

COMPACT EFFICIENT A-200/A-300

Owner's Manual



Model: COMPACT EFFICIENT A-200/A-300
Version: 161109
Ref. No.: 45400312

TABLE OF CONTENTS

1. SAFETY INSTRUCTIONS	5	6.1.1. Starting in automatic mode. Language configuration.....	51
2. PACKING LIST	9	6.1.2. Warnings and error messages during the system work	52
3. GENERAL DESCRIPTION	13	6.1.3. Starting in the manual mode, (EMERGENCY START).....	53
3.1. System components	17	6.2. System operation during the FRESH WATER FLUSH cycle	
4. INSTALLATION AND PREAJUSTMENTS	19	53
4.1. Installation	21	6.3. System stop	54
4.2. Hydraulic connections.	21	7. SYSTEM MAINTENANCE	55
4.2.1. Hydraulic functional diagram.....	24	7.1. Check and replacement of life-cycle limited parts	57
4.3. Electrical connection	25	7.1.1. Mesh filter.....	57
4.3.1. AC mains power. Power consumption.....	25	7.1.2. Carbon cartridge.....	58
4.3.2. Low pressure booster pump connections.....	25	7.1.3. 20 and 5 micron filters.....	58
4.4. Electronic control panel	33	7.1.4. Membranes.....	58
4.5. The remote electronic control panel	33	7.2. Storage and cleaning instructions	62
4.6. Pre-adjustments	34	7.2.1. Avoiding chemical attack to the system.....	62
4.6.1. Adjustment of the fresh water flow when flushing.....	34	7.2.2. Temperature	62
4.6.2. Adjustment of the maximum production water flow	35	7.2.3. Drying.....	62
4.6.3. Salinity detection.....	36	7.2.4. Biologic dirt	62
4.6.3.1. Calibration of the ppm reading instrument.....	37	7.2.5. Chemical dirt.....	62
4.6.4. Display contrast adjustment (LCD).....	37	7.2.6. Storage.....	62
4.6.5. Maximum admissible pressure (security)	37	7.3. Short inactivity periods.	62
4.6.6. Adjustment of the maximum working pressure in normal		7.4. Long shutdown period.	63
operation	38	8. DRAWINGS, EXPLODED VIEWS	65
4.6.7. Adjustment of the relief valve	38	8.1 System dimensions	67
4.6.8. Manual operation of the three-ways valve in the general		8.2. Main unit	69, 70
distribution assembly (main unit)	38	8.3. Control panels, processors	71
4.6.9. Instructions to remove metal tab from variable frequency drive-		8.3.2. Control processor. Printed circuit board.	71
Delta VFD-	39	8.3.3. Control panel. Local or remote (optional).	73
4.6.10. Programming the Variable Frequency Drive.....	41	8.4. Motor pump assembly.	75
5. FIRST START AND STOP OF THE SYSTEM	45	8.5. General distribution assembly	76
5.1. First Start	47	8.6. Booster and hydraulic feeding unit.	77
5.2. Turning off the system for the first time	47	8.7. Membranes assembly	79
5.3. Fresh Water flow checking	47	8.8. Filters assembly (20 and 5 micron)	83
6. FUNCTIONAL DESCRIPTION	49	9. WARRANTY AND TECHNICAL ASSISTANCE SERVICE	85
6.1 Starting in production mode	51		

1 SAFETY INSTRUCTIONS

Safety Instructions

PRECAUTIONS

The EFFICIENT A-300 system works plugged to AC and DC external power supplies. Depending of the models the AC power should be 220 VAC single phase or 220/380V AC three phase.

They can be combined as follows:

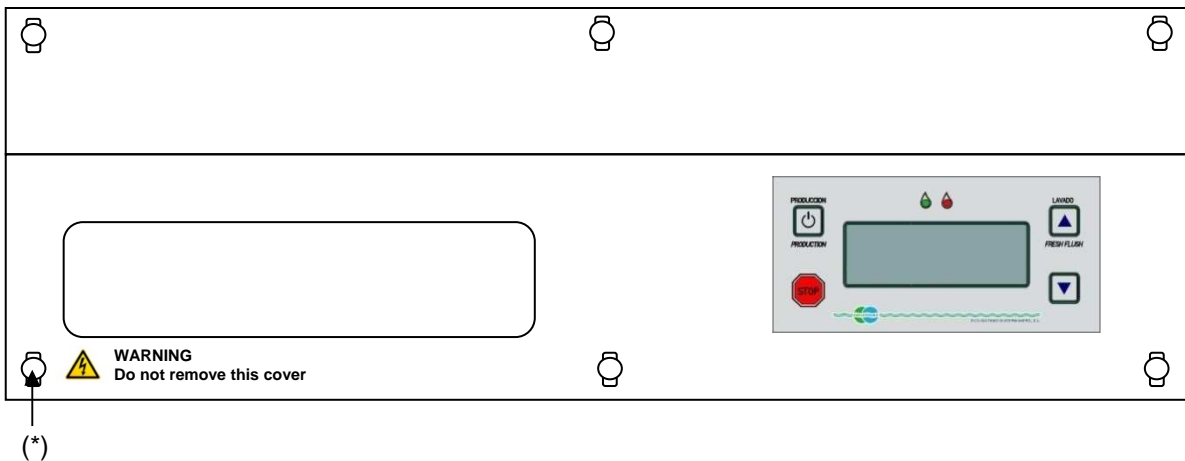
Type of power	Single phase	Three phase	Three phase +neutral
AC	220V	220V	380V

The system installation as well as its maintenance must be made by technically qualified professional people. To avoid injuries to the user and other people pay attention to the following warnings and instructions:



ELECTRICAL SHOCK RISK

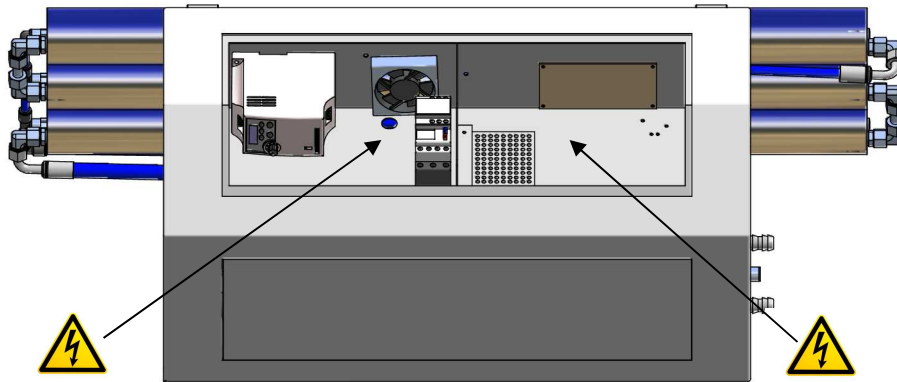
The electrical connections zone, the relays and the control circuits are placed in a closed housing at the top of the main unit.



The control panel is at the right side of the housing cover and it is fixed to the main unit body by six screws (*)..

Do not remove the screws nor open the cover without being sure that the AC power is disconnected from the mains. (See paragraph 4.5 Electrical connections).

Connections board and control system housing.



RISK OF CHEMICAL AGRESSION. IRRITANTS.




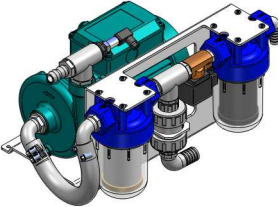
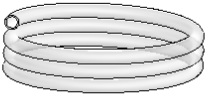


The regular use of chemicals to clean the membrane is not recommended by ECO-SYSTEMS WATERMAKERS S.L.










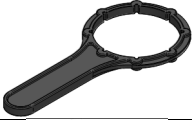



Nevertheless, for long inactivity periods or when highly active cleanings, mostly required when trying to recover obstructed or aged membranes, ECOSYSTEMS WATERMAKERS recommends the usage of cleaning chemicals. In this case, take into account the recommendations and carefully read the instructions contained in the labeling on each of the chemicals.

2 PACKING LIST

EFFICIENT A-300 PACKING LIST

Thanks for buying the ECO-SYSTEMS Watermaker. The Compact Efficient A-300 Watermaker package must contain the modules and parts listed below. Make sure you have all them when unpacked.

Image	Description	Quantity
	Owner's Manual	1
	Main Unit	1
	Pre-filter assembly	1
	Feeding and fresh water flushing unit	1
	Polyester mesh reinforced hose Ø 25 mm	1 (5 m)
	Polyester mesh reinforced hose Ø 20 mm	1 (14m)
	Polyester mesh reinforced hose Ø 15 mm	1 (5m)

	Polyamide tube Ø 12mm	1 (13,5m)
	Barbed fitting connector for Ø 25 mm hose, 3/4" GAS (BSP) thread. (From the seacock valve to the check valve hose)	1
	Barbed fitting connector for Ø 20 mm hose, 3/4" GAS (BSP) thread. (From the hose to the brine discharge thru-hull connector)	1
	Barbed fitting connector for Ø 15 mm hose, 1/2" GAS (BSP) thread. (From the hose to the boat fresh water line (boat water pump or... other fitting))	1
	Quick plug thread male adapter 3/8" BSP for the Ø 10-12 mm polyamide tube. (From the hose to the main tank)	1
	Hose clamps 20-32 for the Ø 25 mm hose	8
	Hose clamps 16-25 for the Ø 20 mm hoses	24
	Hose clamps 12-20 for the Ø 15 mm hose	8
	Fitting screws for the filters holder	4
	Filters special wrench	1
	3 way G1-4 valve Tank/control	1 (optional)
	3 way ball valve – Fresh water flush /production	1 (optional)
	Auxiliary-remote control panel	1 (optional)

3 GENERAL DESCRIPTION

ECO-SYSTEMS EFFICIENT A-300 is a watermakers family focused to be used on boats. It includes the models listed in the table below.

The main differences between the models lay in their AC power supply (single phase, three-phase).

AC Power	Model EFFICIENT	Production litres/hour
220 V AC single phase	A-300 M	300
	A-200 M	200
220 V AC three phase	A-300 T	300
	A-200 T	200
380 V AC three phase + neutral	A-300 TN	300
	A-200 TN	200

All the A-300 models have 4 membrane filters type 2540 attached to the main unit.

The system is easy and reliable, permitting a big energy saving and reverting into a larger water supply autonomy.

The high pressure pump is a hybrid system that works simultaneously as a hydraulic motor that collaborates with the electric motor, thus saving energy. Its operation and control is fully automatic, although it may work in manual control mode. (EMERGENCY START)

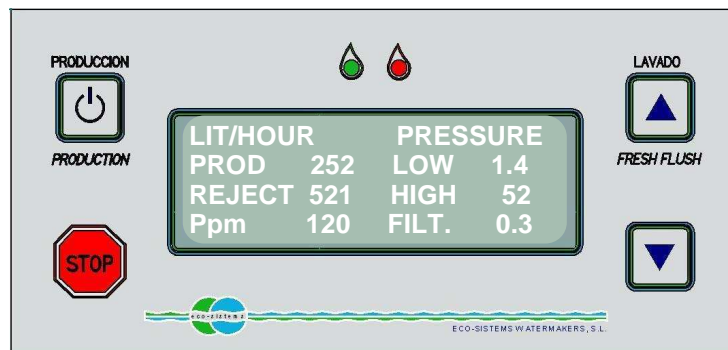
Recommended for boats whose length goes from 15 to 30 meters and with tank capacity between 500 and 2.000 liters.

The sea water is processed by a pre filtering and after, at high pressure, is treated by an osmotic filtering through membranes.

The high pressure pump, the distributor system, the pressure control system, the control panel with 2 microprocessors and the high pressure containers with the membranes are housed in the Main Unit while the rest of the components are distributed at different locations in the boat. See the image in paragraph "3.1 System components".

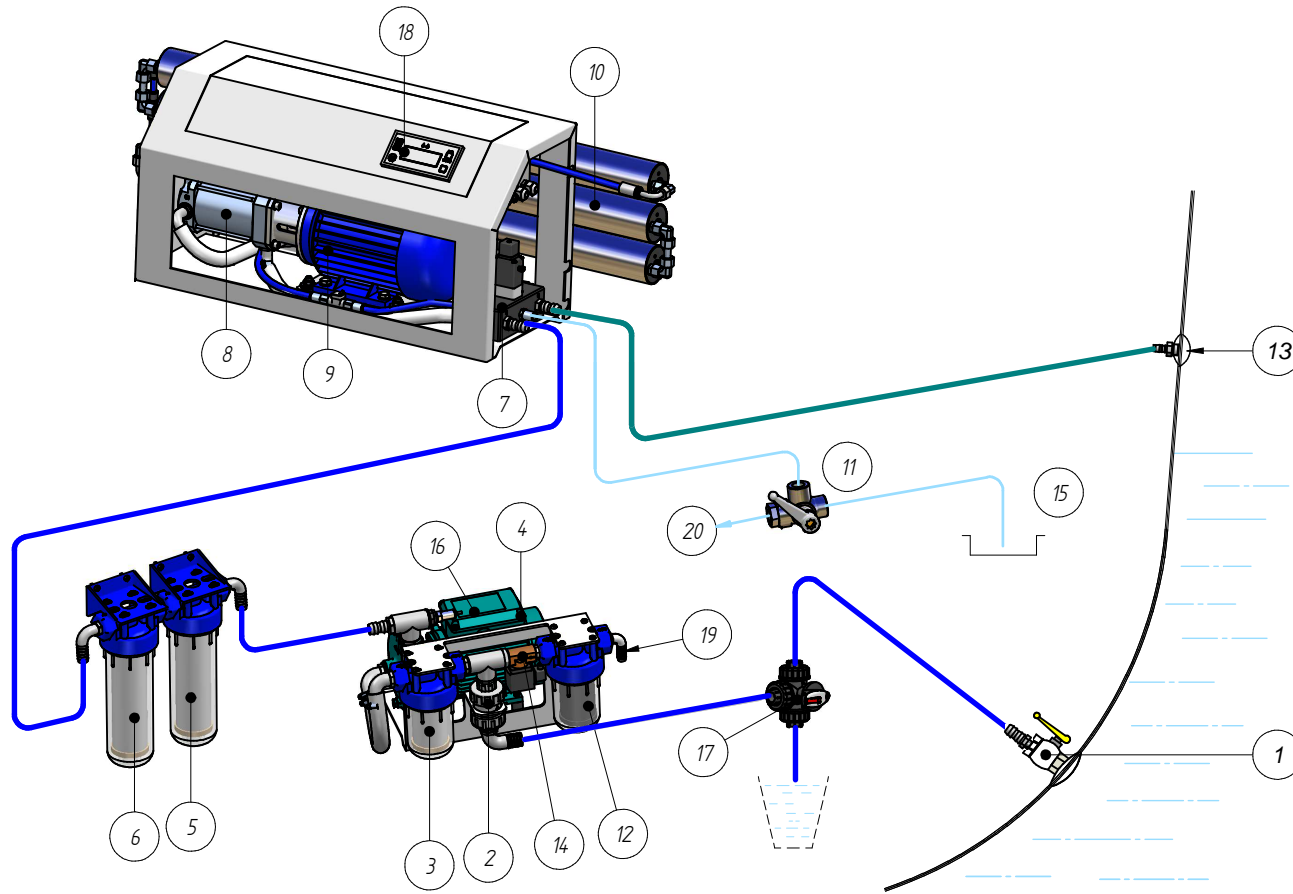
The pressure control is done by varying the three-phase motor speed of the pump by a Variable Frequency Drive (VFD) that is controlled by the control processor. The processor controls the VFD to increase or decrease the frequency of the AC power as a consequence of the sensor readouts made.

By means of a control panel provided of a LCD display, the user can choose the operation mode and modify the operation regime to adapt it to his needs.



The EFFICIENT A-200/A-300 have a self-cleaning system to avoid using chemicals in the process, as they use to be aggressive to the natural environment. It consists off potable water flushing without chemicals. The start of the fresh water flush process can be programmed so it will be performed periodically to easy the membranes maintenance during long inactivity periods of the boat.

3.1. System components.



Item	Description
1	Seacock valve to uptake the see water.
2	Check valve.
3	Protection pre-filter. (Washable mesh filter).
4	Low pressure booster pump. 220 V AC motor.
5	20 microns filter container..
6	5 microns filter container..
7	General distribution assembly..
8	High pressure pump with energy saving system. Energy recovering.
9	220 V AC Motor
10	Membrane containers (3or 4 depending on models A-200/A-300)
11	(OPTIONAL) Three ways valve for the produced water.
12	Anti Cl carbon filter.
13	Brine discharge thru-hull
14	Fresh water flush electro-valve.
15	Direct produced water output. (Control)
16	Low pressure transducer.
17	(OPTIONAL) Three way valve for wintering.
18	Control panel.
19	Boat fresh water input
20	Produced water output to the tank..

EFFICIENT COMPACT A-200/A-300

4 INSTALLATION AND PREADJUSTMENTS

4.1. Installation.

See the drawing on 3.1 System components

To install the system, be sure you have ready the following water uptakes and water outlets:

- Seacock valve (1), minimum pitch $\frac{3}{4}$ " GAS (BSP) for the sea water uptake. To avoid possible cavitation problems because of the air absorption or the resistance to the water flow, install it at the bottommost possible part inside the hull.
- Thru-hull (13). Female thread, $\frac{3}{4}$ " GAS (BSP) for \varnothing 20 mm hose (inner diameter) used for the rejected water evacuation to the sea.
- Water uptake. Female thread, $\frac{3}{8}$ " GAS (BSP) , at the main tank, produced water input
- Water uptake. Female thread $\frac{1}{2}$ " GAS (BSP) .Supply of fresh water to the membrane cleaning system.

ATTENTION

To avoid cavitations by depression, place the feeding unit below the waterline and check that there is a minimum available input flow of 15 l/minute.

The rest of the components can be placed in upper levels provided their separation does not exceed 4 or 5 meters each other

Membranes are provided usually assembled inside the high pressure containers. Just in case they were not factory-assembled please proceed to assemble them as described in 7.1.4. Membranes (in chapter 7. System Maintenance) and 4.2.1 Hydraulic functional diagram.

Once the different modules and components are well placed and secured, the equipment is ready for its hydraulic and electric connection. Connections are described in the following paragraphs.

4.2. Hydraulic connections.

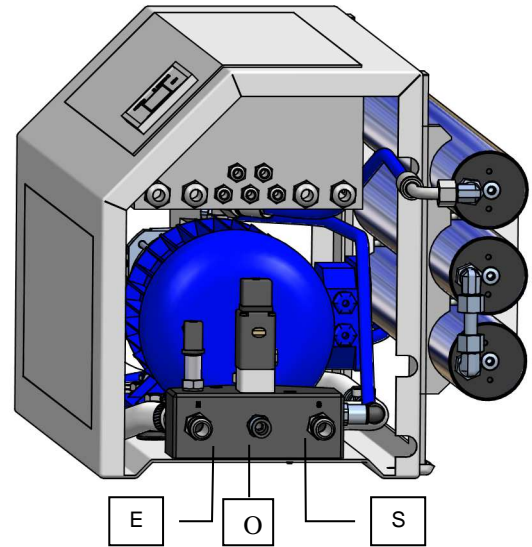
As a general rule, the tube stretches had to be as short and straight as possible to minimize unnecessary charge losses.

Connections must be fully hermetic to avoid the air come in the circuit when water is absorbed. To avoid leakages, use two hose clamps at both ends of the stretch

Use the provided hoses and clamps to connect the different elements and modules. Follow the schematic in paragraph 3.1. Pair the hoses and clamps as shown in the table below

Connection	Hose	Clamp	Quantity
Seacock valve(1) input to the check valve (2) lower input	Ø 25 mm	26-32	8
Pump (4) output to the 25 micron pre-filter (5) input	Ø 20 mm	16-26	8
Pressurized boat fresh water uptake to carbon filter (12) input.	Ø 15 mm	12-20	8
from the 5 micron pre-filter(6) output, to the distributor plate input hose fitting (E) in the distributor assembly (7)	Ø 20 mm	16-26	8
Output fitting connector (S) in the distributor (7) to output (13)	Ø 20 mm	16-26	8

Hose fitting connectors (E) y (S) are located at the distributor plate (7) in the Main Unit of the Water-maker.



Side view with distribution plate

The following connection “must” be done with polyamide Ø10-12 mm tube:

- From the output straight fitting (O) where the osmotized water flows out of the distributor, to the main tank of the boat. The elbow comes factory-protected by a transportation cap. It should be removed before the installation.

A three-way valve (11) can be inserted in the middle of the produced fresh water pipe to have a direct outlet.

An open tap in the kitchen sink is useful to directly fill containers without the water passing through the boat tank. The usage of this outlet ensures that the water collected from it will be fresh-water, with all the purity characteristics of the recently produced water. The risk of collecting contaminated water is 100% discarded in this way.

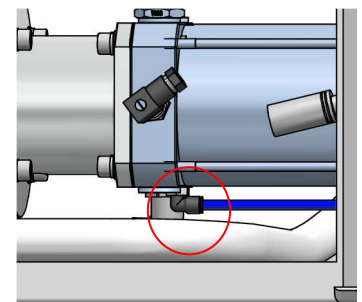


This valve has to be of an adequate model. The water flow never has to be closed completely. It always has to permit an exit through one of the two ways out. The valve must not completely close the flow in neither position. If this ever happened it will produce a rise of the water pressure that might probably produce the hose explosion

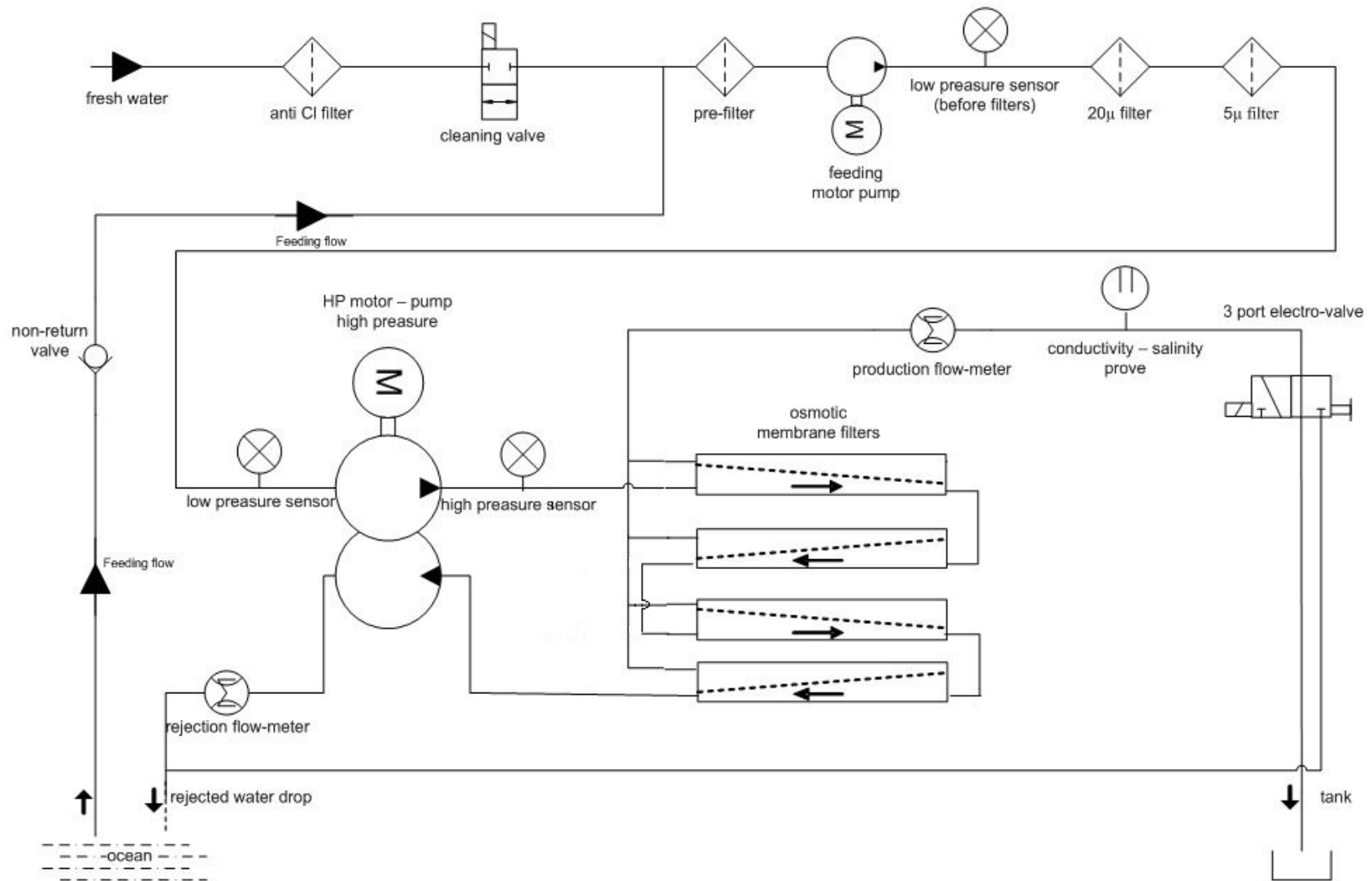
ECO-SYSTEMS can supply the adequate valve if required. (OPTIONAL)

- **Mechanical seal drain**

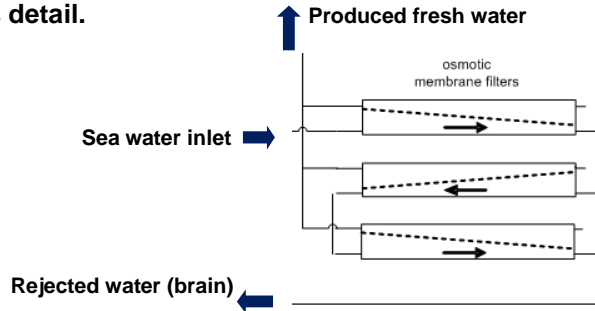
The output of this tube must be conducted to the bilge by a larger diameter tube to avoid clogging. In case of a continuous loss of water it indicates that the mechanical seal is damaged so is necessary to replace the mechanical seal.



4.2.1. Hydraulic functional diagram.



A-200. 3 membranes group connections detail.



4.3. Electrical connection

All the electrical components of the system are connected from its manufacturing. To easy packaging and transportation, the cables from the control system housing of the main unit to the booster pump have been disconnected. To connect them again remove the main unit top-front cover (6 screws) and proceed as follows:

4.3.1.AC mains power. Power consumption.

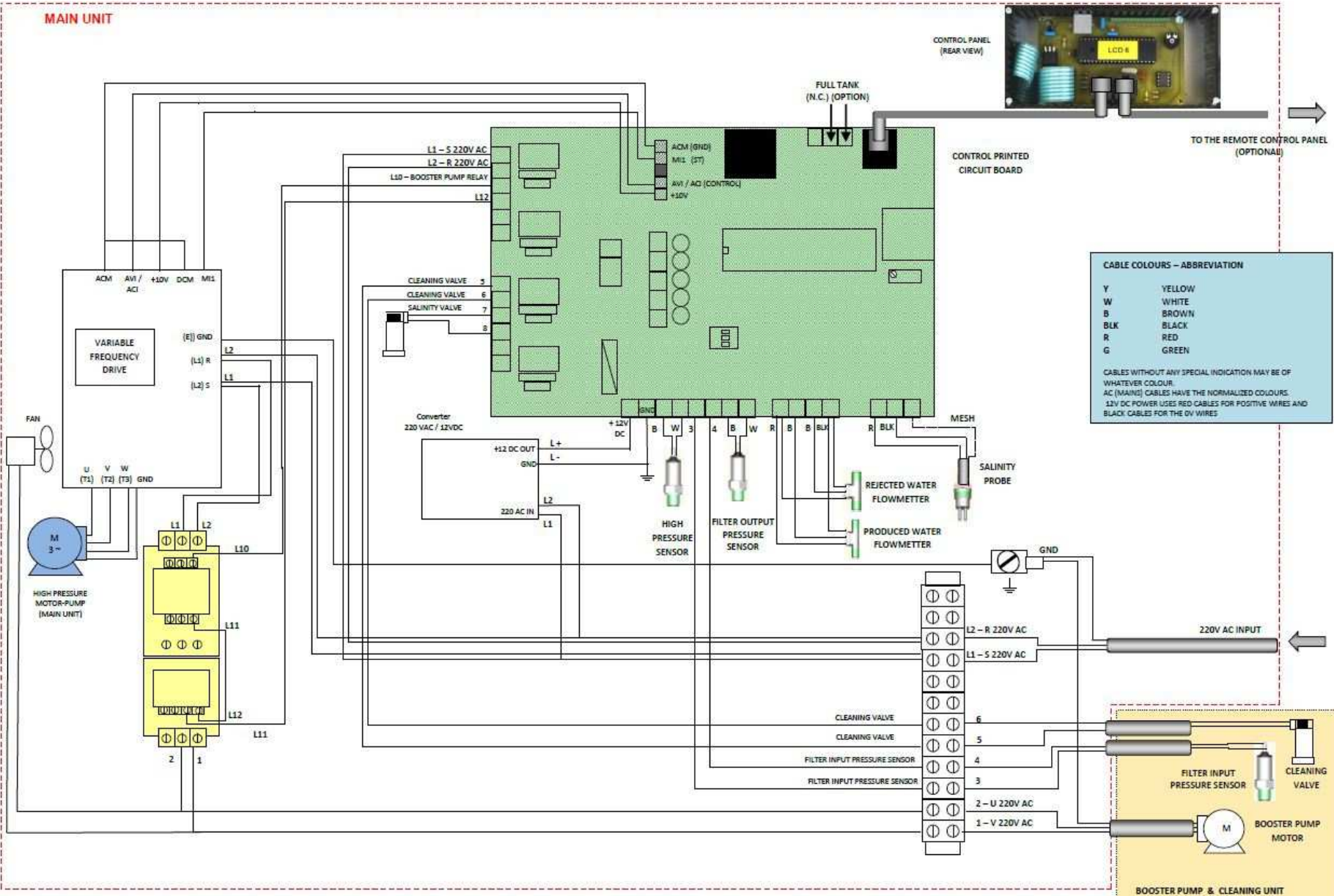
One of the most remarkable features of the EFFICIENT A-200/A-300 is their low power consumption, especially in the high pressure pump. The consumptions are shown in the following table. They were evaluated during a normal working regime (200 or 300 liters/hour production). The recommended values for the magneto-thermal relays/ circuit breakers are also included in the last column.

Model	Booster pump unit	High pressure pump Variable frequency driver	Total Ampers consumption	Circuit breaker
Efficient -300 M single phase 220V	1,5 A	6 A	7,5 A	15 A
Efficient A-300 T Three phase 220V	1,5 A	4,3 A	5,8 A	10 A
Efficient A-300 TN Three phase 380V	1,5 A	2,5 A	4 A	8 A
Efficient -200 M single phase 220V	1,5 A	5,8 A	7,3 A	15 A
Efficient A-200 T Three phase 220V	1,5 A	4,2 A	5,7 A	10 A
Efficient A-200 TN Three phase 380V	1,5 A	2,4 A	3,9 A	8 A

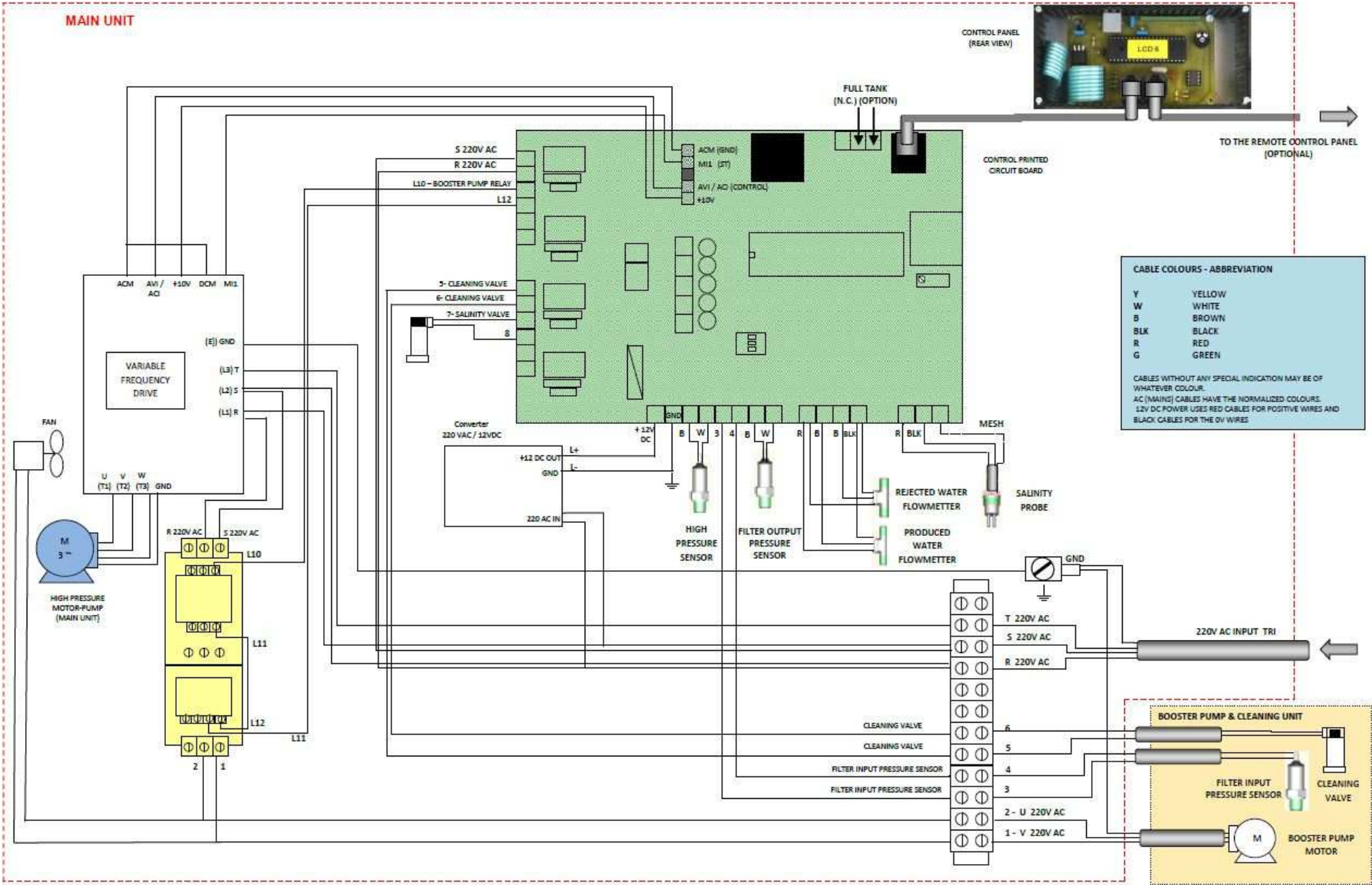
- Follow the schematic diagram corresponding to your EFFICIENT A-300 model. Find it in the following pages.
- As described in the diagram, connect the R-S, R-S-T or R-S-T-N cables of the boat AC mains to the corresponding terminal of the terminal block inside the control system housing in the main unit. Use a proper magneto-thermal relay as protection. See the adequate values in the last column. (Not supplied).

4.3.2.Low pressure booster pump connections.

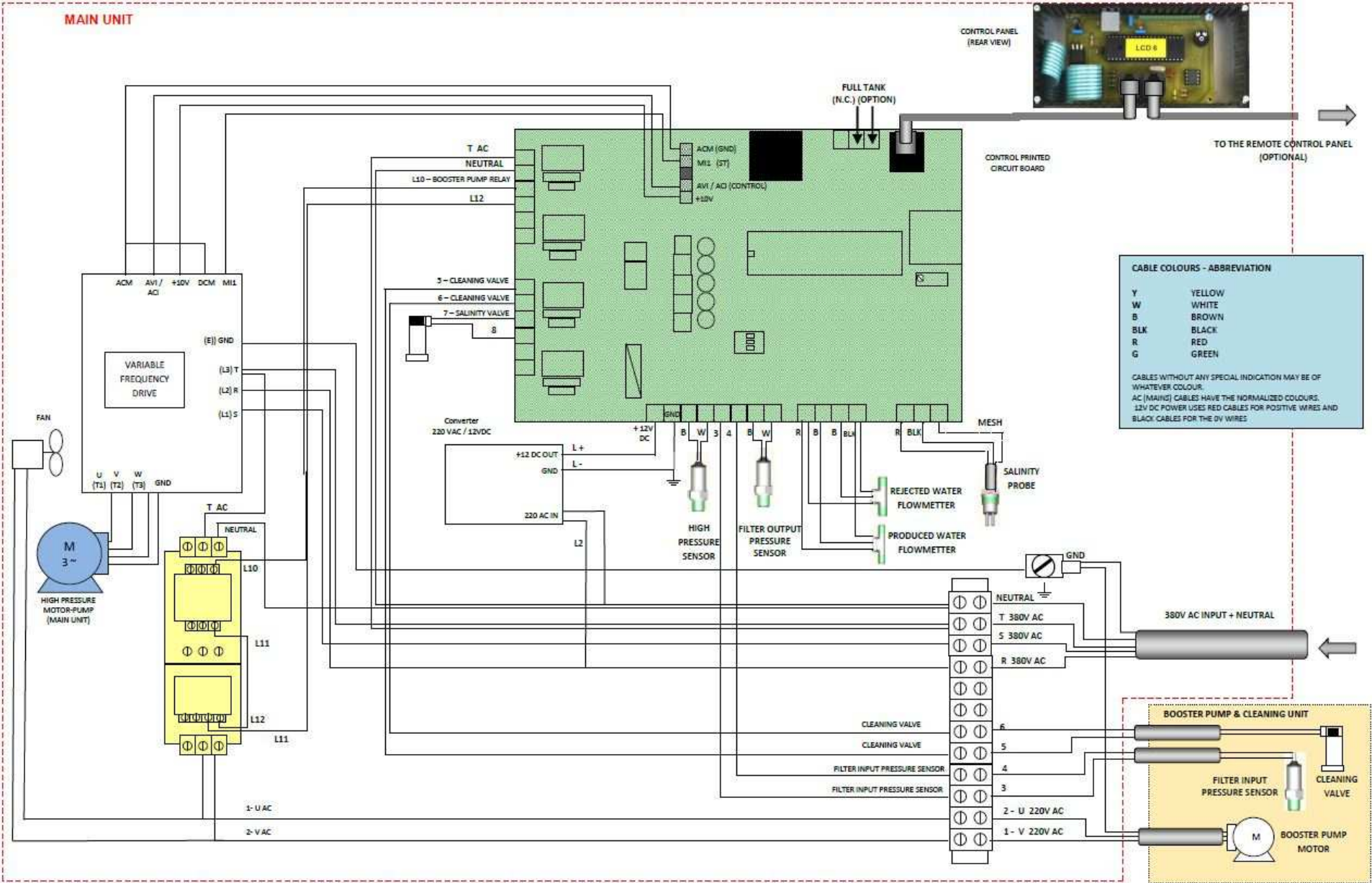
- The Booster unit is delivered by a 10 meters cable connected to the motor. The other cable end goes labeled with U, V, and GND. Pass this cable end through the cable-gland, connect U and V to their corresponding terminals of the terminal block and GND to the chassis terminal- All inside the control system housing.
- There are also another two cables attached to the Booster Unit. Each one has 2 wires and 10 meters length. One of their ends are connected to the electro-valve (14) and to the pressure transducer (16) of the booster pump respectively. Pass the other ends through the cable-gland of the control system housing and connect them to their corresponding terminals at the terminal block. Mind their colors. The cable colors are indicated in the following circuit diagrams:



Electrical schematic diagram model A-300 220V AC Single phase



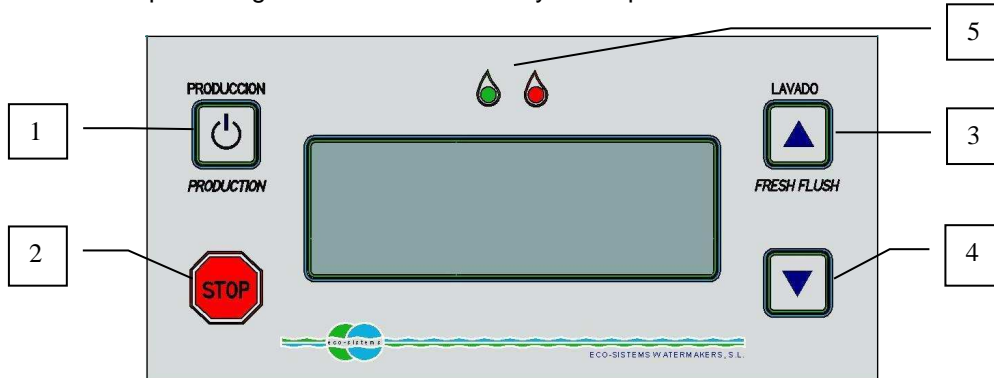
Electrical schematic diagram model A-300 220V AC three-phase



Electrical schematic diagram model A-300 380V AC three-phase plus neutral

4.4. Electronic control panel.

The Control Panel (18) , as referred in 3.1, contains the Liquid Cristal Display (LCD) to show values as the pressure, the flow, the quality of the produced water, etc., It also has two LED lights (green and red) and four push buttons permitting the full control of the system operation.



- 1- PRODUCTION. Starts the system in the normal production operation mode.
- 2- STOP , Stops the system
- 3- FRESH FLUSH The top rightmost button , FRESH FLUSH (**up arrow**), starts the fresh water flush process and it also sets up an autostart every 7 days.
- 4- Down arrow The bottom rightmost button has multiple usages as explained in more detail in each paragraph, nevertheless, as an advance we can summarize that it is used to adjust the value of parameters when programming or to decrease the motor speed in manual operation. It usually works together with the up-arrow button.
- 5- Green and Red LED These lights inform of the water salinity level and the system status. See 6.1.2. Warnings and error messages during the system work.
When the system in the STOP status, there is no fresh-water production and the salinity probe may detect a high level. The red LED would be lighted. This is not an abnormality symptom.

It is possible to remotely control the system by an auxiliary remote control panel that has exactly the same appearance and functionalities (OPTION).



To prevent an abnormal system operation, directly pass from the NORMAL OPERATION to the FRESH-WATER FLUSH PROCESS is not possible without going to STOP. The flushing time is programmed for a period of 2 minutes in which the high pressure pump motor starts at a lower speed (between the 50% and the 60% of the nominal speed approximately) to a better cleaning and to save water. This lower speed is adjustable.

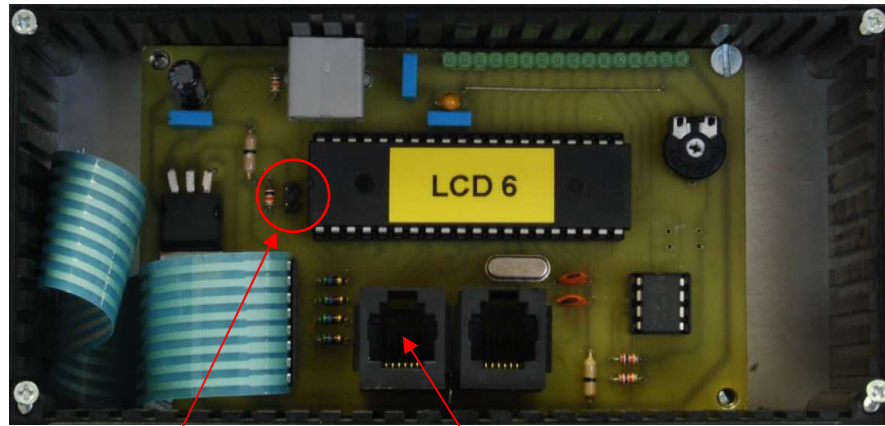
4.5. The remote electronic control panel.

Installed in an accessible location, frequently in the bridge of the ship, it will permit the control of the EFFICIENT A-300 remotely.

The remote control panel is identical to the panel described in the previous paragraph but it needs to be set up to work remotely. Just connect the couple of pins with a jumper (see the zone pointed by a red arrow in the image below).

To connect it to the main unit, plug a RJ45 connector cable from the arrow marked connector to the other connector of the main control panel in the main unit

Operation and functionalities are the same than those of the main control panel.



Remote panel setup strap to work at remote location

Cable to the main panel connector

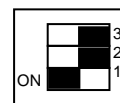
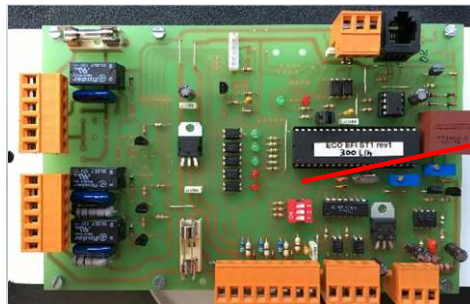
4.6. Pre-adjustments

All the here referred pre-adjustments were already made in factory. In case they have to be modified it is strongly recommended doing them by qualified technical personnel


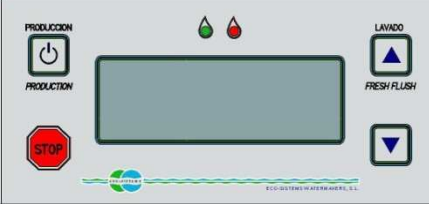

4.6.1. Adjustment of the fresh water flow when flushing.

To avoid excess of water consumption in the flushing process, the system permits to adjust the water flow for the fresh water flush operation mode by varying the motor speed of the main pump. If it were necessary proceed as follows:

- a) Make sure to have the AC mains disconnected before removing the top-front cover of the main unit
- b) With the system in STOP, place the DIP switches (DIP SW) on the control printed circuit board (PCB) as shown in the image below (SW 1 ON)



Put the top front cover in its right position and start the system in FRESH WATER FLUSH mode. The functions of the buttons on the control panel in this “setup status” are like described in the following table:

Button	Funtion	Control panel front view
	Increases the pump motor speed	
	Decreases the pump motor speed	

- c) Push on the increase/decrease buttons until obtaining the desired water
- d) Turn off the system again. Set the DIP SW1 to off (right position). Put the top-front cover on place. The system is now programmed to work with the new flushing water flow.

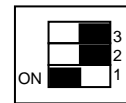
4.6.2. Adjustment of the maximum production water flow

The factory adjustment will be perfect in most of the cases. To modify it, please follow the instructions detailed below:

Take into account that the adjustment will be made by varying the production water flow. Anyhow, the system has a pressure limiter that prevents to overpass 59 Kg/cm2. If the pressure reaches the top limit, the water flow increments will be impossible because the limiter will act to avoid overpassing the maximum pressure permitted.

- a. Be sure to disconnect the AC mains before removing the top front cover to access to the control system housing.

- b. Access to the control PCB and shift the DIP SW1 to the left position (ON)
See the PCB image in the previous paragraph.



- c. Put the cover on again, connect the AC mains and turn on the system. Start the normal production operation.
- d. Wait for the system to reach the stable production regime. Ensure that the high pressure value that is shown on the control panel LCD is below 59 Kg/cm2.
- e. The increases or decreases of the production water flow are done by pushing the up arrow/down arrow buttons respectively .Each push increments/decrements the water flow in 2,5 l/hour. Keep in mind that if the high pressure reaches the upper limit of 59 Kg/cm2 no production increase will be done if the up arrow button is pushed.

The production water flow and the high pressure values are shown in the Control Panel LCD. See the image:



- f. Once the adjustment is done , stop the system again, turn of the AC mains power remove the top-front cover and shift the DIP SW1 back to the off position (right).

4.6.3. Salinity detection.

There is a salinity probe in the system whose readout is handled by the control processor. The obtained value is displayed on the control panel LCD in ppm (parts per million). See the image above.

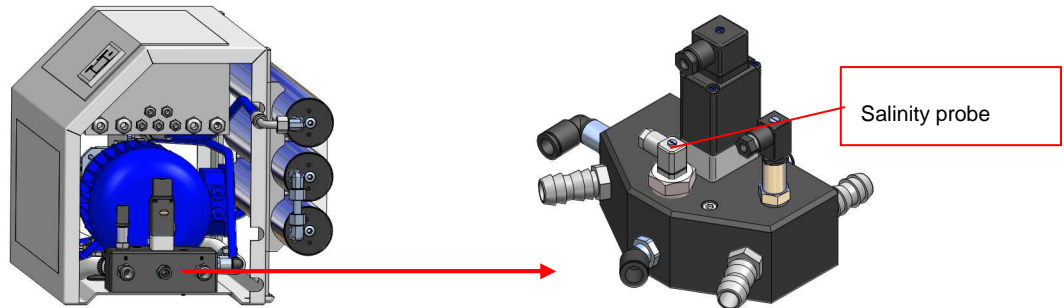
The reading system may need a calibration to adjust it to each probe characteristics. We shall need a 1000 ppm salinity patron to calibrate it.

A costless and easy to prepare patron consists on simply mix 1 gram of salt (NaCl – Sodium Chlorure) with 1 liter of distilled water.

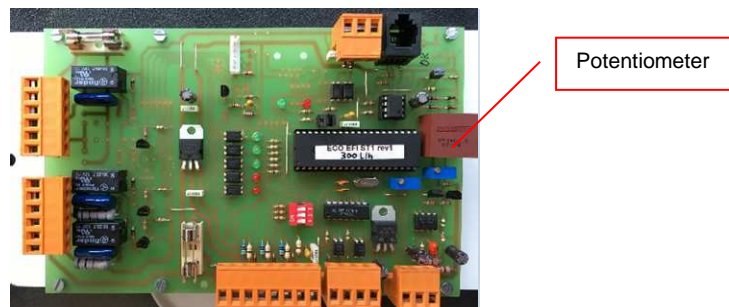
There are more precise salinity patrons in the market. ECO-SISTEM has salinity patrons ready for its customers that can supply on demand. Ask to your commercial.

4.6.3.1. Calibration of the ppm reading instrument.

- a) Turn off the system. (Cut the AC power and the 12 V DC power supply).
- b) Remove the right side cover. Disassemble the salinity probe from the distribution assembly located at the right side of the main unit, Cover the hole with a plug ,3/4 " Gas(BSP male).



- c) To access to the control PCB, carefully remove the top-front cover of the main unit. Care must be taken to place the cover in such a manner that reading the ppm values on the LCD and adjusting the potentiometer were possible simultaneously while the system works.
- d) Turn on the system by reestablishing the AC and the 12V DC power and start it in the normal production mode. Wait for the stabilization of the ppm readouts.
- e) Pour the 1000 ppm patron in a container and put the salinity probe in the patron
- f) Adjust el potentiometer pointed In the image below using a small screwdriver up to obtain a readout of 999 ppm on the LCD display



- g) Turn off the system, remove the 3/4 "plug and re-assemble the probe and the covers of the main unit.

4.6.4. Display contrast adjustment (LCD)

Turn the potentiometer pointed by a white arrow to set the contrast.
 The control circuit is inside the control panel box. To access to the potentiometer, unscrew the 4 screws (↓) at the corners and remove the rear cover



4.6.5. Maximum admissible pressure (security)



*The maximum admissible pressure level is not adjustable by the user. The adjustment must be done in the factory for safety reasons.
 The programmed value is 70 Kg/cm2.*

4.6.6. Adjustment of the maximum working pressure in normal operation.

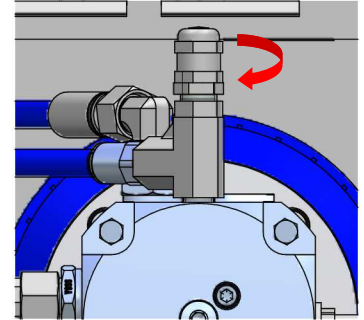


Programming of the maximum working pressure limit is not permitted to the users.
The in factory programmed value is 60 Kg/cm2.

4.6.7. Adjustment of the relief valve



The work pressure adjustment of the relief valve is adjustable by user only in exceptional cases.
The pressure value set in origin is 60Kg/cm2.
To increase pressure we must loose up the locknut and then twist in the direction that is shown in the picture. In case we want to decrease the pressure, we must do it in the opposite direction. Be careful to not forget to screw the locknut once the pressure is already regulated.



4.6.8. Manual operation of the three-ways valve in the general distribution assembly (main unit)).

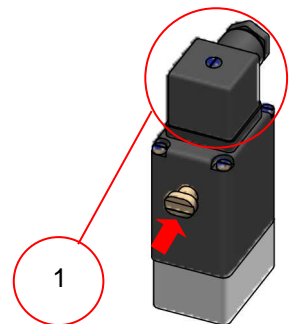
This valve conducts the osmotized water flow from the membranes output to the tank or to the brine discharge output depending on the produced water salinity.

The passage of the produced water towards the tank will only be permitted if it has enough potability warranties.

The control processor controls the electro-valve automatically but the valve also has a manually operated mechanical actuator at the left side to be used in case it was necessary to operate it manually. You can set or release the valve when you push or pull it respectively.

Valve activated -> water rejected to the brine discharge.

Check if the mechanical actuator marked with the red arrow is released (outmost position) permitting the automated control.
The manual actuator position can be blocked if you turn it clockwise.
In the normal operation the actuator should be in its out position and unblocked.

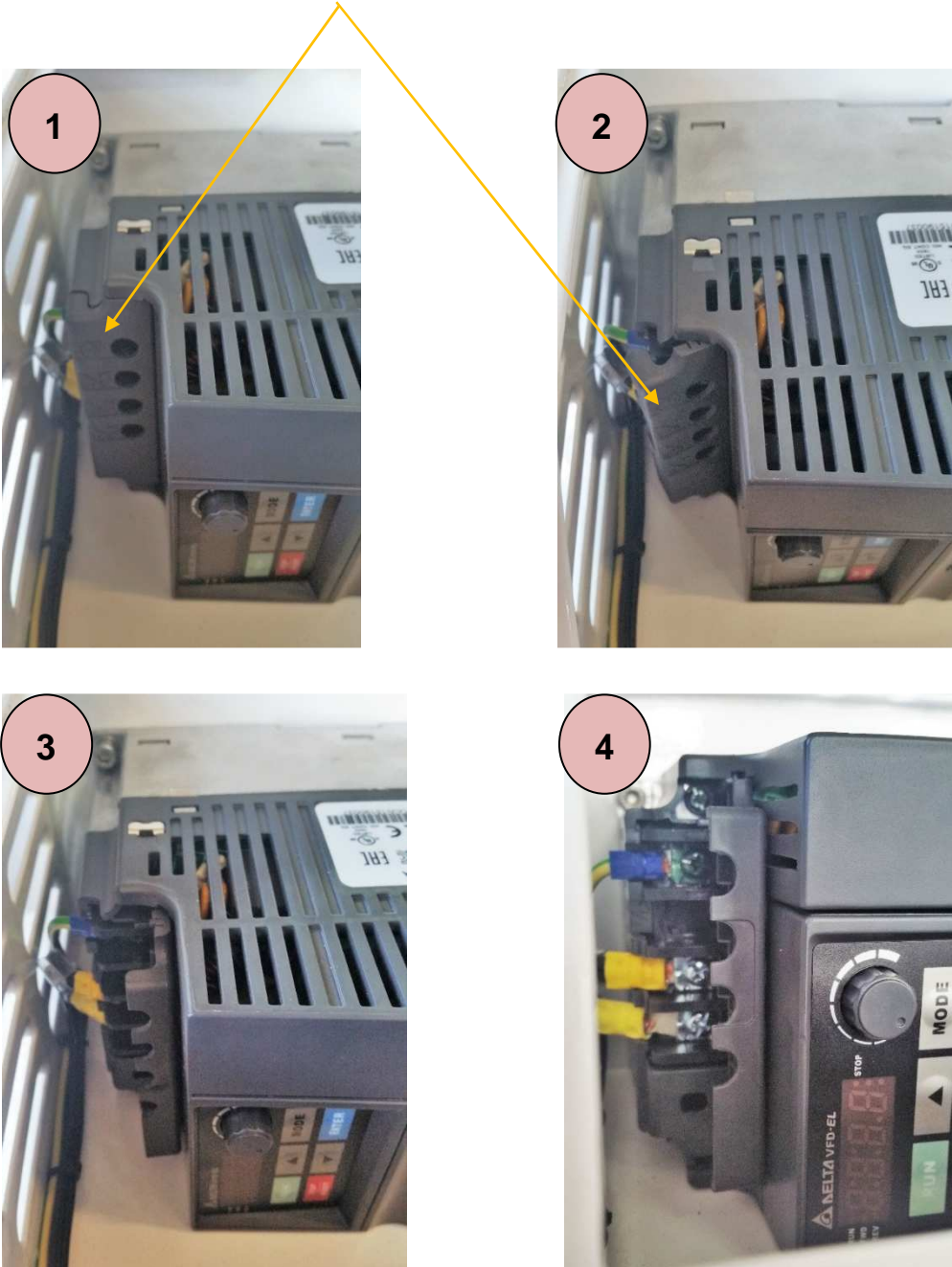


Once the valve is electrically activated the system cannot be deactivated manually. In case necessary to deactivate when the valve is already activated electrically, it can be done separating the electrical connection (disconnecting the head (1)).

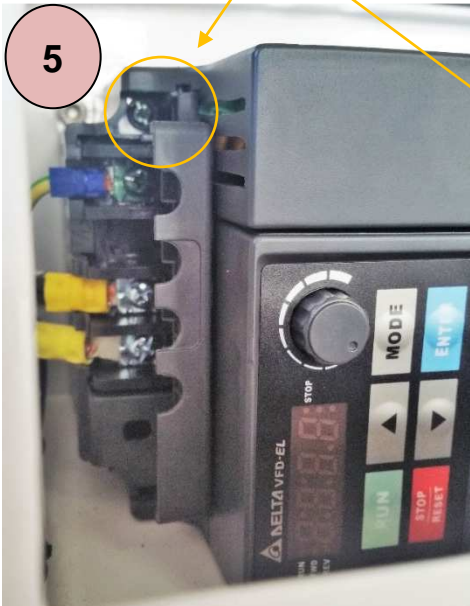
4.6.9. Instructions to remove metal tab from variable frequency drive –Delta VFD-

For the variable frequency drive Delta VFD proper use, the sensibility of the line differential protection of the electrical supply must be 300mA. In many nautical installations we found out that sensibility is lower (typically 60mA), in these cases it should be necessary the removal of the metal tab in order to avoid the jump of the differential protection system. For this reason normally our equipment is delivered without this metal tab.

- 1) Lift the protective cover from the connection terminals. Steps 1,2,3 and 4



- 2) Loosen the screw which is located a little bit right from ground terminal. (5 and 6)



- 3) Remove the metal tab and tighten again the screw. (7 and 8)



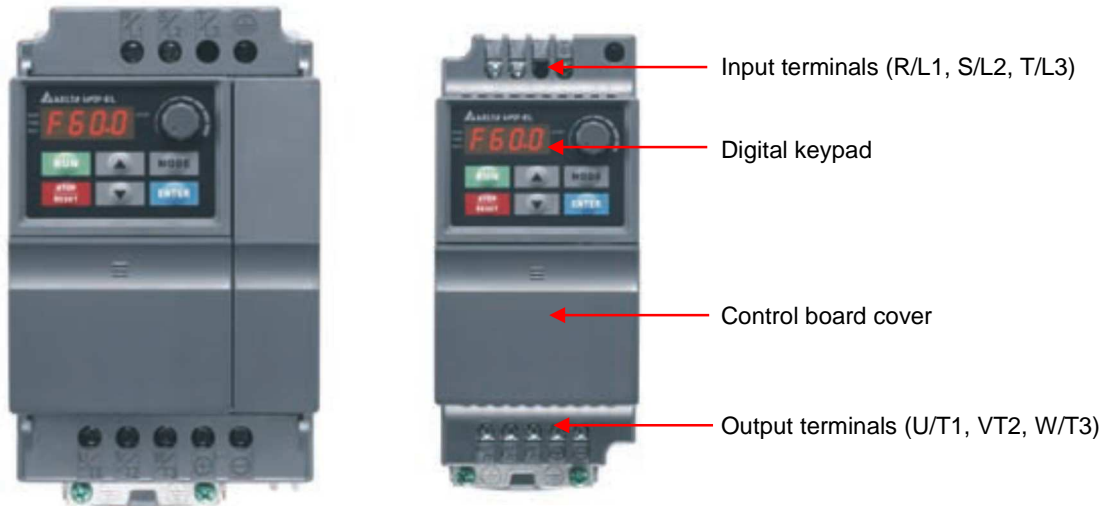
NOTE: While the operation is performed, the system must be disconnected. After disconnecting it, wait 5 minutes before working on the metal tab.

4.6.10. Programming the Variable Frequency Drive.

The Variable Frequency Drive (VFD) controls the motor speed of the High Pressure Pump.

Each Efficient A-200/A-300 model includes a proper Variable Frequency Drive according to the AC mains type:

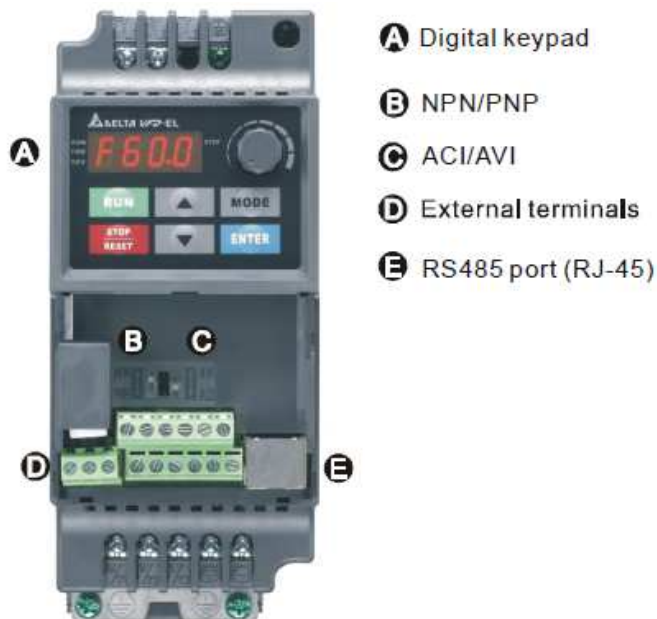
Brand and model	Application
DELTA VFD015EL21	Single phase 230V AC
DELTA VFD015EL23	Three phase 230V AC
DELTA VFD015EL43	Three phase 380V AC +neutral



VFD015EL21A

VFD015EL23A
VFD015EL43A

Internal structure:



The Driver permits adapting to each particular application, but it is not recommended to modify any of the parameter values programmed in factory. Nevertheless we describe the method to program it just

for exceptional necessity occasions and we also indicate the values of the parameters modified to adapt it to the Efficient A-300. The VFD has a digital display showing the status and the parameter values as well as a keypad to operate it and to modify its programming

- 1 Status indicator
- 2 LEDs display
- 3 Potentiometer
- 4 RUN key
- 5 UP - DOWN key
- 6 MODE key
- 7 STOP / RESET key
- 8 ENTER key



The status indicator has four LEDs:

- STOP: Motor stopped.
- RUN: Motor running.
- FWD: Motor running forward.
- REV: Motor running in the reverse sense.

The display can show the frequency, the voltage, the current, the user defined values of the programmable parameters, etc.

Display Message	Descriptions
	Displays the AC drive Master Frequency.
	Displays the actual output frequency at terminals U/T1, V/T2, and W/T3.
	User defined unit (where U = F x Pr.00.05)
	Displays the output current at terminals U/T1, V/T2, and W/T3.
	Displays the AC motor drive forward run status.
	Displays the AC motor drive reverse run status.
	The counter value (C).
	Displays the selected parameter.
	Displays the actual stored value of the selected parameter.
	External Fault.
	Display "End" for approximately 1 second if input has been accepted. After a parameter value has been set, the new value is automatically stored in memory. To modify an entry, use the ▲ and ▼ keys.
	Display "Err", if the input is invalid.

At the starting, in the normal status, (by defect), the display will show the frequency, FXX.X



Push MODE to sequentially advance on the status or on the magnitude to be shown.



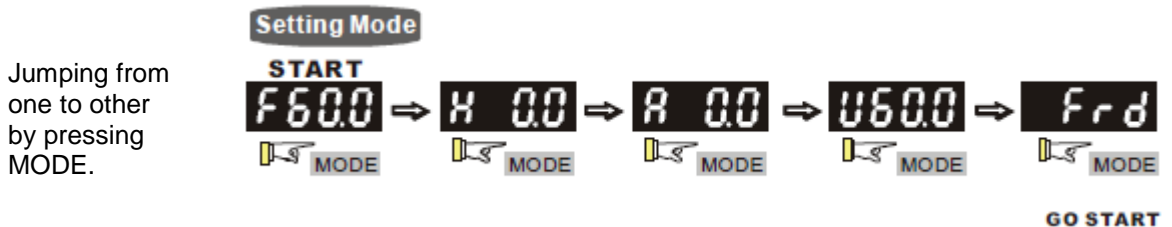
Push ENTER to start programming.
After the first keypress, the display will show the number of the parameter we are pointing to. A second keypress will produce the displaying of the parameter current value



Use the arrow keys (5) to jump from a parameter to another or to modify the value of the parameter while you are on it. In the second case, the value set is the one shown on the display.

Keypad operation:

Jumping between the statuses and magnitudes that can be displayed.



Starting the parameter programming mode:

There are 10 parameter groups organized in the following maner:

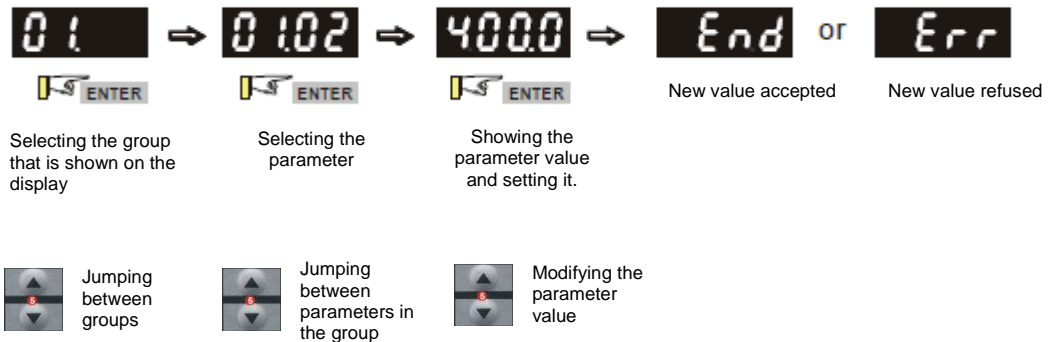
Group	Description
00	User parameters
01	Basic parameters
02	Operation method parameters
03	Output function parameters
04	Input function parameters
05	Multi-Step Speed Parameters
06	Protection parameters
07	Motor parameters
08	Special parameters
09	Communication parameters
10	PID control parameters (Proportional Integral Derivative)

There are several numbered parameters within each group. E.g. in the 00 group there is the 02 parameter, thus, it will be indicated as 00.02.

After the first ENTER we see 00 (group indicator 00) and if we push ENTER again we enter in the 00.00 parameter.

We can go forward or backward after the first ENTER keypress as well as after the second one. We can advance or reverse within the groups or within the parameters inside the groups using the arrow keys (5).

Setting parameters



Parameters and values to remark

Param	Description	Values	Factory settings	Efficient	
				200	300
00.02	Parameter Reset	9__All parameters are reset to the original factory settings	0	9*	
01.00	Maximum Output Frequency (Fmax)	50.00 to 600.0 Hz	60	50	55
01.01	Maximum Voltage Frequency (Fbase)	0.10 to 600.0 Hz	60	55	
01.09	Acceleration Time 1	Value in seconds	10	2	
01.10	Deceleration Time 1	Value in seconds	10	0.5	
02.00	Source of First Master Frequency Command	0__Arrow keys (5) on the keypad 1__ 0 to 10V at AVI	0	1	
02.01	Source of First Operation Command	0__Keypad 1__ External terminals. Keypad STOP/RESET enabled	0	1	
02.05	Line Start Control Lockout	1__Enable 0__Disable	1	0	
03.08	Fan control	0__Fan always on 1__Fan stops 1 minute after the AC motor stops. VFD in STOP	0	1	
07.02	Torque compensation	0,0 to 10,0	0	2	
08.04	Momentary Power Loss Operation Selection	0__Stop working 1__Continue working	0	1	
08.05	Momentary Power Loss Operation Selection	0.1 to 5.0 seconds	2.0	5.0	

(*) Use only when you wish to reset all the parameters to the factory values.

The rest of the parameters not listed in the table keep their original factory values.

If there is any doubt about the possibility that any parameter might have been accidentally modified or manipulated, firstly proceed to reset the VFD to the factory values:

As it is shown on the first line in the above table, set the 00.02 parameter to "9".

Validate the programming by pressing ENTER. A complete parameter reset will be done and the final value of the 00.02 parameter will be 0. The rest of the parameters will adopt their original factory values.

After this operation proceed to set the rest of the listed parameters (from the second line to the end of the table) to the values shown in the column Efficient A-300



For further information about the VFD please consult the manufacturer web:
www.delta.com.tw

5. FIRST START AND STOP OF THE SYSTEM

5.1. First Start.

- Check that all the hydraulic and electric connections are well done and the AC voltage at the terminals is OK (220V AC or 380V AC)
- Check the status of the Seacock valve (1) (image in 3.1 System components). It must be open.
- Does your system have the OPTIONAL 3-way valve (11), for the produced water, installed? If so, do not follow the below instructions oriented to the usage of the production valve installed in the distributor unit (7) as it will be easier to operate with the optional valve (11). The aim is to prevent the arrival of the “first production water” to the tank. If we have the optional valve, we simply have to turn it to the position for opening the flow pass to an external container as reflected in the image in 3.1.
- Check the status of the 3-ways electro-valve located in the distributor assembly (7) inside the main unit. The manual actuator must be anchored in the inner position (activated) to avoid the produced water dropping in the tank. See 4.6.7. (Do it with the optional valve (11) if you have it installed)



- Press “PRODUCTION” to start the system. Check the pumps rotation direction looking to the rotation of their motor ventilators. They have to turn clockwise.

To check the high pressure pump rotation, view it from the right side opening of the main unit. (the closest end to the distributor-assembly). Remove the right side cover if necessary. The booster pump rotation is directly visible as it is not assembled inside any cover.

- STOP the system immediately if they turn counterclockwise.
- Make sure the pumps are primed, the circuit full of water and without air inside the pumps. If the pump is not primed, sometimes is recommendable to do a fresh water flush cycle. See 6.2
- Check the low pressure readout on the LCD immediately after the system start. It should be between 1, 2 and 3 KG/cm2. If the pressure does not reach the minimum level of 1, 2 Kg/cm2 the high pressure pump will not start. Then the system stops. Re-check the circuit and if the pumps are primed (absence of air) and retry the start again. The displayed high pressure (HIGH :) on the screen will progressively rise till its stabilization between 50-55 KG/cm2, approximately.
- PROD (production water flow) will remain irregular for the first minutes because of the air bubbles. These bubbles come from inside the membrane and other components of the system, resulting in a certain irregularity in the high pressure pump cycles. They will normally disappear without purging the circuit
- Press STOP after 5 minutes from the START, unblock and free the production valve manual actuator and immediately launch a FRESH WATER FLUSH cycle (see 6.2) by pushing the FRESH FLUSH button. The FRESH WATER FLUSH cycle must be performed a minimum of two times to clean the new membranes from the preserver product they may keep inside. When FLUSHING, the pressure group of the boat fresh water must be ON, supplying a water flow of 10 liters per minute (minimum) with a pressure of 2 Kg/cm2. See 5.3 Fresh Water flow checking.



5.2. Turning off the system for the first time.



IMPORTANT Always make a FRESH WATER FLUSH cycle before turning off the system. This operation avoids the membrane compactation do to the reproduction of marine biology on its surface. For the FRESH WATER FLUSH follow the instructions in 6.2 and to STOP or to TURN OFF the system see 6.3

5.3. Fresh Water flow checking.

Both, a water flow of 10 liters/minute and a pressure of 2Kg/cm² minimum must be ensured by the boat fresh water supply.

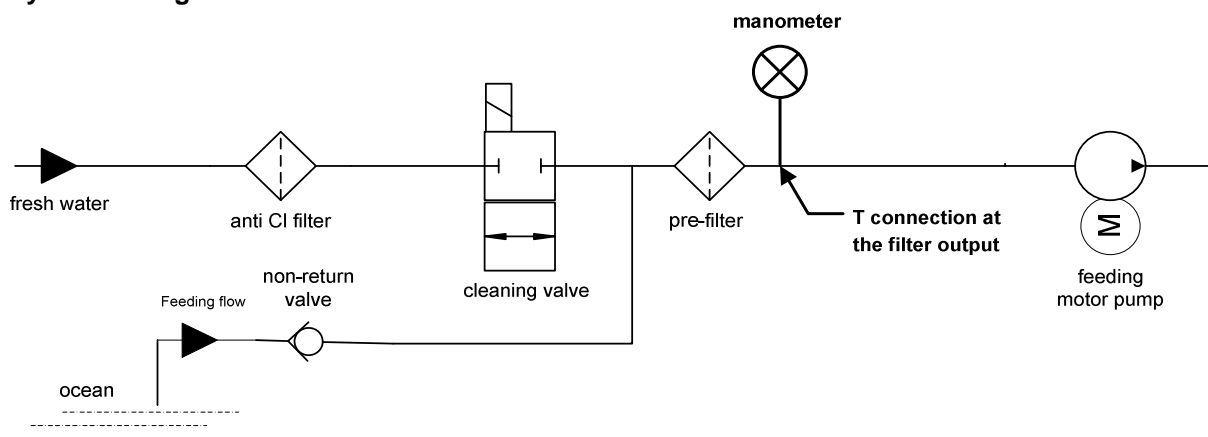
It is important to remark that if there were not positive fresh water pressure at the booster pump entrance, the flushing will be made by absorbing the sea water, so that the desired cleaning effect will not be achieved.

An easy way to check the water pressure during the fresh water flush cycle consists in observing if the pressure of the boat fresh water is sustained on an acceptable level, always above 1Kg/cm². Check it, if necessary, using a manometer temporary installed in the booster unit at the entrance of the water flow to the motor-pump. Use a T connection. The manometer should be with a maximum scale value that covered the normal working pressure. For example: 5 Kg/cm².

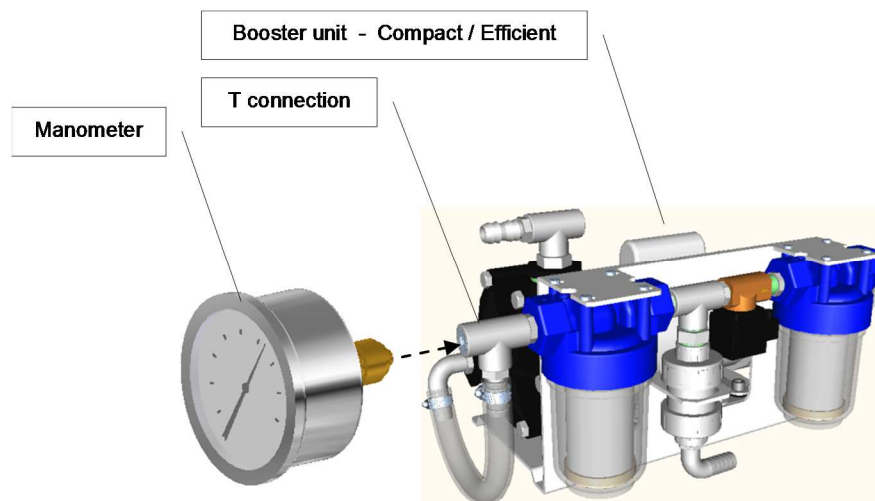
- See all the referred points and components in the diagram and the drawing at the end of the paragraph. And also in the exploded view of 8.5. Booster and hydraulic feeding unit
- With the system turned off and absence of boat fresh water flow, install a T connection \varnothing 3/4" between the pre-filter and the motor-pump entrance. Plug the manometer in the free end.
- Reestablish the boat fresh water flow, START a FRESH WATER FLUSH cycle and check that there are not pressure lows to 0 at any moment .

If there are pressure lows very close to 0 in certain moments, we can try to improve the behavior adjusting the high pressure pump sped to a lower level during the FRESH WATER FLUSH cycle. . Proceed as described in 4.6.1. Adjustment of the fresh water flow when flushing.

Hydraulic diagram



Practical assemblage drawing



6. FUNCTIONAL DESCRIPTION

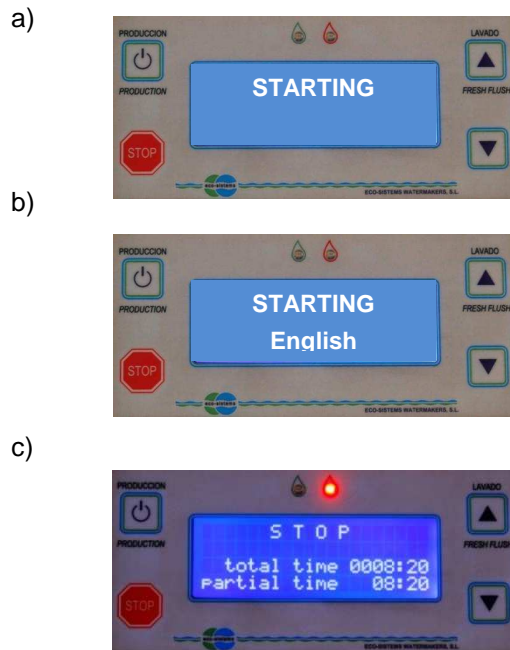
6.1. Starting in production mode.

6.1.1. Starting in automatic mode. Language configuration.


Be sure that the seacock valve (1) (3.1 System components) is open before turning on the system.


The system starts working when the 12 V DC power is on. Immediately after the control system initializes the control processes and the LCD shows the STARTING message.

Sequence of the statuses shown on the LCD when starting:



Modifying the language set up (English-Spanish-French) is permitted in this initial period, while the LCD is in the (b) status.

The selected language is shown on the lower line. Press on the down-arrow key  to change the selected language.

The system starts production when pressing on .



At the beginning, the booster pump starts working and the low pressure rises quickly.

The pressures, the flows of water and the salinity values are shown on the display during the process.

The system could come into two possible statuses at the production start:

- a) The booster pump pressure (low) has raised above 1,2 Kg. /cm2. →The high pressure pump motor starts working. The normal production working regime has started.
- b) The booster pump pressure (low) has not reached the minimum level (1,2 Kg/cm2) in the foreseen period of time → The system stops while indicates the lack of booster pressure. Abnormal situation.

A message on the LCD, (“LOW PRESSURE”) will inform us of the abnormality. If so, please follow the instructions in paragraph 5.1 First start.

When all OK, once the system is working, the speed of high pressure pump motor will be adjusted till achieving the desired production level (pre-programmed) or till reaching the maximum permitted pressure.



The pressure should normally stabilize between 45 to 60 Kg/cm²

In normal temperature and salinity water conditions the regulation will be done by the production water flow control, while in extreme conditions, the regulation and limitation will be achieved through the maximal permitted level of the high pressure (60 Kg/cm²)

The operation remains stable and self-regulated, unless there appear alterations in the normal working conditions.

6.1.2. Warnings and error messages during the system work.

Statuses, warnings and abnormalities reported on the LCD and the control panel when the system is working:

LCD and control panel indications	Reason	Consequence/ Suggested Action
Low pressure	Low pressure in booster circuit <1,2Kg/cm ²	System stops / Check the filters and the booster pump status.
High pressure	High pressure excess > 70 Kg/cm ²	System stops / Check the VFD regulation, the high pressure circuit and the membranes. (**)
Red LED lighted 	Salinity > 600 ppm	Product valve on. Produced water flow to the brine discharge circuit / Normally the LED goes to off after a while. If it remained on, check the membranes do not have any perforation
Green LED lighted 	Salinity < 600 ppm	Product valve released. Produced water flow output to the tank.
Filter Dirty	Dirt in the filter	Pressure fall in filters > 0,5 KG/cm ² / Substitute the 20 and 5 microns filters
Tank Full	Tank full sensor is active (*)	System stops / Use the water in tank
ERROR 1	High pressure sensor failure (production circuit)	Check the cabling, the sensor and the control circuit (**)
ERROR 2	Low pressure sensor (booster) failure at the filter output. .The sensor located in the main unit	Check the cabling, the sensor and the control circuit (**)
ERROR 3	Low pressure (booster) sensor failure. Located at the filter output in the booster unit	Check the cabling, the sensor and the control circuit (**)

(*) Tank full option

Optionally, the system may be equipped by a sensor that detects the tank maximum level: “Tank Full”. If the level of the produced water reaches the maximum limit, the sensor will act and produce a message to appear on the LCD: “Tank Full”.

(**) The system can work in manual mode (EMERGENCY START) provisionally.


When an abnormal status appears (ERROR 1, 2, 3) the system stops and remains waiting while the error message is still hold on the LCD. Pressing the production key will not take any effect. The error message disappears when the cause does it, then the system may start again in “automatic mode” (normal).

Only when ERROR 1 and 2, although the error cause still remained active, the system might start in “manual mode” EMERGENCY START and continue working.

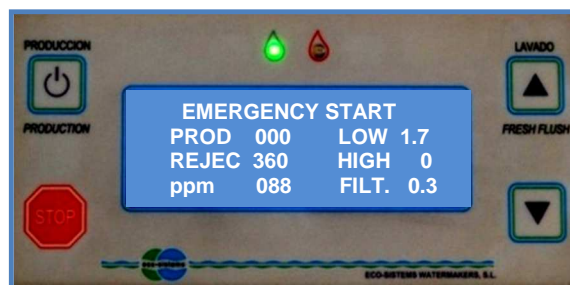
The high pressure sensor will always keep working.

6.1.3. Starting in the manual mode, (EMERGENCY START).


One of the main advantages of the COMPACT EFFICIENT A-300 is that although it is a fully automated system, still maintains the possibility to work in a “manual control” mode. This possibility is of a great help in the first START process, when the pump is not primed, when the Technical Maintenance Service has to check the functionalities of all the modules and devices integrated in the system. It is also an advantage when there is a malfunction of the control circuits.


The Emergency-Start manual mode begins when pressing  while the system is in the STOP status.

After the first key press, the system starts the booster pump and shows EMERGENCY START on the LCD




We shall wait until the booster pressure reached a value between 1,2 -3,5 Kg/cm2 and then we press on the same key. for the second time. Then the high pressure pump motor will start. From this moment the system is "in production". The adjustment the water flow is possible by increasing and/or decreasing the speed of the high-pressure pump motor, pressing on the arrow keys:

Increasing the production water flow 

Decreasing the production water flow 

Although many of the control circuits are off, the sensors for the pressure, the salinity, the water flow, etc.... remain active, as well as the EMERGENCY STOP system to prevent overpassing the high pressure limit at the membranes (> 70 Kg/cm2)

6.2. System operation during the FRESH WATER FLUSH cycle.

The fresh water flush cycle starts pressing the FRESH FLUSH key  while the system is in the STOP status.
(LCD -> Stop)

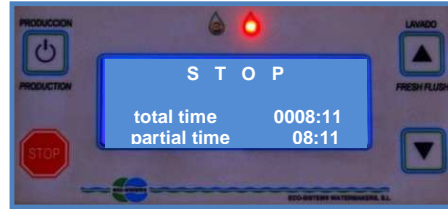
The booster and the high pressure pumps start turning and the flushing electro-valve opens the entrance of the boat fresh water to the system to clean all the circuit.

- In This status the system absorbs the fresh water from the pressurized circuit of the boat, so that the pressure group of the boat fresh water must be working. (Turned on)
- El system will work during a temporized period of 2 minutes approximately
- The FRESH WATER FLUSH cycle produces a sweep of the sea water contained in the membranes by replacing it with the boat fresh water. If we have a look to the pressure value displayed on the LCD (see the image in b, below), we shall see that pressure starts at a high value but it is decreasing as

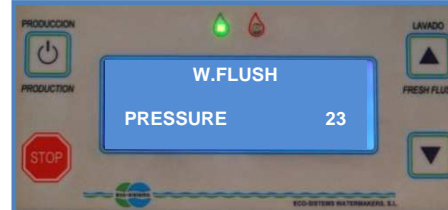
the fresh water flush cycle is progressing till, at the end, it stabilizes at any value between 20 and 25Kg/cm2. The pressure decrease indicates that the cleaning is being done and that it is efficient.

- Simply varying the salinity and the pH index of the water contained in the membranes, we avoid the marine biology reproduction for a period of 90 days maximum. To prevent this phenomena for longer periods follow the instructions in 7.2 Storage and cleaning instructions.

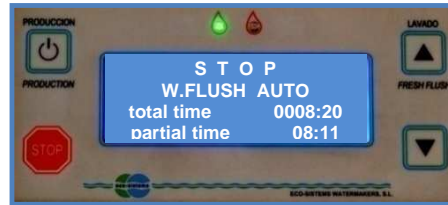
a) Initial STOP status



b) FRESH WATER FLUSH cycle in progress.



c) STOP status after the FRESH WATER FLUSH cycle.



Programmed cycle

To avoid using an excessive quantity of fresh water the speed of the system when flushing is about the 40%-60% of the normal production speed. The speed can be defined during the installation of the system. See 4.6.1. Adjustment of the fresh water flow when flushing. The fresh water flush cycle will stop after 2 minutes but a new fresh water flush cycle will remain programmed to be started within 7 days.




The differed fresh water flush cycle (programmed) will only start if we keep the system ON and we do not STOP it. (Power (both, AC and DC) must remind ON and the STOP key must not be pressed.

After 7 days, when the programmed fresh water flush cycle will finish, the system will newly remain with a programmed fresh water flush cycle to be done after a new 7 days period and so on..

EI LCD will show “W. FLUSH AUTO” (c).

6.3. Systems stop.

A fresh water flush cycle must be done prior to stop the system to avoid the membrane obstruction because of the sea biology reproduction on it. Proceed as described in the paragraph above.

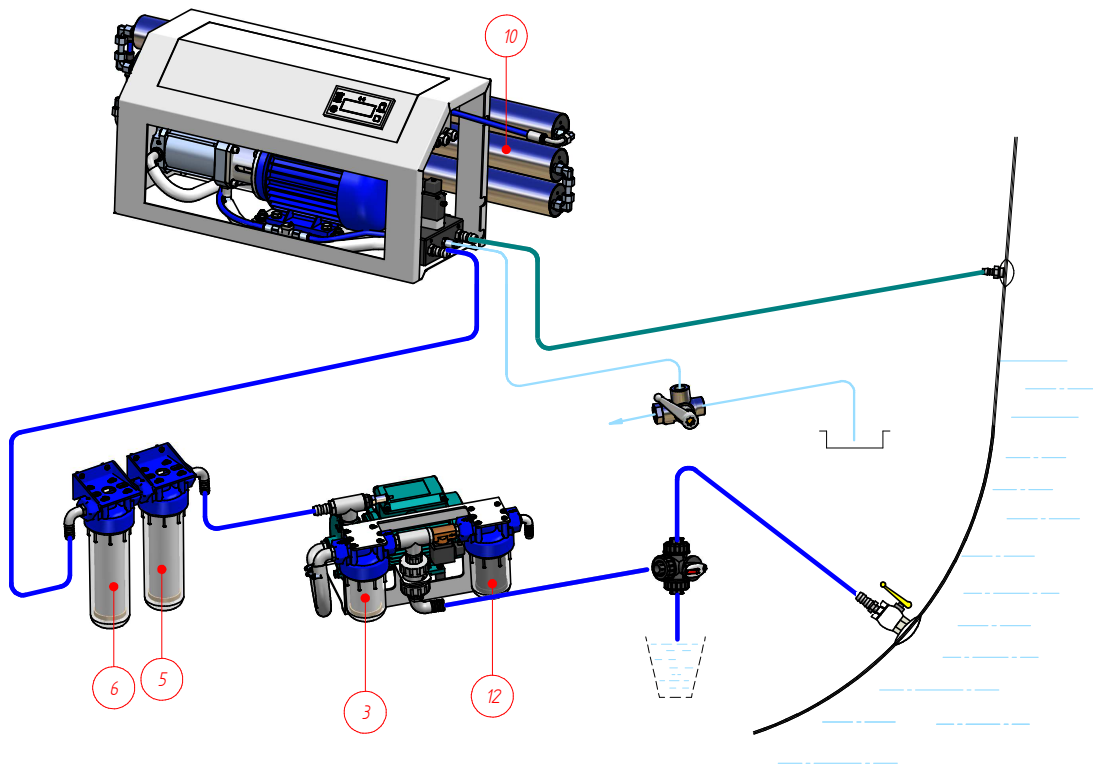
- Press on STOP. 
- Press on LAVADO/ FLUSH  and the system will start a fresh water flush cycle. (See 6.2).
- Pus STOP  again to avoid auto-scheduling a new fresh water flush cycle. If not pressed, a new cycle will be scheduled to start within 7 days.
- **For security reasons, close the Seacock valve (1) when stopping the system for an extended period of time**
- To completely turn of the system, cut the power mains and the 12V DC supply voltage

7. SYSTEM MAINTENANCE

7.1. Check and replacement of life-cycle limited parts

The following devices have to be checked and/or replaced periodically so the system will properly work along the time

Part	Code	Position
Mesh filter	43316010	3
20 microns filter	43317120	5
5 microns filter	43317110	6
Carbon cartridge	43318000	12
Membrane	43362540	10

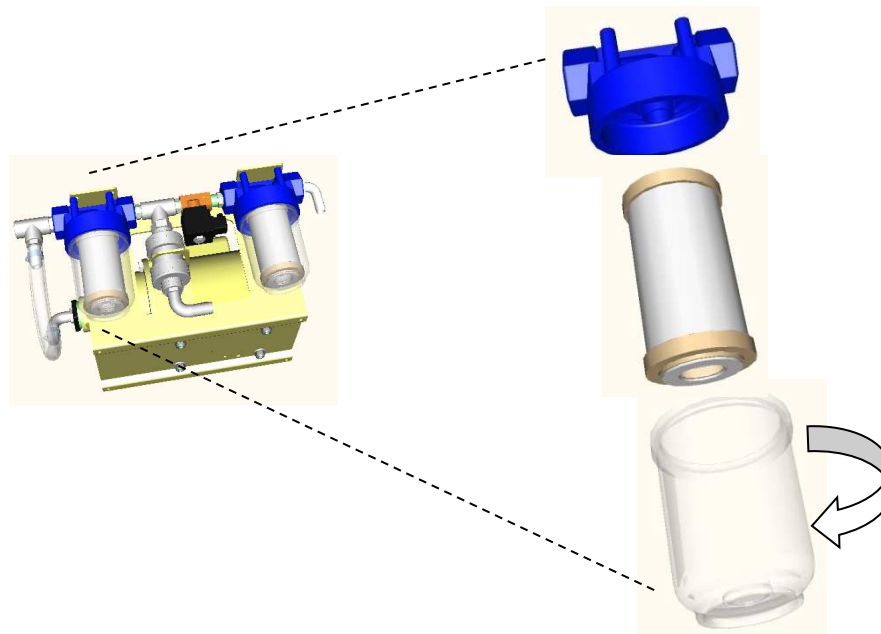


7.1.1. Mesh filter

Periodically check the mesh filter (3) status in the sea water absorption circuit of the booster unit. Clean the mesh of dirt and impurities when required.

To disassemble the cartridge, first close the seacock valve, unscrew the container cup and get it out. Clean it with fresh water enough. Is the cartridge broken or worn out. This is not so common but in this case replace it for another of the same characteristics: (5" 150 microns). Never use another cartridge type. It might not be confident. Unwished particles might pass through.

Once the cartridge has been replaced, screw the container cup and open the seacock valve to permit the sea water absorption again.



7.1.2. Carbon cartridge

Replace the active-carbon cartridge (12) (anti-Cl filter) once a year minimum

Turn off the fresh-water pressure group. Open any water tap to ensure there is no remaining pressure in the circuit and proceed to the active-carbon cartridge substitution. The cartridge must be unassembled like it is described for the mesh filter in the previous paragraph. Once replaced, re-arm the pressure group again.

7.1.3. 20 and 5 micron filters



The system has an automated notice to request the substitution of the filters 5 and 6

The Control panel notifies by a “dirty filter” message if filters 5 and 6 must be replaced.

See 6.1.2. Just take into account the message and replace them when required.

In addition, filters need to be replaced at each season start.

The replacement process is similar to the one described in 7.11 and 7.12 with the particularity that these 20 and 5 micron filters are located in an individual separated assembly

7.1.4. Membranes

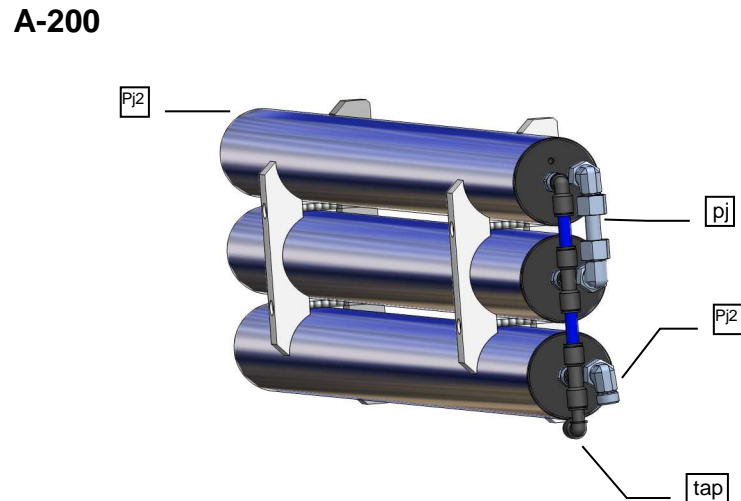
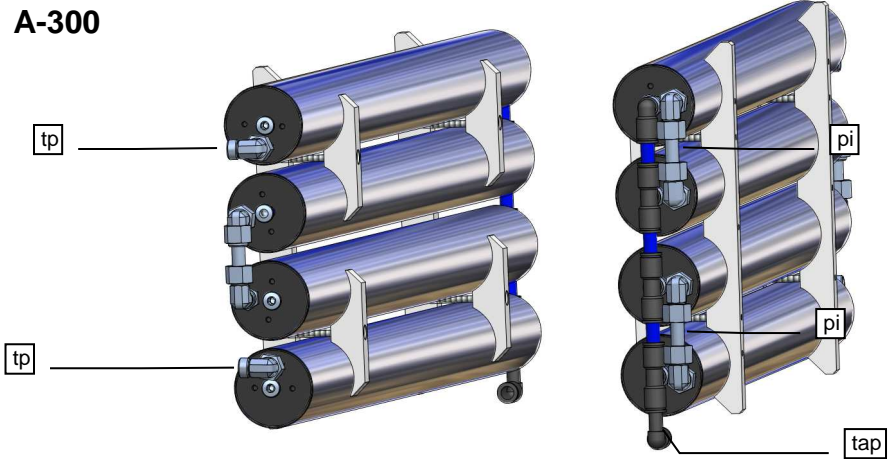
Membranes lose their qualities depending on the usage time, the production and the received maintenance (cleaning, etc.). The estimated life-time, based on normal working conditions and with a proper maintenance, is 5 years minimum.

If you ever detect a significant reduction of the production water flow when water salinity and temperature are within the normal ranges, it could announce the membranes aging. If so, their substitution might be advisable.

For a correct replacement of the membranes, refer to the exploded view below and follow the next instructions:

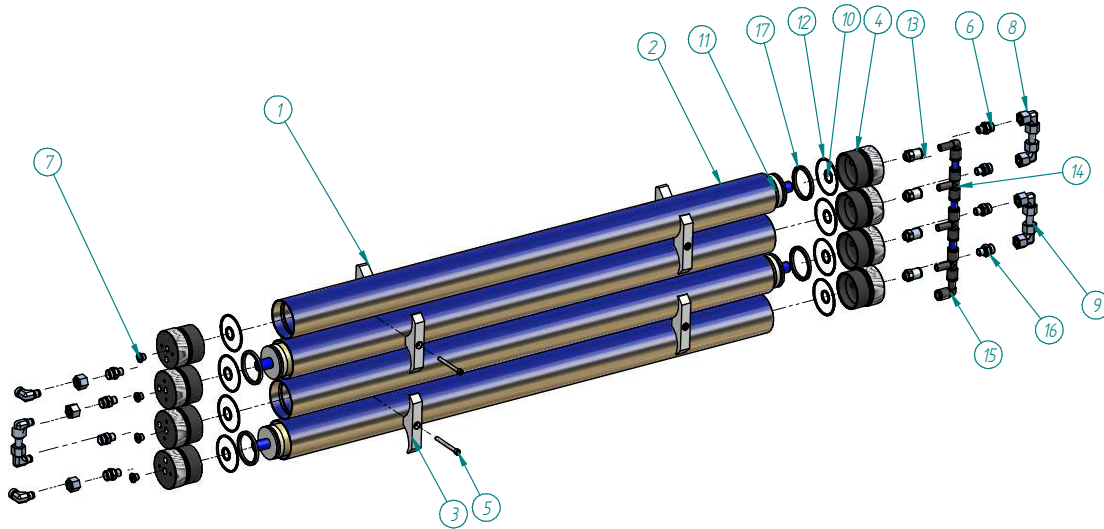
- Make sure there is not pressure in the circuit before manipulating the equipment. If there is still pressure wait until it disappears

- Untight the pressure tubes (tp) using two wrenches. Care must be taken not to untight the fittings (6) on the container-closing caps (4)
- Unplug the output tube of the permeated water (pwt)

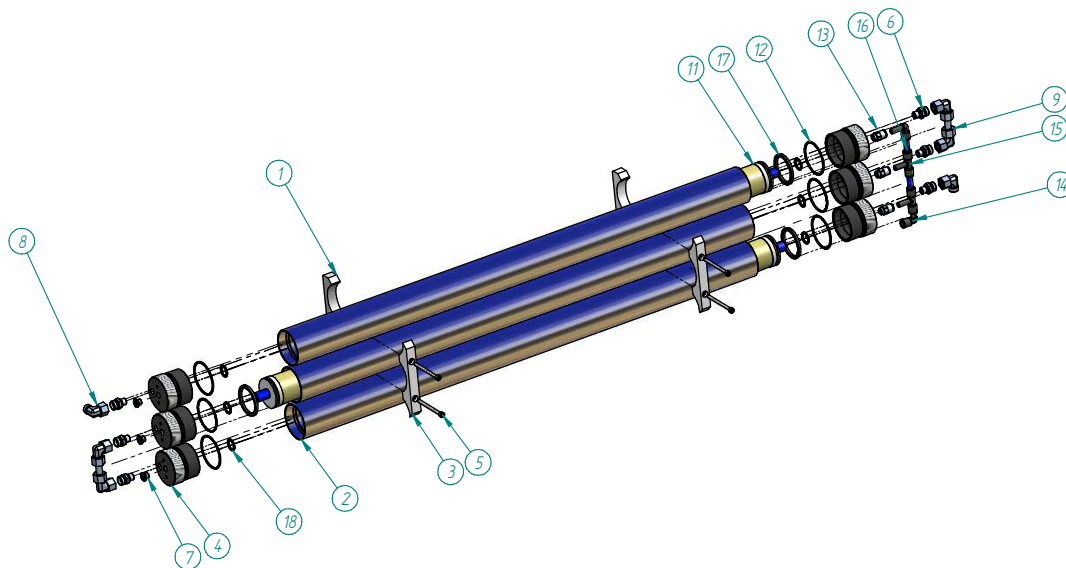


- For a better manipulation, separate the membranes assembly from the main unit by unscrewing the fitting bolts. Access to the nuts from inside the main unit.
- Disassemble the stainless steel bridge pipe (pi) between the closing caps (no. 4 in the exploded view) and release the Ø10-12 polyamide blue tube.

EFFICIENT A-300 MEMBRANE CARTIDGES EXPLODED VIEW

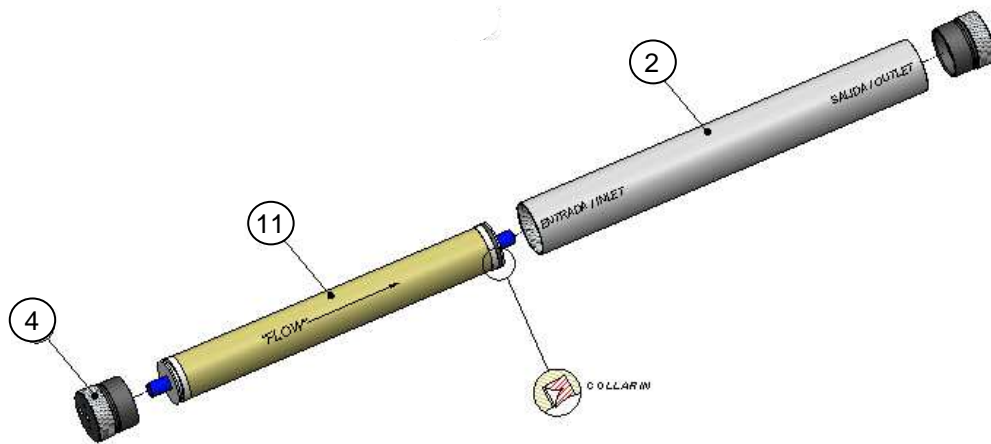


EFFICIENT A-200 MEMBRANE CARTIDGES EXPLODED VIEW



- Loosen the nuts (5), separate the support flanges (1-3) and disassemble the containers
- To access the membranes (11) Get out the closing caps (4) with the help of an adjustable pin wrench.
- Once the membrane has been extracted, clean inside the container with water. This task will eliminate the dirt and it also will lubricate the cartridge, making easy the assembling of the new membrane.
- Unpack the new membrane from its package (Usually the package consists in an hermetically closed plastic bag)
- Check that the lip seal at the membrane end is not deformed, cut or has excessive mechanical gap with the membrane. The lips must be assembled counter pressure (counter-wise to the sense of the water flow). See the flow arrow on the drawing. Slightly lubricate the lip seal with water before its assembly. Notice that the lip seal is placed at the membrane end were the rejected water goes out (water to return to the see). There is no lip seal at the other end...





- Check that the membrane central tube, from where the fresh water flows outside, is well adjusted to the toric seals placed inside the closing caps (4).
- Place the membrane inside the containers and screw the closing cups with the help of the pin wrench
- Repeat the same steps on all the remaining containers.
- Assemble again the containers on their supports(3)
- Properly adjust the high pressure pipe bridges (9) and the permeated water bridges (16) jumping between the containers and tighten the bolts to fix the flanges to the supports
- Tighten the containers assembly to the main unit with the bolts. Remember the nuts go inside the main unit at the rear side.
- Plug the high pressure tubes again. Be sure to tighten the nuts of the fittings on the container closing caps just slightly.
- Plug the permeated water output hose.



The lip seal of the membrane is placed with the lips in the opposite sense of that of the water flow, marked in the picture with an arrow and the word "FLOW", and at the membrane end indicated as "EXIT". This location differs from the one used by other manufacturers using standard 2540 membranes.

Before starting the system again we need to have the valve (11) (see the drawing in 3.1), the position permitting its CONTROL, and to proceed as instructed in 5.1 First start.



CAUTION. The membranes have a certain air quantity inside and need a few minutes to completely expel it

7.2. Storage and cleaning instructions..



IMPORTANT
TO EXTEND THE MEMBRANES LIFE REMEMBER ALWAYS TO PROCEED TO CLEAN THE SYSTEM AFTER USING IT.

7.2.1. Avoiding chemical attack to the system.

At the storage, maintenance, cleaning process, etc., never expose the system to the following chemicals:

Hydrogen peroxide, chloramine, chloramine-T, N-chloro-iso-cyanurates, chlorine dioxide, hypochlorite, chlorine, iodine, bromine, bromide, phenolic disinfectants

Only use the authorized chemicals

The usage of non-authorized chemicals or the excessive usage of the authorized ones cancels the warranty.

7.2.2. Temperature.

When stored, never expose the membranes to temperatures above the 50° Celsius /120° Fahrenheit nor below the 0° Celsius/ 32° Fahrenheit.

Never store the membrane cartridge directly exposed to the sun light.

Frozen temperatures will damage the system. Membranes will be irreversibly damaged

7.2.3. Drying..

Membranes should never dry. Do not permit it. When a membrane dries loses until a 30% of its production flow. This could be an irreversible damage. Always keep the membranes moistened.

7.2.4. Biologic dirt..

Protect membranes of the biologic dirt. Up to a 40% of the production flow will be lost if it gets dirty of biological silt. Only a certain part of the flow can be recovered after a deep cleaning. Not all.

Start a fresh water flush cycle before turning off the system. Schedule periodical fresh water flush cycles when the system is not in use. See 6.2.

7.2.5. Chemical dirt.

Protect the membrane against chemical attacks or dirt. Be caution when using the system in potentially contaminated harbors by chemicals, oils, petrol or derivates. The chemical attack is not covered by the warranty.

7.2.6. Storage.

The membrane inside is dark and humid becoming an excellent microorganisms growing field

When the membrane is used, tested or intermittently operated remains exposed to them. Up to a 50% of the production flow may be lost if the membrane is not well stored.

7.3. Short inactivity periods

ECO-SYSTEMS watermakers, as manufacturers, recommend always to flush using the boat fresh-water before stopping the system

The fresh water flush system circuit will drive the tank water flow through the carbon filter (12) to eliminate any trace of Cl (chlorine), then to the membranes to remove the chemical and biological dirt on them.

We consider as a short inactivity period of the watermaker, the one elapsed while the boat is docked

and the watermaker remains inactive (not used) during a time between one day and three months. An excellent and, at the same time, cheap method to protect the membrane is that described in 6.3. System stop.

Whenever it is possible maintain the system powered and use the programmed fresh water flush functionality (see 6.3). Its application is a warranty of protection against the biological reproduction inside the membranes.

7.4. Long shutdown period.



As far as possible, it is recommended avoiding the long inactivity periods of the watermaker. It is always recommendable to shorten the inactivity periods. For instance, as a preventive maintenance, do a starting and a fresh water flush cycle each 3 months maximum. The below described process has certain risks. It MUST be done by specialized people (aggressive chemicals handling). The reference numbers between brackets (n) appearing in the text refer to the illustration in 3.1. System components...

A long shutdown period can be defined as an inactivity period longer than three months.

The system has to be prepared for a long stop period. Preparation consists in, firstly, doing a flushing using fresh-water (chloride-free) and secondly, applying a “chemical protector”. This product will inhibit the bacterium growth in the membranes and so, it will ensure a high circulation-flow and a great rejection of salts through the membrane when start using the system again



Carefully follow these instructions:

1. Previously to the system stop, preserve 5 liters of fresh-water to be used for the protective chemical solution. In addition, check if you have water enough in the water tank to perform the fresh water flush cycle. If everything is OK press STOP.
2. Press the FRESH-FLUSH key and let the system work along the FRESH WATER FLUSH cycle. The system providing the pressure of on-board fresh-water must be ON.
3. Dissolve 30 to 40 grams of chemical protector (Sodium Metabisulfite (*)) in the 5 liters of water reserved.



(*)CAUTION

Sodium Metabisulfite is a harmful product that may cause skin and mucosa irritations. Take the due precautions before manipulating it. Do not touch it directly and manipulate it always in airy open spaces.

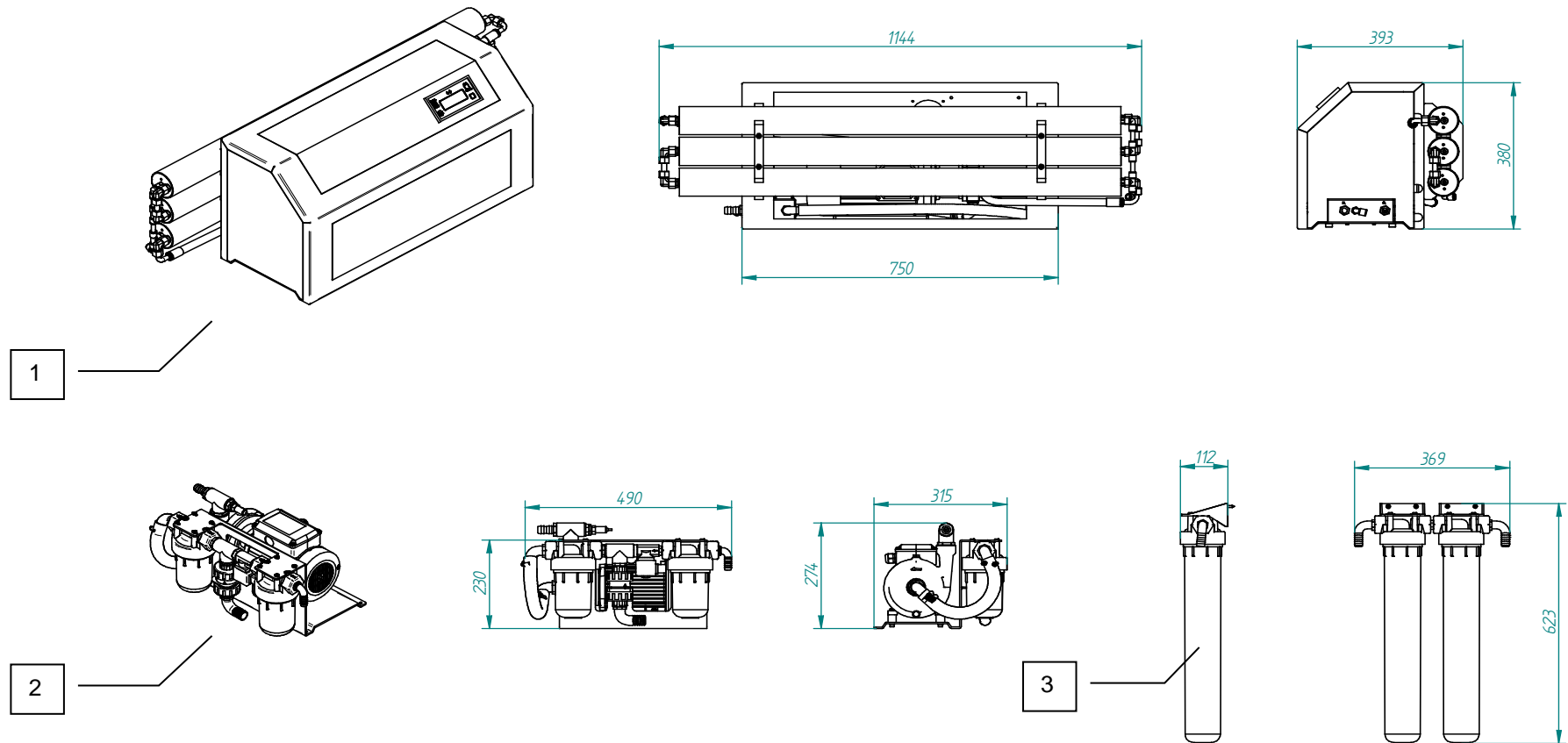
4. Have a three-ways hibernation valve installed in your system?(17)(optional), then, go directly to step no. 6
5. If you do not have the hibernation valve installed, close the seacock valve (1), unplug the sea water entrance hose coming from that valve and introduce it in the dissolution container. Then follow the instructions in step 7
6. Your system has the three-ways hibernation valve (17) (optional), so one of its connections will go to the solution container, turn the valve to the position that permits to the system to absorb the solution.
7. Manually activate the three-ways valve (7) of the general distribution assembly located at the right hand side of the main unit. See the valve description and how to operate it in 4.6.7. The valve is turned on by pushing the manual actuator towards inside and turning it clockwise to lock it. The actuator must remain locked in this position
8. Start the system by pushing the PRODUCTION key. Press STOP immediately before running out dissolution in the container,
9. If you have the hibernation valve installed (17), turn it to its normal position (production position). If not, plug again the hose to the seacock valve (1) that has to remain closed. Once this task is finished, we have filled in the circuit with the dissolution to protect it during the hibernation period.
10. Keep the seacock valve (1) closed during all the hibernation period for security reasons.
11. Before starting the system again, after the hibernation, open the seacock valve (1), be sure the three-way valve in the distribution unit (see 4.6.7) remains set to let the produced water rejection during the first minutes.
12. Start the normal production pressing 
13. After 5 minutes in production, press STOP,  unlock the three-ways valve (7) at the general distribution assembly, we had manually locked it before. Now, by turning the actuator counter clockwise, let it recover itself to its released position (the outmost position).If your system has the 3 way valve (11) installed (optional), simply use it (see the description in paragraph 5.1)
14. The system is now ready for its normal operation. If any abnormal situation arises, proceed as described in 5.1 First start.

8. DRAWINGS, EXPLODED VIEWS

8.1. System dimensions

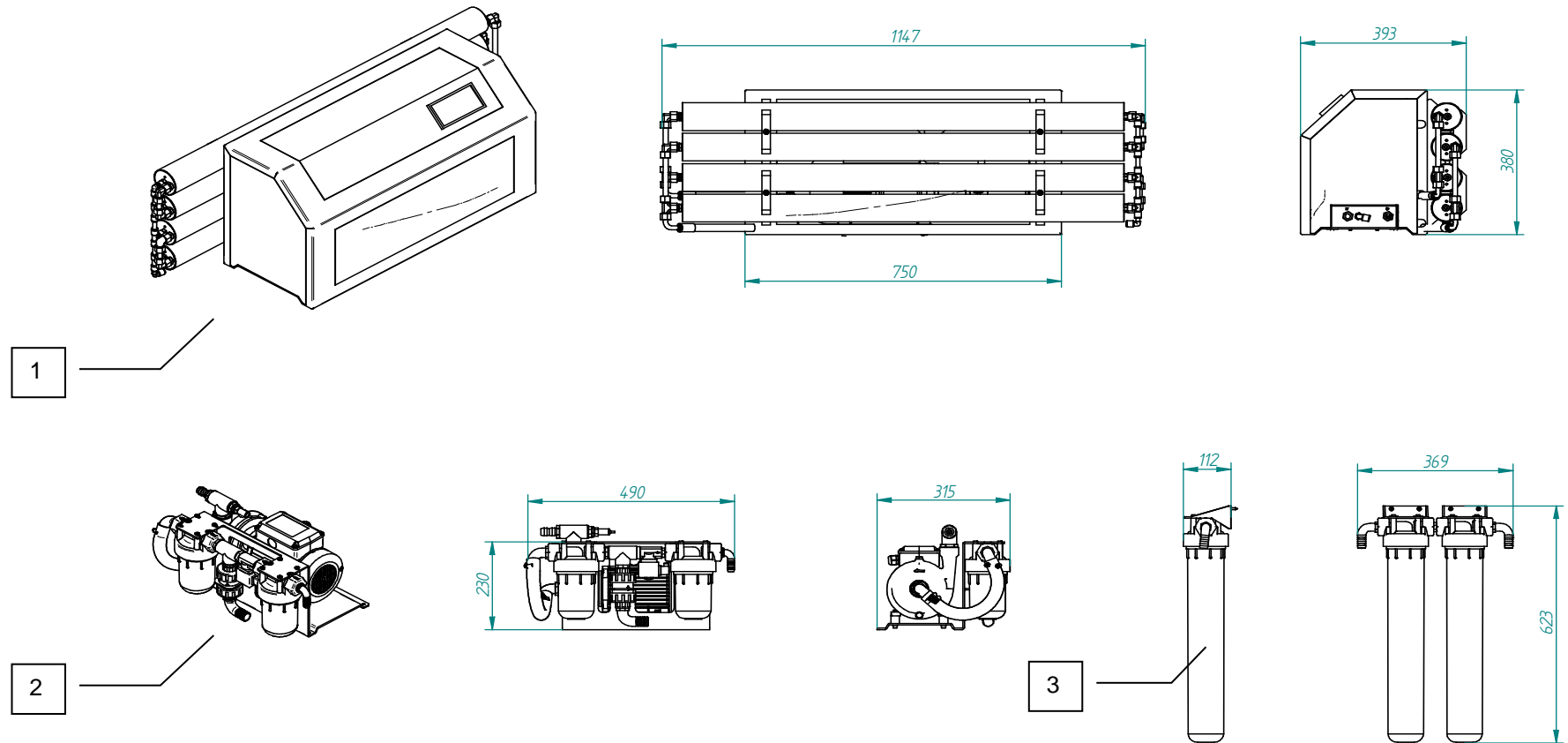
EFFICIENT A-200

Assembly	Description	Estimated weight Kg.
1	Main unit	75
2	Booster unit	17,5
3	Filters 5 and 20 μ	2,5



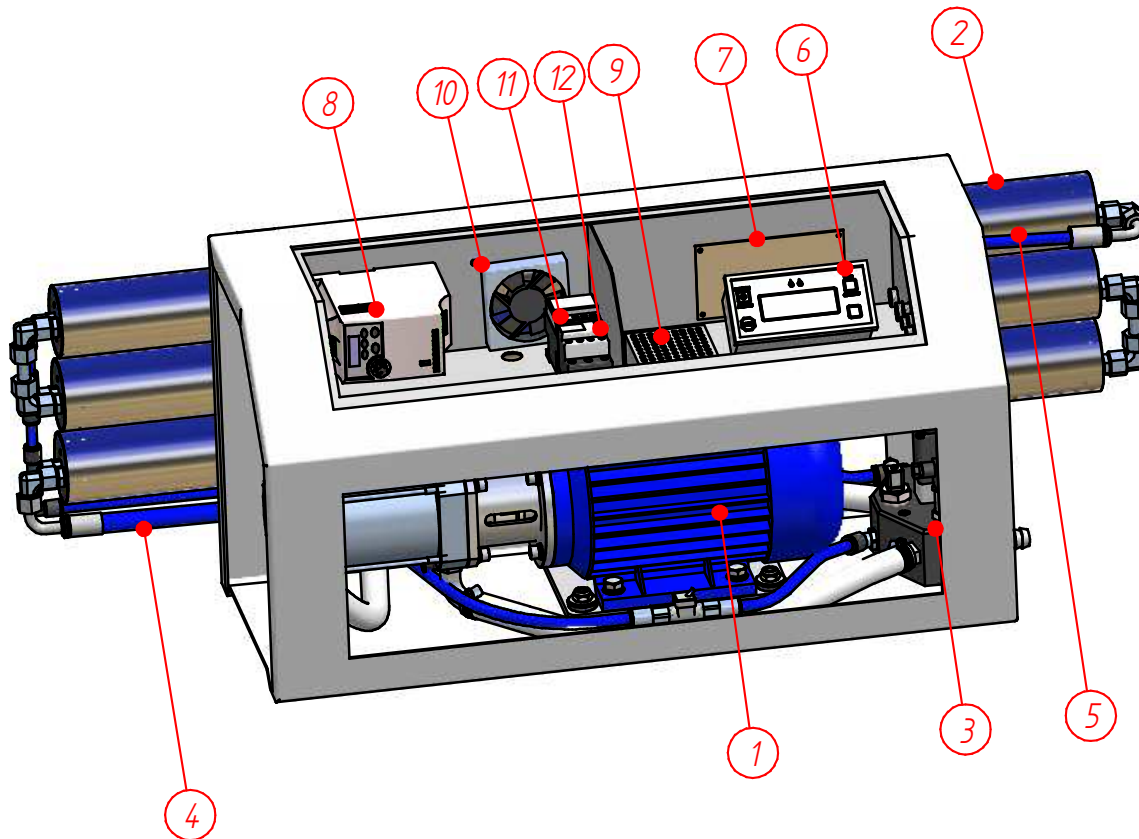
EFFICIENT A-300

Assembly	Description	Estimated weight Kg.
1	Main unit	85
2	Booster unit	17,5
3	Filters 5 and 20 μ	2,5



8.2. Main unit. A-200

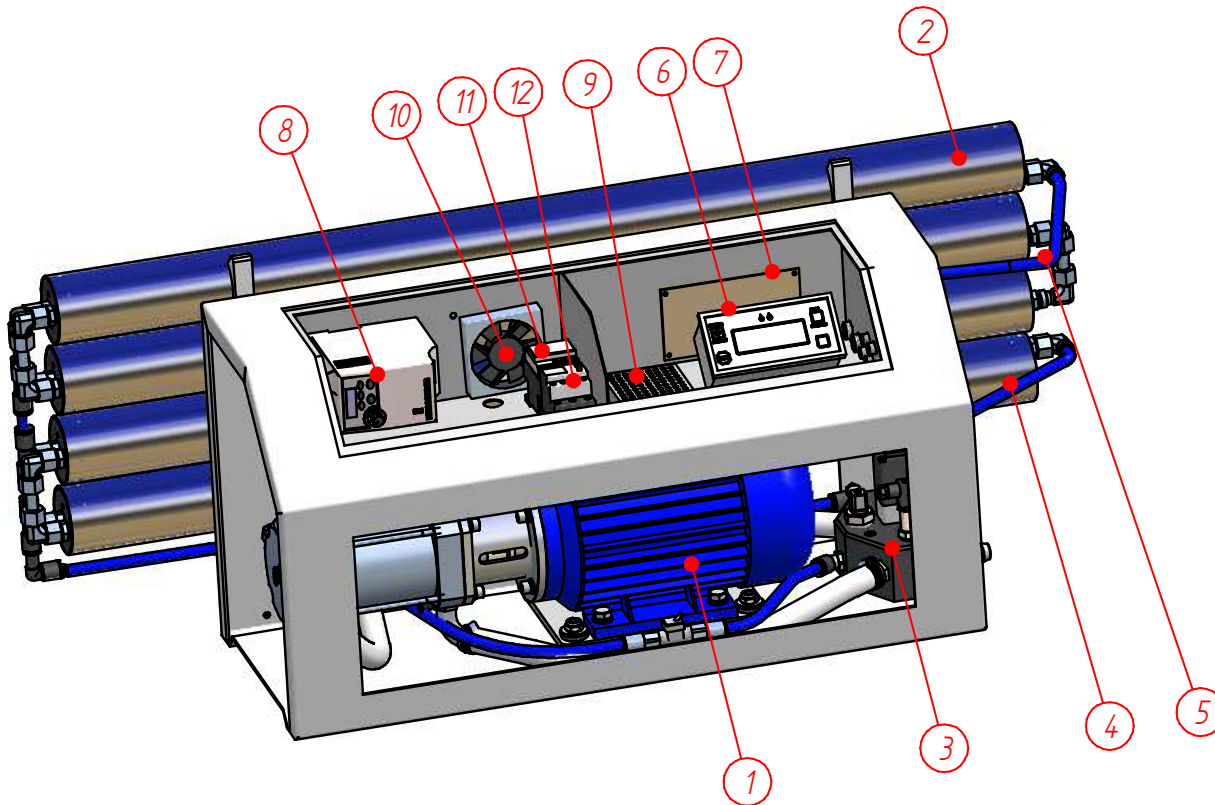
Code: 41420410



POS	CODE	DESCRIPTION
1	42700200	Motor-pump assembly
2	42342541	Membranes assembly
3	42810000	General distributor assembly
4	43402019	High pressure hose H.P. 530 millimeters
5	43402014	High pressure hose H.P. 770 millimeters
6	42220800	Control panel
7	43260320	Control processor PCB
8	43251500	Variable frequency drive. High pressure motor pump
9	43260360	Power converter 220V AC to 12V DC 60w
10	43280050	Fan 80x80 220V AC
11	43280400	Contacting controlling the Booster Pump motor
12	43280500	Thermal relay for the Booster Pump motor

Main unit. . A-300

Code: 41430410

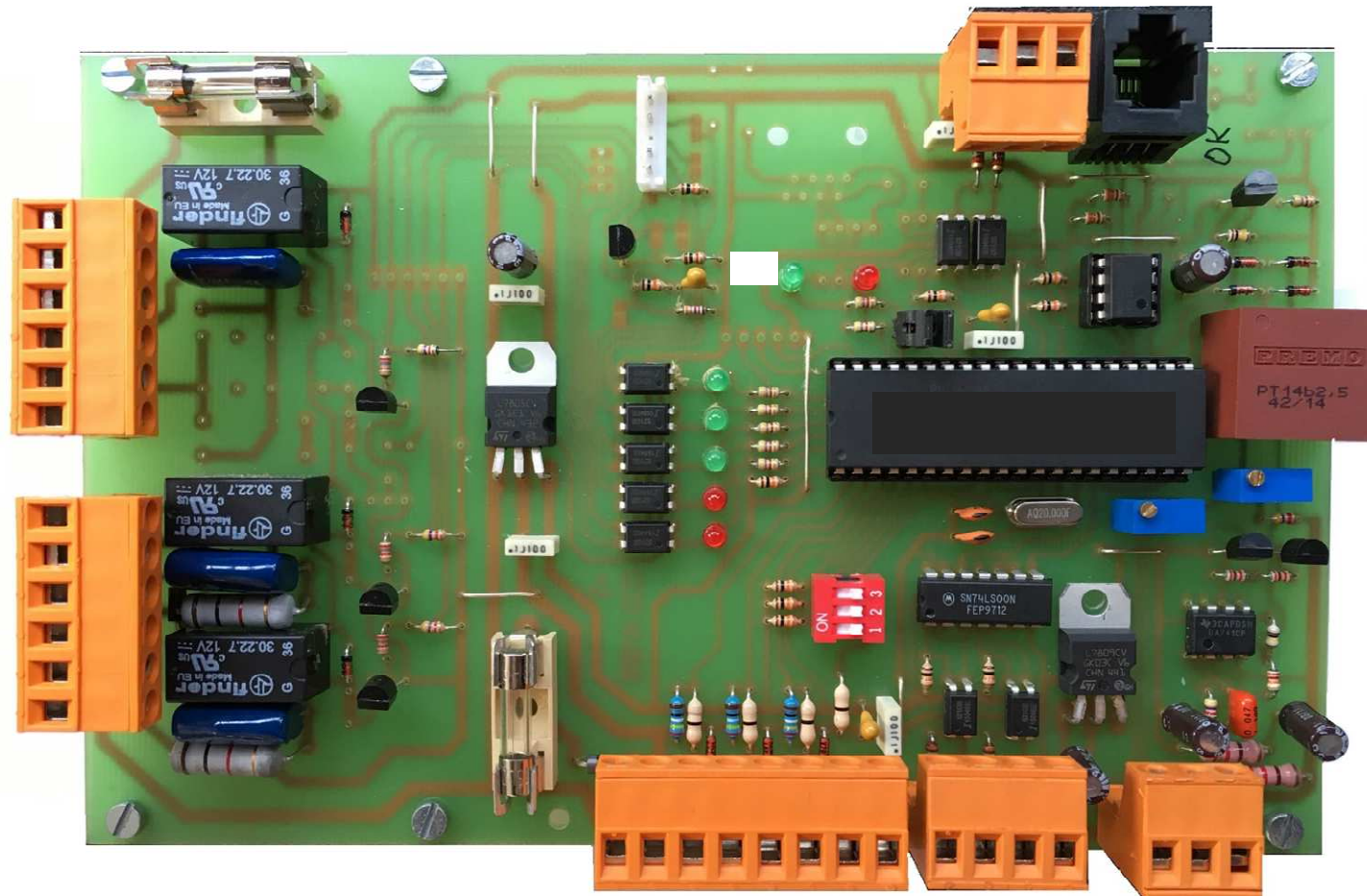


POS	CODE	DESCRIPTION
1	42700200	Motor-pump assembly
2	42342541	Membranes assembly
3	42810000	General distributor assembly
4	43402016	High pressure hose H.P. 920 millimeters
5	43402014	High pressure hose H.P. 770 millimeters
6	42220800	Control panel
7	43260320	Control processor PCB
8	43251500	Variable frequency drive. High pressure motor pump
9	43260360	Power converter 220V AC to 12V DC 60w
10	43280050	Fan 80x80 220V AC
11	43280400	Contacting controlling the Booster Pump motor
12	43280500	Thermal relay for the Booster Pump motor

8.3. Control panels, processors.

8.3.1. Control processor. Printed circuit board.

Code: 43260320



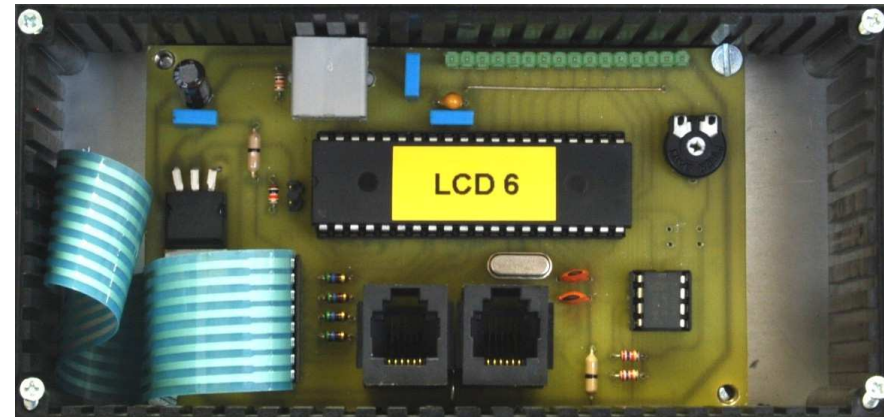
8.3.2. Control panel. Local or remote (optional).

Control panel
Code: 42208000

Connection cable RJ45-RJ45
Code: 43290880



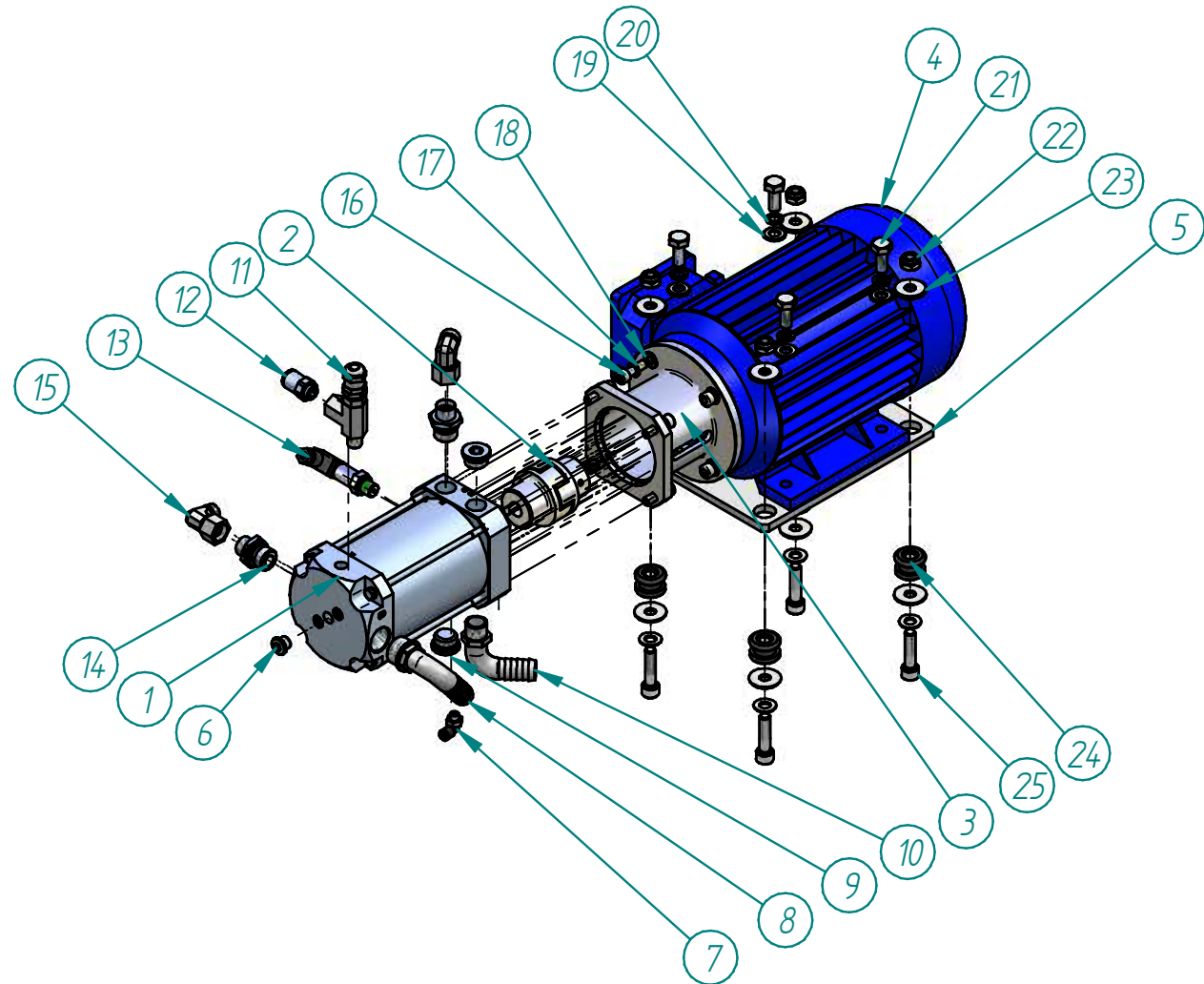
Control Panel rear view



8.4. Motor pump assembly.

Code: 42700200

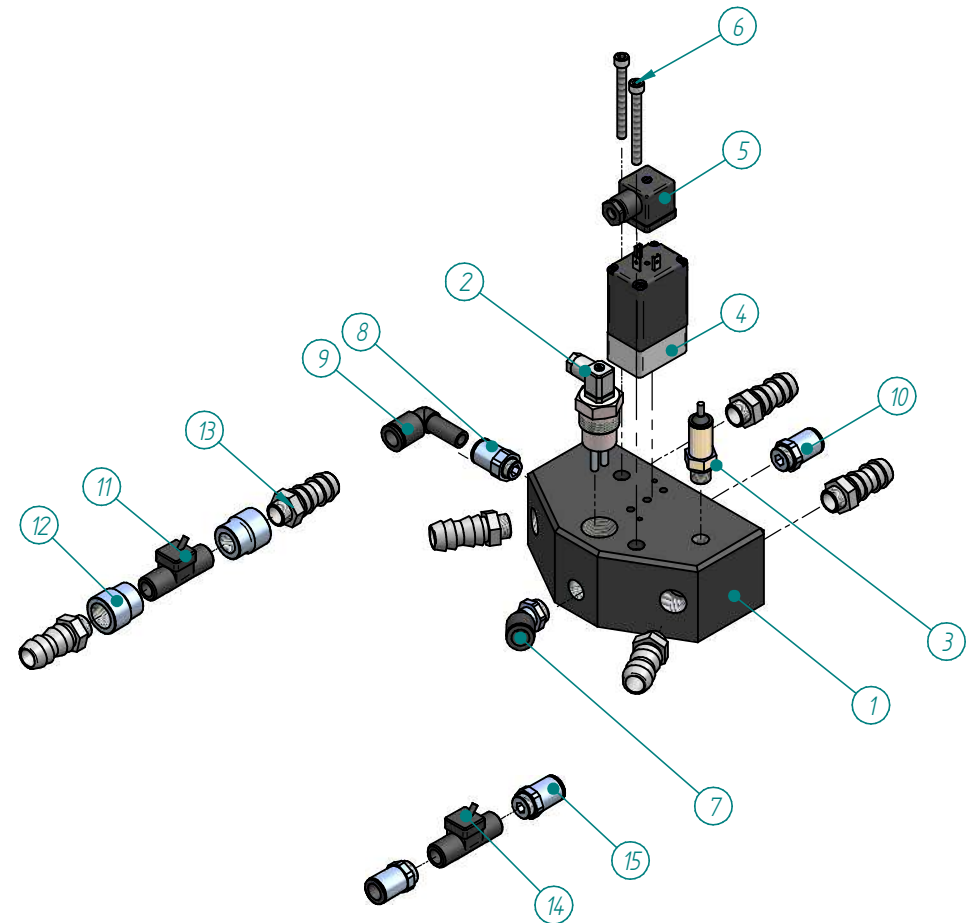
POS	CODE	DESCRIPTION	Qty
1	42041111	PUMP EFFICIENT 300-R15	1
2	44041210	COUPLING MOTOR-PUMP	1
3	44041201	MOTOR-PUMP HOOD	1
4	43231500	MOTOR 2CV TRIF. 1500 rpm B3 + B14	1
5	44030110	MOTOR BASE 2CV	1
6	43710220	SEAL PLUG R1/4" THREAD GAS	1
7	43580610	QUICK PLUG ELBOW M1/8 Ø6 HOSE	1
8	43552060	CURVED BARBED FITTING R3/4" THREAD Gas(BSP) Ø20mm HOSE	1
9	43710240	SEAL PLUG R1/2" THREAD GAS	2
10	43562040	CURVED BARBED FITTING R1/2" THREAD Gas(BSP) Ø20mm HOSE	1
11	43151320	RELIEF VALVE SS-4R3A5-RT	1
12	43571220	QUICK PLUG STRAIGHT MALE 1/4 Ø12 MM HOSE	1
13	43180504	PRESSURE TRANSDUCER R1/4Gas 0-100 bar	1
14	43451240	SEAL STRAIGHT CONNECTOR R1/2"GAS -M18 INOX	2
15	43471200	ELBOW 90° DKO Ø12 MM HOSE INOX	2
16	43801425	ALLEN SCREW DIN-912 M8x25 A4	8
17	43823080	SPRING WASHER Ø8 A4	8
18	43821080	PLAIN WASHER DIN-125 Ø8 A4	8
19	43821100	PLAIN WASHER DIN-125 Ø10 A4	4
20	43823100	SPRING WASHER DIN-7980 Ø10	4
21	43802525	HEXAGONAL SCREW DIN-931 M10x25 A4	4
22	43812100	AUTO-LOCKING NUT DIN-985 M10 A4	4
23	43822100	PLAIN WASHER DIN-9021 Ø10 A4	8
24	43870010	SUPPORT SCB-20 45SH ALT 15.5	4
25	43801540	ALLEN SCREW DIN-912 M10x40 A4	4



8.5. General distribution assembly.

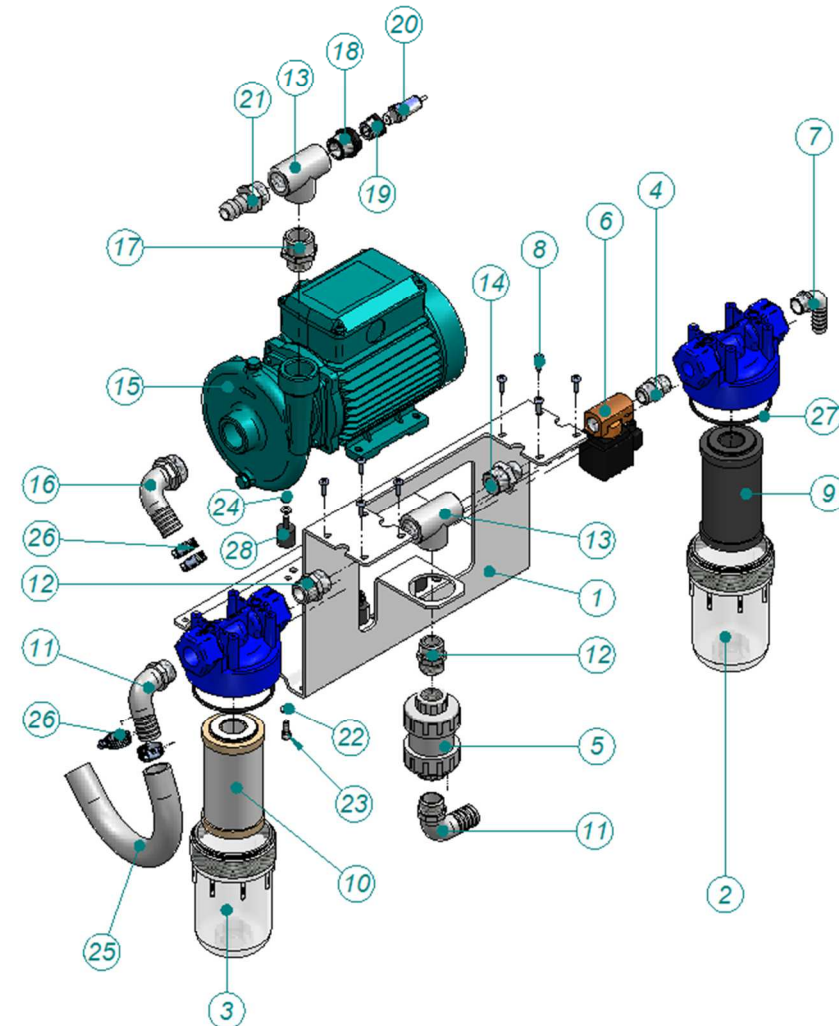
Code: 42810000

POS	CODE	DESCRIPTION	Qty
1	44030171	DISTRIBUTOR UNIT	1
2	43270300	SALINITY PROBE ED1 4 METERS K-0.2	1
3	43180502	PRESSURE TRANSDUCER R1/4" Gas (BSP) 0-5bar	1
4	43150520	THREE-WAY ELECTROVALVE 12V DC	1
5	43150810-C	THREE-WAY ELECTROVALVE CONNECTOR 28 MM/TYPE A	1
6	43801360	SCREW ALLEN DIN-912 M6x60 mm	2
7	43584120	QUICK PLUG 45° ELBOW ADAPTER MALE 3/8 Ø12 MM HOSE	1
8	43571220	QUICK PLUG STRAIGHT MALE 1/4 Ø12 MM HOSE	1
9	43583120	QUICK PLUG ELBOW TANG- Ø12 MM HOSE	1
10	43571230	QUICK PLUG STRAIGHT MALE 3/8 Ø12 MM HOSE	1
11	43162200	REJECTED WATER FLOW-METER	1
12	43691430	BUSHING FEMALE 1/2-FEMALE 3/8 INOX	2
13	43552040	BARBED FITTING CONNECTOR R1/2" Gas (BSP) HOSE Ø 20	6
14	43162300	PRODUCED WATER FLOW-METER	1
15	43571231	QUICK PLUG STRAIGHT FEMALE 3/8 Ø12 MM HOSE	2



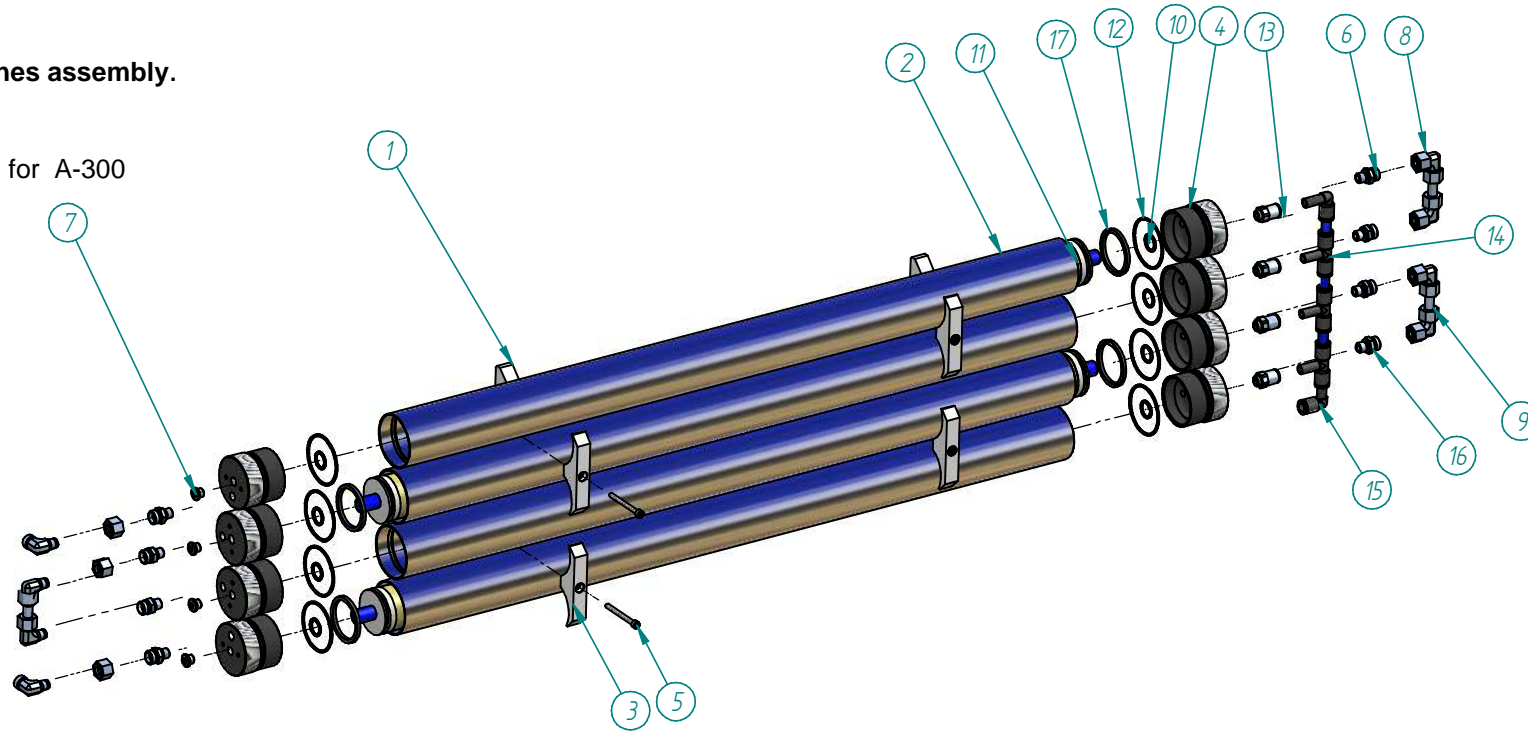
8.6. Booster and hydraulic feeding unit.

POS	CODE	DESCRIPTION	Qty
1	44030020	BOOSTER UNIT BRACKET	1
2	43300502	5" FILTER HOUSING 3/4" THREAD Gas(BSP)	1
3	43300501	5" FILTER HOUSING 1/2" THREAD Gas(BSP)	1
4	43540220	COUPLER 1/2" Gas(BSP)	1
5	43150960	CHECK VALVE 3/4" Gas(BSP)	1
6	43150810	SOLENOID VALVE 1/2" 12-24VCC	1
7	43561640	BARBED FITTING 90° BEND CONNECTOR 1/2"THREAD Gas(BSP) Ø16mm HOSE	1
8	43803630	SELF THREADING SCREW 5,5X16 MM	8
9	43318000	5" CARBON CARTRIDGE	1
10	43316010	5" WASHABLE MESH FILTER CARTRIDGE	1
11	43562560	BARBED FITTING 90° BENDED CONNECTOR 3/4" THREAD Gas(BSP) Ø25mm HOSE	2
12	43540440	COUPLER 3/4" Gas(BSP)	2
13	43520160	T EE FITTING 3/4" PVC	2
14	43670640	ADAPTER MALE 3/4"-MALE 1/2" Gas(BSP)	1
15	43100010	BOOSTER PUMP PUMP BCM/22-A	1
16	43562580	BARBED FITTING 90° BEND CONNECTOR 1" THREAD Gas(BSP) Ø25mm HOSE	1
17	43670860	ADAPTER MALE 1" - MALE 3/4" Gas(BSP)	1
18	43690640	ADAPTER MALE3/4" -FEMALE1/2" Gas(BSP)	1
19	43690420	ADAPTER MALE1/2"-FEMALE1/4" Gas(BSP)	1
20	43180502	PRESSURE TRANSDUCER 1/4" THREAD Gas(BSP) 0-5bar	1
21	43552060	BARBED FITTING 3/4 " THREAD Gas(BSP) Ø20mm HOSE	1
22	43821060	WASHER DIN-125 Ø6mm FLAT	8
23	43801310	SCREW ALLEN DIN-912 M6X12 (metric)	4
24	43812060	NUT DIN-985 M6 (metric)	4
25	43412500	HOSE Ø25X350 mm	1
26	43842600	HOSE CLAMP Ø26-32 mm INOX	4
27	43918470	FILTER JOINT Ø84X3.5 MM	2
28	43870200	Silent block (anti vibration)	4



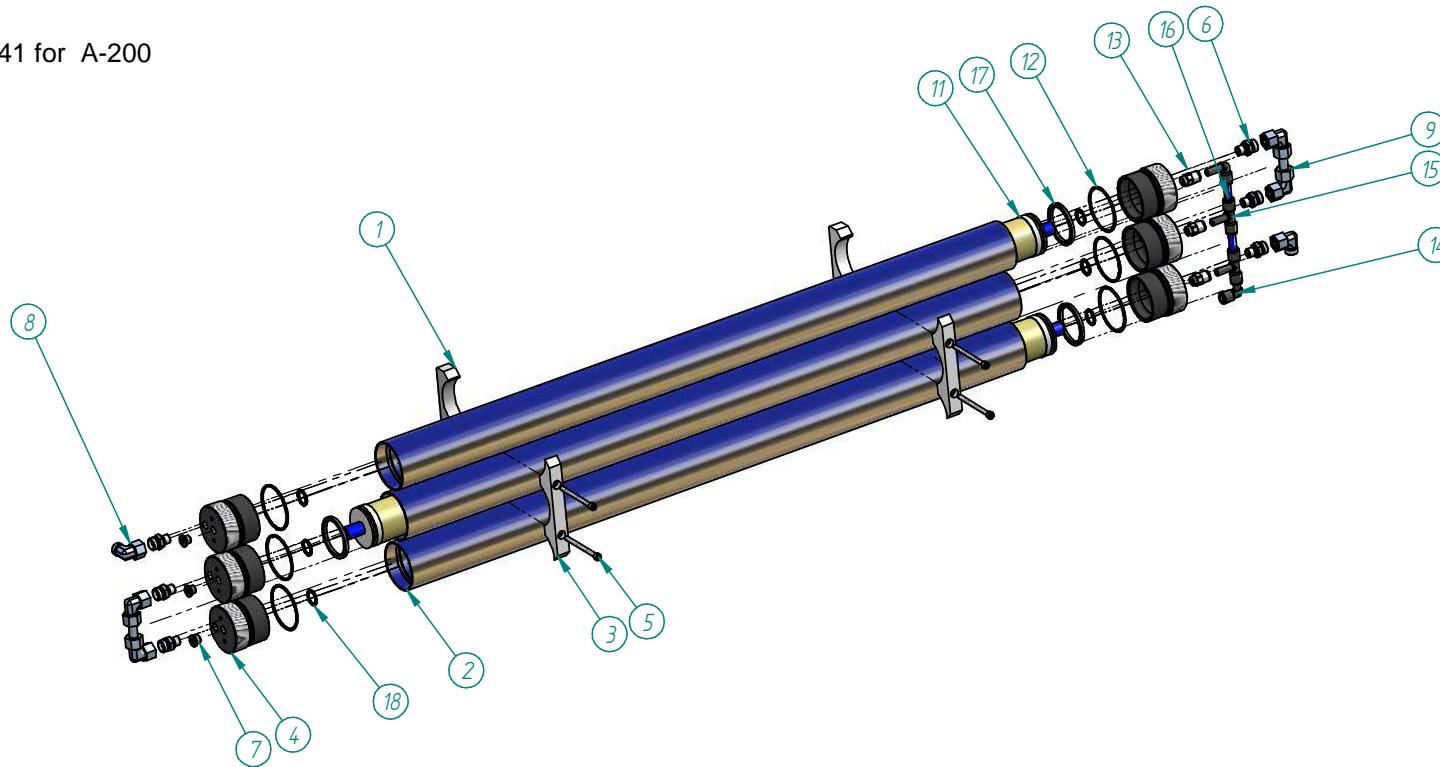
8.7. Membranes assembly.

Code: 42342541 for A-300



POS	CODE	DESCRIPTION	Qty.	POS	CODE	DESCRIPTION	Qty.
1	44030270	BRACKET - 4 CONTAINERS	2	11	43362540	MEMBRANE 25-40	4
2	44008510	STAINLESS STEEL CONTAINER FOR 2540 MEMBRANE	4	12	43916352	TORIC JOINT Ø63.17x2.62 mm	8
3	44030060	FLANGE - 2 CONTAINERS	4	13	43571220	QUICK PLUG THREAD MALE ADAPTER 1/4" Gas BSP ø12mm TUBE	4
4	44008501	CONTAINER CAP	8	14	43521200	QUICK PLUG TEE BARBED FITTING FOR Ø12 mm TUBE	3
5	43801365	SCREW ALLEN DIN-912 M6X65 mm	8	15	43583120	QUICK PLUG ELBOW BARBED FITTING Ø12 mm TUBE	2
6	43451220	BITE TYPE FITTING WITH SEALING O-RING 1/4" THREAD, Ø12 mm HOSE	8	16	43420120	Ø10x12 mm TUBE – CONTAINERS CONNECTION	3
7	43710220	SEAL PLUG 1/4" THREAD Gas(BSP)	4	17	43945200	MEMBRANE SEALING JOINT	4
8	43471200	ELBOW COUPLER FEMALE M18 THREAD (METRIC)	8				
9	43431030	STRAIGHT CONNECTOR/COUPLER	3				
10	43911852	TORIC JOINT Ø18,72X2.62	8				

Code: 42332541 for A-200



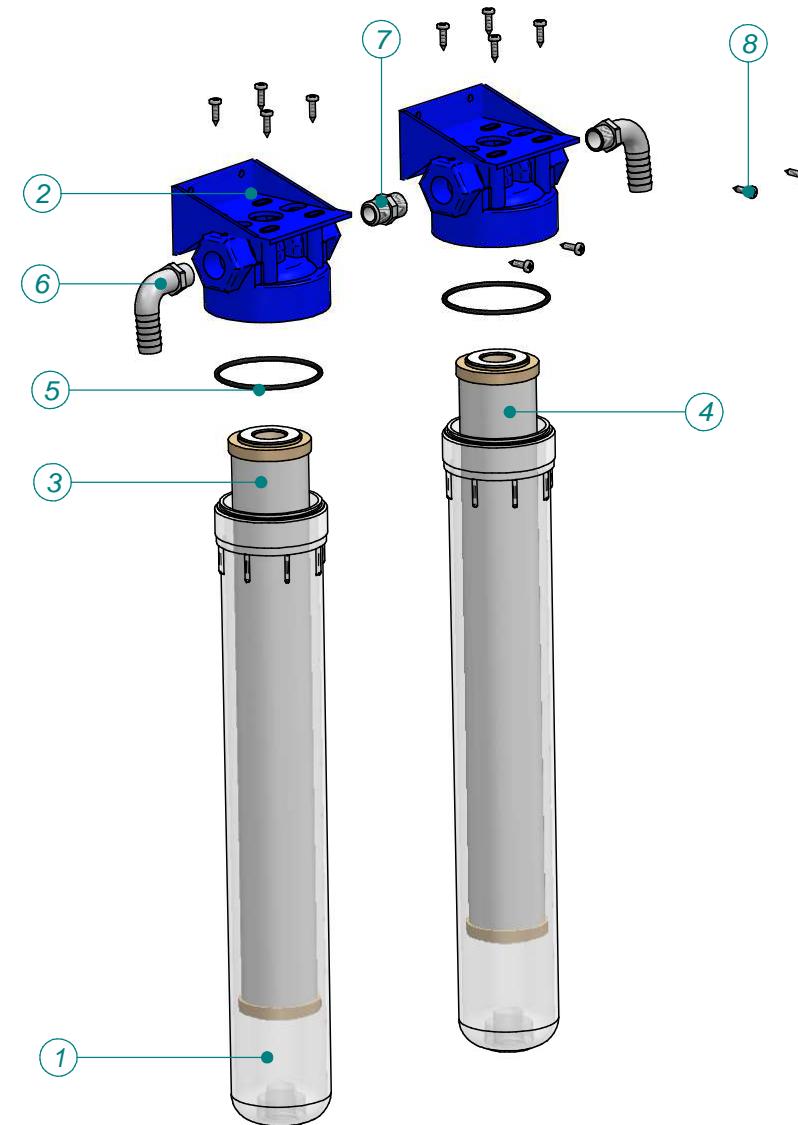
POS	CODE	DESCRIPTION	Qty.	POS	CODE	DESCRIPTION	Qty.
1	44030030	BRACKET - 3 CONTAINERS	2	11	43362540	MEMBRANE 25-40	3
2	44008510	STAINLESS STEEL CONTAINER FOR 2540 MEMBRANE	3	12	43916352	TORIC JOINT Ø63.17x2.62 mm	6
3	44030040	FLANGE - 3 CONTAINERS	2	13	43571220	QUICK PLUG THREAD MALE ADAPTER 1/4" Gas BSP Ø12mm TUBE	3
4	44008501	CONTAINER CAP	6	14	43521200	QUICK PLUG TEE BARBED FITTING FOR Ø12 mm TUBE	2
5	43801365	SCREW ALLEN DIN-912 M6X65 mm	4	15	43583120	QUICK PLUG ELBOW BARBED FITTING Ø12 mm TUBE	2
6	43451220	BITE TYPE FITTING WITH SEALING O-RING 1/4" THREAD, Ø12 mm HOSE	6	16	43420120	Ø10x12 mm TUBE – CONTAINERS CONNECTION	2
7	43710220	SEAL PLUG 1/4" THREAD Gas(BSP)	3	17	43945200	MEMBRANE SEALING JOINT	3
8	43471200	ELBOW COUPLER FEMALE M18 THREAD (METRIC)	6				
9	43431030	STRAIGHT CONNECTOR/COUPLER	2				
10	43911852	TORIC JOINT Ø18,72X2.62	6				

8.8. Filters assembly (20 and 5 micron)

POS	CODE	DESCRIPTION	Qty.
1	43300520	20" FILTER HOUSING R3//4" Gas (BSP) THREAD	2
2	43320200	FILTER FITTING BRACKET	2
3	43317110	20" PLEATED FILTER CARTRIDGE 5 μ	1
4	43317120	20" PLEATED FILTER CARTRIDGE 20 μ	1
5	43918470	FILTER JOINT Ø84X3.5 mm	2
6	43562060	BARBED FITTING 90° BEND, R3//4" Gas (BSP) THREAD, Ø20 mm HOSE	2
7	43660460	COUPLER R3//4" Gas (BSP) THREAD	1

OPTIONAL: 10 inches Filters

POS	CODE	DESCRIPTION	Qty.
1	43300510	20" FILTER HOUSING R3//4" Gas (BSP) THREAD	2
3	43317010	9 3/4" PLEATED FILTER CARTRIDGE 5 μ	1
4	43317020	9 3/4" PLEATED FILTER CARTRIDGE 20 μ	1



9. WARRANTY AND TECHNICAL ASSISTANCE SERVICE.

GARANTIA / WARRANTY/ GARANTIE	
<p>Español</p> <p>Esta máquina está garantizada durante 1 año o (1500 horas), a partir de la fecha de adquisición, contra todo defecto de fabricación. Quedan excluidas de esta garantía las averías que puedan atribuirse al desgaste normal, sobrecarga, manejo inadecuado, malos tratos y manipulación por personal ajeno al fabricante o a sus Servicios de Asistencia Técnica autorizados. La obligación asumida por esta garantía se limita al re emplazamiento de las partes en las cuales hayamos observado, previo examen, que son defectuosas y que no han sido utilizadas de forma indebida. Esta garantía excluye los gastos de transporte. Las reclamaciones pueden efectuarse directamente a cualquier Servicio de Asistencia Técnica autorizado.</p> <p>Distinguido cliente: Conserve en su poder este boletín durante el periodo de garantía. Para cualquier reparación acuda a cualquier Servicio Oficial o a las Oficinas Centrales. Previa presentación de este documento, debidamente cumplimentado, su máquina será reparada sin cargo alguno bajo las condiciones expresadas anteriormente.</p>	<p>English</p> <p>This machine is guaranteed for 1 year (1.500 hours) from the date of purchase, against all manufacturing defects. Any breakdowns which may be attributed to normal wear-and-tear, overloading, improper use, negligent treatment and handling by persons other than the manufacturer or authorised Technical Assistance Services, are not covered by this guarantee. The obligation undertaken by this guarantee is limited to the replacement of parts which have been inspected and declared defective and which have not been used in an inappropriate manner. This guarantee does not cover transport cost. Claims may be made directly to any authorised Technical Assistance Service.</p> <p>Dear costumer, Keep this form throughout the entire guarantee period. If any repairs are required, contact with ant of Official Service Centres or with our Head Bureau. Your machine will be repaired completely free of charge, according to the conditions stated previously, on presentation of this completed form.</p>
<p>Français</p> <p>Cette machine est garantie contre tout défaut de fabrication durant 1 année (1.500 h.) à compter de la date d'acquisition. Les pannes dues à l'usure normale, à une surcharge, à une manipulation inadéquate, à des mauvais traitements et à la manipulation par personne aliène au fabricant et à ses-Services autorisés d'assistance technique ne sont pas couvertes pas cette garantie. L'obligation assumée par cette garantie se limite au remplacement des pièces s'étant révélées défectueuses, que nous aurions pu examiner, et qui n'auraient pas fait l'objet d'une manutention erronée. Les coûts de transport sont exclus de cette garantie Les réclamations peuvent être adressées directement a tour Service d'assistance technique autorisé.</p> <p>Cher client, Veuillez conserver ce bulletin pendent toute la durée de la garantie. Pour toute réparation, vous pourrez recourir à Services officiels ou aux Oficinas Centrales. Sur simple présentation de ce document rempli, votre machine sera réparée sans aucun frais d'accord aux conditions indiquées ci-dessus.</p>	<p>Deutsch</p> <p>Auf den Ihnen erworbenen Apparat gewähren wir, ab Verkaufsdatum, 1 Jahr (1.500 h.) Garantie auf Schäden, die durch Herstellungstehler verursacht werden. Unsere Garantieleistungen erstrecken sich nicht auf solche Schäden, die auf normale Abnutzung, überlastung, unsachgemäße Handhabung, schiechte Behandlung oder auf Eingriffe zurückzuführen sind, die duch hersteller oder seinem autorisierten technischen Kundendienst nicht zugelassenen Personen vorgenommen werden. Unsere Garantiepflichtung beschränkt sich auf den Austausch schadhafter und nicht unsachgemäß benutzter Teile. Transportkosten werden von der Garantie nicht abgedeckt. Reklamationen können direkt bei jedem autorisierten technischen Kundendienst vorgebracht werden.</p> <p>Verehrter Kunde, Den Garantieschein bewahren Sie im Garantieschein bewahren Sie im Garantiezeitraum bitte gut auf Für etwaige Reparaturen wenden Sie sich bitte an eine der unseitig aufgeführten Vertragswerkstätten Bei Ihres vollständig ausgefüllten Garantiescheins wird Ihr Gerät dort Kostenlos zu den nebenstehenden Bedingungen repariert.</p>

FICHA DE IDENTIFICACIÓN PARA ATENCIÓN DE GARANTÍAS:

DESPUÉS DE COMPRAR SU POTABILIZADORA ECO-SYSTEMS, POR FAVOR RELLENE LA FICHA DE IDENTIFICACIÓN QUE ENCONTRARÁ **DEBAJO**. POR FAVOR MANDE UNA COPIA A ECO-SYSTEMS WATERMAKERS, S.L.

WARRANTY REGISTRATION INFORMATION:

AT THE TIME OF PURCHASE OF THE ECO-SYSTEMS DESALINATION SYSTEM, PLEASE COMPLETE THE WARRANTY INFORMATION FORM BELOW. PLEASE SEND A COPY OF THE COMPLETED FORM TO ECO-SYSTEMS WATERMAKERS, S.L.

Nombre / Name / Nom:
Dirección / Address / Adresse:
Ciudad /City / Ville:
C. P. / P. O. Box / CEDEX:
País / Country /Pais:
Tel. / Fax / e-mail:
Modelo / Model/ Modèle:
Fecha de Compra / Date of Purchase / Date d'Achat/Kaufdatum:
Nº de Serie/Serial Number / Numéro de Série / Serienummer:
Distribuidor - Concesionario / Distributor – Dealer / Distributeur - Concessionaire:
Nombre de la Embarcación / Ship Name / Nom du Bateau:
Puerto Base / Harbour / Port :

<p>DISTRIBUIDORES Y CONCESIONARIOS CON SERVICIOS DE ASISTENCIA TECNICA</p>	<p><i>DISTRIBUTORS AND DEALERS WITH TECHNICAL ASSISTANCE SERVICES</i></p>
---	---

EUROPE

ESPAÑA

Dealers

ALICANTE	<p>SPORT NAUTIC DENIA. Sr. Nicolás Navarro Egea Av. Joan Fuster 2 L-1 03700 Denia Tel. (+34) 965784320 Fax. (+34) 966422027</p>	<p>SPORT NAUTIC ALICANTE Sr. Miguel Fourcade, Muelle de Levante Modulo 3 L5 Marina Deportiva Alicante 03001 Alicante Tel. (+34) 965141313 Fax. (+34) 965140229</p>
ALICANTE	<p>SERPA ELECTRO, S.L. Sr. Paco C/ Conde de Altea, 20. 03710 Calpe Tel. (+34) 965838833 Fax. (+34) 965838833 serpaelectro@terra.es</p>	<p>PEDRO CASANOVA TARRES Sr. Pedro C/ Castellón, s/n 03130 Santa Pola Tel. (+34) 965415158 pedrocasanova@ctv.es</p>
ALICANTE	<p>PASCUAL LAFUENTE, S.L. Sr. Pascual, C/ Fontaneros 30, 1-4, Pol. Ind. IN-2, 03130 Santa Pola. Tel. (+34) 965 416 693pascual@pascuallafuente.com</p>	<p>TECNIBOAT-ALAIN & SHERRY,S.L. C/ Gerona, 2 Esc e 4º C, 03130 Santa Pola Tel. (+34) 966 693 778 tecniboat@tecniboat.com</p>
ALMERÍA	<p>NICOLAS CASAS S.L. Sr. Nicolás Casas Puerto de Adra, Muelle Poniente Varadero M, 04770 Adra Tel. (+34) 950400968 nicolascasas@nicolascasas.com</p>	
BALEARES		
IBIZA	<p>ELECTRO FRANCISCO: Sr. Francisco. Marina Botafoc Local 1 07800 Ibiza. Tel. (+34) 9713 6631 nicolascasas@nicolascasas.com</p>	
MALLORCA	<p>ECHO MARINE SERVICE S.L. Sr. Eric Hansen Puig D'Alaró 10 Bajos. 07015 Cala Major (Mallorca) Tel. (+34) 971400213 Fax. (+34) 971405873 info@emswater.net</p>	<p>MERCANAUTIC PALMA S.L. Sr. Rafa Bujosa. Passeig Maritim 38 - 07014 Palma de Mallorca Tel. (+34) 971 28 10 11 palma@mercanautic.com</p>

MALLORCA	<p>SOLNAUTIC SAILING S.L. Sr. Fede Rodríguez. C/ Jaume Bujosa 4, 2º 07198 Son Ferriol (Mallorca) Tel. (+34) 653 94 93 99 info@solnautic.com</p>	<p>SERVINAUTIC PALMA, S.L. Sr. Toni/Pau Julià. C/ Francisco Vallduvi, 12 P.I. Can Valero. 07011 Palma de Mallorca . Tel. (+34) 971 204 208 servinautic@servinautic.com</p>
BARCELONA	<p>MOTIVEL VARADOR 2000. Sr. Xiqui Mas Moll de Llevant S/n. 08350 Arenys de Mar Tel. (+34) 93 795 70 90 Fax. (+34) 93 795 72 70</p>	<p>E.I. ELECTRICA NAVAL Sr. Eudal Illa P. D. Port Balis Local 17. 08392 Sant Andreu de Lliavaneres Tel. (+34) 93 792 85 48 eudald_illa@hotmail.com</p>
BARCELONA	<p>TRAVINAUTIC S.L. Sr. Carlos Traviesa P.D. Port Balis 08392 Sant Andreu de Lliavaneres Tel. (+34) 93 792 8426 Fax. (+34) 93 792 84 23 info@travinautic.com</p>	<p>NAUTICA MASNOU Sr., Doménech. Port Esportiu Masnou, Local 24. 08320 Masnou. Tel. (+34) 93 555 19 08 nauticamasnou@nauticamasnou.com</p>
BARCELONA	<p>SERVIYATE S.L. Sr. Rafa / Miguel, C/ Marina, 38 - 08005 Barcelona Tel. (+34) 932214056 FEDE@SERVIYATE.COM</p>	<p>MULTINAUTIC SERVICIOS NÁUTICOS Sr., Pablo Otero Sr. Fernando Acosta C / Industria, 2, Local 1, 08860 Castelldefels . Tel. (+34) 661272119 (+34) 661272120</p>
BARCELONA	<p>TECNO ELECTRONICA NAVAL S.L. Sr. Cristóbal Ruiz Port Ginesta 723 08860 Castelldefels Tel. (+34) 93 664 49 70 Fax. (+34) 93 665 76 26</p>	<p>NAUTICA VILANOVA S.L. Sr. Ferrán. Canarias 19-21 bajo. 08800 Vilanova i La Geltrú. Tel. (+34) 9381592 84 Fax. (+34) 938158417</p>
BARCELONA	<p>NAUTICA PASCUAL S.L. Sr. Rafael Pascual Rambla Pirelli, 94 Bajos. 08800 Vilanova i La Geltrú Tel. (+34) 938110022 nauticap@teleline.es</p>	
CÁDIZ	<p>ELECTROMECHANICA NAVAL KOZIEL Sr. Ricardo Puerto Duquesa, Puerto Soto Grande Tel. (+34) 619073917</p>	<p>NAUTICA SHERRY. Sr. José Lechuga Puerto Sherry, El Puerto de Santa Mar Tel. (+34) 956861416 Fax. (+34) 956861417</p>
CANARIAS		
GRAN CANARIA	<p>POTENCIA MARINA, S.L. Sr. Julio Suárez, c/ Joaquín Blanco Torrent, 4 – Pto. Deportivo. 35006 Las Palmas de Gran Canaria. Tel. (+34) 928463647 electromecanica@navalko.com</p>	<p>ROLNAUTIC Las Palmas, S.L Sr. Juan Carlos Rodríguez, c/ Joaquín Blanco Torrent, s/n – Pto. Deportivo. 35006 Las Palmas de Gran Canaria. Tel. (+34) 928296811 rolnautic@rolnautic.com</p>
GRAN CANARIA	<p>FERROMAR PUERTO MARINA, S.L.: Sr. Juan Carmelo, c/ Joaquín Blanco Torrent, Loc 1 – Pto. Deportivo. 35006 Las Palmas de Gran Canaria. Tel. (+34) 928310410</p>	<p>JORGE RAMOS. Sr. Jorge, Club de Yates Pasito Blanco. 35100 Maspalomas Tel. (+34) 928142368</p>

GRAN CANARIA	<p>MOTORAS NÁUTICAS ISLAS CANARIAS.: Sr. Santiago Carreño, Av. Juan Díaz Rodríguez – Varadero, Loc. 10. 35130 PUERTO RICO Tel. (+34) 928153707</p>	
TENERIFE	<p>SPINNAKER SHOP S.L. Sr. Juan Montalbán, C/ San Juan Bautista, 32. 38002 Sta Cruz de Tenerife Tel. (+34) 922243975</p>	<p>CRIS MOTORS, S.L. Sr. David Hernández, Puerto Deportivo Radazul, Loc. 16. 38109 El Rosario Tel. (+34) 922681814</p>
TENERIFE	<p>NAUTICAL SERVICE. Sr. Alex Randall, Varadero Puerto Colón. 38660 San Eugenio – Adeje Tel. (+34) 678662710</p>	
LANZAROTE	<p>VARADERO PUERTO CALERO. Sr. Queco Morales, Urb. Pto. Calero Edf. Varadero. 35570 Yaiza Tel. (+34) 928510158</p>	<p>JAN C. HAYWARD. Sr. Jan, Galería Comercial Náutica Marina Puerto Calero. 35570 Yaiza Tel. (+34) 659822118</p>
CASTELLÓN	<p>OREMAR Avda. Marqués de Benicarló 39, (Puerto de Benicarló) 12580 Benicarló Tel. (+34) 964467262 OSCAR@OREMAR.NET</p>	<p>GRAUMAR NAUTICA. Sr. Enric Llinás Av. del Port 2,1 12100 Grau de Castellón Tel. (+34) 964 28 25 59 Fax. (+34) 96428 25 59</p>
GERONA	<p>NAUTIC CENTER S.A. Sr. Ricardo Roig. Ctra. Figueres Roses Sta Margarida 17480 Roses. Tel. (+34) 972257156 Fax. (+34) 972150221 ricard.roig@nauticcenter.com</p>	<p>NAUTICA PALAMÓS S.L. Avda. Angel Guimerá s/n, 17230 Palamós Tel. (+34) 972414900 mdiaz@nauticapalamos.com</p>
GERONA	<p>MARINA ESTRELLA EMPURIABRAVA SL Sr. Pedro Pérez, Ctra.Figueres a Roses – C/ Aeroclub, 59, 17487 Empuriabrava . Tel. (+34) 972456098</p>	
HUELVA	<p>TALLERES CANTERLA S.L. Sr. Ignacio Canterla Pol. Ind. Fortiz, Sector C, Nave 6, 21007 Huelva Tel. (+34) 959237972 canterlasl@vodafone.es</p>	
MÁLAGA	<p>AERONAUTICA YACHTS SERVICE Varadero Puerto de la Caleta 29751 Caleta de Vélez (Málaga) TEL y Fax: +34 952 55 06 92 Sr. José Antonio Romero Tel. (+34) 629549484</p>	<p>SELEMAR ELECTRONICA NAVAL.: Sr. Miguel García, Varadero del Puerto Banús 29660 Marbella Tel. (+34) 952 81 21 21 Fax.- (+34) 952 81 35 28</p>
	<p>JUAN EDUARDO SLOVAK Baradero Puerto José Banús,</p>	

MÁLAGA

29680 Estepona (Málaga),
Tel. (+34) 952816621
slovak_marine@hotmail.com

MURCIA

NAUTIMOVIL, S.L.: Francisco
Sanchez Berlín, P H15-16 Pol. Ind.
Cabezo-Baeza
30392 Cartagena
Tel. (+34) 968121160
nautimovil@terra.es

TELENAUTIC

Ramon Perez Olmo
C/ Campoamor, 16
30310 Los Dolores
Tel. (+34) 696195981
telenautic@hotmail.com

MURCIA

NAUTICA ENTRECABOS, S.L.
Sr. José Luis Gomáriz,
Club Náutico "Villa de San Pedro",
Explanada del Puerto s/n,
30740 San Pedro del Pinatar.
Tel. (+34) 968186092
info@nauticaentrecabos.es

PONTEVEDRA

ILLANTE S.L.:
Sr. Ignacio Román.
Av. Tomas A. Alonso 121 Bajos.
36208 Vigo
Tel. (+34) 986 23 7863
Fax. (+34) 986 20 07 46
illante@illante.com

VALENCIA

JORDI PUJOL ARGEMI
Real Club Náutico de Valencia,
46014 Valencia
Tel. (+34) 608391777
jordipujol@telefonica.net

YACHT SERVICE MENORCA 2005

Sr. Philippe,
R. C. N. de Valencia,
46014 Valencia
Tel. (+34) 963 674 057
(+34) 609 300 951
enaval@infotelecom.es

VALENCIA

SON DE MAR
Sr. Miguel Penadés, R. C. N. de
Valencia, Camino del Canal 91,
46014 Valencia
Tel. (+34) 963 290 441
(+34) 656 409 385

AUSTRIA

Distributors

OCEANFIT
Steingasse 6 A
4662 Steyermühl
Tel: (+43) 660 5561506

FRANCE

Distributors		
83	VIDAL DIFFUSION MARINE 1523 AVENUE DE DRAGUIGNAN Z.I. TOULON EST., 83130 LA GARDE - Tel.- (+33) 494086824 m.rapisarda@vidalmarine.co	LIVEMAR FRANCE Romain Jolly. C/ Botanica 77-79, 08908 P.I. Gran Via Sur, L'Hospitalet de Llobregat (BCN) Tel.- (+33) 613985145 - (+34) 932643100 compras@livemar.com
Dealers		
06	LYVIO MARINE (SAT) M. Mas ou M. Musso. 4 Av. Frederic Mistral, 06600 ANTIBES Tel.- (+33) 4.93.34.18.89	
17	JMLG (SAT) M. Le Guen, 280 Rue du Grossillon, 17290 CHAMBON GARE Tel - (+33) 6.07.19.97.21	
29	CONCARNEAU ELEC.SCE (SAT) M. David, 10 Quai Est, 29110 CONCARNEAU Tel.- (+33) 2.98.50.51.09	
30	PROELEC M. Criado. Zone Technique 2 30240 PORT CAMARGUE Tel.- (+33) 4.66.51.90.30	
40	ABSOLUT SERVICE (SAT) M Rabil, 1146 Route du Port, 40180 HINX Tel (+33) 5.58.89.57.49	
56	ELECTRONIQUE DU GOLFE (SAT) M. Mauguen 18 Quai Des Cabestans, 56640 ARZON Tel.- (+33) 2.97.53.75.32	
83	CN ALMANARRE (SAT) M. Mifsud, Route des Marais, 83400 HYERES Tel.- (+33) 4.94.01.44.44	THALASA PLAISANCE (SAT) M. Dannay, 30 Centre Nautisme Port St. Pierre, 83400 HYERES Tel.- (+33) 4.91.85.35.96
83	DELPHI MARINE (SAT) M Maroleau, Aire de Carenage, 83980 LE LAVANDOU Tel.- (+33) 6.80.30.83.43	

GERMANY

Distributors

AQUAGIV GmbH
 Heinrich Knotte Str. 3^a
82343 Pöcking
 Tel : (+49) 89125 09 000-1
 Fax : (+49) 89125 09 000-10
markus.reger@aquagiv.de

GREECE

Distributors

NAUTILUS LTD
 33, Poseidon Ave/2Metamorfoseos,
17455 / Alimos Shop Athens
 Tel.(+302)109854238
 Fax.(+302)109849444
info@nautilus.gr

ITALY

Distributors

POWERLINE SRL
 Via Guiseppe Micali, 30,
00124 ROMA
 Tel. (+39) 0652311418
 Fax.(+39) 065652084
info@power-line.it

PORTUGAL

Distributors

DPM TRATAMENTO DE AGUAS
 Edifício IPG - Alameda Jardins do
 Arrábida, 1168
4400-478 Vila Nova de Gaia
 Tel : +351 227728549
 Fax : +351 212068850
comercial@dpm.grupoipg.pt

Dealers

SOPROMAR
 Estaleiro Naval de Lagos Estrada
 Sopromar 8600 Lagos
 Tel: +351 282763889
 Fax: +351 282792135
luisborralho@sapo.pt

MEUMAR, Lda
 Marina de Vilamoura – Estaleiros
 8125 – 406, Vilamoura
 Tel : +351 289322056
 Fax : +351 289322075
info@meumar.com
conde@meumar.com
marta@meumar.com

THE NEDERLANDS

Dealers

AQUA SOLAR VOF.
Zwolsmanweg 14
8606 KC SNEEK
Tel: +31 515 431920

TURKEY

Distributors

BETA MÜHENDISLIK
Sanayi Mah. Sefa Sirmen Bulv. Martı
Sok. No.18
41040 İzmit-KOCAELİ
Tel: +90-262-335 1949
Fax: +90-262-335 1914
info@betamuhendislik.com

Dealers

ETAP MARINE
Dr. Orhan Maltepe Cad. No: 27/A
34890 Pendik Istanbul Turkey
Tel. +90 216 491 20 26
info@etap-marine.com

UNITED KINGDOM

Dealers

SAILFISH MARINE

12 York Close – Chandlers Ford.
SO53 4LF HAMPSHIRE
Tel: +44 02381 888250
Mobile: +44 07592 864467
james@sailfishmarine.co.uk

SLOVENIA

Dealers

SOS ALL INCLUSIVE

MARINA PORTOROŽ Cesta
solinarjev 2
6320 Portorož
Tel: +386 31 596 523
info@sosallinclusive.org

SWEDEN

Dealers

SWEWATER

Fyrlyktev, 2 B
SE-42339 Torshälla
Tel : +302109854238
Fax.+302109849444
sveayachts@live.se

AFRICA

SOUTH AFRICA

Dealers

TAMARIX MARINE CC

Unit 6, East End Prime Park,
Printers Way Montague Gardens
Cape Town, 7441,
Tel: +27 (0) 21 551 9192
Fax: +27 (0) 21 552 9326

ASIA

CHINA

Distributors

SUNRISE MARINE LIMITED
A/4055 Qinyuan Road Xili,
Nanshan District,
Shenzhen, Guangdong
Tel: +86 755 86650101
Fax: +86 755 86593878
sales@sunrisemw.com

CARIBE

NEDELANDS ANTILLES

Dealers

ELECTEC N.V.
29 Wellington Road. Colebay.
St. Maarten. Netherlands
Antilles
Tel: +599 544 2051
Fax: +599 544 3641
audrey@electec.info

OCEANIA

AUSTRALIA

Distributors

SOUTHERN SEAS MARINE
Gold Coast City Marina. Unit A 6,
58 Waterways Dr,
Coomera 4209.
Tel: +61755029666
Fax: +61755029777
sales@southernseasmarine.com

NEW ZEALAND

Distributors

GENERAL MARINE SERVICES
196 Pakenham Street West,
Westhaven, Auckland
Tel:+64 9 309 6317
Fax:+64 9 309 6897
roy@generalmarine.co.nz

Visite nuestra Web / Visit our Web

www.eco-systems.com

Si precisa Servicio de Asistencia Técnica (SAT) en cualquier otro país de la UE o USA, póngase en contacto con nuestras oficinas de Sabadell

Tel. (34) 93.710.89.50
Fax: (34) 93.712.23.55.

info@eco-systems.com

If you need Technical Support in another EU or USA country not included in the above list please contact our head office in Sabadell (Spain)

*Tel. (34) 93.710.89.50
Fax: (34) 93.712.23.55.*

info@eco-systems.com