

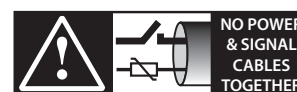
CAREL

Water Treatment System Compact ROC 25/40/80/140 Reverse osmosis system



USER MANUAL

**LEGGI E CONSERVA
QUESTE ISTRUZIONI**
→ **READ AND SAVE
THESE INSTRUCTIONS** ←



READ CAREFULLY IN THE TEXT!

WTS - Compact ROC
+03000130EN - ENG
Up to date version available on
www.carel.com

GENERAL WARNINGS



FAILURE TO CAREFULLY HEED THE WARNINGS SHOWN IN THIS MANUAL COULD LEAD TO FIRE OR EXPLOSION AND CONSEQUENT DAMAGE TO PROPERTY, INJURY OR DEATH.

- **Do not store or use petrol or other flammable vapours and liquids in the vicinity of this or other appliances.**

IF YOU SMELL GAS:

1. **Do not attempt to switch on any appliance;**
2. **Do not touch any electrical switches; do not use telephones in the building;**
3. **Call the gas supplier immediately from a neighbour's phone. Follow the instructions given by the gas supplier;**
4. **If you cannot contact the gas supplier, call the fire brigade;**
 - **Installation and maintenance must be performed by a qualified installer, service centre or gas supplier.**

CAREL Industries reverse osmosis (RO) systems are advanced products, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from the website www.carel.com. Each CAREL product, in relation to its advanced level of technology, requires setup/configuration/programming to be able to operate in the best possible way for the specific application. Failure to complete such operations, which are required/indicated in the user manual, may cause the final product to malfunction; CAREL accepts no liability in such cases. The customer (manufacturer, developer or installer of the final equipment) accepts all liability and risk relating to the configuration of the product in order to reach the expected results in relation to the specific final installation and/or equipment. CAREL may, based on specific agreements, act as a consultant for the installation/commissioning/use of the unit, however in no case does it accept liability for the correct operation of the RO system and the final installation if the warnings or suggestions provided in this manual or in other product technical documents are not heeded. In particular, as well as observing the above warnings and suggestions, the following warnings must be observed for correct use of the product:

ELECTRIC SHOCK HAZARD: the RO system contains live electrical components. Disconnect the mains power supply before accessing inside parts or during maintenance and installation.

WATER LEAK HAZARD: the RO system automatically and constantly fills/drains certain quantities of water. Malfunctions in the connections or in the humidifier may cause leaks.

Environmental conditions, fuel and power supply voltage must all comply with the specified values. All other uses and modifications made to the appliance that are not authorised by the manufacturer are considered incorrect. Liability for injury or damage caused by the incorrect use of the appliance lies exclusively with the user.

Please note that the appliance contains live electrical devices. All service and/or maintenance operations must be performed by specialist and qualified personnel who are aware of the necessary precautions and are capable of performing the operations correctly and in accordance with the safety standards and legislation in force, with specific reference to:

1. Italian law no. 46/90: "Safety standards relating to systems in buildings";
2. Italian Presidential Decree no. 447 of 6 December 1991: "Regulations for the enforcement of law no. 46, dated March 5, 1990, on safety relating to systems in buildings";
3. Italian law no. 10/91: "Regulations for the enforcement of the national plan for energy savings and the development of renewable sources of energy"

CAUTION

The installation of the product must include an earth connection, using the Schuko plug available in the RO system.

Caution:

- Disconnect the appliance from the mains power supply before accessing any internal parts.
- Environmental and power supply conditions must conform to the values specified on the product rating labels.
- The product is designed exclusively to demineralize drinkable water.
- Only qualified personnel who are aware of the necessary precautions and able to perform the required operations correctly may install, operate or carry out technical service on the product.
- Only water with the characteristics indicated in this manual must be used.
- All operations on the product must be carried out according to the instructions provided in this manual and on the labels applied to the product. Any uses or modifications that are not authorised by the manufacturer are considered improper. CAREL declines all liability for any such unauthorised use.
- Do not attempt to open the appliance in any way other than described in the manual.
- Observe the standards in force in the place where the RO system is installed.
- The appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Do not install and use the product near objects that may be damaged when in contact with water (or condensate). CAREL declines all liability for direct or indirect damage following water leaks from the humidifier.
- Do not use corrosive chemicals, solvents or aggressive detergents to clean the inside and outside parts of the RO system, unless specifically indicated in the user manual.
- Do not drop, hit or shake the RO system, as the inside parts and the linings may be irreparably damaged,

CAREL adopts a policy of continual development. Consequently, CAREL reserves the right to make changes and improvements to any product described in this document without prior warning. The technical specifications shown in the manual may be changed without prior warning. The liability of CAREL in relation to its products is specified in the CAREL general contract conditions, published on the website www.carel.com and/or by specific agreements with customers; specifically, to the extent where allowed by applicable legislation, in no case will CAREL, its employees or subsidiaries/affiliates be liable for any lost earnings or sales, losses of data and information, costs of replacement goods or services, damage to things or people, downtime or any direct, indirect, incidental, actual, punitive, exemplary, special or consequential damage of any kind whatsoever, whether contractual, extra-contractual or due to negligence, or any other liabilities deriving from the installation or use of the product, even if CAREL or its subsidiaries/affiliates are warned of the possibility of such damage.

DISPOSAL



Fig. 1





Fig. 2

PLEASE READ AND KEEP.

WITH REFERENCE TO EUROPEAN UNION DIRECTIVE 2012/19/EU ISSUED ON 4 JULY 2012 AND RELATED NATIONAL LEGISLATION, PLEASE NOTE THAT:

- Waste Electrical and Electronic Equipment (WEEE) cannot be disposed of as municipal waste but must be collected separately so as to allow subsequent recycling, treatment or disposal, as required by law;
- users are required to take Electrical and Electronic Equipment (EEE) at end-of-life, complete with all essential components, to the WEEE collection centres identified by local authorities. The directive also provides for the possibility to return the equipment to the distributor or retailer at end-of-life if purchasing equivalent new equipment, on a one-to-one basis, or one-to-zero for equipment less than 25 cm on their longest side;
- the equipment may contain hazardous substances: the improper use or incorrect disposal of such may have negative effects on human health and on the environment;
- the symbol (crossed-out wheeled bin, see Figure 1), if shown on the product or on the packaging, indicates that the equipment must be disposed of separately at end-of-life;
- if at end-of-life the EEE contains a battery (Figure 2), this must be removed following the instructions provided in the user manual before disposing of the equipment. Used batteries must be taken to appropriate waste collection centres as required by local regulations;
- in the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.

Warranty on materials: 2 years (from production date, excluding consumables).

Approval: the quality and safety of CAREL products are guaranteed by the ISO 9001 certified design and production system, as well as the ,  marks.

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1. INTRODUCTION

Dear Customer,
 Thank you for choosing a CAREL reverse osmosis unit. CAREL reverse osmoses units are state of the art. In order to operate your CAREL reverse osmosis unit safely, properly and efficiently, please read these operating instructions.
 Only use the CAREL R.O. unit in faultless condition and for its intended use, being aware of safety and hazards, and observing all instructions in this manual.

If you have additional questions, please contact your expert dealer.

For all technical questions or spare parts orders, please be prepared to provide unit type and serial number (see name plate on the unit).

1.1 Typographic Distinctions

•	preceded by a bullet: general specifications
»	preceded by an arrow: Procedures for servicing or maintenance which should or must be performed in the indicated order
☑	installation step which must be checked off.
<i>italics</i>	Terms used with graphics or drawings

1.2 Documentation

Retention
 Please retain these operating instructions in a secure, always accessible location. If the product is resold, turn the documentation over to the new operator. If the documentation is lost, please contact CAREL.

Versions in Other Languages
 These operating instructions are available in several languages. If interested, please contact CAREL or your CAREL dealer.

1.3 Symbols in Use

Specific Symbols related to Safety Instructions
 According to ANSI Z535.6 the following signal words are used within this document:

- DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- NOTICE is used to address practices not related to physical injury.

1.3.1 General Symbols

☑ Notice: This symbol is used whenever a situation requires special attention beyond the scope of safety instructions.

1.4 Intended Use

CAREL reverse osmosis unit is used to produce fully demineralized water. It may only be used in accordance with its intended purpose.

- ☑ Notice:**
- Intended use also includes compliance with the assembly, disassembly and reassembly, commissioning, operating and maintenance conditions and disposal measures prescribed by us.
 - Only qualified and authorized personnel may work on and with the system. Persons who carry out transport or work on and with the system must have read the relevant parts of the operating instructions and in particular the chapter "Safety instructions". In addition, the personnel must be informed by the operator of any hazards that may exist. Leave a copy of the operating manual at the place of use of the unit.
 - The installation of additional equipment is only permitted with the written approval of the manufacturer.

- Use of the system**
- The system is intended for operation (with use of feed water in the drinking water sector) of humidification systems.
 - The limit and guide values as per the regulations enforced in the installation country must be taken into account.
 - Frost protection and protection against excessive moisture must be ensured
 - The permitted surrounding temperature is between 5° C and 40° C
 - The use of a system separator according to DIN 1988, part 4 and DIN EN 1717 is obligatory.

Notice:

- Avoid water temperatures above 20°C to prevent possible germ growth.
- Due to their construction, CAREL reverse osmosis systems are not intended for outdoor installation.

1.5 Unit sizes

The following reverse osmosis units belong to the ROC (Reverse-Osmosis-Compact) series:

- ROC025: max. permeate production rate of 25 l/h
- ROC040: max. permeate production rate of 40 l/h
- ROC080: max. permeate production rate of 80 l/h
- ROC0140: max. permeate production rate of 140 l/h

The following reverse osmosis plants belong to the ROL (Reverse-Osmosis-Large) series

- ROL160: max. permeate production rate of 160 l/h
- ROL320: max. permeate production rate of 320 l/h
- ROL460: max. permeate production rate of 460 l/h
- ROL600: max. permeate production rate of 600 l/h
- ROL1000: max. permeate production rate of 1000 l/h
- ROL1200: max. permeate production rate of 1200 l/h

2. SAFETY INSTRUCTIONS

These safety instructions are required by law. They promote workplace safety and accident prevention.

2.1 Guidelines for Safe Operation

2.1.1 Scope

Comply with the accident prevention regulation „DGUV Regulation 3“ to prevent injury to yourself and others. Beyond that, national regulations apply without restrictions. This way you can protect yourself and others from harm.

2.1.2 Unit control

Do not perform any work which compromises the safety of the unit. Obey all safety instructions and warnings present on the unit.

In case of a malfunction or electrical power disruption, switch off the unit immediately and prevent a restart. Repair malfunctions promptly.

⚠ Caution: Restricted use.

IEC 60335-1 stipulates as follows:

This device may be used by children of eight years of age and above as well as by persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge so long as they are supervised or have been instructed regarding the safe use of the device and understand the hazards that may result from it. Cleaning and maintenance of the unit must not be undertaken by children without supervision.

🔊 **Notice:** The installation room must be adequately ventilated and be equipped with a floor drain. A water stop mechanism (e.g. leakage detector) can be used as an alternative.

2.1.3 Unit operation

⚠ Caution: Danger of scalding!

Hot surfaces can cause injuries. Protect yourself with suitable protective equipment.

🔊 **Notice: Water leaks possible due to defective connections or malfunctions.**

- Before starting work, the water supply to the reverse osmosis system (RO system) must be shut off.
- The system may be under pressure. Release pressure before starting work.
- The reverse osmosis (RO) systems continuously produce permeate (product water) and concentrate (waste water). Connections and water-carrying components must be checked regularly for correct functionality.

🔊 **Notice: Risk of material damage!**

- The unit may be damaged if switched on repeatedly following a malfunction without prior repair. Rectify defects immediately!
- Regularly check that all safety and monitoring devices are functioning normally. Do not remove or disable safety devices.

🔊 **Notice:** It is essential to leave the RO system connected to the power supply permanently. Only then the automatic rinsing can be carried out (protection against germs).

Switch device ON/OFF

The system can be switched on/off in different ways:

- » Interrupt the power supply (pull the plug) or
- » operate the main fuse switch (only ROL units) or
- » press the ESC key (for about 2 seconds).

2.1.4 Mounting, dismantling, maintenance and repair of the unit

🔊 **Notice:** the CAREL reverse osmosis units are IP20 protected. Make sure that the unit is not object to dripping water in the mounting location.

🔊 **Notice:** Do not install CAREL reverse osmosis systems above electrical equipment such as fuse boxes, electrical appliances, etc. In the event of a leakage, leaking water can damage the underlying electrical systems.

🔊 **Notice:**

- Use genuine spare parts only
- After any repair work, have qualified personnel check the safe operation of the unit
- Attaching or installing of additional components is permitted only with the written consent of the manufacturer

2.1.5 Electrical

⚠ Caution: Risk of electrical shock!

Hazardous electrical voltage!

Any work on the electrical system to be performed by certified expert staff (electricians or expert personnel with comparable training) only.

During maintenance or installation work, the device must be disconnected from the power supply and secured against being switched on again. The absence of voltage must be ensured by a measurement.

After electrical installation or repair work, test all safety mechanisms (such as grounding resistance).

📌 Notice

Use only original fuses with the appropriate amperage rating.

Regularly check the unit's electrical equipment. Promptly repair any damage such as loose connections or burned wiring.

Responsibility for intrinsically safe installation of the CAREL reverse osmosis unit is incumbent on the installing specialist company.

3. TRANSPORT

3.1 Overview

🔔 **Notice:** Proceed carefully when transporting the reverse osmosis unit in order to prevent damage due to stress or careless loading and unloading. Protect the device from moisture during transport; the storage and shipping temperature is 5° to 40°C.

3.2 Interim Storage

Store the unit in a dry place and protect from frost and strong sunlight.

3.3 Check for complete and correct delivery of goods

Upon receipt of the unit, confirm that:

- model and serial number on the name plate match those specified in the order and delivery documents
- the equipment is complete and all parts are in perfect condition

🔔 **Notice:** In case of damage from shipment and/or missing parts, immediately notify the carrier or supplier in writing.

3.4 Scope of delivery

ROC

- reverse osmosis unit incl. control
- 2 membranes (ROC025 and ROC140: only 1 membrane)
- 1 prefilter (ROC140: 2 prefilters)
- manual
- connection material

4. FUNCTION AND STRUCTURE

4.1 Mode of operation

General principle of reverse osmosis

Osmosis is a natural process, it is understood as the one-sided diffusion of a liquid (here the feed water) through a semi-permeable membrane. A semi-permeable membrane is only permeable for certain substances.

As the liquid moves through a semi-permeable membrane, the pressure on the side with the lower concentration decreases and at the same time the pressure of the more concentrated solution increases until a balance is reached, stopping the water flow. Pressure difference between the two liquids is called "osmotic pressure".

Reverse osmosis, on the other hand, is a technical process in which the natural process is reversed. It involves applying a pressure higher than the osmotic pressure to the concentrated liquid so that the water flows in the opposite direction through the semi-permeable membrane and thus separates the salts solved in the water.

Using this principle, water can be demineralized for drinking water as well as for process and industrial applications.

4.2 Influencing factors

The performance of the reverse osmosis membrane depends strongly on the following parameters:

Water inlet pressure at the membrane:

- By lowering the working pressure, a reduction in permeate production can be achieved.
- By increasing the working pressure, an increase in permeate production is also achieved.
- The pump pressure can be changed by turning the screw on the pump (see chapter 8.4).
- Be careful not to exceed the maximum pump pressure!

Salt content of the feed water:

The higher the salt content, the faster the membrane wear.

Temperature of the feed water:

The ROC unit is set up for a feed water temperature of 15°C. Any difference from this temperature will affect the production quantity and the quality of the permeate.

The following table shows the variation of the permeate production quantity by 3% per differing 1°C.

Temperature	15 °C	+1	+2	+3	+4	+5	+6	+7	+8
Correction factor	1	1,03	1,06	1,09	1,12	1,15	1,18	1,21	1,25
Temperature	15 °C	-1	-2	-3	-4	-5	-6	-7	-8
Correction factor	1	0,96	0,92	0,88	0,84	0,8	0,77	0,74	0,7

The colder the feed water, the lower the permeate production and the better/lower the conductivity.
The warmer the feed water, the higher the production quantity, but the lower the permeate quality.

4.3 Operating conditions of the unit

The ROC system can be fed with water from the normal water supply if the water has a maximum hardness up to 30°fH.

In order to avoid a reduction of the operating capacity, the water to be treated must comply with certain parameters:

Iron	< 0,15 ppm
Manganese	< 0,05 ppm
Aluminium	< 0,05 ppm
SDI (Silt Density Index)	< 3
Water temperature	5 to 25 °C
Free chlorine	< 0.25 ppm
Hardness	< 30 °fH
Oil and fat	< 0.1 mg/l
COD	< 10 mg/l
TOC	< 3 mg/l
TDS	< 1000µS/cm
SiO ₂	< 15 ppm
turbidity	< 1 NTU

In some cases the reverse osmosis unit cannot be fed with water from the normal water supply because some elements contained in the water (free chlorine, iron, suspended solids, hardness minerals) would disturb the osmotic process and damage the membranes, sometimes irreversibly.

In these cases a pre-treatment is necessary, e.g: De-ironing, de-chlorination, softening with resins or chemical softening (dosing pump with anti-fogging agent), depending on the characteristics of the water to be treated.

4.4 Operating sequence

The feed water (raw water) is pumped through the pre-filter, which guarantees the de-chlorination and a final filter capacity of 5 µm. This ensures the necessary clarity of the water at the membrane inlet. The feed water pressure must be at least 2 to 5 bar during normal operation to ensure a correct supply pressure at the pump inlet.

The water then flows through the water inlet solenoid valve SV1 and is then directed by the pressure pump at high pressure to the membrane(s).

The pressure switch PSHIGH provides a signal when the pressure exceeds 10 bar at the membrane inlet (ROC140 only). Pure water (permeate) passes through the membrane; the salts solved in the water are retained by the membrane and drained off (concentrate).

The permeate now flows via the pure water line (scope of delivery) to the expansion vessel or the permeate collecting tank.

The quality of the permeate leaving the system is controlled by the conductivity sensor (ECPROBout).

The production process stops automatically when the water outlet pressure has reached

4 bar at the pressure switch PSMAX. The pressure in the following circuit is kept constant by the expansion vessel. If the pressure in the following circuit at the pressure switch PSMIN falls below 2 bar (when the expansion vessel is empty), the unit starts permeate production again.

If the inlet pressure falls below 0.8 bar, the pressure switch PSLOW gives the corresponding alarm and interrupts operation.

🔔 Notice: The reverse osmosis (R.O.) units of the ROC series should not operate without an expansion vessel or permeate collecting tank.

4.5 Mechanical construction

ROC025 to 080

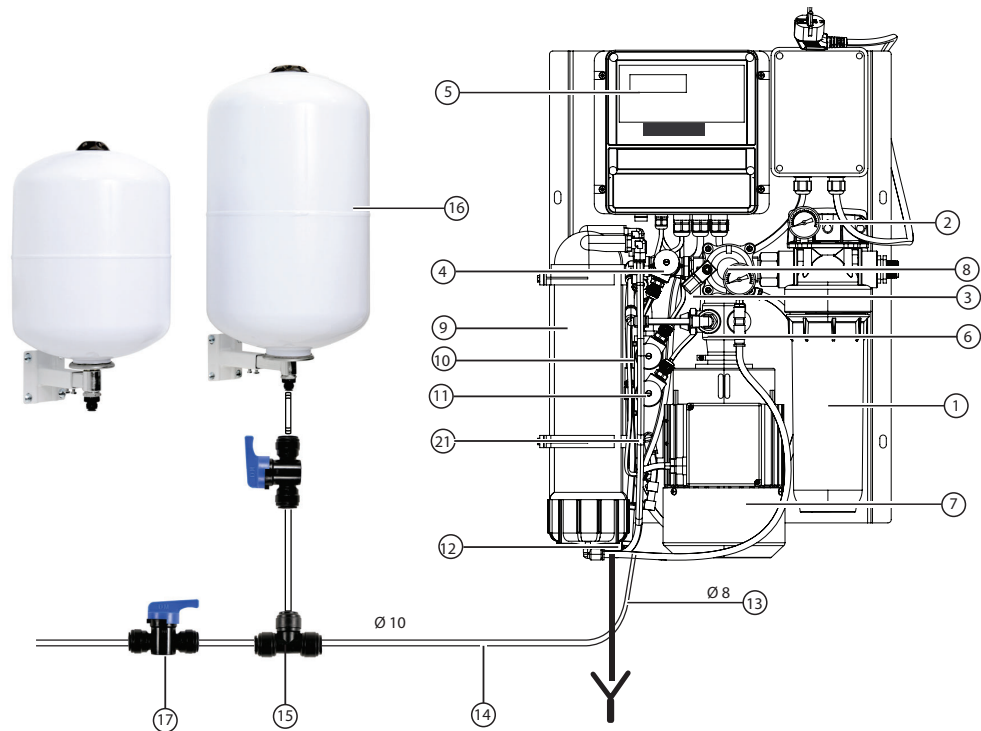


Fig. 4.a

- | | | | |
|----|------------------------------------|----|-------------------------------------|
| 1 | CB-EC activated carbon filter* | 12 | Flow limiter concentrate |
| 2 | Pressure gauge (feed water) / PI | 13 | Concentrate pipe |
| 3 | Water inlet solenoid valve | 14 | Permeate pipe |
| 4 | Pressure switch PS LOW | 15 | T-piece connection expansion vessel |
| 5 | control | 16 | Expansion vessel |
| 6 | Rotary vane pump | 17 | Manual control valve / RV |
| 7 | Motor | 18 | Flush valve (solenoid valve) |
| 8 | Pressure gauge membrane inlet / PI | 19 | Pressure switch / PS HIGH |
| 9 | Membrane vessel | 20 | Sediment filter |
| 10 | Pressure switch / PS MIN | 21 | Conductivity sensor |
| 11 | Pressure switch / PS MAX | | |

ROC140

The devices of the CAREL ROC series are designed for wall mounting.

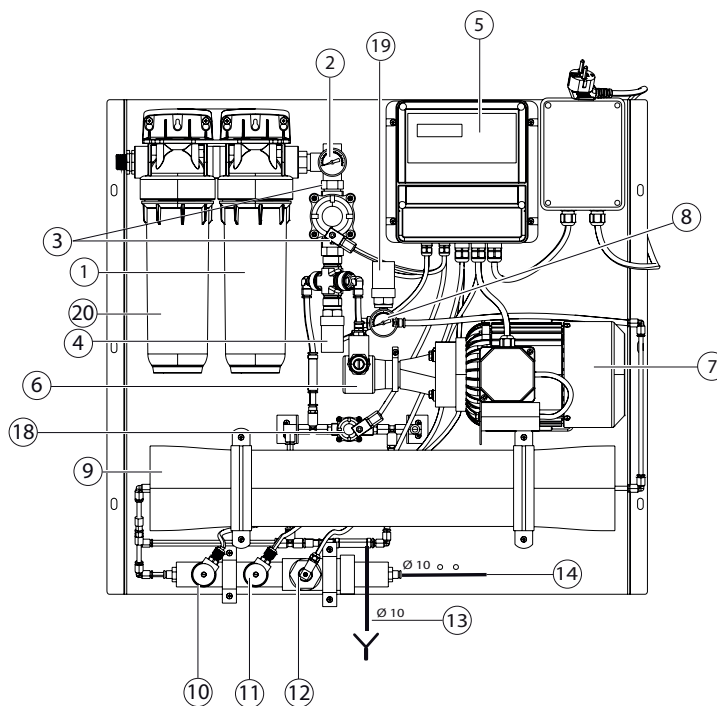
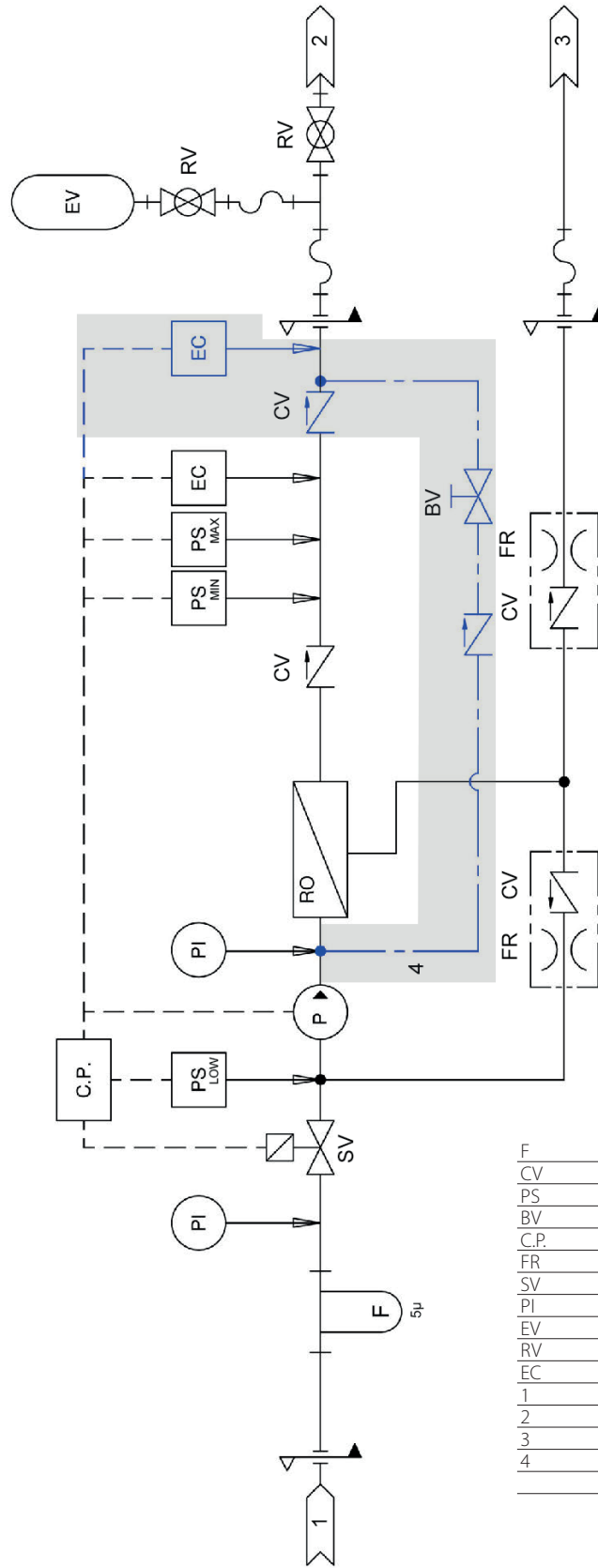


Fig. 4.b

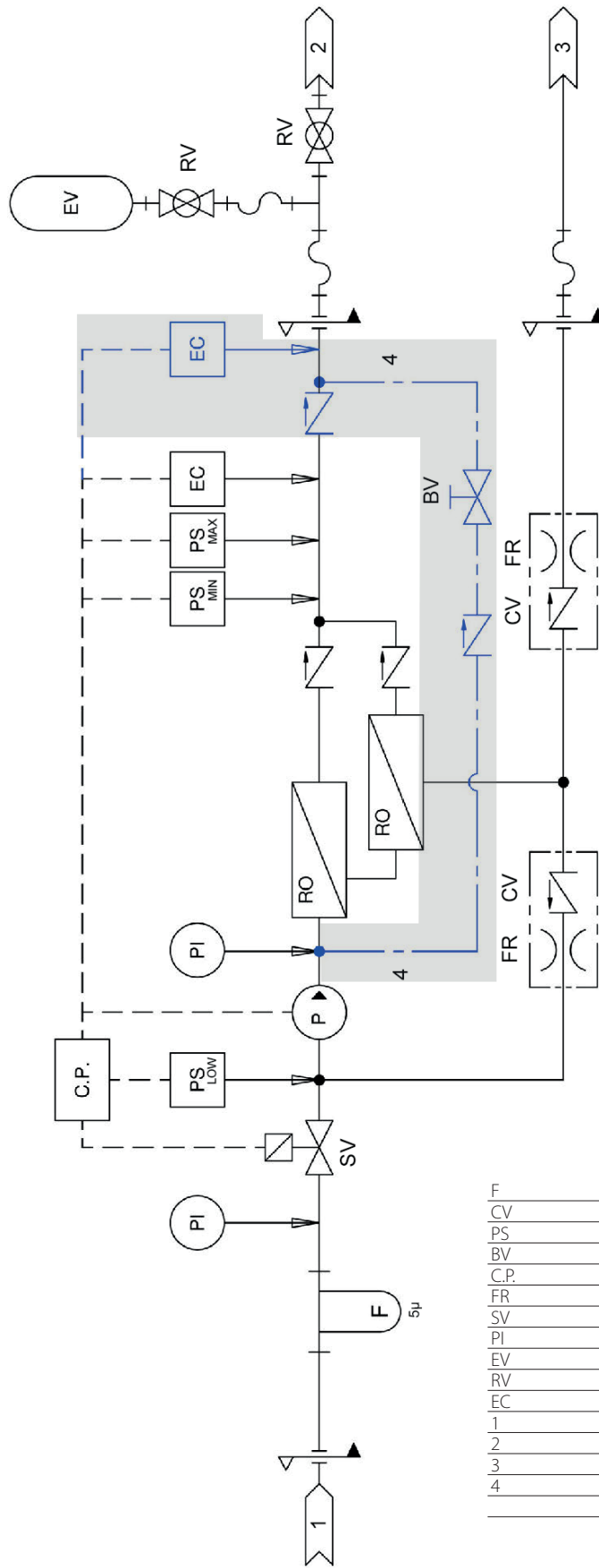
4.6 Flowchart

ROC 25



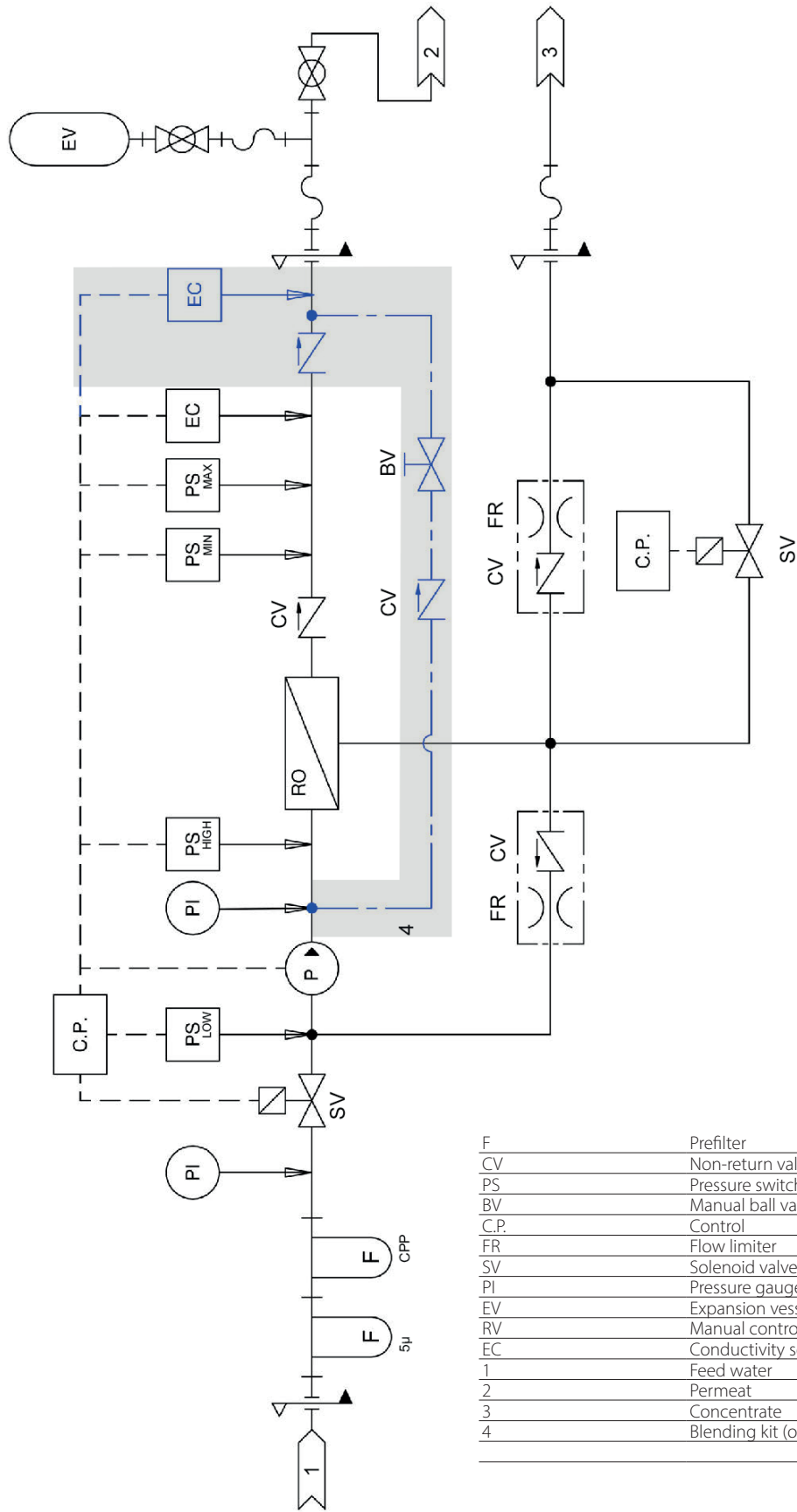
F	Prefilter
CV	Non-return valve
PS	Pressure switch
BV	Manual ball valve
C.P.	Control
FR	Flow limiter
SV	Solenoid valve
PI	Pressure gauge
EV	Expansion vessel
RV	Manual control valve
EC	Conductivity sensor
1	Feed water
2	Permeate
3	Concentrate
4	Blending kit (optional)

ROC 40-80



F	Prefilter
CV	Non-return valve
PS	Pressure switch
BV	Manual ball valve
C.P.	Control
FR	Flow limiter
SV	Solenoid valve
PI	Pressure gauge
EV	Expansion vessel
RV	Manual control valve
EC	Conductivity sensor
1	Feed water
2	Permeate
3	Concentrate
4	Blending kit (optional)

ROC 140



F	Prefilter
CV	Non-return valve
PS	Pressure switch
BV	Manual ball valve
C.P.	Control
FR	Flow limiter
SV	Solenoid valve
PI	Pressure gauge
EV	Expansion vessel
RV	Manual control valve
EC	Conductivity sensor
1	Feed water
2	Permeate
3	Concentrate
4	Blending kit (optional)

5. MECHANICAL INSTALLATION

⚠ Caution: Risk of foot injuries!

Prevent unit from dropping during installation! Helping hand of a second person is advisable.

⚠ Caution: Risk of electrical shock!

Hazardous electrical voltage. During installation, the unit must be disconnected from power supply and secured against being switched on again. The absence of voltage must be ensured by a measurement.

5.1 Environment Parameters to be met and Mounting Recommendations

When selecting the installation site for the reverse osmosis unit, take the following into account:

- The minimum clearances indicated in the fitting measures section must be observed in order to ensure adequate unit ventilation and allow for unobstructed access in case of maintenance
- Protection class IP20
- By design, CAREL reverse osmosis units are not qualified for outdoor installation (electronical components and water-bearing parts may be damaged)
- Ambient temperature must lie between
- +5 and +40 °C (+41 and +104 °F) in order to protect the unit electronics against damage; frost may damage the solenoid valve and pump, as well as make hoses burst.
- Avoid environments with excessive humidity, as it could have negative effects on the electronics.
- Installation in closed rooms requires aeration and, if necessary temperature conditioning in order to meet the environmental conditions.
- Make use of existing water connections for supply and draining.
- Mount the unit on a stable, preferably solid wall with the required load-bearing capacity required (s. unit technical specifications). If such a wall is not at hand, the unit may be attached to a stand bracket firmly anchored to the floor.
- For correct operation it is necessary that the unit is mounted vertically and horizontally perpendicular.
- The optimal feed water pressure of the reverse osmosis (RO) units is in the range of 2 bar to 5 bar. If these values are not reached, the installation of a pressure reducer or a booster pump is necessary.
- The on-site waste water connection must be a free outflow according to DIN EN 1717.
- The installation room must be well ventilated and equipped with a floor drain. Alternatively, a water stop device (e.g. leakage detector) can be used.

5.2 Installation steps

5.2.1 Feed water connection

- » Connect the feed water inlet to the system. The diameter of the raw water pipe must be at least equal to the diameter of the connection piece.

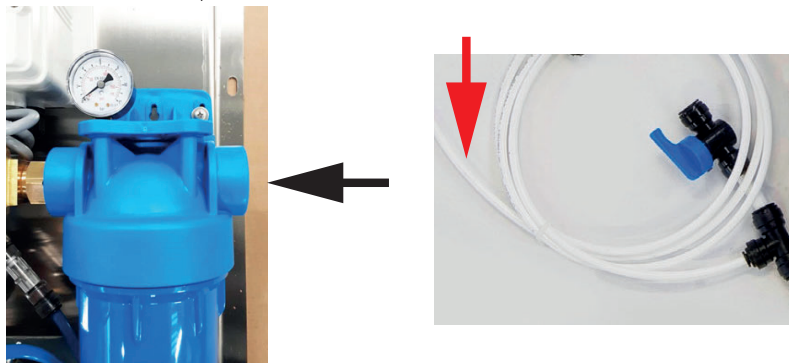


Fig. 5.a

- » Observe the information in the technical data.
- » Connect a shut-off valve upstream of the system.

5.2.2 Permeate line connection

- » A short piece of hose is installed at the outlet port of the permeate in the factory. Remove this and replace it with the white hose Ø10 mm (included in the scope of delivery).



Fig. 5.b

- ⓘ **Notice:** Never use the RO unit with the permeate line closed!

5.2.3 Connection of the expansion vessel

- » Mount the holder* of the expansion tank on a stable wall.
- » Seal the thread of the holder* (e.g. with Teflon tape).
- » Mount the expansion tank on the holder*.
- » Install the adapter* under the holder.
- » Connect the following fitting to the Ø10 ball valve with a piece of white hose (diameter 10 mm).



Fig. 5.c

- » With the rest of the hose, connect the ball valve to the T-piece.



Fig. 5.d

- ⓘ **Notice:** The expansion tank should be installed 3.5 m close to the R.O. unit.
- ⓘ **Notice:** Do not connect the permeate line to the expansion vessel until all other commissioning steps (especially flushing the membranes) have been completed.

* Included in the delivery of the optionally available expansion vessel.

5.2.4 Connection of the concentrate line

- » Connect the free connection of the flow limiter (with integrated backflow preventer) with the black hose (Ø see technical data) with slope to a free flow.

ⓘ **Notice:** Ensure a free outlet and discharge according to DIN EN 1717. Pay attention to the minimum requirement for the free flow distance (between the drain hose and the siphon) of 26 mm to prevent microbial contamination.

ⓘ **Notice:** The colour of the supplied hoses indicates their use:
 White: for permeate
 Black: for concentrate
 (PE hose connection: "John Guest" plug connection)

5.2.5 Inserting the prefilter cartridge(s)

Before installing the filter set in the prefilter container, it must be ensured that the feed water line is closed and thus no pressure is applied.

- » Remove the filter container(s) using the screw driver supplied.
- » Then install the new filter insert as shown.
- » Refit the filter container(s) and screw tight.

🔔 **Notice:** If there are two prefilters (ROC-140), insert the green activated carbon filter first.

Prefilter and membrane position



Fig. 5.e

5.2.6 Inserting the membrane(s)

Before installing the membranes in the membrane container, it must be ensured that:

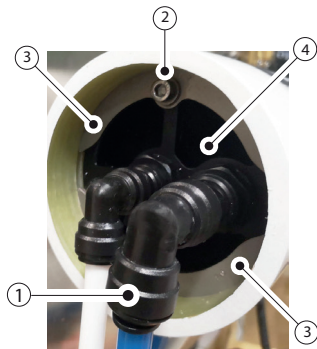
- the feed water line is closed and thus no pressure is applied.
- the unit is out of power.

ROC025/040/080:

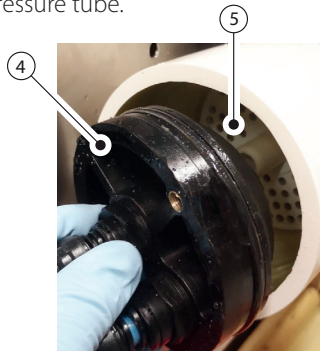
- » Unscrew the cap of the membrane container and install the membrane.
- » Pay attention to the installation direction (black lip seal downwards).
- » Make sure that the membrane is correctly inserted.
- » Tighten the closure of the membrane container.

ROC140:

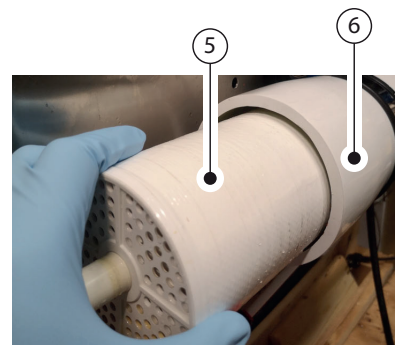
- » Unscrew the two quick fasteners (1) on the left-hand side of the membrane pressure pipe and catch the leftover water.
- » Remove the two Allen screws (2) and the half-moon shaped fastening rings (3) from the slot of the membrane pressure tube.



- » Pull the end cap (4) out of the membrane pressure tube.
- » Pull out the membrane (5) from the left side of the membrane pressure tube.



- » Ensure the correct installation direction and insert the membrane from the right side into the membrane



- pressure tube (6).
- » Put the end cap back into the membrane pressure tube and fasten it with the half-moon shaped fastening rings (3) and the Allen screws (2).
- » Finally, connect both quick fasteners (1).

🔔 **Notice:** Use disposable gloves when installing the pre-filter(s) and membrane(s) to protect them from contamination.

- » Continue with the commissioning (chapter 8.1) and flushing of the membrane.

6. WATER CONNECTION

Have all plumbing work done only by qualified personnel (plumber or specialist with equivalent training) to minimize risks.

⚠ Caution: Risk of electrical shock!

Hazardous electrical voltage! Before starting installation work ensure that the unit is not yet connected to the power supply.

General Rules

- Obey local water utility regulations
- Verify that necessary safety measures have been taken – in compliance with either German Technical and Scientific Association for Gas and Water (DVGW) guidelines (DIN EN1717) or local regulations – that eliminate backflow of polluted water into drinking water treatment facilities. This may require the installation of a system separator, allowable only when free discharge into the drainage system is given.
- Ensure that there is a free outflow and drain according to DIN EN 1717. Pay attention to the minimum requirement for the free flow distance (between the drain hose and the siphon) of 26 mm to prevent microbial contamination.
- Supply water must not exceed 25°C (77°F)
- Allowable range of water pressure: 1,5 to 4 bar / 22 to 58 psi (150.000 to 400.000 Pa). If the pressure is below 1.5 bar, install a pressure booster, if it is above 4 bar, install a pressure reducer after the reverse osmosis system.
- Install a drain tap shortly before the system to flush the pipe. Flushing the pipe prevents foreign particles such as swarf or sealing material from entering the system from the pipes.

Connection of the system supply

- » Make sure that the flow rate and pressure correspond to the values given in the technical data.
- » Ensure that the water supply stays closed. This system may only be supplied with water during commissioning (see chapter 8) !

Connection of the concentrate discharge pipe.

- The diameter of the concentrate pipe must be at least equal to the diameter of the connection piece (see technical data).

🔍 **Notice:** In any case, a particle filter (min. 100 µm) according to DIN 13443-1 should be installed before the reverse osmosis system. Without a water filter there is a risk of damage to the system.

🔍 **Notice:**

The following applies to ROL units:

- For safety reasons the water connections are not screwed during transport. They must be screwed during installation.
- Remove the transport locks from the flow pipes.

🔍 **Notice:** for the Australian market and to comply with Watermark requirements, a watermarked approved dual check valve shall be installed in the supply line to the humidifier when connected to potable water. Should on the other hand the humidifier be fed with treated water from a Carel reverse osmosis system connected to potable water, the dual check valve shall be installed in the supply line to the reverse osmosis system.

Water connections final check

Go down the following water installation checklist:

- ALL screw connections and hoses firmly connected?
- Water supply line flushed before making connections?
- Water connection properly installed?
- Water discharge properly installed?
- Does blow-down water drain freely?
- Water supply line and water discharge leakage-free?

7. ELECTRICAL CONNECTION

⚠ Caution: Risk of electrical shock!

Hazardous electrical voltage.
 All work related to electrical installation to be performed by expert staff (electricians or expert personnel with equivalent training) only. Do not connect the reverse osmosis unit to the live power supply before all installation work has been completed.

The customer is responsible for checking expert staff qualification.

General installation rules

- All local rules concerning the implementation of electrical installations must be obeyed.
- Electric connector cables to be laid professional.

🔔 Notice: Possible electronic components destruction through electrostatical discharge!

Prior to commencing electrical installation work, steps must be taken to guard the sensitive electronic components of the unit control against damage from electrostatical discharge.

7.1 Procedure for electrical installation

Insert the plug into a suitable socket. The performance values are given in the technical data.

- No further wiring is required. Exceptions:
- Connection of the internal alarm output to an external alarm detector
 - Connection of a dosing pump (ROC140)

Fuses

CAREL recommends the use of main fuses with slow-to medium-load characteristic.
 The reverse osmosis system should be operated by its own residual current circuit breaker.

7.2 Electrical installation check list

Check electrical installation with respect to customer-site requirements and local power supply regulations.

- Supply voltage in accordance with name plate voltage rating?
- Have all electrical cable and plug connections been properly tightened?

7.3 Inputs and outputs of the main board

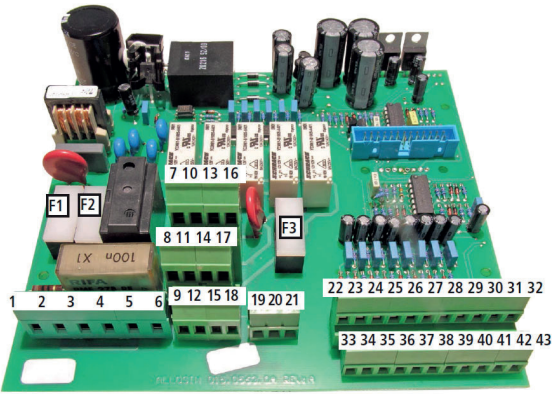


Fig. 7.a

Clamp	Description	ROC025/-040	ROC060	ROC140
1[L] - 2[earth] - 3[N]	230-V 50/60 Hz-Input for system power supply	✓	✓	✓
4[L] - 5[earth] - 6[N]	230-V-Output for pump supply	✓	✓	✓
7[L] - 8[earth] - 9[N]	230-V-Output for dosing pump	/	/	✓
10[L] - 11[earth] - 12[N]	230-V-Output for inlet valve	✓	✓	✓
16[L] - 17[earth] - 18[N]	230-V-Output for flush valve	/	/	✓
19[NO] - 20[C] - 21[NC]	alarm output optional	✓	✓	✓
22[C] - 23[IN]	input pressure switch Feed water connection / Max pressure	✓	✓	✓
24[C] - 25[IN]	input high pressure switch pump pressure	/	/	✓
28[C] - 29[IN]	input alarm dosing pump	/	/	✓
30[shielded] - 31 - 32	conductivity sensor feed water	/	/	✓
33[C] - 34[IN]	input pressure switch Feed water connection / Min pressure	✓	✓	✓
35[C] - 36[IN]	input low pressure switch	✓	✓	✓
37[C] - 38[IN]	input Remote-On/Off optional	✓	✓	✓
39[C] - 40[IN]	input softening filter	✓	✓	✓
41[shielded] - 42 - 43	conductivity sensor row water	/	/	/

8. INITIAL START-UP AND FLUSHING OF THE MEMBRANE(S)

When the system is started for the first time and each time it is put into operation after a period of non-use, you must remove the chemical maintenance solutions and/or standing water. If the system is not used for a longer period of time, the membrane(s) must be replaced.

Risk of electrical shock!

Hazardous electrical voltage!

Follow safety instructions for work on live components

Notice: Do not use the water produced during this phase.

- » Lead the hose for the permeate into the drain
- » Make sure that the water supply is interrupted
- » Close the valve to the expansion vessel
- » Insert the membrane(s) and the 5µm prefilter into the pressure pipes
- » Screw the covers of the pressure pipes tight
- » Connect the unit to the power supply. The system goes into error mode due to lack of water
- » Press **←** for two seconds, the display shows: "PASSWORD 0000".
- » Enter the service-password (see additional information attached to the unit/ membrane)
- » Confirm with **←**
- » Select menu item 14 (system test)
- » Open the water supply (solenoid valve) to the unit
- » Press **↑** (Open the water inlet valve / activate the solenoid valve to flush the membrane(s)).
Let the system run for 10 minutes
- » Press **→** (switch on the pump)
- » Check the system for leaks
- » Let the system run for another 10 minutes
- » Press **→** (switch off the pump)
- » Press **↑** (this close the water inlet valve/ solenoid valve)
- » Open the valve of the expansion vessel
- » Press "ESC" **twice** (leaving the service level). The system starts to produce permeate
- » Check whether the unit switches off after reaching the operating pressure (approx. 4 bar).
- » Connect the permeate line to the expansion vessel

Notice:

- At the start of each commissioning with the use of new membrane(s), the ROC unit produces a higher permeate quantity in the first 2-4 hours, which is also accompanied by higher conductivity.
- Observe the note on the influencing factors (see chapter 4.1 mode of operation).
- The measured permeate conductivity value shown on the display of the controller will settle down to the actual value within the first minutes.

8.1 System start-up after initial commissioning

⚠ Caution: Danger due to incorrect operation!

Commissioning may only be carried out by qualified personnel (electricians or specialists with equivalent training).

Step 1: Check mechanical integrity, water connection and cabling

- » Check functionality of water and electrical installation.
- » Check functionality of the pre-treatment system (if available).

Step 2: Check the feed water

- » Check whether the feed water parameters are within the limits specified in chapter 4.3.

Step 3: Switch on the unit

- » Switch on the main fuse
- » Open the water supply shut-off tap
- » Insert the power plug

Step 4: Observe device and check for leaks

- » Let it run for 15 to 30 minutes
- » If leaks occur, switch off the unit immediately.

Step 5: Remove leaks

- » Locate and eliminate leaks
- » Repeat leakage test

Step 6: Connecting the permeate line to the expansion tank

- » see chapter 5 **mechanical installation**

Notice: The pump may only be operated with the water inlet valve open, otherwise it could be damaged.
Exception: first commissioning.

8.2 Adjusting the metering pump

The ROC140 allows the use of the optionally available antiscalant dosing pump.
When using the recommended antiscalant Pragmaclean 309, proceed as follows:
» Position the flow control knob at 30%



Fig. 8.a

When the activity LED is green, the metering pump supplies an amount 10 times higher than the nominal value. Only use this setting after consultation with the specialist dealer or CAREL.

In standard operation, you use the dosing pump with the divider switched on (orange LED lights up constantly).

To supply the dosing pump with the antiscalant mixture from the canister, proceed as follows:

» Switch off the divider, the colour of the LED changes to green.

The **DIVIDER** is switched on and off as follows:

- » **Short press** on the ON/OFF button (pump goes into standby mode).
- » **Long press** on the ON/OFF button, after 4 short flashes the LED changes colour. Only then release the pressure on the button

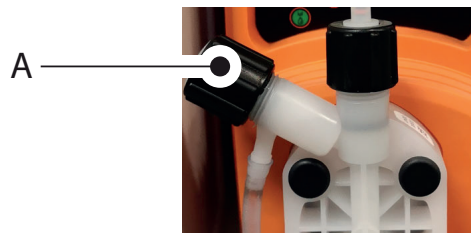


Fig. 8.b

- » Set the rotary knob to 100% (fast pulse frequency).
- » Open the vent screw (A)
- » Close the vent screw (A) when the transparent tube is completely filled with the antiscalant mixture.

When the antiscalant mixture reaches the pump, the "knocking noises" of the dosing pump become quieter.

- » Set the rotary knob to 30%.

When the antiscalant mixture is transported bubble-free in the tube:

- » Switch on the divider, the orange LED lights up continuously.

Notice: During operation, you can directly change the frequency of the dosing pump via the control knob.

ED flashing states

status LED (flashes per sec.)	status pump operation
3x RED	Pump powered but voltage too low
2x RED	Pump powered but voltage too high
2x ORANGE	Pump OFF and powered
leuchtet ORANGE, schaltet bei jedem Klopfen aus	Pump ON
always on (RED)	Level alarm

Notice:

When using the recommended antiscalant Pragmaclean 309, dose it according to the feed water quality (see technical data).

Only use diluted antiscalant!

9. MAINTENANCE

9.1 General

Regular maintenance is essential to ensure that the CAREL units can achieve a long service life. The necessary maintenance work refers to components that are either subject to mechanical or electrical wear, or whose function is reduced by deposits.

The optimum function and required maintenance intervals of a reverse osmosis unit depend mainly on the existing water quality and the permeate quantity produced. Different water qualities can extend or shorten the maintenance intervals.

The following factors in specific could lead to an early blocking of the membranes:

- Blockage as a result of the deposit of iron or calcium sulphate and calcium carbonate
- Blockage with organic material

In general, a replacement of the membranes becomes necessary if a change in the following basic system parameters (at the same temperature and salinity) is noticed:

- Reduction of the permeate production to a value which is insufficient for the application downstream of the reverse osmosis system.
- Too much increase in the conductivity of the water produced to a value too high for the application downstream of the system.
- Increase of the membrane feed pressure.

9.2 Safety instructions for maintenance

⚠ Caution: Risk of electrical shock!

Hazardous electrical voltage!

Any work on the electrical system to be performed by certified expert staff (electricians or expert personnel with comparable training) only.

🔧 Notice: Take care of ESD protection!

The electronic components of the control are very sensitive to electrostatic discharges. In order to protect these components during maintenance, steps must be taken to guard against damage from electrostatic discharge.

🔧 Notice: Removal and replacement of components

If necessary, the parts of the UO unit may only be replaced by qualified personnel. Replacement work must always be carried out with the system at a standstill; contact the supplier or the manufacturer directly for this purpose.

🔧 Notice: Use disposable gloves when installing the pre-filter(s) and membrane(s) to protect them from contamination.



Fig. 9.a

9.3 Change prefilter

Before replacing the prefilter, check

- that the ROC system is switched off
- the inlet valve is closed and there is no pressure on the water line.

- » Remove the pre-filter with suitable tools.
- » Remove the old filter cartridge and clean the inlet.
- » Replace the O-ring if necessary.
- » Moisten the new O-ring and insert it.
- » Insert a new filter cartridge.
- » Mount the pre-filter with suitable tools.
- » Open the feed water supply.

9.4 Membrane exchange

Before replacing the membrane(s), check the following:

- The ROC unit is switched off.
- The inlet valve is closed, there is no pressure on the water line.

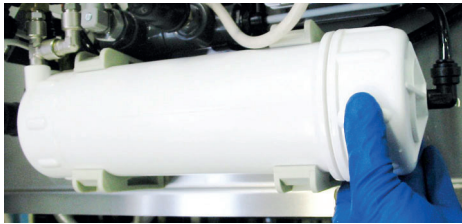


Fig. 9.b



Fig. 9.c

- » Disconnect the black hose from the membrane container.
- » Unscrew the cover and pull out the old membrane cartridge.
- » ROC140: Open the lids on both sides of the container and slide the membrane cartridge out through the left opening.
- » Remove the protective foil from the new membrane.
- » If necessary, moisten the membrane cartridge with clean glycerine.
- » Push the membrane cartridge carefully into the white membrane container without damaging the seal.
- » ROC140: Insert the membrane cartridge through the right opening of the membrane container.
- » Close the lid(s).
- » Reconnect the black hose to the membrane container.

9.5 Maintenance scheme

9.5.1 Daily check

- » Check if the system is working correctly.
- » Check that there are no leaks in the water carrying components.
- » Check the water inlet pressure.

Notice: The system supply pressure (after the pre-filters) must be at least 2 bar during normal operation. Replace the filter cartridges if the pressure loss is too high.

9.5.2 Weekly check

- » Check the max. diaphragm pressure (max.10 bar!).
- » Check the hardness of the water entering the system (max 30°fH)
- » Check the water conductivity of the permeate with the control unit.
- » Note down the data for the listed tests

Notice:

- Note that the production quantity of the permeate increases with rising water temperature, while the quality of Permeate is decreasing. Conversely, the production quantity decreases with decreasing temperature, while the quality of the permeate improves.
- The indication of the measured permeate conductivity value on the display of the control unit settles down to the actual value within the first minutes.

9.5.3 Maintenance every two months

- Check that there is not too much free chlorine at the outlet (less than 0.25ppm).

Replace the prefilter cartridge:

- » Every 2 months if the free chlorine content is between 0.15 ppm and 0.25ppm.
- » Every 4 months if the free chlorine content is less than 0.15 ppm.

Notice: The lifetime of the pre-filter and membrane(s) depends on feed water quality and permeate production rate.

9.5.4 Maintenance by qualified personnel

Every 6 months:

Check the pre-filling pressure of the expansion vessel. This value must be 1.5 to 1.8 bar. To check the pressure, the outlet line of the vessel must be temporarily interrupted.



Fig. 9.d



Fig. 9.e

A pressure gauge can also be permanently connected to the top of the expansion tank (up to 80l/ 1/8") for reading.

Generally:

- » Check the parameters of the water entering the system.
- » Check the conductivity of the feedwater and permeate with a conductivity meter.
- » Record the data for the listed tests.

Unit / spare part	Min. Every 2/4 months		Every 12 months	As needed		Number
	Sediment filter	Carbon filter	Uv lamp	Membrane (s)	O-ring	
ROC25	/	ROKC00FLT1	ROKC00UVLA / ROKC00UVOR	ROKC00MEMB	/	1
ROC40				ROKC00ME00SP		2
ROC80				ROKC00ME05SP		1
ROC140	ROKC00FLT3	ROKC00FLT2				

10. DECOMMISSIONING

The regular operation of the reverse osmosis unit is dependent on the continuous production of desalinated water.

Even during longer periods of non-use, the system must be connected to the power supply, as hygiene regeneration is regularly carried out in standby. Keep the power and water supply of the system connected.

If the system does not produce any permeate for more than 10 days, the membrane(s) must be replaced and rinsed before restarting (see chapter **Initial start-up and rinsing the membrane**).

10.1 Dismantling

Once the RO unit will no longer be used, dismantle (demolish or scrap) it by following the installation procedures in reverse order.

⚠ Caution: Dismantling of the unit may only be performed by qualified personnel. Electrical dismantling may only be performed by trained electricians.

Obey the safety guidelines in section "Safety Instructions," especially the guidelines for disposal.

10.2 Disposal after dismantling

The reverse osmosis unit is made up of metal parts and plastic parts. In reference to European Union directive 2012/19/EU issued on 4 July 2012 and the related national legislation, please note that:

The components of the electrical and electronic devices must not be disposed of as municipal waste, and therefore the method of waste separation must be applied. The public or private waste collection systems defined by local legislation must be used.

🔔 Notice: The operator is responsible for the disposal of unit components as required by law. It must be stressed that if demineralised water (manual mode) or 1-50µS/cm (automatic mode) are selected, the unit will signal maintenance and cleaning via the warning only, without ever shutting down the humidifier.

11. CONTROL

The whole operation of the reverse osmosis unit ROL is controlled by a microprocessor. The control-system enables the production process and the control of the RO-unit. The measured values are shown on a LC-display. The control has the protection class IP65.

11.1 The control panel

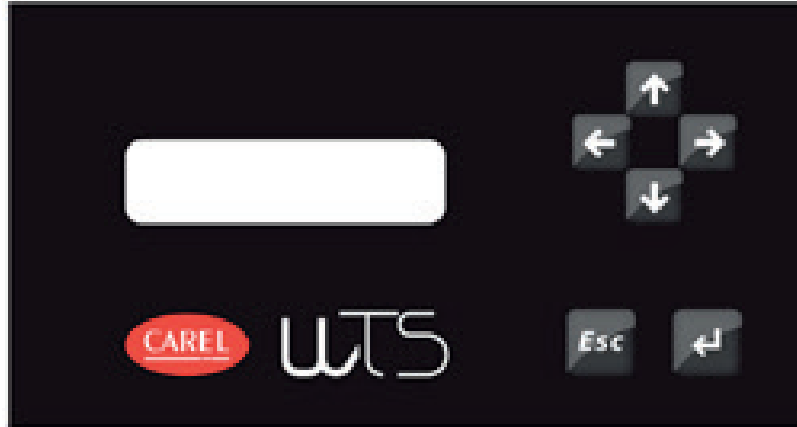


Fig. 11.a

The control panel is separated into three zones:

- the 2 operating keys ESC, ←
- the 4 arrow keys
- LC-display

The **operating keys** are used to navigate through the menus and submenus. The function of the keys is:

ESC: Cancel or return to the previous level

↑↓ Arrow keys: Move within a menu, a submenu or a selection list

← : Acceptance and storage of a selected setting

By pressing the arrow keys ↑↓ you can call up the read values:

- Permeate conductivity
- Operating hours
- Remaining time (hours) until the next service

Access to the main menu:

- » press ← for about 2 sec, the display shows "PASSWORD 0000"
- » enter the password using the arrow keys (0077)
- » confirm with

The control system regulates the automatic sequence for start-up, production, process shut-down, as well as for periodic rinses by controlling the following actuators:

- Feed water valve (VFEED)
- Permeate flush valve (VPER)
- High pressure pump (PHP)
- Dosing pump Antiscalant (PASC)
- Fault signal/alarm (potential-free changeover relay)

The controller is equipped with the following digital inputs for monitoring the process:

- Overpressure switch (PSHIGH)
- Low pressure switch (PSLOW)
- Level of permeate vessel low (PSMin)
- Filling level permeate vessel full (PSMAX)
- External stand-by signal (INSB)
- Error dosing pump antiscalant (INPASC)
- Malfunction feed water pre-filter (INFIL)

Furthermore, the controller has a conductivity measurement (not temperature compensated) for monitoring the permeate quality, with a freely adjustable limit value.

This means that the unit is switched off and a fault message is output if the limit value of the permeate conductivity is exceeded during operation.

The different operating states

Permeate production: Production of product water. The VFEED, PHP and PASC relays are energized.

STAND-BY: Unit is waiting on request. The unit is ready for operation, all relays are off.

Flushing (to prevent deposits on the membrane surface): Factory activated in the main menu, flushing (when the unit is switched on), before/after water production and/or cyclically after a certain number of hours. The cyclic flushing can also be done in STANDBY mode.

Notice: Never deactivate the flushing function! (Avoidance of microbial contamination)

The production is controlled by the two level switches in the permeate tank:

- PS_{HIGH} starts the production
- PS_{LOW} stops production

In the MinPressure condition, the unit starts the water production: it opens the input solenoid valve and starts the pressure pump.

To avoid damage, a delay of 3 seconds is given after the input solenoid valve has opened.

When the MaxPressure condition is reached, the control unit goes into stand-by mode: the input solenoid valve closes and the pressure pump stops.

In the menu it is possible to deactivate one or both level switches and to operate the system with only one or no level switch at all. If both level switches are deactivated, the system goes into continuous production after switching on the power supply.

When the controller is switched on, a module flush is first carried out (if activated in menu 11).

After switching on the control system and module flushing (if activated in menu 10), the control system goes into production mode if the Min. pressure condition is underrun.

If programmed in menu 11 **CLEANING** the control unit starts an interval rinse during production as well as in standby (against standstill contamination) as soon as the countdown for the rinse interval has ended. The countdown for the rinse interval is reset at each rinse.

11.2 Operating states

After switching on the power supply, the version number of the control software appears for a few seconds.

Then the controller returns to the last operating state before switching off.

**WAITING
START PUMP**

The unit starts after the preset start delay has ended.

**CLEANING: TIME
LEFT xxM xxS**

$PS_{LOW} = 0$ und $PS_{HIGH} = 0$

The permeate tank is empty. First, a module rinse is carried out when production is started (if it is programmed). Then the RO plant goes into production.

**SYSTEM WAITING!
HIGH LEVEL**

$PS_{LOW} = 1$ und $PS_{HIGH} = 0$

The filling level in the permeate tank is between empty and full. The unit goes into stand-by mode.

**CLEANING: TIME
LEFT xxM xxS**

**SYSTEM WAITING!
HIGH LEVEL**

$PS_{LOW} = 1$ und $PS_{HIGH} = 1$

The pressure switch PSHIGH switches. The permeate tank is full. The unit performs a module rinse (if programmed) and then goes into stand-by mode.

**COND. PERMEATE
xxx μ S**

Shows the permeate conductivity

**SERVICE IN
xxxxx Hr**

Shows the remaining time (in hours) until the next service.

WORKING TIME xxxxx Hr

Shows the system operating hours.

SYSTEM WAITING! IN FILTER

The IN_{FL} input for the feed water pre-filter or for the hardness sensor has switched (example: potential-free contact of an upstream softening unit). The unit stops. If the input is free again, the plant restarts automatically.

SYSTEM STOPPED! FAILED DOSAGE

The IN_{PASC} input for the Anstiscalant dosing pump (optionally available for WL-ROC 140) has switched. The system stops. If the input is free again, the system restarts automatically.

SYSTEM WAITING! IN STAND BY

The IN_{SB} input (external stand-by signal) has switched. The system stops. When the input is free again, the system restarts automatically.

PERFORM MAINTENANCE

The service hour counter has been counted down. Please make a maintenance and reset the counter.

11.2.1 Alarm messages

If one of the following alarm messages appears, the system stops and the alarm relay switches on. This message cannot be confirmed!

» Disconnect the system from the power supply and eliminate the cause of the alarm.

Further information can be found in the chapter Troubleshooting.

SYSTEM STOPPED! HIGH PRESSURE

The overpressure switch PS_{HIGH} for the max. permitted operating pressure has switched. The system stops.

SYSTEM STOPPED! LOW PRESSURE

The low-pressure monitor PS_{LOW} for the minimum acceptable feed water inlet pressure has switched. The system stops.

SYSTEM STOPPED! HIGH COND. OUT

The max. limit value for the permeate conductivity has been reached. The unit stops.

You can return from the operating display level to the main menu by pressing the ENTER key.

The following operating states may appear:

11.3 Menu navigation

- » use the arrow keys to move through the main menu to the relevant parameter
- » press **↵** to go to the selected submenu
- » press "**ESC**" for about 2 seconds to return to the main menu

↑ Button < UP >:

At the operation display level: to scroll up the operation displays.

At the menu level: Scrolls up at the menu level.

In the relevant parameter: to count up the input-values, and to activate (ENABLE) or deactivate (LOCKED) a function.

↓ Button < DOWN >:

At the operation display level: to scroll down the operation displays.

At the menu level: to scroll down the menu level.

In the relevant parameter: to count down the input value, and to enable (ENABLE) or disable (LOCKED) a function.

← Button < LEFT >:

In the menu: For jumping back to the previous digit within the input field.

→ Button < RIGHT >:

In menu: For jumping to the next digit within the input field.

Button < ESC >:

In menu level: to leave the menu level and return to the operating display level.

In the parameter: to return to the previous iA longer press (2 sec) switches the system off and on.

Input field/display or to leave the menu.

Pressing the button for a longer time (2 sec) switches the system off and on.

Button < ↵ >:

In the operating display level: to open the menu level.

At menu level: to open a menu.

In the parameter: to save the entry and jump to the next entry field or return to the menu level.

🗨 Notice:

By "jumping back with ESC" the earlier entries in this menu item are not saved!

Always end the menu items with "Skip to next" by pressing the ENTER key until the menu item starts again. This is the only way to save the settings you have made.

11.4 Setting options at operator level

The following factory-set parameters can be changed at the operator level (password 0077).

Setting the required conductivity:

3B LIMIT OUT
xx,x μ S

By pressing the arrow keys $\uparrow\downarrow$ you can set the max. set point

» Confirm the selection with \leftarrow

Setting the required flushing time / flush-ing cycle:

11G TIME
00 min 00 sec

By pressing the arrow keys $\uparrow\downarrow$ you enter the duration of the flushing time for the periodic module flush..

» Confirm the selection with \leftarrow . The program jumps to submenu "11H".

11H WASH CYCLE
00 min 15 sec 24 h

By pressing the arrow keys $\uparrow\downarrow$ you specify the time period between the periodic module flushes.

e.g. change 24h to 48h (usage pause)

» Confirm the selection with \leftarrow .
The program jumps back to the main menu.

Notice: In the factory settings, parameter 11 CLEANING is preset to ON. If this setting has been changed to OFF in the service level, no entries can be made here in the operator level.

Setting the required language:

In this submenu you can select the language shown on the display.

16 LANGUAGE
17 SET PASSWORD

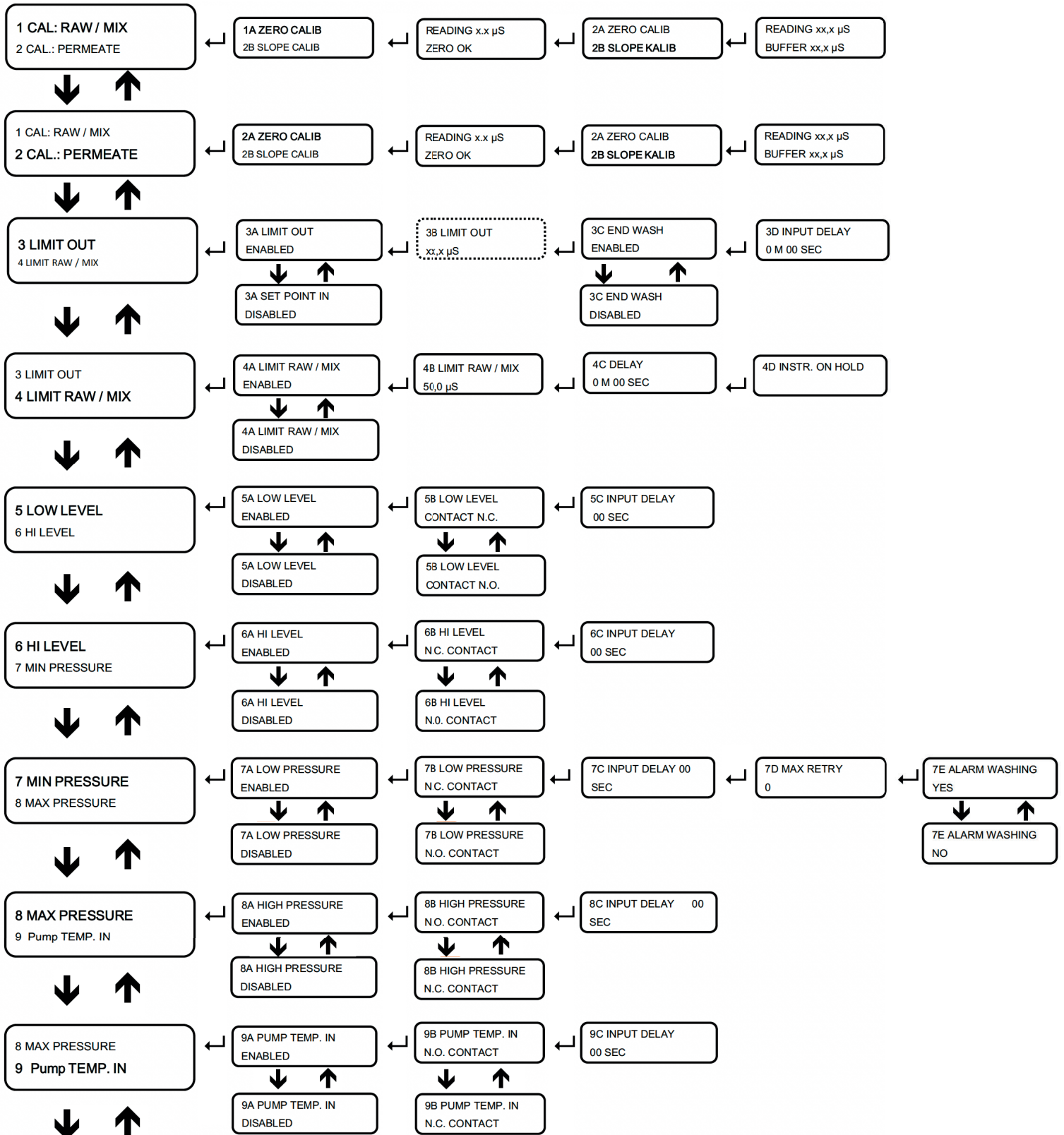


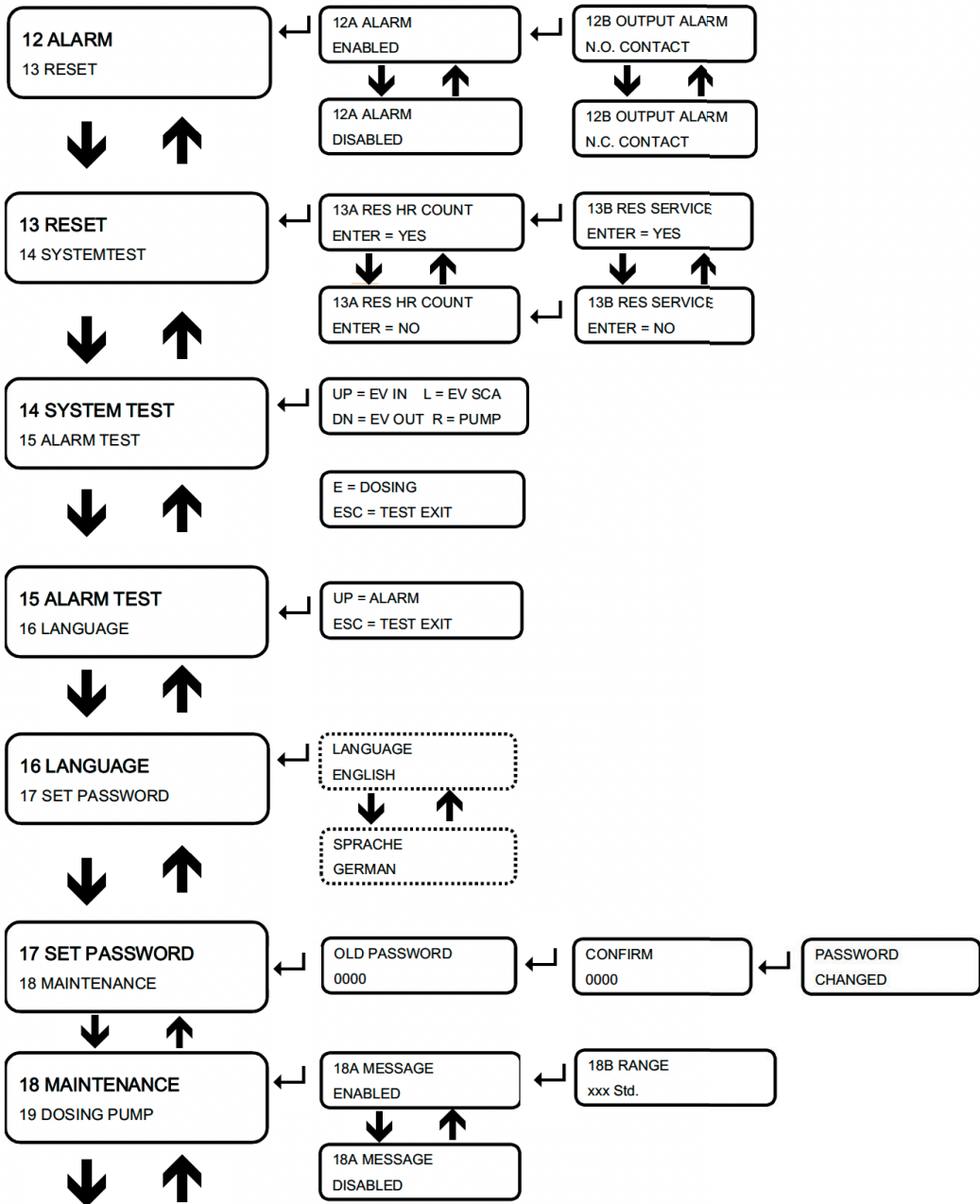
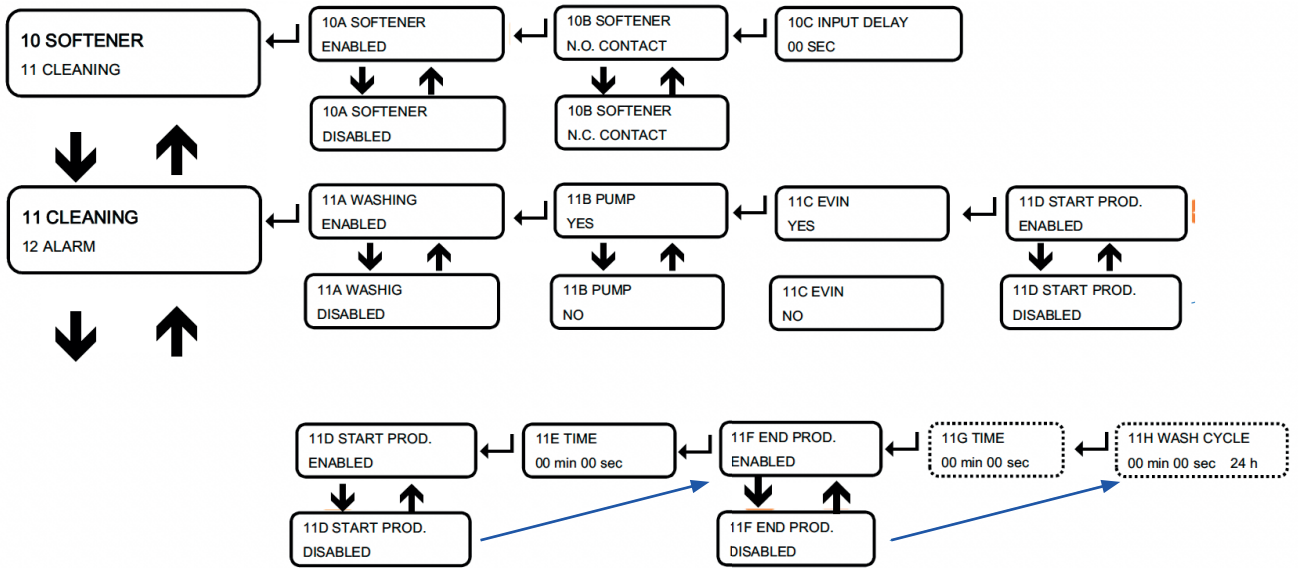
LANGUAGE
ENGLISH

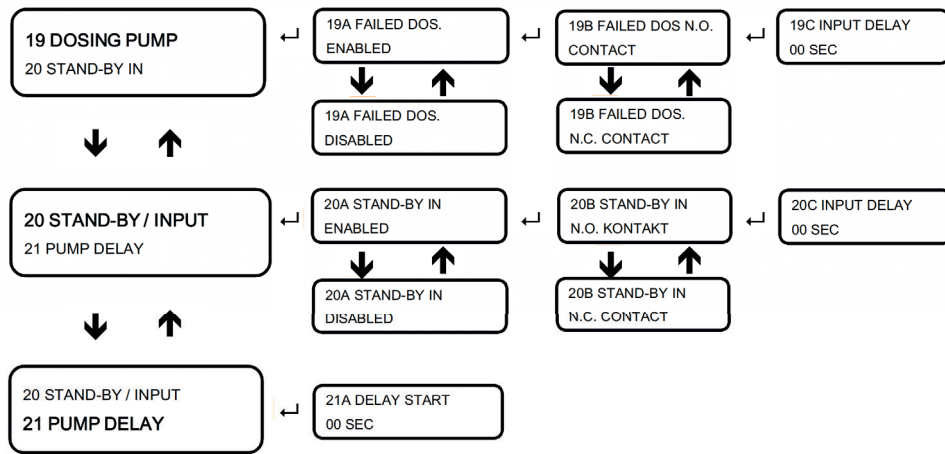
» Press the arrow keys $\uparrow\downarrow$ to select your language
» Confirm the selection with \leftarrow .
The program jumps back to the main menu.

11.5 Menu Structure

The following menu list gives an overview of all parameters of the unit control.
 At the operator level (password 0077) only the parameters shown here in dashed lines can be changed. The other parameters are only visible at the operator level. Changing them is only possible at the service level.







11.6 Setting options at service level

The following chapter is only intended for certified service staff. The password for reaching the service level can be found in the additional information provided with the unit.

CAREL is not liable for damages caused by incorrect parameter settings at this level.

Notice:

The parameters have already been configured ex works and may only be changed with the appropriate expertise.

The contact configuration is preset in all submenus. Do not change this carelessly! Otherwise there is a risk of damage to the system.

11.6.1 Conductivity sensors

The CAREL RO units ROC 25-80 are equipped with one conductivity sensor (permeate).

The ROL units (and ROC-140 with blending kit) are equipped with two conductivity sensors. One sensor measures the conductivity of the feed water (ROH/MIX), the other sensor that of the permeate. Both conductivity sensors are pre-calibrated ex works.

1 CAL. ROH- / MIX
2 CAL. PERMEATE

In the case of recalibration during maintenance, the calibration can be carried out either with the help of a buffer solution with known conductivity, or with a conductivity tester according to the principle of comparative measurement.

Notice:

When selecting the calibration liquid (not included in the scope of delivery), please note the selected measuring range:

- Note that this conductivity measurement is not temperature-compensated.
- To achieve a high measuring precision it is therefore recommended that the calibration liquid (or the water sample for the comparison measurement) has approximately the same conductivity and temperature as the permeate to be measured.

Display shows three lines:



After a few minutes of running time, measure the conductivity of the permeate and/or raw/ mixed water with an external conductivity meter and enter the measured value in the corresponding parameter:

3 LIMIT OUT

- » Press \downarrow + \rightarrow at the same time
- » Press \leftarrow to calibrate
- » Press ESC to exit without calibrating

4 LIMIT ROH-/MIX

- » Press \downarrow + \rightarrow at the same time
- » Press \leftarrow to calibrate
- » Press ESC to exit without calibrating

11.6.2 Calibration of the probe zero point

- » Remove the conductivity probe from the flow assembly and dry it.
- » Select **2A CAL ZERO** in the main menu

2 CAL PERMEATE
3 LIMIT OUT



2A ZERO CALIB
2B SLOPE CALIB



READING 3.12 μ S
ZERO OK

A conductivity value is now displayed in the upper line.

- » Confirm the selection with \leftarrow

The display value may be $> 0 \mu\text{S}$, but should remain $< 50 \mu\text{S}$, otherwise the controller would not accept the calibration. In this case the conductivity probe may be faulty and must be replaced. The display shows the message "ZERO ERROR cal."

- » repeat the calibration or quit the parameter without saving with ESC

11.6.3 Calibration of the probe slope

2A ZERO CALIB
2B SLOPE CALIB



READING 12,5 μ S
BUFFER 15,0 μ S

- » In the main menu, select **2B SLOPE CALIB**
- » Enter the conductivity of the buffer solution in the "BUFFER" field according to the table on the bottle label.
- » Hold the sensor in the buffer solution and wait until the "READ" value has stabilized.
- » press \leftarrow , to confirm the displayed slope value and exit the parameter

and press \downarrow , to return to the main menu

or

- » press ESC to exit the parameter without saving

The buffer value must not be 0, otherwise the calibration is not saved.

11.6.4 Permeate set point calibration

With the assistance of the permeate conductivity measurement and a freely adjustable limit value for the permeate conductivity, the unit can be stopped and an alarm message issued if the permeate quality is reduced.

- » Select **3 LIMIT OUT** in the main menu

3 LIMIT OUT
4 LIMIT RAW/MIX

Press the arrow keys $\uparrow\downarrow$ to select whether the set point function should be active or inactive.

3A LIMIT OUT
ENABLED

- » Confirm the selection with \leftarrow

If the set point function has been activated, the program jumps to submenu "3B".

3B LIMIT OUT
50,00 μ S

By pressing the arrow keys $\uparrow\downarrow$ you can set the max. set point

- » Confirm the selection with \leftarrow
The program jumps to the submenu "3C".

If the permeate conductivity exceeds the limit value

set here during production, the system stops, the alarm message "ALARM CONDUCTIVITY" appears on the display and the alarm output relay picks up.

3C END WASH ENABLED

By pressing the arrow keys $\uparrow\downarrow$ you can select in the submenu "3C FLUSH TIME END" the reaction of the control system when the set point is reached at the end of a module flush.

SWITCHED ON: At the end of module rinsing before the transition to the standby state, the permeate conductivity exceeds the limit value. The alarm message "ALARM CONDUCTIVITY" appears on the display and the alarm output relay picks up.

The unit stops.

OFF: The conductivity control during and after module rinsing is deactivated.

- » Confirm the selection with \leftarrow .
The program jumps to the submenu "3D".

3D DELAY 0M 00Sec

Enter a delay time by pressing the $\uparrow\downarrow$ arrow keys. The delay is intended to prevent the system from being switched off abruptly due to temporary measurement value peaks.

0 Sec = no delay
(Causes an immediate switch-off when the set max. conductivity value is reached. See note at the end of the chapter)

- » Confirm the selection with \leftarrow .
The program jumps back to the main menu.

If a module flush is followed by a longer standstill period, an increased conductivity value may temporarily occur. If the parameter 3C is set to ON, this will lead to an unintended shutdown of the system

11.6.5 RAW/MIX set point calibration

With the assistance of the feed water conductivity measurement and a freely adjustable limit value for the conductivity, the unit can be stopped and an alarm message issued if the feed water quality is reduced.

- » Select **4 LIMIT RAW/MIX** in the main menu

4 LIMIT RAW/MIX 5 LOW LEVEL

Press the arrow keys $\uparrow\downarrow$ to select whether the set point function should be active or inactive.

4A LIMIT RAW/MIX ENABLED

- » Confirm the selection with \leftarrow .
If the set point function has been activated, the program jumps to submenu "4B".

4B LIMIT RAW/MIX xx,xx μ S

By pressing the arrow keys $\uparrow\downarrow$ you can set the max. set point

- » Confirm the selection with \leftarrow .
The program jumps to the submenu "4C".

If the feed water conductivity exceeds the limit value set here during production, the system stops, the alarm message "ALARM CONDUCTIVITY" appears on the display and the alarm output relay picks up.

4C DELAY ENABLED

Enter a delay time by pressing the $\uparrow\downarrow$ arrow keys. The delay is intended to prevent the system from being switched off abruptly due to temporary measurement value peaks.

0 Sec = no delay

(see note at the end of the chapter)

- » Confirm the selection with \leftarrow .
The program jumps to the submenu "4D".

4D INSTR. ON HOLD YES

Press the arrow keys $\uparrow\downarrow$ to select whether the set point function (monitoring of the conductivity limit value during production) should be active or inactive.

YES= active
NO = inactive

Confirm the selection with \leftarrow . The program jumps back to the main menu.

11.6.6 Lower level switch LSLOW

With the aid of the level switch, the minimum fill level in the permeate vessel can be monitored and the system can be started automatically if the pressure falls below the required level.

- » Select 5 LOW LEVEL

5 LOW LEVEL
6 HIGH LEVEL

- » Press the arrow keys $\uparrow\downarrow$ to select if pressure switch should be active or inactive.

5A LOW LEVEL
ENABLED

ENABLED= active
DISABLED = inactive (
not recommended)

- » Confirm the selection with \leftarrow

If the set point function has been activated, the program jumps to submenu "5B".

5B LOW LEVEL
CONTACT N.O.

Press the arrow keys $\uparrow\downarrow$ to set the switching direction.

N.O. CONTACT = The input functions as a normally open contact.

N.C. CONTACT = The input works as a normally closed contact

- » Confirm the selection with \leftarrow .
The program jumps to submenu "5C"
- » Default value: NC

5C INPUT DELAY
00Sec

- » Press the arrow keys $\uparrow\downarrow$ to set the time of delay

0 Sec = no delay
(see note at the end of the chapter)

- » Confirm the selection with \leftarrow .
The program jumps back to the main menu.

11.6.7 Upper level switch LS_{HIGH}

The pressure switch can be used to control the maximum level in the permeate vessel and stop production when this level is reached.

- » Select 6 HIGH LEVEL in the main menu

6 HI LEVEL
7 MIN PRESSURE

6A HI LEVEL
ENABLED

- » Press the arrow keys $\uparrow\downarrow$ to select if relay input should be active or inactive.

ENABLED= active (ex works)
DISABLED = inactive

- » Confirm the selection with \leftarrow .

If the set point function has been activated, the program jumps to submenu "6B".

6B HI LEVEL
CONTACT N.O.

Press the arrow keys $\uparrow\downarrow$ to set the switching direction.

N.O. CONTACT = The input functions as a normally open contact.

N.C. CONTACT = The input works as a normally closed contact (**not recommended**)

- » Confirm the selection with \leftarrow .
The program jumps to submenu "6C".

6C INPUT DELAY
00Sec

- » Press the arrow keys $\uparrow\downarrow$ to set the time of delay

0 Sec = no delay
(see note at the end of the chapter)

- » Confirm the selection with \leftarrow .
The program jumps back to the main menu

11.6.8 Calibration low pressure switch

PS_{LOW}

With the help of a pressure switch between the feed water pre-filter and the high pressure pump the system inlet pressure can be monitored. If the pressure falls below a minimum pressure set on the pressure switch during production (e.g. due to a clogged pre-filter), production can be shut down and the system stopped.

7 MIN. PRESSURE
8 MAX. PRESSURE

7A LOW PRESSURE
ENABLED

- » Press the arrow keys $\uparrow\downarrow$ to select if pressure switch should be active or inactive.
- » Confirm the selection with \leftarrow .
The program jumps to submenu "7B".
- » Default value: ENABLED

7B LOW PRESSURE
CONTACT N.C.

By pressing the arrow $\uparrow\downarrow$ keys you set switching direction.

N.O. CONTACT = The input functions as a normally open contact.

N.C. CONTACT = The input works as a normally closed contact

- » Confirm the selection with \leftarrow .
The program jumps to submenu "7C"
- » Default value: NC

Notice: N.C. contact is set ex works here. Do not change this! Otherwise there is a risk of damage to the system.

7C INPUT DELAY
00Sec

- » Press the arrow keys $\uparrow\downarrow$ to set the time of delay

0 Sec = no delay
(see note at the end of the chapter)

- » Confirm the selection with \leftarrow .
The program jumps to submenu "7D".
- » Default value: 05 sec

7D MAX RETRY
0

By pressing the arrow keys $\uparrow\downarrow$ you set the number of start-up attempts (0-9).

- » Confirm the selection with \leftarrow .
The program jumps to submenu "7E".
- » Default value: 4

7E ALARM WASHING
YES

The menu item is not assigned.

Function of the startup repeats:

If the number of start-up repeats is set to "0", the unit stops as soon as the low-pressure monitor switches (and any delay time set has ended). All output relays are switched off!

The display shows

SYSTEM STOPPED!
LOW PRESSURE

If the number of start-up repeats is set to e.g. "5", the unit stops as soon as the low-pressure monitor switches (and any delay time set has ended). The feed water valve SV1 stays activated. The display shows

LOW PRESSURE!
ALARM 1/4

If the minimum inlet pressure returns, the system starts up again automatically. If the system produces constantly for the next 10 minutes without any further disturbance, the repeat counter is reset to "0". If the pressure drops again, the system stops again and the counter is raised.

If the minimum inlet pressure does not return, the system will continue to start up within the next 20 minutes until the number of repetitions is reached. All output relays are now finally switched off! The display shows

SYSTEM STOPPED!
NO PRESSURE

11.6.9 Calibration high pressure monitor (only ROL / ROC140) PS_{HIGH}

The system operating pressure can be controlled by means of a pressure switch between the high pressure pump and the RO modules. If a maximum pressure set on the pressure switch is reached during production (e.g. due to an overly restricted concentrate valve), the system can be stopped.

8 MAX PRESSURE
9 PUMP TEMP IN

8A HIGH PRESSURE
ENABLED

- » Press the arrow keys $\uparrow\downarrow$ to select if pressure switch should be active or inactive.
- » Confirm the selection with \leftarrow .
The program jumps to submenu "8B".

8B HIGH PRESSURE
CONTACT N.C.

- » Press the arrow keys $\uparrow\downarrow$ to set the switching direction.

N.O. CONTACT = The input functions as a normally open contact.

N.C. CONTACT = The input works as a normally closed contact

- » Confirm the selection with \leftarrow .
The program jumps to submenu "8C".

Notice: N.C. contact is set ex works. Do not change this! Otherwise there is a risk of damage to the system.

8C INPUT DELAY
00Sec

- » Press the arrow keys $\uparrow\downarrow$ to set the time of delay

0 Sec = no delay
(see note at the end of the chapter)

- » Confirm the selection with \leftarrow .
The program jumps back to the main menu.
- » Default value: 00 sec

Menu item 9: "High pressure pump TSHP " is not active.

9 PUMP TEMP IN
10 SOFTENER

11.6.10 Upstream softening system INFIL

If the upstream softening system is e.g. equipped with an automatic backwashing device and has a potential-free switching contact to show the backwashing, then the control system can shut down the WL-ROC system for the duration of the filter backwashing and put it on hold.

It is also possible to connect an upstream 1-column softening system to the control so that the RO unit goes into standby mode for the duration of the regeneration.

10 SOFTENER
11 SPUELVUNG

10A SOFTENER
ENABLED

- » Press the arrow keys $\uparrow\downarrow$ to select if relay input should be active or inactive.
- » Confirm the selection with \leftarrow .
The program jumps to submenu "10B".
- » Default value: Disabled

10B SOFTENER
CONTACT N.O.

- » Press the arrow keys $\uparrow\downarrow$ to set the switching direction.

N.O. CONTACT = The input functions as a normally open contact.

N.C. CONTACT = The input works as a normally closed contact

- » Confirm the selection with \leftarrow .
The program jumps to submenu "10C".
- » Default value: NC

10C INPUT DELAY
00Sec

- » Press the arrow keys $\uparrow\downarrow$ to set the time of delay.

0 Sec = no delay
(see note at the end of the chapter)

- » Confirm the selection with \leftarrow .
The program jumps back to the main menu
- » Default value: 00 sec

11.6.11 Module flushing

In this submenu you configure the module flush(es). Four flushing procedures can be programmed:

- At start-up of production
- During shutdown of the production
- During production at a programmed time interval
- In standby mode against standstill germination (same time interval as during production)

10 SOFTENER
11 CLEANING

11A WASHING
ENABLED

- » Press the arrow keys $\uparrow\downarrow$ to select if relay input should be active or inactive.
- » Confirm the selection with \leftarrow .
The program jumps to submenu "11B".

11B PUMP
YES

By pressing the arrow keys $\uparrow\downarrow$ you set whether the high pressure pump should run during flushing.

Yes = Pump ON
NO = Pump OFF

- » Confirm the selection with \leftarrow .
The program jumps to submenu "11C"
- » Default value: PUMP NO

11C EVIN
YES

Press the arrow keys $\uparrow\downarrow$ to select, if a flush should be done when **production is started up**.

YES = active
NO = inactive

- » Confirm the selection with \leftarrow .
The program jumps to submenu "11D".
- » Default value: EVIN YES

11D START PROD.
ENABLED

By pressing the arrow keys $\uparrow\downarrow$ you set whether a flush should be carried out before each start.

- » Confirm the selection with \leftarrow .
The program jumps to submenu "11E".

11E TIME
00min 00sec

By pressing the arrow keys $\uparrow\downarrow$ you set the duration of the flushing time.

- » Confirm the selection with \leftarrow .
The program jumps to submenu "11F".

11F END PROD.
ENABLED

By pressing the arrow keys $\uparrow\downarrow$ you set whether a flush should be carried out at the end of the production.

- » Confirm the selection with \leftarrow .
The program jumps to submenu "11G".

11G TIME
0min 15sec

By pressing the arrow keys $\uparrow\downarrow$ you set the duration of the flushing time for the periodic module flushing.

- » Confirm the selection with \leftarrow .
The program jumps to submenu "11H".
- » Default value: 01 min 00 sec

11H WASHCYCLE
0min 15sec 24h

By pressing the arrow keys $\uparrow\downarrow$ you specify the time period between the periodic module flushes.

e.g. change 24h to 48h (usage pause)

- » Confirm the selection with \leftarrow .
The program jumps back to the main menu.
- » Default value: 00 min 30 sec 24 h

11.6.12 Configuration of the alarm output relay

(See 11.7 wiring diagram)

12 ALARM
13 RESET



12A ALARM
ENABLED

- » Press the arrow keys **↑↓** to turn the alarm output on or off.
- » Confirm the selection with **←**.
The program jumps to submenu "12B".

12B OUTPUT ALARM
CONTACT N.C.

- » Press the arrow keys **↑↓** to set the switching direction.
- » Default value: NC

N.O. CONTACT = The input functions as a normally open contact.

N.C. CONTACT = The input works as a normally closed contact.

- » Confirm the selection with **↑↓**.
The program jumps back to the main menu.

11.6.13 Operating and service hour counter

The operating hours counter always runs when the system is in production mode. It is for general information and has no further control function.

It counts down the time. As soon as the counter has reached "0 hours", the following message appears on the display: "EXECUTE MAINTENANCE" (do maintenance).

The counter is set in the " 18 MAINTENANCE" submenu.

13 RESET
14 SYSTEM TEST



13A RES HR COUNT
ENTER = YES

- » Press the arrow keys **↑↓** to select, if the operation counter should be reset.
- » Confirm the selection with **←**.
The program jumps to submenu "13B".

13B RES SERVICE
ENTER = YES

By pressing the arrow keys **↑↓** you select if the service interval should be reseted.

- » Confirm the selection with **←**.
The program jumps back to the main menu.

Resetting the parameters to factory settings (except password):

- » Switch off the system
- » Press and hold **↑** and **→** and switch on the system. Only then release the buttons.

RESET Password:

- » Switch off the system
- » Press and hold **↑** and **ESC** and switch on the system. Only then release the buttons.

11.6.14 Function test relay outputs

In this submenu you can check the relay outputs.

10 SOFTENER
11 CLEANING



11A WASHING
ENABLED

Display changes automatically

11D START PROD.
ENABLED

- » Press the keys described below to switch the relay.

UP ↑	Feed water valve
DN ↓	Permeate flush valve VPER
L ←	Concentrate-flush valve VCONC
R →	High pressure pump HP
E ↵	Dosingpump Antiscalant PASC

- » Press the key again to switch the relay back.
- » Press ESC to return to the main menu

Notice:

To avoid damage to the unit: Always activate the feed water valve ↑ first before activating the pump →.

11.6.15 Function test alarm output relay

In this submenu you can manually activate the alarm output. The switched-on relay is then reset to its switching status as programmed in submenu 12.

15 ALARM TEST
16 LANGUAGE



UP=ALARM
ESC=TEST EXIT

- » Press "UP" ↑, to switch the relay.
- » Press the key again to switch the relay back
- » Press ESC to return to the main menu

11.6.16 Select language

In this submenu you can select the language shown on the display.

16 LANGUAGE
17 SET PASSWORD



LANGUAGE
ENGLISH

- » Press the arrow keys ↑↓ to select your language
- » Confirm the selection with ↵. The program jumps back to the main menu

11.6.17 Change password

In this submenu you can change the password to program the main menu.

17 SET PASSWORD
18 MAINTENANCE

OLD PASSWORD
0000

- » Press the arrow keys $\uparrow\downarrow$ to enter your latest password
- » Confirm the selection with \leftarrow .

If the entry is correct, the program displays "PASSWORD ACCEPTED" and jumps to the next submenu.

NEW PASSWORD
0000

- » Press the arrow keys $\uparrow\downarrow$ to enter your new password
- » Confirm the selection with \leftarrow .
The program jumps to the screen:

CONFIRM
0000

Press the arrow keys $\uparrow\downarrow$ to enter your new password again.

- » Confirm the selection with \leftarrow .
The program jumps to the screen:

PASSWORD
CHANGED

If the entry is incorrect, "CONFIRM ERROR" appears on the display for approx. 2 seconds before the programme jumps back to the "NEW PASSWORD" input display so that the new password can be entered again.

11.6.18 Reset password

To reset the password follow the steps below:

- » disconnect the unit from the power supply
- » press the two buttons \uparrow **ESC** while reconnecting the plug (connect to power supply).

The display will show "RESET PASSWORD" for a few seconds before the pump is started up.

11.6.19 Setting the maintenance interval

In this submenu you activate the service interval and enter the countdown of the service hour counter. In the delivery status, the service hour counter is set to 00100 hours. (100 hours). Resetting the countdown is described in submenu 13.

18 MAINTENANCE
19 DOSING PUMP

18A FAILED DO.
ENABLED

- » Press the arrow keys $\uparrow\downarrow$ to activate or inactivate the service hour counter
- » Confirm the selection with \leftarrow .
The program jumps to submenu "18B".

18B FAILED DO.
CONTACT N.C.

Press the arrow keys $\uparrow\downarrow$ to enter the Service interval in hours

- » Confirm the selection with \leftarrow .
The program jumps back to the main menu.

11.6.20 Dosing pump antiscalant IN_{PASC}

If a dosing pump for the dosing of antiscalant is installed instead of an upstream softening system, then either the potential free fault signal output of the dosing pump or the level switch (empty indicator) in the dosing vessel can be connected to the controller.

If the INPASC input is switched, the control system can switch off the RO system for the duration of the fault and put it in the waiting mode. As soon as the fault has been eliminated, the control system automatically returns the RO system to production mode.

19 DOSING PUMP
20 STAND BY/ INPUT

19A FAILED DO.
ENABLED

- » Press the arrow keys $\uparrow\downarrow$ to select if relay input should be active or inactive.
- » Confirm the selection with \leftarrow .
The program jumps to submenu "19B".
Default value: DISABLED

**19B FAILED DO.
CONTACT N.C.**

- » Press the arrow keys **↑↓** to set the switching direction.

N.O. CONTACT = The input functions as a normally open contact.

N.C. CONTACT = The input works as a normally closed contact

- » Confirm the selection with **↵**.
The program jumps to submenu "19C".

**19C INPUT DELAY
00Sec**

- » Press the arrow keys **↑↓** to set time of delay.
- » Confirm the selection with **↵**.
- » The program jumps back to the main menu.
- » Default value: 00 sec

11.6.21 Stand-by-Input (Release contact) IN_{SB}

**20 STAND BY / INPUT
21 PUMP DELAY**

**20A STAND BY IN
ENABLED**

- » Press the arrow keys **↑↓** to select if relay input should be active or inactive.
- » Confirm the selection with **↵**.
- » The program jumps to submenu "20B".
- » Default value: DISABLED

**20B STAND BY IN
CONTACT N.O.**

- » Press the arrow keys **↑↓** to set the switching direction.

N.O. CONTACT = The input functions as a normally open contact.

N.C. CONTACT = The input works as a normally closed contact

- » Confirm the selection with **↵**.
The program jumps to submenu "20C".

**20C INPUT DELAY
00Sec**

- » Press the arrow keys **↑↓** to set the time of delay

0 Sec = no delay
(see note at the end of the chapter)

- » Confirm the selection with **↵**.
The program jumps back to the main menu.

11.6.22 Set start delay

**20 STAND BY/ INPUT
21 PUMP DELAY**

**21A PUMP DELAY
00 sec**

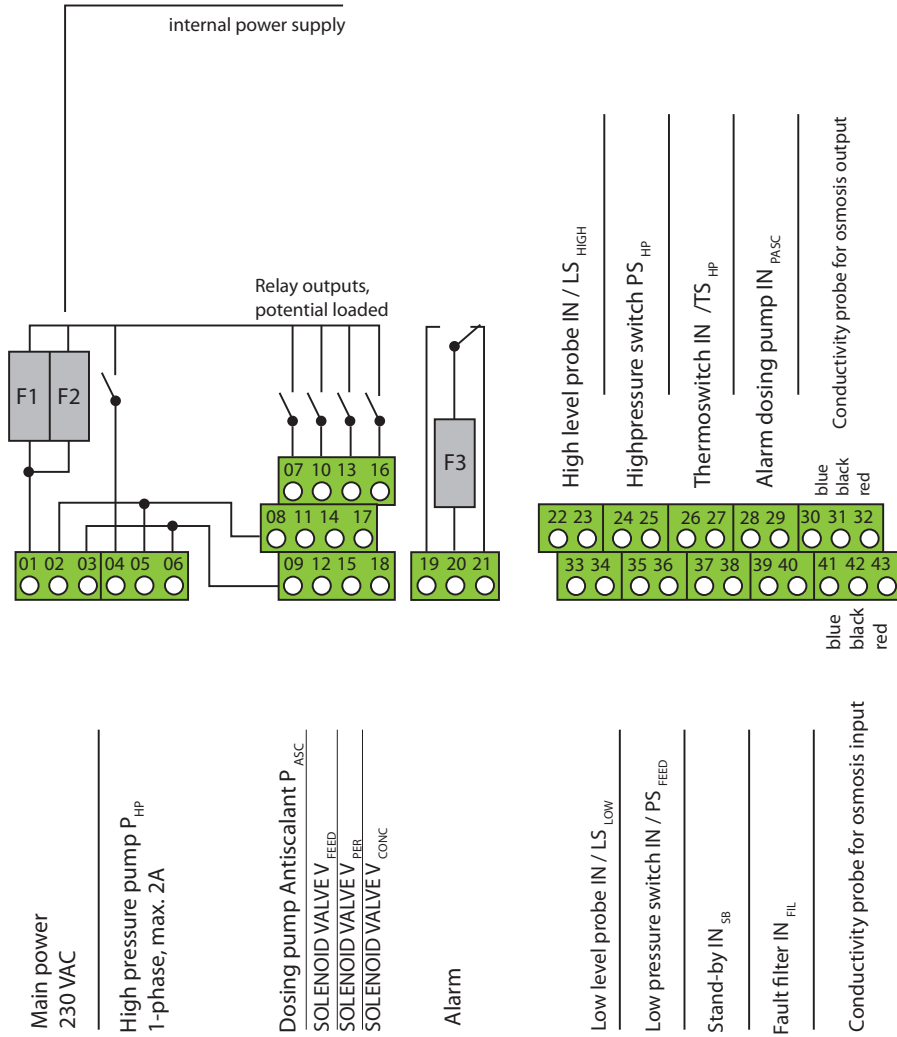
- » Default value: 00 sec

Notice:

Output activation / delay:

In order to avoid pipeline damage due to "water hammer", a delay of 3 seconds between pump on (or off) and solenoid valve on (or off) and a delay of 2 seconds between pump on (or off) and pressure pump on (or off) has been set at the factory.

11.7 Wiring diagram



Power supply, output relay			
01	02	03	Main power IN 230 VAC
L	E	N	
04	05	06	High pressure pump P _{HP} 1-phase, max. 2A
L	E	N	
19	20	21	Alarm OUT
L	E	N	
N.O.	C	N.C.	

Digital inputs	
22	High level probe IN / LS _{HIGH}
23	
24	Highpressure switch IN / PS _{HP}
25	
26	Thermoswitch IN (pressure pump motor) / TS _{HP}
27	
28	Alarm dosingpump IN _{PASC}
29	

Conductivity measurement option 1		
30	blue	Conductivity probe for osmosis output ECDI /01 0,0 – 99,9 µS/cm
31	black	
32	red	

Output relay			
07	08	09	Dosing pump Antiscalant OUT/ P _{ASC}
L	E	N	
10	11	12	SOLENOID VALVE _(EV IN) / V _{FEED}
L	E	N	
13	14	15	SOLENOID VALVE _(EV OUT) / V _{PER}
L	E	N	
16	17	18	SOLENOID VALVE _(EV Conc) / V _{CONC}
L	E	N	

Digital inputs	
33	Low level probe IN / LS _{LOW}
34	
35	Low pressure switch IN / PS _{FEED}
36	
37	Stand-By IN _{SB}
38	
39	Filter IN _{FIL}
40	

Conductivity measurement option 2		
30	blue	Conductivity probe for osmosis output ECDI /1 0,0 – 999,9 µS/cm
31	black	
32	red	

12. ERROR DESCRIPTION

If an error appears, the permeate production stops. The display in the control panel switches from the current display to the display of an error code.

List of possible faults and error codes

Alarm indication on the display	Possible cause	Action
ALARM - CONDUCTIVITY	The conductivity measuring instrument has lost calibration or is no longer working correctly.	Recalibrate or replace the conductivity sensor.
	The feed water parameters have changed.	Contact your supplier or the manufacturer.
	High permeate conductivity due to blocked membrane(s).	Replace the membrane(s).
	Piping blocked	Eliminate the cause of the blockage.
	Delay time too short	If the error occurs after a module flush, change the delay time in parameter 3D. If the error occurs during production, adjust parameter 4C.
Conductivity limit value chosen too low	Check the conductivity limit value entered. Adjust if it's necessary. Note the technical data of the consumer / humidifier.	
SYSTEM STOP - HIGH PRESSURE The PS _{HIGH} overpressure switch for the max. permissible operating pressure has switched. Only for ROC 140 an ROL units	The PSHIGH pressure switch is not calibrated or is not working correctly.	Replace the pressure switch.
	Water pressure too high.	Re-adjust the pump pressure.
SYSTEM STOP - NO PRESSURE The PS _{LOW} overpressure switch for the min. permissible operating pressure has switched.	Membrane(s) is/are blocked.	Replace membrane.
	The PSLOW pressure switch is not calibrated or is not working correctly.	Check an existing pre-treatment (if any). Replace the pressure switch.
	Decreasing flow rate. Blocking of filter cartridges..	Replace them.
System STOP - DOS PUMP (only for systems with dosing pump)	Water pressure too low.	Check the function of the solenoid valve. Check the water inlet pressure.
	Dosing pump does not work.	Check the fuse and replace it if necessary . Dosing pump is not working, replace it.
	Dosing pump does not work, the magnet "knocks".	The suction filter in the anti-coating canister is blocked. Clean the filter.
	Dosing pump does not work, the magnet does not "knock" or only damped.	Dirt deposits in the valve or valve is blocked. Replace the dosing pump.
The red LED in the display of the dosing pump lights up.	Level alarm. Refill with anti-calant.	

List of possible faults and error codes (sequel)

Problem	Possible cause	Action
Reduction of the permeate rate.	Decrease of permeator inlet pressure	Check pump P, make sure it is running correctly, replace it if necessary. Readjust the pressure to the sizing values and adjust the bypass inside pump P if necessary.
	Increase the pressure loss at the membrane due to blockages caused by hardness minerals	Check the process parameters and contact the supplier to arrange for replacement of the membrane(s) if necessary.
	The pressure switches have lost calibration, are worn or no longer function correctly.	Adjust or reset the flow rate and pressure to match the process values. Check the electrical connections.
	Blocked piping.	Correct the cause.
	Reduction of the water flow rate.	If necessary, check the water supply or adjust the shut-off valves in front of the system. Filter cartridges blocked. Replace the filter elements.
	The parameters of the water entering the system have changed.	Contact your supplier or the manufacturer.
Immediate stop (within one minute after start-up).	The pressure switches installed on the PVC distributor of the permeate are not working correctly or are not calibrated.	Check the function of the pressure switches and replace them if necessary.
	Inlet pressure of the expansion vessel is too low. Membrane of the expansion vessel is damaged.	Check the inlet pressure of the expansion tank and replace it if it is damaged.
The solenoid valves do not open	Control board or the solenoid valve coil is not supplied with voltage.	Restore the power supply to the control board and/or check the connections and the solenoid valve supply.
	Solenoid valve is defective.	Replace the solenoid valve.
	Incorrect pressure.	Check the water inlet pressure.
High permeate conductivity	Process parameters not correct.	Check the parameter settings.
High permeate conductivity	The membrane(s) is/are blocked or contaminated.	Replace the membrane(s). Contact your supplier or the manufacturer.
	Low water pressure	Check the water inlet pressure. Check the function of the solenoid valve.
Low water pressure	Low water pressure Inlet valves closed	Blocked filter cartridges. Replace them.
	Decreasing flow rate	
The osmosis production does not start although it is activated and no alarm has been given.	The pressure switches doesn't supply a signal.	Check the connections and the function of the pressure switches and replace them if necessary.
	The fuse that protects the pump is blown.	Replace the fuse and test pump operation.
The system does not carry out the set sequences.	Power supply failure.	Check the power supply.

13. SPARE PARTS

ROC025 to 080

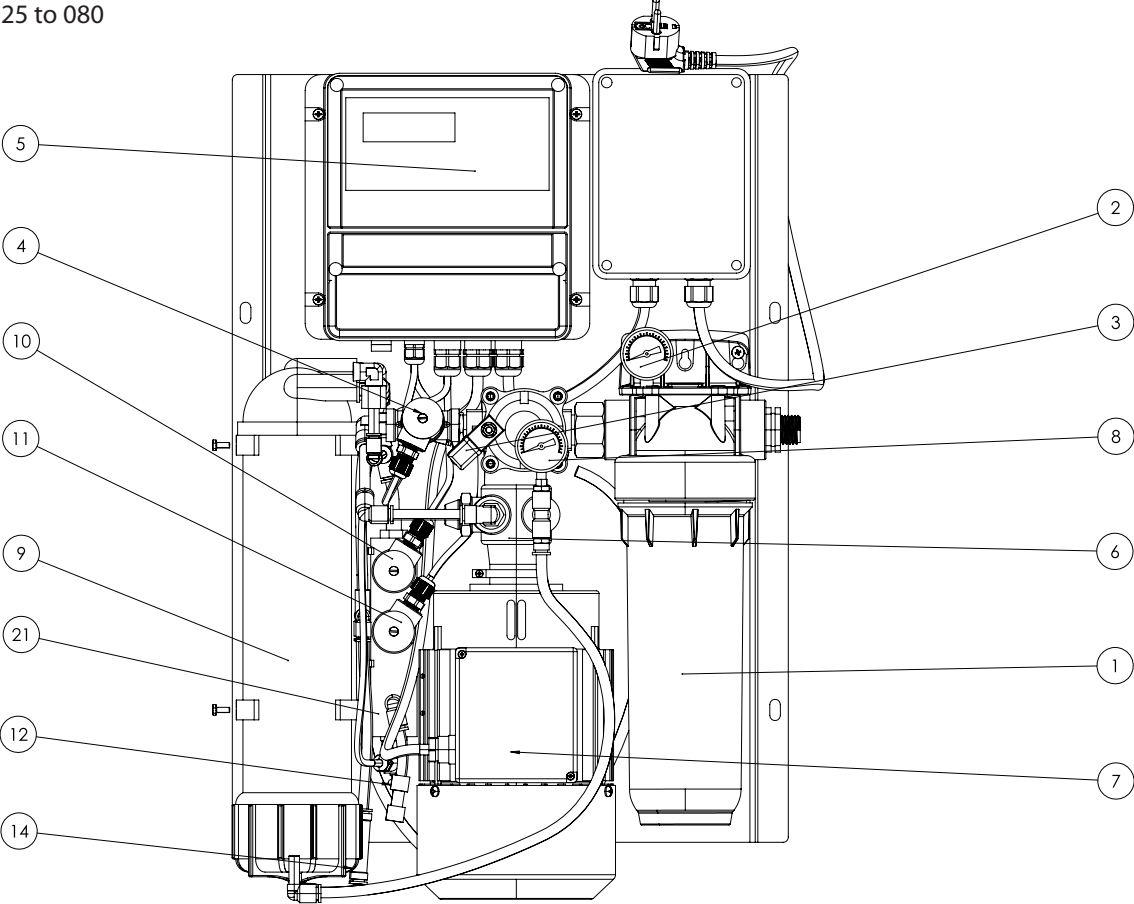


Fig. 13.a

ROC140

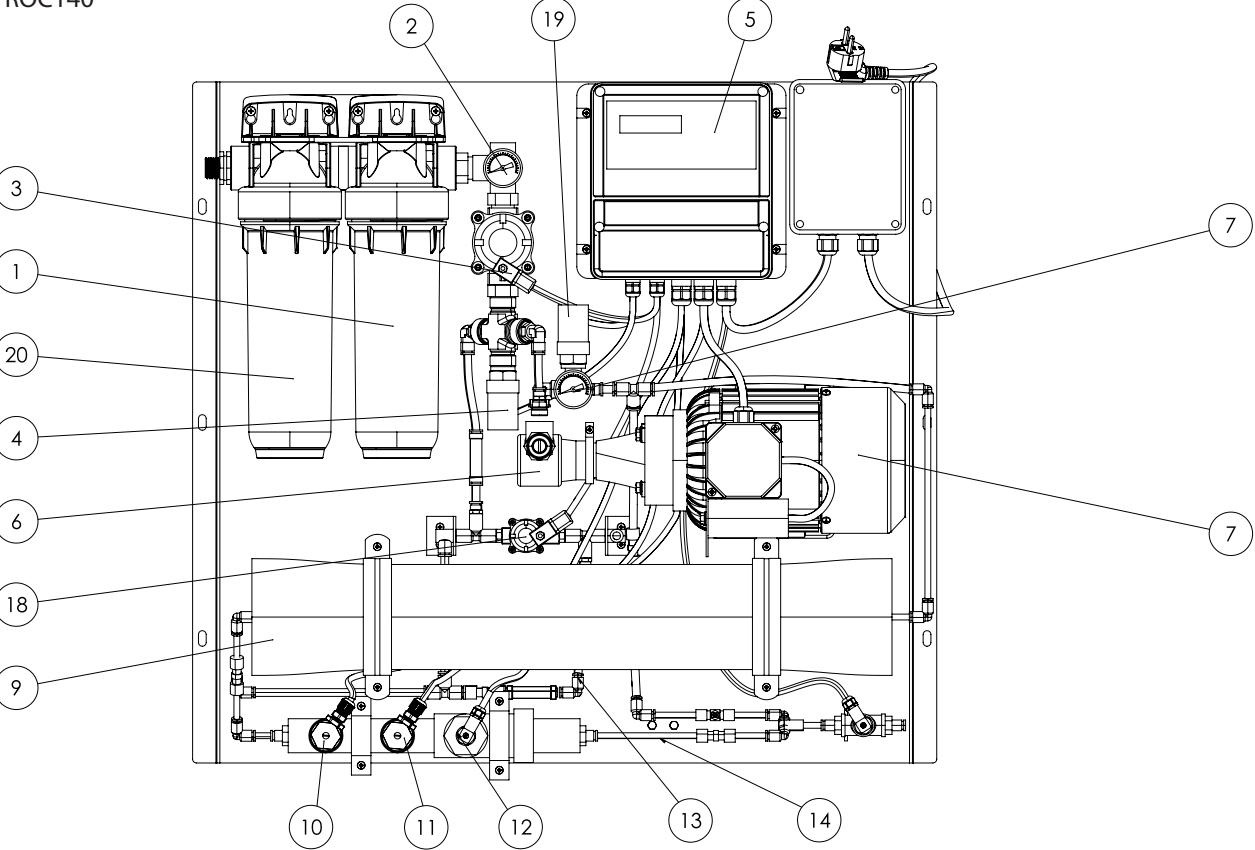


Fig. 13.b

Ref. number	Description	Spare part number	Qty ROC025	Qty ROC040	Qty ROC080	Qty ROC140
1	CB-EC activated carbon filter	ROKC00FLT1	1	1	1	
		ROKC00FLT2				1
2	Pressure gauge (feed water) / PI	ROKC00MR12SP	1	1	1	
		ROKC00MA06SP				1
3	Water inlet solenoid valve	ROKL00IV12	1	1	1	1
4	Pressure switch PS LOW	ROKC00PSLP	1	1	1	1
6	Rotary vane pump	ROKC00EP01	1	1	1	1
		ROKC00PUMP	1	1		
		ROKC00PU00			1	
		ROKC00PU14SP				1
7	Motor	ROKC00MOT5	1	1	1	
		ROKL00MOT5				1
8	Pressure gauge (membrane inlet) / PI	ROKC00MR16SP	1	1	1	
		ROKC00MA16SP				1
9a	Membrane vessel	ROKC00VESP	1	2	2	
		ROKC00VESMSP				1
9b	Membrane	ROKC00MEMB	1	2		
		ROKC00ME00SP			2	
		ROKC00ME05SP				1
10	Pressure switch / PS MIN	ROKL00PSLL	1	1	1	1
11	Pressure switch / PS MAX	ROKL00PSHL	1	1	1	1
12	Flow limiters concentrate and recirculation	ROKC00FR02SP	1			
		ROKC00FR04SP		1		
		ROKC00FR08SP			1	
		ROKC00FR14SP				1
13	Concentrate pipe	ROKC00BR08	x	x	x	
		ROKC001007SP				x
14	Permeate pipe	ROKC001007SP	x	x	x	x
15	T-piece connection	ROKC00TEE1				
16	Expansion vessel	AUC018K000				
		AUC040K000				
17	Manual control valve / RV	ROKC00VALS				
18	Flush valve (solenoid valve)	ROKL00IV14				1
19	Pressure switch / PS HIGH	ROKL00PSHP				1
20	Sediment filter	ROKC00FLT3				1
21	Conductivity sensor for permeate	ROKL00CP01SP	1	1	1	1
		ROKC00CV18	1	2	2	
22	Permeate check valve	ROKC00CV10				1
		ROKL00AD00SP				1
23	Adapter motor to pump	ROKL00EJ00SP				1
24	Elastic joint motor to pump	ROKL00EJ00SP				1
25	Filter spanner	ROKC00WREN	x	x	x	x
26	Membrane spanner	ROKC00SPANSP	x	x	x	

Optional kit	Spare part description	Spare part number	ROC025	ROC040	ROC080	ROC140
UV sterilizer 240 l/h ROKC00DBKA	UV lamp	ROKC00UVLA	x	x	x	x
	Quartz glass	ROKC00QZLA				
	O-ring for quartz glass	ROKC00UVORSP				
	Electronic ballast	ROKL00UVT1				
Blending kit ROKC00BLD1	Cable and connector for conductivity sensor	ROKL00FC15SP	x	x	x	
	Conductivity sensor for mix water	ROKL00CP02SP				
Blending kit ROKC00BLD2	Cable and connector for conductivity sensor	ROKL00FC15SP				x
	Conductivity sensor for mix water	ROKL00CP02SP				
Antiscalant kit with dosing pump ROKC00DPK1	Dosing pump	ROKC00DP01SP				x
	Injection valve	ROKL00JV00SP				x
	Connection hoses for dosing pump	ROKL00DPPI				x
	20 L tank with cap	ROKL00AT00SP				x
	Antiscalant 10 L drum compliant with EN 15040	ROKL00AS10				x
Antiscalant 25 L drum compliant with EN 15040	ROKL00AS25				x	
Antiscalant 25 L drum NSF certified	ROKL00AS00				x	
Inlet water conductivity meter kit ROKC00EC02	Conductivity sensor for inlet water	ROKL00CP02SP	x	x	x	x

14. COMMISSIONING REPORT / MAINTENANCE DOCUMENTATION

Commissioning report for CAREL reverse osmosis systems ROC and ROL

Unit	Type	Serial number
	Type of pressure expansion vessel	
	Date of maintenance	
	Company / name	
Customer	Commercial / Private	
	Street / Number	
	Postal code / City	
	Contact on site	Telephone number

		Checked / Value	
Unit condition	Unit delivered complete?	<input type="checkbox"/> yes <input type="checkbox"/> no	
	Transport locks removed?	<input type="checkbox"/> yes <input type="checkbox"/> no	
	All hoses and connections checked for damage?	<input type="checkbox"/> yes <input type="checkbox"/> no	
	All detachable PVC screw connections tightened? (ROL)	<input type="checkbox"/> yes <input type="checkbox"/> no	
	All electrical cables checked for external damage?	<input type="checkbox"/> yes <input type="checkbox"/> no	
General	Distance appliance - pressure expansion vessel	meters	
	Distance pressure expansion vessel - consumer	meters	
	Connection to the drinking water system	<input type="checkbox"/> yes <input type="checkbox"/> no	
	Softening system connected?	<input type="checkbox"/> yes <input type="checkbox"/> no	
	Hoses to the anti-scalant pump and canister connected (if available)?	<input type="checkbox"/> yes <input type="checkbox"/> no	
	Prefilter and membranes in position?	<input type="checkbox"/> yes <input type="checkbox"/> no	
Feed water	Total hardness	°fH	
	Conductivity	µS/cm	
	Temperature	°C	
	Water inlet pressure	bar	
Permeate / Konzentrate	Conductivity permeate	µS/cm	
	Conductivity concentrate	µS/cm	
	Conductivity Mixwater (only ROC with blending kit)	µS/cm	
	Operation pressure	bar	
	Permeate quantity	l/h	
	Concentrate quantity	l/h	
	Demineralisation rate	%	
	Switch-on pressure	bar	
	Switch-off pressure	bar	
	Antiscalant dosing (if available) activated according to operating instructions and canister filled to mixing ratio?	<input type="checkbox"/> yes <input type="checkbox"/> no	

Note: The commissioning values are to be documented as a basis for the system assessment.
A water analysis is to be attached to this protocol.

Datum / Sign _____

Maintenance checklist for CAREL reverse osmosis systems ROC and ROL

Unit	Type	Serial number
	Type of pressure expansion vessel	
	Date of maintenance	
	Company / name	
Customer	Commercial / Private	
	Street / Number	
	Postal code / City	
	Contact on site	Telephone number

The following system components were tested (settings, setpoints, levels, etc.):	Error - free operation		Replace-ment		Remarks
	Yes	No	Yes	No	
Activated carbon pre-filter (ROL)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5 µm-prefilter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
membrane(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
electrical connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Dosing pump (if available)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Tightness of the unit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
UV lamp (replace after 9000 hours or 1 year)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Measured parameters	Values at		Remarks
	Commis- sioning	Mainte- nance	
Operating hours		hours	
Feed water pressure		bar	
Water pressure behind pre filter		bar	
Total hardness feed water		°fH	
Conductivity feed water		µs/cm	
Temperature feed water		°C	
Conductivity permeate		µs/cm	
Conductivity mixed water (only WL-ROC with blending option)		µs/cm	
Operation pressure		bar	
switch-on pressure (max 2 bar)		bar	
switch-off pressure (max 4 bar)		bar	
Concentrate quantity in relation to the feed water	☺	☹	
Concentrate quantity in relation to the feed water quantity used	☺	☹	
Reset service counter	☺	☹	

Samples taken for analysis	Remarks
Feed water	<input type="checkbox"/>
Permeate	<input type="checkbox"/>

NOTE: The commissioning values are to be documented as a basis for the system assessment. Copy this form for multiple use.

Date / Sign _____

15. TECHNICAL SPECIFICATIONS

Technical Data ROC (Reverse Osmosis Compact)

	ROC 25	ROC 40	ROC 80	ROC 140
Permeate production [l/h] * (+/- 10%)	25	40	80	140
Concentrate production [l/h]*	25	40	80	140
Water consumption during operation [l/h]	50	80	160	280
Minimum power required for flushing [m3/h] – 2bar	-	-	-	-> 0,9
Max. Output permeat [%]	50			
Membran pressure [bar]	8	8	5	10
Feed water pressure [bar]	2 - 5			
Water pressure permeat max. [Bar]	4			
Feed water temperature [°c]	5 - 25			
Water hardness	20 °dH without pre-treatment (otherwise: softening)			
Feed water total dissolved salt [ppm]	< 750			
Feed water conductivity [µs/cm]	< 1000			
Number of membranes	1	2	2	1
Electrical connection	230V /1Ph /N /50-60Hz			
Electrical power [kw]	0,3			0,6
Operation weight (kg)	19	21	21	41
Dimensions	Width		420	
	Height		580	
	Depth		235	
Permeate pipe connection	John Guest 10 mm			
Water connection	3/4" external thread			
Drainage connection	John Guest Ø 8 mm		John Guest Ø12 mm	
Drain function	/			✓
Conductivity measurement	Permeate monitoring and alarm function included			
Antiscalant pump	/			optional
Adjustable blending kit	optional available			

* Specifications refer to the reference water quality: 15°C, TDS: 250 ppm, free of iron and chloride

These values are theoretical because they can change with the temperature of the feed water and its chemical and physical qualities. These values were used for feed water with a TDS of 250 ppm and a water temperature of 16°C.

The temperature of the feed water has a great influence on the productivity and quality of the permeate. As the temperature increases, the permeate output also increases, but with a worse conductivity value.

The recovery value is calculated as follows:

$$\text{RECOVERY (\%)} = \frac{\text{Permeate}^*}{\text{Permeate}^* + \text{Concentrate}^*} \times 100$$

* quantity

16. ANTISCALANT

Dosage specifications:

When using the recommended antiscalant Pragmaclean 309 the correct dosage is 1:40 (1 part of Pragma Clean 309 antiscalant and 40 of water)

🔔 Notice:

Use only diluted antiscalant!

How to proceed:

Fill the empty canister (20l) with the quantity of antiscalant specified for the existing feed water quality.

CAREL

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