



# Operating instructions MESSKO® MFLOC 2.0. Flow indicator

6500372/03 EN



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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 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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MR Reinhausen customer portal: <https://portal.reinhausen.com>

Further information on the product and copies of this technical file are available from this address if required.

## 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]
<b>Bold</b>	Software operating controls	Press <b>Continue</b> 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 Intended use

The flow indicator monitors the flow of the coolant (water, mineral insulating oil, alternative insulating fluids) in the cooling circuit of a transformer.

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 file as well as the warning notices in this technical file and attached to the product, then the product does not present any danger to people, property or the environment. This applies throughout the service life of the product, from delivery, installation and operation to removal and disposal.

The following is considered intended use:

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

## 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 13] 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.

- Keep the work area clean and tidy.
- Make sure that the work area is well lit.
- 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 repair work is not carried out by our Technical Service department, please ensure that the personnel who carry out the repairs are trained and authorized to do so by Maschinenfabrik Reinhausen GmbH.

### 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.

<b>Protective clothing</b>	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.
<b>Safety shoes</b>	To protect against falling heavy objects and slipping on slippery surfaces.
<b>Safety glasses</b>	To protect the eyes from flying parts and splashing liquids.
<b>Visor</b>	To protect the face from flying parts and splashing liquids or other dangerous substances.
<b>Hard hat</b>	To protect against falling and flying parts and materials.
<b>Hearing protection</b>	To protect against hearing damage.
<b>Protective gloves</b>	To protect against mechanical, thermal and electrical hazards.

Table 3: Personal protective equipment

## 3 Product description

This chapter contains an overview of the design and function of the product.

### 3.1 Scope of delivery

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

- Flow indicator
- Fastening materials
- Gasket
- Technical documents

### 3.2 Function description

Flow indicators monitor the operation of pumps in the cooling circuit of a power transformer. Various versions of the flow indicator enable the use of water, mineral insulating oil or an alternative insulating fluid as an insulating medium.

The pump status (PUMP ON or PUMP OFF) is mechanically displayed by a pointer on the flow indicator.

The pump status is electrically signaled by 2 permanently installed micro-switches (changeover contacts).

### 3.3 Design/versions

The flow indicator consists of a display part and a transmitter part (flange with paddle). Depending on the cooling medium used, the display part is labeled with WATER or OIL (mineral insulating oil, alternative insulating fluids).

The micro-switches installed in the flow indicator are designed as change-over contacts, which you can electrically connect using either a terminal box or an ANSI plug or a MIL plug.

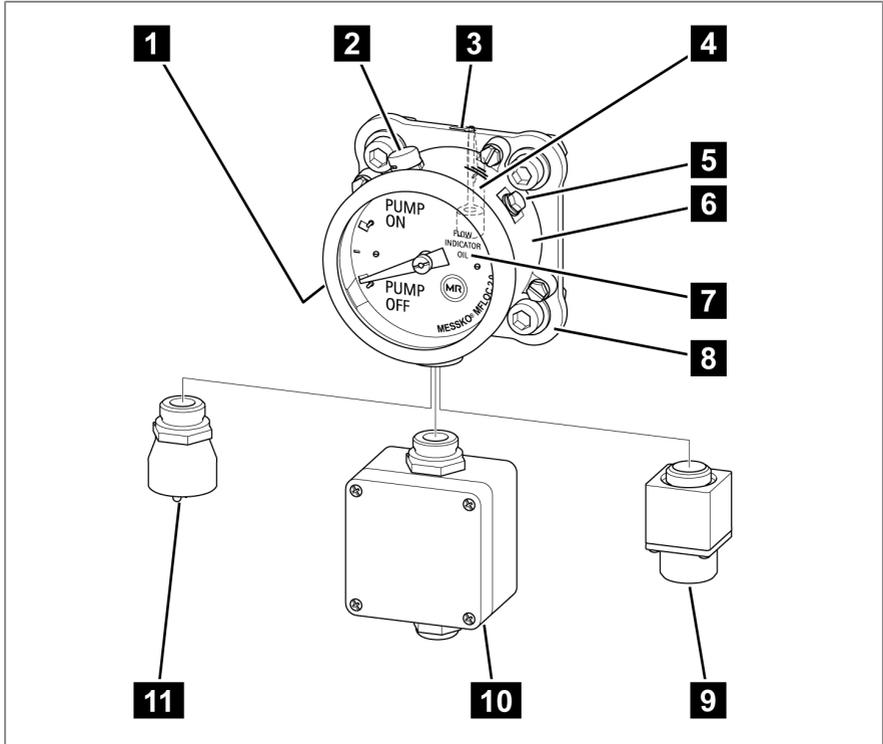


Figure 1: MESSKO® MFLOC 2.0

1	Nameplate	2	Pressure equalization element
3	Marking for mounting position	4	Paddle (on the device rear)
5	Grounding screw	6	Display part
7	Type of cooling medium used	8	Transmitter part
9	MIL plug	10	Terminal box with M20x1.5 or ¾" NPT cable screw connection
11	ANSI plug		

## 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.

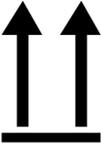
				
Protect against moisture	Top	Fragile	Attach lifting gear here	Center of mass

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 Further transport

Use the original product packaging for further transport.

If you transport the product to the final installation site in a mounted state, observe the following information in order to protect the product against mechanical damage due to external influences.

### Transport packaging requirements

- Select packaging suitable for the duration of transport or storage, taking the climatic conditions into consideration.
- Ensure that the packaging protects the product against transport stress such as shaking, vibrations and impacts.
- Ensure that the packaging protects the product against moisture such as rain, snow and condensation.
- Ensure that the packaging allows for sufficient air circulation in order to prevent the formation of condensation.

## 4.6 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/disassembling 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.

## NOTICE

### Damage to the device and transformer!

An unfavorable installation position or excessive flow speed poses the risk of property damage.

- > Ensure that the maximum flow speed is 2.5 m/s and that no turbulence occurs at the installation location.
- > Install the flow indicator only on the pressure side of the pump.
- > Maintain a distance of at least 600 mm from the pump outlet.
- > In the direction of flow, maintain a distance of at least 300 mm from changes in cross-section, bends and other devices in the piping (additional pump, stop valve, non-return valve, etc.).

This chapter describes how to install the flow indicator on a pipe and electrically connect the micro-switches.

## 5.1 Attaching the flange to a pipe

The flange must be even and clean to enable a flange joint with the least possible stress. Even slight unevenness on a flange can cause the flange to be curved too much, leading to cracks in the flange caused by the resulting transverse stress. Impurities on the seal surfaces will lead to damage to the surfaces or to the sealing materials, thus leading to leaks in the seals.

Therefore, make sure of the following:

- Flanges
  - Flush and even
  - Evenness deviation  $\leq 0.2$  mm
- Sealing surface of the flanges
  - 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 suitable for the gasket being used
- Installation material (screws, nuts, washers)
  - Clean and undamaged, particularly the threads and contact surfaces
- Gasket
  - Clean, undamaged, dry

Proceed as follows to attach a flange to the pipe:

1. Ensure that there is no coolant in the pipe.
2. Attach the flange to the pipe taking into account the aforementioned points.
3. Observe the mounting clearance: The mounting clearance to the pumps must be at least 600 mm. The mounting clearance to traverses must be at least 300 mm.

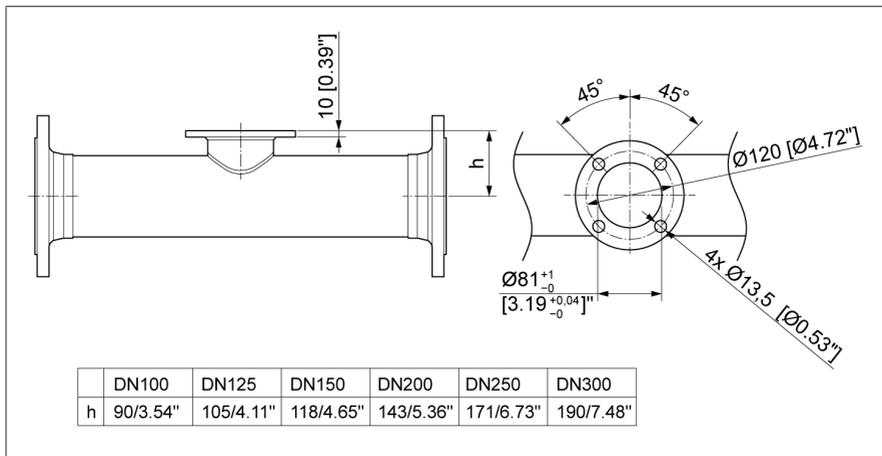


Figure 2: Flange

## 5.2 Fastening the flow indicator to a pipe

**i**

There are various versions of the flow indicator, depending on various factors (e.g. coolant used, electrical connection, flange design). The display part and transmitter part are adjusted to one another at the factory and have identical serial numbers. Only attach transmitter parts and display parts together that have identical serial numbers.

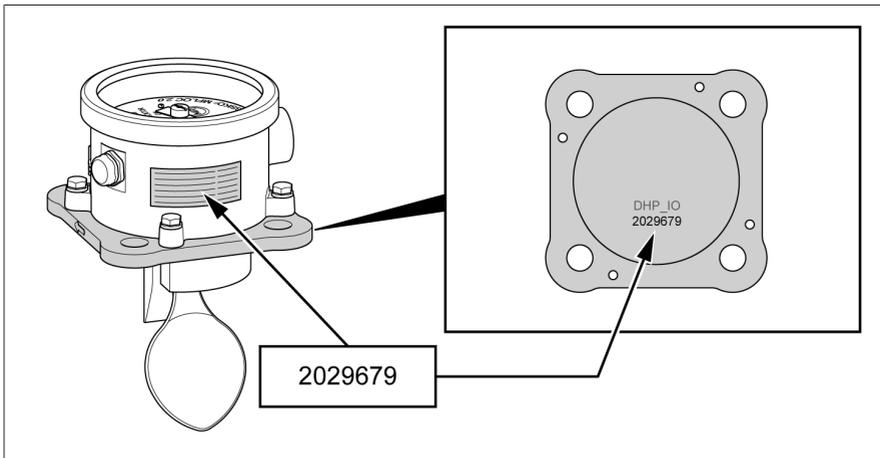


Figure 3: Identical serial numbers (example) on the nameplate of the gauge part and on the transmitter part

### NOTICE

#### Damage due to incorrect switching time

Attaching transmitter parts and display parts together that have different serial numbers can have a detrimental effect on the stated tolerances of the flow indicator.

- Only install transmitter parts and display parts together that are intended for the same version (e.g. for water as the coolant).
- Check for correct function by switching the pump on and off.

Proceed as follows to fasten the flow indicator to the pipe:

1. Loosen the screws on the display part and remove the display part from the transmitter part.

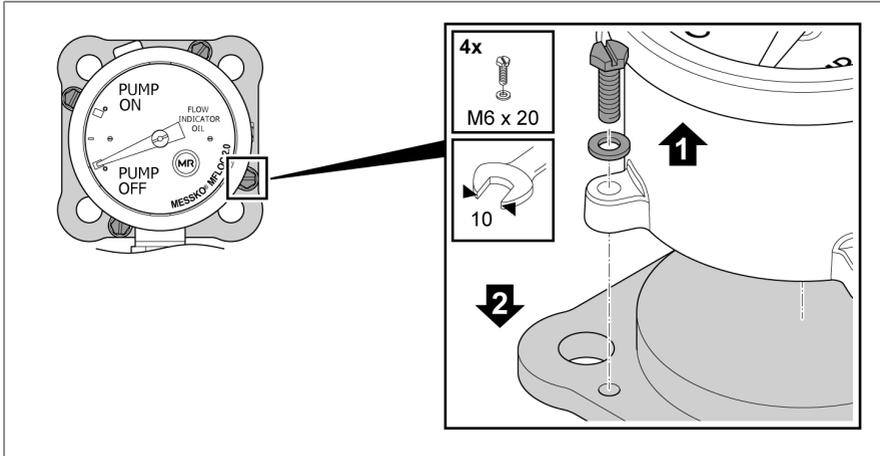


Figure 4: Removing the display part

2. Fasten the transmitter part with gasket on the flange such that the imprinted arrow points in the flow direction of the cooling medium.

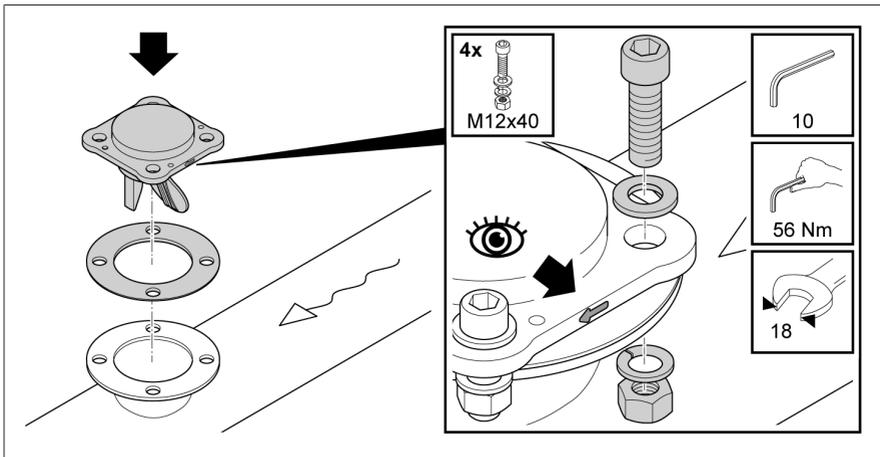


Figure 5: Fastening the transmitter part

3. **NOTICE!** Damage to the device. Never twist the display part on the transmitter part. Align the separated display part as desired and screw it onto the transmitter part.

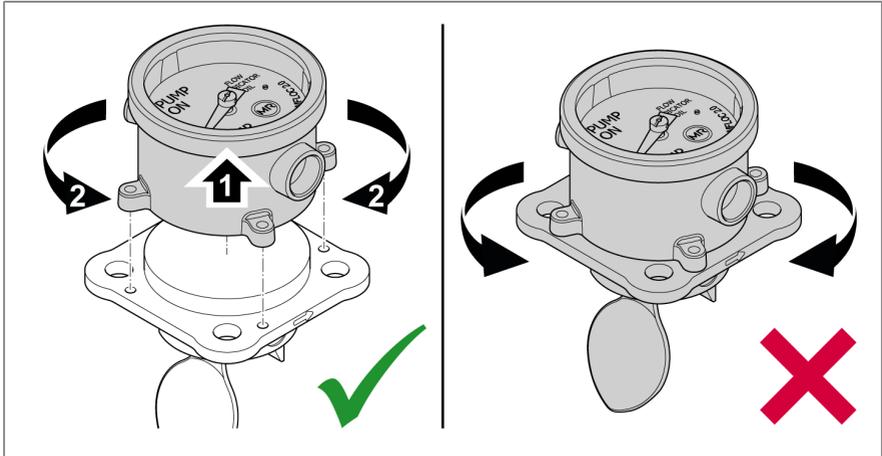


Figure 6: Do not twist the display part on the transmitter part

4. When screwing together the display part and transmitter part, ensure that the O-ring is inserted between the display part and the transmitter part and that the pointer points to PUMP OFF. If the pointer is not pointing to PUMP OFF, remove the display part from the transmitter part and turn the magnet on the bottom of the display part until the pointer points to PUMP OFF. Screw the display part back onto the transmitter part.

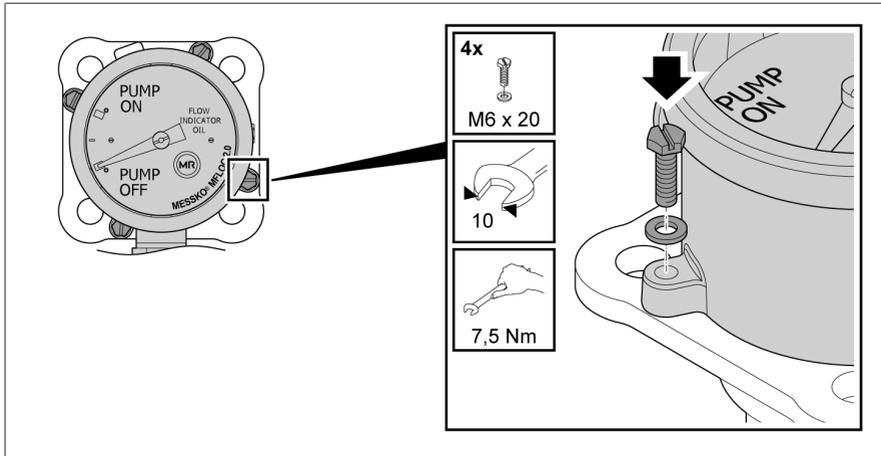


Figure 7: Fastening the display part

## 5.3 Electrically connecting the micro-switches

The micro-switches installed in the flow indicator are designed as changeover contacts. You can electrically connect these using either a terminal strip in the terminal box or an ANSI plug / MIL plug. The cables are not included in the scope of delivery.

### 5.3.1 Cable recommendation

Please note the following Maschinenfabrik Reinhausen GmbH recommendation when wiring the device.

The cables for connecting to the ANSI plug / MIL plug available as an accessory are supplied with a conductor cross-section of AWG16.

The cables used must have a temperature resistance of at least +100 °C (ambient temperature max. +80 °C plus intrinsic device heating of +20 K).

The cables used must be flame-resistant in accordance with IEC 60332-1-2 or UL 2556 VW-1.

Cable	Terminals	Conductor cross-section / cable diameter
External protective conductor	-	≥ all other wires
Wires for connection via terminal box	12/11/14 22/21/24	Standard device version: 6 x 1 mm <sup>2</sup> ...2.5 mm <sup>2</sup> /Ø 8...15 mm Offshore device version: 6 x 1 mm <sup>2</sup> ...2.5 mm <sup>2</sup> /Ø 8...15 mm

Table 5: Cable recommendation

### 5.3.2 Connection via terminal box

1. Unscrew the 4 cross recessed head screws (bit size PH 2) on the terminal box and remove the cover.
2. Remove the sheathing of the cable, strip off approx. 7 mm of insulation from the strands and attach ferrules.
3. Open the cable gland (wrench size 24) and feed the cable through. The cable gland is suitable for a cable diameter of 8...15 mm. If the ¾" NPT cable gland is used, fasten the pipe on the cable gland (wrench size 30). The ¾" NPT cable gland is suitable for cable diameters up to 17 mm.

4. Connect the strands to the terminal strip.

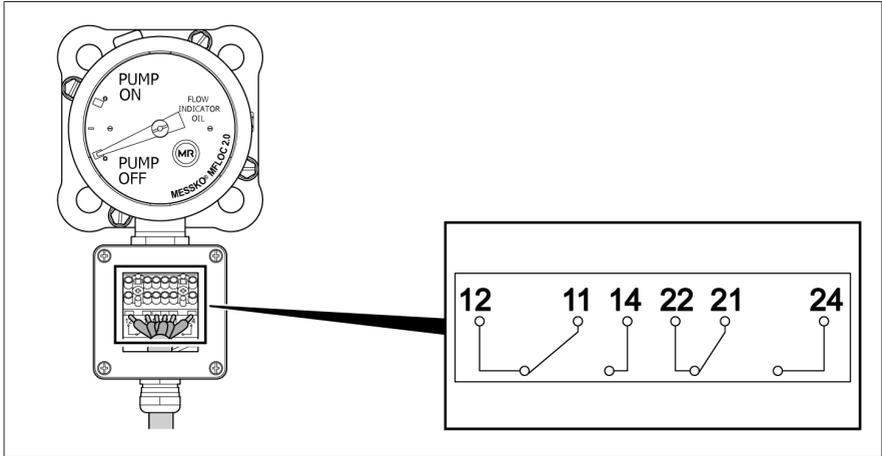


Figure 8: Terminal strip

5. Tighten the cable gland (wrench size 24, 10 Nm).
6. Put the cover on the terminal box and tighten the cross recessed head screws (bit size PH 2) crosswise with a torque of 3 Nm.
7. Ground the flow indicator using a grounding cable with a ring-type cable socket. The copper-aluminum washer (stainless steel with devices suitable for offshore applications) must be on the display part here.

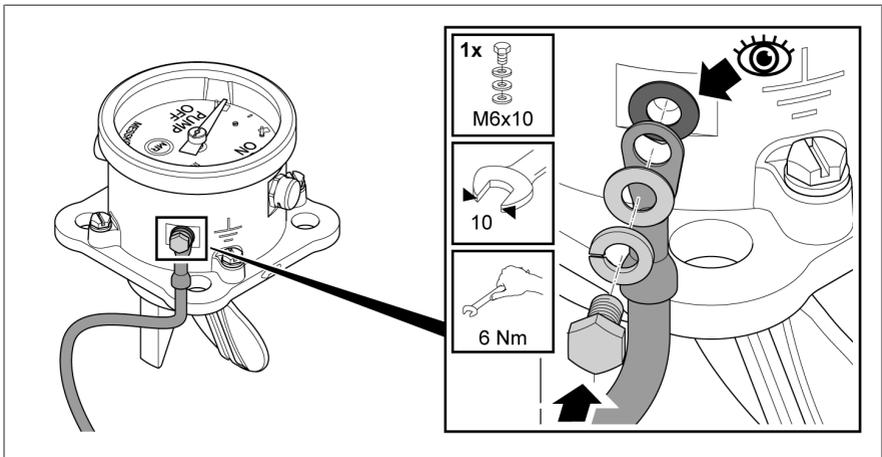


Figure 9: Grounding screw

### 5.3.3 Connection via ANSI plug / MIL plug

1. Attach the socket with the cable to the plug. Hold the cable tightly and turn the socket clockwise as far as it will go.

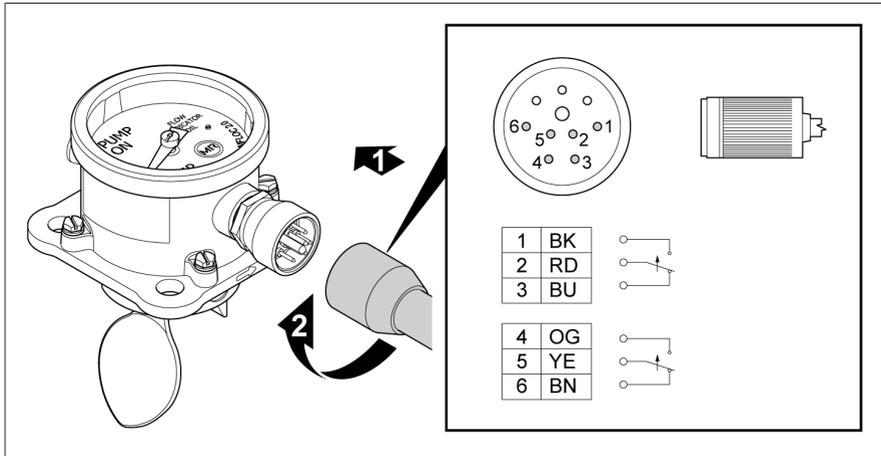


Figure 10: ANSI plug

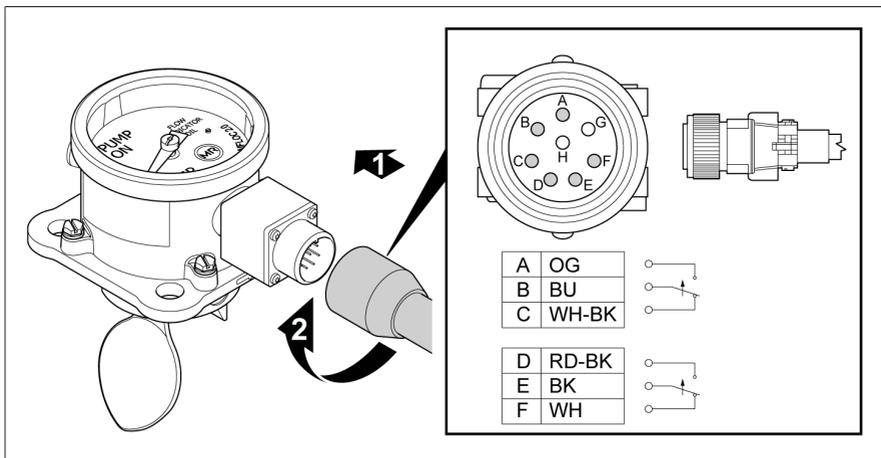


Figure 11: MIL plug

2. Ground the flow indicator using a grounding cable with a ring-type cable socket. The copper-aluminum washer must be on the display part here.

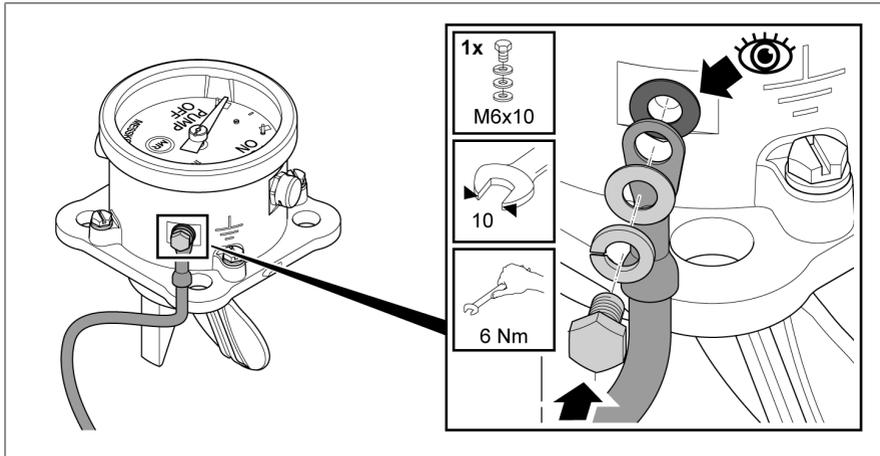


Figure 12: Ground connection

## 5.4 Tests

After installing the flow indicator, check to make sure the flange joint is sealed and the micro-switches function correctly. If anything is unclear regarding the tests or troubleshooting, please contact Maschinenfabrik Reinhausen GmbH [► Section 1.1, Page 5].

### Testing the seal tightness

1. Check the tightness of the flange connection.
2. If the connection is not tight, check the gasket and replace it if necessary.

### Function test

1. After installing the flow indicator, turn the pump on.
2. Check whether the device signalizes a flow in the required range.
3. Check whether the micro-switches are functioning correctly.

## 6 Removal

### DANGER



#### **Electric shock!**

Danger of death due to electrical voltage when assembling/disassembling 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.

First, a description is given on how to remove the display part on the flow indicator to be replaced. The subsequent dismantling of the transmitter part may not be necessary under certain circumstances.

To separate the display part from the transmitter part, proceed as follows:

1. Switch the pump off.
2. Disconnect the voltage supply.
3. Remove the electrical connection depending on the connection type:
  - » Unscrew the cable screw connection.
  - » Open the terminal box and disconnect the terminals.
  - » Unplug the ANSI/MIL plug.
4. Disconnect the ground connection.

5. Loosen the screws on the display part and remove the display part from the transmitter part.

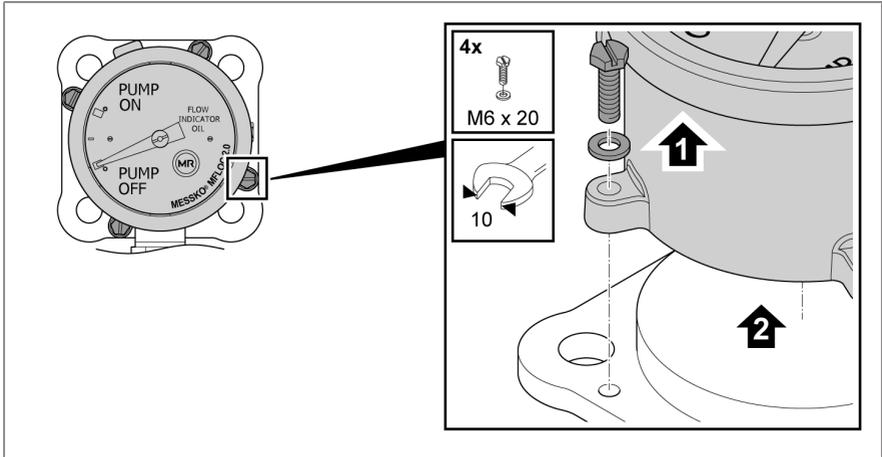


Figure 13: Removing the display part

6. To install a new display part on the existing transmitter part, continue to Fastening the flow indicator to a pipe [► Section 5.2, Page 22].

If you also have to remove the transmitter part, proceed as follows:

1. Lower the fluid level in the pipe to below the flange opening.
2. Remove the transmitter part.

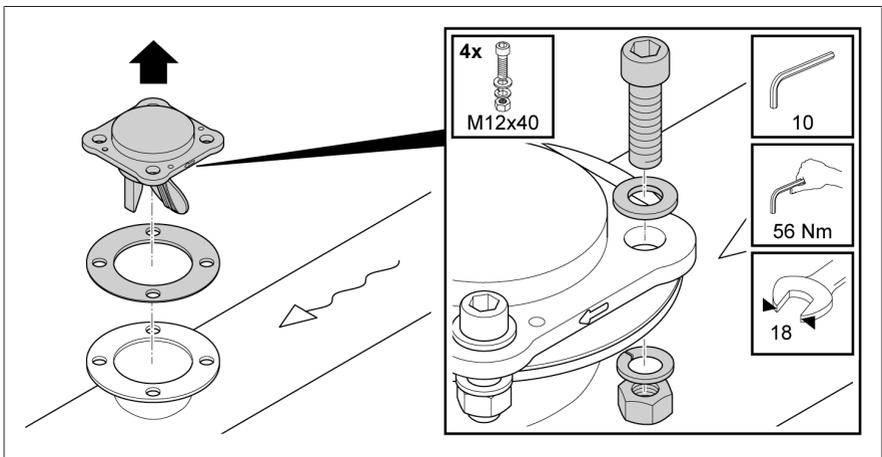


Figure 14: Removing the transmitter part

3. Install the new transmitter part, see Assembly [[▶ Section 5, Page 20](#)].
4. Alternatively, close off the open flange with a suitable dummy flange.

# 7 Maintenance and inspection

## 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. Check the seal quality at the mounting point [▶ Section 5.4, Page 29] (flange leaks).
3. Check the device function [▶ Section 5.4, Page 29] (signaling and switches).
4. Remove the front ring of the inspection window. Lightly grease the thread of the front ring. Mount the front ring and tighten hand-tight (approx. 25 Nm).

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

### **Maschinenfabrik Reinhausen GmbH**

MR Service & Complaint

Falkensteinstraße 8

93059 Regensburg, Germany

E-mail: [service@reinhausen.com](mailto:service@reinhausen.com) or [complaint@reinhausen.com](mailto:complaint@reinhausen.com)

## 8 Disposal

Observe the national disposal regulations in the country of use.

### 8.1 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
- Standard parts with a low property class

## 9 Technical data

Basic materials	
Housing / terminal box	Aluminum alloy, RAL 7033 or 7038, powder-coated in accordance with DIN EN ISO 12944 part 9, class C4H or CX
Mounting flange	Aluminum alloy
Paddle	Glass fiber-reinforced plastic / polyamide copolymer, 50% glass fiber
Indicator dial	Aluminum, matted, anodized Color: black text on white indicator dial or white text on black indicator dial or yellow text on black indicator dial
Inspection window	Laminated safety glass with UV filter

Specifications	
Setup	Indoors and outdoors, tropic-proof
Operating temperature	-40 °C...+80 °C
Storage temperature	-40 °C...+85 °C
Insulating fluid temperature (or other operating medium, see "Operating medium" table)	-30 °C...+120 °C
Degree of protection	IP54 in accordance with DIN EN 60 529
Weight including terminal box	2 kg
Weight without terminal box	1.5 kg
Nominal diameter of the pipe, flange version	DN100 to DN300
Pressure-tightness	Tested up to 3 bar oil pressure, 75 °C
Max. flow speed	2.5 m/s / 98.43 inch/s
Min. flow speed	0.7 m/s / 27.56 inch/s

Specifications	
Pressure loss	< 0.1 bar
Minimum flow speed for the flow indicator to respond	See table "Minimum flow speed for the flow indicator to respond"
Noise development	No perceptible emission

Flange gasket	
Material	NBR for mineral insulating oil FPM (Viton) for alternative insulating fluids EPDM for water
Material hardness	75 shore

Micro-switches		
Tap-changer type	Tap-changer with standard contacts (silver alloy), tap-changer with gold-plated contacts	
Type of contact	Changeover contact	
Quantity	2	
Switching capacity standard tap-changer in accordance with IEC 60076-22-1	<b>230 V AC</b>	
	Making capacity:	250 VA / $\cos \varphi > 0.5$
	Breaking capacity:	60 VA / $\cos \varphi > 0.5$
	<b>24 V DC to 220 V DC</b>	
	Making capacity:	130 W / L/R < 40 ms
	Breaking capacity:	25 W / L/R < 40 ms
Switching capacity, switch with gold-plated contacts*	Making capacity:	24 V DC, max. 2.4 W, resistive load
*) Switching higher loads destroys the gold layer	Breaking capacity:	24 V DC, max. 2.4 W, resistive load

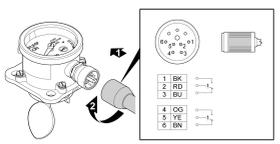
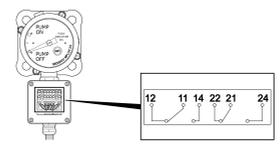
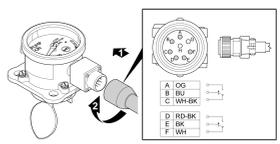
## Micro-switches

Switch point	Centered between PUMP ON and PUMP OFF	
Tap-changer characteristics in accordance with IEC 60076-22-1	Minimum dielectric strength, short-term power supply frequency withstand voltage	2 kV, 1 min, between circuit and ground 1 kV, 1 min, between the contacts in the open position
	Minimum dielectric strength lightning impulse withstand voltage	4 kV (peak), between circuit and ground 3 kV (peak), between the contacts in the open position

## Terminal box

Connection terminals	min. 1 mm <sup>2</sup> / max. 2.5 mm <sup>2</sup>
Cable gland	M20x1.5 for cable Ø 8...15 mm or ¾" NPT

## Electrical connection

 <p><b>ANSI plug</b></p>	 <p><b>Terminal box</b></p>	 <p><b>MIL plug</b></p>
------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------

## Minimum flow speed for the flow indicator to respond

Nominal diameter DN	Piping interior diameter in accordance with DIN 2633		Minimum flow speed for the flow indicator to respond		Oil flow rate for the flow indicator to respond	
	[mm]	[inch]	[m/S]	[inch/s]	[l/min]	[gallons/min]
100	107.10	4.22	0.70	27.56	380.00	100.39
125	131.70	5.19	0.70	27.56	572.00	151.11

Minimum flow speed for the flow indicator to respond						
Nominal diameter DN	Piping interior diameter in accordance with DIN 2633		Minimum flow speed for the flow indicator to respond		Oil flow rate for the flow indicator to respond	
	[mm]	[inch]	[m/S]	[inch/s]	[l/min]	[gallons/min]
150	159.30	6.27	0.70	27.56	837.00	221.11
200	207.30	8.16	0.70	27.56	1,418.00	347.60
250	260.40	10.25	0.70	27.56	2,236.00	590.69
300	309.70	12.19	0.70	27.56	3,163.00	835.58

Operating medium
Water
Mineral oils in accordance with IEC 60296, ASTM D3487 and comparable standards
Alternative insulating fluids: – Synthetic esters: MIDEL7131, ENVIROTEMP200, Nycodiel 1255 and Nycodiel 1258 – Natural esters: ENVIROTEMP FR3, MIDEL eN1215 and eN1204, SunOhm Eco, Pastell-Neo, Paryol Electra 7426 – Other alternative insulating fluids on request

Offshore version
Paint of terminal box as per DIN EN ISO 12944 Part 9, Protection class CX
Unpainted parts made from stainless steel

# 10 Drawings

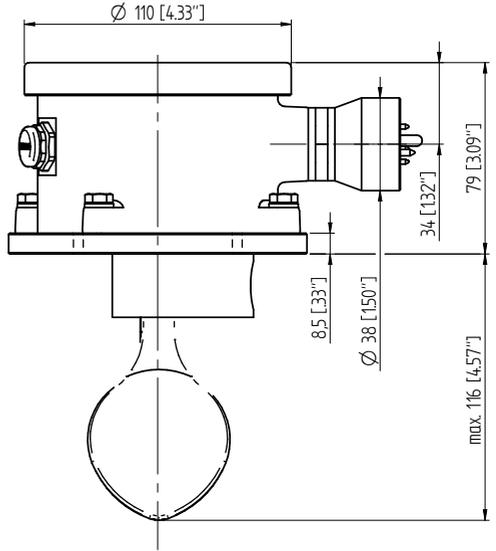
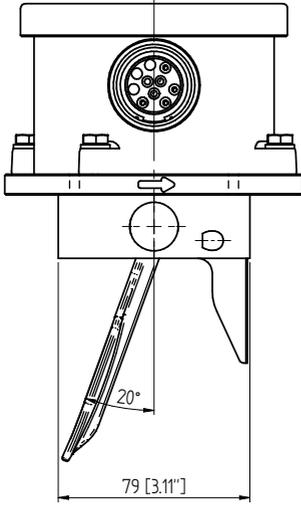
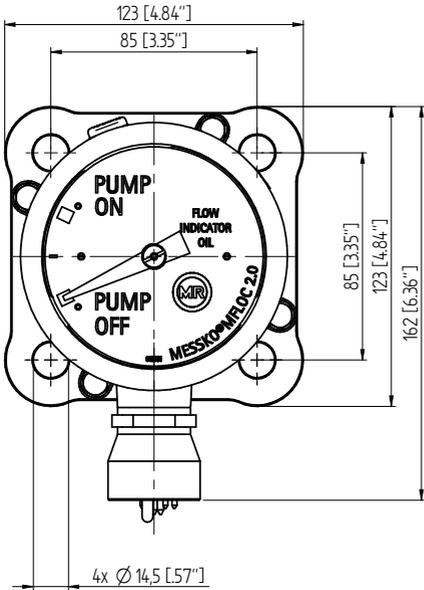
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			1:1

Maßangaben  
in mm, soweit  
nicht anders  
angegeben



Zubehör Transformator / ACC  
MFLOC - ANSI Stecker/CONNECTOR  
Maßzeichnung/DIMENSION DRAWING

Serialnummer	
Materialnummer	Blatt
1012055420	1 / 1



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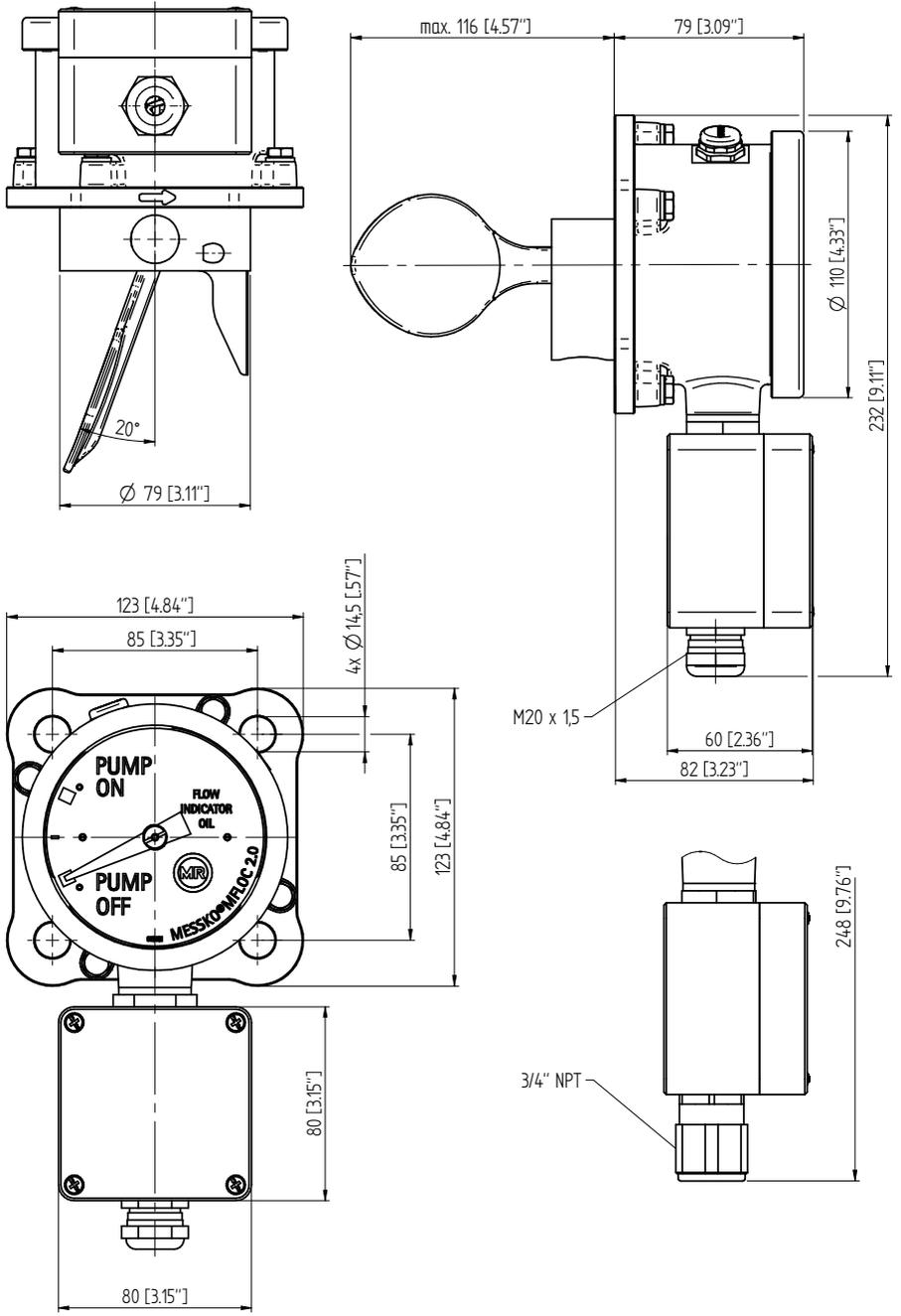
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04.04.2023	KLEYN	1121590
Bez.	Maßstab	1:1
Norm.		

Maßangaben  
 in mm, soweit  
 nicht anders  
 angegeben



Zubehör Transformator / ACC  
 MFLOC -Anschlussbox/CONNECTION BOX  
 Maßzeichnung/DIMENSION DRAWING

Serialnummer	
Materialnummer	Blatt
1012052520	1 / 1



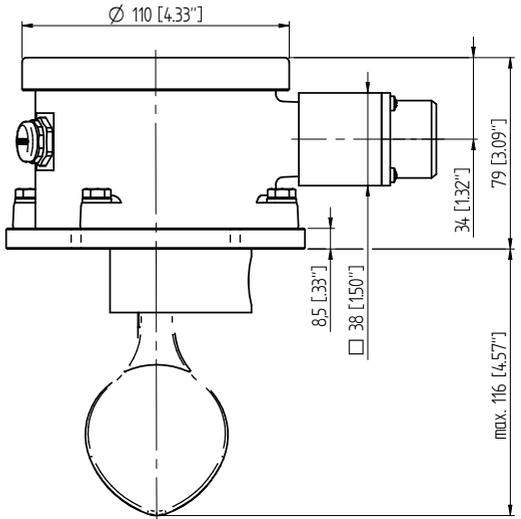
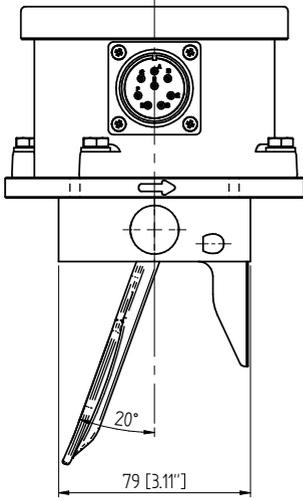
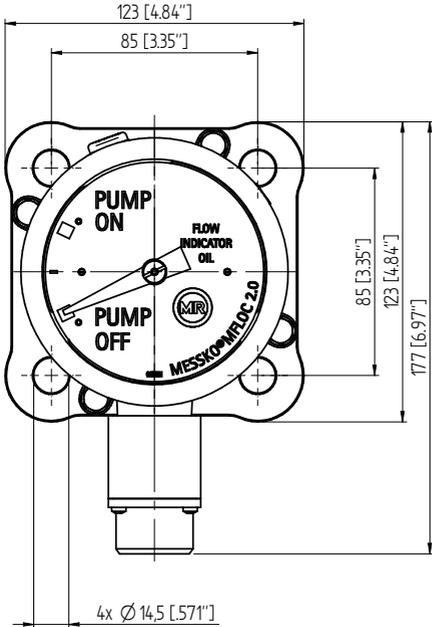
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			Maßstab
			1:1

Maßangaben  
in mm, soweit  
nicht anders  
angegeben



Zubehör Transformator / ACC  
MFLOC -MIL Stecker / CONNECTOR  
Maßzeichnung/DIMENSION DRAWING

Serialnummer	
Materialnummer	Blatt
1012055520	1 / 1



# Glossary

## **Insulating fluid temperature**

Permissible 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.

6500372/03 EN - MESSKO<sup>®</sup> MFLOC 2.0 Operating instructions -

F0372803 - 06/23

Maschinenfabrik Reinhausen GmbH 2023



THE POWER BEHIND POWER.