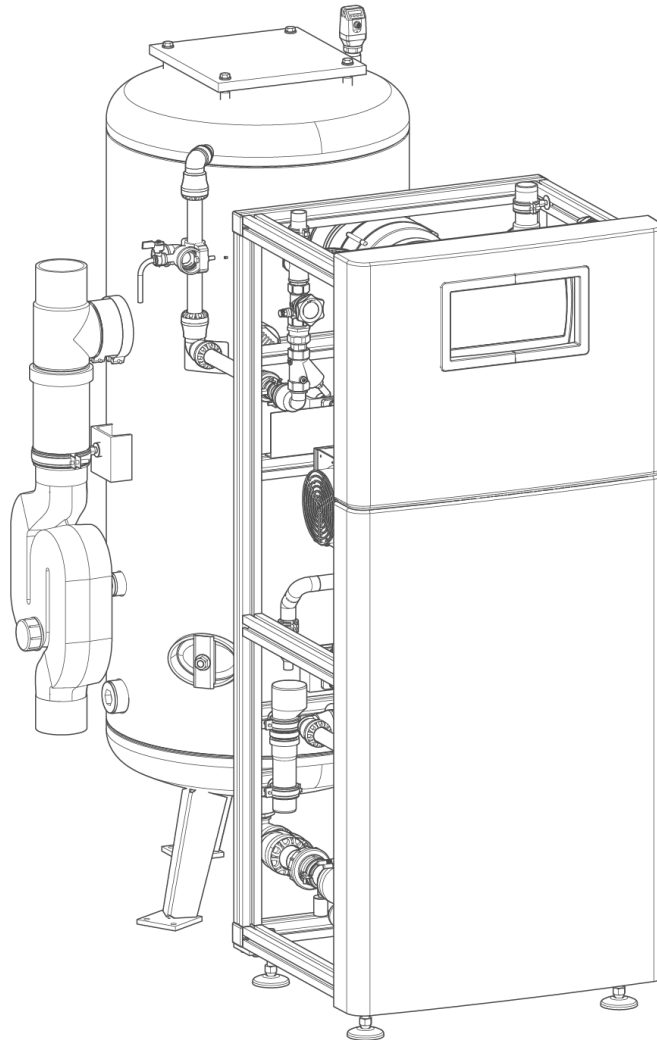


We understand water.



Oxidation filter system | fermaliQ:MA

Operation manual

grünbeck

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1 Introduction

This manual is intended for owners/operating companies, users, as well as qualified specialists, and ensures the safe and efficient handling of the product. The manual is an integral part of the product.

- ▶ Carefully read this manual and the component instructions contained therein before you operate your product.
- ▶ Comply with all safety information and handling instructions.
- ▶ Keep this manual and all other applicable documents, so that they are available when needed.

Illustrations in this manual are for basic understanding and can differ from the actual design.

1.1 Validity of the manual

This manual applies to following products:

- fermaliQ:MA2000
- fermaliQ:MA3000
- fermaliQ:MA5000
- fermaliQ:MA10000
- Special designs that essentially correspond to the standard products given above. For information on changes, please refer to the respective information sheet that is enclosed, if applicable.

1.2 Other applicable documents

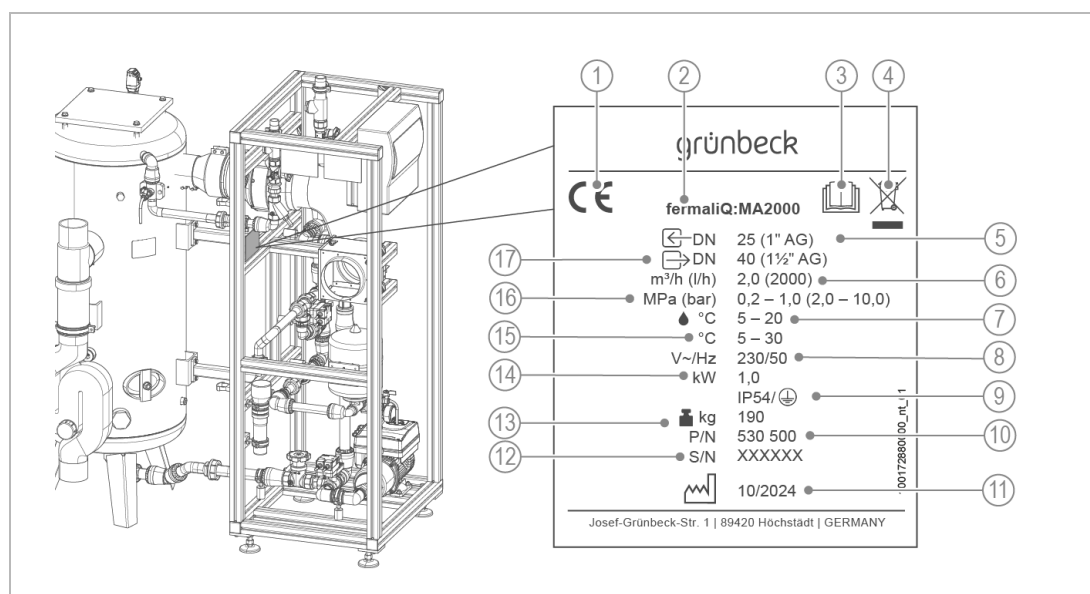
- Electrical circuit diagram, drawing no.: 530547E00R01
- The manuals of all accessories used.

1.3 Product identification

You can identify your product by means of the product designation and the order number on the type plate.

- Check whether the products indicated in chapter 1.1 correspond to your product.

The type plate is located on the system rack.



Designation	
1	CE mark
2	Product designation
3	Adhere to the Operation Manual
4	Disposal information
5	Nominal connection diameter raw water inlet
6	Flow rate volume
7	Water temperature
8	Mains connection
9	Protection/protection class

Designation	
10	Order no.
11	Date of manufacture
12	Serial no.
13	Empty weight (rack + filter tank)
14	Connected load
15	Ambient temperature
16	Operating pressure
17	Nominal connection diameter filtrate outlet

1.4 Symbols used

Symbol	Meaning
	Danger and risk
	Important information or requirement
	Useful information or tip

Symbol	Meaning
	Written documentation required
	Reference to further documents
	Work that must be carried out by qualified specialists only
	Work that must be carried out by qualified electricians only
	Work that must be carried out by technical service personnel only

1.5 Depiction of warnings

This manual contains information with which you must comply for your own personal safety. The information and instructions are highlighted by a warning symbol and are structured as shown below:



SIGNAL WORD Type and source of the hazard

- Possible consequences
- Preventive measures

The following signal words are defined depending on the degree of danger and might be used in this document:

Warning sign and signal word	Consequences when disregarding the information/instructions	
 DANGER	Personal injury	Death or serious injuries
 WARNING		Possible death or serious injuries
 CAUTION		Possible moderate or minor injuries
NOTE	Damage to property	Possible damage to components, the product and/or its functions, or an object in its vicinity

1.6 Demands on personnel

During the individual lifecycle phases of the system, different persons carry out work on the system. This work requires different qualifications.

1.6.1 Qualification of personnel

Personnel	Prerequisites
Operator/user	- No special expertise - Knowledge of the tasks assigned - Knowledge of possible dangers in case of inappropriate behaviour - Knowledge of the required protective equipment and protective measures - Knowledge of residual risks
Owner/operating company	- Product-specific expertise - Statutory regulations on work safety and accident prevention
Qualified specialist - Electrical engineering - Sanitary engineering (HVAC and plumbing) - Transport	- Professional training - Knowledge of relevant standards and regulations - Knowledge of detection and prevention of potential hazards - Knowledge of statutory regulations on accident prevention
Technical service (Grünbeck's technical service/authorised service company)	- Extended product-specific expertise - Trained by Grünbeck

1.6.2 Authorisations of personnel

The following table describes which activities are allowed to be performed by whom.

	User	Owner/operating company	Qualified specialist	Technical service
Transport and storage			X	X
Installation and mounting			X	X
Commissioning			X	X
Operation and handling	X	X	X	X
Cleaning		X	X	X
Inspection	X	X	X	X
Maintenance annually				X
Troubleshooting		X	X	X
Repair			X	X
Decommissioning and recommissioning				X
Dismantling and disposal			X	X

1.6.3 Personal protective equipment

- As an owner/operating company, ensure that the required personal protective equipment is available.

The following components fall under the heading of personal protective equipment (PPE):



Protective gloves



Protective footwear

2 Safety

2.1 Safety measures

- Only operate your product if all components are installed properly.
- Obey the local regulations on drinking water protection, accident prevention and occupational safety.
- Do not make any changes, alterations, extensions or program changes on your product.
- Keep the premises locked against unauthorised access to protect vulnerable or untrained groups of persons against residual risks.
- Lay pipes and cable trays away from traffic routes, escape/rescue routes and accesses to the system.
- Comply with the maintenance intervals (refer to chapter 8.2). Failure to comply can result in the microbiological contamination of your water system.

2.1.1 Mechanical hazards

- You must never remove, bridge, or otherwise tamper with safety equipment.
- For all work on the system that cannot be carried out from the ground, use stable, safe and self-standing vertical access equipment.
- Make sure that the system is set up in such a way that it cannot tip over and that system stability is guaranteed at all times.

2.1.2 Pressure-related hazards

- Components can be under pressure. There is a risk of personal injury and damage to property due to escaping water and/or compressed air as well as unexpected movement of components. Check the system pressure pipes regularly.
- Before starting repair and maintenance work, make sure that all affected components are depressurised.

2.1.3 Electrical dangers

In case of contact with live components, there is an immediate risk of death due to electric shock. Damage to the insulation or single components can be life-threatening.

- Only have a qualified electrician carry out electrical work on the system.
- If live components are damaged, immediately switch off the power supply. Arrange for repair.
- Switch off the supply voltage before working on electrical system components. Discharge the residual voltage.

- Never bridge electrical fuses. Do not disable fuses. Observe the correct current rating when replacing fuses.
- Keep moisture away from live parts. Moisture can cause short-circuits.

2.1.4 Danger due to chemicals

- Chemicals can be hazardous to the environment and health. They can cause chemical skin and eye burns, as well as irritation of the respiratory tract or allergic reactions.
- Avoid any skin/eye contact with chemicals.
- Use personal protective equipment.
- Read the safety data sheet before handling chemicals. Always obey the instructions for different activities/situations.
- Current safety data sheets for chemicals are available for download at <https://www.gruenbeck.de/en/info-centre/safety-data-sheets/>.
- Follow in-house instructions when handling chemicals. Make sure that protective and emergency equipment such as emergency showers and eyewash are available where required, and functional.

Mixing and residual amounts of chemicals

- Do not mix different chemicals. Unforeseeable chemical reactions posing a lethal danger can occur.
- Dispose of residual amount of chemicals according to local regulations and/or in-house instructions.
- In order to avoid impairing the effectiveness of the chemicals, residual amounts from used containers should not be transferred into containers with fresh chemicals.

Labelling/minimum shelf life/storage of chemicals

- Check the labelling of the chemicals - labels must not be removed or rendered illegible.
- Do not use unknown chemicals (no label available or label unrecognisable).
- Obey the use-by date (minimum shelf life) stated on the label to ensure the functionality of the system and the quality of the treated water.
- If stored incorrectly, chemicals could change their state of matter, crystallise, out-gas, or lose their effectiveness. Store and use the chemicals at the specified temperatures only.

Cleaning/disposal

- Immediately absorb spilled chemicals with suitable binding agents.
- Collect and dispose of chemicals in such a way that they do not pose a danger to humans, animals or the environment.

2.1.5 Persons in need of protection

- Children must not play with the product.
- This product is not designed to be used by persons (including children) with reduced capabilities, lack of experience or lack of knowledge. Unless they are supervised, have been instructed on the safe use of the product and understand the resulting hazards.
- Children must be supervised to ensure that they do not play with the product.
- Cleaning and maintenance must not be carried out by children.

2.2 Product-specific safety instructions

Diaphragm expansion tanks operate with a nitrogen cushion and are subject to the Pressure Equipment Directive 97/23/EC.

- In the event of leaks, there is a risk of nitrogen escaping.
- ▶ Check the diaphragm expansion tank regularly for leaks (refer to chapter 8.4.2).

2.2.1 Signals and warning devices

Warnings/pictograms	
	Electric shock hazard (attached to the switch box) ▶ Disconnect the system from the power supply before working on electrical system parts.
	Warning label (attached to the tank) ▶ Keep the lid of the filter tank closed during operation.



The affixed information and pictograms must be clearly legible.
They must not be removed, fouled, or painted over.

- ▶ Obey all warnings and safety instructions.
- ▶ Immediately replace illegible or damaged symbols and pictograms.

2.2.2 Availability of drinking water.

According to DIN 2001-1, the following prerequisites apply to the availability of drinking water:

- When supplied from small units, drinking water must be available at the withdrawal point at all times, in the required quality and sufficient quantity as well as with enough pressure

- In the event the supply is interrupted, remedial action to eliminate the malfunction must be taken without delay.
- For small units that supply drinking water to third parties or that are used in the scope of commercial or public activities, the owner/operating company must draw up an action plan in accordance with the German Drinking Water Ordinance.
- ▶ As the owner/operating company, draw up an action plan in accordance with the German Drinking Water Ordinance which contains, for example, information on how to change to another supply in the event of an emergency or malfunction.

2.3 Conduct in emergencies

2.3.1 In case of water leaks

1. De-energise the device – pull out the mains plug.
2. Locate the leak.
3. Eliminate the cause of the water leak.

2.3.2 System failure

Emergency bypass for emergency supply

- In case of a failure of the treatment system, raw water can be used for fire-fighting purposes and for flushing the toilets (refer to chapter 7.6).
- The emergency bypass must not be used for the supply of drinking water under any circumstances.

3 Product description

By a combination of raw water atomisation, aeration and multi-layer filtration, the substances below are fully automatically reduced in the oxidation filter system fermaliQ:MA:

- Iron
- Manganese
- Ammonium
- Solid particles
- Turbidities
- Unpleasant odours
(e.g. hydrogen sulphide)

An additional effect of the treatment is a moderate deacidification of the raw water.

3.1 Intended use

The system is designed for the treatment of well and spring water.



The oxidation filter system fermaliQ:MA only is the first treatment step in the drinking water supply as per DIN 2001-1.

For complete and safe production of drinking water, the filtration stage must always be followed by a disinfection stage (e.g. UV disinfection).

3.1.1 Application limits

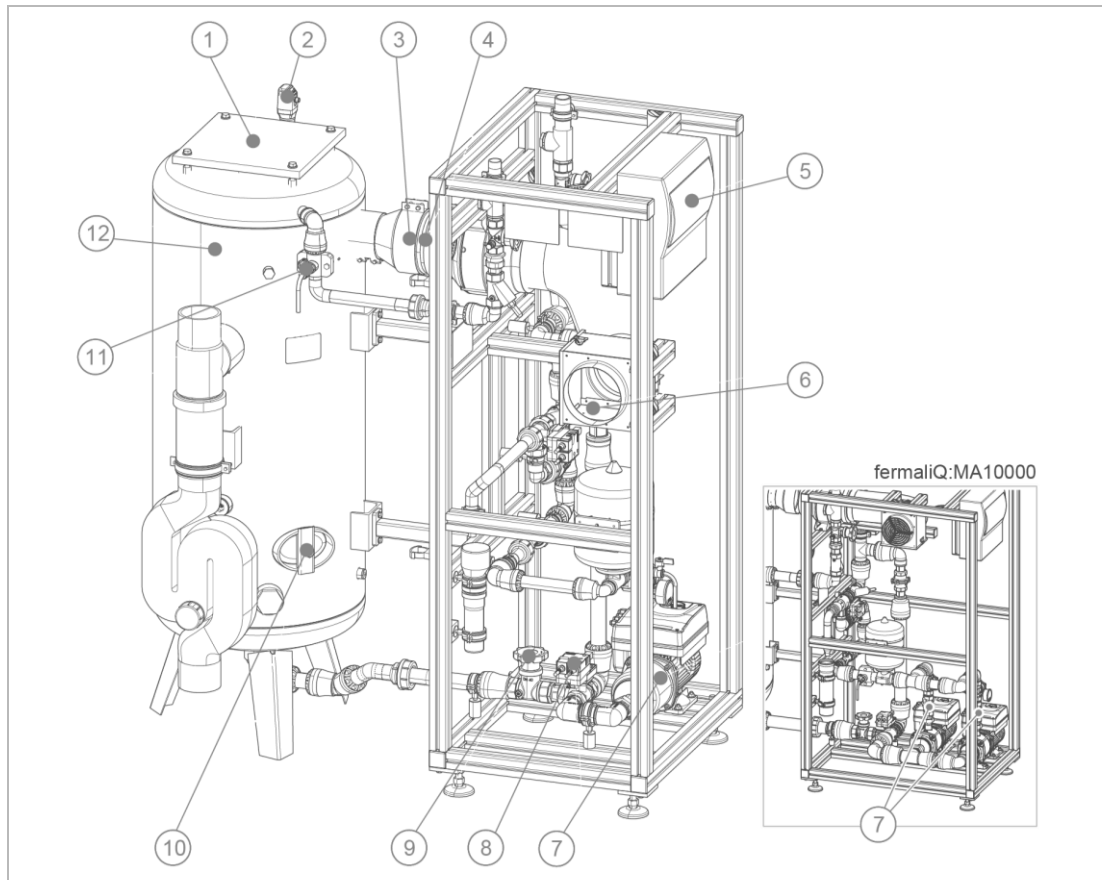
The following application limits must not be exceeded/undershot.

Application li- mits		
Manganese	mg/l	≤ 1.0
Iron	mg/l	≤ 15.0
pH range		6.5 – 8.5
Ammonium	mg/l	≤ 3.0

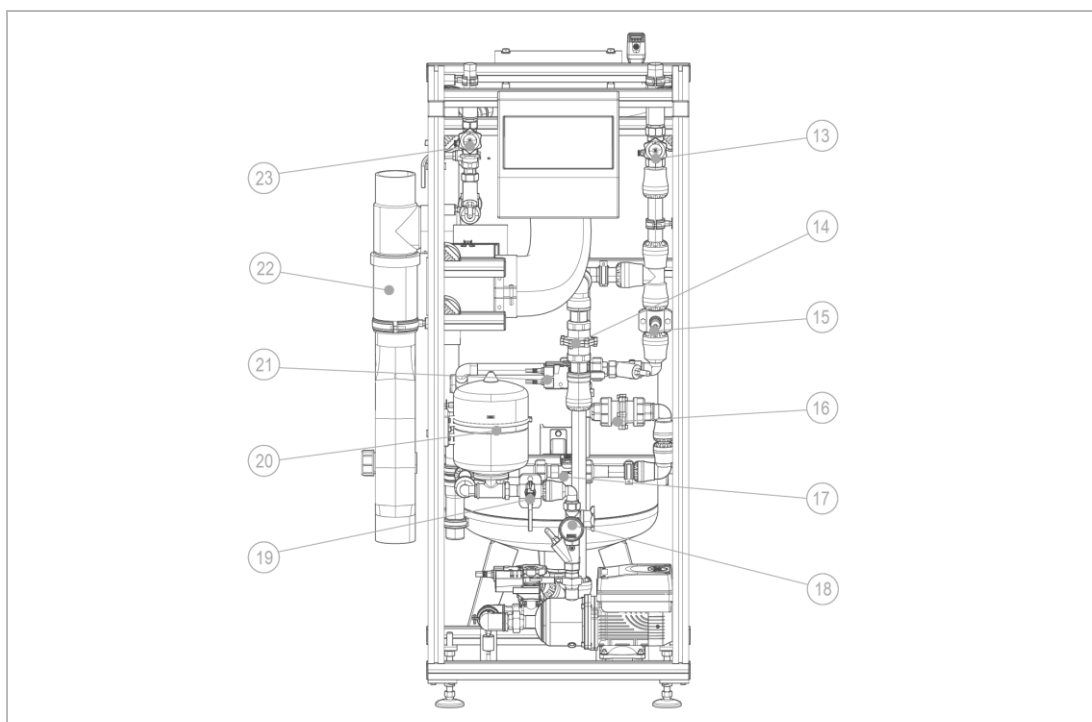
3.1.2 Foreseeable misuse

- Using the system for complete drinking water treatment.

3.2 Product components

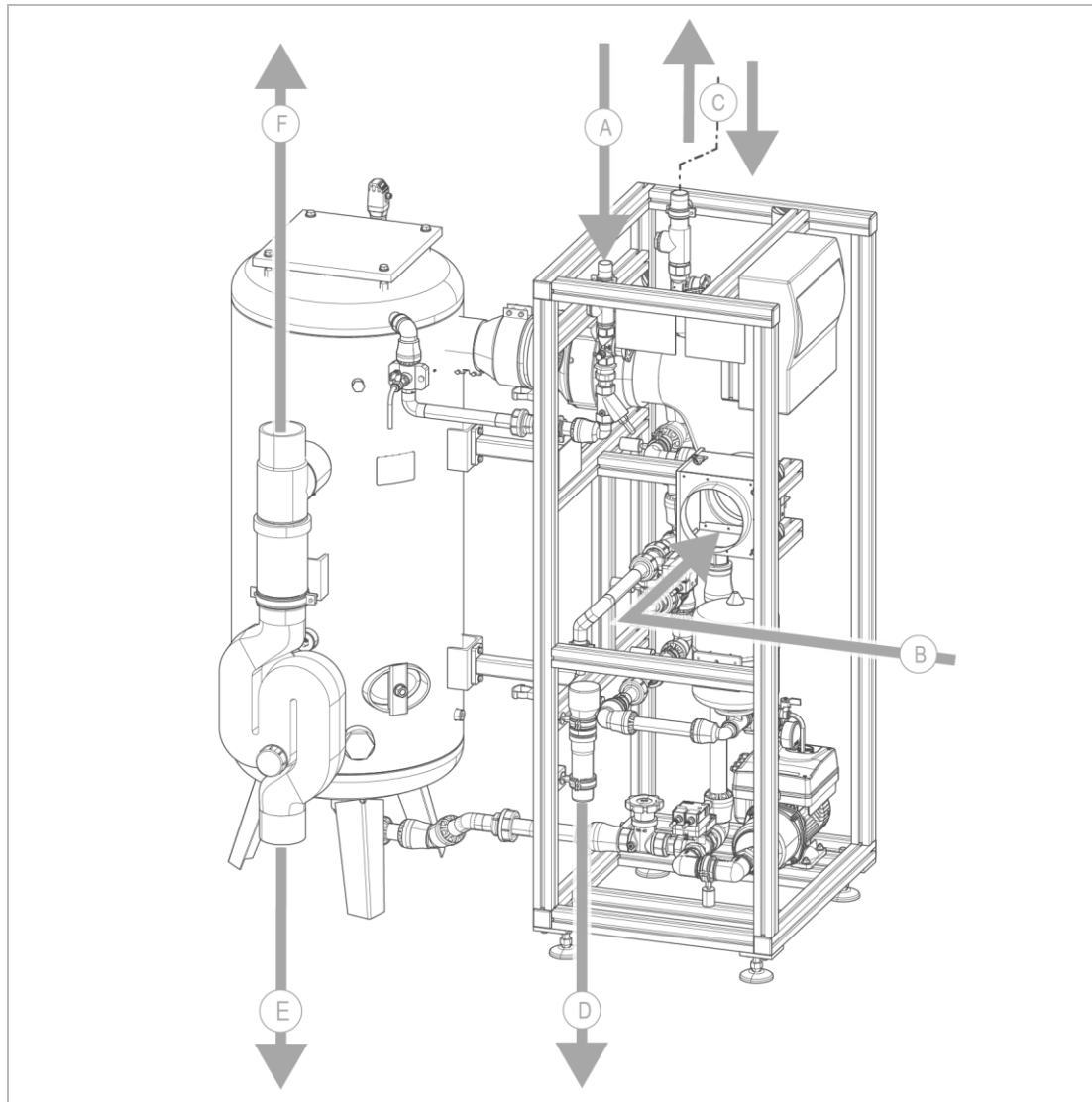


Designation	Function	Coding
1 Lid	Closure of filter tank	-
2 Level probe	Level 1: Filling & aeration OFF (= Make-up water feed stop) Level 2: Filling & aeration ON (= Make-up water feed start & filtrate pump start) Level 3: Dry-run protection filtrate pump (= stop filtrate pump)	1MSF1CL01
3 Pipe fan	Supply of atmospheric oxygen to oxidate iron and manganese Switch-off delay to outgas moist exhaust air	1MSF1AP03
4 Air backflow flap	Moist air in the filter tank is retained and does not penetrate into the installation room.	-
5 Switch box with operating unit	Control of the filter system	1MSF1AE01
6 Air filter box	Contains a particle filter to filter the intake supply air	1MSF1AF01
7 Filtrate pump <i>For fermalIQ:MA10000: 2 x Filtrate pump</i>	To perform the filtration and the discharge of first filtrate	1MSF1AP02 1MSF1BP02
8 Filtration/backwash shut-off valve	Automatic 3-way ball valve to control filtration and backwash	1MSF1AV01
9 Tank shut-off valve	Piston valve to separate the filter tank from the rack with the technical equipment	1MSF1AH03
10 Handhole	Enables lateral access to the filter tank for maintenance work	-
11 Raw water sampling valve	Flame-sterilisable sampling valve to withdraw water samples	1MSF1AH51
12 Filter tank	Tank including fixtures and filter materials	1MSF1AB01



Designation	Function	Coding
13 Filtrate shut-off valve	Piston valve to separate the filtrate pipe from the interface supplied by the client on site	1MSF1AH05
14 Flow stabiliser Backwash	Setting the backwash volume flow	1MSF1AS05
15 Pressure switch	Backwash monitoring Required minimum pressure (adjustable: 0.1 – 1.0 bar) must be reached during backwash	1MSF1ACP03
16 Flow stabiliser Filtration	Setting of filtrate volume flow	1MSF1AS04
17 Flow sensor	Indication of actual flow rate in the display of the control unit and archiving of total flow	1MSF1ACF01
18 Filtrate pressure gauge	Indication of filtration pressure	1MSF1ACP02
19 Filtrate sampling valve	Flame-sterilisable sampling valve to withdraw water samples	1MSF1AH52
20 Diaphragm expansion tank	To absorb water hammer Autonomous switch-off of filtrate pump (no interference from client on site) Protection of the filtrate pump against frequent switching changes	1MSF1AB02
21 Shut-off valve filtration/discharge of first filtrate	Automatic 3-way ball valve to switch filtration and discharge of first filtrate	1MSF1AV02
22 Overflow loop	Discharge of backwash water to drain and upward discharge of exhaust air	-
23 Raw water shut-off valve	Piston valve to separate the raw water pipe from the interface supplied by the client on site	1MSF1AH01

3.3 Connections



Inlet

Designation

- A Raw water inlet
- B Supply air
- C Backwash water inlet

Outlet

Designation

- C Filtrate outlet
- D Discharge of first filtrate to drain
- E Flushing water outlet
- F Exhaust air

3.4 Functional description

The filter system is operated in 4 steps.

- Filling and aeration
- Filtration
- Backwash
- Discharge of first filtrate

3.4.1 Filling and aeration

- The raw water is delivered into the filter tank by the raw water pump provided by the client on site.
- Afterwards the raw water is atomised (increase of the water's surface to optimise the oxidation process).
- At the same time, ambient air is introduced into the upper part of the tank by means of a pipe fan (increase of oxygen supply for improved oxidation of iron/manganese and for outgassing odorous substances).
- The raw water pump and the pipe fan are switched on and off by the level control in the filter tank.
- The pipe fan switches off time-delayed to outgas the moist exhaust air generated by the atomisation process from the filter tank.
- » Oxygenated raw water is located in the filter tank.

3.4.2 Filtration

- The raw water contained in the filter tank is drawn off through the various filter layers and the star-shaped nozzle assembly.
- » Filtrate was generated.
- A pressure booster system delivers the filtrate to a pressurised water tank provided by the client on site or a diaphragm expansion tank provided by the client on site. This on-site tank on the one hand serves as buffer tank to meet short-term peak consumption and on the other hand, the filtrate volume stored in it is used to backwash the filter tank.
- The filtrate pump is controlled to an adjustable constant pressure using a frequency converter. When this pressure is reached permanently (e.g. when all withdrawal points of the consumer are closed), the pump is switched off.
- » Filtrate is available.

3.4.3 Backwash

- The energy stored in pressure cushion of the tank provided by the client on site is used to deliver the filtrate located there into the filter tank.
 - The uniform distribution of the backwash water in the filter tank is ensured by the star-shaped nozzle assembly and by the support layer consisting of quartz gravel.
 - During the backwash process, the filter material is loosened and the substances that have been deposited on the surface of the filter material during filtration are removed. Via the overflow funnel, the substances are then flushed to the drain.
 - A backwash process is triggered when a certain fixed time (weekday and time) has been reached. The duration and time of the work step can be preset.
 - For hygiene reasons, a backwash takes place at least once a day.
 - An automatic backwash monitoring system with backwash counter checks whether the backwash has taken place. Backwash processes that have not been completed properly are detected by the control unit. When a preset counter value (e.g. 3) is reached, an error signal and a visual signal on the display of the control unit indicate an error.
- » The filter tank was backwashed.

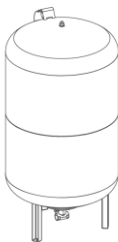
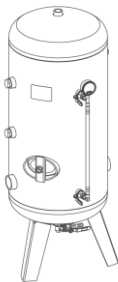
3.4.4 Discharge of first filtrate

- The first filtrate is always discharged fully automatically after a backwash process.
 - The discharge of first filtrate corresponds to filtration into the sewer with the appropriate filtration volume flow rate.
 - The duration of this work step can be preset.
 - This process is designed to compress the filter material and to prevent particles/turbidities from entering into the filtrate.
- » Backwash and discharge of first filtrate were carried out.
- » Filling & aeration as well as filtration are continued.

3.5 Accessories

Your product can be retrofitted with accessories. Please contact your local Grünbeck representative or Grünbeck's headquarters in Hoechst/ Germany for details.

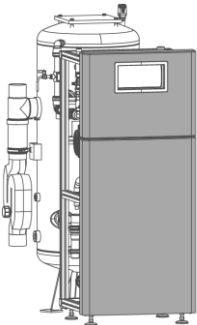
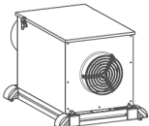
Product	Order no.
 Diaphragm expansion tank DD 33,G$\frac{3}{4}$ To prevent water hammer in the inlet if a compressed-air chamber provided by the client on site is used to store the filtrate.	33 890 60 304

Product		Order no.	
	Diaphragm expansion tank (Diaphragm expansion tank)	25 l	535 105
	In addition to an existing diaphragm expansion tank or for new installations as water supply during the flushing process of the filter system	60 l	535 115
		80 l	535 125
		100 l	535 135
		300 l	535 155
		500 l	535 165
	Pressurised water tank, 6 bar	150 l	530 505
	In addition to an existing pressurised water tank or for new installations as water supply during the flushing process of the filter system	300 l	530 515
		500 l	530 525
		750 l	530 535
		1000 l	530 545
Water test kit for iron		170 150	
Measuring range 0 – 0.8 mg/l and 1 – 10 mg/l (30 determinations)			
Water test kit for manganese Measuring range 0.03 – 0.5 mg/l (100 determinations)		170 097	
Refill pack of reagents for water test kit for manganese		170 193	
Water test kit for pH value Measuring range 4.5 – 10 (100 test strips)		170 148	

3.6 Optional supplementary equipment



Your product can be retrofitted with additional accessories. Please contact your local Grünbeck representative or Grünbeck's headquarters in Hoechststadt/Germany for details.

Product		Order no.
	Front cover of fermaliQ:MA	530 508
	Fine dust filtration for fermaliQ:MA	530800000000

4 Transport, installation and storage

4.1 Shipping/Delivery/Packaging

The system (system rack and filter tank) is fixed on a pallet each at the factory and secured against tipping.

- The system rack is transported standing up and has a low centre of gravity.
- The filter tank is transported in a horizontal position and has a low centre of gravity.
- ▶ Load and unload the system with a forklift or lift truck with suitable pallet forks. Mind the system's centre of gravity.

NOTE

Damage to the system when lifted by crane and lifting strap



- The system does not feature any lifting points for lifting by means of a crane and a lifting strap.
- ▶ The system must not be loaded/unloaded by crane and lifting strap.
- ▶ Dispose of the packaging material in an environmentally sound and appropriate manner only after installation of the system.

4.2 Transport/Placing



WARNING

Risk of tipping over in the event of improper transport

- The system may tip and crush persons/limbs.
- ▶ Transport the system by means of a forklift or lift truck with appropriate forks only – mind the marked pick-up direction
- ▶ Do not transport the system over inclines or stairs.

Transporting the system rack

The system rack is fixed on a pallet at the factory and secured against tipping.

- The system rack is transported standing up.
- The system rack does not feature any lifting points for lifting with lifting gear. The system must not be loaded/unloaded by crane.
- ▶ Only transport the system rack to the installation site (longer distances) when secured on the pallet.
- ▶ Transport the unpacked system (without pallet) in close vicinity of the final installation site only – do not lift it at the system rack.
- ▶ Remove the transport lock, if present.

Transporting the filter tank

The filter tank is fixed on a pallet at the factory and secured against tipping/rolling off.

- The filter tank is transported in a horizontal position.
- ▶ Only transport the filter tank to the installation site (longer distances) when secured on the pallet.
- ▶ Install the level probe (refer to chapter 5.3).
- ▶ Erect the filter tank at the installation site using a suitable lifting device.
- ▶ Use the lugs on the filter tank to lift it.

4.3 Storage

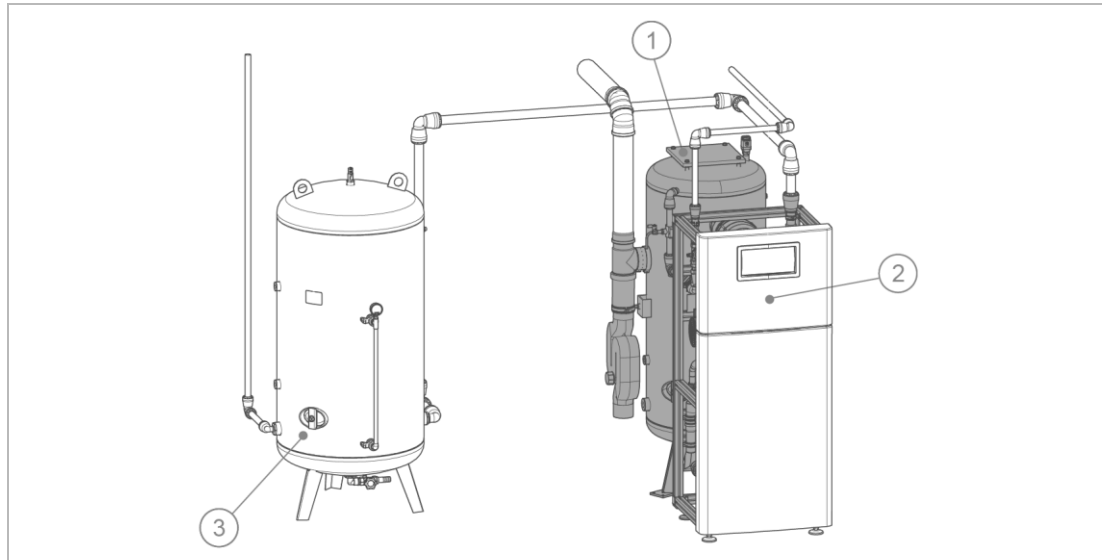
- ▶ Store the product protected from the following effects:
 - Moisture, wetness
 - Environmental impacts such as wind, rain, snow, etc.
 - Frost, direct sunlight, severe heat exposure
 - Chemicals, dyes, solvents and their vapours
- ▶ Do not stack the individual devices on top of each other and do not place any loads on the product packaging of the system.

5 Installation



The installation of the system represents a major intervention into the water system and must be carried out by a qualified specialist only.

Installation example



Designation

- 1 Oxidation filter system fermaliQ:MA3000
- 2 Front cover of fermaliQ:MA (option)

Designation

- 3 Pressurised water tank (supply tank)



CAUTION

Laying cable trays/pipes on traffic routes.

- Persons can stumble/fall.
- ▶ Do not lay pipes and cable trays in traffic ways or at access points to the system components.
- ▶ Make sure that necessary traffic routes and escape routes are kept clear.

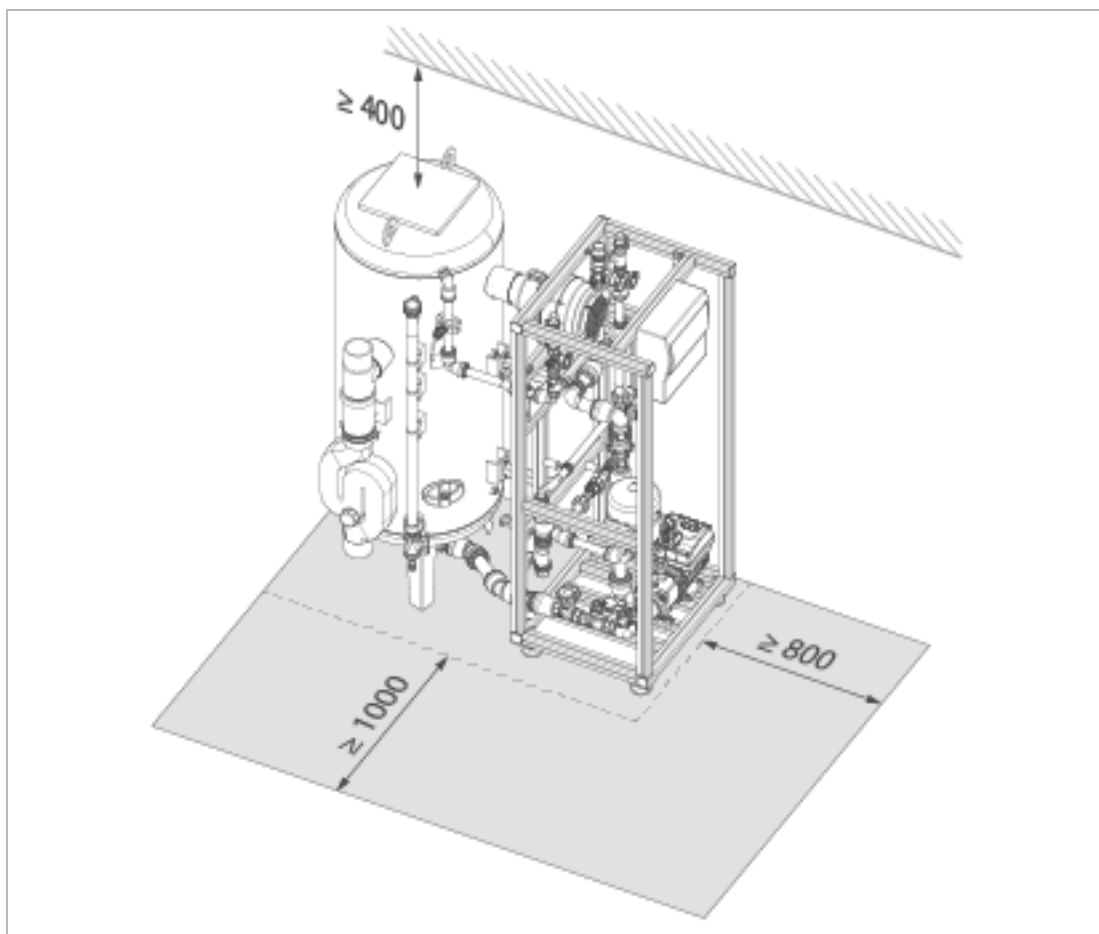
5.1 Requirements for the installation site

- ▶ Obey local installation directives, general guidelines and technical specifications.
- The installation site must be frost-proof and ensure the system's protection from chemicals, dyes, solvents and their vapours as well as from unauthorised access, etc.
- Avoid strong heat radiation and direct sunlight.
- For the electrical connection a Schuko socket is required within a distance of approx. 2 m. The socket outlet requires a permanent power supply and must not be coupled with light switches, emergency heating switches or the like.
- The installation site must be adequately illuminated and ventilated.

- It must be possible to take the system to the installation site unobstructed and in a timely manner.
- On-site obstacles/restrictions must be indicated in advance and taken into account in the design of the system.
- A drain connection of adequate dimensions (DN 100) must be present.
- A floor drain suitable for the respective system size must be available at the installation site. If no floor drain is available, the client must install a flushing water tank including waste water lifting system on site.
- Lifting systems must be secured against power failure.

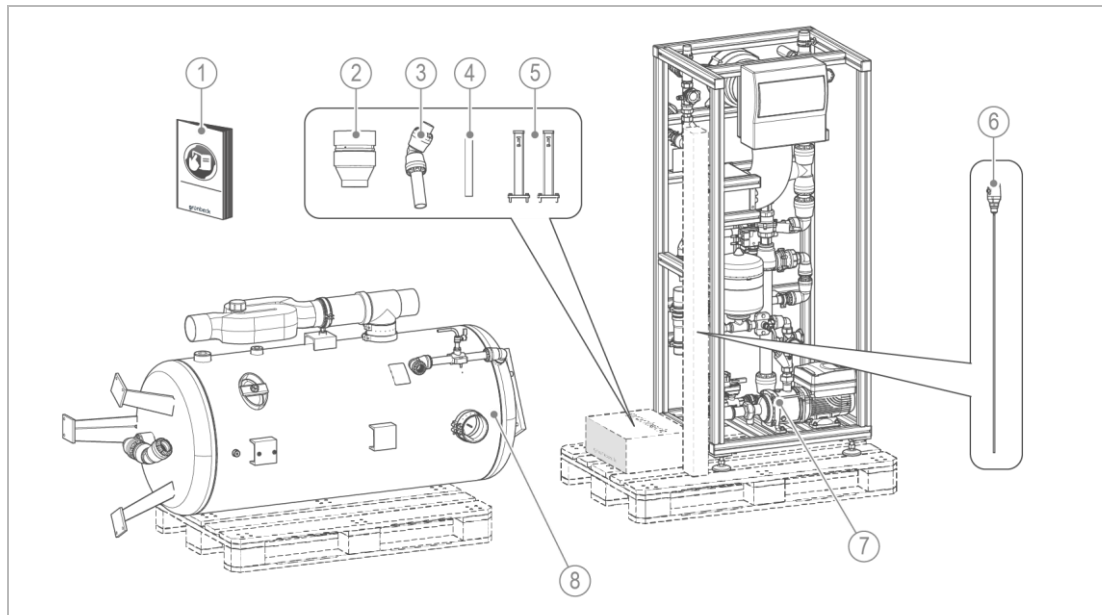
5.1.1 Placing of the system/space required

- The sufficiently dimensioned installation surface of the system (foundation) must be level and have sufficient strength and load-bearing capacity to support the operating weight of the system.
- The system must be accessible for maintenance and repair work.
- Before setting up the individual systems, check that there is sufficient working space.



- Set up the system in a way that there is a working space of at least 800 mm on the front side (switch cabinet) and at least 1000 mm on the left side (to the left of the switch cabinet) of the system.
- In addition, a distance of at least 400 mm must be kept to the ceiling.

5.2 Checking the scope of supply



Designation
1 Operation manual
2 Non-return flap of pipe fan
3 Outlet pipe filter tank
4 Inlet pipe filter tank

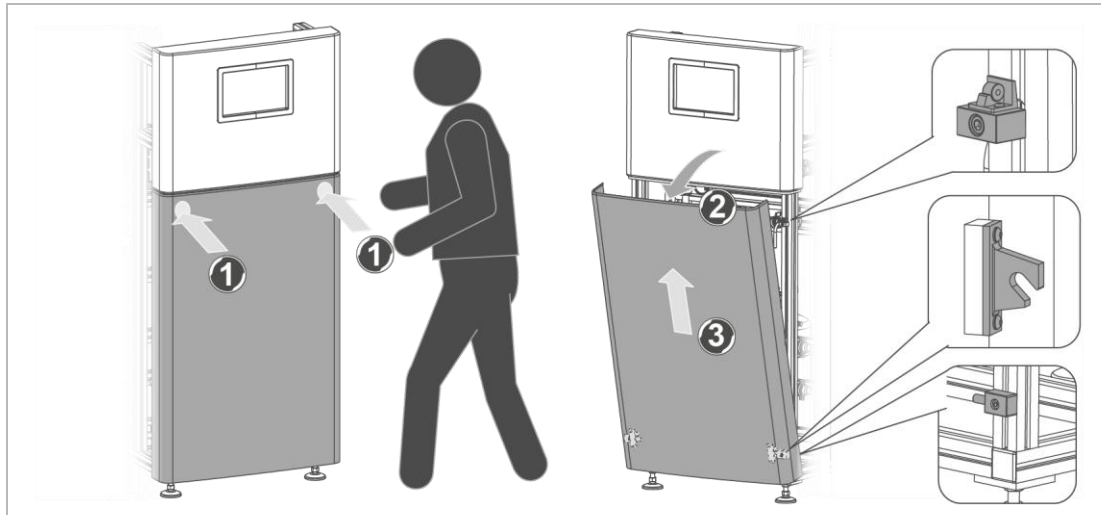
Designation
5 Profile rail to connect the system rack and the filter tank (incl. screws)
6 Level probe
7 System rack fixed on a pallet
8 Filter tank fixed on a pallet

- Check the scope of supply for completeness and damage.

5.3 Removing the front cover (supplementary equipment)

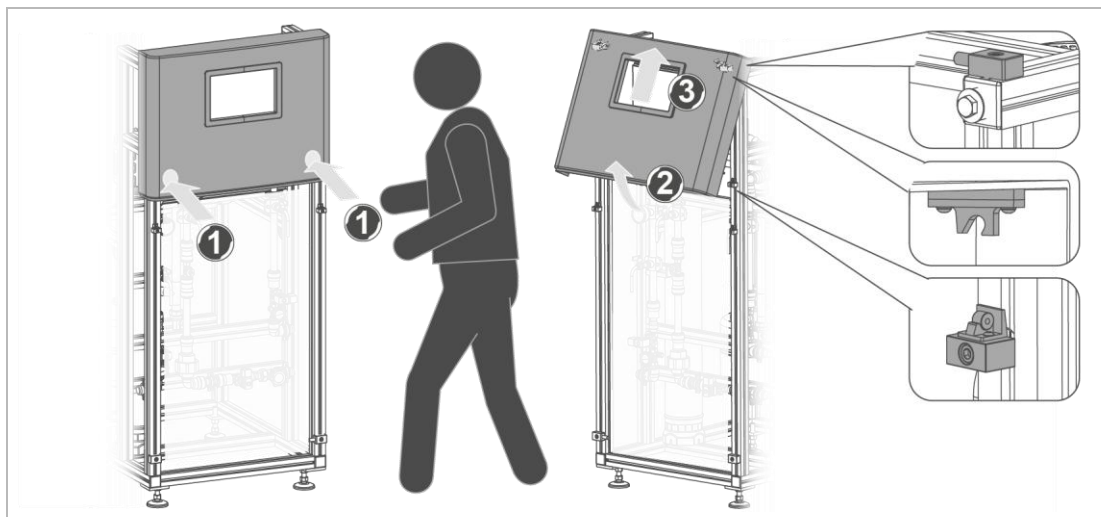
The optional front cover must be removed in order to carry out preliminary work (installation, inspection and maintenance) on the technical equipment.

Removing the lower cover



1. Push the cover against the system rack at the upper corners.
» The snap-fit connections release the cover.
2. Tilt the top of the cover forwards.
3. Lift off the cover from the lower attachment.
4. Put the cover down and secure it against toppling.

Removing the upper cover



5. Push the cover against the system rack at the bottom corners.
» The snap-fit connections release the cover.
6. Lift off the cover from the upper attachment.
7. Tilt the cover forwards on the underside.

8. Put the cover down and secure it against toppling.
» The front cover is removed.

5.4 Installation

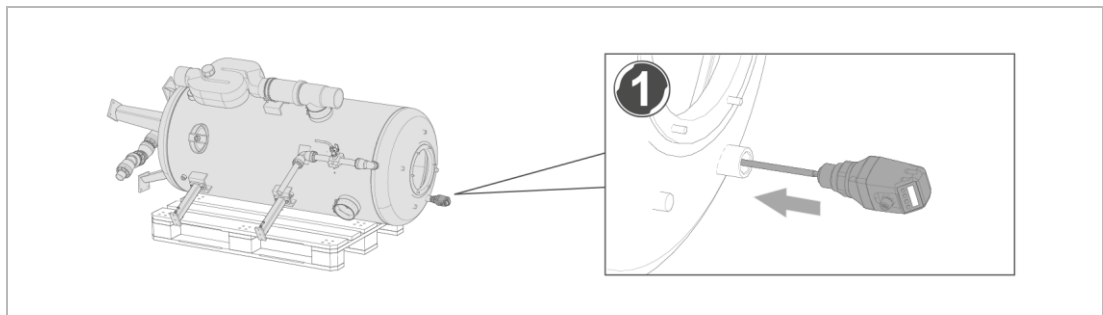
5.4.1 Preliminary work

1. Release the system rack from the transport lock.
2. Remove the pallet.
3. Securely place the system at the designated location – take note of the minimum space required.
4. Level out possible unevenness with the levelling feet.
5. Remove the protective caps from the connections.

5.4.2 Installing the level probe

To protect against damage, the level probe is dismantled for transport.

- Proceed as follows to install the level probe on the tank while the tank is still in horizontal position:



1. Insert the measuring rod of the level probe into the opening provided for this purpose.
2. Screw the level probe to the filter tank. Make sure that the sealing washer is located between the level probe and the filter tank. Tighten the level probe.

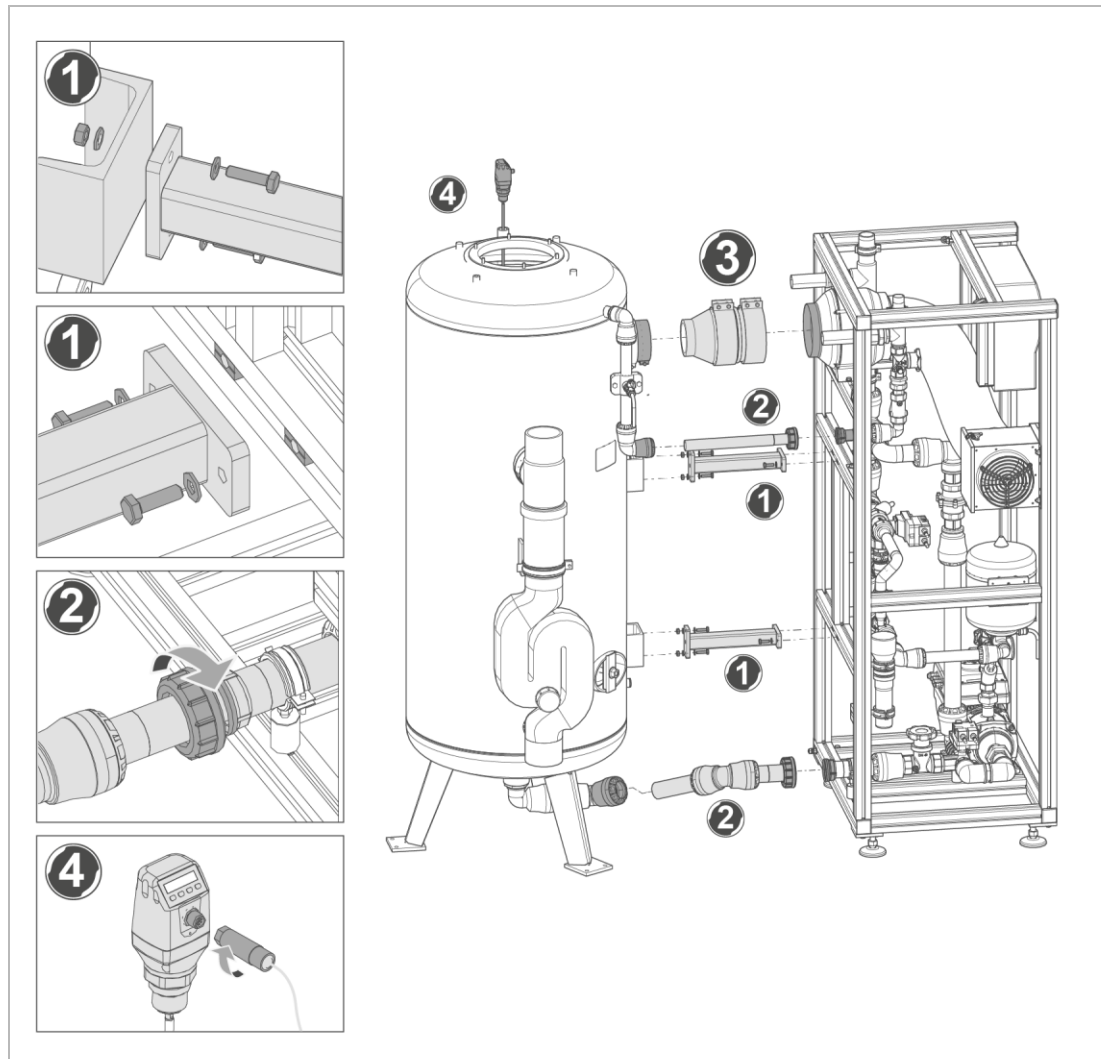
5.4.3 Connecting the system rack with the filter tank



CAUTION

Working at heights (approx. 2 m) during installation

- Risk of injury when falling.
- Use a stable stepladder.



1. Screw the system rack to the filter tank.
2. Connect the inlet and outlet pipes of the filter tank to the system rack.
3. Connect the pipe fan to the filter tank.



Make sure that the pipe fan is slightly tilted downwards towards the filter tank.

Adjust the levelling feet of the rack accordingly.

The slight tilt guarantees that no water droplets (when the raw water is atomised) can enter the housing of the pipe fan.

4. Connect the level probe. The cable is prepared at the factory.

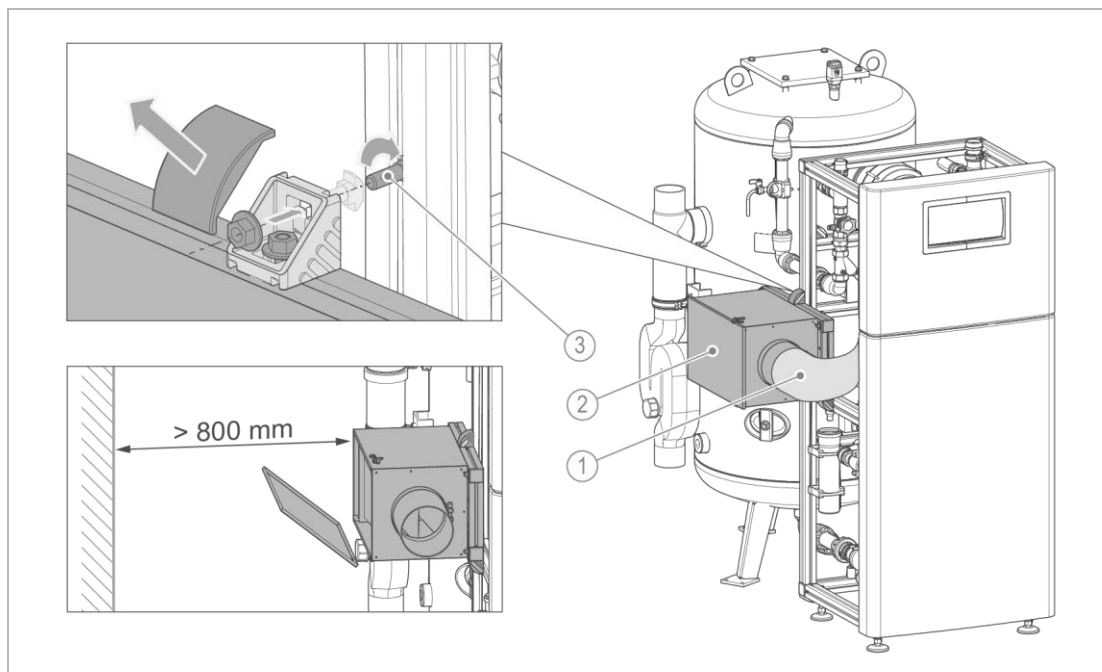
5. Fix the feet of the filter tank to the floor with suitable fastening materials (depending on the floor conditions).
- » The system rack and the filter tank are installed.

5.4.4 Installing the fine dust filtration (supplementary equipment)

You can install the fine dust filter directly on the rack or on a flat surface (e.g. wall) near the system. The supply air pipe is approx. 5 m long.

- Select the installation location for the filter box so that it is easily accessible for filter replacement.

Installation on the rack



Designation	
1	Supply air pipe
2	Filter box

Designation	
3	Hammer head screw

1. Remove the cover from the angle brackets of the pre-assembled filter box.
2. Screw the filter box to the rack using the angle brackets and a hammer head screw.
- » Connect the supply air pipe. Use a hose clamp to secure the line to the filter box.

5.5 Water installation

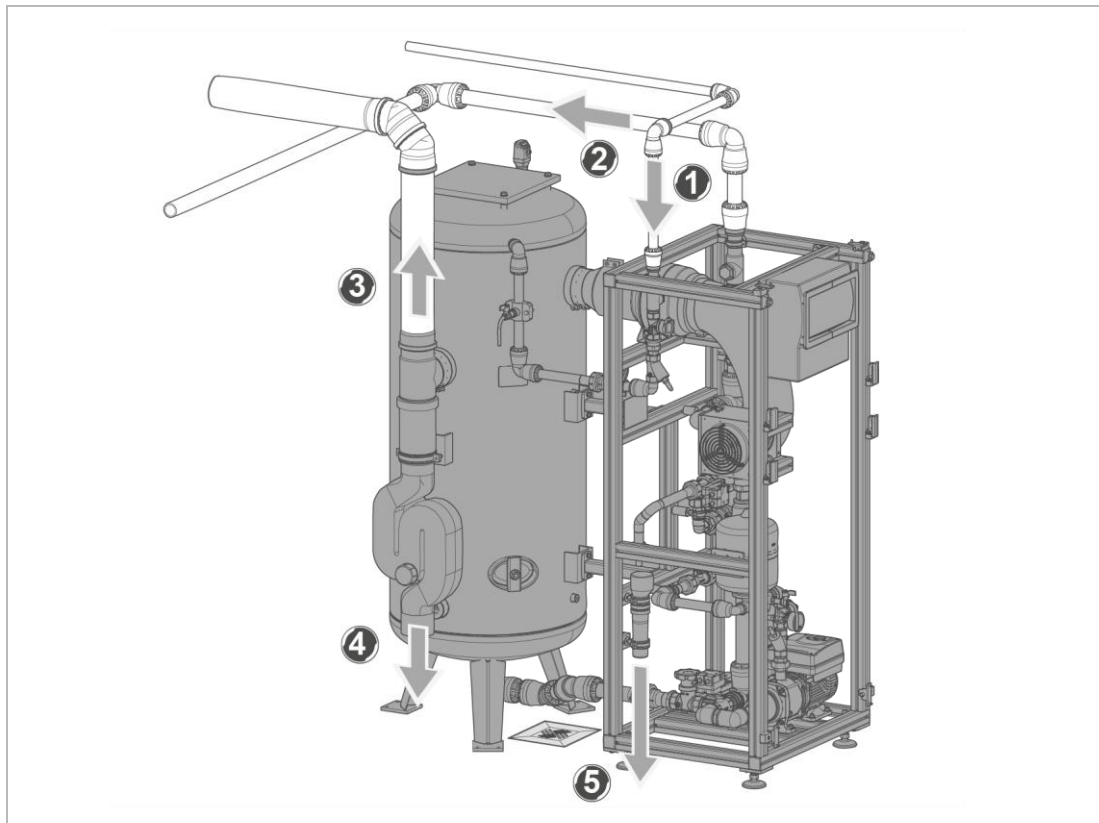
5.5.1 Connecting the system



WARNING

Incorrect routing of the exhaust air pipe

- Irritation/chemical burns of the respiratory tract due to harmful gases (H_2S , CH_4) escaping – only applicable if these gases are dissolved in the raw water.
- Check the inlet and exhaust air piping provided by the client on site as well as the inlet and exhaust air hoses for leaks at least once a week.
- Pipes for raw water waste, water and filtrate provided by the client on site must be separable, for instance, by a screw connection (shut-off valve).
- Only use corrosion-resistant materials for the piping of the system/system components.



1. Connect the inlet pipe to the “raw water inlet” connection.
2. Connect the outlet pipe “filtrate outlet” to the supply tank.
3. Connect the exhaust air piping to the upper part of the overflow loop. Route the pipe upwards and then along the ceiling. Make sure to use as few angle brackets as possible to the interface to the outside in order to avoid any unnecessary slowing of the exhaust air volume flow.
4. Route the outlet “backwash water to drain” to the drain.
5. Route the outlet “discharge of first filtrate to drain” to the drain.

5.6 Electrical installation



DANGER

Lethal voltage of 230 V

- Risk of severe burns, cardiovascular failure, fatal electric shock.
- ▶ The electrical installation must be carried out by a qualified electrician only.
- ▶ Check the system for proper condition prior to commissioning.
- ▶ Switch off the supply voltage before working on electrical system parts.
- ▶ Secure the system against being switched back on.
- ▶ Discharge residual voltage.
- ▶ Only use suitable, undamaged tools.
- ▶ Use personal protective equipment – do not work with wet hands.

NOTE

Malfunctions caused by the frequency converter

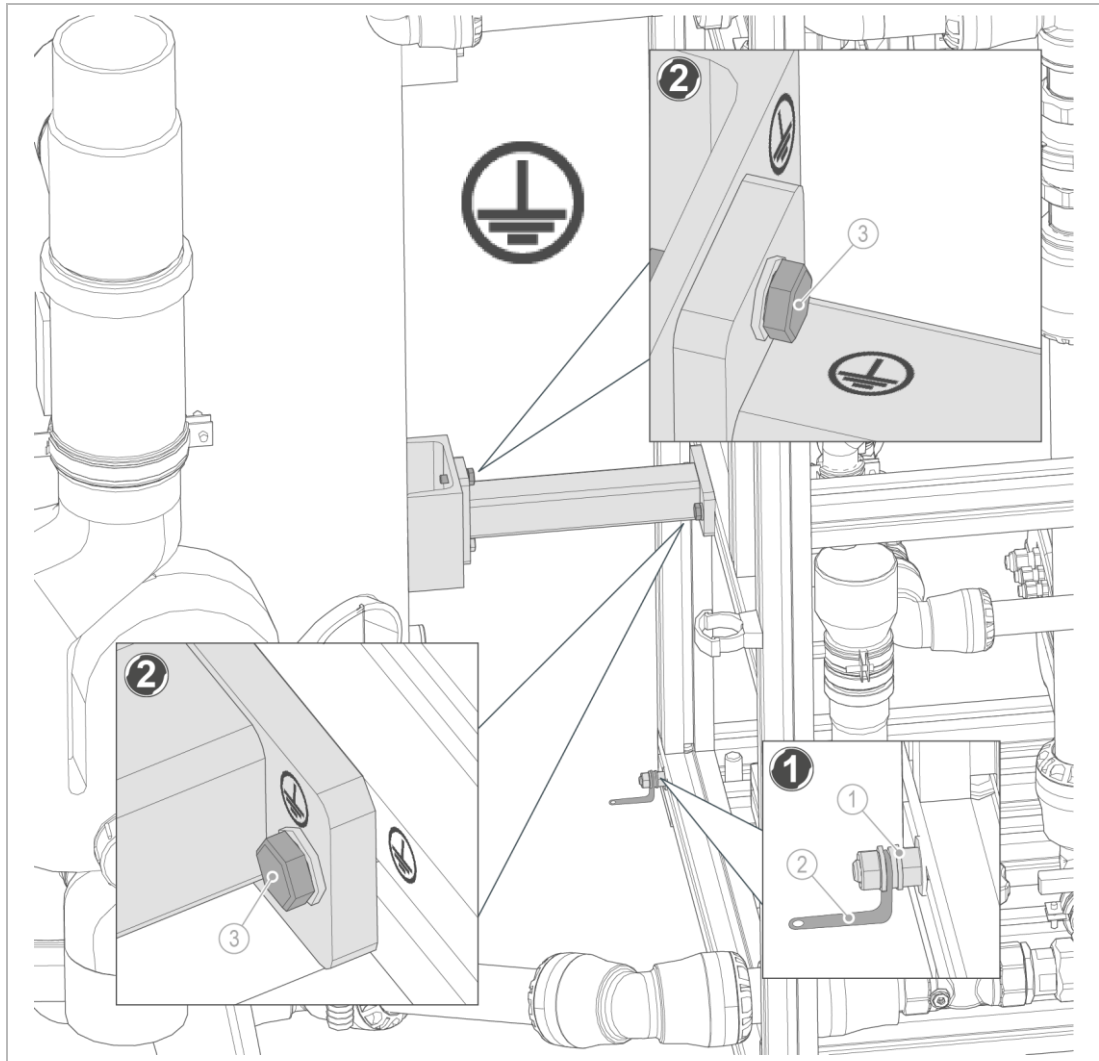
- The frequency converter of the centrifugal pump can cause malfunctions of the residual current circuit breaker installed in the mains supply line.
- ▶ Use an AC/DC sensitive RCCB with a response threshold of 30 mA.
- ▶ Use a of 230 V/50 Hz/L/N/PE power outlet with 16 A fuse protection for the on-site power supply of the system.
- ▶ Make sure that the protective conductor has at least a cross section of 10 mm² (Cu).

1. Carry out the electrical installation according to the electrical circuit diagram no. 530547E00.
2. Connect the raw water pump (refer to electrical circuit diagram no. 530547E00).

5.6.1 Establishing potential equalisation

In normal operation, the speed-controlled filtrate pump can have a ground leakage current > 10 mA.

► Proceed as follows to establish the connection to the potential equalisation:



Designation

- 1 Hammer head screw
- 2 Ribbon cable

Designation

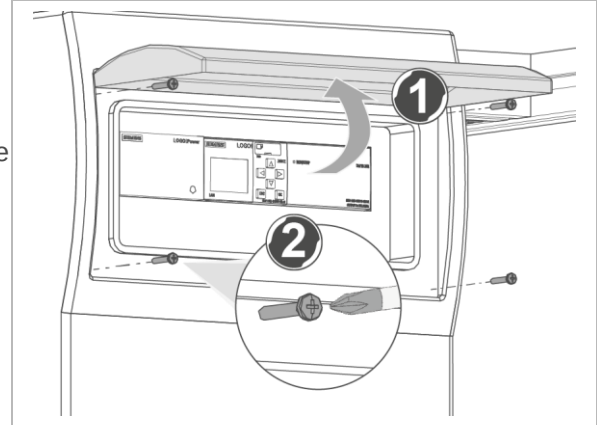
- 3 Earth screw

1. Connect the system rack with the potential equalisation provided by the client on site.
 - a Connect the multi-pin strap cable to the hammer head screw.
 - b Connect the multi-pin strap cable to the potential equalisation provided by the client on site.
2. Screw the system rack and the filter tank together on both sides with an earth screw each in accordance with the standard

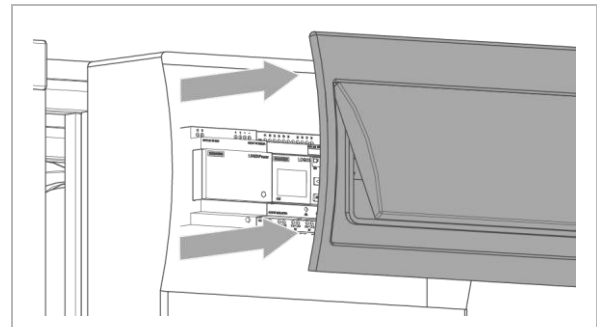
5.6.2 Connecting the raw water pump

The raw water pump provided by the client on site is enabled from switch cabinet 1MSF1AE02.

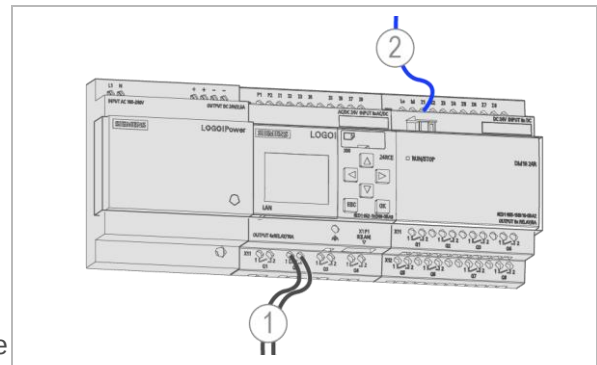
1. Open the cover of the control unit.
2. Using a cross-headed screwdriver, loosen the four screws at the corners under the cover.



3. Remove the cover toward the front.



4. Connect the raw water pump:
 - a Connect "Enable raw water pump" to terminals **Q2** of the middle module 4A1 .
 - b Connect "Raw water pump in operation" to terminal **I1** of the right-hand module 4A2.
 - c Bridge the input to **L+**, if there is no "Raw water pump in operation".

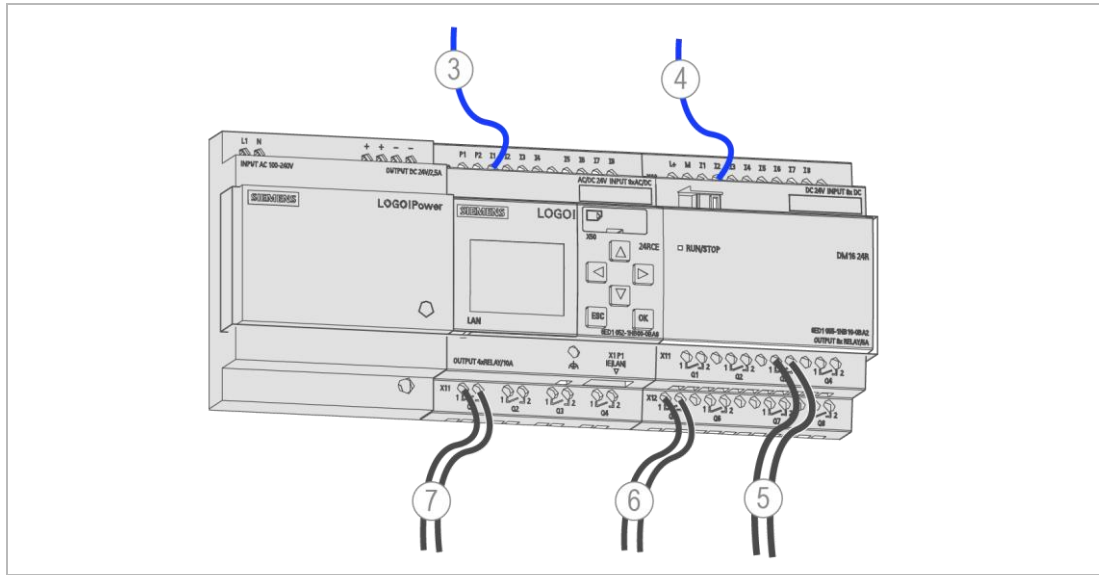


Designation

- 1 Enable raw water pump
voltage-free, max. 250 V, 2 A
- 2 Raw water pump in operation

5.6.3 Connecting the options

- Open the cover (refer to chapter 5.6.2, steps 1 – 3).



Designation	Function
3 "Enable system" voltage-free, max. 250 V, 2 A	If signal at the input is <i>FALSE</i> (0 V at the input), all running processes are aborted and the system returns to the basic state. The system remains locked until the signal at the input is <i>TRUE</i> (+24 VDC at the input).
4 "Enable filtrate pump(s)" voltage-free, max. 250 V, 2 A	If signal at the input is <i>FALSE</i> (0 V at the input), the filtrate pump(s) 1MSF1AP02 (1MSF1BP02) does not/do not deliver any filtrate to the consumer. First filtrate and manual discharge of first filtrate are possible nevertheless.
5 Collective fault voltage-free, max. 250 V, 2 A	
6 Enable dosing voltage-free, max. 250 V, 2 A	Contact is closed during make-up water feed (activation of raw water pump). (Only if "Raw water pump in operation" is present <i>TRUE</i> (+24 VDC at the input), the contact is closed).
7 Backwash signal voltage-free, max. 250 V, 2 A	Contact is closed during the backwash process until the backwash valve is in the closed position again. (Starting from first filtrate, the contact is open again)

Connecting "Enable system"

- Connect "Enable system" to terminals **1** of the middle module 4A1 .

Connecting "Enable filtrate pump(s)"

- Connect "Enable filtrate pump(s)" to terminals **2** of the right-hand module 4A2.

Connecting "Collective fault"

- Connect "Collective fault" to terminals **Q1** of the middle module 4A1.

Connecting "Enable dosing"

- Connect "Enable dosing" to terminals **Q4** of the right-hand module 4A2.

Connecting "Backwash signal"

- Connect "Backwash signal" to terminals **Q5** of the right-hand module 4A2.

5.6.4 Connection to the power supply

1. Install the cover and close the control unit.
2. Plug in the mains plug.

6 Commissioning



The start-up/commissioning of the system must be carried out by a qualified specialist only.

6.1 Filling in filter material



CAUTION

The containers/bags containing the filter material are heavy.

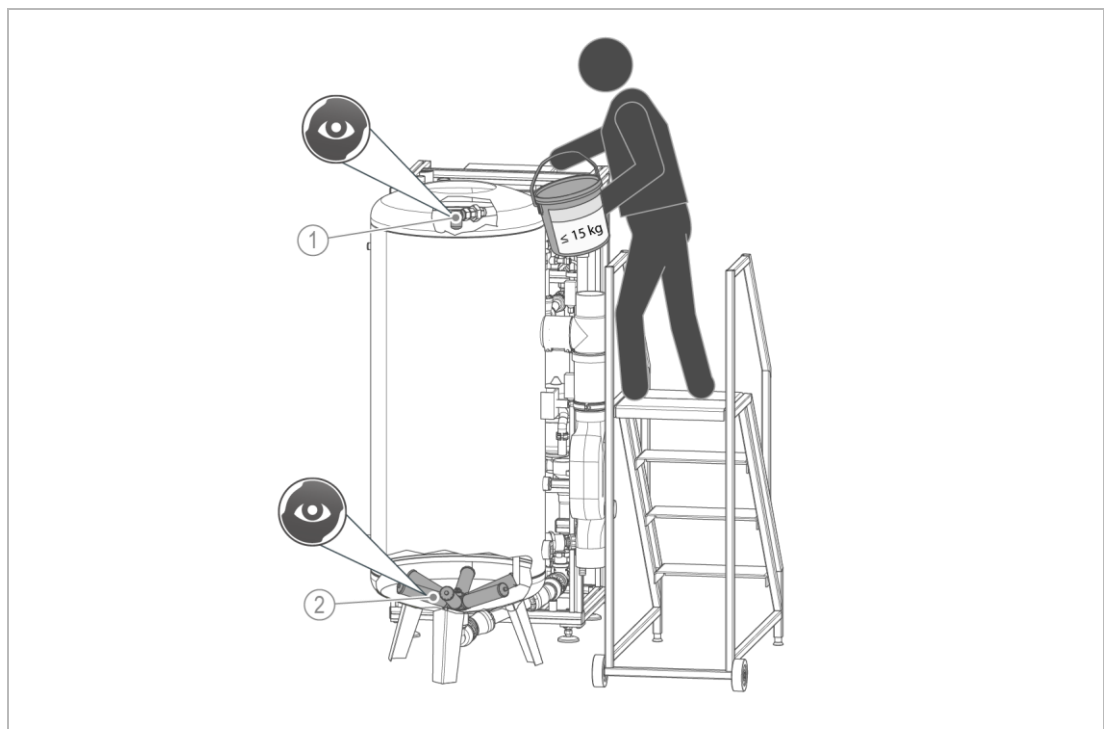
- Risk of injury when lifting heavy containers/bags
- When using lifting gear (e.g. cranes), there is risk caused by suspended loads
- ▶ Use a forklift, lifting cart or wheelbarrow to transport the filter material packed in bags.
- ▶ For transport up or down stairs: Fill the filter material into containers, so that the weight to be transported does not exceed 25 kg.
- ▶ Use an auxiliary container, which does not exceed a weight of 15 kg when full, to fill the filter materials into the filter tank.



CAUTION

Working at heights (approx. 2 m) during filling

- Danger of falling
- ▶ Use stable access equipment with a shelf for filter material.



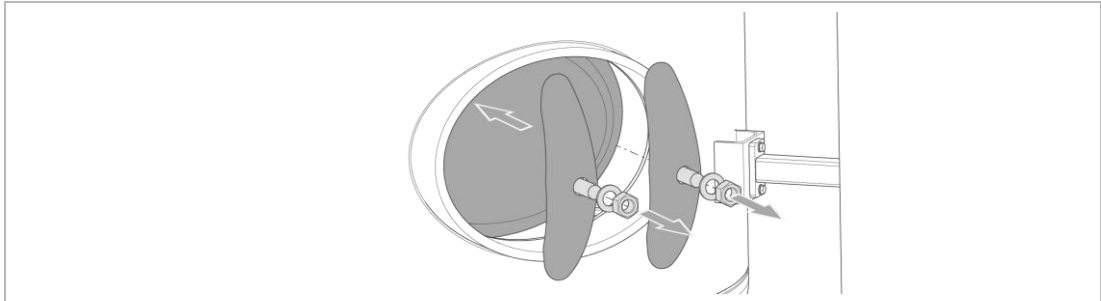
Designation

1 Nozzle

Designation

2 Star-shaped nozzle assembly

1. Loosen the screw connections of the lid.
2. Remove the lid of the filter tank (weight approx. 5 kg) and place it next to the system.
3. Check the nozzle and the star-shaped nozzle assembly for completeness and integrity – use the handhole to check the star-shaped nozzle assembly.



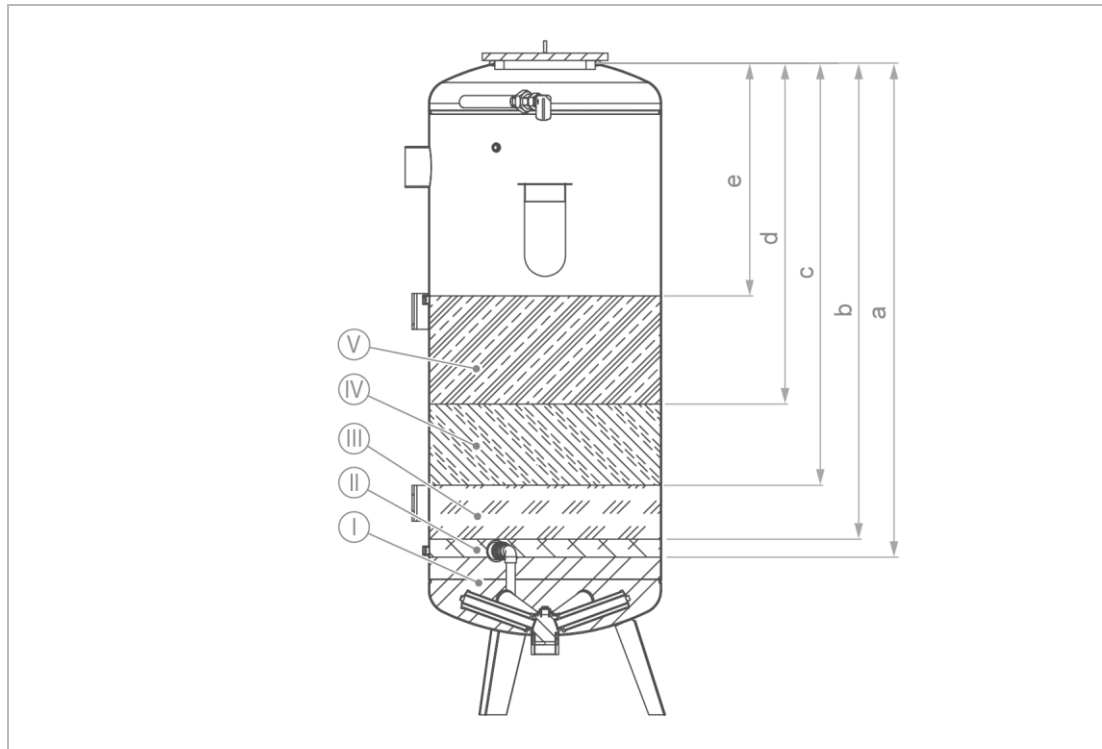
- a Open the handhole by loosening the screw nut.
 - b Carry out a visual inspection.
 - c Close the handhole.
4. Fill the filter tank about halfway with water. This prevents dust when filling in the support and filter layers.

NOTE

Damage to the star-shaped nozzle assembly during filling.

- ▶ Make sure that the filter tank is half full of water.
- ▶ Pour the filter material in slowly.
- ▶ Make sure that the support layers and filter layers are distributed uniformly.

5. Filling in the support layers:
 - a Fill in the support layers (I, II) in the specified order according to the filling diagram – refer to the chart and tables below.
6. Filling in the filter layers:
 - a Fill in the filter layers (III, IV, V) in the specified order according to the filling diagram – refer to the chart and tables below.
7. Fill the filter tank with water up to the overflow.
8. Leave the system in this state for 24 hours (soaking time).
 - » The filter material wets and partially soaks up the water.
 - » The resulting increase in weight prevents the filter material from being flushed out during future backwash processes.



6.1.2 Filter filling for deferrisation/demanganisation

Filter material			MI	2000	3000	5000	10000
I	Quartz sand SB 3.15 – 5.6 T	a Filling height	mm	1150	1425	1410	1660
		Filling volume	kg	50	75	125	250
		Layer height	mm	155	165	180	190
II	Quartz sand SB 1.0-2.0 T	b Filling height	mm	1075	1375	1340	1605
		Filling volume	kg	25	25	50	75
		Layer height	mm	75	50	70	55
III	Filter sand SB 0.4 – 0.8 T	c Filling height	mm	930	1220	1170	1445
		Filling volume	kg	50	75	125	225
		Layer height	mm	145	155	170	160
IV	GENO-Fermanit 0.5 – 1.0 mm	d Filling height	mm	710	985	940	1215
		Filling volume	kg	100	150	225	425
		Layer height	mm	220	235	230	230

Filter material			MI	2000	3000	5000	10000
V	Hydro-anthracite "N" 0.6 –1.6 mm	e Filling height	mm	490	675	635	895
		Filling volume	l	50	100	150	300
		Layer height	mm	220	310	305	320

6.1.3 Filter filling for solid particle filtration

Filter material			MI	2000	3000	5000	10000
I	Quartz sand SB 3.15 – 5.6 T	a Filling height	mm	1150	1425	1410	1660
		Filling volume	kg	50	75	125	250
		Layer height	mm	155	165	180	190
II	Quartz sand SB 1.0-2.0 T	b Filling height	mm	1075	1375	1340	1605
		Filling volume	kg	25	25	50	75
		Layer height	mm	75	50	70	55
III	Filter sand SB 0.4 – 0.8 T	c Filling height	mm	710	1010	930	1210
		Filling volume	kg	125	175	300	550
		Layer height	mm	365	365	410	395
IV	–	–		–	–	–	–
V	Hydro-anthracite "N" 0.6 –1.6 mm	e Filling height	mm	490	700	625	890
		Filling volume	l	50	100	150	300
		Layer height	mm	220	310	305	320

6.2 Diaphragm expansion tank: Setting the preload pressure

The filtrate pump of the oxidation filter system fermaliQ:MA is speed-controlled via a pressure sensor and keeps the set pressure constant. Smooth start-up and run-down of the centrifugal pump prevent water hammer. In addition, an expansion tank operating with forced flow, absorbs pressure fluctuations in case of major changes in the flow rate and reduces the switching frequency in the case that small amounts are withdrawn.



A change in the set pressure (operating pressure) requires an adjustment of the diaphragm expansion tank.

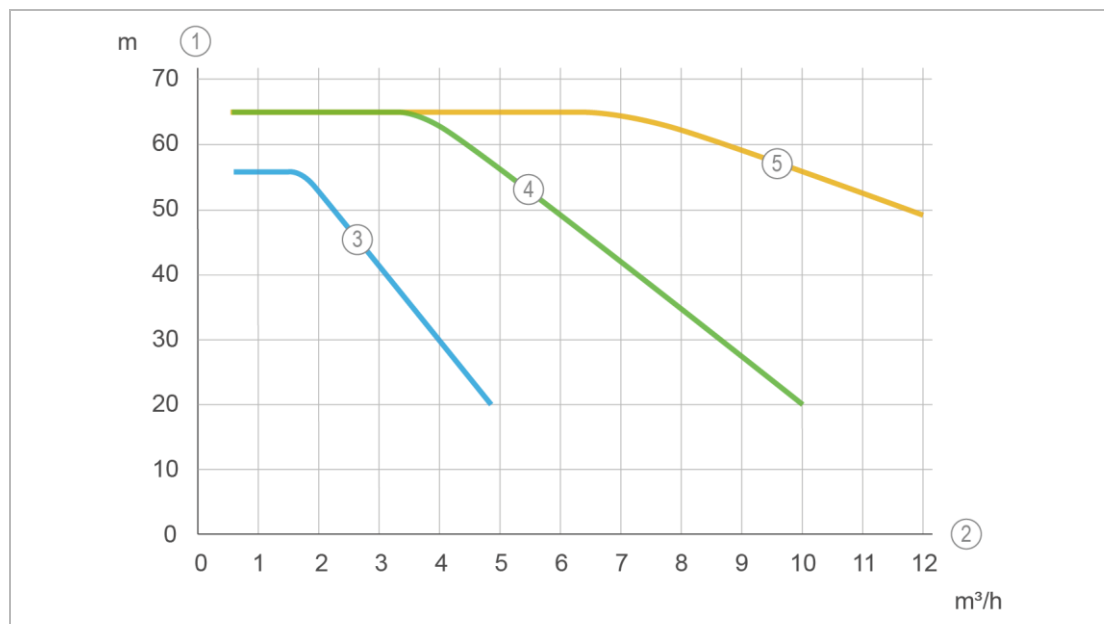
NOTE

Incorrect setting of the preload pressure

- Insufficient function of diaphragm expansion tank
- Increased wear and tear of the diaphragm
- Check the correct setting of the preload pressure.

- The diaphragm expansion tank is factory-set to a preload pressure of 4 bar.
- The preload pressure must be checked and adjusted with an empty diaphragm expansion tank without pressure on the water side.
- Set the preload pressure in a way that it corresponds to 90 % of the operating pressure. Proceed as follows to do so:

1. Determine your desired operating pressure which must correspond to the delivery characteristic range of the centrifugal pump.



Designation
1 Delivery head in m
2 Delivery rate in m³/h
3 Characteristic curve of fermaliQ:MA2000

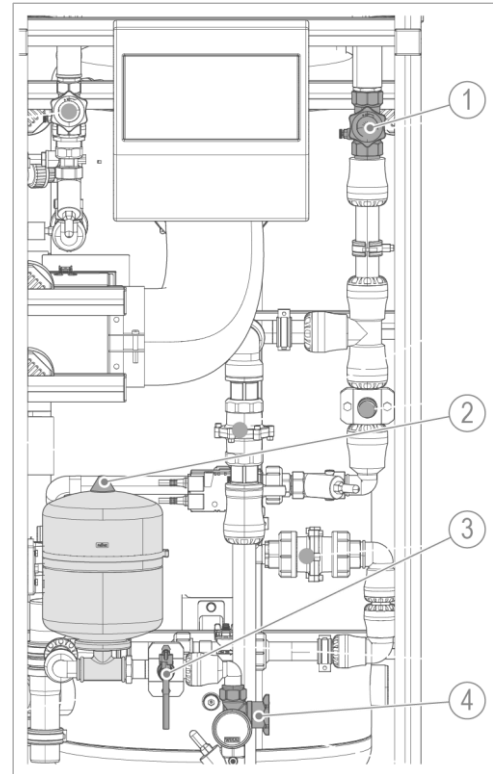
Designation
4 Characteristic curve of fermaliQ:MA3000/MA5000
5 Characteristic curve of fermaliQ:MA10000

2. Set the operating pressure (set pressure) using the buttons $\oplus$ and $\ominus$ on the operating panel of the centrifugal pump.

3. Determine the required preload pressure.

$$\begin{array}{ccccccc}
 \text{Example:} & 5.0 \text{ bar} \times 90 \% & = & 5.0 \text{ bar} \times 0.9 & = & 4.5 \text{ bar} \\
 & \uparrow \text{Operating pressure} & & & & \uparrow \text{Preload pressure}
 \end{array}$$

4. Adjust the preload pressure of the diaphragm expansion tank.
 - a Close shut-off valves 1 and 4.
 - b Drain the diaphragm expansion tank via sampling valve 3.
 - c Measure the set preload pressure on gas filling valve 2 with a hand-held pressure gauge.
5. Alternative 1: Preload pressure too high – release gas
 - a Open gas valve 2 to release gas.
6. Option 2: Preload pressure too low – refill inert gas
 - a Fill the diaphragm expansion tank with inert gas at the gas filling valve (e.g. by means of a nitrogen bottle) until the desired preload pressure is reached.



- b Open shut-off valves 1 and 4.

» The diaphragm expansion tank is ready for operation.

► Enter the newly set preload pressure on the type plate.

6.3 Checking the system

1. Check the screw connections on the pumps, valves, flange connections and pipes.
 - a Check the screw connections for leaks and retighten them, if necessary.
2. Check the electrical installation:
 - a Check the electrical connections.
 - b Check the cable screw connections and retighten or reseal them, if necessary.
3. Vent the system:

6.4 Flushing the system

1. Completely open all valves except for filtrate shut-off valve (1MSF1AH05).
2. Switch on the system (refer to chapter 7).
3. Initiate the manual discharge of first filtrate (refer to chapter 7.2). Repeat this process until clear water runs off.
 - » After the first filtrate has been discharged, the system returns to normal operation.
4. Completely open the filtrate shut-off valve (1MSF1AH05).
5. Initiate a backwash after an operating time of 30 minutes.

The flushing processes are required to flush out the fines from the uppermost filter layer and thus prevent them from entering the filtrate.



- ▶ Make sure that the soaking time (24 h) indicated above was kept (otherwise the material does not soak up enough water and therefore is too light).
- ▶ Make sure that the pressurised water tank provided by the client on site is functional when filled with filtrate for the first time, i.e. a pressure cushion must form in order to be able to carry out a proper backwash of the filter tank.
- ▶ If fines continue to be discharged after the procedure, check the following:
 - Default setting of the system (refer to the technical service manual)
 - The level must be set in a way that the uppermost filter material is always in the water. Otherwise, the filter material must be backwashed with raw water (refer to the technical service manual).

If fine particles of filter material are still present in the filtrate after flushing the filter system, additional flushing can be carried out if the raw water quality is adequate.



This involves continuous backwashing with raw water. The additional flushing is carried out until the fine particles of filter material have been completely flushed out (refer to the technical service manual, chapter 3.1).

6.5 Handing over the product to the owner/operating company

1. Explain to the owner/operating company how the system works.
2. Use the manual to brief the owner/operating company and answer their questions.
3. Inform the owner/operator/operating company about the need for inspections and maintenance.
4. Hand over all documents to the owner/operator/operating company for keeping.



Depending on the quality of the raw water, filter systems for the removal of iron, manganese and ammonium might require a run-in period of several weeks.

6.5.1 Disposal of packaging

- ▶ Dispose of packaging material as soon as it is no longer needed.

NOTE

Risk to the environment due to incorrect disposal

- Packaging materials are valuable raw materials and can be reused in many cases.
- Incorrect disposal can cause environmental hazards.
- ▶ Dispose of packaging material in an environmentally sound manner.
- ▶ Comply with locally applicable disposal regulations.
- ▶ If necessary, commission a specialist company with the disposal.

7 Operation/handling

Normally, no intervention by the owner/operating company/operator/ is required during operation.



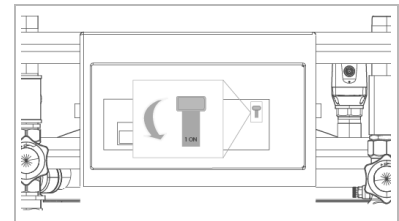
WARNING

Leaking exhaust air pipe, failure of the pipe fan

- Irritation/chemical burns of the respiratory tract and risk of asphyxiation due to harmful gases (e.g. hydrogen sulphide, methane) escaping – only applicable if these gases are dissolved in the raw water.
- ▶ Check the inlet and exhaust air piping provided by the client on site as well as the inlet and exhaust air hoses for leaks at least once a week.
- ▶ Watch out for the smell of hydrogen sulphide in the installation room and at the exhaust air pipe outside (foul odour) – contact the technical service if you suspect this.
- ▶ Make sure the installation site is sufficiently ventilated.

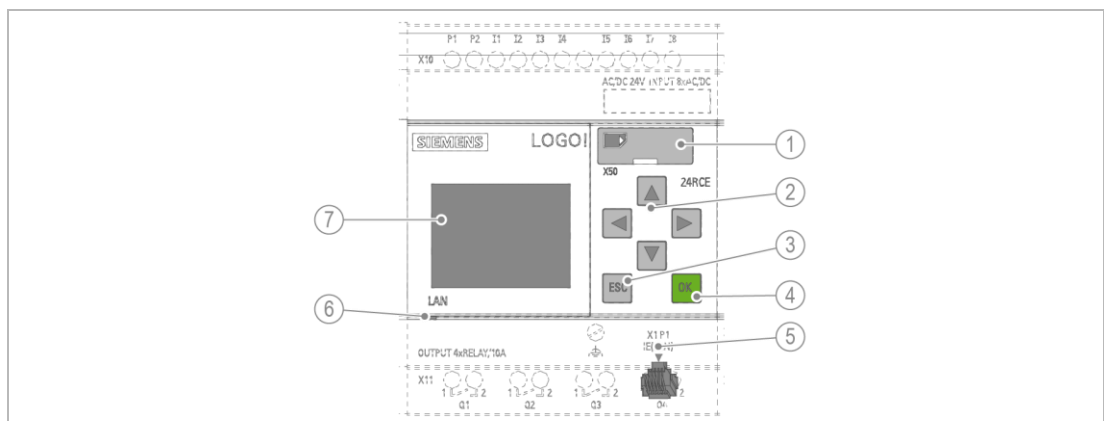
Switching on the system

- ▶ Flip the rocker switch under the plexiglass cover of the switch box to **On**
- » The display shows **System: On**.



7.1 Operation of the control unit

The system is controlled by means of the PLC controller “Siemens Logo! 12/24RCE”. The operating unit is located at the front of the system rack.



Designation		Designation	
1	Slot for memory card (micro SD)	5	LAN connection
2	Navigation keys	6	LAN control lamp
3	ESC button	7	Display
4	OK button		

7.1.1 Operating concept

The menu consists of one level.

- To change views, use the navigation keys ▼ and ▲.

Setting the values

- Press and hold the ESC button for 3 seconds.
 - » The input field is highlighted in black.
- Switch between different input fields within a display by using ▼ and ▲.
- Press OK to change a value.
 - » The input field highlighted in black is flashing.
- Change the setting value using ▼ and ▲ or trigger an action with OK.
- Press ESC to quit the settings.

7.1.2 Menu structure (as of software V10)

In the eight different view displayed, there are purely informative elements as well as elements where settings can be made, or actions can be triggered.

No.	Display	Explanation
1/11	System: On 0 l/h Level: 85.7% Make-up feed: Off ▼	Information: • System On/Off • Current flow in l/h • In case of manual discharge of the filtrate, "Discharge" is indicated in the empty display line • Filling level in % • Make-up feed: On/Off (enable raw water pump)

2/11

▲

Filtrate pump(s)
Release: On
Auto: On

▼

Information:

- Activation of filtrate pump(s)
- Release: On/Off (status of the "Enable filtrate pump(s)" option)
- Auto: On/Off
-

3/11

▲

Input
raw water pump
In operation:
On

▼

Information:

- Status at the input "Raw water pump in operation"
- On/Off (TRUE/FALSE)

4/11

▲

Initiate manual
Backwash
activation? Off

▼

Information:

- Initiating backwash manually On/Off



In case a backwash is initiated manually, the specified backwash requirements are ignored. The backwash process is started irrespective of pressure, level and flow.

5/11

▲

Discharge of filtrate
00:00m/05:00m
Start/Stop: Off

▼

System: On
0 l/h

Discharge
Level: 70.5
Make-up feed: On

▼

Actions:

- Setting the setpoint for discharge of filtrate
- Start or stop the discharge of filtrate



Upon start, the first filtrate valve is activated and remains open until either the time has expired, a manual stop takes place again or a backwash is triggered.

In the start screen, "Discharge" is shown in the empty display line as long as this function is active.

	▲ Discharge of filtrate 04:49m/05:00m Start/Stop: Off ▼	Information: • Remaining time of discharge of filtrate
6/11	▲ Backwash: inactive Remaining time: 00:00m First filtrate: inactive Remaining time: 00:00m ▼	Information: • Backwash active/inactive • Remaining time of backwash in minutes • Discharge of first filtrate active/inactive • Remaining time of discharge of first filtrate in minutes
7/11	▲ Filtered volume: 0 m³ Backwash counter: 0 ▼	Information: • Total (filtered) volume logged by the water meter in m³ • Number of successful backwash processes
8/11	▲ Repeat ER 2: 0/ 3 Reset? Off ▼	Information: • Number of failed backwash processes Actions: • Determine number of repeats until error ER 2 is triggered • Reset the number of failed attempts
9/11	▲ Collective fault: On Raw water pump: Off (NO=Off / NC=On)	Actions: • Logic (opener/closer) of outputs: • Collective fault An/Aus, On/Off • Raw water pump An/Aus, On/Off • NO = Normally open = Off NC = Normally closed = On

10/11	Software version V11	Information: • Display of the software version
11/11	Tu. 09:00 2020-01-28	Information: • Time and date

7.2 Initiating manual discharge of filtrate

During commissioning, it is necessary to thoroughly flush the filter material in the filter tank.

► Proceed as follows to initiate a manual discharge of the filtrate:

1. Navigate to view 5/11.
2. Press and hold **ESC** for 3 seconds.
3. Use **▼** and **▲** to navigate to field **XX:XXm**.
4. Press **OK** to change the value.
5. Use **▲** and **▼** to set the required value for the duration of the discharge of the filtrate.
6. Confirm the value with **OK**.
7. Use **▼** and **▲** to navigate to field **Off**.
8. Press **OK** to change the value.
9. Set the value to **On** using **▼** and **▲**.
10. Press **OK**.
11. Press **ESC** to quit the settings.
 - » The discharge of filtrate starts.

7.3 Initiating manual backwash



Under certain circumstances, it may be necessary to trigger a backwash outside the planned intervals.

In case a backwash is triggered manually, the specified backwash requirements are ignored. The backwash process is started irrespective of pressure, level and flow.

► Proceed as follows to initiate a manual backwash:

1. Navigate to view 4/11.
 2. Press and hold **ESC** for 3 seconds.
 3. Use **▼** and **▲** to navigate to field **OFF**.
 4. Press **OK** to change the value.
 5. Set the value to **On** using **▼** and **▲**.
 6. Press **OK**.
 7. Press **ESC** to quit the settings.
- » The backwash starts.

7.4 Backwash monitoring

If a backwash process has not been carried out or has not been carried out completely, this is logged as a failed attempt.

Possible reasons for an unsuccessful backwash are listed and explained in chapter 9.1, fault ER 2.

7.4.1 Determining the number of failed attempts until an error message is displayed

In the control unit of the system, you can define after how many failed attempts, the error message ER 2 will be output. Proceed as follows to do so:

1. Navigate to view 8/11.
2. Press and hold **ESC** for 3 seconds.
3. Use **▼** and **▲** to navigate to field **O/X**.
4. Press **OK** to change the value.
5. Set the desired value using **▼** and **▲**.
6. Press **ESC** to quit the settings.

7.4.2 Resetting the number of failed attempts

NOTE

Repeated manual reset of the counter

- Malfunctions in the event of repeated manual reset of the counter
- ▶ Eliminate the cause of failed backwash processes.
- ▶ If the backwash processes keep failing, contact the technical service.



Resetting the counter is logged and can be followed up by the technical service personnel.

At the next successful backwash, the number of failed attempts is reset automatically.

You can reset the counter manually. Proceed as follows to do so:

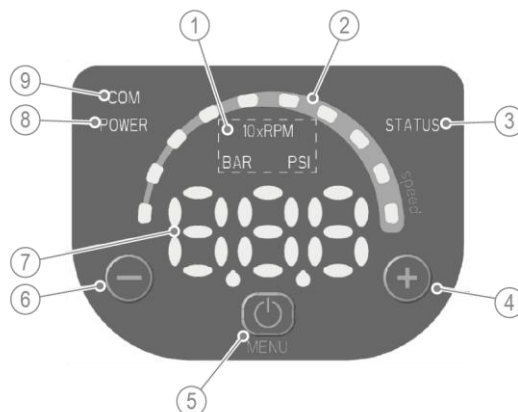
1. Navigate to view 8/10.
 2. Press and hold **ESC** for 3 seconds.
 3. Use **▼** and **▲** to navigate to field **Reset**.
 4. Press **OK** to change the value.
 5. Set the value to **On** using **▼** and **▲**.
 6. Press **OK**.
- » The counter was reset to 0.
- ▶ Press **ESC** to quit the settings.

7.5 Operation of filtrate pump

The following chapter provides information on the operating and display elements of the filtrate pump.



Only the technical service personnel must make settings on the filtrate pump.



	Designation	Function
1	Measuring unit LEDs	Information on the unit of the rotational speed LED strip and the display
2	Rotational speed LED strip	Indication of the current rotational speed in steps of 10 % (subject to the set min./max. rotational speed)
3	Status LED	Indication of the operating state
4	Plus button 	- To increase values - Navigation in the menu
5	START/STOP button 	- Start/stop pumps - Long press to call up the parameter menu - Confirmation of a selection in the parameter menu
6	Minus button 	- To decrease values - Navigation in the menu
7	Display	Indication of parameters/menu
8	POWER LED	Information on power supply
9	Communication LED	Information on communication

7.5.1 Status LED

The status LED indicates the operating state of the pump and signals any malfunctions.

LED	Description
 Off	Pump stopped
 Continuous green light	Pump in operation
 Flashing green/orange light	Non-locking alarm during operation of the pump
 Continuous orange light	Non-locking alarm when pump is stopped
 Continuous red light	Locking fault, the pump cannot be started

7.5.2 Rotational speed LED strip

The rotational speed LED strip consists of 10 LEDs.

Each LED represents the rotational speed range between parameter P27 (min. speed) and parameter P26 (max. speed) in stages between 10 and 100 %.

LED	Description
On	Motor in operation – the speed corresponds to the percentage stages that are indicated by the switched-on LEDs on the strip (e.g.: 3 LEDs On = rotational speed 30 %).
First LED flashes	Motor in operation – the speed is below the absolute minimum value (parameter P27)
Off	Motor stopped

7.5.3 Display

The display indicates operating state, operating values, menu and fault codes.

Display	Mode	Description
OFF	OFF	Pump OFF
StP	STOP	Pump stopped manually
ON	ON	Pump on; the motor starts depending on the selected control mode – appears for a few seconds, then the operating pressure is displayed

Alarm and error indication

Indication (example)	Mode	Description
A01 → 3.56	Alarm	In the event of an alarm, the corresponding code is displayed alternately with the main display.
E15	Error	If an error occurs, the corresponding code number is shown on the display.



Alarm and error codes (refer to chapter 9.2).

7.6 Emergency bypass

All oxidation filter systems fermaliQ:MA feature an emergency bypass as standard which can optionally be connected. The system is bypassed by means of a drinking water hose.

Using raw water (no drinking water quality) as emergency supply ("emergency bypass") is admissible for the fields of application below:

- Fire-fighting purposes
- Toilet flushing



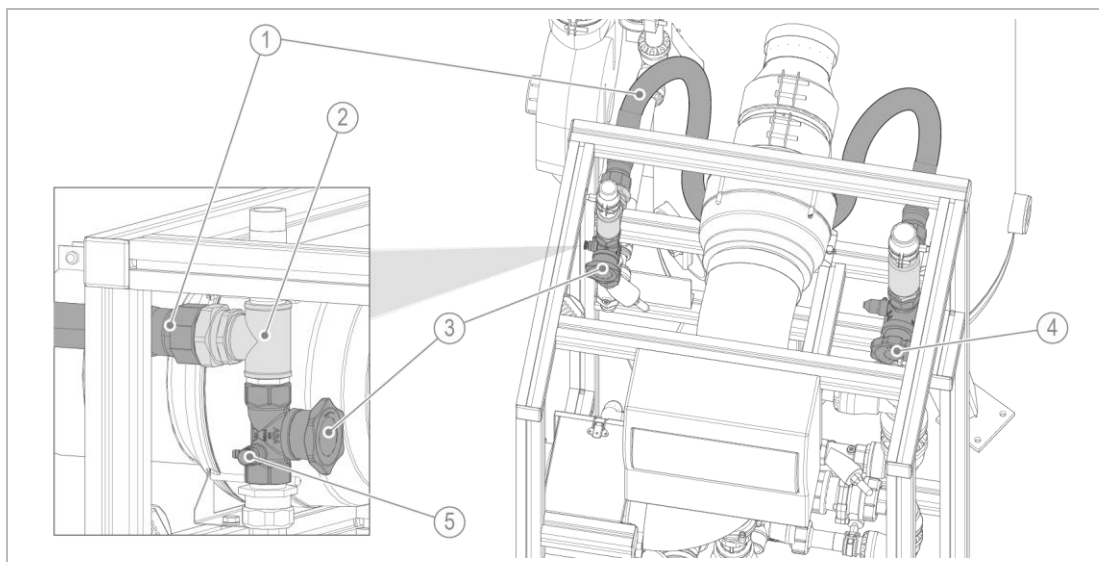
WARNING Risk of infection due to microbially contaminated water

- Infectious diseases
- ▶ Make sure that no microbially contaminated water gets into the drinking water supply when using the emergency bypass.
- ▶ If it is nevertheless necessary to use microbially contaminated raw water, route the water directly to the above-mentioned consumers, if possible, and do not connect the drinking water hose to the filtrate side.
- ▶ If the water must be routed via the filtrate side, all components that come into contact with the water must be chemically cleaned and disinfected after the emergency bypass has been used or after the emergency has been remedied.



Observe installation requirements: The well water pump must be able to be switched on and off via a pressure switch control.

To use the emergency bypass, the following steps are required:



Designation

- 1 Drinking water hose
- 2 Hose connection
- 3 Raw water shut-off valve

Designation

- 4 Filtrate shut-off valve
- 5 Draining at shut-off valve

1. Switch off the system (refer to chapter 7).
2. Close the fittings below:
 - Raw water shut-off valve (1MSF1AH01)
 - Filtrate shut-of valve (1MSF1AH04)
 - Shut-off valves on the raw water side provided by client (downstream of diaphragm expansion tank provided by client)
 - Shut-off valves on the filtrate side provided by client (upstream of pressurised water tank/buffer tank provided by client)
3. Drain the corresponding pipe section using the valves provided by the customer or by slightly opening the blind plugs on the piping for emergency bypass.
4. Remove the blind plugs of the piping.
5. Connect the drinking water hose tightly using tools.
6. Open the shut-off valves provided by the client on site on the raw water and filtrate side.
 - » Emergency bypass can be operated with a pressure switch-controlled well pump.
 - » The system remains out of service



If the fermaliQ system idle time is longer (> 48 hours), the piping and filter tank must be completely drained using the appropriate draining valves. The filter material in the filter tank should be refilled with fresh raw water immediately after draining.



The drinking water hose can also be used to perform additional flushing during commissioning (see technical service manual). "flushing at start-up/commissioning" (refer to technical service manual)

8 Maintenance and repair

Maintenance and repair includes the cleaning, inspection and maintenance of the product.



The responsibility for inspection and maintenance is subject to local and national requirements. The owner/operating company is responsible for compliance with the prescribed maintenance and repair work.



By concluding a maintenance contract you ensure that all maintenance work is performed on time.

- ▶ Only use genuine spare and wearing parts from Grünbeck.

8.1 Cleaning



Only allow cleaning work to be carried out by persons who have been instructed on the risks and dangers that can arise from the appliance.



WARNING Damp cleaning of live components

- Risk of electric shock
- Sparking possible due to short circuit
- ▶ Switch off the voltage supply as well as any external voltage before starting the cleaning work.
- ▶ Wait for 15 minutes and make sure that the components do not carry any voltage.
- ▶ Do not open any switch cabinets.
- ▶ Do not use any high-pressure equipment for cleaning and do not blast electrical/electronic devices with water.



CAUTION Climbing onto system components

- Risk of falling when climbing onto system components
- ▶ Do not climb onto system components such as pipes, racks, etc.
- ▶ Use stable, safe and self-standing vertical access equipment such as stepladders, platforms, etc. when cleaning components located at high levels.

NOTE

Do not clean the system with cleaning agents containing alcohol/solvents.

- These substances damage plastic components
- ▶ Use a mild/pH-neutral soap solution.
- ▶ Use personal protective equipment.
- ▶ Only clean the outside of the system.
- ▶ Do not use any strong or abrasive cleaning agents.
- ▶ Wipe the surfaces with a damp cloth.
- ▶ Dry the surfaces with a cloth.

8.2 Intervals



By way of regular inspections and maintenance, malfunctions can be detected in time and system failures might be avoided.

- As the owner/operating company, determine which components have to be inspected and maintained at which intervals (load-dependent).

The following interval table shows the minimum intervals for the activities to be performed.

Activity	Interval	Execution
Inspection	Weekly	• Visual check for damage, leaks and tears • Odour test • Check the pipe fan for function • Check contamination of air filter
Maintenance	annually	• Check the entire system for leaks • Check the pump for function • Check the rack • Remove and clean level probe • Check connections • Check diaphragm expansion tank • Check control unit • Replace the air filter • Check and clean the pipe fan
	5 years	• Replace seals
	as required	• Change the filter material

8.3 Inspection

Regular inspections increase the operational reliability of your product.

- Carry out an inspection at least once a week. Proceed as follows:
 1. Visually check for damage, leaks and tears.
 2. Check the air filter of the pipe fan for impurities – replace the air filter, if necessary.
 3. Check whether the fan and the ventilation slots of the pump are free of dust – clean the pump, if necessary.
 4. Watch out for the smell of hydrogen sulphide in the installation room and at the exhaust air pipe outside (foul odour) – contact the technical service if you suspect this.

8.4 Maintenance



Carrying out annual maintenance work requires specialist knowledge. The maintenance work must be carried out by technical service personnel only.



DANGER

Life-threatening electrical voltage during interventions on the system

- Risk of severe burns, cardiovascular failure, fatal electric shock
- Short-circuits and voltage transfers are possible
- ▶ Only have qualified electricians carry out electrical work on the system.
- ▶ Before starting work on active system parts, make sure they are de-energised. Ensure their de-energised state for the duration of the work. Obey the following 5 safety rules while doing so:
 - a De-energise
 - b Secure against restart
 - c Verify that no voltage is present
 - d Earth and short-circuit
 - e Cover or block off adjacent live parts

8.4.1 Removing (old) filter material

It might be necessary to change the filter material from time to time. This period of time can vary depending on the quality of the raw water.



CAUTION

Working at heights (approx. 2 m) when removing the filter material

- Risk of falling by slipping or losing balance
 - ▶ Use a stable stepladder.
1. Remove the lid of the filter tank (weight approx. 5 kg) and place it next to the system.
 2. Extract the filter material through the tank opening.
 - a Use a solid matter vacuum cleaner (the length of the suction hose must reach to the bottom of the tank).

8.4.2 Checking the diaphragm expansion tank

1. Check the diaphragm expansion tank for damage and impurities. Replace the diaphragm expansion tank in case of damage.
 2. Briefly operate the gas filling valve. Replace the diaphragm expansion tank if water escapes.
 3. Check the setting pressure (preload pressure) of the diaphragm expansion tank. Correct it, if necessary.
- Use nitrogen for gas filling. When doing so, the water side must be depressurised.

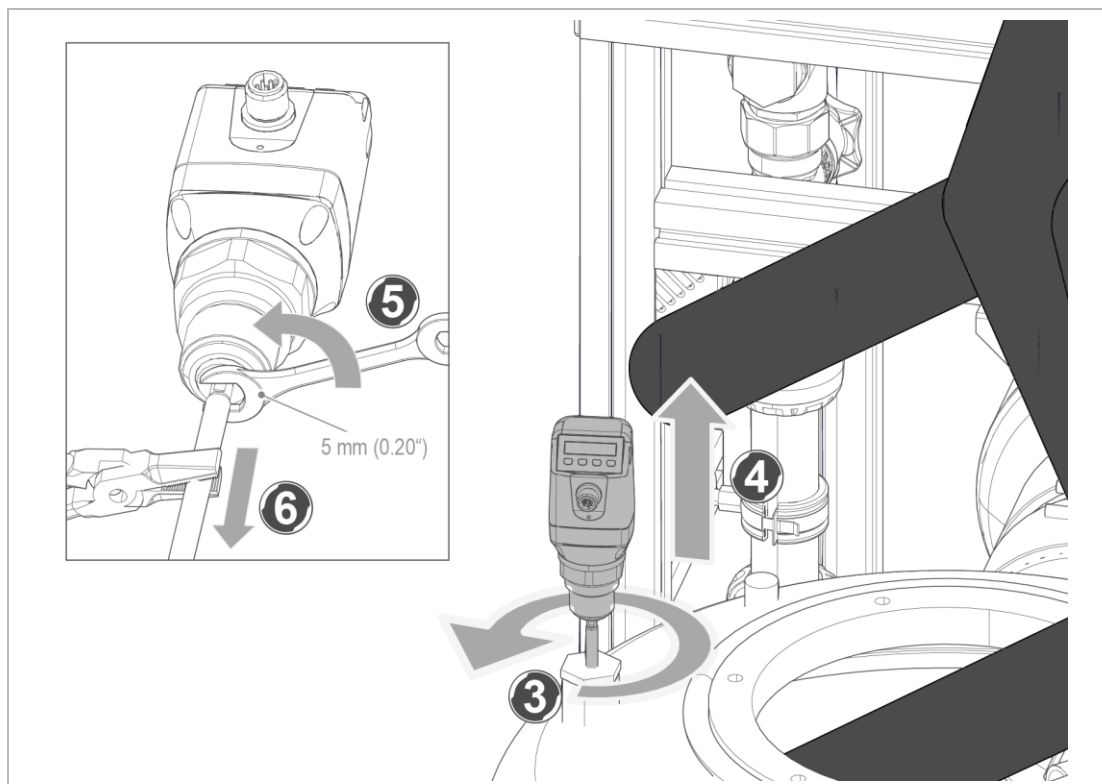
8.4.3 Remove and clean level probe



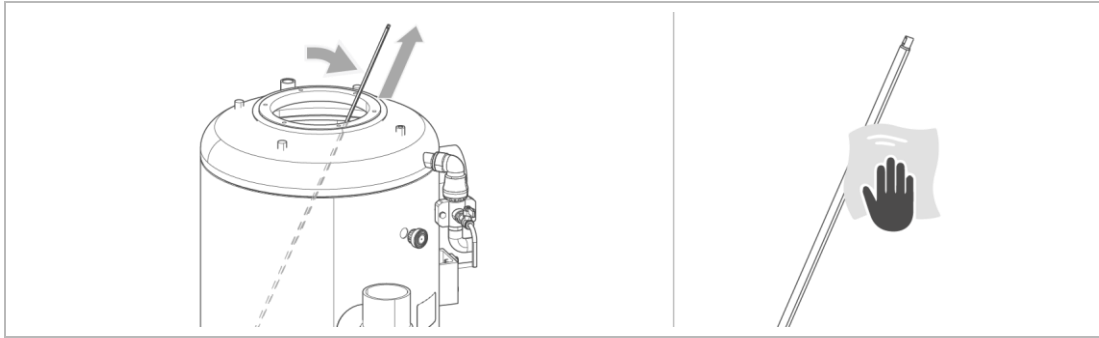
CAUTION Working at heights (approx. 2 m) when removing the level probe

- Danger of falling
- Use stable access equipment.

1. Loosen the screw connections of the lid.
2. Remove the lid of the filter tank (weight approx. 5 kg) and place it next to the system.



3. Unscrew the head of the level probe from the tank.
4. Pull the rod sensor upwards until the entire head is visible.
5. Unscrew the rod from the head.



6. Grasp the rod through the opening in the tank and press it downwards until it can be pulled out of the tank opening by tilting it.
 7. Clean the rod.
 - a Clean the rod with a cloth.
 - b For heavier iron deposits, an acid solution can be used (e.g. GENO-clean M or citric acid).
- To install the level probe, proceed in reverse order.

8.5 Consumables

Filter filling for deferrisation/demanganisation

Product	Order no.
Filter filling fermaliQ:MA2000, FE/MN	530 501
Filter filling fermaliQ:MA3000, FE/MN	530 511
Filter filling fermaliQ:MA5000, FE/MN	530 521
Filter filling fermaliQ:MA10000, FE/MN	530 531

Filter filling for solid particle filtration

Product	Order no.
Filter filling fermaliQ:MA2000, FIL	530 502
Filter filling fermaliQ:MA3000, FIL	530 512
Filter filling fermaliQ:MA5000, FIL	530 522
Filter filling fermaliQ:MA10000, FIL	530 532

Additional consumables

Product	Order no.
Replacement air filter LFV	530 529
LFT bag filter for fine dust filtration	100009890001

8.6 Spare parts, wearing parts

For spare parts and wearing parts, please contact your local Grünbeck representative This can be found on the internet at www.gruenbeck.com.

9 Fault



WARNING

Contaminated water due to stagnation.

- Infectious diseases
- Have malfunctions eliminated immediately.

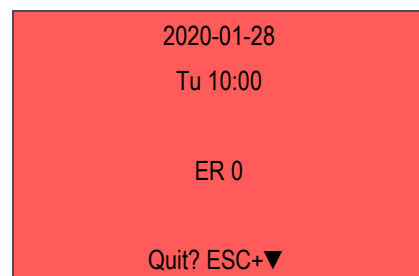
9.1 Display messages

In case of a malfunction, the display of the control unit flashes in red.

The following appears on the display: Time when the fault occurred and error code of the fault.

To acknowledge the malfunctions:

- Press and hold **ESC** and simultaneously press **▲**.
- » The malfunction was acknowledged.



Code	Meaning	Cause	Remedy
ER 0	Raw water pump defective	The filling level (between level 3 and level 2) is not reached within a specified delay time	► Check function and control signal of raw water pump.
ER 1	Fault Filtrate pump 1MSF1AP02	The pump is fault mode	► Check filtrate pump for function. ► (For a description of the fault, refer to the error code on the frequency converter and the operation manual of the filtrate pump)
The fermalIQ:MA10000 features two pumps. If one of the pumps fails, a fault is output. However, the system can continue to operate at half power.			
ER 2	Backwash unsuccessful	The required backwash volume was not reached.	► Check the compressed air cushion in the pressurised water tank and refill, if necessary.

		The existing compressed air cushion was not sufficient for the backwash process (error only appears after repeated occurrence of the cause of the error).	Check pressure switch 1MSF1ACP03 for function.
ER 3	Fault End position of backwash valve 1MSF1AV01	Backwash does not open or close although it has been activated.	Check function and feedback of valve.
ER 4	Fault End position of discharge valve of first filtrate 1MSF1AV02	First filtrate valve does not open or close although it has been activated.	Check function and feedback of valve.
ER 5	Requirements for backwash process not met	No backwash process could be started because there was no pressure during the backwash period, water was continuously withdrawn, or the minimum filling level in the tank was not reached.	- Check the compressed air cushion in the pressurised water tank and refill, if necessary. - Check the backwash times and adjust them, if required. - Check function and control signal of raw water pump.

9.2 Pump displays

In the event of an alarm or error, the display of the pump indicates a code and the status LED lights up.

- Alarms and errors are stored with date and time.
- Alarms and errors can be reset by switching the device off for at least one minute.

9.2.1 Alarm codes

Code	Meaning	Cause	Remedy
A03	Loss of power	Temperature too high	- Lower the room temperature - Lower the water temperature - Reduce the load
A05	Data memory alarm	Data memory corrupted	Forward fault signal to technical service
A06	LOW alarm	Lack of water detected	Check water level in tank

A15	EEPROM	• Data memory corrupted	► Stop the pump for 5 min and then restart it
A20	Internal alarm		If the problem persists: ► Forward fault signal to technical service
A30	Multi-pump connection alarm	• Faulty multi-pump connection	► Check the condition of the connection cables ► Check that there are no discrepancies in the addresses
A31	Loss of multi-pump connection	• Loss of multi-pump connection	► Check the condition of the connection cables

9.2.2 Error codes

Code	Meaning	Cause	Remedy
E01	Internal communication error	• Lack of internal communication	► Stop the pump for 5 min and then restart it
E02	Motor overload error	• High motor voltage • Current consumption of motor too high	If the problem persists: ► Forward fault signal to technical service
E03	DC-bus overvoltage error	• DC-bus overvoltage • External causes condition pump operation via generator	► Check system configuration ► Check position and integrity of non-return valves
E04	Rotor blocked	• Motor standstill • Rotor synchronicity is lacking, or rotor is blocked by foreign matter	► Make sure that there is no foreign matter that prevents the pump from rotating ► Stop the pump for 5 min and then restart it If the problem persists: ► Forward fault signal to technical service
E05	EEPROM data memory error	• EEPROM data memory corrupted	► Stop the pump for 5 min and then restart it If the problem persists: ► Forward fault signal to technical service
E06	Grid voltage error	• Voltage supply outside the operating range	► Check voltage ► Check electrical connection
E07	Motor winding temperature error	• Thermal contactor motor tripped	► Check whether there are impurities near the impeller and the rotor – remove them, if necessary

			▶ Check condition of installation as well the water and air temperature ▶ Wait until the motor has cooled down If the problem persists: ▶ Stop the pump for 5 min and then restart it If the problem persists: ▶ Contact technical service
E08	Power module temperature error	• Thermal contactor of frequency converter has tripped	▶ Check condition of installation and air temperature
E09	General hardware error	• Hardware error	▶ Stop the pump for 5 min and then restart it If the problem persists: ▶ Contact technical service
E11	LOW error	• Detection of lack of water (if P48 = ERR)	▶ Check water level in tank
E12	Pressure sensor error	• Missing pressure sensor (not available for ACT mode)	▶ Check condition of contacts on the sensor
E14	Low-pressure error	• Pressure below minimum limit (not available for ACT mode)	▶ Check settings of parameters P45 and P46
E15	Loss of phase	• Loss of one of the three phases (only in case of three-phase version)	▶ Check connection to mains
E30	Multi-pump protocol error	• Incompatible multi-pump protocol	▶ Update all devices to the same firmware version

9.3 Other observations

Observation	Meaning	Remedy
Pump does not start up	• Intervention of amperometric thermal protection	▶ Wait for reset after cooling ▶ Check voltage and integrity of the connection to mains
	• Main fuse or residual current circuit breaker has tripped; fuse has blown	▶ Reset fuse or replace blown fuses
Pump starts running, but after a short time the overload protection trips or the fuses blow	• Supply cable damaged, short-circuit of electric motor, overload protection or fuses are not suitable for the supply current of the motor.	▶ Check components and replace, if necessary

	• Intervention of amperometric thermal protection or protection device because current consumption is too high	► Check the motor
	• Absence of a power supply phase	► Check supply
	• Foreign matter inside the pump blocks the impellers	► Clean the pump
Pump starts running but does not deliver water	• Pump draws in air	► Check liquid level, seal of suction line and bottom valve
	• Pump is not filled correctly	► Repeat filling process
Pump does not deliver enough water		► Check the lines for bottlenecks and restrictions
	• Pump is not filled correctly	► Repeat filling process
	• Direction of rotation is not correct	► Check direction of rotation

10 Dismantling and disposal

10.1 Dismantling



Have this work carried out by qualified specialists only.

1. Flush the system with raw water.
2. Disconnect the system from mains – discharge residual voltage.
3. Close the shut-off valves provided by the client on the raw water and filtrate side
(upstream and downstream of the system).
4. Vent and drain the system.
5. Drain the filter material.
6. Separate the system from the plumbing installation (raw water inlet, filtrate outlet, exhaust air, drain connections).
7. Disconnect the potential equalisation (grounding) provided by client on site.
8. Remove individual components such as accessories, if necessary.
9. Transport the system secured on a pallet.

10.2 Disposal

- Comply with the applicable national regulations.

Packaging

- Dispose of the packaging in an environmentally sound manner.

Product



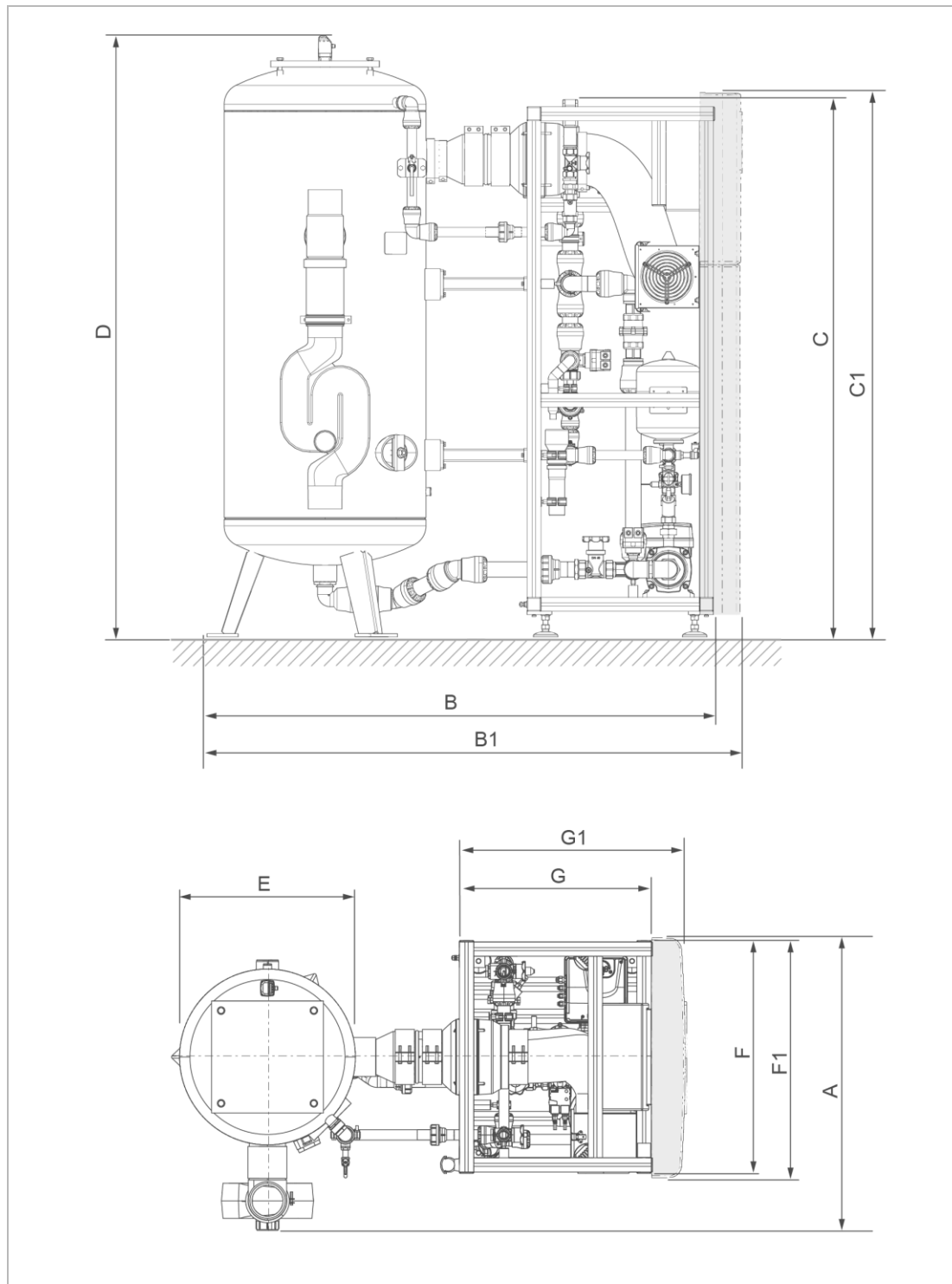
If this symbol (crossed-out wheelie bin) is on the product, this product or its electrical and electronic components must not be disposed of as household waste.

- Dispose of electrical and electronic products or components in an environmentally sound manner.



For more information on take-back and disposal, go to www.gruenbeck.com.

11 Technical specifications



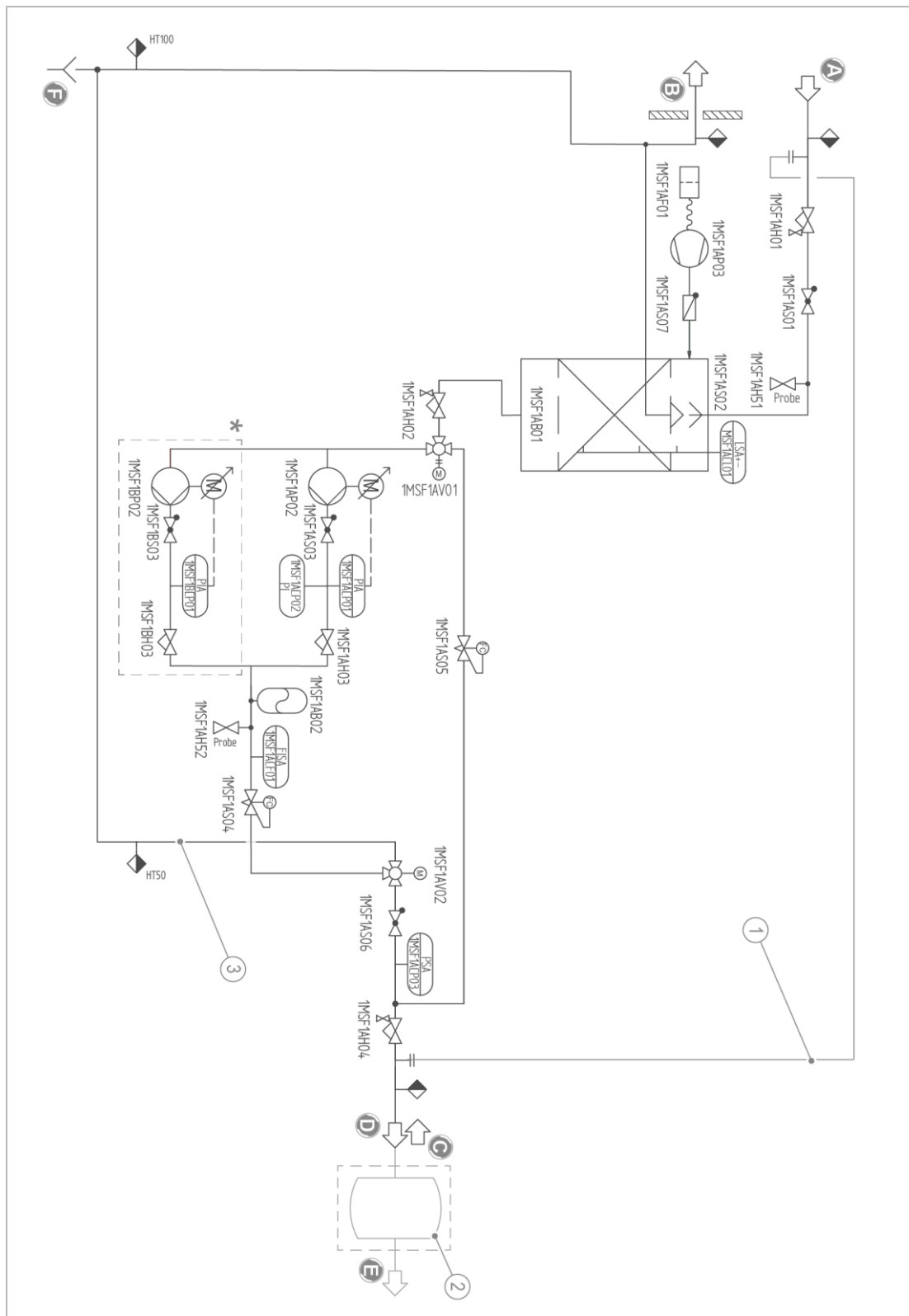
Dimensions and weights			MA2000	MA3000	MA5000	MA10000
A	Width of entire system	mm	880	920	1060	1340
B	Depth of entire system	mm	1540	1630	1800	2430
B1	Depth of entire system with front cover	mm	1600	1690	1860	2490
C	Height of system rack	mm	1730			
C1	Height of system rack with front cover	mm	1750			
D	Height of filter tank	mm	1700	1940	1920	2120
E	Outside diameter of filter tank	mm	550	650	800	1100
F	Width of system rack	mm	720			
F1	Width of system rack with front cover		750			
G	Depth of system rack	mm	600	600	600	990
G1	Depth of system rack with front cover	mm	660	660	660	1050
Operating weight of filter tank, approx.		kg	500	800	1200	2300
Empty weight of filter tank, approx.		kg	90	110	130	330
Weight of system rack, approx.		kg	100	100	100	120

Connection data		MA2000	MA3000	MA5000	MA10000
Raw water inlet	DN	25 (1" male thread)	25 (1" male thread)	32 (1¼" male thread)	40 (1½" male thread)
Filtrate outlet/backwash water inlet	DN	40 (1½" male thread)	40 (1½" male thread)	50 (2" male thread)	65 (2½" male thread)
Backwash water to drain (HT pipe)	DN	100 (PE)			
Discharge of first filtrate to drain (HT pipe)	DN	50 (PP)	50 (PP)	50 (PP)	100 (PP)
Supply air D _o	mm	160			
Exhaust air	DN	100 (PE)			
Connected load, approx.	kW	1.0	1.5	1.5	3.0
Mains connection	V/Hz	230/50			
Protection/protection class		IP 54/⊕			

Performance data		MA2000	MA3000	MA5000	MA10000
Nominal flow (subject to the raw water quality)	m³/h	2.0	3.0	5.0	10.0
Backwash volume flow	m³/h	5.7	7.9	12.5	18.2
Well water volume flow	m³/h	3.0 – 4.0	4.5 – 6.0	7.5 – 10.0	15.0 – 20.0
Operating pressure of well water	bar	2.0 – 5.5			
Operating pressure of filtration	bar	3.5 – 5.5			
Operating pressure of backwash	bar	3.5 – 5.5			
Required dimensioning of pressurised water tank (for backwash)	l	≥ 500	≥ 750	≥ 1000	≥ 2000 or 2 x 1000

General data		MA2000	MA3000	MA5000	MA10000
Water temperature (drinking water)	°C	5 – 20			
Ambient temperature (drinking water)	°C	5 – 25			
Water temperature (technical applications)	°C	5 – 35			
Ambient temperature (technical applications)	°C	5 – 35			
pH value of raw water		6.5 – 8.5			
Humidity (non-condensing)	%	≤ 70			
Order no.		530 500	530 510	530 520	530 530

11.1 PID flow chart



* Only fermaliQ:MA10000, order no. 530 530

No./Coding	Designation
1	Emergency bypass
2	Pressurised water tank (accessories)
3	Discharge of first filtrate
1MSF1AB01	Filter tank
1MSF1AB02	Diaphragm expansion tank
1MSF1ACF01	Flow sensor
1MSF1ACL01	Level control
1MSF1ACP01	Filtrate pressure sensor
1MSF1ACP02	Filtrate pressure gauge
1MSF1ACP03	Pressure switch (backwash monitoring)
1MSF1AE01	Switch cabinet
1MSF1AF01	Air filter box
1MSF1AH01	Raw water shut-off valve
1MSF1AH02	Tank shut-off valve
1MSF1AH03	Filtrate pump shut-off valve
1MSF1AH04	Filtrate shut-off valve
1MSF1AH51	Raw water sampling valve

Connections

	Designation
A	Raw water inlet
B	Exhaust air into the atmosphere
C	Backwash water inlet

No./Coding	Designation
1MSF1AH52	Filtrate sampling valve
1MSF1AP02	Filtrate pump
1MSF1AP03	Pipe fan
1MSF1AS01	Raw water non-return valve
1MSF1AS02	Hollow cone spray nozzle
1MSF1AS03	Filtrate non-return valve
1MSF1AS04	Flow stabiliser Filtration
1MSF1AS05	Flow stabiliser Backwash
1MSF1AS06	Backwash non-return valve
1MSF1AS07	Air backflow flap
1MSF1AV01	Shut-off valve Filtration/Backwash
1MSF1AV02	Shut-off valve Filtration/Discharge of first filtrate
1MSF1BCP01	Filtrate pressure sensor
1MSF1BH03	Filtrate pump shut-off valve
1MSF1BP02	Filtrate pump
1MSF1BS03	Filtrate non-return valve

	Designation
D	Filtrate outlet
E	To the consumer
F	To drain

EC Declaration of Conformity

In accordance with the EC Machinery Directive 2006/42/EC



This is to certify that the system designated below meets the safety and health protection requirements of the applicable EC/EU guidelines in terms of its design, construction and execution.

This certificate becomes void if the system is modified in any way not approved by us.

Oxidation filter system fermaliQ:MA

Serial no.: Refer to type plate

Furthermore, we confirm compliance with the essential requirements of the EMC Directive 2014/30/EU

The harmonised standards below have been applied:

- DIN EN ISO 12100: 2011-03
- DIN EN 60204-1:2019-06

Responsible for documentation:

Manufacturer

Müller Mirjam

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Germany

Hoechstädt, 24.10.2024



i. V.

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