



# Owner's Manual

## **WATER-PRO SERIES**

### **MODULAR S-90 220V AC**

*Version: 200130*

*Reference: 45109313*

**Eco-Systems Watermakers, S.L.**

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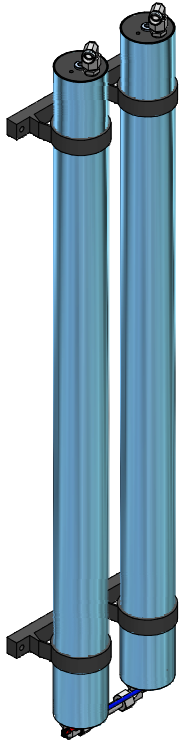
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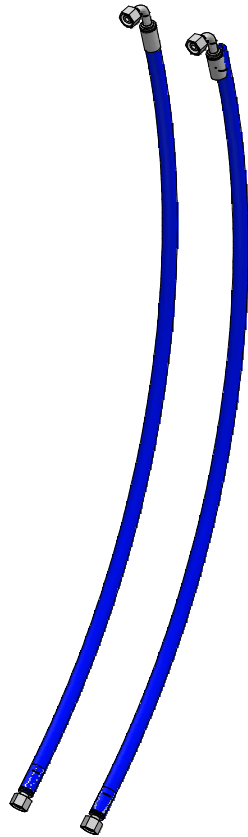
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# WATER-PRO MODULAR S-90 220V AC

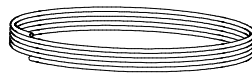
MEMBRANE VESSEL  
90 LITRES



2-HOSE H.P.



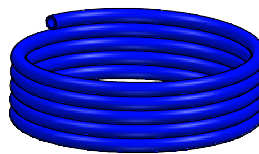
TUBE Ø4X2



TUBE Ø8x6BLUE



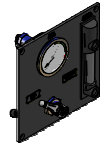
HOSE 1/2 BLUE



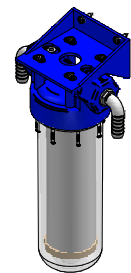
HOSE CLEAR BRAID Ø20



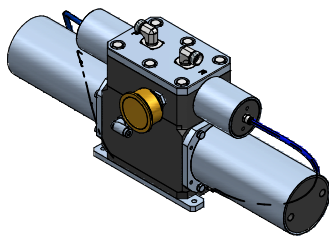
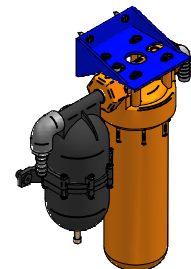
PANEL CONTROL SET



FWF FILTER SET



LOW PRESSURE FILTER SET



ST-18/CERAMIC  
ECO-SYSTEMS PUMP

CONNECTOR Ø6 TUBE X  
1/4 BSP PLASTIC



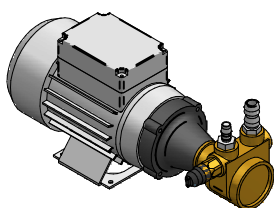
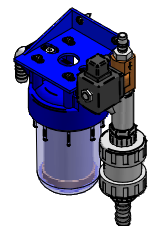
2-ADAPTER 1/2 BSP X  
1/2 BARB PVC

ADAPTER 1/2 BSP X  
3/4 BARB PVC



8 - HOSE CLAMP Ø16/27    20 -HOSE CLAMP Ø12/22

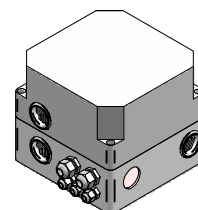
SEA STRAINER SET



MOTOR PUMP  
220 V AC SET



ELECTRONIC  
CONTROL PANEL



INVERTER BOX



FILTER WRENCH

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# **CHAPTER I**

**INTALLATION, OPERATION  
AND MAINTENANCE OF THE  
EQUIPMENT.**



# **SYSTEM COMPONENTS**

1. - Seacock valve to uptake the seawater.
2. - Check Valve.
3. - Protection pre-filter. (Washable mesh filter).
4. - Low-pressure booster pump. 220 V DC motor.
5. - Low Pressure Gauge.
6. - 5 microns filter container.
7. - Expansion Vessel.
8. – ST-18/CERAMIC High pressure pump with energy saving system. Energy recovering.
9. - High Pressure Gauge.
10. - R.O. Membrane and Vessel.
11. -Three ways valve for the produced water.
12. - Produced Water Flow meter.
13. - Anti Cl carbon filter.
14. - Produced water output to the tank.
15. - Brine discharge thru-hull.
16. - Switch.
17. - Direct produced water output. (CONTROL)
18. – Boat fresh water input
19. - FLUSHING Solenoid Valve.
20. - Power Box.
21. - DIGITAL Control Panel.
22. – (OPTIONAL) Three way valve for wintering.
23. - (OPTIONAL) Remote Control Panel

## **I.1. Installation.** (See diagram Chapter I Pages 1 and 2)

For the installation of the system, it must be taken into account that the pump can reach a temperature up to 55°C, so it must be placed in such a way that it does not affect the surrounding elements. Furthermore, to assemble the unit you will need to have the following inlet and outlet connections ready:

- Seacock (1) with a minimum nominal pitch of 3/4" Gas responsible for water intake, which should be located as low as possible on the bottom of the hull in order to prevent possible cavitation problems due to air aspiration.
- ½" Gas female thread through-hull (15) fitting for connecting the internal blue tube Ø12 that drains the rejected water into the sea.
- ¼" Gas female thread inlet in the main tank for the intake of the fresh water produced.
- ½" Gas female inlet for pressurised intake of water used on the water maker's cleaning process.

### **WARNING**

**It is very important to place the sea strainer (3) as close as possible to the motor pump (4), making sure both of them are located below the waterline, lastly, check that at least a minimum flow of 15 liters/minute is supplied to the motor pump (4), to prevent it from cavitation due to a pressure fall.**

The other components belonging to the unit can be located at a higher level, provided that they do not exceed a distance of 4 or 5 metres and taking into account that the membrane (10) and the high pressure pump (8) must be connected by the 1 meter long high pressure tubes. In longer distances, pressure drop increases significantly, increasing the power consumption.

The membrane's building position is irrelevant (vertical/horizontal), but in case of placing it in a vertical position, the outlet fresh water tube has to be on the upper part.

**The membrane is normally delivered assembled inside the high-pressure container. If it has not been factory-installed look for the assembling information in Chapter IV.**

After all components have been put in place and fixed, the unit will be ready for hydraulic and electrical connection, which will be covered in the following sections.

## I.2.Hydraulic connections.

The connection between the various components is made with the tubes included within unit, as shown in the diagram in Chapter I Pages 1 and 2.

The two suction connections between the points described below are made using the transparent tube Ø20

- Lower check valve inlet (2) and sea cock valve (1).
- Sea strainer outlet (3) and pump inlet (4).

The connection between the boat pressurized water intake to the carbon filter inlet (13) and the carbon filter outlet to the electro valve inlet (19), is to be made with the Ø12 blue tube.

**As a general rule, the tube sections should be as short and as straight as possible to avoid unnecessary pressure drop, and the connections should be completely airtight so that air does not enter the circuit during the water suction process.**

The remaining seawater circuit sections will be made with the Ø12 blue tube (maximum pressure 20 bar). **This special tube is developed to work with up to 20 bar pressures, and it's not recommended replacing it with a different one (even of similar characteristics).**

To make the connections proceed as indicated below:

- Pump outlet (4) and 5-micron pre-filter inlet (6).
- Expansion vessel (7) and the high-pressure pump (8) inlet elbow (E).
- Outlet elbow (S) of the pressure amplifier pump (8) and the brine outlet (15).

The referred elbows marked as E and S are located in the back / lower part of the high pressure pump (8)

To connect the high pressure pump (ETD) with the R.O. membrane vessel proceed to use a high pressure hose (blue with stainless steel terminals) from the stainless steel connection located in the brine outlet, marked with the letter (P) in the back side of the high pressure pump (8), with the stainless steel elbow located in the R.O. membrane vessel, marked as ENTRANCE/ENTRADA (E) Then proceed to connect link the R.O. membrane vessel elbow marked as EXIT/SALIDA (S) to the stainless steel adaptor marked as (R) located at the high pressure pump(8).by using the other high pressure hose(blue with stainless steel connections).

By using the Ø8x6 polyamide tube, connect the end cap plastic adaptor (10), located in the membrane vessel inlet with the lower flow meter connector (12) as well as with the three way valve outlets (11), connect the left adaptor to the main tank adaptor (14), and the right adaptor to the produced fresh water outlet (17). The feed Pump (4) is equipped with a pressure switch (16), calibrated to 18 bar that in case of over pressure would stop the system.



## I.3. Hydraulic Control Panel.

The control panel shown in the diagram in Chapter I on Page 1 is made up of a flow meter (12) indicating the production of freshwater, a low-pressure gauge (5) and a three-way valve (11), which should be connected as follows:



- Blue Ø 8x6 polyamide tube to connect the end cap plastic adaptor (10), located in the membrane vessel inlet, to the elbow located in the lower part of the flow meter (12).
- Blue Ø 8x6 polyamide tube connecting the three way valve “MAIN TANK” outlet (11) to the boat’s main tank.
- Blue Ø 8x6 polyamide tube from the three way valve “PRUEBA/TEST” outlet (11) to an accessible fresh water point, such as a tap installed in the kitchen.
- White Ø 4x2 polyamide tube between the gauge (5) and the adaptor located in the side of pump’s central body (8).

## I.4. Electronic Control Panel

The electronic Control Panel (20), shown in the diagram Page 1 Chapter I consists of a potentiometer which controls the speed/power in the feed pump motor (4) and three buttons equipped with indicator lights that allow the complete control of the system.

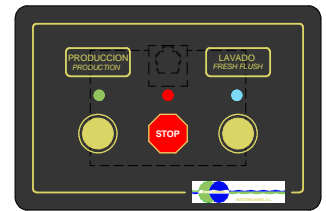


- The first button, from left to right, is marked with the word PRODUCCION and is equipped with a green LED light. It starts the system.
- The central button, is marked with the word STOP and is equipped with a red LED light. It stops the system.
- The third button, from left to right, is marked with the word FLUSH and is equipped with a blue LED light. It starts the timed Fresh Water Flush System.
- Pushing the production button by 3-4 seconds, the machine is temporized for 1 hour of production. Pushing by 6-7 seconds is temporized for 2 hours and 9 -10 seconds is temporized for 3 hours. After the temporized time the machine make a flush automatically.

**For a proper operation, the system doesn’t allow the change from the Production function to the Flush function without pressing the STOP button. The flushing time is programmed to last 120 seconds, working the system at 60% speed of the feed pump.**

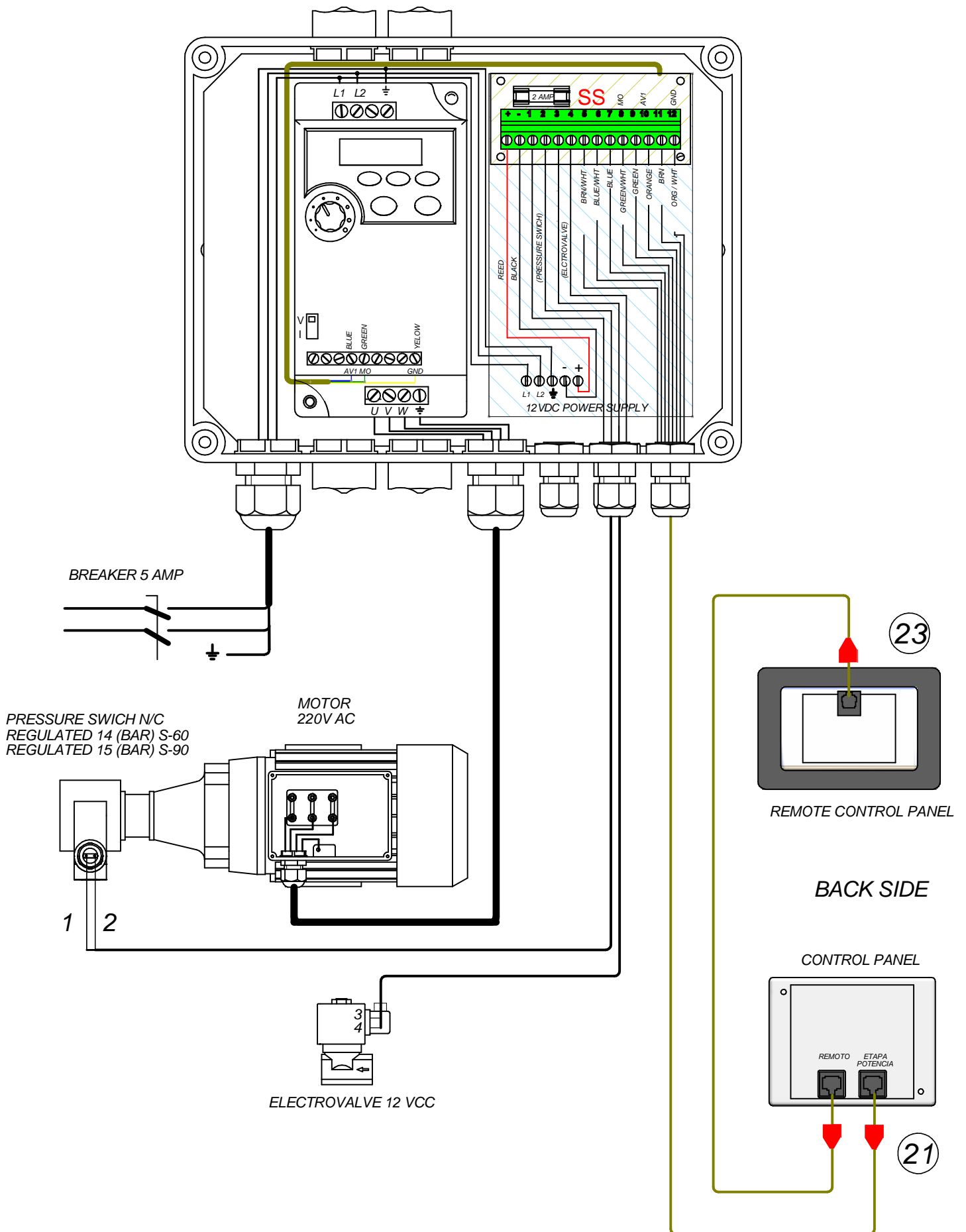
## Remote Control Panel. (Optional)

The remote control panel (23) shown on the diagram of Page1 Chapter I consists of three buttons, each one with its corresponding light indicator which allow a complete operation of the system from another point on the boat within a 10m radius.



- The button marked with the word “PRODUCTION” and green LED on top . Start’s the system.
- The button with the word STOP and a red LED indicator on top. Stop’s the system.
- The button marked with the word’s “FRESH FLUSH” and a blue LED, is used to start the automatic washing process.

# ELECTRICAL CONNECTION



## **I.5. Electrical Connections.**

### **POWER CONNECTIONS:**

- Following the scheme on Chapter I Page 6, connect to the terminals L1 and L2 the 220V power source with both thermal and magnetic protections (MCB not supplied).

### **CONTROL PANEL CONNECTION:**

- An 8 thread 5 meter long copper cable is delivered with the equipment, connect it to the control panel (21) on the end with a red connector RJ-45 (Ethernet), taking care to place it at the base of the back face marked as POWER STAGE. The other end of the cable should be passed by the stuffing box and connected to its respective terminals as indicated in Chapter I Page 6. The remote control equipment (23) OPTIONAL must connect using the 10 meter cable with red connectors on both ends at the base marked as REMOTE.

### **BOOSTER PUM ASSEMBLY CONNECTION:**

- Connect one end of a 3-wire power cable to the motor terminals marked with the letters U, V and W. The other end of the cable must be passed through the cable glands of the box and be connected to their respective terminals marked with the same letters.

### **SOLENOID CONNECTION:**

- Connect one end of the 2-thread cable to the electro valve, the other end of the cable should be passed by the stuffing box and connected to its respective terminals marked with the word solenoid.

### **PRESSURE SWITCH CONNECTION:**

- Connect one end of the 2-thread cable to the power switch, the other end of the cable should be passed by the stuffing box and connected to its respective terminals marked with the words pressure switch

**The safety pressure switch, which is normally closed contact (NC), will open and stop the system if the supply pressure exceeds 18bar.**

### **POTENTIOMETER RANGE ADJUSTMENT**

- Turn the speed adjust button to the minimum level and adjust the production trimmer (back side of the panel) until reaching the minimum speed wanted.
- The maximum speed can be adjusted by changing the maximum operating frequency in the inverter (frequency controller) that controls the motor pump (see the Frequency Controller Manual).

### **FLUSH WATER FLOW ADJUSTMENT**

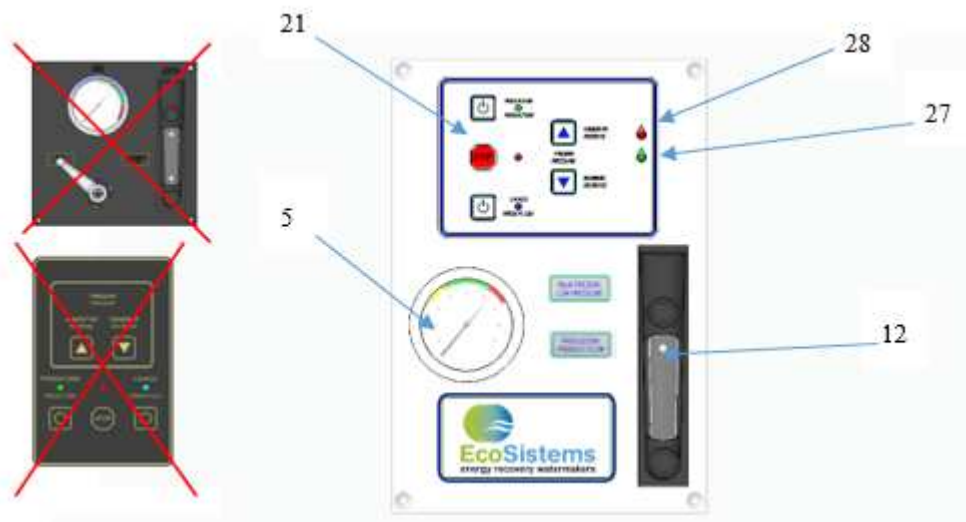
- Switch on the system while pressing the flush button on the control panel until the blue led gets on.
- From that moment on every tap on the ▲ button will increase the pump speed in one unit, the same way every tap on the ▼ button will decrease the pump speed in one unit.
- Once reached the wanted flush water flow press the Stop button, the red led will get on, after releasing it the led will flash, this means the water flows has been adjusted.
- Disconnect the system and turn it on again to return it to it's the normal functioning.

### **HOUR METER READING**

- Switch the system on while pressing the Stop button in the control panel.
- Both green and red LEDs will flash a few times.
- Each green flash is equivalent to 400 working hours and each red flash is equivalent to 25 working hours. The total reading of working hours of the system is given by the sum of all green and red flashes.
- The maximum count will be 8 green flashes and 3 red flashes, which makes a total of 3275 hour's reading, from that moment on, the hour meter gets self-restarted, starting a new reading cycle.
- The green led will flash 5 times when the system reaches 2.000 hours of working, which means the pump maintenance must be performed.
- Switch off the system and switch it on again to return it to it's normal functioning.

## SALINITY CONTROL (OPTIONAL)

In machines with this option, the hydraulic panel and the electronic digital panel, are replaced by the new control panel which includes the salinity control. This option doesn't change the instructions of this handbook. These elements don't need any special maintenance.

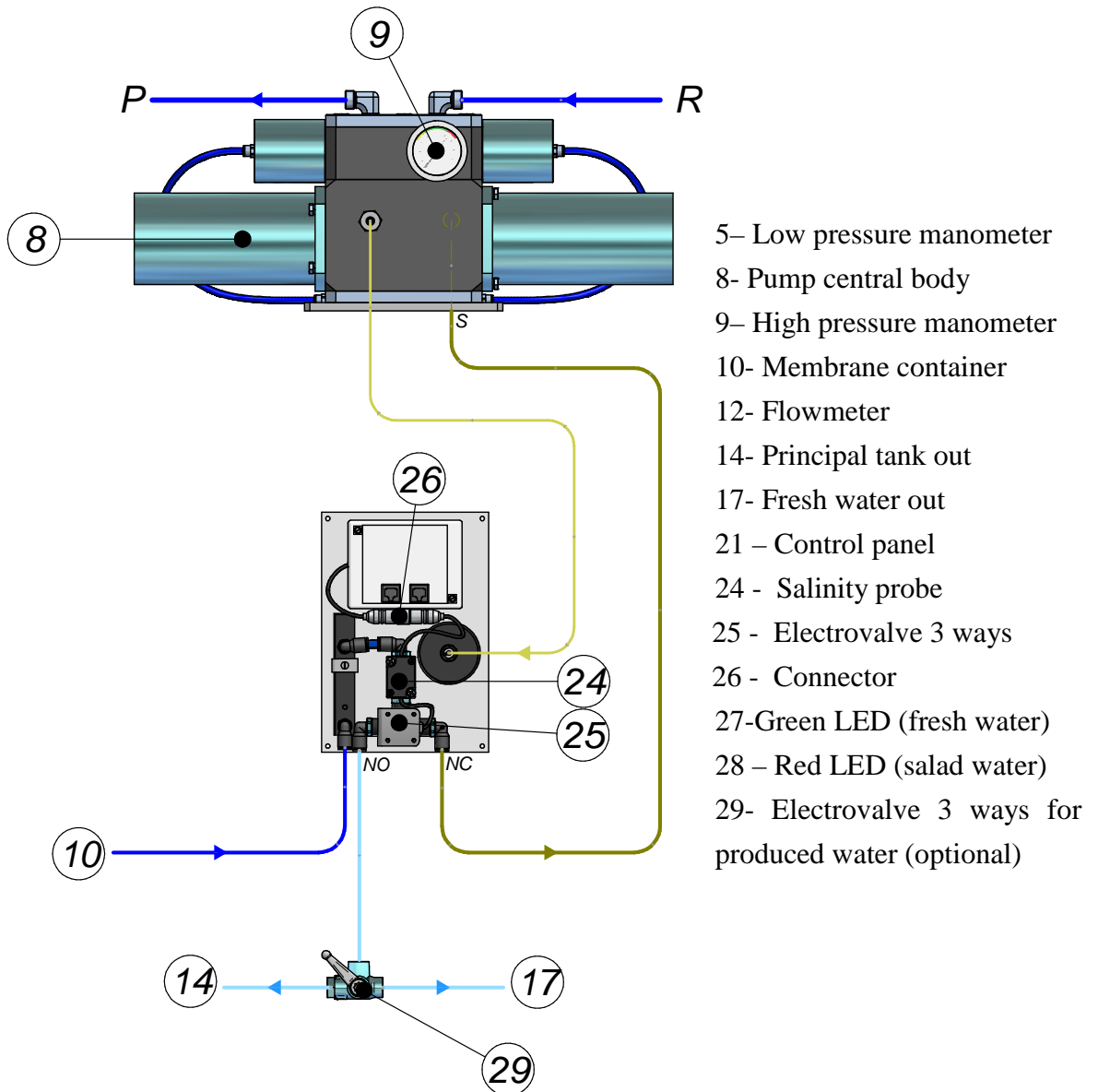


The connections must be done like is showed in the picture.

- Polyamide tube  $\varnothing$  8x6 from the end cap plastic adaptor (10), located in the membrane vessel inlet, until the flowmeter inferior adaptor (12).
- Polyamide tube  $\varnothing$  4x2 between manometer (5) and the adaptor located in the side of pump central body (8).
- Polyamide tube  $\varnothing$  8x6 between NC electro valve adaptor (25) and the adaptor located in the side of pump central body (8), which is near to out connector (S).
- Polyamide tube  $\varnothing$  8x6 from NO electro valve adaptor (25) to principal tank (14) (without option) or to produced water valve (29) (with option).

With option:

- Polyamide tube  $\varnothing$  8x6 from produced water valve (29) to direct out of produced potable water (17).
- Polyamide tube  $\varnothing$  8x6 from produced water valve (29) to principal tank out (14).



The green LED (27) lights up when the produced water quality is lower than 600 ppm and the 3-way solenoid valve directs water to the vessel's tank. The red LED (28) lights up when the produced water quality is higher than 800 ppm and the 3-way solenoid valve is connected to direct the water to the reject through an inlet in the body of the high-pressure pump.

## **I.6. First Start Up.**

- Check all connections have been properly made and the voltage at the terminals is the right one.
- Check the Sea Cock Valve (1) is opened. And the three way valve (11) is in the “*PRUEBA/TEST*” position, as in the diagram, so the first fresh water produced can be rejected (17).
- Switch on the system by pressing the “**PRODUCCION**” button and check that the rotation direction of the pump is correct, gradually increase the pump motor speed with the potentiometer “**PRESSURE**” making sure not to exceed the 60Kg/cm<sup>2</sup> high pressure (green zone) indicated on the high pressure pump gauge (9).
- Check that pressure in the control panel pressure gauge (5) lies between approximately 12 and 14 kg/cm<sup>2</sup>, and does not exceed 15 kg/cm<sup>2</sup> under any circumstances (red zone).
- Make sure that the filter holders are well tighten up. Use the supplied wrench if adjustment is required.
- The high pressure, indicated on the high pressure pump gauge (9), will gradually rise before stabilizing at approximately 45 – 60 kg/cm<sup>2</sup>.
- In the first few minutes, some air bubbles will be observed in the panel control flow meter (12). Those bubbles come from the interior of the membrane and other system elements, causing some irregularities in the first high pressure work cycles. They usually go away without purging the circuit.
- Approximately 5 minutes after the start-up, the “control tank” should contain about 7.5 liter water produced (1.5 liter/minute), what determines that the production rate is correct. Press “**STOP**” to stop the feed pump, and after that, by pressing the “**FLUSH**” button the system will activate the electro-valve (19) as well as the pump, which will work at slower speed for about 120 seconds, stopping automatically once finished the flushing. By that time, a significant reduction in both high and low pressure will be noticed, due to the fact that the fresh water will have reached the membranes. This operation should be repeated twice at least, to clean the new membranes and eliminate the membrane preservative that may have accumulated inside. During the flushing, the pressurized fresh water system in the boat must be “ON”, providing approximately 10 liters per minute flow, at 2 Pressure Bars.



## **I.7. Start-up**

- Make sure the sea cock valve (1) is completely open, and the 3 way valve (11) is set to “*MAIN TANK*”.
- Start the motor and check that the pressure in the control panel pressure gauge (5) lies between approximately 10 and 12 kg/cm<sup>2</sup>, and does not exceed 15 kg/cm<sup>2</sup> under any circumstances (red zone).
- High pressure will gradually rise until stabilizing at approximately 45-60 kg/cm<sup>2</sup>. There may be some differences depending on the temperature of the water.

## **I.8. Turning the unit off.**

Before switching off the unit, the system must be cleaned to prevent compaction of the membrane due to the biological fouling in it. To do this make sure you have water from the boat's system and proceed as follows:

- Press “STOP” to stop the low pressure motor pump.
- Press “LAVADO/ FLUSH” to start the flushing system.
- At this point the system will take fresh water from the pressurized fresh water system in the boat. The low pressure pump must be “ON”, providing approximately a 5l per minute flow, at a pressure of two Bars.

For a good cleaning of the membranes, the feed pump will work for 120 approximately.

- The high pressure will fall to around 20-30 kg/cm<sup>2</sup>. This significant decrease in high pressure means that seawater contained in the membranes has been cleaned out and replaced by fresh water. Changing the salinity and pH of the water in the membrane prevents the biological fouling in the membrane for a maximum period of 90 days. For longer periods see **Chapter II Storage and Cleaning**.
- **Always shut off the sea cock valve (1) as a safety measure when the system is switched off.**

## **I.9. Maintenance of the unit.**

- Regularly check the status of the Sea Strainer for the admission of seawater (3) and clean the mesh of impurities when needed.
- Change the 5 micron filter at the beginning of each season or at least once every three months in the event of continuous service.
- Change the active carbon cartridge at least once a year.
- When the high-pressure pressure gauge (9) exceeds 65 kg/cm<sup>2</sup> (with a water temperature between 18°C and 25°C), the used membrane should be replaced by a new one.
- Periodically check the pressure of the accumulator (7), it may be 8 Kg/cm<sup>2</sup> pressure, not to produce low pressure oscillations

**(An annual inspection by the Technical Support Service is recommended).**

# **CHAPTER II**

**STORAGE AND CLEANING.**

# **VERY IMPORTANT**

**REMEMBER THAT FOR A LONGER LIFE OF YOUR MEMBRANE, YOU MUST CLEAN THE SYSTEM WITH FRESH WATER AFTER EVERY USE.**

## **II.1. Storage system.**

### **PREVENTION OF CHEMICAL ATTACKS ON THE SYSTEM:**

Do not use for storage purposes, or expose the unit to, hydrogen peroxide, chloramine, chloramine-T, N-chloroisocyanide, chlorine dioxide, hypochlorite, chlorine, iodine, bromine, bromide, phenolic disinfectants or any other chemical element. The use of unauthorized chemical elements or the abuse of authorized ones will invalidate any warranty.

### **TEMPERATURE:**

Never expose the membrane to storage temperatures higher than 50°C or lower than 0°C. Never store the membrane vessel under direct sunlight. Freezing temperatures will result in mechanical damage to the system due to the expansion of air on freezing. This will cause irreversible damage to the membrane.

### **DRYING OUT:**

Never allow the membrane to dry out. If the membrane is allowed to dry out, up to 30% of production flow will be lost. This will cause irreversible damage to the membrane. The membrane must always be kept damp.

### **BIOLOGICAL DIRT:**

Protect the membrane from biological dirt. Up to 40% of production flow will be lost if the membrane is allowed to become dirty with biological slime. Some production, but not all, can be recovered by following a thorough cleaning.

### **CHEMICAL DIRT:**

Protect the membrane from chemical attacks or dirt. Be careful when using the system in ports that may be polluted with chemical products, oil or fuel. Chemical attacks are not covered by the warranty.

### **STORAGE:**

The inside of the membrane, which is dark and damp, is an excellent place for microorganisms to reproduce. When the membrane is used, tested or operated intermittently, it is exposed to microorganisms. Up to 50% of production flow can be lost if the membrane is not stored correctly.

## **II.2. Shutting down for short periods of time.**

Shutting down for a short period of time means when the unit will not be used for between one day and three months. An excellent and inexpensive way to protect the system and the membrane is set out in the **Switching off the unit** section which guarantees protection against the biological fouling in the membranes. As manufacturers we recommend that **immediately after** using the system you always wash it with freshwater from the “Main Boat Tank” sent through the carbon filter (13) in order to get rid of all traces of chlorine that may be in the water in the tank.

**The anti-chlorine carbon filter, must be replaced at least once a year.**

## **II.3. Shutting down for long periods of time.**

(Recommended for experts only)

A long period of time or prolonged shutdown means when the unit will not be used for four months or more. In this case the unit must first be rinsed with chlorine-free drinking water, and then stored with a chemical protector. This product inhibits bacteria growth while maintaining a high circulation flow and salt rejection in the membrane.

Follow these instructions carefully:

1. Before switching off the unit: make sure you have enough water in the boat’s main tank and also fill up another container with 5 liters of additional water that will be used to dissolve the preservative.
2. Press the “**FLUSH**” button and let the system be washed with fresh water from the boat tank. Remember that whenever the system is flushed, **the pressurized fresh water system must be “on” and there has to be enough water in the main tank.** (14). After about 90 seconds the high pressure will decrease until reaching 20/30 Kg/cm<sup>2</sup>, that fall will indicate the system has been washed with fresh water.

3. Dissolve of 30/40 grams of chemical protector (sodium metabisulfite) with the 5 liters of water you set aside in a different container and suction this solution using the auxiliary valve (22).
4. Close the Sea Cock Valve (1), Start up the system by pressing **LAVADO**, and press **STOP** just before the chemical protector and water solution from the tank runs out. This means the entire circuit will contain this protecting solution.

**Do not forget to shut off the sea cock valve (1) as a security measure.**

5. When the unit is ready to be turned on once again, the valve (1) must set to the open position and the valve (11) to the “*PRUEBA/TEST*” position so that the water produced initially is rejected. Proceed as described in **I.5 FIRST START-UP** (Chapter I Page 7).

**Warning**

**Sodium metabisulfite is a caustic product that may cause serious irritation to the skin and mucus membranes. Take due precautions before handling, do not touch it directly and always work in well-ventilated spaces.**

# **CHAPTER III**

## **PARTS LISTING EXPLODED VIEW OF THE ST-18/CERAMIC ECO-SYSTEMS PUMP**

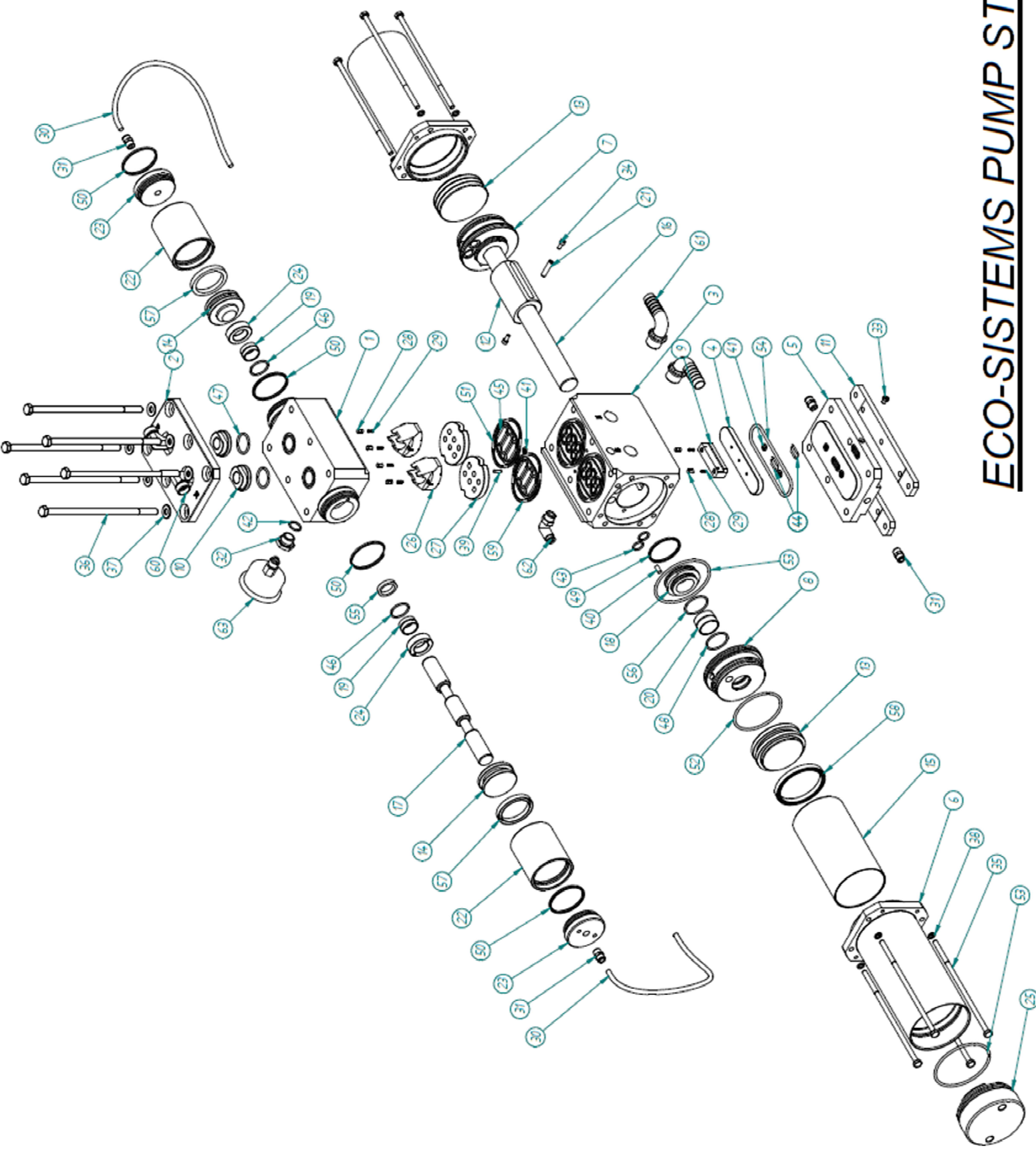


## Eco-Systems ST-18/CERAMIC PUMP ELEMENTS

Reference	Item	Description	Quantity
44015011	1	Distributor body ST-18	1
44015020	2	Upper plate	1
44015031	3	Central body ST-18	1
44015040	4	Distribution control valve slide base	1
44015050	5	Lower plate	1
44015060	6	External cylinder liner	2
44015071	7	Intermediate cap ST-18 (E)	1
44015081	8	Intermediate cap ST-18 (S)	1
44015090	9	Distribution control valve slide ST-15	1
44015100	10	Upper plate fitting	2
44015110	11	Lower deck plate	2
44008111	12	Closed central valve slide	1
44015120	13	Blind piston	2
44015131	14	Distributor blind piston	2
44008130	15	Cylinder	2
44015150-T	16	Shaft Ø25 hole Ø6	1
44015161	17	Distributor shaft	1
44015180	18	Intermediate ring	2
44015190	19	PEEK base Ø 20	2
44015200	20	PEEK base Ø 25	2
44015210	21	Fastener POM	1
44008200	22	Distributor cylinder	2
44008210	23	Distributor cap	2
44008220	24	Distributor lip seal cap	2
44008240	25	Cylinder cap	2
44008261	26	Distributor valve slide	2
44008271	27	Ceramic base ST-14	2
44405270	28	Spring stopper/guide	6
44406130	29	Springe Ø3x 12 A4	6
43420600	30	Hose Ø6x4	2
43570610	31	Straight R1/8" Gas hose Ø6x4	4
43690321	32	Adapter M-3/8-H-1/4	1
43710200	33	Sealing cap (with joint) M5	1
43801135	34	Allen Screw DIN-912 M4x10	2
43802317	35	Hexagonal screw DIN-931 M6x170	8

Referencia	Nº Despiece	Descripción	Cantidad
43802418	36	Hexagonal screw DIN-931 M8x180	6
43821081	37	Plain washer WS9246 Ø8 A4	6
43823060	38	Grower washer Ø6 A4	8
43850410	39	Cylindrical bolt DIN-7 Ø4x10	1
43850510	40	Cylindrical bolt DIN-7 A4 Ø5x10	2
43910540	41	Toric joint Ø5x2	3
43911440	42	Toric joint Ø14x1.78	1
43911240	43	Toric joint Ø12x2	4
43911340	44	Toric joint Ø13x2	2
43912040	45	Toric joint Ø20x2	6
43912340	46	Toric joint Ø23x2	2
43912350	47	Toric joint Ø23x2.25	2
43912830	48	Toric joint Ø28x3	2
43914050	49	Toric joint Ø40x2.5	2
43914550	50	Toric joint Ø45x2.5	4
43916052	51	Toric joint Ø60x2.62	2
43916460	52	Toric joint Ø64x3	2
43917560	53	Toric joint Ø75x3	4
43918470	54	Toric joint Ø84x3.5	1
43942000-B	55	Lip seal Ø20x26x5	1
43913026	56	Toric joint Ø30x2,62	2
43944000	57	Lip seal Ø40x50x6	2
43946000	58	Lip seal Ø60x70x6	2
43914720	59	Toric joint Ø47x2	2
43461230	60	Elbow 90° R3/8" Gas hose Ø12	2
43561640	61	Curved barbed fitting R1/2"Hose x16	2
43586620	62	Elbow R1/4"Gas Hose Ø1/4"	2
43180222	63	Pressure gauge	1

# ECO-SYSTEMS PUMP ST-18 CERAMIC



# **CHAPTER IV**

## **FILTERS AND MEMBRANE REPLACEMENT**

## **IV.1. Changing the filters.**

When changing the filter cartridge make sure you have closed the seawater inlet seacock valve before unscrewing the bowl filter that enables you to remove the old cartridge and replace it with a new one which has the same specifications: 9 ¾ long, 5 micron calibrated filter. We do not recommend another type of cartridge, it could allow unwanted particles enter the system.

Once changed, screw the bowl filter back on and re-open the seawater inlet seacock valve. Warning: use the filter wrench to close it.

To replace the active carbon cartridge, disconnect the boat pressurized fresh water system, open a tab for not leaving any residual pressure in the circuit, and replace the active carbon cartridge. Finally, connect the boat pressurized fresh water system again.

## **IV.2. Membrane Replacement.**

Follow these instructions to change the membrane, see diagram (Chapter IV Page 3)

- Before handling the unit, make sure there is no pressure in the circuit. If the pressure gauge indicates there is some, wait until it disappears.
- Dismantle the high pressure tube with two keys, taking care to have two wrenches so as not to loosen the fittings of the end caps (7) located on the vessels (1).
- Disconnect the blue polyamide tube.
- Remove the end caps (7) to get access to the membranes (2), unscrewing them with the help of a special pivot wrench.
- Once the membranes have been removed, clean the inside of the vessels with chlorine-free water. This will remove dirt, and the water will act as a lubricant for inserting the new membrane.
- Take the new membrane out of its packaging (the packaging is usually an airtight plastic bag).
- Check that the membrane gaskets have no malfunctions, damages or a excessive lack between it and the membrane. It has to be placed with its lips against the water flow direction (see drawing). Lubricate the gasket with water before being placed in the vessel.

- The gasket is located only in one side of the membrane, the outlet side. There is no gasket in the inlet side.
- Check that the membrane permeation tube fits properly into the O-rings inside the sealing caps (7).
- Place the membrane and screw the end caps previously removed, with the pivot wrench.
- Reassemble the vessel on their supports.
- Reconnect the high-pressure tubes, making sure the fitting nuts are well tight. Connect the fresh water outlet.

**NOTE:**

**The location of the membrane's gasket is different than in the 2521 Standard model, it is placed on the side marked as (OUTLET) with its lips against the water flow direction (FLOW).**

Before restarting the unit, make sure the valve (11) (see drawing in Chapter I, Page 1) is in the "PRUEBA/TEST" position and proceed as indicated in Chapter I section 6 **FIRST START-UP** following all the steps as explained in that section in detail.

**WARNING.** - The membrane may have air inside and it needs a few minutes to be completely taken out.

