



BUDGET SERIES REVERSE OSMOSIS SYSTEMS



OPERATION AND MAINTENANCE MANUAL



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BUDGET 125-3

BUDGET SERIES SPECIFICATIONS

The Budget 125-3 RO works directly from a raw water inlet connection (preferably on a softened supply) and a (220 V/50HZ) electrical connection. The inlet pressure/temperature must be between (2 and 4 bar) and (10 to 40 °C) to operate. If the inlet pressure is too low the system will not function.

Raw Water Spec. (Recommended)

Raw Water Conductivity	2000 $\mu\text{S}/\text{cm}$ (max)
Raw Water Temperature	10-40 °C
Inlet Pressure	2-4 bar
Maximum Manganese, Aluminum	<0,05
Iron	<0,05
Bacteriological Index	Absent
Organic Index	Absent
Hydrocarbons, Oils or Grease	Absent
Hydrogen Sulfide	Absent
Ba, Sr, F deposits	None
Max. Feed Water SDI (silt density)	< 5
Max. Feed Water NTU	< 1

-If the inlet pressure falls while the system is working; the system gives an ALARM and stops. Push the RESET BUTTON to start it again.

-FRP Membrane Vessels

.Brass Body Rotary Vane Type Pressure Pump

-AISI304 Stainless Steel Skid

-5 Micron Cartridge Filter

- Inlet Solenoid Valve

–Low level Switch

-Gliserin Filled Manometer

–Permeate (product) Water Conductivity meter (0-2000 $\mu\text{S}/\text{cm}$)

.On-Off Button

-Alarm Button

-Alarm Reset Button

-220 V/50Hz/3ph (ALFA 125/140/240)

- IP56 control panel

REVERSE OSMOSIS SYSTEM DESCRIPTION

Osmosis is the movement of water from a high concentration to a low concentration, through a SEMI-permable membrane. Osmosis is 'complete' when both sides are in the state of equilibrium which this means when the water molecules are of equal concentration on both sides of the membrane.

Reverse osmosis (RO) is a filtration method that removes many types of large molecules and ions from solutions by applying pressure to the solution on one side of a selective membrane forcing only the small water molecules through the membrane becoming purified or permeate water.

REVERSE OSMOSIS BUDGET SERIES TECHNICAL TABLE

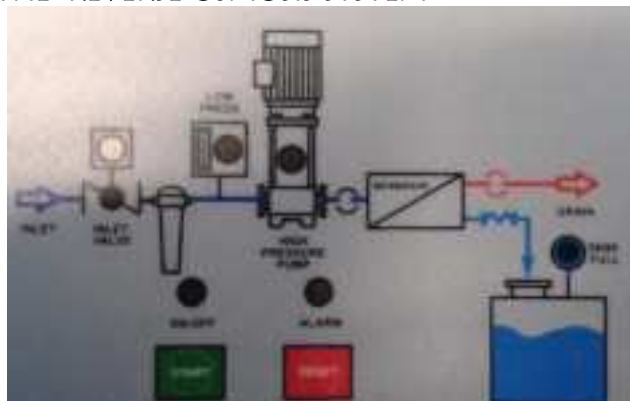
MODEL	CAPACITY (m ³ / day)	VOLTAGE /HERTZ /AMP (V / Hz / A)	MEMBRANE STAGE QUANTITY DIMENSIONS			MEMBRANE HOUSING QUANTITY	pH INTERVAL	WEIGHT (Kg)
BT 125-3	1,89	230 / 50 / 3	1	1	4"x 21"	1	4-11	40

TABLE - 1

MODEL	FEED (m ³ /day)	PRODUCT (m ³ /day)	DRAIN (m ³ /day)	RECOVERY (m ³ /day)	EFFICIENCY (%)	DIAMETERS (INCH)		
						RO INLET	RO PRODUCT	RO DRAIN
BT 125-3	4,7	1,89	2,8	-	40	3/4" Female	1/4" female	1/2" Barbed

TABLE - 2

BASIC PRINCIPLES OF THE REVERSE OSMOSIS SYSTEM



Raw water (feed water) from a (softened) supply flows through a sediment filter and on through the high pressure pump. The pressure is checked and if too low the inlet valve shuts and a yellow alarm light appears (see above). The system will try again and after 3 attempts if the pressure is still too low the alarm red LED will light up and the system will stop. Press the reset button for 3 seconds to clear the alarm.

Assuming the pressure is ok the high pressure pump will start up and boost the pressure to 5 to 10 bar (see pressure gauge). Water is forced through the membrane while the minerals and concentrate go to waste. There is a flow restrictor in the waste nozzle fitting **DO NOT REMOVE** this. The permeate flows into the storage tank where the float switch should be fitted. When the tank is full the RO will stop (and the max full LED will light up. When there has been a demand and the float drops the RO will start up automatically.

WARNINGS AND PRECAUTIONS ABOUT SYSTEM

1. Do not leave the membranes dry. Operate the RO system for at least 1 hour if the RO system is not used for 2 or more days (stop stagnation).
2. Check the RO inlet pressure, and if the inlet pressure is higher or lower than expected pressure, consult your supplier.
3. Check the permeate (product) and concentrate water conductivity, and if the conductivity is higher than expected, consult your supplier.
4. Check the permeate and concentrate water flow, if the flow is higher or lower than expected flow, consult your supplier.
5. Life span of the membranes is a minimum of 3 years under normal conditions. If membrane efficiency decreases or becomes clogged despite chemical washing, renew the membranes.
6. When the system is in the operation mode, never close the inlet and outlet valves.
7. This systems should only be used on well and tap water (pre treatment maybe needed).
8. Electrical earthing is required.
9. The RO system is transported as packaged system. Connect the feed, permeate and waste (concentrate) lines on site..
10. The float switch should be connected in the permeate water tank.

BEFORE COMMISSIONING

The feed water to the RO system may need pre-treatment such as filtration units, or softener require chemical dosing depending on the raw water quality. If the pretreatment system already exists in the plant, the RO must be stopped while the pre treatment is off line (eg when back washing). These systems should be checked before the RO system is installed.

HYDRAULIC CONNECTION

Connect the raw water supply.

Connect the permeate (product) water line to the permeate tank. Within specification (table 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 (3m of head).

If there has to be a shut off valve, the safety valve must be put before the shut off valve.

The permeate water float is should be connected to an existing permeate water tank.

Slowly fill the system with raw water checking the flow and pressures.

Air in the line can be released via the air relief valve on the cartridge filter.

COMMISSIONING STEPS

1. Check the feed water characteristics are within the defined design limits. If the conductivity is higher than 2000 $\mu S/cm$, do not feed water to the system.
2. If the membrane is not already in put it into the vessel. Arrows on the membranes should be same direction with raw water direction.
3. Press the green on button. Check whether there are any alarms (alarms indicated with a lighted alarm led).
4. Check the conductivity of the permeate water on the built in conductivity meter. For first half an hour the conductivity can be high so please wait 30 minutes for the system to stabilise.

POSSIBLE MALFUNCTIONS DURING COMMISSIONING STEPS

1. LOW PRESSURE ALARM

Feed water pressure has to be between 2-4 bar. If the pressure drops under 2 bar, low pressure alarm occurs in the system. Possible reasons for low pressure alarm:

- Cartridge filter at the front end of the reverse osmosis could be clogged,
- Raw water feed pump may not be working properly,
- Low pressure switch may not be working properly,
- Check position of all valves and make sure they are open or not.
- Check the direction of inlet solenoid valve is the correct direction..
- Check low pressure set value is 2 bar.

PERIODICAL MAINTENANCES

DAILY MAINTENANCE



- › Check static and dynamic elements in the plant.
- › Check 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 manometer
- › Check inlet temperature of the reverse osmosis device
- › Check the reverse osmosis operation efficiency
- › Check chemical consumption

WEEKLY MAINTENANCE



- › Add consumed chemicals to the chemical tank (if used).
- › Clean chemical storage tank if it is not clean.
- › Check the pumps and valves
- › Check the efficiency of the RO
- › Keep the system clean

MONTHLY MAINTENANCE



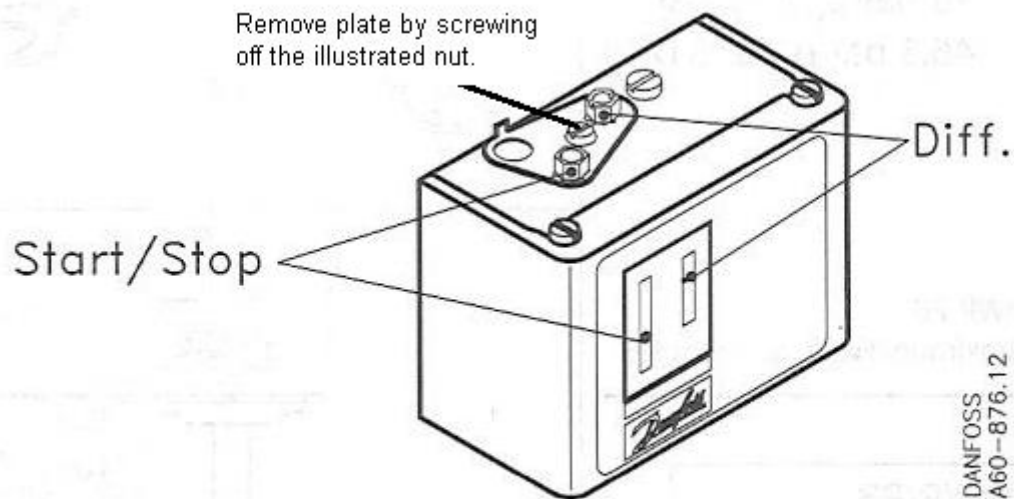
- › Repeat daily and weekly maintenance
- › Check the electrical panel
- › Calibrate analysers if applicable

YEARLY MAINTENANCE



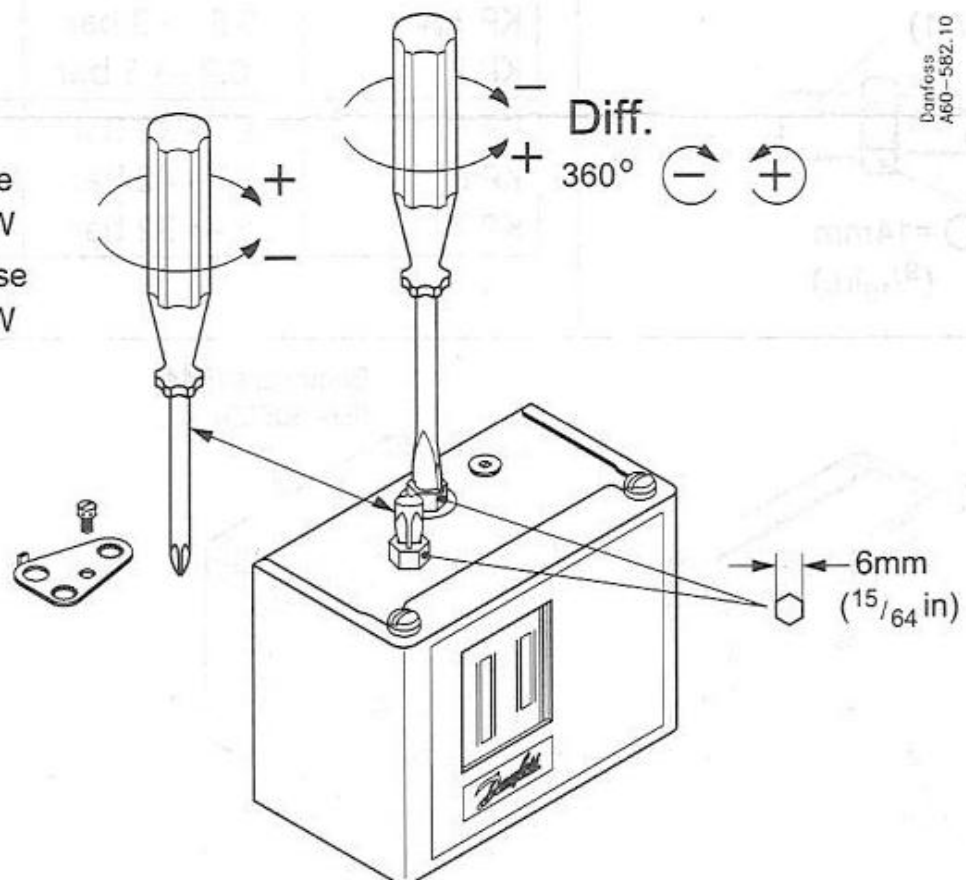
- › Repeat monthly and weekly maintenance
- › Make general cleaning and painting jobs
- › Painted surfaces must be renewed if necessary
- › Alignment of equipment and level; equipment must be checked in accordance with manufacturers instructions. This process should be made especially for pumps and electric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

LOW PRESSURE SETTINGS



Range

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



The pressure sensor is pre set . If it needs to be adjusted then the start-stop set pressure increases in a clock wise direction and decreases in a counterclock wise direction. Diff (differential) works the opposite way.

Start – Stop is the low pressure value. Differential; is the range either side of the low pressure value..

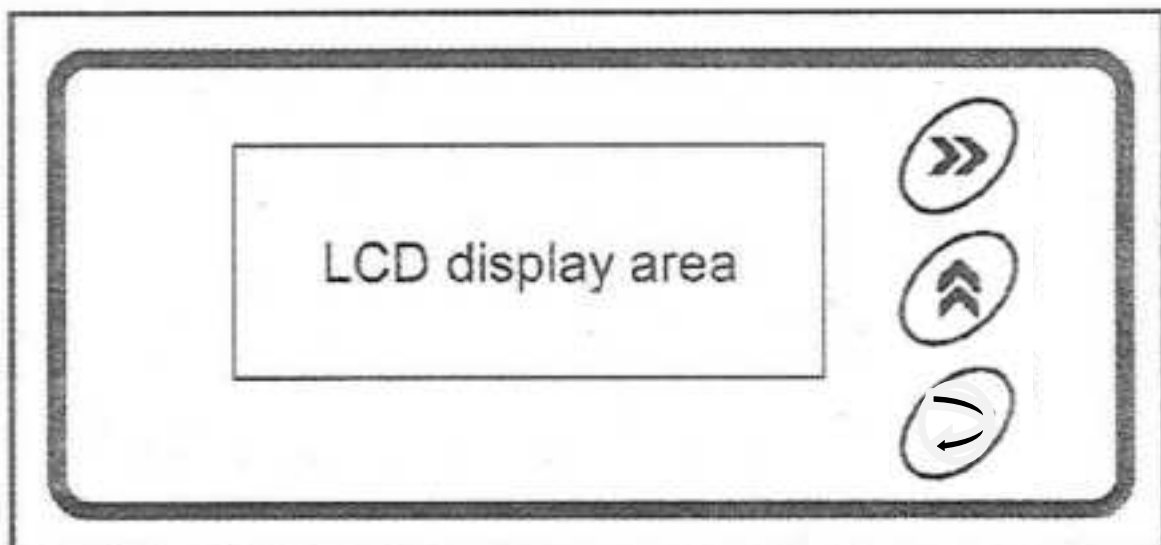
Example:

When the low pressure is set at 3 bar and diff is set at 1 bar, the system low pressure cuts in at $3 \pm 1 = 2$ to 4 bar operating range.

When the low pressure is set at 2 bar and diff is set at 3 bar, (2 ± 3) the low pressure will work from -1 bar ie never switch off (avoid this as below 2 bar the pump can get damaged !).

CONDUCTIVITY METER CALIBRATION

Front Panel Illustration



LCD Display Area: When power is in on.



click this buton to toggle conductivity/temperature



click this buton to set the conductivity units as ppm or $\mu\text{S}/\text{cm}$.

K FACTOR SETTINGS

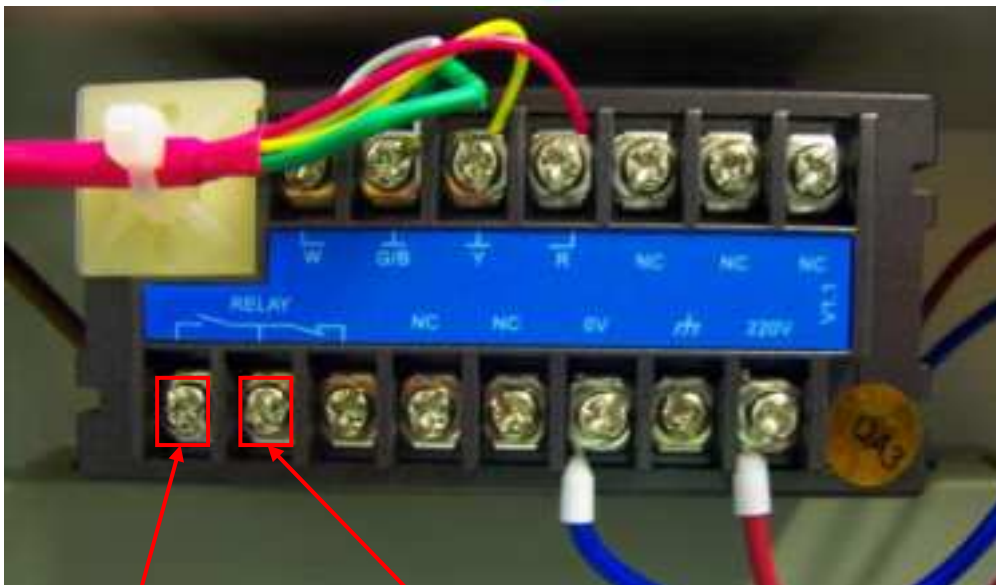
This should not be altered unless the probe is changed. When pressing the SET button for 3 seconds (time counts up from 0 to 3 and 1,000 appears on the screen. The K value is written on the conductivity probe and this should be entered by using the » button. When it is correct confirm it by pressing the the ⤵ button.

CHANGING THE HIGH LEVEL ALARM

Press the set button ⤵ until the numerical count up stops, then press it again (shows 999) and again (shows unit) and again (A small “Hi”) will appear on top of the display with a value underneath (default is 180.0). Use the » to move along the digits and ⤴ to change the value; confirm by pressing the set ⤵ button it will then move onto “Low” this is not used so just press ⤵

⤵(for 3 secs)--1000--⤵---999---⤵--unit--⤵Hi 1800--⤵Lo 1100

If the high value is exceeded the display will continuously flash indicating an alarm! if required a external signal can be taken from the relay connections shown below; this is made when the alarm is active. To reset the alarm you need to turn the power off and on again and restart the unit.



Normally Open

Common

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 new protection solution according to rates that given to you and charge the solution to system.

PROTECTION SOLUTION RINSING AND COMMISSIONING THE SYSTEM

1. Open the RO System valves and drain all protection solution from the system.
2. Turn on power to the main panel.
3. Open the thermic of RO HPP and take the pump out of service.
4. Open the HPP inlet valves.(if present)
5. Charge the system with the protection fluid using a pump until the fluid starts to come from the drain and all system is pressured.
6. Deaerating of system is done using the sample tap on top of the cartidge filter.
7. The system is rinsed with raw water and the rinsing takes about one hour.
8. The system is stopped after rinsing and the thermic of HPP is closed.

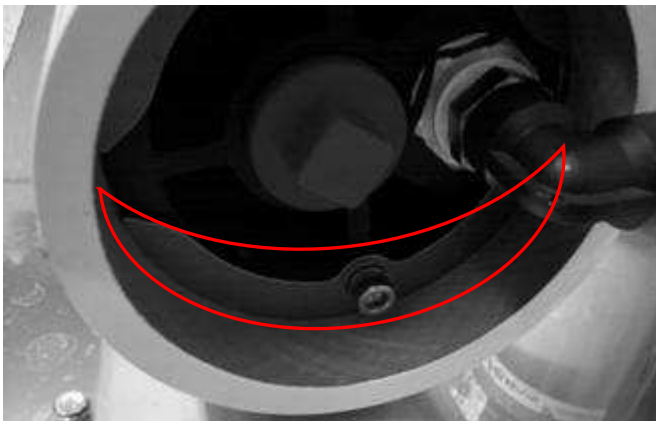
Membrane replacement

Turn off power.

Depressurise the system

Close the input valve.

Remove one of the endscaps from the vessels by removing the two screws that retain the two retaining clips (see picture 1) take care not damage the retaining slot when removing the retainers and screws. Carefully pull the vessel cap (see picture 2) to reveal the membrane taking care not to damage the cap seal.



Picture 1



Picture 2



The membrane vessel can now be cleaned before following a reverse procedure to fit a replacement membrane.

WARRANTY CONDITIONS

- › This Water Treatment Systems has a 2 YEAR limited warranty from the invoice date against manufacturing and material faults.
- › Should this equipment fail due to manufacturing or material fault during this period it will be repaired free of charge at the discretion of the supplier.
- › Should this equipment be irreparable during the warranty period the defective part will be replaced.
- › Replaced parts have a limited warranty of six months or the remaining period of the original warranty period.

CONDITIONS not covered by the warranty

Warranty does not include following explanations

- › Operation outside water specifications, design parameters and the manual's instructions.
- › Damage or malfunction from incorrect voltage, earthing or incorrect electrical installation.
- › Damage from transportation and misuse.
- › Damage caused by natural disasters; lightning, fire, flood or earthquake.
- › Delays in declaring malfunctions to your supplier.

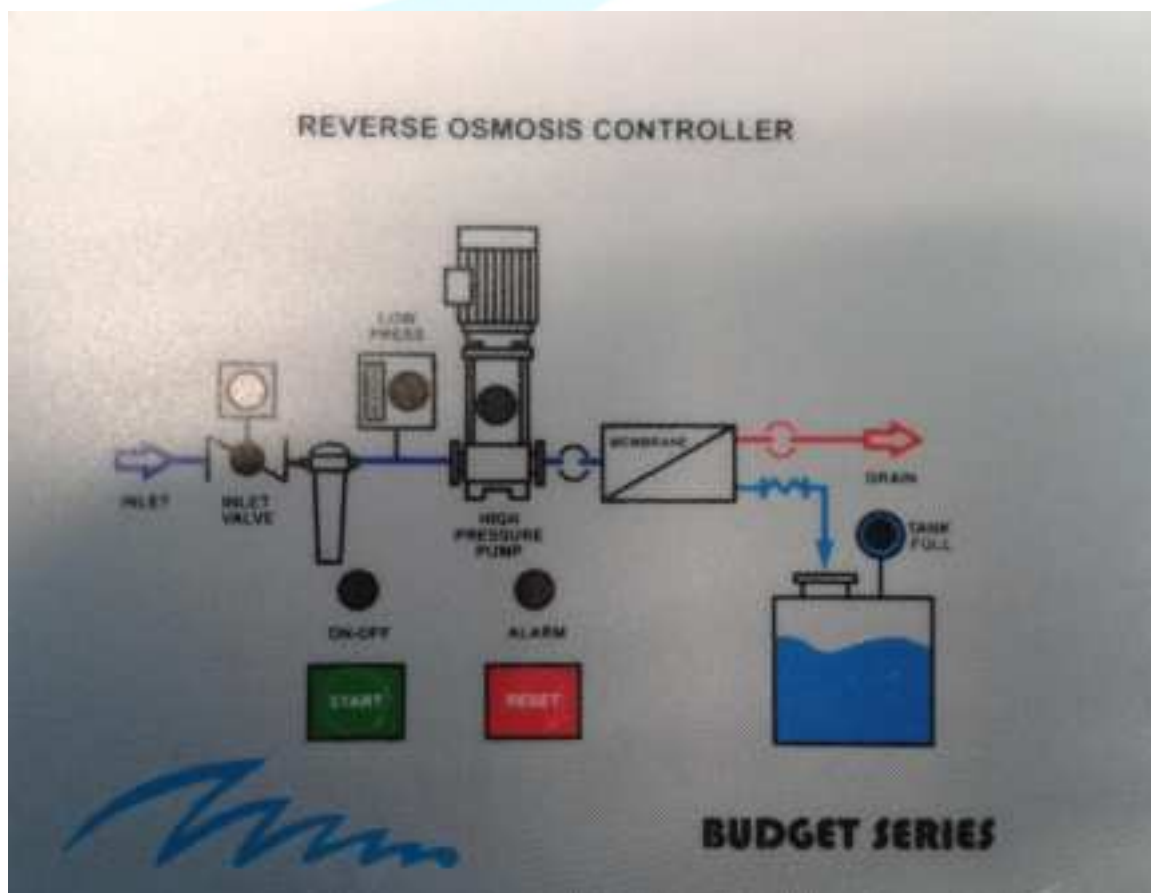
PERFORMANCE GUARANTEES

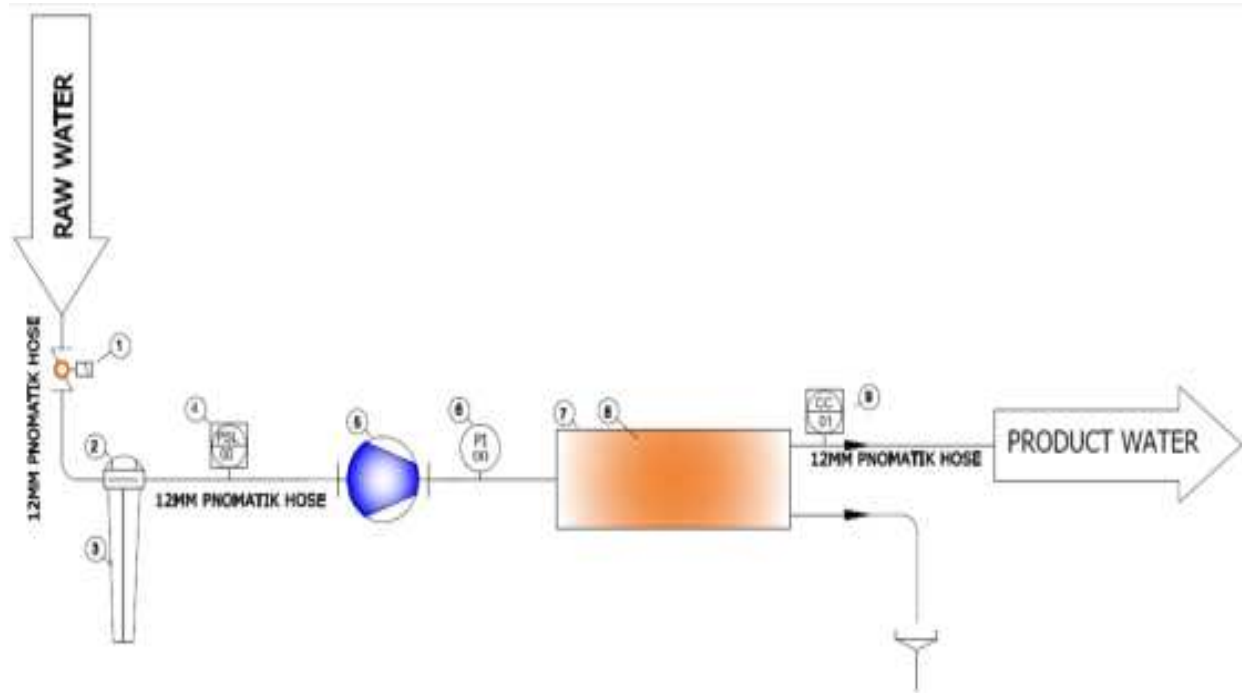
- › System performance can change over time; some of these are explained below.
- › Reverse Osmosis Membranes:
 - Ion removing efficiency can decrease annually %10
 - Total system efficiency can decrease annually %5
- › Ion Exchange:
 - Ion removing efficiency can decrease annually %5
- › Multimedia Sand Filter Systems:
 - Total system efficiency can decrease annually %5
- › Active Carbon Filter Systems:
 - Total system efficiency can decrease annually %100

STANDARD PERFORMANCE GUARANTEES

› In the warranty period, some units will lose their performance to a degree. These are shown below.

- ♦ **Membranes:**
%10 increase per year in salt passage.
%5 decrease in recovery rate.
- ♦ **Ion exchangers:**
%5 decrease per year in ion removal efficiency.
- ♦ **Multi media filters:**
%5 decrease in performance
- ♦ **Activated Carbon filters:**
It must be changed every year.





NO	NAME OF MATERIAL	SPECIFICATIONS	SUPPLIED BY	QTY	STOCK NO
1	SOLENOID VALVE	3/4 SELONID VALF N.K.0,5-16 BAR 24 V AC BOBBIN	GEVAX	1	1303002
2	FILTER HOUSING	ATLAS 3P HAUSING MONO 3P10AFOSXTS 3/4"	AQUALINE	1	0701004
3	CARTRIDGE FILTER	AQUALINE 10" 1 MIC. SPUN W/OUT ENDCAP	AQUALINE	1	0703001
4	LOW PRESSURE SWITCH	KP35	DANFOSS	1	1303024
5	HIGH PRESSURE PUMP	370W230V 50HZ 4P MOTOR 300/400 PA401 ROTATIVE 400 1/H POMPA 48YZ ELASTIC COUPLING FOR RPM 640W	FLUID-O-TECH	1	1001005 1001001 1001022
6	MANOMETER	0-20 BAR W/OUT LOGO STAINLESS COMP.CENTRAL CONN.	AQUALINE	1	0907033
7	MEMBRANE VESSEL	AQUALINE FRP PRESSURE VESSEL 300 PSI 4021	AQUALINE	1	0405505
8	MEMBRANE	LOW4 - 4021	OLTREMARE	1	0302011
9	CONDUCTIVITY METER	AQUALINE CONDUCTIVITY METER RELAY OUTPUT	AQUALINE	1	0910009

ELECTRICAL PROJECT

