit switch	0.085	0.2		

① When L=500 mm

② When L=20"

Basic version: Axial / Axial process connections

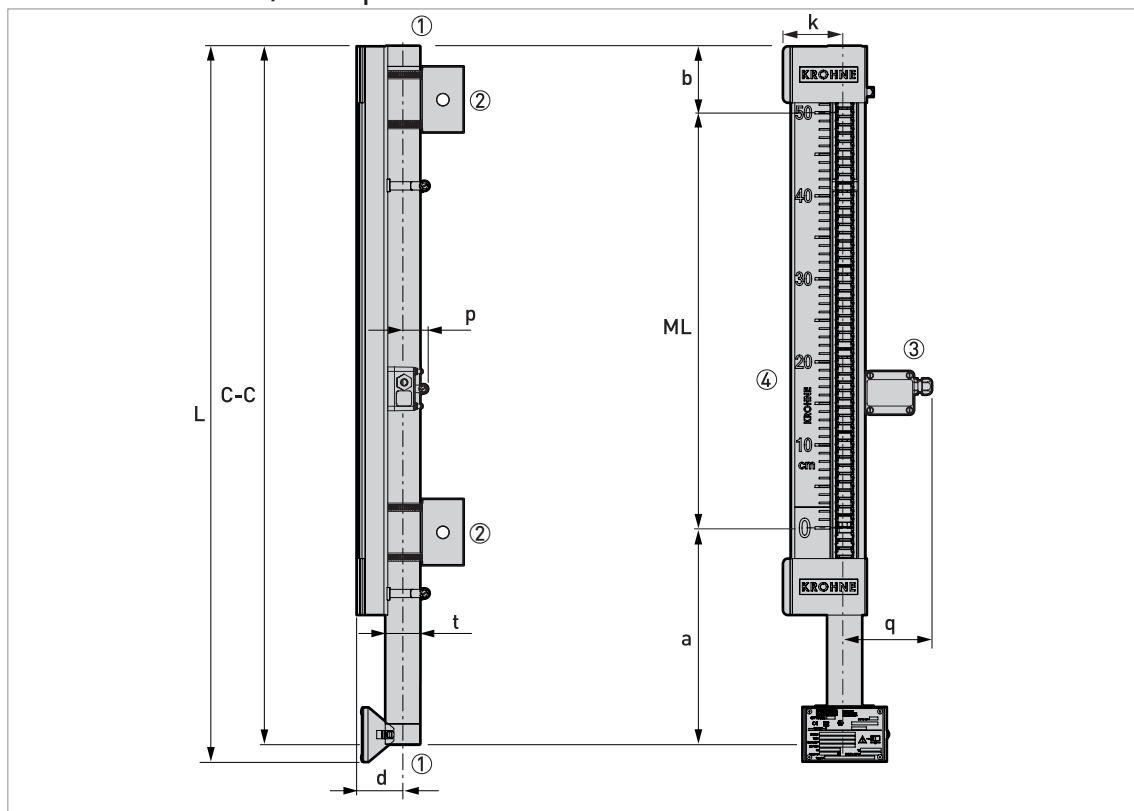


Figure 8-3: Axial / Axial process connections

- ① 3/8 NPT threaded connection
- ② Optional support bracket - also refer to "Support bracket option: Dimensions and weight"
- ③ Optional limit switch
- ④ Level indicator with optional scale

Note:

- C-C = Face-to-face length (process connections)
- ML = Measuring length
- L = Overall length
- a = bottom dead zone; b = top dead zone

Dimensions in mm

	Dimensions [mm]									
	a	b	C-C	ML	d	k	L	p	q	Øt
Axial / Axial process connections	274	96	ML +370	272... 5300	55.5	74	(C-C) +21	32	113	42.4

Dimensions in inches

	Dimensions [inches]									
	a	b	C-C	ML	d	k	L	p	q	Øt
Axial / Axial process connections	10.8	3.8	ML +14.6	10.8... 208	2.5	2.9	(C-C) +0.8	1.3	4.4	1.7

Weights in kg and lb

	Weights		Weight for every additional 100 mm	Weight for every additional 4 inches
	[kg]	[lb]	[kg]	[lb]
3/8 NPT	6.0 ①	13.2 ②	0.3	0.7
Limit switch	0.085	0.2		

① When L=500 mm

② When L=20"

Basic version: Top lateral / Bottom axial process connections

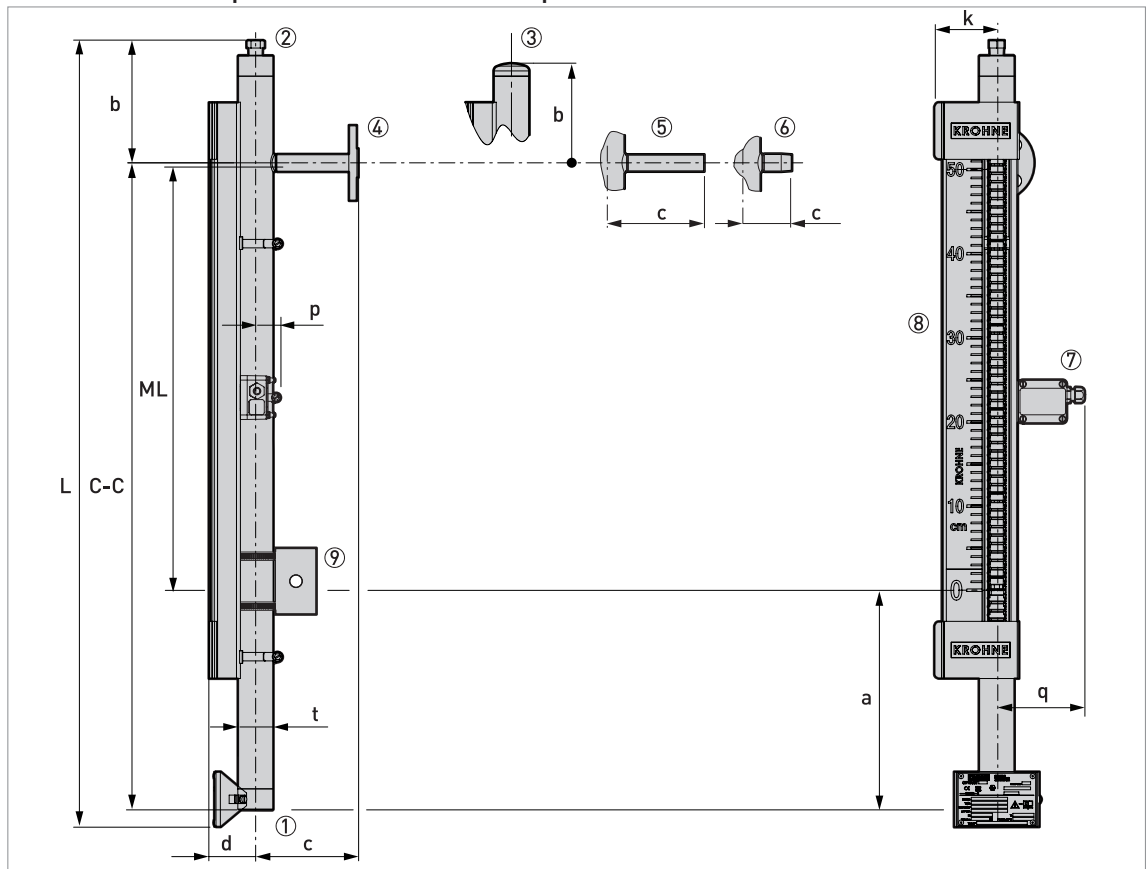


Figure 8-4: Top lateral / Bottom axial process connections

- ① 3/8 NPT threaded connection
- ② Optional drain or vent with 3/8 NPT connection (with plug)
- ③ Welded cap
- ④ Flange connection
- ⑤ Optional long stud (1/2" or 3/4") connection
- ⑥ Optional male thread (1/2... 3/4 NPT or G 1/2... 3/4) connection
- ⑦ Optional limit switch
- ⑧ Level indicator with optional scale
- ⑨ Optional support bracket - also refer to "Support bracket option: Dimensions and weight"

Note:

- C-C = Centre-to-face length (process connections)
- ML = Measuring length
- L = Overall length
- a = bottom dead zone; b = Distance from the axis of the top connection to the top of the device

Dimensions in mm

	Dimensions [mm]										
	a	b	C-C	ML	c	d	k	L	p	q	Øt
Top lateral / Bottom axial process connections	300	173 ①	ML +300	370... 5300	135 ②	55.5	74	[C-C] +194 ③	32	113	42.4

① Welded cap option: 149 mm

② Long stud option: 130 mm. Male thread connection option: 58 mm.

③ Welded cap option: [C-C] +170 mm

Dimensions in inches

	Dimensions [inches]										
	a	b	C-C	ML	c	d	k	L	p	q	Øt
Top lateral / Bottom axial process connections	11.8	6.8 ①	ML +11.8	14.6... 208	5.3 ②	2.2	2.9	[C-C] +7.6 ③	1.3	4.4	1.7

① Welded cap option: 5.9"

② Long stud option: 5.1". Male thread connection option: 2.3".

③ Welded cap option: [C-C] +6.7"

Weights in kg and lb

	Weights		Weights for every additional 100 mm	Weights for every additional 4 inches
	[kg]	[lb]	[kg]	[lb]
Min.: 3/8 NPT / DN15 PN40 flange	6.7 ①	14.8 ②	0.3	0.7
Max.: 3/8 NPT / 1½" 300 lb flange	8.6 ①	19.0 ②	0.3	0.7
Limit switch	0.085	0.2		

① When L=500 mm

② When L=20"

Basic version: Top axial / Bottom lateral process connections

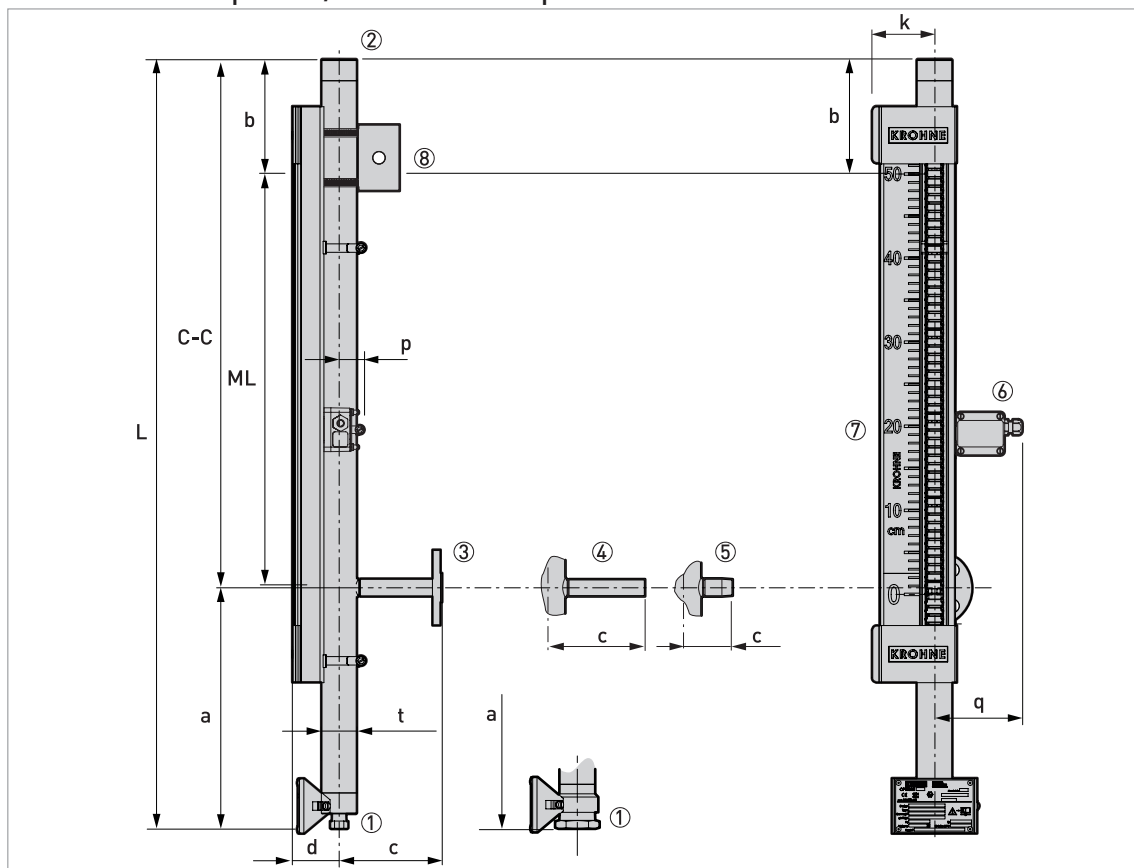


Figure 8-5: Top axial / Bottom lateral process connections

- ① Optional drain with 3/8 NPT or 1 1/4 NPT connection (with plug - 1 1/4 NPT connection is for removal of the float from the bottom of the device)
- ② 3/8 NPT threaded connection
- ③ Flange connection
- ④ Optional long stud (1/2" or 3/4") connection
- ⑤ Optional male thread (1/2... 3/4 NPT or G 1/2... 3/4) connection
- ⑥ Optional limit switch
- ⑦ Level indicator with optional scale
- ⑧ Optional support bracket - also refer to "Support bracket option: Dimensions and weight"

Note:

- C-C = Face-to-centre length (process connections)
- ML = Measuring length
- L = Overall length
- a = Distance from the axis of the bottom connection to the bottom of the device;
- b = top dead zone

Dimensions in mm

	Dimensions [mm]										
	a	b	C-C	ML	c	d	k	L	p	q	Øt
Top axial / Bottom lateral process connections	310 ①	140	ML +140	288... 5300	135.2 ②	55.5	74	[C-C] +310 ③	32	113	42.4

① Optional drain with 1¼" plug: 323 mm

② Long stud option: 130.2 mm. Male thread connection option: 58.2 mm.

③ 1¼" plug option: [C-C] +327 mm

Dimensions in inches

	Dimensions [inches]										
	a	b	C-C	ML	c	d	k	L	p	q	Øt
Top axial / Bottom lateral process connections	12.2 ①	5.5	ML +5.5	11.3... 208	5.3 ②	2.2	2.9	[C-C] +12.2 ③	1.3	4.4	1.7

① Optional drain with 1¼" plug: 12.7"

② Long stud option: 5.1". Male thread connection option: 2.3".

③ 1¼" plug option: [C-C] +12.9"

Weights in kg and lb

	Weights		Weights for every additional 100 mm	Weights for every additional 4 inches
	[kg]	[lb]	[kg]	[lb]
Min.: 3/8 NPT / DN15 PN40 flange	6.7 ①	14.8 ②	0.3	0.7
Max.: 3/8 NPT / 1½" 300 lb flange	8.6 ①	19.0 ②	0.3	0.7
Limit switch	0.085	0.2		

① When L=500 mm

② When L=20"

8.6 Advanced version: Dimensions and weights

Advanced version: Lateral / Lateral process connections

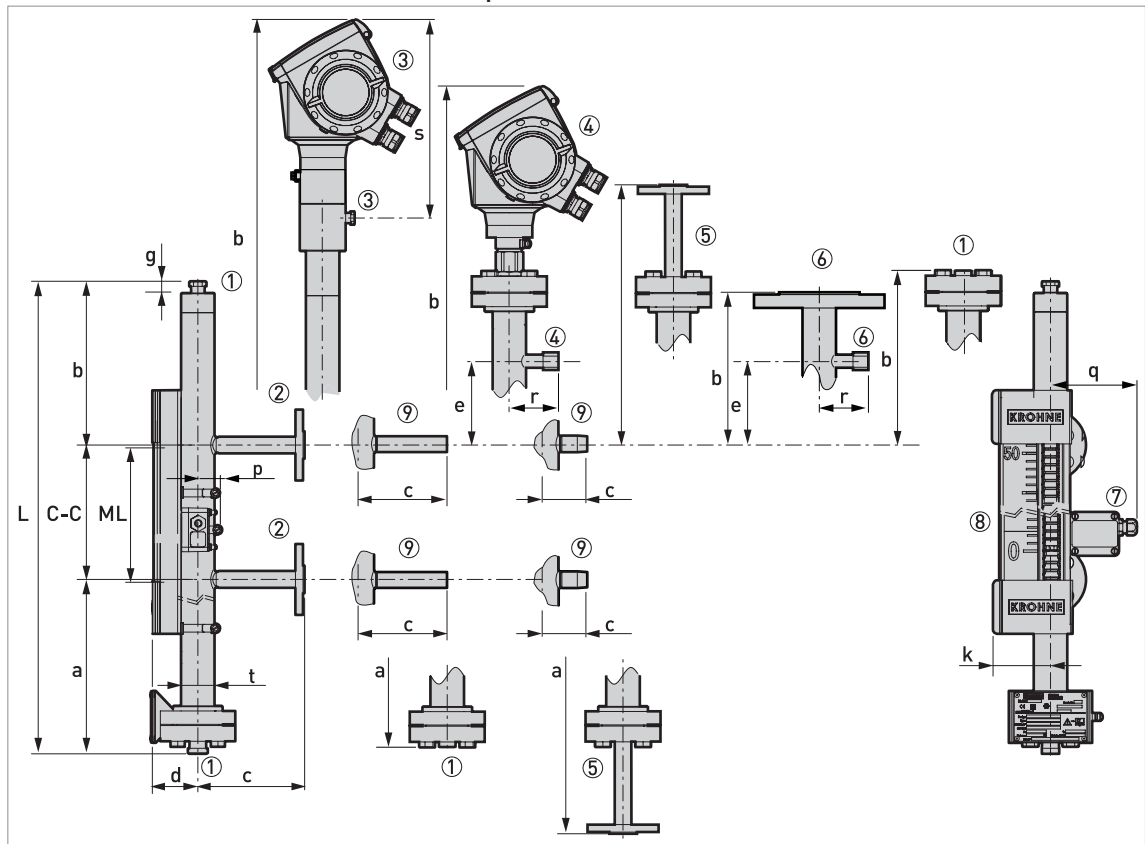


Figure 8-6: Lateral / Lateral process connections

- ① Optional vent with 3/8 NPT connection (with plug) , or optional vent with 1/2 NPT, G 1/2 or G 3/8 connection (with plug) on a plate flange, or drain with 1/2 NPT, 3/8 NPT, G 1/2 or G 3/8 connection (with plug) on a plate flange
- ② Process connection (flange)
- ③ Welded antenna option for the OPTIWAVE 7300 radar level transmitter with 1/4 NPT connection for a flushing system
- ④ 1/2 BSP connection for OPTIFLEX 1300 TDR level transmitter with 1/2 NPT lateral vent (with plug)
- ⑤ Optional vent and drain (flange)
- ⑥ Optional DN40 top flange for other level transmitters
- ⑦ Optional limit switch
- ⑧ Level indicator with optional scale
- ⑨ Optional male thread (1/2... 3/4 NPT or G 1/2...3/4) or long stud (1/2" or 3/4") connection

Note:

- C-C = Centre-to-centre length (process connections)
- ML = Measuring length
- L = Overall length
- a = Distance from the axis of the bottom connection to the bottom of the device;
- b = Distance from the axis of the top connection to the top of the device

Dimensions in mm

	Liquid density [kg/l]	Dimensions [mm]														
		a	b	C-C	ML	c	d	e	g	k	L	p	q	r	s	Øt
Lateral / Lateral process connections	0.58...0.7 ①	②	③	④	300... 5300	⑤	55.5 ⑥	106	15	74	⑦	32	113	259	70	42.4
	0.7...0.99 ①	⑧	③	④		⑤	55.5 ⑥	106	15	74	⑦	32	113	259	70	42.4
	0.99...2.0 ①	⑨	③	④		⑤	55.5 ⑥	106	15	74	⑦	32	113	259	70	42.4

① For more data, refer to "Floats" at the end of this chapter

② Optional 1/2NPT or 3/8NPT drain + plug: 480 mm. Optional G1/2 or G3/8 drain + plug: 472 mm. Optional drain flange: 580 mm.

③ Optional 3/8NPT vent: 228 mm. Optional 1/2NPT vent: 228 mm. Optional G1/2 vent: 220 mm. Optional welded OPTIWAVE 7300 transmitter: 542 mm. Optional OPTIFLEX 1300 transmitter with 2 mm single cable probe: 454 mm. Optional flange vent: 328 mm. Optional DN40 flange: 193 mm.

④ This is equal to the dimension C-C

⑤ EN flange, type B: 135 mm. EN flange, type C: 135 mm. EN flange, type E: 135 mm. Long stud: 130 mm. Male thread connection: 58 mm.

⑥ If ambient temperature is -40...-20°C: 85.5 mm (with Plexiglas® cover)

⑦ Depends on the options selected. Contact your local sales office for more data.

⑧ Optional 1/2NPT or 3/8NPT drain + plug: 299 mm. Optional G1/2 or G3/8 drain + plug: 291 mm. Optional drain flange: 399 mm.

⑨ Optional 1/2NPT or 3/8NPT drain + plug: 255 mm. Optional G1/2 or G3/8 drain + plug: 247 mm. Optional drain flange: 355 mm.

Dimensions in inches

	Liquid density [lb/ft³]	Dimensions [inches]														
		a	b	C-C	ML	c	d	e	g	k	L	p	q	r	s	Øt
Lateral / Lateral process connections	36.2...43.7 ①	②	③	④	12... 208	⑤	2.2 ⑥	4.2	0.6	2.9	⑦	1.3	4.4	10.2	2.8	1.7
	43.7...61.8 ①	⑧	③	④		⑤	2.2 ⑥	4.2	0.6	2.9	⑦	1.3	4.4	10.2	2.8	1.7
	61.8...124.8 ①	⑨	③	④		⑤	2.2 ⑥	4.2	0.6	2.9	⑦	1.3	4.4	10.2	2.8	1.7

① For more data, refer to "Floats" at the end of this chapter

② Optional 1/2NPT or 3/8NPT drain + plug: 18.9". Optional G1/2 or G3/8 drain + plug: 18.6". Optional drain flange: 22.8".

③ Optional 3/8NPT vent: 9.0". Optional 1/2NPT vent: 9.0". Optional G1/2 vent: 8.6". Optional welded OPTIWAVE 7300 transmitter: 21.3". Optional OPTIFLEX 1300 transmitter with 0.08" single cable probe: 17.9". Optional flange vent: 12.9". Optional DN40 flange: 7.6".

④ This is equal to the dimension C-C

⑤ EN flange, type B: 5.3". EN flange, type C: 5.1". EN flange, type E: 5.3". Long stud: 5.1". Male thread connection: 2.3".

⑥ If ambient temperature is -40...-4°F: 3.4" (with Plexiglas® cover)

⑦ Depends on the options selected. Contact your local sales office for more data.

⑧ Optional 1/2NPT or 3/8NPT drain + plug: 11.8". Optional G1/2 or G3/8 drain + plug: 11.4". Optional drain flange: 15.7".

⑨ Optional 1/2NPT or 3/8NPT drain + plug: 10". Optional G1/2 or G3/8 drain + plug: 9.7". Optional drain flange: 14.0".

Weights in kg and lb

	Weights		Weights for every additional 100 mm	Weights for every additional 4 inches
	[kg]	[lb]	[kg]	[lb]
Min.: DN15 PN40 flanges	7.4...8 ①	16.3...17.6 ②	0.3	0.7
Max: 1½" 600 lb flanges	12.4...13 ①	27.3...28.7 ②	0.3	0.7
Limit switch	0.085	0.2		

① When L=500 mm - if liquid density is low, then weight is higher

② When L=20" - if liquid density is low, then weight is higher

Advanced version: Axial / Axial process connections

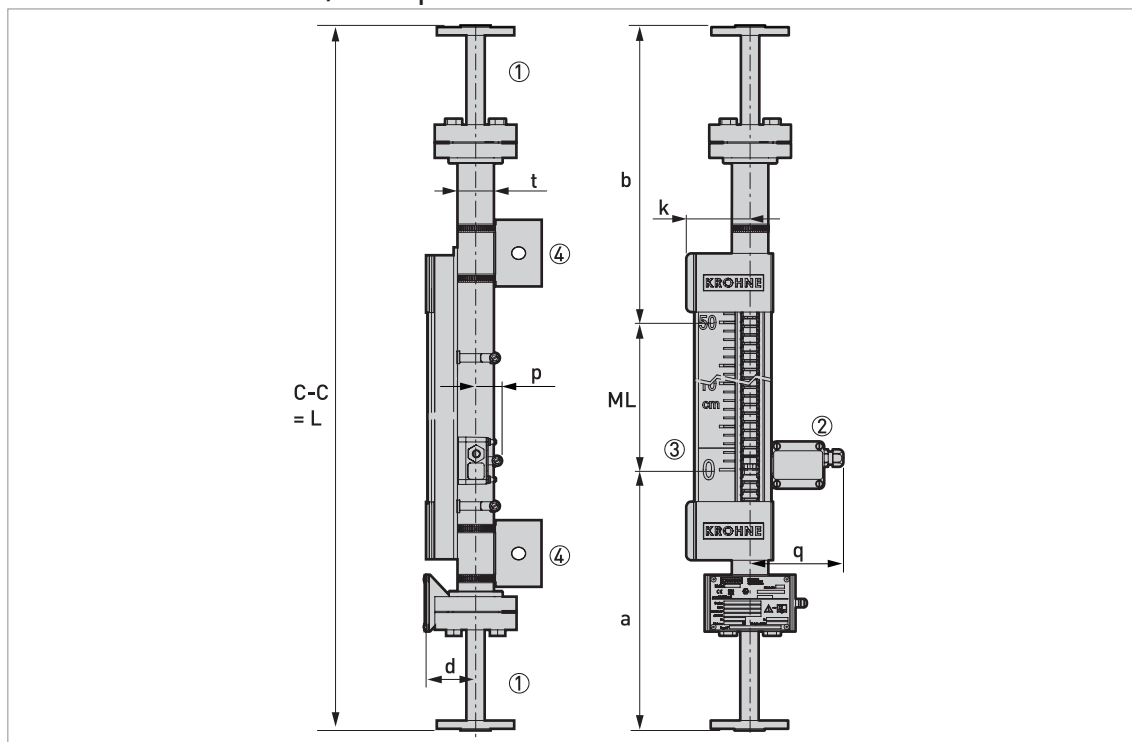


Figure 8-7: Axial / Axial process connections

- ① Process connection (flange)
- ② Optional limit switch
- ③ Level indicator with optional scale
- ④ Optional support bracket - also refer to "Support bracket option: Dimensions and weight"

Note:

- C-C = Face-to-face length (process connections)
- ML = Measuring length
- L = Overall length
- a = bottom dead zone; b = top dead zone

Dimensions in mm

	Liquid density [kg/l]	Dimensions [mm]										
		a	b	C-C	ML	d	e	k	L	p	q	Øt
Axial / Axial process connections	0.58...0.7 ①	570	250	ML +820	300... 5300	55.5 ②	106	74	③	32	113	42.4
	0.7...0.99 ①	390	250	ML +640		55.5 ②	106	74	③	38	113	42.4
	0.99...2.0 ①	340	250	ML +590		55.5 ②	106	74	③	32	113	42.4

① For more data, refer to "Floats" at the end of this chapter

② If ambient temperature is -40...-20°C: 85.5 mm (with Plexiglas® cover)

③ This is equal to the dimension C-C

Dimensions in inches

	Liquid density [lb/ft³]	Dimensions [inches]										
		a	b	C-C	ML	d	e	k	L	p	q	Øt
Axial / Axial process connections	36.2...43.7 ①	22.4	9.8	ML +32.3	11.8... 208	2.2 ②	4.2	2.9	③	1.3	4.4	1.7
	43.7...61.8 ①	15.3	9.8	ML +25.2		2.2 ②	4.2	2.9	③	1.3	4.4	1.7
	61.8...124.8 ①	13.4	9.8	ML +23.2		2.2 ②	4.2	2.9	③	1.3	4.4	1.7

① For more data, refer to "Floats" at the end of this chapter

② If ambient temperature is -40...-4°F: 3.4" (with Plexiglas® cover)

③ This is equal to the dimension C-C

Weights in kg and lb

	Weights		Weights for every additional 100 mm	Weights for every additional 4 inches
	[kg]	[lb]	[kg]	[lb]
Min.: DN15 PN40 flanges	7.4...8 ①	16.3...17.6 ②	0.3	0.7
Max: 1½" 600 lb flanges	12.4...13 ①	27.3...28.7 ②	0.3	0.7
Limit switch	0.085	0.2		

① When L=500 mm - if liquid density is low, then weight is higher

② When L=20" - if liquid density is low, then weight is higher

Advanced version: Top lateral / Bottom axial process connections

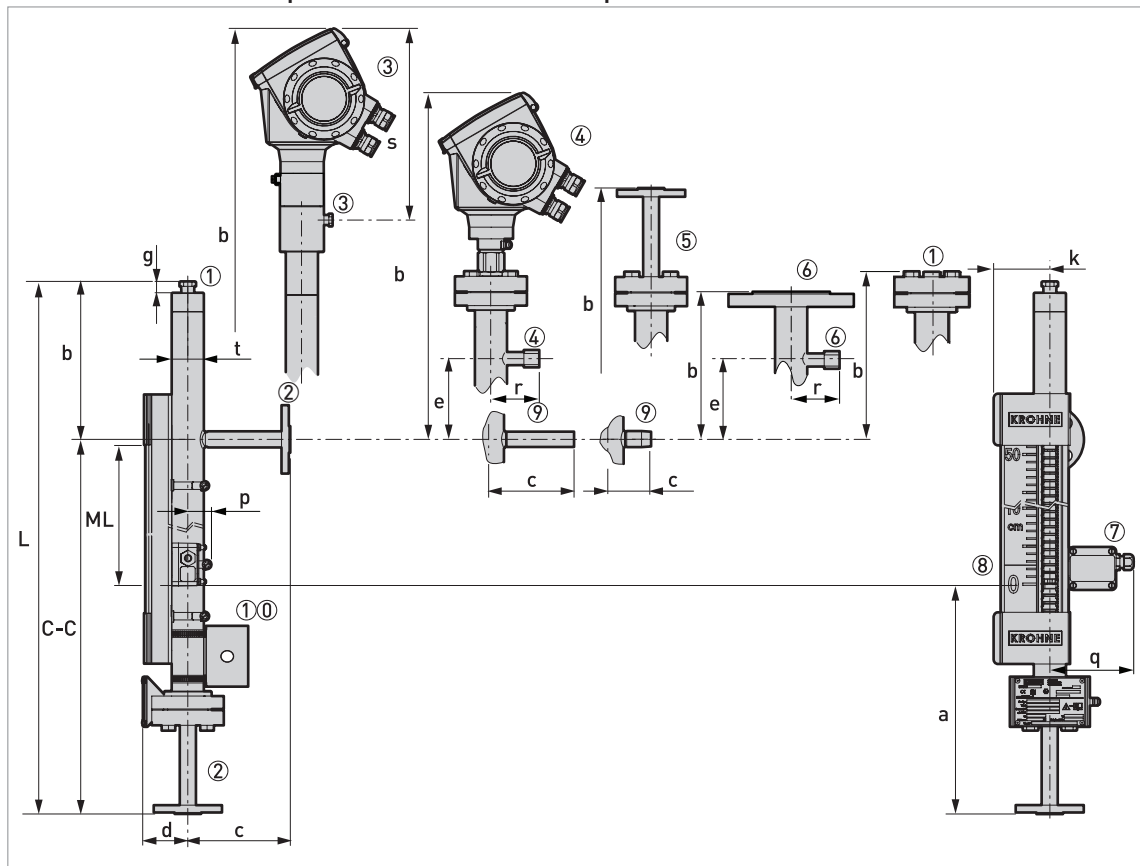


Figure 8-8: Top lateral / Bottom axial process connections

- ① Optional vent with 3/8 NPT connection (with plug) or optional vent with 1/2 NPT or G 1/2 connection (with plug) on a plate flange
- ② Process connection (flange)
- ③ Welded antenna option for the OPTIWAVE 7300 radar level transmitter with 1/4 NPT connection for a flushing system
- ④ 1/2 BSP connection for OPTIFLEX 1300 TDR level transmitter with 1/2 NPT lateral vent (with plug)
- ⑤ Optional vent (flange)
- ⑥ Optional DN40 top flange for other level transmitters with 1/2 NPT lateral vent (with plug)
- ⑦ Optional level switch
- ⑧ Level indicator with optional scale
- ⑨ Optional male thread (1/2... 3/4 NPT or G 1/2... 3/4) or long stud (1/2" or 3/4") connection
- ⑩ Optional support bracket - also refer to "Support bracket option: Dimensions and weight"

Note:

- C-C = Centre-to-face length (process connections)
- ML = Measuring length
- L = Overall length
- a = bottom dead zone; b = Distance from the axis of top connection to the top of the device

Dimensions in mm

	Liquid density [kg/l]	Dimensions [mm]														
		a	b	C-C	ML	c	d	e	g	k	L	p	q	r	s	Øt
Top lateral / Bottom axial process connections	0.58... 0.7 ①	580	②	ML +580	300 ...5 300	③	55.5 ④	106	15	74	⑤	32	113	259	70	42.4
	0.7... 0.99 ①	400	②	ML +400		③	55.5 ④	106	15	74	⑤	32	113	259	70	42.4
	0.99... 2.0 ①	360	②	ML +360		③	55.5 ④	106	15	74	⑤	32	113	259	70	42.4

① For more data, refer to "Floats" at the end of this chapter

② Optional 3/8NPT vent: 228 mm. Optional 1/2NPT vent: 228 mm. Optional G1/2 vent: 220 mm. Optional welded OPTIWAVE 7300 transmitter: 542 mm. Optional OPTIFLEX 1300 transmitter with 2 mm single cable probe: 454 mm. Optional flange vent: 328 mm. Optional DN40 flange: 193 mm.

③ EN flange, type B: 135.2 mm. EN flange, type C: 134.7 mm. EN flange, type E: 135.2 mm. Long stud: 130.2 mm. Male thread connection: 58.2 mm.

④ If ambient temperature is -40...-20°C: 85.5 mm (with Plexiglas® cover)

⑤ Depends on the options selected. Contact your local sales office for more data.

Dimensions in inches

	Liquid density [lb/ft³]	Dimensions [inches]														
		a	b	C-C	ML	c	d	e	g	k	L	p	q	r	s	Øt
Top lateral / Bottom axial process connections	36.2... 43.7 ①	22.8	②	ML +22.8	11.8... 208	③	2.2 ④	4.2	0.6	2.9	⑤	1.3	4.4	10.2	2.8	1.7
	43.7... 61.8 ①	15.7	②	ML +15.7		③	2.2 ④	4.2	0.6	2.9	⑤	1.3	4.4	10.2	2.8	1.7
	61.8... 124.8 ①	14.2	②	ML +14.2		③	2.2 ④	4.2	0.6	2.9	⑤	1.3	4.4	10.2	2.8	1.7

① For more data, refer to "Floats" at the end of this chapter

② Optional 3/8NPT vent: 9.0". Optional 1/2NPT vent: 9.0". Optional G1/2 vent: 8.6". Optional welded OPTIWAVE 7300 transmitter: 21.3". Optional OPTIFLEX 1300 transmitter with 0.08" single cable probe: 17.9". Optional flange vent: 12.9". Optional DN40 flange: 7.6".

③ EN flange, type B: 5.3". EN flange, type C: 5.1". EN flange, type E: 5.3". Long stud: 5.1". Male thread connection: 2.3".

④ If ambient temperature is -40...-4°F: 3.4" (with Plexiglas® cover)

⑤ Depends on the options selected. Contact your local sales office for more data.

Weights in kg and lb

	Weights		Weights for every additional 100 mm	Weights for every additional 4 inches
	[kg]	[lb]		
Min.: DN15 PN40 flanges	6.7...7.3 ①	14.8...16.1 ②	0.3	0.7
Max: 1½" 600 lb flanges	9.2...9.8 ①	20.3...21.6 ②	0.3	0.7
Limit switch	0.085	0.2		

① When L=500 mm - if liquid density is low, then weight is higher

② When L=20" - if liquid density is low, then weight is higher

Advanced version: Top axial / Bottom lateral process connections

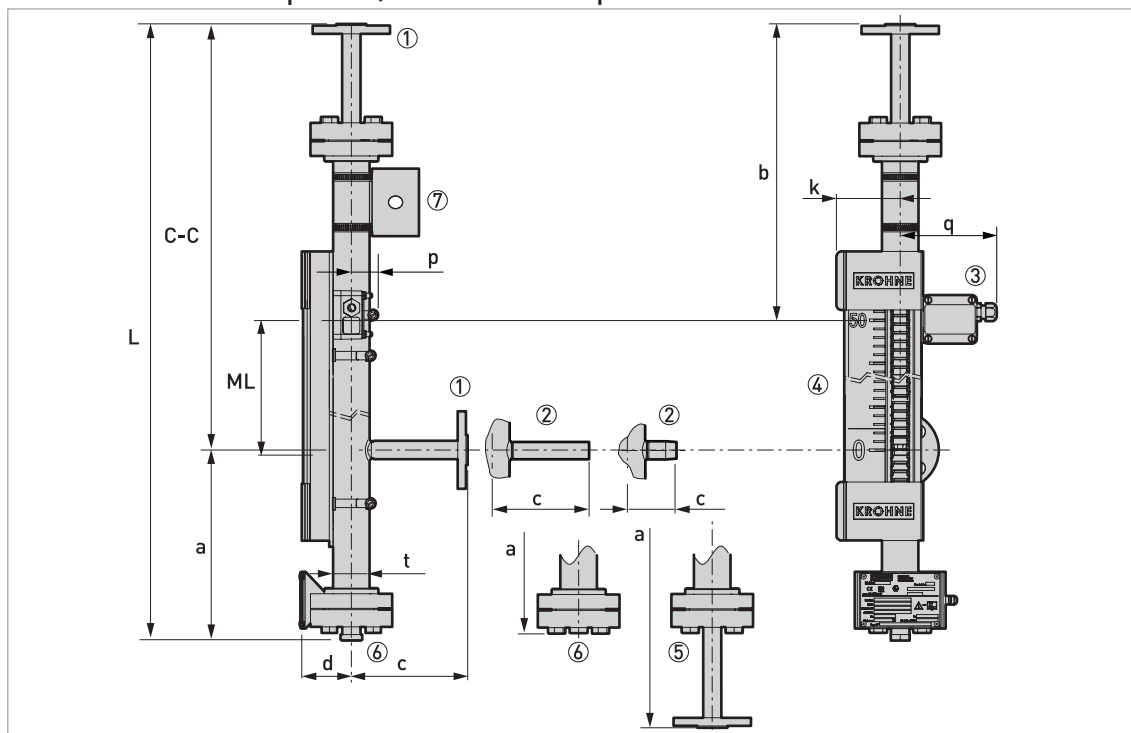


Figure 8-9: Top axial / Bottom lateral process connections

- ① Process connection (flange)
- ② Optional male thread ($\frac{1}{2}$... $\frac{3}{4}$ NPT or G $\frac{1}{2}$... $\frac{3}{4}$) or long stud ($\frac{1}{2}$ " or $\frac{3}{4}$ " connection)
- ③ Optional level switch
- ④ Level indicator with optional scale
- ⑤ Optional drain (flange)
- ⑥ Optional drain with 1/2 NPT, 3/8 NPT, G 1/2 or G 3/8 connection (with plug) on a plate flange
- ⑦ Optional support bracket - also refer to "Support bracket option: Dimensions and weight"

Note:

- C-C = Face-to-centre length (process connections)
- ML = Measuring length
- L = Overall length
- a = Distance from the axis of the bottom connection to the bottom of the device;
- b = top dead zone

Dimensions in mm

	Liquid density [kg/l]	Dimensions [mm]										
		a	b	C-C	ML	c	d	k	L	p	q	Øt
Top axial / Bottom lateral process connections	0.58... 0.7 ①	②	330	ML +330	300... 5300	③	55.5 ④	74	⑤	32	113	42.4
	0.7... 0.99 ①	⑥	310	ML +310		③	55.5 ④	74	⑤	32	113	42.4
	0.99... 2.0 ①	⑦	320	ML +320		③	55.5 ④	74	⑤	32	113	42.4

① For more data, refer to "Floats" at the end of this chapter

② Optional 1/2NPT or 3/8NPT drain + plug: 480 mm. Optional G1/2 or G3/8 drain + plug: 472 mm. Optional drain flange: 580 mm.

③ EN flange, type B: 135.2 mm. EN flange, type C: 134.7 mm. EN flange, type E: 135.2 mm. Long stud: 130.2 mm. Male thread connection: 58.2 mm.

④ If ambient temperature is -40...-20°C: 85.5 mm (with Plexiglas® cover)

⑤ Depends on the options selected. Contact your local sales office for more data.

⑥ Optional 1/2NPT or 3/8NPT drain + plug: 299 mm. Optional G1/2 or G3/8 drain + plug: 291 mm. Optional drain flange: 399 mm.

⑦ Optional 1/2NPT or 3/8NPT drain + plug: 255 mm. Optional G1/2 or G3/8 drain + plug: 247 mm. Optional drain flange: 355 mm.

Dimensions in inches

	Liquid density [lb/ft³]	Dimensions [inches]										
		a	b	C-C	ML	c	d	k	L	p	q	Øt
Top axial / Bottom lateral process connections	36.2... 43.7 ①	②	13	ML +13	11.8... 208	③	2.2 ④	2.9	⑤	1.3	4.4	1.7
	43.7... 61.8 ①	⑥	12.2	ML +12.2		③	2.2 ④	2.9	⑤	1.3	4.4	1.7
	61.8... 124.8 ①	⑦	12.6	ML +12.6		③	2.2 ④	2.9	⑤	1.3	4.4	1.7

① For more data, refer to "Floats" at the end of this chapter

② Optional 1/2NPT or 3/8NPT drain + plug: 18.9". Optional G1/2 or G3/8 drain + plug: 18.6". Optional drain flange: 22.8".

③ EN flange, type B: 5.3". EN flange, type C (tongue): 5.1". EN flange, type E: 5.3". Long stud: 5.1". Male thread connection: 2.3".

④ If ambient temperature is -40...-4°F: 3.4" (with Plexiglas® cover)

⑤ Depends on the options selected. Contact your local sales office for more data.

⑥ Optional 1/2NPT or 3/8NPT drain + plug: 11.8". Optional G1/2 or G3/8 drain + plug: 11.4". Optional drain flange: 15.7".

⑦ Optional 1/2NPT or 3/8NPT drain + plug: 10". Optional G1/2 or G3/8 drain + plug: 9.7". Optional drain flange: 14.0".

Weights in kg and lb

	Weights		Weights for every additional 100 mm	Weights for every additional 4 inches
	[kg]	[lb]	[kg]	[lb]
Min.: DN15 PN40 flanges	6.7...7.3 ①	14.8...16.1 ②	0.3	0.7
Max: 1½" 600 lb flanges	9.2...9.8 ①	20.3...21.6 ②	0.3	0.7
Limit switch	0.085	0.2		

① When L=500 mm - if liquid density is low, then weight is higher

② When L=20" - if liquid density is low, then weight is higher

8.7 Analog transmitter: Dimensions and weight

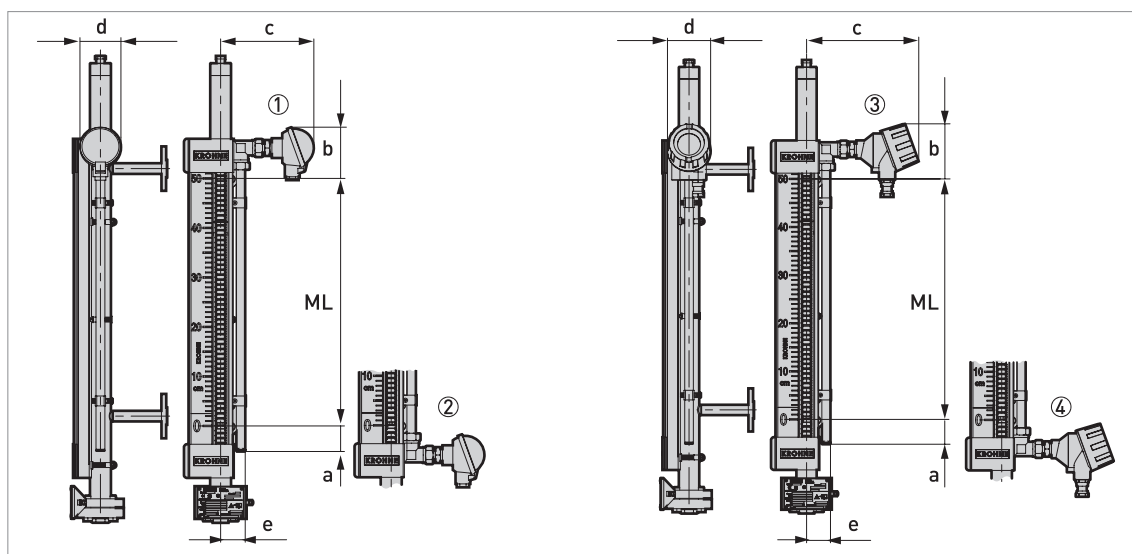


Figure 8-10: Analog transmitter

- ① Non-Ex or Ex i analog transmitter (at the top of the reed chain)
- ② Non-Ex or Ex i analog transmitter (at the bottom of the reed chain)
- ③ Non-Ex or Ex i analog transmitter (at the top of the reed chain, with optional LCD indicator)
- ④ Non-Ex or Ex i analog transmitter (at the bottom of the reed chain, with optional LCD indicator)

Dimensions in mm

Converter	Dimensions [mm]					
	a	b	c	ML	d	e
Non-Ex or Ex i	52	103	189	①	83	50
Non-Ex or Ex i, with optional LCD indicator	52	115	234	①	90	50

① Refer to the dimension ML for each device version

Dimensions in inches

Converter	Dimensions [inches]					
	a	b	c	ML	d	e
Non-Ex or Ex i	2.1	4.1	7.4	①	3.3	2.0
Non-Ex or Ex i, with optional LCD indicator	2.1	4.5	9.2	①	3.5	2.0

① Refer to the dimension ML for each device version

Weights in kg and lb

Converter	Weights for 1 m	Weights for 40 inches	Weights for every additional 1000 mm	Weights for every additional 40 inches
	[kg]	[lb]	[kg]	[lb]
Non-Ex or Ex i	1.32	2.9	+1	+2.20
Non-Ex or Ex i, with optional LCD indicator	1.85	4.1	+1	+2.20

8.8 Support bracket option: Dimensions and weight

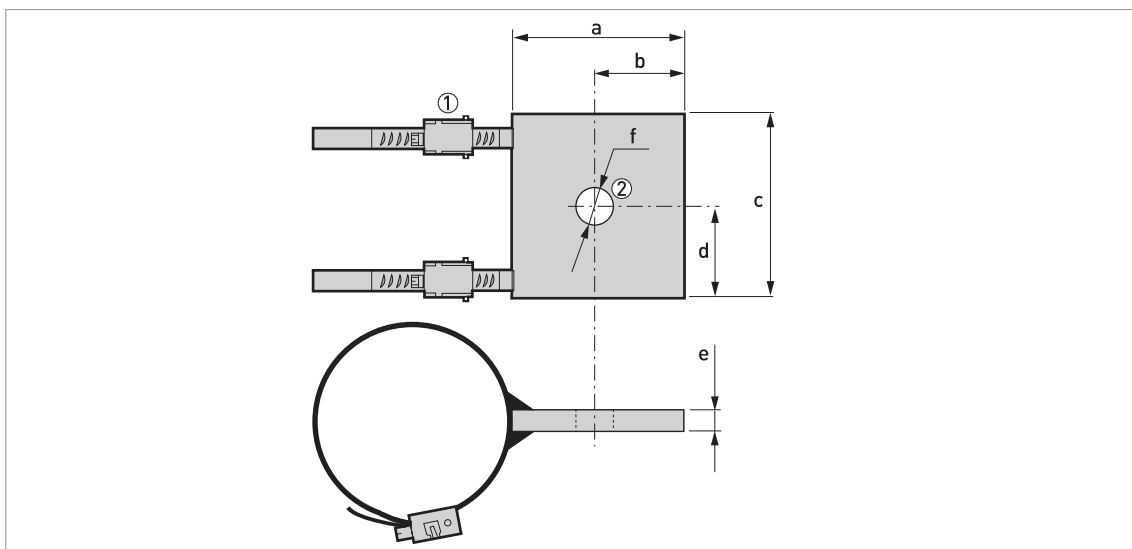


Figure 8-11: Support bracket option

- ① Attach the collar to the measuring chamber
- ② Attach the plate to the tank

Dimensions and weights in mm and kg

	Dimensions [mm]						Weights [kg]
	a	b	c	d	e	f	
Support bracket	50	25	80	40	5	Ø15	0.22

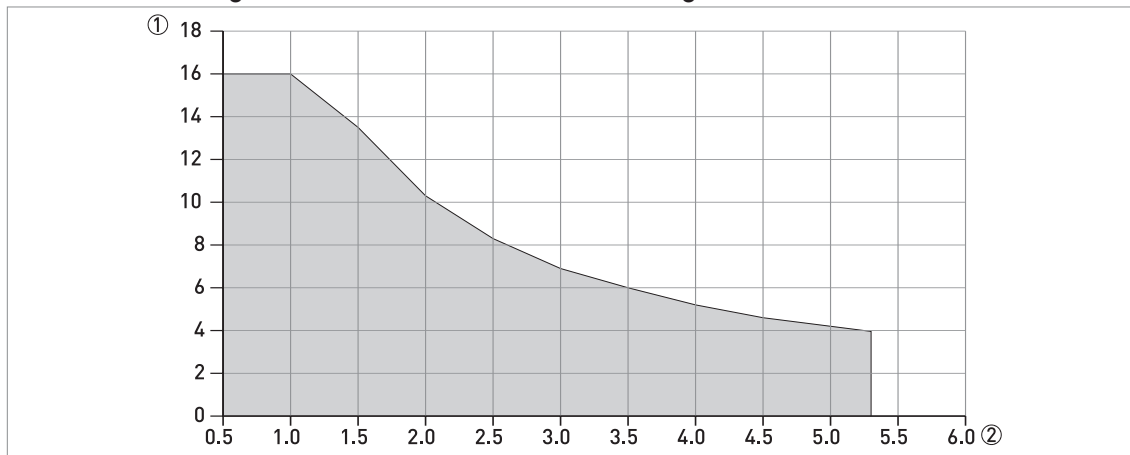
Dimensions and weights in inches and lb

	Dimensions [inches]						Weights [lb]
	a	b	c	d	e	f	
Support collar	2	1	3.14	1.57	0.2	Ø0.6	0.48

8.9 Guidelines for maximum operating pressure

Make sure that the devices are used within their operating limits. Observe the following requirements:

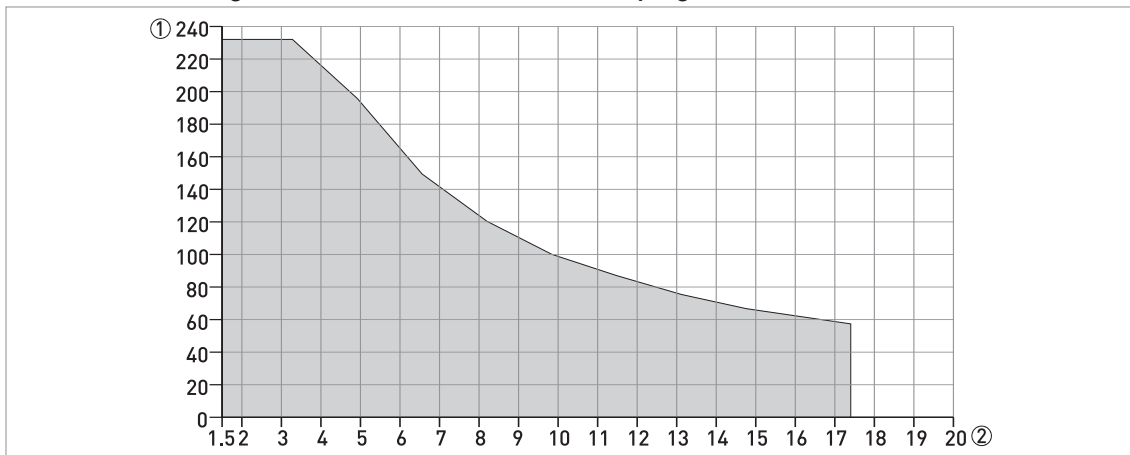
Pressure derating chart for the Basic version in barg



① Process pressure, P [barg]

② Length of the indicator, L [m]

Pressure derating chart for the Basic version in psig



① Process pressure, P [psig]

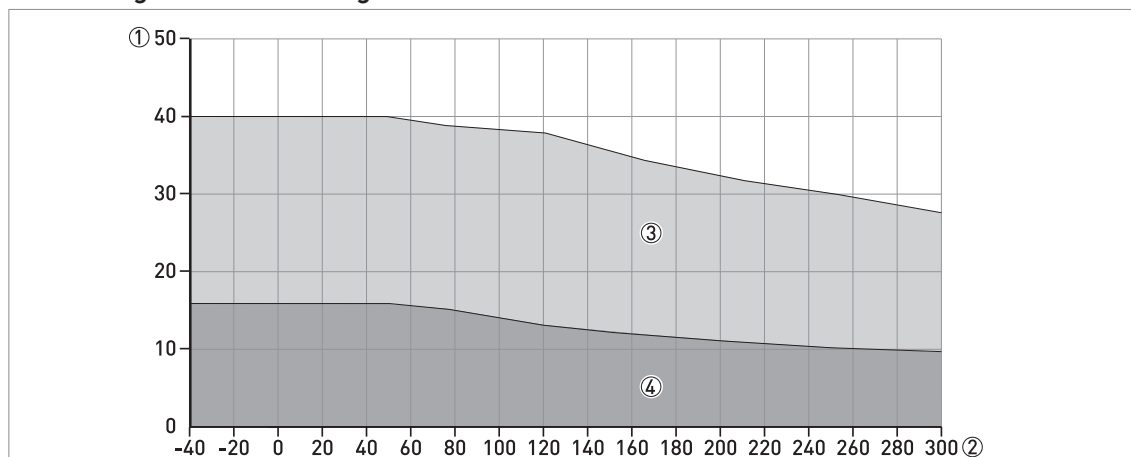
② Length of the indicator, L [ft]



INFORMATION!

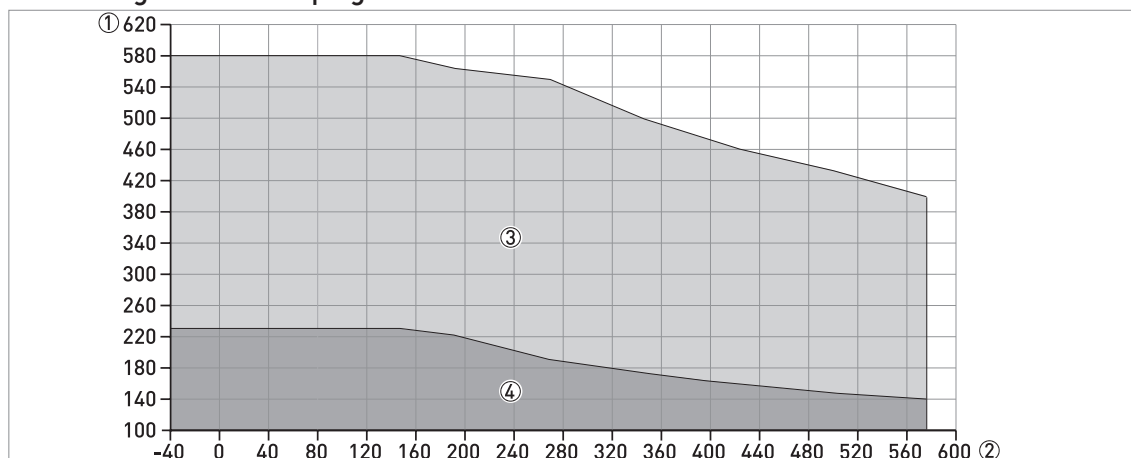
The EU Pressure Equipment Directive does not apply to the use of the BM 26 Basic.

Pressure derating chart (PED 97/23/EC) for the Advanced version with a 316 L measuring chamber in barg



- ① Process pressure, P [barg]
- ② Process temperature, T [°C]
- ③ PN40, PN63, PN100 (EN 1092-1), 300LB (ASME B16.5) flanges, welded pipes and threaded pipes
- ④ 150LB (ASME B16.5) flanges

Pressure derating chart (PED 97/23/EC) for the Advanced version with a 316 L measuring chamber in psig



- ① Process pressure, P [psig]
- ② Process temperature, T [°F]
- ③ PN40, PN63, PN100 (EN 1092-1), 300LB (ASME B16.5) flanges, welded pipes and threaded pipes
- ④ 150LB (ASME B16.5) flanges

8.10 Floats

Make sure that the devices are used within the operating limits of the floats. Refer to the table and graphs that follow:

BM 26 Basic: Application limits of floats in °C, bar and kg/l

	Dimensions	Material	Density range	Maximum operating pressure [barg]		
	[mm]		[kg/l]	20°C	100°C	150°C
Float	Ø32 × 245	316L	0.80...1.19	16	15.1	13.7

BM 26 Basic: Application limits of floats in °F, psi and lb/ft³

	Dimensions	Material	Density range	Maximum operating pressure [psig]		
	[inches]		[lb/ft³]	70°F	210°F	300°F
Float	Ø1.3 × 9.6	316L	49.9...74.3	232	219	199

BM 26 Advanced: Application limits of floats in °C, bar and kg/l

	Dimensions	Material	Density range	Maximum operating pressure [barg]					
	[mm]		[kg/l]	20°C	100°C	150°C	200°C	250°C	300°C
Float 1	Ø32 × 420	Titanium	0.58...0.7	40	37.9	34.4	31.8	29.8	27.6
Float 2	Ø32 × 240	Titanium	0.7...0.99	40	37.9	34.4	31.8	29.8	27.6
Float 3	Ø32 × 185	316L ①	0.99...2.0	40	37.9	34.4	31.8	29.8	27.6

① Hastelloy® C-276 is available on request

BM 26 Advanced: Application limits of floats in °F, psi and lb/ft³

	Dimensions	Material	Density range	Maximum operating pressure [psig]					
	[inches]		[lb/ft³]	70°F	210°F	300°F	390°F	480°F	570°F
Float 1	Ø1.3 × 16.5	Titanium	36.2...43.7	580	449	500	461	432	400
Float 2	Ø1.3 × 9.4	Titanium	43.7...61.8	580	449	500	461	432	400
Float 3	Ø1.3 × 7.3	316L ①	61.8...124.8	580	449	500	461	432	400

① Hastelloy® C-276 is available on request

9.1 Liquid level offset: description

The float contains magnets that rotate the flaps in the indicator column on the side of the measuring chamber. The position of the magnets does not correspond to the level of liquid so the scale is offset at the factory to take into account this difference. The offset of the magnets depends on the liquid density. Refer to the illustration that follows:

Magnet offset

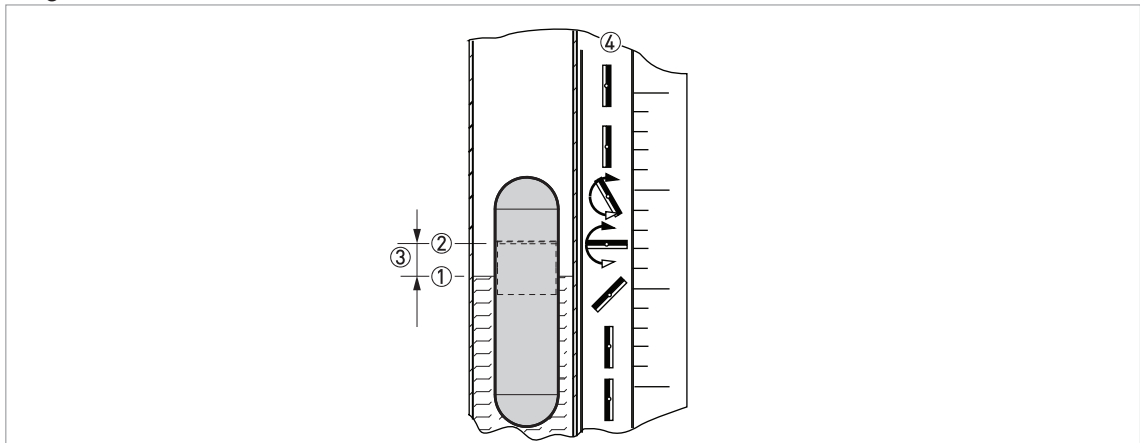


Figure 9-1: Magnet offset

- ① True level of the liquid
- ② Top of the float magnet (which corresponds to the level shown on the indicator column)
- ③ Difference (offset) between the true level of the liquid and the top of the float magnet (depends on the liquid density)
- ④ Indicator column of yellow/black rotating flaps (with the optional scale)



CAUTION!

If the product density changes, the device will not measure accurately. Contact your local sales office for more data and advice.



INFORMATION!

*The limit switches are not delivered attached to the device and the liquid level offset must be taken into account. For the limit switch installation procedure, refer to *Optional limit switch* on page 23. For liquid level offset switches and other correction data, refer to *Liquid level offset: correction data* on page 80.*

9.2 Liquid level offset: correction data

Liquid level offset

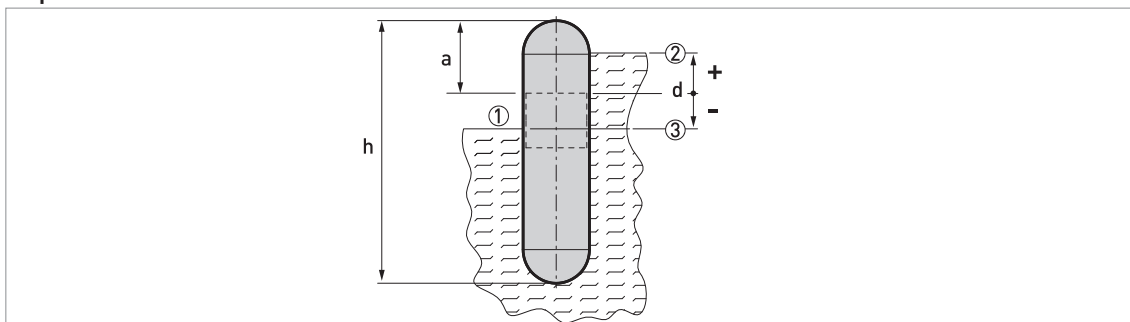


Figure 9-2: Liquid level offset

① Top of the magnets

② Maximum liquid level

③ Minimum liquid level

h is the length of the float,

a is the distance to the zero point of the magnets from the top of the float

d is the liquid level relative to the zero point of the magnet

Dimensions in mm and kg/l

Float	Product density	Dimensions [mm]		
	[kg/l]	a	h	d
Basic version, float 1	0.8...1.19	45	245	①
Advanced version, float 1	0.58...0.7	45	420	①
Advanced version, float 2	0.7...0.99	45	240	①
Advanced version, float 3	0.99...2.0	45	185	①

① Refer to the graphs that follow

Dimensions in inches and lb/ft³

Float	Product density	Dimensions [inches]		
	[lb/ft ³]	a	h	d
Basic version, float 1	49.9...74.3	1.8	9.6	①
Advanced version, float 1	36.2...43.7	1.8	16.5	①
Advanced version, float 2	43.7...61.8	1.8	9.4	①
Advanced version, float 3	61.8...124.8	1.8	7.3	①

① Refer to the graphs that follow

Basic version: Float magnet offset in relation to liquid level in mm

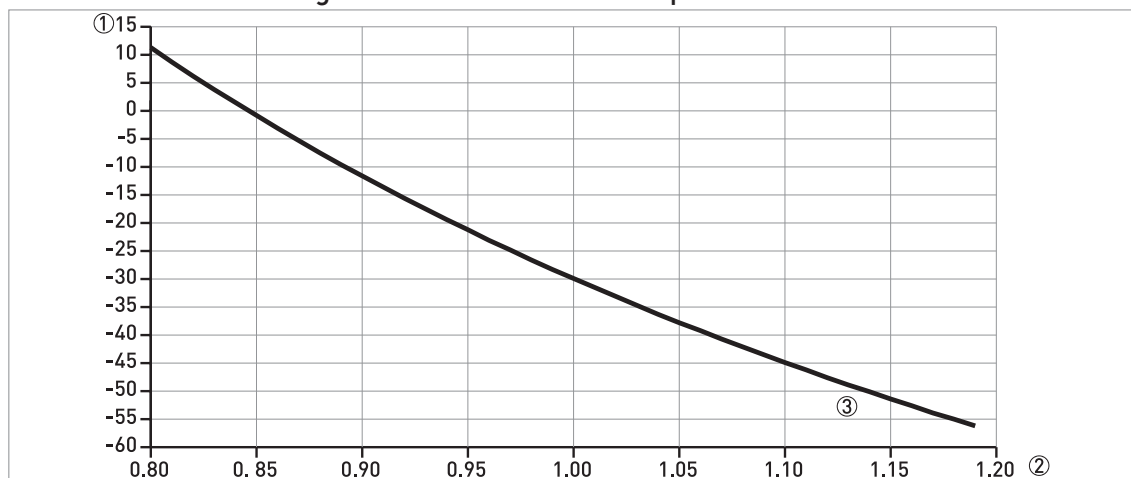


Figure 9-3: Basic version: Float magnet offset in relation to liquid level in mm

- ① Liquid level in relation to the magnet zero point, d [mm]
- ② Liquid density, ρ [g/cm³]
- ③ Curve for Basic version float

Basic version: Float magnet offset in relation to liquid level in inches

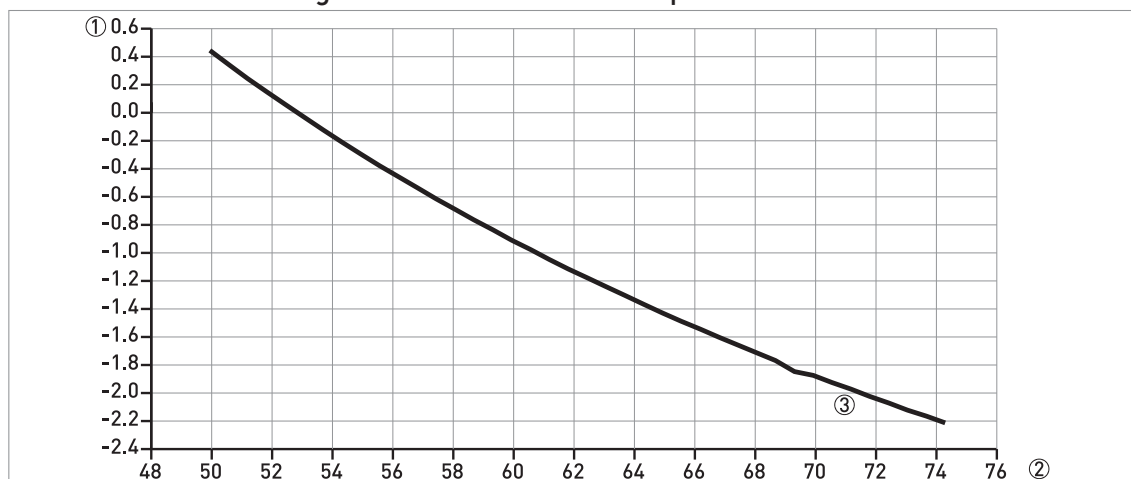


Figure 9-4: Basic version: Float magnet offset in relation to liquid level in inches

- ① Liquid level in relation to the magnet zero point, d [inches]
- ② Liquid density, ρ [lb/ft³]
- ③ Curve for Basic version float

Advanced version: Float magnet offset in relation to liquid level in mm

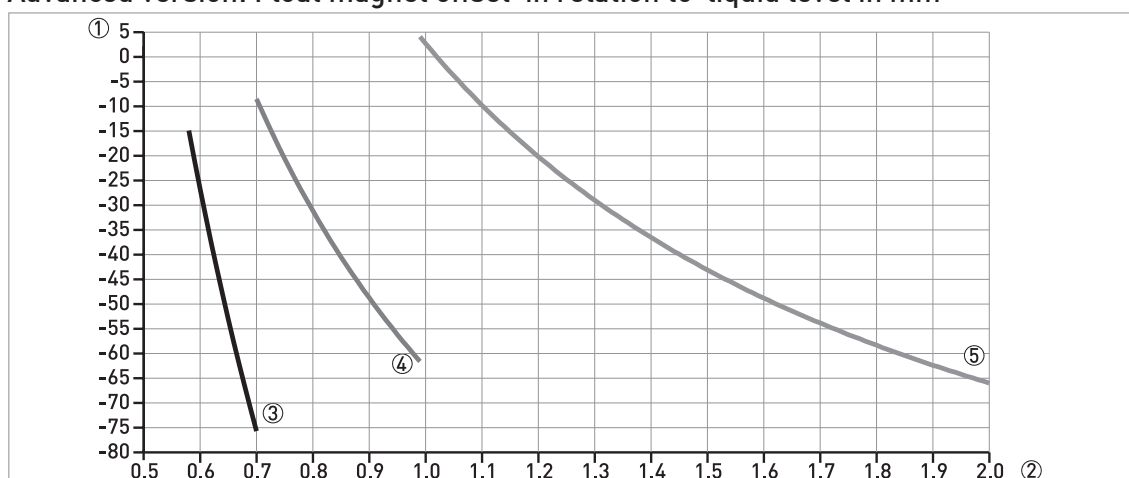


Figure 9-5: Advanced version: Float magnet offset in relation to liquid level in mm

- ① Liquid level in relation to the magnet zero point, d [mm]
- ② Liquid density, ρ [g/cm³]
- ③ Curve for Advanced version float 1
- ④ Curve for Advanced version float 2
- ⑤ Curve for Advanced version float 3

Advanced version: Float magnet offset in relation to liquid level in inches

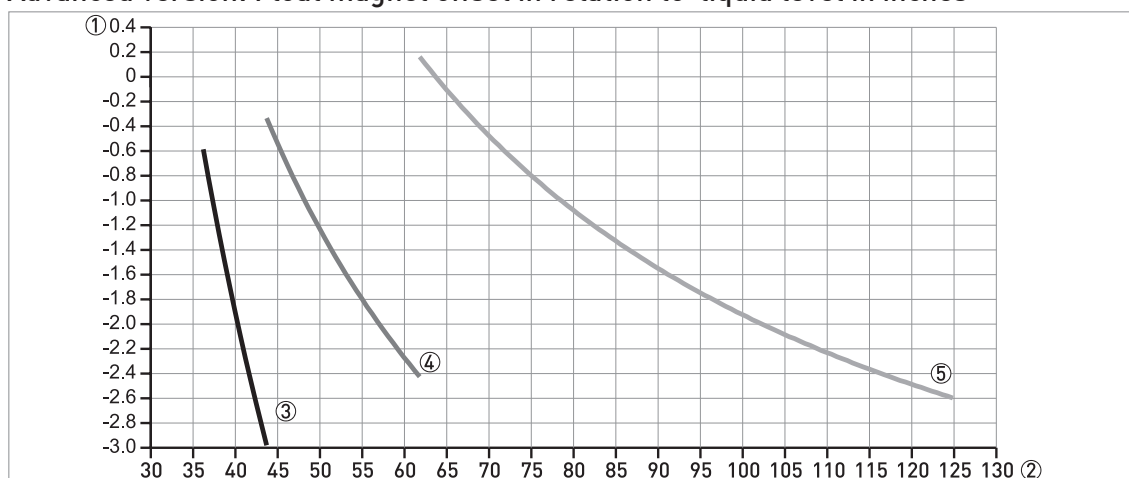


Figure 9-6: Advanced version: Float magnet offset in relation to liquid level in inches

- ① Liquid level in relation to the magnet zero point, d [inches]
- ② Liquid density, ρ [lb/ft³]
- ③ Curve for Advanced version float 1
- ④ Curve for Advanced version float 2
- ⑤ Curve for Advanced version float 3

9.3 Glossary

A

Analog transmitter

An optional device that transmits an output given by the position of a magnetic field along a resistance reed chain. The resistance reed chain is in a tube attached adjacent to the measuring chamber. Output options include 4...20 mA, HART, PROFIBUS PA and FOUNDATION™ Fieldbus.

E

Electromagnetic compatibility

Defines how much a device influences or is influenced by other devices that generate electromagnetic fields during operation. Refer to European standard EN 61326-1 and EN 61326-2-3 for further details.

F

Float

An air-filled, sealed cylinder that contains magnets. The float stays on the surface of liquid in the measuring chamber. The magnetic field of the float operates equipment adjacent to the measuring chamber: this includes the level indicator column, the optional analog transmitter and optional limit switches.

L

Level indicator

The level indicator is column of 2-color, rotating flaps (or a floating index, if this option is available) sealed in a heat-resistant glass tube. An optional scale show the level in the tank in m + cm, feet + inches or % filled.

Limit switch

An optional device with a reed contact that is operated by the magnetic field of the float. It is attached at one or more points adjacent to the measuring chamber. It indicates when the level of the liquid is at a reference point. The switch is bi-stable. The switch stays "open" or "closed" until the float goes back to its initial position.

M

Measuring chamber

The measuring chamber is a bypass chamber that is attached adjacent to a tank with contents that must be measured. There are 2 process connections: 1 at the top and 1 at the bottom of the measuring chamber. The measuring chamber contains a float. Options include axial or lateral process connections, vents, drains and support collars

R

Radar level transmitter

An optional device that transmits a high frequency signal whose frequency increases linearly during the measurement phase (called the frequency sweep). The signal is emitted, reflected on the measuring surface and received with a time delay. The frequency difference is processed and the result is the distance to the surface of the liquid. This data is converted into an output. For more data, refer to technical documentation for the OPTIWAVE 7300 C.

T

TDR

Time domain reflectometry (TDR). The principle used by the TDR level transmitter. For more data, refer to technical documentation for the OPTIFLEX 1300 C.

TDR level transmitter

An optional device (attached to the top of the measuring chamber) that transmits low-intensity electromagnetic pulses along a rigid or flexible conductor. When the pulses get to the surface of the product to be measured, the pulses are reflected. The device measures the time from when the pulse is transmitted to when it is received: half of this time is equivalent to the distance from the reference point of the device (the thread stop) to the surface of the product. The time value is converted into an output. For more data, refer to technical documentation for the OPTIFLEX 1300 C.

9.4 Order code

The characters of the order code highlighted in light grey describe the standard.

Basic version

VF41	4	BM 26 Basic Magnetic bypass level indicator: -40...+150°C and -16 bar max. / -40...300°F and 232 psi max.									
		Material									
		0	316L								
		Approval									
		0	Non-Ex								
		1	ATEX								
		Other approval									
		0	Without								
		Process temperature									
		1	-40...+150°C (-40...+300°F)								
		Density [kg/l]/Float material									
		1	0.8...1.19 / 316L								
		Orientation of process connections									
		0	Lateral / Lateral								
		1	Bottom lateral / Top axial								
		2	Bottom axial / Top lateral								
		3	Axial / Axial								
		4	Bottom lateral / Top axial + 1 support bracket								
		5	Bottom axial / Top lateral + 1 support bracket								
		6	Axial / Axial + 2 support brackets								
		Process connection type									
		0	Without (3/8 NPTF for axial process connections)								
		1	Flange connection								
		2	Welded connection								
		3	Threaded connection (male)								
VF41	4										Order code (complete this code on the pages that follow)

												Process connection	
												0	Without
												1	DN15 PN40
												3	DN20 PN40
												5	DN25 PN40
												7	DN40 PN40
												D	½" 150LB
												E	½" 300LB
												F	¾" 150LB
												G	¾" 300LB
												H	1" 150LB
												K	1" 300LB
												L	1½" 150LB
												M	1½" 300LB
												R	Welded pipe ½", sch10, length 107 mm
												S	Welded pipe ¾", sch10, length 107 mm
												T	Threaded pipe ¾ NPT, Sch10, male, length 35 mm
												U	Threaded pipe ½ NPT, Sch10, male, length 35 mm
												V	Threaded pipe G ¾, Sch10, male, length 35 mm
												W	Threaded pipe G ½, Sch10, male, length 35 mm
												Flange facing	
												0	Without (options without flange connections)
												B	Form B1 (EN 1092-1)
												F	Form RF (ASME B16.5)
												Vent	
												0	Without
												1	3/8 NPT + plug
												Drain	
												1	3/8 NPT + plug
												2	1¼ NPT + plug (without flange)
												Sealing	
												0	Without
												Indicator / scale	
												0	Without indication
												1	Flaps / without scale
												2	Flaps / m + cm
												3	Flaps / feet + inch
												4	Flaps / %
VF41	4											Order code (complete this code on the pages that follow)	

														Transmitter/Converter position	
														0	Without
														D	LT40 (4-20 mA) + display / top of chamber
														E	LT40 (4-20 mA+HART) + display / top of chamber ①
														F	LT40 (4-20 mA) / top of chamber
														G	LT40 (4-20 mA+HART) / top of chamber
														H	LT40 (FF) / top of chamber
														K	LT40 (PROFIBUS PA) / top of chamber
														N	LT40 (4-20 mA) + display / bottom of chamber
														P	LT40 (4-20 mA+HART) + display / bottom of chamber ①
														R	LT40 (4-20 mA) / bottom of chamber
														S	LT40 (4-20 mA+HART) / bottom of chamber
														T	LT40 (FF) / bottom of chamber
														U	LT40 (PROFIBUS PA) / bottom of chamber
														Transmitter approval	
														0	Without
														1	Ex i
														Number of limit switches	
														0	Without
														1	1 switch
														2	2 switches
														3	3 switches
														4	4 switches
														5	5 switches
														Limit switch approval	
														0	Without
														1	Ex i
														A	Namur (DIN 19234)
														B	Namur (DIN 19234), Ex i
VF41	4													0	0
														Certificate for calibration	
														0	Without
														1	Adjustment certificate
VF41	4													0	0
														Tag number	
														0	Without
														2	Tag n° on nameplate
VF41	4													0	0
														Order code (complete this code on the pages that follow)	

[illegible]

① For non-Ex devices only

Advanced version

VF42	4	BM 26 Advanced Magnetic bypass level indicator: 40 bar max. at 20°C / 27.6 bar max. at 300°C (580 psi max. at 68°F / 400 psi maxi. at 572°F)				
		Material				
		0	316L			
		1	Hastelloy® C-276 (on request)			
		Approval				
		0	Non-Ex			
		1	ATEX			
		Other approval				
		0	Without			
			Process temperature			
		0	-40...+20°C (-40...+68°F)			
		1	-40...+50°C (-40...+122°F)			
		2	-40...+100°C (-40...+212°F)			
		3	-40...+150°C (-40...+302°F)			
		4	-40...+200°C (-40...+392°F)			
		5	-40...+250°C (-40...+122°F)			
		6	-40...+300°C (-40...+572°F)			
			Density [kg/l]/Float material			
		0	Without			
		1	0.58...0.7 / Titanium			
		2	0.70...0.99 / Titanium			
		3	0.99...2 / 316L			
		A	0.99...2 / Hastelloy® (on request)			
			Orientation of process connections			
		0	Lateral / Lateral			
		1	Bottom lateral / Top axial			
		2	Bottom axial / Top lateral			
		3	Axial / Axial			
		4	Bottom lateral / Top axial + 1 support bracket			
		5	Bottom axial / Top lateral + 1 support bracket			
		6	Axial / Axial + 2 support brackets			
			Process connection type			
		0	Without			
		1	Flange connection			
		2	Welded connection			
		3	Threaded connection (male)			
		4	Loose flange EN			
VF42	4					Order code (complete this code on the pages that follow)

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[illegible]

① For non-Ex devices only

9.5 Spare parts code

The characters of the order code highlighted in light grey describe the standard.

Limit switch

VF40	4	Limit switch			
		Used with...			
		0	BM 26 Basic		
		1	BM 26 Advanced		
		Approval			
		0	Non-Ex		
		1	ATEX		
		Process temperature			
		0	-40...+150°C (-40...+300°F)		
		1	-80...+300°C (112...572°F)		
		Approval type			
		0	Without		
		1	Ex i		
		A	Namur (DIN 19234)		
		B	Namur (DIN 19234), Ex i		
VF40	4				Order code

Analog transmitter

VF45	4	Analog transmitter					
		Module					
		B	4...20 mA				
		D	FOUNDATION™ Fieldbus				
		E	4...20 mA with LCD indicator ①				
		G	4...20 mA+HART with LCD indicator ②				
		W	4...20 mA+HART				
		X	PROFIBUS PA				
		Approval					
		0	Non-Ex				
		1	Ex i				
			Mounting position				
			1	Top			
			B	Bottom			
				C-C length			
				0	0 m		
				1	1 m		
				2	2m		
				3	3 m		
				4	4 m		
				5	5 m (5.3 m max. - longer on request)		
					C-C length (> 1000 mm)		
					0	0 mm	
					1	100 mm	
					2	200 mm	
					3	300 mm	
					4	400 mm	
					5	500 mm	
					6	600 mm	
					7	700 mm	
					8	800 mm	
					A	900 mm	
						Power supply	
						0	Without
VF45	4						Order code

① The units (mm, % etc.) must be specified in the order

② The units (mm, % etc.) must be specified in the order. For non-Ex devices only.