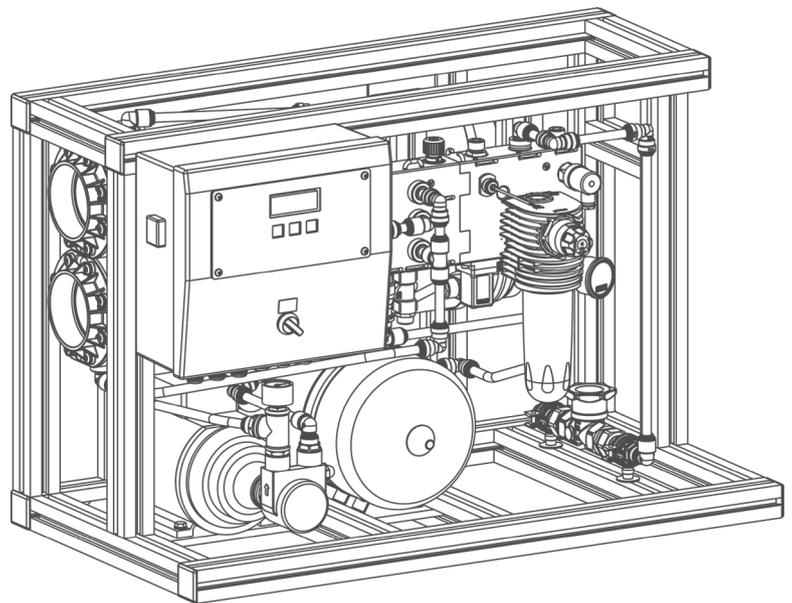


Operation manual

Reverse osmosis system

GENO-OSMO-AVRO 125 RU



Edition September 2018
Order no.: 100074900000_en_035

Grünbeck Wasseraufbereitung GmbH

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A company certified by TÜV SÜD
in accordance with DIN EN ISO 9001,
DIN EN ISO 14001 and SCC

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EU Declaration of Conformity

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

This certificate will become void if the system is modified in a way not approved by us.

Manufacturer: Grünbeck Wasseraufbereitung GmbH
Josef-Grünbeck-Str.
89420 Hoechstädt
Germany

Responsible for documentation: Peter Harlander

System designation: Reverse osmosis system

System type: GENO-OSMO-AVRO 125 RU

Serial no.: Refer to type plate

Applicable guidelines: Machinery Directive (2006/42/EC)
EMC (2014/30/EU)

Applied harmonised standards,
in particular: EN ISO 12100:2011-03,
EN 61000-6-2:2006-03
EN 61000-6-3:2011-09

Applied national standards and
technical specifications, in particu-
lar:

Place, date and signature: Hoechstädt, 30 April 2018 i.V. P. Höß
P. Höß

Function of signatory: Head of Technical Systems & Equipment

A General

1 | Preface

Thank you for choosing a Grünbeck product. Backed by decades of experience in the area of water treatment, we provide custom-made solutions for all kind of processes.

Drinking water is classified as food and requires particular care. Therefore, always ensure the required hygiene in operating and maintaining systems involved in the drinking water ordinance. This also applies to the treatment of water for industrial use if repercussions for the drinking water cannot completely be excluded.

All Grünbeck systems and devices are made of high-quality materials. This ensures trouble-free operation over many years, provided you treat your water treatment system with the required care. This operation manual assists you with important information. Please read the entire operation manual carefully before installing, operating or servicing the system.

Customer satisfaction is our primary aim, and providing customers with qualified advice is crucial at Grünbeck. If you have any questions concerning this system, possible extensions or general water and waste water treatment, our field service staff, as well as the experts at our headquarters in Hoechstädt, are available to help you.

Advice and assistance For advice and assistance please contact your local representative (refer to www.gruenbeck.com). In case of emergency, please get in touch with our service hotline at +49 (0)9074 41-333. We can connect you with the appropriate expert more quickly if you provide the required system data. To ensure that this information is to hand at all times, please copy the data indicated on the type plate to the table in chapter C, paragraph 1.

2 | Notes on using the operation manual

This operation manual is intended for operators of our systems. It is divided into several chapters (a letter is assigned to each of them) that are listed in the "Table of contents" on page 2 in alphabetical order. Locate the corresponding chapter on page 2 in order to find the specific information you are looking for.

The headers and page numbers with chapter information make it easier to find your way around in the operating instructions.

3 | General safety information

3.1 Symbols and notes Important information in this operation manual is emphasised by symbols. Please pay particular attention to this information to ensure the hazard-free, safe and efficient handling of the system.



Danger! Failure to adhere to this information will cause serious or life-threatening injuries, extreme damage to property or inadmissible contamination of the drinking water.



Warning! Failure to adhere to this information can cause injuries, damage to property or contamination of the drinking water.



Caution! Failure to adhere to this information can result in damage to the system or other objects.



Note: This symbol emphasises information and tips that make your work easier.



Tasks with this symbol may only be performed by Grünbeck's technical service/authorised service company or by persons expressly authorised by Grünbeck.



Tasks with this symbol may only be performed by trained and qualified electrical experts according to the VDE guidelines or according to the guidelines of a similar local institution.



Tasks with this symbol may only be performed by water suppliers or approved installation companies. In Germany, the installation company must be registered in the installation directory of a water supplier according to Section 12(2) AVBWasserV (German Ordinance on General Conditions for the Supply of Water).

3.2 Operating personnel

Only allow persons who have read and understood this operation manual to work with the system. Strictly observe the safety information.

3.3 Intended use

The system may only be used for the purpose outlined in the product description (chapter C). The instructions in this operation manual as well as the applicable local guidelines concerning drinking water protection, accident prevention and occupational safety must be adhered to.

In addition, intended use also implies that the system may only be operated when it is in proper working order. Any errors must be eliminated at once.

3.4 Protection from water damage



Warning! In order to properly protect the installation site from water damage:

- a) a sufficiently dimensioned floor drain system must be available or
- b) a safety device (refer to chapter C Optional accessories) must be installed.



Warning! Floor drains that discharge to a lifting system do not work in the event of a power failure.

3.5 Indication of specific dangers

Danger due to electrical energy! → Do not touch electrical parts with wet hands! Disconnect the system from the mains before starting work on electrical parts of the system! Have qualified experts replace damaged cables immediately.

Danger due to mechanical energy! System parts may be subject to overpressure. Danger of injury and damage to property due to escaping water and unexpected movement of system parts. → Check pressure pipes regularly. Depressurise the system before starting repair or maintenance work on the system.

Hazardous to health due to contaminated drinking water! → The system should be installed by a specialist company only. Strictly adhere to the operation manual! Ensure that there is sufficient flow. Adhere to the pertinent guidelines when starting up the system after extended periods of standstill. Perform inspections and maintenance at the intervals specified!



Note: By concluding a maintenance contract, you ensure that all of the required tasks are performed on time. You may perform the interim inspections yourself.

4 | Shipping and storage



Caution! The system may be damaged by frost or high temperatures. In order to avoid damage of this kind:

Protect from frost during transportation and storage! Do not install or store the system next to objects which radiate a lot of heat.

5 | Disposal

Comply with the applicable national regulations.

5.1. Packaging

Dispose of the packaging in an environmentally sound manner.

5.2. Product



If this symbol (crossed out waste bin) is on the product, European Directive 2012/19/EU applies to this product. This means that this product or the electric and electronic components are not allowed to be disposed of in the household waste.

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



For information on collection points for your product, contact your municipality, the public waste disposal authority, an authorised body for the disposal of electrical and electronic products or your waste collection service.

B Basic information

1 | Laws, regulations, standards

In the interest of good health, rules cannot be ignored when it comes to the processing of drinking water. This operation manual takes into consideration the current regulations and stipulates information that you will need for the safe operation of your water treatment system.

Among other things, the set of rules stipulate that

- only approved companies are permitted to make major modifications to water supply facilities
- and that tests, inspections and maintenance on installed devices are to be performed at regular intervals.

2 | Water

There is no chemically pure water in nature. Even in the atmosphere, rain water absorbs various substances that change the properties of the water to a greater or lesser degree. This process continues as the water passes through the ground layers, with the result that the water is enriched with increasingly large quantities of materials. Carbon dioxide (CO₂) is particularly important here, since this substance increases the dissolving capability of the water even more. Consequently, drinking water contains quantities of dissolved sodium, potassium, calcium, magnesium, iron, manganese, copper, zinc, chlorides, fluorides, sulphates and also nitrates, nitrites, phosphates and silicates that vary greatly from location to location.

Due to dynamic substance and water cycles, harmful elements, which are only partly and only slowly biodegradable are increasingly released into nature. These are only partially and slowly broken down by natural effects. Consequently, these elements accumulate in the groundwater and surface water over the course of time. Removing them from natural water deposits represents a particular challenge. Grünbeck faces this challenge with the aim of producing unpolluted drinking and industrial water.

The water works provide us with pure drinking water that is suitable for consumption. However, if the water is to be used for technical purposes, further treatment is frequently required.

3 | Functional principle of reverse osmosis system GENO-OSMO-AVRO 125 RU

Principle:

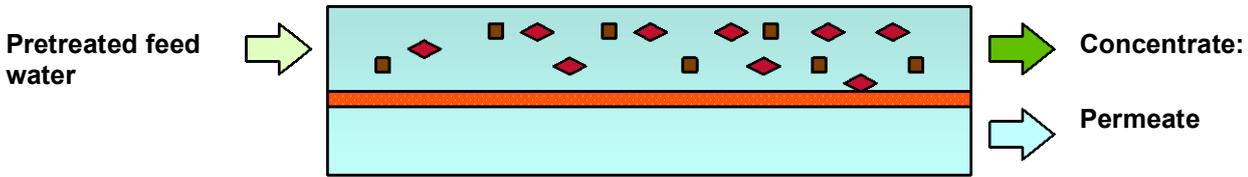


Fig. B-1: Functional principle

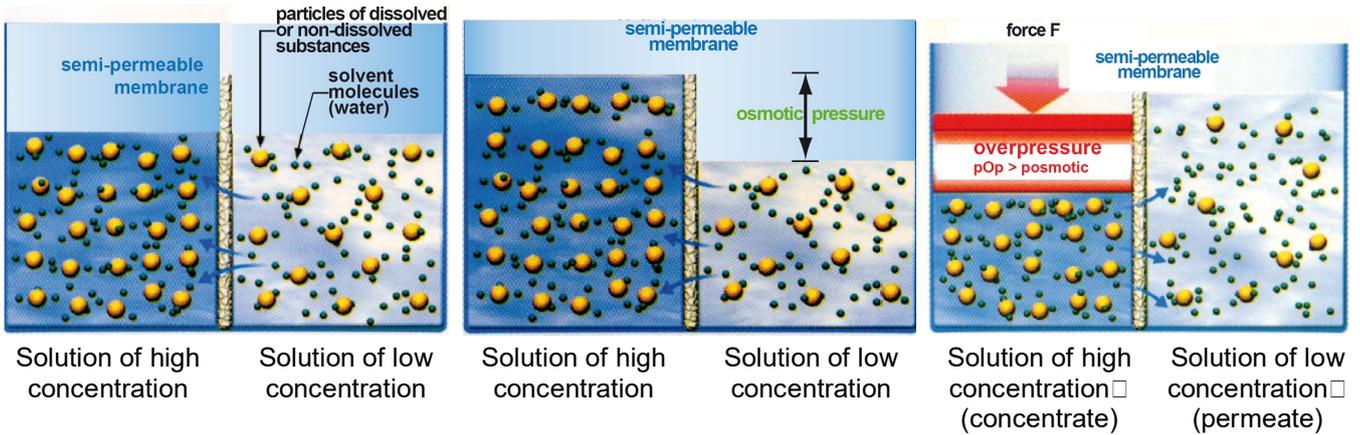


Fig. B-2: Principle of reverse osmosis system GENO-OSMO-AVRO 125 RU

In the osmosis process, watery solutions of different concentrations are separated by a semi-permeable membrane. In keeping with the law of nature, the concentrations will tend to equalise. What is referred to as "osmotic pressure" is generated on the side of the higher original concentration. In the reverse osmosis system GENO-OSMO-AVRO 125 RU, this "osmotic pressure" is countered by a higher pressure. The consequence: The process runs in the opposite direction. A particular advantage of the reverse osmosis technology compared to other water treatment processes is the fact that apart from the removal of dissolved salts, bacteria, germs, particles, and dissolved organic substances are also reduced.

3.1 Functional principle of the AVRO system

AVRO is an alternative anti-scaling process to the common traditional processes of "softening" or "antiscalant dosing". Contrary to these processes, AVRO does not require any addition of auxiliary additives. The chemical composition of the generated concentrate is not modified. There is only a doubling of the concentration (standard recovery 50%).

Hydraulically, the AVRO is installed in the concentrate pipe downstream of the membrane.

The treatment unit consists of two inert special electrodes to which a low current is applied. Seed crystals (calcium carbonate) are generated at the cathode and are permanently directed via the concentrate recirculation. The salts of the supersaturated concentrate continue to grow on these seed crystals, and they are finally washed out to the drain with the residual concentrate flow. This reliably prevents scaling (deposits of insoluble salts on the membrane). Some of the calcium carbonate remains on the cathode of the AVRO and due to increasing electrical resistance, limits the service life of the AVRO treatment unit to 3000 operating hours (permeate production) or 5 years.

C Product description

1 | Type plate

The type designation plate can be found on the housing of the reverse osmosis system GENO-OSMO-AVRO 125 RU. In order to speed up the processing of your inquiries or orders, please specify the data shown on the type plate of your system when contacting Grünbeck. Please copy the indicated information to the table below in order to have it handy whenever necessary.

Reverse osmosis system GENO-OSMO-AVRO 125 RU

Serial number: n n n n n n / n

Order number: n n n n n n





Reverse osmosis system GENO-OSMO AVRO 125 RU

Nominal connection diameter	DN 15 1/2" male thread
Permeate output (15 °C)	125 l/h
Nominal pressure	PN 16
Min. inlet flow pressure of feed water	2.5 bar
Min./max. temperature feed water	10/30 °C
Power supply	230 V / 50 Hz
Connected load	0.7 kW
Order no.	750 570.
Serial no.	

Please observe operation manual!

Grünbeck Wasseraufbereitung GmbH | Josef-Grünbeck-Str. 1 | 89420 Hoechstädt | www.gruenbeck.com

Fig. C-1: Type plate

2 | Functional description

Via a fine filter, the water is directed to the inlet of the feed water section. The water flows to the high-pressure pump via the inlet solenoid valve with a downstream pressure switch for minimum pressure. By means of an adjusting valve, the pressure generated by the pump is reduced to the required operating pressure and the water is directed to the membrane. The membrane separates the water into the partial flows permeate and concentrate. A partial flow of the concentrate is returned to the feed water via an orifice regulating independently of pressure and thus ensures a steady flow over the reverse osmosis membrane and increases the economic efficiency of the reverse osmosis system.

At the same time, the concentrate volume flow is run via an AVRO treatment module, where seed crystals are formed at a cathode due to the application of direct current. These seed crystals are then washed out with the residual concentrate and thus the reverse osmosis membrane is protected from clogging. Whenever the system is switched off or in case of disturbances, the substances retained on the membrane are flushed off by means of the inlet solenoid valve and a solenoid valve switched in parallel to the control valve for concentrate.

The hydraulic set-up of the system is designed in a way that the concentrate volume and the permeate volume are registered by means of flow sensors and are displayed in the control unit. The system recovery can also be called up in the control unit.

With optional features, the permeate produced can be stored in a tank or can also be supplied to a consumer via Online skid.

- | | |
|--|--|
| ① Safety device (option) (AVR1V3) | Closes when a leak occurs to protect against water damage and serves as a shut-off valve for the system (e.g. when changing filters). |
| ② Euro system separator GENO-DK 2 Mini (option) (AVR1S4) | To secure devices and systems endangering the drinking water according to DIN 1988-100 (DIN EN 1717). |
| ③ GENO activated carbon filter AKF 300 (AVR1F2) (option) | To reduce the chlorine concentration in the water. |
| ④ Fine filter incl. pressure reducer (AVR1F1) | Pressure reducer preset to 2.5 bar, incl. pressure gauge. |
| ⑤ Inlet solenoid valve <input type="checkbox"/> (AVR1V1) | During permeate output, this valve is always open. Following the system stop (tank full), the valve remains open for the programmed flushing time of the membranes. Visual indication in the control unit ⑬. |
| ⑥ Pressure switch <input type="checkbox"/> High-pressure pump <input type="checkbox"/> (AVR1CP1) | To prevent the high-pressure pump from running dry. Switches time-delayed after the solenoid valve has opened ⑤. Visual indication in the control unit ⑬. |
| ⑦ Flushing solenoid valve (AVR1V2) | Opens after the switch-off pressure ⑰ has been reached for a set time. The solenoid valve also opens for forced flushing, in the event of system malfunctions and always in conjunction with the inlet solenoid valve ⑤. |
| ⑧ Needle valve concentrate (AVR1H1) | To set the feed water-dependent "concentrate" volume flow to the drain. During permeate output, this portion of the water flows constantly to the drain. |
| ⑨ High-pressure pump (AVR1P1) | Pump unit that generates the operating pressure required for the membrane. Pump starts after permeate request from the permeate pressure switch ⑰. A control valve for adjusting the operating pressure is integrated in the pump head. <input type="checkbox"/>
Visual indication in the control unit ⑬. |
| ⑩ Membrane (AVR1B1) | Reverse osmosis membrane for generating the permeate. |
| ⑪ AVRO treatment unit (AVR1B2) | AVRO treatment unit to generate seed crystals. |
| ⑫ Solenoid valve for permeate relief ("Online-skid" option) (AVR1V4) | Used to relieve the RO membranes during START and STOP of the RO system and during forced flushing of the system. |
| ⑬ Control unit (AVR1E1) | Microprocessor controller that in conjunction with the respective units, regulates the permeate production and the supply of consumers downstream. |
| ⑭ Flow sensor <input type="checkbox"/> concentrate (AVR1CF1) | Registers the concentrate volume and sends pulses to the control unit. Visual indication of the concentrate volume in the control unit ⑬. |
| ⑮ Flow sensor <input type="checkbox"/> permeate (AVR1CF2) | Records the permeate volume and sends pulses to the control unit. <input type="checkbox"/>
Visual indication of the permeate volume in the control unit ⑬. |
| ⑯ Diaphragm expansion tank ("Online-skid" option) (AVR1B3) | Permeate buffer to reduce the switching operations of the reverse osmosis system GENO-OSMO-AVRO 125 RU |
| ⑰ Pressure switch <input type="checkbox"/> ("Online-skid" option) (AVR1CP3) | Switches the reverse osmosis system GENO-OSMO-AVRO 125 RU on when water is required, and off again after water withdrawal ends. |

-
- | | |
|---|--|
| ⑱ Connection HT50 (option) | Drain connection |
| ⑲ Connection ½" (DN 15)
male thread | Feed water. |
| ⑳ Connection ½" (DN 15)
male thread | Permeate/consumer. |
| ㉑ Pressure gauge
(AVR1CP2) | To display the operating pressure of the HP pump ⑨. |
| ㉒ Pressure gauge □
("Online skid" option)
(AVR1CP4) | To display the current permeate pressure to the consumer. |
| ㉓ Collecting water (option) | For sensitive installation sites in conjunction with the option of a safety device protectliQ:A20. |

2.1 | Product components

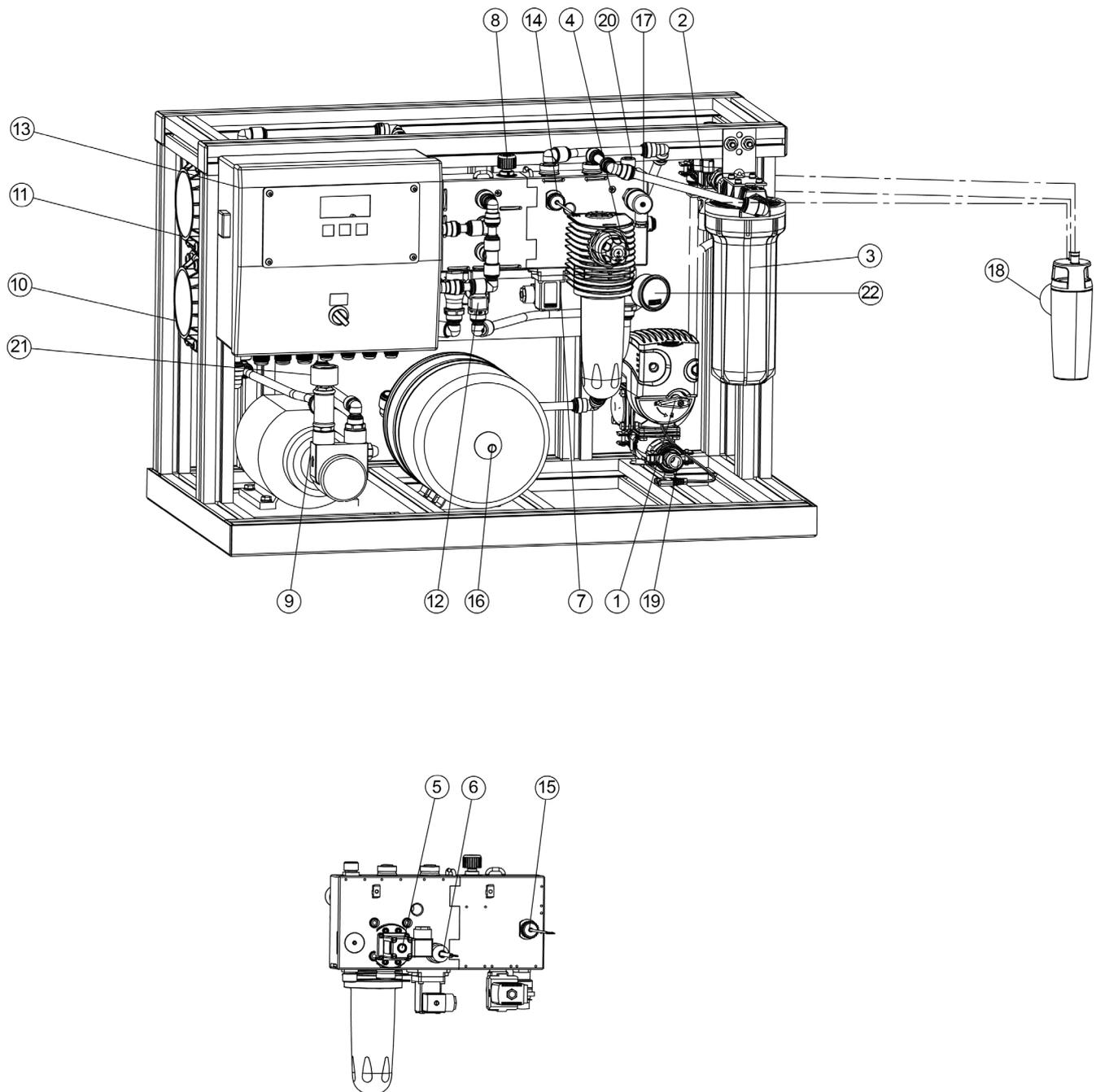


Fig. C-2: Product components of reverse osmosis system GENO-OSMO-AVRO 125 RU

Technical specifications		Reverse osmosis system □ GENO-OSMO-AVRO 125 RU
Connection data		
Nominal connection diameter of feed water pipe		DN 15 (½" male thread)
Nominal connection diameter of permeate outlet		DN 15 (½" male thread)
Nominal connection diameter of concentrate outlet		DN 15 (½" male thread)
Min. drain connection		DN 50
Connected load approx.	[kW]	0.7
Power supply	[V/Hz]	230/50
Performance data		
Permeate output at a feed water temperature □ 10 °C/15 °C	[l/h]	105/125
Electrical capacity of pump at operating pressure	[kW]	0.55
Permeate output per day (max. 24 h) approx. min./max.	[m³/d]	2.5/3.0
Inlet flow pressure of feed water, min.	[bar]	2.5
Nominal pressure		PN 16
Salt rejection		95 – 99 %
Total salt concentration of the feed water as NaCl, max.	[ppm]	1000
Concentrate volume flow (at 15 °C)	[l/h]	125 ¹⁾
Feed water volume flow □ (fresh water 15 °C) at a recovery of 50%, max.	[l/h]	250
System recovery	[%]	50 – 75 □ (default setting 50 ¹⁾)
Dimensions and weights		
A System width	[mm]	900
B System height	[mm]	600
C System depth	[mm]	500
Operating weight, approx.	[kg]	50
Shipping weight, approx.	[kg]	50
General		
Feed water temperature min./max.	[°C]	10/30
Ambient temperature, min./max.	[°C]	5/35
Order no.		750 570

1) After a water analysis, the technical customer service can set a higher recovery.

2) For feed water temperatures > 20 °C, a separate design of the system is required.

3 | Intended use

The reverse osmosis system GENO-OSMO-AVRO 125 RU is used to demineralise drinking water for:

- Technical applications in trade
- Industry
- Medical technology

The permeate capacity of the system depends on the temperature and is defined at 15°C. The permeate outputs can fall (falling temperature) or rise (rising temperature) by up to 3% for each °C rise or fall in the feed water temperature.

The system is adjusted to the permeate requirements to be expected at the installation site, it is not suitable for major deviations.

Only operate the system if all components are properly installed. Safety devices and equipment must NEVER be removed, bridged or tampered with.

Intended use of the device also implies that the information contained in this operation manual and all safety guidelines applying at the installation site be observed. Furthermore, the maintenance and inspection intervals must be respected.

The reverse osmosis system GENO-OSMO-AVRO 125 RU is designed exclusively for use in industrial and commercial applications.

3.1 | System shut-down

If the system is shut down for more than 14 days, the reverse osmosis system must be preserved by Grünbeck's technical customer service/authorised service company. The maximum time, the system can remain in the preserved condition is 6 months.

In case the down time is longer, the system must be preserved again in regular intervals by Grünbeck's technical customer service/authorised service company. Prior to resuming operation, the preserving agent must be flushed from the system.

4 | Application limits

For the application of the reverse osmosis system GENO-OSMO-AVRO 125 RU, the limit values stipulated in the German Drinking Water Ordinance represent the upper limits for the admissible substances contained in the water.

- < 22°dH (39.2° f; 3.92 mmol/l) without water analysis
 - free chlorine max. 0.2 mg/l
 - Iron < 0.10 mg/l
 - Manganese < 0.05 mg/l
 - Silicate < 15 mg/l
 - Chlorine dioxide not detectable
 - Turbidity < 1 FTU
 - Colloid index < 3
 - pH range 3 – 9

For total hardness > 22 °dH or sulphate > 250 mg/l a water analysis is required.



Note: The permeate originating from the reverse osmosis system is not potable but requires additional treatment (blending, hardening) if it is to be used as drinking water.



Caution! In case of an admissible excess of the sulphate concentration due to geogenic conditions, the recovery with regard to the standard settings according to layout might need to be reduced.

5 | Scope of supply

5.1 Standard equipment

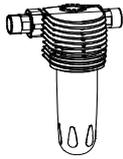
- Aluminium frame to accommodate all aggregates and control elements.
- Microprocessor controller with LC display, voltage-free collective fault signal and voltage-free signal contact (maintenance interval, various pre-warnings).
- Sliding-vane rotary pump made of corrosion-resistant brass with motor as high-pressure pump to supply the membrane, incl. control valve for operating pressure and pressure gauge.
- Pressure switch and diaphragm expansion tank to supply consumers downstream.
- Hydro module for the water supply within the membrane system. Integrated valves and measuring instruments for easier system calibration.
- Fine filter with integrated pressure reducer preset to 2.5 bar.
- Ultra-low pressure reverse osmosis membrane, installed in pressure pipe made of high-strength PE.
- AVRO treatment unit, installed in a pressure pipe made of high-strength PE.
- Flow sensor to measure the volume of the system flows permeate and concentrate.
- Operation manual.

5.2 Optional features

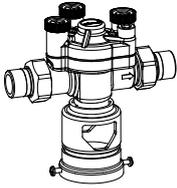


Note: It is possible to retrofit existing systems with optional components. Please contact your local Grünbeck representative or Grünbeck's headquarters in Hoechststedt for more information.

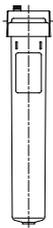
- Connection block for RO 125 K/AVRO 125/AVRO 125 RU 752 840
 Connection block (installation length 180 mm).
 Permeate-resistant incl. two shut-off valves – suitable for connection set
- Connection set for RO 125 K/AVRO 125/AVRO 125 RU 752 830
 2 flexible connection hoses DN 15
 (L = 600 mm) for feed water and permeate
 1 drain hose for concentrate
- Conductivity measurement for 752 820
 RO 125 K/AVRO 125/AVRO 125 RU
 As plug-on circuit board for the control unit. Display with limit value and delay, incl. connecting line and conductivity measuring cell. (Available as a pre-installed variant.)
- Solenoid valve forced withdrawal 752 810
 RO 125K/AVRO 125/AVRO 125 RU
 Solenoid valve adaptable on permeate outlet. Hydro module for forced withdrawal with AVRO 125 TS/AVRO 125 RU from the tank during lengthy idle times.
 Electrically controlled from the control unit of the AVRO 125 TS/AVRO 125 RU.
- Blending unit for 752 800
 RO 125 K/AVRO 125/AVRO 125 RU/
 Adaptable control unit on hydraulic unit AVRO 125 TS/TL/RU consisting of: Connection G 3/4 for feed water, solenoid valve, needle valve, flow sensor to display the total blended water in the control unit AVRO 125 TS/TL, connection option for blended water in AVRO 125 TS/TL/RU or on-site tank.



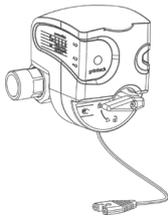
- Drinking water filter BOXER K □ 101 210
Filter element for prefiltration.



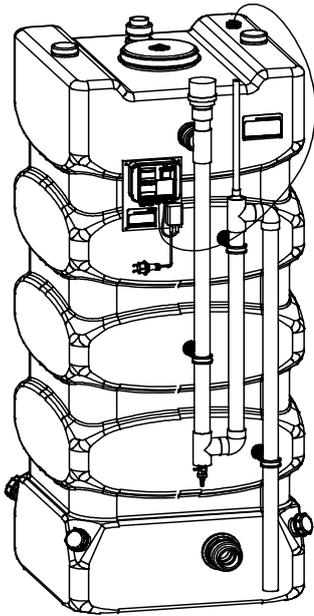
- Euro system separator GENO-DK 2 Mini □ 133 100
For protecting systems hazardous to drinking water in accordance with DIN 1988 Part 4 (DIN EN 1717) GENO-DK 2 Mini. (Available as a pre-installed variant.)



- GENO activated carbon filter AKF 300 □ 109 150
For reducing the chlorine content in water. (Available as a pre-installed variant.)



- Safety device protectliQ:A20 □ 126 400
Product for the protection from water damage in one and two-family homes. For other sizes, please inquire.



- Pure water tank for intermediate storage of permeate flowing unpressurised from GENO-reverse osmosis systems □

Tank design: □

All tanks are pre-assembled, with PVC overflow pipe as well as connections for the permeate inlet and the suction line of the pressure booster system. Grey PE. Handhole with removable screwed cover and level control
GENO-Multi Niveau (switching level).

- Pure water basic tank RT "sterile" cpl. □ 712 400
net volume approx. 850 litres / L 780 / W 990 / □
overall height 2000 mm*.
- Add-on tank RT for pure water basic tank □ 712 405
net volume approx. 850 litres / L 780 / W 780 / □
overall height 2100 mm*.
- Pure water basic tank RT "standard" □ 712 410
net volume approx. 850 litres / L 780 / W 1000 /
overall height 2050 mm**.

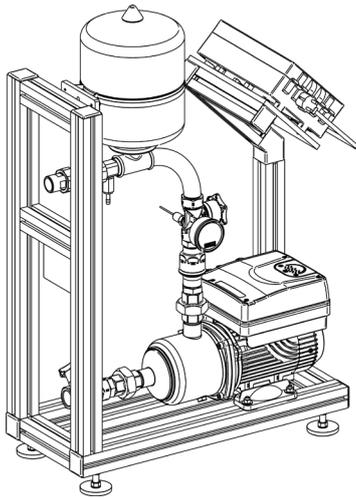
* Tank height incl. connecting pieces.
For larger tanks, please inquire

** without sterile overflow channel as siphon –
overflow as down-pipe

Additional tank without level control and overflow
loop, including 2 connecting lines, id=36 mm.



Note: A maximum of four supply tanks can be combined.

**Pressure booster**

730 640

GENO FU-X 2/40-1 N

Compact pump unit with pressure-dependent control consisting of a centrifugal pump cpl. stainless steel, as well as integrated pressure and contact water meter. Control electronics with power switching, back-lit graphic display. Operating switch, operating log via SD card, voltage-free signal/fault signal contact, non-return valve, shut-off valve for each pump (on suction and pressure side), membrane expansion vessel with forced flow.

Delivery rate: max. 1.2 – 4.2 m³/h

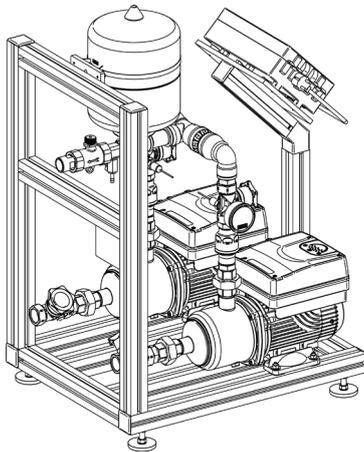
Delivery height: max. 18.2 – 45.6 m

Power supply: 230 V / 50 Hz

Power input: 1 kW

Connections: DN 25 / DN 32

Protection type: IP 55



- **Pressure booster**

730 641

GENO FU-X-2/40-2 N

Description as single pressure booster, still offers the load change switching function.

For additional pressure booster systems, please inquire

- **Online skid for AVRO 125 RU**

750 575

for an uninterrupted permeate supply consisting of a flow-through diaphragm expansion tank (approved for use with drinking water), integrated first permeate to drain via solenoid valve, pressure switch for switching the system on/off. (Available as a pre-installed variant.)

- **Tray for AVRO 125 RU**

750 580

Collecting tray as drip protection in connection with a safety device protectliQ:A20. The system frame is placed completely in the collecting tray.

5.3 Consumables

Only use genuine consumables in order to ensure the reliable operation of the system.

GENO-replacement filter element with protective cylinder□ Packing unit: 2 pc	103 061
Reverse osmosis membrane with seal□ Packing unit: 1 pc	720 295e
AVRO treatment unit with seals□ Packing unit: 1 pc	720 050
Water test kit "Total hardness" □ Packing unit: 1 pc	170 187
Water test kit "carbonate"□ Packing unit: 1 pc	170 169
Activated carbon filter cartridge 250-M□ Packing unit; 1 piece	109 615

5.4 Wearing parts

Seals and valves are subject to a certain wear and tear. Wearing parts are listed below:



Note: Although these parts are wearing parts, we grant a limited warranty period of 6 months for them.

- a) Solenoid valves, control valves, concentrate, seals
- b) High-pressure pump

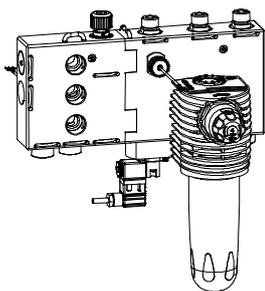


Fig. C-4: Valves

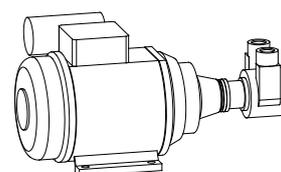


Fig. C-5: High-pressure pump

D Installation

1 | General installation information

The installation site must offer adequate space. A foundation of a sufficient size and adequate load carrying capacity has to be provided. The required connections must be provided prior to the installation. Dimensions and connection data are summarised in table C-1.

1.1 Sanitary installation

When installing the reverse osmosis system GENO-OSMO-AVRO 125 RU, certain rules must always be observed. Additional recommendations are given in order to facilitate the handling of the system. The installation instructions described below are also illustrated in fig. D-1.

Mandatory regulations



The installation of a reverse osmosis system GENO-OSMO-AVRO 125 RU represents a major interference with the drinking water system. Therefore, only authorised experts are allowed to install such systems.

- Observe the local installation guidelines and general regulations.
 - Install a drinking water filter (e.g. BOXER KD) upstream of the system.
 - Provide a drain connection (minimum DN 50) to discharge the concentrate.
-



Note: If the concentrate is directed to a lifting system, the delivery rate of the lifting system should at least be 500 l/h.



Warning! Floor drains that discharge to a lifting system do not work in the event of a power failure.

Recommendation

Install a sample valve immediately before and after the reverse osmosis system GENO-OSMO-AVRO 125 RU. This simplifies the sampling for the regular quality control (functional check).

2 | Preliminary work

1. Unpack all system components.
2. Check for completeness and soundness.
3. Install the reverse osmosis system GENO-OSMO-AVRO 125 RU at the intended location.

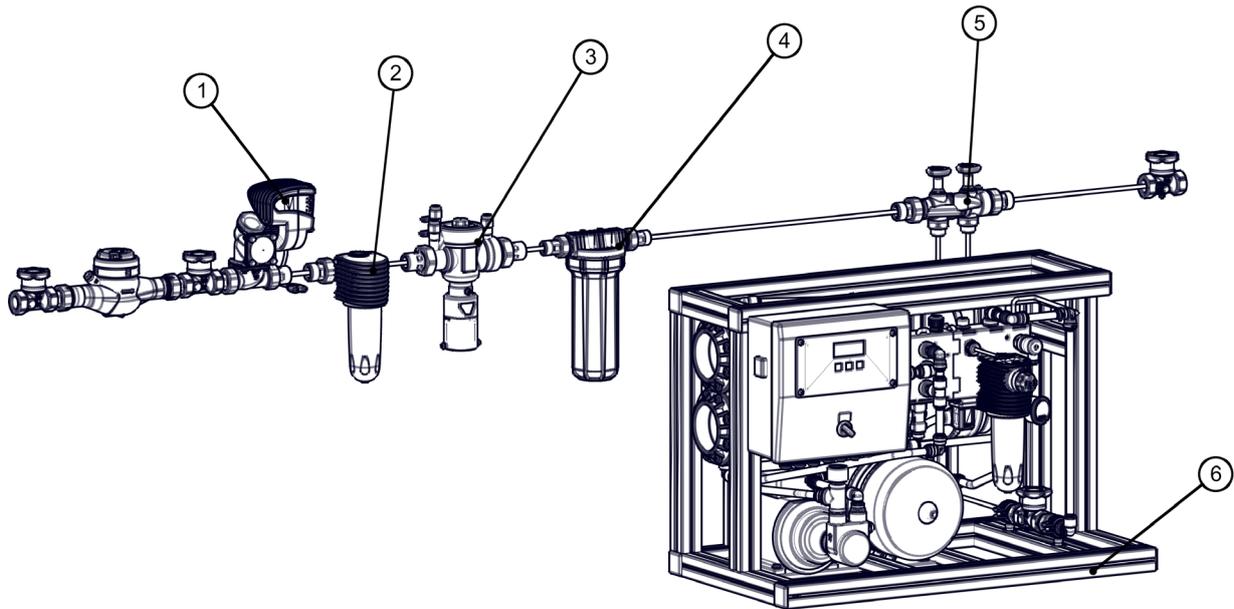
3 | How to connect the system to the water supply

1. Connect the feed water to the system (refer to fig. D-1, no. 3).
2. Connect the permeate pipe to the system (refer to fig. D-1, no. 2).



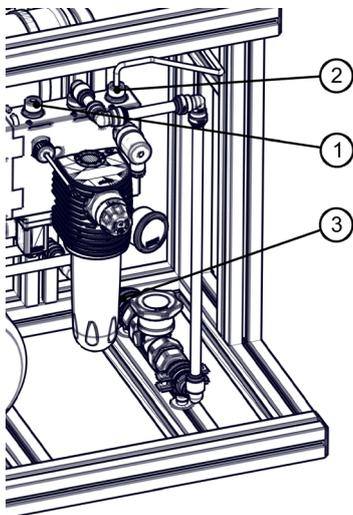
Note: Permeate line must be made of corrosion-resistant material.

3. Connect the concentrate line to the system (refer to fig. D-1, no. 1).
Run the hose with a gradient to the drain and connect in accordance with DIN 1988 (free outlet).



- | | | | |
|---|--------------------------------------|---|---|
| 1 | Safety device protectliQ:A20 | 2 | Drinking water filter BOXER KD 1" |
| 3 | Euro system separator GENO-DK 2 Mini | 4 | GENO activated carbon filter AKF |
| 5 | Connection block | 6 | Reverse osmosis system GENO-AVRO 125 RU |

Fig. D-1: Installation drawing of reverse osmosis system GENO-OSMO-AVRO 125 RU



- ① Concentrate connection
- ② Permeate connection
- ③ Feed water connection

Fig. D-1: (a) Connections of reverse osmosis system GENO-OSMO-AVRO 125 RU

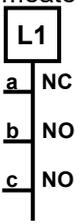
4 | Electrical wiring

Internal wiring of control unit GENO-OSMO-RO125K

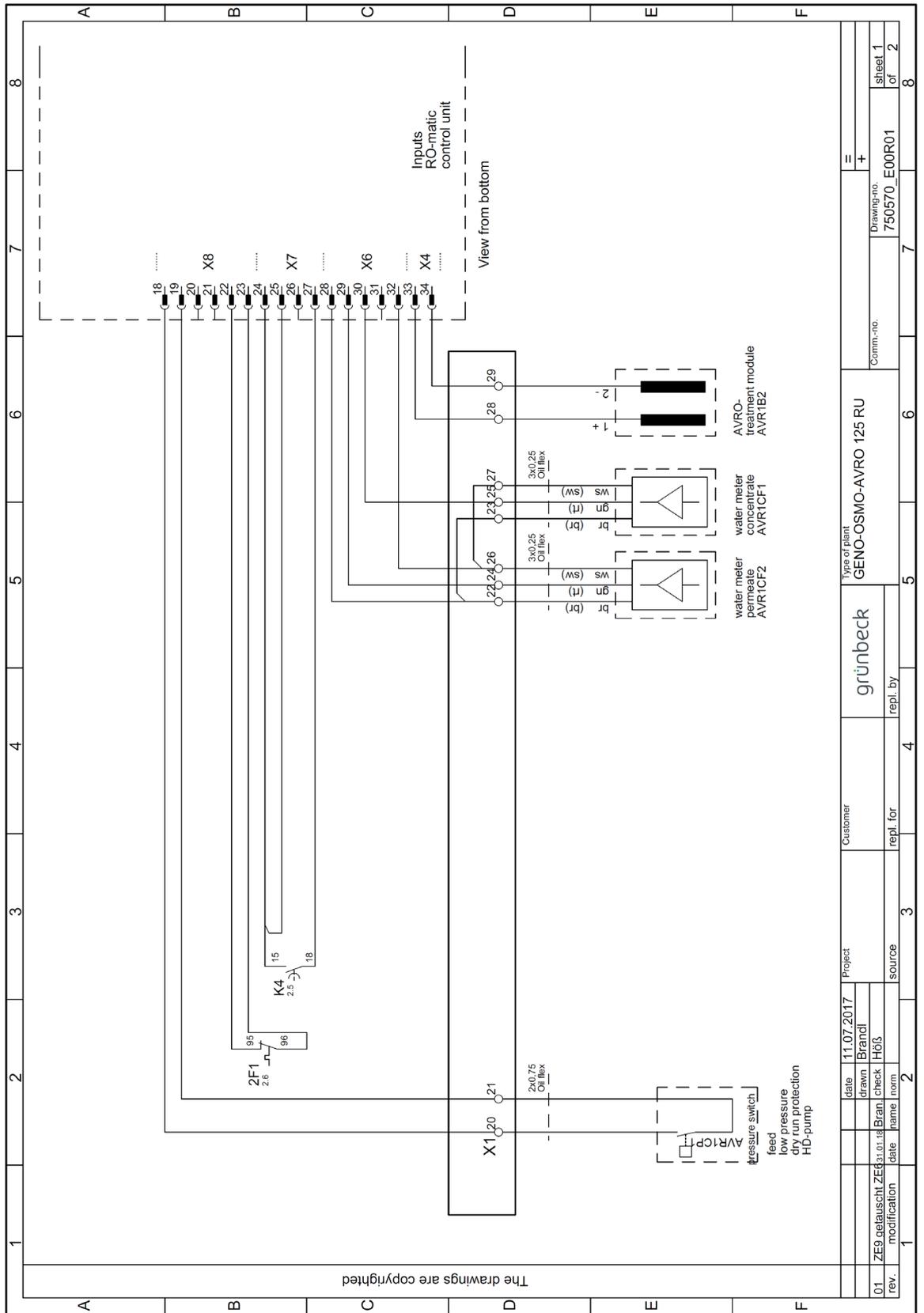
or AVRO 125 RU

The system is completely pre-wired (possibly including options) and delivered ready to plug in. During commissioning, parameter ECL:1 must be reprogrammed to ECL:0 at code level 113 (NC contact >>NO contact). This is a protective measure to prevent the system from being inadvertently switched on after the power cable has been plugged in, without the system having been vented first.

Terminal no.	Terminal	Function (core colour)	Note	
All protective grounding conductors are connected to the 7-pin protective grounding conductor terminal on the left-hand mounting rail				
X1	3	L	230 V / 50 Hz phase	
	2	N	Neutral conductor	
	1	PE	Earth wire	
X2	6	MVW	230 V / 50 Hz phase	
	5	N	Neutral conductor	
	7	MVE	230 V / 50 Hz phase	
	10	MVR	230 V / 50 Hz phase	
	9	N	Neutral conductor	
X3	12	PS	230 V / 50 Hz phase	
	13	N	Neutral conductor	
				GENO-OSMO RO 125K-TS or AVRO 125 TS Actuation only integrated booster pump via relay K2, fuse protection by fuse F3 (T 3,15 A) GENO-OSMO RO 125K-TL or AVRO 125/TL • Actuation of pressure booster pump voltage-free contact: Relay K2, terminals 21-24 • Control voltage for external power unit 230 V~: Relay K2, terminals 14-A2
	14	HP	230 V / 50 Hz phase	
	13	N	Neutral conductor	
	14	HP	230 V / 50 Hz phase	
	2	N	Neutral conductor	
X4	33	+	Electrode cable AVRO	
	34	GND		
X5	15	COM	Common root	
	16	SAMS	Fault signal contact	
	17	MELD	Signal contact	
X6	28	GND	Common ground (brown)	
	29	WZ0	Pulse input permeate	
	30	WZ1	Pulse input concentrate	
	31	WZ2	Option: Impulse input blending unit	
	32	+12V	Common transmitter voltage □ 12 VDC (white)	
			green	
			Hall impulse cable of the turbine water meters	
		1		
		2		
Only used with AVRO 125 TS/TL				
Voltage-free contacts NC 250 V~ / 3 A with common control COM				

Terminal no.	Terminal	Function (core colour)		Note	
X7	24	LEVEL A	Switch-off level high-pressure pump Brown	Level control permeate tank 	
	25	LEVEL B	Switch-on level high-pressure pump green		
	26	LEVEL C	Dry-run protection pressure booster pump yellow		
	27	+24V	Common transmitter voltage □ 24 VDC White		
X8	18	DS_HP	Pressure switch high-pressure pump	Feed water negative pressure, dry-run protection high-pressure pump	
	19	+24V	Transmitter voltage 24 VDC		
	20	DS_PS	Pressure switch pressure booster pump	Pressure switch for controlling the pressure switch (AVRO 125 TS/TL-TS or AVRO 125 TS integrated in the system). For the RO/AVRO 125-TL version, a jumper must be inserted at terminals X8 20/21.	
	21	+24V	Transmitter voltage 24 VDC		
	22	CLOSE	Release input close	<ul style="list-style-type: none"> • Shutdown of the system when the thermal protection contact in the HP pump is activated. • Block system from outside, e.g. pre-treatment, residual hardness For this purpose, an on-site NC contact must be connected in series to the thermal circuit breaker. 	
	23	+24V	Transmitter voltage 24 VDC		
X9	35	Shielding	Conductive 2-electrode measuring cell, not temperature-compensated, cell constant 0.1 or 1.0	Option: Conductivity measurement	
	36	LF E			White
	37	LF V			Brown
Re- lay K1	31 □ 34		Release signal/start of analysis □ Hardness control monitoring device	Contact is closed when system is producing permeate. GENO-Softwatch Komfort: □ connect to terminals 16/17.	

4.1 Wiring diagram of reverse osmosis system GENO-OSMO-AVRO 125 RU



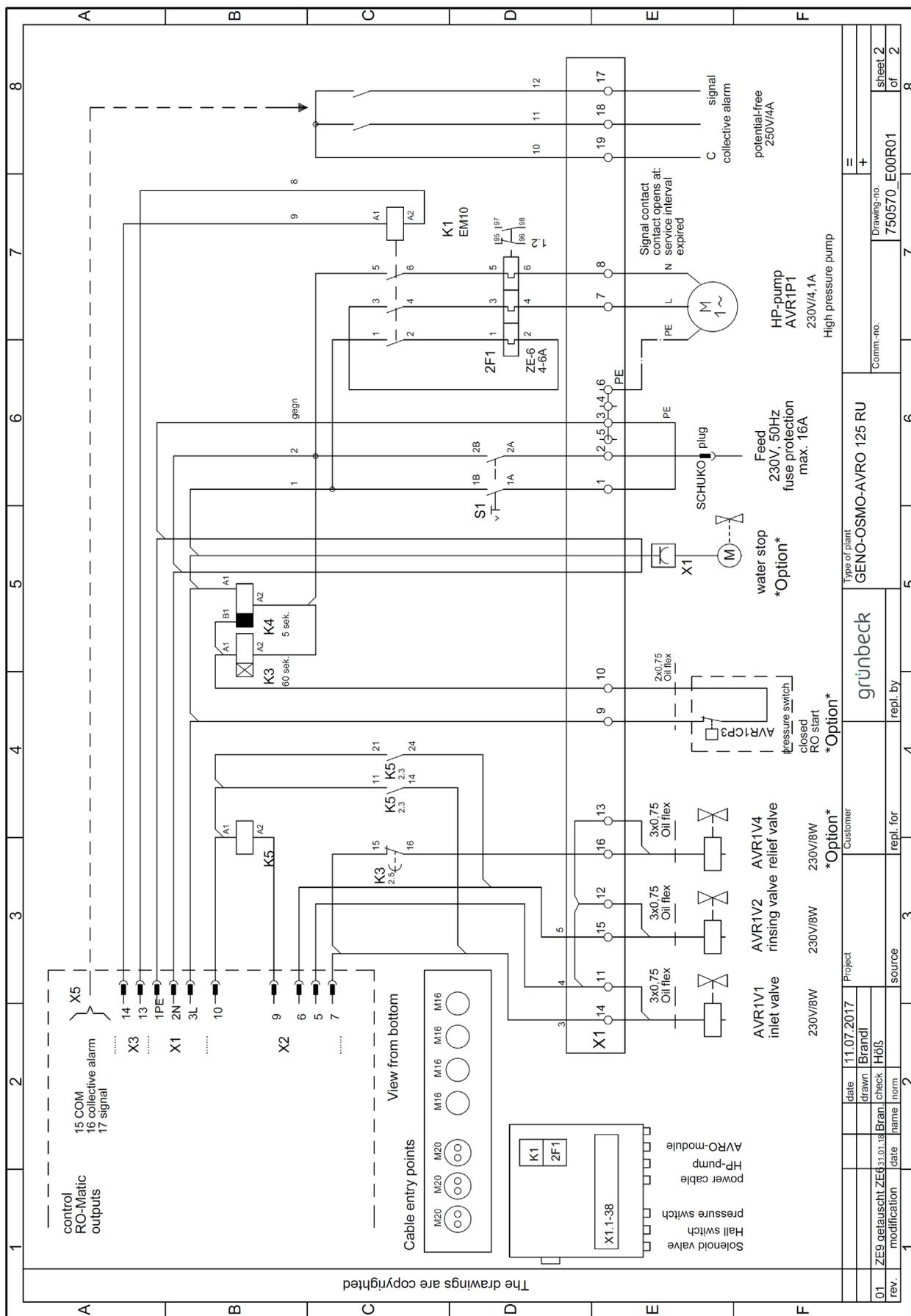


Fig. D-2: Wiring diagram of reverse osmosis system GENO-OSMO-AVRO 125 RU

E Commissioning



The work described below may only be performed by trained experts. We recommend having Grünbeck's technical service/authorised service company start up the system.

1 | How to flush the system



Note: For the duration of storage and transport, the membrane is protected by means of a preserving agent. This preserving agent must be flushed out before the first commissioning. In order to prevent the system being switched on beforehand, it is locked electronically.

1.2 Rinsing out preserving agent



Note: For more detailed information on the handling of the control unit, refer to chapter F.

1. Via code 113, (refer to Table E-1: Extract from...), parameter ECL release the system: To do this, open parameters with the P key, use the ▼ key to set ECL: 1 and confirm with P button.
2. From pressure switch ¹⁷ (refer to fig. C-2) Pull out the plug.
3. Via code 113, (refer to Table E-1: Extract from...), parameter EnL: 1, open both solenoid valves ("DEAERATE") and flush preserving agent out system for 30 minute by opening parameters with the ▲ button, use the P button to set EnL: 1 and confirm with P button.
4. Complete program step "DEARATE": Open parameter with P button, set EnL: 0 with ▼ button and confirm with P button.
5. Exit the "EnL" program by pressing the ▲ and ▼ keys at the same time.

Table E-1: Extract from point F-3.1 input logic code 113

Display factory setting	Parameters	Setting range	Comments
E-A: 1	Contact type level "a"	0 ... 1	0 = NO contact <input type="checkbox"/> 1 = NC contact
E-b: 0	Contact type level "b"	0 ... 1	0 = NO contact <input type="checkbox"/> 1 = NC contact
E-c: 0	Contact type level "c"	0 ... 1	0 = NO contact <input type="checkbox"/> 1 = NC contact
EHP: 2	Type of contact pressure switch relative pressure HP (high-pressure pump).	0 ... 3	0 = NO contact <input type="checkbox"/> 1 = NC contact <input type="checkbox"/> 2 = NO contact with auto restart ¹⁾ 3 = NC contact with auto restart ¹⁾
EPS: 0	Contact type pressure switch PS (pressure booster pump).	0 ... 1	0 = NO contact <input type="checkbox"/> 1 = NC contact
ECL: 0	Contact type close input.	0 ... 1	0 = NO contact <input type="checkbox"/> 1 = NC contact
EnL: 0	Rinse system (inlet and rinsing solenoid valves).	0 ... 1	1 = Open solenoid valves (only possible if the system is switched off using ▼ button). 0 = Close solenoid valves again
A.PF:0	Function signal contact <input type="checkbox"/> terminals 15/17.	0 ... 1	0 = Contact opens when HP pressure switch is deenergised, conductivity pre-warning, level has fallen below "c", maintenance interval expired. 1 = Contact closed when HP pump running.

Do not change when flushing out the preserving agent!

1.3 Commissioning Online-skid option

1.3.1 Diaphragm expansion tank



Caution! To set the gas pressure, the reverse osmosis system GENO-OSMO-AVRO 125 RU must be switched off.



Note: There must be no water counter-pressure for the gas pressure adjustment.

The gas pressure (we recommend nitrogen) in the diaphragm expansion tank (refer to fig. E-1, point 3) must be approx. 0.2 bar less than the minimum pressure required by the client.

After unscrewing the cover on the diaphragm expansion tank, check and adjust the gas pressure via the tyre inflation valve there.

1.3.2 Setting pressure switch



Note: The reverse osmosis system GENO-OSMO-AVRO 125 RU must be switched on for the switch-on pressure to be set.

Dismantle the centric slotted screw on the pressure switch (refer to fig. E-1, point 1).

Loosen the black cap.

Turn the adjusting screw below to adjust the switch-on pressure.



Note: A water withdrawal must be carried out for pressure adjustment.

1.3.3 Solenoid valve for initial discharge/membrane degassing

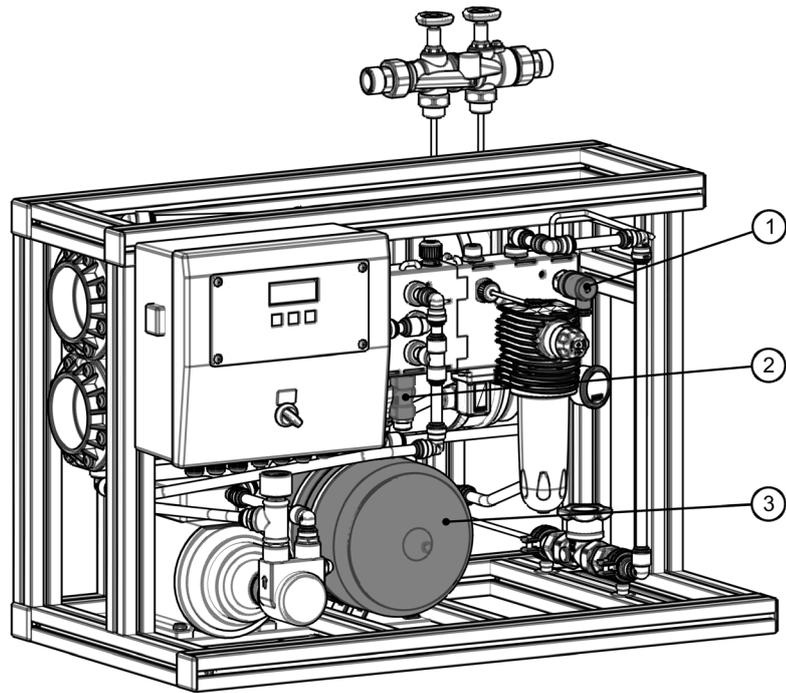
Corresponding times are set via two time relays in the switch box (K3) – initial permeate to drain or (K5) – permeate to drain:

Initial permeate to drain

Discharge of start-up permeate with lower quality to drain.

Permeate relief

In the case of the reverse osmosis membrane, there must be no counter-pressure on the permeate side during flushing times and downtimes – pressure relief by the solenoid valve.



- ① Pressure switch
- ② Solenoid valve
- ③ Diaphragm expansion tank

Fig. E-1: Components of the Online-skid option

F Operation

1 | Preface



Note: Instructions in bold are absolutely essential to ensure that work can continue. All other instructions can be ignored if the value shown on the display remains unchanged.



Settings in the technical service programming level may only be performed by Grünbeck's technical customer service/authorised service company or by persons expressly authorised by Grünbeck.



Warning! Incorrect settings can lead to hazardous operating conditions which cause injury, illness or damage to property. Strictly adhere to the operation manual! Only make the settings described there!

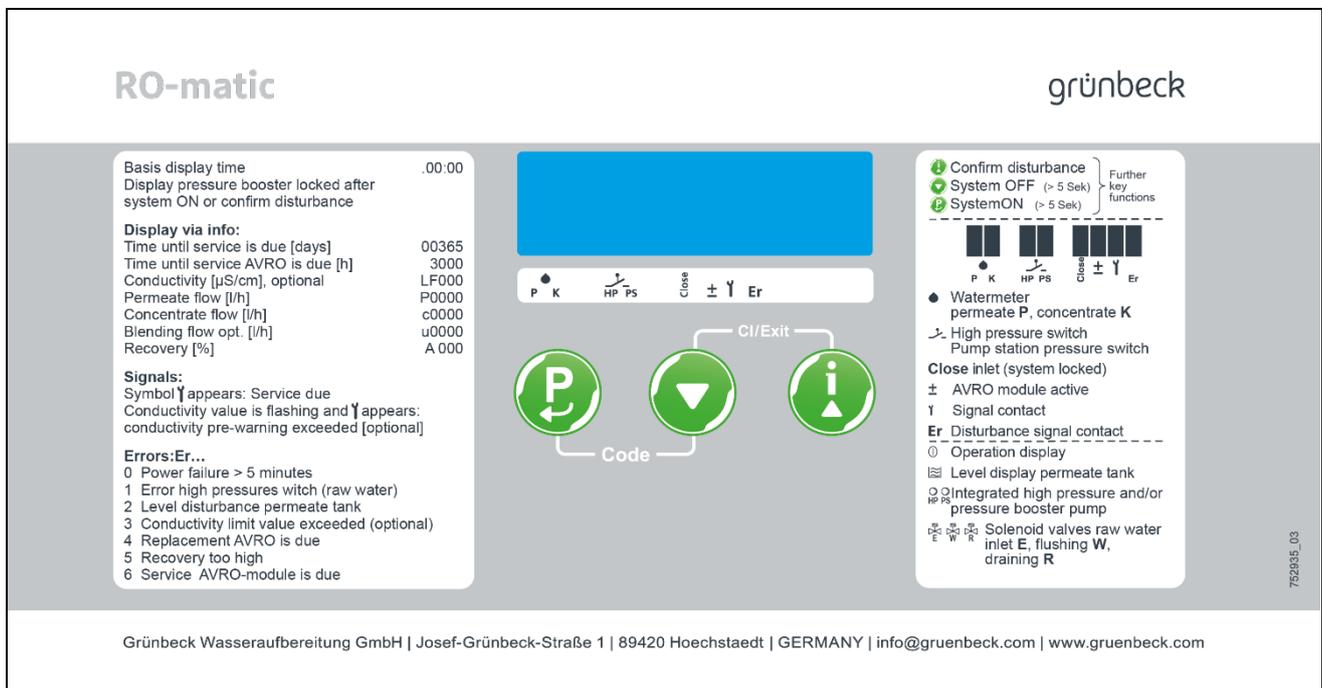
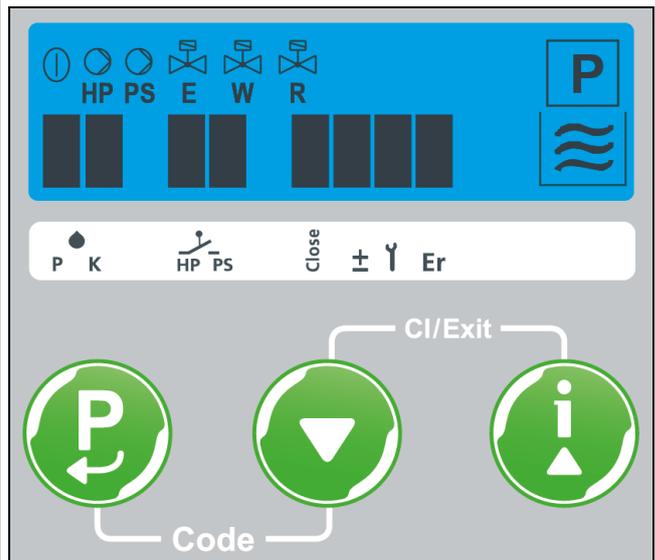


Fig. F-1: Control unit

2 | How to operate the control unit

Display symbols:	
	Operating display Appears when the system is switched on using the ▲ button <input type="checkbox"/> (> 5 s from basic time display).
	High-pressure pump Appears when the high-pressure pump produces permeate.
	Solenoid valve input Appears when permeate is being produced, or when the system is rinsing.
	Rinse solenoid valve Appears when the system is rinsing.
	Solenoid valve forced flushing Appears when the system is being flushed
	Level indicator permeate tank Upper wave: <input type="checkbox"/> Switch-off pressure or level for permeate production. Middle wave: <input type="checkbox"/> Switch-on pressure or level for permeate production. Lower wave: Dry run protection for pressure booster pump or permanently with the "Online skid" option.
	Bars for water meter pulses Flash with every 5th pulse of the water meter permeate or concentrate.
	Bars for operational readiness of high-pressure pump (HP) and pressure booster pump (PS) Shows the status of the feed water inlet pressure switch (bar appears when pressure is active) and PS pump operation enable (bar appears when enabled).
	Bar for close input <ul style="list-style-type: none"> Appears when the system is blocked because the on-site operational release is missing. Appears when HP pump is overheated.
 <p>Fig. F-2: Operating panel for control unit of reverse osmosis system GENO-OSMO-AVRO 125 RU</p>	
	Numerical display <ul style="list-style-type: none"> In the information level, indicates the time and operating parameters. Displays the parameters of the code levels. Displays symbols in addition to the error message.
	Flashes when the pressure switch for high-pressure pump drops out during permeate production (lack of feed water pressure)
	Bars for signal and fault signal contact. <ul style="list-style-type: none"> Y Appears when the maintenance interval has expired, high-pressure pump pressure switch failed, conductivity pre-alarm, permeate tank empty. <input type="checkbox"/> Er appears in the event of malfunctions Er 0 ... Er 6.
	Bar appears when AVRO treatment module is active (always at the same time as high-pressure pump).
Button functions:	
Basic function:	Expanded function in programming levels:
 <ul style="list-style-type: none"> Acknowledgement of malfunctions Access to time programming <input type="checkbox"/> (press and hold button > 2.5 s) 	<ul style="list-style-type: none"> Open parameter for editing (value is flashing) Saving and closing parameters
 <p>Switch off system <input type="checkbox"/> (> 5 s in basic time display)</p>	<ul style="list-style-type: none"> Reduce numerical value Return to the previous menu item
 <p>Switch on system <input type="checkbox"/> (> 5 s in basic time display), <input type="checkbox"/> display operating values of the information level</p>	<ul style="list-style-type: none"> Increase numerical value Switch to the next menu item

 + 	Access to the code-protected programming levels (code request C 000)
 + 	<ul style="list-style-type: none"> • Close the opened parameters without saving (previous value is maintained) • Jump back to the basic time display

2.1 Reading the operating status

Various operating parameters can be displayed in the information level. The information level is accessed by pressing the ▲ button (> 5 s). The other parameters are accessed by touching. The information level remains locked for as long as the system has not been enabled using the close input signal.

Key	Display	Parameters
	00:00	Basic time display
	The system might still be switched on with the first press (> 5 s)!	
	365	Remaining duration of the service interval [days]
	3000	Remaining time AVRO maintenance interval <input type="checkbox"/> [operating hours]
	LF022	Permeate conductivity [µS/cm] (optional – display value flashes if the advance warning value is exceeded)
	P0200	Permeate flow rate [l/h]
	c0200	Concentrate flow [l/h]
	u0320	Flow rate blending [l/h] (option 752 800)
	A 050	System recovery [%]
	A 050	System recovery [%]

2.2 How to set the time

Requirement:

Basic time display is currently being displayed.

1. Press P key > 2.5 seconds, only the hours are still displayed 00:
2. Press P button to change the hours (value is flashing, now set the desired value with the ▼ or ▲ button and save with the P button) or press ▲ button to advance to the minutes :00.
3. Press P button to change the minutes (value is flashing, now set the desired value with button ▼ or ▲ and save with the P button).
4. Return to the basic display time by simultaneously pressing ▼ and ▲ buttons.

2.3 Access to the programming levels – change parameters

1. Simultaneously pressing the buttons P and ▼ (> 1 s) causes the code request C 000 to appear.
2. Set the required code with the ▼ or ▲ buttons and confirm with P button.
3. Within the programming level, select the desired parameter with the ▼ or ▲ button and open it for editing with the P button (value starts flashing).
4. Use the ▼ or ▲ button to change the parameter to the required value.
5. Save the new parameter setting with the P button (value stops flashing) or reject the change by simultaneously pressing the ▼ and ▲ buttons, and close the parameter again (value stops flashing, previous setting remains saved).
6. Return to the basic display time by simultaneously pressing ▼ and ▲ buttons.
7. If no button is pressed during longer than 5 minutes within a parameter level, the display automatically jumps back to the basic time display. Any opened parameters (flashing value) and closed and the old set value is maintained.

2.4 Software version

Display	Parameters
P1.00	Software version of the RO-matic control unit

3 | Programming levels

3.1 Input logic code 113

Display factory setting	Parameters	Setting range	Comments
E-A: 1 ²⁾ <input type="checkbox"/> E-A: 1 ³⁾	Switch-off pressure "a"	0 ... 1	0 = NO contact <input type="checkbox"/> 1 = NC contact
E-b: 0 ²⁾ <input type="checkbox"/> E-b: 1 ³⁾	Switch-on pressure "b"	0 ... 1	0 = NO contact <input type="checkbox"/> 1 = NC contact
E-c: 0 ²⁾ <input type="checkbox"/> E-c: 1 ³⁾	Contact type level "c"	0 ... 1	0 = NO contact <input type="checkbox"/> 1 = NC contact
EHP: 2	Type of contact pressure switch negative pressure HP (high-pressure pump).	0 ... 3	0 = NO contact <input type="checkbox"/> 1 = NC contact <input type="checkbox"/> 2 = NO contact with auto restart ¹⁾ 3 = NC contact with auto restart ¹⁾
EPS: 0	Type of contact PS pressure switch.	0 ... 1	GENO-OSMO-AVRO 125 RU 0 = normally open contact or <input type="checkbox"/> 1 = normally closed contact
ECL: 0	Contact type close input.	0 ... 1	0 = NO contact <input type="checkbox"/> 1 = NC contact
EnL: 0	Rinse system (inlet and rinsing solenoid valves).	0 ... 1	1 = Open solenoid valves (only possible if the system is switched off using ▼ button). 0 = Close solenoid valves again.
A.PF:0	Function signal contact <input type="checkbox"/> terminals 15/17.	0 ... 1	0 = Contact opens when HP pressure switch is deenergised, conductivity pre-warning, level has fallen below "c", maintenance interval expired. 1 = Contact closed when HP pump running.

- 1) If error Er 1 occurs when permeate production is in progress (negative pressure switch of high-pressure pump), the system attempts a new start at the following intervals:
5 ... 10... 20... 40... 80... 160 minutes.
- If there is sufficient pressure available, permeate is produced until the switch-off pressure is reached, and the error is self-acknowledging.
- The symbol flashes on the display in the waiting time between the start attempts **P**
- The hysteresis of the pressure switch can be adjusted in parallel with the central screw of the switch.
- 2) Setting for option 125 RU
- 3) Setting with tank

3.2 System parameters code 290

Display / factory setting	Parameters	Setting range	Comments
1. 0	Cell constant conductivity measurement <input type="checkbox"/> (optional).	0.0 / 0.1 / 1.0	0.0 = Conductivity measurement deactivated, i.e. parameter 2 ... 4 inactive 0.1 = Measuring range 0 ... 99 $\mu\text{S}/\text{cm}$ 1.0 = Measuring range 0 ... 999 $\mu\text{S}/\text{cm}$
2. 080	Conductivity limit value for fault Er 3 [$\mu\text{S}/\text{cm}$].	1 ... 999	 Note: Set value must be selected appropriate for the cell constant (i.e. measuring range)!
3. 070	Conductivity advance warning [$\mu\text{S}/\text{cm}$] (display in the information level starts to flash and signal contact switches).	1 ... 999	
4. 05	Switch-off delay with <input type="checkbox"/> Er 3 [minutes].	0 ... 99	Also delay time for outputting the signal message when the conductivity advance warning is exceeded.

Display / factory setting	Parameters	Setting range	Comments
5. 0	Mains return reaction for fault Er 0 (mains failure > 5 minutes).	0 ... 2	0 = Irrespective of whether the system was switched off or on before the mains failure, it remains switched off after the mains returns and fault Er 0 is output. 1 = Fault Er 0 is deactivated. 2 = After the mains power returns, the system is switched off or on as it was before the mains failure, and fault Er 0 is output.
6. 1	Daily interval for forced flushing □ [days].	1 ... 3	Forced flushing takes place if the daily interval has been reached since the last permeate production at the programmed time.
7.18:00	Forced flushing time.	00:00 ... 23:59	
8. 0	Duration forced flushing [hours].	0 ... 9	
9. 3.0	Opening time solenoid valve forced withdrawal [minutes].	0.0 ... 99.9	
A. 0	Recovery monitoring (Er 5).	0 ... 1	With GENO-OSMO-AVRO 125 RU the recovery monitoring must be activated!
b. 65	Upper recovery limit value [%].	1 ... 99	 Caution! With GENO-OSMO-AVRO 125 RU, the recovery must be set to 50%!
c. 060	Delay time for recovery deactivation [min.].	0 ... 240	

4 | Operation of reverse osmosis system GENO-OSMO-AVRO 125 RU

4.1 How to set the system recovery

A certain part of the feed water must be rejected in order to prevent the membrane from clogging due to scaling. The ratio of the produced permeate volume to the feed water volume is called recovery.

4.1.1 How to set the permeate volume

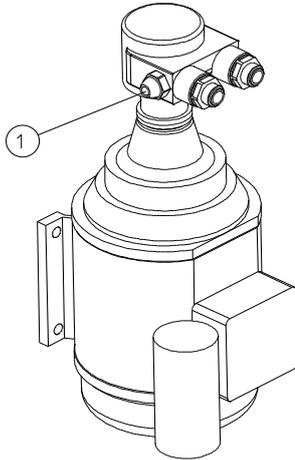


Fig. F-3: Pump

1. Switch on the system at the control unit by pressing the "ON" button.
2. Use the adjustment valve operating pressure (refer to fig. F-3, no. 1) to throttle the pump in such a way that the specific permeate flow rate 125 l/h is achieved.



Note: The current permeate flow can be displayed via the control unit (refer to chapter F, point 2.1 Reading the operating status).

4.1.2 How to set the concentrate volume

1. Set the concentrate flow at the concentrate needle valve (refer to fig. F-4, no. 1).
2. The concentrate flow in a standard system has to be set in a way, that a recovery of 50% is attained (125 l/h of permeate flow, 125 l/h of concentrate flow).

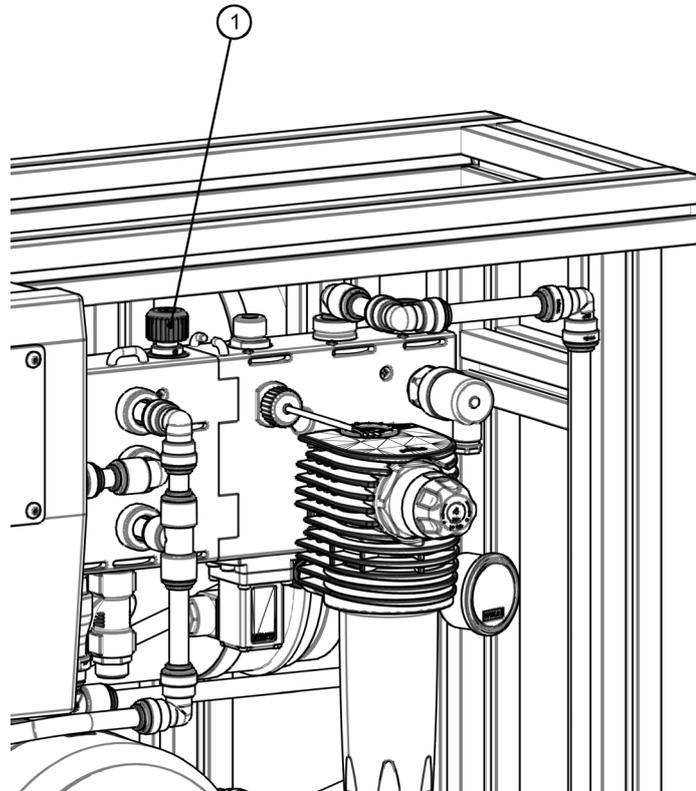


Note: The current concentrate flow and the recovery can be displayed via the control unit (refer to chapter F, point 2.1 Reading the operating status).



Caution! If the recovery setting is not maintained, scaling (precipitation of dissolved salts) occurs on the reverse osmosis membrane.

3. Measure water values of feed water, permeate, concentrate after 10 minutes and enter them in the operating log.
4. Switch off system.



① Needle valve, concentrate

Fig. F-4: Hydro module

Example for the calculation of the recovery

$$\text{Recovery [\%]} = \frac{\text{Permeate flow [l/h]} \times 100 \text{ \%}}{\text{Permeate flow [l/h]} + \text{Concentrate flow [l/h]}}$$

$$\text{Concentrate flow [l/h]} = \frac{\text{Permeate flow [l/h]} \times 100}{\text{Concentrate recovery [\%]}} - \text{Permeate flow [l/h]}$$

G Troubleshooting

Even carefully designed and manufactured technical systems that are operated properly, may experience malfunctions. Table G-1 provides an overview of possible problems that can occur during the operation of the systems and indicates the causes and their elimination.

The systems are equipped with an error detection and reporting system. If an error message is displayed:

1. Press button (= acknowledge malfunction).
2. Watch the display.
If the message reappears, compare it with table G-1.
3. If necessary, notify Grünbeck's technical customer service.



Note: In the case of malfunctions which cannot be remedied with the information in Table G-1, it is essential to contact the customer service (refer to www.gruenbeck.com)! Enter the system designation, serial number and, if necessary, fault signal in the display.

Table G-1: Troubleshooting		
This is what you observe	This is the cause	This is what to do
Water quality deteriorated by 50%.	Membrane clogged.	Replace or flush the membrane ¹⁾ .
	Feed water values deteriorated.	Check feed water values.
Solenoid valve does not open .	Coil defective or fuse on the circuit board blown.	Replace coil or fuse.
Solenoid valve does not close .	Valve contaminated.	Clean valve.
Bar appears in the display above Symbol Close.	<ul style="list-style-type: none"> • HP pump: Thermostat contact has responded, pump has overheated. • Upstream hardness monitoring or water treatment locks the system. 	<ul style="list-style-type: none"> • Wait until the pump has cooled down again, the system will then automatically continue to produce. • Inspect system installed upstream.
Bar appears in the display above screw wrench symbol (without further indications of a malfunction).	Service interval has elapsed.	Have maintenance performed.

Continuation Table G-1: Troubleshooting

This is what you observe	This is the cause	This is what to do
Conductivity measured value in information level is shown flashing and bar appears in the display over spanner symbol.	Optional conductivity measurement: Conductivity pre-warning part □ F / chapter 3.2 / parameter 4 has been exceeded.	Check feed water values and rinse diaphragm, if necessary.
Er 0	Power failure > 5 minutes Refer to part F / chapter 3.2 / parameter A: Depending on the setting, the system either continues to run or remains switched off.	Check mains supply for failures.
Er 1	Pressure loss at pressure switch HP: Refer to part F / chapter 3.1 / parameter EHP: Depending on the setting, the system had 6 previous unsuccessful start attempts.	Re-establish feed water primary pressure.
Er 2	Invalid level setting in the permeate tank.	Check wiring or setting in code 113, parameters E-A, E-b and E-c and correct if necessary (NC/NO contact assignment).
Er 3	Optional conductivity measurement: Conductivity limit value □ Part F / chapter 3.2 / parameter 3 has been exceeded.	Check feed water values, rinse diaphragm and renew if necessary.
Er 4	Minimum AVRO treatment current undershot.	Have the AVRO treatment module replaced immediately by Grünbeck's technical customer service/authorised service company.
Er 5	System recovery too high.	Gauge and reset the system.
Er 6	AVRO maintenance interval has elapsed.	Notify Grünbeck's technical customer service/authorised service company to have the AVRO treatment module replaced promptly.
Symbol  flashes (from software V1.22 onwards) or symbol  flashes (up to software V1.19)	Refer to Er 1: Waiting time runs between 2 start attempts.	Re-establish feed water primary pressure.

1) Separate flushing instructions for membranes are available for authorised service personnel under order no. 700 950.

H Maintenance and care

1 | Basic information

In order to guarantee the reliable function of the systems over a long period of time, some maintenance work has to be performed at regular intervals. All regulations and guidelines which apply at the installation site must be strictly adhered to.

1. Check the quality and the system volume flows every day.
2. Maintenance has to be performed by Grünbeck's technical customer service/authorised service company or by a specialised company. Maintenance is subject to the load, but at the latest has to be performed once a year.
3. An operation log and the corresponding test log must be kept in order to document the maintenance work performed.



Note: By concluding a maintenance contract you ensure that all maintenance work will be performed in due time.

The maintenance work performed must be documented in the checklist, refer to appendix "Operation log".

2 | Inspection (functional check)

You may perform the daily inspections yourself.

Please refer to the following summary for the tasks to be performed within the framework of an inspection.

Overview: Inspection work

1. Determine inlet water values.
(Water test kit "total hardness" or total alkalinity).
2. Determine the permeate quality. Either at the display if a conductivity monitoring device is installed or by means of a manual conductivity meter.
3. Read the recovery.



Note: Minor deviations are normal and cannot be prevented technically. In case of considerable deviations from the standard, notify Grünbeck's technical customer service.

4. Take the remaining time of AVRO treatment unit's maintenance interval into consideration (refer to chapter F, point 2.1). If the remaining time is < 100 hours, notify Grünbeck's technical service/authorised service company to have the treatment module replaced.
5. Take the remaining time of the maintenance interval into consideration. Chapter F – point 2.2 Reading the operating state. In case the remaining time of the maintenance interval is < 30 days, inform Grünbeck's technical customer service about the impending service.

6. Make sure that there are no leakages from the system to the drain (all 3 waves can be seen on the display when the system is switched off (refer to fig. F-2, point 5). Solenoid valves are not tightened, visible in the display (refer to fig. F-2, no. 9 and 10). In this state, no water must creep to the drain.



Note: There can be increased water consumption by the system if the solenoid valves are leaking. The recovery will be reduced.

3 | Maintenance



According to DIN 1988 part 8 / A 12, maintenance work at the systems may only be performed by Grünbeck's technical service/authorised service company or an approved specialist company.

For this kind of systems, an operation log – a checklist has to be kept. In this operation log, the service technician records all maintenance and repair work performed. In case of malfunctions, this log helps to identify possible sources of error. In addition, the log documents the proper system maintenance.



Note: Make sure that all maintenance work is recorded in the operation log as well as in the corresponding test report.

Overview: Maintenance work

- Replacing the filter element.
- Replace the filter element of the activated carbon filter.
- Check the permeate quality; flush or replace the membrane, if required. So-called flushing instructions (order no. 700 950) are available for authorised service personnel.
- Replacement of AVRO treatment unit, if necessary (limit value: 3000 h or 5 years).
- Check diaphragm expansion tank.
- Clean the solenoid valves – check their function.
- Check the flow volumes and water meter
- Check the state of the entire system and check for tightness.
- Mechanical resp. electrical functional and performance check of all aggregates (pumps, valves).
- Prepare a written maintenance log on the state and function of the system and the maintenance work performed, incl. evaluation and assessment of the operating values and water analysis results.



Note: The maintenance work performed must be documented in the checklist, refer to appendix "Operation log"

3.1 Operation log

The operation log is located in chapter H, point 4 of this operation manual. When starting up the system, make sure to record all data on the cover sheet of the operation log and fill in the first column of the checklist.

The service technician will fill in a column of the check list whenever maintenance is performed. This document provides evidence of proper maintenance.

4 | Operation log

Customer

Name:

Address:.....

.....

.....

Reverse osmosis system

GENO-OSMO-AVRO 125 RU

(Please check appropriate box)

Serial number

Installed by

Drinking water filter: Make/Type..... /

System separator: Make/Type /

Activated carbon filter: Make/Type . /

Filter: Make/type /

Connection data:

(Please check appropriate box)

Drain connection DIN 1988 yes no

Floor drain available yes no

Line before reverse osmosis sys- Galvanised

tem GENO-OSMO-AVRO 125 RU Copper

Plastic

.....

Height of drain cm from bottom edge of the system

Maintenance work on reverse osmosis system GENO-OSMO-AVRO 125 RU
Checklist

Please enter measured values. Confirm checks with OK or enter repair work performed.

<input type="checkbox"/> Maintenance performed without replacement of the module	<input type="checkbox"/> Maintenance performed with replacement of the module Module no.	<input type="checkbox"/> Maintenance performed with replacement of AVRO treatment module Treatment module no.	
---	---	--	--

Measured values

Water volumes and water qualities **before** the replacement of the module / **after** the replacement of the module or in case of maintenance

Pump pressure [bar]	Conductivity [μS/cm]	Total hardness <input type="checkbox"/> [°dH] ¹⁾	Total alkalinity <input type="checkbox"/> [°cH] ²⁾	Temperature <input type="checkbox"/> [°C]	Volume flow <input type="checkbox"/> [l/h]	Recovery <input type="checkbox"/> [%]
before/after	before/after	before/after	before/after	before/after	before/after	before/after
/						
Feed water	/	/	/	/	/ % / %
Permeate	/	/	/	/	/	
Concentrate	/	/	/	/	/	

	Acknowledgement	Remarks
Water meter reading upstream of the system [m ³]		
Inlet water pressure (2.5 – 4 bar) checked		
Filter elements changed		
Settings of electronics checked		
Remaining AVRO maintenance interval (chapter F 2.1) [h]		
Operating hours (chapter F, 2.1)		
Run time of high-pressure pump <input type="checkbox"/> (code 245, par. c) [h]		
Permeate volume produced <input type="checkbox"/> (code 245, par. E) [m ³]		
Concentrate volume generated <input type="checkbox"/> (code 245, par. F) [m ³]		
Blended water quantity <input type="checkbox"/> (code 245, par. G) [m ³]		
AVRO treatment current intensity <input type="checkbox"/> (code 245, par. I) [mA]		
Error memory <input type="checkbox"/> (code 245, par. 1..9) [Er]		

1) 1°dH = 1.78°f = 0.178 mmol/l

2) 1°cH = 0.36 mmol/l

Maintenance work on reverse osmosis system GENO-OSMO-AVRO 125 RU
Checklist

Please enter measured values. Confirm checks with OK or enter repair work performed.

<input type="checkbox"/> Maintenance performed without replacement of the module	<input type="checkbox"/> Maintenance performed with replacement of the module Module no.	<input type="checkbox"/> Maintenance performed with replacement of AVRO treatment module Treatment module no.	
---	---	--	--

Measured values

Water volumes and water qualities **before** the replacement of the module / **after** the replacement of the module or in case of maintenance

Pump pressure <input type="checkbox"/> [bar]	Conductivity <input type="checkbox"/> [μS/cm]	Total hardness <input type="checkbox"/> [°dH] ¹⁾	Total alkalinity <input type="checkbox"/> [°cH] ²⁾	Temperature <input type="checkbox"/> [°C]	Volume flow <input type="checkbox"/> [l/h]	Recovery <input type="checkbox"/> [%]
before/after	before/after	before/after	before/after	before/after	before/after	before/after
/						
Feed water	/	/	/	/	/	
Permeate	/	/	/	/	/	
Concentrate	/	/	/	/	/ % / %

	Acknowledgement	Remarks
Water meter reading upstream of the system [m³]		
Inlet water pressure (2.5 – 4 bar) checked		
Filter elements changed		
Settings of electronics checked		
Remaining AVRO maintenance interval (chapter F 2.1) [h]		
Operating hours (chapter F, 2.1)		
Run time of high-pressure pump <input type="checkbox"/> (code 245, par. c) [h]		
Permeate volume produced <input type="checkbox"/> (code 245, par. E) [m³]		
Concentrate volume generated <input type="checkbox"/> (code 245, par. F) [m³]		
Blended water quantity <input type="checkbox"/> (code 245, par. G) [m³]		
AVRO treatment current intensity <input type="checkbox"/> (code 245, par. I) [mA]		
Error memory <input type="checkbox"/> (code 245, par. 1..9) [Er]		

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Maintenance work on reverse osmosis system GENO-OSMO-AVRO 125 RU
Checklist

Please enter measured values. Confirm checks with OK or enter repair work performed.

<input type="checkbox"/> Maintenance performed without replacement of the module	<input type="checkbox"/> Maintenance performed with replacement of the module Module no.	<input type="checkbox"/> Maintenance performed with replacement of AVRO treatment module Treatment module no.	
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Measured values

Water volumes and water qualities **before** the replacement of the module / **after** the replacement of the module or in case of maintenance

Pump pressure [bar]	Conductivity [µS/cm]	Total hardness [°dH] ¹⁾	Total alkalinity [°cH] ²⁾	Temperature [°C]	Volume flow [l/h]	Recovery [%]
before/after	before/after	before/after	before/after	before/after	before/after	before/after
/						
Feed water	/	/	/	/	/ % / %
Permeate	/	/	/	/	/	
Concentrate	/	/	/	/	/	

	Acknowledgement	Remarks
Water meter reading upstream of the system [m³]		
Inlet water pressure (2.5 – 4 bar) checked		
Filter elements changed		
Settings of electronics checked		
Remaining AVRO maintenance interval (chapter F 2.1) [h]		
Operating hours (chapter F, 2.1)		
Run time of high-pressure pump <input type="checkbox"/> (code 245, par. c) [h]		
Permeate volume produced <input type="checkbox"/> (code 245, par. E) [m³]		
Concentrate volume generated <input type="checkbox"/> (code 245, par. F) [m³]		
Blended water quantity <input type="checkbox"/> (code 245, par. G) [m³]		
AVRO treatment current intensity <input type="checkbox"/> (code 245, par. I) [mA]		
Error memory <input type="checkbox"/> (code 245, par. 1..9) [Er]		

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Maintenance work on reverse osmosis system GENO-OSMO-AVRO 125 RU
Checklist

Please enter measured values. Confirm checks with OK or enter repair work performed.

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Measured values

Water volumes and water qualities **before** the replacement of the module / **after** the replacement of the module or in case of maintenance

Pump pressure [bar]	Conductivity [µS/cm]	Total hardness [°dH] ¹⁾	Total alkalinity [°cH] ²⁾	Temperature [°C]	Volume flow [l/h]	Recovery [%]
before/after	before/after	before/after	before/after	before/after	before/after	before/after
/						
Feed water	/	/	/	/	/ % / %
Permeate	/	/	/	/	/	
Concentrate	/	/	/	/	/	

	Acknowledgement	Remarks
Water meter reading upstream of the system [m³]		
Inlet water pressure (2.5 – 4 bar) checked		
Filter elements changed		
Settings of electronics checked		
Remaining AVRO maintenance interval (chapter F 2.1) [h]		
Operating hours (chapter F, 2.1)		
Run time of high-pressure pump <input type="checkbox"/> (code 245, par. c) [h]		
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Concentrate volume generated <input type="checkbox"/> (code 245, par. F) [m³]		
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AVRO treatment current intensity <input type="checkbox"/> (code 245, par. I) [mA]		
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Maintenance work on reverse osmosis system GENO-OSMO-AVRO 125 RU
Checklist

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Pump pressure [bar]	Conductivity [µS/cm]	Total hardness [°dH] ¹⁾	Total alkalinity [°cH] ²⁾	Temperature [°C]	Volume flow [l/h]	Recovery [%]
before/after	before/after	before/after	before/after	before/after	before/after	before/after
/						
Feed water	/	/	/	/	/ % / %
Permeate	/	/	/	/	/	
Concentrate	/	/	/	/	/	

	Acknowledgement	Remarks
Water meter reading upstream of the system [m³]		
Inlet water pressure (2.5 – 4 bar) checked		
Filter elements changed		
Settings of electronics checked		
Remaining AVRO maintenance interval (chapter F 2.1) [h]		
Operating hours (chapter F, 2.1)		
Run time of high-pressure pump <input type="checkbox"/> (code 245, par. c) [h]		
Permeate volume produced <input type="checkbox"/> (code 245, par. E) [m³]		
Concentrate volume generated <input type="checkbox"/> (code 245, par. F) [m³]		
Blended water quantity <input type="checkbox"/> (code 245, par. G) [m³]		
AVRO treatment current intensity <input type="checkbox"/> (code 245, par. I) [mA]		
Error memory <input type="checkbox"/> (code 245, par. 1..9) [Er]		

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2) 1°cH = 0.36 mmol/l

Maintenance work on reverse osmosis system GENO-OSMO-AVRO 125 RU
Checklist

Please enter measured values. Confirm checks with OK or enter repair work performed.

<input type="checkbox"/> Maintenance performed without replacement of the module	<input type="checkbox"/> Maintenance performed with replacement of the module Module no.	<input type="checkbox"/> Maintenance performed with replacement of AVRO treatment module Treatment module no.	
---	---	--	--

Measured values

Water volumes and water qualities **before** the replacement of the module / **after** the replacement of the module or in case of maintenance

Pump pressure [bar]	Conductivity [µS/cm]	Total hardness [°dH] ¹⁾	Total alkalinity [°cH] ²⁾	Temperature [°C]	Volume flow [l/h]	Recovery [%]
before/after	before/after	before/after	before/after	before/after	before/after	before/after
/						
Feed water	/	/	/	/	/ % / %
Permeate	/	/	/	/	/	
Concentrate	/	/	/	/	/	

	Acknowledgement	Remarks
Water meter reading upstream of the system [m³]		
Inlet water pressure (2.5 – 4 bar) checked		
Filter elements changed		
Settings of electronics checked		
Remaining AVRO maintenance interval (chapter F 2.1) [h]		
Operating hours (chapter F, 2.1)		
Run time of high-pressure pump <input type="checkbox"/> (code 245, par. c) [h]		
Permeate volume produced <input type="checkbox"/> (code 245, par. E) [m³]		
Concentrate volume generated <input type="checkbox"/> (code 245, par. F) [m³]		
Blended water quantity <input type="checkbox"/> (code 245, par. G) [m³]		
AVRO treatment current intensity <input type="checkbox"/> (code 245, par. I) [mA]		
Error memory <input type="checkbox"/> (code 245, par. 1..9) [Er]		

1) 1°dH = 1.78°f = 0.178 mmol/l

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	Acknowledgement	Remarks
All electrical lines checked <input type="checkbox"/> for external damage		
All hoses and connections checked <input type="checkbox"/> for external damage		
Inlet and flushing solenoid valve checked for leaks – cleaned if necessary		
Pressure switch of high-pressure pump checked for function		
Pressure switch – switching hysteresis		
Conductivity sensor checked/cleaned		
Visual check of electronics board		
System checked for tightness		
Load units reset		

Miscellaneous
<p>Remarks:</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>Commissioning specialist / CS technician:</p> <p>Company:</p> <p>.....</p> <p>.....</p> <p>Work time certificate (no.):</p> <p>Date/signature.....</p>