

PWG ALFA

Reverse Osmosis



OPERATION AND MAINTENANCE MANUAL



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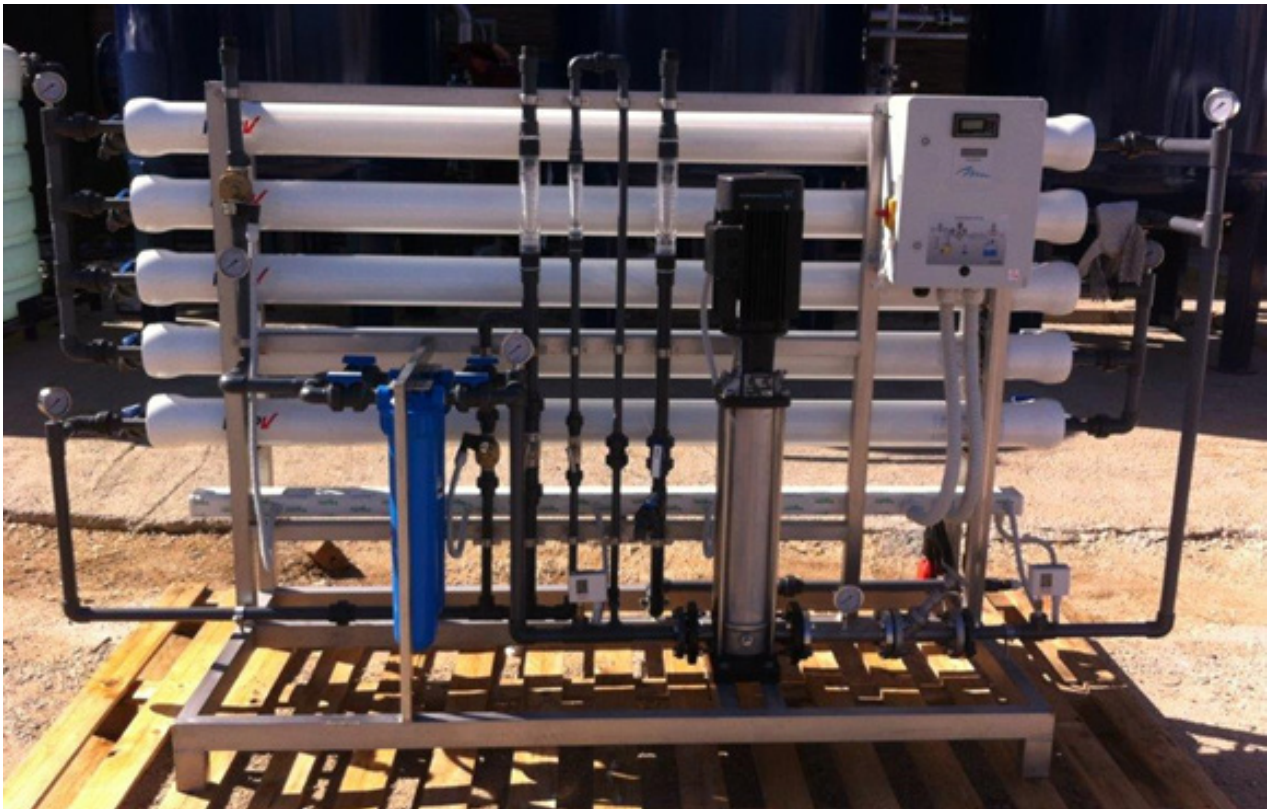
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ALFA 140 – ALFA 640

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ALFA 840 – ALFA 1540

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REVERSE OSMOSIS SYSTEM DESCRIPTION

Reverse osmosis (RO) is a filtration method that removes many types of molecules and ions from water by applying pressure when it is on one side of a selective membrane and only the water molecules (permeate) get through the membrane. The impurities (concentrate) go to drain.

ALFA SERIES RO SYSTEM DESIGN PARAMETERS

Model	Capacity @20 °c	Operating pressure (psi)	Membrane size	Membrane (qty)	Recovery (%)	Motor power (kw)
	lt / DAY					
ALFA 125 - 1	720	150 - 200	2,5" x 21"	1	40	0,37
ALFA 125 - 2	1500	150 - 200	2,5" x 40"	1	40	0,37
ALFA 125 - 3	2000	150 - 200	4" x 21"	1	40	0,37
ALFA 140	5000	150 - 200	4" x 40"	1	50	0,64
ALFA 240	10000	150 - 200	4" x 40"	2	50	0,64
ALFA 340	15000	150 - 200	4" x 40"	3	60	1,1
ALFA 440	20000	150 - 200	4" x 40"	4	60	1,5
ALFA 540	25000	150 - 200	4" x 40"	5	60	2,2
ALFA 640	30000	150 - 200	4" x 40"	6	60	2,2
ALFA 840	40000	150 - 200	4" x 40"	8	60	2,2
ALFA 940	45000	150 - 200	4" x 40"	9	60	2,2
ALFA 1040	50000	150 - 200	4" x 40"	10	60	2,2
ALFA 1240	60000	150 - 200	4" x 40"	12	60	3
ALFA 1540	75000	150 - 200	4" x 40"	15	60	3

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WARNINGS AND PRECAUTIONS ABOUT THE SYSTEM

1. This system must be protected by a softener to protect the membranes.
2. Membranes will be out of warranty if a softener is not used.
3. Do not leave the membranes without water. Operate the RO system for at least 1 hour a day when RO system is not worked during 2 days or more.
4. Check the RO feed water (inlet) pressure, if the inlet pressure is higher than expected, please consult your supplier.
5. Check the permeate and concentrate water conductivity, if the conductivity is higher than expected, consult your supplier.
6. Check the permeate and concentrate water flow, if the flow is higher than expected, consult your supplier.
7. Life span of the membranes is 3 years under normal conditions. If the membrane efficiency decreases or if they block, please renew the membranes.
8. Check the inlet water for chlorine. The feed water should be 0 ppm.
9. When the system is in operation, never close the inlet and outlet valves.
10. This systems should only be used for treated well water or mains water.
11. When the system is in operation, never close the needle valve in the drain line.
12. The RO frame should be earthed.

BEFORE COMMISSIONING

The feed water for the RO system should be pre treated if it originates from a bore hole or well. A softener should always be used. The RO must be stopped while any pre treatment is in back wash or regeneration. These systems should be checked before starting the RO system.

HYDRAULIC CONNECTIONS

- Raw water inlet connection should be made.
- Permeate water line should be connected to permeate tank.
- Permeate water back pressure should be less than 0,5 bar. If the pressure is higher than 0,5 bar a check valve has to be put into this line.
- If there has to be a shut off valve, the safety valve must be put before shut off valve.
- The inlet water should be fed to the system with sufficient flow and pressure.
- Inlet valve is opened.
- Needle valve on concentrate water is opened completely.
- Air in the line is relased from air relief valve on the cartridge filter.



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COMMISSIONING STEPS

1. Check if the feed water characteristics are within the defined design limits (see below). If the conductivity is higher than 2000 $\mu\text{S}/\text{cm}$, do not feed this water to the system. Calcium and Manganese ions which cause hardness have to be removed before the water enters the reverse osmosis system. If they are not removed, pre treatment and or softening must be used in order to protect membranes and any scaling problems.
2. If not already installed, put the membranes into the vessels taking note of the directional arrow. Arrows on the membranes should be in same direction with raw water direction.
3. Fit the level switch into the storage tank.
4. Connect to the power supply.
5. Connect to the water supply.
6. Make sure the waste water can flow freely.
7. Allow water to fill the system.
8. Turn the switch on the control panel to I (on) position. If no alarm the system will run.
9. Bring permeate and concentrate flow to the desired level by adjusting the concentrate and recirculation valves (7l/min see below).
10. The conductivity will be high to start with, please take this into account and check after half an hour.

DURING COMMISSIONING STEPS

1. LOW PRESSURE ALARM

The feed water pressure has to be between 2-4 bar. If the pressure drops under 2 bar, the low pressure alarm will be activate. Possible reasons for low pressure alarm:

- Low feed water pressure.
- Cartridge filter blocked.
- Raw water feed pump not working properly.
- Low pressure switch not working properly.
- Check if all the valves exist in the system feed line are open.
- Check if the direction of inlet solenoid valve is in the correct way.
- Check if the low pressure set value is 2 bar.

2. HIGH PRESSURE ALARM

High pressure set value has to be between 8-10 bar. Raw water pressure is assumed as 2 bar and if this value increases, high pressure set value will increase by the same ratio. Higher than 10 bar is not recommended because it could damage the membranes. Possible reasons for high pressure alarm:

- High pressure needle valve could be open more than required. Arrange permeate water flow desired values.
- Membranes could be clogged.
- Concentrate water line could be blocked. Be sure it is open.
- High pressure switch not working properly, check cable connections. If any malfunction observed change the new one.

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3. AC 220 V ALARM

If the AC 220 volt lamp does not give a green light, it means there is no voltage in the line. Be sure the braker switch is correctly switched.

3. AC 24 V ALARM

If AC 24 volt lamp does not give a green light, it means there is no voltage in the line. If the voltage is entering the transformator but there is no output, the transformator could be faulty.

MAINTENANCE

DAILY MAINTENANCE



- Visually check the RO for any leakage of water.
- Check the cartridge filter check input / output pressure. If the pressure limit exceeds 0,8 bar, change the cartridge.
- Check product water and waste water flow
- Check the pressure on guages.
- Check inlet temperature of the reverse osmosis system.

WEEKLY MAINTENANCE



- Repeat daily process
- Check the pumps and valves

MONTHLY MAINTENANCE



- Repeat daily and weekly maintenance
- Check the electrical panel

YEARLY MAINTENANCE



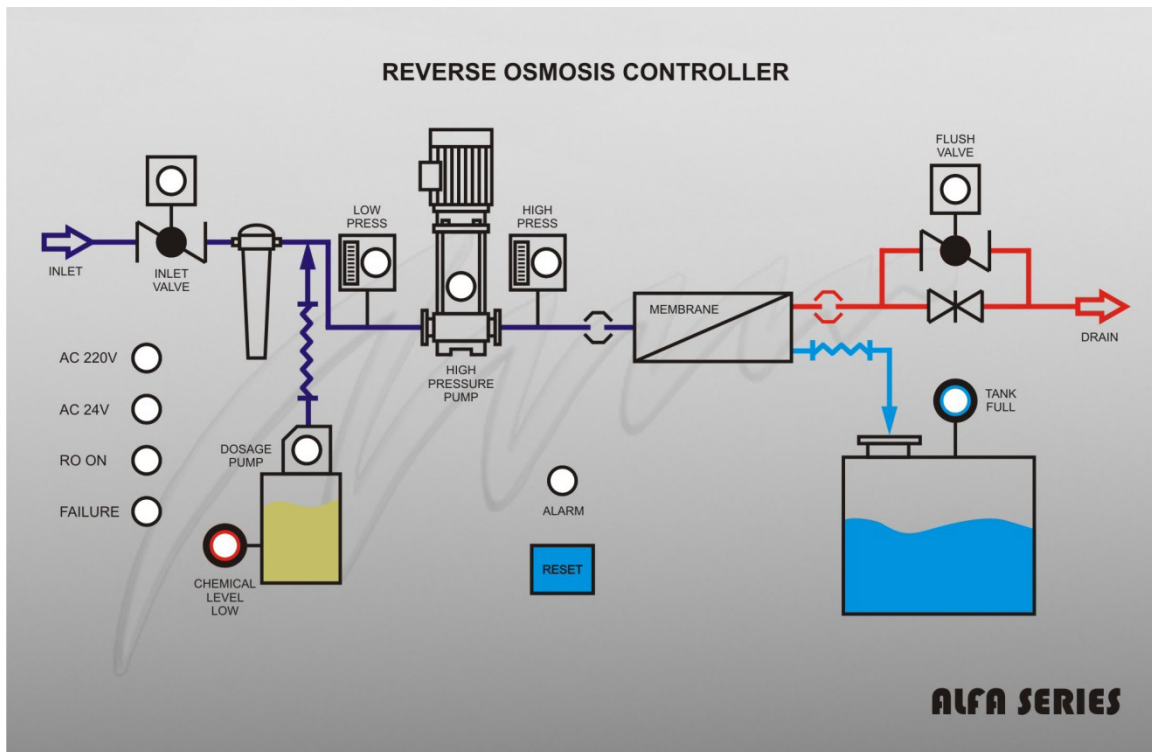
- Repeat monthly and weekly maintenance
- Make general cleaning and painting jobs
- Painted surfaces must be renewed if necessary
- Alignment of equipment and level; equipment must be checked in accordance with manufacturers instructions. This process should be made especially for pumps and electric motors.



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DESCRIPTION OF LEDS ON CONTROL PANEL



INLET VALVE

When the LED is lit the system has water, the valve will automatically open. This led will flash when storage tank is full and all system is off position.

LOW PRESS

If the low pressure LED illuminates the incoming pressure is below the 2 Bar minimum, the inlet valve will try again after a few seconds.

HIGH PRESSURE PUMP

It shows the high pressure pump is working and it continues during pump operation.

HIGH PRESS

It shows the high pressure after high pressure pump line.

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TANK FULL

When the tank is full, LED will flash on.

ALARM

If there is a malfunction in the equipments shown on the control panel, the LED illuminates and the alarm will sound. After overcoming the fault press the reset button to cancel.

RESET

Use this button after correcting the faults.

AC 220V

It shows that there is 220 V electricity.

AC 24V

It shows that there is 24 V electricity.

RO ON

If main switch is turned on, the LED lights. It will fade if the system is closed.

FAILURE

The LED flashes when there is an error and cancelled with the reset button.

FLUSH

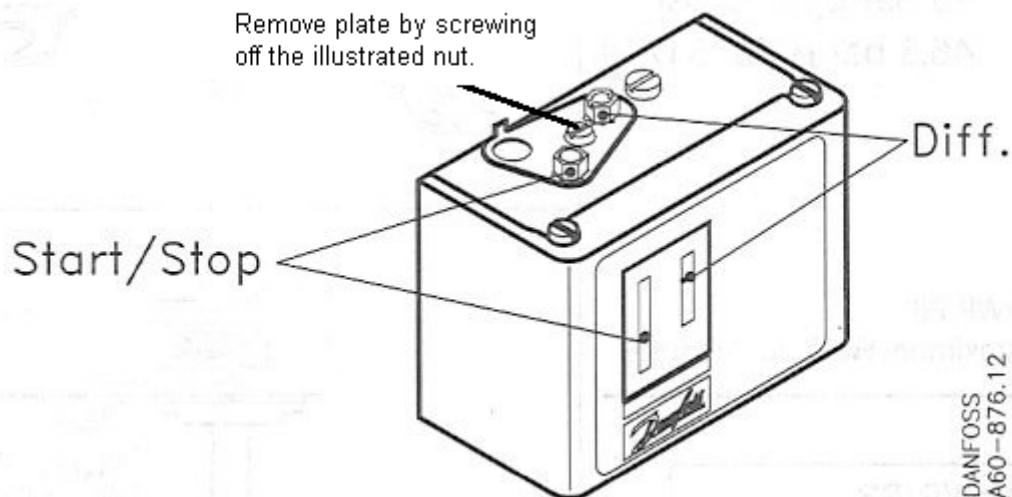
The Flush LED will illuminate on start up to flush the system before production of permeate.



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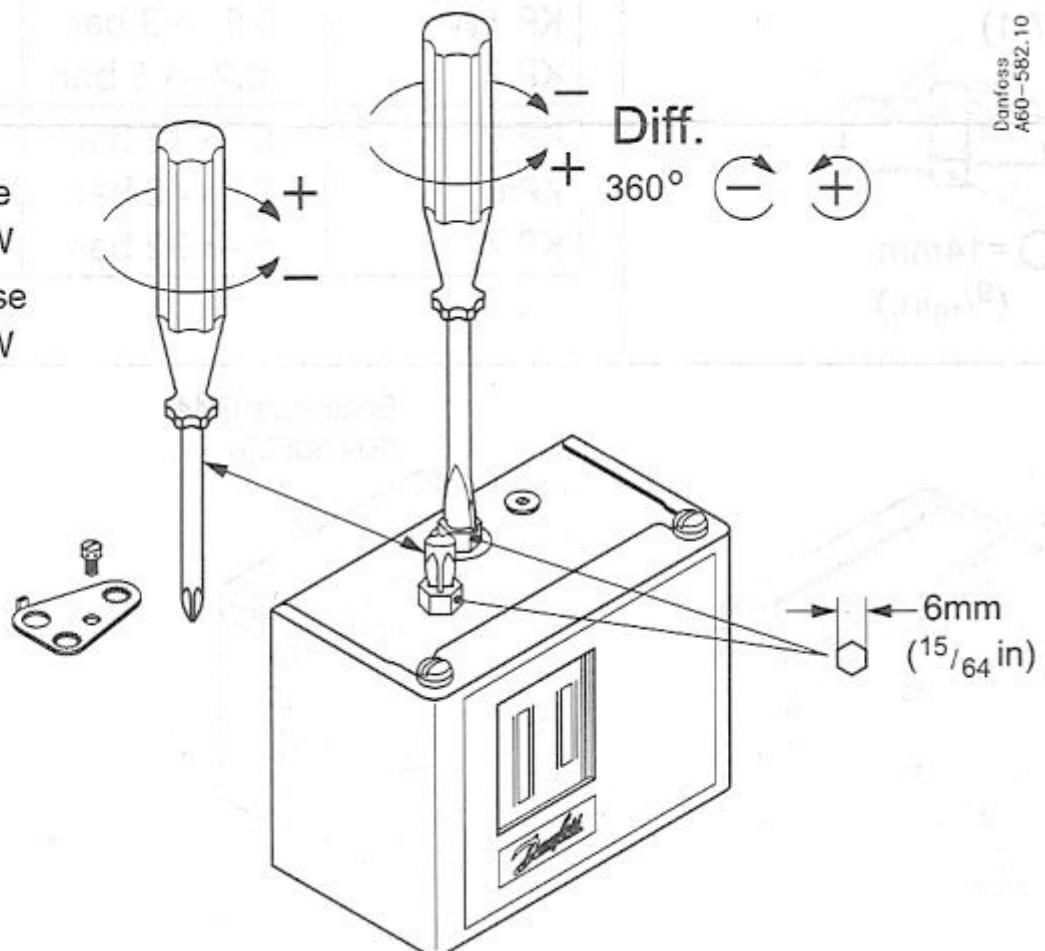
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HIGH AND LOW PRESSURE SETTINGS



Range

- ⊕ Increase 360° CW
- ⊖ Decrease 360° CW



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The pressure switches are pre set, if required they can be adjusted as follows: increase the start-stop set pressure by turning the screw in a clock wise direction and decrease it by turning the screw in a counterclock wise direction. The Diff works in the opposite way.

Start – Stop is defined when low or high pressure set pressure wanted. Diff. is excluded from the set values of low pressure and net value is found. For high pressure net set value, add Diff. to the arranged set value.

Example:

When the low pressure is set at 2 bar and diff is set at 1 bar, system low pressure net set value will be $2-1 = 1$ bar.

When the low pressure is arranged 2 bar and diff is arranged 3 bar, system low pressure net set value will be $2-3 = -1$ bar. Because the system will not read this value, system will work without water.

When the high pressure is arranged 8 bar and diff is arranged 2 bar, system high pressure net set value will be $8+2 = 10$ bar.

When the high pressure is arranged 8 bar and diff is arranged 6 bar, system high pressure net set value will be $8+6 = 14$ bar. This net value is so high for the system operation efficiency and this will damage the membranes and all the equipment in the system.

Please adhere to the system parameters.

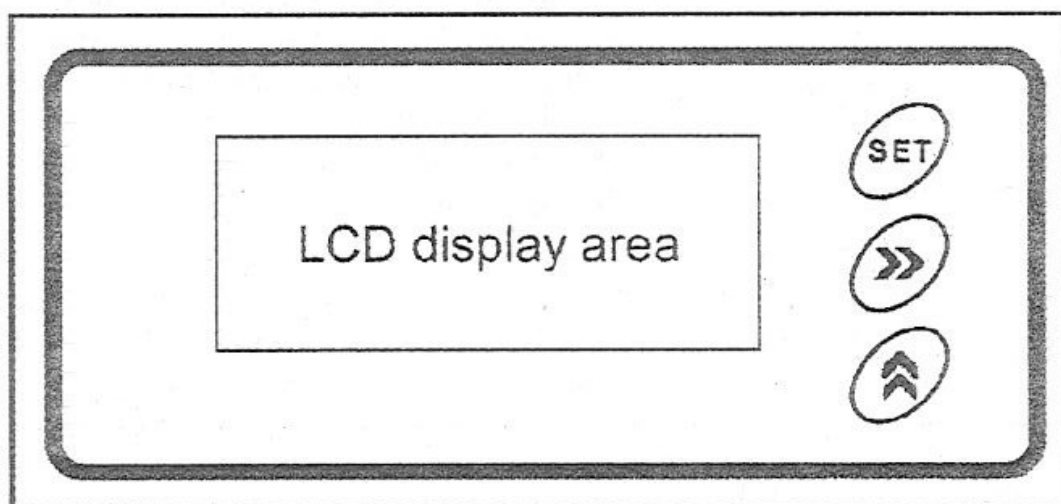


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HIGH AND LOW PRESSURE SETTINGS

Front Panel Illustration



LCD Display Area: When power is on and the display is showing the conductivity measurement.

» click this button to toggle between the conductivity and temperature display.

⇧ click this button to select the units of conductivity as ppm or $\mu\text{S}/\text{cm}$.

K FACTOR SETTINGS

This should not be changed unless the conductivity probe is changed or replaced.

The new K value is written on the replacement conductivity probe and this should be entered as follows.

Press the ↻ button and the display will count up to 1.000. press ↻ again then » to move to the second digit then press the ⇧ to select the figure required, continue in the same way to enter the remaining two figures then press ↻ to set or for confirmation of it.

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SET CONDUCTIVITY ALARMS

Press and hold the  button and the display will count up to 1.000. press the  button 3 times to reach the high conductivity alarm value (Hi). Use the  button to select the digit and the  button to select the value when correct press the  button to confirm and move on to the Low conductivity alarm setting; this should be changed as above.

MEMBRANE PROTECTION

PREPARING OF PROTECTION SOLUTION

1. Protection Chemical: sodium bisulphite (SBS), %95 powder
2. Protection Solution Concentration: % 1-2 weight / weight
3. Protection Solution Preparing Rate: 1-2 kg %95 powder SBS for 100 lt Ro Permeate Water.

PROTECTION SOLUTION REFRESHING

1. Open the RO system valves and drain all protection solution once a month if the RO is not working for a long time.
2. After that please rinse the system with low pressured water. Then prepare the new protection solution according to the rates you received and charge the solution into the system.

PROTECTION SOLUTION RINSING AND COMMISSIONING THE SYSTEM

1. Open the RO System valves and drain all protection solution from the system.
2. Feed the power to the main panel.
3. The protection solution is prepared in an external tank, charge the system with a pump. The water appears in the drain outlet once the entire system is pressured.
4. The deaerating of the system is done by the sample tap on top of the cartridge filter.
5. The rinsing of the system is with the pressure of raw water, feeding and rinsing takes about one hour.



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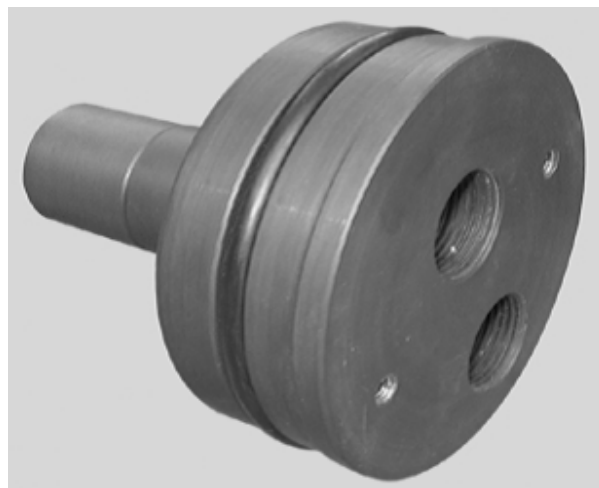
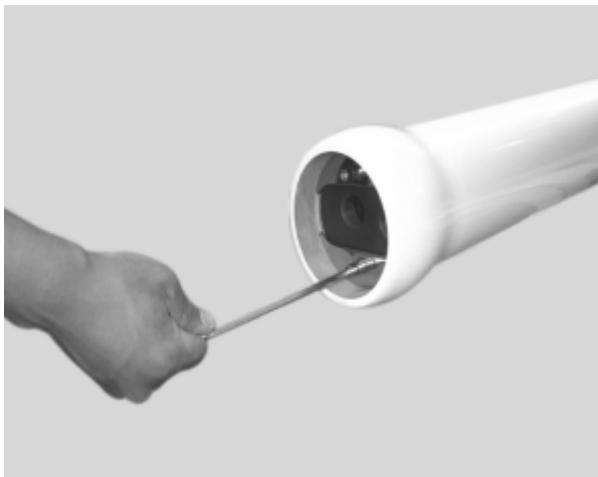
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DISASSEMBLY

To relocate the system or to permanently close it down the following steps should be followed;



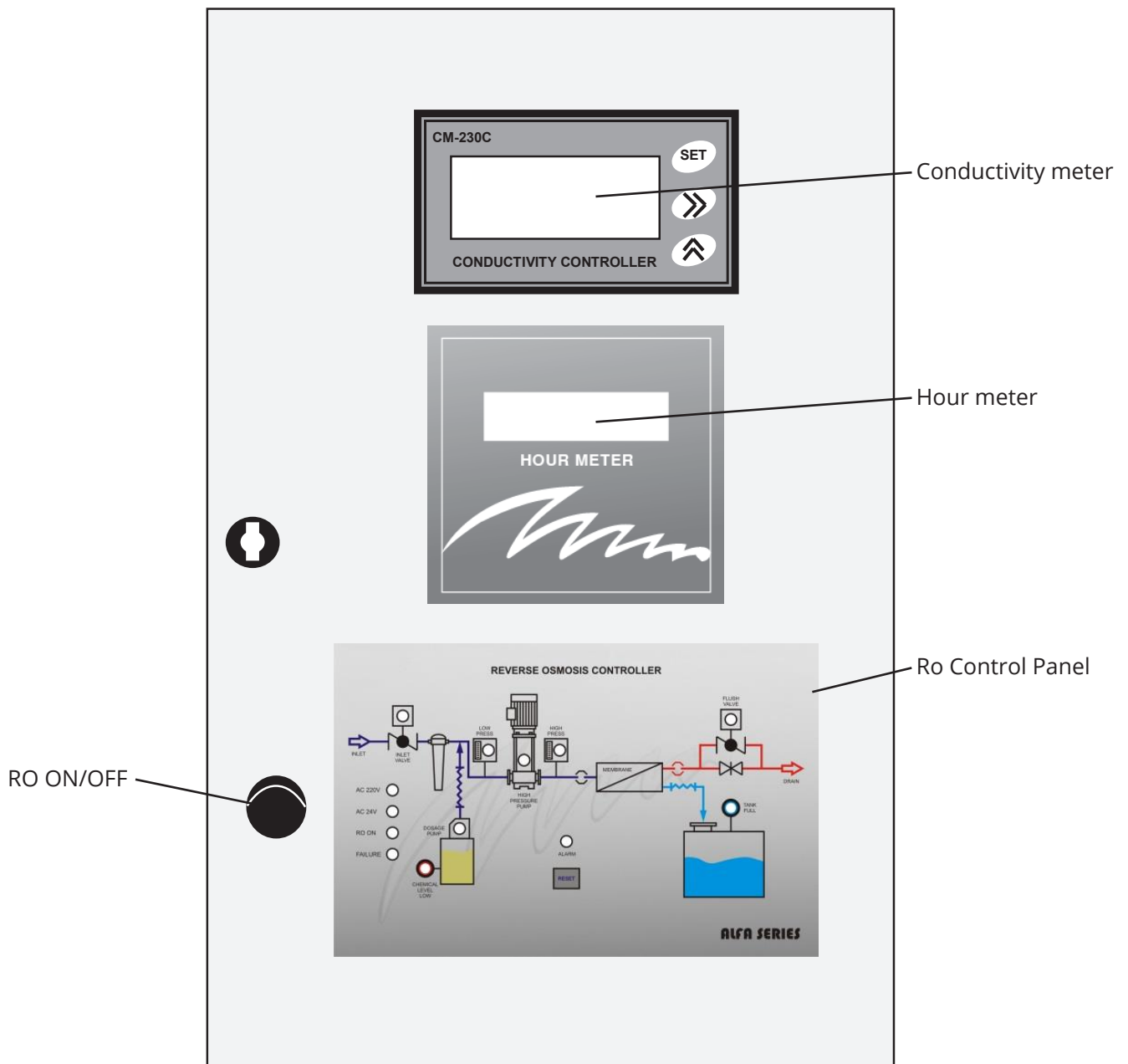
- Turn off the system power supply.
- In order to isolate the system input and output valves are completely closed.
- Unscrew endscaps of vessels take care not to damage threads while taking out the caps. Remove the cover and remove the membranes from inside the housings.
- Consider the center of gravity if lifting with a forklift.



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ELECTRIC PANEL COVER



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WARRANTY CONDITIONS

- This RO is warranted for 1 YEAR from the invoice date against defective materials or, manufacturing faults.
- During the warranty period; If the equipment fails due to material, production or assembly failure, it will be repaired by an authorised company (sent back to factory).
- During the warranty period; If it is not possible to repair the parts or material that has failed, the defective part will be replaced with a new one.
- Replaced parts will have a warranty of six months or to the end of the warranty period whichever is the longest.

NOT COVERED BY WARRANTY

The warranty does not include the following:

- If the system had not been operated correctly according to the operating manual.
- Damages or failures from Low or high voltage, incorrect electrical installation.
- Damages caused during operation or transportation caused by the customer / user.
- Failure to correctly maintain the system.
- If the incoming water does not meet requirements for operation.
- If equipment or materials have been lost or stolen .
- Damage from natural disasters like lightning, fire, water flood, earthquake.
- Failure to declare the failure to your supplier within an acceptable period.

PERFORMANCE GUARANTEES

- The performance will differ throughout time, some of these are described below.
- Reverse Osmosis Membranes:
 - Ion removing efficiency can decrease annually by %10
 - Total system efficiency can decrease annually by %5

