

Reverse osmosis system

WTS large

CAREL



(ENG) User manual

**→ READ AND SAVE
THESE INSTRUCTIONS ←**

H i g h E f f i c i e n c y S o l u t i o n s

IMPORTANT

CAREL Industries reverse osmosis desalinators (WTS) 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 Industries product, in relation to its advanced level of technology, requires setup/configuration/programming/commissioning to be able to operate in the best possible way for the specific application. Failure to complete such operations, which are required/specified in the user manual, may cause the final product to malfunction; CAREL Industries 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 Industries 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 system and the final installation if the warnings or suggestions provided in this manual or in other product technical documents are not heeded. In addition to observing the above warnings and suggestions, the following warnings must be heeded for the correct use of the product:

- **DANGER OF ELECTRIC SHOCK:** The system contains live electrical components. Disconnect the mains power supply before accessing inside parts or during maintenance and installation.

**IMPORTANT**

- Environmental and power supply conditions must conform to the values specified on the product rating labels.
- The product is designed exclusively to humidify rooms in mode direct or using distribution systems (ducts).
- 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 for water vapour production.
- 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 Industries declines all liability for any such unauthorised use.
- Do not attempt to open the system in ways other than those specified in the manual.
- Observe the standards in force in the place where the system is installed.
- Keep the system out of the reach of children and animals.
- Do not install and use the product near objects that may be damaged when in contact with water (or condensate). CAREL Industries declines all liability for direct or indirect damage following water leaks from the system.
- Do not use corrosive chemicals, solvents or aggressive detergents to clean the inside and outside parts of the system, unless specifically indicated in the user manual.
- Do not drop, hit or shake the system, as the inside parts and the linings may be irreparably damaged.

CAREL Industries adopts a policy of continual development. Consequently, CAREL Industries 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 Industries in relation to its products is specified in the CAREL Industries general contract conditions, available 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 Industries, its employees or subsidiaries 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, use or impossibility to use the product, even if CAREL Industries or its subsidiaries are warned of the possibility of such damage.

DISPOSAL

The system is made up of metal parts and plastic parts. In reference to European Union directive 2002/96/EC issued on 27 January 2003 and related national legislation, please note that:

1. WEEE cannot be disposed of as municipal waste and such waste must be collected and disposed of separately;
2. the public/private waste collection systems defined by local legislation must be used. In addition, the equipment can be returned to the distributor at the end of its working life when buying new equipment;
3. 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;
4. the symbol (crossed-out wheeled bin) shown on the product or on the packaging and on the instruction sheet indicates that the equipment has been introduced onto the market after 13 August 2005 and that it must be disposed of separately;
5. 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.

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1. GENERAL FEATURES AND MODELS

1.1 Description of the unit

The reverse osmosis desalinators described in this manual are purpose-built for treating water used in technological processes.

These units can resolve the problem of excessive mineral salts in the feed water.

Reverse osmosis desalinators are made up of the following main components:

- micron pre-filtration;
- softening with descaler;
- pump;
- desalination module (reverse osmosis membrane);
- UV lamp disinfection system;
- service and control instruments;
- electrical control panel.

Below is the list of products available, differentiated according to whether the pump or circuit downstream of the system are steel or brass (the latter requires less aggressive treated water).

Carel P/N	Description
ROL1005U00	Reverse osmosis system, 100 l/h – 230V 50 Hz – for steel
ROL3205U00	Reverse osmosis system, 320 l/h – 230V 50 Hz – for steel
ROL4605U00	Reverse osmosis system, 460 l/h – 230V 50 Hz – for steel
ROL6005U00	Reverse osmosis system, 600 l/h – 230V 50 Hz – for steel
ROL1K05U00	Reverse osmosis system, 1000 l/h – 230V 50 Hz – for steel
ROL1K25U00	Reverse osmosis system, 1200 l/h – 230V 50 Hz – for steel
ROL1005U0B	Reverse osmosis system, 100 l/h – 230V 50 Hz – for brass
ROL3205U0B	Reverse osmosis system, 320 l/h – 230V 50 Hz – for brass
ROL4605U0B	Reverse osmosis system, 460 l/h – 230V 50 Hz – for brass
ROL6005U0B	Reverse osmosis system, 600 l/h – 230V 50 Hz – for brass
ROL1K05U0B	Reverse osmosis system, 1000 l/h – 230V 50 Hz – for brass
ROL1K25U0B	Reverse osmosis system, 1200 l/h – 230V 50 Hz – for brass
ROL1006U00	Reverse osmosis system, 100 l/h – 230V 60 Hz – for steel
ROL3206U00	Reverse osmosis system, 320 l/h – 230V 60 Hz – for steel
ROL4606U00	Reverse osmosis system, 460 l/h – 230V 60 Hz – for steel
ROL6006U00	Reverse osmosis system, 600 l/h – 230V 60 Hz – for steel
ROL1K06U00	Reverse osmosis system, 1000 l/h – 230V 60 Hz – for steel
ROL1K26U00	Reverse osmosis system, 1200 l/h – 230V 60 Hz – for steel
ROL1006U0B	Reverse osmosis system, 100 l/h – 230V 60 Hz – for brass
ROL3206U0B	Reverse osmosis system, 320 l/h – 230V 60 Hz – for brass
ROL4606U0B	Reverse osmosis system, 460 l/h – 230V 60 Hz – for brass
ROL6006U0B	Reverse osmosis system, 600 l/h – 230V 60 Hz – for brass
ROL1K06U0B	Reverse osmosis system, 1000 l/h – 230V 60 Hz – for brass
ROL1K26U0B	Reverse osmosis system, 1200 l/h – 230V 60 Hz – for brass

Tab. 1.a

1.2 General principle of reverse osmosis

Osmosis is a natural process whereby solute of diluted or lighter solutions (water) spontaneously pass through semipermeable membranes into solutions with a higher concentration of salts.

When a solution passes through a semipermeable 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 reaching a point of equilibrium, at which point the solute stops flowing. The pressure difference between the two solutions, in conditions of equilibrium, is called the "osmotic pressure" that corresponds to that specific solution.

Reverse osmosis, on the other hand, is a scientific process that reverses this natural process. It involves applying a pressure exceeding osmotic pressure to the more concentrated solution, so as to reverse the flow through the semipermeable membrane and separate the salts dissolved in the water.

This principle can be applied to water desalination, for both drinking and technological uses.

Reverse osmosis has several advantages:

- water desalination regardless of salt content;
- no chemicals that need to be drained after use, so no pollution problems;
- relatively low running costs compared to ion-exchange resin systems, above all with high salinity of the water being treated;
- simple operation.

1.3 ROL operating principle

The feed water flows through the cartridge filters for dechlorination and final filtering at 5 µm. This is then softened by injecting liquid descaler. This ensures the water entering the permeators meets design specifications. Feed water pressure, during normal operation, must be at least 1 bar (pressure gauge PI01) so as to guarantee correct pressure to the reverse osmosis pump. When the cartridge filter outlet pressure falls below 0.8 bars, pressure switch PSLOW sends a signal to the control panel. The water then flows through the feed solenoid valve SV01, before being lifted by the high pressure pump P so as to guarantee the pressure required by the process. Pressure switch PSHIGH is calibrated to send a signal if the pressure at the permeators exceeds the threshold of 12 bars. The quality of the treated water at the system outlet is controlled by the conductivity probe (EC OUT) installed on the outlet manifold.

The treated water is then collected in the expansion vessel downstream of the system. Pressure switch PSOUT provides the signal to start or stop the reverse osmosis system.

In normal production, the following values can be read on the unit (see water circuit on pages 24 and 25):

- desalinated water production (FI01),
- drain (FI03),
- recirculation (FI02),
- pressure at the permeators (PI02)
- permeate pressure (PI04).

For example, an ROL 320 unit should show the following values:

- desalinated water production 320 l/h,
- drain 150 l/h,
- recirculation 150 l/h,
- pressure at the permeators around 8 bars,
- permeate pressure around 1 bar.

These values are theoretical and may change as feed water temperature and its chemical-physical characteristics vary. These values have been determined at design recovery (for ROL 320 is 68%) at a feed water temperature of 18°C and with a TDS of 500 ppm, calculated using the following formula:

$$\text{RECOVERY (\%)} = \frac{\text{PERMEATE}}{(\text{PERMEATE} + \text{DRAIN})} * 100$$

Considering that the unit should produce 320 l/h (at a water temperature of 18°C) and that recovery that meet the design requirements, the drain flow-rate should be adjusted using BV03, reading the value on FI03. Recirculation is adjusted using BV02, reading the value on FI02. The aim of these adjustments is to give a pressure at the permeators such as to guarantee production as close as possible to the values specified above. For fine control of pressure at the permeators, the pump bypass can be used. Feed water temperature significantly affects both productivity and permeate quality. If the temperature increases, even by just a few degrees, productivity (and consequently recovery) will increase, however conductivity will be higher.

1.4 End desalinated water production

Desalinated water production is controlled automatically by the programmer using the pressure switch fitted on the permeate line: the pressure switch stops operation when the pressure in the circuit downstream of the unit exceeds a certain value (default 3.5 bars). Pressure in the downstream circuit can be maintained using a suitable expansion vessel (optional, P/N AUCxxxxxx).

The signal to start and end desalinated water production can also be provided using a storage tank + booster pump: in this case, the WTS is controlled based on a signal sent by the level sensor.

1.5 Nomenclature of parts

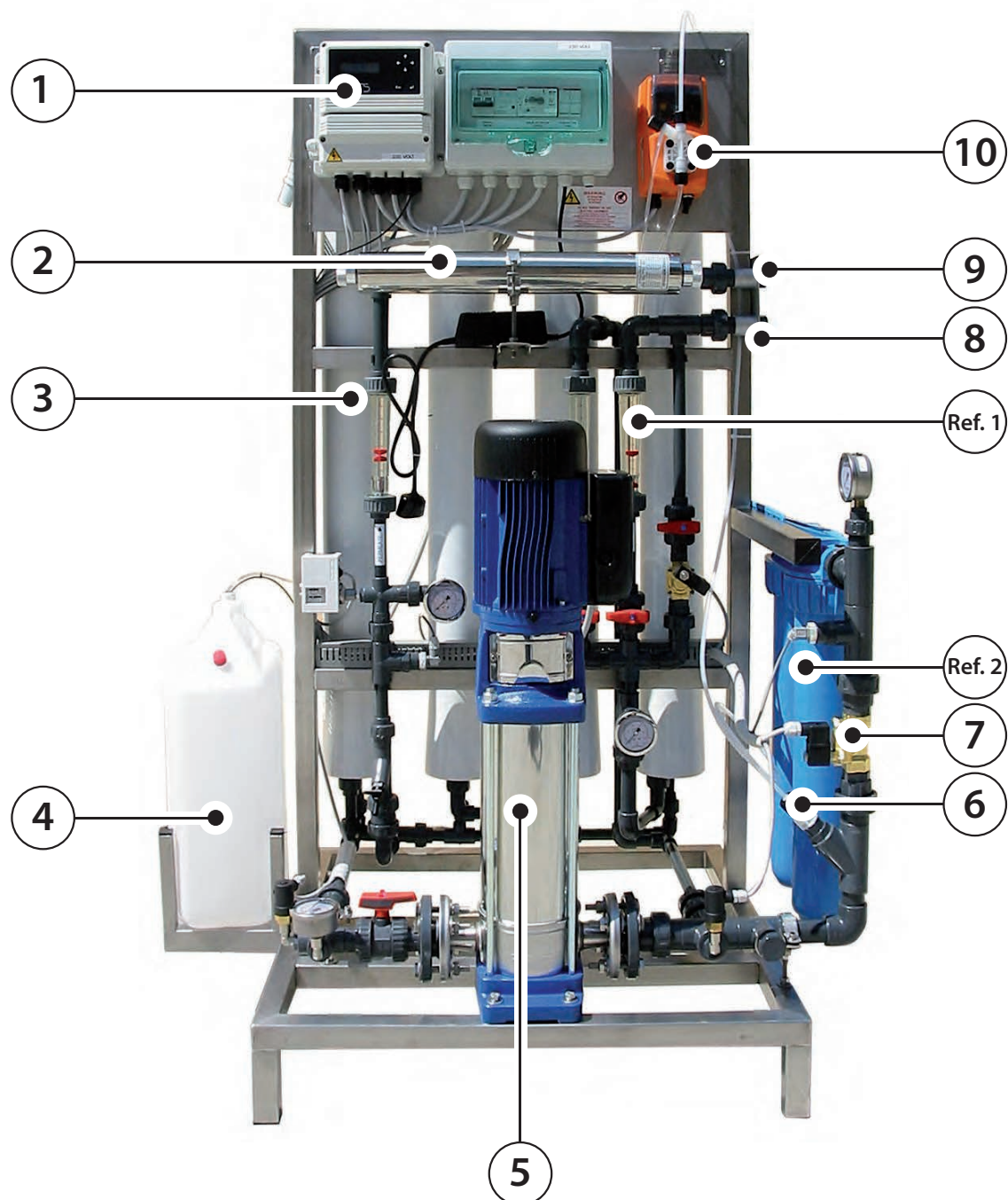


Fig. 1.a

Ref. Description

1	Electrical assembly with panel and controller
2	UV germicidal lamp
3	Reverse osmosis membrane
4	Descaler tank
5	Electric pump
6	Check valve for descaler injection
7	System fill solenoid valve
8	Drain water outlet
9	Desalinated water outlet (permeate)
10	Descaler metering pump

Tab. 1.b

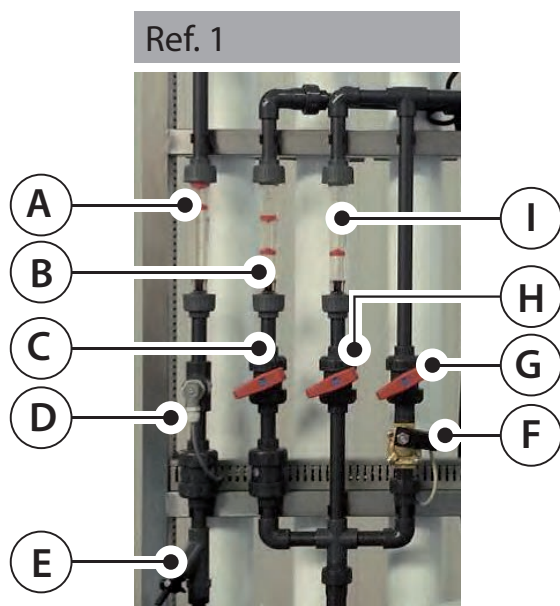


Fig. 1.b

Ref. 1	Description
A	permeate flow meter
B	recirculation flow meter
C	manual recirculation control valve
D	permeate conductivity probe
E	attachment for sampling permeate
F	flushing solenoid valve
G	manual flushing control valve
H	manual drain control valve
I	drain flow meter

Tab. 1.c

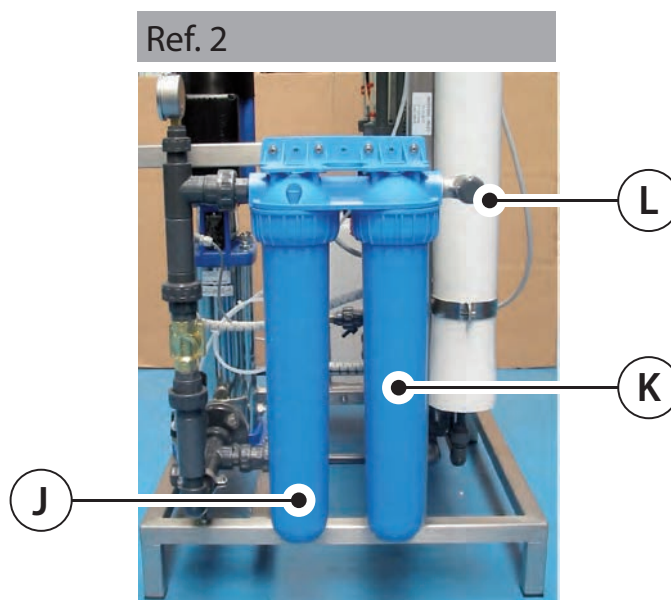


Fig. 1.c

Ref. 2	Description
J	20" CPP filter L 5 µm
K	CB-EC carbon filter 10" L 10 µm
L	water inlet

Tab. 1.d

1.6 Dimensions and weight

Model	ROL1005U00 ROL1005U0B ROL1006U00 ROL1006U0B	ROL3205U00 ROL3205U0B ROL3206U00 ROL3206U0B	ROL4605U00 ROL4605U0B ROL4606U00 ROL4606U0B	ROL6005U00 ROL6005U0B ROL6006U00 ROL6006U0B	ROL1K05U00 ROL1K05U0B ROL1K06U00 ROL1K06U0B	ROL1K25U00 ROL1K25U0B ROL1K26U00 ROL1K26U0B
Packaged	670x1260xh1900 mm	670x1260xh1900 mm	760x1300xh1800 mm	760x1300xh1800 mm	760x1300xh1800 mm	760x1300xh1800 mm
Unpackaged	600x900xh1700 mm	600x900xh1700 mm	700x1100xh1600 mm	700x1100xh1600 mm	700x1100xh1600 mm	700x1100xh1600 mm
Total weight (with packaging)	180 kg	180 kg	220 kg	220 kg	220 kg	220 Kg

Tab. 1.e

1.7 Feed water characteristics

The water being treated must be clear and drinkable, and must comply with certain parameters, as defined in directive 98/83/EC. The maximum admissible concentrations are listed below:

Conductivity	< 1000 µS/cm
Turbidity	< 1 NTU
Iron	< 0.15 ppm
SDI (Silt Density Index)	< 3
Water temperature	5 - 35 °C
Free chlorine	< 0.2 ppm
TDS (Total Dissolved Solids)	< 750 ppm
Water hardness TH	< 500 ppm CaCO ₃ eq (< 50 °F) (< 28°dH)
SiO ₂	< 15 ppm
TOC (Total Organic Carbon)	< 3 mg/l
COD (Chemical Oxygen Demand)	< 10 mg/l

Tab. 1.f

1.8 Technical specifications

Feed water pressure	1.5 - 4	bar
Operating pressure	≤ 12	bar
Outlet water pressure	≤ 3	bar
Water temperature	5 - 35	°C
Room temperature	5 - 40	°C
Power supply	230V – 50 Hz or 60 Hz single-phase	
Storage and delivery conditions	5-40 °C, sheltered from sunlight and excessive humidity	

Tab. 1.g

Model: WTS reverse osmosis system	ROL1005U00 ROL1005U0B ROL1006U00 ROL1006U0B	ROL3205U00 ROL3205U0B ROL3206U00 ROL3206U0B	ROL4605U00 ROL4605U0B ROL4606U00 ROL4606U0B	ROL6005U00 ROL6005U0B ROL6006U00 ROL6006U0B	ROL1K05U00 ROL1K05U0B ROL1K06U00 ROL1K06U0B	ROL1K05U00 ROL1K05U0B ROL1K06U00 ROL1K06U0B
Production (± 10%) - (l/h) (*)	160	320	460	600	1000	1200
Minimum feed water flow-rate (l/h)	1100	1100	2500	2500	2500	2500
Water consumption in operation (l/h)	250	460	950	1200	1500	1770
Feed water pressure (min-max) bars	1.5 - 3	1.5 - 3	1.5 - 3	1.5 - 3	1.5 - 3	1.5 - 3
Drain (l/h)	70	150	460	600	470	570
Recirculation	70	150	460	650	450	450
Recovery (%)	50	68	50	50	68	68
LOW ENERGY membrane	2	4	2	2	4	4
Membrane model	2.5" x 40"	2.5" x 40"	4" x 40"	4" x 40" XL	4" x 40"	4" x 40" XL
Installed power (W)	600	600	1600	1600	1600	1600
Feed water connection Ø	¾" G F	¾" G F	1" G F	1" G F	1" G F	1" G F
Permeate connection Ø	½" G F	½" G F	¾" G F	¾" G F	¾" G F	¾" G F
Drain connection Ø	½" G F	½" G F	¾" G F	¾" G F	¾" G F	¾" G F
Max permeate pressure (bars)	3	3	3	3	3	3
Width (mm)	850	850	1080	1080	1080	1080
Height (mm)	1660	1660	1545	1545	1545	1545
Depth (mm)	500	500	695	695	695	695
Overall weight in steady operation with water (kg)	83	83	114	114	137	140

Tab. 1.h

(*): The above data refer to clear water, without iron and free chlorine, at a temperature of 18°C, TDS of 500 ppm and permeate pressure of 1 bar.

1.9 System conformity

The WTS reverse osmosis desalinators comply with the following standards and directives:

- Machinery directive 2006/42/EC;
- Low voltage directive 2006/95/EC;
- Electromagnetic compatibility directive (EMC) 2004/108/EC;
- EN12100-1, EN12100-2 Safety of machinery.

The system comes within the scope of PED directive 97/23/EC, article 3 par. 3.

Ingress protection (IP):

- IP40 = with the WTS unit connected to the expansion vessel and permeate pressure switch active
- IP55 = with the WTS unit connected to the storage tank + booster pump and level sensor.

2. INSTALLATION

The system must be installed in compliance with the relevant standards in force, by qualified personnel and according to the instructions provided by the manufacturer. Incorrect installation may cause harm to people and animals or material damage, in which cases the manufacturer cannot be held liable. Electrical safety is only ensured when the appliance is plugged into a power socket with an efficient earth connection and protected by circuit breaker, as specified by the safety standards in force. This fundamental safety requirement must be ensured, having the connection carefully checked by professionally qualified personnel in case of doubt.

THE MANUFACTURER CANNOT BE HELD LIABLE FOR ANY DAMAGE DUE TO FAILURE TO COMPLY WITH THE MECHANICAL, WATER CIRCUIT AND ELECTRICAL SYSTEM STANDARDS IN FORCE, INSTALLATION NOT PERFORMED CORRECTLY OR ABSENCE OF AN EARTH CONNECTION.



Important: The system **MUST** be installed within:

- **6 months:** if the membranes are supplied inside the unit with conservation liquid and/or glycol;
- **1 year:** if the membranes are dried or supplied vacuum-sealed.

In any case, membranes must be stocked between 0 and 35 °C.

2.1 Water connections

Reverse osmosis desalinators operate correctly at a feed water pressure ranging from a minimum of 1.5 bars to a maximum of 4 bars. If the pressure is lower than 1.5 bars, a pressurisation unit needs to be installed upstream of the appliance, while if the pressure exceeds 4 bars, an effective pressure reducer needs to be installed, again upstream of the appliance.

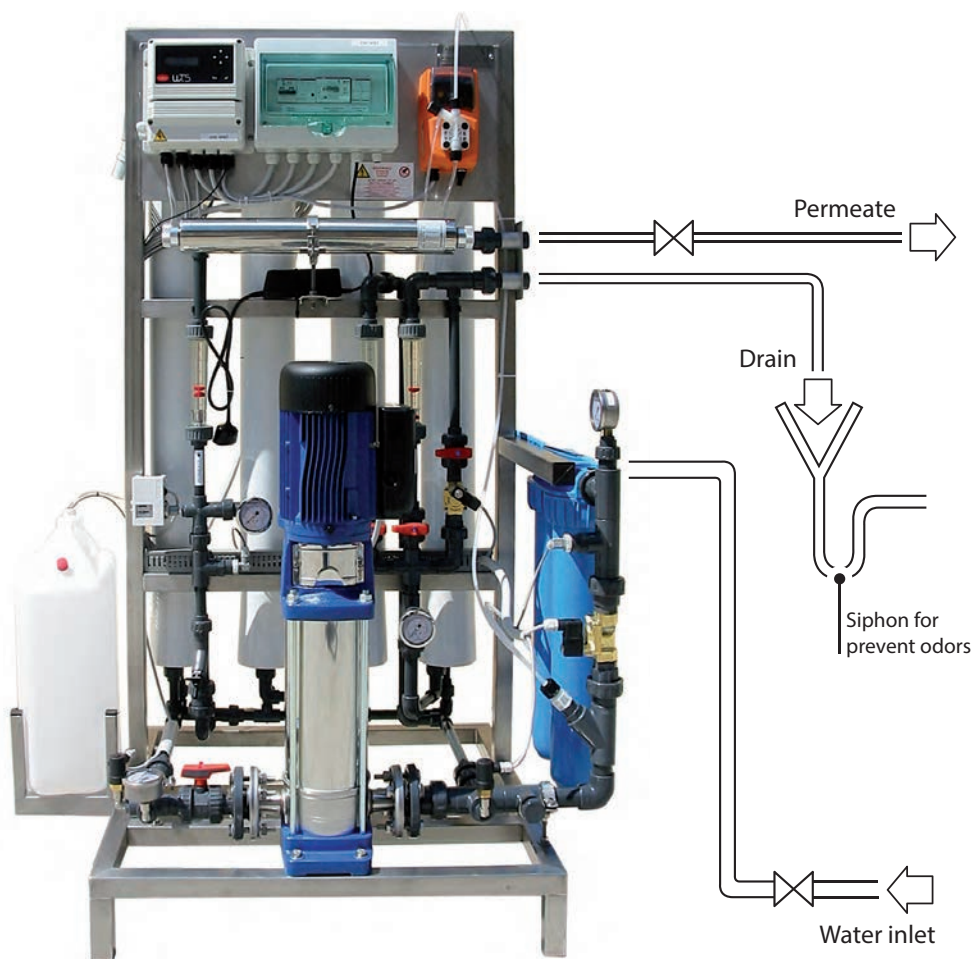


Fig. 2.a



Important: for safety reasons, the water fittings are not tightened for transport. Remember to tighten the fittings during installation.



Important: Leave clear space at the front of the system (around 1 m) to guarantee enough room for personnel to carry out adjustments and/or maintenance. Leave enough space around the system to allow access for assembly or replacement of the membrane.

2.1.1 System feed water connection

Connect the feed water to the system using piping with a minimum diameter of the connector on the appliance, ensuring flow-rate and pressure in accordance with the values shown in the table in paragraph 1.5. Fit a shut-off valve upstream of the system.

Minimum requirements: P=1.5 - 4 bars

(the feed water pressure must be as stable as possible)

¾" G F connector
ROL100...320

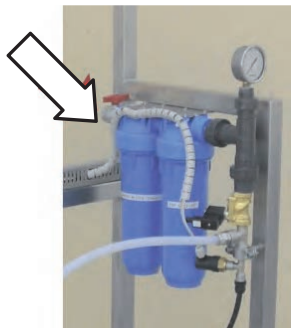


Fig. 2.b

1" G F connector
ROL460...1200

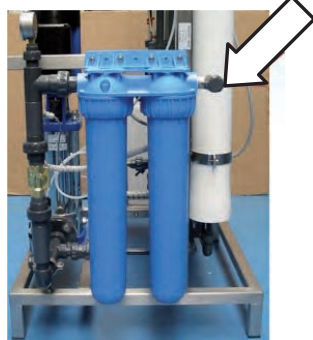


Fig. 2.c

2.1.2 Permeate line connection

Connect the permeate hose to the connection marked "PERMEATE" (Fig. 2.d and Fig. 2.e) and then to the expansion vessel or storage tank + booster pump. Use a hose with a minimum diameter equal to the diameter of the connector.

Important: to guarantee flow at the outlet even in the event of system malfunctions, install an external bypass between WATER INLET and PERMEATE.

½" G F connector
ROL100...320

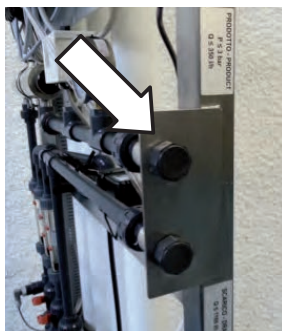


Fig. 2.d

¾" G F connector
ROL460...1200



Fig. 2.e

2.1.3 Drain line connection

Connect the concentrate drain line (DRAIN) using a hose with a minimum diameter equal to the diameter of the connector and where possible at a lower level than the connector (downward gradient).

½" G F connector
ROL100...320

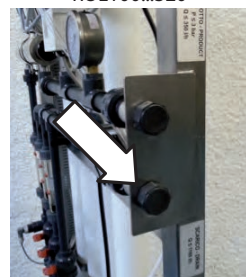


Fig. 2.f

¾" G F connector
ROL460...1200

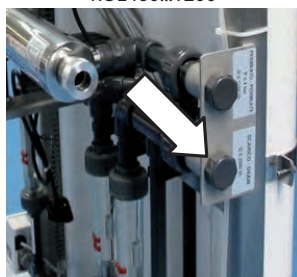


Fig. 2.g

2.1.4 Connection between RO system and humidifier, with expansion vessel

Connect the "PERMEATE" outlet to the expansion vessel or the storage tank + booster pump using suitable fittings (not supplied). The expansion vessel must be connected a maximum of 1 metre from the humidifier. Install suitable shut-off valves as illustrated in the figure.



Fig. 2.h

1" G M connector up to 100 l/h
1 ½" G M connector 200 l/h and higher

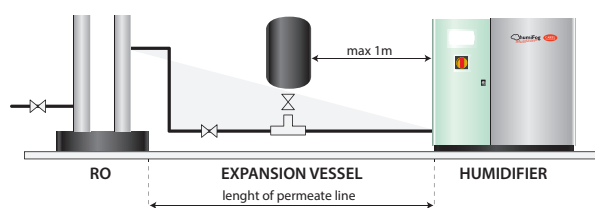


Fig. 2.i

unit P/N	permeate outlet flow-rate	length of permeate line (LINEAR, LEVEL)			
		5 m	10 m	15 m	20 m
			min. hose ID	min. hose ID	min. hose ID
ROL100	160 l/h	10 mm	10 mm	10 mm	10 mm
ROL320	320 l/h	10 mm	16.6 mm	16.6 mm	16.6 mm
ROL460	600 l/h	16.6 mm	16.6 mm	16.6 mm	16.6 mm
ROL600	600 l/h	16.6 mm	16.6 mm	16.6 mm	16.6 mm
ROL1K0	1000 l/h	16.6 mm	16.6 mm	25.4 mm	25.4 mm
ROL1K2	1200 l/h	16.6 mm	16.6 mm	25.4 mm	25.4 mm

Tab. 2.i

Note: try to limit the number of connections on the line to the minimum necessary. Adding elbows, "tees" and reducers will increase pressure drop in the line. The diameters shown in the table have been defined based on one pair of connectors, if doubling the number of connectors choose the next biggest hose diameter. Install the RO unit at the same level as the humidifier and the expansion vessel.

2.1.5 Filling the expansion vessel

Pre-charge the expansion vessel with compressed air until reaching a pressure less than or equal to the minimum setting of the permeate pressure switch (≈1.5-1.8 bars).

Fill the vessel by opening the valve on the top (see the photo).



Fig. 2.j

Use a pressure gauge (not supplied, connection 1/8" GAS) at the top of the vessel to read the water pressure inside.

2.2 Electrical connections

2.2.1 Power supply connection

Connect the electrical panel to the 230 Vac (P+N+E) - 50/60 Hz line using the plug supplied. The power socket must comply with the standards in force, protected by a residual current circuit breaker. For the power ratings, see the specifications shown in the table in paragraph 1.5.

230V single-phase (P+N+E) - 16 A – IEC 309 SL

ROL100...320

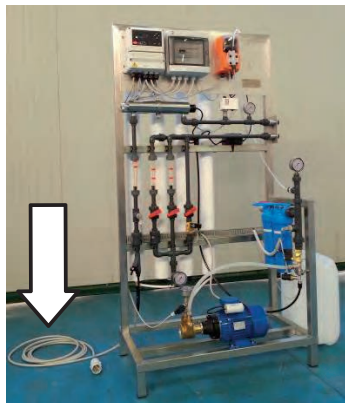


Fig. 2.k

ROL460...1200

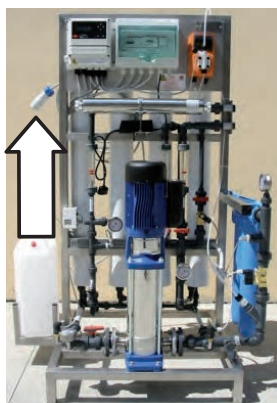


Fig. 2.l

2.2.2 Remote ON/OFF and alarm relay connection

To connect the remote ON/OFF and/or alarm relay signal cable, open the front panel of the electronic controller so as to access the terminal block. Connect the two-wire signal cable (not supplied) to the utility terminal (Fig. 2.m), running it through the cable glands into the control panel (Fig. 2.n).



Fig. 2.m

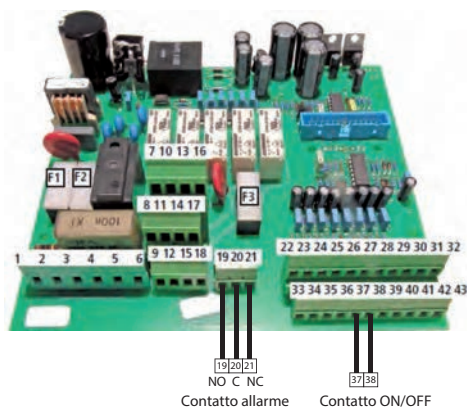


Fig. 2.n

2.2.3 Storage tank + booster pump float connection

If using the WTS unit with a storage tank + booster pump, connect the high level signal to terminals 22 - 23, and the low level signal to terminals 33 - 34.

The high level signal can be enabled in the menu "5 HIGH LEVEL".

The low level signal can be enabled in the menu "4 LOW LEVEL".

The logic of the contact (NC or NO) and the signal delay (DEFAULT 00 sec) can also be set in the same menus.

The permeate pressure switch already supplied does not need to be disconnected, as this does not interfere with the operating logic of the float.

2.3 Quartz/UV lamp installation

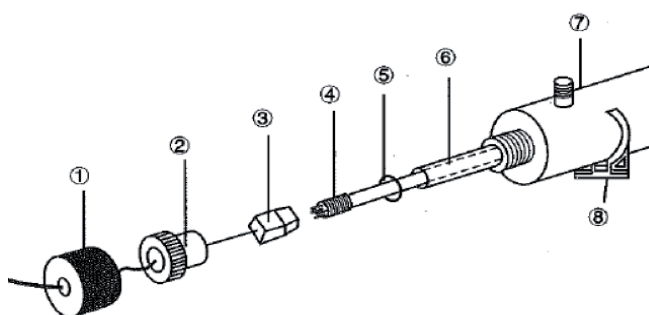


Fig. 2.o



Warning

UV radiation is harmful to the skin and eyes: disconnect power to the UV lamp before performing any operations.

The UV lamp and the quartz are very fragile. Pay extra care when performing the following operations to fit and/or remove the lamp and the quartz:

1. Open the rubber cap (1) and unscrew the plug (2).
2. Slide the lamp (4) approximately five centimetres out of the chamber (7).
3. Securely holding the end of the lamp (4), carefully remove the four-pin lamp connector (3) from the open end of the lamp.
4. Carefully remove the lamp (4) from the chamber (7).
5. Then unscrew the other end of the UV lamp to access to O-ring on the quartz tube.
6. Carefully remove the O-rings (5) from both ends of the quartz tube (6).

2.4 Filter cartridge assembly

- Make sure that the valve upstream of the system is closed. Manually activate the solenoid valve SV01 using the "SYSTEM TEST PROCEDURE" (see paragraph 3.3), so as to discharge any residual pressure;
- Switch the unit off (holding ESC for two seconds), then unplug the power cable.
- Remove the filter housings using the tool supplied;
- For maintenance work, remove the old cartridges and clean any

- impurities from the housings;
- Insert the new cartridges making sure they are positioned correctly;
- Correctly reposition the housings and tighten them using the tool;
- Open the feed water line and vent the filters using the screw at the top of the vessel;
- Plug the unit into the power socket;
- Switch the system back on.

2.4.1 ROL100 to 320 units

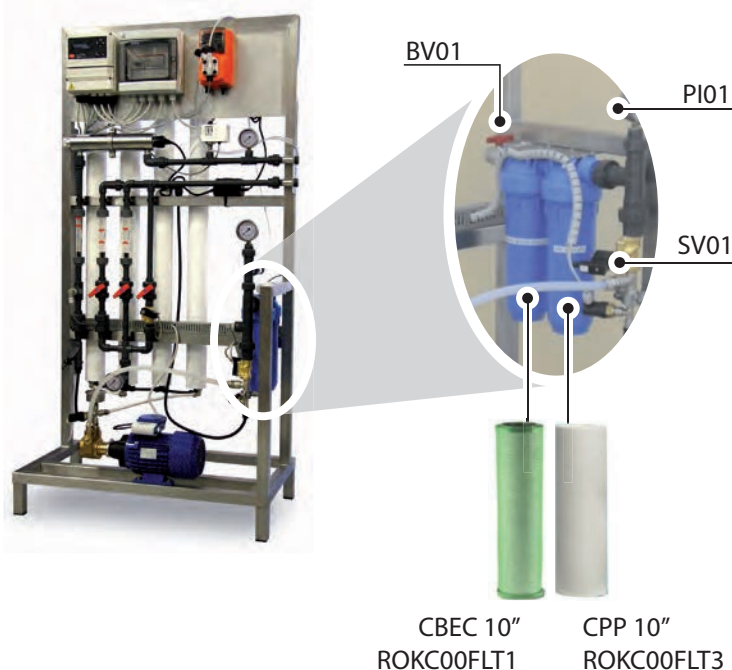


Fig. 2.p

2.4.2 ROL460 to 1200 units

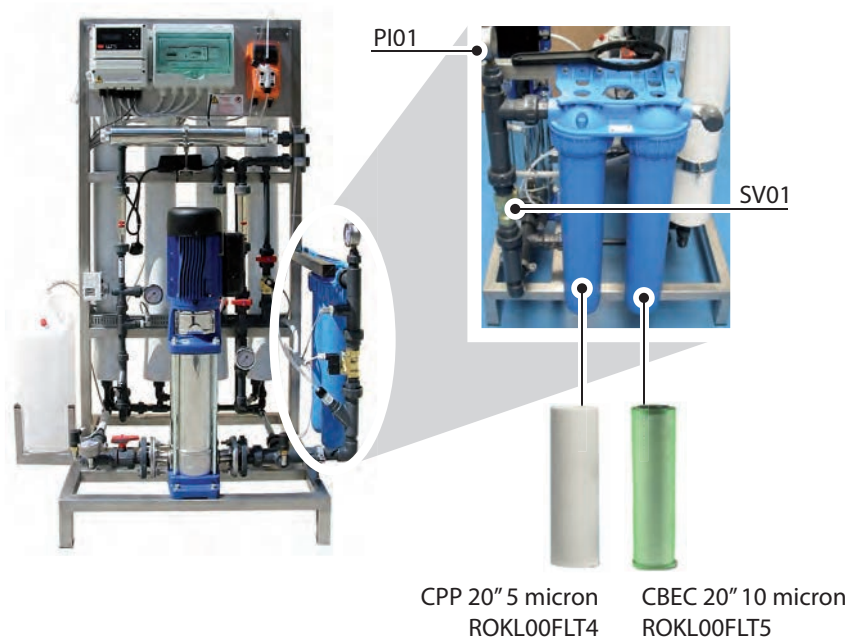


Fig. 2.q

2.5 Membrane assembly



Important:

BEFORE INSTALLING THE MEMBRANE, MAKE SURE THERE IS NO PRESSURE INSIDE THE VESSEL.

1. Attention: it is necessary to remove only the upper heads of vessel. Then loosen the locking plates, pay attention don't lose the fixing-screws.
2. Remove the plugs, making sure not to damage the fittings, tubing or gaskets. Mark the parts so as to indicate the assembly position.
3. Take the reverse osmosis membrane supplied (use clean gloves) and remove the protective wrapping, without damaging the component. Insert the gasket. Lubricate the gasket and the ends of the male spigot with clean glycerol. Also lubricate the first part of the vessel.
4. Insert the reverse osmosis membrane inside the vessel as shown in the

- figure, making sure the gasket is the right-way round (see the figure). Be careful not to damage the lip seal gasket highlighted in the photo
5. Replace the top plugs on the vessel, being careful with the tubing and checking correct positioning. Fasten them using the metal plates. Make sure that the fittings are tight.
6. Reposition the fittings on the bottom of the vessel
7. Make sure there is no abnormal stress on the tubing or the fittings.

2.5.3 Units with 4 membranes

2.5.4 Units with 2 membranes

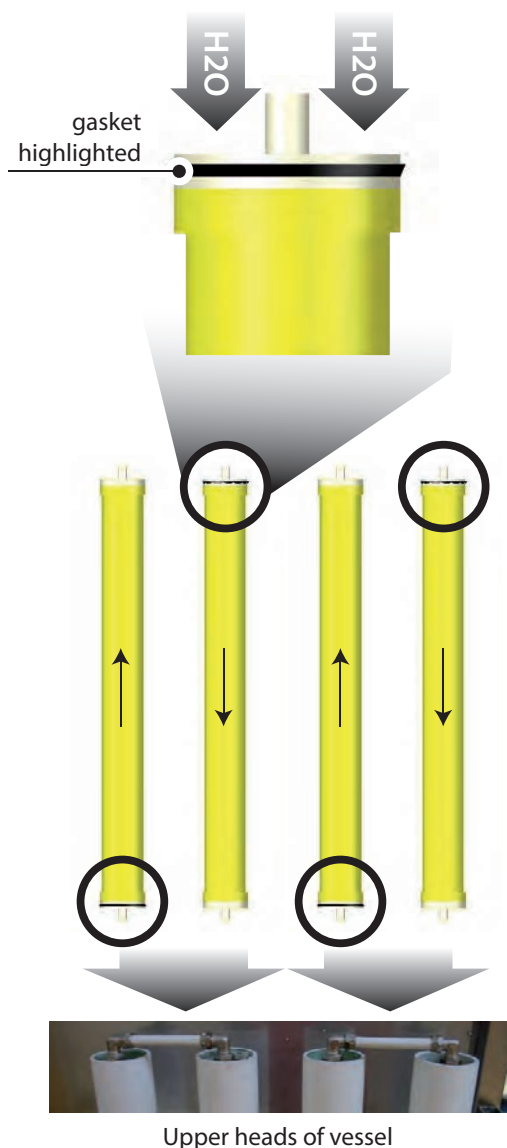


Fig. 2.r

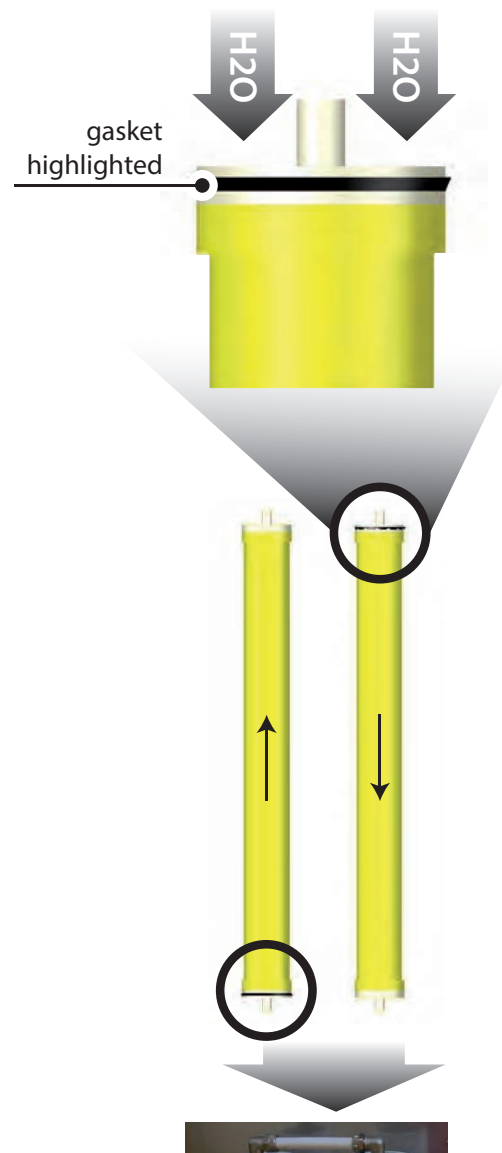


Fig. 2.s

3. COMMISSIONING

3.1 Checks before starting

Each unit is calibrated and tested in the factory using a special test procedure. When starting the appliance for the first time, the following checks need to be completed by the user:

- tightness of the various connections;
- operation of the feed water circuit;
- electrical connections;
- operation of any pre-treatment systems.

All these operations are performed by the user, who must also ensure the correct power supply.

3.2 Power on and password entry

After completing the electrical and water connections, switch the unit on:

- Press **Esc** for at least two seconds. The display will show WAIT ON for a few seconds (the time the unit takes to prepare for operation), and then the current unit status.
- Use the arrow buttons **↑** & **↓** to display the read-only information relating to operation of the unit (hour counter, conductivity, ...).
- Press **←** to access the system configuration screens.
- Enter the password. The default value is "0077". To enter the password, use the arrows **→** & **←** to move the cursor, **↑** & **↓** to change the value. Press **↵** to confirm.
- This accesses the list of modifiable items.

⚠ Important: the modifiable parameters have already been set during testing, and must not be changed. See the information provided in the manual, and only change the items described in the following section.

3.3 System test procedure

Run the system test procedure when starting or alternatively after changing the membrane and/or the inlet water filters.

The procedure is used to manually check operation of the individual components in the system.



Fig. 3.a

Water circuit test

- Access the list of modifiable items (see paragraph 3.2);
- Use the arrow buttons **↑** & **↓** to select "13 SYSTEM TEST";
- Press **←**: the unit enters manual operating mode, with all the alarms disabled;
- The display shows the map of the buttons and the components that are activated:



UP=SVIN: up arrow to enable SVIN (inlet solenoid valve EV1); each time the button is pressed, the status of the output is changed;



L=SVDRN: left arrow to enable SVDRN (drain solenoid valve EV3); each time the button is pressed, the status of the output is changed;



DN=SVOUT: down arrow to enable SVOUT (outlet solenoid valve EV2); this valve is not used on the system;



R=PUMP: right arrow to enable the PUMP; each time the button is pressed, the status of the output is changed.

Important: do not activate the pump when there is no water or solenoid valve SVDRN is closed.



E=METERING: press ENTER to enable the descaler metering pump; each time the button is pressed, the status of the output is changed.

Press **Esc** to return to the main menu.

3.4 Setting the on/off input and alarm parameters

If ON/OFF inputs and alarms are connected as shown in point 2.2.2, the controller needs to be programmed as follows:

ON/OFF input:

- Access the list of modifiable items;
- Use the arrow buttons **↑** & **↓** to select "19A STANDBY";
- Press **←**;
- Use the arrow buttons **↑** & **↓** to select "ENABLED";
- Press **←**;
- In section "19B CONTACT";
- Select the type of contact - N.O. or N.C. - using the arrows **↑** & **↓**;
- Press **←** to set a delay (in seconds) for activation of the input, otherwise press **Esc**;
- In section "19C IN DELAY";
- Use the arrow buttons **↑** & **↓**, select the contact delay closing in seconds;
- Pressing **←** returns to the main menu, while pressing **Esc** returns to the main menu without confirming the changes made.

Alarm output:

- Access the list of modifiable items;
- Use the arrow buttons **↑** & **↓** to select "11A ALARM OUT";
- Press **←**;
- Use the arrow buttons **↑** & **↓** to select "ENABLED";
- Press **←**;
- In section "11B CONTACT";
- Select the type of contact - N.O. or N.C. - using the arrows **↑** & **↓**;
- Pressing **←** returns to the main menu.

Test alarm relay

Proceed as follows:

- Access the list of modifiable items;
- Use the arrow buttons **↑** & **↓** to select "14 TEST ALARM";
- Press **←**;
- The display shows the map of the buttons and the components that are activated:
 - UP TEST ALARM:** **↑** arrow to activate/deactivate switching of the alarm relay;
- Press **Esc** to return to the main menu.

3.5 Filling the descaler container-adjusting the metering pump

The descaler liquid is used to prevent calcium and magnesium residues present in the feed water from depositing on the membrane, causing a decline in performance and reducing operating life. The descaler liquid is contained in the descaler tank, housed on a special support. The metering pump dilutes the liquid and delivers the required dose into the feed water circuit, upstream of the pump.

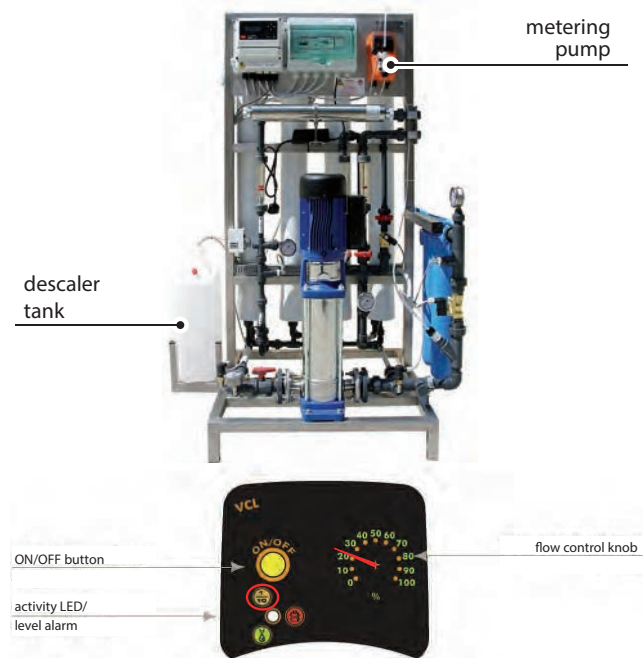


Fig. 3.b

3.5.5 Filling the descaler container

Using a graduated recipient, the dilute the descaler in the tank supplied with desalinated water (produced during start-up, see point 7 on page 18).

Using Carel P/N ROKL00AS**, a dilute 1:40 in water, i.e. 0.5 kg of descaler with 20 litres of demineralised water.

Make sure not to damage the float when closing the cap on the tank.

3.5.6 Adjusting the metering pump

Position the flow control knob at 20% (see Fig. 3.a).

Press and hold the On/Off button until the indicator LED flashes three times.

Release the On/Off button.

This will deliver around 3 ppm of descaler. During production, check that descaler is metered every 12-20 seconds in WTS models up to 320 l/h, or around each 6-10 seconds on WTS models from 460 to 1200l/h.

Otherwise, adjust the knob by increasing flow above 20%.

Indicator LED

The LED on the front of the metering pump indicates its operating status using five different signals.

LED	PUMP OPERATION
3 flashes per second (RED)	Pump powered but voltage too low
2 flashes per second (RED)	Pump powered but voltage too high
2 flashes per second (ORANGE)	Pump OFF and powered
On steady, off each delivery (ORANGE)	Pump ON
Always on (RED)	Level alarm

Tab. 3.a

3.6 System shutdown

Correct operation of the reverse osmosis desalinator requires continuous production of demineralised water.

If not operating the unit for a period no longer than 10 days, simply leave it plugged in to the power and connected to the water supply, and the unit will periodically flush the membrane (generally for 30 seconds every 24 hours of inactivity, parameter set during testing).

If not operating the unit for a period longer than 10 days up to a maximum time of 1-2 months, the flushing setting should be changed to 15 minutes every 48 hours.

To change the flushing setting, proceed as follows:

- access the list of modifiable items;
- use the arrows \uparrow & \downarrow to select "10 FLUSHING";
- press \leftarrow ;
- scroll screens 10A, 10B, 10C... by pressing \leftarrow , until reaching screen 10H. Make sure not to change the default values on the screens when scrolling.
- on screen 10H set the membrane flushing cycle every n hours. Then set the duration of the flushing cycle in min and sec (maximum value 99 min and 59 sec) and the applicable period in hours (maximum value 99 hours). Use the arrows \rightarrow & \leftarrow to move the cursor to the required digit use the arrows \uparrow & \downarrow to enter the value.



Important: setting "00 hrs" disables periodical flushing.

- pressing \leftarrow returns to the main menu, confirming the changes made.
- pressing **Esc** scrolls back through the screens until reaching the main menu, without saving the changes made.

If not operating the unit for a period longer than 1-2 months, or alternatively when needing to disconnect the reverse osmosis system from the power or water supply, the system maintenance procedure must be performed. This procedure involves emptying the system and then filling it with a special maintenance liquid. This operation must only be performed by authorised technical personnel, following agreement with Carel.



Important: Remember that during not operating periods also the expansion vessel (or the storage tank) needs to be drained.

4. START-UP

4.1 Starting the system the first time

When starting the first time, and whenever starting the system after a period of inactivity, the chemicals used for maintenance and/or any stagnant water need to be removed and/or the membrane needs to be wetted, if newly fitted.

Do not use the water produced during this stage.

Disconnect the permeate outlet from the vessel and run the water into an open drain.

Before performing any operations, with the unit off, visually identify the following manual valves (Fig. 4.a):

- BV02 recirculation control valve
- BV03 drain control valve
- BV04 flushing control valve
- SV01 NC fill solenoid valve (see Fig. 2.o and 2.p)
- SV02 NC flushing solenoid valve

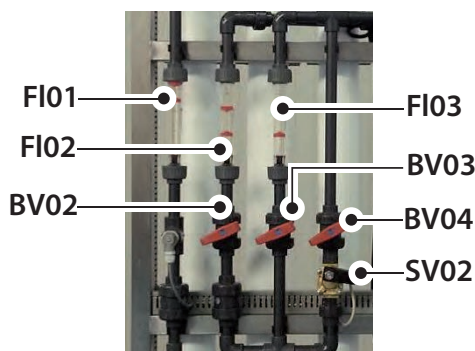


Fig. 4.a

Slowly open the water supply upstream of the system: the water will enter the inlet filters, currently shut-off by the NC fill solenoid valve. Then vent the cartridge filters using the screw at the top of the vessel, to release any air trapped inside.

Switch the unit on by pressing the **Esc** button for two seconds. The screen will show "WAIT ON" (loading time), then the current unit status will be displayed.

Proceed as follows:

1. Press enter the password "0077", scroll the various screens (&) and access submenu "13 TEST SYSTEM" by pressing , this accesses manual operating mode, and all the alarms are disabled (see paragraph 3.3).
2. Energise the normally closed solenoid valves so as to allow the flow of water at mains pressure (leaving the pump off). To open the valves, proceed as follows:
 - arrow pressed once: energise the fill valve (SV01 water inlet solenoid valve)
 - arrow pressed once: energise the drain valve (SV02 flushing valve).
3. Completely open the flushing valve BV04. With the solenoid valves open, allow natural flow to the permeators for 10 minutes, at mains pressure, without production of desalinated water.
4. Then adjust BV04 (flushing) so that the pressure at the permeators (membrane) is around 1 bar, read on the pressure gauge immediately downstream of the pump (PI02). Leave the system in this condition for at least 10 minutes.
5. Start the pump (P). To do this, press the arrow once from the "13 TEST SYSTEM" menu (see paragraph 3.3).
6. Manually adjust valve BV04 (flushing) so that the pressure at the permeators is 2-2.5 bars. Leave the system in this condition for at least 5 minutes.
7. Close the flushing solenoid valve SV02 (arrow from menu 13); desalinated water will now be produced, but not of satisfactory quality. Part of the water produced in this stage can be used to fill and dilute the descaler tank. This water can also be used to wash the tank downstream. Continue for at least 10 minutes.

8. Then turn off first the pump (arrow in submenu 13) and then close the fill solenoid valve SV01 (arrow). Empty the storage tank so as to eliminate any contaminants. Connect the permeate outlet back to the vessel downstream of the WTS.
9. Restore automatic operation by exiting menu 13.
10. Bring the system to steady operation so that the proportion between permeate flow-rate, recirculation flow-rate and drain flow-rate ensures the recommended recovery values (see the chart in Table 1.f). The flow-rate values can be read on the flow meters positioned in the permeate circuit (FI 01), in the recirculation circuit (FI 02) and in the drain circuit (FI 03). The correct position for reading the flow-rate is in line with the graduated scale on the flow meter. If necessary, adjust valves BV02 and BV03 to obtain the required production and recovery values.
11. If, despite having achieved the recommended recovery value, the flow-rate of permeate produced is not satisfactory, adjust the operating pressure upstream of the membrane. In particular, increasing the pressure upstream of the membrane will ensure greater production of desalinated water.

Depending on the type of pump fitted on the system, proceed as follows:

- rotary vane pump (on models from 100 l/h to 320 l/h): adjust the bypass valve (see Fig. 4.b), opening or closing it using a flat-head screwdriver. Observe the variation in pressure on the pressure gauge downstream of the pump, then observe the variation in flow-rate on the permeate flow meter. Keep adjusting until obtaining the required flow-rate.
- multistage pump (on models from 460 l/h to 1000 l/h): manually adjust the ball valve immediately downstream of the pump (Fig. 4.c). Observe the variation in pressure on the pressure gauge downstream of the pump, then observe the variation in flow-rate on the permeate flow meter. Keep adjusting until obtaining the required flow-rate.



Fig. 4.b

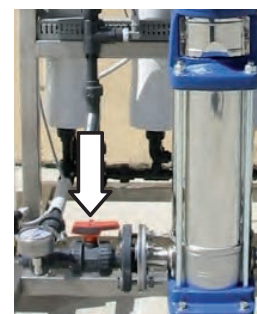


Fig. 4.c

Important: Reverse osmosis membranes work at a pressure between 5 to 12 bars. Nonetheless, the optimum pressure value is always the lowest possible that gives satisfactory permeate production. Permeate flow-rate depends considerably on the conditions of the feed water and its temperature, as well as membrane wear. For this reason, at times operating pressure needs to be increased.

12. Leave the system running for 30 minutes so as to reach steady operating conditions, periodically checking that the design parameters (flow-rates, pressure and conductivity) stabilise within the range of limit values.
13. Take a sample of outlet water and perform chemical/physical and if necessary bacteriological analysis to ensure the water is suitable for the intended purpose.
14. Finally, adjust manual valve BV04 so that when the membrane is flushed (automatically on start-up and at the end of each production cycle), the pressure is 1 to 3 bars.

5. TROUBLESHOOTING

Fault	Probable cause	Solution
Solenoid valves don't open	No voltage to the electrical panel or the control coil	Connect voltage to the electrical panel and/or check coil connections and power supply
	Faulty control coil	Replace the solenoid valve
	Insufficient pressure	Check feed water and make sure this meets the design parameters
High permeate conductivity: display shows "SYSTEM OFF HIGH CONDUCT. ALARM"	Incorrect process parameters	Set the system again, making sure the settings meet the design parameters
	Dirty or contaminated membrane	Contact the supplier's Technical Service for details on how to proceed
	System feed water parameters changed	Contact the supplier's Technical Service for details on how to proceed.
Reverse osmosis production doesn't start even when enabled and no alarms are active	No signal from the float	Check operation of the float and replace if necessary
	Pre-treatment system (if featured) regenerating	Check the microswitch on the pre-treatment system
Decrease in desalinated water flow-rate	Decrease in permeator suction pressure	Check the pump P and make sure it is powered correctly, repair if necessary. Restore pressure to the design values, where necessary adjusting the bypass on pump P01
	Increased pressure drop across the membrane due to blockage	Check process parameters and if necessary contact the supplier for a replacement
	Valves not calibrated correctly, worn or faulty	Adjust or restore design flow-rate and pressure Check the wiring
	Blocked pipes	Unblock
	Decrease in feed water flow-rate	Check any pre-treatment systems or shut-off valves upstream of the system Blocked filter cartridge. Replace the cartridge
	System feed water parameters changed	Contact the supplier's Technical Service for details on how to proceed.
	Valves not correctly adjusted or closed	1. Adjust or restore flow as per the instructions 2. Perform maintenance on the valves, checking the conditions of the internal parts 3. Check correct operation of the electrical actuators
		Check the wiring and make the necessary repairs
Display shows "SYSTEM STANDBY – METERING FAILED"	Electrical fault	The fuse has blown. Replace the fuse as described in chapter 3.6.2 The metering pump is faulty. Replace the metering pump.
	The metering pump doesn't start	The liquid inlet filter inside the descaler container is blocked. Clean the filter
	The metering pump does not deliver liquid but the magnet "fires"	Dirt has formed inside the valve or the valve is blocked. Replace the metering pump
	The metering pump does not deliver liquid and the magnet does not "fire", or its activation is quite weak	Level alarm.
	The red LED on the pump is on steady	Add descaler liquid.

Tab. 5.a



Important: If the problem persists please contact CAREL for assistance.

6. MAINTENANCE

For correct operation of the reverse osmosis system, operating conditions must be constantly monitored, specifically:

- make sure the chlorine concentration of the feed water is not excessive
- make sure that the hardness and conductivity of the feed water are within the limit values (suggested in paragraph 1.7)
- make sure system operation is regular
- keep the unit and the surrounding environment clean

6.1 Routine maintenance

Routine maintenance is very important, and without it the reverse osmosis system may not operate correctly. The monthly operations carried out should be recorded on a photocopy of the chart shown in chapter 7.

6.1.7 Filling the descaler liquid

The descaler liquid, in suitable proportions, is used to prevent calcification of the membrane.

The level of descaler liquid in the tank needs to be monitored continuously. Consumption of the descaler liquid mixture depends on the production of demineralised water and the dosage set on the metering pump.

The reverse osmosis system cannot work without descaler liquid, otherwise the membrane may be irreversibly damaged. Consequently, the electronic controller stops operation and activates an alarm when the descaler in the tank reaches the low level.

Always fill the descaler tank before this alarm is activated.

6.1.8 Replacing the inlet filters

The inlet filter assembly comprises the CBC carbon filter and CPP 5 µm filter. These filters need to be checked and replaced when necessary.

Replacing the CBC carbon filter: the CBC carbon filter is used to reduce the chlorine content in the feed water. The presence of chlorine in the water may irreversibly damage the membrane. The carbon filter works by chemical reaction, combining and absorbing the chlorine molecules. Consequently, its performance will decline over time.

The CBC cartridge needs to be replaced:

- every four months if the chlorine content in the feed water is less than 0.1 ppm.
- every two months if the chlorine content in the feed water is between 0.1 ppm and 0.2 ppm.

Replacing the CPP 5 µm filter: the CPP micron filter traps impurities around 5 µm in size. The filter works mechanically, letting the feed water flow through a filtering mesh. It is normal for the filter to become blocked over time, letting less water through and increasing the pressure drop.

The CPP cartridge needs to be replaced when the system feed water pressure (after having passed through the inlet filter cartridges) is less than 1 bar during normal operation (pressure read on pressure gauge PI01).

6.1.9 Replacing the UV lamp

The UV lamp has a limited operating life. The following intervals are recommended for replacement (whichever comes first):

- 1000 operating hours
- one year

6.1.10 Resetting the maintenance counter










To display the number of hours of system production, from the main screen that shows system status, press the DOWN ARROW, scrolling the following screens in sequence:

- outlet conductivity
- system operating hours, where one operating hour corresponds to a decimal number (resettable in menu "12A RES HOUR COUNTER")
- countdown of hours remaining until routine maintenance is next required, signalled every 400 operating hours (resettable in menu "12B RES MAINT").

It is not recommended to reset the system hour counter, unless in exceptional cases (e.g. replacing the membrane).

The maintenance hour counter is reset after the unit has signalled the maintenance alarm, meaning maintenance is needed on the system.

The hour counter can be reset on the user interface, in menu "12 RESET":

- The display shows the first screen "12A RES HOUR COUNTER".
- By default the cursor is on NO (press  to confirm).
- Press  or  to change the setting between YES-NO.
- Press  to confirm the setting.
- Press  to go to the second screen "12B RES MAINT".
- By default the cursor is on NO (press  to confirm).
- Press  or  to change the setting between YES-NO.
- Press  to confirm the setting.

6.2 Special maintenance and repairs

Special maintenance and repairs concern the repair or replacement of one or more components: typically these operations are never required, unless in cases exceptional.

Below are some cases of special maintenance and repairs that may be required.

6.2.11 Membrane replacement

The membranes undergo a natural decline in performance over time, specifically:

- annual reduction in water produced of 7%
- annual increase in outlet water conductivity of 10%

After a certain period of operation, in relation to the characteristics and volume of water treated, the membranes tend to become blocked, with a decline in efficiency.

This decline in membrane efficiency may depend on two main factors:

- blockage due to precipitation of iron or calcium sulphate and carbonate
- biological blockage
- infrequent replacement of the CBC (carbon block filter)

Replacement becomes necessary when the system shows variations in the following fundamental parameters (for the same initial feed water temperature):

- decrease in water produced to a level that is insufficient for the application connected downstream of the reverse osmosis system.
- excessive increase in the conductivity of the water produced to a level that is excessive for the application connected downstream of the reverse osmosis system.

6.2.12 Replacing the metering pump fuse

If the fuse on the metering pump blows, it can only be replaced by specialist personnel. The replacement procedure is as follows:

- Holding the pump, remove the 6 screws at the rear
- Slide out the rear part of the pump until it is completely detached from the front part, so as to access the circuit at the front of the pump. Be careful with the spring on the injection element shaft
- Locate the fuse and replace it with an identical one
- Reposition the rear part of the pump until it is completely coupled with the front part
- Tighten the 6 screws on the pump
- Replace the pump in the unit and tighten the two screws to the frame

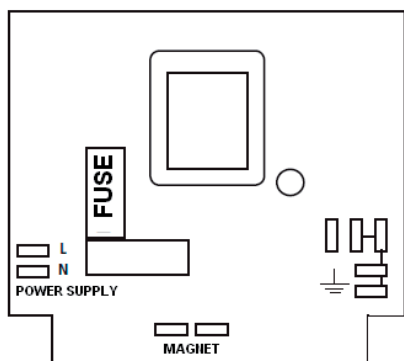


Fig. 6.a

6.3 Dismantling

If the desalinator is no longer used, or is replaced by another appliance, it needs to be dismantled. This procedure must be performed in accordance with the standards in force.

If the desalinator, or part of it, is decommissioned, the parts that are potentially hazardous need to be made safe.

The following materials used to construct the unit need to be separated: polyethylene and rubber, fibreglass, plastic and PVC, electrical wiring, semipermeable membrane, metals, filter cartridges

Separation and disposal of the above-mentioned materials must be performed in accordance with the relevant standards in force.

6.4 Instructions for emergency situations

In the event of fires, use powder extinguishers compliant with the standards in force. Never use liquid fire extinguishers. Beware of the gases produced (plastic, electrical system, fibreglass, etc.).

7. PERIODICAL MAINTENANCE CHART

SYSTEM			DATE	
EQUIPMENT OR COMPONENTS CHECKED (CHECKS, CALIBRATIONS, LEVELS, SET POINT, ETC.)	Correct operation		Replacement	REMARKS & SUGGESTIONS
	YES	NO		
ACTIVATED CARBON CARTRIDGE FILTERS	<input type="checkbox"/>	<input type="checkbox"/>		
5 MICRON CARTRIDGE FILTERS	<input type="checkbox"/>	<input type="checkbox"/>		
DESALINATOR (MEMBRANE)	<input type="checkbox"/>	<input type="checkbox"/>		
SYSTEM WATER CONNECTIONS	<input type="checkbox"/>	<input type="checkbox"/>		
ELECTRICAL PANEL, VARIOUS INSTRUMENTS	<input type="checkbox"/>	<input type="checkbox"/>		
SOLENOID VALVES, PRESSURE SWITCHES	<input type="checkbox"/>	<input type="checkbox"/>		

MEASURED VALUES			
MAINS WATER PRESSURE	BARS	FEED WATER HARDNESS	ppm CaCO ₃
REVERSE OSMOSIS PUMP PRESSURE	BARS	DESALINATED WATER FLOW-RATE	L/H
		DRAIN WATER FLOW-RATE	L/H

SAMPLES TAKEN FOR ANALYSIS		REMARKS
SYSTEM FEED WATER	<input type="checkbox"/>	
DESALINATED WATER OUTLET	<input type="checkbox"/>	

SYSTEM SUPERVISOR'S SIGNATURE

8. SPARE PARTS

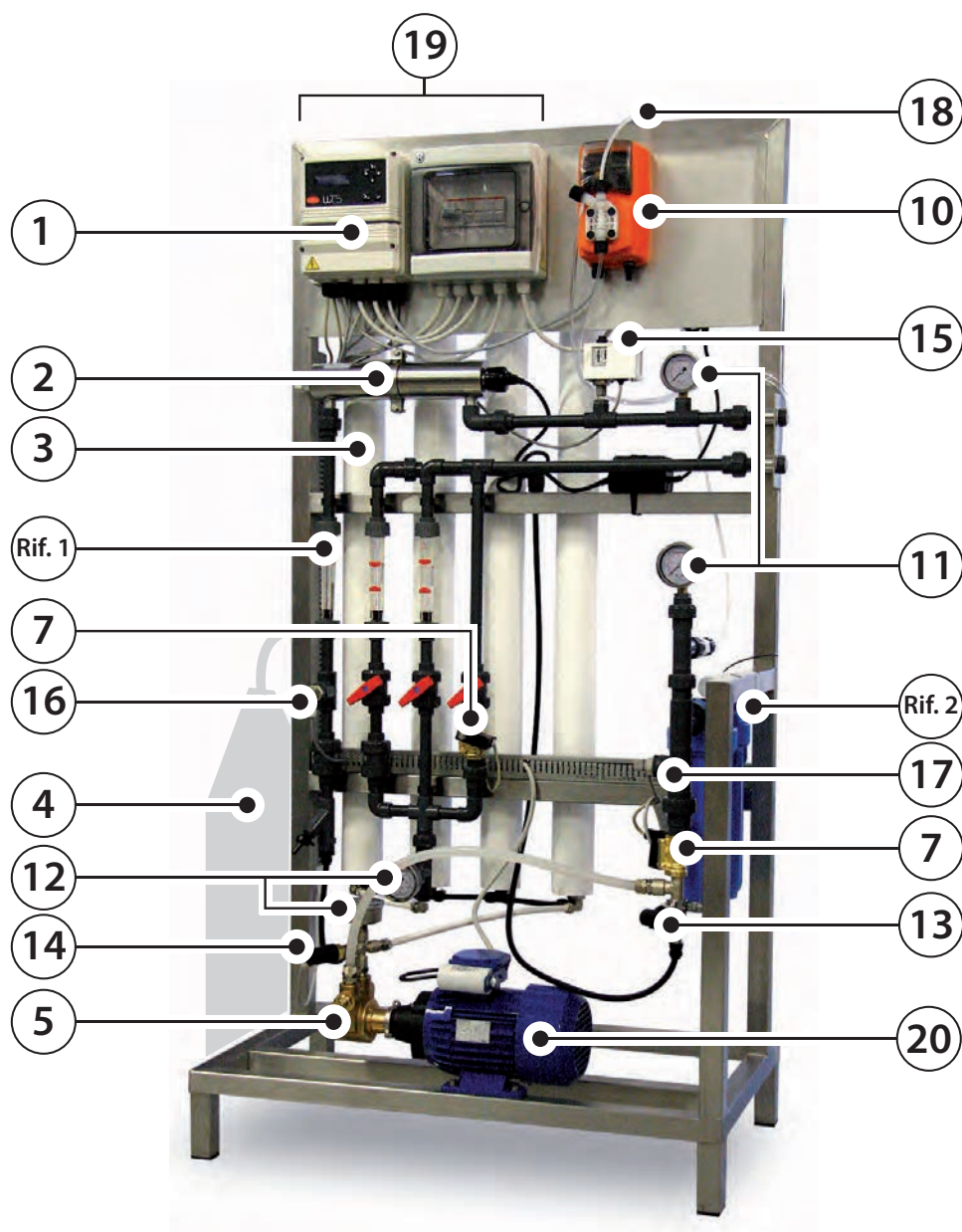


Fig. 8.a

ROL100-ROL320

Spare parts and consumables for routine maintenance.

No.	P/N	Description
Ref.	ROK00FLT1	CB-EC activated carbon cartridge – 10" size – 10 µm filtration
2	ROK00FLT3	CPP cartridge – 10" size – 5 µm filtration
	ROKL00AS00	Descaler liquid, NSF certified – 25 litre container
4	ROKL00AS01	Descaler liquid – 25 litre container
2	ROKL00UVL1	UV lamp

Tab. 8.a

Spare parts for special maintenance and repairs.

No.	P/N	Description
Ref.	ROK00HOU1	10" water inlet filter housing – 3/4" G F attachment
	ROK00WREN	10" filter tightening spanner
2	ROK00OR10	10" water inlet filter gasket kit
	ROKL00ME10	Single reverse osmosis membrane, 2.5" x 40" high filtration for steel
3	ROKL00ME1B	Single reverse osmosis membrane, 2.5" x 40" for brass
	ROKL00VS25	Single vessel for 2.5" reverse osmosis membrane
	ROKL00OR25	O-ring kit for 2.5" reverse osmosis membrane
7	ROKL00IV12	NC water inlet solenoid valve with 230 V coil – 1/2"

No.	P/N	Description
Ref.	ROKL00FL20	Flow meter D.20
1	ROKL00VALS	Ball valve D.20
11	ROKL00MA06	Stainless steel pressure gauge D.63 1/4" brass radial attachm. 0 – 6 bars
12	ROKL00MA16	Stainless steel pressure gauge D.63 1/4" brass rear attachm. 0 – 16 bars
13	ROK00PSLP	1/4" brass adjustable pressure switch – NO
14	ROKL00PSHP	1/4" brass adjustable pressure switch – NC
15	ROKL00PSOU	1/4" stainless steel adjustable pressure switch – NC / NO
16	ROKL00EC01	1/2" outlet conductivity probe
17	ROKL00EC02	1/2" inlet conductivity probe
5	ROKL00PUMP	800 lph rotary pump with bypass
20	ROKL00MOT5	Single-phase motor with joint and adapter 550 W – 50 Hz
	ROKL00MOT6	Single-phase motor with joint and adapter 550 W – 60 Hz
10	ROKL00DP00	Descaler metering pump
18	ROKL00DPPI	Connection tubing kit for metering pump
1	ROKL00EP00	Complete electronic control panel
	ROKL00DEB1	UV germicidal lamp (complete)
2	ROKL00QZL1	Quartz for UV lamp
	ROKL00UVT1	Power supply for UV lamp
		UV lamp fuse in the electrical panel 10x38 – 6A aM
		Pump fuse in the electrical panel 10x38 – 1A gG
19	ROKL00FUS1	Slow-blow fuse for metering pump 5x20 – 800 mA
	Kit including all the fuses	Fuse F1 – general protection 5x20 – 6.3A T
		Fuse F2 – instrument protection 5x20 – 2A T
		Fuse F3 – alarm protection 5x20 – 2A T

Tab. 8.b

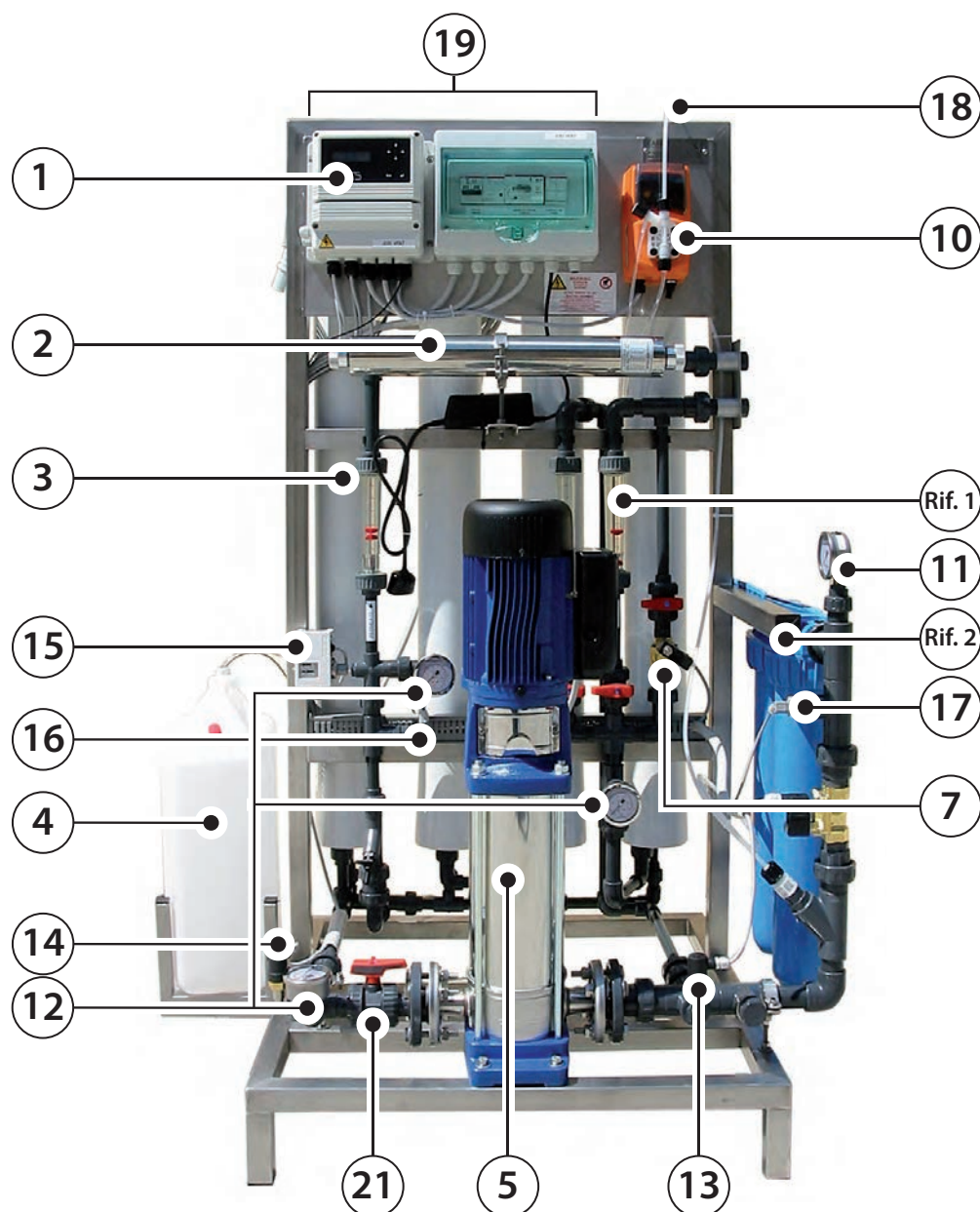


Fig. 8.b

ROL460 - ROL600 - ROL1K0 - ROL1K2

Spare parts and consumables for routine maintenance.

No.	P/N	Description
Ref.	ROK00FLT5	CB-EC activated carbon cartridge – 20" size – 10 µm filtration
2	ROK00FLT4	CPP cartridge – 20" size – 5 µm filtration
4	ROKL00AS00	Descaler liquid, NSF certified
	ROKL00AS01	Descaler liquid
2	ROKL00UVL1	UV lamp (for 460 and 600 l/h system)
	ROKL00UVL2	UV lamp (for 1000 l/h and 1200 l/h system)

Tab. 8.c

Spare parts for special maintenance and repairs.

No.	P/N	Description
Ref.	ROKL00HOU2	20" water inlet filter housing - 1" G F attachment
2	ROKL00WREN	20" filter tightening spanner
	ROKL00OR20	20" water inlet filter gasket kit
	ROKL00ME20	Single reverse osmosis membrane, 4" x 40" high filtration for steel
	ROKL00ME2B	Single reverse osmosis membrane, 4" x 40" for brass
3	ROKL00ME30	Single reverse osmosis membrane, 4" x 40" XL high filtration for steel (600 l/h only)
	ROKL00ME3B	Single reverse osmosis membrane, 4" x 40" XL for brass (600 l/h only)
	ROKL00VS40	Vessel for 4" reverse osmosis membrane
	ROKL00OR40	O-ring kit for 4" reverse osmosis membrane
7	ROKL00IV34	NC water inlet solenoid valve with 230 V coil – 3/4"

No.	P/N	Description
Ref.	ROKL00FL25	Flow meter D.25
1	ROKL00VALS	Ball valve D.25
	ROKL00FL32	Flow meter permeate D.32 (1200 l/h units only)
11	ROKL00MA06	Stainless steel pressure gauge D.63 1/4" brass radial attachm. 0 – 6 bars
12	ROKL00MA16	Stainless steel pressure gauge D.63 1/4" brass rear attachm. 0 – 16 bars
13	ROK00PSLP	1/4" brass adjustable pressure switch – NO
14	ROKL00PSHP	1/4" brass adjustable pressure switch – NC
	ROKL00PSOU	1/4" stainless steel adjustable pressure switch – NC / NO
16	ROKL00EC01	1/2" outlet conductivity probe
17	ROKL00EC02	1/2" inlet conductivity probe
	ROKL00PUM5	Multistage centrifugal pump – 50 Hz
5	ROKL00PUM6	Multistage centrifugal pump – 60 Hz
	ROKL00PUX5	Multistage centrifugal pump – 50 Hz (1200 l/h units only)
	ROKL00PUX6	Multistage centrifugal pump – 60 Hz (1200 l/h units only)
21	ROKL00VALS	Ball valve D.25
10	ROKL00DP00	Descaler metering pump
18	ROKL00DPPI	Connection tubing kit for metering pump
1	ROKL00EP00	Complete electronic control panel
	ROKL00DEB1	UV germicidal lamp (complete)
	ROKL00QZL1	Quartz for UV lamp
2	ROKL00UVT1	Power supply for 15W UV lamp
	ROKL00DEB2	UV germicidal lamp (complete) (1000 and 1200 l/h units only)
	ROKL00QZL2	Quartz for UV lamp (1000 and 1200 l/h units only)
	ROKL00UVT2	Power supply for 21W UV lamp (1000 and 1200 l/h units only)
19	ROKL00FUS2	UV lamp fuse in the electrical panel 10x38 – 1A gG
		Slow-blow fuse for metering pump 5x20 – 800 mA
		Fuse F1 – general protection 5x20 – 6.3A T
		Fuse F2 – instrument protection 5x20 – 2A T
		Fuse F3 – alarm protection 5x20 – 2A T

Tab. 8.d

9. WATER CIRCUIT

Key

BV	Manual ball valve
PI	Pressure gauge
PS	Adjustable pressure switch
SV	Diaphragm solenoid valve
P	Electric rotary vane pump
EC	Conductivity probe
FI	Flow indicator
CV	Check valve
RO E.P.	RO system control panel
LSH	Float level switch
RV	Manual control valve
DP	Metering pump



DRAIN CONNECTION
AT CLIENT'S CHARGE

COLLEGAMENTO A SCARICO
A CURA DEL COMMITTENTE

CAREL



Gas F XX"

LIMITS OF
SUPPLY

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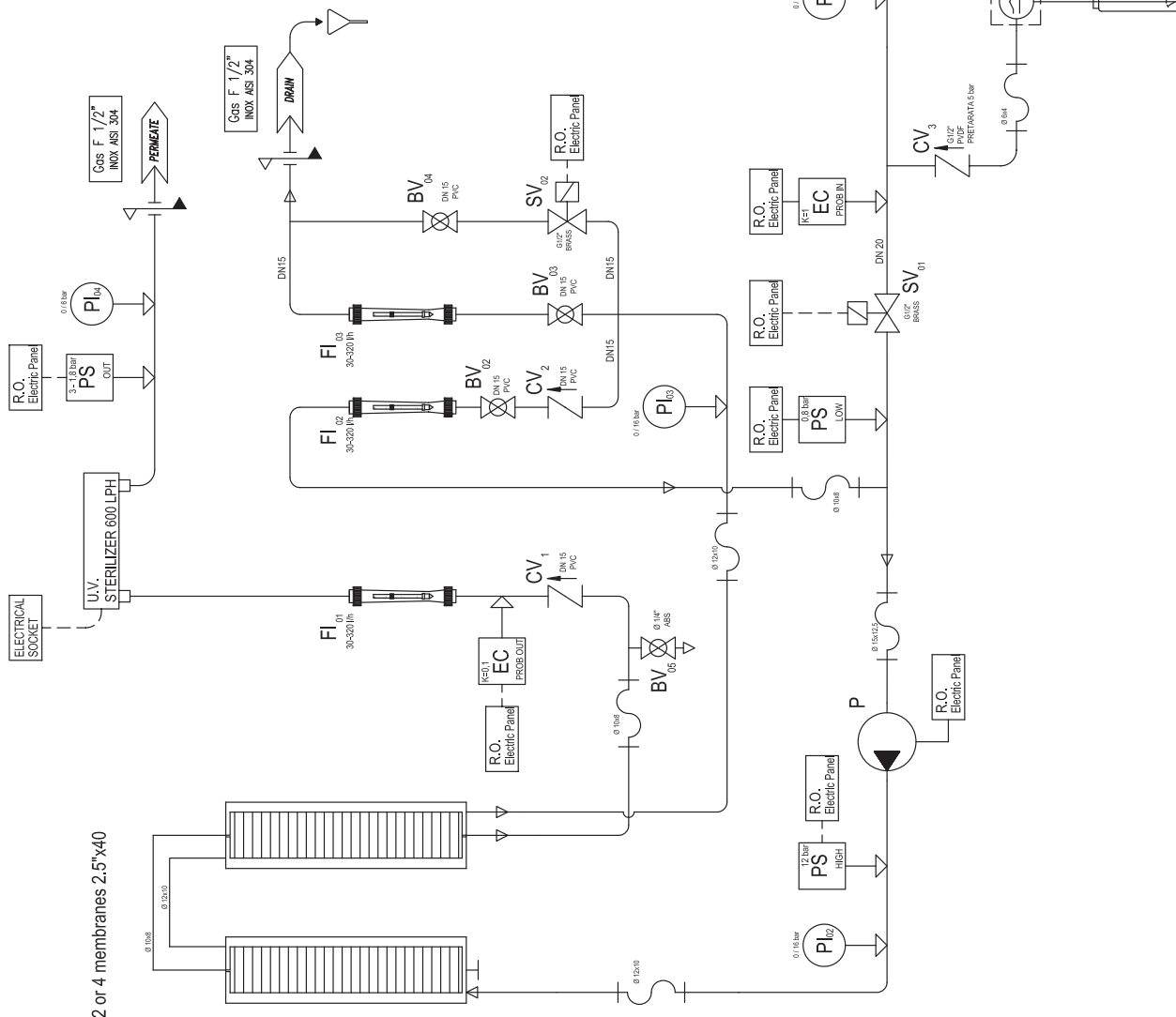
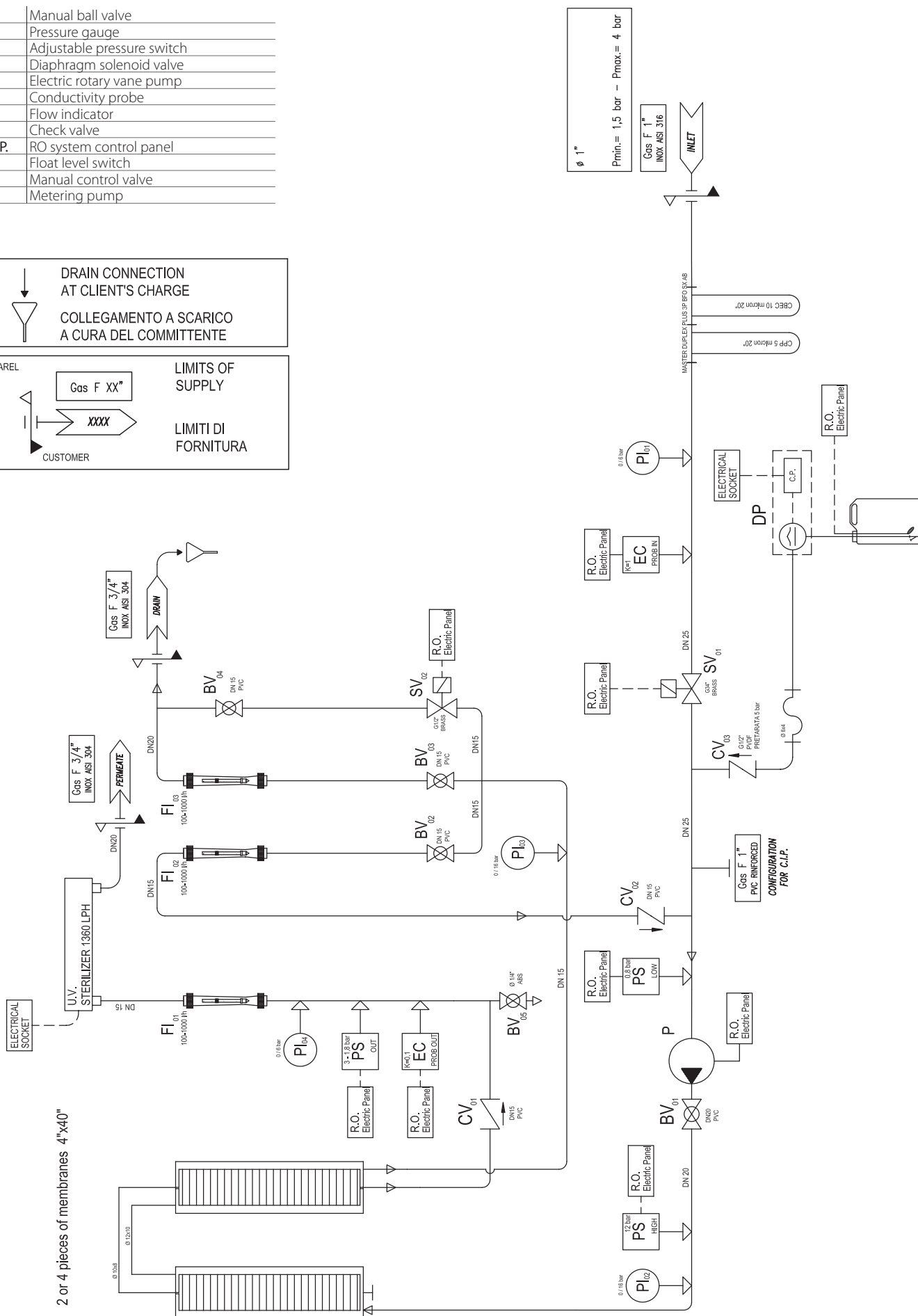
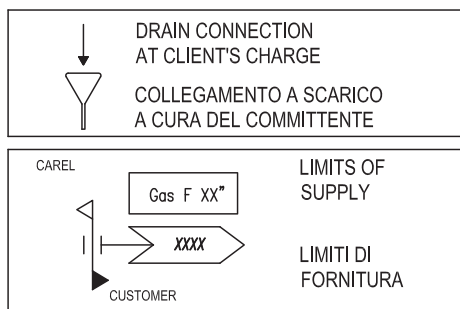


Fig. 9.a

BV	Manual ball valve
PI	Pressure gauge
PS	Adjustable pressure switch
SV	Diaphragm solenoid valve
P	Electric rotary vane pump
EC	Conductivity probe
FI	Flow indicator
CV	Check valve
RO E.P.	RO system control panel
LSH	Float level switch
RV	Manual control valve
DP	Metering pump



"WTS large reverse osmosis" +0300016IE rel. 1.1 - 15.10.2014

Notes

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