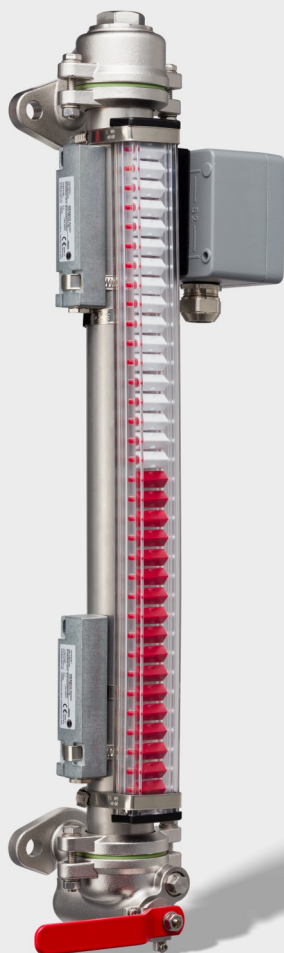




Operating instructions MESSKO® MMK. Oil level indicator

5793437/03 EN



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Infringements will result in liability for compensation. All rights reserved in the event of the granting of patents, utility models or designs.

The product may have been altered since this document was published.

We reserve the right to change the technical data, design and scope of supply.

Generally the information provided and agreements made when processing the individual quotations and orders are binding.

The product is delivered in accordance with MR's technical specifications, which are based on information provided by the customer. The customer has a duty of care to ensure the compatibility of the specified product with the customer's planned scope of application.

The original operating instructions were written in German.

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1 Introduction

This technical file contains detailed descriptions on the safe and proper installation, connection, commissioning and monitoring of the product.

This technical document is intended solely for specially trained and authorized personnel.

1.1 Manufacturer

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reinhausen.com

Customer portal

You can find additional information on this product in our customer portal at portal.reinhausen.com.



1.2 Safekeeping

Keep this technical file and all supporting documents ready at hand and accessible for future use at all times.

1.3 Notation conventions

This section contains an overview of the symbols and textual emphasis used.

1.3.1 Hazard communication system

Warnings in this technical file are displayed as follows.

1.3.1.1 Warning relating to section

Warnings relating to sections refer to entire chapters or sections, sub-sections or several paragraphs within this technical document. Warnings relating to sections have the following format:

 WARNING



Type of danger!
Source of the danger and its consequences.

- > Action
- > Action

1.3.1.2 Embedded warning information

Embedded warnings refer to a particular part within a section. These warnings apply to smaller units of information than the warnings relating to sections. Embedded warnings use the following format:

 **DANGER!**

 Instruction for avoiding a dangerous situation.

1.3.1.3 Signal words

Depending on the product, the following signal words are used:

Signal word	Meaning
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates measures to be taken to prevent damage to property.

Table 1: Signal words in warning notices

1.3.2 Information system

Information is designed to simplify and improve understanding of particular procedures. In this technical file it is laid out as follows:



Important information.

1.3.3 Instruction system

This technical file contains single-step and multi-step instructions.

Single-step instructions

Instructions which consist of only a single process step are structured as follows:

Aim of action

✓ Requirements (optional).

1. Step 1 of 1.

» Result of step (optional).

» Result of action (optional).

Multi-step instructions

Instructions which consist of several process steps are structured as follows:

Aim of action

✓ Requirements (optional).

1. Step 1.

» Result of step (optional).

2. Step 2.

» Result of step (optional).

» Result of action (optional).

1.3.4 Typographic conventions

Typographic convention	Purpose	Example
UPPERCASE	Operating controls, switches	ON/OFF
[Brackets]	PC keyboard	[Ctrl] + [Alt]
Bold	Software operating controls	Press Continue button
...>...>...	Menu paths	Parameter > Control parameter
<i>Italics</i>	System messages, error messages, signals	<i>Function monitoring alarm triggered</i>
[► Number of pages]	Cross reference	[► Page 41].
<u>Dotted underscore</u>	Glossary entry, abbreviations, definitions, etc.	<u>Glossary entry</u>

Table 2: Typographic conventions used in this technical file

2 Security

Read this technical file through carefully to familiarize yourself with the product. This technical file is a part of the product.

- Read and observe the safety instructions provided in this chapter in particular.
- Observe the warnings in this technical file to avoid function-related dangers.

The product is manufactured based on state-of-the-art technology. Nevertheless, danger to life and limb for the user or impairment of the product and other material assets may arise in the event of improper use.

2.1 Appropriate use

The oil level indicator displays the oil level of the transformer's oil conservator using a float gauge and magnetic flaps.

The product is designed solely for use in stationary large-scale systems.

If used as intended and in compliance with the requirements and conditions specified in this technical document as well as the warning notices contained in this technical document and attached to the product, the product does not pose risk of personal injury or damage to property or the environment. This applies throughout the entire service life of the product, from delivery, installation and operation to removal and disposal.

Intended use refers to the following:

- Only use the product with the transformer specified in the order.
- Operate the product in accordance with this technical document, the agreed-upon delivery conditions and the technical data.
- Ensure that any necessary work is only performed by qualified personnel.
- Use the equipment and special tools supplied solely for the intended purpose and in accordance with the specifications of this technical document.

2.2 Fundamental safety instructions

To prevent accidents, malfunctions and damage as well as unacceptable adverse effects on the environment, those responsible for transport, installation, operation, maintenance and disposal of the product or parts of the product must ensure the following:

Personal protective equipment

Loosely worn or unsuitable clothing increases the danger of becoming trapped or caught up in rotating parts and the danger of getting caught on protruding parts. This results in danger to life and limb.

- All necessary devices and personal protective equipment required for the specific task, such as a hard hat, safety footwear, etc. must be worn. Observe the "Personal protective equipment" [► Section 2.4, Page 14] section.
- Never wear damaged personal protective equipment.
- Never wear rings, necklaces or other jewelry.
- If you have long hair, wear a hairnet.

Work area

Untidy and poorly lit work areas can lead to accidents and malfunctions.

- Keep the work area clean and tidy.
- Make sure that the work area is well lit.
- The device, tools and installation materials must be clean and dry.
- Observe the applicable laws for accident prevention in the relevant country.

Explosion protection

Highly flammable or explosive gases, vapors and dusts can cause serious explosions and fire.

- Do not install or operate the product in areas where a risk of explosion is present.

Safety markings

Warning signs and safety information plates are safety markings on the product. They are an important aspect of the safety concept. Safety markings are depicted and described in the chapter "Product description".

- Observe all safety markings on the product.
- Make sure all safety markings on the product remain intact and legible.
- Replace safety markings that are damaged or missing.

Ambient conditions

To ensure reliable and safe operation, the product must only be operated under the ambient conditions specified in the technical data.

- Observe the specified operating conditions and requirements for the installation location.

Modifications and conversions

Unauthorized or inappropriate changes to the product may lead to personal injury, material damage and operational faults.

- Only modify the product after consultation with Maschinenfabrik Reinhausen GmbH.

Spare parts

Spare parts not approved by Maschinenfabrik Reinhausen GmbH may lead to physical injury, damage to the product and malfunctions.

- Only use spare parts that have been approved by Maschinenfabrik Reinhausen GmbH.
- Contact Maschinenfabrik Reinhausen GmbH.

Working during operation

You must only operate the product when it is in a sound operational condition. Otherwise it poses a danger to life and limb.

- Regularly check the operational reliability of safety equipment.
- Perform the inspection tasks described in this technical document regularly.

2.3 Personnel qualification

The person responsible for assembly, commissioning, operation and inspection must have the following qualifications.

Electrically skilled person

The electrically skilled person has a technical qualification and therefore has the required knowledge and experience, and is also conversant with the applicable standards and regulations. The electrically skilled person is also proficient in the following:

- Can identify potential dangers independently and is able to avoid them.
- Is able to perform work on electrical systems.
- Is specially trained for the working environment in which (s)he works.
- Must satisfy the requirements of the applicable statutory regulations for accident prevention.

Technical Service

We strongly recommend having repairs and retrofitting carried out by our Technical Service department. This ensures that all work is performed correctly. If a repair is not carried out by our Technical Service department, please ensure that the personnel who carry out the maintenance are trained and authorized by Maschinenfabrik Reinhausen GmbH to carry out the work.

Maschinenfabrik Reinhausen GmbH

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2.4 Personal protective equipment

Personal protective equipment must be worn during work to minimize risks to health.

- Always wear the personal protective equipment required for the job at hand.
- Never wear damaged personal protective equipment.
- Observe information about personal protective equipment provided in the work area.

Protective clothing	Close-fitting work clothing with a low tearing strength, with tight sleeves and with no protruding parts. It mainly serves to protect the wearer against being caught by moving machine parts.
Safety shoes	To protect against falling heavy objects and slipping on slippery surfaces.
Safety glasses	To protect the eyes from flying parts and splashing liquids.
Visor	To protect the face from flying parts and splashing liquids or other dangerous substances.
Hard hat	To protect against falling and flying parts and materials.
Hearing protection	To protect against hearing damage.
Protective gloves	To protect against mechanical, thermal and electrical hazards.

Table 3: Personal protective equipment

3 Product description

3.1 Scope of delivery

The product is packaged with protection against moisture and is delivered as follows:

- Oil level indicator
- Float gauge
- Flat gaskets
- Technical documents

3.2 Function description

The oil level indicator displays the oil level of the transformer's oil conservator using a float gauge and magnetic flaps. Permanent magnets are integrated into the float gauge and also in the magnetic flaps. The magnetic flaps are movable and have a white and a red side. The float gauge turns the magnetic flaps 180° from white to red when the fill level increases and 180° from red to white when the fill level drops. This allows the oil level of the oil conservator to be read easily from outside even at greater distances. Using the optionally available limit switches and remote measured value transmission, you can also monitor the fill level of the oil conservator and transmit measured values.

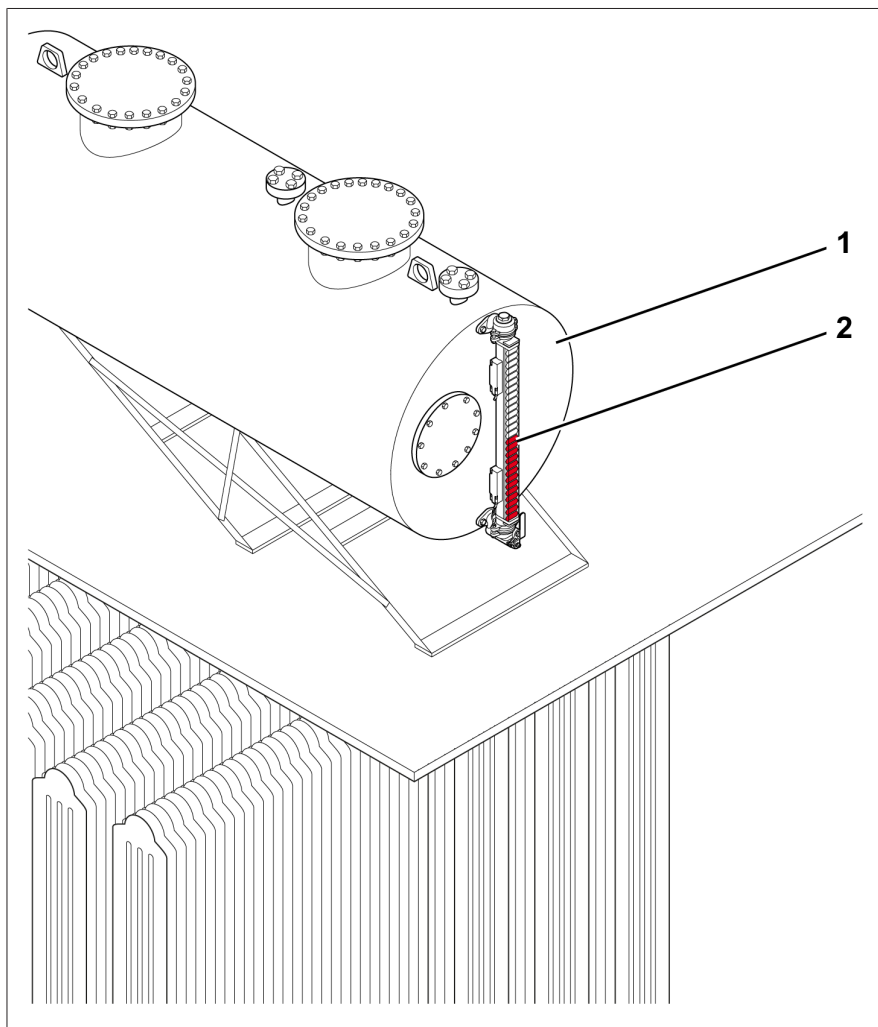


Figure 1: Oil conservator with oil level indicator

1	Oil conservator	2	Oil level indicator
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3.3 Design/versions

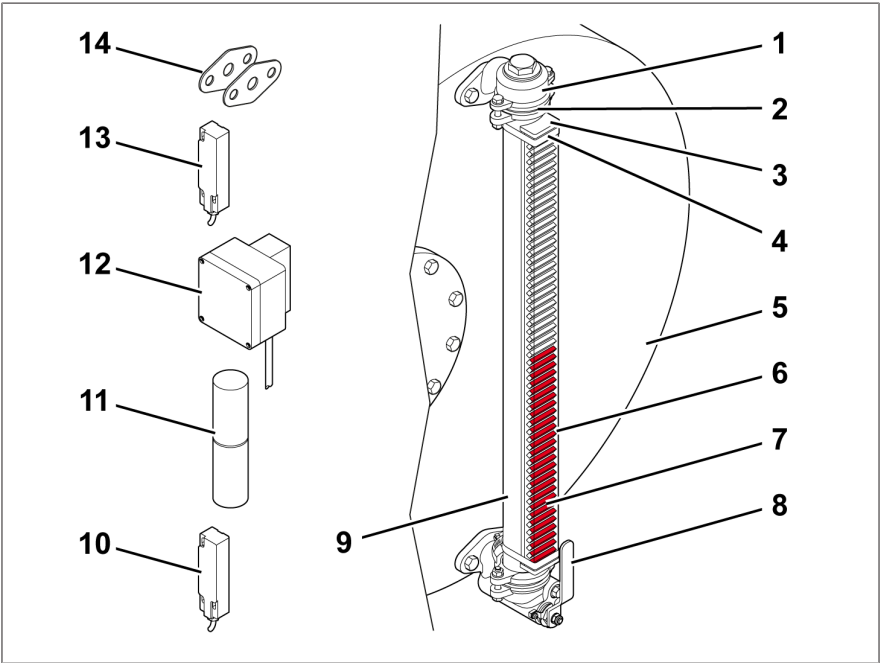


Figure 2: Oil level indicator

1	Top part	2	Sealing ring
3	End cap	4	Clip
5	Oil conservator	6	Indicator rail
7	Magnetic flaps	8	Locking lever
9	Measuring pipe	10	Lower limit switch (optional)
11	Float gauge with magnet	12	Remote transmitter (optional)
13	Upper limit switch (optional)	14	Flat gaskets for flange connections

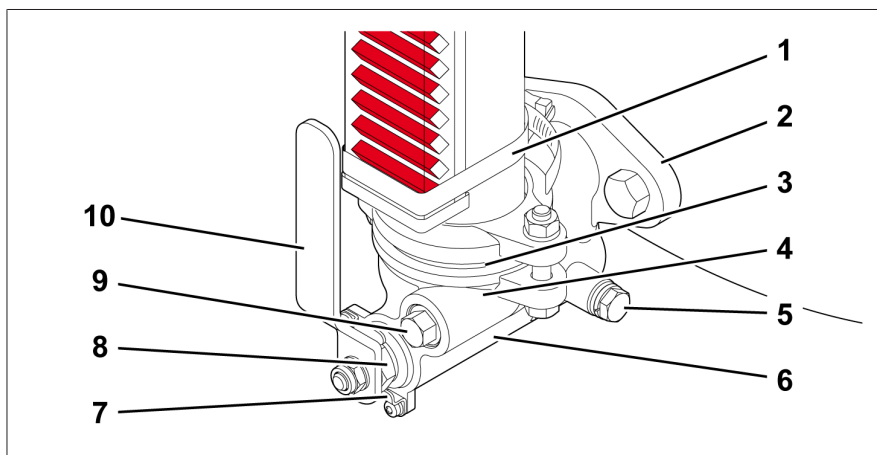


Figure 3: Oil level indicator bottom part

1	Clip	2	Lower connecting flange
3	Sealing ring	4	Bottom part
5	Ground connection	6	Stop valve
7	Locking tab	8	Gland nut
9	Oil drain screw	10	Locking lever

Stop valve open

The stop valve is open when the locking lever is in the vertical position pointing upwards.

Stop valve closed

The stop valve is closed when the locking lever is in the horizontal position or in the vertical position pointing downwards.

3.4 Nameplate

The nameplate is located on the measuring tube.

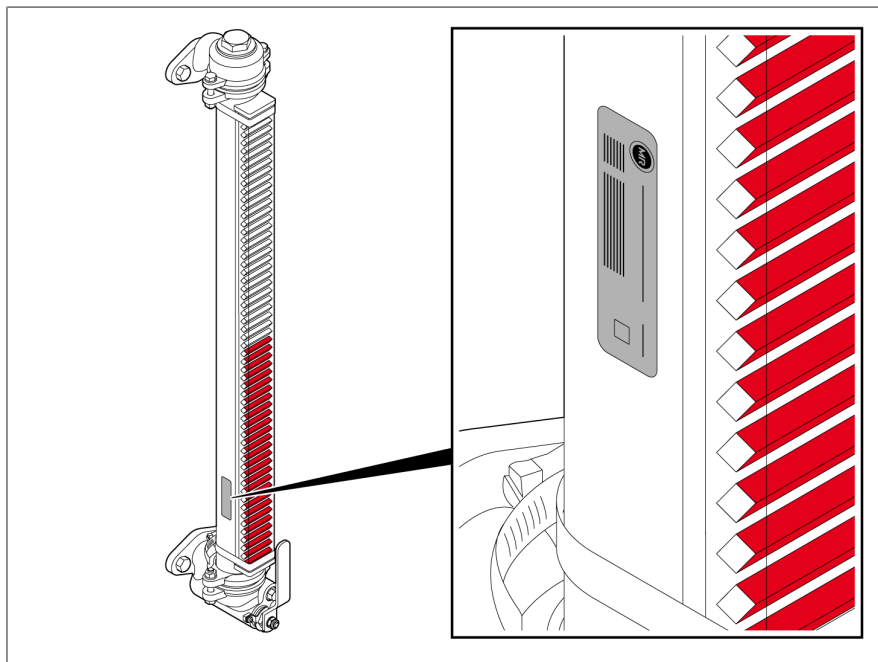


Figure 4: Nameplate

4 Packaging, transport and storage

4.1 Purpose

The packaging is designed to protect the packaged product during transport, loading, unloading and during periods of storage in such a way that no detrimental changes occur. The packaging must protect the goods against permitted transport stresses such as vibration, knocks and moisture (rain, snow, condensation).

The packaging also prevents the packaged goods from moving impermissibly within the packaging.

4.2 Suitability, structure and production

The goods are packaged in a sturdy cardboard box or solid wooden crate. These ensure that the shipment is secure when in the intended transportation position and that none of its parts touch the loading surface of the means of transport or touch the ground after unloading.

Inlays inside the box or crate stabilize the goods, preventing impermissible changes of position and protecting them from vibration.

4.3 Markings

The packaging bears a signature with instructions for safe transport and correct storage. The following symbols apply to the shipment of non-hazardous goods. Adherence to these symbols is mandatory.

				
Protect against moisture	Top	Fragile	Attach lifting gear here	Center of mass

Table 4: Shipping pictograms

4.4 Transportation, receipt and handling of shipments

In addition to vibrations, jolts must also be expected during transportation. To prevent possible damage, avoid dropping, tipping, knocking over and colliding with the product.

If the packaging tips over or falls, damage is to be expected regardless of the weight.

Every delivered shipment must be checked for the following by the recipient before acceptance (acknowledgment of receipt):

- Completeness based on the delivery slip
- External damage of any type.

The checks must take place after unloading when the cartons or transport container can be accessed from all sides.

Visible damage

If external transport damage is found upon receipt of the shipment, proceed as follows:

- Immediately record the transport damage found in the shipping documents and have this countersigned by the carrier.
- In the event of severe damage, total loss or high damage costs, immediately notify the sales department at Maschinenfabrik Reinhausen GmbH and the relevant insurance company.
- After identifying damage, do not modify the condition of the shipment further and retain the packaging material until an inspection decision has been made by the transport company or the insurance company.
- Record the details of the damage immediately on site together with the carrier involved. This is essential for any claim for damages.
- If possible, photograph damage to packaging and packaged goods. This also applies to signs of corrosion on the packaged goods due to moisture inside the packaging (rain, snow, condensation).
- Be absolutely sure to also check the sealed packaging.

Hidden damage

When damage is not determined until unpacking after receipt of the shipment (hidden damage), proceed as follows:

- Make the party responsible for the damage liable as soon as possible by telephone and in writing, and prepare a damage report.
- Observe the time periods applicable to such actions in the respective country. Inquire about these in good time.

With hidden damage, it is very hard to make the transportation company (or other responsible party) liable. Any insurance claims for such damage can only be successful if relevant provisions are expressly included in the insurance terms and conditions.

4.5 Storage of shipments

When selecting and setting up the storage location, ensure the following:

- Store the product and accessories in the original packaging until installation.
- Protect stored goods against moisture (rain, flooding, water from melting snow and ice), dirt, pests such as rats, mice, termites etc. and against unauthorized access.
- Store crates and boxes on pallets, timber beams or planks as protection against ground moisture and for improved ventilation.
- Ensure that the foundation has sufficient load-bearing capacity.
- Keep entrance paths clear.
- Check the stored goods at regular intervals. Also take appropriate action after storms, heavy rain or snow etc.

5 Mounting

DANGER



Electric shock!

Danger of death due to electrical voltage when assembling/dis-assembling the device.

- Switch off transformer on high-voltage side and low-voltage side.
- Lock transformer to prevent unintentional restart.
- Make sure that everything is de-energized.
- Visibly connect all transformer terminals to ground (grounding leads, grounding disconnectors) and short circuit them.
- Cover or cordon off adjacent energized parts.

This chapter describes the installation of the oil level indicator and the installation and connection of the limit switch and the remote transmitter.

5.1 Removing the oil level indicator

If you are already using an oil level indicator, it must be completely removed before installing the new oil level indicator.

To do so, proceed as follows:

1. Close the stop valve.
2. Completely drain oil from the oil level indicator using the oil drain screw.
3. Lower the oil level in the oil conservator so that no oil escapes from the flange of the oil conservator after removing the oil level indicator.
4. Completely remove the oil level indicator.

5.2 Checking the flanges on the oil conservator

The flanges on the oil conservator must be flush and clean to enable the oil level indicator to be positioned with the least possible stress. Even slight unevenness on a flange of the oil conservator can cause the flange of the oil level indicator to be curved too strongly, leading to cracks in the flange caused by the resulting transverse stress.

Therefore, check the following:

- Flanges on the oil conservator
 - Flush and even
 - Evenness deviation ≤ 0.2 mm
- Sealing surface of the flanges on the oil conservator
 - Clean and undamaged
 - Without any damage along the radial surface such as scratches or points of impact
 - The surface quality of the sealing surface must be suited for the delivered CENTELLEN® WS 3820 flat gasket
- Installation material (screws, nuts, washers)
 - Clean and undamaged, particularly the threads and contact surfaces
- Gasket
 - Clean, undamaged, dry

5.3 Attaching the oil level indicator to the oil conservator

NOTICE

Damage to the transformer!

Improperly tightening the screws can lead to a high dispersion of initial forces, causing a contact pressure level below the required minimum or even leaks.

- > Preinstall the bolts manually and insert them so that all the bolt heads are arranged on one side of the flange. The screw heads, nuts and washers must be flush.
- > For screw connections for which the screw head is twisted (blind hole), place the washers beneath the screw head.
- > Replace the bolts that are difficult to move with ones that are easy to move.

Proceed as follows to install the oil level indicator on the oil conservator.

Shortening the measuring tube and indicator rail (if necessary)

i

Use a saw to shorten the measuring tube and indicator rail. A pipe cutter can magnetize the measuring tube and thus lead to malfunctions.

1. Undo the clips of the indicator rail and remove the indicator rail from the measuring tube.
2. Shorten the measuring tube and indicator rail with a saw.
3. Insert the end cap on the shortened end of the indicator rail.
4. Attach the indicator rail to the measuring tube with the clips. The side of the indicator rail marked TOP must be on top.

i

From a length of 700 mm, the indicator rail is additionally fixed to the measuring tube in the middle with a cable tie ex-works. To ensure proper function, reaffix a cable tie after shortening.

Inserting the float gauge into the measuring tube

1. Sweep with the float gauge over the indicator rail externally from top to bottom so that all magnetic flaps turn to white.
2. Pull the bottom part off of the measuring tube.
3. Insert the float gauge into the measuring tube.
4. Replace the bottom part on the measuring tube. In doing so, do not jam or damage the float gauge.

i

Do not yet tighten the screws in the top part and bottom part so that you can shift the measuring tube in the top part and bottom part slightly when installing the oil level indicator on the oil conservator.

Attaching the oil level indicator to the oil conservator

1. Attach the oil level indicator to the oil conservator using flat gaskets. Only tighten the screws by hand.

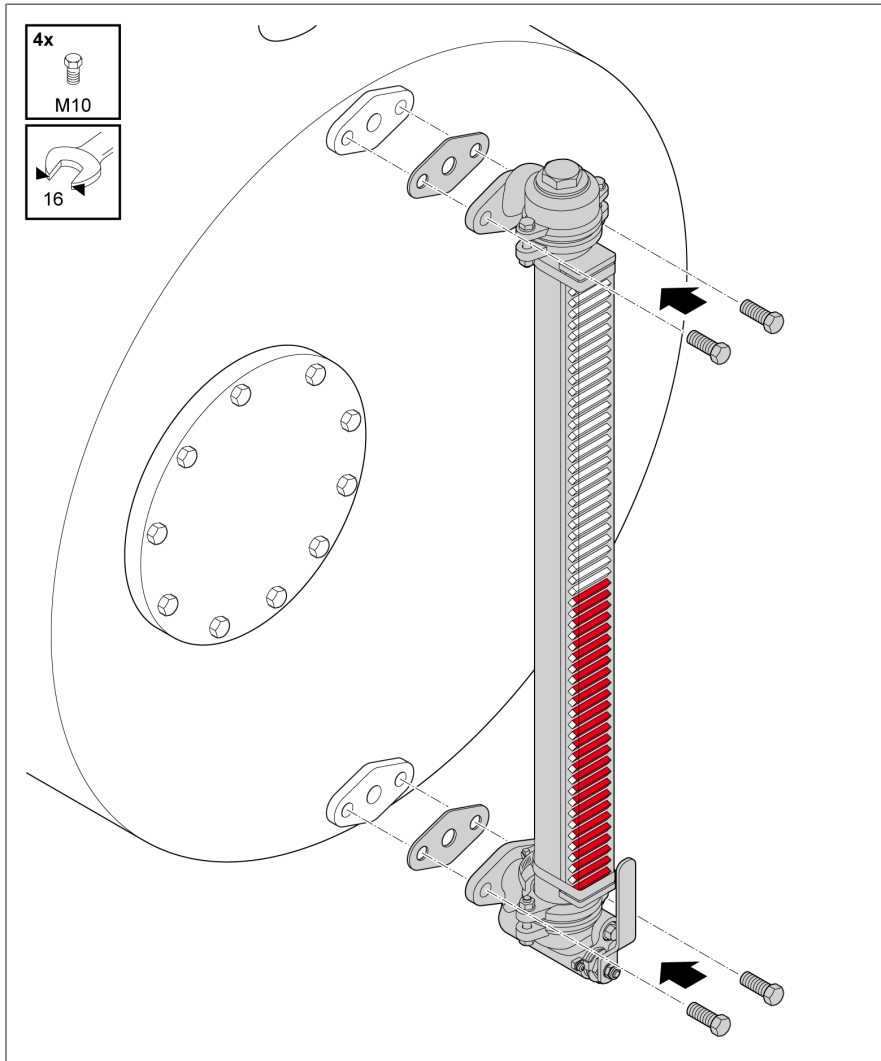


Figure 5: Attaching the oil level indicator

2. **NOTICE!** A residual distance between the flanges caused by a deviation in evenness can cause damage to the flanges. Tighten the screws with 10% of the target tightening torque and ensure that there are no gaps between the flanges. If there is a gap, repair the affected oil conservator flanges or, if necessary, detach and re-weld them so that there is no longer a gap.

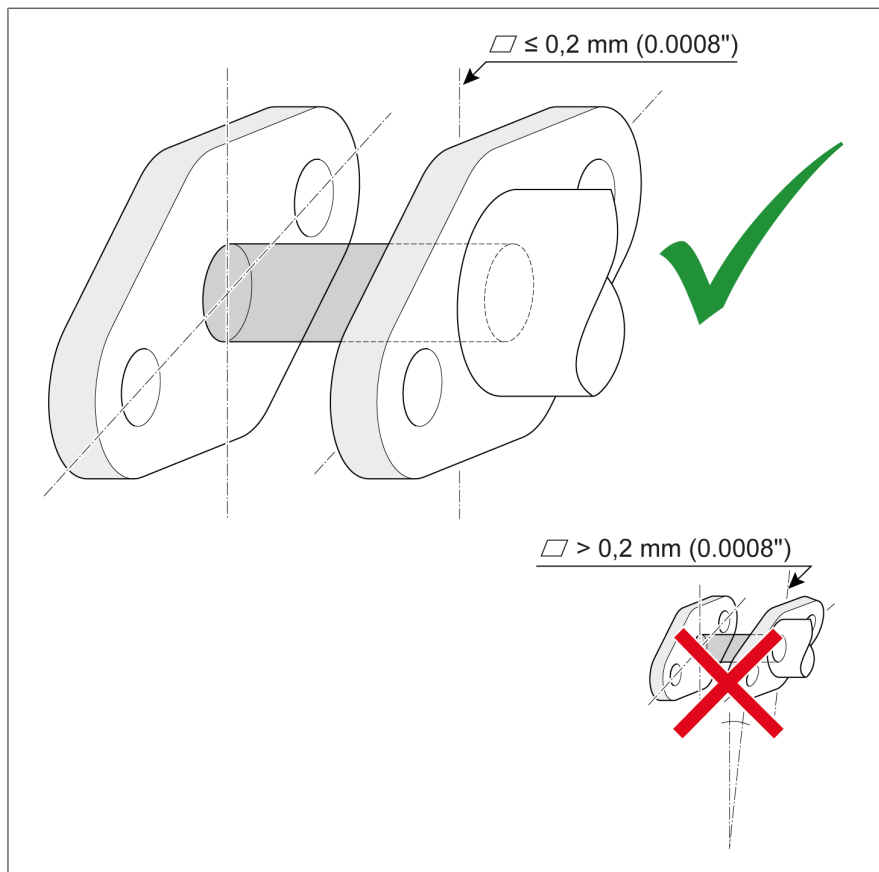


Figure 6: Flanges

3. Tighten the screws with 30% of the target tightening torque.
4. Tighten the screws with 60% of the target tightening torque.
5. Tighten the screws with 100% of the target tightening torque.

6. Retighten all screws of the flange connection with 100% of the target tightening torque until the screws can no longer be turned.
7. Now tighten the screws in the top part and bottom part of the oil level indicator.
8. Fill the oil conservator with oil and open the stop valve.
 - » Oil flows into the oil level indicator and the magnetic flaps turn from white to red.



After a few hours or after the first thermal load, retighten the screws on the flanges at room temperature and with the flange connection in a depressurized state until the screws can no longer be turned further when applying the full tightening torque.

5.4 Tests

Test all connections for seal-tightness and the correct oil level indication after installing the oil level indicator. If the measures for leaks or an incorrect oil level indication listed below are not successful, please contact Maschinenfabrik Reinhausen GmbH [► Section 1.1, Page 5].

Leaks

If oil escapes, proceed as follows.

1. Close the stop valve.
2. Completely drain the oil from the measuring tube using the oil drain screw.
3. Lower the oil level in the oil conservator so that no oil escapes from the oil conservator flange after removing the oil level indicator.
4. Completely remove the oil level indicator.
5. Remove and clean the sealing rings from the top part and bottom part of the measuring tube.
6. Insert the sealing rings in the top and bottom parts.
7. Clean the flanges and flat gaskets.
8. Attach the oil level indicator to the oil conservator [► Section 5.3, Page 25].
9. Retighten the gland nut with ¼ rotation.
10. Fill the oil conservator with oil and open the stop valve.
 - » Oil flows into the oil level indicator and the magnetic flaps turn from white to red.

Tightly fitted locking lever

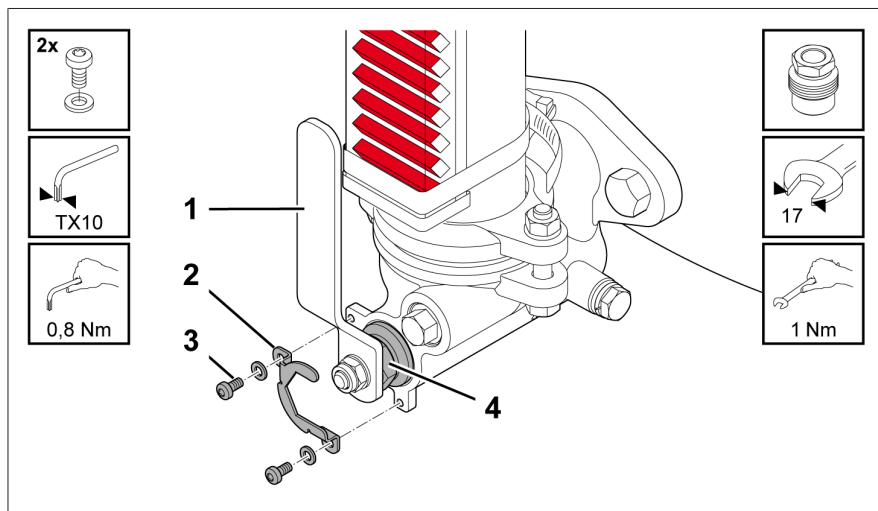


Figure 7: Loosening the locking lever

1	Locking lever	2	Locking tab
3	Torx screw with safety washers	4	Gland nut

Do not use force! If the locking lever cannot be moved, proceed as follows:

1. Loosen two Torx screws and remove the locking tab. When doing so, ensure that you do not lose the safety washers.
2. The gland nut is to be unscrewed up to the stop in the direction of the locking lever.
 - » The locking lever can now be moved easily.
3. Move the locking lever backwards and forwards twice.
4. Screw the gland nut back in and tighten with a torque of 1 Nm.
5. Secure the locking tab in place using Torx screws and safety washers.

Incorrect oil level indication

The following table shows possible causes for an incorrect oil level indication. The measuring accuracy is ± 2 indicator flaps.

Cause	Measure
No oil in the oil conservator	Fill the oil conservator with oil.
Stop valve closed	Open the stop valve.
The side of the indicator rail marked TOP is on the bottom	Attach the indicator rail to the measuring tube so that the side marked TOP is on top.
Float gauge jammed	1. Close the stop valve. 2. Completely drain the oil from the measuring tube using the oil drain screw. 3. Remove the bottom part from the measuring tube. 4. Ensure the float gauge can move freely. 5. Attach the bottom part to the measuring tube. In doing so, do not jam or damage the float gauge. 6. Open the stop valve.
Magnetic parts in the area of the indicator rail	Replace magnetic parts with non-magnetic parts.

5.5 Ground connection

The ground connection on the device must be connected with the ground potential.

1. Select a grounding cable (2.5 ... 6 mm²) in accordance with the local requirements.
2. Crimp the grounding cable with a ring cable lug.
3. Attach the ring cable lug to the device in accordance with the drawing and tighten the screw with a torque of 4 Nm.

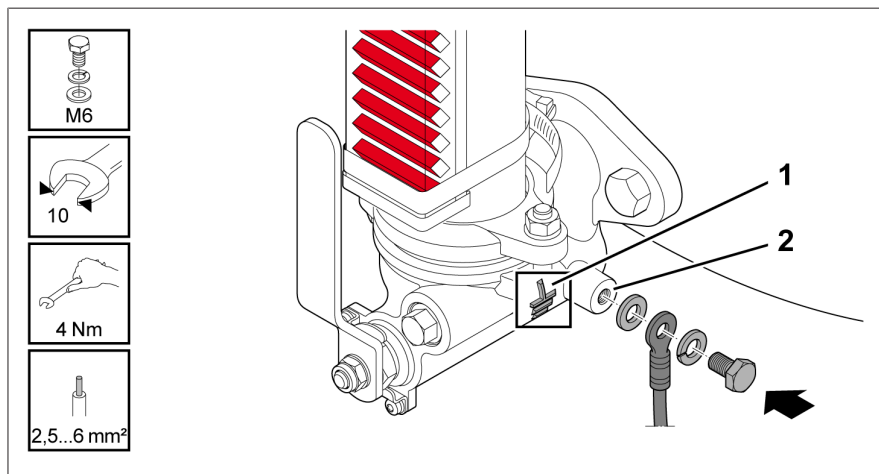


Figure 8: Ground connection

1	Ground symbol	2	Ground connection
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5.6 Attaching limit switches to the measuring tube

The limit switches have a bistable reed contact and can be used as normally closed contacts or normally open contacts. Depending on the oil level, the magnet in the float gauge opens or closes the reed contact.

- Normally open contact: Oil level is above MAX = Contact is closed
- Normally closed contact: Oil level is above MIN = Contact is opened

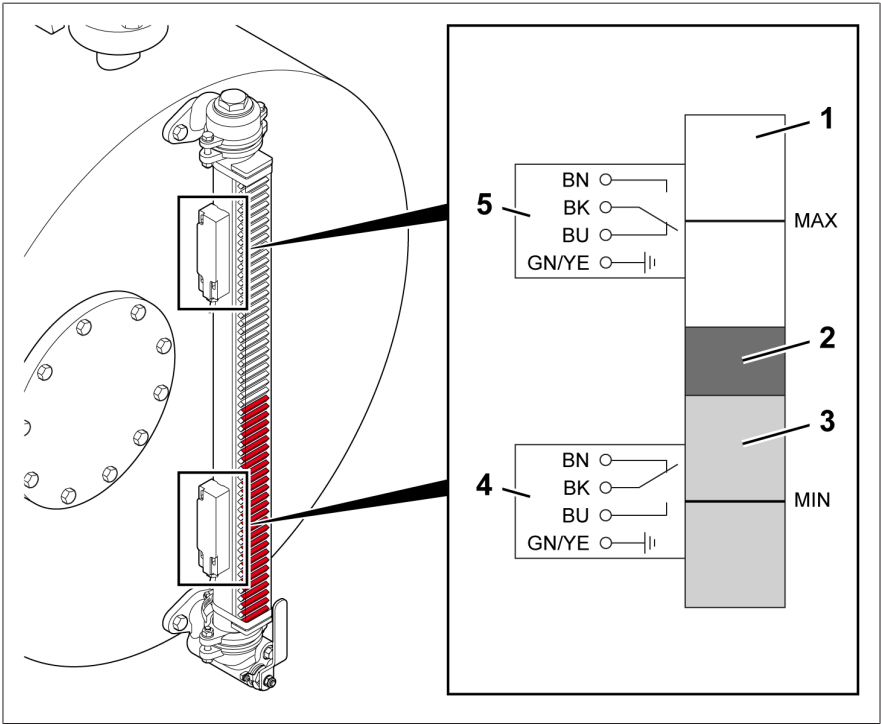


Figure 9: Limit switches

1	Measuring pipe	2	Float gauge
3	Oil	4	Lower limit switch (normally closed contact)
5	Upper limit switch (normally open contact)		

The wires of the connection cable for the limit switches are assigned as follows:

Wire	Code	up to 2007-06	from 2007-07	Function
3	BN	Brown	Black	Normally open contact
1	BK	Black	Black	Center contact
2	BU	Blue	Black	Normally closed contact
	GN/YE	Green/yellow	Green/yellow	Protective conductor (housing)

Table 5: Wires of the connection cable

Proceed as follows to install the limit switch.

1. Attach the limit switch, shifted 90° to the indicator rail, to the measuring tube using the clips supplied. In doing so, the cable must point downward.



As the reed contact is mounted in the middle of the housing, the lowest value to be set is 50 mm above the top edge of the bottom part. The highest value to be set is 50 mm below the bottom edge of the head part.

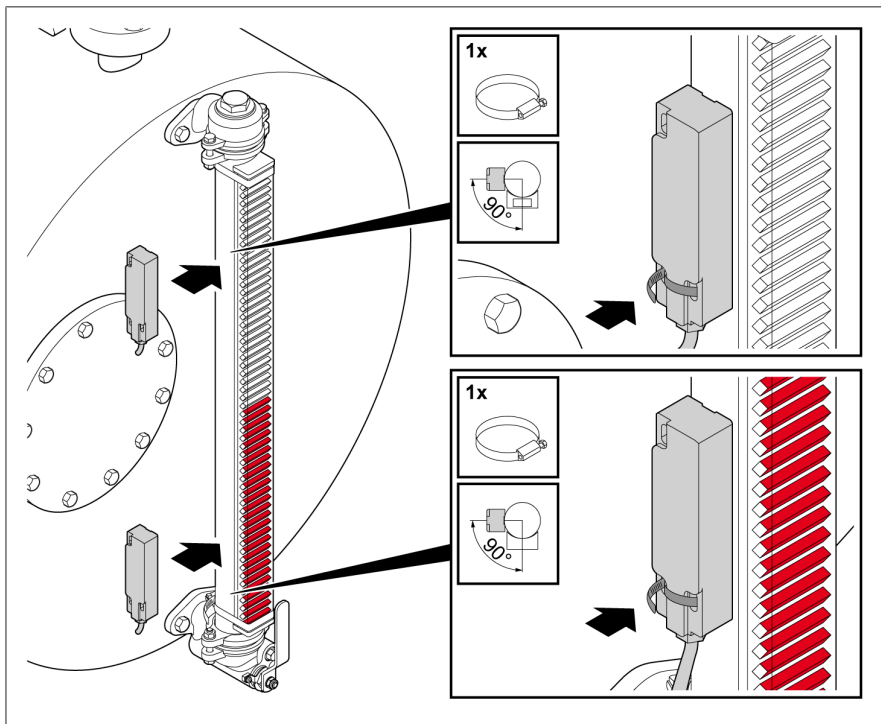


Figure 10: Attaching the limit switch

2. **⚠ WARNING!** Electric shock. Connect the limit switch electrically corresponding to its use as a normally closed contact or normally open contact and using the protective conductor. This circuit must be protected with a 16 A miniature circuit breaker, characteristic C, and with an RCD.

3. Sweep a magnet over the limit switches externally in order to orient the limit switches as normally closed contacts or normally open contacts.

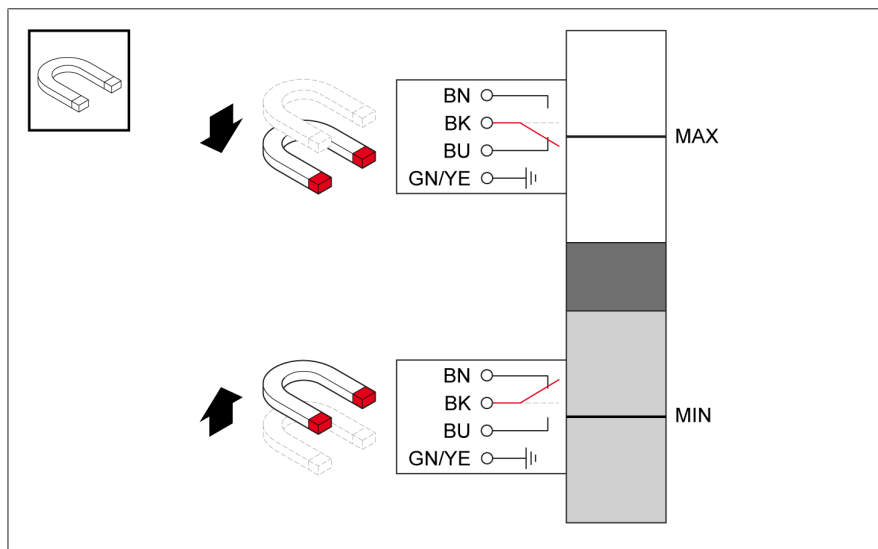


Figure 11: Orienting the limit switches

4. Check the orientation with an ohmmeter.

5.7 Attaching the remote transmitter to the measuring tube

The measuring transducer installed in the remote transmitter converts the level-dependent change in resistance (3-wire potentiometer circuit) to an impressed output current of 4...20 mA.

The installed wire break protection allows the output current to fall to ≤ 3.8 mA in case of a line break.

Proceed as follows to mount the remote transmitter.

1. Attach the remote transmitter, shifted 90° to the indicator rail, to the measuring tube using the clips supplied.

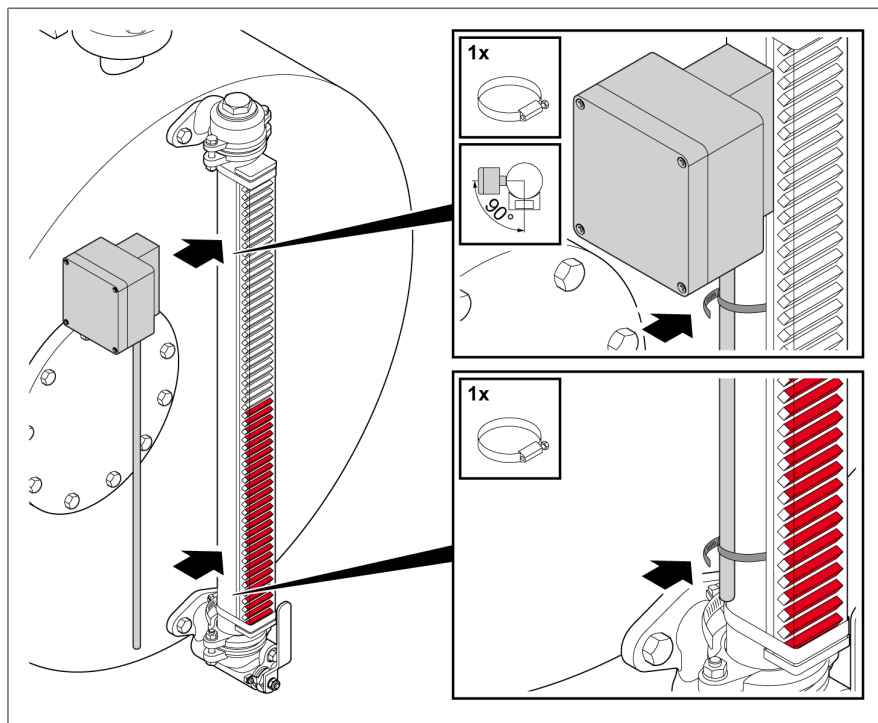


Figure 12: Attach the remote transmitter

2. Connect the supply voltage of 8...35 V DC to terminals 1 (+) and 2 (-).

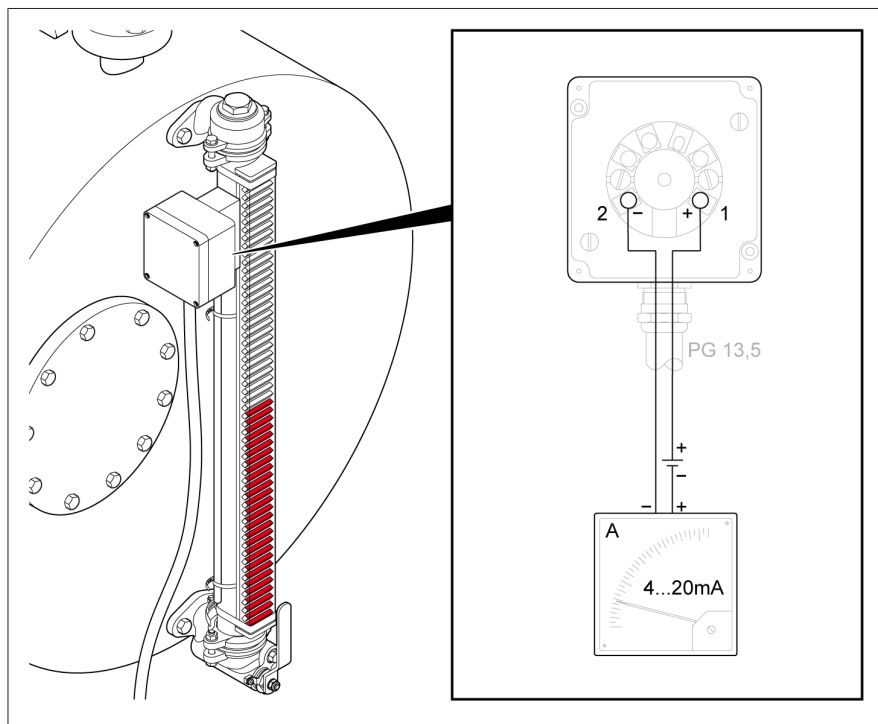


Figure 13: Connecting the remote transmitter

6 Maintenance, inspection and care

Maintenance

The device is maintenance-free.

Inspection

Depending on the conditions of use of the device and the national regulations in the respective country of use, the transformer manufacturers can specify different inspection intervals.

- Observe the inspection intervals defined in CIGRE Publication No. 445 "Guide for Transformer Maintenance" or the inspection intervals specified by the transformer manufacturer.

During each transformer inspection, check the following:

1. Check the external condition of the device for contamination, damage (e.g. glass, electrical connection) and corrosion.
2. Use only a damp towel and mild cleaning agent to clean the housing of the device when needed.
3. Check the seal quality at the mounting point (flange leaks).
4. Check the device function (signaling and switches).

In the event of questions or irregularities, contact the Technical Service department:

Maschinenfabrik Reinhausen GmbH

MR Service & Complaint

Falkensteinstrasse 8

93059 Regensburg, Germany

E-mail: service@reinhausen.com or complaint@reinhausen.com

7 Disposal

Observe the national disposal regulations in the country of use.

7.1 SVHC information in accordance with the REACH regulation

This product complies with the provisions of European Regulation 1907/2006/EC dated December 18, 2006 on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

The following components of the product contain > 0.1% [w/w] of the SVHC substance lead (CAS no. 7439-92-1):

- Brass alloy

8 Technical data

8.1 Oil level indicator

Measuring pipe	Stainless steel 1.4571
Float gauge	Nitrophyl with integrated permanent magnet
Indicator rail	Makrolon, UV-resistant

Table 6: Basic materials

Diameter and wall thickness of the measuring tube	40 x 1 mm
Standard lengths of the measuring tube	400 mm, 500 mm, 630 mm, 800 mm, 1,000 mm, 1,250 mm; other lengths on request
Measurement fluid	Mineral oil, alternative insulating fluids
Measuring range	Any (max. 2 m)
Measuring accuracy	+/-2 indicator flaps
Pressure	Max. 1 bar relative
Density of the measurement fluid	Min. 0.8 g/cm ³
Viscosity of the measurement fluid	Max. 150 cST (1.5 x 10 ⁻⁴ m ² /s)
Insulating fluid temperature	-40 °C...+80 °C
Operating temperature	-40°C...+80°C
Storage temperature	-40 °C...+80 °C
Connection	DIN 42 552 A1 Form B, other connections on request

Table 7: Specifications

8.2 Limit switch

Switching voltage	Max. 230 V AC/DC
Switching current	Max. 1 A
Contact load	Max. 60 VA/40 W
Protection	16 A miniature circuit breaker, characteristic C, and RCD

Table 8: Technical data of the limit switch

8.3 Remote transmitter

Supply voltage	8...35 V DC
Output signal I	4...20 mA
Update rate	10 Hz
Load resistance	$\leq (V_{\text{supply}} - 8 \text{ V}) / 23 \text{ mA } [\Omega]$
Load stability	$< \pm 0.01 \%$ of the presently selected range / $100 \Omega [\text{W}]$
Signal in case of loop break	$\leq 3.8 \text{ mA}$
Response time	0.33 s
Accuracy	0.2 % from end value
Operating temperature	-40...+80 °C
Storage temperature	-40...+80 °C
Level-measuring circuit	3-wire potentiometer connection
Degree of protection	IP68

Table 9: Technical data of the remote transmitter

9 Drawings

The product may have been altered since this document was published.

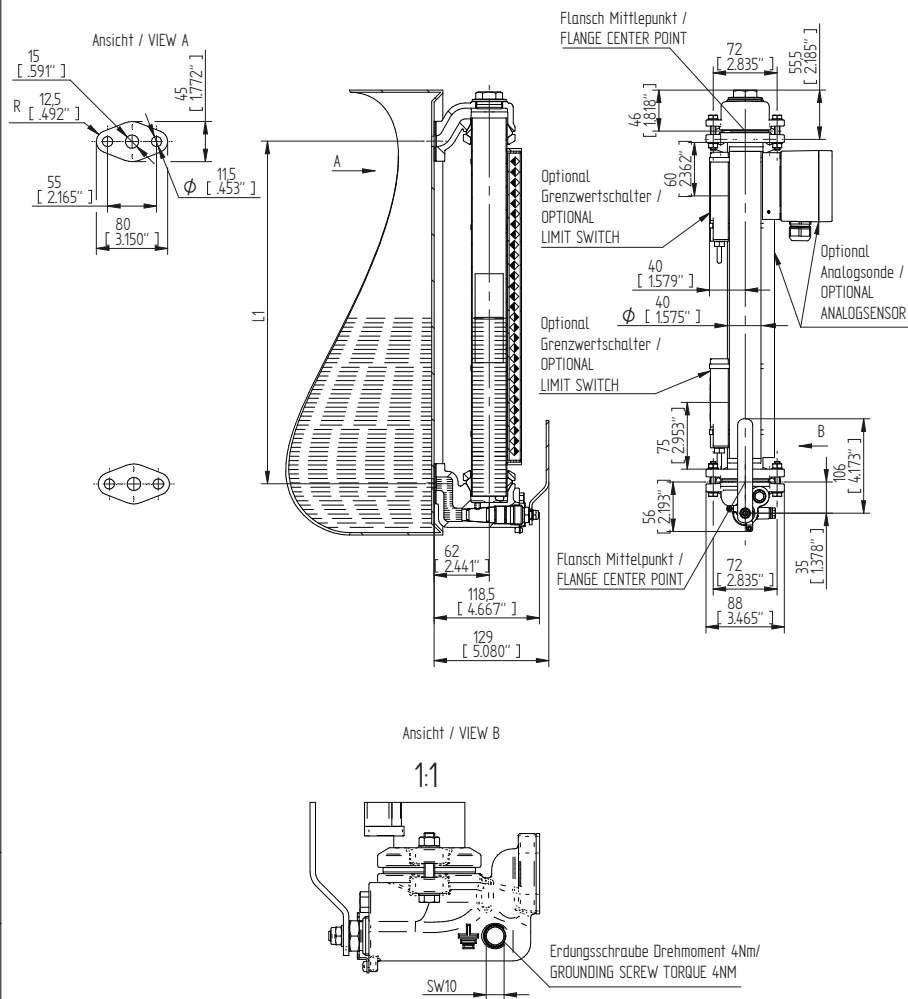
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04HKL	07.11.2023	THIELEK	CHANGE NO. SCALE
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DIMENSION
IN mm
EXCEPT AS
NOTED



TRANSFORMER ACCESSORIES
MMK mit Öltank / MMK WITH OILTANK
Maßzeichnung / DIMENSION DRAWING

SERIAL NUMBER	
—	
MATERIAL NUMBER	SHEET
101872520M	1 / 1



Glossary

Insulating fluid temperature

Temperature of the insulating fluid in the product or directly on the product.

Operating temperature

Permissible temperature in the immediate surroundings of the device during operation taking ambient influences, for example due to the equipment and installation location, into consideration.

Storage temperature

Permissible temperature for storing the device in an unmounted state or in a mounted state so long as the device is not in operation.

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Please note:

The data in our publications may differ from the data of the devices delivered. We reserve the right to make changes without notice.

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F0359703 - 08/25

Maschinenfabrik Reinhausen GmbH 2025

THE POWER BEHIND POWER.