



Dehydrating breather

MESSKO® MTRAB®

Operating instructions

BA6820378-03 EN . Version 2.5



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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 document 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

The product is manufactured by:

Messko GmbH

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Messko-Platz 1
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Germany

Phone: +49 6171 6398-0

E-mail: messko-info@reinhausen.com

Internet: www.reinhausen.com/messko

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

1.2 Completeness

This technical document is incomplete without the following documentation:

- Quick guide
- Order confirmation

1.3 Subject to change without notice

The information contained in this technical file comprises the technical specifications approved at the time of printing. Significant modifications will be included in a new edition of the technical file.

The document number and version number of this technical file are shown in the footer.

1 Introduction

1.4 Safekeeping

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

1.5 Notation conventions

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

1.5.1 Hazard communication system

Warnings in this technical file are displayed as follows.

1.5.1.1 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

1.5.1.2 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.

1.5.1.3 Signal words and pictograms

The following signal words are used:

Signal word	Definition
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

Pictograms warn of dangers:

Pictogram	Definition
	Warning of a danger point
	Warning of dangerous electrical voltage
	Warning of combustible substances

1 Introduction

Pictogram	Definition
	Warning of a tipping hazard
	Warning of a hot surface

Table 2: Pictograms used in warning notices

1.5.2 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.

1.5.3 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).

► 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).

1.5.4 Typographic conventions

The following typographic conventions are used in this technical file:

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	[► 41].

Table 3: Typographic conventions

2 Safety

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

- Read this technical document through carefully to familiarize yourself with the product.
- This technical document is a part of the product.
- Read and observe the safety instructions provided in this chapter in particular.
- Observe the warnings in this technical document in order to avoid function-related dangers.
- The product is manufactured on the basis of state-of-the-art technology. Nevertheless, risks to life and limb of the user or impairment of the product and other material assets may occur during use due to function-related dangers.

2.1 General safety information

All persons responsible for the assembly and commissioning of the device must have sufficient specialist training.

Improper operation or misuse may lead to:

- Serious injury or death
- Damage to the device and other property of the user
- A reduction in the efficient functioning of the equipment

2.2 Appropriate use

The maintenance-free MESSKO® MTRAB® dehydrating breather is used in oil-insulated transformers, reactors and tap changers for dehydrating the air sucked into oil conservators.

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

The following is considered appropriate use:

- Operate the product in accordance with this technical document, the agreed-upon delivery conditions and the technical data.
- Ensure that all necessary work is performed by qualified personnel only.
- Only use the equipment included in delivery for the intended purpose and in accordance with the specifications of this technical document.
- Observe the notices in this technical document regarding electromagnetic compatibility and the technical data.

2.3 Inappropriate use

Use is considered inappropriate if the product is used other than as described in the "Appropriate use" section.

Messko GmbH does not accept liability for damage resulting from unauthorized or inappropriate changes to the product. Inappropriate changes to the product without consultation with Messko GmbH can lead to personal injury, damage to property and operational disruptions.

2.4 Fundamental safety instructions

To prevent accidents, disruptions 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 2.6, Page 16] section.
- Never wear damaged personal protective equipment.
- Never wear rings, necklaces or other jewelry.
- If you have long hair, wear a hairnet.

2 Safety

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 Messko GmbH.

Spare parts

Spare parts not approved by Messko GmbH may cause physical injury and damage the product.

- Only use spare parts approved by the manufacturer.
- Contact Messko 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.

2.5 Personnel qualification

The person responsible for assembly, commissioning, operation and inspection must ensure that personnel are sufficiently qualified.

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.

Electrically trained persons

An electrically trained person receives instruction and guidance from an electrically skilled person in relation to the tasks undertaken and the potential dangers in the event of inappropriate handling as well as the protective devices and safety measures. The electrically trained person works exclusively under the guidance and supervision of an electrically skilled person.

2 Safety

Operator

The operator uses and operates the product in line with this technical document. The operating company provides the operator with instruction and training on the specific tasks and the associated potential dangers arising from improper handling.

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.

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2.6 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.

Personal protective equipment to be worn at all times



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.

Special personal protective equipment for particular environments



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 from falling and flying parts and materials.



Hearing protection

To protect from hearing damage.



Protective gloves

To protect from mechanical, thermal, and electrical hazards.

3 Product description

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

The dehydrating breather is mounted using a "flange" as standard with the option of 2 side "mounting rods" on the pipe for venting and dehydrating the oil conservator.

3.1 Scope of delivery

The following components are included in the delivery:

- MTRAB® dehydrating breather
- DIN flange including mounting kit and gasket or 4-hole circular flange or 2-hole RM flange (all optional)
- Operating instructions
- Quick guide

3.2 Design/versions

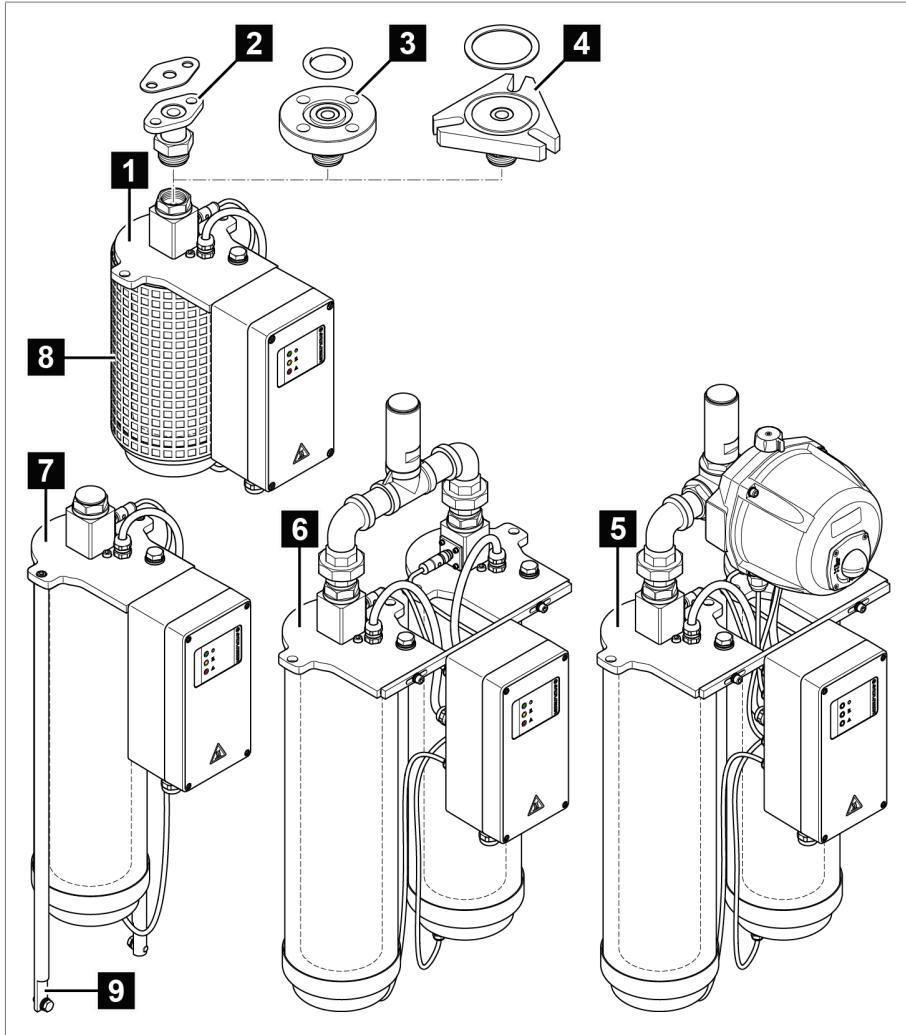


Figure 1: Design

3 Product description

1 DB100	2 2-hole RM flange*) (in accordance with DIN 2558) including Centellen WS3820 gasket; for DB100 only (optional)
3 4-hole circular flange*) for 1/2" screws including NBR75 gasket black (optional)	4 DIN flange *) (similar to DIN 42 562-3) including NBR70 gasket in accordance with DIN5305 and including mounting kit (optional)
5 DB200G (not offshore version)	6 DB200D
7 DB200	8 Protective grate (optional)
9 Additional fastening points on the side (optional)	

*) additional flanges can be delivered as an option

3.3 Function description

The dehydrating breather is used in oil-insulated transformers, reactors or tap changers for dehydrating the air sucked into oil conservators.

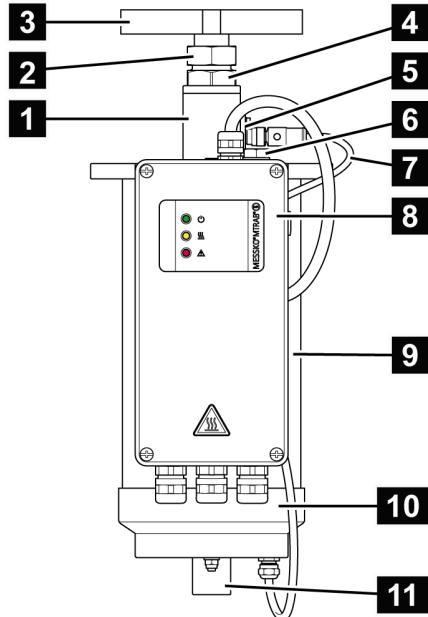


Figure 2: Overview

1 Upper air spout	2 Lock nut
3 Mounting flange (configurable)	4 Nut
5 Temperature and humidity sensor	6 Grounding screw
7 Sensor cable and cable protection (optional)	8 Connection box (lacquer color configurable)
9 Desiccant container	10 Lower metal flange
11 Dust protection tube with insect protection grille (optional) or with filter heating (optional HT version)	

For illustrations of the various designs, see Dimensional drawings.

3 Product description

3.4 Terminal box

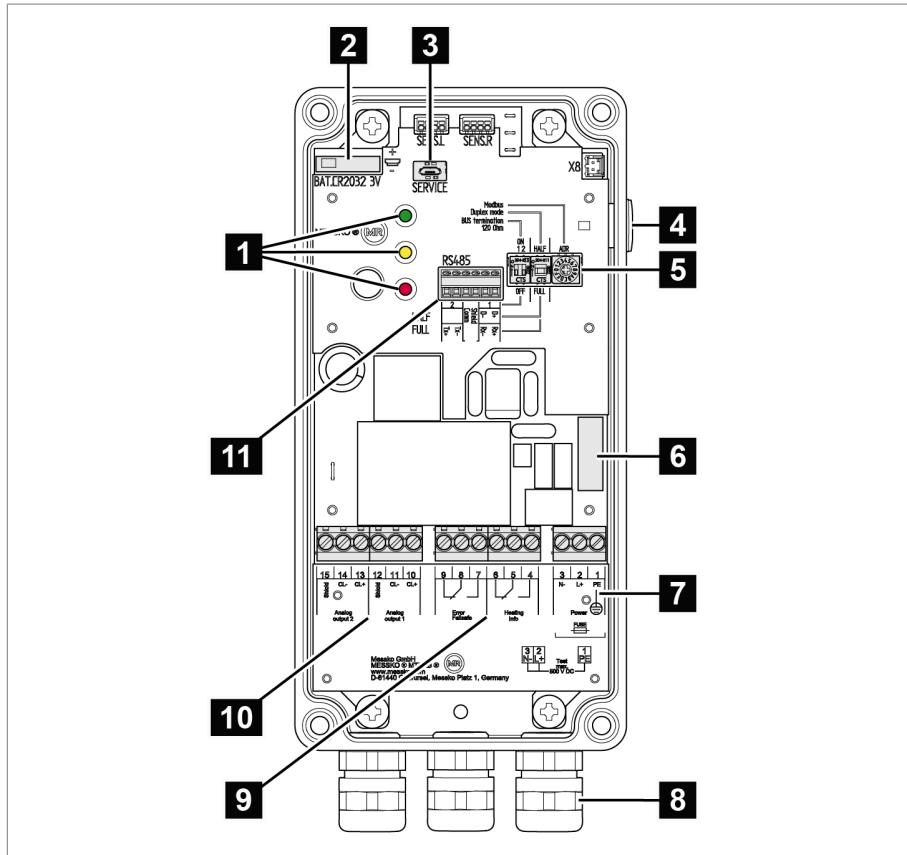


Figure 3: Connection box

1 LEDs for status display

2 RTC buffer battery (type CR2032)

3 USB service interface

4 Test button

5 Modbus settings (optional)

6 Fuse

7 Supply voltage

100...127 V DC / AC 50/60 Hz
200...240 V DC / AC 50/60 Hz

8 Cable gland

M20x1.5 (brass/stainless steel) or
1/2" 14NPT (brass)

3 Product description

-
- | | |
|-------------------------------|--|
| 9 Signaling relay | 10 Analog output 1 (temperature)
Analog output 2 (humidity)
0...20 mA or 4...20 mA |
| 11 RS485 interface (optional) | |
-

3.5 Controller for silica gel heating

The MTRAB dehydrating breather is delivered with an alpha controller, beta controller or gamma controller.

The recommended application areas for the different versions of the dehydrating breather are specified in the Applications table (see [▶ Section 12.2, Page 108]).

3.6 Status LEDs

There are 3 LEDs **1** **2** **3** on the front of the terminal box that indicate the status of the device.

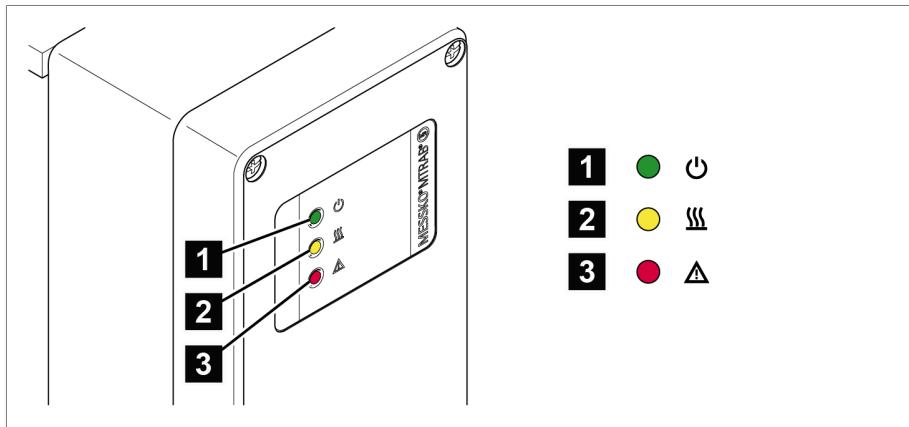


Figure 4: LEDs

-
- | | |
|---|----------------------------------|
| 1 | Operating status – green LED |
| 2 | Regeneration heater – yellow LED |
| 3 | Device error – red LED |
-

An explanation of the various device status messages is given in the chapter Status messages [▶ Section 9.2, Page 87].

3 Product description

3.7 Self-monitoring function

The dehydrating breather has a self-monitoring function. If an error occurs in the device, this is indicated by the different lighting patterns of the LEDs **1** **2** **3** on the front of the terminal box, and also output by the "device error" signaling relay [► Section 3.4, Page 22], position **9**. The following errors are detected:

- Supply voltage failure
- Silica gel heating error
- Sensor unit fault
- Internal error
- Ball valve failure (only with the gamma controller)

Also refer to the chapter "Error messages and troubleshooting" [► Section 9, Page 83].

3.8 Outputs

The dehydrating breather features two analog current outputs and two signaling relays for central data collection and further processing of its status.

Analog outputs (active):

Measurement of the temperature and humidity via "sensors" **5** on the upper air spout **1** (see Function description [► Section 3.3, Page 21])

Analog 1 (left)	Analog 2 (right)
Temperature	Humidity

Regeneration relay output (silica gel heating):

1x changeover contact, regeneration active/inactive

Device error relay output

1x changeover contact, failsafe

3.9 Filter heater (HT version) (optional)

To ensure device functionality in low temperature environments, the stainless-steel filter is heated in the HT version. Use of the HT version is intended for applications in cold regions (ambient temperature is continuously below 0 °C for more than 20 days).

3.10 Test button

The test button can be used to force a device test to be performed (Test button [► Section 10.3, Page 94]).

3.11 Safety markings and nameplate

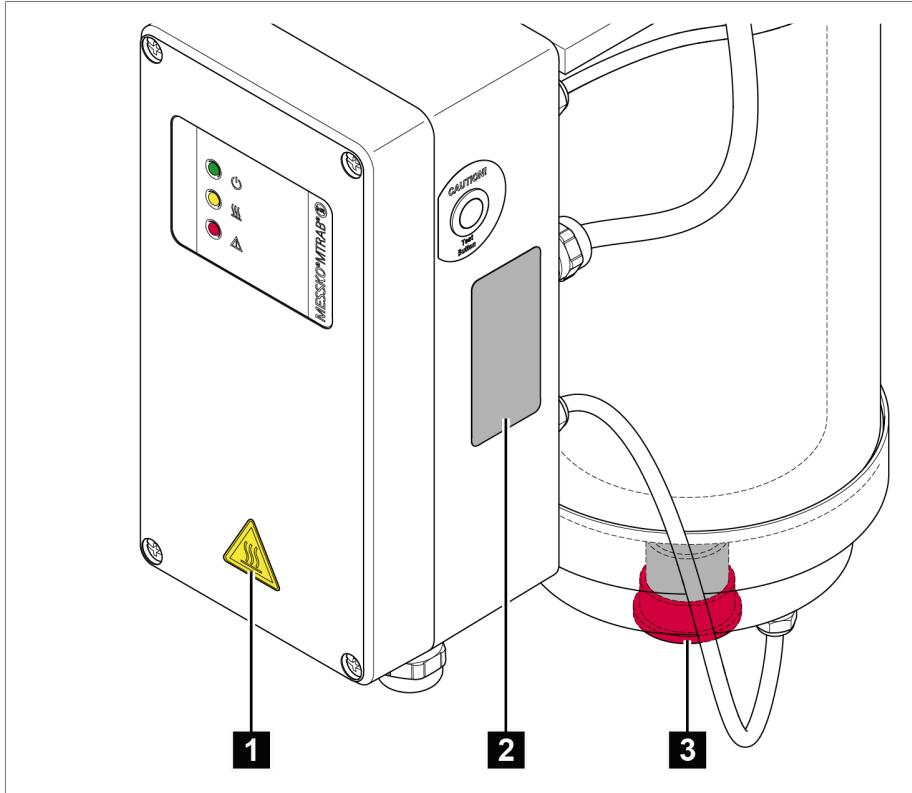


Figure 5: Safety markings

3 Product description

1



Risk of burns! See the chapter Operation [► Section 8, Page 79]

2



Warning symbol on the nameplate:

Danger! Observe notices in the operating instructions regarding supply voltage; see nameplate in the chapter Commissioning [► Section 7, Page 76]

3



Sticker on the dust protection tube:

Remove protective cap! See the section Removing the red protective cap [► Section 5.5, Page 49]

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.

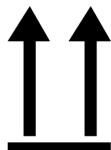
Inlays inside the box or crate stabilize the goods, preventing impermissible changes of position and protecting them from vibration.

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. In order to prevent possible damage, avoid dropping, tipping, knocking over and colliding with the product.

Should the packaging tip over or fall, damage is to be expected regardless of the weight.

4 Packaging, transport and storage

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 kind.

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

Visible damage

If externally visible transport damage is detected upon receipt of the shipment, proceed as follows:

- Immediately record the transport damage found in the shipping documents and have this countersigned by the deliverer.
- In the event of severe damage, total loss or high damage costs, immediately notify the sales department at Messko 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 on-site immediately with the transport company 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 (rain, snow, condensation) infiltrating the packaging.
- Make sure you also check the sealed packaging.

Hidden damage

In the event of damage that is not detected until unpacking after receipt of the shipment (hidden damage), proceed as follows:

- Make the party potentially 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 be successful only if relevant provisions are expressly included in the insurance terms and conditions.

4 Packaging, transport and storage

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.

4.6 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.

4.7 Unpacking

In order to remove the DB100 / DB200 dehydrating breather from the packaging, proceed as follows:

1. Remove the DB100 / DB200 from the packaging as shown in the image.

4 Packaging, transport and storage

2. Place on an open flat surface so that the glass cylinder of the desiccant container is exposed.

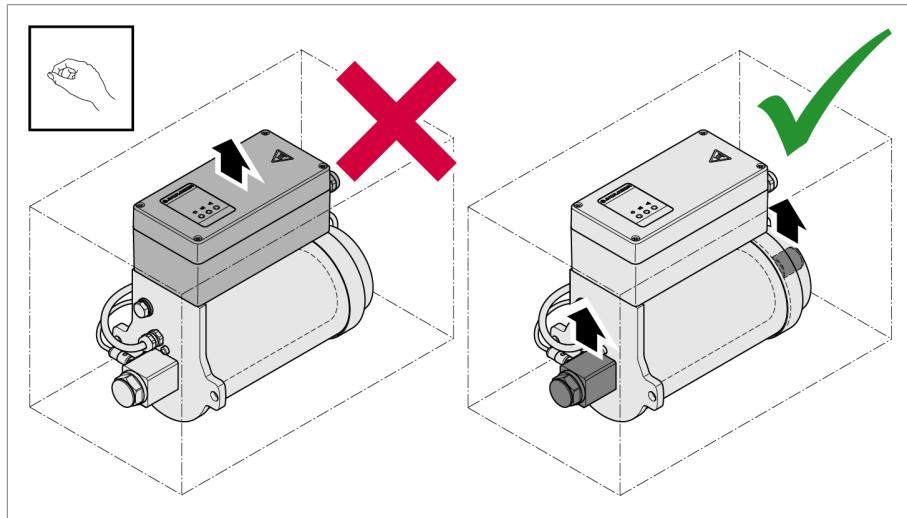


Figure 6: DB100 / DB200 removal

⚠ CAUTION



Risk of injury!

Improper removal of the device from the shipping container can lead to injuries.

- ▶ Use lifting equipment or work as a pair to remove the DB200D / DB200G dehydrating breather from the transport container.
- ▶ Use lifting gear with sufficient carrying capacity.

4 Packaging, transport and storage

To remove the DB200D / DB200G dehydrating breather from the packaging, proceed as follows:

1. Grasp the connection pipe and both air exhausts on the DB200D / DB200G as shown in the image.

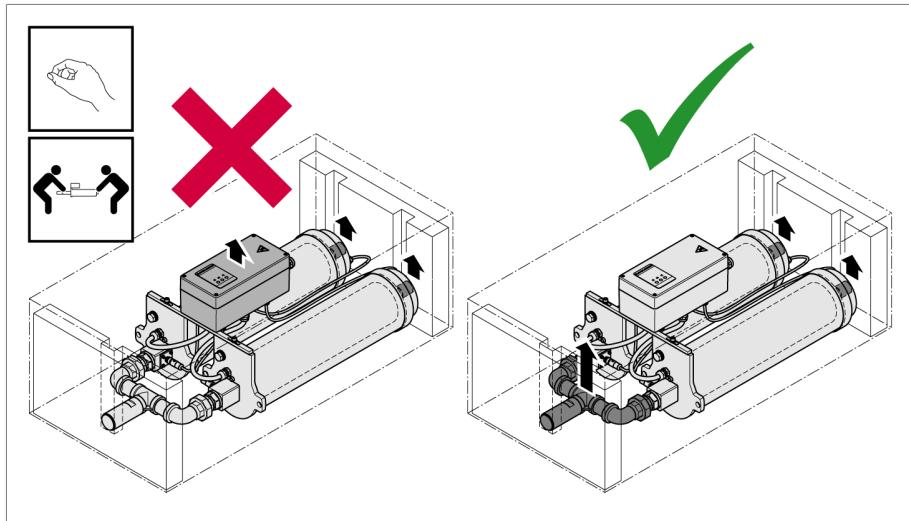


Figure 7: DB200D / DB200G removal

2. Work in pairs to remove the DB200D / DB200G from the shipping container.
3. Place the dehydrating breather on a flat surface. Ensure that the glass cylinder of the desiccant container is exposed.

NOTICE

Damage to the dehydrating breather

The device can become damaged or fall if it is set down vertically on the air exhaust.

- Do not support or set the device down on the air exhaust.
- Always set the device down horizontally.
- Hold the DB100/DB200 firmly and secure it against turning.

4 Packaging, transport and storage

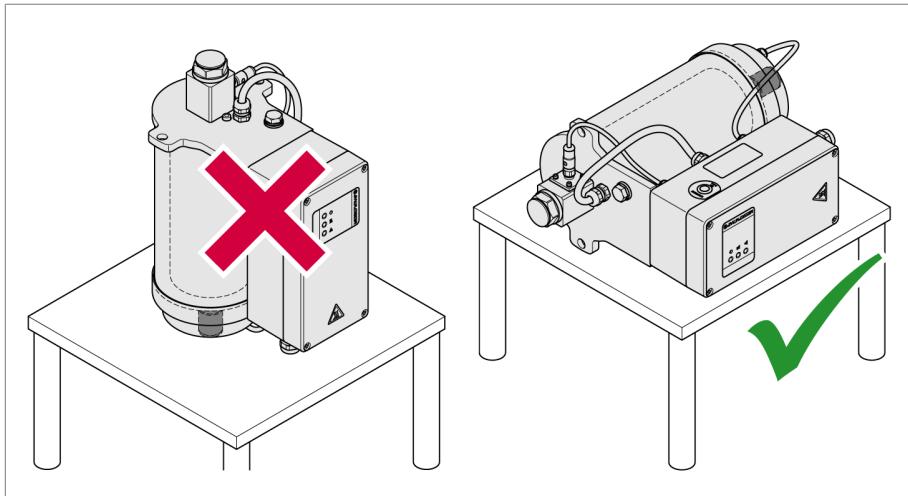


Figure 8: Setting down the DB100 / DB200

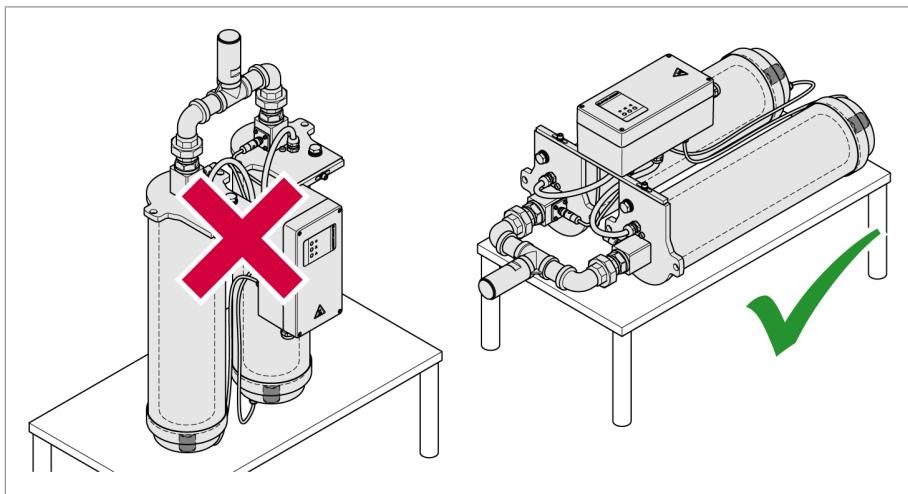


Figure 9: Setting down the DB200D / DB200G

This chapter describes how to correctly mount the device.

⚠ CAUTION



Risk of injury!

Risk of injury due to shattered glass cylinder of the desiccant container as the result of mechanical tension or jolts!

- Wear safety gloves during assembly in addition to the protective equipment that must always be worn.

The DIN flange, 4-hole circular flange and 2-hole RM flange connection versions as well as the dimensions of the different MTRAB versions are listed in the chapter "Dimensional drawings [► Section 13, Page 110]."

5.1 Installation recommendations

- Install the MTRAB dehydrating breather as close to the transformer as possible.
- Provide a pipe at least 1 m in length above the MTRAB.
- The total length of the pipe from the MTRAB to the expansion tank should not be more than 20 m.
- Ensure that the pipes have an incline of at least 2°.

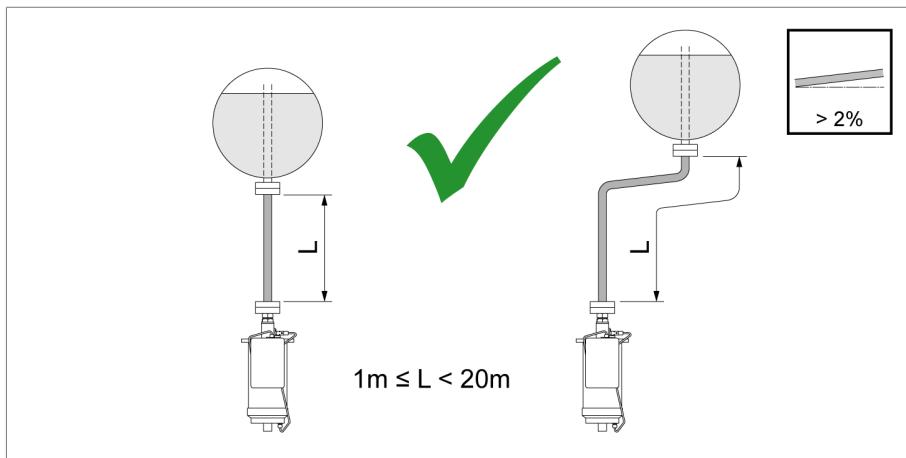


Figure 10: MTRAB pipe length

- Ensure that the pipes are not horizontal.
- Prevent the pipe from dipping between the MTRAB and the expansion tank.

5 Mounting

- Prevent any sources of interference in the pipe between the MTRAB and the expansion tank (conventional dehydrating breather, non-return valves, etc.).

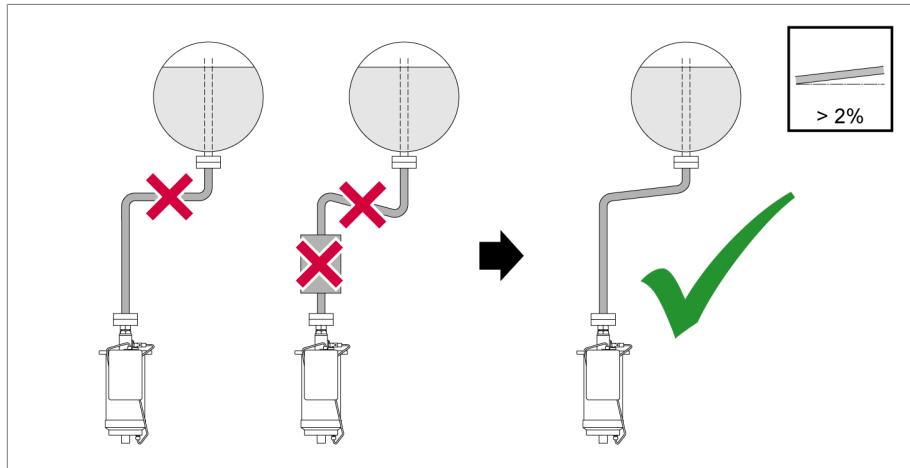


Figure 11: MTRAB pipe dips and interference sources

- Do not install MTRAB dehydrating breathers in parallel.

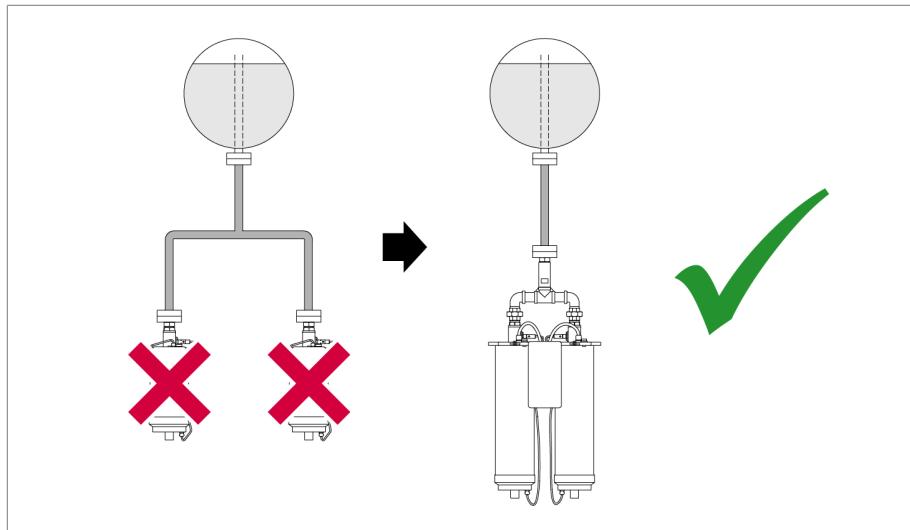


Figure 12: MTRAB parallel installation

- Do not install the MTRAB dehydrating breather close to a sprinkler system that sprays upwards from below.
- Do not clean the MTRAB dehydrating breather with spray water from below.

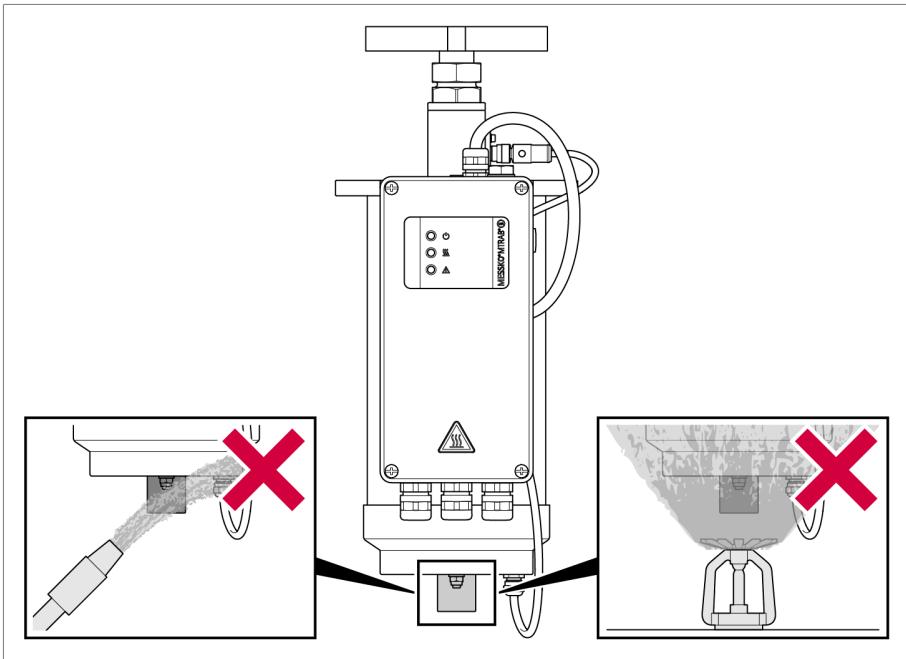


Figure 13: Sprinkler system and spray water

5.2 Checking the connecting flange on the transformer

1. Check counterflange. It must be flush and even. Permitted evenness deviation $\leq 0.2 \text{ mm}$.

5 Mounting

- Check the sealing surface of the counterflange. It must be clean and undamaged, without any surface damage radiating out from the center. The surface quality of the sealing surface must be suitable for use of the gas ket.

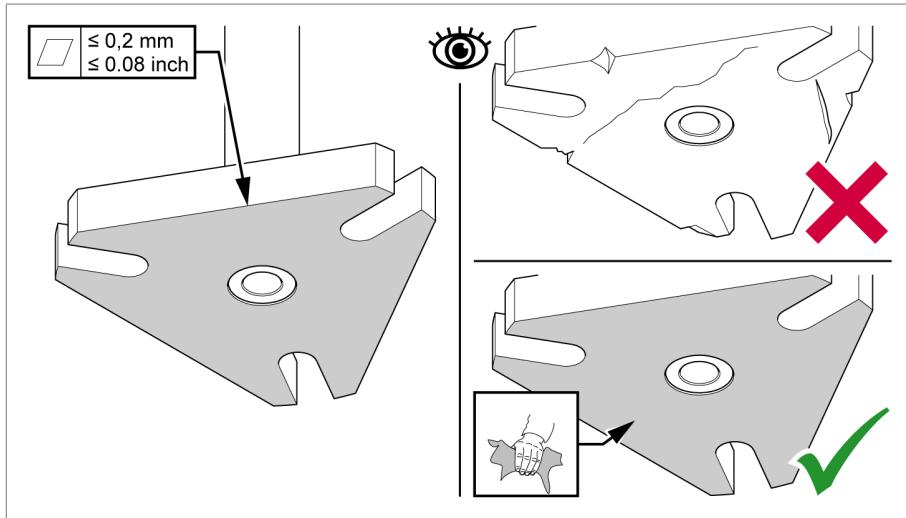


Figure 14: Counterflange

5.3 Preparing the device

NOTICE

Damage to the dehydrating breather!

Impairment of seal-tightness on the dehydrating breather due to loosening of the nut on the upper air intake spout!

- Ensure that the upper screw connection is not loosened from the dehydrating breather.

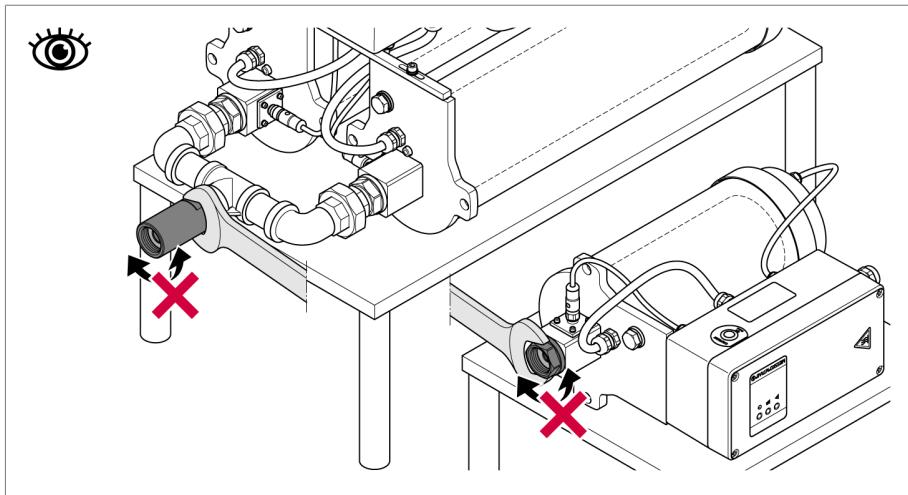


Figure 15: Nut on the upper air spout

To prepare the dehydrating breather for mounting, proceed as follows:

1. Remove the red protective cap from the upper air intake spout.
2. Check that there is a gasket in the air intake spout.

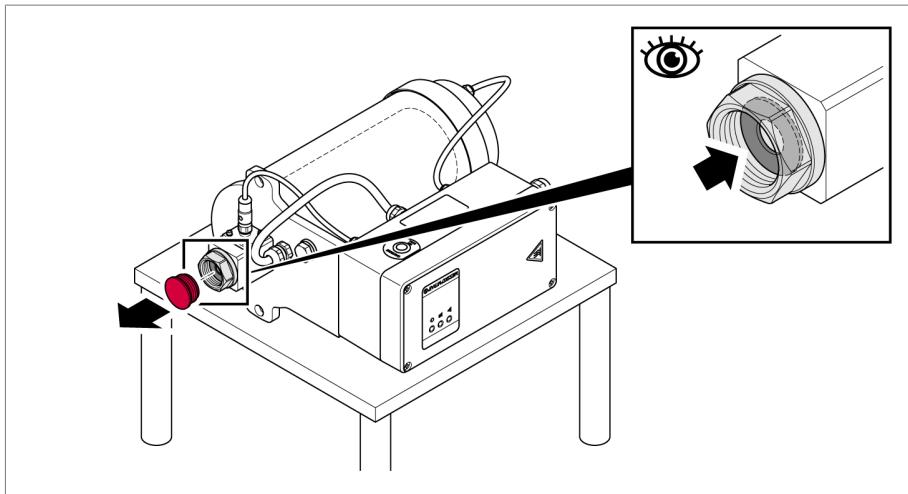


Figure 16: Protective cap and gasket

3. Insert the flange included with delivery into the upper air intake spout.

5 Mounting

NOTICE

Danger of damage to property

If a flange is used that is unsuitable for the weight of the device, the flange may fail.

- Only use the 2-hole RM flange for the DB100.

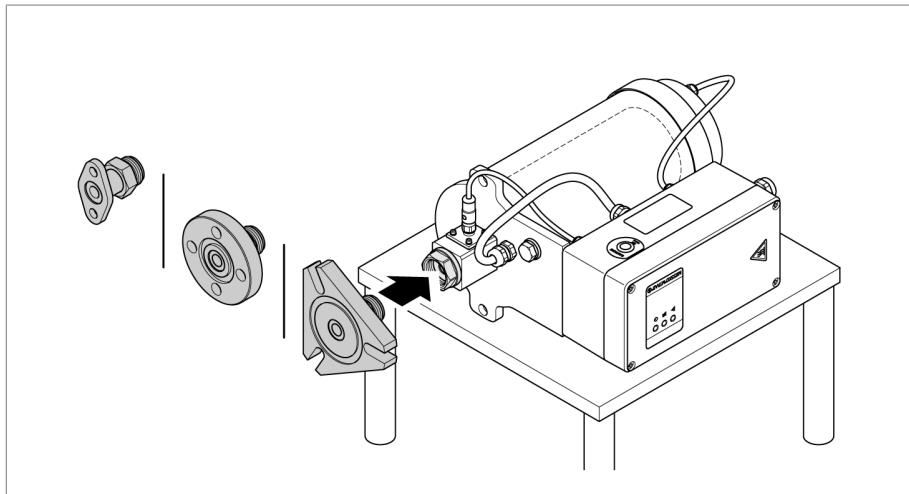


Figure 17: Insertion of MTRAB flange

4. Screw the flange onto the MTRAB by hand (approx. 1 Nm).

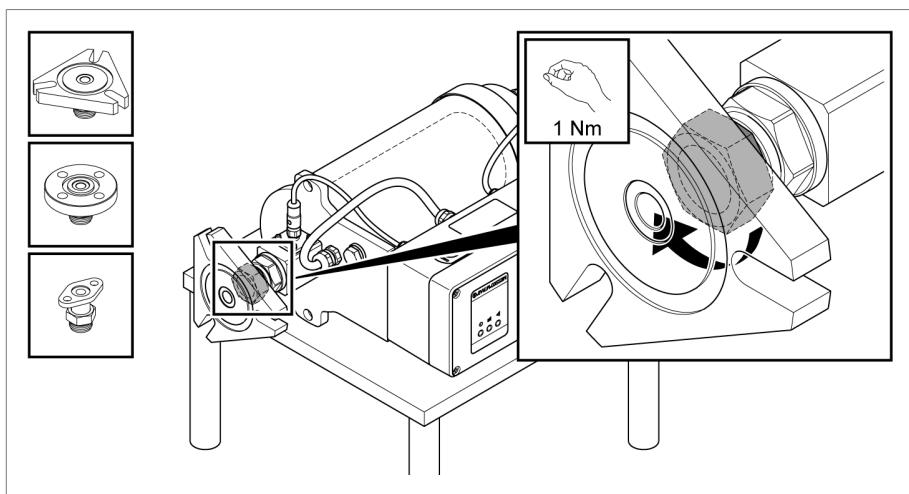


Figure 18: Screwing on the flange

- For lifting the DB100 / DB200, replace the grounding screw with a lifting eye bolt.

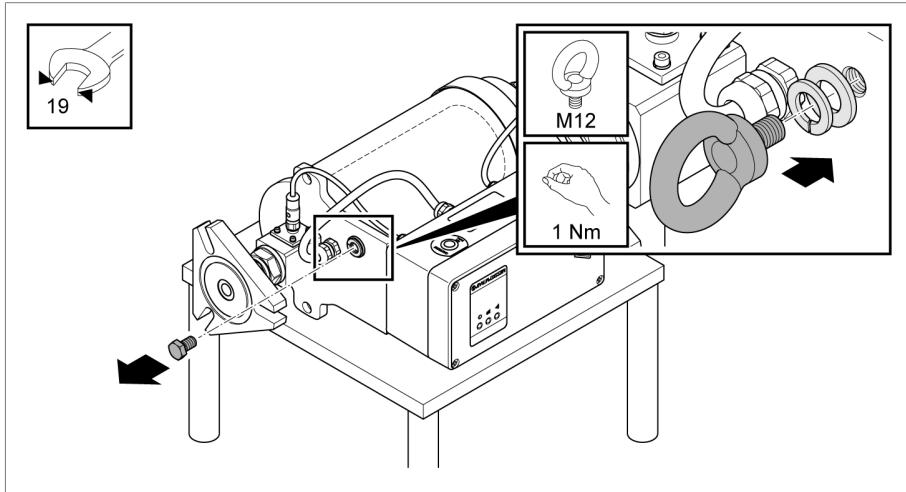


Figure 19: Lifting eye bolt

5.4 Mounting the device on the counterflange

⚠ WARNING



Danger of death and damage to property!

Danger of death and damage to property due to falling load!

- Do not walk under the suspended load.
- Use a means of transport and lifting gear with sufficient carrying capacity.

NOTICE

Malfunction!

The connection may not be correctly sealed if there is grease on the flange contact surfaces.

- Ensure that the flange contact surfaces are clean and free of grease when mounting.

5 Mounting

5.4.1 Attaching the lifting gear

NOTICE

Damage to the dehydrating breather

The device can become damaged or fall if it is set down vertically on the air exhaust.

- Do not support or set the device down on the air exhaust.

To mount the dehydrating breather on the counter-flange, proceed as follows:

1. Lift and upright the DB200D / DB200G with the help of a second person. Each person should have one hand on the air exhaust and one hand on the connection pipe.

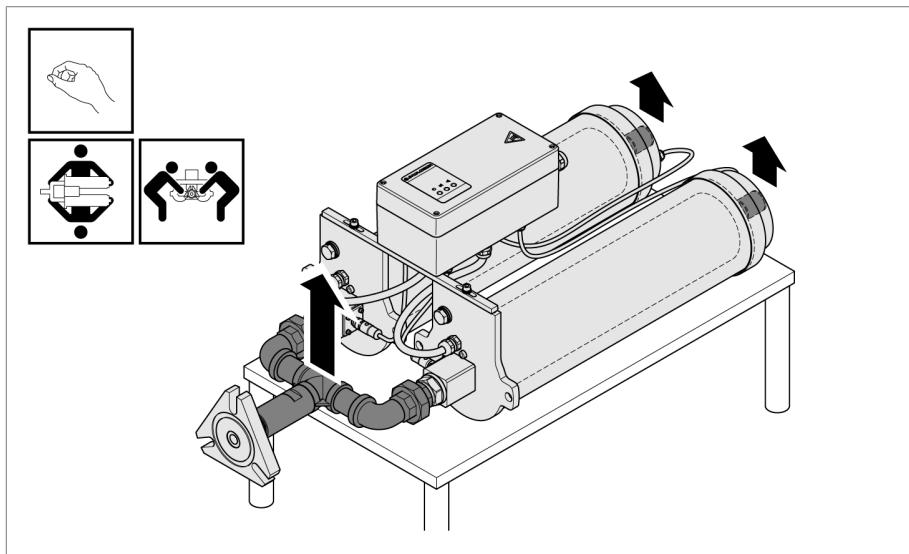


Figure 20: Lifting and up-righting the DB200D / DB200G

2. Lift and upright the DB100 / DB200 as shown in the image.

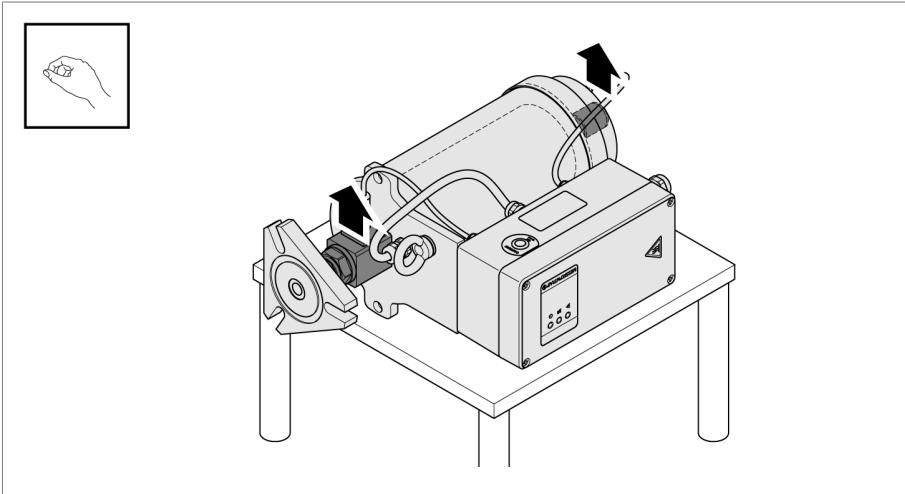


Figure 21: Lifting and up-righting the DB100 / DB200

3. Attach the lifting gear to the lifting eye bolt or pipe connection.

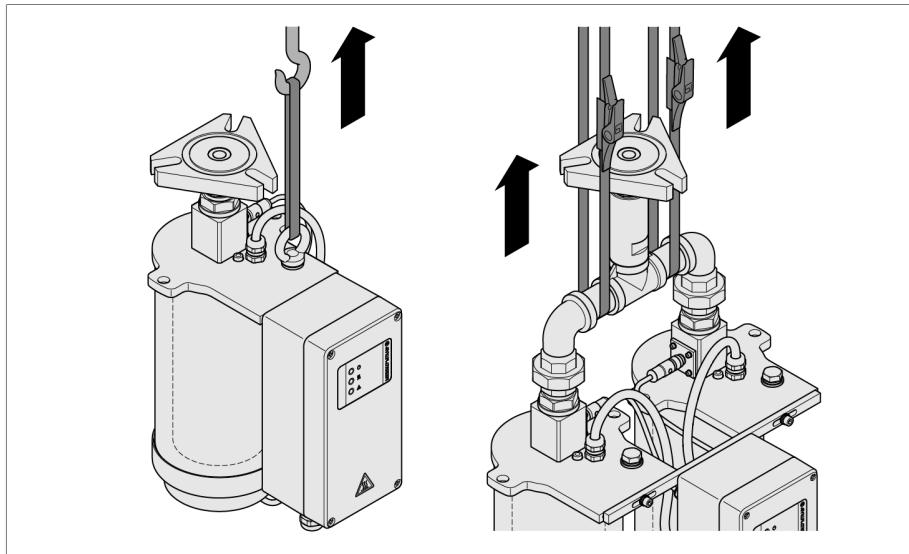


Figure 22: Lifting gear

5 Mounting

5.4.2 Inserting the flange gasket

- ▶ Insert the flange gasket.

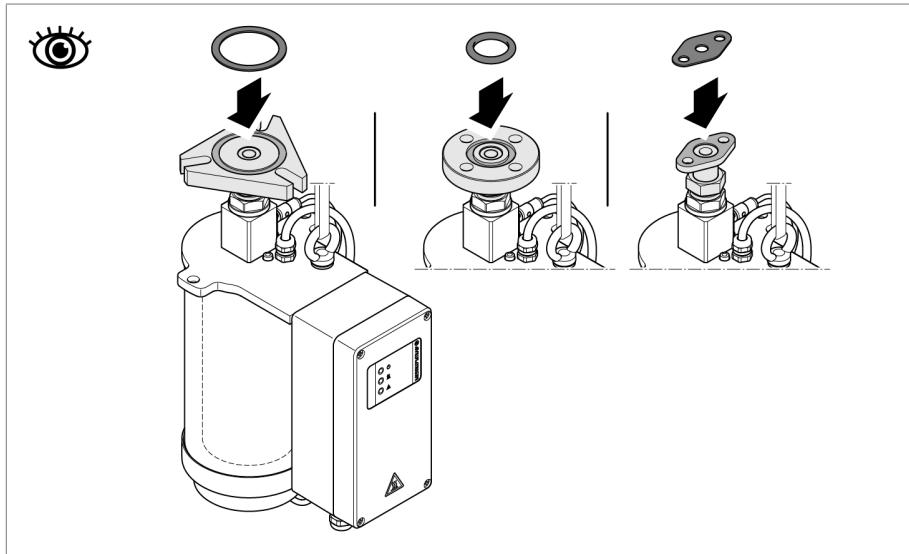


Figure 23: Flange gasket

5.4.3 Screwing on the flanges

DIN flange (optional)

1. Screw the MTRAB to the transformer counter-flange using the flange (mounting materials contained in the scope of delivery).

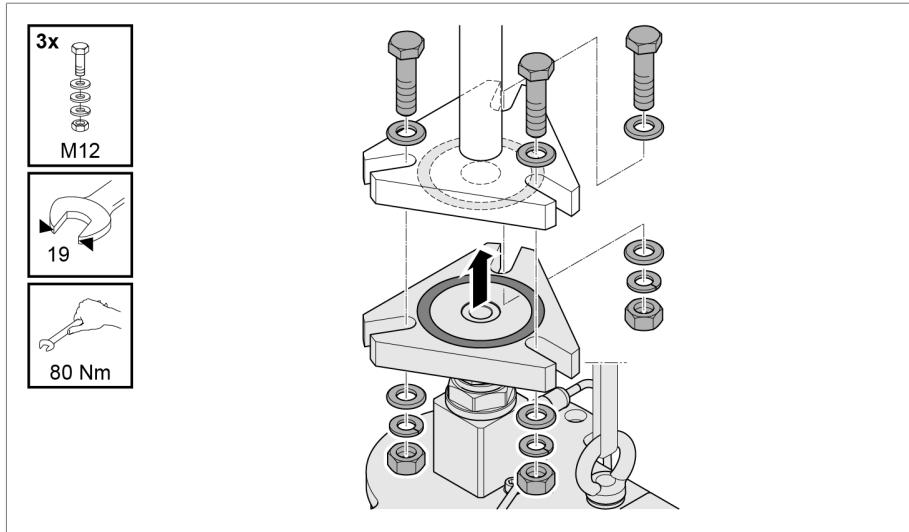


Figure 24: Screw connection

2. Tighten each screw in turn with approximately 24 Nm.
3. Tighten each screw in turn with approximately 48 Nm.
4. Tighten each screw in turn with approximately 80 Nm.
5. Wait 5 minutes.

5 Mounting

6. Tighten each screw again with approximately 80 Nm.

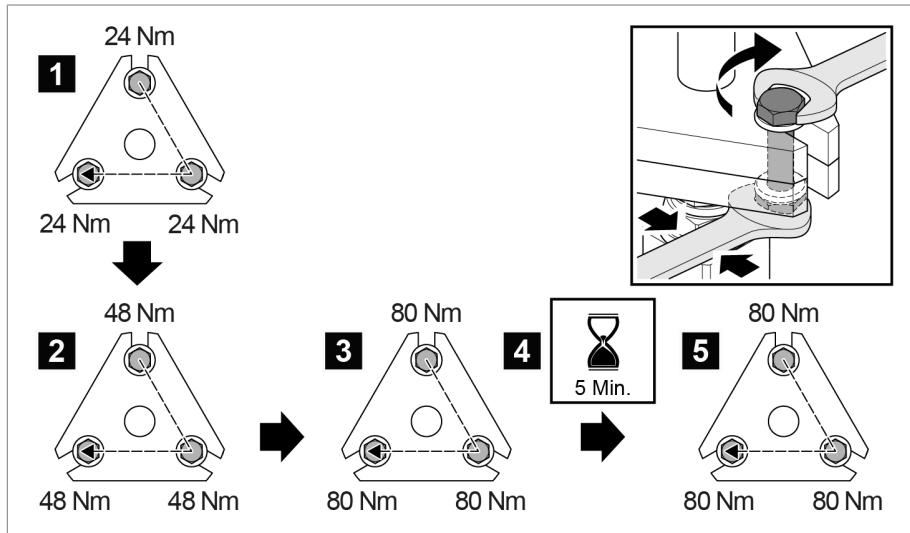


Figure 25: Screws of DIN flange

or

4-hole circular flange (optional)

1. Screw the MTRAB to the transformer counter-flange using the flange (mounting materials not included in the scope of delivery).

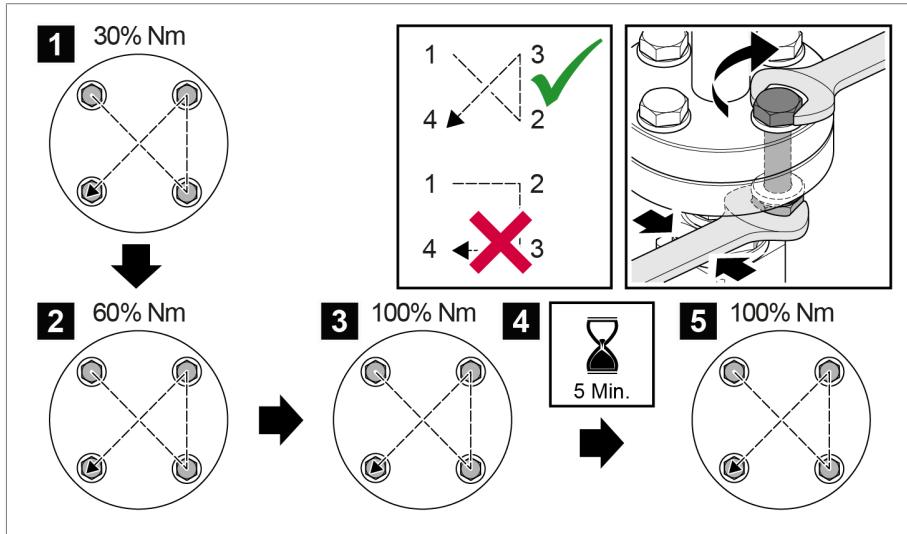


Figure 26: Screws of 4-hole round flange

2. Tighten the screws crosswise with approx. 30% of the torque.
 3. Tighten the screws crosswise with approx. 60% of the torque.
 4. Tighten the screws crosswise with approx. 100% of the torque.
 5. Wait 5 minutes.
 6. Tighten the screws crosswise again with approx. 100% of the torque.
- or

5 Mounting

2-hole RM flange (optional)

1. Screw the MTRAB to the transformer counter-flange using the flange (mounting materials not included in the scope of delivery).

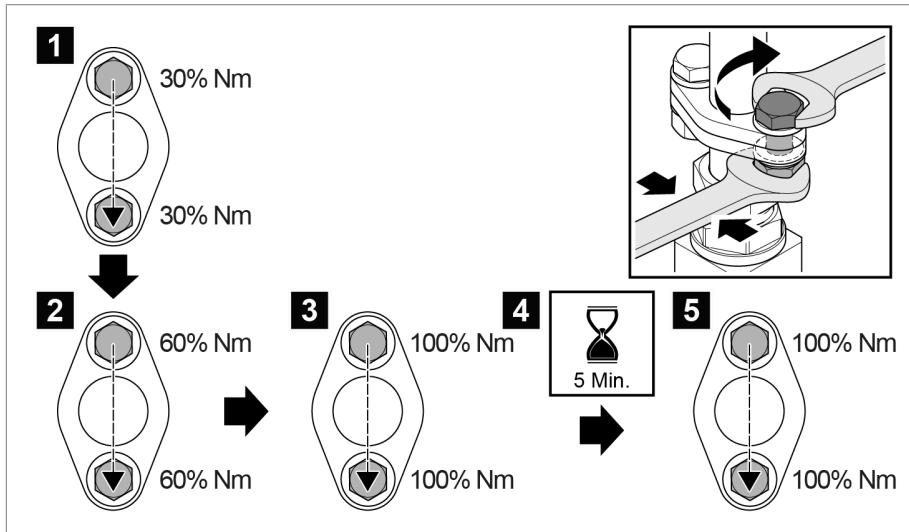


Figure 27: Screws of 2-hole RM flange

2. Tighten each screw in turn with approx. 30% of the torque.
3. Tighten each screw in turn with approx. 60% of the torque.
4. Tighten each screw in turn with approx. 100% of the torque.
5. Wait 5 minutes.
6. Tighten each screw again with approx. 100% of the torque.

5.4.4 Aligning the device

Aligning the device:

- Align the device as desired using the double screw connection after mounting.

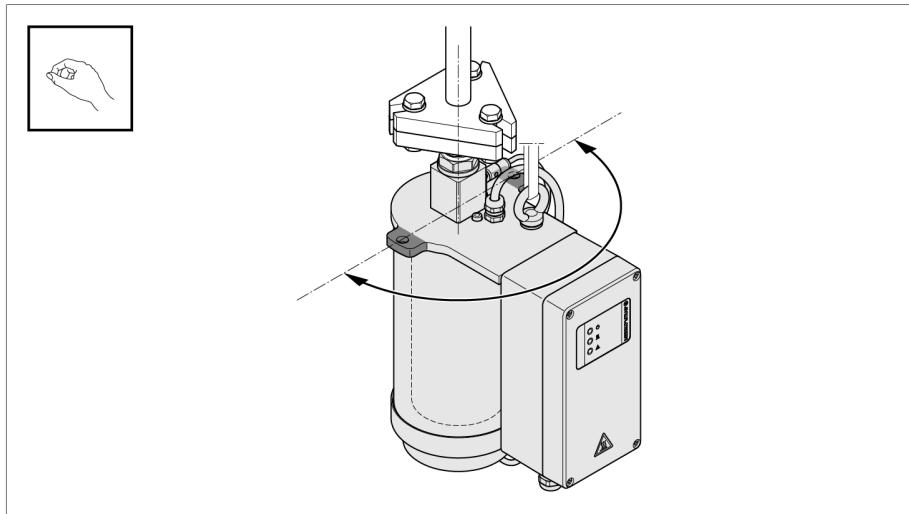


Figure 28: Alignment of dehydrating breather

5.4.5 Tightening the double screw connection

Tightening the double screw connection on the DB100 / DB200:

1. Hold the nut on the upper air spout and tighten the locknut on the flange with 250 Nm.
2. Make sure that the lower nut is not loosened from the device during assembly.
3. Wait 5 minutes.
4. Tighten the upper nut again with 250 Nm.

or

Tightening the double screw connection on the DB200D / DB200G:

1. Hold the screw connection on the upper air spout and tighten the locknut on the flange with 250 Nm.
2. Make sure that the lower screw connection is not loosened from the device during assembly.
3. Wait 5 minutes.

5 Mounting

4. Tighten the locknut again with 250 Nm.

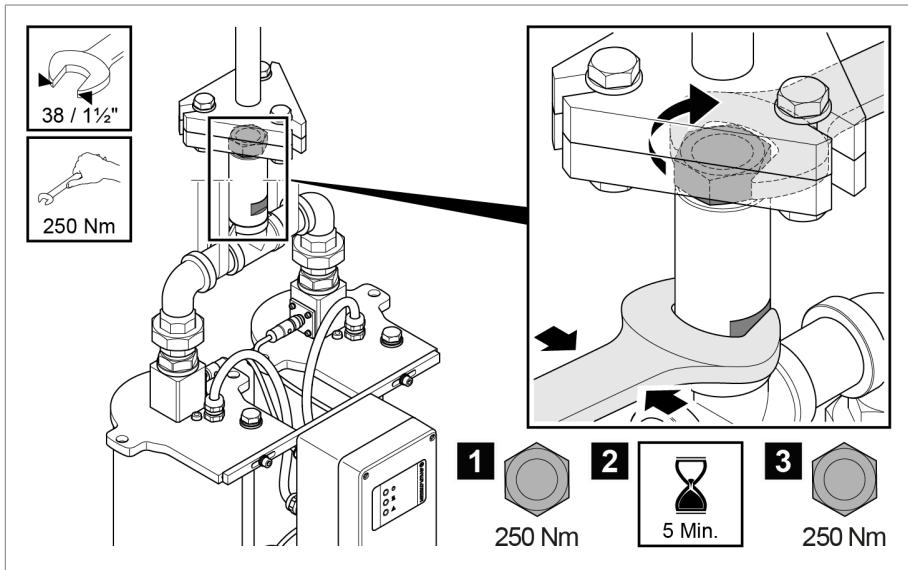


Figure 29: Double screw connection on the DB200D / DB200G

5.4.6 Removing the lifting gear again

- Remove the lifting gear again carefully. For DB100 / DB200, replace the lifting eye bolt with the grounding screw including washer.

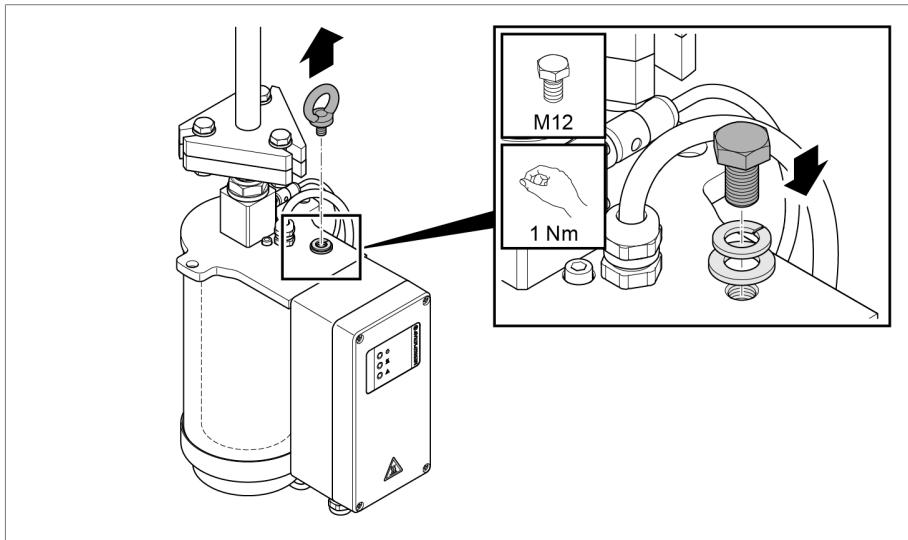


Figure 30: Grounding screw

5.5 Removing the red protective cap

NOTICE

Dehydrating breather malfunction!

The red protective cap blocks air exchange during operation of the dehydrating breather!

- Make sure that the red protective cap is removed from the dust protection tube before commissioning.



Figure 31: Warning sticker on the dust protection tube

5 Mounting

- Remove the red protective cap from the dust protection tube on the bottom of the device.

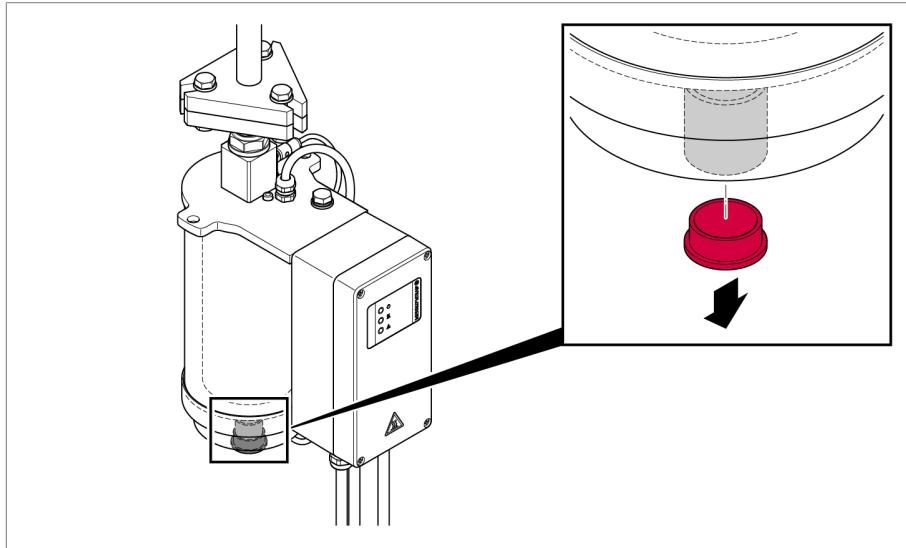


Figure 32: Red protective cap

6 Electrical connection

This chapter describes the correct electrical connection of the device. Observe the following hazard notices prior to opening the device:

DANGER



Electric shock!

Risk of fatal injury due to electrical voltage. Always observe the following safety regulations when working in or on electrical equipment.

- ▶ Disconnect the system.
- ▶ Lock the system to prevent an unintentional restart.
- ▶ Ensure all poles are de-energized.
- ▶ Ground and short-circuit.
- ▶ Cover or cordon off adjacent energized parts.

NOTICE

Damage to the device!

Electrostatic discharge can lead to damage to the device.

- ▶ Take precautionary measures to prevent the build-up of electrostatic charges on work surfaces and personnel.

6.1 Electromagnetic compatibility

The device has been developed in accordance with the applicable EMC standards. The following points must be noted in order to maintain the EMC standards.

6.1.1 Wiring requirement of installation site

Note the following when selecting the installation site:

- The system's overvoltage protection must be effective.
- The system's ground connection must comply with all technical regulations.
- Separate system parts must be joined by a potential equalization.

6 Electrical connection

6.1.2 Wiring requirement of operating site

Note the following when wiring the operating site:

- Do not route lines which cause interference (e.g. supply lines) and lines susceptible to interference (e.g. signal lines) in the same cable duct.
- Maintain a distance of more than 100 mm (3.94") between lines which cause interference and those which are susceptible to interference.

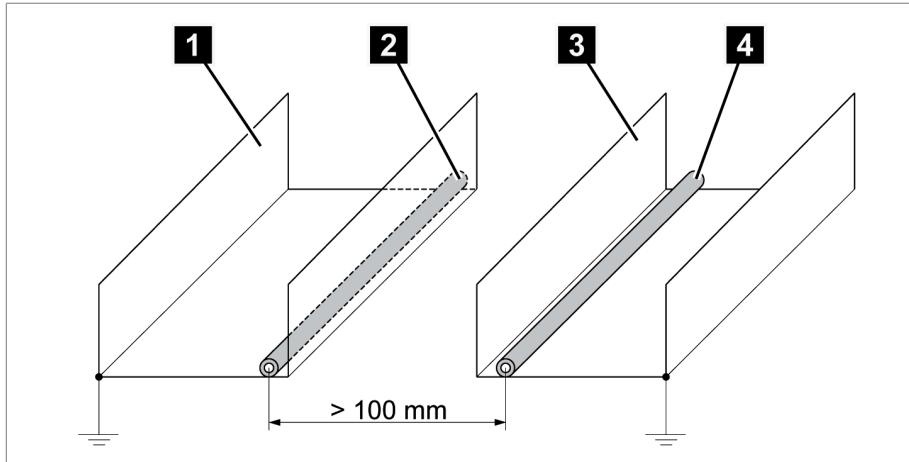


Figure 33: Recommended wiring

1 Cable duct for lines causing interference	3 Cable duct for lines susceptible to interference
2 Line causing interference (e.g. power line)	4 Line susceptible to interference (e.g. signal line)

- Never connect the device with a multi-wire collective pipe.
- Use a shielded cable for transmitting the output signal.

6.2 Supply voltage

You may only connect the device to circuits with an external overcurrent protection device and an all-pole isolating device so that the equipment can be fully de-energized if required.

6 Electrical connection

Suitable equipment includes isolating devices in accordance with IEC 60947-1 and IEC 60947-3 (e.g. circuit breakers). Note the properties of the relevant circuits (voltage, maximum currents) when selecting the circuit breaker type. In addition, observe the following:

- It must be easy for the operator to access the isolating device.
- The isolating device must be labeled for the device and circuits to be isolated.
- The isolating device may not be a part of the power line.
- The isolating device may not interrupt the main protective conductor.

Miniature circuit breaker

You must fuse the power supply circuit with a miniature circuit breaker. The miniature circuit breaker must have the following properties:

- Rated current: 16 A or 20 A
- Triggering characteristic: C, K, Z

Conductor cross-section

For the power supply circuit, use a conductor cross-section suitable for the miniature circuit breaker that you have selected, but at least 1.5 mm² (AWG 15).

6.3 Cable recommendation

Please note the following Messko GmbH recommendation when wiring the device:

- Excessive line capacitance can prevent the relay contacts from interrupting the contact current. In control circuits operated with alternating current, take into account the effect of the line capacitance of long control cables on the function of the relay contacts.
- The connection cables used must have a temperature resistance of at least +90 °C (ambient temperature max. +70 °C plus intrinsic device heating of 20 K).

6 Electrical connection

- The cables used must be flame-resistant in accordance with IEC 60332-1-2 or UL 2556 VW-1.
- If both low voltage and extra-low voltage are connected in the device, it must be ensured that the circuits for extra-low voltage and for low voltage in the connection area and in the cable are separated from each other with double insulation.

Cable ^{*)}	Terminal	Cable type	Cross-section
Protective conductor connection	1  (PE)	Unshielded	>= cross-section of the voltage supply terminal 2 (L+) and terminal 3 (N-)
Voltage supply	2 (L+), 3 (N-)	Unshielded	1.5 ... 4 mm ² / AWG 11 ... 15
Regeneration signaling relay, device error signaling relay	4, 5, 6, 7, 8, 9	Unshielded	1.5 ... 4 mm ² / AWG 11 ... 15
Analog outputs: Analog output 1, Analog output 2	Terminals 10 to 15	Shielded	1.5 ... 4 mm ² / AWG 11 ... 15
RS485		Shielded	0.14 ... 1.5 mm ² / AWG 15 ... 26

Table 5: Recommendation for connection cable (standard connections)

^{*)} It must be possible to load all connection cables with a nominal voltage of 300 V;
Cable type solid or flexible

6.4 Routing and preparing the cable



The glass cylinder of the Messko® MTRAB® can reach temperatures of >90°C during regeneration. When laying the cables, ensure that they do not touch the glass cylinder.

Consider the position of the connections when preparing the cable.



Ensure that the length of the protective conductor  (terminal 1) is at least 50 mm longer than the supply voltage conductors (terminals 2 and 3).

6 Electrical connection

To prepare the cable correctly, proceed as follows:

1. Open the terminal box of the dehydrating breather. To do so, unscrew the 4 captive screws on the housing cover. The cover is held on the left-hand side via spring hinges and can be swung open to the left. The cover of the terminal box is grounded with a grounding cable

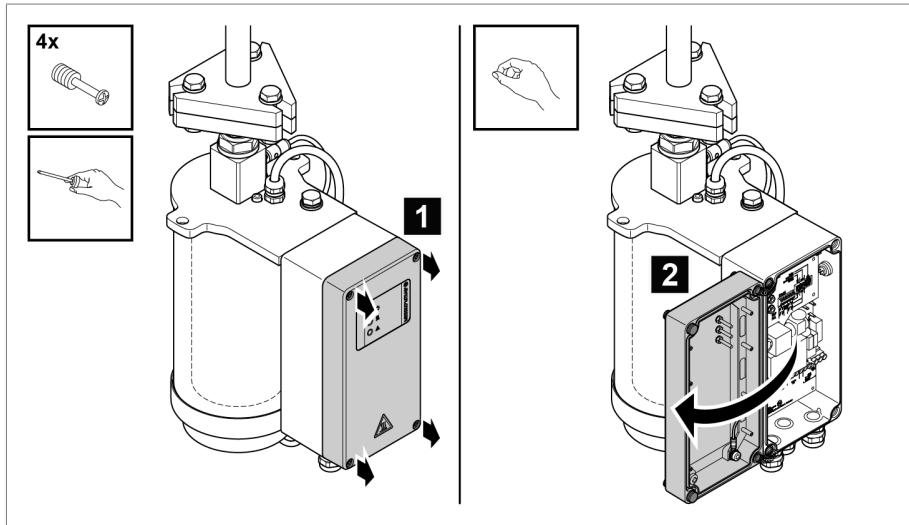


Figure 34: Uninstalling the cover of the terminal box

2. Remove the supply voltage cable jacket and cut the cable such that the length of the PE wire is 50 mm longer than the wires for L and N. Strip 7 mm (1/4") of the insulation from the wires.

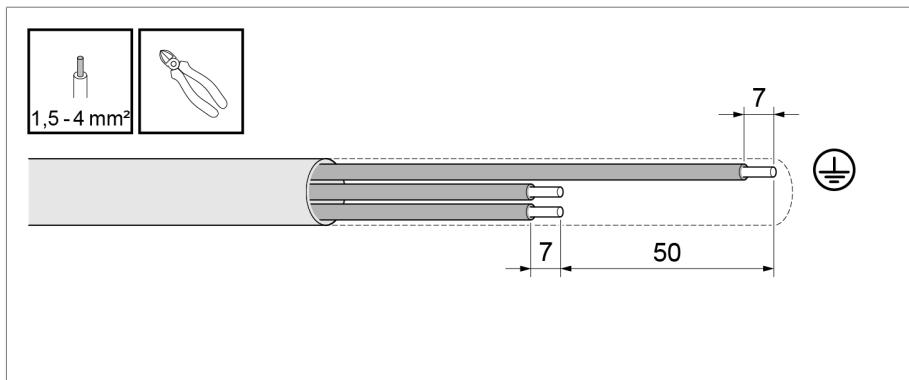


Figure 35: Preparing the cable

6 Electrical connection

3. Remove the cable jacket from the relay and analog output cables and strip 7 mm (1/4") of insulation from the wires
4. Unscrew the leftmost of the three cable glands.

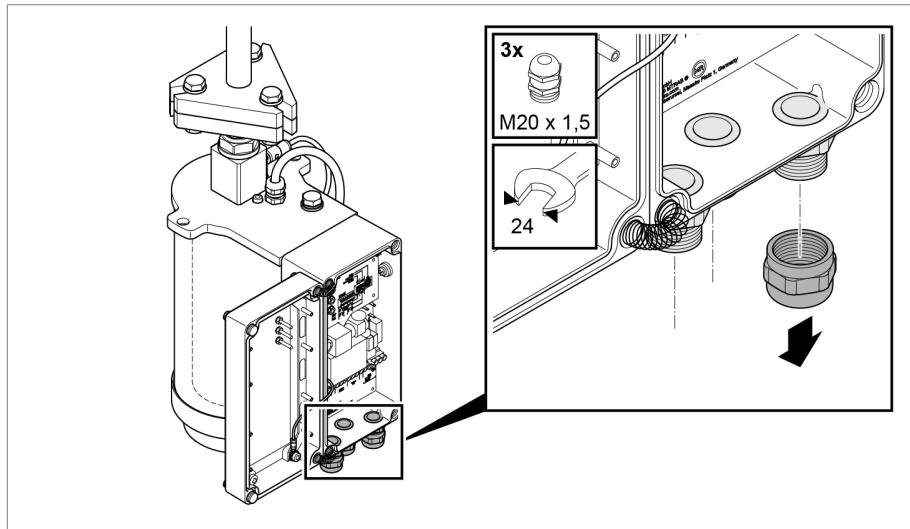


Figure 36: Unscrewing the cable gland

6 Electrical connection

5. Insert a sufficient length of cable through the cable gland and rubber gasket and tighten the cable gland so that moisture from outside cannot penetrate the terminal box.

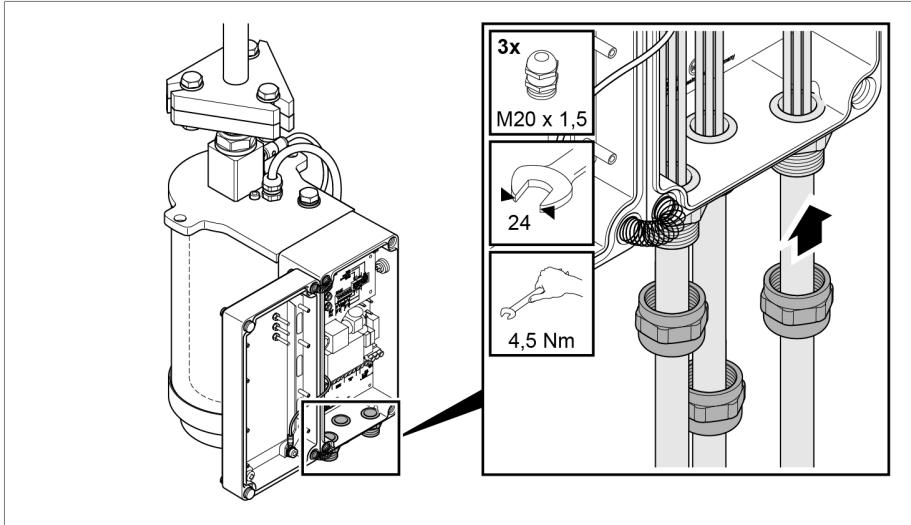


Figure 37: Closing the cable gland

NOTICE

Malfunction

Tightening the cable glands too tightly may result in line breaks and short circuits.

- Tighten the cable gland with a torque of 4.5 Nm.

NOTICE

Malfunction

Unsealed or missing cable glands may result in dirt and moisture penetrating the device. This will lower or invalidate the protection class. Corrosion and malfunctions may occur.

- Remove transport dust-protection rings from unused cable glands and seal the cable glands using a dummy plug.
- Alternatively, replace the entire cable gland with a sealed locking screw.

6 Electrical connection

6.5 Connecting the supply voltage

In order to connect the cable for the supply voltage, proceed as follows:

1. Insert the wire for the protective conductor into terminal 1 (PE) and tighten the screw terminal.
2. Insert the wire for the phase/plus into terminal 2 (L+) and tighten the screw terminal.
3. Insert the wire for the neutral conductor/minus into terminal 3 (N-) and tighten the screw terminal.

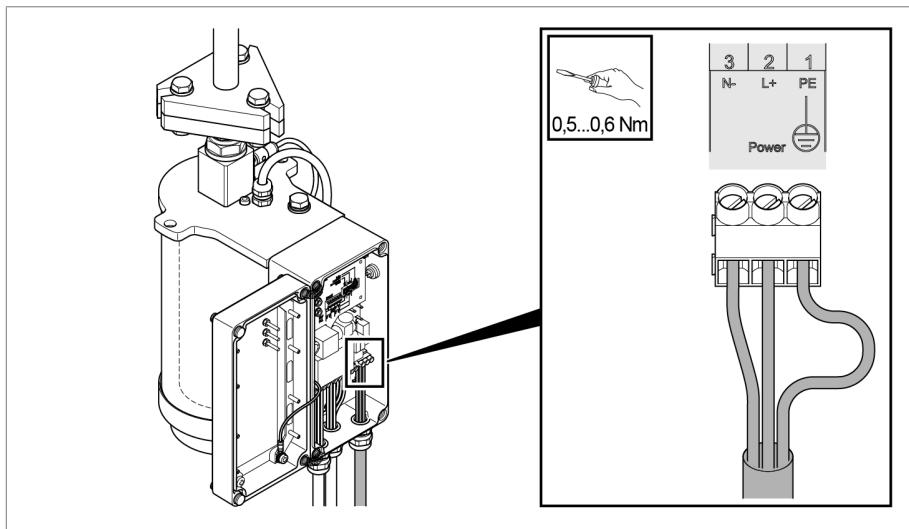


Figure 38: Connecting the supply voltage

6.6 Connecting the regeneration signaling relay

⚠ WARNING

Electric shock!



The regeneration and device error signaling contacts may both be operated either with safety extra-low voltage (SELV) or with low voltage. For electrical safety reasons, mixed operation with both SELV and low voltage is not permitted.

In order to connect the cable for transmitting the regeneration signal (changeover contact), proceed as follows:

1. Insert the wires into terminals 5 and 6 (NC contact) or 4 and 5 (NO contact).
2. Tighten the screw terminals.

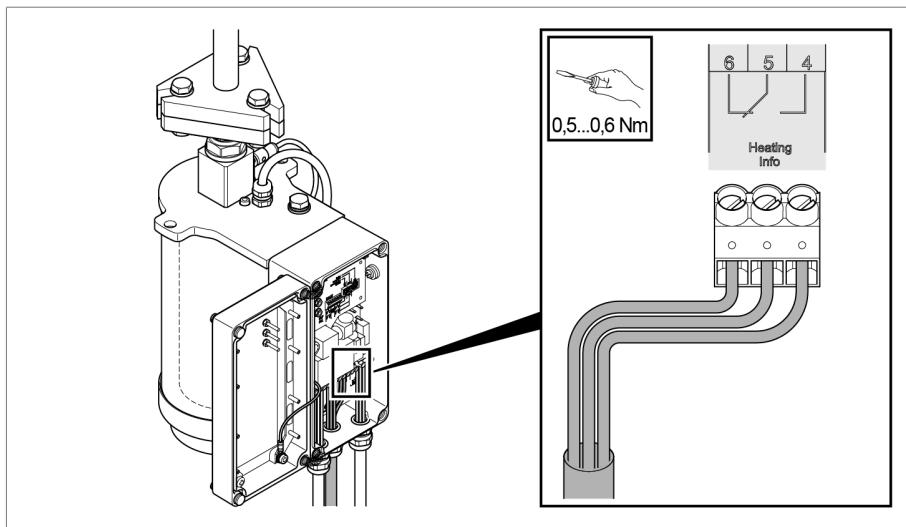


Figure 39: Regeneration signal cable

6 Electrical connection

6.7 Connecting the device error signaling relay

⚠ WARNING

Electric shock!



The regeneration and device error signaling contacts may both be operated either with safety extra-low voltage (SELV) or with low voltage. For electrical safety reasons, mixed operation with both SELV and low voltage is not permitted.

In order to connect the cable for transmitting the device error signal (NC contact, failsafe), proceed as follows:

1. Insert the wires into terminals 7 and 8 (NO contact) or 8 and 9 (NC contact).
2. Tighten the screw terminals.

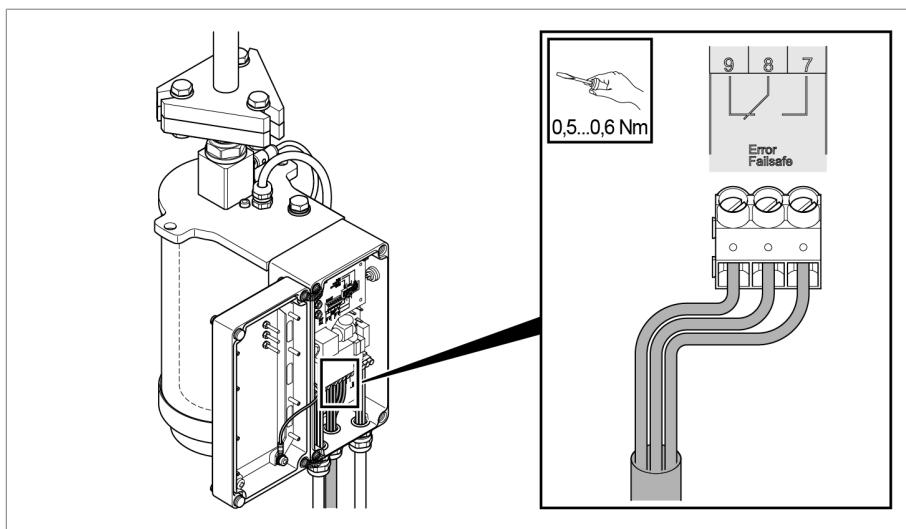


Figure 40: Device error signal cable

6.8 Connecting analog outputs

Analog 1	Analog 2
Temperature	Humidity



The analog outputs are active outputs. Observe the load resistance of 0...600 Ω.

In order to connect the cable for transmitting analog signal 1 for the temperature, proceed as follows:

1. Insert the wires into terminals 10(CL+) and 11(CL-).
2. Twist the shielding (if present) and insert it into terminal 12.
3. Tighten the screw terminals.

In order to connect the cable for transmitting analog signal 2 for the humidity, proceed as follows:

1. Insert the wires into terminals 13(CL+) and 14(CL-).
2. Twist the shielding (if present) and insert it into terminal 15.
3. Tighten the screw terminals.

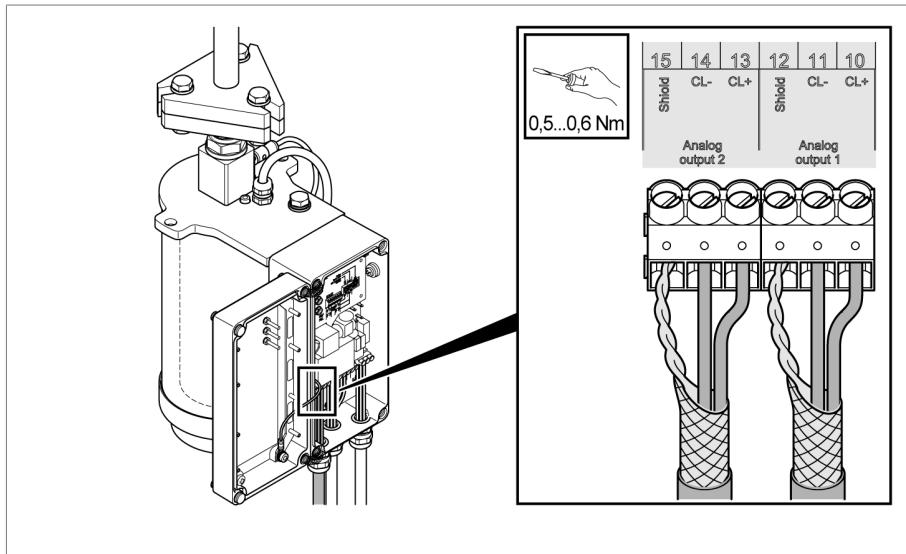


Figure 41: Analog outputs 1 and 2

6 Electrical connection



The analog output signal is a 4...20 mA signal by default (0...20 mA optional).

6.9 Connecting the RS485 interface and configuring Modbus (optional)

The MESSKO® MTRAB® can be connected with a SCADA system via the RS485 interface. This is designed as a 4-conductor system (full duplex), but can also be integrated into a 2-conductor system (half duplex).

RS485 interface assignment for Modbus RTU

PINs	4-conductor system	2-conductor system
1	Rx+	D+
1	Rx-	D-
2	Tx-	
2	Tx+	
	Shield	Shield
	Comm	Comm

6.9.1 4-conductor full duplex

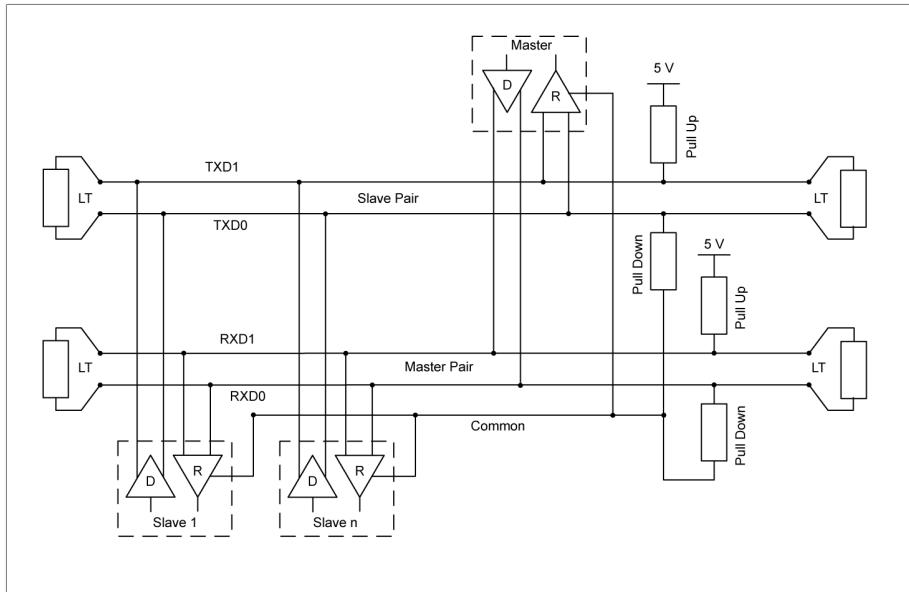


Figure 42: 4-conductor system

6 Electrical connection

To connect the cables for integration into a 4-conductor system, proceed as follows:

1. Insert the wire for Rx+ into screw terminal "1 Rx+" and tighten.
2. Insert the wire for Rx- into screw terminal "1 Rx-" and tighten.
3. Insert the wire for Tx- into screw terminal "2 Tx-" and tighten.
4. Insert the wire for Tx+ into screw terminal "2 Tx+" and tighten.
5. Insert the wire for the ground potential into screw terminal "Comm" and tighten.
6. Twist the shielding, insert it into the "Shield" terminal and tighten.

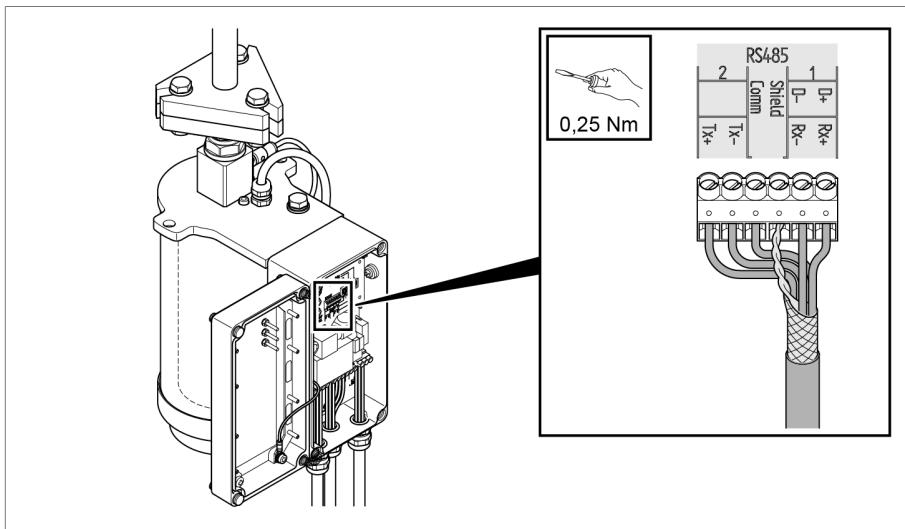


Figure 43: Connecting the full-duplex cable

6.9.2 2-conductor half duplex

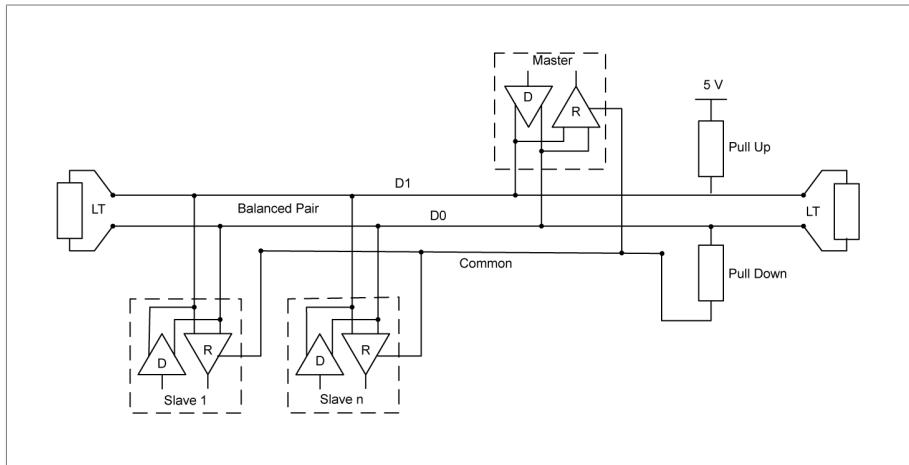


Figure 44: 2-conductor system

To connect the cables for integration into a 2-conductor system, proceed as follows:

1. Insert the wire for D+ into screw terminal "1 D+" and tighten.
2. Insert the wire for D- into screw terminal "1 D-" and tighten.
3. Insert the wire for the ground potential into screw terminal "Comm" and tighten.

6 Electrical connection

4. Twist the shielding, insert it into the "Shield" terminal and tighten.

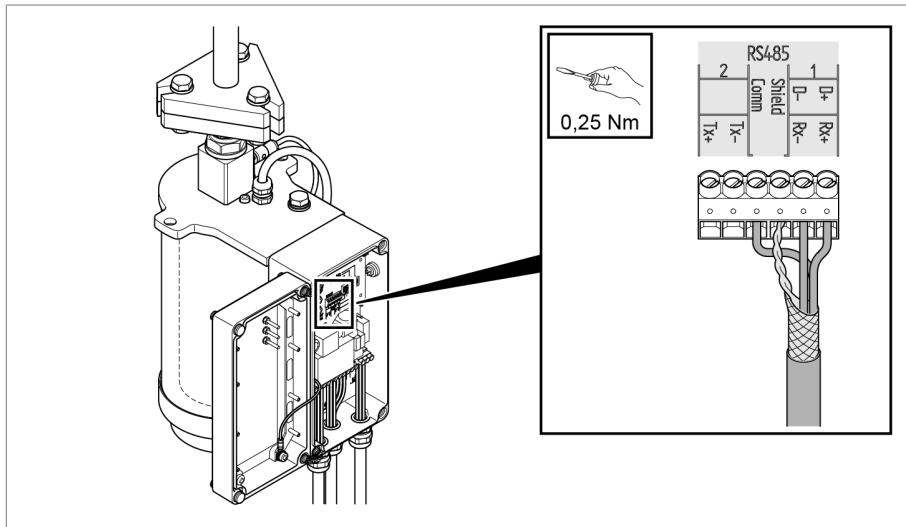


Figure 45: Connecting the half-duplex cable

6.9.3 Notes on connecting to the MR sensor bus

The optionally available MR sensor bus function lets you connect digital and analog sensors to the device over Modbus RTU. The MR sensor bus supports the connection of up to 31 sensors (Modbus slaves). The ISM® device operates as the Modbus master.



Ensure that no other Modbus master is connected over the MR sensor bus. Assign a unique Modbus address to each sensor you are connecting over MR sensor bus. The MR sensor bus may experience errors if multiple sensors are using the same Modbus address.

Observe the following notes for connecting the sensors:

- **NOTICE!** Damage to the device or sensor. Connect all of the sensors to the potential equalization rail to avoid circulating currents over the MR sensor bus.
- The MR sensor bus uses Modbus in a 2-wire configuration (2W). The 4-wire configuration (4W) is not supported.

6 Electrical connection

- You must connect the sensors via a shielded line with 3 conductors (D0, D1, Common). The data lines (D0, D1) must be in twisted pairs. Note the cable recommendation.
- Stub lines from the bus node to the respective device must be shorter than 20 m.
- The CPU assembly contains a terminating resistor (120Ω) at the COM2 interface. Install another terminating resistor (120Ω , 0.5 W) at the other end of the bus.
- The CPU assembly contains a pull-up resistor and a pull-down resistor (each of 680Ω in accordance with the Modbus specification). No additional pull-up/pull-down resistors are needed.

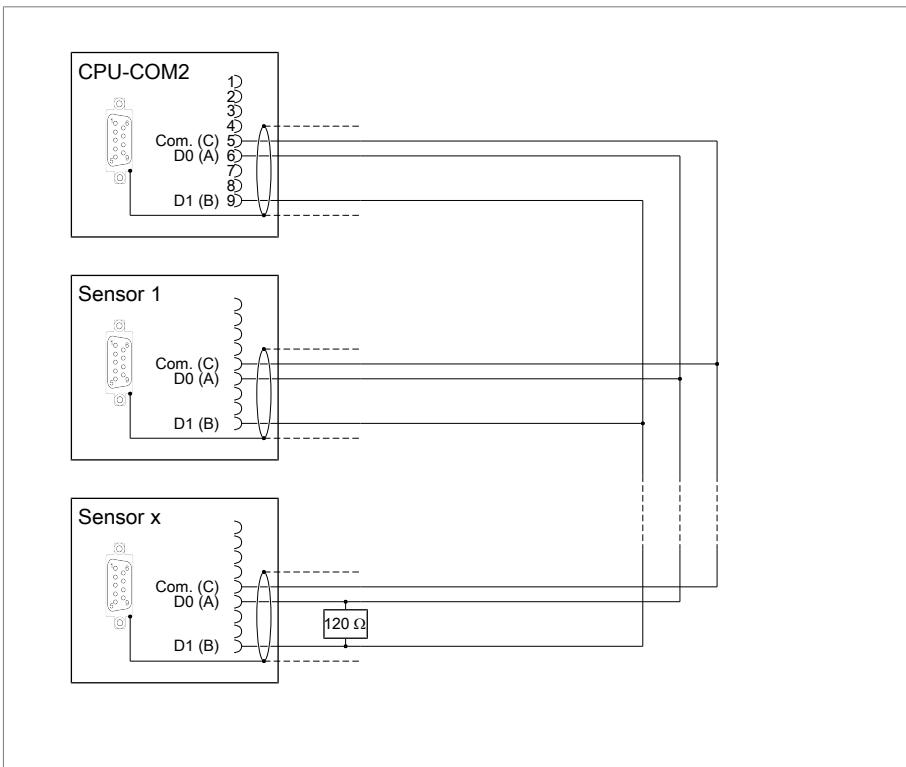


Figure 46: MR sensor bus

6 Electrical connection

6.9.4 MESSKO® MTRAB® 2.5

If you would like to use a MESSKO® MTRAB® 2.5 sensor, you must connect the sensor to the RS485 plug terminals on the sensor bus.

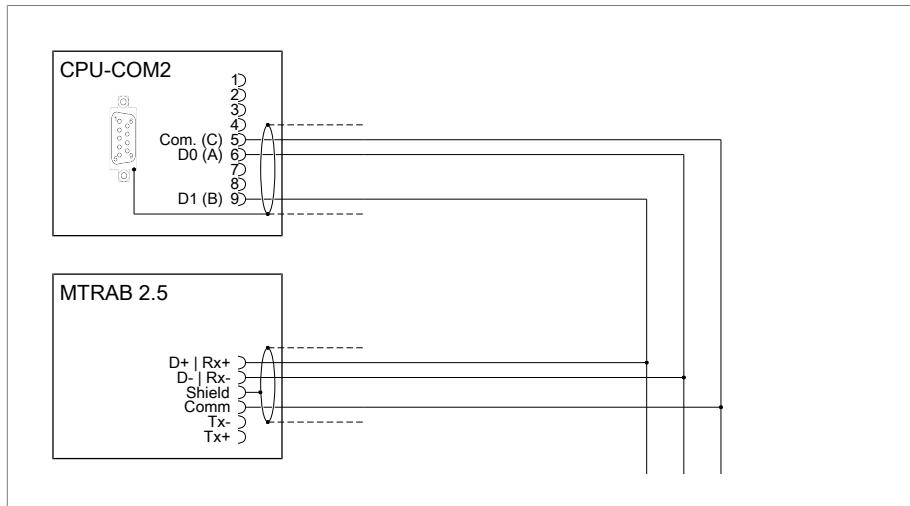


Figure 47: Connection example MESSKO® MTRAB® 2.5 (terminal RS485)

6 Electrical connection

You must enable the half-duplex operating mode on the sensor by switching the "Duplex mode" switch to the "HALF" setting. If the MESSKO® MTRAB® 2.5 sensor is the only bus device or the last bus device, you must activate the sensor terminating resistor by switching the "BUS termination 120 ohms" switch to the position "1 = ON" and "2 = OFF".

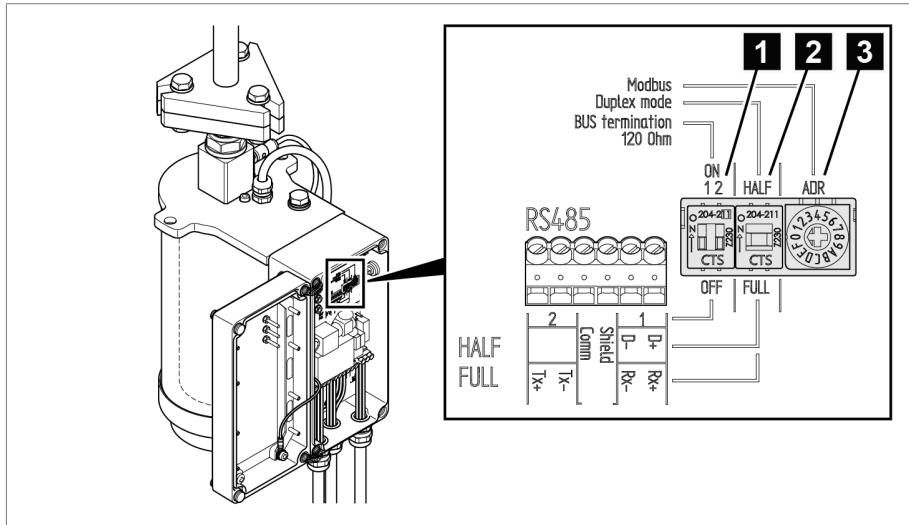


Figure 48: MESSKO® MTRAB® 2.5 Modbus configuration

- | | |
|---|--|
| 1 Terminating resistor: in half duplex mode: 1 = ON, 2 = OFF; in full duplex mode: 1 = ON, 2 = ON | 2 Operating mode: HALF = half duplex, FULL = full duplex |
| 3 Modbus address | |

6 Electrical connection

6.9.5 Modbus settings

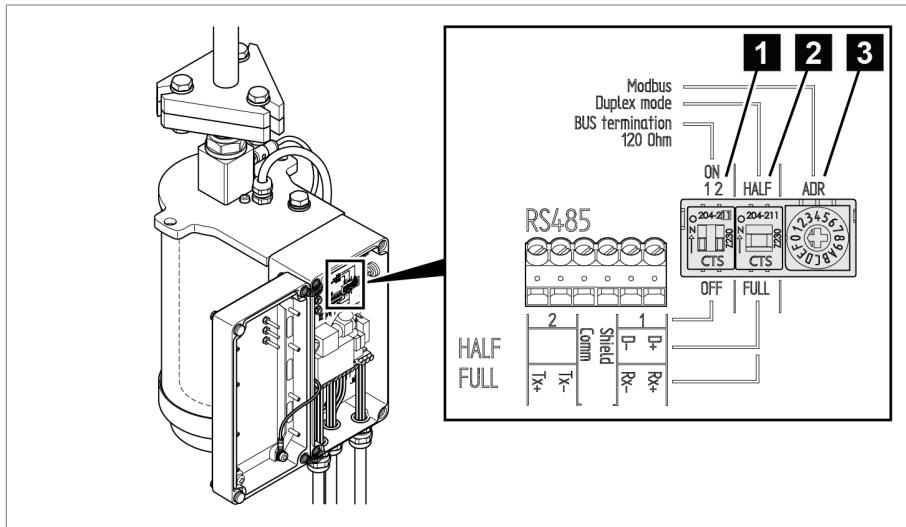


Figure 49: RS485 settings

Half-duplex or full-duplex operation

To set the MESSKO® MTRAB® for half-duplex operation, proceed as follows:

- Set the "Duplex mode" switch **2** to the "HALF" position.

To set the MESSKO® MTRAB® for full-duplex operation, proceed as follows:

- Set the "Duplex mode" switch **2** to the "FULL" position.

Half-duplex operation terminating resistor

If the MESSKO® MTRAB® in half-duplex operation is the last device in the bus system, the device is to be terminated with a 120-ohm resistor. To do so, proceed as follows:

- Set the left-hand switch on "BUS termination 120 Ohm" **1** to the "ON" position.

Full-duplex operation terminating resistors

If the MESSKO® MTRAB® in full-duplex operation is the last device in the bus system, the device is to be terminated with two 120-ohm resistors. To do so, proceed as follows:

- Set both switches on "BUS termination 120 Ohm" **1** to the "ON" position.

Changing the Modbus address of the device

The Modbus address of the device is set to 3 (ADR switch position 3) as standard. In this setting, the transmission speed is 19,200 baud and the parity is "EVEN". The Modbus address of the device can be changed via the "ADR" switch **3** (see RS485 communication settings [► Section 14.2, Page 120]).

6.10 Closing the terminal box

In order to close the terminal box again, proceed as follows:

- Check the grounding cable in the terminal box.

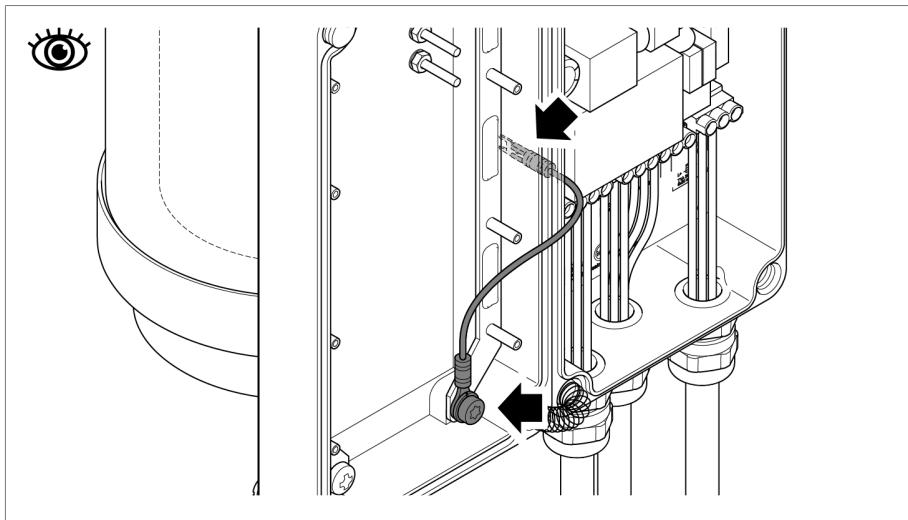


Figure 50: Terminal box grounding cable

6 Electrical connection

1. Ensure that the grounding cable to the housing cover is not damaged when closing the terminal box.

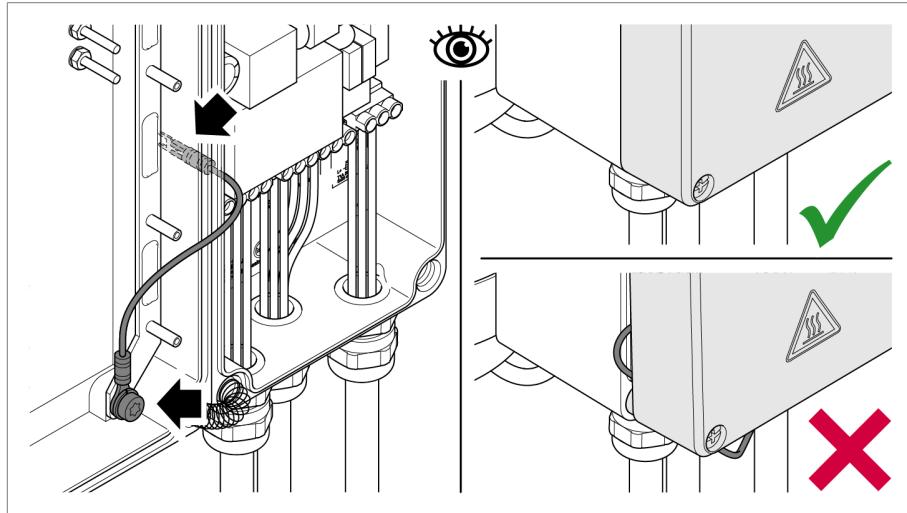


Figure 51: Visual inspection

2. Set the cover of the terminal box properly on the bottom of the housing and then tighten the four housing screws.

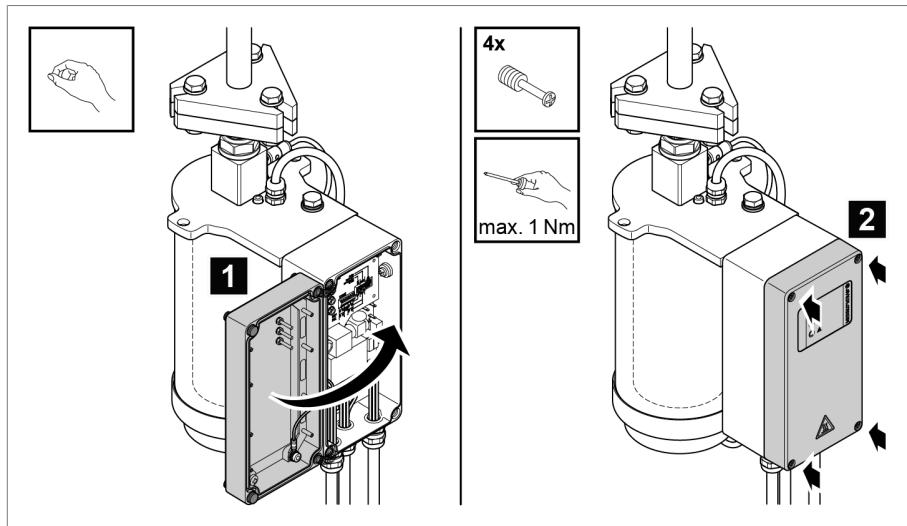


Figure 52: Closing the terminal box cover

6.11 Additional device grounding

The device has an additional grounding point which, if required, can be connected to the ground potential. The material for establishing this additional ground connection is not included in the scope of delivery.

- ▶ Connect the grounding cable at the grounding point shown in the figure to the ground potential.



Connection points, bolts and washers for grounding the device may not be lacquered.

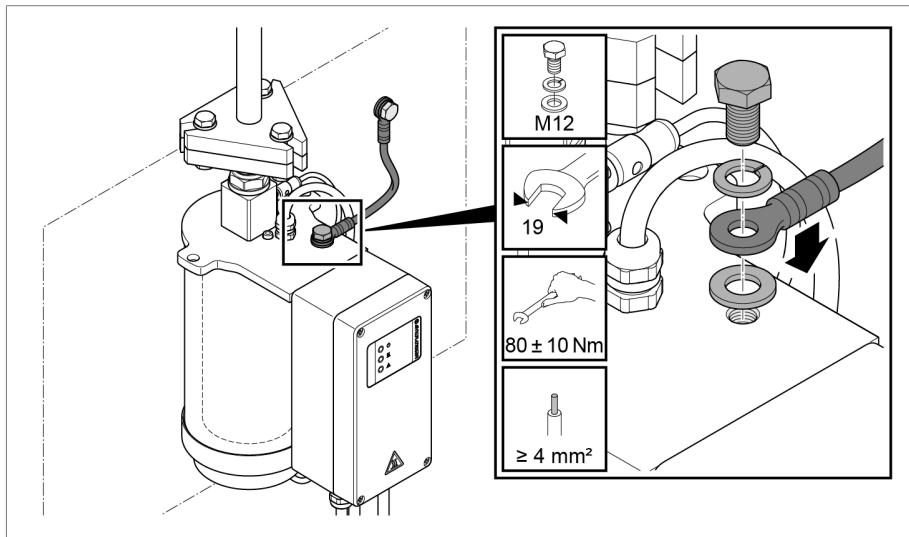


Figure 53: Additional grounding point

6.12 Dielectric test

NOTICE

Damage to the device!

Incorrect test voltage can cause damage to the device.

- ▶ Carry out dielectric testing with a maximum of 500 V DC.
- ✓ Prepare the test device.
- ✓ De-energize the dehydrating breather.

6 Electrical connection

1. Conduct a test between the protective conductor (PE) at terminal 1 and neutral conductor (N-) at terminal 3.
2. Conduct a test between the protective conductor (PE) at terminal 1 and phase (L+) at terminal 2.

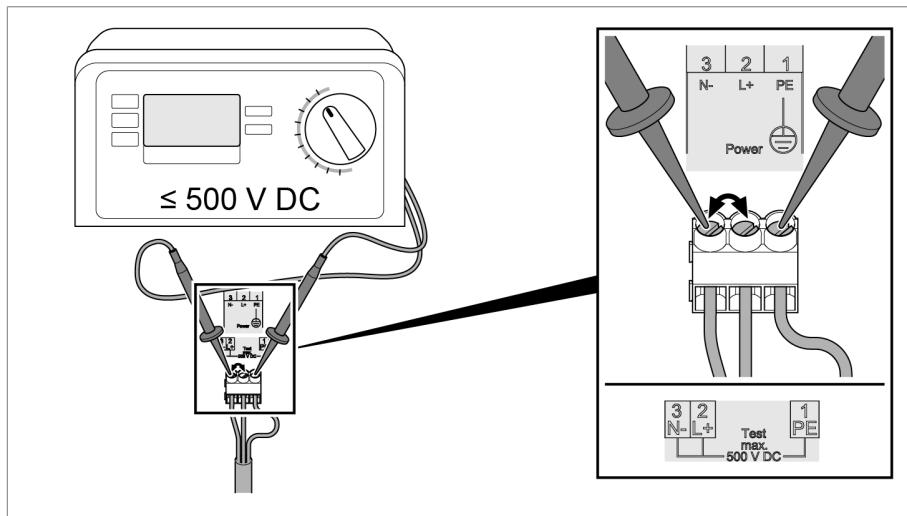


Figure 54: Dielectric test



If the device is not operated in the European Community, the national regulations for conducting the dielectric test in the respective country of use must be observed.

6.13 Ground test

Prior to commissioning, perform a ground test (check of the protective bonding impedance) in accordance with IEC 61010-1. When doing so, observe the following information:

- Test current: 2 times the rated current of the overcurrent protection device in the supply line.
- Test duration: 1 minute per measurement point.
- The measured voltage between the measurement point and the protective conductor must be less than 10 V.

6 Electrical connection

To perform the ground test, proceed as follows:

- Feed the test current in at the fixing screw of the grounding cable using a constant current source and measure the voltage between the measurement point and the protective conductor connection at terminal 1.
 - ⇒ The measured voltage must remain less than 10 V for a period of 1 minute.

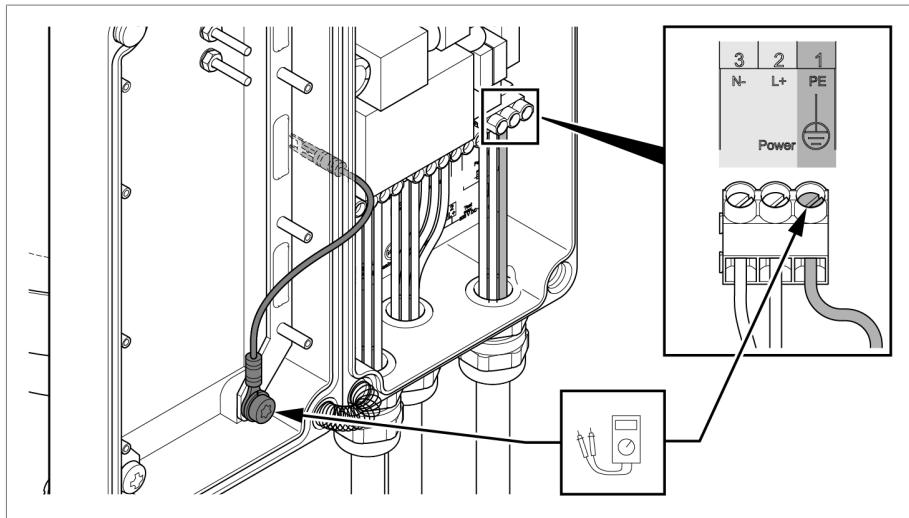


Figure 55: Protective bonding test

7 Commissioning

NOTICE

Damage to the device!

Damage to the electronics of the dehydrating breather due to incorrect supply voltage!

- ✓ Make sure that the correct supply voltage in accordance with the nameplate is present on the energized miniature circuit breaker.
- Switch on supply voltage using an external isolating device.

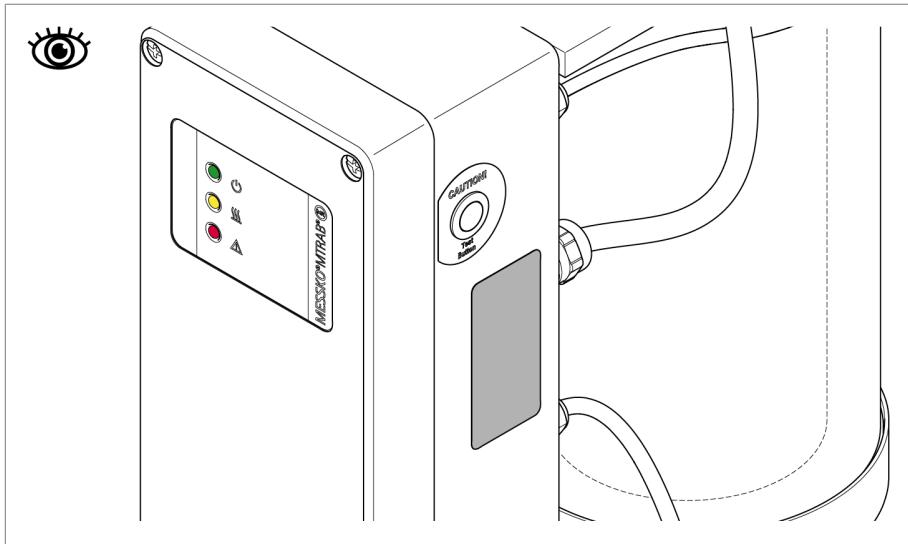


Figure 56: Nameplate

7.1 Device self test during commissioning

The MTRAB LED signaling during commissioning is explained in the following. Observe the following legend for the respective LED state.

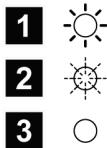


Figure 57: LED legend

1 LED lights up

2 LED flashes

3 LED off

The device performs a device self-test (approx. 5 seconds / maximum 60 seconds for devices with gamma control) independently after the supply voltage is applied. During the entire self-test, the outer LEDs flash successively

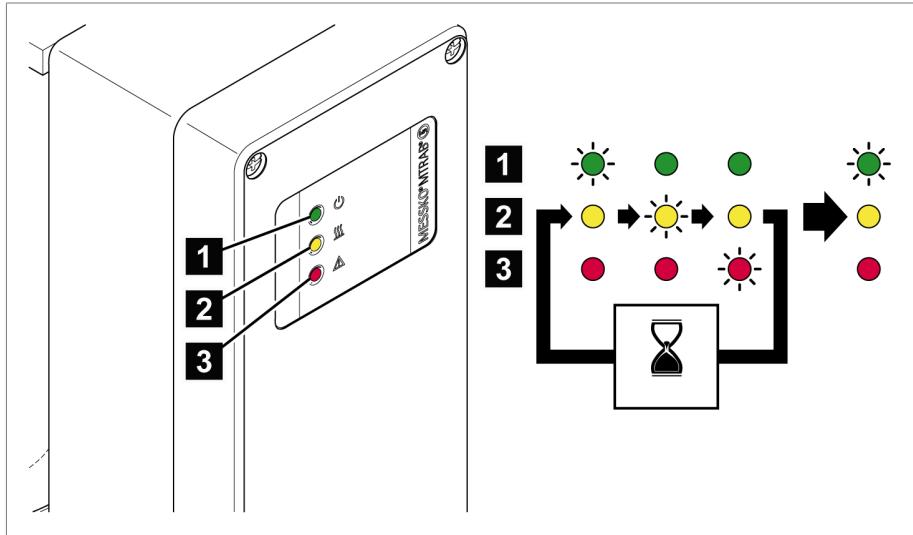


Figure 58: LED signaling during commissioning

7 Commissioning

After concluding the self-test, the green power LED remains lit. If an error has been detected, this is indicated via the LEDs (see Error messages and troubleshooting [▶ Section 9, Page 83]).

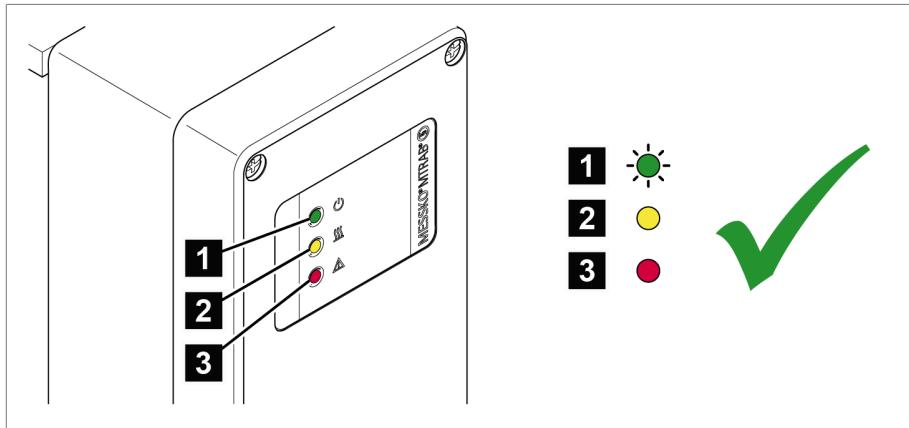


Figure 59: Error-free operation

An expanded test triggered by the user can be started using the test button (see "Test button" [▶ Section 10.3, Page 94]).

7.2 Adjusting Modbus settings

For information on adjusting or testing the Modbus settings, see Modbus settings [▶ Section 6.9.5, Page 70].

During error-free operation, the green power LED is constantly lit and the red error LED is off.

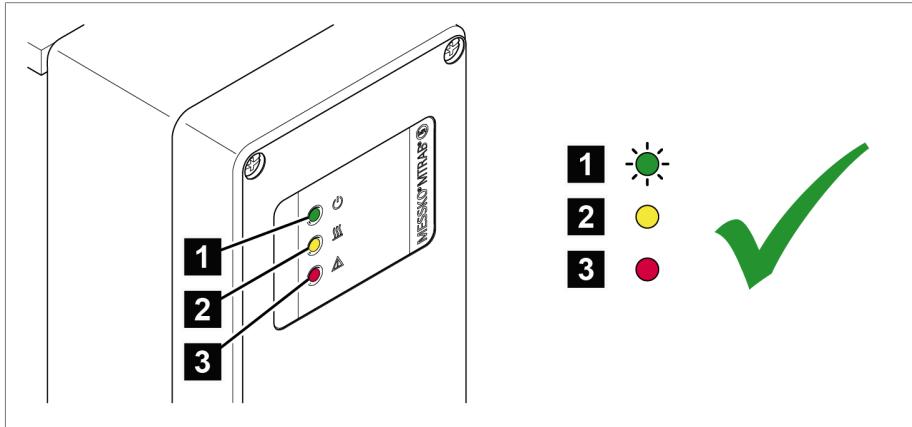


Figure 60: Error-free operation

If LED **1** and/or LED **2** issues a lit and flashing signal and the device malfunction LED **3** is off, follow the instructions in the chapter Status messages [► Section 9.2, Page 87].

If the silica gel is heat-dried during error-free operation, the yellow LED **1** then lights up continuously in addition to the green LED **2**. This state can be transmitted over the "Regeneration" signaling relay for central data collection and further processing of the dehydrating breather status.

⚠ CAUTION



Risk of burns!

Danger of bodily injuries due to heat!

- ▶ During regeneration (yellow LED **2** lights up continuously), do not touch the glass cylinder of the "desiccant container".

8 Operation

⚠ CAUTION



Slipping hazard!

Danger to health!

- ▶ In case of temperatures at or below freezing, any escaping condensation can lead to icy ground beneath the device. In this case, do not step under the device.

NOTICE

Malfunction due to contaminated silica gel

Prevent the silica gel becoming contaminated due to direct contact with the insulating fluid.

In the event of the silica gel being contaminated with insulating fluid, refer to the notes in the section Error messages and troubleshooting (Contaminated silica gel [▶ Section 9.5, Page 91]).

If a device error LED 3 lights up or flashes, please observe the error table in the chapter Error messages and troubleshooting [▶ Section 9, Page 83].

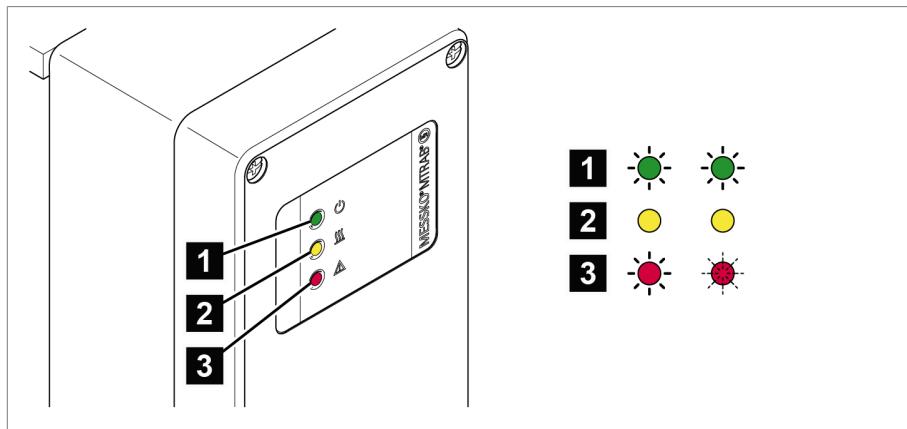


Figure 61: Signaling device errors

This also applies if an error is signaled over the "device error" relay.



If the fuse fails, it can easily be replaced (Fuse [► Section 9.3, Page 88]).

If it happens again, please consult "MR Service & Complaint" [► Section 9, Page 83]. A device version is available that eliminates the occurrence of overvoltages. Overvoltage protection can also be retrofitted by replacing a circuit board.

8.1 MTRAB with gamma controller (DB200G only)



Make sure that the switch **1** above the ball valve **2** is in the "AUTO" position.

The display **3** on the front of the ball valve indicates which of the two cylinders is separated from the air flow. This display has absolutely no operational function.

8 Operation

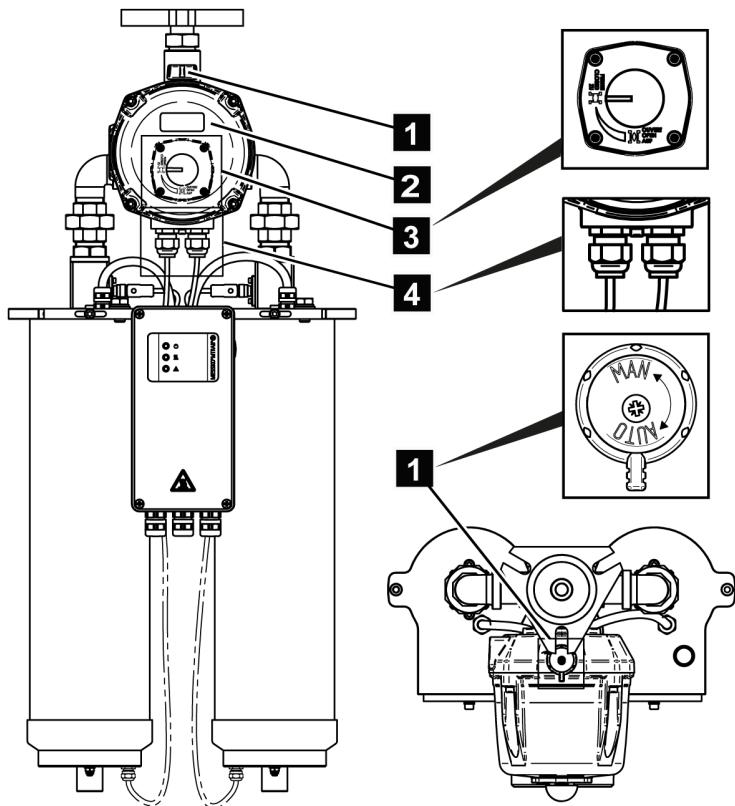


Figure 62: Ball valve

1 Switch

2 Ball valve

3 Display

4 Ball valve control cable

9 Error messages and troubleshooting

Prior to opening the terminal box or when checking the cables and sensors, always observe the following safety information:

⚠ WARNING



Electric shock

Risk of fatal injury due to electrical voltage.

- De-energize the device and system peripherals and take measures to ensure that they cannot be switched back on.



If you would like to acknowledge an error that is no longer present, press the test button on the side of the terminal box. If several errors were present, these are to be acknowledged individually one after the other. The LED signaling is then reset and the signaling relay for device malfunctions (failsafe) picks up again after all errors have been acknowledged.

If an error occurs that you cannot remedy yourself, please contact:

Maschinenfabrik Reinhausen GmbH

MR Service & Complaint
Falkensteinstrasse 8
93059 Regensburg
Germany

E-mail: service@reinhausen.com

E-mail: complaint@reinhausen.com

Using the self-monitoring function, the device identifies internal errors and signals them by illuminating and flashing LEDs in different ways **1** **2** **3**. In addition, an error is signaled via the device error relay (failsafe) [► Section 6.7, Page 60].



The device error relay is energized in normal operation and drops out after a delay (> 7 seconds) after switching off the supply voltage so as to avoid generating an error message during short interruptions of the supply voltage.

9 Error messages and troubleshooting

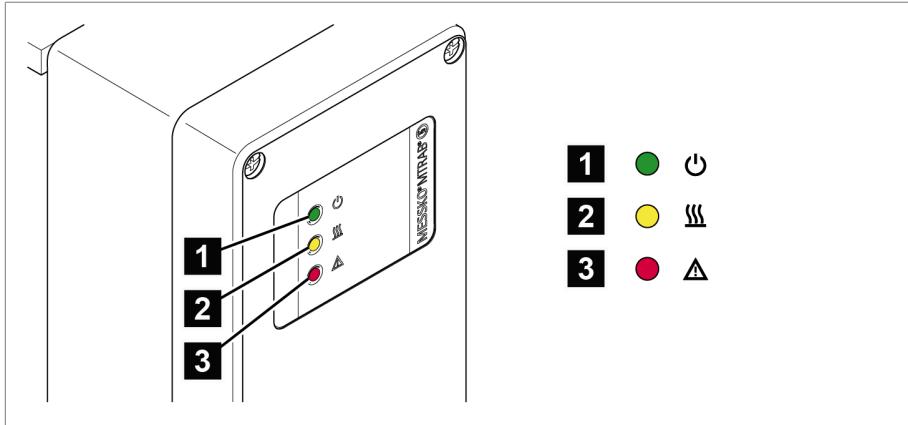


Figure 63: LEDs

- | | | |
|----------|---|---|
| 1 | ● | ⊕ |
| 2 | ● | ⚠ |
| 3 | ● | ⚠ |

- 1 Green LED
- 2 Yellow LED
- 3 Red LED

9 Error messages and troubleshooting

9.1 Error messages

The individual errors and possible corrective actions are listed in the following table. If a suitable corrective action cannot be found in this table, please contact MR Service & Complaint [▶ Section 9, Page 83].

Green LED 1	Yel- low LED 2	Red LED 3	Error	Action
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	MTRAB not functioning	<p>Check whether the isolating device is switched on for the voltage supply.</p> <p>Check whether the supply voltage is connected correctly.</p> <p>Check that supply voltage [▶ Section 6.5, Page 58] is in accordance with nameplate [▶ Section 7, Page 76].</p> <p>Check the fuse [▶ Section 9.3, Page 88] and replace if necessary.</p>
	<input type="radio"/>		Sensor failure on the left-hand desiccant container	<p>Check the cable connection of the sensor 5 and tighten by hand if necessary (1 Nm +/- 0.2 Nm).</p>
	<input type="radio"/>		Sensor failure on the right-hand desiccant container (DB200D and DB200G only)	<p>Check the cable sensor 6 for damage.</p> <p>Check the sensor contacts and sensor cable socket 4 for corrosion.</p> <p>The sensor may be soiled or defective.</p>
			Error when heat-drying the left-hand desiccant container	<p>Check the wiring of the supply voltage; retighten terminals if necessary.</p>
			Error when heat-drying the right-hand desiccant container (DB200D and DB200G only)	<p>Check that supply voltage [▶ Section 6.5, Page 58] is in accordance with nameplate [▶ Section 7, Page 76].</p> <p>Check the cable for silica gel heating 3 for damage.</p> <p>The silica gel heating is probably defective.</p>

9 Error messages and troubleshooting

Green LED 1	Yel- low LED 2	Red LED 3	Error	Action
			Internal error	General device error. Contact MR Service & Complaint [▶ Section 9, Page 83].
			Left-hand position ball valve error (DB200G only)	Check whether the ball valve switch [▶ Section 8.1, Page 81] is in the "AUTO" position.
			Right-hand position ball valve error (DB200G only)	Check both cables to the ball valve (see MTRAB with gamma controller (DB200G only) [▶ Section 8.1, Page 81] 4) for damage.

Table 6: Error messages

= LED OFF

= LED ON

= LED FLASHING

9 Error messages and troubleshooting

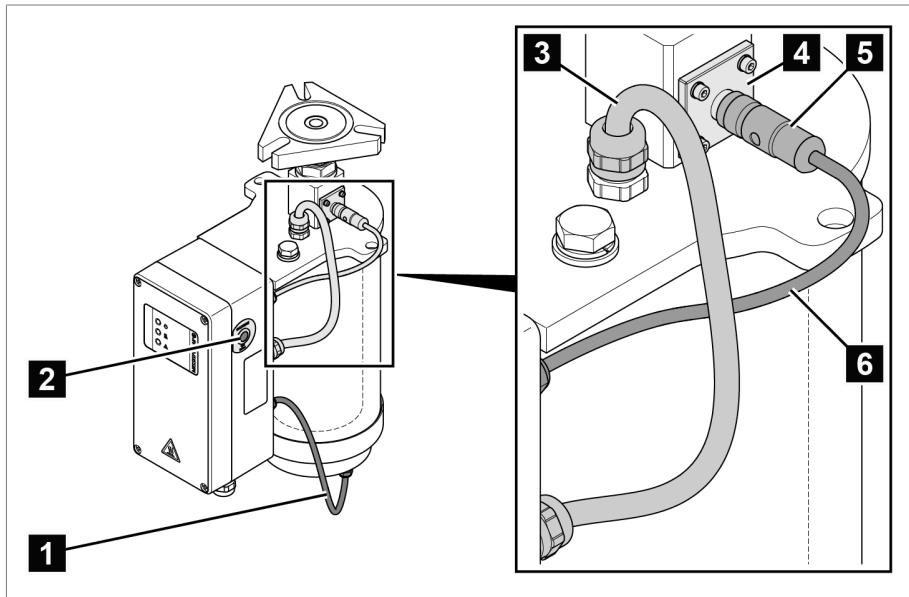


Figure 64: Tests

1 Filter-heater supply cable (optional / HT version only)

2 Test button

3 Silica-gel heating supply cable

4 Sensor-cable socket

5 Sensor-cable screw connection

6 Sensor cable

9.2 Status messages

The individual status messages that do not have an error as the cause are listed in the following table.

Green LED 1	Yell- low LED 2	Red LED 3	Status messages	Action
	<input type="radio"/>	<input type="radio"/>	Device is active	
	<input type="radio"/>	<input type="radio"/>	The device is sending data logger data	Optional software for output via USB necessary

9 Error messages and troubleshooting

Green LED 1	Yel- low LED 2	Red LED 3	Status messages	Action
			The device is in regeneration mode	
			Regeneration being repeated	
			Forced regeneration	
			RTC battery voltage too low	Replace battery [▶ Section 9.4, Page 90] (CR2032)

Table 7: Status messages

= LED OFF

= LED ON

= LED FLASHING

9.3 Fuse



If the fuse fails again, please consult MR Service & Complaint [▶ Section 9, Page 83]. A device version is available that eliminates the occurrence of overvoltages. Overvoltage protection can be retrofitted by replacing a circuit board.

A fine-wire fuse is installed on the circuit board in the terminal box to protect the control electronics. This can be replaced by a replacement fuse (see [▶ Section 12.1, Page 103]) if needed.

In order to replace the fuse, proceed as follows:

1. De-energize the dehydrating breather.

9 Error messages and troubleshooting

2. Open the terminal box of the dehydrating breather (see [► Section 6.4, Page 54]). To do so, unscrew the 4 captive screws on the housing cover. Open the cover of the terminal box.

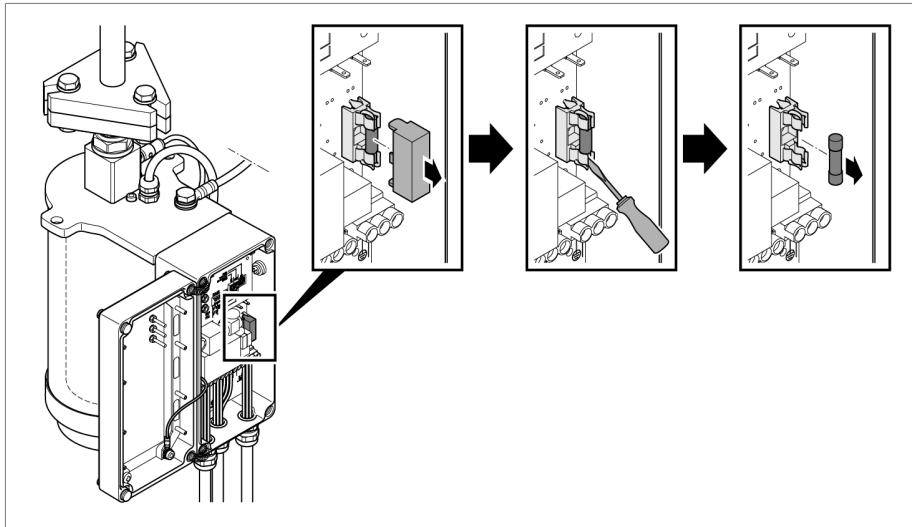


Figure 65: Removing the fine-wire fuse

3. Remove the safety cover.
4. Using a screwdriver, carefully move under one end of the fuse and lift it out of the holder.
5. Remove the fuse.
6. Position the new fuse (5x20 mm; T2A; 400 V DC/500 V AC) with both ends on the holder and carefully press down until it snaps in place.

9 Error messages and troubleshooting

7. Replace the safety cover.

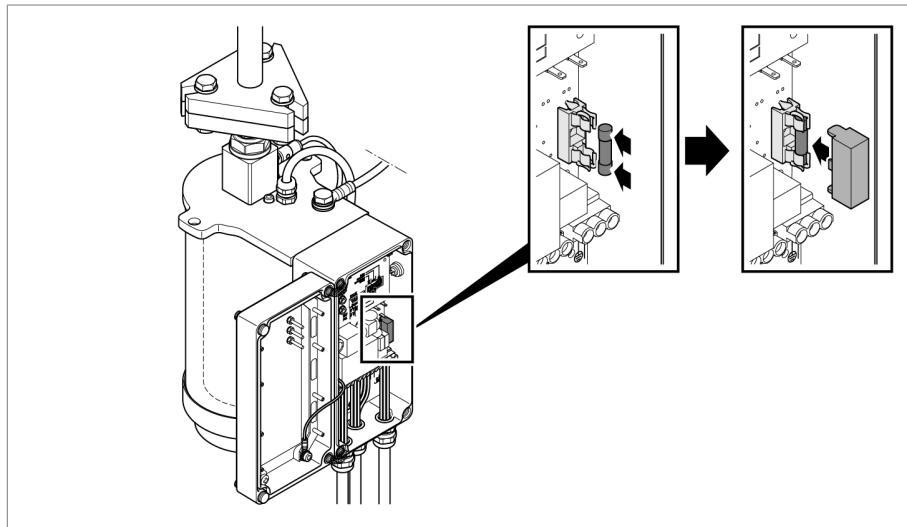


Figure 66: Inserting the fine-wire fuse

8. Close the terminal box again (see [► Section 6.10, Page 71]).

9.4 Replacing the battery (CR2032)

If the following LED signaling arises, the CR2032 battery in the device is to be replaced.

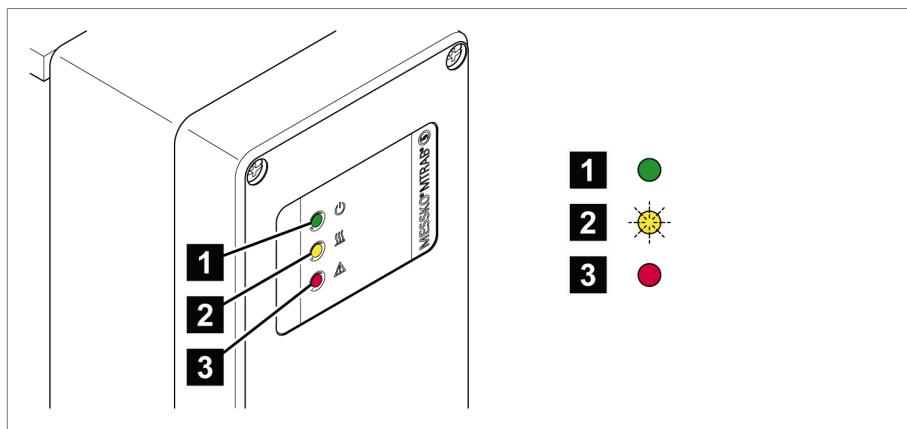


Figure 67: Battery exhausted

9 Error messages and troubleshooting

To replace the CR2032 battery in the device, proceed as follows:

- ✓ New battery is available.
 - ✓ The device and system peripherals have been de-energized and measures have been taken to ensure that they cannot be switched back on.
1. Open the terminal box of the dehydrating breather. To do so, unscrew the 4 captive screws on the housing cover. The cover is held on the left-hand side via spring hinges and can be swung open to the left.
 2. Remove the exhausted CR2032 battery from the battery holder.
 3. Insert the new battery (see [► Section 12.1, Page 103]) quickly and do not allow several minutes to pass, because otherwise the internal time will no longer match the current time. When doing so, ensure the polarity is correct.

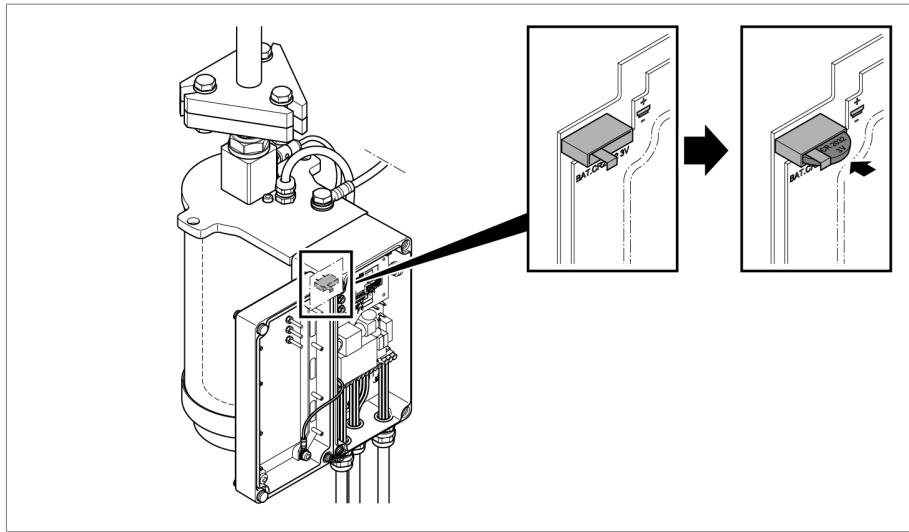


Figure 68: Replacing the CR2032 battery

4. Close the terminal box again (see [► Section 6.10, Page 71]).
5. Recommission the device (see [► Section 7, Page 76]).

9.5 Contaminated silica gel

The silica gel must not come into direct contact with the insulating fluid. In the event of the dehydrating breather being inadvertently flooded with insulating fluid, it must be thoroughly cleaned, the silica gel replaced completely and the correct function tested.

9 Error messages and troubleshooting

In the event of the device being flooded, contact Maschinenfabrik Reinhausen Service. Service will replace the silica gel and clean the device. Alternatively, you can request detailed documentation on replacing the silica gel.

Maschinenfabrik Reinhausen GmbH

MR Service & Complaint

Falkensteinstrasse 8

93059 Regensburg

Germany

E-mail: service@reinhausen.com

E-mail: complaint@reinhausen.com

⚠ CAUTION



Risk of burns!

Danger of bodily injuries due to heat!

- ▶ During regeneration (yellow LED **2** lights up continuously), do not touch the glass cylinder of the desiccant container.

10.1 Maintenance

The MTRAB dehydrating breather does not require maintenance.

10.2 Inspection

Depending on the conditions of use of the device and the national characteristics 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.

The following checks are necessary for **each** transformer inspection:

- Check the external condition of the device for contamination, damage and corrosion.
- Also carefully clear contamination from the dust protection tube. Do not used any sharp-edged or pointed tools for this.
- If the device is opened for inspection purposes (e.g. for repeated insulation or ground testing or for reading off log data), the housing screws are to be inspected for corrosion and, if necessary, regreased.
- Check the display of the LEDs.
- Use the test button for checking the signaling paths (see next section).
- In the event of questions and discrepancies, contact:

Maschinenfabrik Reinhausen GmbH

MR Service & Complaint

Falkensteinstrasse 8

93059 Regensburg

Germany

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

10 Maintenance, inspection and care

10.3 Test button



If there was an error on the MTRAB, this must be acknowledged prior to conducting a function test. If several errors were present, these are to be acknowledged individually one after the other. If an error remains present, it is not possible to conduct a function test at this time (see [▶ [Section 9, Page 83](#)]).



It is also not possible to conduct a function test if the device is heat-drying (yellow LED **2** is lit). If the test button is actuated in this case, all LEDs flash simultaneously 10 times.

The test button can be used to force performance of a function test.

Quick test [▶ [Section 10.3.1, Page 95](#)]

If the test button is held down briefly (≤ 3 seconds), the humidity level in the upper air spout will be displayed for 30 seconds.

Long test [▶ [Section 10.3.2, Page 98](#)]

If the test button is held down for a longer period (> 3 seconds) and then released, the following tests will be performed:

- Heating test
- Analog output test
- Failsafe relay test
- Ball valve test (MTRAB DB200G only)

10 Maintenance, inspection and care

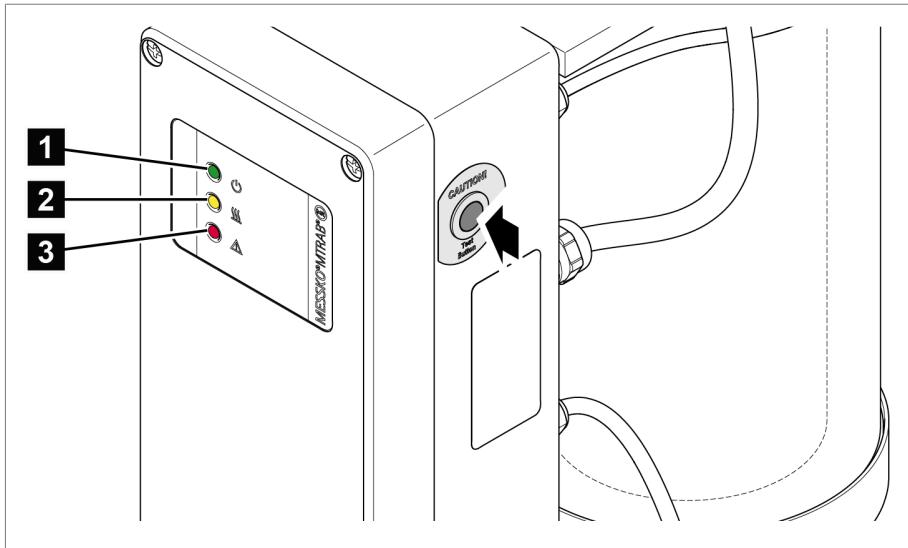


Figure 69: Test button

10.3.1 Quick test

Gree n LED 1	Yel- low LED 2	Red LED 3	Humidity level	Action
			≤10% R.H.	Humidity OK.
			≤10% R.H.	Humidity OK. Regeneration imminent.
			≤10% R.H.	Humidity OK. Regeneration performed within the last 7 days.
			>10% and <20% R.H.	Humidity OK.
			>10% and <20% R.H.	Humidity OK. Regeneration imminent.
			>10% and <20% R.H.	Humidity OK. Regeneration performed within the last 7 days.
			20% R.H.	Regeneration imminent.

10 Maintenance, inspection and care

Gree n LED	Yel- low LED	Red LED	Humidity level	Action
1	2	3		
			>20% R.H.	<p>Humidity increased, even though regeneration has been performed within the last 7 days.</p> <p>The device may be inadequately dimensioned or the silica gel may be contaminated.</p> <p>Check the installation situation. Are all transition points of the piping still sealed tightly?</p> <p>Contact MR Service & Complaint [► Section 9, Page 83] if necessary.</p>
			>40% R.H.	<p>WARNING!</p> <p>Humidity too high. Regeneration imminent.</p> <p>The device may be inadequately dimensioned or the silica gel may be contaminated.</p> <p>Check the installation situation. Are all transition points of the piping still sealed tightly?</p> <p>Contact MR Service & Complaint [► Section 9, Page 83] if necessary.</p>
			>40% R.H.	<p>WARNING!</p> <p>Humidity is too high, even though regeneration has been performed within the last 7 days.</p> <p>Check the installation situation. Are all transition points of the piping still sealed tightly?</p> <p>Contact MR Service & Complaint [► Section 9, Page 83] if necessary.</p>

= LED OFF

= LED ON

= LED FLASHING

Starting a quick test in normal operation

- ✓ Device is not in the regeneration process (the silica gel is not being heat-dried; the yellow LED **2** is off).
- Briefly press the test button (hold down for ≤ 3 seconds).
- ⇒ The start of the quick test is signaled by an LED sequence (see following figure).
- ⇒ The code for the device humidity will be displayed via the LEDs (see table) for 30 seconds.
- If necessary, make a note of the code for the humidity.
- ⇒ The end of the quick test is signaled by an LED sequence (see following figure).
- ⇒ After this, the power LED **1** alone is permanently lit in error-free operation.

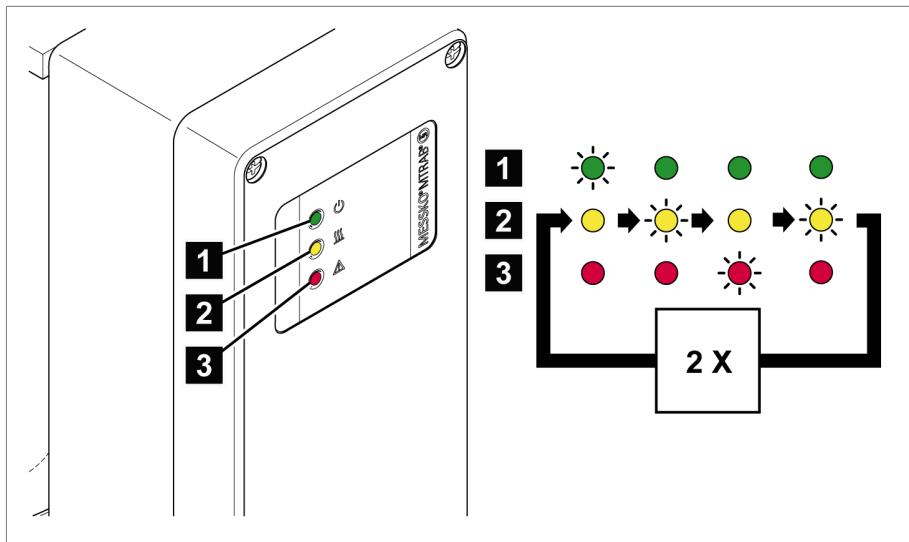


Figure 70: LED signal sequence at the beginning and end of the quick test

If the LEDs signal again or if an error is signaled over the device error signaling relay, observe the chapter Error messages and troubleshooting [► Section 9, Page 83].

10 Maintenance, inspection and care

10.3.2 Long test

NOTICE

Incorrect messaging!

When performing the long test, the failsafe relay will be activated for test purposes.

- Inform the control room that the failsafe relay will be activated.

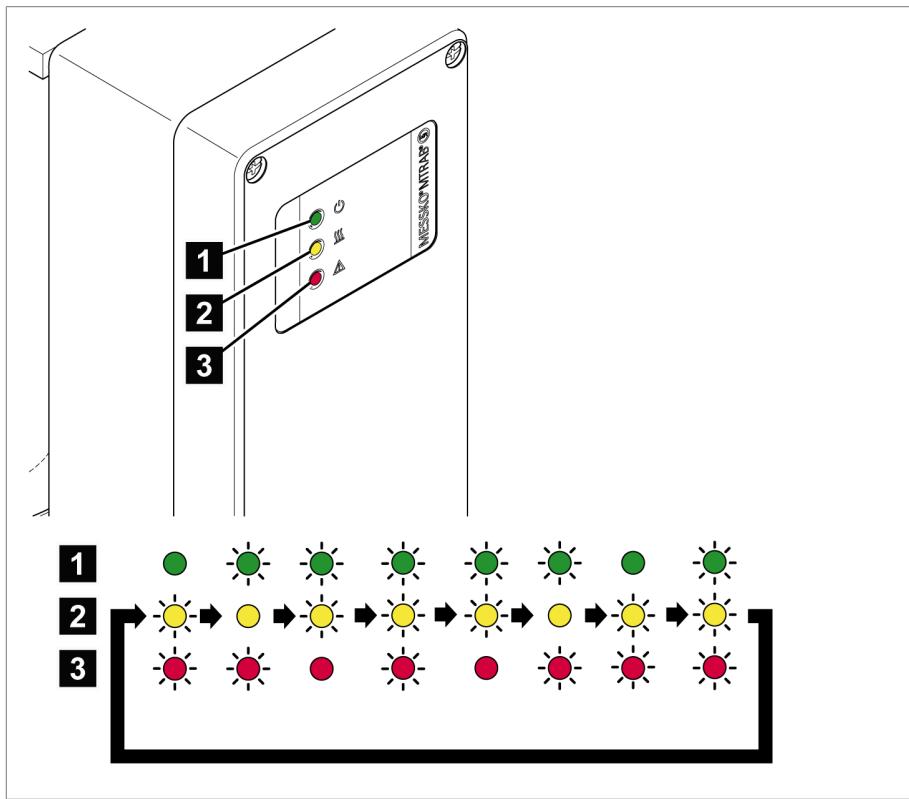


Figure 71: LED signaling during the long test

Starting a long test in normal operation

- ✓ Device is not in the regeneration process (the silica gel is not being heat-dried; the yellow LED **2** is off).
- 1. Press the test button for a longer period and then release (hold down for > 3 seconds).
- 2. The long test can only be interrupted within the first minute of starting the long test by pressing the key for at least 5 seconds. In this case, the interruption will be signaled by a flashing green LED and the device will be reset to its original status.
 - ⇒ The long test will be signaled by the LEDs for the duration of the test (approx. 10 minutes) as shown in the figure above.
 - ⇒ A heating test will be performed. In addition, the heating signaling relay will be activated.
 - ⇒ A 4...20 mA signal will be issued cyclically at the analog outputs for the duration of the test.
- 3. In the control room, check whether the heating signaling relay is energized.
- 4. Check whether the heat-drying process starts on the device.
- 5. Using a measuring device in the control room, check whether the signal at the analog outputs rises from 4 mA to 20 mA and then drops to 4 mA again within one minute.

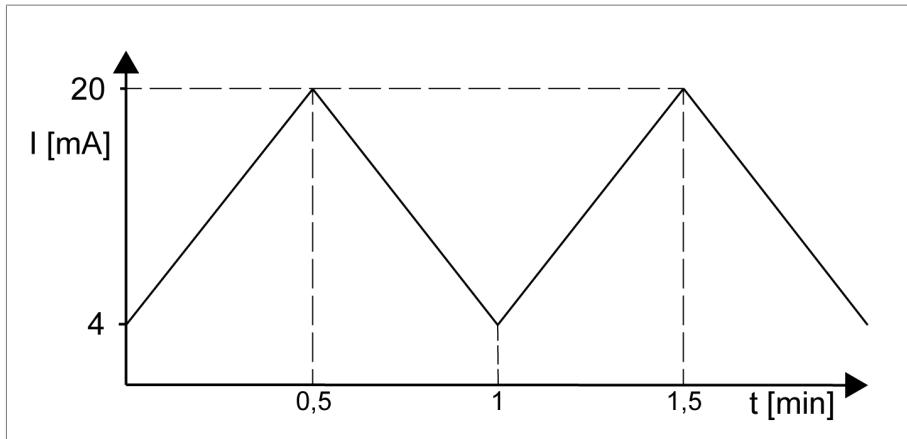


Figure 72: Analog signal

6. In the control room, check whether the device error signaling relay is deenergized and then energized again.

10 Maintenance, inspection and care

7. On an MTRAB DB200G device (gamma control), check whether the ball valve moves to the opposite position and back again. While doing so, monitor the display **3** on the front of the ball valve [► Section 8.1, Page 81].
⇒ Once the long test has been completed, the power LED **1** is permanently lit in error-free operation.

If the LEDs signal again or if an error is signaled over the device error signaling relay, observe the chapter Error messages and troubleshooting [► Section 9, Page 83].

10.4 MSET MTRAB data logger software (optional)

The MESSKO® MSET MTRAB® data logger software is used for visualization, for processing the measurement and event data, and for the configuration of the optional Modbus interface of the MESSKO® MTRAB®. Furthermore, you can backup and export data with the program.

10.5 Care

⚠ WARNING



Electric shock!

Risk of fatal injury due to electrical voltage.

- De-energize the device and system peripherals and take measures to ensure that they cannot be switched back on.

NOTICE

Damage to the dehydrating breather!

Impairment to function due to the ingress of splash water via the dust protection tube.

- Do not clean the dehydrating breather from below with spray water.

10 Maintenance, inspection and care

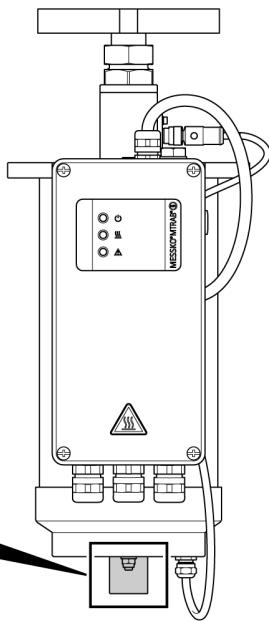
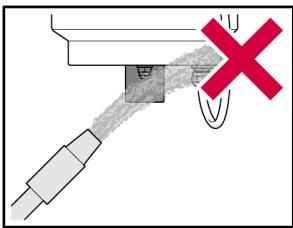


Figure 73: Spray water

Only use a damp cloth and mild cleaning agent to clean the device when needed.

11 Disposal

Observe the national disposal regulations in the country of use.

12.1 Technical data

Operating conditions

Location of use	Indoors and outdoors
Contamination level	4
Relative humidity (operation and storage)	Inside the connection box: 5 to 95% (non-condensing)
Ambient temperature	DB100/200/200D: 0...+70°C / -50...+70°C HT version*; DB200G: 0...+70°C / -20...+70°C HT version*; It's will**) HT version for applications in cold regions, i.e. ambient temperature is continuously below 0°C over a time period of 20 days.
Storage temperature	-50 °C...+70°C
Degree of protection (terminal box)	IP66/IP67 in accordance with IEC 60529
Oversupply category	III
Protection class	I
Installation altitude	2,000 m above sea level

Design types

Materials	All external parts are resistant to weathering and UV radiation; version with resistance to saltwater (offshore) optional
Color	Flanges and metal parts: anodized (aluminum) Connection box: Powder-coated (C4H or CX in accordance with DIN EN ISO 12944-9 as an option) or RAL7033 (cement gray) or RAL7038 (agate gray)
Weight (without flange)	DB100: approx. 8.6 kg DB200: approx. 12.6 kg DB200D: approx. 23.6 kg DB200G: approx. 31.6 kg
Dimensions	See section Dimensional drawings

12 Technical data

Design types

Flange connection	Flange optional; see dimensional drawings and design; Further customer-specific flanges on request; 2-hole RM flange only for DB 100
Desiccant	Only use special colorless, non-toxic silica gel (silicon dioxide) sold by Messko GmbH; See application table for volume

Power supply

Nominal voltage	200 ...240 V AC, 50/60 Hz, 200...240 V DC Pmax. 2500 W or 100...127 V AC, 50/60 Hz, 100...127 V DC Pmax. 2500 W
Power consumption	Max. 100 mA (in normal operation); Increased power consumption during regeneration; Refer to the heating current values in the application table
Heating current	Current during heating process (approx. 1-2 minutes after enabling the heating): Refer to heating current values in the application table
External fuse protection	Miniature circuit breaker characteristic C, K, Z with nominal current of 16 A or 20 A
Rated insulation voltage	500 V DC (in accordance with IEC 61010-1), L to protective conductor  , N to protective conductor 
RTC buffer battery	CR2032 (recommendation CR2032 from Renata or CR2032W from Murata Electronics)

Connection box

Cable screw connections	Ventilated to prevent water condensation M20x1.5 as nickel-plated brass or 1/2"-14NPT as nickel-plated brass or M20x1.5 stainless-steel rust-free
-------------------------	--

12 Technical data

Connection box

Connection terminals	Supply connection, relay, analog outputs: 1.5...4 mm ² , AWG11-15 (solid or flexible), tightening torque 0.5...0.6 Nm RS485 interface: 0.14...1.5 mm ² , AWG15-26 (solid or flexible), tightening torque 0.25 Nm
Status display	3 LEDs (green - operation indicator, yellow - regeneration heating, red - device malfunction) visible from the outside; refer to status messages for the status
Test button	For the device function test
Fuse	5x20 mm; T2A; 400 V DC/500 V AC (e.g. Littelfuse 477002)

Signaling contacts

Type of contact	1x changeover contact, silica gel regeneration signaling relay; 1x changeover contact, device error signaling relay (failsafe)
Contact material	Hard-gold-plated gold contacts to ensure reliable function in applications with low switched currents. Minimum load: ≥1 mV/1 mA
Dielectric strength	Between circuits and ground: ≥2 kV, 50 Hz, duration 1 minute; Between contacts in the open position: ≥ 1 kV, 50 Hz, duration 1 minute; Impulse voltage withstand strength between contacts: ≥3 kV, 1.2/50 µs

12 Technical data

Signaling contacts

Reliable switching capacity	240 V AC, 8 A (IEC 61810, 100,000 switching cycles); 240 V AC, 10 A, 2000 VA (UL 508, 30,000 switching cycles); 30 V DC, 8 A, 240 W; 240 V DC, 300 mA
Maximum switching capacity	In accordance with IEC 60076-22-7, 1,000 switching cycles: 230 V AC, 1840 VA / cos phi > 0.5 250 V AC, 2,500 W / resistive load 24 V DC, 192 W / resistive load

Analog outputs (active)

Output analog 1 left in the upper air spout	Temperature: -40...+80°C 4...20 mA: 7.5°C/mA or optionally 0...20 mA: 6.0°C/mA Measuring error: 4...20 mA: +/- 2.3°C 0...20 mA: +/- 1.8°C
Output analog 2 right in the upper air spout	Humidity: 0...100% 4...20 mA: 6.25% R.H./mA or optionally 0...20 mA: 5.0% R.H./mA Measuring error: 4...20 mA: +/- 1.9% R.H. 0...20 mA: +/- 1.5% R.H.
Error signal in the event of sensor failure	< 3.6 mA (with 4...20 mA output signal); > 23 mA (with 0...20 mA output signal)
Load resistance	0...600 Ω

12 Technical data

Options	
Offshore	Connection box in accordance with the requirements of DIN EN ISO 12944-9 with corrosion class CX; Offshore flange version Cable gland stainless-steel version (grade 1.4404)
Insect grille	See dimensional drawings in attachment 7 SED 6356099
Cable protection	Protects the cable from damage such as animal bites, designed as a spiral coiled hose (stainless steel, suitable for offshore applications); refer to dimensional drawings in attachment 4 SED 6600056 and attachment 5 SED 6600296
Filter heater	HT version: With heated stainless-steel filter; recommended for cold regions with an ambient temperature that is continuously below 0°C for more than 20 days in order to guarantee proper functioning Switching point < 5°C (switch on)
Lateral mounting	See dimensional drawings in attachment 2 SED 6356077 and attachment 3 SED 6367297
Protective grate	See dimensional drawings in attachment 7 SED 6356099
Data logger software	For the evaluation of the MTRAB data
RS485 interface	For connection to a SCADA system
Overvoltage protection	For protection against overvoltages

12 Technical data

Standards and directives

Electrical safety

IEC 61010-1:2010	Safety requirements for electrical measurement and control and regulation equipment and laboratory instruments
UL 61010-1	
CAN/CSA-C22.2 No. 61010-1:2012	<ul style="list-style-type: none">▪ Protection class I▪ Overvoltage category III▪ Contamination level 2

Electromagnetic compatibility

IEC 61000-6-5, IEC/KC 61000-6-2, IEC/KC 61000-6-4, FCC 47 CFR Part 15B, ICES-003

Environmental durability tests

IEC 60529	IP66, IP67
IEC 60068-2-1	Dry cold -25°C / 96 hours
IEC 60068-2-2	Dry heat +70°C / 96 hours

Power transformer and reactor fittings

IEC 60076-22-7	Accessories and fittings
----------------	--------------------------

12.2 Application table

Application	MTRAB type	Silica gel
Tap changer	DB100	1.1 kg
Arc suppression coil (Petersen coil)	DB100	1.1 kg
Air-filled cable boxes	DB100	1.1 kg
Vehicle transformers	DB100	1.1 kg
Network transformers ≤ 40 MVA	DB100T	1.1 kg
Network transformers and step-up transformers > 40 MVA ≤ 200 MVA	DB200T	2.2 kg
Network shell transformers > 200 MVA	DB200D-T or 2x DB200T ²⁾	4.4 kg
Phase shifter ≤ 40 MVA	DB100T	1.1 kg
Phase shifter > 40 MVA ≤ 200 MVA	DB200T	2.2 kg

12 Technical data

Application	MTRAB type	Silica gel
Phase shifter > 200 MVA	DB200D-T or 2x DB200T ²⁾	4.4 kg
Reactors ≤ 40 MVAr	DB100T	1.1 kg
Reactors > 40 Mvar ≤ 200 Mvar	DB200T	2.2 kg
Reactors > 200 MVAr	DB200D-T or 2x DB200T ²⁾	4.4 kg
High voltage DC transmission (HVDCT) transformers	DB200D-T or 2x DB200T ²⁾	4.4 kg
Furnace transformers	DB200G	4.4 kg
Underground hall transformers	DB200G	4.4 kg
GSU machine transformers	DB200G	4.4 kg
MTRAB type	Heating current ¹⁾	Silica gel
	$U_V = 120 \text{ V}$	$U_V = 230 \text{ V}$
DB100	1.2 A	0.6 A
DB100T	1.2 A	0.6 A
DB200T	2.3 A	1.2 A
DB200D-T	4.7 A	2.4 A
DB200G	2.3 A	1.2 A
		Control ³⁾
		Alpha
		Beta
		Beta
		Beta
		Gamma

1) Heating current during the heating process (approx. 1-2 min. After heating activation).

2) Mount individually on the conservator tank, no parallel mounting (see mounting recommendations).

3) **Alpha control:** Status-dependent control of the heat-drying process through humidity monitoring.

Beta controller (suffix T in the type designation): Self-learning system with status-dependent control of the heat-drying procedure through humidity monitoring and temperature-dependent determination of the most advantageous time to perform heat-drying.

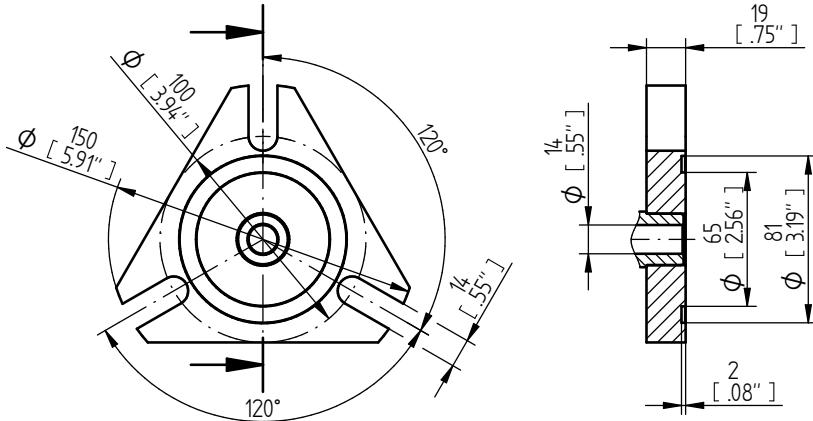
Gamma controller: System for applications with non-periodic breathing behavior. By monitoring the air humidity, the dehydrating cylinders are alternately regenerated based on status.

13 Dimensional drawings

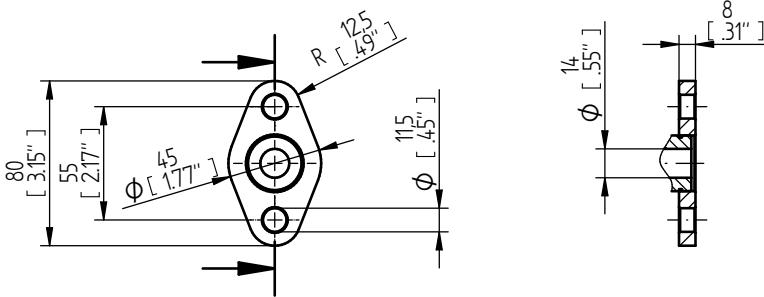
For dimensional drawings, refer to the following pages.

Ap- pen- dix	Drawing No.	Dehydrating breather	Version
1	SED 6653712 000 00	MTRAB®	Flange connections
2	SED 6356077 000 00	MTRAB® DB100/ DB200	With additional fastening points on the side
3	SED 6367297 000 01	MTRAB® DB200D- T	With additional fastening points on the side
4	SED 6600056 000 00	MTRAB® DB100/ DB200	With cable protection
5	SED 6600296 000 01	MTRAB® DB200D- T	With cable protection
6	SED 6368543 000 01	MTRAB® DB200G	With gamma control
7	SED 6356099 000 00	MTRAB®	With protective grate and insect grille

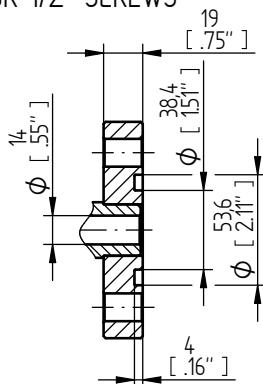
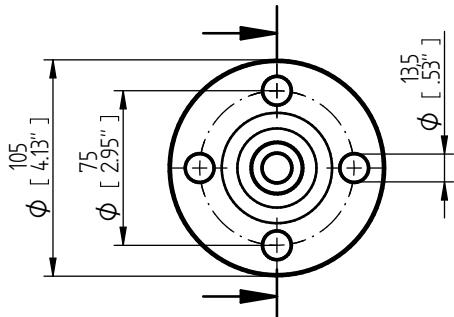
1 DIN-Flansch ähnlich / DIN FLANGE SIMILAR TO DIN 42562-3



2 RM-Flansch nach / RM FLANGE IN ACCORDANCE WITH DIN 2558



3 Rundflansch für 1/2"-Schrauben / FLANGE FOR 1/2" SCREWS



Datum	Name	Dokumentnummer
Gez.: 28.01.2019	RÄDLINGER	SED 6653712.00.00
Sept.: 30.01.2019	HUBERTHO	Anforderungsnummer
Norm.	KLEIN	1090594

Maßangaben
in mm, soweit
nicht anders
angegeben



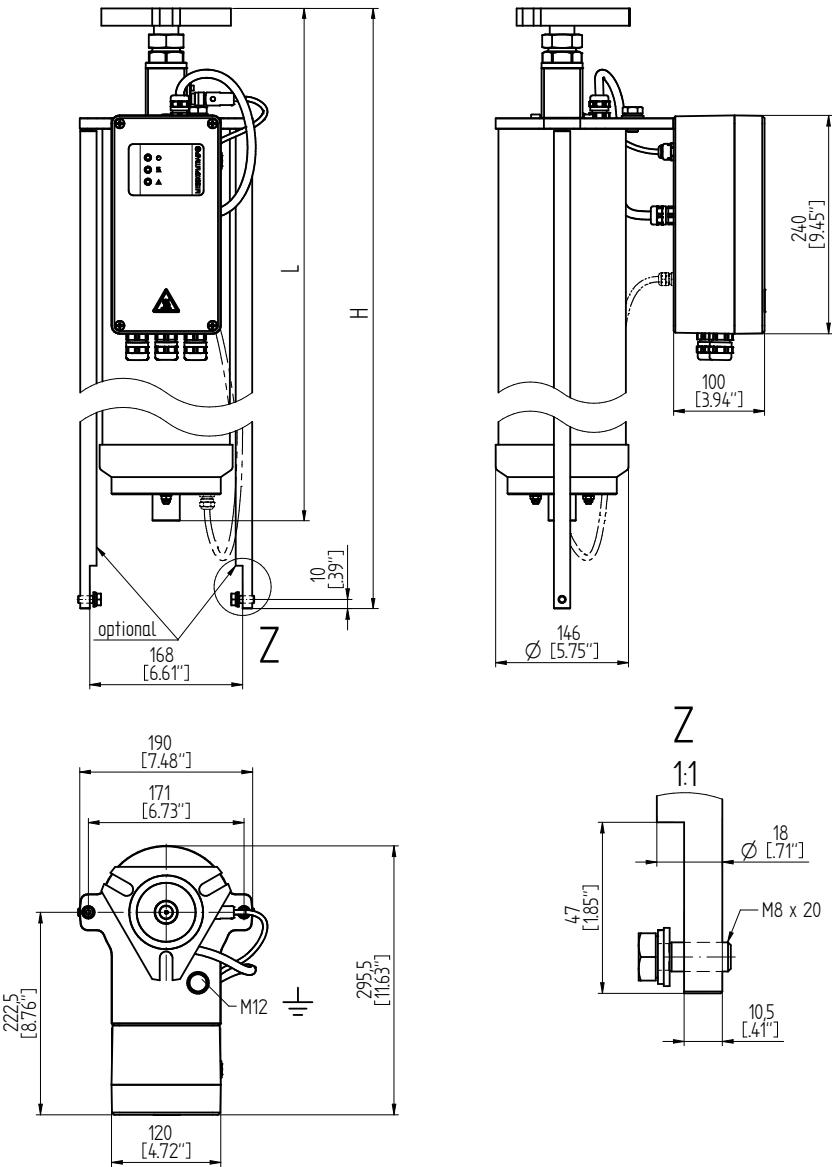
MTRAB® Standard-Flanschanschlüsse
MTRAB® STANDARD FLANGE CONNECTIONS
Maßzeichnung / DIMENSION DRAWING

Serialnummer

Materialnummer
101227020M

Blatt
1/1

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	DATE	NAME	DOCUMENT NO.
JFTR	12/12/2018	RAEDINGER	SED 3536077 000 00
EINKL	17/12/2018	HUBERTHO	CHANCE NO. SCALE
STAND	03/01/2019	KLEYN	1090594 14

MTRAB-Abmessung mit Flansch / MTRAB DIMENSIONS WITH FLANGE	DB100 L	DB100 H	DB200 L	DB200 H
DIN-Flansch / DIN FLANGE	454.5 [17.89"]	634 [24.96"]	684.5 [27.11"]	781 [30.75"]
RM-Flansch / RM FLANGE	458.5 [18.05"]	638 [25.12"]	-	-
1/2"-Schrauben / 1/2" SCREWS	454.5 [17.89"]	634 [24.96"]	684.5 [27.11"]	781 [30.75"]

DIMENSION
IN mm
EXCEPT AS
NOTED



MTRAB® DB100/DB200 mit seitlicher Zusatzbefestigung /
 MTRAB® DB100/DB200 WITH ADDITIONAL FASTENING POINTS
 Maßzeichnung / DIMENSION DRAWING

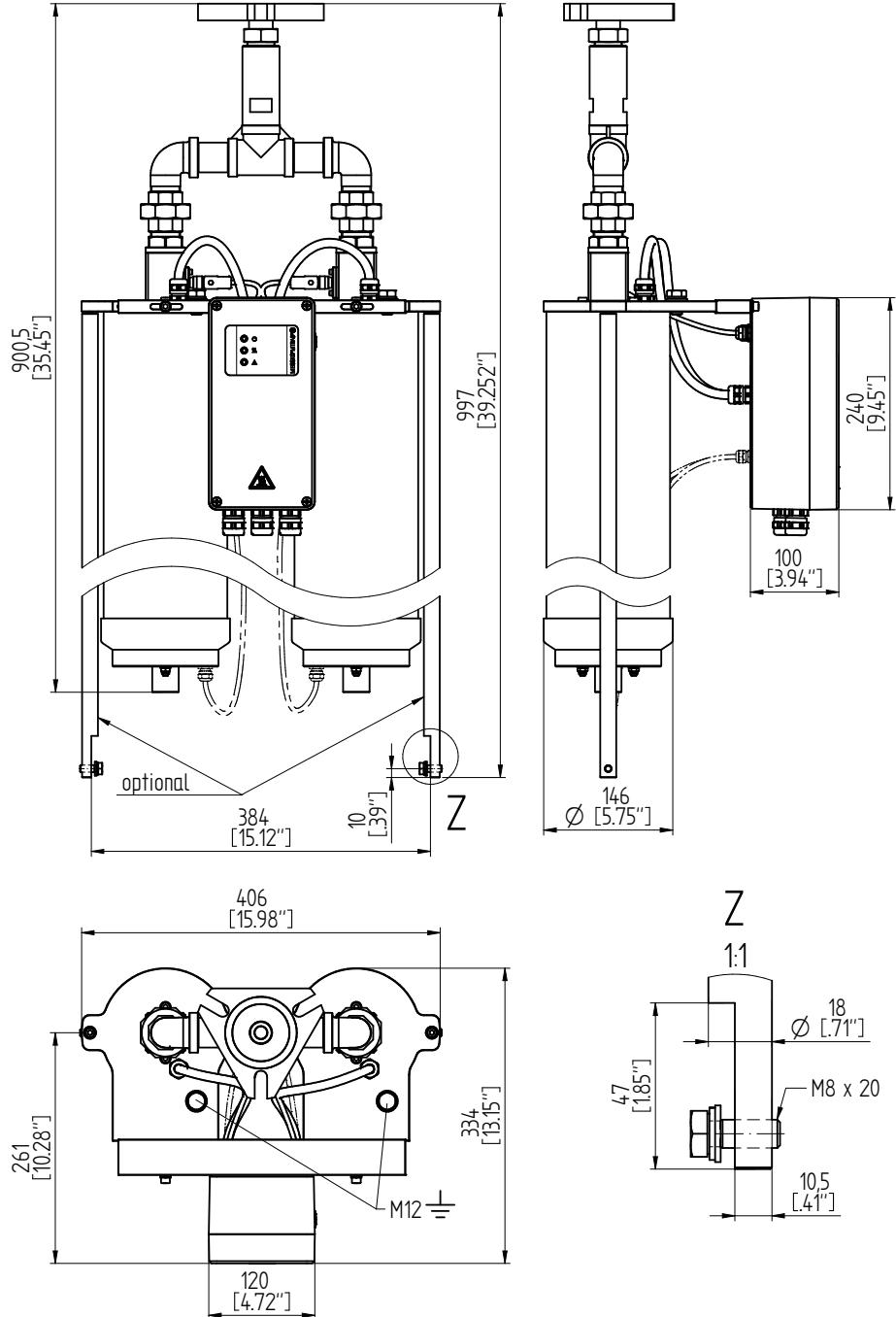
SERIAL NUMBER

MATERIAL NUMBER
101213140M

SHEET
1 / 1

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	DATE	NAME	DOCUMENT NO.
JFTR	21/01/2020	SCHAFFERB	SED 5367/297 000 01
EINKL	21/01/2020	REINHOLD	CHANGE NO.
STAND	22/01/2020	KLEYN	1098/810 14



DIMENSION
IN mm
EXCEPT AS
NOTED



MTRAB® DB2000-T mit seitlicher Zusatzbefestigung /
MTRAB® DB2000-T WITH ADDITIONAL FASTENING POINTS
Maßzeichnung / DIMENSION DRAWING

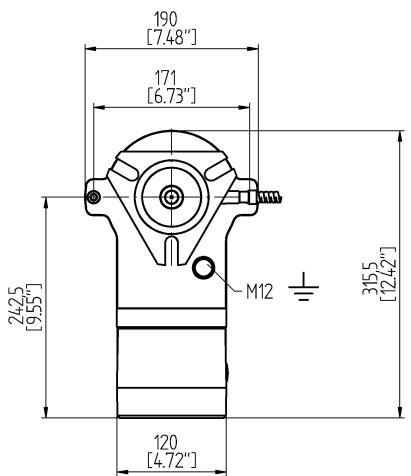
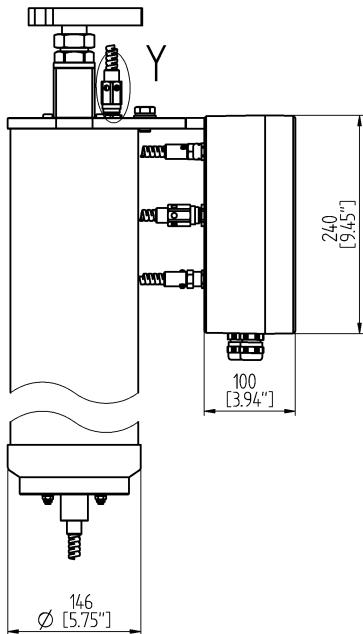
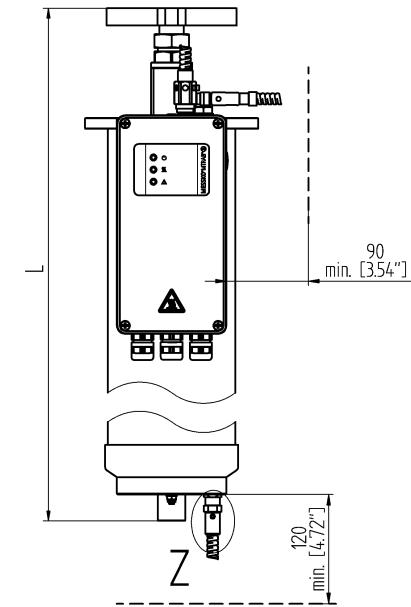
SERIAL NUMBER

MATERIAL NUMBER
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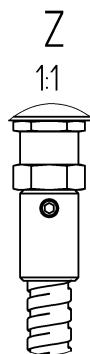
SHEET
1 / 1

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	DATE	NAME	DOCUMENT NO.
JFTR	26.02.2019	RAEDINGER	SED 6600056 000 00
EING.	01.03.2019	HUBERT HHO	CHANCE NO.
STAND	01.03.2019	GRADL	109094



Kabelschutz / CABLE PROTECTION



MTRAB-Abmessung mit Flansch / MTRAB DIMENSIONS WITH FLANGE	DB100 L	DB200 L
DIN-Flansch / DIN FLANGE	454,5 [17.89"]	684,5 [27.11"]
RM-Flansch / RM FLANGE	458,5 [18.05"]	-
1/2"-Schrauben / 1/2" SCREWS	454,5 [17.89"]	684,5 [27.11"]

DIMENSION
IN mm
EXCEPT AS
NOTED



MTRAB® DB100/DB200 mit Kabelschutz (optional) /
MTRAB® DB100/DB200 WITH CABLE PROTECTION (OPTIONAL)
Maßzeichnung / DIMENSION DRAWING

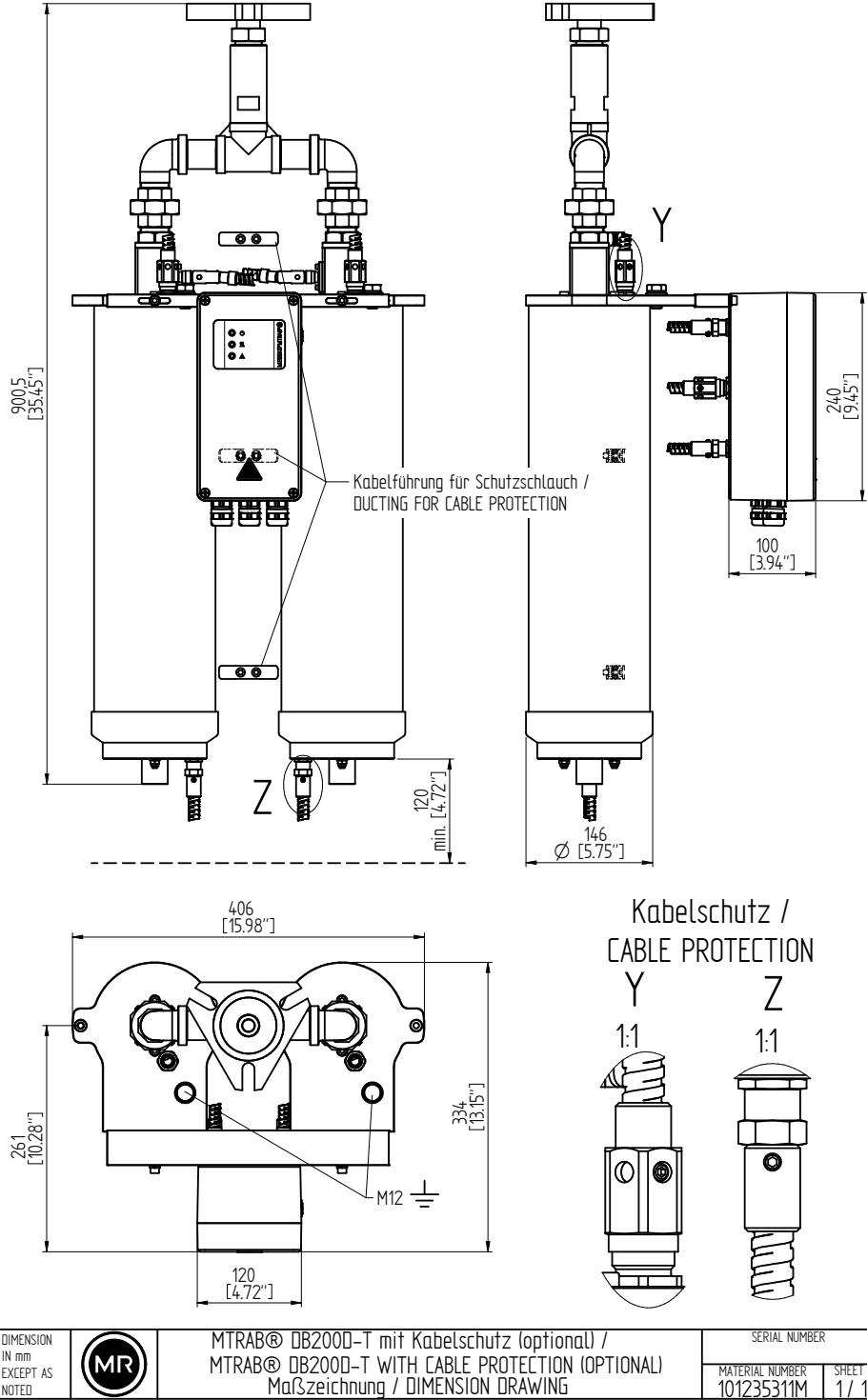
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MATERIAL NUMBER
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HEET
1 / 1

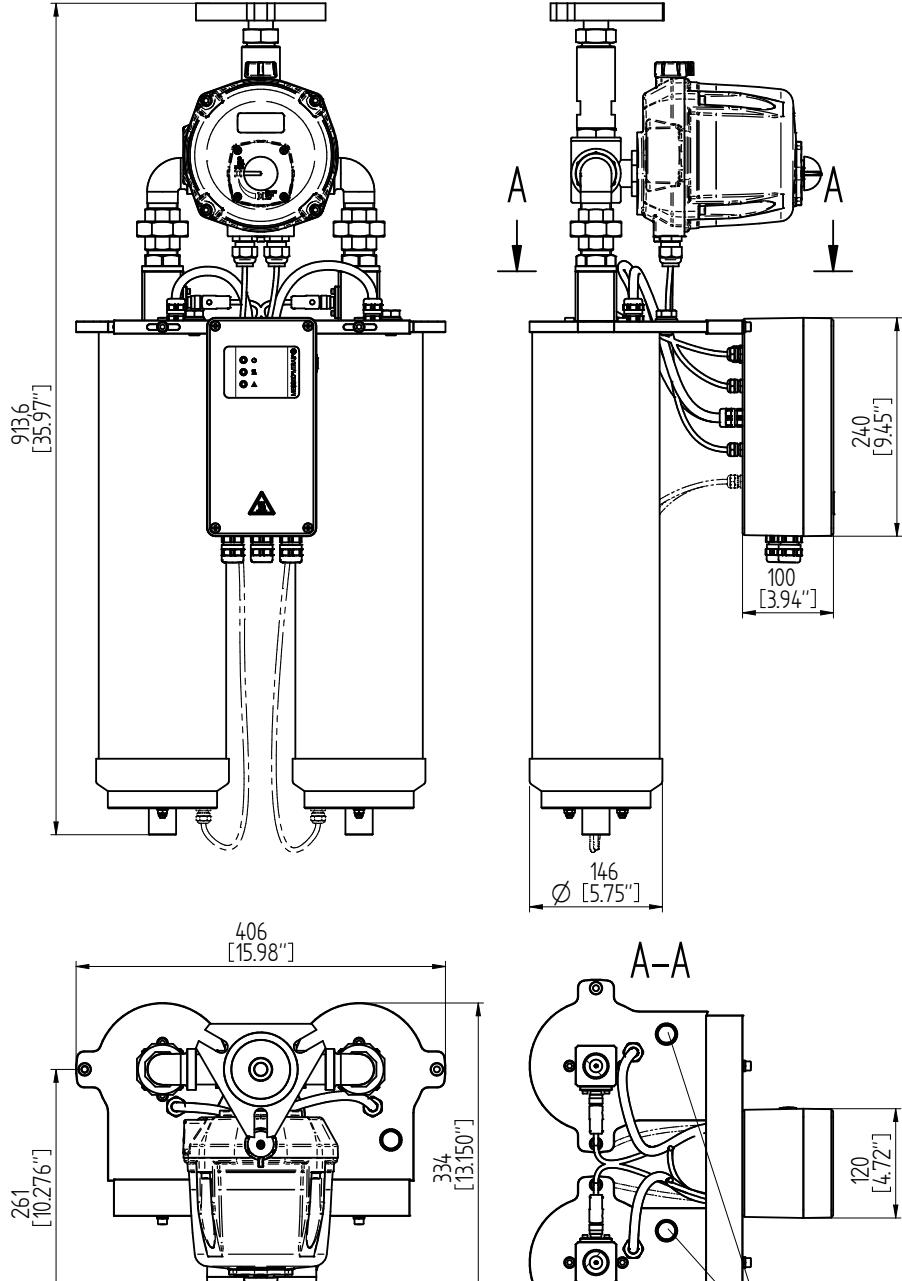
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JFTR	21/01/2020	SCHAFFERB	SED 6600296 000 01
EINKL	21/01/2020	REINHOLD	SCALE
STAND	22/01/2020	KLEYN	1098810 14



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JFTR	20012020	SCHAFFERB	SE0 53 68543 000 01
EINKL	21012020	REINHOLD	SCALE
STAND	22012020	KLEYN	1098810 14



DIMENSION
IN mm
EXCEPT AS
NOTED



MTRAB® DB2006 mit Gammasteuerung /
MTRAB® DB2006 WITH GAMMA CONTROL
Maßzeichnung / DIMENSION DRAWING

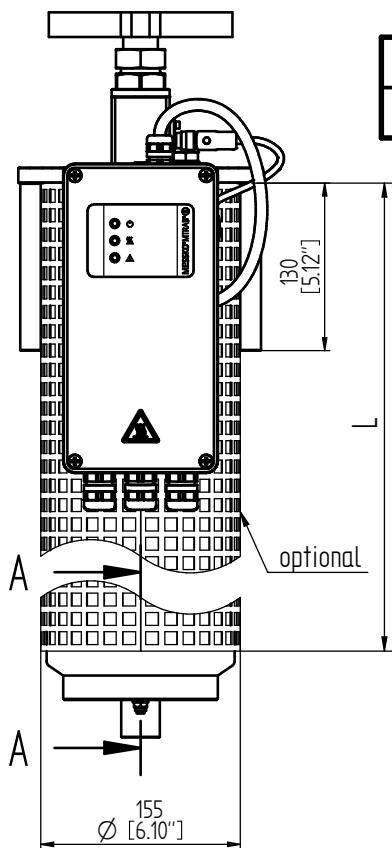
SERIAL NUMBER

MATERIAL NUMBER
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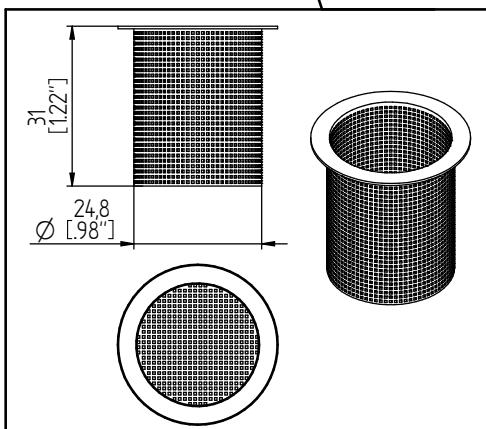
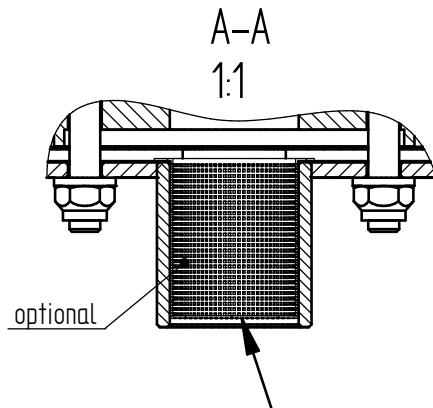
SHEET
1 / 1

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DATE	NAME	DOCUMENT NO.
12.12.2018	RAEDLINGER	SED 6356099 000 00
CHKD	HUBERTHO	CHANGE NO.
17.12.2018		SCALE
STAND	KLEYN	1090594
03.01.2019		14.



Maß / DIMENSION	DB100	DB200
L	260 [10.24"]	485 [19.10"]



DIMENSION IN mm EXCEPT AS NOTED	MR	MTRAB® mit Schutzzitter und Insektschutzzitter / WITH PROTECTIVE GRATE AND INSECT PROTECTIVE GRATE Maßzeichnung / DIMENSION DRAWING	SERIAL NUMBER	
			MATERIAL NUMBER	HEET
			101213190M	1/1

14 Appendix

14.1 Modbus RTU

Status information

Function code "02" for reading the information

No.	Value	Designation	DB100/200/200D	DB200G
0	ON/ OFF	Error present	Yes	Yes
1	ON/ OFF	Left SiO ₂ heating error	Yes	Yes
2	ON/ OFF	Right SiO ₂ heating error	DB200D only	Yes
3	ON/ OFF	Voltage supply error	Yes	Yes
4	ON/ OFF	Left sensor error	Yes	Yes
5	ON/ OFF	Right sensor error	DB200D only	Yes
6	ON/ OFF	Right gamma error	No	Yes
7	ON/ OFF	Left gamma error	No	Yes
8	ON/ OFF	RTC battery low	Yes	Yes
9	ON/ OFF	Analog output 1 open	Yes	Yes
10	ON/ OFF	Analog output 2 open	Yes	Yes
11	ON/ OFF	Alpha controller info	Yes	No
12	ON/ OFF	Beta controller info	Yes	No
13	ON/ OFF	Info two cylinders	DB200D	Yes
14	ON/ OFF	Gamma controller info	No	Yes
15	ON/ OFF	Left cylinder closed	No	Yes

No.	Value	Designation	DB100/200/200D	DB200G
16	ON/ OFF	Right cylinder closed	No	Yes
17	ON/ OFF	Left regeneration	Yes	Yes
18	ON/ OFF	Right regeneration	DB200D only	Yes
19	ON/ OFF	Left sensor status	Yes	Yes
20	ON/ OFF	Right sensor status	DB200D only	Yes

Analog values (input register)

Function code "04" for reading the information

No.	MSW/ LSW*	Value	Designation	DB100/200/200D	DB200G
0	MSW	float32	Left humidity sensor	Yes	Yes
1	LSW				
2	MSW	float32	Left temperature sen- sor	Yes	Yes
3	LSW				
4	MSW	float32	Right humidity sensor	DB200D only	Yes
5	LSW				
6	MSW	float32	Right temperature sen- sor	DB200D only	Yes
7	LSW				

*) MSW=most significant word; LSW=least significant word

14 Appendix

Analog values (input register)

Function code "04" for reading the information

No.	Value	Designation	DB100/200/200D	DB200G
16	sint16 / factor 10	Left humidity sensor	Yes	Yes
17	sint16 / factor 10	Left temperature sensor	Yes	Yes
18	sint16 / factor 10	Right humidity sensor	DB200D only	Yes
19	sint16 / factor 10	Right temperature sensor	DB200D only	Yes

14.2 RS485 communication settings

ADR position	Address	Baud rate	Parity	Description
0	247	9,600	EVEN	Address, baud rate and parity cannot be changed
1 - D	1 - 13	19,200	EVEN	The addresses 1 - 13 can be set via HEX rotary switch 1 - D; baud rate and parity cannot be changed
E	*)	*)	*)	*) Settings via MSET MTRAB data logger software
F	None	115,200	NONE	For service purposes

Factory settings

ADR position	Address	Baud rate	Parity	Description
3	3	19,200	EVEN	Delivery status

Duplex mode: HALF

BUS termination 120 ohms: OFF

Messko GmbH

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✉ messko-info@reinhausen.com

www.reinhausen.com/messko

BA6820378-03 EN - MESSKO® MTRAB® -
F0377903 - 08/21 - Messko GmbH 2021

THE POWER BEHIND POWER.

