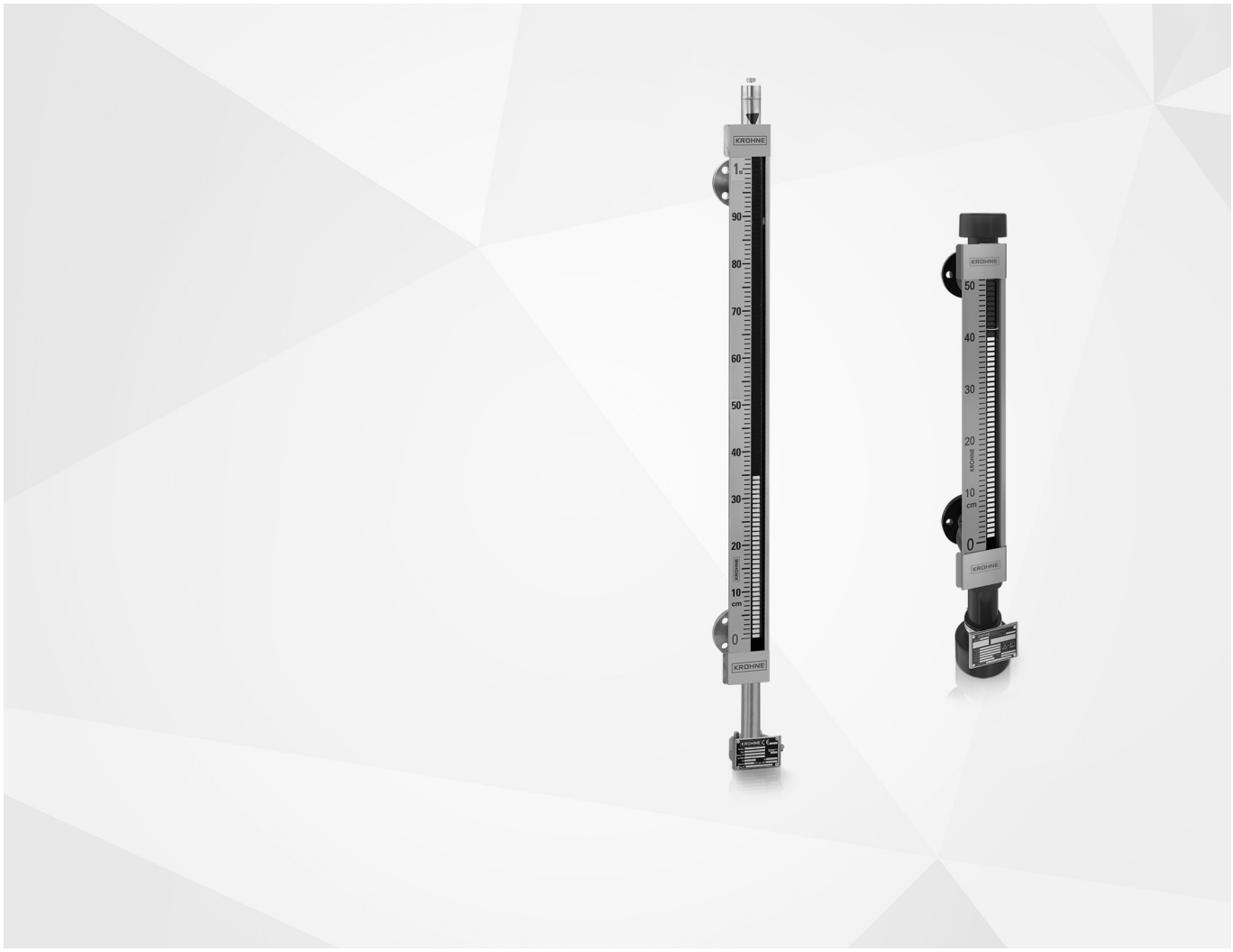

BM26A-1000/3000 Handbook

Magnetic Level Indicator
BM26A-1000: basic liquid applications
BM26A-3000: corrosive liquids

KROHNE

IMPRINT

1.1 Intended use

The BM26A-1000 and BM26A-3000 are magnetic level indicators that measure the level or volume of liquids.

The BM26A-1000 is a low-cost solution for basic applications.

The BM26A-3000 is designed to be used with corrosive liquids.

These devices are installed next to open or pressurized tanks. With the applicable options, they are resistant to difficult service conditions and liquids that are poisonous or flammable.

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

DANGER!
For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

CE marking

The device meets the essential requirements of the EU Directives

BM26A-1000

- Pressure Equipment Directive
- ATEX Directive (only for devices approved for hazardous locations)

LT40

- Electromagnetic Compatibility Directive
- ATEX Directive (only for devices approved for hazardous locations)

MS15 series / MS40 series

- Low Voltage Directive (only for switches that do not have a NAMUR ouput)
- ATEX Directive (only for devices approved for hazardous locations)

The manufacturer certifies successful testing of the product by applying the CE marking. For more data about the EU Directives and European Standards related to this device, refer to the EU Declaration of Conformity. You can download this document free of charge from the website (Download Center).

1.3 EU Pressure Equipment Directive

These devices are designed, assembled and tested to agree with the EU Pressure Equipment Directive (PED). The CE mark on the nameplate shows that the manufacturer did a conformity assessment. The PED conformity assessment is approved by a Notified Body. The identification number of the Notified Body is given on the nameplate.

INFORMATION!
The Pressure Equipment Directive is not applicable to BM26A-3000. The maximum permitted pressure is related to the distance between the process connections. For more data, refer to Maximum process pressure: measuring chamber on page 101.

A code on the nameplate gives data about the PED rating of the device:

Example: PED/G1/III	
G	Gases and vapours
1	Fluid group 1
III	Category III

Table 1-1: Example of PED rating

For more data about the nameplate refer to *Measuring chamber nameplate* on page 14 ("Namur").

WARNING!
The process pressure (PS) and process temperature (TS) are given on the device nameplate and are only applicable to your measuring chamber. Do not use the device at a process pressure more than the maximum limit for a given process temperature. For more data, refer to Maximum process pressure: measuring chamber on page 101.

WARNING!
If the device has an Ex approval, then you must obey other temperature limits. For more data, refer to the Ex supplementary instructions.

The manufacturer did a risk analysis on the device that agrees with the Pressure Equipment Directive. All personnel must know the design and operating conditions that follow to prevent the risk of damage and injury:

- This device is designed to function at almost constant pressure and temperature conditions. A maximum of 500 cycles is permitted along the full pressure range. A maximum of 2000 cycles is permitted along the full temperature range.
- This device 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 cause 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 etc.).

- 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 pressure permitted by the pressure-limiting valve) must never be more than the maximum permitted pressure, PS. PS is 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 device is designed to measure a liquid with a gas phase. It is not designed to measure liquids that change to a solid phase because of changes in pressure (solidification) and temperature (freezing), e.g. water and ice.
- Make sure that there are no magnetic particles in the liquid. These particles can have an effect on the performance of the device.
- Make sure that the size of the particles in the liquid are less than 0.05 mm / 0.002¨ in diameter.
- Make sure that the device is correctly sealed. Do a leakage check between the device and the tank.
- The external pressure, Pext, must be equal to atmospheric pressure, Patmos (Pext = Patmos).

1.4 Safety instructions from the manufacturer

1.4.1 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.

1.4.2 Product liability and warranty

The BM26A-1000 and BM26A-3000 magnetic level indicators are designed solely for measuring the level or 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.

1.4.3 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 icons as shown below.

1.4.4 Warnings and symbols used

Safety warnings are indicated by the following symbols.

DANGER!
This warning 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.

1.5 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

Do a check of the packing list to make sure that your device agrees with the customer order. The device is supplied in one box.

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

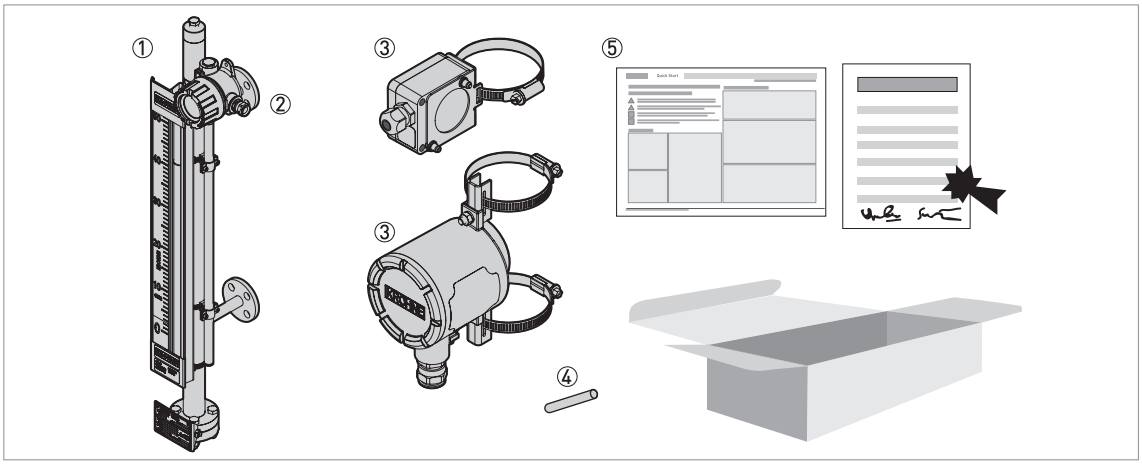

Figure 2-1: Scope of delivery

① Measuring chamber with the indicator column and optional indicator scale
② Optional reed-chain level transmitter - LT40 C/F
③ Optional limit switches - MS15 series or MS40 series. If the customer order includes limit switches, they can be attached to the measuring chamber or can be supplied in preformed packing at one end of the box. You must attach them to the measuring chamber and make sure that they are in the correct position before operation.
④ Magnet (to set the indicator column to zero after installation - if the flaps moved during transportation). The magnet is attached to the indicator column with adhesive tape.
⑤ Quick Start

Technical documentation for this device can be downloaded from the website (Download Centre).

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, its magnetic field turns a column of flaps inside the glass tube of the indicator. If a reed-chain level transmitter is also attached adjacent to the measuring chamber, it is possible to have an output that can be monitored from a remote station. Optional limit switches let the user monitor important measurement limits.

2.2.1 BM26A-1000 magnetic level indicator

The BM26A-1000 is a low-cost solution for basic applications. The measuring chamber is made of stainless steel. It is designed to measure the level of liquids that have a density of 700...1200 kg/m³ / 43.70...74.91 lb/ft³, for a temperature range of -70...+200°C / -94...+392°F at a pressure of -1...40 barg / -14.5...580 psig.

2.2.2 BM26A-3000 magnetic level indicator

The measuring chamber of the BM26A-3000 is made of PVC, PP or PVDF. It is designed to measure the level of liquids that can cause the corrosion of metal surfaces.

BM26A-3000 PVC

This device is designed to measure the level of corrosive liquids that have a density of 680...1200 kg/m³ / 42.45...74.91 lb/ft³, for a temperature range of -20..+50°C / -4...+122°F at a pressure of 0...6 barg / 0...87 psig.

BM26A-3000 PP

This device is designed to measure the level of corrosive liquids that have a density of 560...1200 kg/m³ / 34.96...74.91 lb/ft³, for a temperature range of -20..+100°C / +212°F at a pressure of 0...6 barg / 0...87 psig.

BM26A-3000 PVDF

This device is designed to measure the level of corrosive liquids that have a density of 700...1200 kg/m³ / 43.70...74.91 lb/ft³, for a temperature range of -20..+100°C / +212°F at a pressure of 0...6 barg / 0...87 psig.

2.2.3 LT40 reed-chain level transmitter (option)

It is possible to have the level of the liquid shown as an output signal that can be monitored from a remote station.

The LT40 is an optional transmitter that has a column of reed resistors and a signal converter. The LT40 transmits an output signal that is proportional to the resistance given by the position of the magnetic float in the measuring chamber adjacent to the reed chain. This output signal can be analog (4…20 mA) or digital (HART®, PROFIBUS PA or FOUNDATION™ fieldbus). There is also an output signal option with an analog and digital signal (4...20 mA + HART).

2.2.4 MS15-series and MS40-series limit switches (option)

Limit switches let the user monitor important measurement limits. The limit switch is a bistable electrical device that is set to open or close when a magnetic object (float) goes near to it.

HIGH limit switch

The limit switch is set to open when the float is above the switching point.

LOW limit switch

The limit switch is set to open when the float is below the switching point.

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 Location of device labels

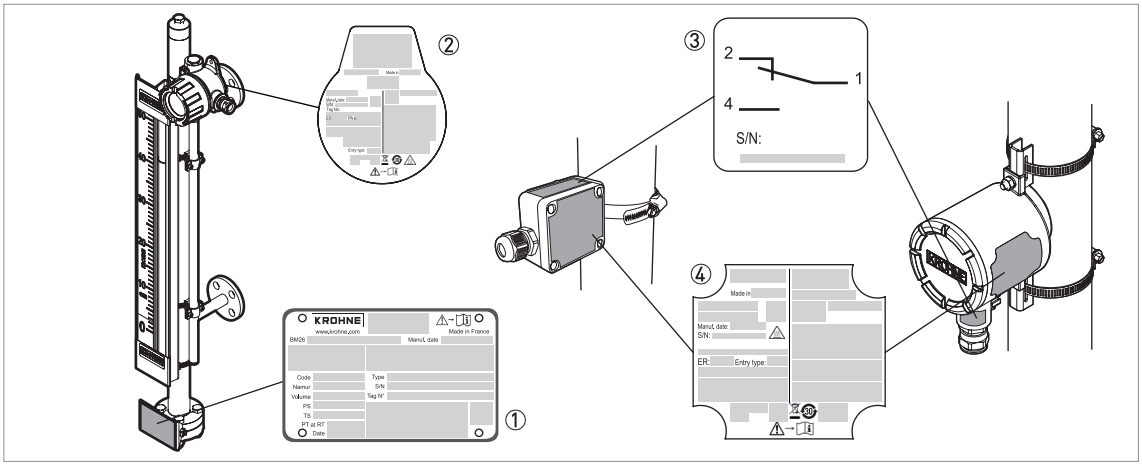

Figure 2-2: Location of device nameplates

① Measuring chamber nameplate
② LT40 reed-chain level transmitter nameplate (on the rear side of the housing)
③ MS15-series or MS40-series limit switch: electrical schematic label
④ MS15-series or MS40-series limit switch nameplate

2.3.2 Measuring chamber nameplate

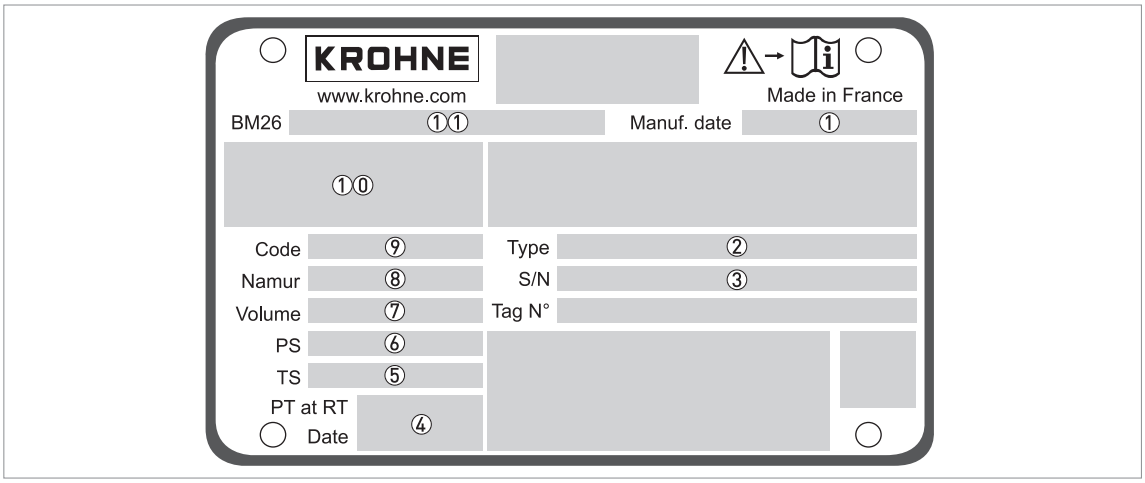

Figure 2-3: Measuring chamber nameplate

① Date of manufacture (Year . Month . Day)
② Designation code (VF or SF code given in the order)
③ Factory serial number
④ Test pressure (PT) and test date
⑤ Process temperature range (TS)
⑥ Process pressure range (PS)
⑦ Measuring chamber volume)
⑧ PED marking (no marking, PED/G1/III, PED/G1/IV or PED/G2/III). This marking agrees with NAMUR Recommendation NE 080. There is no marking in this zone for the BM26A-3000 because PED is not applicable to this device. For more data, refer to *EU Pressure Equipment Directive* on page 7.
⑨ Construction code
⑩ CE marking. If EU directives are not applicable to the device, then the device does not have a CE marking. PED certification agency code (0036) - if there is a PED marking given on the nameplate. Refer also to item ⑦ on this illustration.
⑪ Model name

2.3.3 LT40 reed-chain level transmitter nameplate

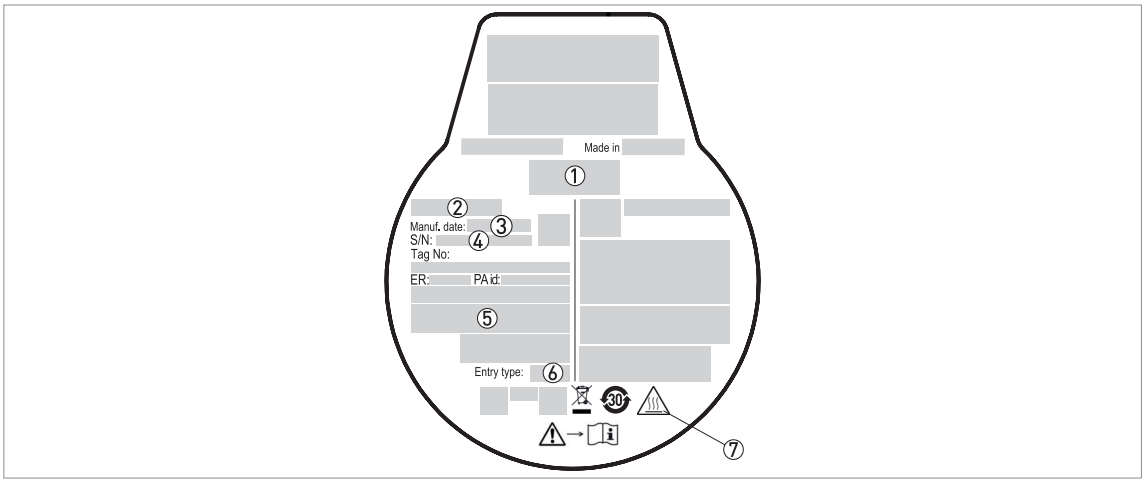

Figure 2-4: LT40 reed-chain level transmitter nameplate

① Model
② Designation code (VF or SF code given in the order)
③ Date of manufacture
④ Factory serial number
⑤ Electrical data
⑥ Cable entry size
⑦ WARNING! Hot surface. If the device is connected to a tank that operates at high temperature, there is a risk of injury.

2.3.4 Nameplate and electrical schematic label for the MS15-series and MS40-series limit switches

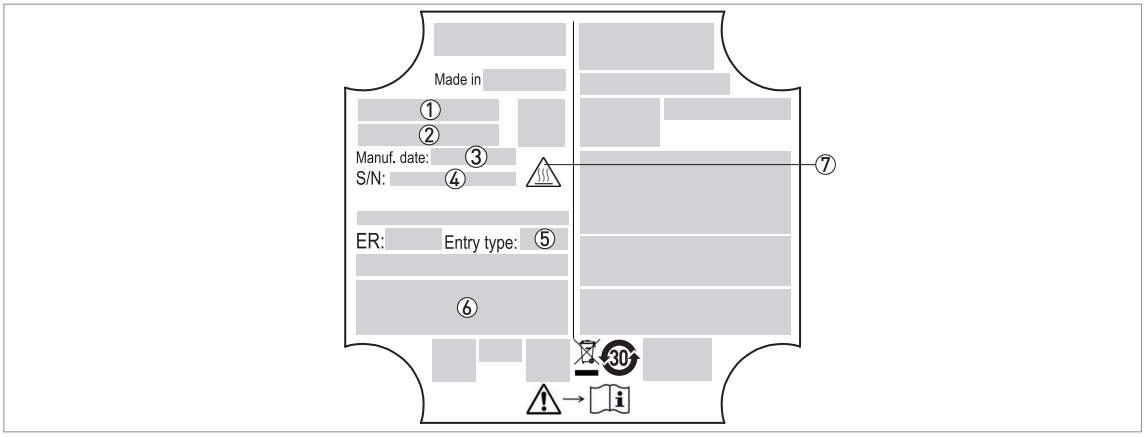

Figure 2-5: Limit switch nameplate (housing cover)

① Model
② Designation code (VF or SF code given in the order)
③ Date of manufacture
④ Factory serial number
⑤ Cable entry size (only for MS15 series)
⑥ Electrical data
⑦ WARNING! Hot surface. If the device is connected to a tank that operates at high temperature, there is a risk of injury.

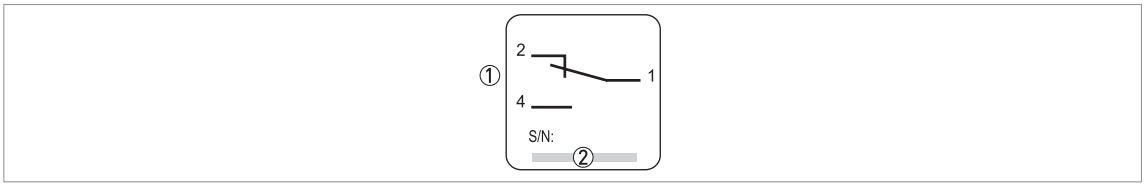

Figure 2-6: Electrical schematic label (limit switch housing)

① Electrical schematic
② Factory serial number

WARNING!
MS40 series: Make sure that the serial number on the electrical schematic label (limit switch housing) agrees with the serial number on the nameplate (limit switch housing cover).

3.1 General notes for installation

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

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

This chapter gives procedures to:

- put the device into storage,
- move the device safely,
- prepare the device for installation, and
- install the device.

3.2 Storage

- Do not keep the device in a vertical position before installation. Put the device on its side.
- Store the device in its original packing and in dry and dust-free location.
- **Storage temperature range:** refer to the table that follows.

Storage temperature

Device	Storage temperature	
	[°C]	[°F]
BM26A-1000 magnetic level indicator	-70…+80	-94…+176
BM26A-3000 magnetic level indicator	-20…+80	-4…+176
LT40 C/F reed-chain level transmitter	-40…+80	-40…+176
MS15-series limit switch		
MS40-series limit switch		

Table 3-1: Storage temperature

3.3 Transportation

Lift the device carefully. Make sure that the method used to transport the device is adapted to its weight and agrees with national regulations.

3.4 How to prepare the device for installation

3.4.1 Packings

Discard the packings and make sure that the float is in the measuring chamber and can move freely.

CAUTION!
Make sure that you do not discard the limit switches and the magnet that are attached to the indicator column with adhesive tape.

If the device has one or more process connections on the side of the measuring chamber, then the float is in the measuring chamber, locked with a pin and cannot move. Remove the lock pin before you install the device in the tank. For the procedure to remove the lock pin, refer to *How to remove the float lock pin* on page 19.

If the device has no process connections on the side of the measuring chamber, then the float is not in the measuring chamber. For the procedure to put the float in the measuring chamber, refer to *How to put the float in the measuring chamber* on page 20.

CAUTION!
Make sure that the device does not contain unwanted objects (dirt etc.).

INFORMATION!
Optional limit switches are usually not attached to the measuring chamber before delivery. Examine the contents of the box for missing items, if it is necessary.

3.4.2 How to remove the float lock pin

If the device has one or more process connections on the side of the measuring chamber, then the float is in the measuring chamber. Do the procedure that follows before you install the device on the tank.

CAUTION!
The float is locked in position with a pin. You must remove the float lock pin before you can use the device.

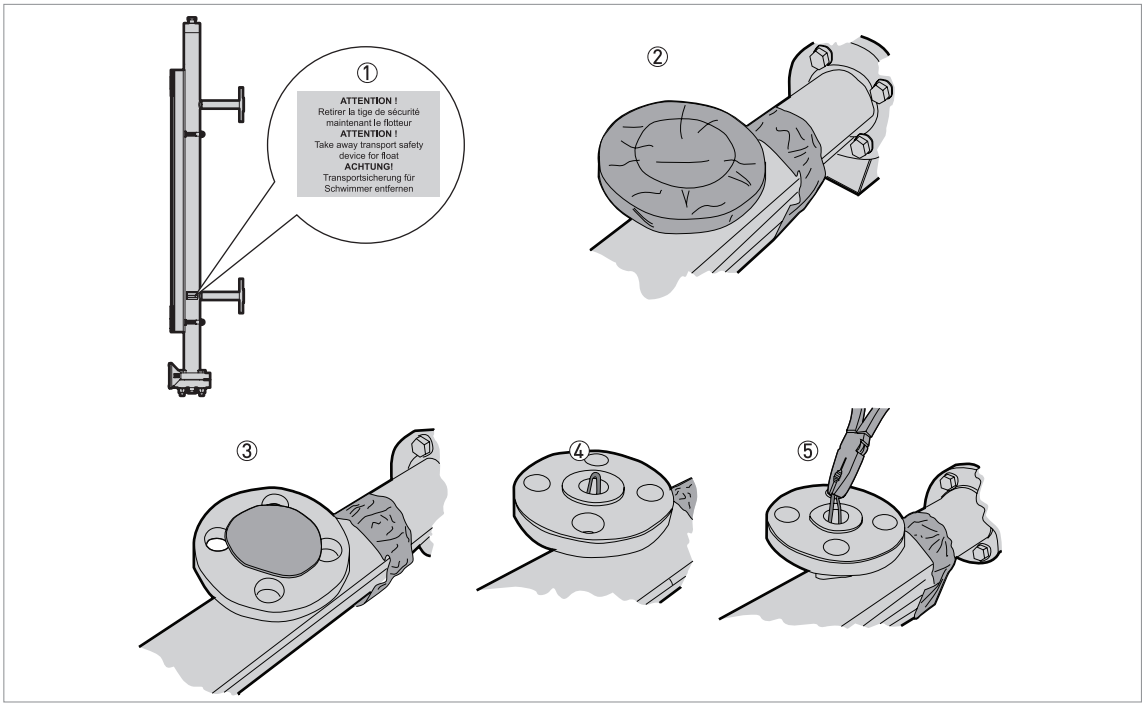

Figure 3-1: How to remove the float lock pin

Equipment needed

- A pair of pliers (not supplied)

Procedure

① Check the measuring chamber for a red label next to a side process connection. You can find the lock pin in this process connection.
➲ Label text: ATTENTION! Take away transport safety device for float.
② Remove the adhesive tape around the process connections.
③ Remove the plastic protection from the process connections.
④ Find the lock pin in the process connection.
⑤ Remove the lock pin with a pair of pliers.
➲ End of the procedure. The device can be installed on the tank.

3.4.3 How to put the float in the measuring chamber

If the device does not have process connections on the side of the measuring chamber, then the float is not supplied in the device. Do the procedure that follows before you use the device.

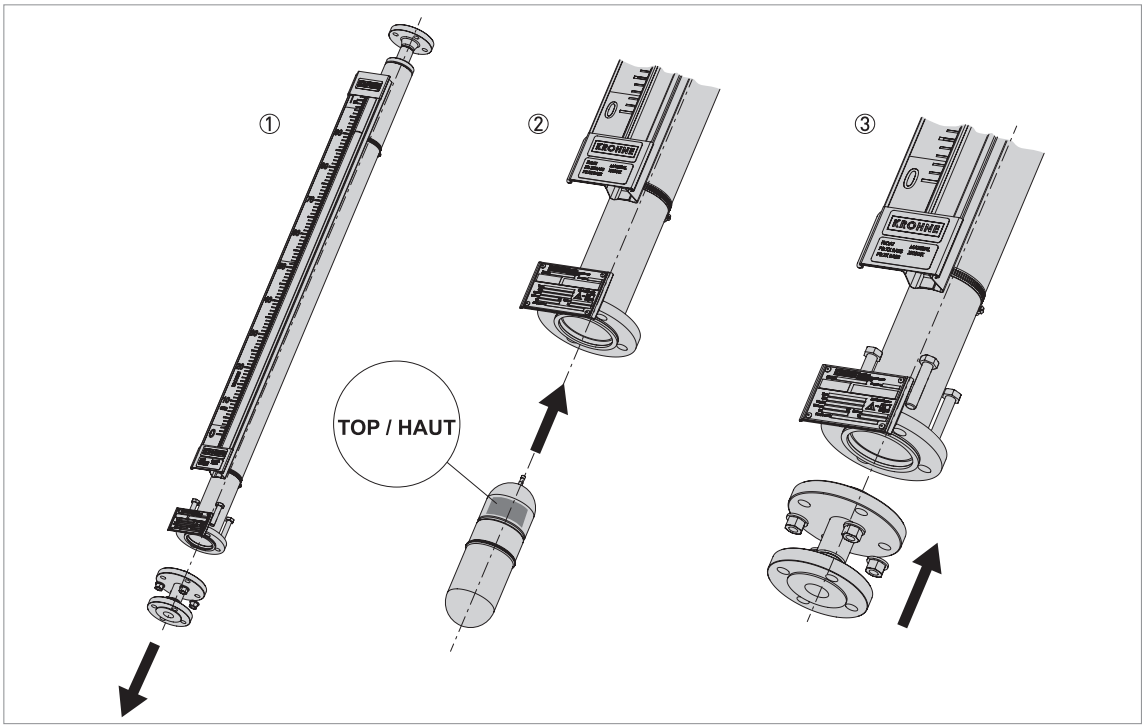

Figure 3-2: How to put the float in the measuring chamber (if it is delivered separately)

Equipment needed

- A torque wrench (not supplied)

Procedure

① Remove the bottom flange.
② Put the top of the float in the measuring chamber first (the end of the float that has the label "TOP / HAUT" on it).
③ Align the gaskets. Attach the bottom flange and tighten the bolts to the correct torque.
➲ End of the procedure. The device can be installed on the tank.

WARNING!
Make sure that the torque applied on the bolts of the bottom flange agrees with the process or test conditions, the related standards and good engineering practice.

3.5 Installation - measuring chamber

3.5.1 General notes

The operating conditions that are applicable for your device are given on the device nameplate. For more data on where to find the operating conditions data for your device, refer to *Nameplates* on page 13. For general technical data about the device, refer to *Technical data* on page 74.

Make sure that the installation conditions obey the design constraints related to PED. For more data, refer to *EU Pressure Equipment Directive* on page 7.

Other installation conditions

- Make sure that there is no contamination (dirt etc.) or unwanted objects in the measuring chamber.
- Install the magnetic level indicator vertically on the tank.
- Make sure that the device is correctly installed. The device nameplate is always at the bottom of the device.
- Select bolts and gaskets (not supplied) that agree with the pressure rating of the process connection and the process pressure.
- Make sure that mechanical loadings do not cause damage to the process connections. If necessary, put support brackets on the device.

DANGER!
Make sure that the outer surface temperature of the device is less 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!
Stay away from the process connections. If you stand on the process connections, you can cause damage to the device and the installation.

3.5.2 Isolation valves

We recommend that you install isolation valves between the device and the tank. The device can then be easily removed from the tank for the cleaning procedure. Drain the device only when it is isolated from the tank.

3.6 Installation - indicator column

3.6.1 General notes

The level indicator column is attached to the measuring chamber in the factory. Customer order data is used to adjust its position. No other adjustment is necessary.

CAUTION!
Customer order data is used to adjust the device. If liquid density changes, the device will not measure correctly. For example, if liquid density decreases, then the float does not follow the surface of the liquid and goes down to the bottom of the measuring chamber. For more data about errors and error handling, refer to Errors on page 43.

3.6.2 How to set the indicator column to zero

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.

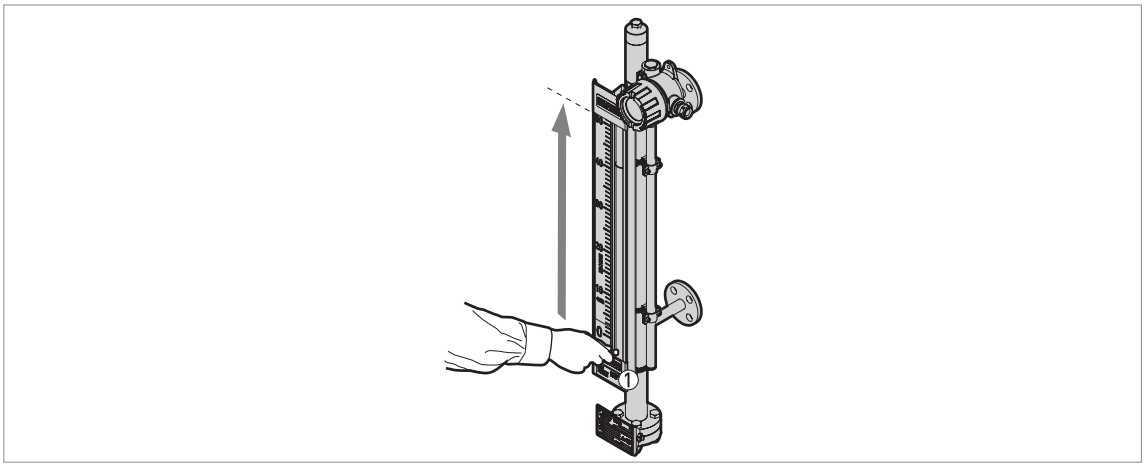

Figure 3-3: Set the indicator column to zero

Equipment needed

- Magnet (to set the indicator column to zero after installation - if the flaps moved during transportation). The magnet is attached to the indicator column with adhesive tape for transportation.

Procedure

- 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.

➲ End of the procedure. The flaps all turn to black. The indicator column is set to zero. You can now fill the tank.

3.7 Installation - reed-chain level transmitter (LT40)

3.7.1 General notes

The reed-chain level transmitter is attached to the measuring chamber at the factory. Customer order data is used to adjust its position. No other adjustment is necessary.

CAUTION!
Do not move the reed-chain level transmitter. If you adjust the position of this device, the output will be incorrect. Speak or write to our nearest sales office to get a procedure to correct this error.

CAUTION!
Customer order data is used to adjust the device. If liquid density changes, the device will not measure correctly. For example, if liquid density decreases, then the float does not follow the surface of the liquid and goes down to the bottom of the measuring chamber. For more data about errors and error handling, refer to Errors on page 43.

LT40 C

The electronics module of the compact version of the LT40 is attached to the reed-chain tube.

LT40 F

The electronics module of the remote version of the LT40 is connected the reed-chain tube by an electrical cable this a maximum of 25 m / 82 ft long. The electronics module of the remote version can be attached to a pipe with two hose clamps or attached to a wall with two bolts. Refer to the illustration that folows:

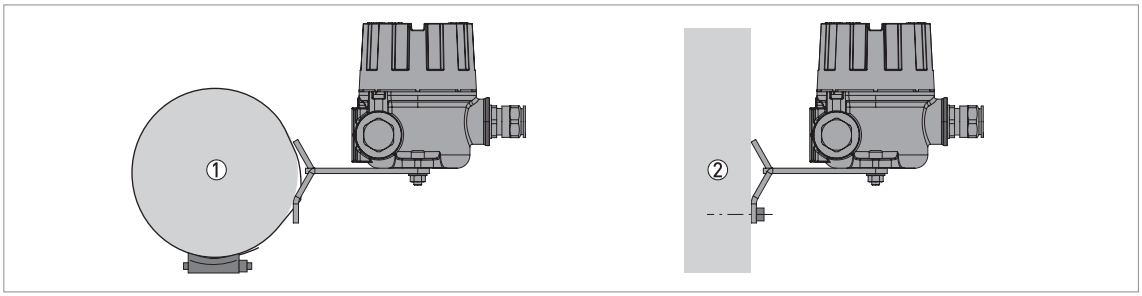

Figure 3-4: LT40 F: Installation of the housing (remote version) for the electronics module: top view

① The housing is attached to a tube with two hose clamps
② The housing is attached to a wall with two bolts

3.7.2 Thermal insulation

If you put thermal insulation around the magnetic level indicator, do not cover the housing of the reed-chain level transmitter. Make sure that there is approximately 15 mm / 0.6¨ of empty space between the housing and the thermal insulation.

3.8 Installation - limit switches (MS15 series and MS40 series)

3.8.1 General notes

The limit switches are supplied in the box with the magnetic level indicator. The packing solution agrees with good professional practice.

- If the limit switches are attached to the device, then they are at one end of the measuring chamber, but not in the correct position. Obey the procedure on page 26.
- If the limit switches are not attached to the device, then they are in preformed packing at one end of the box. Remove the limit switches from the packing and obey the procedure on page 26.

Make sure that you position the limit switch correctly. The density of the liquid, the position of the magnets in the float (float type), and the limit switch condition (”LOW limit” or “HIGH limit”) will have an effect on the position of the limit switch on the measuring chamber.

Limit switch condition - LOW limit:
The limit switch is open when the float moves **below** the switching point.

Limit switch condition - HIGH limit:
The limit switch is open when the float moves **above** the switching point.

CAUTION!
The limit switch does not immediately change its condition when the float goes above or below the limit switch position. The limit switch has an offset (hysteresis) that causes the switch to change its condition to "open" when the float moves a small distance above or below its position. Thus, it is necessary to adjust the position of the limit switch to the offset to have the correct switching point.

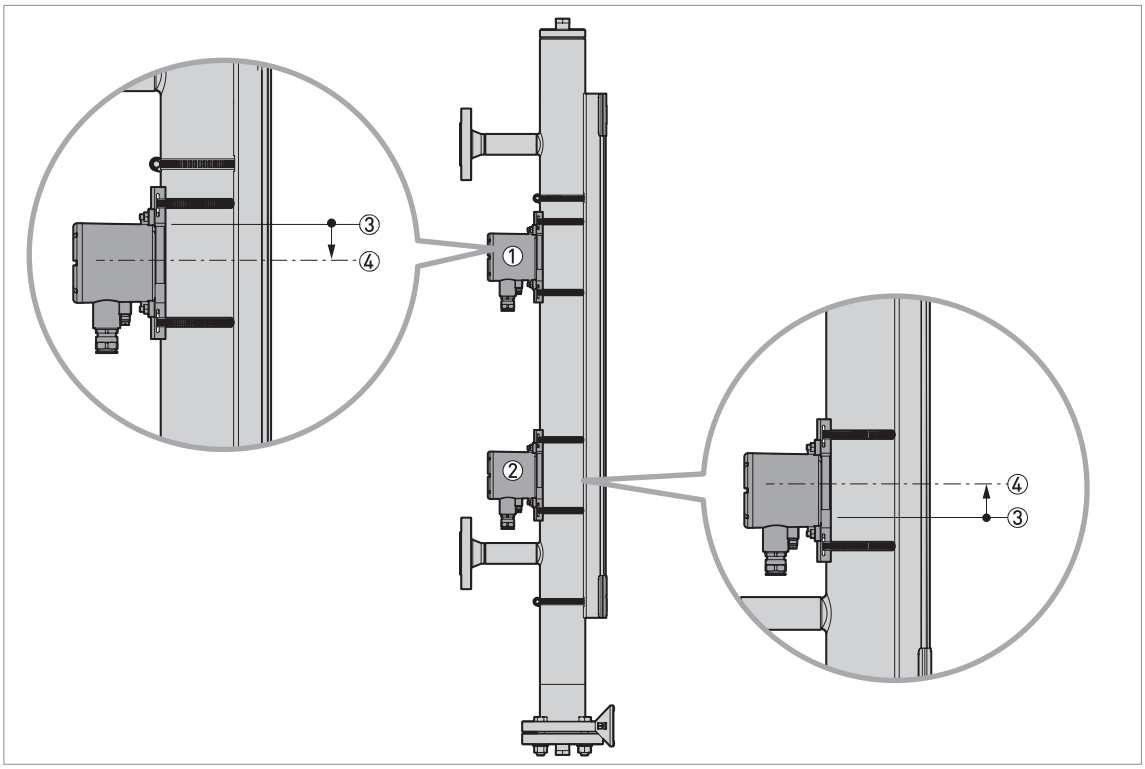

Figure 3-5: Definitions

① Limit switch in "HIGH limit" position
② Limit switch in "LOW limit" position
③ Switching point (the level at which the limit switch changes its condition from "closed" to "open")
④ Correct position of the limit switch in relation to the switching point. If it is a "HIGH limit" switch, put it below the switching point (at a distance equal to the switching point offset value). If it is a "LOW limit" switch, put it above the switching point (at a distance equal to the switching point offset value).

CAUTION!

Risk of overfill. If liquid density changes, the limit switch will not detect level correctly. Recalculate the position of the limit switch to agree with the density of the liquid and repeat the installation procedure that follows.

3.8.2 Procedures

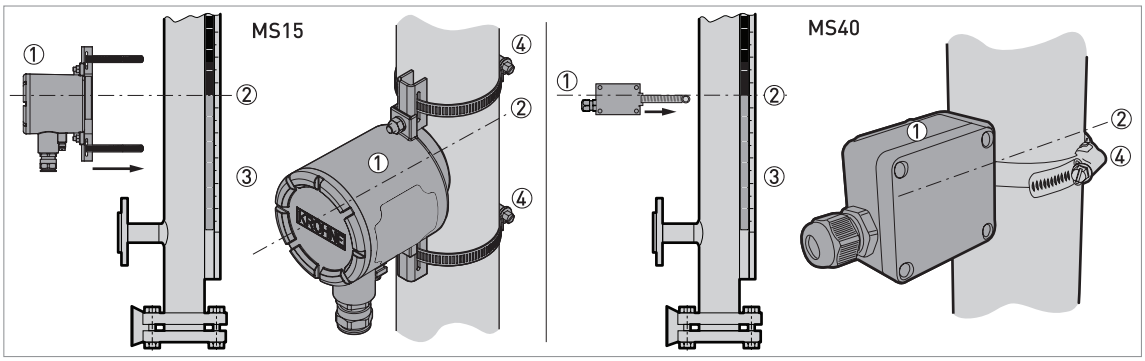

Figure 3-6: How to attach the limit switch to the measuring chamber

① Limit switch
② Limit switch position
MS15 series: a horizontal line at the same height as the centre of the cylindrical surface of the limit switch that touches the measuring chamber
MS40 series: a horizontal line at the same height as top of the clamp slot on the limit switch bracket
③ Level indicator and optional measuring scale
④ Limit switch clamp

Equipment needed

- Large slotted screwdriver (not supplied)

CAUTION!
Make sure that the cable gland is on the bottom half of the housing and is tight to stop leaks into the housing.

CAUTION!
Limit switches are not attached to the measuring chamber at the factory. Make sure that you include the switching point offset in your calculation when you make adjustments to the position of the limit switch on the measuring chamber.

General procedure

- Use the clamp to attach the limit switch to the measuring chamber. Do not tighten the clamp.
- Put the limit switching in a position where the switching point centreline is at the level required. Refer to the indicator column scale to help you position the limit switch.
- Adjust the limit switch position for the switching point offset. For more data, refer to the "Switching point offset values" table in this section.
- Tighten the limit switch clamp.

➲ End of the procedure.

Switching point offset (hysteresis)

Limit switch - "HIGH limit" position

Put the limit switch in a position a small distance above theswitching point. This adjustment is equal to the switching point offset value. Refer to the table that follows.

Limit switch - "LOW limit" position

Put the limit switch in a position a small distance below the switching point. This adjustment is equal to the switching point offset value. Refer to the table that follows.

Device	Measuring chamber	Switch condition	Switching point offset, a	
			[mm]	[inches]
BM26A-1000	All-metal	"HIGH limit" or "LOW limit"	30	1.2
BM26A-3000	Plastic (PVC, PP or PVDF)	"HIGH limit" or "LOW limit"	26	1.0

Table 3-2: Switching point offset values

Liquid level offset

If the indicator column does not have the scale option, it is necessary to calculate the offset of the float magnet in relation to the level of the liquid ("liquid level offset" or "vertical offset"). The liquid level offset is related to the float type and the liquid density.

For the liquid level offset values, refer to *Liquid level offset* on page 111 (Appendix).

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 the "LOW" limit. For more data about electrical connections, refer to *Limit switches* on page 32.
- 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.

➲ End of the procedure. The limit switch is in the correct position.

For more data about the indication of float failure, refer to *Error indication* on page 43.

3.8.3 Thermal insulation

If you put thermal insulation around the magnetic level indicator, do not cover the housing of the limit switch. Make sure that there is approximately 15 mm / 0.6¨ of empty space between the housing and the thermal insulation.

WARNING!
Too much heat can cause damage to the limit switch.

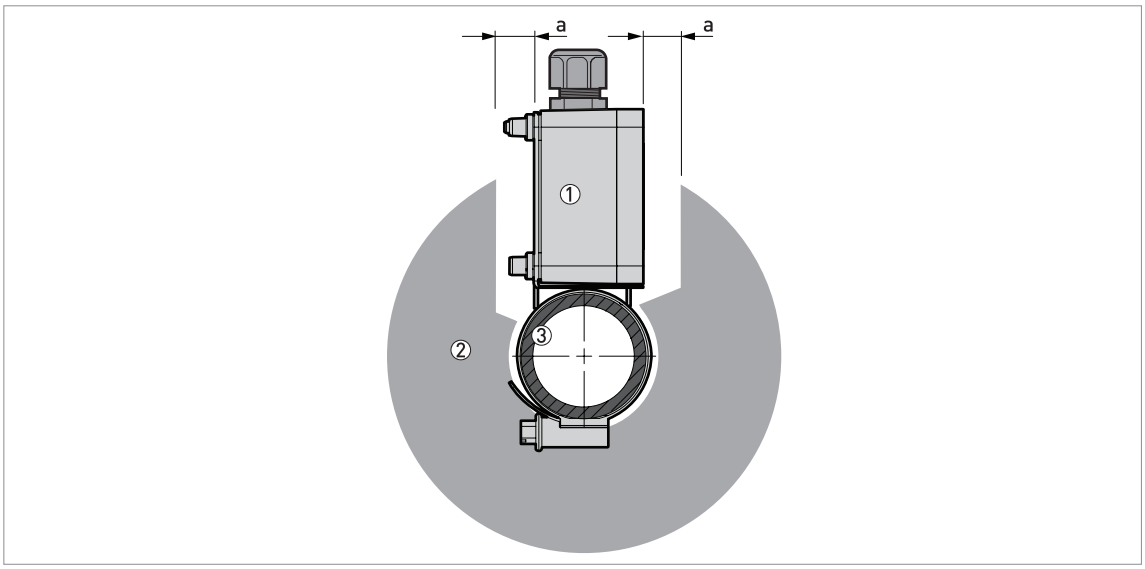

Figure 3-7: Limit switches and thermal insulation for the measuring chamber

① Limit switch housing
② Thermal insulation around the measuring chamber (cross-section)
③ Measuring chamber (cross-section)
Empty space between the limit switch and the thermal insulation for the measuring chamber, a ≥15 mm / 0.6¨.

4.1 Safety instructions

DANGER!
All work on the electrical connections may only be carried out with the power disconnected.
Take note of the voltage data on the nameplate!

DANGER!
Observe the national regulations for electrical installations!

WARNING!
Observe without fail the local occupational health and safety regulations.
Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

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.

4.2 Reed-chain level transmitter

4.2.1 General notes

The reed-chain level transmitter has 4 output options:

- 4…20 mA
- 4…20 mA + HART®
- PROFIBUS PA
- FOUNDATION™ fieldbus

Obey the wiring instructions that follow.

For more data about the reed-chain level transmitter, refer to *LT40 reed-chain level transmitter* on page 79.

4.2.2 Electrical schematics and procedure

4...20 mA and 4...20 mA + HART output modules

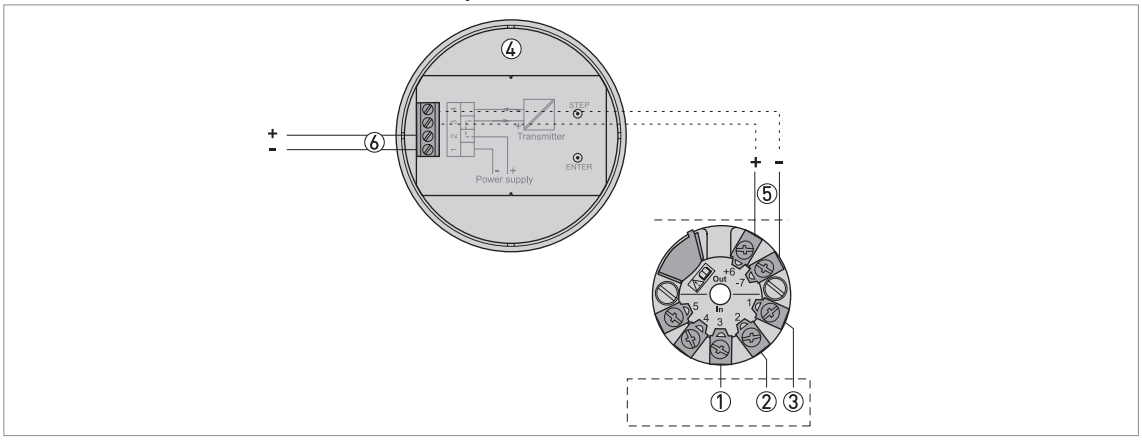

Figure 4-1: Electrical schematic for the 4...20 mA and 4...20 mA + HART output module

① Internal wiring - brown wire
② Internal wiring - red wire
③ Internal wiring - orange wire
④ Optional LCD indicator
⑤ Power supply terminals +/-, without LCD indicator (DC voltage range: 10…35 V (non-Ex or Ex db) or 10…30 V (Ex ia))
⑥ LCD indicator power supply terminals +/- (DC voltage range: 17...35 V)

CAUTION!
If the reed-chain level transmitter has the LCD indicator option, then there is a red wire between the positive (+) terminals and a black wire between the negative (-) terminals of the output module and the LCD indicator. Use the +/- terminals on the back the LCD indicator to connect the reed-chain level transmitter to the power supply.

FOUNDATION™ fieldbus / PROFIBUS PA module

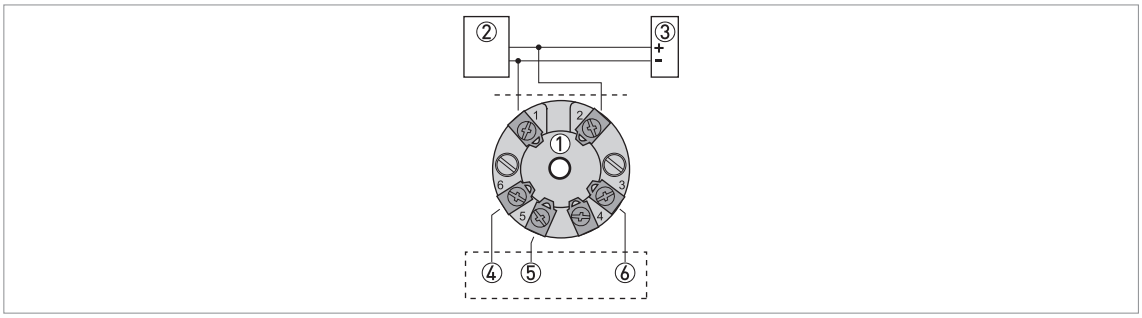

Figure 4-2: Electrical schematic for the FOUNDATION™ fieldbus / PROFIBUS PA module

① Bus connection terminals
② Segment coupler
③ Bus termination
④ Internal wiring - orange wire
⑤ Internal wiring - red wire
⑥ Internal wiring - brown wire

Equipment needed

- Small slotted screwdriver (not supplied)

CAUTION!
Make sure that the cable gland is tight to stop leaks into the housing.

Procedure

- Remove the housing cover.
- Prepare the electrical wires for the device terminals. Do not remove more than 6 mm / 0.2¨ of insulation from the electrical wire.
- Connect the device to the electrical circuit. Make sure that this agrees with the electrical schematics in this section.
- Attach the housing cover.

➲ End of the procedure. You can energize the device.

4.3 Limit switches

4.3.1 General notes

There are four limit switch models:

- MS15
- MS15 NAMUR
- MS40
- MS40 NAMUR

Obey the wiring instructions that follow.

For more data, refer to *MS15-series and MS40-series limit switches* on page 84.

4.3.2 Electrical schematics and procedure

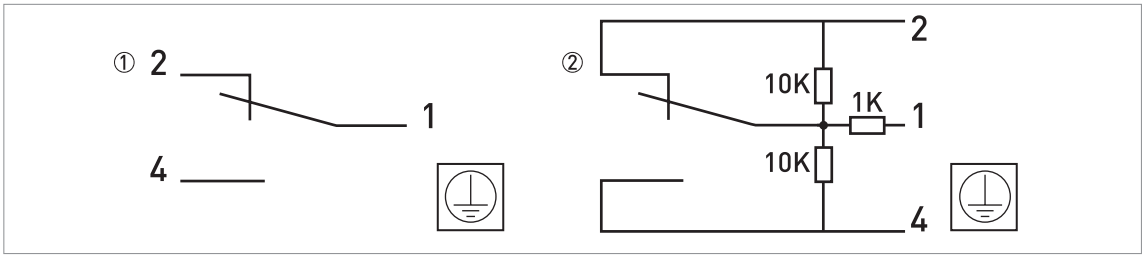

Figure 4-3: Electrical schematics for the MS15-series and MS40-series limit switches

① MS15 or MS40 limit switch
② MS15 or MS40 limit switch with a NAMUR output

Equipment needed

- Small slotted screwdriver or small Phillips screwdriver (not supplied)

CAUTION!
Make sure that the cable gland is on the bottom half of the housing and is tight to stop leaks into the housing.

CAUTION!
If the limit switch is set to "LOW limit", make sure that it is open when the float is below the switch position. If the limit switch is set to the "HIGH limit", make sure that it is open when the float is above the switching point.

Procedure

- Remove the housing cover.
- Prepare the electrical wires for the device terminals. Do not remove more than 6 mm / 0.2¨ of insulation from the electrical wire.
- Connect the device to the electrical circuit. Make sure that this agrees with the related electrical schematic in this section.
- Make sure that the limit switch is correctly grounded. For more data, refer to *Limit switches (option)* on page 34.
- Tighten the cable gland.

- Attach the housing cover.

➲ End of the procedure.

4.4 Grounding connections

4.4.1 Measuring chamber (BM26A-1000)

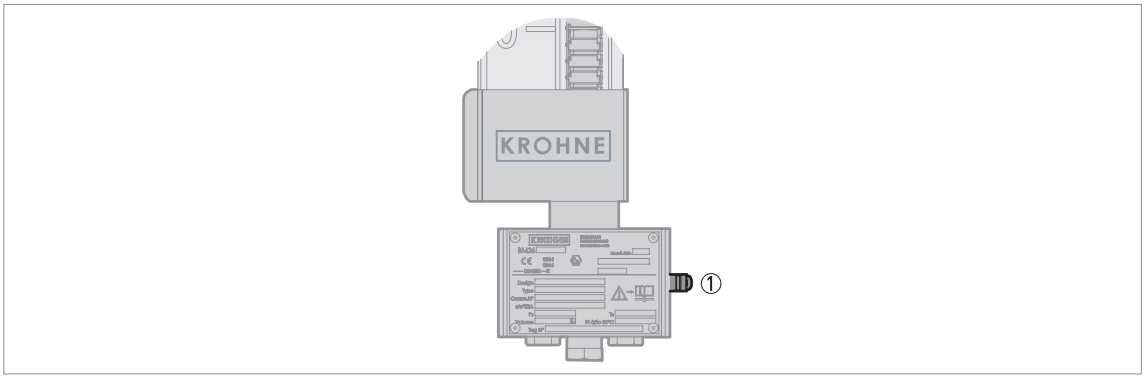

Figure 4-4: Measuring chamber - location of grounding terminal

① Grounding terminal on the side of the nameplate

4.4.2 Reed-chain level transmitter (option)

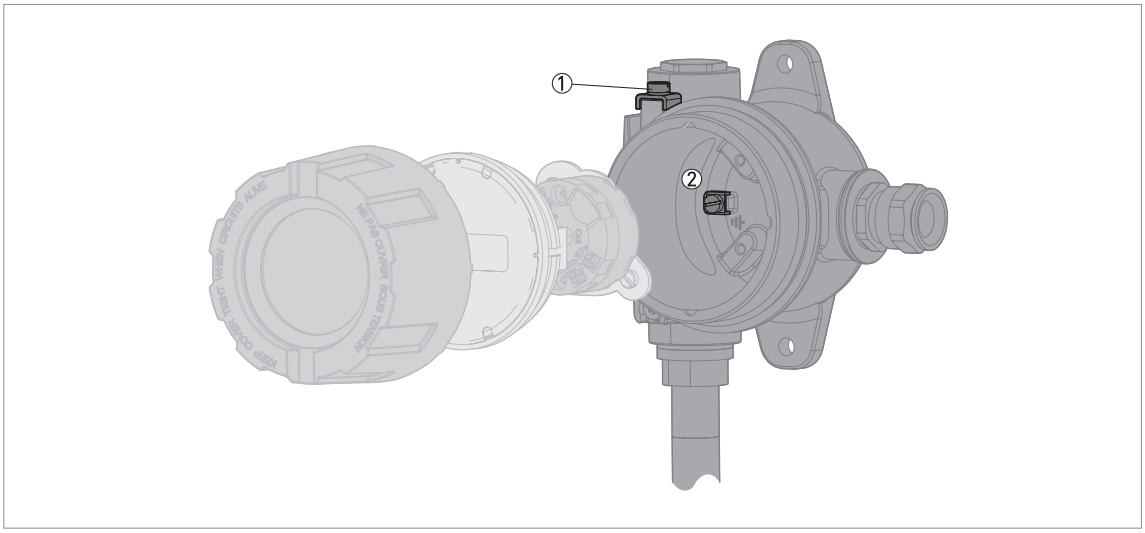

Figure 4-5: Reed-chain level transmitter - location of grounding terminals

① Grounding terminal on top of the housing
② Grounding (PE) terminal in the housing

4.4.3 Limit switches (option)

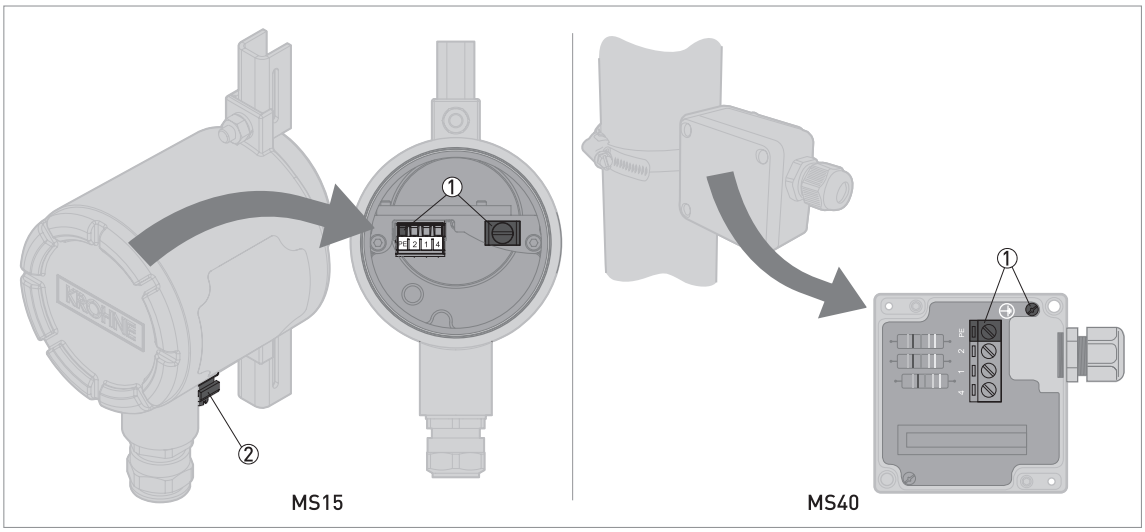

Figure 4-6: Limit switch - location of grounding terminals

① Grounding (PE) terminal in the housing (MS15 series and MS40 series)
② Grounding terminal on the housing (MS15 series only)

4.5 Protection category

IP ratings (IEC 60529)

For the IP (Ingress Protection) ratings of device options, refer to the table that follows:

Device housing	IP rating
LT40 reed-chain level transmitter	
Non-Ex / Ex i / Ex d	IP66 / IP68 ①
MS15-series limit switch	
Non-Ex / Ex i / Ex d	IP66 / IP68 ①
MS40-series limit switch	
Non-Ex / Ex i	IP66

Table 4-1: IP ratings (IEC 60529)

① IPx8 = in water at a depth of 1.5 metres for 2 weeks

How to make sure that the electrical installation agrees with the IP rating

- 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.
- Make sure that the electrical cables are in a loop in front of the device so water cannot enter the housing.
- Tighten the cable glands.
- Close cable glands without electrical cables with dummy plugs.

CAUTION!
Make sure that the cable gland is on the bottom half of the housing and is tight to stop leaks into the housing.

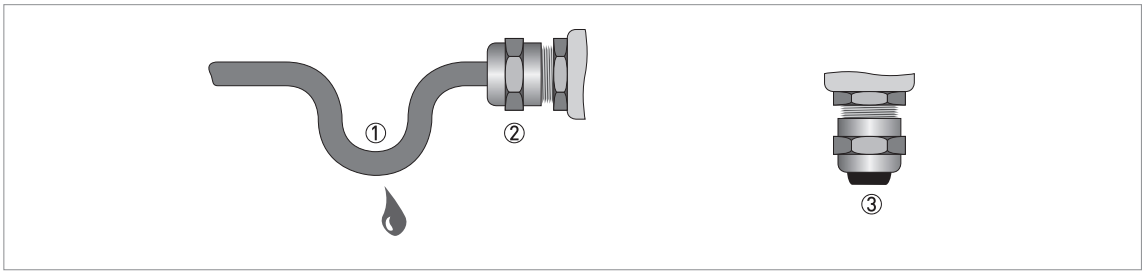

Figure 4-7: How to make sure that the electrical installation agrees with the IP rating

① Cable loop
② Cable gland
③ Dummy plug

5.1 Start-up checklist

Do these checks before you use the device:

- Are all the wetted components (measuring chamber, flanges and gaskets) resistant to the product in the tank?
- Does the information on the nameplate agree with the operating data? For more data about nameplates, refer to *Nameplates* on page 13.
- If the device has a side process connection, did you remove the float lock pin from the process connection? For more data about the procedure, refer to *How to remove the float lock pin* on page 19.
- If the device has axial process connections, did you put the float in the measuring chamber? For more data about the procedure, refer to *How to put the float in the measuring chamber* on page 20.
- Did you correctly install the device on the tank?
- Device options: Do the electrical connections agree with the national electrical codes?
- Do the electrical cables have properties that are applicable to the operating conditions?

DANGER!
Devices with Ex approval options: Make sure that the magnetic level indicator, electrical equipment and the installation agree with the requirements of all the related Ex certificates of compliance.

CAUTION!
If the device has a level transmitter option or electric heat tracing equipment, obey the instructions given in the related handbooks for this equipment.

5.2 How to start the device

- Attach the drainage plugs or close the drainage cock.
- Slowly open the isolation valves on the top and bottom process connections.
- Do a leak test.
- Energize the electrical equipment.

➲ End of the procedure.

DANGER!
Low-temperature or high-temperature versions: risk of burns. Put on protective clothing when you go near the device.

WARNING!
Do the servicing of device regularly to agree with the regulations of the site that it is installed on.

CAUTION!
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.

6.1 Operating concept

You can read level measurements with:

- An indicator column with or without a scale. Scale options include m/cm, ft/in, customized volume units and % (simplified).
- A reed-chain level transmitter. Output options include 4...20 mA, 4...20 mA + HART, FOUNDATION™ fieldbus and PROFIBUS PA. An LCD indicator option is also available for the 4...20 mA and 4...20 mA + HART output options.

You can receive a signal when the liquid gets to a specified level with:

- A limit switch

6.2 Description of display

6.2.1 Indicator column

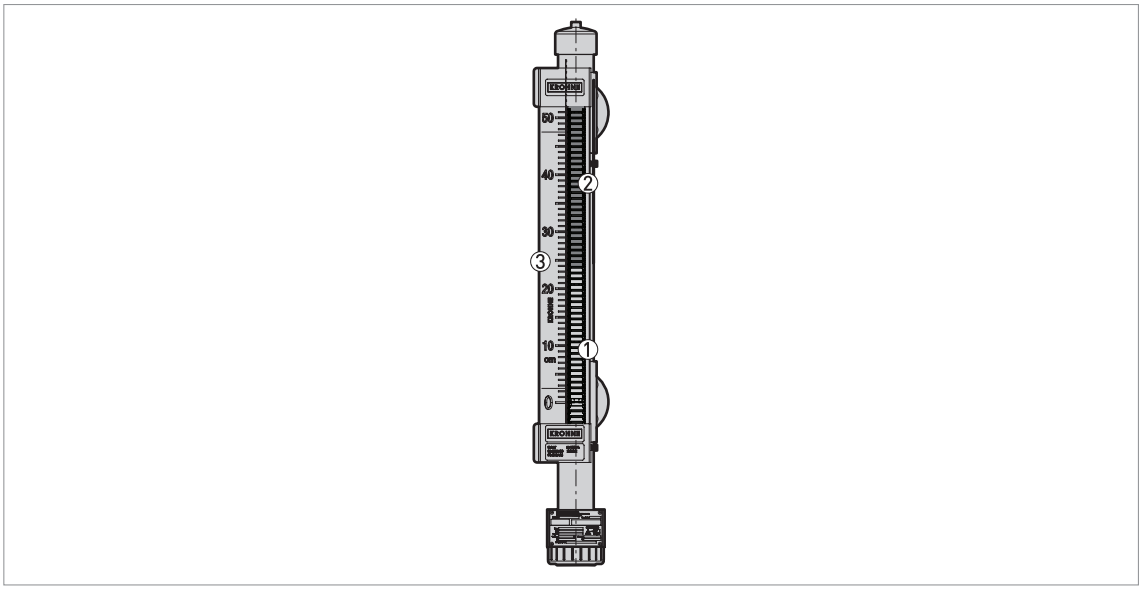

Figure 6-1: Display of data on an indicator column

① Yellow or red flaps: level of the liquid in the tank
② Black or white flaps: empty volume
③ Optional measuring scale in m/cm, ft/in, customized volume units or % (simplified)

If the scale adjacent to the indicator column has % (simplified) units, then it has a range of 0...100% with an increment of 10% between each marking. "0%" agrees with the bottom of the measuring length of the bypass chamber. "100%" agrees with the top of the measuring length of the bypass chamber.

For data about the indication of float failure, refer to *Error indication* on page 43.

6.2.2 Reed-chain level transmitter (option)

Signal outputs

The reed-chain level transmitter has transmitter modules for analog and digital outputs (4...20 mA + HART®, FOUNDATION™ fieldbus and PROFIBUS PA®). Use the web links in the table that follows to download the software and device description files.

Transmitter output	Module	Manufacturer	Software	Device description files
4...20 mA	TT53 C	KROHNE INOR	N/A	N/A
4...20 mA + HART®	TT53 C	KROHNE INOR	N/A	DD ①
FOUNDATION™ fieldbus	5350B	PR electronics	PReset ②	DD ②
PROFIBUS PA	5350B	PR electronics	PReset ②	GSD ②

Table 6-1: Signal output options for the reed-chain level transmitter

① Go to the KROHNE website: www.krohne.com (Downloads > Software). DD files are available for field communicators, DTM, AMS and PDM.

② Go to the PR electronics website: www.prelectronics.com (Downloads > Software > Files for HART and bus communication)

LCD indicator (option)

The LCD indicator has a 4-digit display screen. The values on the display screen are in millimetres by default, but you can also select inches or %.

6.3 How to change measurement units (LT40)

Example procedure: How to change the measurement units from mm to %

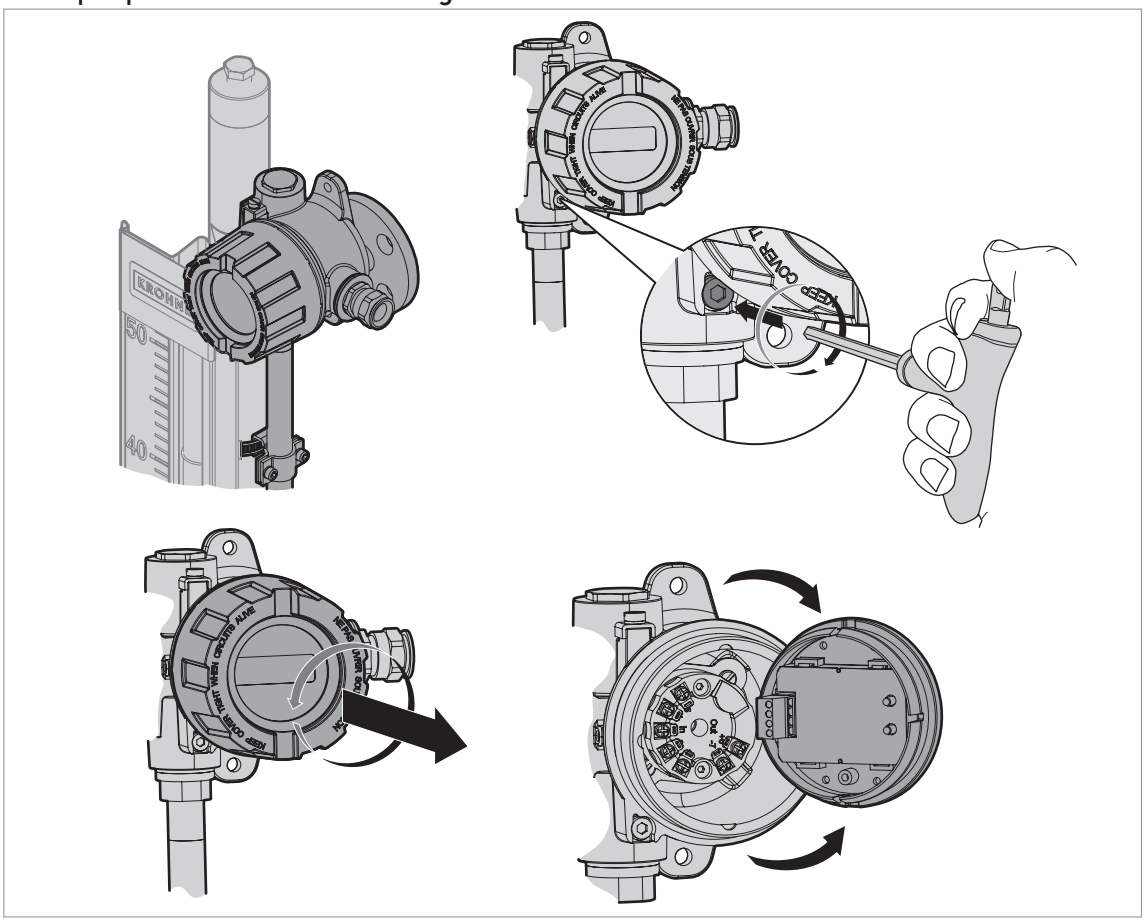

Figure 6-2: How to change the measurement units from mm to % - part 1

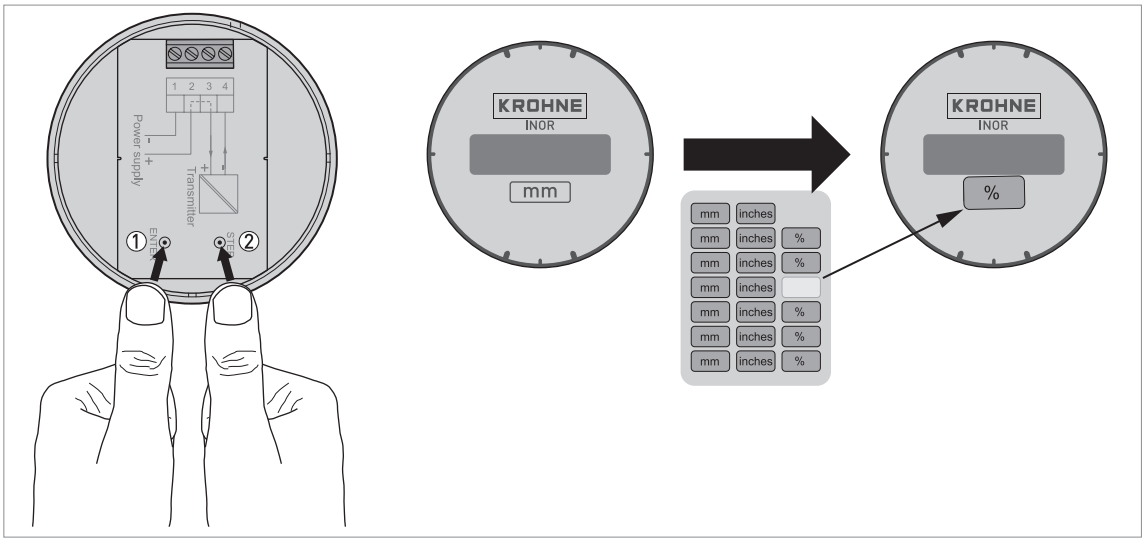

Figure 6-3: How to change the measurement units from mm to % - part 2

① ENTER button
② STEP button

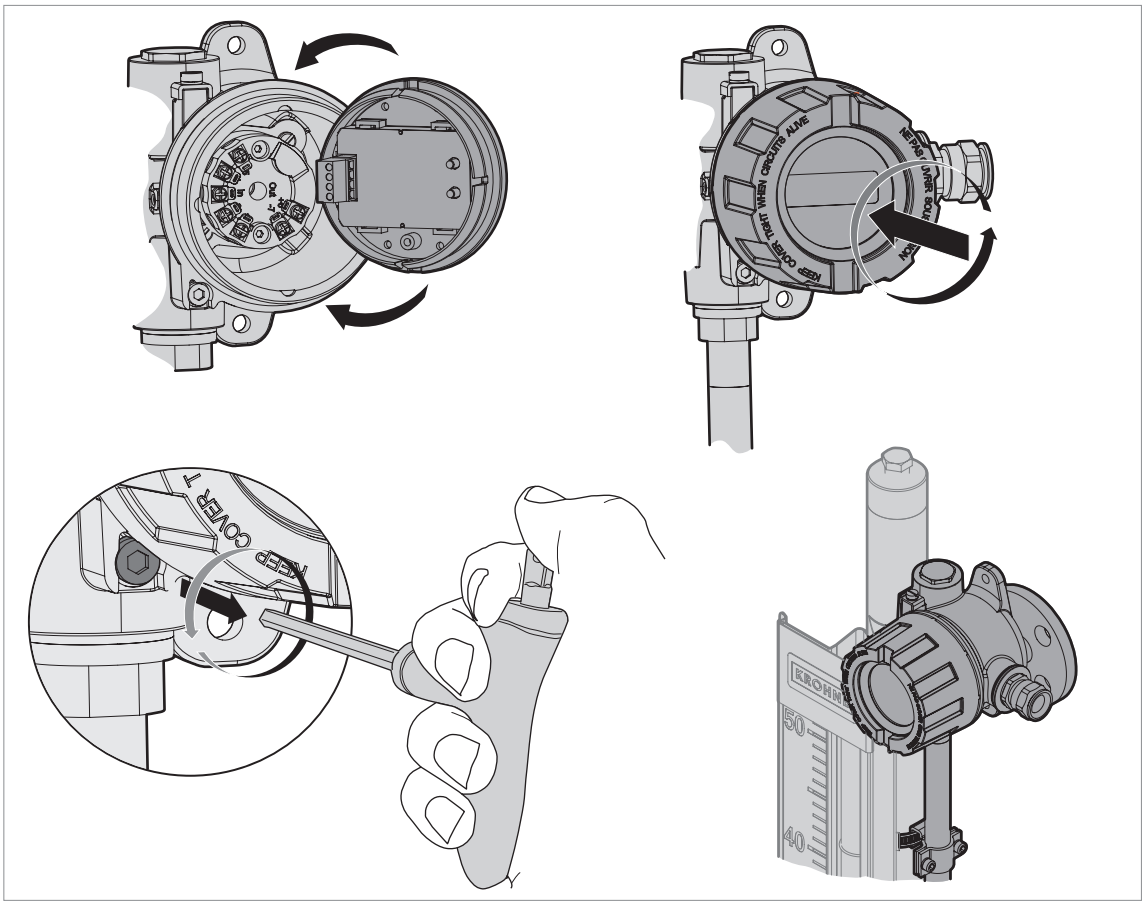

Figure 6-4: How to change the measurement units from mm to % - part 3

Equipment needed

- Sheet of stickers with measurement units - mm, inches and % (supplied)
- 3-mm Allen wrench (not supplied)

DANGER!
Do not open the housing in a hazardous location. For more data, refer to the supplementary instructions for the related Ex approval.

For more data about how to change parameters of the LCD indicator, refer to the key function and menu overview tables that follow:

- Turn the lock screw clockwise with a 3-mm Allen wrench to unlock the housing cover.
- Remove the housing cover.
- Remove the LCD indicator module from the housing.
- Turn the LCD indicator module to use the 2-button keypad ([STEP] and [ENTER]) on the back of the module to change the units.
- Push [STEP] for 4 seconds to access the menu of the LCD indicator module

➲ The display screen shows the menu item “LO” (to set the parameter for the bottom of the scale). If you do not change the value in less than 20 seconds, then the display screen will automatically go back to measurement mode.

- Push [ENTER] one time to enter the new value. Make sure that the value is set to 0. For more data on how to change values, refer to the data that follows this procedure.
- Push [ENTER] to go to the End screen. If the value is correct, then push [ENTER] again to go back to the menu.
- Push [STEP] to show the menu item “HI” (to set the parameter for the top of the scale).
- Push [ENTER] one time to enter the new value. Make sure that the value is set to 100. For more data on how to change values, refer to the data that follows this procedure.
- Push [ENTER] to go to the End screen. If the value is correct, then push [ENTER] again to go back to the menu.
- If the parameters are correct, push [STEP] to show the menu item “SAVE” (to save the changed parameters). Push [ENTER] to go back to the measurement mode.
- If the parameters are incorrect, push [STEP] two times to show the menu item “ESC” (to cancel the changed values and keep the initial parameters). Push [ENTER] to go back to the measurement mode.
- Attach the LCD indicator module to the housing.
- Put the sticker with the correct measurement unit over the default units under the indicator screen.
- Attach the housing cover.
- Turn the lock screw counterclockwise with a 3-mm Allen wrench to lock the housing cover. Make sure that you cannot turn the housing cover.

➲ End of the procedure. The LCD indicator module shows a value between 0 and 100.

INFORMATION!

Make sure that the decimal point is in the correct position before you push [ENTER] to go back to the End screen and the menu.

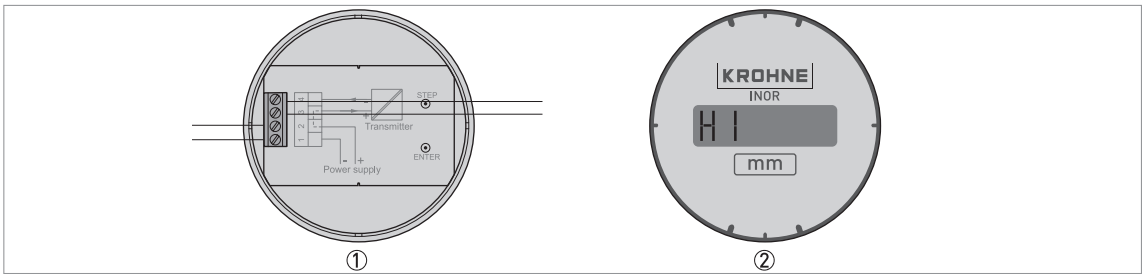

Figure 6-5: Front and back view of the LCD indicator module

① Back of the LCD indicator module
② Front of the LCD indicator module (”HI” is the menu item for the maximum value of the measuring range)

Key functions

Key	Function		
	Measurement mode	Menu	Menu item
[STEP] for 4 seconds	Get access to the menu.	N/A	N/A
[STEP]	N/A	Select a menu item.	Push intermittently to increase the value by increments of 1. If the cursor is on the first digit, it is possible to select the negative sign to have a negative value.
[ENTER]	N/A	Get access to a menu item. If you select “SAVE” or “ESC”, these menu items save or cancel changes and put the LCD indicator module back into measurement mode.	Move the cursor one digit to the right. Add a decimal point. Go back to the menu.

Table 6-2: LT40 with LCD indicator module: key functions

Menu overview

Menu item	Function description	Range/Selection list	Default
LO	Minimum value on the scale for the reed-chain level transmitter.	-999...+9999	①
HI	Maximum value on the scale for the reed-chain level transmitter.	-999...+9999	①
SAVE	Push [ENTER] to save the changed parameters.	N/A	N/A
ESC	Push [ENTER] to cancel the changed values and keep the initial parameters.	N/A	N/A

Table 6-3: LT40 with LCD indicator module: menu overview

① This value is given in the customer order

How to enter a negative value

If the cursor is on the first digit, it is possible to select the negative (-) sign to enter a negative value.

How to add a decimal point

If the cursor is on the last digit, push [ENTER] again to put a decimal point between the first and second digit. You can then push [STEP] one time to move the decimal point one digit to the right. If you push [STEP] again when the decimal point is to the left of the last digit, then the display screen will show 4 digits without a decimal point.

6.4 Errors

6.4.1 Error indication

Indicator column

If the float goes to the bottom of the measuring chamber, the indicator column will show orange flaps.

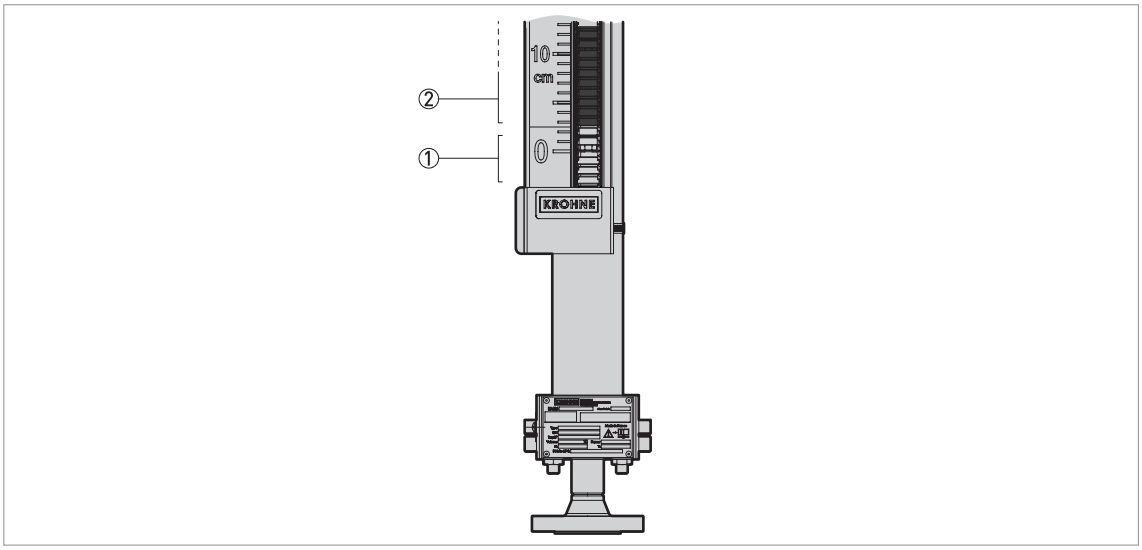

Figure 6-6: Error indication - indicator column

① Orange flaps: float failure
② Black flaps: empty volume

The indicator shows orange if:

- the float is at the bottom of the measuring chamber,
- the measuring chamber is completely empty, or
- the liquid density is less than the value given in the order.

For procedures to find and correct errors related to float failure, refer to *Error handling* on page 44.

LT40 reed-chain level transmitter (option)

If the float goes above or below the ends of the reed chain, then the display screen will flash the text “HI” at one-second intervals.

For procedures to find and correct errors related to the reed-chain level transmitter, refer to *Error handling* on page 44.

6.4.2 Error handling

Error	Description	Corrective action
Indicator column		
Float failure	The indicator shows orange flaps. The float is at the bottom of the measuring chamber.	• Make sure that the measuring chamber is not completely empty. • Make sure the density of the liquid is the same as the value given in the order data. • Speak to your local sales office to make sure that the float agrees with the density of the liquid. • If there is corrosion on the float or the foat is damaged, it is necessary to replace the float. Send an order for a new float. • Isolate the measuring chamber and remove the liquid. Remove the bottom flange and the float. For the procedure to replace the float, refer to *How to put the float in the measuring chamber* on page 20.
There is too much liquid in the tank. The indicator continues to show a level that is below the maximum 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. Speak to your local sales office for more data and instructions.
The level of the liquid in the tank is above the minimum limit, but the indicator shows orange flaps.		
The level of the liquid is below the maximum limit. The indicator shows that the level is at 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. Speak to your local sales office for more data and instructions.
The quantity of liquid in the tank is too small. The indicator shows a level that is above the minimum limit.		
Reed-chain level transmitter (LT40)		
LCD indicator module status: HI	The current output is more than 20.5 mA. Overfill. The level of the liquid is above the maximum limit.	Lower the level of liquid below the maximum limit.
	Current output is more than 20.5 mA. The LT40 is not in the same position as it was set in the factory. A value more than 20 mA is not equal to the maximum limit at this time.	Speak to your local sales office for more data and instructions.
	Current output is more than 20.5 mA. The LT40 is defective. A value more than 20 A is not equal to the maximum limit at this time.	

Error	Description	Corrective action
LCD indicator module status: LO	Current output is less than 3.8 mA. The level of the liquid is below the minimum limit.	Increase the level of liquid until it is above the minimum limit.
	Current output is less than 3.8 mA. The LT40 is not in the same position as it was set in the factory. A value less than 4 mA is not equal to the minimum limit at this time.	Speak to your local sales office for more data and instructions.
	Current output is less than 3.8 A. The LT40 is defective. A value less than 4 mA is not equal to the minimum limit at this time.	
The level of the liquid is at or is above the maximum level, but the LT40 output does not show that level is at 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. Speak to your local sales office for more data and instructions.
The LT40 output shows that the liquid is at or is below the minimum level, but the level of the liquid stays above the minimum limit.		
The level of the liquid is below the maximum level, but the LT40 output shows that level is at 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. Speak to your local sales office for more data and instructions.
The LT40 output is not at the minimum level at this time, but the level of the liquid is at or is below the minimum limit.		

Limit switch (MS15 series and MS40 series)

The limit switch is in a high (maximum) position and set to "HIGH limit". Its status is "open".	Is there too much liquid in the tank? The level of the liquid is at or is above the maximum limit.	Lower the level of liquid below the maximum limit.
The limit switch is in a low (minimum) position and set to "LOW limit". Its status is “open”.	Is the tank empty? The level of the liquid is at or is below the minimum limit.	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". Its status is "open".	Float failure. The float is at the bottom of the measuring chamber.	Is the measuring chamber empty? If the measuring chamber is not empty, then it is necessary to replace the float. Send an order for a new float to your local sales office. For the procedure to replace the float, refer to *How to put the float in the measuring chamber* on page 20.

Error	Description	Corrective action
The level switch does not detect the minimum limit correctly.	The limit switch (set to "LOW limit)" is "open", but the level of the liquid stays 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 "closed", but the level of the liquid is at or is 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 is above the maximum level, but the limit switch (set to "HIGH limit") is "closed". 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". The density of the liquid is higher than the value given in the customer order data.	

Table 6-4: Error handling

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!
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 you do work near pressurized tanks and dangerous chemical products.

How to flush the device

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

➲ End of the procedure.

WARNING!
If you remove the float, close the isolation valves.

Float removal

- Close the isolation valves.
- If the device has a bottom side process connection, remove the flange at the bottom of the measuring chamber.
- Remove and clean the float.

➲ End of the procedure.

7.2 How to replace device components

If it is necessary to replace the float, refer to *How to prepare the device for installation* on page 18.

If it is necessary to replace a limit switch, refer to *Installation - limit switches (MS15 series and MS40 series)* on page 24.

7.3 Cleaning

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

7.4 Service warranty

Maintenance is not necessary for most applications.

Servicing by the customer is limited by warranty to

- The removal and installation of limit switches. For the procedure, refer to *Electrical connections* on page 29.
- The removal and installation of the float. For the procedure, refer to *How to put the float in the measuring chamber* on page 20.
- The removal and installation of the indicator column. For the procedure, speak or write to your supplier.
- The removal and installation of the LT40 reed-chain level transmitter. For the procedure, speak or write to your supplier.

The indicator column, LT40 reed-chain level transmitter, MS15 series limit switch, and MS40 series limit switch can be removed under process conditions.

The manufacturer supplies these spare parts:

- screws, nuts, studs, gaskets and counter flanges for flanged connections
- male and female plugs for drains and vents
- ball valves
- float
- support brackets for the measuring chamber

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

INFORMATION!
Make sure that you supply the data given on the device nameplate when you send an order for spare parts.

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.

WARNING!
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 the personnel, the 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.*

WARNING!
If the device has been operated with toxic, caustic, radioactive, 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 it 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

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

Separate collection of WEEE (Waste Electrical and Electronic Equipment) in the European Union:

According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life **must not be disposed of with other waste**.
The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.

7.8 Disassembly and recycling

This section shows you how to handle the MS15-series and MS40-series limit switches and the LT40 reed-chain level transmitter if they are at the end of their product life cycles or if they must be discarded. Data given in this section agrees with the EU Directive 2012/19/EU on waste electrical and electronic equipment (WEEE) and the EU Directive 2008/98/EC on waste (Waste Framework Directive). Refer to the data and obey the instructions that follow to disassemble and prepare components for waste treatment.

INFORMATION!
The device does not contain dangerous gases or materials. If there is contamination from the process, refer to Returning the device to the manufacturer on page 49.

7.8.1 LT40 reed-chain level transmittter

INFORMATION!
*Words in **bold text** refer to electrical and electronic equipment.*

LT40 C - Compact Version

Product description

Product name and data

Type	Reed chain
Model	LT40 C (compact version)
Usage	Level measurement

Weight

Total weight	**Aluminium housing** ≤ 4.951 kg / ≤ 10.915 lb ①
	Stainless-steel housing ≤ 6.473 kg / ≤ 14.271 lb ①
Weight of metal parts	**Aluminium housing** ≤ 4.823 kg / ≤ 10.633 lb ①
	Stainless-steel housing ≤ 6.344 kg / ≤ 13.986 lb ①
Weight of plastic parts	~0.025 kg / ~0.055 lb

Dimensions

Volume	≤ 0.509 dm³ / ≤ 31.06 in³ ②

Table 7-1: LT40 C - product description

① The options will have an effect on the weight
② The options will have an effect on the volume

Parts list

Item	Description	Material
(1)	**Electronic transmitter**	FR-4, electronic components, solder, polycarbonate, stainless steel
(2)	Housing Ex d	aluminium or stainless steel
(3)	Gasket	aramid fibre
(4)	Cover	aluminium or stainless steel + glass
(5)	**Display**	FR-4, electronic components, solder
(6)	Gasket	aramid fibre
(7)	Threaded plug	stainless steel
(8)	Gasket	silicon
(9)	Threaded connection	stainless steel
(10)	Collar	stainless steel
(11)	Clamp	stainless steel
(12)	Screw	stainless steel
(13)	Screw	stainless steel
(14)	Adhesive label	polyester
(15)	Pipe	stainless steel Ex d-approved device: stainless steel + alumina
(16)	Cable gland	PA or nickel-brass or stainless steel
(17)	Gasket	silicon
(18)	**Reed chain**	polyimide, electronic components, solder
(19)	Profile	polycarbonate
(20)	Welded plug	stainless steel
(21)	Support	stainless steel
(22)	Plate	polycarbonate
(23)	Adapter	polycarbonate
(24)	Plate	polycarbonate

Table 7-2: LT40 C - parts list

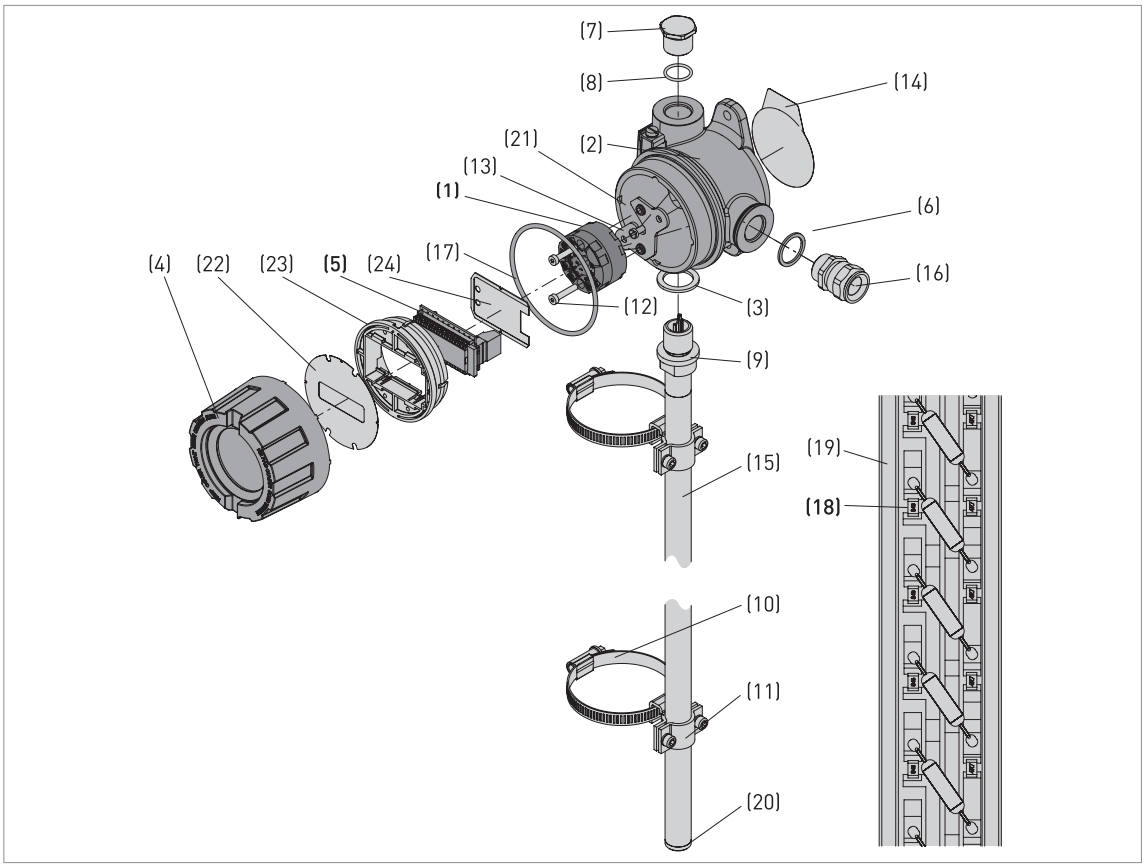

Figure 7-1: LT40 C - parts of the device (refer to "Parts list" table)

Procedure: how to disassemble the LT40 C reed-chain level transmitter

- Use a large slotted screwdriver to remove the collar (10).
- Use a 4-mm Allen wrench to remove the clamp (11).
- Remove the cover (4).
- Remove the LCD indicator module (option - items (22) and (23)) and the **display (5)**.
- Use a small slotted screwdriver to disconnect the electrical wires from **electronic transmitter (1)**
- Use a 2.5-mm Allen wrench to remove two screws (12). Remove the **electronic transmitter (1)**.
- Use slotted screwdriver to remove two screws (13). Remove the support (21).
- Use a 24-mm open-end wrench to remove the cable gland (16) and the threaded plug (7).
- Use a heat gun to apply heat to the point where the threaded connection (9) is attached to the housing (2) to melt the thread locker adhesive.
- While the adhesive is warm, use a 21-mm open-end wrench to remove the threaded connection (9) and then the tube (15).
- Remove the profile (19) and the **reed chain (18)** from the pipe (15).

➲ You can send the parts to the approved location for waste treatment or recycling.

Materials and components that must be removed and independently prepared for treatment

Material	Weight		Additional information
	[kg]	[lb]	
Polychlorinated biphenyl	N/A	N/A	N/A
Mercury	N/A	N/A	N/A
Battery	N/A	N/A	N/A
Printed circuit boards, area > 10 cm² / > 1.55 in²	**(1) Electronic transmitter:**		**FR-4 or polyimide, electronic components, solder, silicone, polycarbonate, stainless steel**
	0.03	**0.07**	
	(5) Display:		
	0.013	**0.029**	
	(18) Reed chain:		
	< 0.1	**< 0.22**	
Toner cartridge	N/A	N/A	N/A
LCD screen (device), area > 100 cm² / > 15.5 in²	N/A	N/A	N/A
Plastic that contains brominated flame retardants	N/A	N/A	N/A
Asbestos	N/A	N/A	N/A
Cathode ray tube	N/A	N/A	N/A
CFC, HCFC, HFC or HC	N/A	N/A	N/A
Gas discharge lamp	N/A	N/A	N/A
External electric cable	N/A	N/A	N/A
Refractory ceramic fibers	N/A	N/A	N/A
Radioactive substance	N/A	N/A	N/A
Electrolyte capacitor > 25 mm / > 0.98¨	N/A	N/A	N/A

Table 7-3: LT40 C - materials and components that must be removed and independently prepared for treatment

Materials and components that can cause problems in the recycling process

Material	Part (item number)	Weight		Additional information
		[kg]	[lb]	
a mixture of metals and plastics	**(1) electronic transmitter**	≤ **0.1**	≤ **0.220**	**FR-4 or polyimide, electronic components, solder, silicone, polycarbonate, stainless steel**
	(5) display			
	(18) reed chain			
a mixture of metals and plastics	(16) cable gland	~0.01	~0.022	PA, nickel-brass or stainless steel ①
a mixture of metals and plastics	(2) housing	Aluminium housing		Aluminium or stainless steel + polycarbonate ①
		0.56 ②	1.235 ②	
		Stainless steel housing		
		1.64 ②	3.616 ②	
a mixture of metals and plastics	(4) cover	Aluminium housing		Aluminium or stainless steel + polycarbonate ①
		0.23 ②	0.507 ②	
		Stainless steel housing		
		0.67 ②	1.477 ②	
a mixture of metals	N/A	N/A	N/A	N/A
a mixture of plastics	N/A	N/A	N/A	N/A

Table 7-4: LT40 C - Materials and components that can cause problems in the recycling process

① The material depends on the device options
② The options will have an effect on the weight

Materials and components that can be recycled

Stainless-steel housing				
Material	Part (item number)	Weight		Additional information
		[kg]	[lb]	
Stainless steel	housing Ex d (2)	≤ 6.344	≤ 13.986	N/A
	threaded plug (4)			
	threaded connection (9)			
	collar (10)			
	clamp (11)			
	screw (12)			
	screw (13)			
	tube (15)			
	welded plug (20)			
	support (21)			
Plastic	gasket (3)	~0.001	~0.002	silicone
	gasket (8)	~0.001	~0.002	silicone
	gasket (17)	~0.001	~0.002	silicone
	profile (19)	~0.014	~0.031	polycarbonate
	adhesive label (14)	N/A	N/A	polyester
	plate (22)	N/A	N/A	polycarbonate
	adapter (23)	~0.02	~0.044	polycarbonate
	plate (24)	N/A	N/A	polycarbonate
Rubber	gasket (6)	N/A	N/A	aramid fibre
Noble metals	N/A	N/A	N/A	N/A
PCB	**electronic transmitter (1)**	**~0.10**	**~0.22**	**FR-4 or polyimide, electronic components, solder, silicone, polycarbonate, stainless steel**
	display (5)			
	reed chain (18)			
Total (average weight)	—	~6.481	~14.288	N/A

Table 7-5: LT40 C with a stainless-steel housing: materials and components that can be recycled

Aluminium housing				
Material	Part (item number)	Weight		Additional information
		[kg]	[lb]	
Stainless steel	threaded plug (7)	≤ 4.037	≤ 8.900	N/A
	threaded connection (9)			
	collar (10)			
	clamp (11)			
	screw (12)			
	screw (13)			
	tube (15)			
	welded plug (20)			
	support (21)			
Aluminium	housing Ex d (2)	~0.786	~1.733	polyester-coated (paint)
	cover (4)			
Plastic	gasket (3)	~0.001	~0.002	silicone
	gasket (8)	~0.001	~0.002	silicone
	gasket (17)	~0.001	~0.002	silicone
	profile (19)	~0.014	~0.031	polycarbonate
	adhesive label (14)	N/A	N/A	polyester
	plate (22)	N/A	N/A	polycarbonate
	adapter (23)	~0.02	~0.044	polycarbonate
	plate (24)	N/A	N/A	polycarbonate
Rubber	gasket (6)	N/A	N/A	aramid fibre
Noble metals	N/A	N/A	N/A	N/A
PCB	**electronic transmitter (1)**	≤ **0.10**	≤ **0.22**	**FR-4 or polyimide, electronic components, solder, silicone, polycarbonate, stainless steel**
	display (5)			
	reed chain (18)			
Total (average weight)	—	~4.96 ①	~10.93 ①	N/A

Table 7-6: LT40 C with an aluminium housing: materials and components that can be recycled

① This depends on the device options

LT40 F - Remote Version
Product description

Product name and data

Type	Reed chain
Model	LT40 F (remote version)
Usage	Level measurement

Weight

Total weight	≤ 5.433 kg / ≤ 11.978 lb
Weight of metal parts	≤ 5.245 kg / ≤ 11.561 lb ①
Weight of plastic parts	~0.1 kg / ~0.220 lb

Dimensions

Volume	≤ 0.6 dm³ / ≤ 34.65 in³ ②

Table 7-7: LT40 F - product description

① The options will have an effect on the weight
② The options will have an effect on the volume

Parts list

Item	Description	Material
(1)	**Electronic transmitter**	FR-4, electronic components, solder, polycarbonate, stainless steel
(2)	Housing Ex d	aluminium
(3)	Gasket	aramid fibre
(4)	Cover	aluminium + glass
(5)	**Display**	FR-4, electronic components, solder
(6)	Gasket	aramid fibre
(7)	Threaded plug	stainless steel or nickel-brass
(8)	Gasket	silicon
(9)	Threaded connection	stainless steel
(10)	Collar	stainless steel
(11)	Clamp	stainless steel
(12)	Screw	stainless steel
(13)	Screw	stainless steel
(14)	Adhesive label	polyester
(15)	Pipe	stainless steel Ex d-approved device: stainless steel + alumina
(16)	Cable gland or 1/2 NPT adapter	PA or nickel-brass or stainless steel (Ex)
(17)	Gasket	silicon

Item	Description	Material
(18)	**Reed chain**	polyimide, electronic components, solder
(19)	Profile	polycarbonate
(20)	Welded plug	stainless steel
(21)	Support	aluminium
(22)	Plate	polycarbonate
(23)	Adapter	polycarbonate
(24)	Plate	polycarbonate
(25)	Housing support	stainless steel
(26)	Washer M6×14×1.5	galvanized steel
(27)	Screw A2 70 HM6 - DIN 934	stainless steel
(28)	**Cable**	**copper + polyethylene + PVC**
(29)	Screw M6×20 ISO 4762	stainless steel
(30)	Cable gland	nickel-brass or stainless steel

Table 7-8: LT40 F - parts list

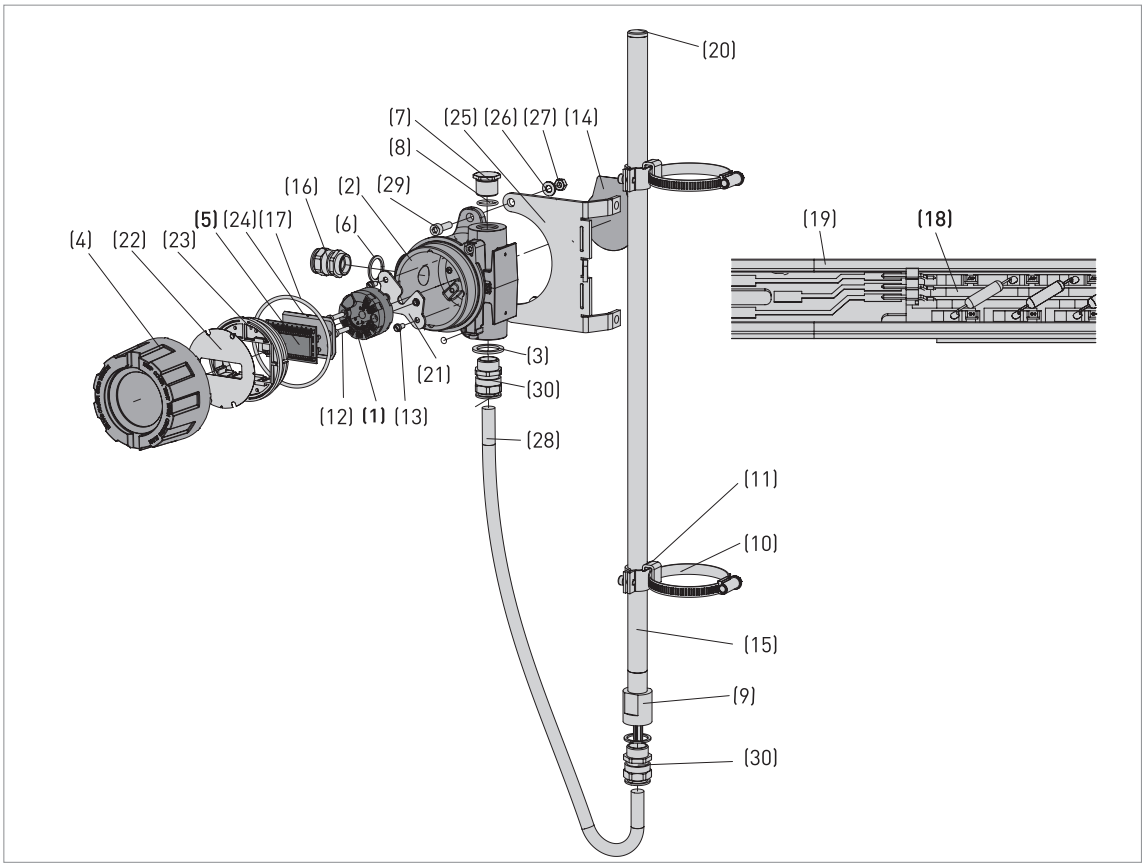

Figure 7-2: LT40 F - parts of the device (refer to "Parts list" table)

Procedure: how to disassemble the LT40 C reed-chain level transmitter

- Use a large slotted screwdriver to remove the collar (10).
- Use a 4-mm Allen wrench to remove the clamp (11).
- Use a 5-mm Allen wrench to remove 2 screws. Remove the support (25) from the housing (2).
- Remove the cover (4).
- Remove the LCD indicator module (option - items (22) and (23)) and the **display (5)**.
- Use a small slotted screwdriver to disconnect the electrical wires from **electronic transmitter (1)**
- Use a 2.5-mm Allen wrench to remove two screws (12). Remove the **electronic transmitter (1)**.
- Use slotted screwdriver to remove two screws (13). Remove the support (21).
- Use a 24-mm open-end wrench to remove the cable gland (16) and the threaded plug (7).
- Use a heat gun to apply heat to the point where the cable gland (30) is attached to threaded connection (9) to melt the thread locker adhesive.
- While the adhesive is warm, use a 24-mm open-end wrench to remove the cable gland (30).
- Remove the **cable (28)**, profile (19) and the **reed chain (18)** from the pipe (15).

➲ You can send the parts to the approved location for waste treatment or recycling.

Materials and components that must be removed and independently prepared for treatment

Material	Weight		Additional information
	[kg]	[lb]	
Polychlorinated biphenyl	N/A	N/A	N/A
Mercury	N/A	N/A	N/A
Battery	N/A	N/A	N/A
Printed circuit boards, area > 10 cm² / > 1.55 in²	**(1) Electronic transmitter:**		**FR-4 or polyimide, electronic components, solder, silicone, polycarbonate, stainless steel**
	0.03	**0.07**	
	(5) Display:		
	0.013	**0.029**	
	(18) Reed chain:		
	< 0.1	**< 0.22**	
Toner cartridge	N/A	N/A	N/A
LCD screen (device), area > 100 cm² / > 15.5 in²	N/A	N/A	N/A
Plastic that contains brominated flame retardants	N/A	N/A	N/A
Asbestos	N/A	N/A	N/A
Cathode ray tube	N/A	N/A	N/A
CFC, HCFC, HFC or HC	N/A	N/A	N/A
Gas discharge lamp	N/A	N/A	N/A
External electric cable	The cable length will have an effect on the weight		①
Refractory ceramic fibers	N/A	N/A	N/A
Radioactive substance	N/A	N/A	N/A
Electrolyte capacitor > 25 mm / > 0.98¨	N/A	N/A	N/A

Table 7-9: LT40 F - materials and components that must be removed and independently prepared for treatment

① Make sure that you obey Ex regulations when you discard or reuse the cable

Materials and components that can cause problems in the recycling process

Material	Part (item number)	Weight		Additional information
		[kg]	[lb]	
a mixture of metals and plastics	**(1) electronic transmitter**	**≤0.100**	**≤0.220**	**FR-4 or polyimide, electronic components, solder, silicone, polycarbonate, stainless steel**
	(5) display			
	(18) reed chain			
a mixture of metals and plastics	(16) cable gland or 1/2 NPT adapter (30) cable gland	~0.01	~0.022	PA, nickel-brass or stainless steel ①
a mixture of metals and plastics	(2) housing	0.56	1.235	Aluminium + polycarbonate
a mixture of metals and plastics	(4) cover	0.23	0.507	Aluminium + polycarbonate
a mixture of metals and plastics	**(28) cable**	②	②	**PE + PVC**
a mixture of metals	N/A	N/A	N/A	N/A
a mixture of plastics	N/A	N/A	N/A	N/A

Table 7-10: LT40 F - Materials and components that can cause problems in the recycling process

① The material depends on the device options

② The cable length will have an effect on the weight

Materials and components that can be recycled

Material	Part (item number)	Weight		Additional information
		[kg]	[lb]	
Stainless steel	threaded plug (7)	≤ 4.037	≤ 8.900	N/A
	threaded connection (9)			
	collar (10)			
	clamp (11)			
	screw (12)			
	screw (13)			
	tube (15)			
	cable gland or adapter (16)			
	welded plug (20)			
	cable gland (30)			
Aluminium	housing Ex d (2)	~0.793	~1.748	polyester-coated (paint)
	cover (4)			
	support (21)			
Plastic	gasket (3)	~0.001	~0.002	silicone
	gasket (8)	~0.001	~0.002	silicone
	adhesive label (14)	N/A	N/A	polyester
	cable gland (16)	~0.01	~0.022	polyester
	gasket (17)	~0.001	~0.002	silicone
	profile (19)	~0.014	~0.031	polycarbonate
	plate (22)	N/A	N/A	polycarbonate
	adapter (23)	~0.02	~0.044	polycarbonate
	plate (24)	N/A	N/A	polycarbonate
Rubber	gasket (6)	N/A	N/A	aramid fibre
Noble metals	N/A	N/A	N/A	N/A
PCB	**electronic transmitter (1)**	≤ **0.10**	≤ **0.22**	**polyimide, electronic components**
	display (5)			
	reed chain (18)			
Total (average weight)	—	~4.977 ①	~10.972 ①	N/A

Table 7-11: LT40 F: materials and components that can be recycled

① This depends on the device options

7.8.2 MS15-series limit switch

INFORMATION!
*Words in **bold text** refer to electrical and electronic equipment.*

Product description

Product name and data

Type	Switch
Model	MS15
Usage	Electrical switch

Weight

Total weight	Aluminium housing: ~0.937...0.943 kg / ~2.066...2.079 lb ①
	Stainless-steel housing: ~2.198...2.204 kg / ~4.846...4.859 lb ①
Weight of metal parts	Aluminium housing: ~0.925...0.931 kg / ~2.039...2.053 lb ①
	Stainless-steel housing: ~2.186...2.192 kg / ~4.819...4.833 lb ①
Weight of plastic parts	~0.01 kg / ~0.022 lb

Dimensions

Volume	~0.290...0.296 cm³ / ~0.0177...0.0181 in³ ②

Table 7-12: MS15 series - product description

① The options for the housing will have an effect on the weight
② The options for the housing will have an effect on the volume

Parts list

Item	Description	Material
(1)	Housing	aluminium or stainless steel ①
(2)	Cover	aluminium or stainless steel ①
(3)	Gasket	silicone
(4)	Stirrup	stainless steel
(5)	Cable gland	PA or nickel-brass or stainless steel ①
(6)	Spring washer	stainless steel
(7)	Spring washer	stainless steel
(8)	Support	stainless steel
(9)	Nut	stainless steel
(10)	Screw	stainless steel
(11)	Earthing terminal	stainless steel
(12)	Screw	stainless steel
(13)	Locking screw M3 x 0.5	stainless steel
(14)	Support	aluminium
(15)	Screw	stainless steel
(16)	Adhesive label	polyester
(17)	**PCB ②**	**FR4 + electronic components + solder**
(18)	Collar	stainless steel
(19)	Adapter M20 x 1.5 - 1/2 NPT	stainless steel or nickel-brass
(20)	Gasket	silicone
(21)	Screw	stainless steel
(22)	Cable	silicone + PE + copper
(23)	Spacer Ø4.3 x 2	brass

Table 7-13: MS15 series - Parts list

① This depends on the device options

② PCB = Printed circuit board. This depends on the output option.

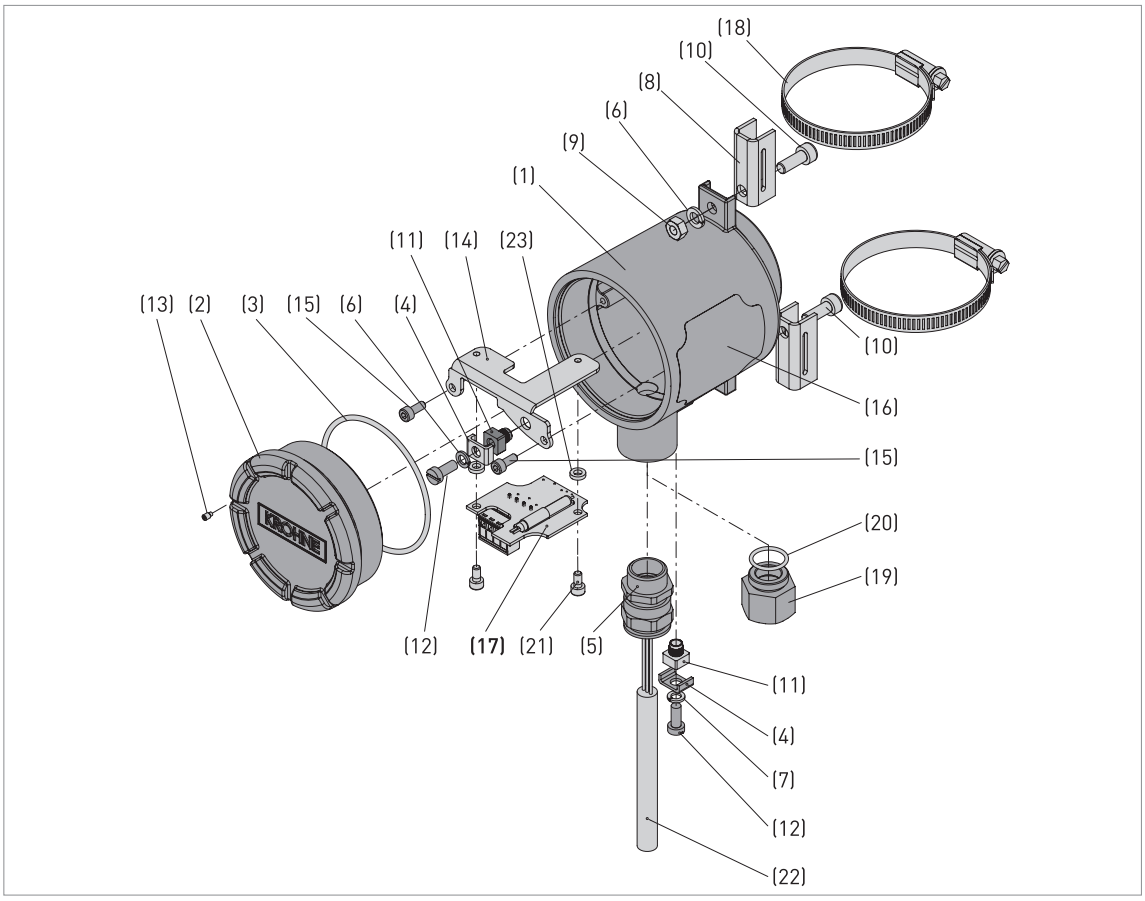

Figure 7-3: MS15 series - parts of the device (refer to "Parts list" table)

Procedure: how to disassemble the MS15 limit switch

- Remove the two collars (18), the support (8), the cable gland (5) and the adapter (19).
- Remove the cover (2). Gasket (3) is on the cover (2).
- Remove the two screws (15) to extract the assembly ((14), (11), (23), (4), (7), (12), (15), **(17)** and (21)).
- Remove the two screws (21) to remove the **PCB (17)**.

➲ You can send the parts to the approved location for waste treatment or recycling.

Materials and components that must be removed and independently prepared for treatment

Material	Weight		Additional information
	[kg]	[lb]	
Polychlorinated biphenyl	N/A	N/A	N/A
Mercury	N/A	N/A	N/A
Printed circuit boards, area > 10 cm² / > 1.55 in² (17)	**0.009** ①	**0.020** ①	**FR4 + electronic components + solder**
Toner cartridge	N/A	N/A	N/A
LCD screen (device), area > 100 cm² / > 15.5 in²	N/A	N/A	N/A
Plastic that contains brominated flame retardants	N/A	N/A	N/A
Asbestos	N/A	N/A	N/A
Cathode ray tube	N/A	N/A	N/A
CFC, HCFC, HFC or HC	N/A	N/A	N/A
Gas discharge lamp	N/A	N/A	N/A
External electric cable	N/A	N/A	N/A
Refractory ceramic fibers	N/A	N/A	N/A
Radioactive substance	N/A	N/A	N/A
Electrolyte capacitor > 25 mm / > 0.98¨	N/A	N/A	N/A

Table 7-14: MS15 series - materials and components that must be removed and independently prepared for treatment

① This depends on the device options

Materials and components that can cause problems in the recycling process

Material	Part (item number)	Weight		Additional information
		[kg]	[lb]	
a mixture of metals and plastics	**PCB (17)**	**0.009**	**0.020**	**FR-4 + electronic components + solder**
a mixture of metals and plastics	cable gland (5)	0.065	0.14	stainless steel ①
		0.0093	0.021	PA ①
		0.07	0.154	nickel-brass ①
a mixture of metals and plastics	**cable (22)**	N/A	N/A	silicone + PE + copper
a mixture of metals and plastics	cover (2)	0.19	0.418	aluminium + polycarbonate ①
		0.558	1.230	stainless steel + polycarbonate ①
a mixture of metals	housing (1)	0.463	1.021	aluminium housing
a mixture of plastics	N/A	N/A	N/A	N/A

Table 7-15: MS15 series - materials and components that can cause problems in the recycling process

① This depends on the device options

Materials and components that can be recycled

Stainless-steel housing				
Material	Part (item number)	Weight		Additional information
		[kg]	[lb]	
Stainless steel	housing (1)	2.00... 2.16 ①	4.41... 4.76 ①	N/A
	cover (2)			
	stirrup (4)			
	spring washer (6)			
	spring washer (7)			
	screw (10)			
	earthing terminal (11)			
	screw (12)			
	locking screw M3 x 0.5 (13)			
	screw (15)			
	collar (18)			
	adapter (19)			
	gasket (20)			
	screw (21)			
	cable (22)			
	spacer Ø4.3 x 2 (23)			
Plastic	gasket (3)	~0.01	~0.002	silicone
Rubber	N/A	N/A	N/A	N/A
Noble metals	Adapter (19)	~0.07	~0.154	nickel-brass
PCB	**PCB (17)**	**0.009** ①	**0.020** ①	**FR-4 + electronic components + solder**
Total (average weight)	—	~2.089... 2.249 ①	~4.605... 4.958 ①	N/A

Table 7-16: MS15 series with a stainless-steel housing - materials and components that can be recycled

① This depends on the device options

Aluminium housing				
Material	Part (item number)	Weight		Additional information
		[kg]	[lb]	
Stainless steel	stirrup (4)	0.78... 0.85 ①	1.720... 1.874 ①	N/A
	spring washer (6)			
	spring washer (7)			
	support (8)			
	nut (9)			
	screw (10)			
	earthing terminal (11)			
	screw (12)			
	locking screw M3 x 0.5 (13)			
	screw (15)			
	collar (18)			
	adapter (19)			
	screw (21)			
	cable (22)			
	spacer Ø4.3 x 2 (23)			
	screw (7)			
	screw (10)			
Aluminium	housing (1)	0.66 ①	1.455 ①	External surfaces are painted
	cover (2)			
	support (14)			
Plastic	gasket (3)	~0.01	~0.022	silicone
Rubber	N/A	N/A	N/A	N/A
Noble metals	adapter (19)	~0.07	~0.154	nickel-brass
FR-4, electronic components	**PCB (17)**	**0.009** ①	**0.020** ①	**PCB**
Total (average weight)	—	~1.53... 1.60 ①	~3.373... 3.527 ①	N/A

Table 7-17: MS15 series with an aluminium housing - materials and components that can be recycled

① This depends on the device options

7.8.3 MS40-series limit switch

INFORMATION!
*Words in **bold text** refer to electrical and electronic equipment.*

Product description

Product name and data

Type	Switch
Model	MS40
Usage	Electrical switch

Weight

Total weight	~0.156...0.163 kg / ~0.344...0.359 lb ①
Weight of metal parts	~0.145...0.151 kg / ~0.320...0.333 lb ①
Weight of plastic parts	~0.0071 kg / ~0.016 lb

Dimensions

Volume	~76...77.5 cm³ / ~4.638...4.729 in³ ②

Table 7-18: MS40 series - product description

① The options for the housing will have an effect on the weight
② The options for the housing will have an effect on the volume

Parts list

Item	Description	Material
(1)	Support contact	stainless steel
(2)	Housing	aluminium
(3)	Screw CHC M4 x 20 A4 DIN 912	stainless steel
(4)	**PCB** ①	**FR-4 electronic components + solder**
(5)	Label 20 x 20	metallized polyester
(6)	Label 60 x 35	metallized polyester
(7)	Screw TC M4-8 A2	stainless steel
(8)	Hose clamp ②	stainless steel
(9)	Label 55 x 20	metallized polyester
(10)	Cable gland	polycarbonate
(11)	Screw CHC M4 x 20 A4 DIN 912	stainless steel
(12)	Cover	aluminium
(13)	Gasket (housing / cover)	silicone

Table 7-19: MS40 series - Parts list

① PCB = Printed circuit board. This depends on the output option.
② This depends on the output option.

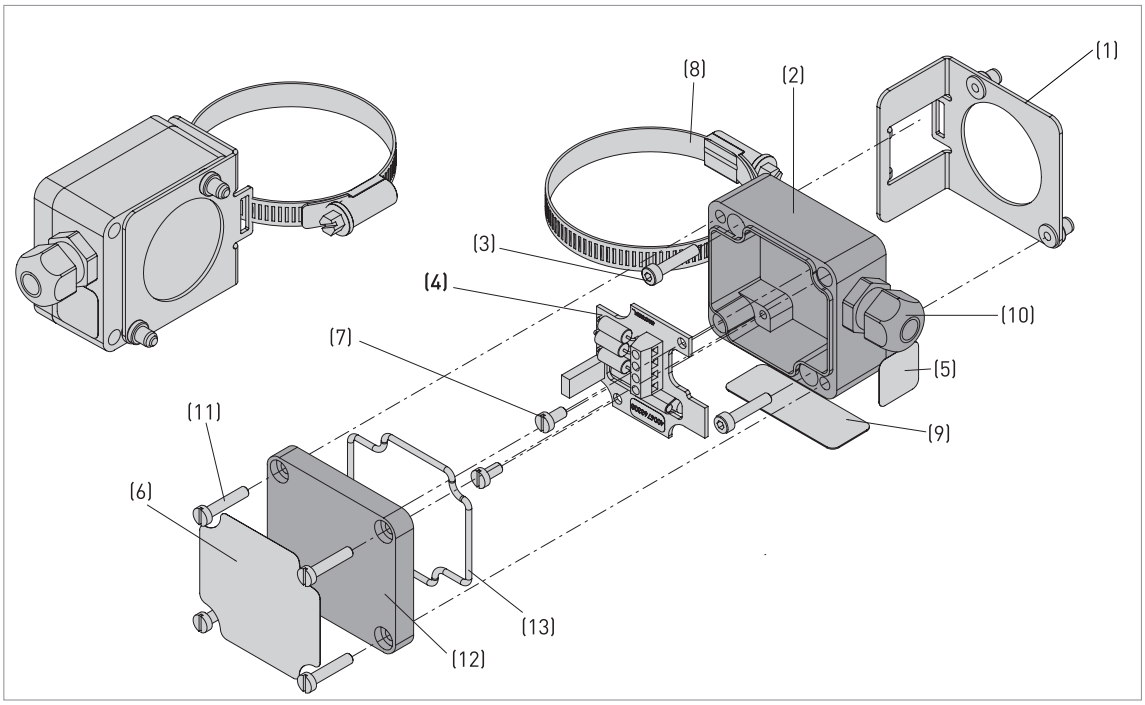

Figure 7-4: MS40 series - parts of the device (refer to "Parts list" table)

Procedure: how to disassemble the MS40 limit switch

- Remove the four screws (11) to remove the cover (12) and the gasket (13) from the housing (2)
- Remove the two screws (7) to remove the **PCB (4)**.
- Remove the two screws (3) to remove the support contact (1).
- Remove the cable gland (10) from the housing (2).

➲ You can send the parts to the approved location for waste treatment or recycling.

Materials and components that must be removed and independently prepared for treatment

Material	Weight		Additional information
	[kg]	[lb]	
Polychlorinated biphenyl	N/A	N/A	N/A
Mercury	N/A	N/A	N/A
Printed circuit boards, area > 10 cm² / > 1.55 in² (17)	**N/A**	**N/A**	**PCB is 5 cm²**
Toner cartridge	N/A	N/A	N/A
LCD screen (device), area > 100 cm² / > 15.5 in²	N/A	N/A	N/A
Plastic that contains brominated flame retardants	N/A	N/A	N/A
Asbestos	N/A	N/A	N/A
Cathode ray tube	N/A	N/A	N/A
CFC, HCFC, HFC or HC	N/A	N/A	N/A
Gas discharge lamp	N/A	N/A	N/A
External electric cable	N/A	N/A	N/A

Material	Weight		Additional information
	[kg]	[lb]	
Refractory ceramic fibers	N/A	N/A	N/A
Radioactive substance	N/A	N/A	N/A
Electrolyte capacitor > 25 mm / > 0.98¨	N/A	N/A	N/A

Table 7-20: MS40 series - materials and components that must be removed and independently prepared for treatment

Materials and components that can cause problems in the recycling process

Material	Part (item number)	Weight		Additional information
		[kg]	[lb]	
a mixture of metals and plastics	**PCB (4)**	**0.005**	**0.0110**	**FR-4 + electronic components + solder**
a mixture of metals and plastics	N/A	N/A	N/A	N/A
a mixture of metals	N/A	N/A	N/A	N/A
a mixture of plastics	N/A	N/A	N/A	N/A

Table 7-21: MS40 series - materials and components that can cause problems in the recycling process

Materials and components that can be recycled

Material	Part (item number)	Weight		Additional information
		[kg]	[lb]	
Stainless steel	support contact (1)	0.092... 0.098 ①	0.203... 0.216 ①	N/A
	screw CHC M4 x 20 A4 DIN 912 (3)			
	screw TC M4-8 A2 (4)			
	hose clamp (8) ②			
	screw CHC M4 x 20 A4 DIN 912 (11)			
Plastic	cable gland (10)	~0.0071	~0.0157	polycarbonate
	gasket (13)			silicone
Aluminium	housing (2)	~0.053	~0.117	N/A
	cover (12)			
PCB	**PCB (4)**	**~0.005**	**~0.011**	**FR-4 + electronic components + solder**
Total (average weight)	—	~0.156... 0.163 ①	~0.344... 0.359 ①	N/A

Table 7-22: MS40 series - materials and components that can be recycled

① This depends on the device options

② Hose clamp type depends on device options

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:

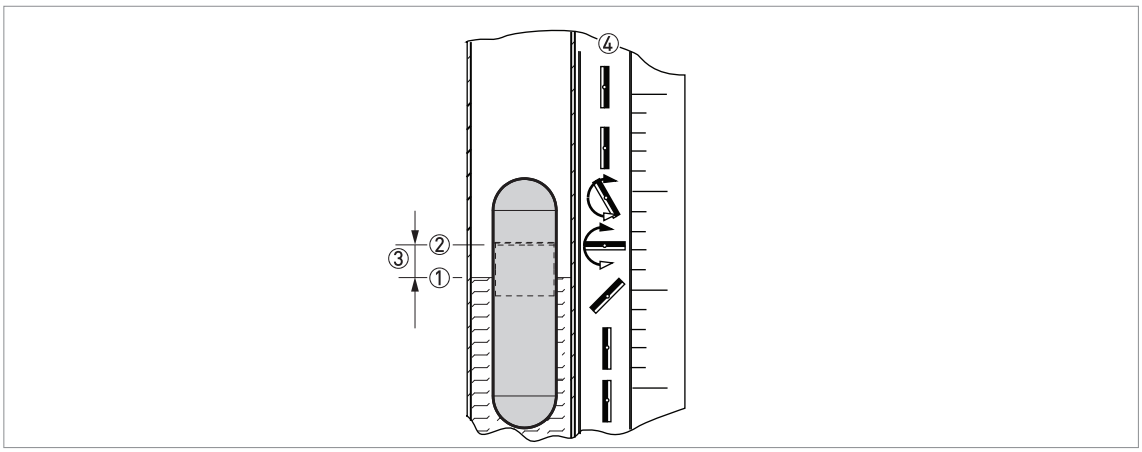

Figure 8-1: Offset between liquid level and the float magnet (liquid level offset)

① Level of the liquid
② Top of the float magnet. The magnet field around the top of the magnet turns the flaps in the indicator column that shows the level in the tank.
③ Liquid level offset. This offset is the difference between the level of the liquid and the top of the float magnet. The value is related to the type of float in the measuring chamber and the density of the liquid.
④ Indicator column of yellow/black or red/white rotating flaps with the optional scale in m/cm, ft/inch, % (simplified) or customized volume units

8.2 Technical data

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 (Downloadcenter).*

8.2.1 BM26A-1000 magnetic level indicator

Measuring system

Measuring principle	Magnetic level indicator - bypass chamber (principle of communicating tubes). A float in the measuring chamber (Ø42 mm × 2 mm / NPS 1 1/4 pipe) is magnetically coupled to a mechanical level indicator.
Application range	Level indication of liquids in applications from vacuum up to 40 barg / 580 psig
Measured value	
Primary measured value	Level of the float magnets in the measuring chamber
Secondary measured value	Level or volume of the liquid in the tank

Design

Measuring chamber variants	Side / side process connections
	Axial / axial process connections
	Bottom axial / top side process connections
	Bottom side / top axial process connections
Options	LT40 reed-chain level transmitter without LCD indicator module with a compact or a remote housing ①
	LT40 reed-chain level transmitter with LCD indicator module with a compact or a remote housing ①
	Anti-icing cover for glass indicator tube
	Bistable limit switches ②
Measuring range (ML)	0.3…5.5 m / 1…18 ft (longer on request)
Display and user interface	
Display	Indicator column with magnetically coupled rotating flaps that have two colors: yellow/black; red/white
Float failure indication (at the bottom of the indicator column)	Orange flaps
Scale marking options	No scale; m + cm; ft + inches; customized volume units; % (simplified) ③

Measuring accuracy

Accuracy	±10 mm / 0.4¨
Repeatability	±10 mm / 0.4¨ (when density is constant)
Maximum rate of change	20 mm/s / 0.787¨/s

Operating conditions

Temperature	
Process temperature	-70...+200°C / -94...+392°F (Ex: see supplementary instructions or approval certificates)
Ambient temperature	-70...+80°C / -94...+176°F (Ex: see supplementary instructions or approval certificates)
Storage temperature	-70...+80°C / -94...+176°F
Pressure	
Process pressure	-1...40 barg / -14.5...580 psig ④
Chemical properties	
Density	700...1200 kg/m³ / 43.7...74.91 lb/ft³. Higher density on request.
Viscosity	≤ 500 mPa·s / ≤ 500 cP
Other conditions	
Ingress protection (IEC 60529)	Indicator column: IP66 / IP68 (0.15 barg)

Materials

Measuring chamber	Stainless steel (1.4404 / 316L)
Float	Stainless steel (1.4404 / 316L); titanium
Indicator column rail	Stainless steel (1.4401 / 316)
Indicator column tube	Borosilicate glass 3.3 (agrees with ISO 3585) - hermetically sealed tube
Scale (option)	Stainless steel (1.4401 / 316)
Process connection	Stainless steel (1.4404 / 316L)
Gasket options	Aramid; graphite; PTFE
Braid insulation	Ceramic fibre (thermal insulation between the indicator column and the measuring chamber when the process temperature is +100...+200°C / +210...+392°F)
Anti-icing cover	PLEXIGLAS® (option for glass indicator column tube) - when the liquid temperature is -50...+40°C / -58...+104°F

Process connections

Threaded pipes	1/2...3/4 NPT (male); G 1/2...3/4 (male)
Welded pipes, ASME	NPS 1/2...1 in Sch10S ⑤
Flange options	
EN	DN15...50 (Type B1) in PN40
ASME	NPS 1/2...2 (RF) in Class 150 / 300 ⑤

Drain and vent connections

Drain options	
Thread	Without; G 3/8...3/4 (female) with plug; 3/8...3/4 NPT (female) with plug
Flange	All process connection options
Vent options	
Thread	Without; G 3/8...1/2 (female) with plug; 3/8...1/2 NPT (female) with plug
Flange	All process connection options

Power supply

Limit switches	Refer to the technical data for the MS15 series and MS40 series
Reed-chain level transmitter	Refer to the technical data for the LT40

Input and output

Parameter	Level detection or indication
Output signal	Refer to the technical data for the LT40 reed-chain level transmitter and the MS15-series and MS40-series limit switches

Approvals and certification

CE	The device meets the essential requirements of the EU Directives. The manufacturer certifies successful testing of the product by applying the CE marking.
	For more data about the EU Directives and European Standards related to this device, refer to the EU Declaration of Conformity. You can download this document free of charge from the website (Download Center).
Explosion protection	
ATEX	II 1/2 G Ex h IIC T6...T3 Ga/Gb or II 2 G Ex h IIC T6...T3 Gb
IECEx	Ex h IIC T6...T3 Ga/Gb or Ex h IIC T6...T3 Gb
Other standards and approvals	
Pressure	Pressure Equipment Directive
Vibration resistance	EN 60721-3-4 - vibration class 4M4 (1...200 Hz:1g, 15g shock ½ sinus: 6 ms)
Construction code	Standard: EN 13445
	Option: NACE MR0175 / MR0103 / ISO 15156

Table 8-1: BM26A-1000: technical data

① For more data, refer to technical data for the LT40 reed-chain level transmitter in this section
② For more data, refer to technical data for the MS15-series and MS40-series limit switches in this section
③ If the scale adjacent to the indicator column has % (simplified) units, then it has a range of 0...100% with an increment of 10% between each marking
④ The maximum pressure is related to the type of process connection, pressure rating and the process temperature. For more data about 316-316L stainless-steel measuring chambers for the BM26A-1000, refer to the "Maximum process pressure: measuring chamber" section in this chapter.
⑤ NPS = National Pipe Size. For more data about the dimensions of flanges, refer to the ASME B16.5 standard. For more data about the dimensions of welded pipes, refer to the ASME B36.19M standard.

8.2.2 BM26A-3000 magnetic level indicator

	PVC	PP	PVDF

Measuring system

Measuring principle	Magnetic level indicator - bypass chamber (principle of communicating tubes). A float in the measuring chamber is magnetically coupled to a mechanical level indicator.		
Application range	Level indication of liquids in applications 0...6 barg / 0...87 psig		
Measured value			
Primary measured value	Level of the float magnets in the measuring chamber		
Secondary measured value	Level or volume of the liquid in the tank		

Design

Measuring chamber, variants	Side / side process connections		
Measuring chamber, diameter	Ø63 mm × 4.7 mm	Ø63 mm × 3 mm	Ø63 mm × 5.8 mm
Options	LT40 reed-chain level transmitter without LCD indicator module with a compact or a remote housing ①		
	LT40 reed-chain level transmitter with LCD indicator module with a compact or a remote housing ①		
	Bistable limit switches ②		
Measuring range (ML)	0.5...4.0 m / 1.64...13.1 ft (longer on request)		
Display and user interface			
Display	Indicator column with magnetically coupled rotating flaps that have two colors: yellow/black; red/white		
Float failure indication (at the bottom of the indicator column)	Orange flaps		
Scale marking options	No scale; m + cm; ft + inches; customized volume units, % (simplified) ③		

Measuring accuracy

Accuracy	±10 mm / 0.4¨
Repeatability	±10 mm / 0.4¨ (when density is constant)
Maximum rate of change	20 mm/s / 0.787¨/s

Operating conditions

Temperature			
Process temperature	-20...+50°C / -4...+122°F	-20...+100°C / -4...+212°F	-20...+100°C / -4...+212°F
Ambient temperature	-20...+80°C / -4...+176°F (Ex: see supplementary instructions or approval certificates)		
Storage temperature	-20...+80°C / -4...+176°F		
Pressure			
Process pressure	0...6 barg / 0...87 psig ④		
Chemical properties			
Density	680...1200 kg/m³ / 42.45...74.91lb/ft³	560...1200 kg/m³ / 34.96...74.91lb/ft³	700...1200 kg/m³ / 43.7...74.91lb/ft³
Viscosity	≤ 500 mPa·s / ≤ 500 cP		

	PVC	PP	PVDF
Other conditions			
Ingress protection (IEC 60529)	Indicator column: IP66 / IP68 (0.15 barg)		

Materials

Measuring chamber	PVC	PP	PVDF
Float	PVC	PP	PVDF
Indicator column rail	Stainless steel (1.4401 / 316)		
Indicator column tube	Borosilicate glass 3.3 (agrees with ISO 3585) - hermetically sealed tube		
Scale (option)	Stainless steel (1.4401 / 316)		
Process connection	PP	PP	PP
Gasket options	FKM/FPM; Nitrile; PTFE; EPDM		

Process connections

Flange, EN	DN20…50 (Type B1) in PN06; DN25…50 (Type B1) in PN16
Flange, ASME	NPS 1…2 (RF) in Class 150 ⑤

Drain and vent connections

Drain options	Without; G 3/8...3/4 (female) with plug; 3/8...3/4 NPT (female) with plug
Vent options	Without; G 3/8...3/4 (female) with plug; 3/8...3/4 NPT (female) with plug

Power supply

Limit switches	Refer to the technical data for the MS15 series and MS40 series
Reed-chain level transmitter	Refer to the technical data for the LT40

Input and output

Parameter	Level detection or indication
Output signal	Refer to the technical data for the LT40 reed-chain level transmitter and the MS15-series and MS40-series limit switches

Approvals and certification

CE	The device meets the essential requirements of the EU Directives. The manufacturer certifies successful testing of the product by applying the CE marking.
	For more data about the EU Directives and European Standards related to this device, refer to the EU Declaration of Conformity. You can download this document free of charge from the website (Download Center).
Vibration resistance	EN 60721-3-4 - vibration class 4M4 (1...200 Hz:1g, 15g shock ½ sinus: 6 ms)

Table 8-2: BM26A-3000: technical data

① For more data, refer to technical data for the LT40 reed-chain level transmitter in this section
② For more data, refer to technical data for the MS15-series and MS40-series limit switches in this section
③ If the scale adjacent to the indicator column has % (simplified) units, then it has a range of 0...100% with an increment of 10% between each marking
④ The maximum process pressure is related to the measuring range (C-C length), type of process connection and the process temperature. Refer to the "Maximum process pressure: measuring chamber" section in this chapter.
⑤ NPS = National Pipe Size. For more data about the dimensions of flanges, refer to the ASME B16.5 standard.

8.2.3 LT40 reed-chain level transmitter

4...20 mA and 4...20 mA + HART® communication modules

Measuring system

Measuring principle	A reed resistor chain that is magnetically operated by a magnetic float in an adjacent measuring chamber
Primary measured value	Resistance
Secondary measured value	Level or volume of the liquid in the tank

Design

Description of device	Resistance reed chain with 2-wire loop-powered transmitter module attached adjacent to the measuring chamber of the magnetic level indicator. A transmitter module converts changes in resistance to an output signal. If the LT40 is used in multidrop mode, a maximum of 63 transmitters can be connected to a network that agrees with the HART® communication protocol.
Options	Transmitter module position: LT40 C - compact housing at the top of the reed resistor chain
	Transmitter module position: LT40 C - compact housing at the bottom of the reed resistor chain
	Transmitter module position: LT40 F - remote housing connected to the bottom of the reed resistor chain. Max. cable length: 25 m / 82 ft.
	LCD indicator module (non-Ex and Ex d-approved devices only)
Accessories	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	Optional 2-wire loop-powered LCD indicator module (backlit)
	4-digit LCD with minus sign, 2-button keypad. Selectable number of decimals, 0 to 3.
Available units	mm; inches; %
Range	-1999...9999

Measuring accuracy

Resolution	Standard: ±10 mm / 0.4¨ (when density is constant)
	Option: ±5 mm / 0.2¨ (when density is constant)

Operating conditions

Temperature	
Ambient temperature, transmitter	-40...+80°C / -40...+176°F ①
Ambient temperature, LCD indicator	-20...+70°C / -4...+158°F ①
Process temperature	The ambient temperature limit is related to the process temperature. Do not put thermal insulation around the transmitter housing. Refer to the "Temperature limits: LT40 C/F reed-chain level transmitter" section in this chapter.
Storage temperature	-40...+80°C / -40...+176°F

Pressure	
Operating pressure	Atmospheric pressure
Other conditions	
Warm-up time	30 s
Response time	1....60 s ②
Ingress protection (IEC 60529)	IP66/IP68 (at a depth of 1.5 m for 2 weeks)
Relative air humidity (RH)	0...99%

Installation conditions

Notes	The LT40 is calibrated at the factory and attached to the measuring chamber before delivery
Dimensions	Refer to the "Dimensions" section

Materials

Housing	Polyester-coated aluminium
Reed-chain tube	Stainless steel (1.4401 / 316)
Clamp	Stainless steel (1.4401 / 316)
Cable gland	Plastic (for M20 × 1.5 only), nickel-plated brass or stainless steel

Power supply

Voltage, without LCD indicator	non-Ex or Ex db: 10…35 V DC
	Ex ia: 10…30 V DC
Voltage, with LCD indicator	non-Ex or Ex db: 17…35 V DC
EN 60947-1 electrical data	Overvoltage category I
Cable entry	M20 × 1.5; 1/2 NPT
Cable gland	None; M20 × 1.5; 1/2 NPT
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	High: 21 mA; Low: 3.6 mA - agrees with NAMUR NE 43
HART®	
Description	Digital signal transmitted with the current output signal (HART® protocol)
Version	7
Multidrop operation	Yes, current output = 4 mA. Polling address 1...15.

Approvals and certifications

CE	The device meets the essential requirements of the EU Directives. The manufacturer certifies successful testing of the product by applying the CE marking.
	For more data about the EU Directives and European Standards related to this device, refer to the EU Declaration of Conformity. You can download this document free of charge from the website (Download Center).

Explosion protection	
ATEX (EU Type Approval)	II 1 G Ex ia IIC T6...T1 Ga or II 2 G Ex ia IIC T6...T1 Gb ③
	II 2 G Ex db IIC T6...T1 Gb
IECEx	Ex ia IIC T6...T1 Ga or Ex ia IIC T6...T1 Gb ③
	Ex db IIC T6...T1 Gb
Other standards and approvals	
EMC	Electromagnetic Compatibility Directive ④
	NAMUR NE 21 (pending) ⑤
Vibration resistance	EN 60721-3-4 - vibration class 4M4 (1...200 Hz:1g, 10g shock ½ sinus: 11 ms)
NAMUR	NAMUR NE 43 ⑥

Table 8-3: LT40 (4...20 mA and 4...20 mA + HART® communication modules): technical data

① The ambient temperature limit is related to the process temperature. Do not put thermal insulation around the transmitter housing. Refer to the "Temperature limits: LT40 C/F reed-chain level transmitter" section in this chapter.
② This value is programmable
③ This Ex approval does not include the optional LCD indicator module
④ LT40 F: Strong interference from EMC-conducted emissions (EN 61000-4-6) can cause a maximum deviation of 1.8% along the measurement span
⑤ Electromagnetic Compatibility of Industrial and Laboratory Control Equipment
⑥ Standardization of the Signal Level for the Failure Information of Digital Transmitters

Fieldbus communication module

	FOUNDATION™ fieldbus	PROFIBUS PA

Measuring system

Measuring principle	A reed resistor chain that is magnetically operated by a magnetic float in an adjacent 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 magnetic level indicator. A transmitter module converts changes in resistance to an output signal.	
Description of transmitter module	Changes in resistance are converted to signals that agree with the FOUNDATION™ fieldbus communication protocol.	Changes in resistance are converted to signals that agree with the PROFIBUS PA communication protocol.
Options	Transmitter module position: LT40 C - compact housing at the top of the reed resistor chain	
	Transmitter module position: LT40 C - compact housing at the bottom of the reed resistor chain	
	Transmitter module position: LT40 F - remote housing connected to the bottom of the reed resistor chain. Max. cable length: 25 m / 82 ft.	
Display and user interface		
Display	None	

Measuring accuracy

Resolution	Standard: ±10 mm / 0.4¨ (when density is constant)
	Option: ±5 mm / 0.2¨ (when density is constant)

	FOUNDATION™ fieldbus	PROFIBUS PA

Operating conditions

Temperature		
Ambient temperature	-40…+80°C / -40…+176°F ①	
Process temperature	The ambient temperature limit is related to the process temperature. Do not put thermal insulation around the transmitter housing. Refer to the "Temperature limits: LT40 C/F reed-chain level transmitter" section in this chapter.	
Storage temperature	-40…+80°C / -40…+176°F	
Pressure		
Operating pressure	Atmospheric pressure	
Other conditions		
Ingress protection (IEC 60529)	IP66/IP68 (at a depth of 1.5 m for 2 weeks)	
Relative air humidity (RH)	0...99%	

Installation conditions

Notes	The LT40 is calibrated at the factory and attached to the measuring chamber before delivery
Dimensions	Refer to the "Dimensions" section

Materials

Housing	Polyester-coated aluminium
Reed-chain tube	Stainless steel (1.4401 / 316)
Clamp	Stainless steel (1.4401 / 316)
Cable gland	Plastic (for M20 × 1.5 only), nickel-plated brass or stainless steel

Power supply

Voltage	non-Ex or Ex db: 9...32 V DC	
	Ex ia: 9...30 V DC	
EN 60947-1 electrical data	Overvoltage category I	
Cable entry	M20 × 1.5; 1/2 NPT	
Cable gland	None; M20 × 1.5; 1/2 NPT	
Intrinsically safe circuit data for Ex ia-approved devices	Refer to supplementary instructions or approval certificates	
FOUNDATION™ fieldbus		
Description	FOUNDATION™ fieldbus protocol	N/A
PROFIBUS PA		
Description	N/A	PROFIBUS PA protocol Profile A&B, ver.3.0 (EN 50170 vol.2)

Approvals and certification

CE	The device meets the essential requirements of the EU Directives. The manufacturer certifies successful testing of the product by applying the CE marking.
	For more data about the EU Directives and European Standards related to this device, refer to the EU Declaration of Conformity. You can download this document free of charge from the website (Download Center).

	FOUNDATION™ fieldbus	PROFIBUS PA
Explosion protection		
ATEX (EU Type Approval)	II 1 G Ex ia IIC T6...T1 Ga or II 2 G Ex ia IIC T6...T1 Gb	
	II 2 G Ex db IIC T6...T1 Gb	
IECEx	Ex ia IIC T6...T1 Ga or Ex ia IIC T6...T1 Gb	
	Ex db IIC T6...T1 Gb	
Other standards and approvals		
EMC	Electromagnetic Compatibility Directive	
Vibration resistance	EN 60721-3-4 - vibration class 4M4 (1...200 Hz:1g, 10g shock ½ sinus: 11 ms)	

Table 8-4: LT40 (fieldbus communication module): technical data

① The ambient temperature limit is related to the process temperature. Do not put thermal insulation around the transmitter housing. Refer to the "Temperature limits: LT40 C/F reed-chain level transmitter" section in this chapter.

8.2.4 MS15-series and MS40-series limit switches

	MS15 series	MS40 series

Measuring system

Measuring principle	Bistable reed switch (SPDT) that is magnetically operated by a magnetic float in an adjacent measuring chamber
Application range	Level detection

Design

Description of device	Limit switch attached adjacent to the measuring chamber of the magnetic level indicator

Measuring accuracy

Hysteresis	The hysteresis value agrees with the model of the magnetic level indicator. For more data, refer to *Limit switch adjustment data* on page 109.

Operating conditions

Temperature		
Ambient temperature	-40...+80°C / -40...+176°F ①	
Process temperature	The ambient temperature limit is related to the process temperature. Do not put thermal insulation around the transmitter housing. Refer to the "Temperature limits: MS15-series limit switch" and "Temperature limits: MS40-series limit switch" sections in this chapter.	
Operating temperature	-40…+115°C / -40…+239°F ②	-40…+120°C / -40…+248°F ②
Storage temperature	-40…+80°C / -40…+176°F	
Pressure		
Operating pressure	Atmospheric pressure Max. height above mean sea level: 2000 m / 6560 ft	
Other conditions		
Ingress protection (IEC 60529)	MS15 series: IP66 / IP68 (at a depth of 1.5 m for 2 weeks)	
	MS40 series: IP66	
Relative air humidity (RH)	0...99%	

Installation conditions

Notes	Adjust the switch position in relation to the hysteresis data (switching point offset) and the density of the liquid
Dimensions	Refer to the "Dimensions" section

Materials

Housing	Aluminium with epoxy powder paint	
Clamp	Stainless steel (1.4401 / 316)	
Cable gland	Plastic (for M20 × 1.5 only), nickel-plated brass or stainless steel	Plastic

	MS15 series	MS40 series

Electrical connections

Switching capacity	MS15 / MS40: Absolute ratings: 250 V AC/DC; 1 A; 60 VA/W	
	MS15 NAMUR / MS40 NAMUR: Agrees with DIN 19234 (NAMUR); Umax = 13 V DC	
EN 60947-5-1 electrical data (MS15 and MS40 only)	Overvoltage category II	
	Rated insulation voltage, Ui: 250 V AC or 250 V DC	
	Rated impulse withstand voltage, Uimp: 2.5 kV	
	Rated conventional thermal current, Ith: 1 A	
	Pollution degree: 4	
Utilization category (EN 60947-5-1) with current and voltage ratings	AC13: Ie = 0.5 A; Umax = 60 V AC	
	AC13: Ie = 0.25 A; Umax = 250 V AC	
	DC12: Ie = 1 A; Umax = 60 V DC	
	DC13: Ie = 0.5 A; Umax = 60 V DC	
Short-circuit protection device	0.25 A fuse, type 1500 A interrupting rating (IEC 60127-2/1)	
	1 A fuse, application category gG (IEC 60269) or type 1500 A interrupting rating (IEC 60127-2/1)	
Intrinsically safe circuit data	Refer to supplementary instructions or approval certificates	
Cable entry	M20 × 1.5; 1/2 NPT	M16 × 1.5
Cable gland	None; M20 × 1.5; 1/2 NPT	M16 × 1.5

Approvals and certification

CE	The device meets the essential requirements of the EU Directives. The manufacturer certifies successful testing of the product by applying the CE marking.	
	For more data about the EU Directives and European Standards related to this device, refer to the EU Declaration of Conformity. You can download this document free of charge from the website (Download Center).	
Explosion protection		
ATEX (EU Type Approval)	II 1 G Ex ia IIC T6...T1 or II 2 G Ex ia IIC T6...T1 Gb	
	II 2 G Ex db IIC T6...T1 Gb	N/A
IECEx	Ex ia IIC T6...T1 Ga or Ex ia IIC T6...T1 Gb	
	Ex db IIC T6...T1 Gb	N/A
Other standards and approvals		
LVD	MS15 / MS40: Low-Voltage Directive (LVD)	
	MS15 NAMUR / MS40 NAMUR: N/A	
Vibration resistance	EN 60721-3-4 - vibration class 4M4 (1...200 Hz:1g, 10g shock ½ sinus: 11 ms)	

Table 8-5: MS15-series and MS40-series limit switches: technical data

① The ambient temperature limit is related to the process temperature. Do not put thermal insulation around the transmitter housing. Refer to the "Temperature limits: MS15-series limit switch" and "Temperature limits: MS40-series limit switch" sections in this chapter.

② The operating temperature is the temperature of the electronic parts

8.3 Dimensions

8.3.1 BM26A-1000

Side - side process connections

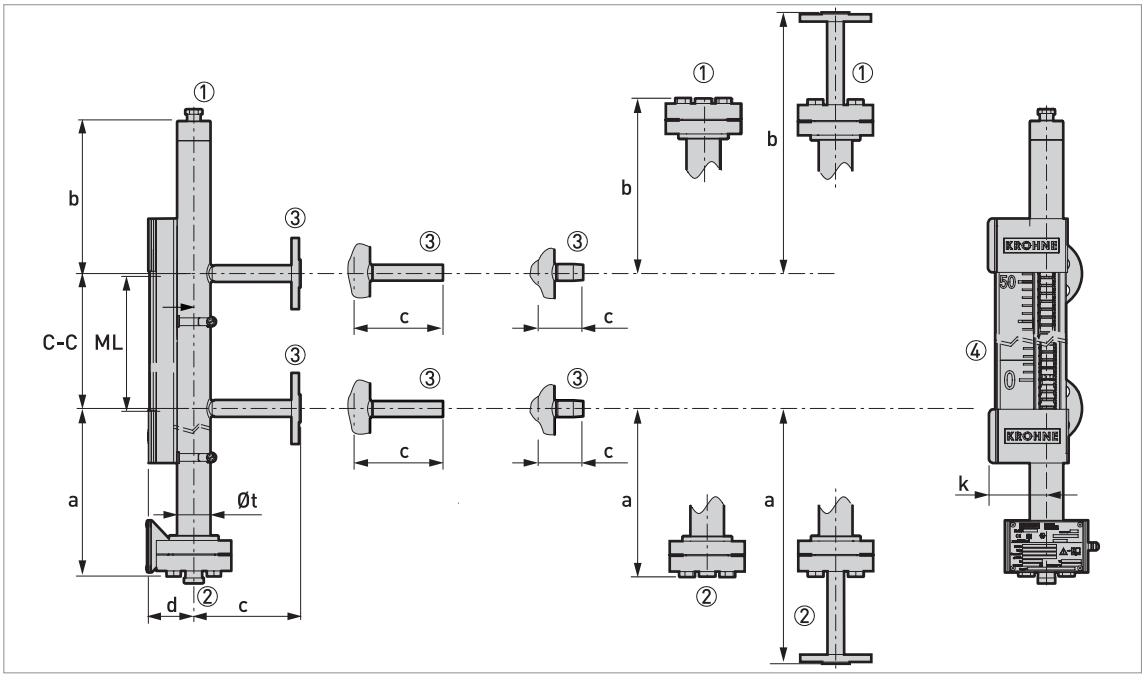

Figure 8-2: BM26A-1000: side - side process connections

① Optional vent with 3/8...1/2 NPT threaded connection (with plug), G 3/8...1/2 threaded connection on a plate flange (with plug), or DN15...50 / NPS 1/2...2 flange
② Optional drain with 3/8...3/4 NPT threaded connection (with plug), G 3/8...3/4 threaded connection on a plate flange (with plug), or DN15...50 / NPS 1/2...2 flange
③ Process connection (flange, welded pipe, or pipe with male threaded connection)
④ Level indicator column with optional scale (mm, inch, simplified % or volume)

INFORMATION!

- *a = distance from the center axis of the bottom connection to the bottom of the device*
- *b = distance from the center axis of the top connection to the top of the device*
- *C-C = distance between the center axes of the top and bottom process connections*
- *ML = measuring length*

If the magnetic level indicator has the flanged vent and drain options, these flanges have the same pressure rating as the flanges for the process connections.

Other dimensions are available on request.

Liquid density [kg/m³]	Dimensions [mm]							
	a	b	C-C	ML	c	d	k	Øt
700…950	①	228 ②	300…5500 ③	③	④	55.5 ⑤	74	42.4
950…1200	⑥							

Table 8-6: BM26A-1000 (side - side process connections): general dimensions in mm

① Drain options are available. NPT connection (female) + plug: 299 mm. G connection (female) + plug: 291 mm. Flange: 399 mm.
② Vent options are available. NPT connection (female) + plug: 228 mm. NPT or G connection (female) + plug: 220 mm. Flange: 328 mm.
③ This value agrees with the "C-C" dimension given in the customer order
④ NPT or G connection (male): 58 mm. Welded pipe: 130 mm. Flange: 135 mm.
⑤ If the indicator column has the PLEXIGLAS® anti-icing cover option, then d = 85.5 mm
⑥ Drain options are available. NPT connection (female) + plug: 255 mm. G connection (female) + plug: 247 mm. Flange: 355 mm.

Liquid density [lb/ft³]	Dimensions [inches]							
	a	b	C-C	ML	c	d	k	Øt
43.70…59.31	①	8.98 ②	11.8...216.5 ③	③	④	2.2 ⑤	2.9	1.67
59.31…74.91	⑥							

Table 8-7: BM26A-1000 (side - side process connections): general dimensions in inches

① Drain options are available. NPT connection (female) + plug: 11.77¨. G connection (female) + plug: 11.46¨. Flange: 15.71¨.
② Vent options are available. NPT connection (female) + plug: 8.98¨. NPT or G connection (female) + plug: 8.66¨. Flange: 12.91¨.
③ This value agrees with the "C-C" dimension given in the customer order
④ NPT or G connection (male): 2.28¨. Welded pipe: 5.12¨. Flange: 5.31¨.
⑤ If the indicator column has the PLEXIGLAS® anti-icing cover option, then d = 3.4¨
⑥ Drain options are available. NPT connection (female) + plug: 10.04¨. G connection (female) + plug: 9.72¨. Flange: 13.98¨.

Axial - axial process connections

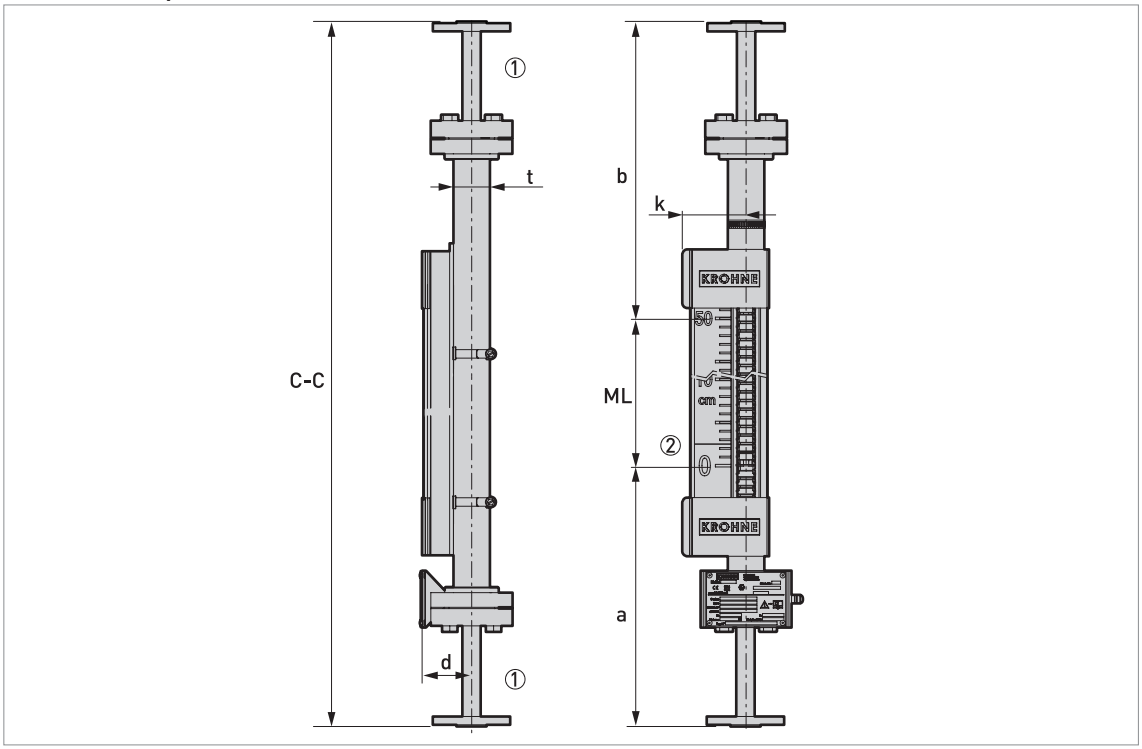

Figure 8-3: BM26A-1000: axial - axial process connections

① Process connection (flange)
② Level indicator column with optional scale (mm, inch, simplified % or volume)

INFORMATION!

- *a = bottom dead zone*
- *b = top dead zone*
- *C-C = distance between the flange facings of the top and bottom process connections*
- *ML = measuring length*

Other dimensions are available on request.

Liquid density [kg/m³]	Dimensions [mm]						
	a	b	C-C	ML	d	k	Øt
700…950	390	250	300...5500 ①	C-C - 640	55.5 ②	74	42.4
950…1200	340	250		C-C - 590			

Table 8-8: BM26A-1000 (axial - axial process connections): general dimensions in mm

① This value agrees with the "C-C" dimension given in the customer order
② If the indicator column has the PLEXIGLAS® anti-icing cover option, then d = 85.5 mm

Liquid density [lb/ft³]	Dimensions [inches]						
	a	b	C-C	ML	d	k	Øt
43.70…59.31	15.35	9.84	11.8…216.5 ①	C-C - 25.20	2.2 ②	2.9	1.67
59.31…74.91	13.39			C-C - 23.23			

Table 8-9: BM26A-1000 (axial - axial process connections): general dimensions in inches

① This value agrees with the "C-C" dimension given in the customer order
② If ambient temperature is -76...-4°F: 3.4" (level indicator column with a PLEXIGLAS® anti-icing cover)

Top side - bottom axial process connections

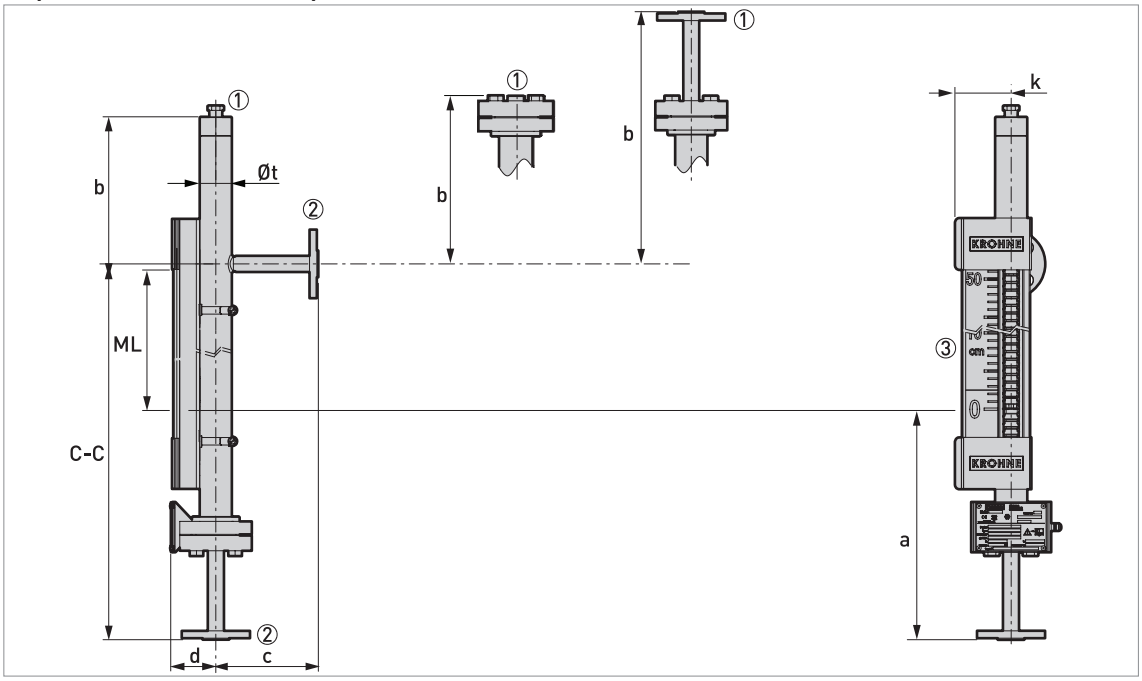

Figure 8-4: BM26A-1000: top side - bottom axial process connections

① Optional vent with 3/8…1/2 NPT threaded connection (with plug), G 3/8…1/2 threaded connection on a plate flange (with plug), or DN15…50 / NPS 1/2…2 flange
② Process connection (flange)
③ Level indicator column with optional scale (mm, inch, simplified % or volume)

INFORMATION!

- *a = bottom dead zone*
- *b = distance from the center axis of the top process connection to the top of the device*
- *C-C = distance between the center axis of the top process connection and the flange facing of the bottom process connection*
- *ML = measuring length*

If the magnetic level indicator has the flanged vent option, this flange has the same pressure rating as the flanges for the process connections.

Other dimensions are available on request.

Liquid density [kg/m³]	Dimensions [mm]							
	a	b	C-C	ML	c	d	k	Øt
700…950	400	228 ①	300...5500 ②	C-C - 400	③	55.5 ④	74	42.4
950…1200	360			C-C - 360				

Table 8-10: BM26A-1000 (top side - bottom axial process connections): general dimensions in mm

① Vent options are available. NPT connection (female) + plug: 228 mm. G connection (female) + plug: 220 mm. Flange: 328 mm.
② This value agrees with the "C-C" dimension given in the customer order
③ EN flange, type B: 135.2 mm. EN flange, type C: 134.7 mm. EN flange, type E: 135.2 mm.
④ If the indicator column has the PLEXIGLAS® anti-icing cover option, then d = 85.5 mm

Liquid density [lb/ft³]	Dimensions [inches]							
	a	b	C-C	ML	c	d	k	Øt
43.70…59.31	15.75	8.98 ①	11.8…216.5 ②	C-C - 15.75	③	2.2 ④	2.9	1.67
59.31…74.91	14.17			C-C - 14.17				

Table 8-11: BM26A-1000 (top side - bottom axial process connections): general dimensions in inches

① Vent options are available. NPT connection (female) + plug: 8.98¨. G connection (female) + plug: 8.66¨. Flange: 12.91¨.
② This value agrees with the "C-C" dimension given in the customer order
③ EN flange, type B: 5.32¨. EN flange, type C: 5.30¨. EN flange, type E: 5.32¨.
④ If the indicator column has the PLEXIGLAS® anti-icing cover option, then d = 3.4¨

Top axial - bottom side process connections

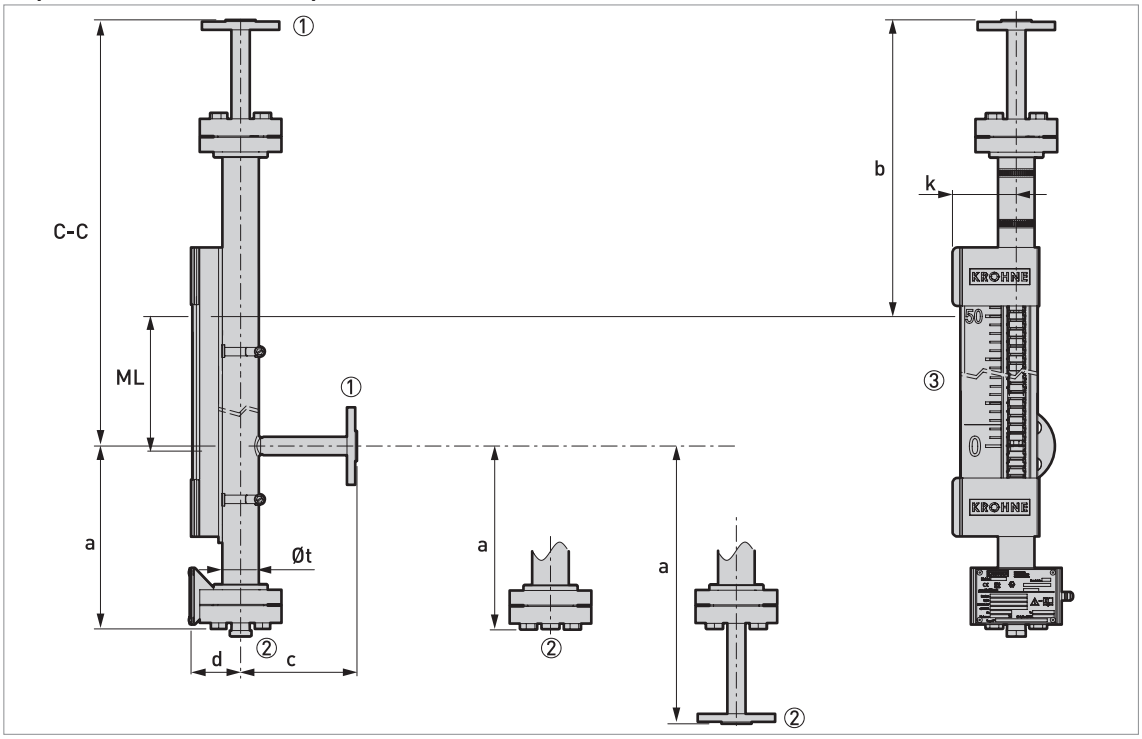

Figure 8-5: BM26A-1000: top axial - bottom side process connections

① Process connection (flange)
② Optional drain with 3/8…3/4 NPT threaded connection (with plug), G 3/8…3/4 threaded connection on a plate flange (with plug), or DN15…50 / NPS 1/2…2 flange
③ Level indicator column with optional scale (mm, inch, simplified % or volume)

INFORMATION!

- *a = distance from the center axis of the bottom process connection to the bottom of the device*
- *b = top dead zone*
- *C-C = distance between the flange facing of the top process connection and the center axis of the bottom process connection*
- *ML = measuring length*

If the magnetic level indicator has the flanged drain option, this flange has the same pressure rating as the flanges for the process connections.

Other dimensions are available on request.

Liquid density [kg/m³]	Dimensions [mm]							
	a	b	C-C	ML	c	d	k	Øt
700…950	①	330	300…5500 ②	C-C - 330	135	55.5 ③	74	42.4
950…1200	④							

Table 8-12: BM26A-1000 (top axial - bottom side process connections): general dimensions in mm

① Drain options are available. NPT connection (female) + plug: 299 mm. G connection (female) + plug: 291 mm. Flange: 399 mm.
② This value agrees with the "C-C" dimension given in the customer order
③ If the indicator column has the PLEXIGLAS® anti-icing cover option, then d = 85.5 mm
④ Drain options are available. NPT connection (female) + plug: 255 mm. G connection (female) + plug: 247 mm. Flange: 355 mm.

Liquid density [lb/ft³]	Dimensions [inches]							
	a	b	C-C	ML	c	d	k	Øt
43.70…59.31	①	12.99	11.8…216.5 ②	C-C - 12.99	5.31	2.2 ③	2.9	1.67
59.31…74.91	④							

Table 8-13: BM26A-1000 (top axial - bottom side process connections): general dimensions in inches

① Drain options are available. NPT connection (female) + plug: 11.77¨. G connection (female) + plug: 11.46¨. Flange: 15.71¨.
② This value agrees with the "C-C" dimension given in the customer order
③ If the indicator column has the PLEXIGLAS® anti-icing cover option, then d = 3.4¨
④ Drain options are available. NPT connection (female) + plug: 10.04¨. G connection (female) + plug: 9.72¨. Flange: 13.98¨.

8.3.2 BM26A-3000

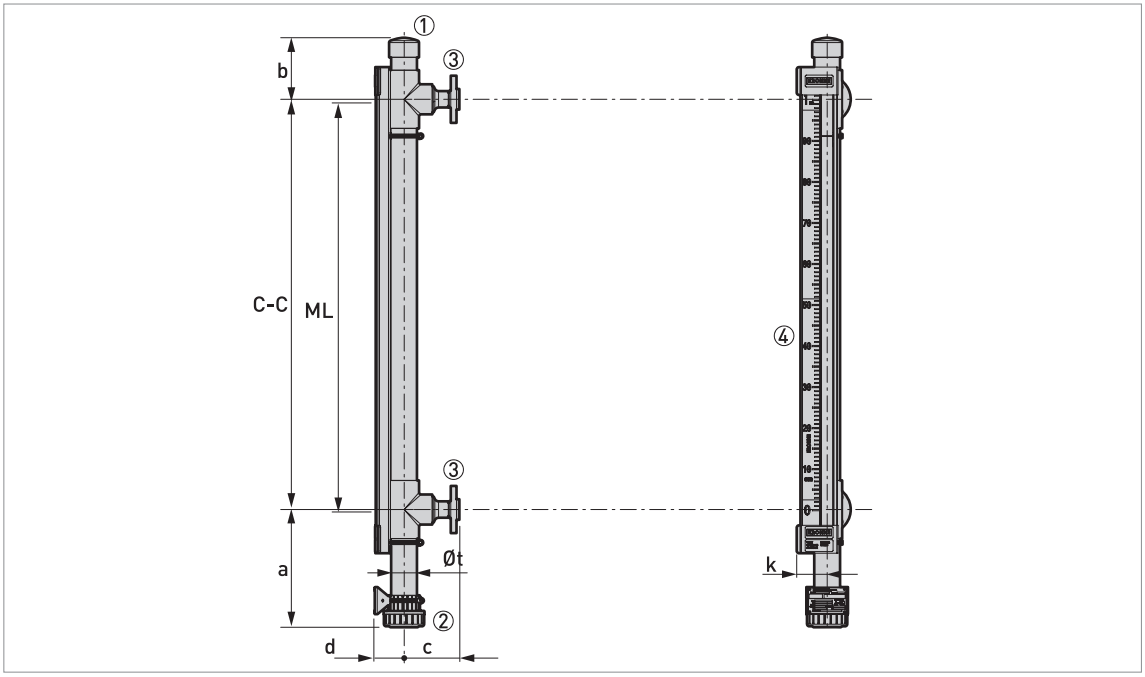

Figure 8-6: BM26A-3000 (PP, PVC and PVDF versions): side - side process connections

① Optional vent with 3/8...3/4 NPT or G 3/8...3/4 threaded connection (with plug)
② Optional drain with 3/8...3/4 NPT or G 3/8...3/4 threaded connection (with plug)
③ Process connection (flange)
④ Level indicator column with optional scale (mm, inch, simplified % or volume)

INFORMATION!

- *a = distance from the center axis of the bottom connection to the bottom of the device*
- *b = distance from the center axis of the top connection to the top of the device*
- *C-C = distance between the center axes of the top and bottom process connections*
- *ML = measuring length*

Other dimensions are available on request.

Device material	Dimensions [mm]							
	a	b	C-C	ML	c	d	k	Øt
PP	252	150	500…4000 ①	①	②	73	74	63
PVC	274							
PVDF	332							

Table 8-14: BM26A-3000 (side - side process connections): dimensions in mm

① This agrees with the "C-C" dimension given in the customer order
② If the flange size is DN40 or NPS 1 1/2, then c = 155 mm. For all other flange sizes, c = 135 mm.

Device material	Dimensions [mm]							
	a	b	C-C	ML	c	d	k	Øt
PP	9.92	5.91	19.7…157.5 ①	①	②	2.9	2.9	2.48
PVC	10.79							
PVDF	13.07							

Table 8-15: BM26A-3000 (side - side process connections): dimensions in inches

① This agrees with the "C-C" dimension given in the customer order
② If the flange size is DN40 or NPS 1 1/2, then c = 6.10". For all other flange sizes, c = 5.31".

8.3.3 Options

LT40 C reed-chain level transmitter (compact version)

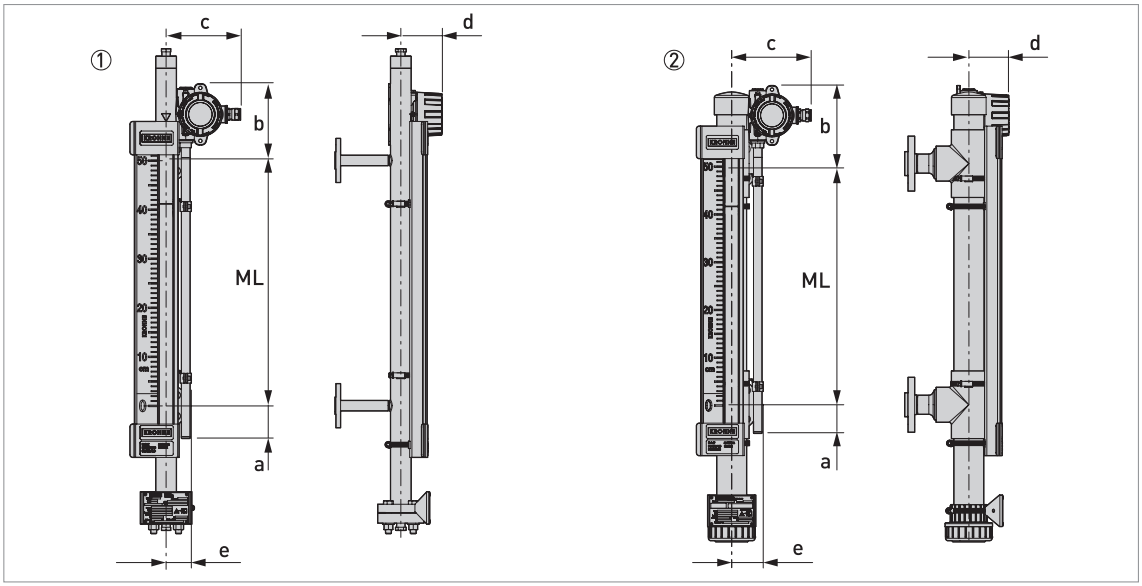

Figure 8-7: LT40 C reed-chain level transmitter (compact version)

① BM26A-1000 magnetic level indicator with an LT40 C reed-chain level transmitter
② BM26A-3000 magnetic level indicator with an LT40 C reed-chain level transmitter

Device version	Dimensions [mm]					
	a	b	c	ML	d	e
BM26A-1000	66.5	157	153	300...5500	84	50
BM26A-3000	57	163.5	167.4	500…4000	84	64

Table 8-16: LT40 C reed-chain level transmitter: dimensions in mm

Device version	Dimensions [inches]					
	a	b	c	ML	d	e
BM26A-1000	2.6	6.2	6.0	11.8…216.5	3.3	2.0
BM26A-3000	2.2	6.4	6.6	19.7…157.5	3.3	2.5

Table 8-17: LT40 C reed-chain level transmitter: dimensions in inches

LT40 F reed-chain level transmitter (remote version)

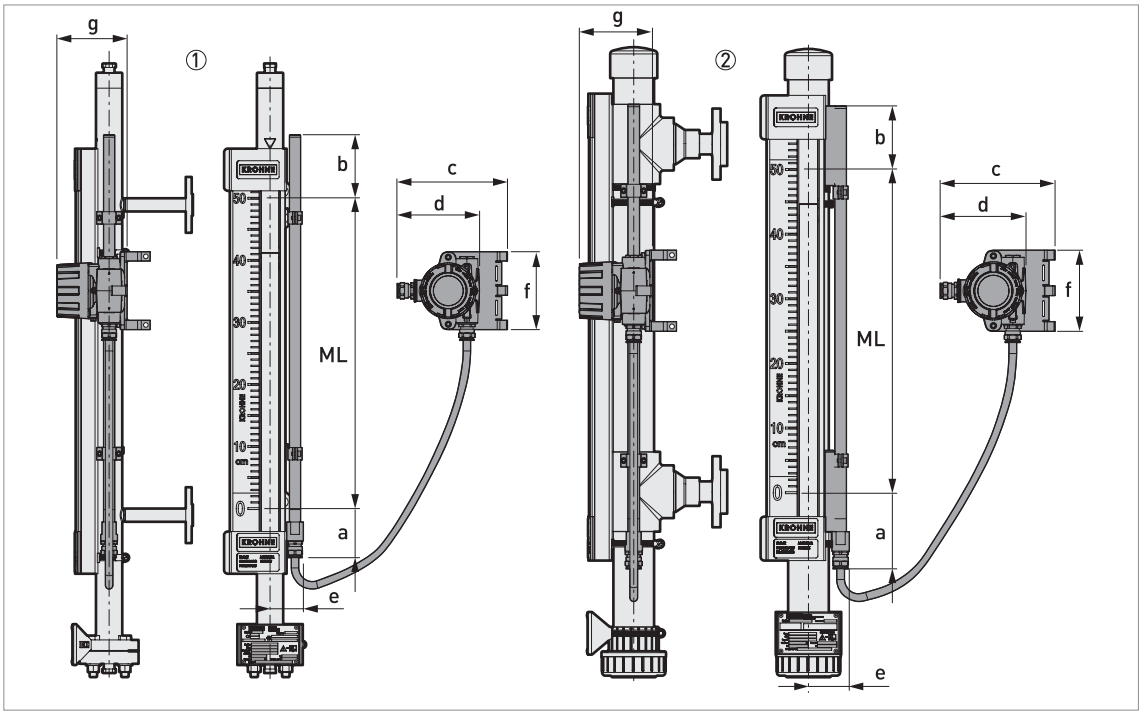

Figure 8-8: LT40 F reed-chain level transmitter (remote version)

① BM26A-1000 magnetic level indicator with an LT40 F reed-chain level transmitter
② BM26A-3000 magnetic level indicator with an LT40 F reed-chain level transmitter

Device version	Dimensions [mm]							
	a	b	c	d	ML	e	f	g
BM26A-1000	66.5	157	176	133	300...5500	50	125.5	62
BM26A-3000	57	163.5	176	133	500…4000	50	125.5	62

Table 8-18: LT40 F reed-chain level transmitter: dimensions in mm

Device version	Dimensions [inches]							
	a	b	c	d	ML	e	f	g
BM26A-1000	2.62	6.18	6.93	5.24	11.8…216.5	1.97	4.94	2.44
BM26A-3000	2.24	6.44	6.93	5.24	19.7…157.5	1.97	4.94	2.44

Table 8-19: LT40 F reed-chain level transmitter: dimensions in inches

Support for the LT40 F reed-chain level transmitter

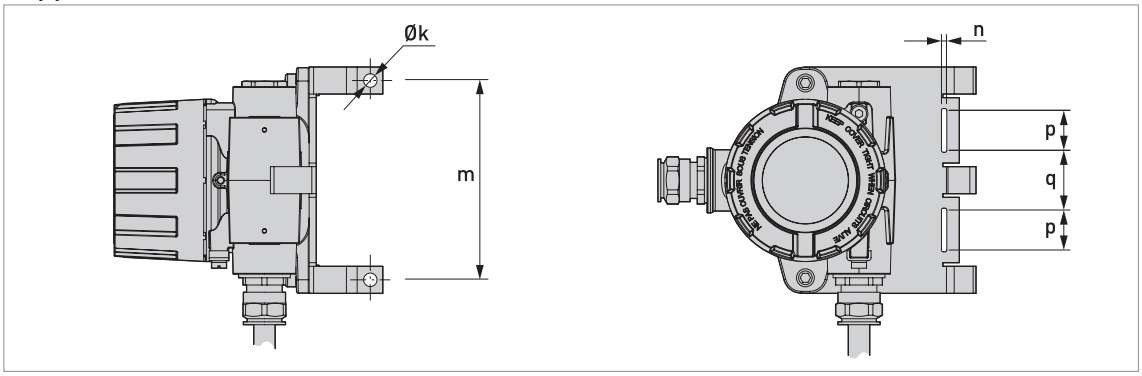

Figure 8-9: Support for the LT40 F reed-chain level transmitter

Dimensions [mm]				
Øk	m	n	p	q
7.5	107.75	3	24.25	31

Table 8-20: Support for the LT40 F reed-chain level transmitter: dimensions in mm

Dimensions [inches]				
Øk	m	n	p	q
0.30	4.24	0.12	0.95	1.22

Table 8-21: Support for the LT40 F reed-chain level transmitter: dimensions in inches

MS15 -series and MS40-series limit switches

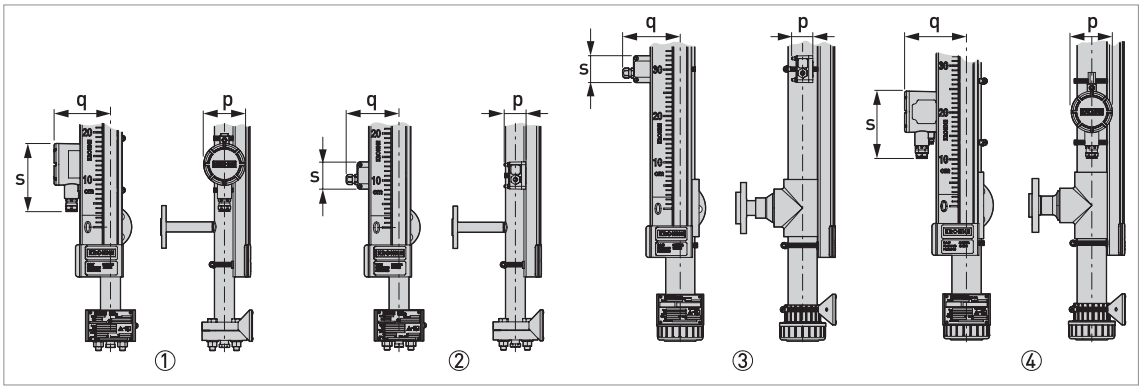

Figure 8-10: MS15-series and MS40-series limit switches

① BM26A-1000 magnetic level indicator with an MS15-series limit switch
② BM26A-1000 magnetic level indicator with an MS40-series limit switch
③ BM26A-3000 magnetic level indicator with an MS40-series limit switch
④ BM26A-3000 magnetic level indicator with an MS15-series limit switch

Device	Limit switch version	Dimensions [mm]		
		p	q	s
BM26A-1000	MS15 series	88	122.7	143.5
	MS40 series	46	108.7	56
BM26A-30000	MS15 series	88	133	143.5
	MS40 series	46	119	56

Table 8-22: MS15-series and MS40-series limit switches: dimensions in mm

Device	Limit switch version	Dimensions [inches]		
		p	q	s
BM26A-1000	MS15 series	3.46	4.83	5.65
	MS40 series	1.81	4.28	2.20
BM26A-30000	MS15 series	3.46	5.24	5.65
	MS40 series	1.81	4.68	2.20

Table 8-23: MS15-series and MS40-series limit switches: dimensions in inches

8.3.4 Accessories

Support bracket

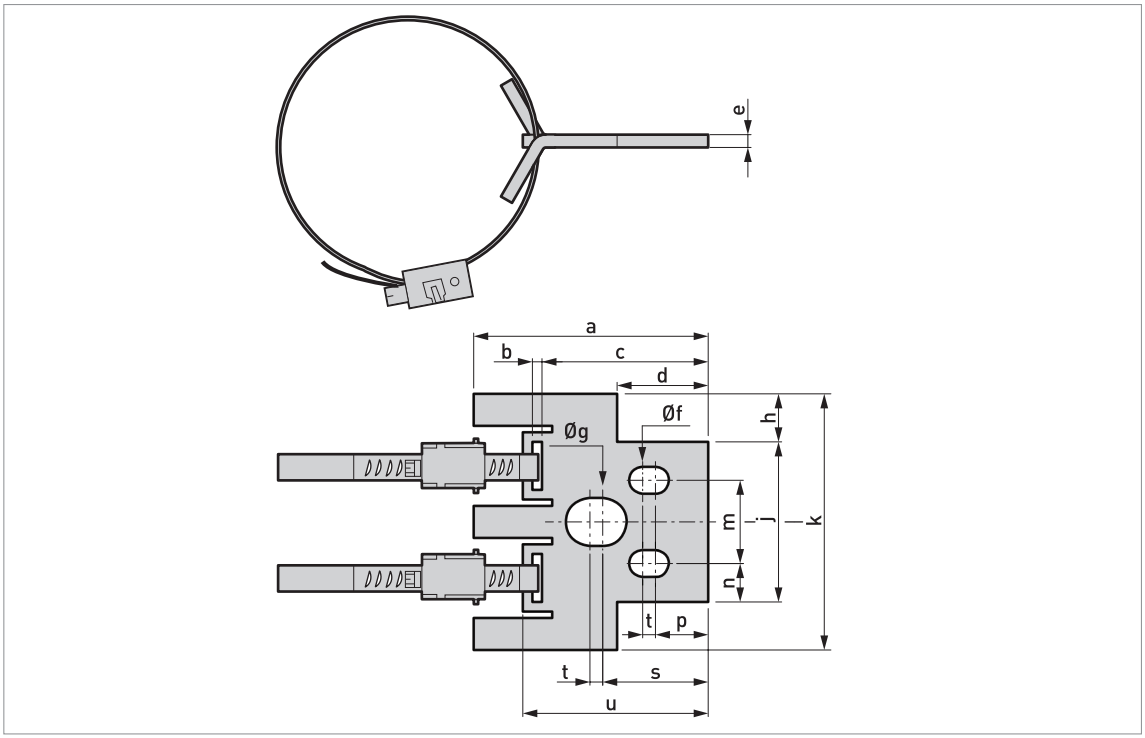

Figure 8-11: Support bracket

The support bracket is an accessory. If necessary, send an order to your supplier.

	Dimensions [mm]															
	a	b	c	d	e	Øf	Øg	h	j	k	m	n	p	s	t	u
Support bracket	73	3	52	28.5	4	8.4	15	15	50	80	26	12	16.5	33	4	58

Table 8-24: Support bracket: dimensions in mm

	Dimensions [inches]															
	a	b	c	d	e	Øf	Øg	h	j	k	m	n	p	s	t	u
Support bracket	2.87	0.12	2.05	1.12	0.16	0.33	0.59	0.59	1.97	3.15	1.02	0.47	0.65	1.30	0.16	2.28

Table 8-25: Support bracket: dimensions in inches

8.4 Maximum process pressure: measuring chamber

DANGER!
Do not use the device at a process pressure more than the maximum limit for a given process temperature.

8.4.1 BM26A-1000 magnetic level indicator with a 316 L measuring chamber

Maximum process pressure [bar] for a given maximum process temperature [°C]

Standard	Pressure rating	Maximum process temperature [°C]							
		-70	-20	+20	+38	+50	+100	+150	+200
		Maximum process pressure [bar]							
EN 1092-1	PN40	40	40	40	40	40	40	36.3	33.7
ASME B16.5	Class 150	19	19	19	19	18.4	16	14.8	13.6
	Class 300	40	40	40	40	40	40	36.3	33.7
ISO 228-1	G	40	40	40	40	40	40	36.3	33.7
ASME B1.20.1	NPT	40	40	40	40	40	40	36.3	33.7
ASME B36.19M	10S	40	40	40	40	40	40	36.3	33.7

Table 8-26: Maximum process pressure [barg] for a given maximum process temperature [°C]

Maximum process pressure [psig] for a given maximum process temperature [°F]

Standard	Pressure rating	Maximum process temperature [°F]							
		-94	-4	+68	+100.4	+122	+212	+302	+392
		Maximum process pressure [psig]							
EN 1092-1	PN40	580.2	580.2	580.2	580.2	580.2	580.2	526.5	488.8
ASME B16.5	Class 150	275.6	275.6	275.6	275.6	266.9	232.1	214.7	197.3
	Class 300	580.2	580.2	580.2	580.2	580.2	580.2	526.5	488.8
ISO 228-1	G	580.2	580.2	580.2	580.2	580.2	580.2	526.5	488.8
ASME B1.20.1	NPT	580.2	580.2	580.2	580.2	580.2	580.2	526.5	488.8
ASME B36.19M	10S	580.2	580.2	580.2	580.2	580.2	580.2	526.5	488.8

Table 8-27: Maximum process pressure [psig] for a given maximum process temperature [°F]

8.4.2 BM26A-3000 magnetic level indicator with a PP, PVDF or PVC measuring chamber

Maximum process pressure [bar] for a given maximum process temperature [°C]

Standard	Pressure rating	Measuring range, L (C-C)	Maximum process temperature [°C]				
			-20	+20	+38	+50	+100
		[m]	Maximum process pressure [barg]				
EN 1092-1	PN6	0.5 ≤ L ≤ 1	6	6	6	5	1 ①
		1 < L ≤ 2	3	3	3	3	1 ①
		2 < L ≤ 3	2	2	2	2	1 ①
		3 < L ≤ 4	2	2	2	2	1 ①
EN 1092-1	PN16	0.5 ≤ L ≤ 1	6	6	6	5	1 ①
		1 < L ≤ 2	3	3	3	3	1 ①
		2 < L ≤ 3	2	2	2	2	1 ①
		3 < L ≤ 4	2	2	2	2	1 ①
ASME B16.5	Class 150	0.5 ≤ L ≤ 1	6	6	6	5	1 ①
		1 < L ≤ 2	3	3	3	3	1 ①
		2 < L ≤ 3	2	2	2	2	1 ①
		3 < L ≤ 4	2	2	2	2	1 ①

Table 8-28: Maximum process pressure [barg] for a given maximum process temperature [°C]

① Do not use the PVC measuring chamber at a process temperature more than +50°C

Maximum process pressure [psig] for a given maximum process temperature [°F]

Standard	Pressure rating	Measuring range, L (C-C)	Maximum process temperature [°F]				
			-4	+68	+100.4	+122	+212
		[ft]	Maximum process pressure [psig]				
EN 1092-1	PN6	1.6 ≤ L ≤ 3.3	87.0	87.0	87.0	72.5	14.5 ①
		3.3 < L ≤ 6.6	43.5	43.5	43.5	43.5	14.5 ①
		6.6 < L ≤ 9.8	29.0	29.0	29.0	29.0	14.5 ①
		9.8 < L ≤ 13.1	29.0	29.0	29.0	29.0	14.5 ①
EN 1092-1	PN16	1.6 ≤ L ≤ 3.3	87.0	87.0	87.0	72.5	14.5 ①
		3.3 < L ≤ 6.6	43.5	43.5	43.5	43.5	14.5 ①
		6.6 < L ≤ 9.8	29.0	29.0	29.0	29.0	14.5 ①
		9.8 < L ≤ 13.1	29.0	29.0	29.0	29.0	14.5 ①
ASME B16.5	Class 150	1.6 ≤ L ≤ 3.3	87.0	87.0	87.0	72.5	14.5 ①
		3.3 < L ≤ 6.6	43.5	43.5	43.5	43.5	14.5 ①
		6.6 < L ≤ 9.8	29.0	29.0	29.0	29.0	14.5 ①
		9.8 < L ≤ 13.1	29.0	29.0	29.0	29.0	14.5 ①

Table 8-29: Maximum process pressure [psig] for a given maximum process temperature [°F]

① Do not use the PVC measuring chamber at a process temperature more than +122°F

8.5 Temperature limits: LT40 C/F reed-chain level transmitter

WARNING!
Do not use the device at an ambient temperature more than the maximum limit for a given process temperature. Do not use the device at an ambient temperature less than the minimum limit for a given process temperature.

CAUTION!
The temperature limit calculations for these graphs do not include thermal insulation.

INFORMATION!
BM26A-3000: The process temperature does not have an effect on maximum ambient temperature for the LT40 reed-chain level transmitter.

8.5.1 LT40 without an LCD indicator module

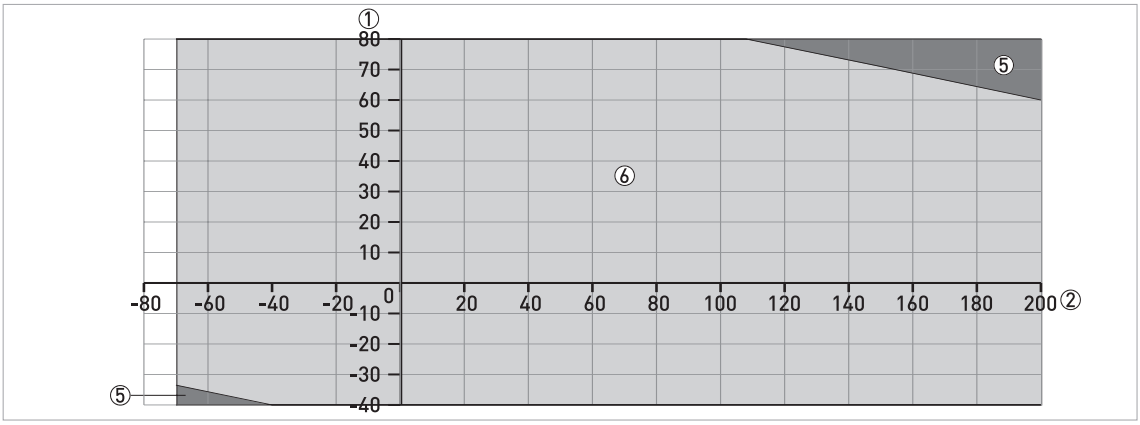

Figure 8-12: Ambient temperature / process temperature - LT40 without an LCD indicator module, in °C

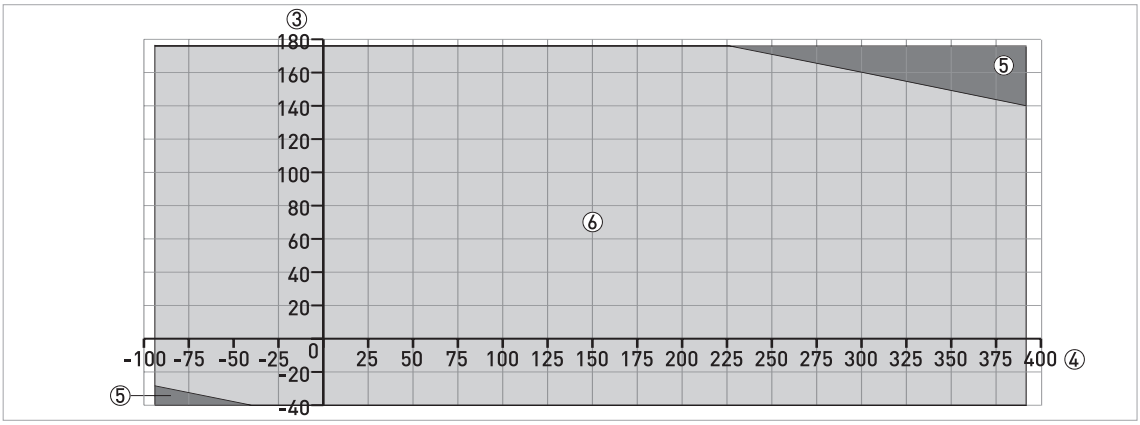

Figure 8-13: Ambient temperature / process temperature - LT40 without an LCD indicator module, in °F

① Ambient temperature, °C
② Process temperature, °C
③ Ambient temperature, °F
④ Process temperature, °F
⑤ LT40 F - without thermal insulation
⑥ LT40 C and LT40 F - without thermal insulation

8.5.2 LT40 with an LCD indicator module

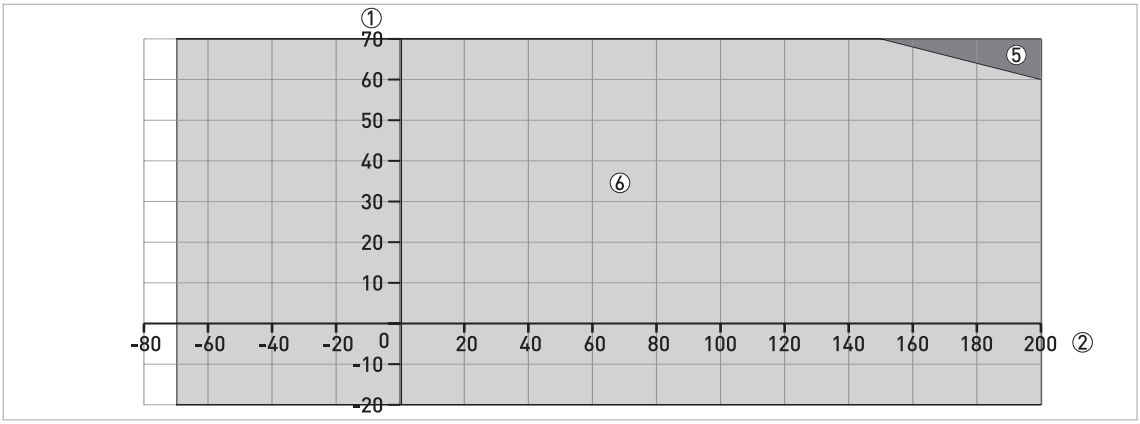

Figure 8-14: Ambient temperature / process temperature - LT40 with an LCD indicator module, in °C

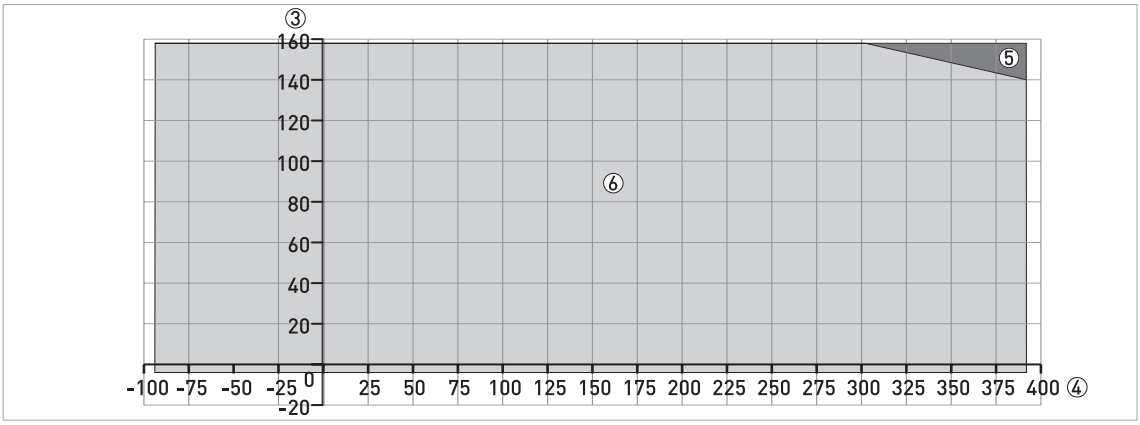

Figure 8-15: Ambient temperature / process temperature - LT40 with an LCD indicator module, in °F

① Ambient temperature, °C
② Process temperature, °C
③ Ambient temperature, °F
④ Process temperature, °F
⑤ LT40 F - without thermal insulation
⑥ LT40 C and LT40 F - without thermal insulation

8.6 Temperature limits: MS15-series limit switch

WARNING!
Do not use the device at an ambient temperature more than the maximum limit for a given process temperature. Do not use the device at an ambient temperature less than the minimum limit for a given process temperature.

CAUTION!
The temperature limit calculations for these graphs do not include thermal insulation.

INFORMATION!
BM26A-3000: The process temperature does not have an effect on maximum ambient temperature for the MS15-series limit switch.

8.6.1 Aluminium housing

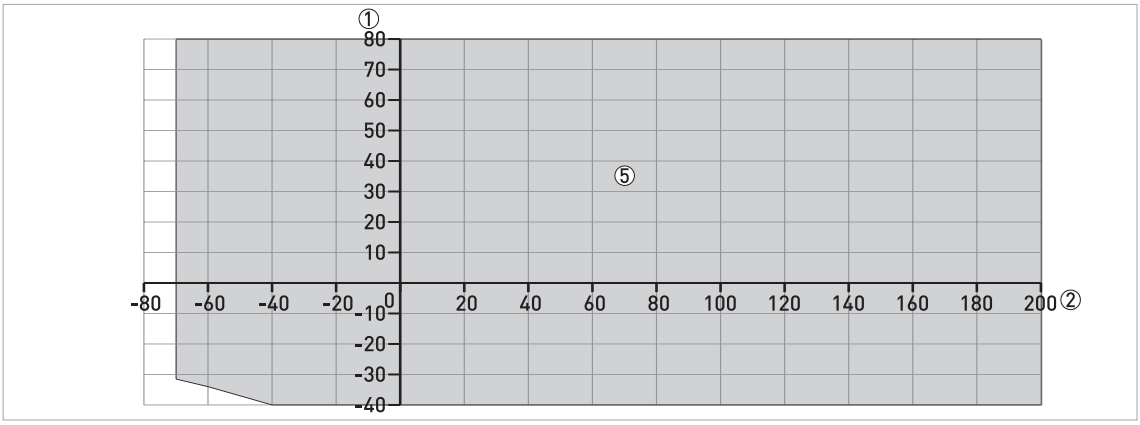

Figure 8-16: MS15 series - aluminium housing: ambient temperature / process temperature, in °C

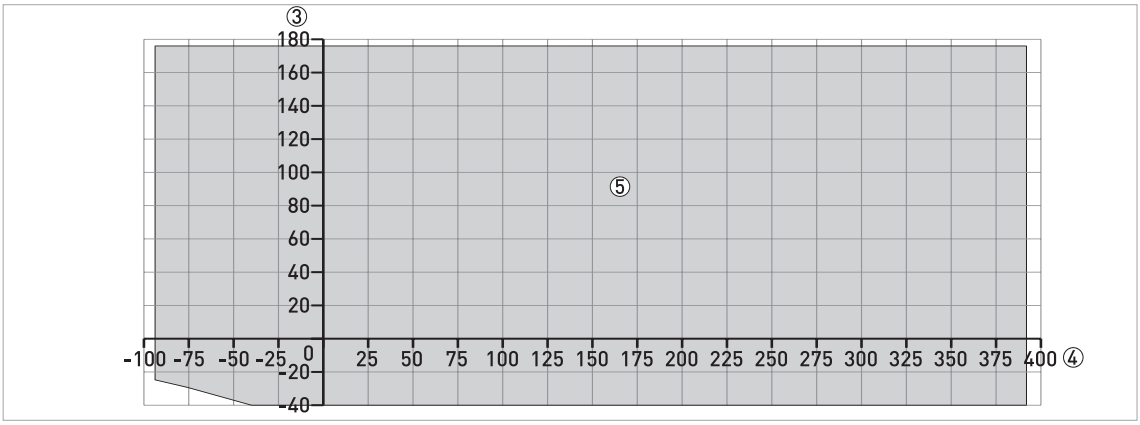

Figure 8-17: MS15 series - aluminium housing: ambient temperature / process temperature, in °F

① Ambient temperature, °C
② Process temperature, °C
③ Ambient temperature, °F
④ Process temperature, °F
⑤ MS15-series limit switch - without thermal insulation

8.6.2 Stainless-steel housing

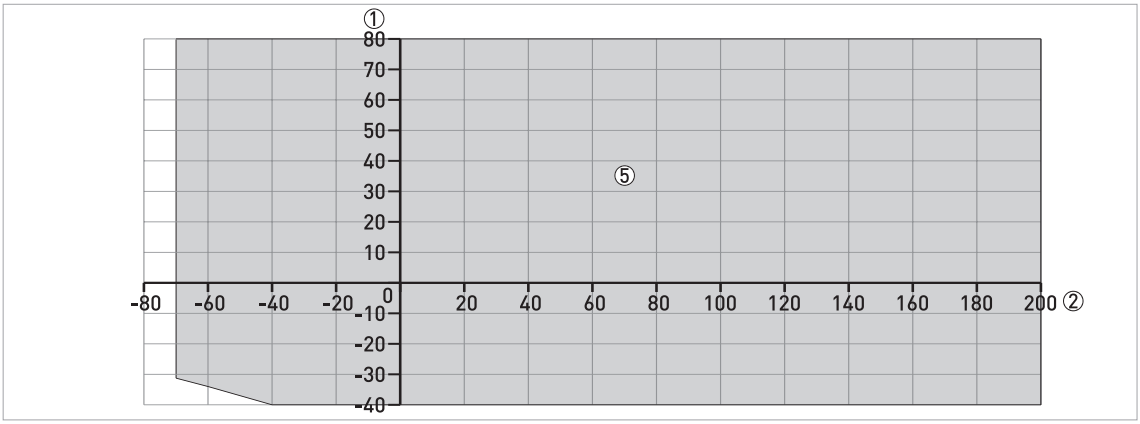

Figure 8-18: MS15 series - stainless-steel housing: ambient temperature / process temperature, in °C

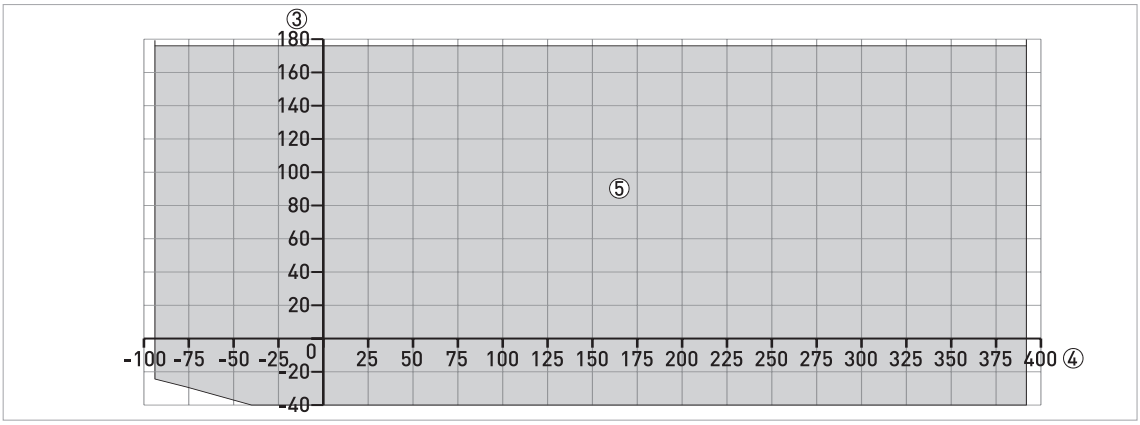

Figure 8-19: MS15 series - stainless-steel housing: ambient temperature / process temperature, in °F

① Ambient temperature, °C
② Process temperature, °C
③ Ambient temperature, °F
④ Process temperature, °F
⑤ MS15-series limit switch - without thermal insulation

8.7 Temperature limits: MS40-series limit switch

WARNING!
Do not use the device at an ambient temperature more than the maximum limit for a given process temperature. Do not use the device at an ambient temperature less than the minimum limit for a given process temperature.

CAUTION!
The temperature limit calculations for these graphs do not include thermal insulation.

INFORMATION!
BM26A-3000: The process temperature does not have an effect on maximum ambient temperature for the MS40-series limit switch.

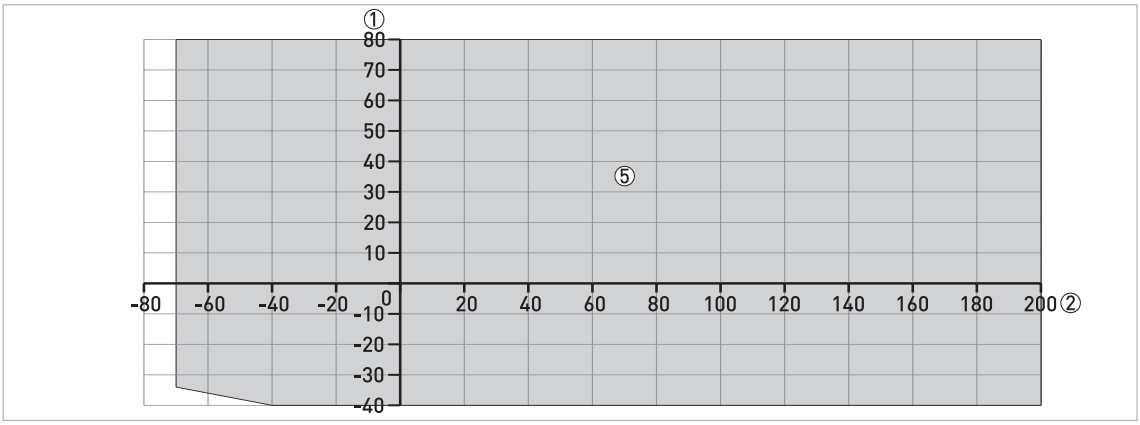

Figure 8-20: MS40 series: ambient temperature / process temperature, in °C

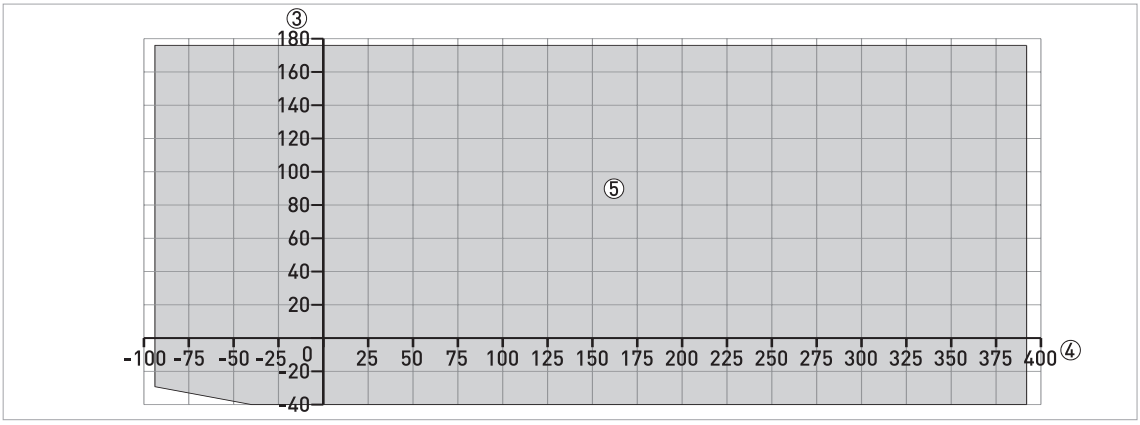

Figure 8-21: MS40 series: ambient temperature / process temperature, in °F

① Ambient temperature, °C
② Process temperature, °C
③ Ambient temperature, °F
④ Process temperature, °F
⑤ MS40-series limit switch - without thermal insulation

9.1 Limit switch adjustment data

9.1.1 General notes

Refer to this section if there are limit switches in the customer order. The position of the limit switch on the measuring chamber must agree with:

- The density of the liquid and the float option.
- The model of the magnetic level indicator.
- The limit switch condition ("LOW limit" or "HIGH limit"). For more data about limit switch conditions, refer to *Switching point offset: examples* on page 109.

If the device has an indicator column with a scale, then it is not necessary to calculate the liquid level offset. But you must calculate the switching point offset (hysteresis) and move the limit switch a small distance to compensate for this property.

If the device does not have a scale, then refer to the sections that follow for the calculation of the liquid level offset and the switching point offset (hysteresis).

For more data about the installation procedure for the limit switch, refer to *Installation - limit switches (MS15 series and MS40 series)* on page 24.

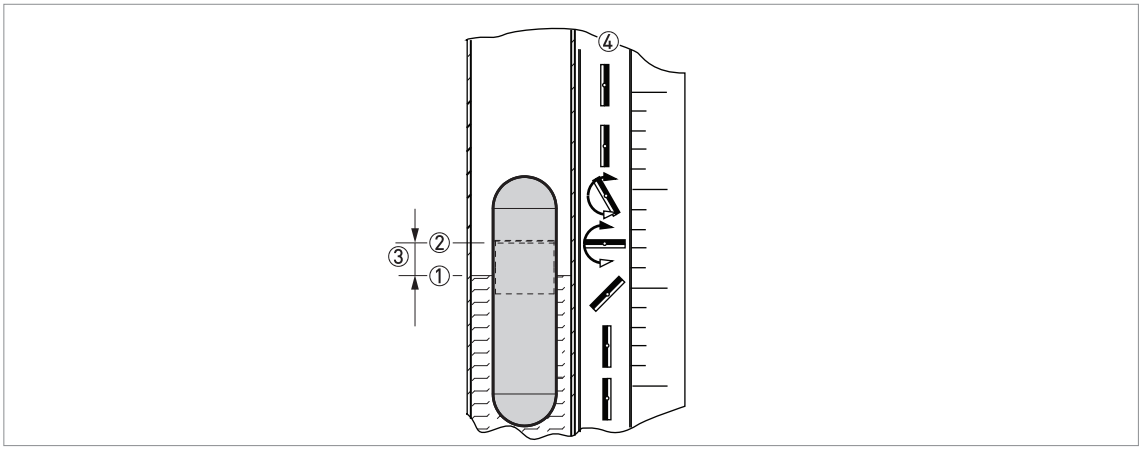

Figure 9-1: Offset between liquid level and the float magnet (liquid level offset)

① Level of the liquid
② Top of the float magnet. The magnet field around the top of the magnet turns the flaps in the indicator column that shows the level in the tank.
③ Liquid level offset. This offset is the difference between the level of the liquid and the top of the float magnet. The value is related to the type of float in the measuring chamber and the density of the liquid.
④ Indicator column of yellow/black or red/white rotating flaps with the optional scale in m/cm, ft/inch, % (simplified) or customized volume units

9.1.2 Switching point offset: examples

"High limit" level switch

The limit switch changes its condition to “open” when the float goes above the switching point.

The limit switch does not immediately change its condition when the float goes above the limit switch position. The limit switch has an offset (hysteresis) that causes the switch to change its condition to "open" when the float moves a small distance above its position. Thus, it is necessary to move the switch down the measuring chamber by a distance equal to the offset to have the correct switching point.

"Low limit" level switch

The limit switch changes its condition to “open” when the float goes below the switching point.

The limit switch does not immediately change its condition when the float goes below the limit switch position. The limit switch has an offset (hysteresis) that causes the switch to change its condition to "open" when the float moves a small distance below its position. Thus, it is necessary to move the switch up the measuring chamber by a distance equal to the offset to have the correct switching point.

Example 1: "HIGH limit" switch

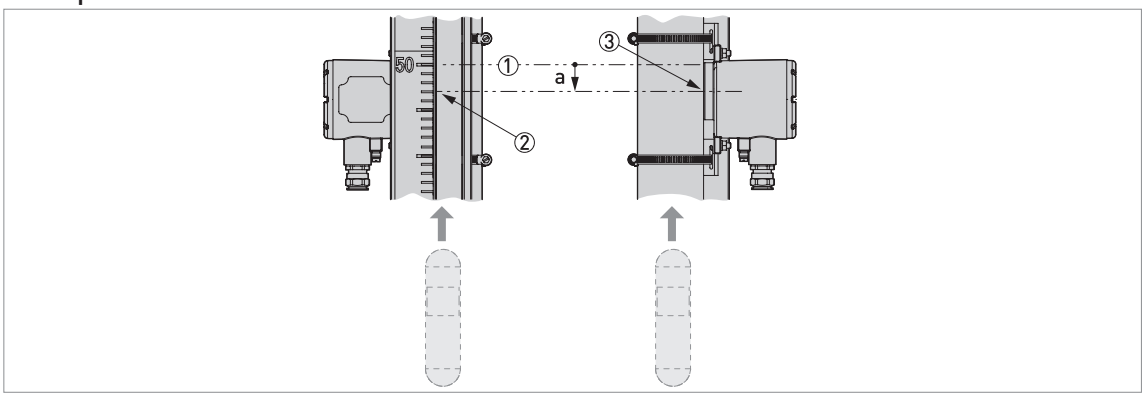

Figure 9-2: MS15 series: switching point offset (hysteresis) for a "HIGH limit" switch

① Switching point (in this example a level of 50 cm is shown on the indicator column)
② Position of the switch with the offset (hysteresis) included (for example, if the limit switch has an offset of 28 mm and the switching point is a level of 50 cm, then the correct position of the limit switch is at a level of 47.2 cm on the indicator column)
③ Correct position of the limit switch in relation to the switching point
a = switching point offset

Example 2: "LOW limit" switch

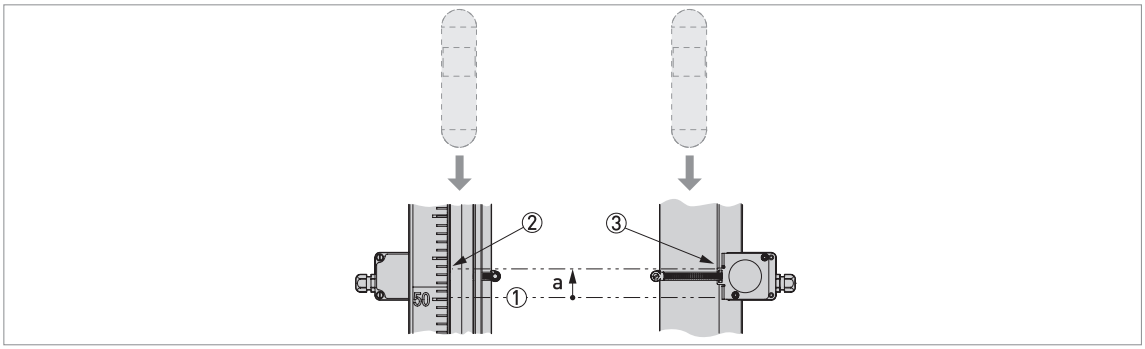

Figure 9-3: MS40 series: switching point offset (hysteresis) for a "LOW limit" switch

① Switching point (in this example a level of 50 cm is shown on the indicator column)
② Position of the switch with the offset (hysteresis) included (for example, if the limit switch has an offset of 28 mm and the switching point is a level of 50 cm, then the correct position of the limit switch is at a level of 52.8 cm on the indicator column)
③ Correct position of the limit switch in relation to the switching point
a = switching point offset

9.1.3 Liquid level offset

CAUTION!
Limit switches are not attached to the measuring chamber at the factory. Make sure that you include the liquid level offset in your calculation when you make adjustments to the position of the limit switch on the measuring chamber. For more data about the installation of level switches, refer to Installation - limit switches (MS15 series and MS40 series) on page 24.

The float contains magnets that:

- turn the flaps in the indicator column,
- cause the limit switch to change state (open / close), and
- cause the output signal of the reed-chain level transmitter to change.

It is possible that the position of the magnets in the float is not the same as the level of liquid. The factory sets the position of indicator column scale in relation to this offset.

INFORMATION!
If the device has an indicator column with a scale, then it is not necessary to calculate the liquid level offset for the limit switch.

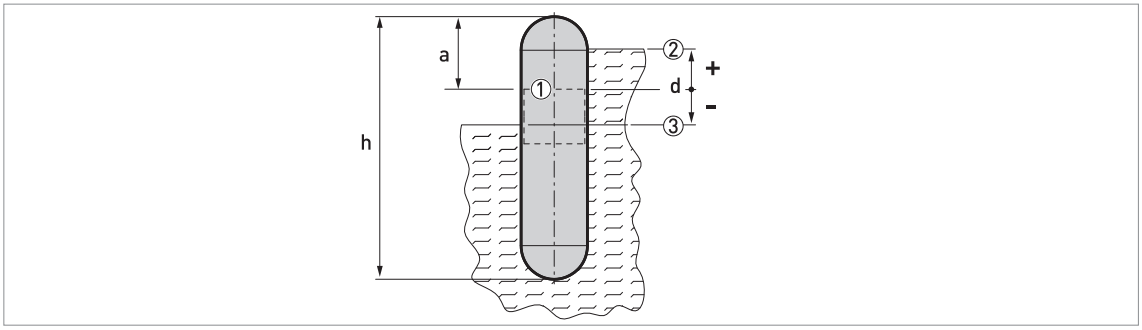

Figure 9-4: Liquid level offset (difference between the liquid level and the top of the float magnets)

① Top of the magnets
② Maximum liquid levelMaximum liquid level - if the density of the liquid is low
③ Minimum liquid levelMinimum liquid level - if the density of the liquid is high
"h" is the length of the float,
"a" is the distance from the the top of the magnets in the float (zero point) to the top of the float
"d" is the distance from the the top of the magnets in the float (zero point) to the liquid level. This distance is the liquid level offset.

If the distance "d" is a positive value, then the liquid level is above the top of the magnet (zero point). In relation to the switching point that you have selected on the measuring chamber, move the switch down the measuring chamber by distance "d".

If the distance "d" is a negative value, then the liquid level is below the top of the magnet (zero point). In relation to the switching point that you have selected on the measuring chamber, move the switch up the measuring chamber by distance "d".

Distance "d" is related to the device model, the float option and the density of the liquid. Refer to the data on the float data label (material etc.) to identify the float option in the table that follows:

Float option	Material	Product density	Dimensions [mm]		
		[kg/m³]	a	h	d
BM26A-1000					
Float 8	Titanium	700…950	45	260	①
Float A	316L	950…1200	45	205	①
BM26A-3000					
Float 1	PVC	680…1200	16.4	178	①
Float 2	PP	560…1200	16.4	194	①
Float 3	PVDF	700…1200	25	232	①

Table 9-1: Liquid level offset: dimensions in mm and kg/m³

① Refer to the graphs that follow

Float option	Material	Product density	Dimensions [inches]		
		[lb/ft³]	a	h	d
BM26A-1000					
Float 8	Titanium	43.70…59.31	1.77	10.23	①
Float A	316L	59.31…74.91	1.77	8.07	①
BM26A-3000					
Float 1	PVC	42.45…74.91	0.65	7.01	①
Float 2	PP	34.96…74.91	0.65	7.64	①
Float 3	PVDF	43.70…74.91	0.98	9.13	①

Table 9-2: Liquid level offset: dimensions in inches and lb/ft³

① Refer to the graphs that follow

BM26A-1000: Float magnet offset in relation to liquid level

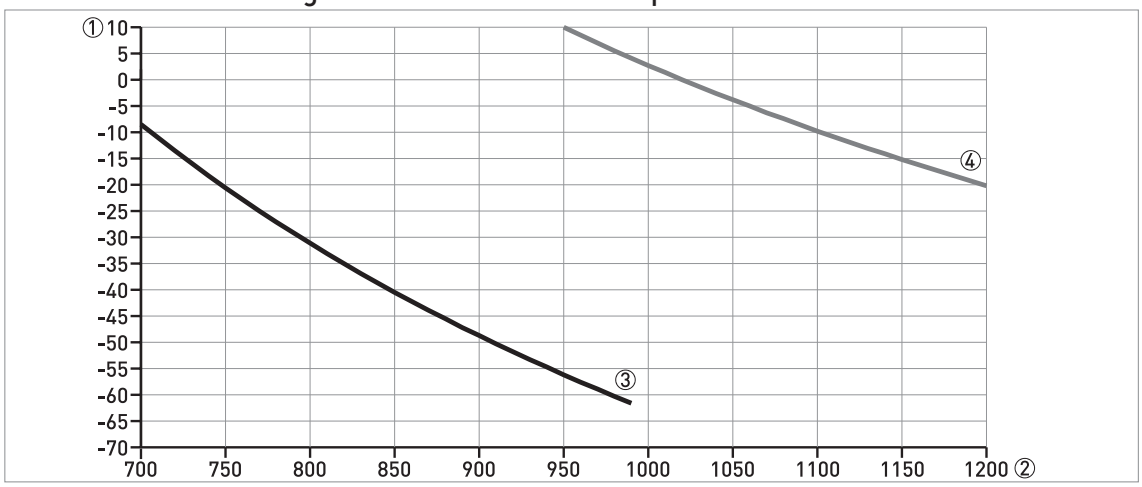

Figure 9-5: BM26A-1000: Float magnet offset in relation to liquid level in mm

① Liquid level in relation to the magnet zero point, d [mm]
② Liquid density, ρ [kg/m³]
③ Curve for BM26A-1000 - float 8 (titanium)
④ Curve for BM26A-1000 - float A (316L)

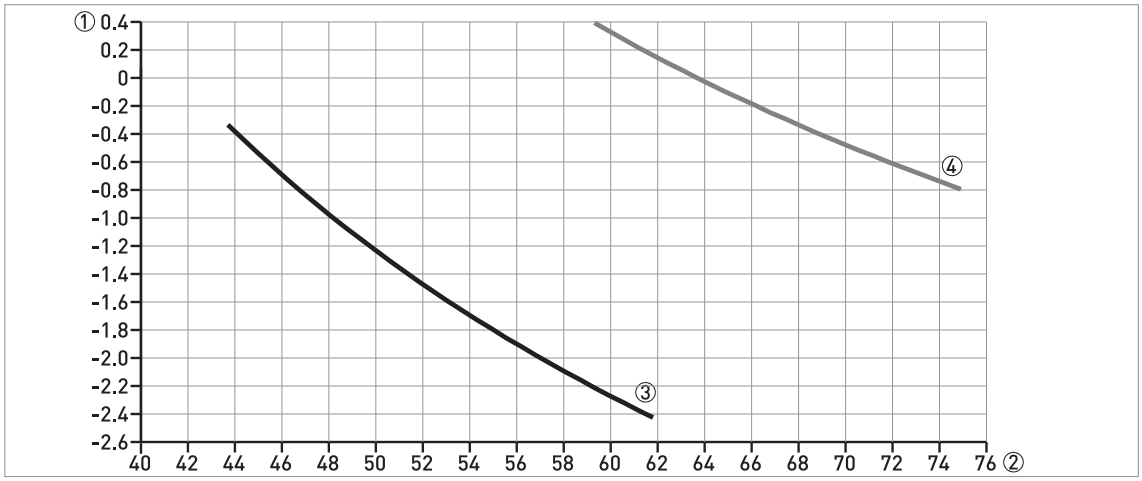

Figure 9-6: BM26A-1000: Float magnet offset in relation to liquid level in inches

① Liquid level in relation to the magnet zero point, d [inches]
② Liquid density, ρ [lb/ft³]
③ Curve for BM26A-1000 - float 8 (titanium)
④ Curve for BM26A-1000 - float A (316L)

BM26A-3000: Float magnet offset in relation to liquid level

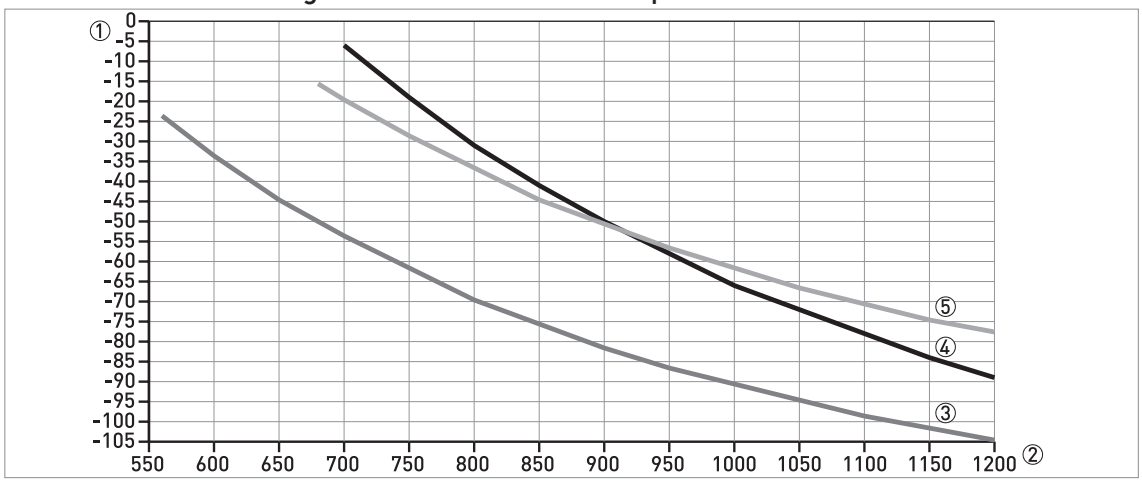

Figure 9-7: BM26A-3000: Float magnet offset in relation to liquid level in mm

① Liquid level in relation to the magnet zero point, d [mm]
② Liquid density, ρ [kg/m³]
③ Curve for BM26A-3000 - float 1 (PVC)
④ Curve for BM26A-3000 - float 2 (PP)
⑤ Curve for BM26A-3000 - float 3 (PVDF)

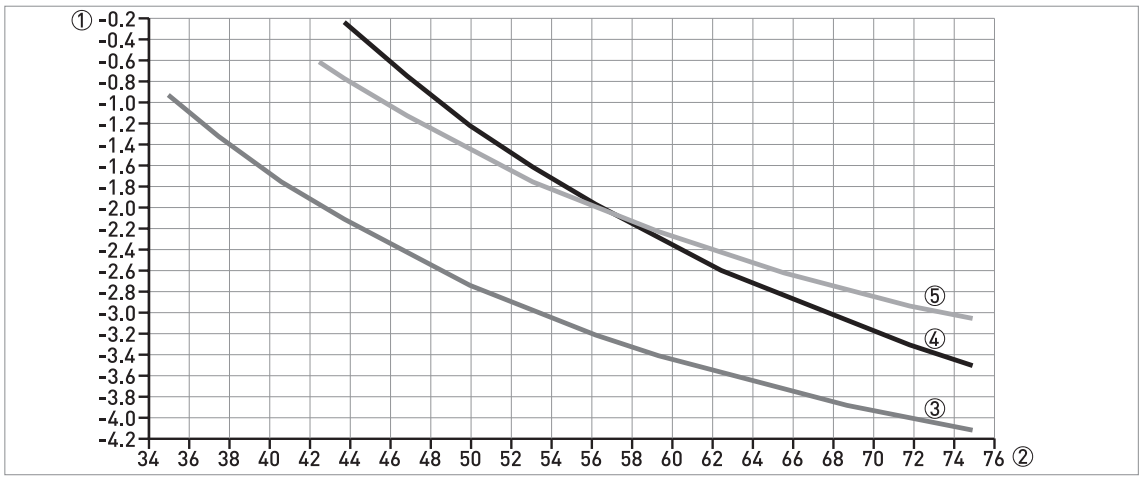

Figure 9-8: BM26A-3000: Float magnet offset in relation to liquid level in inches

① Liquid level in relation to the magnet zero point, d [inches]
② Liquid density, ρ [lb/ft³]
③ Curve for BM26A-3000 - float 1 (PVC)
④ Curve for BM26A-3000 - float 2 (PP)
⑤ Curve for BM26A-3000 - float 3 (PVDF)

9.2 Glossary

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.

I

Indicator column The indicator column is column of rotating 2-color flaps sealed in a heat-resistant glass tube. An optional scale shows the level in the tank in m + cm, feet + inches or % filled.

L

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 and drains.

R

Reed-chain level 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.

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