We understand water.

Reverse osmosis system | osmoliQ:LB

Operation manual

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1 Introduction

This manual is intended for owners/operators/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 included manuals on the components before you operate your product.

> ► Obey all safety 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 the products below:

- Reverse osmosis system osmoliQ:LB4000
- Reverse osmosis system osmoliQ:LB7000
- Reverse osmosis system osmoliQ:LB10000
- Reverse osmosis system osmoliQ: LB12000
- Reverse osmosis system osmoliQ: LB16000
- 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

- Manuals for components from other manufacturers
- Safety data sheets for chemicals
- Electric circuit diagram (project-specific)

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1.3 Product identification

You can identify your product based on the product designation and the order no. indicated on the type plate.

► Check whether the products indicated in chapter 1.1 correspond to your product.
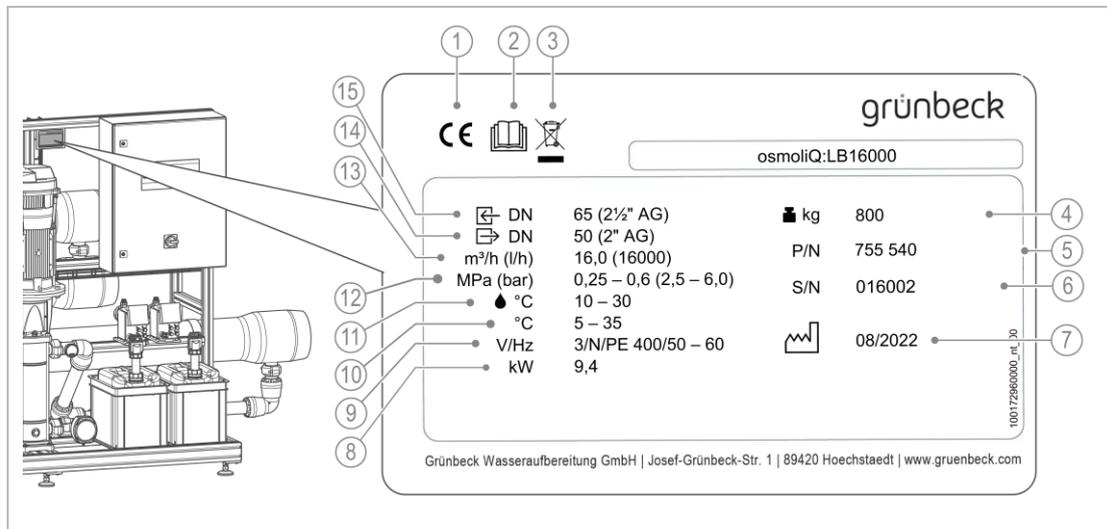
	Designation		Designation
1	CE mark	**9**	Power supply
2	Obey the operation manual	**10**	Ambient temperature
3	Disposal information	**11**	Water temperature
4	Empty weight (rack + filter tank)	**12**	Entry point
5	Order no.	**13**	Max. flow volume Permeate
6	Serial no.	**14**	Nominal connection diameter Permeate outlet
7	Date of manufacture	**15**	Nominal connection diameter Feed water inlet
8	Connected load		

A setting log with system-typical setting values is located in the switch cabinet.

1.4 Symbols used

Symbol	Meaning
⚠	Danger and risk
❗	Important information or requirement
ℹ	Useful information or tip
✎	Written documentation required

Symbol	Meaning
	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 and instructions that you must obey for your personal safety. The information and instructions are highlighted by a warning symbol and are structured as shown below:

SIGNAL WORD   Type and source of hazard

- ● Possible consequences
- ► Preventive measures

The signal words below are defined subject to the degree of danger and might be used in the present document:

Warning symbol and signal word		Consequences if the information/instructions are ignored
⚠ 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 phases in the service life of the system, different persons carry out work on the system. This work requires different qualifications.

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1.6.1 Qualification of personnel

Personnel	Requirements
User	• No special expertise required • Knowledge of the tasks assigned • Knowledge of possible dangers in case of incorrect behaviour • Knowledge of necessary protective equipment and protective measures • Knowledge of residual risks
Owner/operator/ operating company	• Product-specific expertise • Knowledge of 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 table below describes which tasks may be carried out by whom.

		User	Owner/ operator/ operating company	Qualified specialist	Technical service
Transport and storage				X	X
Installation and mounting				X	X
Start-up/commissioning				X	X
Operation and handling		X	X	X	X
Cleaning			X	X	X
Inspection		X	X	X	X
Maintenance	semi-annually				X
	annually				X
Troubleshooting		X	X	X	X
Repair				X	X
Decommissioning and restart/recommissioning				X	X
Dismantling and disposal				X	X

1.6.3 Personal protective equipment

► As an owner/operator/operating company, make sure that the required personal protective equipment is available.

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

	Protective gloves		Protective footwear
	Protective overall		Safety goggles
	Hard hat		Mask
	Face shield		Protective apron

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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.
- Only use genuine spare parts for maintenance or repair.
- Keep the premises locked against unauthorised access to protect imperilled or untrained groups of persons from residual risks.
- Comply with the maintenance intervals (refer to chapter 8.2). Failure to comply can result in the microbiological contamination of your drinking 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 access aids (e.g. stepladders).
- Make sure that the system is set up in a way that it cannot tip over and that the stability of the system is guaranteed at all times.

2.1.2 Pressure-related hazards

- Components can be under pressure. There is a risk of injuries and damage to property due to escaping water and unexpected movement of components. Check the system's pressure lines at regular intervals.
- Before starting any repair and maintenance work, make sure that all affected components are depressurised.

2.1.3 Electrical hazards

There is an immediate danger of fatal injury from electric shock when touching live parts. Damage to the insulation or individual components can be lethal.

- Only have qualified electricians carry out electrical work on the system.
- In case of damage to live components, switch off the voltage supply immediately and arrange for repair.
- Switch off the voltage supply before working on electrical components.

Before starting work on active system parts, make sure they are de-energised. Make sure they stay de-energised for the duration of the work. Obey the 5 safety rules below:

    a Disconnect (unplug the power plug)

    b Secure against restart

    c Verify that no voltage is present

    d Ground and short-circuit

    e Cover or block off adjacent live parts

- Never bridge electrical fuses. Do not disable fuses. Use the correct current ratings 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 health and environment.
  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 and always obey the instructions for the different actions/situations.
- Current safety data sheets for chemicals are available for download at **www.gruenbeck.de/en/info-centre/safety-data-sheets**.
- Obey in-house instructions when handling chemicals and make sure that any protective and emergency equipment such as emergency showers and eye showers is present and functional.

Mixing and residual amounts of chemicals

- Never mix different chemicals. Unforeseeable chemical reactions posing a lethal danger can occur.
- Dispose of residual amounts of chemicals in accordance with local regulations and/or in-house instructions.
- Residual amounts from used containers should not be transferred into containers with fresh chemicals in order not to impair the effectiveness of the 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 any unknown chemicals (no labelling or labelling illegible).
- Comply with the use-by date (minimum shelf life) stated on the label.
- If stored incorrectly, chemicals could change their state of matter, crystallize, outgas, or lose their effectiveness. Store and use the chemicals at the specified temperatures only.

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Cleaning/Disposal

- Immediately absorb leaked chemicals with suitable binding agents.

- Collect and dispose of chemicals in such a way that they cannot pose a risk to people, animals, or the environment.

2.1.5 Groups of persons requiring protection

- Children must not play with the product.

- This product must not be used by persons (including children) with limited abilities, lack of experience or knowledge.

- Cleaning and maintenance must not be carried out by children.

2.2 System-specific safety instructions

The system features a main switch. Via the main switch, the system is disconnected from mains.

► Completely switch off the system in an emergency situation.
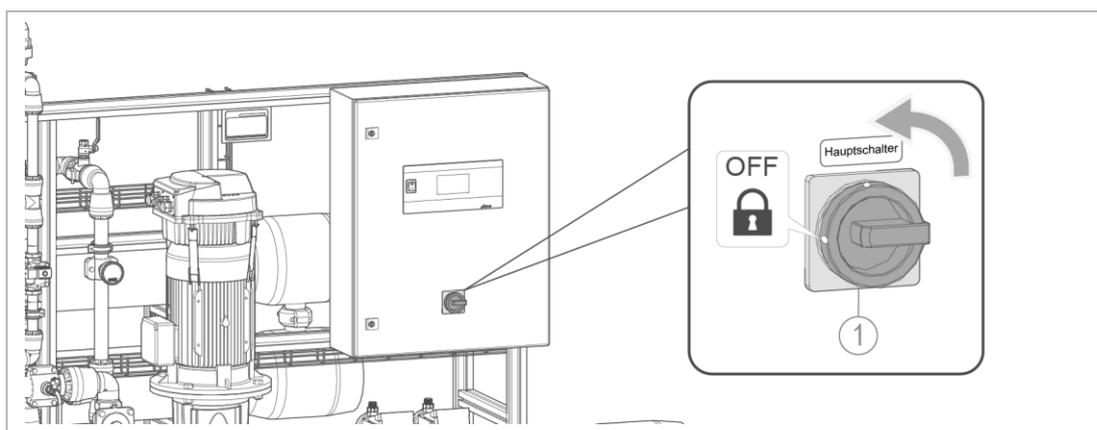
Designation
1 Lockable main switch.

► In case of maintenance and repair work, de-energise the system by switching off the main switch.

► In addition, mechanically secure the system (e.g. by way of a lock) against unintentional restart.

2.2.2 Signals and warning mechanisms at the system

Warnings/pictograms	
	Risk of electric shock (attached to distributor cover and in the power distributor/switch cabinet) ► Disconnect the system from the power supply before working on electrical system parts
	Risk of electric shock due to residual voltage (attached to frequency converter) ► Wait for 15 min after having switched off the main switch before you work on the system.
	Hazardous material (attached to the packaging) Environmental damage due to lithium batteries

The attached information and instructions/pictographs must be clearly legible.

They must not be removed, soiled, or painted over.

► Obey all warnings and safety instructions.

► Immediately replace illegible or damaged symbols/pictograms.

2.3 Conduct in emergencies

2.3.1 In case of water leaks

1. De-energise the system – unplug the mains plug.

2. Locate the leak.

► Eliminate the cause of the water leak.

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3 Product description

3.1 Intended use

The reverse osmosis system osmoliQ:LB is designed for the demineralisation of raw water whose composition complies with the quality requirements of the German Drinking Water Ordinance (TrinkwV).

3.1.1 Application limits

We assume that the composition of the feed water will not change significantly, that the feed water will always be free of mechanical and organic impurities and that the limit values indicated below will not be exceeded.

Chlorine and oxidants must be below the limit of detection as such substances would immediately cause the destruction of the membrane.

Parameters		Value
Total hardness [1]	°dH	< 0.1
	°f	< 0.18
	mol/m³	< 0.018
Chlorine dioxide	mg/l	not detectable
Free chlorine	mg/l	not detectable
Iron	mg/l	< 0.10
Manganese	mg/l	< 0.05
Silicate	mg/l	< 15
Turbidity	NTU	< 1
Silt density index		< 3
pH range		6.5 – 8.5
Total salt concentration as NaCl	mg/l	< 1000
Feed water temperature [2]	°C	10 – 30

[1] Not applicable for antiscalant option
[2] For feed water temperatures > 20 °C, separate system dimensioning is required.

3.1.2 Foreseeable misuse

The reverse osmosis system osmoliQ: LB is not suitable for the use given below:

- Demineralisation of salt water (sea water)
- Strongly deviating/fluctuating flow rates of the feed water
- Direct supply of consumers (online operation)

3.2   Product components
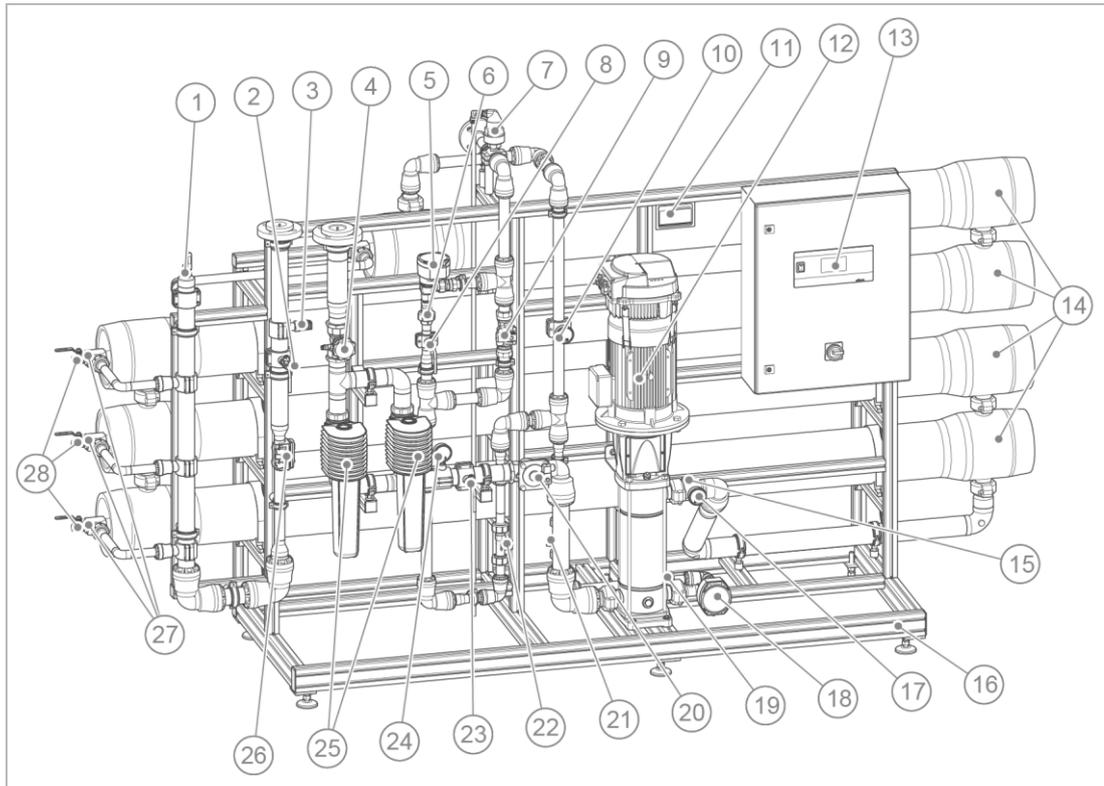
	Designation	Functions/characteristics	Coding
1	Permeate vent valve	Venting of permeate collection pipe	RO1H54
2	Sampling valve Total permeate	Sampling valve to withdraw total permeate	RO1H52
3	Permeate conductivity measuring cell	Conductivity sensor for continuous measurement of the permeate conductivity – display of the measured value in the control unit	RO1CQ1
4	Feed water shut-off valve	Piston valve to disconnect the system from the on-site pipe network	RO1H1
5	Motor control valve Concentrate-to-drain	To automatically control the recovery-dependent volume flow Concentrate-to-drain	RO1V3
6	Screw connection with restrictor orifice	Pre-restriction the volume flow Concentrate-to-drain	RO1S3
7	Aeration and vent valve Concentrate	Aeration of concentrate-to-drain pipe	RO1S50
8	Concentrate sampling valve	Sampling valve to withdraw concentrate	RO1H51
9	Flushing solenoid valve Concentrate	Opens after ever system STOP to flush out the concentrate generated during operation	RO1V11
10	Pressure gauge Concentrate	Display of concentrate pressure	RO1CP6
11	Type plate	Indication of performance data	–
12	High-pressure pump with frequency converter	Increase to the required operating pressure to achieve the permeate capacity	RO1P1
13	Switch cabinet with control unit	Switch cabinet with control electronics	RO1E1
14	Pressure pipe with reverse osmosis membrane	Main component to produce permeate by means of the reverse osmosis process	RO1AB20 RO1BB20 …
15	Pressure sensor for operating pressure	Permanent measurement of operating pressure and display in the control electronics	RO1CP3

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	Designation	Functions/characteristics	Coding
16	Aluminium rack	Rack made of aluminium to house the system components, piping and switch cabinet, with levelling feet to compensate for uneven floors	–
17	Pressure gauge Operating pressure	Indication of operating pressure	RO1CP4
18	Motor control valve Concentrate recirculation	For automatic control of the necessary volume flow Concentrate recirculation	RO1V2
19	Screw connection with restrictor orifice	Pre-restriction of the volume flow Concentrate recirculation	RO1S2
20	Feed water solenoid valve	Opens upon START of the system. Closes after completion of the flushing process	RO1V1
21	Flow sensor Concentrate recirculation	Display of the volume flow Concentrate recirculation in the control electronics	RO1CF2
22	Flow sensor Concentrate-to-drain	Display of the volume flow Concentrate-to-drain in the control electronics	RO1CF1
23	Sampling valve Feed water	Flame-sterilisable sampling valve to withdraw feed water	RO1H50
24	Pressure gauge Feed water	Display of feed water pressure	RO1CP1
25	Fine filter	Prefiltration of feed water	RO1AF1, RO1BF1
26	Flow sensor Permeate	Display of the permeate volume flow in the control electronics	RO1CF3
27	Permeate non-return valve	Prevents the permeate from flowing back	RO1S21 RO1S22 RO1S30 RO1S31
28	Sampling valve for individual permeate	Sampling valve to withdraw individual permeate from the pressure pipe	RO1H20 RO1H21 RO1H30 RO1H31

osmoliQ:LB10000 with antiscalant dosing system (option)
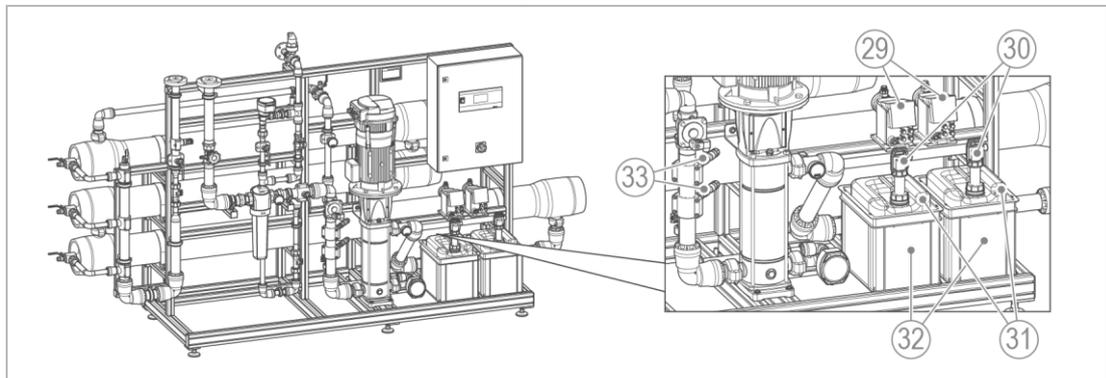
(The illustration shows the option of redundant dosing)

	Designation	Functions/characteristics	Coding
29	Dosing pump	Delivery of the dosing agent as soon as the feed water flows into the system	RO1P2 RO1P3
30	Suction lance	Withdrawal of dosing agent from dosing tank – signals filling level to the control unit	RO1S8 RO1S14
31	Dosing tank	Disposable container with dosing agent	RO1B2 RO1B4
32	Chemical spill tray	Prevents dosing agent from escaping in case of a leaking dosing tank	RO1B3 RO1B5
33	Dosing point	Injection of the dosing agent into the feed water	RO1S10 RO1S16

3.3　System connections
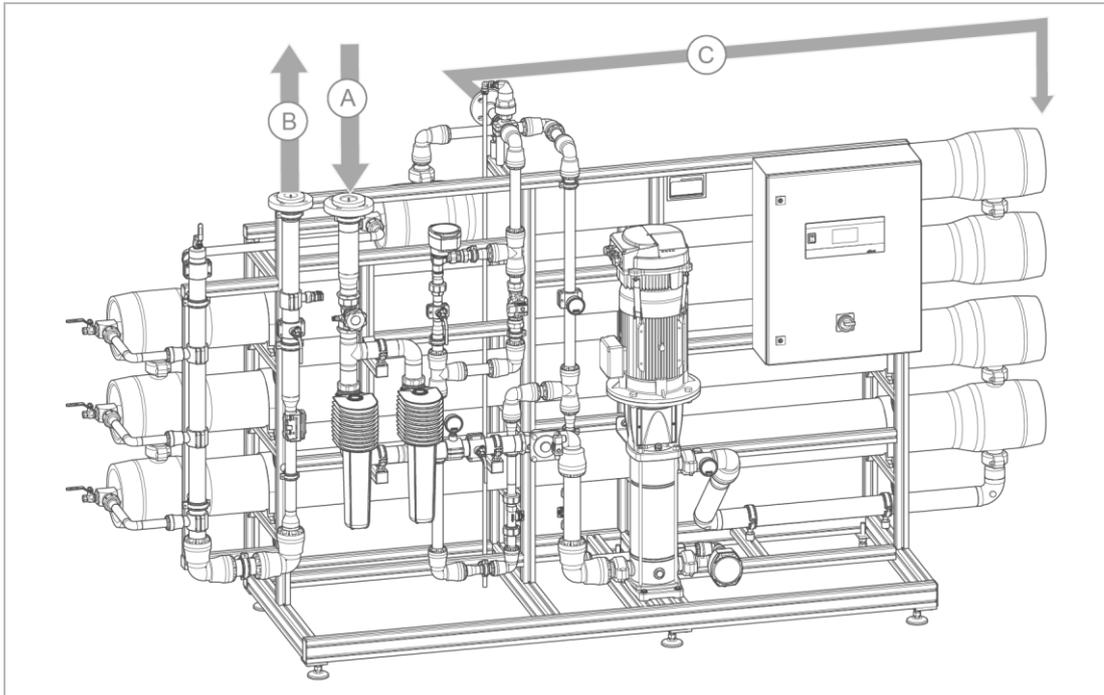
	Designation
A	Feed water inlet
B	Permeate outlet
C	Concentrate outlet

3.4　Functional description

The osmoliQ:LB works according to the reverse osmosis principle.

The feed water is directed to the high-pressure pump via a fine filter and an automatic fitting. An optical sensor in the pump sends a message to the control unit in the event of a lack of feed water and protects the pump from running dry. The frequency converter communicates with the system controller and regulates the pump speed in a way that the permeate capacity remains constant - irrespective of the inlet pressure or the feed water temperature. With the controller, the permeate capacity can be reduced by up to 20 %.

From the pump, the feed water is directed to the reverse osmosis membranes and is divided into the partial flows "permeate" and "concentrate". A partial flow of the concentrate is captured by a flow meter and returned to the feed water by means of a control valve (automatic).

The remaining concentrate is captured by a flow meter and directed to the drain via an automatic control.

Using the existing feed water pressure, the remaining constituents are flushed from the osmoliQ:LB via an additional automatic fitting after each operating period (permeate tank full).

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3.4.1   Process/function

The pre-treated feed water flows in parallel over the surface of the membrane. The water recirculated within the system is called FEED.

A partial flow of pure water passes through the membrane as permeate (cross flow), while the remaining partial flow – with now increased salt concentration – is carried away from the membrane surface as concentrate. As the concentrate passes through the circuit, it is concentrated still further.

An RO membrane is characterised by the fact that it has no pores and is "tight". The water does not flow through the membrane but diffuses through it.

This process can remove minerals dissolved in the water and significantly reduce bacteria, germs and particles as well as dissolved organic substances.

Over time, minerals and biological contaminants are deposited on the membrane surface. Therefore, it must be cleaned at regular intervals.

Structure of an RO membrane module
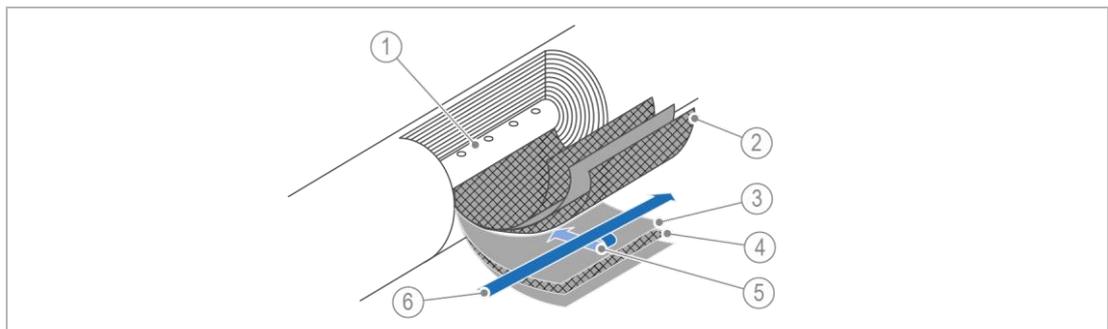
	Designation
1	Permeate collection pipe
2	Feed water spacer
3	RO membrane

	Designation
4	Permeate spacer
5	Permeate
6	Feed water

RO process

Reverse osmosis is reversing the natural osmosis process.

A	B	C
Water (diluted solution)	Concentrated solution	Membrane

Osmosis	Explanation
	Osmosis occurs when two solutions of different concentrations of dissolved minerals are separated from each other by a membrane. Water passes from the diluted solution (A) through the semi-permeable membrane (C) to the concentrated solution (B) until the concentration is balanced on both sides of the membrane.

Osmotic pressure	Explanation
	This balance is characterised by the static pressure difference between the resulting water columns. The pressure difference is referred to as the osmotic pressure. The higher the concentration of the dissolved minerals in the concentrated solution (B), the higher the osmotic pressure difference (D).
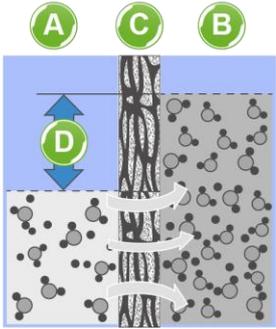
Reversed osmosis	Explanation
	In the case of reverse osmosis, the osmotic pressure is countered by a higher pressure (E). The process takes place in the reverse direction; water passes from the concentrated solution (B) through the membrane to the diluted solution (A). This way, the water can be demineralised.
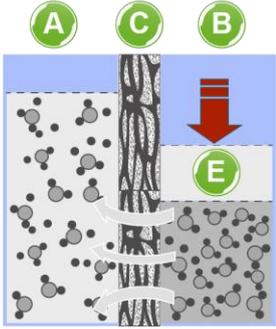
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3.5   Accessories

You can retrofit your product with accessories. Please contact your local Grünbeck representative or Grünbeck's headquarters in Hoechstaedt/Germany for details.

Illustration	Product	Order no.
	Fine filter BOXER KX 1"	**101 835**
	80 µm filter element for prefiltration	
	Fine filter BOXER KDX 1"	**101 820**
	with additional pressure reducer	
	Fine filter GENO-FME	**- Please inquire-**
	Euro system separator GENO-DK 2	**- Please inquire-**
	To secure systems and devices endangering the drinking water according to DIN 1988, part 4.	
	GENO-activated carbon filter AKF	**- Please inquire-**
	Reduction of the chlorine concentration in the water. For larger filters, please inquire.	
	Water softener GENO-mat duo WE-X	**- Please inquire-**
	Fully automatic twin water softener working according to the ion exchange principle. Generation of fully softened water with volume-controlled regeneration. For larger systems, please inquire.	
	Delta-p water softener	**- Please inquire-**
	Fully automatic triple water softener working according to the ion exchange principle. Generation of fully/partially softened water with volume-controlled regeneration. For larger systems, please inquire.	
	Water softener softliQ:XLA	**- Please inquire-**
	Hardness control measuring device softwatch	**172600000000**
	Automatic limit value monitoring of residual/total hardness.	
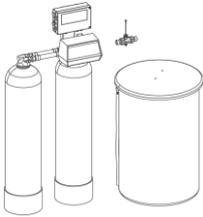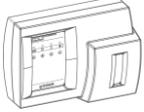
Illustration	Product	Order no.
	Communication module PROFIBUS DP	**750 160**
	For connection to a PROFIBUS DP master.	
	Communication module BACnet-IP	**750 170**
	For connection to a BACnet-IP master.	
	Communication module Modbus RTU	**750 175**
	For connection to a Modbus RTU master.	
	Voltage-free signals	**750 180**
	For connection to a **B**uilding **M**anagement **S**ystem/**C**entral **C**ontrol **S**tation.	
	Analogue signals 4-20 mA	**750 185**
	For connection to a **B**uilding **M**anagement **S**ystem/**C**entral **C**ontrol **S**tation.	
	Dosing system	**- Please inquire-**
	For hardness stabilisation.	
	Pure water tank	**- Please inquire-**
	For intermediate storage of permeate flowing unpressurised from reverse osmosis systems. Design of all tanks: • Connections for permeate inlet and suction line of pressure booster system • Black PE • Inspection opening with removable screw cap • Level probe Optional: • Level indicator GENO-Multi-Niveau • Sterile ventilation • CO_2 trap • Overflow loop	
	Basic pure water tank K-X **- Please inquire-** Rectangular tank for pure water 1100, 1500, 2000, 2500, 3000 and 4000 litres.	
	Basic pure water tank KR **- Please inquire-** Tank version: cylindrical with conical roof, made of black PE-HD or grey PP.	
	Pressure booster system **- Please inquire-** Vertical high-pressure centrifugal pump with standard priming and frequency converter. Pump system pre-assembled on aluminium rack with optionally selectable piping material for the system, microprocessor controller. Nominal flow rates: 5, 10, 16, 22, 33 m³/h	
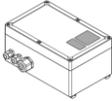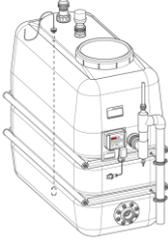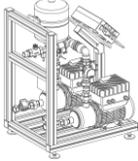
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4 Transport, set-up and storage

4.1 Shipping/Delivery/Packaging

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

► Upon receipt, immediately check for completeness and transport damage.

► In case of visible transport damage, proceed as follows:

- Do not accept the delivery or only accept it under reserve.
- Record the extent of damage on the transport documents or on the delivery note of the carrier.
- Initiate a complaint.

► Load/unload the system with a forklift/lift truck and suitable pallet forks. Take note of the system's top-heavy centre of gravity.

NOTE	Lifting the system with a crane and lifting strap

● Risk of damage (the system does not feature any lifting points for lifting by crane and lifting strap)

► The system must not be loaded/unloaded by crane and lifting strap.
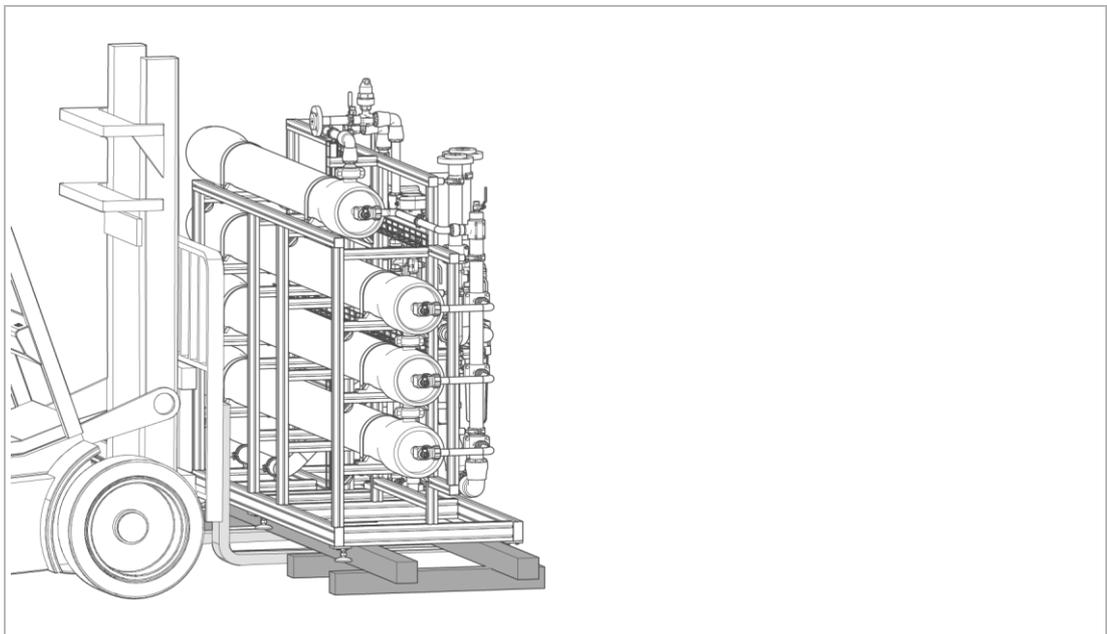
► Dispose of the packaging material in an environmentally sound and appropriate manner only after installation of the system.

4.2 Transport/Set-up

WARNING   Improper transport

- ● The system's centre of gravity is top-heavy. The system can tip and crush persons/limbs.
- ► Transport the system by means of a forklift or lift truck with appropriate forks only.
- ► Do not transport the system over inclines or stairs.

- ► Transport the system to the installation site (longer distances) in its original packaging and secured on the wooden sled only.

- ► Transport the unpacked system (without sled) in close vicinity of the final installation site only – do not lift it at the system rack.

4.3 Storage

- ► Protect the product from the impacts below when storing it:

  - • Dampness, moisture
  - • Environmental impacts such as wind, rain, snow, etc.
  - • Frost, direct sunlight, severe heat exposure
  - • Chemicals, dyes, solvents and their vapours

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5 Installation

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

Installation example osmoliQ:LB4000
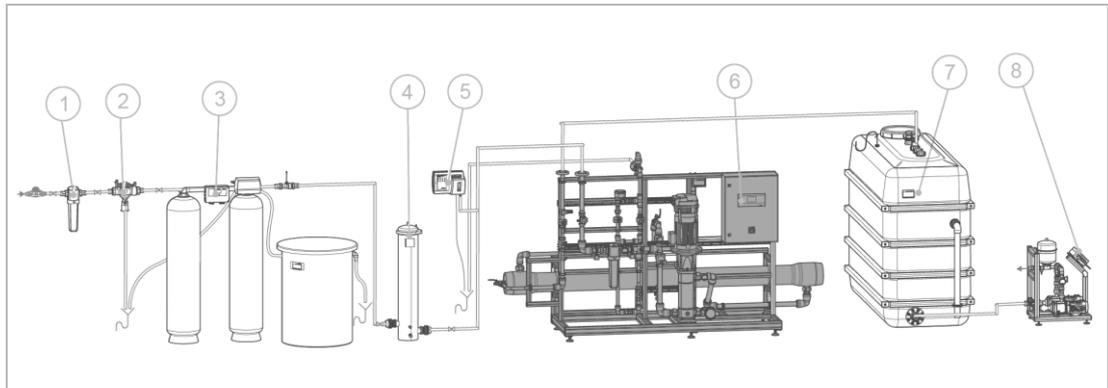
	Designation			Designation
1	Fine filter (e.g. BOXER KX)		5	Hardness control measuring device softwatch
2	System separator GENO-DK-2 1½"		6	Reverse osmosis system osmoliQ:LB4000
3	Water softener GENO-mat duo WE-X 450		7	Basic pure water tank K-X 4000
4	Activated carbon filter AKF 6000		8	Pressure booster system GENO FU-X 4/40-2 N

Installation example osmoliQ:LB10000 with antiscalant dosing
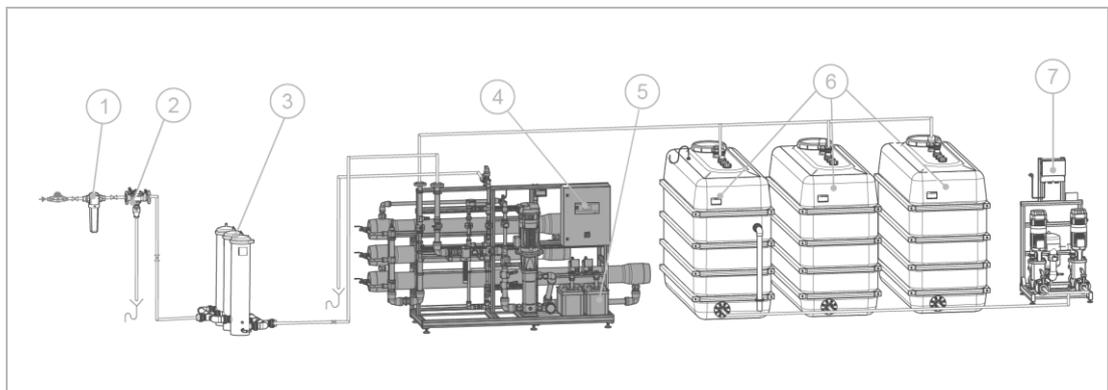
	Designation			Designation
1	Fine filter (e.g. BOXER KX)		5	Antiscalant dosing system
2	System separator GENO-DK-2 2"		6	Basic pure water tank K-X 4000 with 2 additional tanks K 4000
3	3 x Activated carbon filter AKF 4500		7	Pressure booster system GENO-FU-X 16/40-2 N
4	Reverse osmosis system osmoliQ:LB10000			

5.1 Requirements for the installation site

Obey the 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.

● Avoid strong heat radiation and direct sunlight.

● The installation site must be adequately illuminated and ventilated.

● If the softened water is used as drinking water as defined by the German Drinking Water Ordinance, the ambient temperature must not rise above 25 °C. For applications that are purely technical, the ambient temperature must not exceed 35 °C.

● A drain connection (refer to Technical specifications, chapter 12) to discharge the concentrate must be available.

● A floor drain suitable for the respective system size must be available at the installation site. Floor drains that discharge to a lifting system do not work in case of a power failure.

● The permeate and concentrate pipes provided by the client on site must be made of corrosion-proof material.

5.1.1 Placing of the system/Required space

● 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.

● For maintenance purposes, a sufficient distance of at least 1200 mm (distance A) must be kept on the left and the right of the system.

● For operating purposes, there must be a clearance of at least 850 mm (distance B) in front of the system.

● A distance of 300 mm (distance C) must be kept from the rear panel

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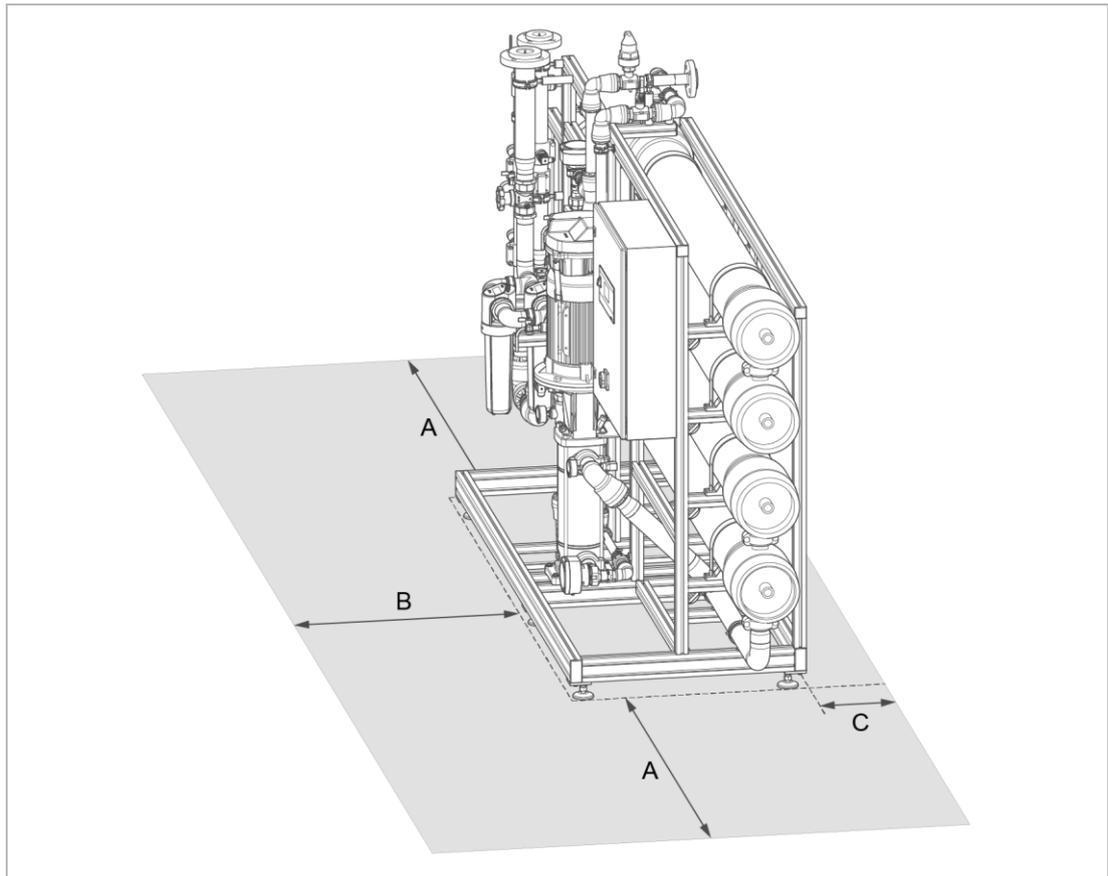
5.1.2   Products installed upstream

● The components below must be installed upstream of the system:

  • Fine filter

  • Euro system separator

  • Activated carbon filter or liquid dosing to reduce oxidants

  • Water softener or antiscalant dosing system

● The concentrate and permeate pipe provided by the client on site must feature a device to separate the pipe (e.g. screw connections). This is required to flush out the preserving agent, or to carry out chemical cleaning and/or disinfection, if necessary.

● In case of system configurations with water softeners we recommend monitoring the residual hardness by installing a hardness control measuring device in the soft water outlet in order to increase operational safety.

5.1.3 Requirements for electrical wiring

- For the power supply of the system, a power outlet 3x 400 V/50 Hz/3 phases/N/PE must be provided by the client on site.

- The supply line to the system provided by client on site must be dimensioned and routed according to the respective type of system – refer to the electric circuit diagram (project-specific).

5.2 Water installation

The osmoliQ reverse osmosis system is completely piped internally, wired, workshop-tested and preserved.

5.2.1 Preliminary work

NOTE High differences in temperature at the installation site

- Possible malfunction of the control unit during initial start-up/commissioning due to moisture condensation on electronic components inside the control unit.

► Unpack the system and let it rest unused at the installation site for 1 hour before installing it.

» Possible moisture on electronic components inside the control unit can dry off.

1. Remove all packaging/protective foils.

2. Release the system rack from the transport lock.

3. Remove the wooden sled.

4. Securely place the system at the designated location – take note of the minimum space required (refer to chapter 5.1.1).

5. Remove the protective caps from the connections.

5.2.2 Connecting the system

Pipes provided by the client on site for feed water and permeate must be separable, for instance by means of a screw connection (flushing section).

The flushing section – which can be removed, if necessary – is a pipe section with detachable connecting elements at both pipe ends.

During chemical cleaning (CIP) and disinfection operations, the system must be disconnected from the feed water and permeate pipe.

When flushing out the preserving agent, only the permeate pipe must be separated.

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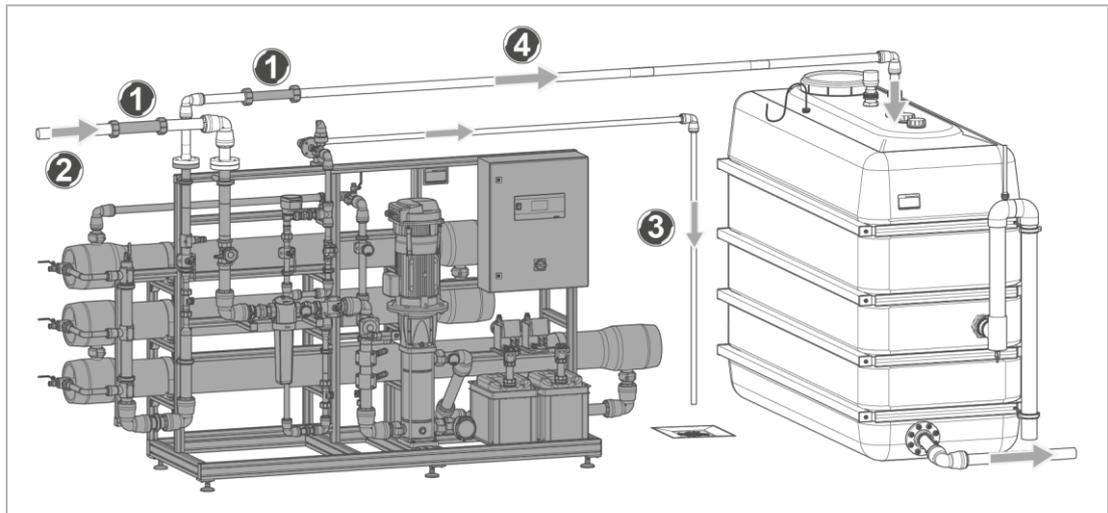
1. Install a flushing adapter each in the "feed water" inlet pipe and the "permeate" outlet pipe.

2. Connect the inlet pipe to the "feed water" connection.

3. Connect the outlet pipe to the "concentrate-to-drain" connection according to DIN EN 1717 (with free outlet).

4. Connect the "permeate" outlet pipe to the supply tank.

5.3   Electrical installation

The electrical installation must be carried out by a qualified electrician only.

DANGER	Lethal voltage of 400 V

- ● Risk of severe burns, cardiovascular failure, fatal electric shock
- ► Check the system for proper condition before start-up/commissioning.
- ► Switch off the supply voltage before working on electrical system parts.
- ► Secure the system against restart.
- ► Discharge residual voltage.
- ► Only use suitable, undamaged tools.
- ► Use personal protective equipment – do not work with wet hands.

| NOTE | Operation of the high-pressure pump/the frequency converter |

- The frequency converter of the high-pressure 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 300 mA.
- ► Use a of 3 phases/N/PE, 50 Hz, 400 V/230 V power outlet for the on-site power supply of the system.
- ► The fuse protection/supply line to the system provided by client on site must be appropriately dimensioned and routed according to the respective type of system – refer to the electric circuit diagram (project-specific). A C32A back-up fuse is recommended.

5.3.1 Establishing potential equalisation

In proper operation, the speed-controlled high-pressure pump can have a ground leakage current of > 10 mA.

- Connection to the potential equalisation provided by the client on site is required.
- The protective conductor must have a minimum cross-section of 6 mm² CU or 10 mm² Al.
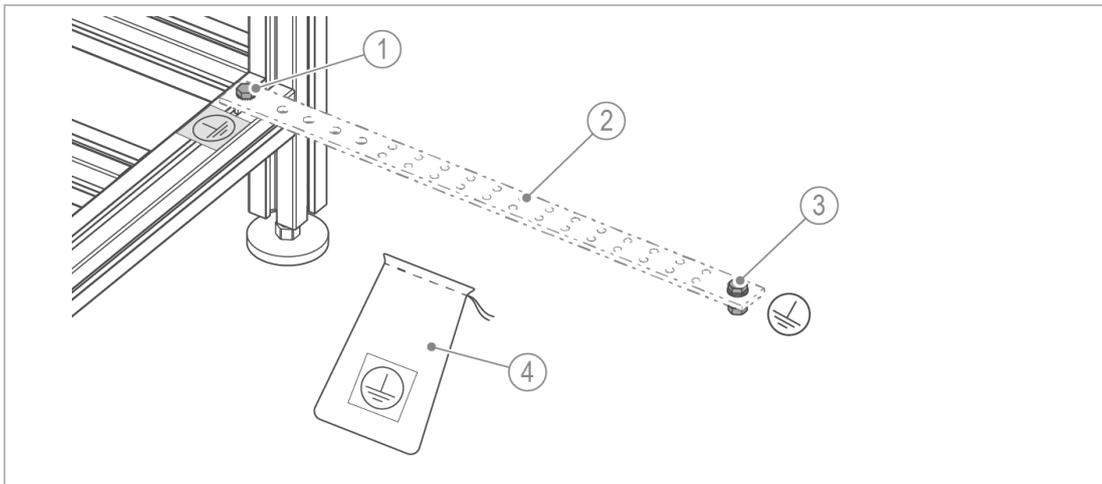
	Designation			Designation
1	Grounding point on the aluminium rack		3	Grounding point for potential equalisation by the client on site
2	Grounding tape		4	Bag with connection material

1. Establish the grounding point on the aluminium rack – use the connection material: hammer nut, hexagon head screw M8x25 and serrated washer.

2. Attach the "Grounding" label.

3. Connect the protective conductor to the potential equalisation provided by the client on site – use the connection material: hexagon head screw M8x20, washer and spring washer.

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5.3.2 Establishing the electrical connection

4. Open the switch cabinet.

5. Establish the power supply – refer to the electric circuit diagram (project-specific).

5.3.3 Line connections (within the GENO-tronic control unit)

⚠️ **WARNING** External voltage possible at voltage-free contacts and on the circuit board

- ● Risk of electric shock when connected to 230 V
- ► Do not open any switch boxes or other parts of the electrical equipment if you are not a qualified electrician.
- ► Switch the system's main switch to OFF before working on the system.
- ► Wait for approx. 15 minutes for the residual voltage to be discharged.
- ► Obey the warning labels in the control unit.

ℹ️ The line connections below are pre-installed in the system at the factory and must not be modified:
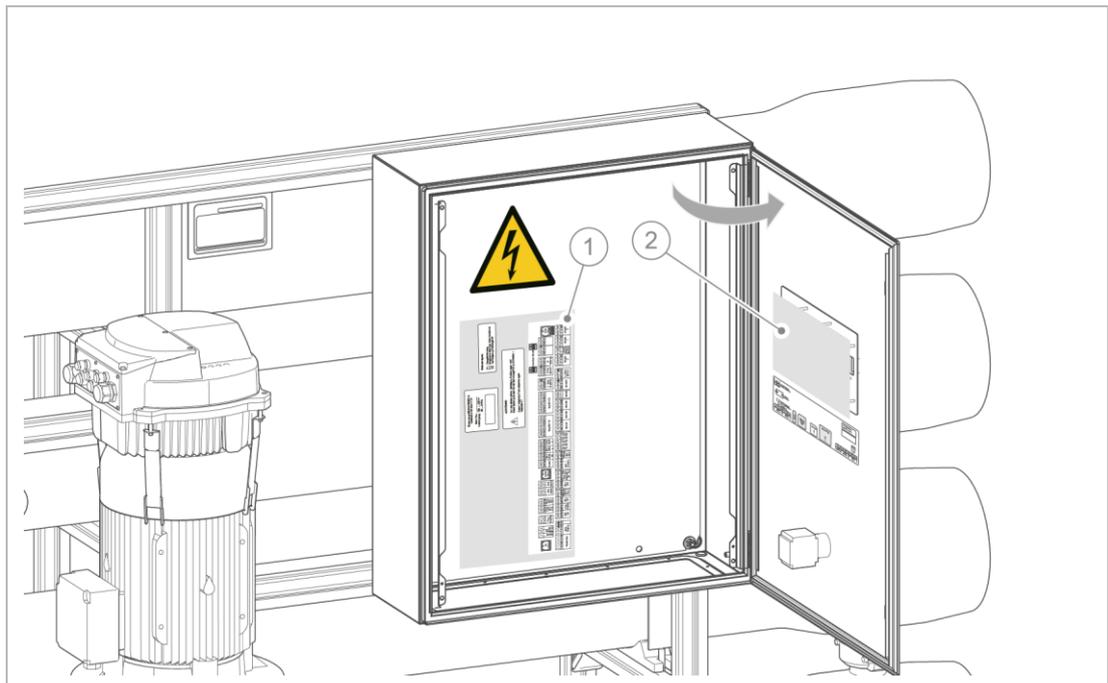
	Designation			Designation
1	Terminal strip of main circuit board		**2**	Operating board

Operating board
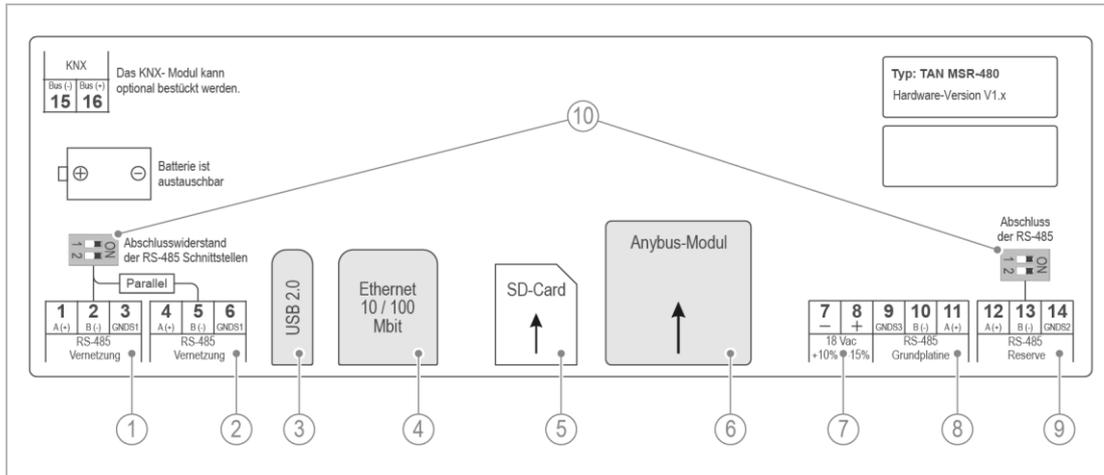
	Designation			Designation
1	RS-485 for interconnection of Modbus RTU		**6**	Anybus module interface
2	RS-485 for interconnection of Modbus RTU		**7**	Voltage supply
3	USB 2.0 reserve		**8**	RS-485 basic module
4	Ethernet 10/100 Mbit		**9**	RS-485 for interconnection of internal system components
5	SD card slot		**10**	Terminating resistors for RS-485 interfaces

Terminal strip of main circuit board
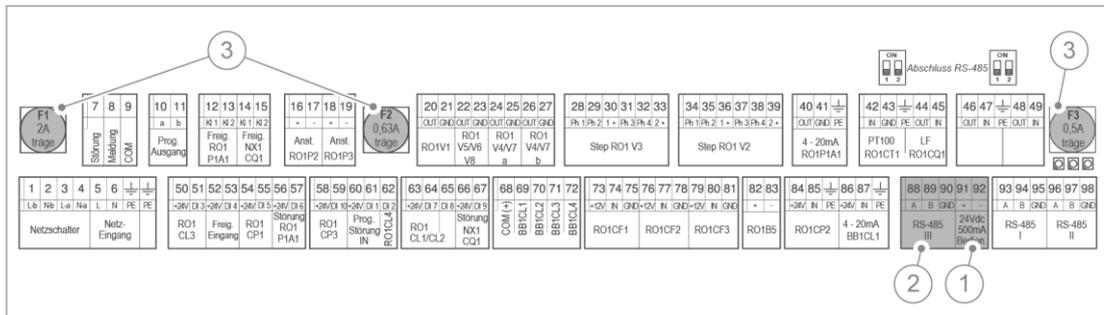
	Designation			Designation
1	Power supply of operating board		**3**	Fuses of main circuit board
2	RS-485 (III) serial interface			

Power supply of operating board

Terminal of main circuit board	Function	Terminal to operating board
91	24 VDC / 500 mA	8
92	Ground	7

RS-485 (III) serial interface

Terminal of main circuit board	Function	Terminal to operating board
88	RS 485 A	11
89	RS 485 B	10
90	RS 485 GND	9

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Fuses of main circuit board

Fuse	Function	Comments
F1	2 A slow-blow	Main fuse of mains input
F2	0.63 A slow-blow	24 VDC solenoid valves, step motors
F3	0.5 A slow-blow	Operating board 24 VDC

For other connections of the main circuit board, refer to the electric circuit diagram.

Interface RS-485
Data line to interconnected subsystems Water softener and/or Pressure booster

Connecting terminating resistors

If more than two subsystems are interconnected or if the length of the line between the two is > approx. 20 m, the so-called terminating resistors have to be connected to the two "endpoints" by means of DIP switches.

RS485 interconnection between	Terminating resistors to be connected in case of	
GENO-mat duo WE+ osmoliQ	GENO-mat duo WE and osmoliQ (*)	
Delta-p + osmoliQ	Delta-p and osmoliQ (*)	
osmoliQ + pressure booster	osmoliQ + pressure booster (*)	
GENO-mat duo WE-X or Delta-p + osmoliQ + pressure booster GENO-FU (HR)-X	GENO-mat duo WE	Pressure booster

(*) For length of line RS-485 > approx. 20 m

For osmoliQ: The terminating resistors are aligned below the sheet cover of the main circuit board.

- Near terminal 43 (connection to water softener GENO-mat duo WE)

- Near terminal 50 (connection to water softener Delta-p)

- Near terminal 47 (connection to pressure booster)

In case of control unit IONO-matic WE or PBS (pressure booster system) controller:

- Near terminal 36
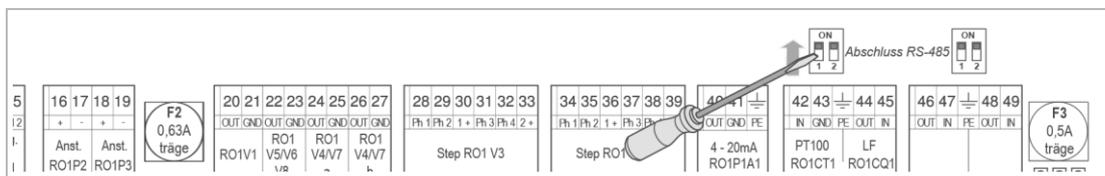
► Switch both DIP switches to "ON", if required.

5.4 Connection/Settings of communication interface MODBUS RTU

The RS-485 connector plug is accessible upon opening the door of the switch cabinet.

5.4.1.1 Configuration of the 3-pin connector

Terminal	Designation
1	A (+)
2	B (-)
3	GNDS1

5.4.1.2 Settings

The Modbus RTU address is set at the GENO-tronic control unit (module address).

You can change the values below:

- Module address: 0 … 255

The following values cannot be changed:

- Baud rate: 19200 bits

- Parity: Even

- Data bits: 8 bits

- Stop bits: 1

5.4.2 Logging on the communication interface

5.4.2.1 System menu II

The purpose of system menu II is to log on all existing components of the "production line" that are to be displayed in the GENO-tronic.

Access to the menu is protected by Code 339. Undocumented but available parameters and setting options have not yet been enabled. These must not be declared as logged on.

Settings of module addresses (refer to chapter 5.4.1.2)

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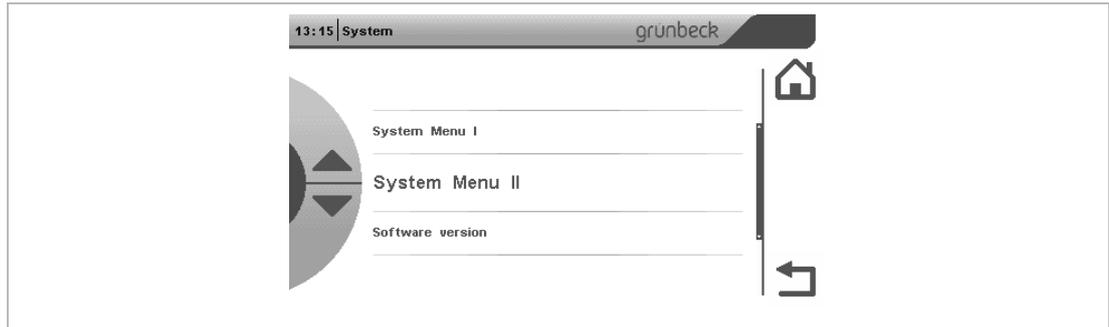
Logon of interface modules
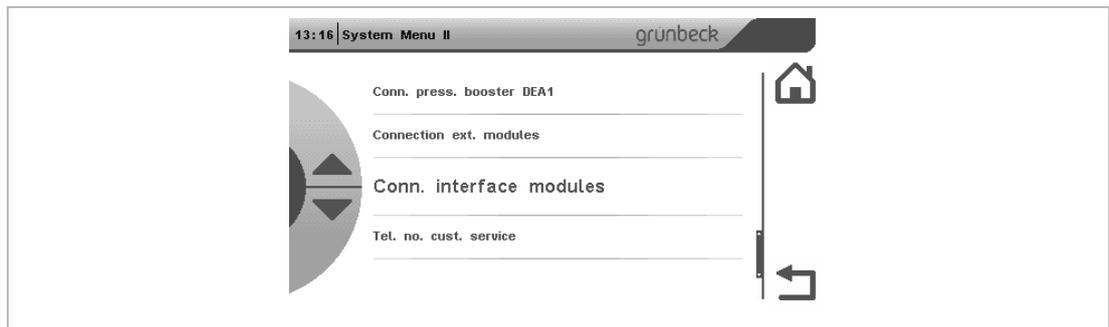
Modbus RTU

Module address

5.4.3   Data from master to communication module MODBUS

Modbus Register		Bytes	Value	Format	Resolution		Factor	Function/Comment
100	00	2	Actuation	bool	0/1	Off/On		System state RO system With this bit, you can switch the system on or off.
	01			bool	0/1			
	02			bool	0/1			
	03			bool	0/1			
	04			bool	0/1			
	05			bool	0/1			
	06			bool	0/1			
	07			bool	0/1			
	08			bool	0/1			
	09			bool	0/1			
	10			bool	0/1			
	11			bool	0/1			
	12			bool	0/1			
	13			bool	0/1			
	14			bool	0/1			
	15			bool	0/1	Clock pulse 1 s		Live bit clocking (ON for 1 second/ OFF for 1 second)
101	00	2	Actuation	bool	0/1	Off/On		System state of pressure booster system With this bit, you can switch the system on or off.
	01			bool	0/1	Normal/ signal		Message Dry-run protection of permeate tank This bit indicates when the dry-run protection of the permeate tank is active.
	02			bool	0/1			
	03			bool	0/1			
	04			bool	0/1			
	05			bool	0/1			
	06			bool	0/1			
	07			bool	0/1			
	08			bool	0/1			
	09			bool	0/1			
	10			bool	0/1			
	11			bool	0/1			
	12			bool	0/1			
	13			bool	0/1			
	14			bool	0/1			
	15			bool	0/1			

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Modbus Register		Bytes	Value	Format	Resolution		Factor	Function/Comment
	00			bool	0/1	Off/Start		Manual regeneration of water softener With this bit, you can start the manual regeneration.
	01			bool	0/1			Triple regeneration of water softener (Delta– p) With this bit, you can start the triple regeneration.
	02			bool	0/1			
	03			bool	0/1			
	04			bool	0/1			
102	05	2	Actuation	bool	0/1			
	06			bool	0/1			
	07			bool	0/1			
	08			bool	0/1			
	09			bool	0/1			
	10			bool	0/1			
	11			bool	0/1			
	12			bool	0/1			
	13			bool	0/1			
	14			bool	0/1			
	15			bool	0/1			

5.4.4 Data from MODBUS communication module to master

5.4.4.1 Signals of RO system

Modbus Register	Bytes	Value	Format	Resolution		Factor	Function/Comment
0	2	Measuring value	int	0…65535	l/h	1	Flow rate Concentrate-to-drain RO1CF1
1	2	Measuring value	int	0…65535	l/h	1	Flow rate Concentrate recirculation RO1CF2
2	2	Measuring value	int	0…65535	l/h	1	Flow rate Permeate RO1CF3
3	2	Measuring value	int	0…16.0	bar	10	Operating pressure High-pressure pump RO1CP2
4	2	Measuring value	int	0…99	%	1	Recovery
5	2	Measuring value	int	0.0…100.0	µS/cm	10	Permeate conductivity RO1CQ1
6	2	Measuring value	int	0…100	°C	1	Permeate temperature RO1CT1
7	2	Measuring value	int	0…100	%	1	Output level Concentrate recirculation RO1V2
8	2	Measuring value	int	0…100	%	1	Output level Concentrate-to-drain RO1V3
9	2	Counter value	int	0…65535	h	1	Operating hours
10	2	Counter value		0…65535	h	1	Run time of HP pump RO1P1

Modbus Register	Bytes	Value	Format	Resolution		Factor	Function/Comment
11		2	Counter value		0…65535	h	1	Run time of dosing pump RO1P2
12		2	Counter value		0…65535	h	1	Run time Dosing pump RO1P3
13 14		4	Counter value	Dint	0…9,999,999.9	m³	10	Sum Permeate
15 16		4	Counter value	Dint	0…9,999,999	m³	10	Sum Concentrate-to-drain
17 18		4	Counter value	Dint	0…9,999,999	m³	10	Sum Inlet flow rate
19	00	2	Signals 1 RO system	bool	0/1	Normal/signal		System enabled This bit indicates when the system is enabled.
	01			bool	0/1	Normal/signal		Conductivity pre-alarm RO1CQ1 This bit indicates when the conductivity value is exceeded.
	02			bool	0/1	Normal/signal		Conductivity pre-alarm RO1CQ2 This bit indicates when the conductivity value is exceeded.
	03			bool	0/1	Normal/signal		Pre-alarm Dosing RO1CL1 This bit indicates when an alarm is present at the dosing system.
	04			bool	0/1	Normal/signal		Pre-alarm Dosing RO1CL3 This bit indicates when an alarm is present at the dosing system.
	05			bool	0/1	Normal/signal		Maintenance interval RO expired This bit indicates when the maintenance interval has expired.
	06			bool	0/1	Normal/signal		Minimum pressure switch RO1CP (after repeated attempts) This bit indicates when the minimum pressure has not been reached.
	07			bool	0/1	Normal/signal		System ON (push-button switched on) This bit indicates when the system is switched on.
	08			bool	0/1	Normal/signal		Manual operation ON This bit indicates when the system is in manual operation.
	09			bool	0/1	Normal/signal		Automatic operation ON This bit indicates when the system is in automatic operation.
	10			bool	0/1	Normal/signal		Flushing This bit indicates when the system is in flushing operation.

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Modbus Register		Bytes	Value	Format	Resolution		Factor	Function/Comment
	11			bool	0/1	Normal/ signal		Forced flushing This bit indicates when the system is in forced flushing.
	12			bool	0/1	Normal/ signal		Forced stop This bit indicates when the system is in forced stop.
	13			bool	0/1	Normal/ signal		No general warnings pending This bit indicates when a warning is present at the system.
	14			bool	0/1	Reserve		Reserve
	15			bool	0/1	Reserve		Reserve
20	00	2	Signals 2 RO system	bool	0/1	Normal/ signal		Level a This bit indicates when there is a filling level.
	01			bool	0/1	Normal/ signal		Level b This bit indicates when there is a filling level.
	02			bool	0/1	Normal/ signal		Level c This bit indicates when there is a filling level.
	03			bool	0/1	Normal/ signal		Level d This bit indicates when there is a filling level.
	04			bool	0/1	Normal/ signal		System is producing This bit indicates when the system is producing.
	05			bool	0/1	Normal/ signal		First-permeate-to-drain time exceeded This bit indicates when the time for the discharge of the first permeate is exceeded.
	06			bool	0/1	Reserve		Reserve
	07			bool	0/1	Reserve		Reserve
	08			bool	0/1	Reserve		Reserve
	09			bool	0/1	Reserve		Reserve
	10			bool	0/1	Reserve		Reserve
	11			bool	0/1	Reserve		Reserve
	12			bool	0/1	Reserve		Reserve
	13			bool	0/1	Reserve		Reserve
	14			bool	0/1	Reserve		Reserve
	15			bool	0/1	Clock pulse 1 s		Reserve
21	00	2	Signals 3 RO system	bool	0/1	Off/ Enable		Enabling Frequency converter of high-pressure pump RO1P1A1 This bit indicates when the frequency converter is enabled.
	01			bool	0/1	Closed/ Open		Feed water solenoid valve RO1V1 This bit indicates when the feed water valve RO1V1 is open.

Modbus Register		Bytes	Value	Format	Resolution		Factor	Function/Comment
	02			bool	0/1	Closed/ Open		Solenoid valve Discharge of permeate RO1V4 This bit indicates when the valve for the discharge of permeate RO1V4 is open.
	03			bool	0/1	Closed/ Open		Blending solenoid valve RO1V5 This bit indicates when the blending solenoid valve RO1V5 is open.
	04			bool	0/1	Closed/ Open		Solenoid valve Emergency bypass RO1V6 This bit indicates when the solenoid valve for emergency bypass RO1V6 is open.
	05			bool	0/1	Closed/ Open		Solenoid valve Draining valve RO1V7 This bit indicates when the valve Draining valve RO1V7 is open.
	06			bool	0/1	Closed/ Open		Solenoid valve Membrane degassing RO1V8 This bit indicates when the solenoid valve for membrane degassing RO1V8 is open.
	07			bool	0/1	Closed/ Open		Solenoid valve Flushing water RO1V11 This bit indicates when the flushing water valve RO1V11 is open.
	08			bool	0/1	Off/ Enable		Enabling dosing RO1P2 This bit indicates when the dosing pump RO1P2 is enabled.
	09			bool	0/1	Off/ Enable		Enabling dosing RO1P3 This bit indicates when the dosing pump RO1P3 is enabled.
	10			bool	0/1	Off/ Enable		Enabling residual hardness measurement NX1CQ1 This bit indicates when the residual hardness measurement NX1CQ1 is enabled.
	11			bool	0/1	Off/ Active		Programmable output closed
	12			bool	0/1	Reserve		Reserve
	13			bool	0/1	Reserve		Reserve
	14			bool	0/1	Reserve		Reserve
	15			bool	0/1	Reserve		Reserve
22	00	2	Faults 1 RO system	bool	0/1	Normal/ Fault		Fault Collective fault This bit indicates when a fault is present at the system.

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Modbus Register		Bytes	Value	Format	Resolution		Factor	Function/Comment
	01			bool	0/1	Normal/ Fault		Fault Recovery This bit indicates when the recovery too high.
	02			bool	0/1	Normal/ Fault		Fault Membrane cross flow This bit indicates when the cross flow deviates.
	03			bool	0/1	Normal/ Fault		Fault Permeate conductivity RO1CQ1 This bit indicates when the conductivity is exceeded.
	04			bool	0/1	Normal/ Fault		Fault Negative pressure RO1CP1 This bit indicates when the system pressure is undershot.
	05			bool	0/1	Normal/ Fault		Fault Operating pressure RO1CP2 This bit indicates when the operating pressure is exceeded.
	06			bool	0/1	Normal/ Fault		Fault Overpressure RO1CP3 This bit indicates when the system pressure is exceeded.
	07			bool	0/1	Normal/ Fault		Fault High-pressure pump RO1P1 This bit indicates when a fault is present at the high-pressure pump or at the frequency converter.
	08			bool	0/1	Normal/ Fault		Fault Empty signal RO1CL2/dosing RO1P2 This bit indicates when a fault is present at the dosing system.
	09			bool	0/1	Normal/ Fault		Fault Empty signal RO1CL4/dosing RO1P3 This bit indicates when a fault is present at the dosing system.
	10			bool	0/1	Normal/ Fault		Fault Does not close RO1V1 This bit indicates when the raw water valve does not close.
	11			bool	0/1	Normal/ Fault		Fault Residual hardness NX1CQ1 This bit indicates when the residual hardness measuring device is faulty or the limit value has been exceeded.
	12			bool	0/1	Normal/ Fault		Fault Permeate tank level BB1CL1 This bit indicates when a fault is present at the level control.

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Modbus Register		Bytes	Value	Format	Resolution		Factor	Function/Comment
	13			bool	0/1	Normal/ Fault		Fault Conductivity measurement RO1CQ1 This bit indicates when the conductivity is exceeded.
	14			bool	0/1	Normal/ Fault		Fault Programmable input This bit indicates when a freely programmable fault is present.
	15			bool	0/1	Normal/ Fault		Fault Permeate water meterRO1CF3 This bit indicates when a fault is present at the water meter.
23	00	2	Faults 2 RO system	bool	0/1	Normal/ Fault		Fault membrane degassing RO1CF5 This bit indicates when the flow rate is undershot.
	01			bool	0/1	Reserve		Reserve
	02			bool	0/1	Reserve		Reserve
	03			bool	0/1	Reserve		Reserve
	04			bool	0/1	Reserve		Reserve
	05			bool	0/1	Reserve		Reserve
	06			bool	0/1	Reserve		Reserve
	07			bool	0/1	Reserve		Reserve
	08			bool	0/1	Reserve		Reserve
	09			bool	0/1	Reserve		Reserve
	10			bool	0/1	Reserve		Reserve
	11			bool	0/1	Reserve		Reserve
	12			bool	0/1	Reserve		Reserve
	13			bool	0/1	Reserve		Reserve
	14			bool	0/1	Reserve		Reserve
	15			bool	0/1	Reserve		Reserve

5.4.4.2 Permeate tank signals

Modbus Register	Bytes	Value	Format	Resolution		Factor	Function/Comment
55	2		int	0…100	%	1	Filling level Permeate tank BB1CL1

5.4.4.3 Pressure booster signals

Modbus Register	Bytes	Value	Format	Resolution		Factor	Function/Comment
56	2	Measuring value	int	0…99.99	m³/h	100	Flow rate DEA1CF1
57 58	4	Counter value	Dint	0…99999	h	1	Operating hours DEA1P1
59	4		Dint	0…99999	h	1	

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Modbus Register	Bytes	Value	Format	Resolution			Factor	Function/Comment
60		Counter value						Operating hours DEA1P2
61	4	Counter value	Dint	0…99999		m³	1	Sum Flow rate DEA1CF1
62								
63	2	Measuring value	int	0…999		d	1	Remaining time of maintenance interval
	00		bool	0/1	Normal/ Fault			Fault pressure booster DEA1P1 This bit indicates when a fault is present at the pressure booster pump.
	01		bool	0/1	Normal/ Fault			Fault Pressure booster DEA1P2 This bit indicates when a fault is present at the pressure booster pump.
	02		bool	0/1	Normal/ Enable			Enable Pressure booster DEA1P1 This bit indicates when the pressure booster pump is enabled.
	03		bool	0/1	Normal/ Enable			Enable Pressure booster DEA1P2 This bit indicates when the pressure booster pump is enabled.
	04		bool	0/1	Normal/ signal			System ON This bit indicates when the system is ON.
	05		bool	0/1	Normal/ signal			Hand DEA1P1 This bit indicates when the pressure booster pump is in manual operation.
64	06	Signals Pressure booster system	bool	0/1	Normal/ signal			Hand DEA1P2 This bit indicates when the pressure booster pump is in manual operation.
	07		bool	0/1	Normal/ signal			Auto DEA1P1 This bit indicates when the pressure booster pump is in automatic operation.
	08		bool	0/1	Normal/ signal			Auto DEA1P2 This bit indicates when the pressure booster pump is in automatic operation.
	09		bool	0/1	Normal/ signal			Dry-run protection This bit indicates dry running protection.
	10		bool	0/1	Normal/ signal			Peak load operation This bit indicates when the pressure booster pump is in peak load operation.
	11		bool	0/1	Normal/ signal			No external enabling This bit indicates enabling.
	12		bool	0/1	Normal/ signal			Maintenance interval expired This bit indicates when the maintenance interval has expired.

Modbus Register		Bytes	Value	Format	Resolution		Factor	Function/Comment
	13			bool	0/1	Normal/ signal		Power failure This bit indicates when there was a power failure.
	14			bool	0/1	Normal/ signal		No bus connection to OSMO-X This bit indicates that the systems are not connected.
	15			bool	0/1	Normal/ signal		Operating mode "Bus" This bit indicates when the system is in Bus operation.

5.4.4.4 Signals of water softener Delta-p

Modbus Register		Bytes	Value	Format	Resolution		Factor	Function/Comment
65		2	Measuring value	int	0…999.9	m³	10	Residual capacity Exchanger *
66		2	Measuring value	int	0…999.9	m³	10	Residual capacity Exchanger**
69		2	Measuring value	int	0…9.99	m³/h	100	Flow rate Exchanger *
70		2	Measuring value	int	0…9.99	m³/h	100	Flow rate Exchanger **
72 73		4	Counter value	Dint	0…99999	pcs	1	Regeneration counter
7 75		4	Counter value	Dint	0…99999	m³	1	Counter Soft water volume
76		2	Counter value	int	0…999	h	1	Time since last regeneration
77		2	Counter value	int	0…999	h	1	Time until maintenance is due
78	00	2	Signals Water softener Delta-p	bool	0/1	Normal/ signal		Standby This bit indicates when the system is in standby.
	01			bool	0/1	Normal/ signal		Salting This bit indicates when the system is in step Salting.
	02			bool	0/1	Normal/ signal		Slow rinse This bit indicates when the system is in step Slow rinse.
	03			bool	0/1	Normal/ signal		Backwash This bit indicates when the system is in step Backwash.
	04			bool	0/1	Normal/ signal		Filling brine tank This bit indicates when the system is in step Fill brine tank.
	05			bool	0/1	Normal/ signal		First filtrate This bit indicates when the system is in step First filtrate.

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Modbus Register		Bytes	Value	Format	Resolution		Factor	Function/Comment
	06			bool	0/1	Normal/ signal		Washing out This bit indicates when the system is in step Washing out.
	07			bool	0/1	Normal/ signal		Regeneration running This bit indicates when the system is in regeneration.
	08			bool	0/1	Normal/ signal		Exchanger operation NX1B1 This bit indicates when exchanger NX1B1 is in operation.
	09			bool	0/1	Normal/ signal		Exchanger operation NX1B2 This bit indicates when exchanger NX1B2 is in operation.
	10			bool	0/1	Normal/ signal		Exchanger operation NX1B3 This bit indicates when exchanger NX1B3 is in operation.
	11			bool	0/1	Normal/ signal		Maintenance interval expired This bit indicates when the maintenance interval has expired.
	12			bool	0/1	Reserve		Reserve
	13			bool	0/1	Reserve		Reserve
	14			bool	0/1	Reserve		Reserve
	15			bool	0/1	Reserve		Reserve
79	00	2	Faults Water softener Delta-p	bool	0/1	Normal/ Fault		Fault Power failure Er 0 This bit indicates when there was a power failure.
	01			bool	0/1	Normal/ Fault		Fault Run time Regeneration valve Er 1 This bit indicates when there was a power failure.
	02			bool	0/1	Normal/ Fault		Fault Transfer valve Er 2 This bit indicates when there was a power failure.
	03			bool	0/1	Normal/ Fault		Fault Hard water Er 3 This bit indicates when there was a power failure.
	04			bool	0/1	Normal/ Fault		Fault Electrolysis current Er –4 This bit indicates when there was a power failure.
	05			bool	0/1	Normal/ Fault		Fault Short-circuit Carbon electrodes Er –4 This bit indicates when there was a power failure.
	06			bool	0/1	Normal/ Fault		Fault Make-up water volume Brine tank Er 6 This bit indicates when there was a power failure.

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Modbus Register	Bytes	Value	Format	Resolution		Factor	Function/Comment
	07			bool	0/1	Normal/ Fault		Fault Water meter Exchanger EX1 Er -8 This bit indicates when there was a power failure.
	08			bool	0/1	Normal/ Fault		Fault Water meter Exchanger EX2 Er -8 This bit indicates when there was a power failure.
	09			bool	0/1	Normal/ Fault		Fault Water meter Exchanger EX3 Er -8 This bit indicates when there was a power failure.
	10			bool	0/1	Normal/ Fault		Fault Microswitch Er 9 This bit indicates when there was a power failure.
	11			bool	0/1	Normal/ Fault		Pre-alarm Lack of salt Er A This bit indicates when there was a power failure.
	12			bool	0/1	Normal/ Fault		Fault Nominal flow exceeded Er C This bit indicates when there was a power failure.
	13			bool	0/1	Normal/ Fault		Fault Run time monitoring Blending valve motor Er D This bit indicates when there was a power failure.
	14			bool	0/1	Normal/ Fault		No bus connection Er F This bit indicates when there was a power failure.
	15			bool	0/1	Normal/ Fault		Fault Motor current WE-X This bit indicates when there was a power failure.
80	00	2	Water softener Delta-p	bool	0/1	Reserve		Reserve
	01			bool	0/1	Reserve		Reserve
	02			bool	0/1	Reserve		Reserve
	03			bool	0/1	Reserve		Reserve
	04			bool	0/1	Reserve		Reserve
	05			bool	0/1	Reserve		Reserve
	06			bool	0/1	Reserve		Reserve
	07			bool	0/1	Reserve		Reserve
	08			bool	0/1	Reserve		Reserve
	09			bool	0/1	Reserve		Reserve
	10			bool	0/1	Reserve		Reserve
	11			bool	0/1	Reserve		Reserve
	12			bool	0/1	Reserve		Reserve
	13			bool	0/1	Reserve		Reserve
	14			bool	0/1	Reserve		Reserve
	15			bool	0/1	Reserve		Reserve

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5.4.4.5 Signals of water softener WE-X

Modbus Register		Bytes	Value	Format	Resolution			Factor	Function/Comment
65		2	Measuring value	int	0…999.9	m³		10	Residual capacity Exchanger NX1B1
66		2	Measuring value	int	0…999.9	m³		10	Residual capacity Exchanger NX1B2
68		2	Measuring value	int	99.9	m³/h		10	Flow rate Exchanger NX1CF1
72 73		4	Counter value	Dint	0…99999	h		1	Regeneration counter
74 75		4	Counter value	Dint	0…99,999.9	m³		10	Counter Soft water volume
76		2	Counter value	int	0…999	d		1	Time since last regeneration
77		2	Counter value	int	0…999	d		1	Time until maintenance is due
78	00	2	Signals Water softener WE-X	bool	0/1	Normal/ Fault			1 = Standby This bit indicates when the system is in standby.
	01			bool	0/1	Normal/ Fault			1 = Salting This bit indicates when the system is in step Salting.
	02			bool	0/1	Normal/ Fault			1 = Slow rinse This bit indicates when the system is in step Slow rinse.
	03			bool	0/1	Normal/ Fault			1 = Backwash This bit indicates when the system is in step Backwash.
	04			bool	0/1	Normal/ Fault			1 = Fill brine tank This bit indicates when the system is in step Fill brine tank.
	05			bool	0/1	Normal/ Fault			Reserve
	06			bool	0/1	Normal/ Fault			1 = Washing out This bit indicates when the system is in step Washing out.
	07			bool	0/1	Normal/ Fault			1 = Regeneration running This bit indicates when the system is in regeneration.
	08			bool	0/1	Normal/ Fault			1 = Operation Exchanger NX1B1 This bit indicates when exchanger NX1B1 is in operation.
	09			bool	0/1	Normal/ Fault			1 = Operation Exchanger NX1B2 This bit indicates when exchanger NX1B2 is in operation.
	10			bool	0/1	Normal/ Fault			Reserve

Modbus Register	Bytes	Value	Format	Resolution		Factor	Function/Comment
	11		bool	0/1	Normal/Fault		1 = Maintenance interval expired This bit indicates when the maintenance interval has expired.
	12		bool	0/1	Normal/Fault		Reserve
	13		bool	0/1	Normal/Fault		Reserve
	14		bool	0/1	Normal/Fault		Reserve
	15		bool	0/1	Normal/Fault		Reserve
79	00	Faults Water softener WE-X	bool	0/1	Normal/Fault		1 = Fault Power failure Er 0 This bit indicates when there was a power failure.
	01		bool	0/1	Normal/Fault		1 = Fault Run time Regeneration valve Er 1 This bit indicates when a fault is present at the water regeneration valve.
	02		bool	0/1	Normal/Fault		Reserve
	03		bool	0/1	Normal/Fault		1 = Fault hard water Er 3 This bit indicates when a hard water fault is present.
	04		bool	0/1	Normal/Fault		Reserve
	05		bool	0/1	Normal/Fault		Reserve
	06		bool	0/1	Normal/Fault		Reserve
	07	2	bool	0/1	Normal/Fault		Reserve
	08		bool	0/1	Normal/Fault		Reserve
	09		bool	0/1	Normal/Fault		Reserve
	10		bool	0/1	Normal/Fault		1 = Fault Microswitch Er 9 This bit indicates when a fault is present at the microswitch.
	11		bool	0/1	Normal/Fault		1 = Pre-alarm Lack of salt Er A This bit indicates when a pre-alarm Lack of salt is present.
	12		bool	0/1	Normal/Fault		Reserve
	13		bool	0/1	Normal/Fault		Reserve
	14		bool	0/1	Normal/Fault		Reserve
	15		bool	0/1	Normal/Fault		1 = Fault Motor current WE-X This bit indicates when a motor current fault is present.

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Modbus Register		Bytes	Value	Format	Resolution		Factor	Function/Comment
80	00	2	Water softener WE-X	bool	0/1	Reserve		Reserve
	01			bool	0/1	Reserve		Reserve
	02			bool	0/1	Reserve		Reserve
	03			bool	0/1	Reserve		Reserve
	04			bool	0/1	Reserve		Reserve
	05			bool	0/1	Reserve		Reserve
	06			bool	0/1	Reserve		Reserve
	07			bool	0/1	Reserve		Reserve
	08			bool	0/1	Reserve		Reserve
	09			bool	0/1	Reserve		Reserve
	10			bool	0/1	Reserve		Reserve
	11			bool	0/1	Reserve		Reserve
	12			bool	0/1	Reserve		Reserve
	13			bool	0/1	Reserve		Reserve
	14			bool	0/1	Reserve		Reserve
	15			bool	0/1	Reserve		Reserve

6 Start-up/commissioning

🛈 The initial start-up of the system must be carried out by technical service personnel only.

⚠️ | **CAUTION** | Climbing onto system components when operating components that are located at high levels.

- ● Risk of falling when climbing onto system components
- ● Risk of tripping in case of loose cables/pipes lying around.
- ► Do not climb onto system components such as pipes, racks, etc.
- ► Use stable, safe and self-standing access aids such as stepladders, pedestals, etc. when operating components that are located at high levels.

6.1 Flushing out the preserving agent

Systems that were preserved in the factory are marked.

For the duration of storage and transport, the membrane(s) is (are) protected by means of a preserving agent.
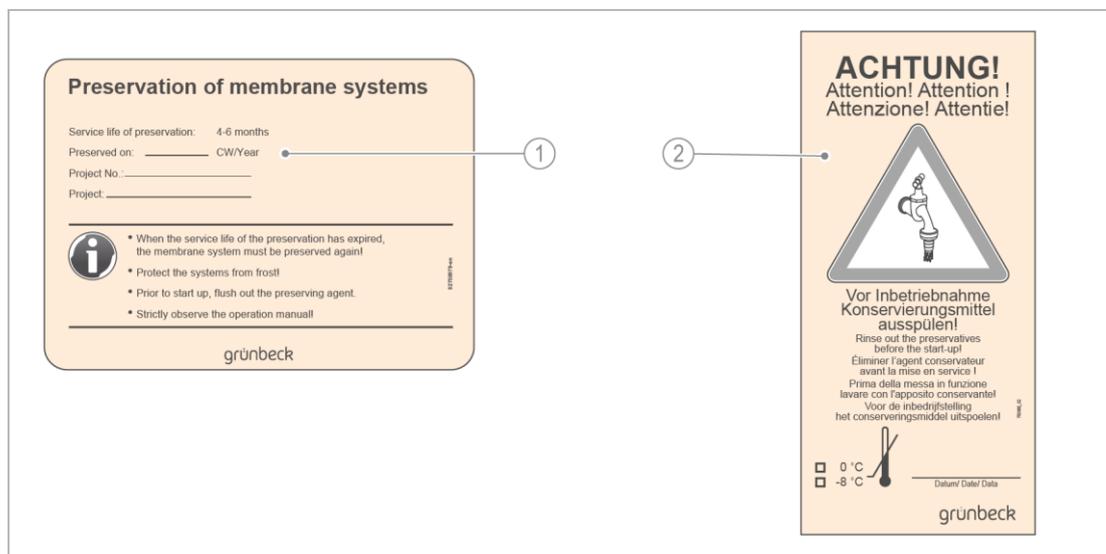
Abb. 1

	Designation		**Designation**
1	Information sheet with details on the preservation carried out	2	Warnings at the system

► Comply with the information.

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⚠ **WARNING**   Contact with preserving agent

- Eye/skin burns.
- ► Use personal protective equipment (PPE).
- ► Obey the safety data sheet of the chemical.

NOTE   Skipping or prematurely terminating the flushing process

- By flushing out the preserving agent, the system is vented at the same time.
- When the flushing process is skipped or cancelled, the high-pressure pump runs dry.
- The preserving agent gets into the permeate tank or a permeate line provided by the client on site – these can only be cleaned/flushed with difficulty.
- ► Always flush out the preserving agent.
- ► The system flushing can be restarted manually– refer to chapter 7.3.1 Operating mode - Flushing.

ⓘ Faulty parameter settings or missing signal connections can cause malfunctions due to which flushing out the preserving agent cannot be started.
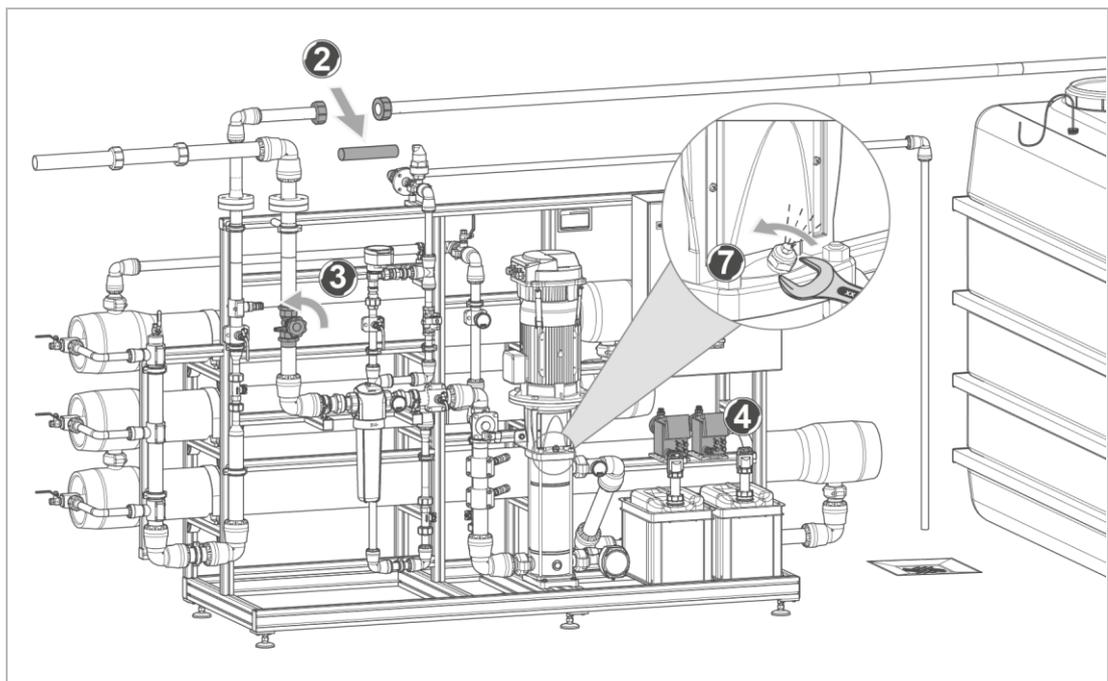
1. Check the concentrate line to the drain.

2. Remove the permeate flushing section.

3. Open the shut-off valve of the "feed water" inlet.

4. Put the antiscalant dosing system (option - refer to chapter 6.4) or an upstream water softener into operation.

> **NOTE**   Damage to the system when operated with hard water
>
> - Operating the system with hard water results in damage to the membranes.
> ► The preserving agent must be flushed out with softened (0 °dH) or hardness-stabilised water.
> ► Put the antiscalant dosing system or the water softener into operation first.
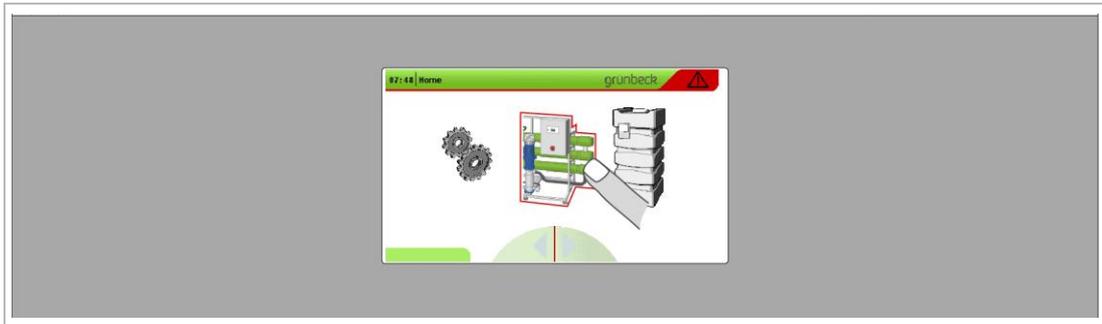
5. Tap on the osmoliQ system in the display.

6. Tap START.

» The feed water solenoid valve, the concentrate-to-drain control valve and at times the control valve for concentrate recirculation are opened.

» The preserving agent is washed out to the drain.

» Antiscaling is being dosed (if present).

» The system automatically stops flushing when three times the flushing volume has been flushed to the drain (duration subject to system size and programmed flushing volume).

7. Vent the high-pressure pump after a flushing time of approx. 5 minutes.

  a Slightly unscrew the vent screw on the HP pump.

  b Close the vent screw when no more air is escaping.

8. Install the flushing section in the permeate pipe.

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6.2 Setting the control unit

1. Make the basic settings (refer to chapter 7.2).

2. Check the operating mode of the osmoliQ subsystem in the Info level (refer to chapter 7.1.2).

3. Start the subsystem with the I/O button.

» The system's operating mode is `AUTOMATIC` and the I/O button is green.

4. Do a test run, if necessary.

5. Fill in the start-up/commissioning log (refer to chapter 13.1).

6.3 Checking the system

⚠ **CAUTION**   Risk of slipping at the sampling points.

- ● You might slip/fall and injure yourself.
- ► Use personal protective equipment - wear sturdy shoes.
- ► Immediately mop up escaped liquids.

1. Let the system run in for at least 20 minutes.

2. Check the system for leaks.
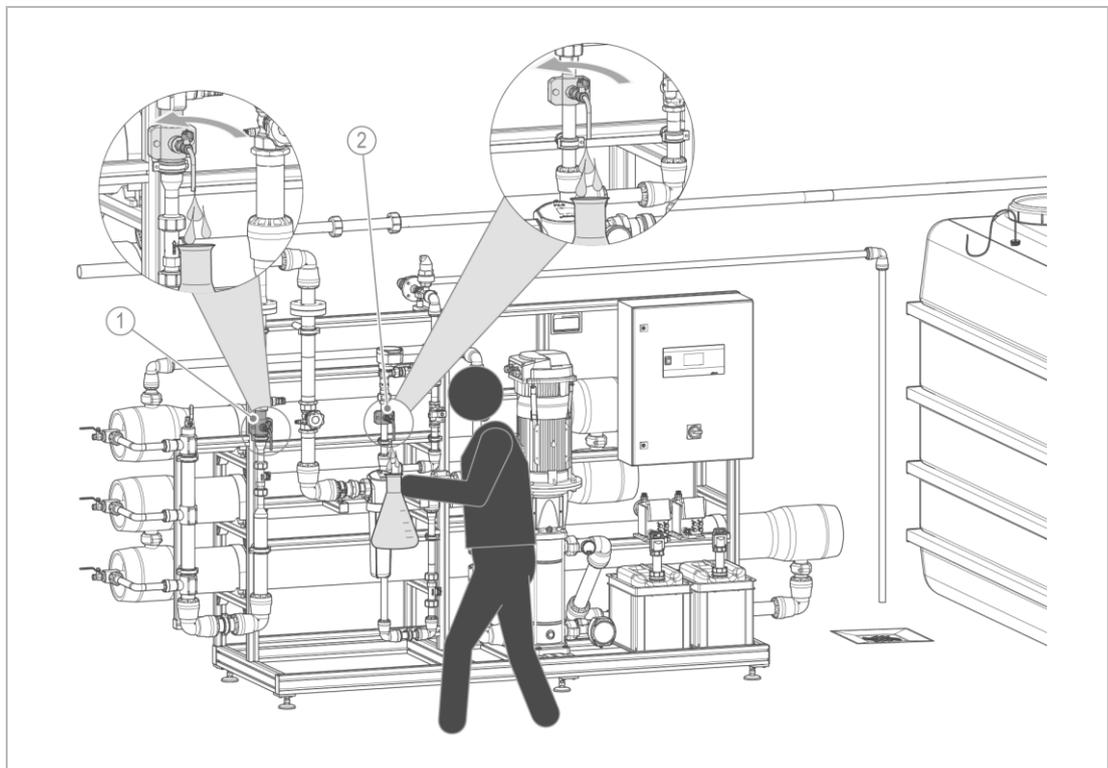
	Designation			Designation
1	Permeate sampling valve		2	Concentrate-to-drain sampling valve

3. Take water samples at the permeate sampling valve and at the concentrate-to-drain sampling valve.

4. Determine the conductivity of each sample.

5. Document the values in the start-up/commissioning log (refer to chapter 13.1).

6.4 Start-up of antiscalant dosing system (option)

► Carry out initial filling with antiscalant dosing agent:
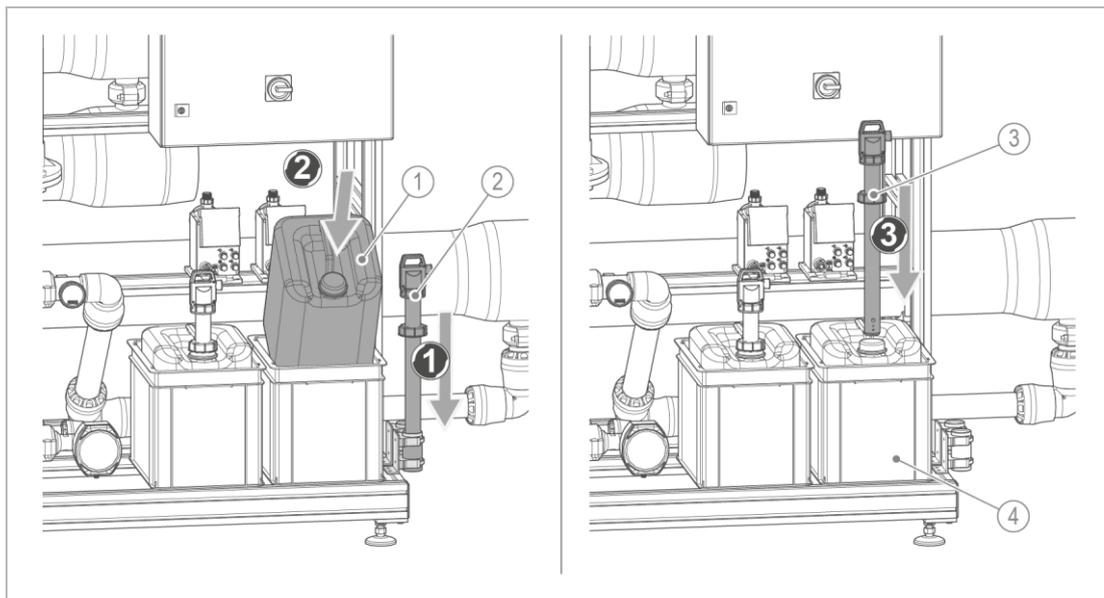
	Designation		Designation
1	20-l dosing tank with antiscalant dosing agent (e.g. MT 4000)	**3**	Slide cover on suction lance
2	Suction lance	**4**	Chemical spill tray

1. Insert the suction lance into the quiver on the right of the system rack.

2. Put the dosing tank into the chemical spill tray and remove the screw cap. Keep the screw cap – to close the dosing tank after use.

3. Put the suction lance into the dosing tank.

4. Secure the suction lance with the sliding cover.

5. Put the dosing pump into operation.

► Repeat the steps for the second dosing tank, if necessary.

Obey the operation manual of the dosing pump.

Refer to the system-specific dosing specification for the required dosing amounts.

6.5 Handing over the product to the owner/operator/operating company

► Explain to the owner/operator/operating company how the product works.

► Use the manual to brief the owner/operator/operating company and answer any questions.

► Inform the owner/operator/operating company about the need for inspections and maintenance.

► Hand over all documents to the owner/operator/operating company for keeping.

6.5.1 Disposal of packaging

► Dispose of the packaging material as soon as it is no longer needed.

NOTE	Danger to the environment due to incorrect disposal

- Packaging materials are valuable raw materials that can be reused in many cases
- Incorrect disposal can cause hazards to the environment
► Dispose of packaging materials in an environmentally sound manner.
► Obey the local disposal regulations.
► If necessary, commission a specialist company with the disposal.

6.5.2 Storage of accessories

► Keep the accessories supplied with the system in a safe place near the system.

7 Operation

The system is operated via the operating unit of the GENO-tronic control unit with touchscreen.

The control unit is pre-programmed with different parameters subject to the respective system type.

The control unit can log on and visualise several components of the "production line".

| NOTE | Making incorrect setting at the control unit. |

● Incorrect operation can lead to dangerous operating states and might cause personal injury.

► Only make the settings described in this chapter.

Settings in the technical service level must be made by technical service personnel only.

7.1 Operating concept

Screensaver

In the default setting, the screen saver is displayed.

● Tapping on the touchscreen activates the basic display.

● The screen saver is displayed automatically if the screen has not been touched for a period of 5 minutes (or for a set period of time).

● As soon as the touchscreen is being touched or a signal or a fault occurs, the display returns to the basic display.

7.1.1 Basic display Home

The Home screen is the superordinate screen for all subsystems connected to/interconnected with the control unit of the reverse osmosis system.

The arrangement of the subsystems on the display from left to right corresponds to the water flow through the overall system.

	Designation	Function
1	Status bar	The system status is signalled by colours (green = no fault, yellow = warning, red = fault)
2	Subsystem section	By tapping on a subsystem, you switch to the Info level of the respective subsystem
3	◀ and ▶	Keys for scrolling
4	⚙	System settings: By tapping on the cogwheels, you switch to the basic settings of the control unit.

7.1.2 Info level

In case of subsystems with ON/OFF function (e.g. osmoliQ), the Info level features an ON/OFF key.
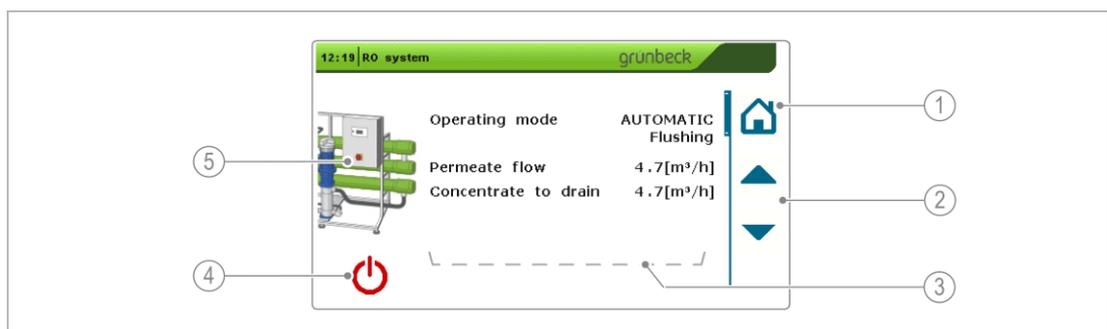
	Designation	Function
1		Back to Home screen
2	▲ and ▼	Keys for scrolling. Calling up information/parameters
3	Parameters	Operating mode and current measuring values
4	⏻	I/O button Green = subsystem ON, Red = subsystem OFF
5	Depiction of subsystem	By tapping on the subsystem, you switch to the Setting level of the respective subsystem.

7.1.3 Setting the parameters

Different settings can be selected, modified, saved, or discarded:
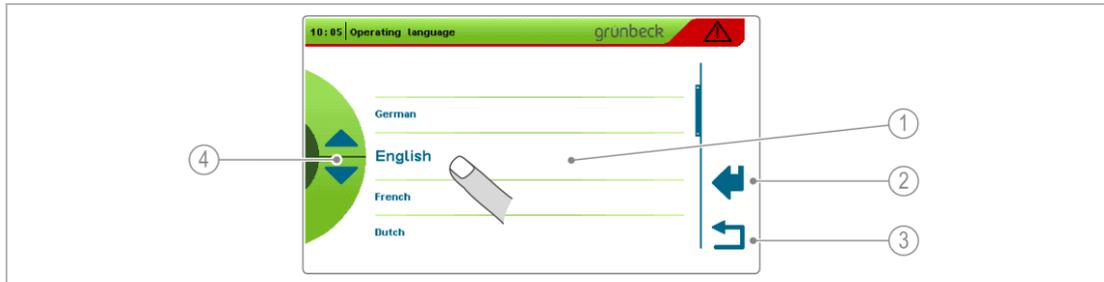
	Symbol/designation	Function
1	Selection option	Selection line. The line in the middle is displayed larger
2	↵	Save selection
3	↩	Quit the menu without changing former selection
4	▲ and ▼	Keys for scrolling

The numerical and the alphanumerical menu each have the same operating logic:
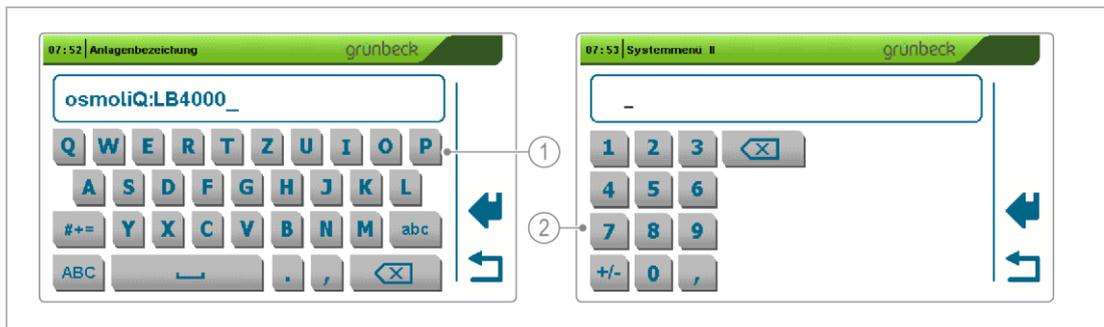
	Designation			Designation
1	Alphanumerical		2	Numerical

7.1.4 Warning signals/faults

A pending signal or fault is shown in the status bar in red or yellow. The subsystem concerned is highlighted by a coloured frame (refer to chapter 9).

7.1.5 Menu structure

The table below shows the different menu levels with the parameters and settings contained therein.

Menu level 1	Menu level 2	Code	Parameters and settings*
Basic settings Control unit	System menu I		Operating language
			System designation

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Menu level 1	Menu level 2	Code	Parameters and settings*
⚙️			Date, time
			Data logging
			Interval, min
			Loading parameters
			Saving parameters
			Screensaver, min
			Lock screen, s
	System menu II	🔒	*Logon of all existing components of the "production line"*
	Software version		Software version Display
			Software version Main circuit board
Subsystem section			
🖥️	*Info level Reverse osmosis system*		Operating mode
			Permeate flow rate, m³
			Concentrate-to-drain flow rate, m³
			Concentrate recirculation flow rate, m³
			Recovery, %
			Operating pressure, bar
			Permeate conductivity, µS/cm
			Permeate temperature, °C
			Current setpoint, m³
			Inlet flow rate, m³
			Concentrate flow rate, m³
			Analogue signal output FC, %
			Output level Control valve RO1V3, %
			Output level Control valve RO1V2, %
			Service in, d
	Setting level Reverse osmosis system	User programming level	Operating mode
			Automatic restart
			Conductivity monitoring RO1CQ1
			Conductivity limit value RO1CQ1
			Delay Conductivity fault/signal RO1CQ1
		Installer level	113	*Setting input/output logic*
		Technical service level	🔒	*Contains parameters that might have to be adapted to the conditions on site during start-up/commissioning.*
		Extended technical service level I	🔒	*Contains parameters that in general only have to be programmed in Grünbeck's manufacturing department but rarely on site.*
		Extended technical service level II	🔒	
		Counter readings, error memory	245	Operating hours
				Sum Permeate
				Sum Concentrate-to-drain
				Run time HP pump
				Limit value Recovery exceeded
				Operating phase counter < 30 minutes
				Operating phase counter 30 … 90 minutes
				Operating phases > 90 minutes
				1 Exxx — *Error memory containing the 20 most recent events*
				…
				20 Exxx
		Resetting counter readings	🔒	*Resetting counter readings after maintenance or replacement of components*
		Jog mode	🔒	*The jog mode (key operation) is required during start-up/commissioning and for service purposes if components need to be replaced.*

Menu level 1		Menu level 2	Code	Parameters and settings*
		Operating parameter memory		*In the operating parameter memory, the last 30 parameter changes are documented.*
	Information Permeate tank			Filling level, %
				Filling level, cm
				Filling level, m³
	Settings Antiscalant dosing	User programming level		Size of dosing tank (container), l
(Option)	Settings Antiscalant dosing	User programming level		Replacing dosing tank P2

* Information in italics is for explanation purposes only and does not appear like this in the control unit. These items can each contain several parameters.

🔒 Code-protected level

7.2 Basic settings of control unit GENO-tronic

► Tap on ⚙ in the basic display.

» The system sections below are shown:

• System menu I

• System menu II (🔒)

• Software version

7.2.1 System menu I

Parameters	Setting range	Remarks
Operating language	German	
	English	
	French	
	Dutch	
	Italian	
	Russian	
	Spanish	
System designation		18 alphanumerical digits, text will appear in the upper left corner of the Home screen.
Date, time		Incl. automatic switch-over from daylight saving time to standard time.
Data logging	Start	All measured values of all subsystems (Info level) are logged on the SD card.
	Terminate	
Interval	1…999 min	Specifies the frequency at which measured values are archived on the SD card.
Loading parameters		Loads the parameter record previously saved on SD card.
		Note: Do not do so while permeate production is in progress
Saving parameters		Saves current parameter record on SD card

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Parameters	Setting range	Remarks
Screensaver	0…1…99 min	
Locking screen	10…30…99 s	

7.2.2 System menu II (🔒)

Settings in the system menu II must be made by technical service personnel only.

The purpose of system menu II is to log on all existing components of the "production line" that are to be displayed in the GENO-tronic.

Level 1	2	3	4	Setting range	Remarks
Logon GENO-tronic	–	–	–	GENO-tronic logged out	At least one GENO-tronic must be logged on within a "production line".
				GENO-tronic logged on	
Serial number of system	–	–	–	Text	Serial number of reverse osmosis system osmoliQ
Logon Water softener	–	–	–		Water softener interconnected with OSMO-X control unit via bus connection. *Note:* Refer to the respective operation manuals for the settings of GENO-mat duo WE-X and Delta-p
				–	No water softener present or device only supplies fault signal contact to OSMO-X
				duo WE	Water softener duo WE with control unit "GENO-IONO-matic WE …" is present
				Delta-p	Water softener with control unit "GENO-IONO-matic$_3$" is present
Logon Residual hardness	–	–	–		Residual hardness monitoring device
				-	– = No residual hardness monitoring device present
				Komfort	Komfort = Hardness control measuring device softwatch (receives enable signal, provides analysis result/fault signal)
Logon Dosing RO1Px	–	–	–		Dosing unit e.g. for antiscalant dosing
				–	No dosing unit
				RO1P2	One dosing unit
				RO1P2 and RO1P3	Two dosing units

Level 1	2	3	4	Setting range	Remarks
Logon EDI	–	–	–		Electrodeionisation (EDI)
				–	No EDI process present
				Electrodeionisation present	System component with EDI process present
Logon Pressure booster DEA1	–	–	–		Pressure booster system GENO-HR-X or GENO-FU-X
				–	No pressure booster present
				Single pressure booster	System with one pump unit
				Twin pressure booster	System with two pump units
Logon Additional module				–	No additional module present
	12ROUT	Available	–	OFF	
				ON	
	4AA	Available	–	OFF	
				ON	
	8E4RA	Available	–	OFF	
				ON	
		Reserve Input 1…8	–	NC	
				NO	
		Output 1…4 Function	–	–	
				Permeate discharge valve RO1V4	
				Blending valve RO1V5	
				Bypass valve RO1V6	
				Draining valve RO1V7	
				Membrane degassing valve RO1V8	
		Output 1…4	–	NC	
				NO	
Additional Interface modules					No interface module present
	HMS Profibus PD V1	Module address	–		
	HMS BACnet-IP	Use DHCP	–	No	
				Yes	
		Manual IP address	–	Figure	
		Manual net mask	–	Figure	
		Manual getway	–	Figure	
		UDP port	–	Figure	
		Device ID	–	Figure	
		Device name	–	Text	
	Modbus	Module address	–	Figure	

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Level 1	2	3	4	Setting range	Remarks
	Web server	Network parameters (IPv4)	Use DHCP	No	
				Yes	
			Manual IP address	Figure	
			Manual net mask	Figure	
			Manual getway	Figure	
			Manual DNS	Figure	
		Email connection parameters	Mail server	Text	
			IP address	Figure	
			User name	Text	
			Password	Text	
			Sender address	Text	
			Port no.	Figure	
			Encryption	Unencrypted	
				STARTTLS	
			Sending test email	No	
				Yes	
		Target e-mail addresses	Target address 1… 5	Text	
			File attachment Target 1… 5	No	
				Yes	
			Monthly dispatch Target 1... 5	No	
				Yes	
			Postal code of system site	Text	
			Country of system site	Text	
			Tel. no. Responsible on site	Text	
			Only send email to target address 5	No	
				Yes	
		WEB/VNC configu-ration	Allow VNC access	No	
				Yes	
			VNC password	Text	

7.2.3 Software version

Indication of software version of GENO-OSMO-X control unit and GENO-tronic operating unit, for example: **Software version Display V1.02**
Software version Main circuit board 0.14

A software update must be carried out by technical service personnel only.

7.2.4 Data logging on SD card

The SD card socket is integrated in the operating unit

ⓘ The SD card used must be FAT32 formatted.
We recommend proper formatting instead of quick formatting.

1. Terminate the data logging in system menu I.

2. Open the housing of the control unit.

3. Remove the SD card from the slot.

Theoretically, the measured values on the SD card comprise an entire "production line":

● Pretreatment (water softener or antiscalant dosing)

● Reverse osmosis (RO)

● Electrodeionisation (EDI)

● Pure water tank (BB1)

● Pressure booster (DEA)

ⓘ Recommendation: Open the file with a spreadsheet software (e.g. MS-Excel) – that way, the structure is optimally displayed.

osmoliQ DataLog

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		"000000000"									RO1 P2	RO1 P3	RO1	
2	Datum	Uhrzeit	NX1											
3			C m³	C m³	Q m³/h	T h	R	S d	R	V m³	V m³	V m³	Q l/h	C µS/cm
4	29.10.2014	14:18:02	0	0	0	0	0	0	0	0	1600	1600	2992	17,5
5														

Column/line	Unit	Comments
B1	–	Serial number of the system
C/D	m³	Display of active exchangers of water softener Delta-p
E	m³/h	Display of the flow of exchanger 1 – equals 50 % of the total flow

7.3 Reverse osmosis system osmoliQ

Info level

► Tap on the subsystem in the basic display.

» The submenu of the subsystem osmoliQ is displayed.

The information below is stored in the osmoliQ Info level:

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Parameters	Unit	Displayed values
Operating state	–	Locked
		Flushing
		Manual operation
		Automatic
Permeate flow rate	m³/h	
Concentrate-to-drain flow rate	m³/h	
Concentrate recirculation flow rate	m³/h	
Recovery	%	
Operating pressure HP pump	bar	
Permeate conductivity	µS/cm	
Permeate temperature	°C	
Setpoint Permeate capacity	m³/h	
Inlet flow rate	m³/h	
Concentrate flow rate	m³/h	
Analogue signal output to FC	%	
Output level Adjusting valve RO1V3	%	
Output level Adjusting valve RO1V2	%	
Maintenance in	d	

Setting level

► Tap on osmoliQ in the Info level.

» The setting level of the osmoliQ is displayed.

► Select the required sublevel.

● The setting level of the subsystems includes:

- User programming level

- Installer level (`Code 113`)

- Technical service level (🔒)

- Extended technical service level I (🔒)

- Extended technical service level II (🔒)

- Counter readings, error memory (`Code 245`)

- Jog mode (🔒)

- Reset of counter readings (🔒)

- Operating parameter memory

► Select the parameter to be set and set the required values.

Settings in the technical service levels must be made by technical service personnel only.

7.3.1 User programming level

Parameters	Setting range	Remarks
Operating mode		The desired operating mode (except for Locked) must be started in the Info level with the I/O button (the colour of the I/O button changes from red to green):
	Locked	Delivery state, no system operation possible.
	Flushing	Flushing volume stored in the system size will be flushed to the drain once.
	Manual operation	Not possible in case of system output Online: Permeate production continues as long as the system stays switched on via the I/O button. A switch-off command via tank full detection will not be processed.
	Automatic	Permeate is produced subject to the level in the permeate tank or the permeate pressure.
Automatic restart		Behaviour after a power failure.
	No	After return of power, the system signals "Power failure fault"; automatic or manual operation remains stored but is switched off.
	Yes	After return of power, the system continues running in the previously set operating mode and does not show a fault.
Forced operation		
	Flushing	Factory setting in case of system output Online: Flushing to the drain, high-pressure pump is not running.
Conductivity monitoring RO1CQ1		Monitoring of permeate conductivity:
		If the programmed conductivity limit value is exceeded for the delay time, optional programming of the value is possible:
	Signal	The system continues running although the limit value has been exceeded.
	Fault	The system switches off.
Conductivity limit value RO1CQ1	0…30…99 µS/cm	
Delay Conductivity fault/signal RO1CQ1	0…30…999 min	

7.3.2 Installer level (Code 113)

The installer level contains parameters that might have to be adapted to the conditions on site during start-up/commissioning.

The settings described here must be made by a qualified specialist only.

The parameters marked with am (*) must not be modified for the osmoliQ.

Parameters	Setting range	Remarks
Output logic Enable FC Pump RO1P1A1	Normally open contact NOC	The voltage-free contact terminals 12/13 of the control unit must be connected to terminals 1/2 of the frequency converter – pump is on when contact is closed.
	Normally closed contact NCC	
Function Dosing RO1P2 and RO1P3 (*)	Pulse	Only Pulse is admissible as output signal to activate the dosing pump(s).
	Normally closed	
	Normally open	
Function Programmable output	Operation	Contact closes upon start of RO1P1
	Dry-run protection	Contact opens if BB1CL1.4 is undershot and closes if BB1CL1.3 is exceeded

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Parameters	Setting range	Remarks
Redundancy RO1P2/RO1P3 (*)		If two dosing pumps are present;
	No	The pumps have different dosing tasks
	Yes	The pumps have the same dosing task and operate redundantly
Operating time on redundancy	1…6…9 h	
Dosing operation + flushing (*)		The dosing pump either only runs during permeate production or, in addition, during flushing at the end of production:
	No	Dosing during permeate production only (one or two dosing pumps)
	P2	There are two dosing pumps, and P2 also runs during flushing.
	P3	There are two dosing pumps, and P3 also runs during flushing.
	Both	There are two dosing pumps, and both also run during flushing.
Output logic Voltage-free contact Warning		Switching behaviour of signal contact Terminals 8/9:
	Normally open contact NOC	Contact closes in case a signal occurs
	Normally closed contact NCC	Contact opens in case of Mains Off or in case a signal occurs
Output logic Volt.-free contact Fault		Switching behaviour of fault signal contact Terminals 7/9:
	Normally open contact NOC	Contact closes in case a fault occurs
	Normally closed contact NCC	Contact opens in case of Mains Off or in case a fault occurs
Output logic Enable NX1Q		Switching behaviour Enable NX1Q1 Terminals 14/15:
	Normally open contact NOC	Contact is closed when enabled.
	Normally closed contact	Contact is opened when enabled.
Input logic Minimum pressure switch RO1CP1(*)		Switching behaviour Negative pressure switch Terminals 54/55:
	Normally open contact NOC	Contact is closed by means of sufficient pressure in the inlet.
	Normally closed contact NCC	Contact is opened by means of sufficient pressure in the inlet.
Input logic Fault signal RO1P1A1(*)		The voltage-free contact Terminals 10/11 of the frequency converter must be connected to Terminals 56/57 of the control unit.
	Normally open contact NOC	Contact is closed when there is no fault at the frequency converter.
	Normally closed contact NCC	
Function Programmable input		Input function Terminals 60/61:
	Signal	Signal contact Terminals 8/9 switches and a programmable text appears, the system continues running.
	Fault	Signal contact Terminals 7/9 switches and a programmable text appears, the system switches off.
	Forced stop	System switches off without prior warning or fault and does not flush. When the input signal is removed again, the system starts running again.
	Membrane degassing	System switches off and display text for programmable input is shown.

Parameters	Setting range	Remarks
Function Enable input		Input of terminals 52/53 reacts to normally open contact:
	None	No function stored
	Smart metering	„Smart Metering" function for systems with a large permeate tank and filling level measurement with 4-20 mA signal: In case of „favourable electricity tariffs", the input/output level is moved up, so that permeate can preferably be produced for stock.
	Start/Stop command	"Normal" start/stop command (analogue button Info level) via enable input.
	Bus signal	"Normal" start/stop command (analogue button Info level) via enable from bus system (master) provided by the client.
Display text for prog. input	Editable alphanumerically	If the programmed input is programmed to Signal or Fault, the text will be displayed at terminals 60/61 in case of an incoming signal.
Input logic Fault Empty signal RO1CL2(*)		Contact type Suction lance Dosing pump RO1 P2 Terminals 63/64 (empty signal):
	Normally open contact NOC	Contact open means that the level has been exceeded.
	Normally closed contact NCC	Contact closed means that the level has been undershot.
Input logic Pre-alarm RO1CL1 (*)		Contact type Suction lance Dosing pump RO1 P2 Terminals 63/64 (pre-alarm)
	Normally open contact NOC	Contact open means that the level has been exceeded.
	Normally closed contact NCC	Contact closed means that the level has been undershot.
Input logic Residual hardness NX1CQ1 (*)		Contact type Alarm + Limit value Terminals 66/67 from monitoring device for residual hardness:
	Normally open contact NOC	Contact opens in case of power failure, fault or if the limit value is exceeded.
	Normally closed contact NCC	Contact closed in case of alarm or if the limit value is exceeded.
Input logic Level BB1CL1		The topmost level is declared as NCC by the factory, so that a fault in the filling level measurement can be detected.
	Normally open contact NOC	Contact open means that the level has been exceeded.
	Normally closed contact NCC	Contact closed means that the level has been undershot.
Input logic Level BB1CL2 … CL4	Normally open contact NOC	
	Normally closed contact NCC	
Input logic Prog. fault signal input		Input logic Terminals 60/61
	Normally open contact NOC	
	Normally closed contact NCC	
Input logic Fault Empty signal RO1CL4(*)		Contact type Suction lance Dosing pump RO1P3 Terminals 50/62 (empty signal):
	Normally open contact NOC	Contact open means that the level has been exceeded.
	Normally closed contact NCC	Contact closed means that the level has been undershot.
Input logic Pre-alarm RO1CL3(*)		Contact type Suction lance Dosing pump RO1P3 Terminals 50/51 (pre-alarm)
	Normally open contact NOC	Contact open means that the level has been exceeded.
	Normally closed contact NCC	Contact closed means that the level has been undershot.

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Parameters	Setting range	Remarks
Input logic Overpressure switch RO1CP3		Contact type Terminals 58/59:
	Normally open contact NOC	The system pressure being too high closes the contact.
	Normally closed contact NCC	The system pressure being too high opens the contact.
Solenoid valve outputs		Applies equally to all valve outputs.
	Pulsating	Valve output is switched in a clocked manner
	Duration	Valve output is activated permanently.

7.3.3   Technical service level (🔒)

The technical service levels contain parameters that might have to be adapted to the conditions on site during start-up/commissioning.

Parameters	Setting range	Remarks
Delay Prog. fault signal input	0 - 255 s	The signal at input terminals 60/61 must be pending continuously for longer than the delay time in order to take effect.
Delay Overpressure switch RO1CP3	0 - 255 s	The signal at input terminals 58/59 must be pending continuously for longer than the delay time in order to take effect.
Conductivity First permeate	0 - 99 µS/cm	After permeate production starts, the first permeate valve V4 is open until the conductivity of the first permeate has been undershot.
Time First permeate	0 - 999 s	It closes at the latest after the first permeate time, even if the conductivity is still higher.
Flushing volume RO membrane	0 - 255 l	The system is flushed free of minerals at the end of permeate production. The concentrate-to-drain control valve opens completely. The RO membrane flushing volume – measured by the Feed flow sensor – is flushed to the drain. Following that, the concentrate-to-drain control valve is closed first, and then both control valves are moved to their start position.
Start-up delay HP pump RO1P1	0 - 999 s	After the inlet solenoid valve V1 opens, the high-pressure pump starts time-delayed for permeate production.
Period of standstill for forced operation	1 - 3000 min	If no permeate production has taken place for longer than the period of standstill, either forced operation or forced flushing take place for the duration of the run time (refer to user programming level).
Run time Forced operation	30 - 3000 min	
Maintenance interval RO system		Time-controlled maintenance interval
		For the restart (= acknowledgement that maintenance was carried out), the stored value must be reprogrammed.
	0	Interval is deactivated.
	1 – 395 days	
Draining time Emergency bypass	0 - 999 s	

Parameters	Setting range	Remarks
Recovery alarm value	35 - 99 %	5 % higher than the value assigned to the pretreatment process: Softening: 85 % Antiscalant dosing: 80 %
Delay Recovery/QSV fault	0 - 999 min	If the recovery continuously is higher than the recovery alarm value, or the cross-flow ratio is outside the designated window, there will be a fault switch-off.
Delay Fault Permeate water meter RO1CF3	0 - 99 s	If the permeate flow is < 10 l/h for longer than the delay time while the high-pressure pump is running, there will be a fault switch-off.
Delay Query Pressure switch RO1CP1	1 - 999 s	The minimum pressure switch must have dropped out continuously for longer than the delay time, so that restart attempts are made following a wait time.
RO1CP1 Repeats	0 - 9	
RO1CP1 Wait time	0 - 99 min	
Delay Fault Operating pressure RO1CP2	0 - 240 s	
Limit value Fault Operating pressure RO1CP2	0.0 - 16 bar	
Conductivity reference value Permeate RO1CQ1	0 - 99.9 µS/cm	The reference value must be determined during ongoing permeate production using a temperature-compensated reference measuring device and then must be programmed here.

7.3.4 Extended technical service level I (🔒)

In the extended technical service level I, fundamental parameters are stored that in general only have to be programmed in Grünbeck's manufacturing department but rarely on site.

The settings described here must be made by technical service personnel only.

Parameters	Setting range	Remarks
System type	osmoliQ:LB	
System size = Setpoint Permeate flow rate	4000 7000 10000 12000 16000 20000 25000 30000	Every system can be upgraded by one level from the originally delivered system.
Setpoint Recovery	30 - 90 %	Factory settings: Softening: 80 % Antiscalant dosing: 75 % AVRO: 50 % Following a water analysis, the setpoint can also be set differently
Flow measurement + recovery control	No Yes	

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Parameters	Setting range	Remarks
Concentrate recirculation present	No	
	Yes	
Water meter pulse rate Concentrate-to-drain RO1CF1	0.0000 - 1 l/pulse	Pulse rates of reverse osmosis systems Vortex flow measurement: 0.0123 l/pulse Ultrasound flow measurement: 1.0 l/pulse
Water meter pulse rate Concentrate recirculation RO1CF2	0.0000 - 1 l/pulse	
Water meter pulse rate Permeate RO1CF3	0.0000 - 1 l/pulse	
Measuring range Operating pressure	0 - 99 bar	
FC setpoint during flushing	0 - 100 %	
HP controller Kp	0.00 - 1	Controller parameters may only be changed after consultation with Grünbeck.
HP controller TN	0.00 - 999.9 s	
Filling level measurement Permeate tank	Digital signals	For example via external level control or switching contacts of GENO-Multi Niveau.
	Analogue signal 4-20 mA	Level probe
Measuring range Pressure transducer	0.00 - 1 bar	Measuring range of level probe (only in case of filling level measurement Permeate tank with analogue signal 4 - 20 mA)
Water column 100 % filling level	0 - 1000 cm	Max. filling level of permeate tank (only in case of filling level measurement Permeate tank with analogue signal 4-20 mA)
Filling volume	0 - 999.99 m³	Analogue … = ON/OFF switching point moved up in case of filling level measurement via analogue signal 4-20 mA and enable signal simultaneously pending at terminals 52/53 ("Smart metering" function).
Analogue Permeate production OFF	0 - 100 %	Digital …, as well as bypass valve and dry-run protection functions = Standard ON/OFF switching points.
Analogue Permeate production ON, digital permeate production OFF	0 - 100 %	NOTE: Do not do so while permeate production is in progress.
Digital Permeate production ON, bypass valve closed	0 - 100 %	
Bypass valve open, dry-run protection OFF	0 - 100 %	
Dry-run protection ON	0 - 100 %	
Signal Preserving agent	No	
	Yes	Next time the mains power is switched on, the message "Flush out preserving agent" will be displayed when the "osmoliQ" subsystem menu is called up.
		3-times the flushing volume will be flushed out by means of the "Flush out preserving agent" function.
Installation information Hardness	0.00 - 999999.99 °dH	Here, operating values can be entered and recorded.

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Parameters	Setting range	Remarks	
Installation information Chlorine	0.00 - 999999.99 mg/ml	These values automatically output during data logging.	
Installation information Chlorine dioxide, mg/ml	0.00 - 999999.99 mg/ml		
Installation information Pressure HP pump	0.00 - 999999.99 bar		
Installation information Raw water pressure	0.00 - 999999.99 bar		
Texts Variable installation data	0.00 - 999999.99	Here, texts and/or values can be entered freely. These values will then automatically be included in the data logging (lines 12-15).	Installation text 1 Installation text 2 Installation text 3 Installation text 4

Assignment of the level functions with factory-set switching thresholds:
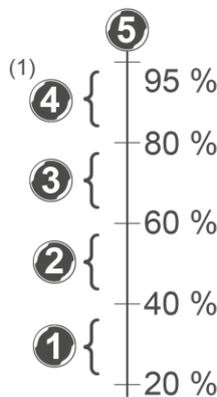
	Designation
1	Dry-run protection **DEA1**
2	Bypass valve **V3**
3	Permeate production **without** enable signal "Smart metering"
4	Permeate production **with** enable signal "Smart metering" [1] Additional function not available in case of filling level detection Permeate tank "Digital signals"
5	Level measurement Permeate tank **BB1 CL**

7.3.5   Extended technical service level II (🔒)

In the extended technical service level II, fundamental parameters are stored that in general only have to be programmed in Grünbeck's manufacturing department but rarely on site.

Parameters	Setting range	Remarks
Setpoint Concentrate recirculation	0 - 20000	Ratio: System-specific value – is documented in the acceptance report
Reduced permeate setpoint	0 system size	Mainly for adaptation of the permeate capacity to on-site withdrawal in case of system output Online.
Temp.-dependent reduction factor of permeate flow rate	0 - 6 %	If the water temperature is < 15 °C, the permeate capacity must be set 3 % lower per °C, for example.
Min. opening angle RO1V3	5 - 15 %	Minimum opening angle for RO1V3 in operation.

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Parameters	Setting range	Remarks
Write operating parameter memory to SD card	**No**	
	Yes	Documenting fault memory, counter readings and last parameter changes on SD card.
Start position Control valve RO1V3	1 … 50 … 99 %	Adjustment by prior confirmation in the operating phase, if necessary
Start position Control valve RO1V2	1 … 50 … 99 %	

7.3.6 Counter readings, error memory (`Code 245`)

Here, the system's history is documented. Access to this level is protected by Code 245.

The settings described here must be made by a qualified specialist only.

Parameters	Display	Unit	Remarks
Operating hours		h	Time for which the system is connected to the electrical power supply
Sum Permeate		m³	Permeate volume produced so far
Sum Concentrate-to-drain		m³	Waste water volume produced so far
Run time HP pump RO1P1		h	Time during which permeate was produced
Operating phase counter > 30 minutes	XXXXXX		Three counters register how often the system produced permeate between the switch-on and switch-off command. This helps the technical service personnel to optimise the system parameters.
Operating phase counter 30… 90 minutes	XXXXXX		
Operating phases > 90 minutes	XXXXXX		
1 Exxx … 20 Exxx	Fault Date, time		Error memory containing the 20 most recent events

7.3.7 Jog mode (🔒)

The settings described here must be made by technical service personnel only.

> **NOTE** Manual switch-on of digital inputs
>
> ● Dangerous system states might be caused.
> ► Especially with the FC setpoint of HP pump RO1P1, make sure that the inlet solenoid valve V1 is open, and the control valves KK (concentrate-to-drain) and KR (concentrate recirculation) are in a sensible position.

Parameters	Setting range		Remarks
Inlet solenoid valve RO1V1	OFF		"Standard" digital outputs
	ON		
Control valve RO1V3	0 - 100 %		
Control valve RO1V2	0 - 100 %		
Setpoint FC HP pump RO1P1A1	0 - 100		
RO1B5	OFF		
	ON		
Dosing RO1P2	–		
	1		Continuous signal
	250		The appropriate pulse sequence corresponding to the flow rate of 250 l/h (approx. 2.3 Hz) is output to both pulse outputs.
Dosing RO1P3	–		
	1		Continuous signal
	250		The appropriate pulse sequence corresponding to the flow rate of 250 l/h (approx. 2.3 Hz) is output to both pulse outputs.
Warning	OFF		
	ON		
Fault	OFF		
	ON		
Solenoid valve RO1V11	OFF		
	ON		
8E4RA Output 1	OFF		
	ON		
8E4RA Output 2	OFF		
	ON		
8E4RA Output 3	OFF		
	ON		
8E4RA Output 4	OFF		
	ON		
Programmable output Stage 1	OFF		
	ON		
Display Status Digital inputs Stage 1	Min. pressure switch RO1CP1	OFF	ON = Control unit detects 24 V signal at the input terminal.
		ON	
	Fault signal FC HP pump RO1P1A1	OFF	
		ON	
	Fault RO1CL2	OFF	
		ON	
	Pre-alarm RO1CL1	OFF	
		ON	
	Residual hardness NX1CQ1	OFF	
		ON	
	Level control BB1CL1	OFF	
		ON	
	Level control BB1CL2	OFF	
		ON	

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Parameters	Setting range		Remarks
	Level control BB1CL3	OFF	
		ON	
	Level control BB1CL4	OFF	
		ON	
	Overpressure switch RO1CP3	OFF	
		ON	
	Programmable fault signal input	OFF	
		ON	
	Fault RO1CL4	OFF	
		ON	
	Pre-alarm RO1CL3	OFF	
		ON	
	Enable input	OFF	
		ON	
Display Analogue inputs Stage 1	Permeate conductivity RO1CQ1	OFF	ON = Control unit detects 24 V signal at the input terminal.
		ON	
	Permeate temperature RO1CT1	OFF	
		ON	
	Concentrate conductivity	OFF	
		ON	
	Operating pressure HP pump	OFF	
		ON	
	Level control BB1	OFF	
		ON	
	Inlet flow rate RO1CF1	OFF	
		ON	
	FEED flow rate RO1CF2	OFF	
		ON	
	Permeate flow rate RO1CF3	OFF	
		ON	
	Concentrate flow rate RO1CF4	OFF	
		ON	

7.3.8   Resetting counter readings (🔒)

The settings described here must be made by technical service personnel only.

► Reset the counter reading after replacing a component or carrying out maintenance.

Parameters	Setting range	Remarks
All	No	
	Yes	The respective counter reading is deleted.

7.3.9 System data printout (🔒)

Only technical service personnel must make a system data printout.

1. Select a submenu with code request.

2. Enter the code.

» The current system data is written to the SD card once.

7.3.10 Operating parameter memory

In the operating parameter memory, the last 30 parameter changes are documented. This level is not access-protected.

The parameter changes below are shown:

- No. = Consecutive number 1…30 of the operating parameter memory
- Code = Code level concerned
- Idx = Index no. of the parameter within the Code level (0…)
- Pre = Previous setting value
- Post = New setting value
- Time = Time/date of the change

7.4 Permeate tank

► Tap on ▤ in the basic display.

» The filling level of the permeate tank is shown.

The permeate tank does not have any functions of its own. It is only shown in the Info level if the system output "Tank" of the osmoliQ is programmed.
This level is readily accessible.

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7.5 Dosing (option)

In case of antiscalant dosing as pretreatment, the dosing pump is shown in the Info level.

Info level

► Tap on 📱 in the basic display.

Setting level

► Tap on the illustration of the dosing pump in the Info level.

» You reach the submenu of the user programming level.

7.5.1 User programming level

► Select the parameter to be set and set the required values.

► When replacing the dosing tank, set the value to Yes .

The user programming level is not access-protected.

Parameters	Setting range	Remarks
Replacing dosing tank P2	No Yes	If a full dosing tank is used, this parameter must be reprogrammed to "Yes". The calculation of the estimated volume is restarted in the Info level.

7.5.2 Technical service level (🔒)

The technical service level contains parameters (dosing volume P2) that might have to be adapted to the conditions on site during start-up/commissioning.

Parameters	Setting range	Remarks
Dosing volume P2, ml/pulse	0,0001…0,0015…6,5535	Concentration of the dosing agent in the treated feed water.

Flow indicator of antiscalant dosing pump Grundfos DDA(🔒)

In order to prevent unauthorised modification of the dosing pump, the dosing pump is secured by a key lock (Code 290).

► Set the dosing pump according to the respective dosing specification.

7.5.3 Replacing the dosing tank

NOTE	Decanting residues

- ● Mixing old and new diminishes the effectiveness of the dosing agents – flocculation can occur and cause functional system failure.
- ● For hygienic reasons, mixing residues with fresh dosing agents should be avoided.
- ► Do not fill residues from used dosing tanks into dosing tanks containing fresh dosing agents.
- ► Discard residual amounts of antiscalant from opened dosing tanks.
- ► When replacing dosing tanks, only use new dosing tanks containing fresh antiscalant.

► Proceed as follows when replacing the antiscalant dosing tank:

1. Disconnect the system from the power supply – turn the main switch to OFF.
2. Wait for 15 minutes until the residual voltage is discharged.
3. Pull the suction lance from the empty dosing tank.
4. Insert the suction lance into the quiver on the right of the system rack.
5. Remove the empty dosing tank from the chemical spill tray.
6. Put the new dosing tank into the chemical spill tray and unscrew the screw cap.
7. Put the suction lance into the dosing tank.
8. Secure the suction lance with the sliding cover.
9. Put the system into operation.

Obey the operating manual of dosing pump DDA.

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8   Maintenance and repair

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

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

By concluding a maintenance contract you make sure that all maintenance work will be carried out on time.

► Only use genuine spare and wearing parts from Grünbeck.

8.1   Cleaning

Only have persons perform cleaning work that have been briefed on the risks/dangers the system and the possibly used chemicals can pose.

WARNING   Cleaning of live components with a damp cloth.

- Risk of electric shock.
- Sparking possible due to short circuit.
- ► Switch off the voltage supply as well as any external voltage prior to starting the cleaning work.
- ► Wait for at least 15 minutes and make sure that no voltage is present at the components.
- ► 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 access aids such as stepladders, platforms, etc. when cleaning components that are located at high levels.

NOTE   Do not clean the system with cleaning agents containing alcohol or solvents

- These substances damage the 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.

► Wipe the surfaces with a dry cloth.

8.1.1 Cleaning of leaked dosing agent and dosing tanks containing residual chemicals

Obey the safety data sheet of the dosing chemical.

► Use personal protective equipment.

► Clean the dosing tanks with a large amount of water – rinse them thoroughly.

► Wipe up escaped dosing chemicals with a fabric cloth.

► Clean the areas until they are completely dry.

8.2 Intervals

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

► (As owner/operating company) Determine which components have to be inspected and maintained at which intervals (load-dependent). This is subject to the actual conditions such as: water condition, degree of contamination, environmental impacts, consumption, etc.

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The interval table below shows the minimum intervals for the activities to be carried out.

Activity	Interval	Tasks
Inspection	daily	• Check system volume flows and pressures • Determine the feed water values and permeate quality • Read off the recovery • Pay attention to the remaining time of the maintenance interval [d] • Visually check for leaks
	6 weeks	• Replace the filter element • Visually check for function and leaks
Maintenance	annually	• Check the condition of the system and check for leaks • Replace the filter elements on the fine filter and the activated carbon filter • Clean the solenoid valves • Check the flow volumes • Calibrate the flow sensors • Check the function and performance of all aggregates (pumps, valves) • Maintain the dosing system
	load-dependent	• Refer to "annually"
Maintenance and repair	5 years	• Recommendation: replace wearing parts

8.3   Inspection

Regular inspection increases the operational reliability of your system.

You as owner/operating company can carry out the daily inspections yourself.

Please note that there can be slight fluctuations in the values, especially during the run-in phase of the system. Minor deviations from the standard values are normal and cannot be prevented technically. In the event of major deviations, contact the technical service.

► Carry out the inspection work below **on a daily basis**:

1. Determine the feed water hardness (inlet) using the water test kit "Total hardness" (order no. 170 187).

2. In case of antiscalant option: Read the antiscalant dosing volume in the display. Check the filling level of the dosing agent.

3. Proceed as follows to determine the quality of the permeate:

    •   In case conductivity monitoring is installed: Read the display

4. Read the permeate recovery at the display.

5. Monitor the remaining time of the maintenance interval – contact technical service at a remaining time of < 30 days.

6. Check at the display of the control unit that the feed water solenoid valve is not energised.

7. Check the system for leaks towards the drain in operating mode "standby".

    »   In this mode, no water must creep to the drain.

8.3.1 Replacing the filter element

► Replace the filter element at least **every 6 weeks**:

1. Disconnect the system from the power supply – turn the main switch to OFF.

2. Wait for 15 minutes until the residual voltage is discharged.

3. Place a bucket under the filter.

4. Close the feed water shut-off valve (RO1H1).

5. Depressurise the pipe by briefly opening the feed water sampling valve (RO1H50).
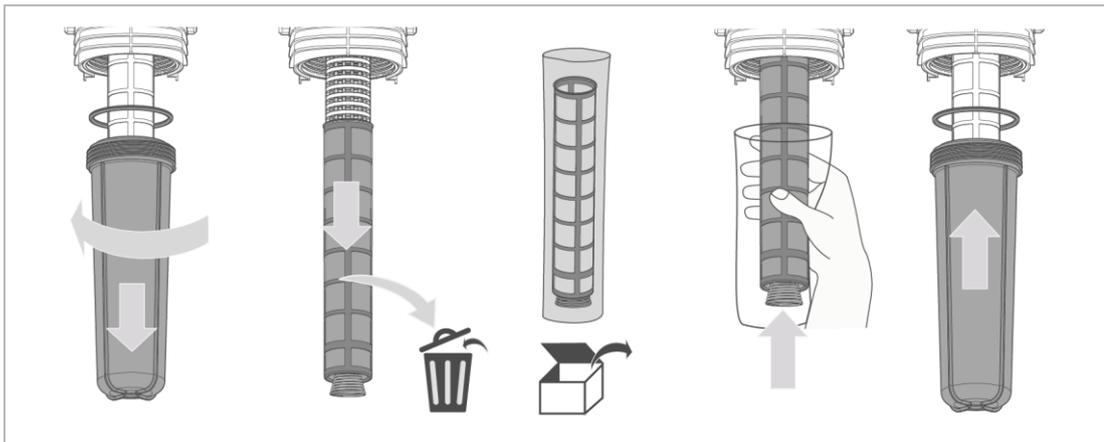
6. Unscrew the filter cylinder by hand – use a strap wrench, if necessary.

7. Pull off the O-ring with the filter cylinder.

8. Pull off the used filter element from the support mesh.

9. Dispose of the used filter element.

> ⓘ For hygienic reasons, do not touch the new filter element and the support mesh with bare hands – use hygienic gloves.
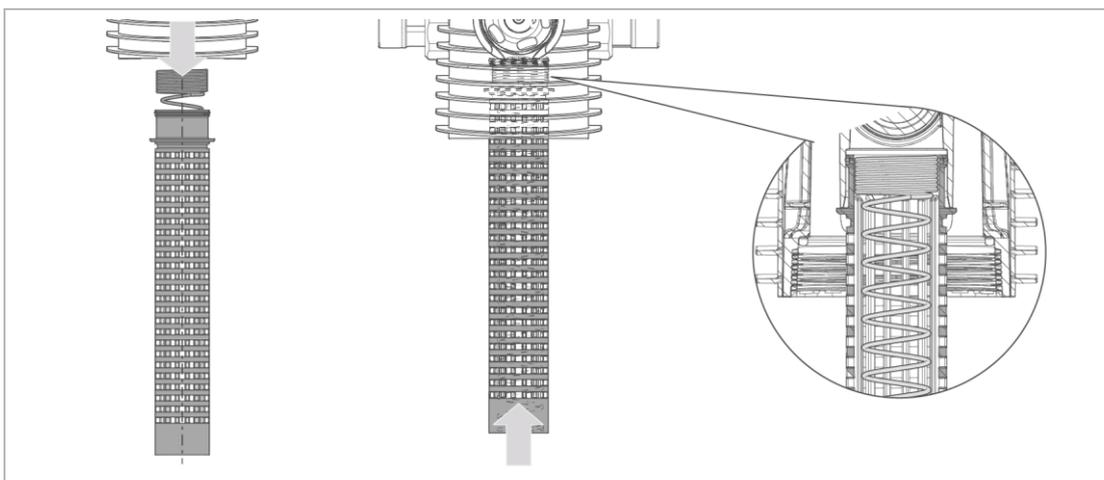
10. Clean the support mesh in case of major impurities.

   a Pull off the support mesh downwards and remove the filter spring.

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b Rinse the support mesh.

c Insert the filter spring into the support mesh – mind the proper direction.

d Insert the support mesh into the filter head as far as it will go.

11. Slide the new filter element in its foil packaging over the support mesh.

12. Check the sealing surfaces and the O-ring of the filter cylinder for cleanliness – replace the O-ring of the filter cylinder, if necessary.

13. Clean the filter cylinder with clear water.

14. Screw in the filter cylinder by hand as far as it will go – do not use a strap wrench.

  » The filter element is replaced.

  » The filter is ready to use.

15. Open the feed water shut-off valve (RO1H1).

8.4 Maintenance

Some regular work is necessary to ensure the proper functioning of the system in the long term.

Maintenance is subject to the load but must be carried out once a year at the latest.

8.4.1 Annual maintenance

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

The work below must be carried out as part of annual maintenance:

Operating values

1. Read the water meter reading.

2. Read the static and flow pressure (inlet pressure 1 – 4 bar).

3. Determine the feed water hardness (inlet).

4. Determine the quality of the permeate.

  a Flush the membrane modules, if necessary, or replace them.

The membrane modules must be flushed and replaced by technical service personnel only.

5. Check the settings in the control unit, in particular the ones below:

• Pretreatment

• Recovery

- System outlet

6. Read the operating hours at the display:

   - Run time of high-pressure pump

   - Concentrate volume generated

   - Feed water volume

   - Permeate volume produced

   - Antiscalant dosing pump (dosing volume)

7. Read out the error memory.

8. Make a system data printout.

Maintenance work

1. Check the fine filter upstream of the system and replace the filter element, if necessary.

2. Check the activated carbon filter upstream of the system and replace the filter cartridges, if necessary.

3. Replace the filter element of the fine filter on the RO system.

4. In case of optional activated carbon filters on the RO system, replace the filter cartridges.

5. Determine the measuring values below for feed water, permeate and concentrate-to-drain:

   - Conductivity

   - Total hardness

   - Temperature

   - Volume flow

   - Recovery

   a Determine these measuring values again in case the membrane modules were flushed or replaced.

   b Recalibrate the conductivity meter, if necessary.

6. Calibrate the antiscalant dosing pump (option).

7. Clean the solenoid valves for feed water and flushing water.

   a Check the solenoid valves for function and leaks after the cleaning.

8. Check all cables and connections for damage and a tight fit.

9. Check all aggregates such as valves, HP pump, etc. for proper mechanical and electrical function.

   a Check the pressure of the feed water on the pressure gauge of the fine filter.

   b Check and clean the conductivity probe.

10. Visually check the electronics board for damage.

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11. Check the installation for leaks – visually check all pipes/hoses and all connections for escaping water.

12. Check the condition and presence of warning labels – replace them if they are worn/illegible.

13. Reset the maintenance interval and, if necessary, the counter readings.

► After completion, document the maintenance work in the operation log and in the test log (refer to chapter 13).

8.5 Consumables

Product		Quantity	Order no.
5 µm filter element		2	**103 083**
RO membrane module (8" x 40") with seal		1	**89401012**
Activated carbon filter cartridge 250-M		1	**109 615**

8.6 Spare parts

For an overview of the spare parts, refer to our spare parts catalogue at www.gruenbeck.com. You can order the spare parts from your local Grünbeck representative.

8.7 Wearing parts

Wearing parts must be replaced by qualified specialists only.

The wearing parts are listed below:

- Seals
- Solenoid valves
- Control valves
- Mechanical seal (high-pressure pump)
- Sampling valves

► Have the seals replaced in the event of leaks, damage or deformations.

► Have defective or worn components replaced.

9   Troubleshooting

> ⚠️ **WARNING**   Risk of contaminated drinking water due to stagnation.
>
> - Risk of infectious diseases.
> ► Have malfunctions remedied immediately.

> ℹ️ A fault at one of the subsystems in general causes the shut-off of subsystems installed downstream.
>
> Repairing and acknowledging faults generally restarts the switched-off subsystems automatically.

There is a difference between **Warning signals** and **faults**:
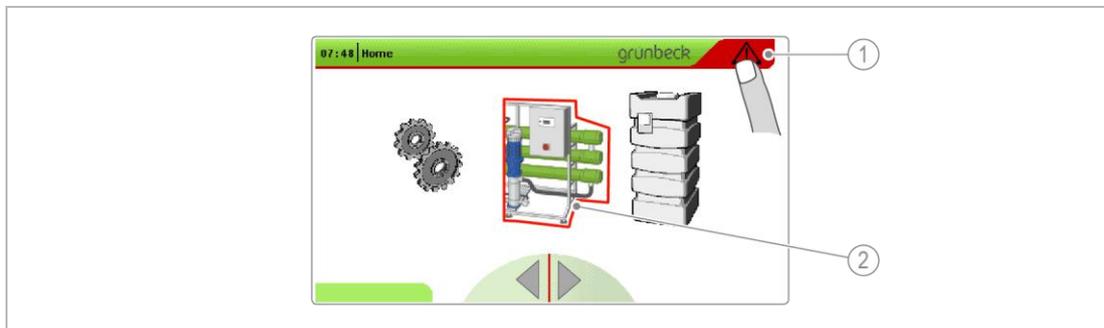
	Symbol/designation		Function	
1	Status		If a signal or a fault is pending, the status bar changes colour.	
		Green	= No fault	
		⚠️ Yellow	= Warning	Signal contact of the control unit (terminals 8/9) opens
		⚠️ Red	= Fault	Fault signal contact of the control unit (terminals 7/9) opens
2	Subsystem		The subsystem concerned is framed.	

- As long as the power supply is on and no warning/fault is pending, the signal contact and the fault signal contact are closed.

The system shows faults in the display. The fault display remains active until the condition has been rectified.

► Tap on the status bar.

» A list of errors is displayed.

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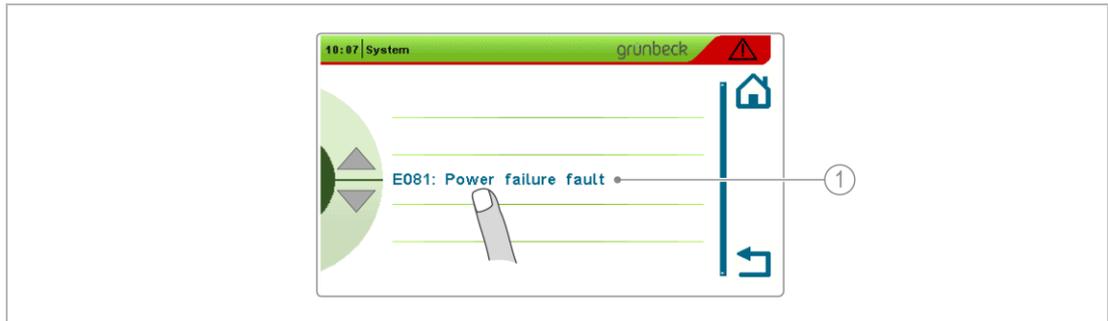
Error list

	Symbol/designation	Function
1	Error with explanation	By tapping on the entry, you switch to the acknowledgement window
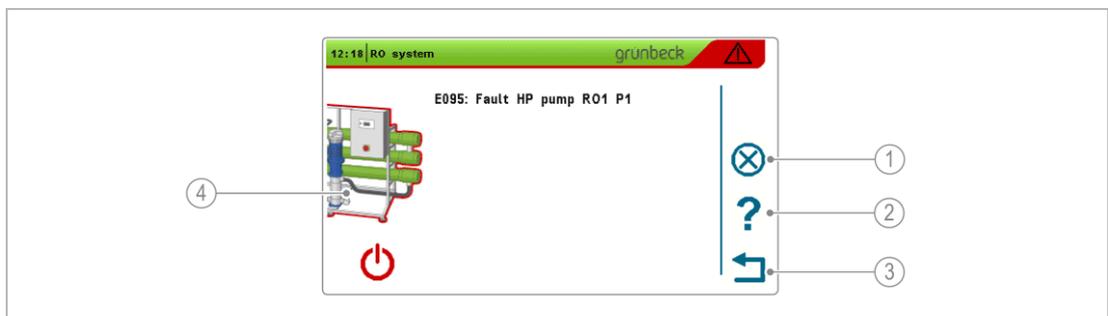
Acknowledgement window

	Symbol/designation	Function
1	⊗	Key to acknowledge the message or fault
2	?	Key to call up a help text including the telephone number of the technical service
3	↩	Back to the error list
4	Subsystem	The subsystem concerned is shown.

	Symbol/designation	Function
1	✓	Acknowledge message/fault
2	✗	Leave message/fault pending
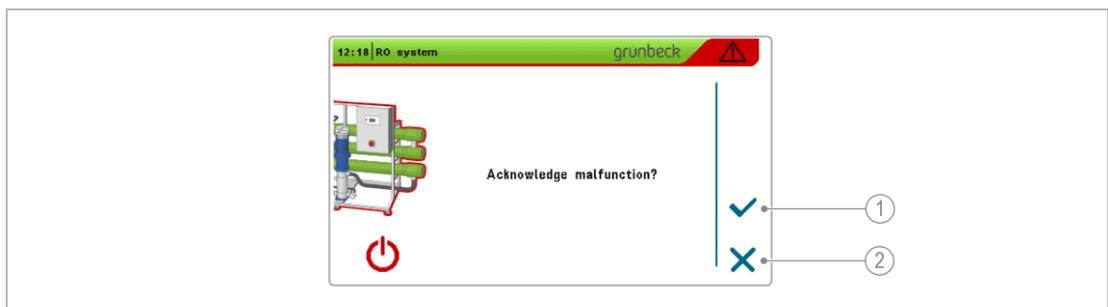
► By tapping on ☑ or ☒, you switch to the error list.

► If you cannot eliminate malfunctions with the instructions given below, contact the technical service.

► Have the data given on the type plate handy (refer to chapter 1.3).

9.2 Display messages

1. Eliminate the fault (refer to fault table).

2. Acknowledge the fault.

3. Monitor the display of the control unit.

4. If the malfunction reoccurs, compare the display message with the fault tables below.

9.2.1 Warnings (yellow)

Warnings	Explanation	Remedy
W006 Fault Parameter comparison EH	Fault Parameter comparison EH	• Software versions of osmoliQ and water softener differ. ► Carry out an update. ► Incorrect pressure booster system selected.
W007 Firmware of softener outdated	Firmware of softener outdated.	• Software version of operating unit does not match the main circuit board. ► Update the main circuit board.
W008 Fault Parameter comparison PB	Fault Parameter comparison pressure booster	• Software versions of osmoliQ and water softener differ. ► Carry out an update. ► Incorrect water softener system selected.
W009 Firmware of pressure booster outdated	Firmware of pressure booster is outdated.	• Software version of operating unit does not match the main circuit board. ► Update the main circuit board.
W010 HMS bus module not supported	HMS bus module is not supported.	► Module not detected properly or an as yet unsupported module type was connected.
W021 Permeate conductivity RO1CQ1	The monitoring of the permeate conductivity is programmed to "signal" and the conductivity continuously was above the threshold value for longer than the programmed delay time. Typical system behaviour: After the start of permeate production, the permeate conductivity quickly decreases within a few minutes (first permeate) until an almost constant value is reached. Due to a non-functioning pretreatment, this constant value is negatively affected (scaling).	► Conductivity limit value too low or delay time of conductivity signal/fault is programmed too short. ► Contact Grünbeck's technical service.
W022 Dos low RO1CL1 W023 Dos low RO1CL3	Only for DOS pretreatment: Dosing agent will be empty soon.	► Insert new dosing tank and confirm in subsystem menu Dosing, so that the calculation of the estimated time for the dosing agent to last is restarted.
W024 Display text of prog. fault signal input	Signal pending at the programmable fault signal input. Response is programmed to "Warning"	► Eliminate the cause of the pending signal

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Warnings	Explanation	Remedy
W025 Battery	Buffer battery on main circuit board (stage 1) defective.	► Contact Grünbeck's technical service.
W026 Warning Preserving agent	Information during start-up/ commissioning	► Contact Grünbeck's technical service.
W027 Battery 2	Buffer battery on main circuit board (stage 2) defective.	► Contact Grünbeck's technical service.
W028 Service due		► Contact Grünbeck's technical service.
W029 Service AVRO	Only for AVRO pretreatment: AVRO treatment modules must be replaced soon.	► Contact Grünbeck's technical service.
W030 Minimum pressure	Minimum pressure switch RO1 CP1 has detected low water pressure in the inlet. Subsystem osmoliQ was stopped and restarts automatically after a short time. Here, no acknowledgement is required yet, but possible. Following the last, unsuccessful restart attempt, the osmoliQ stops and indicates the fault "Negative pressure". Acknowledgement is required.	► Enable water supply for osmoliQ. ► Contact Grünbeck's technical service.
W031 First permeate Time exceeded	The quality of the first permeate is still too poor after expiration of the time set for the first permeate.	► Check in the technical service menu whether the limit value for the conductivity of the first permeate is set too high or the time for the first permeate is set too short.
W033 Comm. fault Softening	Faulty bus connection to the interconnected subsystems water softener WE-X or DEA-X.	► If necessary, restore the power supply of the respective subsystems. ► Check bus wiring and restore, if necessary.
W034 Comm. fault Residual hardness		
W035 Comm. fault EDI		
W036 Comm. fault Pressure booster		
W037 Stop filter sys./ overf. prot. BB1	The maximum filling level of the tank has been reached.	► Check the filling level in the tank and adjust, if necessary.
W038 Comm. fault MK200 12RA	Bus connection to MK200 12RA module is faulty.	► Check bus wiring and restore, if necessary.
W039 Fault KK200 12RA defective	MK200 12RA module is faulty.	► Check the setting at the module. Check parameterisation.
W040 Comm. fault MK200 4AA	Bus connection to MK200 4AA module is faulty.	► Check bus wiring and restore, if necessary.
W041 Fault MK200 4AA defective	MK200 4AA module is faulty.	► Check the setting at the module. Check parameterisation.
W053 Comm. fault Main circuit board	Faulty connection between touch panel GENO-tronic and main circuit board.	► Contact Grünbeck's technical service.
W055 Firmware of main circuit board is outdated	Firmware of main circuit board is outdated.	► Software version of operating unit does not match the main circuit board.
W056 SD card removed	SD card missing, defective	► Put in/replace SD card.
W057 SD card full	Memory of SD card full	► Change/replace SD card.
W058 SD card I/O error	SD card defective	► Replace SD card.
W060	Not enough salt in brine tank.	► Check the salt level in brine tank and refill salt tablets as

Warnings	Explanation	Remedy
SF lack of salt		per DIN EN 973 A, if necessary.
W061 SF service interval	Maintenance interval of water softener has expired.	► Contact Grünbeck's technical service.
W062 PBS service interval	Maintenance interval of pressure booster system has expired.	► Contact Grünbeck's technical service.
W063 PBS no ext. enable signal	Incorrect enable signal selected.	► Check parameter settings.
W064 PBS dry-run protection	Insufficient water in supply tank.	► The signal is acknowledged automatically as soon as sufficient water is available again.
W065 PBS power failure	Power failure > 1 minute	► Check parameter setting in the user menu. Ensure electrical power supply.

9.2.2 Fault messages (red)

Faults	Explanation	Remedy
E080 Fault osmoliQ	Control unit defective	► Contact Grünbeck's technical service.
E081 Fault Power failure	Power failure has occurred. System is not set to automatic restart. Whether this affects other subsystems as well, must be checked on site.	► Make sure that the power supply to the osmoliQ is secured. ► Reprogram the parameter "Automatic system restart", if necessary.
E082 EEPROM	EEPROM defective	► Contact Grünbeck's technical service.
E083 Comm. fault Stage 1 E084 Comm. fault Stage 2	Communication with data line RS485 to control unit installed upstream/ downstream is interrupted.	► Check line connection for proper connection. Check whether the terminating resistors (dip switches) are set correctly.
E085 Sensor error Pressure	Fault at sensor signal 4-20 mA of pressure sensor.	► Contact Grünbeck's technical service.
E086 Sensor error Level	Fault at sensor signal 4-20 mA of level probe of permeate tank	► Contact Grünbeck's technical service.
E087 Sensor error Conductivity 1	Fault at sensor signal Conductivity/PT100 of conductivity probe	► Contact Grünbeck's technical service.
E090 Fault Recovery	For more than 30 minutes, the OSMO-tronic control unit continuously was unable to regulate the system to the correct recovery (setpoint exceeded by more than 5 %).	► Contact Grünbeck's technical service.
E091 Fault Permeate WM defective	No signal is transferred from the permeate water meter to the OSMO-tronic control unit.	► Contact Grünbeck's technical service.
E092 Fault Membrane outflow	For more than 30 minutes, the GENO-tronic control unit continuously was unable to regulate the system to the correct outflow on the membrane (the window of +/- 5 % around the setpoint was exceeded/undershot).	► Contact Grünbeck's technical service.
E093 Fault Permeate conductivity RO1CQ1	The monitoring of the permeate conductivity is programmed to "fault" and the conductivity was continuously higher than the threshold value for longer than the programmed delay time (also refer to "Warning Permeate conductivity RO1CQ1").	• Conductivity limit value too low or delay time of conductivity signal/ fault programmed too short. ► Contact Grünbeck's technical service.

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Faults	Explanation	Remedy
E094 Fault AVRO current	Only for AVRO pretreatment: The current through the AVRO treatment module is too low, the pretreatment does not work any longer.	► Contact Grünbeck's technical service.
E095 Fault HP pump RO1P1	Frequency converter of high-pressure pump signals a fault.	► Flip the GENO-tronic control unit towards the front. ► Relay the fault message of the frequency converter to Grünbeck's technical service.
E096 Fault DOS empty RO1P2 E097 Fault DOS empty RO1P3	Only for DOS pretreatment: Dosing agent is empty.	► Insert new dosing tank and confirm in subsystem menu, so that the calculation of the time for the dosing agent to last is restarted.
E098 Fault Residual hardness NX1CQ1	Only for softening as pretreatment: The residual hardness monitoring system has detected hardness breaking through at the water softener.	► If necessary, release a manual regeneration on the water softener and 5 minutes later, a manual analysis at the residual hardness monitoring system.
E099 Fault Tank level BB1CL	Only for system output Tank: An invalid signal was received from the level monitoring in the permeate tank.	► Contact Grünbeck's technical service.
E100 Fault Overpressure RO1CP3	The overpressure switch has tripped within the system	► Contact Grünbeck's technical service.
E101 Fault Negative pressure RO1CP1	Also refer to "negative pressure warning": The last automatic start attempt was unsuccessful	► Enable water supply for osmoliQ. ► Contact Grünbeck's technical service.
E102 Fault Permeate pressure RO1CP2	Only for system output Online: The permeate pressure continuously did not pass the alarm limit value for longer than the programmed time (for instance due to line breakage).	► Contact Grünbeck's technical service. ► Delay time and alarm limit value can be adapted to the conditions on site.
E103 Display text of prog. fault signal input	Signal is pending at the programmable fault signal input. Response is programmed to "Fault".	► Eliminate the cause of the pending signal ► Correct the programming of the system's response, if necessary
E104 Fault GENO-tronic	Operating unit of control unit defective.	► Contact Grünbeck's technical service.
E107 Fault Temperature sensor	Temperature sensor of permeate conductivity measuring cell defective or short-circuit at a conductivity measuring cell.	► Contact Grünbeck's technical service.
E108 Fault HP pump RO1P2	Frequency converter of high-pressure pump signals a fault.	► Flip the OSMO-tronic control unit towards the front and relay the fault message of the frequency converter to Grünbeck's technical service.
E110 R01V1 does not close	V1 does not close, possibly due to impurities or a defective valve.	► Clean RO1V1. ► Replace solenoid valve.
E111 Membrane degassing	Air flow is too low.	► Check compressed air supply.
E113 SF Fault Power failure	Power failure > 5 minutes	► If the power failure has continued for some time, start a manual regeneration to be on the safe side. The water that in the meantime has flown through the system was not measured, and the exchanger in operation might have exceeded the limits of its capacity.
E114 SF Valve motor fault	The next step position on the control valve has not been reached within the required time.	► If the fault reoccurs within 5 minutes after having been acknowledged, notify Grünbeck's technical customer service.

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Faults	Explanation	Remedy
E116 Hard water fault	While one exchanger tank has not yet been fully regenerated, the capacity of the other exchanger tank is exhausted already.	► The fault is acknowledged automatically as soon as a regenerated exchanger tank is available again.
E120 Microswitch fault	Outside of a regeneration, the signal from microswitch S2 is pending at terminal 14.	► Check the wiring and function of the switch, and contact Grünbeck's technical service, if necessary.
E124 Motor current fault	Monitoring of the step motor current has responded.	► If the fault reoccurs within 5 minutes after having been acknowledged, contact Grünbeck's technical service.
E127 Bus error RO1 - DEA1	Communication with data line RS485 to the pressure booster control unit installed downstream is interrupted.	► Check line connection for proper connection. Check whether the terminating resistors (dip switches) are set correctly.
E150 Stage 2 Fault osmoliQ	Control unit defective.	► Contact Grünbeck's technical service.
E151 Stage 2 Fault Power failure	Power failure has occurred. System is not set to automatic restart. Whether this also affects other subsystems must be checked on site.	► Make sure that the power supply to the osmoliQ is secured. ► Reprogram the parameter "Automatic system restart", if necessary.
E152 Stage 2 EEPROM	EEPROM defective.	► Contact Grünbeck's technical service.
E153 Stage 2 Comm. fault Stage 1 E154 Comm. Fault Stage 2	Communication with data line RS485 to control unit installed upstream/ downstream is interrupted.	► Check line connection for proper connection. Check whether the terminating resistors (dip switches) are set correctly.
E155 Stage 2 Sensor error Pressure	Fault at sensor signal 4-20 mA of the pressure sensor.	► Contact Grünbeck's technical service.
E156 Stage 2 Sensor error Level	Fault at sensor signal 4-20 mA of the level probe of the permeate tank.	► Contact Grünbeck's technical service.
E157 Stage 2 Sensor error RO1CQ2	Fault at the sensor signal Conductivity/PT100 of the conductivity probe.	► Contact Grünbeck's technical service.
E160 Stage 2 Fault Recovery	For more than 30 minutes, the OSMO-tronic control unit continuously was unable to regulate the system to the correct recovery (setpoint exceeded by more than 5 %).	► Contact Grünbeck's technical service.
E161 Stage 2 Fault Permeate water meter defective	No signal is transferred from the permeate water meter to the OSMO-tronic control unit.	► Contact Grünbeck's technical service.
E162 Stage 2 Fault Membrane outflow	For more than 30 minutes, the GENO-tronic control unit continuously was unable to regulate the system to the correct outflow on the membrane (the window of +/- 5 % around the setpoint was exceeded/undershot).	► Contact Grünbeck's technical service.
E163 Stage 2 Fault Permeate conductivity RO1CQ1	The monitoring of the permeate conductivity is programmed to "fault" and the conductivity continuously was higher than the threshold value for longer than the programmed delay time (also refer to "Warning Permeate conductivity RO1CQ1")	► Conductivity limit value too low or delay time of conductivity signal/fault programmed too short. ► Contact Grünbeck's technical service.
E165 Stage 2 Fault HP pump RO1P4	Frequency converter of high-pressure pump signals a fault.	► Flip the GENO-tronic control unit towards the front. Relay the fault signal of the frequency converter to Grünbeck's technical service.
E170 Stage 2 Fault Overpressure RO1CP5	The overpressure switch has responded within the system.	► Contact Grünbeck's technical service.

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Faults	Explanation	Remedy
E172 Stage 2 Fault Permeate pressure RO1CP5	Only for system output Online: The permeate pressure continuously did not pass the alarm limit value for longer than the programmed time (for instance due to line breakage).	► Contact Grünbeck's technical service. ► Delay time and alarm limit value can be adapted to the conditions on site
E173 Stage 2 Display text Programmable input	Signal is present at the programmable fault signal input. Reaction is programmed to "Error"	► Eliminate the cause of the pending signal ► Correct the programming of the system's response, if necessary
E174 Stage 2 Fault GENO-tronic	Operating unit of control unit defective.	► Contact Grünbeck's technical service.
E177 Stage 2 Fault Temperature sensor	Temperature sensor of permeate conductivity measuring cell defective or short-circuit at a conductivity measuring cell.	► Contact Grünbeck's technical service.
E178 Stage 2 Fault HP pump RO1P4	Frequency converter of high-pressure pump signals a fault	► Flip the GENO-tronic control unit towards the front and relay the fault message of the frequency converter to Grünbeck's technical service.
E182 Fuse action 24V solenoid valve	Short-circuit/overload at the solenoid valves.	► Contact Grünbeck's technical service.
E183 Encoder voltage Short-circuit	Short-circuit/overload at the input signals.	► Contact Grünbeck's technical service.
E184 Comm. fault Softening	Communication with data line RS485 to control unit of water softener installed upstream is interrupted.	► Check line connection for proper connection. Check whether the terminating resistors (dip switches) are set correctly.

10 Decommissioning

Decommissioning and restarting requires expert knowledge. This work must be carried out by technical service personnel only.

10.1 Temporary standstill

In case of system output "Online", the system features an automatic forced operation or forced flushing to minimise bacterial growth.

If no permeate is generated within a set time (technical service level: pre-set to 2880 minutes = 48 h), a forced operation or forced flushing is triggered automatically.

The forced operation can be set to 48 h max.

● If a longer standstill of the system is planned, the system must be decommissioned.

10.2 Decommissioning

1. Set the control unit to the operating mode Locked.

2. Set the main switch to OFF and secure it against switching on again.

3. Mechanically separate all connected lines.

4. Preserve the system.

   a Label the system with a note and a warning about the preservation that has been carried out.

10.3 Restart/recommissioning

1. Flush out the preserving agent.

2. Put the system into operation again (refer to chapter 6).

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11 Dismantling and disposal

11.1 Dismantling

The work described herein represents an intervention into your drinking water system.

► 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 feed water shut-off valve.

4. Vent and drain the system.

5. Disconnect the system from the water system (feed water inlet pipe, permeate outlet pipe and concentrate-to-drain pipe).

6. Disconnect the electrical connections to subsystems installed downstream.

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 (refer to chapter 4).

11.2 Disposal

► Obey the applicable national regulations.

Packaging

► Dispose of the packaging in an environmentally sound manner.

| *NOTE* | Danger to the environment due to incorrect disposal |

- Packaging materials are valuable raw materials that can be reused in many cases.
- Incorrect disposal can cause hazards to the environment.
- ► Dispose of packaging materials in an environmentally sound manner.
- ► Obey the local disposal regulations.
- ► If necessary, commission a specialist company with the disposal.

Membrane module

► Dispose of used membrane modules with your household waste.

Dosing agent

► Obey the safety data sheet of the dosing chemical.

► Direct the antiscalant residues to the drain in diluted form.

► Rinse empty dosing tanks with a large amount of water.

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.

► Find out about the local regulations on the separate collection of electrical and electronic products.

► Make use of the collection points available to you for the disposal of your product.

► If your product contains batteries or rechargeable batteries, dispose of them separately from your product.

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

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12   Technical specifications
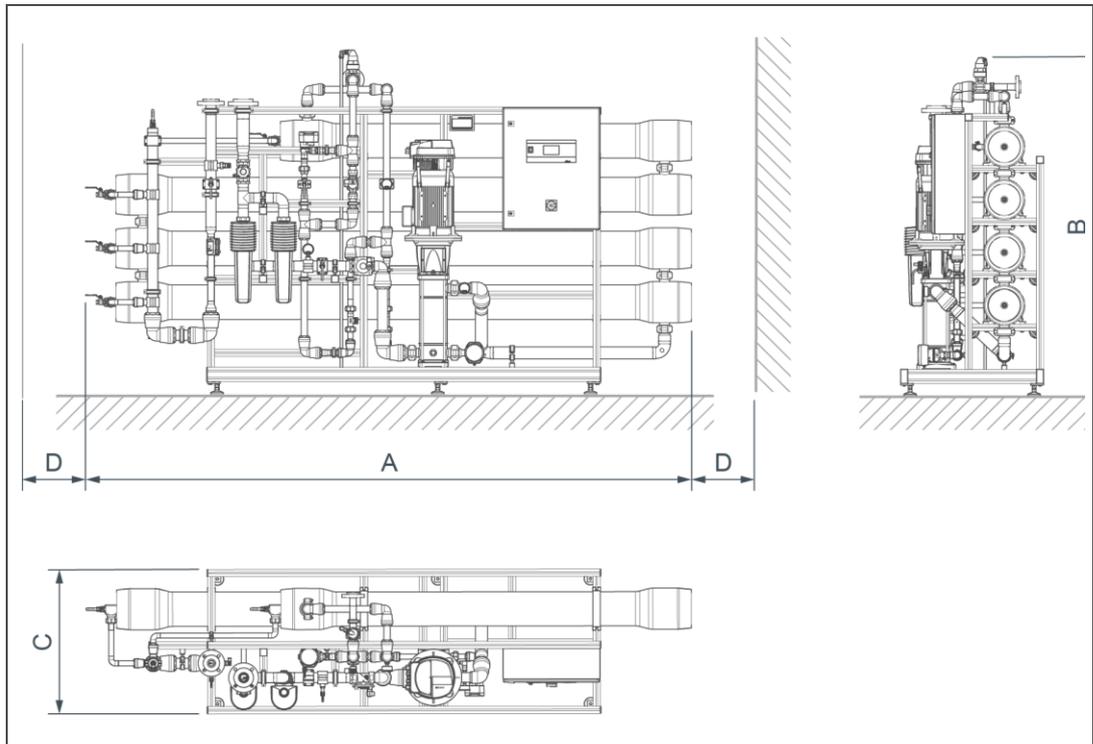
Dimensions and weights			LB4000	LB7000	LB10000	LB12000	LB16000
A	System width	mm	3700	3700	3700	3700	3700
B	System height	mm	2050	2050	2050	2050	2150
C	System depth	mm	900	900	900	900	900
D	Distance to wall (to remove modules)	mm	1200	1200	1200	1200	1200
	Room height/installation height	mm	≥ 2500	≥ 2500	≥ 2500	≥ 2500	≥ 2500
	Empty weight, approx.	kg	425	520	625	700	800
	Operating weight, approx.	kg	485	600	725	830	950

Connection data		LB4000	LB7000	LB10000	LB12000	LB16000
Nominal connection diameter of feed water inlet (flange PN 10)		DN 40	DN 40	DN 50	DN 50	DN 65
Nominal connection diameter of permeate outlet (flange PN 10)		DN 32	DN 40	DN 50	DN 50	DN 50
Nominal connection diameter of concentrate outlet (flange PN 10)		DN 25	DN 25	DN 25	DN 25	DN 25
Min. drain connection		DN 70	DN 70	DN 70	DN 70	DN 100
Connected load, approx.	kW	4.2	5.3	6.7	7.1	9.4
Power supply	V/Hz	400 / 50 – 60				
Phases		3P / N / PE				
Protection/protection class		IP 54/⊕				

Performance data		LB4000	LB7000	LB10000	LB12000	LB16000
Permeate capacity at a recovery of 80 % (at 15 °C)	m³/h	4	7	10	12	16
Inlet flow pressure of feed water	bar	1.0 – 5.0				
Outlet pressure of permeate, approx.	bar	0.5 – 1.5				
Nominal pressure		PN 16				
Salt rejection	%	95 – 99				
Total salt concentration in feed water as NaCl, max.	ppm	1000				
Silt density index (SDI)		< 3				
Recovery (adjustable)	%	50 – 80				
Concentrate volume flow, 80 % recovery	m³/h	1	1.75	2.5	3	4
Volume flow of feed water, 80 % recovery	m³/h	5	8.75	12.5	15	20

General data		LB4000	LB7000	LB10000	LB12000	LB16000
Feed water temperature	°C	10 – 30[1]				
Ambient temperature	°C	5 – 35				
Humidity (non-condensing)	%	≤ 70				
Order no.		**755 500**	**755 510**	**755 520**	**755 530**	**755 540**

[1] For feed water temperatures > 20 °C, separate system dimensioning is required.

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13 Operation log

► Document the initial start-up/commissioning and all maintenance activities.

► Copy the maintenance sheets, if necessary.

Reverse osmosis system| osmoliQ type: _____

Serial no.: _____

13.1 Start-up/commissioning log

Customer	
Name:	
Address:	

Installation/Accessories		
Fine filter upstream of water softener Make/type:	☐ Yes	☐ No
Euro system separator Make/type:	☐ Yes	☐ No
Water softener Make/type:	☐ Yes	☐ No
Activated carbon filter Make/type:	☐ Yes	☐ No
Fine filter upstream of RO system Make/type:	☐ Yes	☐ No
Additional tank	☐ Yes	☐ No
Drain connection (concentrate) acc. to DIN EN 1717 Height of drain, measured from lower edge of RO system	☐ Yes	☐ No cm
Floor drain available	☐ Yes	☐ No
Safety device (if no floor drain is available)	☐ Yes	☐ No

Feed water pipe upstream of RO system	☐ Galvanised steel	☐ Copper	☐ Plastic	☐ Stainless steel

Operating values					
Water pressure, flow pressure	bar		bar		
Water meter reading	m³				
Permeate supply tank	m³				
Pressure booster	bar				
Highest withdrawal point, approx.	m				
Room temperature	°C				
Hardness unit	°dH	°f	mol/m³	°e	°ppm
Total raw water hardness (measured)	☐	☐	☐	☐	☐

Parameters

Feed water	Date/time	yyyy/mm/hh:mm	
	Inlet pressure of fine filter (5 µm)	bar	
	Temperature	°C	
	Volume flow	l/h	
	Total hardness	°dH	
		mol/m³	
	Dosing (option: antiscalant)	ml/h	
	Conductivity	µS/cm	
	pH value	pH	
	Free chlorine downstream of activated carbon filter (Cl_2)	mg/l	
	Silt density index < 3		
High-pressure pump	Pump pressure	bar	
	Pump frequency	Hz	
	Run time of pump	h	
Permeate	Volume flow	l/h	
	Pressure	bar	
	Conductivity	µS/cm	
Concentrate	Volume flow	l/h	
	Conductivity	µS/cm	
	Concentrate recirculation	l/h	
	System recovery (WCF - water conversion factor)	%	

Remarks

Start-up/commissioning

Company:	
Service technician:	
Work time certificate (no.):	
Date/signature:	

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Maintenance ___:

► Enter the measured values and operating data.
► Confirm the checks with *OK* or record any repairs carried out.

Maintenance carried out	Membrane module no.	Restart	
☐ **with flushing** of membrane module		☐ **Yes**	☐ **No**
☐ **without** replacement of membrane module		Date:	
☐ **with** replacement of membrane module			

Measured values: **Before** or during restart or **/ after** replacement of membrane module(s)					
	Conductivity µS/cm *before / after*	Total hardness °dH, mol/m³ *before / after*	Temperature °C *before / after*	Volume flow l/h *before / after*	Recovery % *before / after*
Feed water	/	/	/	/	–
Permeate	/	/	/	/	–
Concentrate-to-drain	/	/	/	/	/

Inlet pressure (inlet)	bar	Water meter reading	m³

Operating hours			
Concentrate volume generated	m³	Feed water volume	m³
Permeate volume produced	m³	Run of time HP pump	h

Error memory read out	Counter reading reset	System printout created
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Maintenance work	OK
Settings of control unit checked (pretreatment, recovery, system outlet)	☐
Fine filter upstream of system checked (filter element replaced, if necessary)	☐
Activated carbon filter checked (filter cartridge replaced, if necessary)	☐
Fine filter of RO system checked (5 µm filter element replaced, if necessary)	☐
Solenoid valves for feed and flushing water cleaned and checked for leaks	☐
All cables and connections (hydraulic, electrical) checked for damage and a tight fit	☐
Mechanical and electrical function of all aggregates (HP pump, valves) checked	☐
Conductivity probe cleaned and checked	☐
Pressure sensor for operating pressure checked for function	☐
Electronics board visually checked for damage	☐
Installation/system checked for leaks	☐
Condition and presence of warning labels checked	☐

Remarks

Carried out by	
Company:	
Service technician:	
	Date Signature

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Maintenance ___:

► Enter the measured values and operating data.
► Confirm the checks with **OK** or record any repairs carried out.

Maintenance carried out	Membrane module no.	Restart	
☐ **with flushing** of membrane module		☐ **Yes**	☐ **No**
☐ **without** replacement of membrane module		Date:	
☐ **with** replacement of membrane module			

Measured values: **Before** or during restart or **/ after** replacement of membrane module(s)					
	Conductivity µS/cm *before / after*	Total hardness °dH, mol/m³ *before / after*	Temperature °C *before / after*	Volume flow l/h *before / after*	Recovery % *before / after*
Feed water	/	/	/	/	–
Permeate	/	/	/	/	–
Concentrate-to-drain	/	/	/	/	/

Inlet pressure (inlet)	bar	Water meter reading	m³

Operating hours			
Concentrate volume generated	m³	Feed water volume	m³
Permeate volume produced	m³	Run time of HP pump	h

Error memory read out	Counter reading reset	System printout created
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Maintenance work	OK
Settings of control unit checked (pretreatment, recovery, system outlet)	☐
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Conductivity probe cleaned and checked	☐
Pressure sensor for operating pressure checked for function	☐
Electronics board visually checked for damage	☐
Installation/system checked for leaks	☐
Condition and presence of warning labels checked	☐

Remarks

Carried out by	
Company:	
Service technician:	
	Date Signature

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Maintenance ___:

► Enter the measured values and operating data.
► Confirm the checks with **OK** or record any repairs carried out.

Maintenance carried out	Membrane module no.	Restart	
☐ **with flushing** of membrane module		☐ **Yes**	☐ **No**
☐ **without** replacement of membrane module		Date:	
☐ **with** replacement of membrane module			

Measured values: **Before** or during restart or **/ after** replacement of membrane module(s)					
	Conductivity µS/cm *before / after*	Total hardness °dH, mol/m³ *before / after*	Temperature °C *before / after*	Volume flow l/h *before / after*	Recovery % *before / after*
Feed water	/	/	/	/	–
Permeate	/	/	/	/	–
Concentrate-to-drain	/	/	/	/	/

Inlet pressure (inlet)		bar	Water meter reading		m³

Operating hours					
Concentrate volume generated		m³	Feed water volume		m³
Permeate volume produced		m³	Run time of HP pump		h

Error memory read out	Counter reading reset	System printout created
☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Maintenance work	OK
Settings of control unit checked (pretreatment, recovery, system outlet)	☐
Fine filter upstream of system checked (filter element replaced, if necessary)	☐
Activated carbon filter checked (filter cartridge replaced, if necessary)	☐
Fine filter of RO system checked (5 µm filter element replaced, if necessary)	☐
Solenoid valves for feed and flushing water cleaned and checked for leaks	☐
All cables and connections (hydraulic, electrical) checked for damage and a tight fit	☐
Mechanical and electrical function of all aggregates (HP pump, valves) checked	☐
Conductivity probe cleaned and checked	☐
Pressure sensor for operating pressure checked for function	☐
Electronics board visually checked for damage	☐
Installation/system checked for leaks	☐
Condition and presence of warning labels checked	☐

Remarks

Carried out by	
Company:	
Service technician:	
	Date Signature

EC Declaration of Conformity

In accordance with Machinery Directive 2006/42/EC

$$C\,E$$

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.

Reverse osmosis system osmoliQ:LB

Serial no.: Refer to type plate

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

The following harmonised standards have been applied:

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

Responsible for documentation:	Peter Höß
Manufacturer:	Grünbeck Wasseraufbereitung GmbH
	Josef-Grünbeck-Str. 1
	89420 Hoechstaedt/Germany

Hoechstaedt/Germany, 25/05/2020

i. V.

Peter Höß

Head of Technical Systems & Equipment

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For more information go to
www.gruenbeck.com