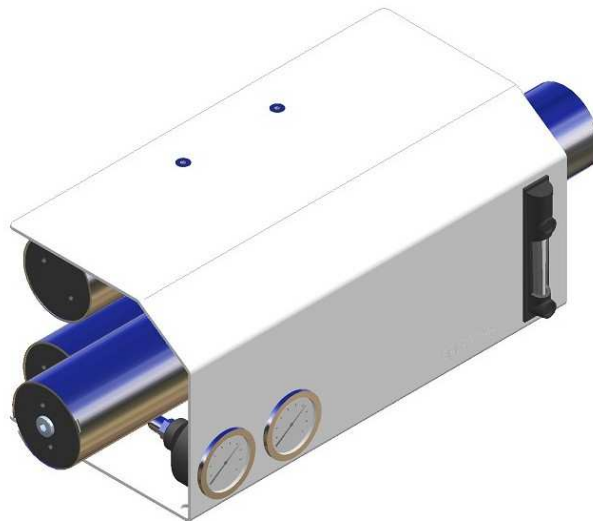


eco-systems

ECO-SYSTEMS WATERMAKERS S.L.

# Owner's Manual

## **SPLASH-25 (12/24V DC)**



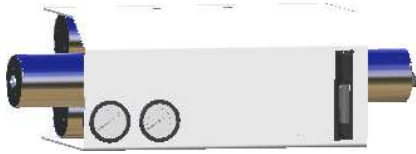
***Version: 160426***

***Reference: 45004002***

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# SPLASH-25 12/24V DC



MAIN BLOCK



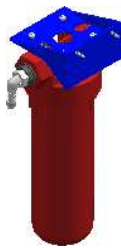
MOTOR PUMP 12/24 V DC SET



SEA STRAINER SET



HOSE CLEAR BRAID Ø20



LOW PRESSURE FILTER SET



HOSE 1/2 BLUE



TUBE Ø6X4 BLUE



FWF FILTER SET



THREE WAYS VALVE



FILTER WRENCH



4 - HOSE CLAMP Ø16/27



10 -HOSE CLAMP Ø12/22



CONNECTOR Ø6 TUBE X  
1/4 BSP PLASTIC



ADAPTER 1/2 BSP X  
3/4 BARB PVC



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



MANUAL

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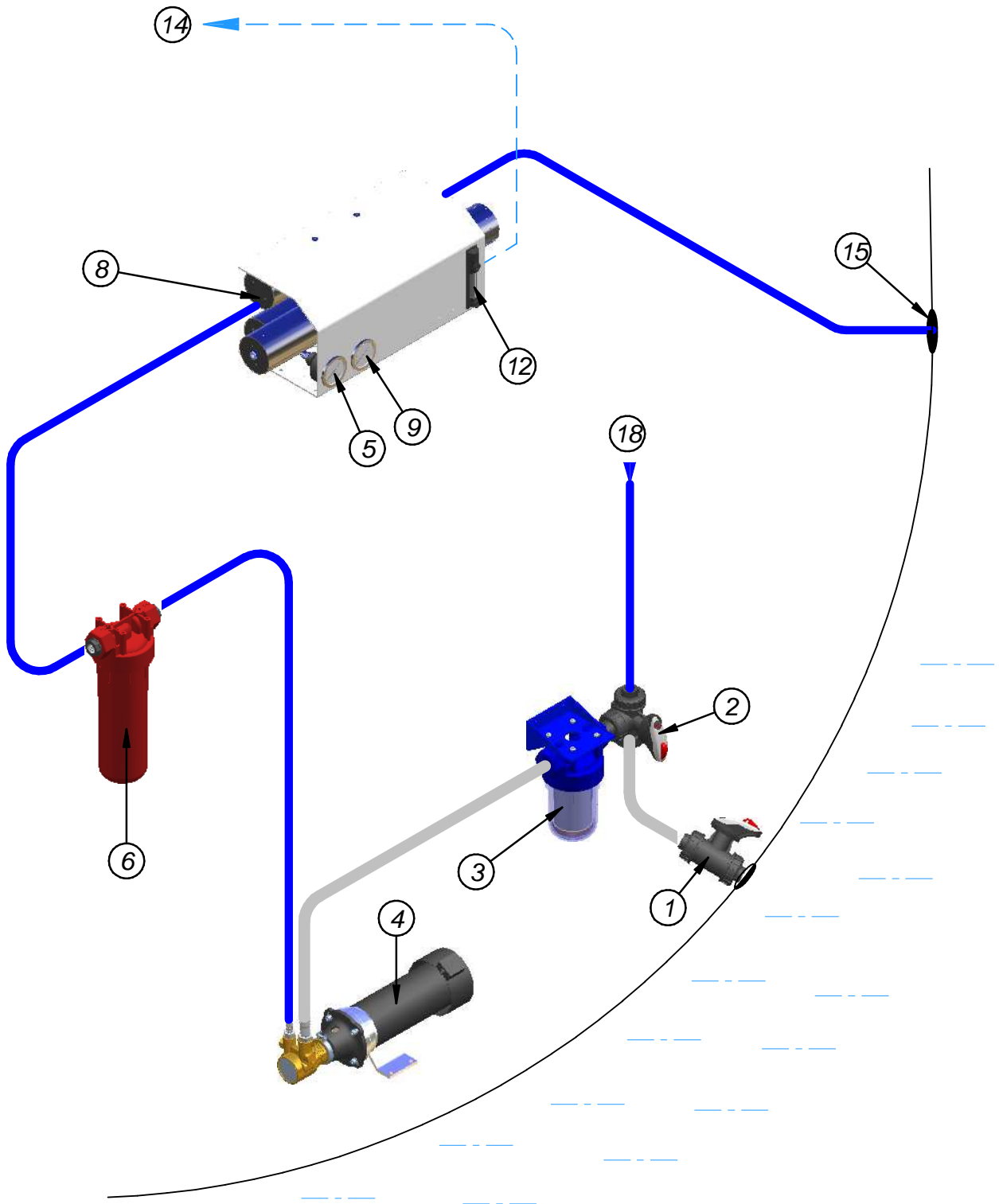
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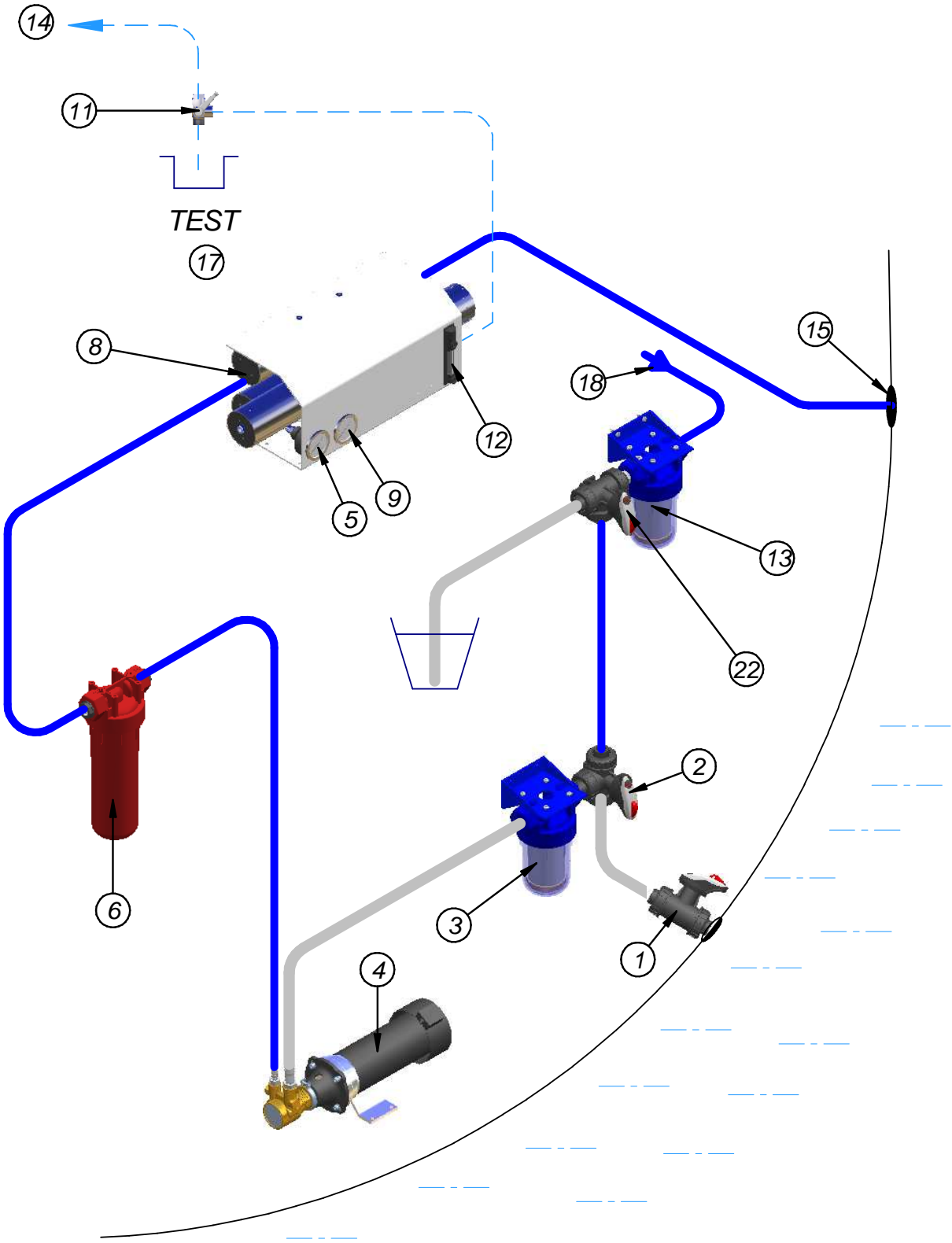
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# **CHAPTER I**

**INTALLATION, OPERATION,  
AND MAINTENANCE**



SPLASH-25 12/24V DC



**SPLASH-25 12/24V DC**

*Optional Components (11), (13) and (22) Installation Drawing*

# **SYSTEM COMPONENTS**

## **SPLASH-25 12-24 V DC**

1. - Seacock valve to uptake the sea water.
2. - PRODUCTION/FLUSHING Three Way Valve.
3. - Protection pre-filter. (Washable mesh filter).
4. - Low pressure booster pump. 12/24V DC motor.
5. - Low Pressure Gauge.
6. - 5 microns filter container.
8. - “INTEGRAL CERAMIC” High pressure pump with energy saving system.  
Energy recovering.
9. - High Pressure Gauge.
11. - (OPTIONAL) Three ways valve for the produced water.
12. - Produced Water Flow meter.
13. - (OPTIONAL) Anti Cl carbon filter.
14. - Produced water output to the tank.
15. - Brine discharge thru-hull
17. - Direct produced water output. (TEST)
18. - Boat fresh water input
22. - (OPTIONAL) Three way valve for wintering.

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

To assemble the unit you will need to have the following inlet and outlet connections ready:

- Sea cock valve (1) with a minimum nominal pitch of ½” Gas for sea water intake, which should be sited as low as possible on the bottom of the hull in order to prevent possible cavitation problems due to air suction.
- ½” Gas female thread through-hull fitting (15) for connecting the internal blue tube Ø12 that drains rejected water into the sea.
- ¼” Gas female thread inlet in the main tank (14) for the intake of fresh water produced.
- Ball valve installed in the water line pressure out of the boat with female R ½ "Gas for water intake (18) Wash System.
- Options: three way valve (22) for winter storage, valve (11) for a direct take of the produced fresh water, and, chlorine filter (13) for washing.

### **WARNING**

**It is very important to place the sea strainer (3) as close as possible to the motor pump (4), and both of them below the waterline and check that a least a minimum 6 litres/ minute flow is supplied to feed the motor pump (4), to prevent the pump from cavitation due to pressure falls.**

The rest of the components of the unit can be located at a higher level, provided that they do not exceed a distance of 4 or 5 metres. In longer distances, pressure drop increases significantly, increasing the power consumption.

**The membrane is normally delivered assembled inside the high-pressure container. If it has not been factory-installed, see assembly instructions 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 will be done with the tubes supplied with the unit, as shown in the diagram in Chapter I Page 1 and 2.

The two suction sections between the points described below are made using the transparent tube Ø20 (transparent with metallic reinforcement)

- Lower three-way valve inlet (2) and sea cock valve (1).
- Sea Strainer outlet (3) and pump inlet (4).

The remaining seawater circuit sections are made with blue tube Ø12. **It is a special tube, developed to work with pressures up to 20 bar, it is not recommended to replace it with other tubes with similar features.**

Proceed to make the connections as indicated below:

- Pump outlet (4) to the 5 micron pre-filter inlet (6).
- 5 micron Pre-filter outlet (6) to the inlet elbow (E) at the pressure amplifier pump(8).
- Outlet elbow (S) at the pressure amplifier pump (8) to the brine outlet (15).

The mentioned elbows, marked as E and S, are located in the upper part of the pressure amplifier pump (8).

Connect the flow-meter (12) output upper elbow to the main tank intake by using the polyamide Ø6 pipe. (Previously remove the protection cup of the elbow).

A three ways valve (11) can be inserted in the produced fresh water pipe to provide a direct take. Sometimes it could be useful to have a direct taken water tap in the kitchen and avoid water to pass through the tank. ( This valve must not interrupt the water flow in any of its positions)

**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 water suction.**

### **I.3. Electrical connections.**

The system is equipped with a motor for the low-pressure pump 12V DC 200 rated watts at 1500 rpm or 24V DC 300 rated watts at 1500 rpm. It must be connected up using moisture shielded cable with a cross-section adequate to the distance between the batteries and the motor, as shown in Chapter I – Page 6.

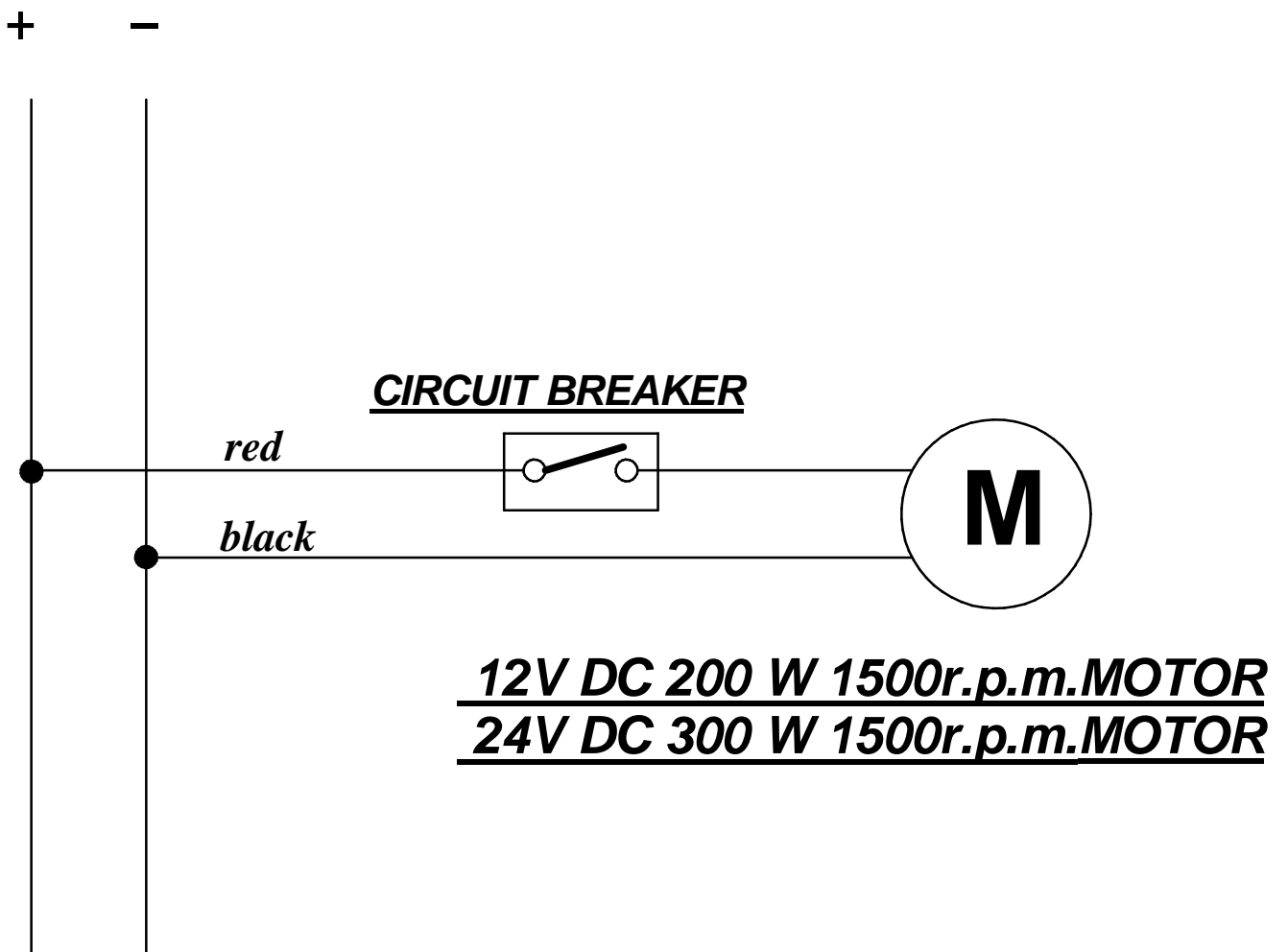
These sections will prevent voltage losses greater than 1.6% of the rated voltage (0.2 V in 12 V DC).

- Make sure the rotation direction in the pump is correct, which is marked by the water inlet and the outlet, if it doesn't, reverse the polarity on the motor connection.(Chapter I Page 6 )

**As a general rule, the electricity grid circuit should be suitably protected, taking care to oversize the connection cables to avoid voltage drops, besides unnecessary power consumption.**

# ELECTRICAL CONNECTIONS DIAGRAM

Batteries/ Motor distance	Wire square 12V DC	24 V DC
From 0 to 5 metros	10 mm <sup>2</sup>	6 mm <sup>2</sup>
From 6 to 12 metros	16 mm <sup>2</sup>	10 mm <sup>2</sup>
Circuit breaker	25Amp	15 Amp



## I.4. First start-up.

- Check all connections have been properly made and the voltage at the terminals is the right one.
- Check that the sea cock valve (1) is open and make sure the valve (2) is located at the position of "PRODUCTION". In case the optional valve (11) is not installed, its connection to the main tank will be removed.



PRODUCTION



FRESH FLUSH

- Make sure there is pressure in the boat fresh water circuit.
- Switch on the system and check the booster pump motor rotation direction is OK.
- Check that pressure in the control panel pressure gauge (5) lies between approximately 8 and 10 kg/cm<sup>2</sup>, and does not exceed 12 kg/cm<sup>2</sup> under any circumstances (red zone).
- The high pressure, indicated on the high pressure pump gauge (9), will gradually rise before stabilizing at approximately 40-50 kg/cm<sup>2</sup>.
- In the first few minutes, some air bubbles will be observed in the panel control flow meter (12). These bubbles come from 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 12 minutes after the start-up, the “control tank” placed at the output (14) should contain about 5 liter water produced (0,4 liters/minute), indicating that the production rate is correct. Stop the booster pump and put the 3 way valve (2) in **FRESH FLUSH** position, then switch on the booster pump again for about 2 minutes. 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. **Repeat this operation at least twice** to clean the new membranes and to eliminate the membrane preservative that may have been accumulated inside. During the **flushing**, the pressurized fresh water system in the boat must be “ON”, providing approximately 5 liters per minute flow.

## **I.5. . Start-up.**

- Before starting up the system, open the sea cock valve (1) to feed the unit and make sure the three-way valve (2) is in **PRODUCTION** position.
- Make sure there is pressure in the boat fresh water circuit.
- Start the motor and check that the pressure in the control panel pressure gauge (5) lies between approximately 8 and 10 kg/cm<sup>2</sup>, and does not exceed 12 kg/cm<sup>2</sup> under any circumstances (red zone).
- High pressure will gradually rise before stabilising at approximately 40-50 kg/cm<sup>2</sup>. There may be some differences depending on the temperature and salinity of the water.

## **I.6. Switching off the unit.**

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 proceed as follows:

- Switch off the low pressure motor pump.
- Make sure you have water from the boat's pressurized water system.
- Change the three-way valve position (2) to **FRESH FLUSH** and switch on the motor pump again.
- At this point the unit is suctioning water from the boat's main tank (18) and it needs approximately 2 minutes to perform a proper clean of the membranes.
- 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**.
- Switch off the unit and put the valves in the production position.

**Close always the sea cock valve (1) as a safety measure when the system is switched**  
Chapter I Page 9

## **I.7. Maintenance of the unit.**

- Regularly check the status of the sea strainer (3) and clean the mesh of dirt when needed.
- Replace the 5 micron filter with a new cartridge at the beginning of each season or every three months in case of continuous service.
- Change the active carbon cartridge at least once a year.
- When the high-pressure pressure gauge (9) exceeds  $60 \text{ kg/cm}^2$  (with a water temperature around  $18^\circ\text{C}$  and  $25^\circ\text{C}$ ), the used membrane should be replaced by a new one.

# **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 USAGE**



## **II.1. System storage.**

### **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 unauthorised chemical elements or the abuse of authorised 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 in 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:**

You should never let the membrane to get dry. If the membrane dries out, up to a 30% of the 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 the 40% of the production flow will be lost if the membrane becomes polluted with biological slime. Some production, but not all, can be recovered 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 attack is 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 a short period of time.**

“Shutting down for a short period of time” means the unit will not be used for a period between one day and three months. An excellent and inexpensive way to protect the system and the membrane is set out in the “**I.6 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 Tank”, sent through the carbon filter (13), (optional), in order to eliminate any trace of chlorine that might exist in the tank fresh water.

## **II.3. Shutting down for a long period of time.**

(Recommended Only to Experts)

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 fresh 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 litres of additional water that will be used to dissolve the preservative.
2. Switch off the low-pressure motor pump and change the position of the three-way valve to **FRESH FLUSH**. **Remember that every time a flush is performed, the pressurized water system must be “on”**. Restart the motor pump so that it suctions the water from the boat’s tank. During this period of time, about 1 to 2 minutes, there will be a significant loss of high pressure before it stabilises at 20/30 kg/cm<sup>2</sup>. This indicates that the unit has been cleaned yet. Switch off the motor pump.

3. Dissolve 30/40 grams of chemical protector (sodium metabisulfite) in 5 litres 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, and switch it off 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 as a security measure.**

5. When the unit is to be turned on once again, the valve (1) must set to the open position. 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.**

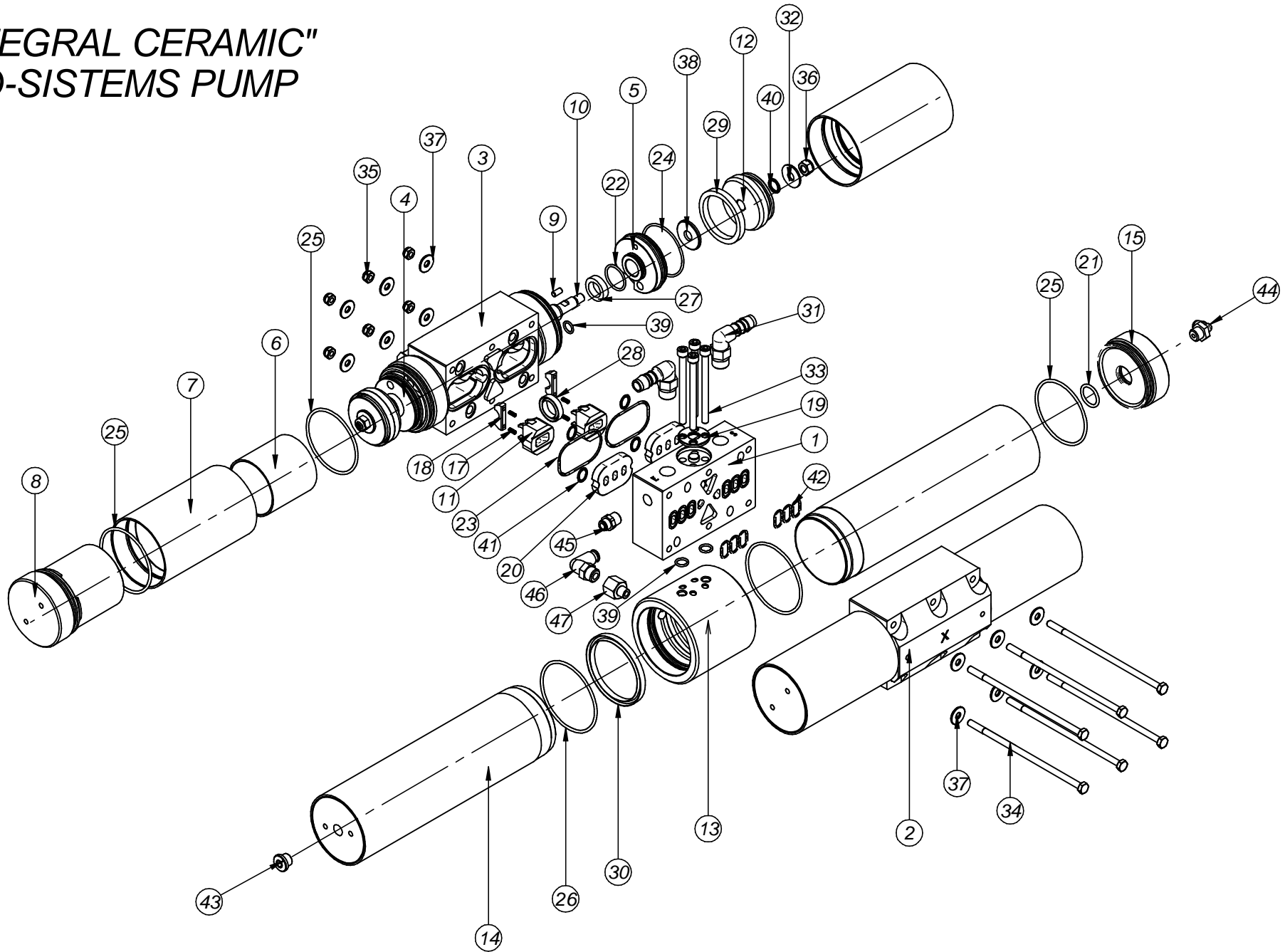
# **CHAPTER III**

**DRAWINGS, AND EXPLODED VIEWS.  
“INTEGRAL CERAMIC”  
ECO-SYSTEMS PUMP**

**“INTEGRAL CERAMIC” ECO-SISTEMS PUMP**

Re. no.	Position	Name	Quantity
44022012	1	Direct distributor plate	1
44021022	2	Manifold X	1
44021032	3	Manifold Z	1
44021042	4	Manifold lid R18	2
44021052	5	Manifold lid R22	2
44021062	6	Inner liner Ø55	4
44021072	7	Outer cylinder	4
44021083	8	Cylinder cap Ø55	4
43850510	9	Spindle Ø5x10 mm A-4	4
44021101	10	Rod Ø16 M8	2
44022072	11	Slide	4
44021122	12	Plunger Ø55	4
44022020	13	Membrane container body	1
44022031	14	Membrane vessel	2
44022041	15	Membrane vessel cap	2
44406130	17	Spring ø 3 x 12 x 0.3 mm MONEL	8
44022081	18	Spring guide stop	4
44022060	19	Manifold flat washer	1
44022092	20	Base intermediate plate (CERAMIC)	4
43911852	21	O-ring Ø18.72x2.62	2
43912340	22	O-ring Ø23x2	4
43914140	23	O-ring Ø48x2	4
43914140	24	O-ring Ø51x2	4
43916352	25	O-ring Ø63.17x2.62	10
43916952	26	O-ring Ø69.52x2.62	2
43941600	27	Seal Ø16x24x6.3	4
43941800	28	Seal Ø18x26x6.3	2
43944500	29	Seal Ø45x55x6	4
43946300	30	Seal Ø63x73x6	1
43590380	31	Elbow R3/8 BSPx1/2 barb PVC	2
43822080	32	Flat washer DIN-9021 Ø8 A4	4
43801380	33	Allen screw DIN-912 M6x80 A4	4
43802315	34	Screw DIN 931 M6x150 A4	6
43812060	35	Self-locking nut M8 A4	6
43812080	36	Self-locking nut M10 A4	4
43822060	37	Flat washer DIN-9021 Ø6 A4	12
43822100	38	Flat washer DIN-9021 Ø10 A4	4
43910935	39	O-ring Ø9.25x1.78	6
43911041	40	O-ring Ø10.5x2	4
43911035	41	O-ring Ø10.8x2.78	8
43911235	42	O-ring Ø12.42x1.78	12
43710220	43	Cap ¼”	1
43580620	44	Elbow barbed fitting Ø 6 mm tube	1
43570620	45	Connector Ø6 tube x 1/4BSP plastic	1
43586620	46	Elbow barbed fitting Ø 1/4”tube	1
43690120	47	Reduction M1/8”-H1/4”	1

# "INTEGRAL CERAMIC" ECO-SISTEMS PUMP



# **CHAPTER IV**

## **FILTERS AND MEMBRANE REPLACEMENT**

## **IV.1. Replacing the filter.**

When changing the filter cartridge make sure you have closed the seawater inlet sea cock 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. Pleated polypropylene. We do not recommend cord or extruded filters.

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

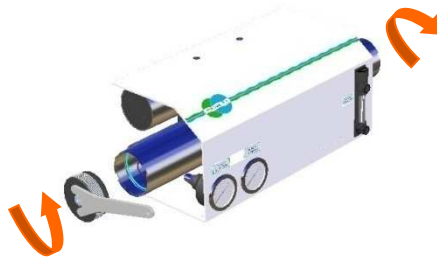
To replace the active carbon cartridge (13), disconnect the boat pressurized fresh water system, open a tab to not leave any residual pressure in the circuit. Replace the active carbon cartridge and connect the boat pressurized fresh water system again.

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

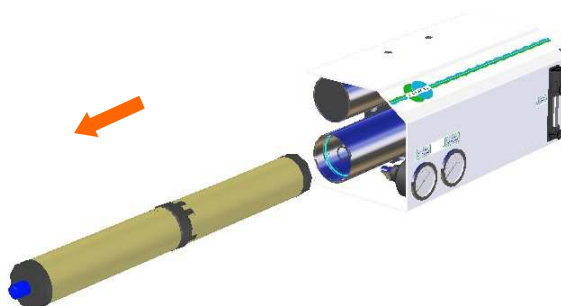
Follow these instructions to change the membrane:

**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.**

- Disconnect the osmotic water outlet tube and remove the caps by unscrewing them with the help of a special tool (nail key).

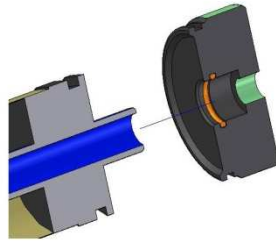


- After removing the caps, take the membrane out of the vessel. This should always be done on the left-hand side looking at the pump on the pressure gauge side, to avoid damaging the lips of the central collar, giving it a few light taps with a nylon mallet on the opposite side.

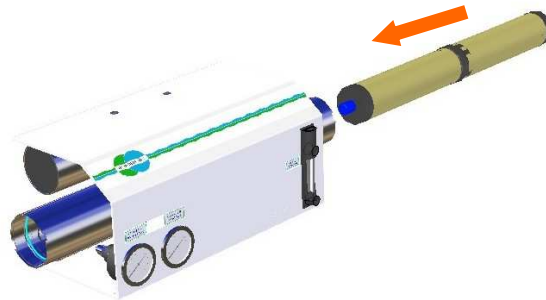




- Once the membrane has been removed, clean the inside of the container with chlorine-free water. This will remove dirt and the water will act as a lubricant for inserting the new membrane.
- Take the new membrane out of its packaging (the packaging is usually an airtight plastic bag).
- Check that the membrane permeation tube fits properly into the O-rings inside the sealing caps.



- Put the membrane in the container via the side opposite to the one from which the old membrane was removed. Make sure it is centred so that the central collar is on the membrane ferrule.



- Roscar los tapones de cierre que habíamos sacado anteriormente y vuelva a poner el tubo de agua osmotizada.

To restart the unit,, proceed as in Chapter I section 4 **FIRST START-UP**  
FOLLOW ALL THE STEPS SET OUT IN THAT SECTION CAREFULLY .