TECNICOMAR®
WATERMAKERS - SEWAGE TREATMENT PLANTS

INSTRUCTIONS FOR THE INSTALLATION, USE AND MAINTENANCE OF TECNICOMAR SYSTEM FOR SEWAGE WATER TREATMENT

MODEL: ECOmar 20 S; 32 S; 45 S; 70 S; 145 S.

ECOmar® S

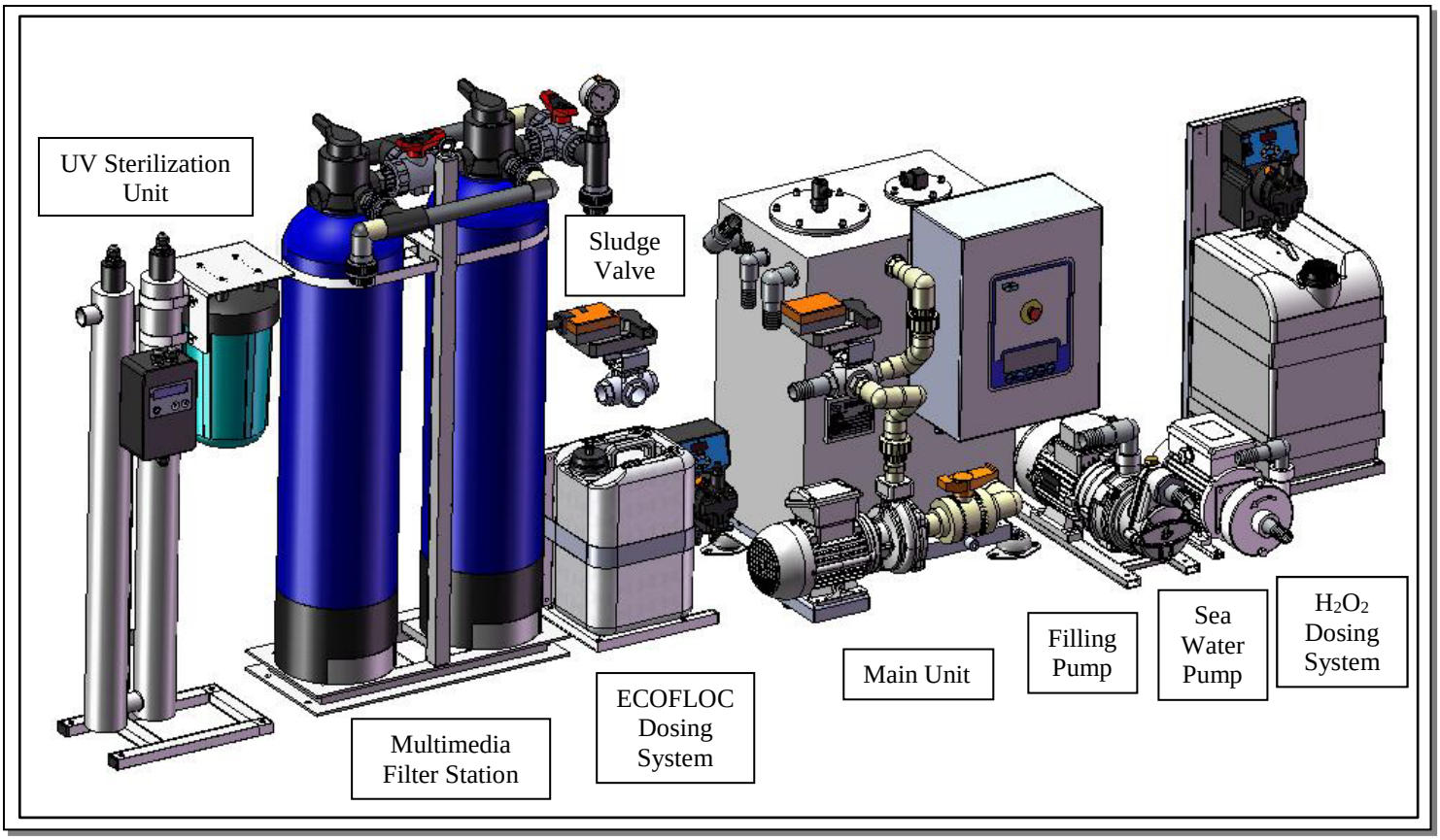


Image for illustration purposes only

Rev.	Date	Main content revisions
00	10.02.2019	

Dear Customer,

We would like to thank you for choosing a TECNICOMAR system to treat the sewage water.

All TECNICOMAR equipments are designed by expert technicians and manufactured with care for all its aspects and in respect of the EU Directives for the machinery (safety) 89/392 and later modifications.

Before using the unit you are kindly requested to read carefully this manual as integral part of the equipment since the respect of the instructions here quoted assures the performance and the operator safety.

WARNING!

TECNICOMAR S.P.A. declines any and all liability for failure to observe the safety and accident prevention standards described in this manual, for damage due to the improper use of the equipment and for modifying it without the authorisation of Tecnicomar S.P.A.

Signs used throughout the Manual

Warning
These instructions should be followed carefully to operate the equipment correctly.

Danger
These instructions should be followed carefully to avoid damage to the equipment or to the operator.

Note or Information
The notes contain important information and useful hints to run the unit.

If not specified otherwise, letters & numbers used in the text refer to the functional diagram shown in the drawings situated at the end of this Manual.

* *

TABLE OF CONTENTS

1 INTRODUCTION

The system is able to treat the on board sewage water as to make it suitable to be discharged directly into the sea, in accordance with the international standard (IMO-MARPOL regulation – MEPC 227).
The unit does not need to be run by any operator, who has only to start up the unit in automatic mode. The ECOmar S plant is a batch functioning system that treat a fixed quantity of sewage at each operating cycle. Each cycle starts with the loading of a set quantity of sewage water from the on board collecting tank (your supply). After loading, the sewage is diluted with clean seawater and pre-set quantities of Hydrogen Peroxide (H_2O_2) and ECOFLOC Flocculants are added. Finally the sewage is macerated and mixed for a fixed period of time, after which it is made to rest for a further fixed period of time. During these steps, lasting some minutes, the chemical-physical reactions inside the system disinfect the water, reduce the dimensions of sediments and separate the cleared water from the sludge. At this point, the cleared water pass throughout a multimedia filter station and an U.V. sterilizer and finally it is discharged outboard into the sea, according to the International Rules (IMO-MARPOL regulation – MEPC 227). In the final step of the operation cycle the system discharges the residual sludge into the on board sludge tank (your supply).
The automatic mode functioning is continuous in that the unit is able to start-up automatically a sewage treatment cycle every time the set quantity of stored sewage; relative to the collecting tank level (Max Level) set to start-up the cycle; is reached inside the on board collecting tank (your supply).
Each operating cycle lasts about 22-25 minutes. For the sewage quantities treated by the plant refer to the **TREATMENT CAPACITY** section.

2 STORAGE PRIOR TO UNPACKING AND PACKAGING CONTENT

2.1 Storage Prior to Unpacking

⇒ Do not store in direct sunlight.
⇒ Do not freeze (see **SPECIAL PROCEDURES** section).
⇒ Do not store above 50°C (122°F).
⇒ Store only on base with arrows up.

2.2 Unpacking

a) Open the wood case, if any, being careful to do not hit the protruding parts of the components, such as fittings or pipes, hose-barbs, flange, etc.
b) Use caution in moving the STP plant and all its loose parts with a forklift or a pallet truck after it is removed from the shipping crate. Place wood or other material onto the metal forks of the forklift (pallet truck) which can damage the powder coating on the underside of the skid.
c) Always remember that, despite being accurately packaged and protected, the supply contains light bulbs and quartz tubes: this means that the entire system must be considered as fragile material and handled as such.

2.3 Checking Packaging Content

After unpacking the Sewage Treatment Plant (STP), check all the parts for any damage. Claims for any missing or damaged materials must be made immediately to Tecnicomar authorized dealer or Tecnicomar headquarters
In the package there are usually the following components:

- ECOmar S STP main unit, complete with Treatment tank, Macerating pump, Motorized Discharge Valve (V1), PCB control panel, Multilevel sensors and Nr.4 Anti-vibration dampers (installed on the Main ECOmar S frame).
- Nr.1 Sea water pump*.
- Nr.1† or Nr.2‡ filling pumps*.
- Nr.1† or Nr.2‡ level probes complete with relative level probe control box (or junction box)*.
- Nr.1 H_2O_2 Dosing system complete with dosing pump and tank*.
- Nr.1 ECOFLOC Dosing system complete with dosing pump and tank*§.
- Nr.1 Sludge Discharge Valve (V2)*§.
- Nr.1 Multimedia Filter Station, complete with the proper quantity of Zeolite and Quartzite*§.
- Nr.1 U.V. Sterilizer*§, complete with U.V. lamps.
- *Installation Kit*: Nr.3† or Nr.4‡ anti-syphon valves set; Nr.1 diaphragm manual pump; hose for dosing pump; and clamps.
- Optional devices, such as a remote control.

* Supplied as loose part.
† If the plant is supplied for one tank control.
‡ If the plant is supplied for two tanks control.
§ Supplied on request inside a common customizable Additional Skid.

3 MARKING OF PRUDOCT

A Nameplate is affixed on the front of the unit, showing:

- Manufacturer information
- EC mark stamp
- Model
- Serial number
- Year of construction
- Voltage
- Hydraulic loading

Fig. 3-1 - Nameplate

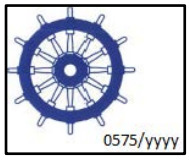


Fig. 3-2 – Mark label

A wheel mark label, attached close to the nameplate, with the identification of the Notified Body and followed by the year in which the mark is affixed.

4 PLACARD

ATTENTION

- THE INSTALLATION PROCEDURES EXPOSE THE INSTALLER TO HIGH VOLTAGE AND ELECTRICAL SHOCK HAZARD. ONLY ATTEMPT INSTALLATION IF YOU ARE A QUALIFIED TECHNICIAN AND ONLY IF SURROUNDING CONDITIONS ARE SAFE.
- DO NOT USE ANY FILTERS ALONG ALL THE AIR RELIEF LINE.
- MAKE SURE ALL ANTI-SIPHON VALVES ARE PROPERLY INSTALLED.
- CHECK ALL HYDRAULIC PIPES/HOSES ARE PROPERLY FIXED.
- CHECK ALL ELECTRICAL CABLES ARE PROPERLY WIRED.
- CHECK ROTATION OF ALL MOTORS ACCORDING TO THEIR ARROWS.
- USE A CIRCUIT BREAKER IN ORDER TO AVOID OVERLOAD. ITS SIZE DEPENDS ON ELECTRICAL CONSUMPTION OF THE UNIT.

5 TREATMENT CAPACITY

Marine Sanitation Device		***ECOmar20 S***	***ECOmar 32 S***	***ECOmar 45 S***	***ECOmar 70 S***	***ECOmar 145 S***
Average capacity per day (lt.)		1500	2400	3375	5250	10875
Peak capacity per day (lt.)*		**2000**	**3200**	**4500**	**7000**	**14500**
Average capacity per hour (lt.)		62.5	100	140.625	218.75	453.125
Peak capacity per hour (lt.)		83.3	133.3	187.5	291.67	604.17
Sewage capacity treated per cycle (lt.)		33.75	52.8	66.5	107.865	241.5
Seawater / brackish water / fresh water load per cycle (lt.) * **		24.3	38.016	47.88	71.91	124.2
Total volume per cycle (lt.)		58.05	90.816	114.38	179.775	365.7
Persons, if passenger ships**	**Without vacuum plant**	8	14	19	30	63
	With vacuum plant	10	17	24	37	78
Persons, if other ships**	**Without vacuum plant**	11	17	25	38	80
	With vacuum plant	14	23	33	51	107
Condition of heel up to (max angle of pitch and roll)		22.5°				
Range of environmental temperature		0°C ÷ 55°C				
Humidity		95%				
Salinity		55000 ppm				

System running 24 hours per day.
****Indicative maximum persons number, at peak treatment capacity per day (system running 24h/24h). Ask to Tecnicomar S.P.A. for a proper plant sizing.***
*****Designed to operate in salt, brackish and fresh water.***

6 SYSTEM DESCRIPTION

The ECOmar S STP can be supplied with two different configuration: 1 Tank Control or 2 Tanks Control.
The main differences between the two configurations are the number of the supplied filling pumps (1 or 2); the number of the supplied anti-syphon valve set; the number of the supplied level probes; the number of the supplied level probe control boxes; the dosing systems arrangement and the main control box arrangement.
The diagrams below show a functional installation scheme of the plant with its main components for both configurations.

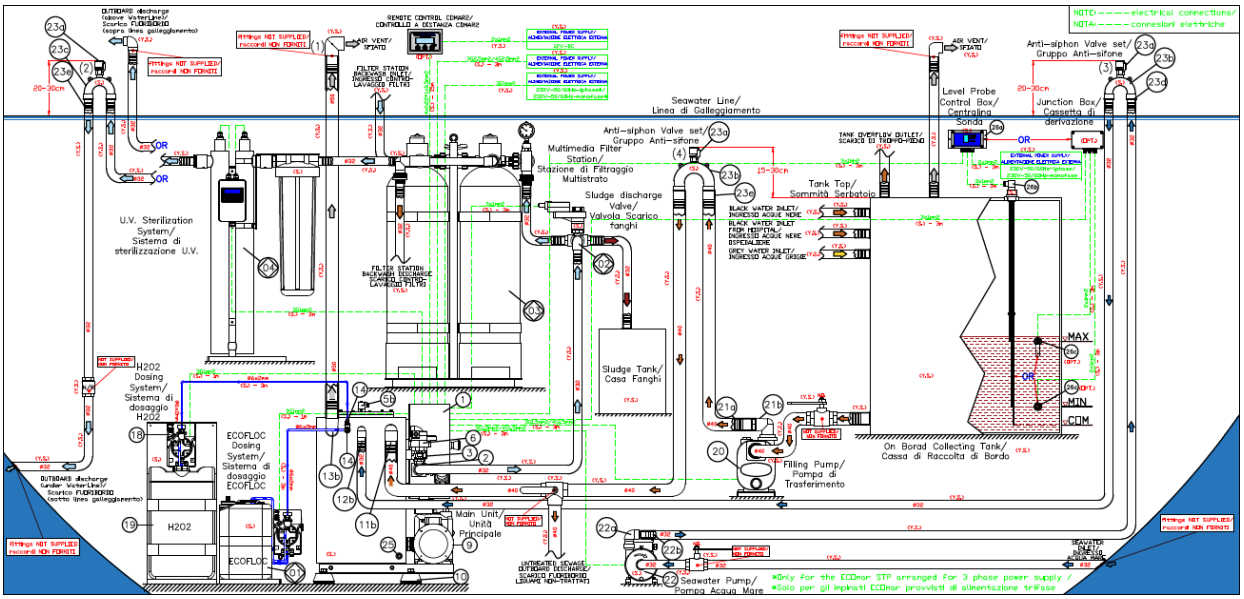


Fig. 6-1 - Functional installation scheme – 1 Tank Control - (see also annexed drawing)

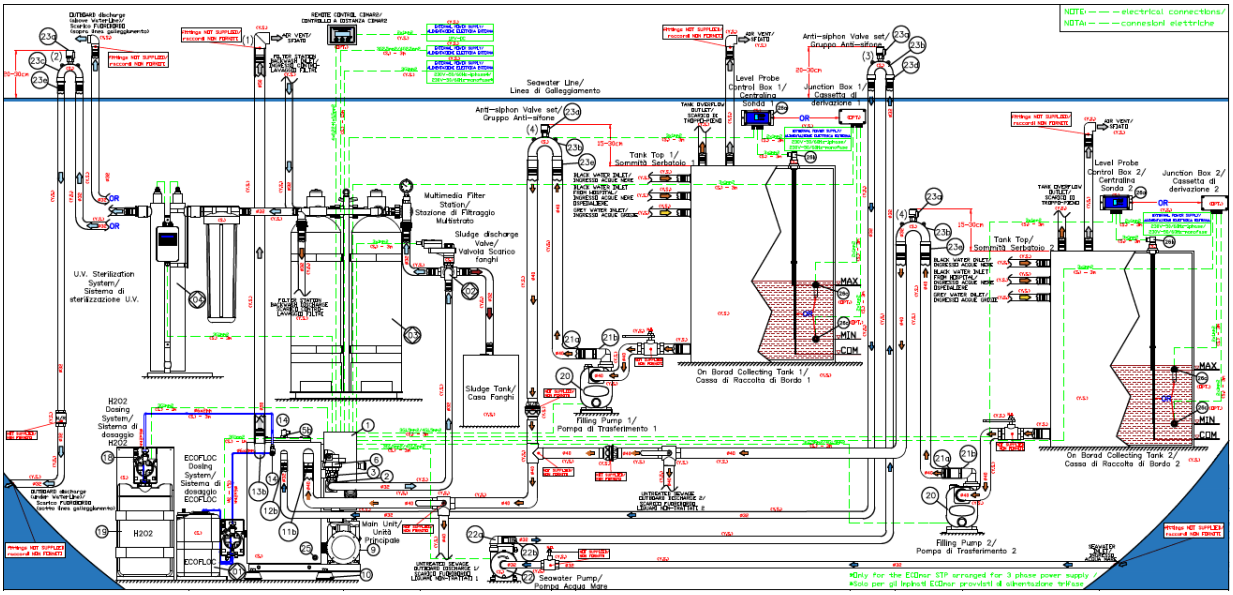


Fig. 6-2 - Functional installation scheme – 2 Tanks Control - (see also annexed drawing)

As shown in the diagrams above, the system is composed by:

1. A **Main Unit Skid** made by:
   - 1.1. A tank (*Treatment Tank*) made of PP (polypropylene) or SS (stainless steel)*, where the sewage water is treated;
   - 1.2. A pump (*Macerator* or *Macerating Pump*) to treat and discharge the treated water;
   - 1.3. A motorized *Discharge Valve* (*V1*) to divert the treated water to the sludge discharge valve *(V2)* inlet or back to the treatment tank;
   - 1.4. Level probes†, installed on the treatment tank, for the tank level monitoring;
   - 1.5. A pressure sensor (*Pressure Switch*)‡ to protect the treatment tank from overpressure;
   - 1.6. A PCB control panel (*Main Control Box*) with motor protections, contactors, microprocessor, touch pad and liquid crystal back-lighted display.

*For the ECOmar 70 S and 145 S; the treatment tank is available only in SS (stainless steel).
†Nr.1 *Multi-point Ball Level Switch* for ECOmar 20 S – 32 S – 45 S – 70 S – 145 S.
‡ Only for the STP supplied with the treatment tank in PP (polypropylene).

Loose parts

2. An **Additional Unit**[*] made by:
   2.1. Nr.1 ***ECOFLOC Dosing System*** composed by a tank and a dosing pump;
   2.2. Nr.1 ***Sludge Discharge Valve (V2)*** to divert the treated water to the multimedia filter station inlet or to the sludge tank;
   2.3. Nr.1 ***Multimedia Filter Station***, to filtrate the cleared from the main treatment unit;
   2.4. Nr.1 ***U.V. Sterilizer*** to remove any residual coliforms in the treatment water.
3. Nr.1[†] (or Nr.2[‡]) **Filling Pump** to move the sewage water from the collecting to the treatment tank.
4. Nr.1 **Disinfectant Liquid (H_2O_2) Dosing System** composed by a tank and a dosing pump.
5. Nr.1 **Sea Water Pump** to fill the treatment tank with sea water (diluent).
6. Nr.1[†] (or Nr.2[‡]) **Level Probe** for min/max level in the sewage water collecting tank on board (supplied uncut[§]).
7. Nr.1[†] (or Nr.2[‡]) **Level Probe Control Box** for collecting tank sewage level monitoring (to be connected to **Level Probe**).
8. **Installation Kit** consisting in:
   8.1. No.2[†] (or Nr.3[‡]) anti-siphon valve sets,
   8.2. No.1 anti-siphon valve in case of discharge located below waterline,
   8.3. No.4 vibration dampers,
   8.4. No.1 manual diaphragm pump for disinfectant tank filling,
   8.5. No. 2 injection valve for H_2O_2 and ECOFLOC injection,
   8.6. No. 1 tee fitting for H_2O_2 and ECOFLOC injectors installation,
   8.7. Pipe for chemicals injection and stainless steel clamps.

Optional

9. A ***Remote Control Panel*** **t**hat allows the start/stop of the unit.

The ECOmar S Sewage Treatment Plant (STP) is designed to auto-manage the sewage level inside the on board collecting tank. The standard management system of the level inside the collecting tank is essentially composed by the supplied **Level Probe** and by the relative **Level Probe Control Box**. When the management system of the level signals from the collecting tank is correctly installed and connected (refer to the **Management system of the level signals from the collecting tank sensors** and the **INSTALLATION** sections) to the Main Control Box of the Main Unit; the plant starts up every time the sewage collecting tank (your supply) is full and continues to run until it is empty.
The sewage to be treated is pumped from the on board collecting tank to the Treatment Tank of the Main Unit by the **Filling Pump**; which, if correctly installed (refer to the **INSTALLATION** section), also performs a pre-maceration on the sewage, while transferring it. An anti-siphon valve set is supplied for the filling pump to prevent siphoning on the filling line.
When the transferred sewage reaches the min level of the Multi-point Ball Level Switch, installed on the Treatment Tank of the Main Unit, the system Main Control Box stops the Filling Pump and activates the Disinfectant Liquid (H_2O_2) Dosing System and the ECOFLOC Dosing System at the same time.
If correctly installed and set (refer to the **INSTALLATION** and to the **System Settings** sections) the **Disinfectant Liquid (H_2O_2) Dosing System** injects, throughout the relative injector installed on the Treatment Tank, a pre-set quantity of H_2O_2 solution inside the tank to disinfect the water to be treated.
During the same time, (refer to the **PCB CONTROL PANEL – Functional Description** section), the **ECOFLOC Dosing System**, if correctly installed and set (refer to the **INSTALLATION** and to the **System Settings** sections) injects, throughout the relative injector installed on the Treatment Tank, a pre-set quantity of ECOFLOC solution inside the tank to activate the sludge separation process.
At this point, the Main Control Box activates the **Sea Water Pump**; which, if correctly installed (refer to the **INSTALLATION** section), pumps a set quantity of clean seawater from the on board seacock valve (your supply), to the Treatment Tank for the sewage dilution. An anti-siphon valve set is also supplied for the seawater pump to prevent siphoning on the seawater line.
After this preliminary preparation phase, the sewage treatment that takes place almost exclusively on the plant **Main Unit**, begins. All chemical-physical reactions necessary for the sewage treatment happens inside the *Treatment Tank*. This tank is provided with a *Multi-point Ball Level Switch*, which is designed to stop the Filling Pump; when the set quantity of sewage (refer to **TREATMENT CAPACITY** section) is inside the tank; and the Sea Water Pump, when the set quantity of dilution seawater is added. Moreover the Multi-point Ball Level Switch is also designed to stop the plant in case of treatment tank overflow (refer to **PCB CONTROL PANEL – Functional Description** section). Once filled the Treatment Tank, the *Main Control Box,* to which is assigned the management of all the plant parts, activates the *Macerating Pump*, installed on the Main Unit. This pump aspires the water to be treated from the treatment tank and resend it to the tank. Thanks to the thus realized recirculation, the sewage is further macerated and mixed. This operation activates the sewage treatment process that requires a certain time frame, to be completed successfully. Therefore, once stopped the macerating pump, the sewage is left inside the tank for a further period of time. During this phase there is a separation of the clarified water from the residual sludge that

[*] The additional unit is standard supplied with all components as loose parts, but on request it can be supplied in any customizable common skid configurations.
[†] If the plant is supplied with the 1 Tank Control Configuration.
[‡] If the plant is supplied with the 2 Tanks Control Configuration.
[§] It is important to know dimensions of the storage tank to evaluate type of sensors to supply and fit.

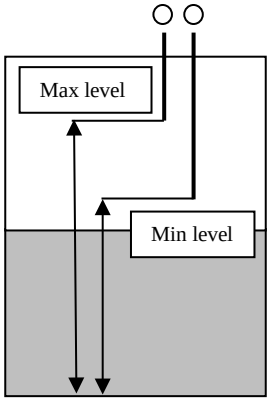
floats on the liquid free surface. In the treatment process, can be released some vapors which, if not correctly expelled from the treatment tank air vent, could bring to harmful overpressure inside the tank, damaging it. The Treatment Tank is designed to withstand a certain degree of internal overpressure. In particular for the model with the tank in PP (polypropylene), on the Treatment Tank is installed a *Pressure Switch* that stops the system leading it in Overpressure Alarm mode, in case of overpressure inside the tank. However, for a correct and safe operation of the ECOmar S STP it is recommended to connect the Treatment Tank air vent as to have a vent piping (refer to the **INSTALLATION** section) free from any obstructions and as straight as possible.

DO NOT USE ANY FILTERS ALONG ALL THE AIR RELIEF LINE

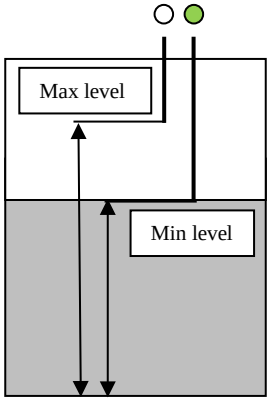
Once the treatment process is complete, stats the discharge phase. This phase begin is characterized by the status changing of the *Discharge Valve (V1)*. This 3-way motorized valve, installed on the Main Unit, has in fact the task of diverting the flow from the Macerating Pump to the Treatment Tank, during the treatment phase; or to the Main Unit discharge outlet, during the discharge phase.
Moreover, the discharge phase mainly comprises two sub-steps: the clarified water discharge step and the sludge discharge step. The discrimination between the two sub-steps is assigned to the **Sludge Discharge Valve (V2)**. This 3-way motorized valve, part of the Additional Unit, has in fact the task of diverting the flow from the Main Unit discharge outlet to the inlet of the Multimedia Filter Station, during the clarified water discharge step; or to the on board sludge tank (your supply), during the sludge discharge step.
During the clarified water discharge step the water pass first throughout the **Multimedia Filter Station**. This component, part of the Additional Unit, mainly consists of two stages. In the first stage the clarified water is treated by Zeolite to adjust its residual content. In the second stage the clarified water is subjected to a filtration to eliminate any excessive presence of suspended solids. Each of the Multimedia Filter Station stages consists of one or two filter that can be backwashed (refer to **SPECIAL PROCEDURES** section) using fresh not-chlorinated water (your supply).
At least the clarified water pass throughout the **U.V. Sterilizer**, which ensure the bacterial removal from the treated water, just before been discharged. This U.V. Sterilizer is supplied complete with a bag filter, which as the task to protect the U.V. lamps from the presence of any gross particles. Moreover, an anti-siphon valve set is also supplied for the outboard discharge, in case of discharge under the seawater line, to prevent siphoning on the outboard discharge line.

6.1 Management system of the level signals from the collecting tank sensors

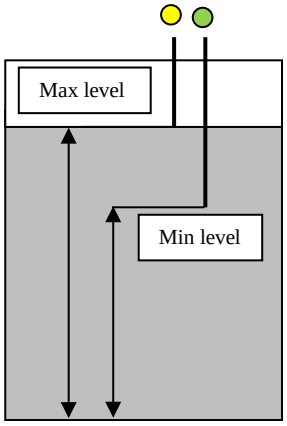
The main control box of the ECOmar S STP has to interface with a min level signal (N.C.) and max level signal (N.O.) from the level probes installed on the sewage collecting tank (your supply). The system does not manage the signal for the absolute max level of the collecting tank. This signal (if provided by the installed probe) can only be used for local or remote signaling. This signals can be derived from the level probe control box (standard supply), from a junction box connected with two or three lateral level probe (supplied on request), or from any other levels detecting system (your supply), capable of sending the correct level signals, as above specified, to the system control box.
When the system is correctly connected to the level sensors of the on board collecting tank and the level probes are configured to give the correct signals to the system control box; the ECOmar S plant will operate as described below:



I. When the collecting tank is empty, the level of sewage is below the minimum level and of course below the maximum level. The min level sensor has to give a closed free voltage contact signal to the ECOmar S main control box; and the max level sensor has to give an open free voltage contact signal to the ECOmar S main control box. In this way, the filling pump is set in standby.

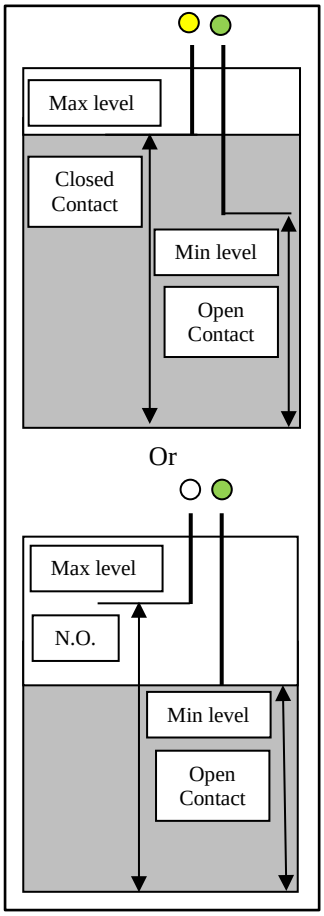


II. When the sewage level of sewage reaches the minimum level, the min level probe installed on the collecting tank has to give an open free voltage contact signal to the ECOmar S control box; and the max level sensor, has to continue to give an open free voltage contact signal to the ECOmar S main control box. In this way, the filling pump is still set in standby.

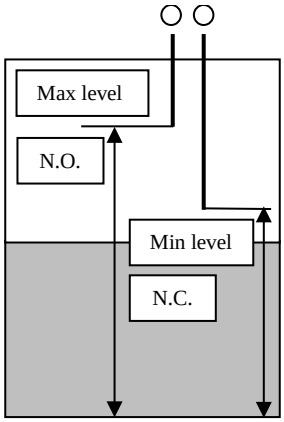


III. When the sewage level of sewage reaches the maximum level, the min level probe, installed on the collecting tank, has to continue to give an open free voltage contact signal to the ECOmar S control box; and the max level sensor, has to give a closed free voltage contact signal to the ECOmar S main control box. At this point the ECOmar S control box will activate the filling pump, transferring the sewage to the ECOmar S treatment tank up to the bottom sensor in the treatment tank, then stops the sewage transfer and continues the treatment cycle.

IV. At this stage, after the treatment cycle is completed, we can have two different sceneries:



IV.1. The sewage level inside the collecting tank is still above the minimum level. The min level probe installed on the collecting tank, continues to give an open free voltage contact signal to the ECOmar S control box; and the max level sensor continues to give a closed free voltage contact signal to the ECOmar S main control box. As a consequence the ECOmar S control box will re-activate the filling pump to start a new sewage transfer to the ECOmar S treatment tank (if the level in the treatment tank is below the min level), then stops the sewage transfer and continues to run a new treatment cycle.



IV.2. The sewage level inside the collecting tank is below the minimum level. The min level probe installed on the collecting tank gives a closed free voltage contact signal to the ECOmar S main control box; and the max level sensor continues to give an open free voltage contact signal to the ECOmar S main control box. As a consequence the ECOmar S control box will set the filling pump in standby, waiting for the sewage level to reach the max to start a new transfer.

6.1.1 Control box for level probe

The system is standard supplied with a 3 rods level probe* (supplied uncut) and a level probe control box for the management of the level signals from the on board collecting tank (your supply).
The 3-rods level probe is supplied uncut and must be cut, according the collecting tank dimensions, in a way to have that the rod related to the 'COMMON' signal is the longer, the one related to the min. level signal is the medium rod and the rod related to Max level signal is the shorter. For a correct rods cutting procedure refer to the **INSTALLATION** section.
The level probe control box has a display with three colored LED lights, and a touch button for the alarm buzzer reset (available only for the system supplied with a 4-rods level probe, ignore it if the system is supplied with the standard configuration).
The lights are related to three different levels (min, Max, and Absolute Max) inside the on board sewage collecting tank.
The green light (the lower on the display) is for the min level, the yellow light (the medium on the display) for the max level and the red light (the upper on the display) for the absolute max level (available only for the system supplied with a 4-rods

* On request, the system can be supplied with a 4-rods level probe for alarm signaling in case of tank Absolute Max level.

level probe, ignore it if the system is supplied with the standard configuration). There is no light for the COMMON level related to the probe longer rod.
The level probe manage the 3-rods level probe as to translate the level signals coming from it into the appropriate free voltage signals for the correct plant functioning.
When the collecting tank (your supply) is empty the level of sewage is below the longer electrode (rod) and all the lights are off. As the sewage level touches the medium electrode (and of course the longer too) the green light turns ON. Finally, when the sewage level touches the shorter electrode (and of course the longer and the medium too) the yellow light turns on. In this case, both the green and yellow lights are ON and the filling pump starts to transfer the sewage to the ECOmar S treatment tank up to the bottom sensor in the tank, then stops transferring.
The monitoring of the absolute max level of the collecting tank by the level probe control box, is available only if the plant is supplied with a 4-rods level probe. In this case the rod, related to the absolute max level, must be cut in a way to be shorter than the one related to the tank max level.
When the absolute max level monitoring is available, the red begin to flash and the alarm buzzer turns on as the sewage reaches the electrode related to absolute max level. The buzzer can be turned off by pressing the related button on the level probe control box, but the red light continues to flash until the sewage level touches the absolute max electrode.
However, in any case the ECOmar S plant functioning is not affected by the absolute max level of the collecting tank.

Fig. 6.1.1 - Level Probe Control Box

7 SAFETY INSTRUCTIONS

7.1 Important Safety Information

Owners and operators of Tecnicomar ECOmar S STP are urged to read this manual thoroughly as, by understanding the functional principles of the plant, operational problems will not occur and satisfaction with your unit will be obtained. It is important to read this manual through before attempting to install, connect or run the system.
Most of accidents that happen during the ECOmar S STP use, maintenance and repair are caused by the not observance of principals, rules or safety precautions. An accident can be avoided simply by knowing the potentially dangerous situation before an accident happens. Staff must have been trained, in possess of the competence and instruments to operate in good way and take care for potential risks.
The use, maintenance or repair executed in the wrong way can be dangerous and cause injuries of the staff or even death. Do not use the system or execute operations of inspection, test, cleaning or maintenance until all the information about use, inspections, test, cleaning or maintenance have been read.
This manual contains a summary of the information needed for knowledge, installation, conduct and maintenance, in safety conditions, of the sewage treatment plant. For that reason, besides being an important bibliography containing the essential rules for a good use of the system, it is also a guide for the installer. The remaining technical documentation supplied with the ECOmar S STP (wiring schemes, layout drawings, and use and maintenance manuals of the subsystems items) represents integral part of this manual.
A detailed maintenance is one of the most important factors for a good working of the unit. To neglect this factor can be a source of danger for people and things and, obviously, for the system. The normal periodic maintenance and the daily controls must be carried out with a prefixed program according to the instructions and prescriptions contained in the technical manuals of the macerator pump, sea water pump, filling pump, dosing pumps, U.V. sterilizer and all the other main components. It is good to set up a service schedule containing the operations to carry out where to note the working time, interventions, maintenance operations and repair done. Supplementary maintenance, repairs and particular calibrations and settings must be carried out only by qualified and authorised staff.
The careful reading of this manual by the installer is important for safety ends. Nevertheless, it must be considered that many of the arguments and information contained have a specialist attribute and need a more specific knowledge in the system/electromechanical field to be understood. For that reason the user should refer to a qualified technician for the installation and maintenance of the system, following the instructions contained in the sections. Tecnicomar disposes of an Aftermarket Service and of a Technical Office capable of supply, in every moment, every kind of technical information or tips needed for good installation and good use of the system. The use and maintenance intervals refer to a normal working condition that can change with particular conditions of use. The normal working, the life, the safety use, the operative economy of the ECOmar S and all the subsystems depend on the observance of the recommendations and provisions contained in this manual. The neglect of that and a bad or improper use of the systems, besides to being reason for invalidate the warranty, can lower the safety and increase the operative costs. It is important to consider that the ECOmar S STP it is not intended to be used by not professional users. All the activities linked to the operative part and to the life cycle of the system, must be carried out by authorised and trained staff, with experience on mechanical, hydraulic and electrical systems.

7.2 Instructions and Warnings

All the warnings contained in this manual are referred to the subsystem items and to the whole ECOmar S STP. User must follows the instructions, warnings and indications contained. Authorised operators will be aware of duties and, during operative interventions, must be in perfect psychophysical conditions. Nevertheless it is to remember that this manual is necessary but not enough to complete the training of the specialists that will operate the system, Tecnicomar is excluded from any contractual or extra contractual responsibility for damage caused to people, things or pet, after the improper use of the sewage treatment plant and non-observance of the norms and instructions contained in this manual. Every kind of opening and/or modification, as well as use of non-original spare parts can compromise the system safety and cancel the warranty. System parts that are damaged in the electrical and mechanical equipment can be reused only after an adequate check-up, carried out by Tecnicomar authorised staff.

Pay attention to this symbol when reported in the manual. It means a possible dangerous situation.

Dangers can be of three levels:

WARNING

The “WARNING” sign means that if the operations described are not well done they can cause heavy lesions, death or long term risks for health.
The instructions should be followed carefully to operate the ECOmar S STP correctly.

DANGER

The sign “DANGER” is the maximum sign of danger level warning and means that if the operations described are not well done they can cause heavy lesions, death or long term risks for health.
The instructions should be followed carefully to avoid damage to the ECOmar S STP or to the operator.

CAUTION

“CAUTION” sign means that if the operations described are not well done they can cause damage to the system and/or to the operator.

"NOTE" or "INFORMATION": The notes contain important information and useful hints for the ECOmar S STP operation.

7.3 CE Declaration of Compliance

The original copy of the CE Declaration of Compliance here reported in facsimile, is delivered along with the test report of the ECOmar S plant, in the annexes of this manual.

TECNICOMAR
WATERMAKERS - SEWAGE TREATMENT PLANTS

As manufacturers of this equipment, we hereby state the following:

DECLARATION OF "CE" CONFORMITY

Sewage Treatment Plant:

Model: ECOmar S; Serial Number:

The conformity is declared according to the following EU Directives:

a) FOR THE ELECTROMAGNETIC COMPATIBILITY (EMC) Directive 2014/30/UE:

- IEC 61000-6-4/EN 50081-2: *Generic rules of emissions for industrial machines*
- IEC 61000-6-2/EN50082-2: *Generic rules of immunity for industrial machines and subsequent updates.*

b) FOR THE MACHINERY (SAFETY) DIRECTIVE: 2006/42/EC and for THE LOW VOLTAGE DIRECTIVE 2014/35/EU:

- IEC 60335-2-14:2016: *Safety of electric appliances for domestic use and similar.* [CEI 61-150(95)]; *and subsequent updates.*

DATE: --/--/----

SIGNATURE/COMPANY STAMP

TECNICOMAR SpA

TECNICOMAR S.p.A.
Head Office and Plant: 91025 MARSALA (TP), ITALY
C.da Berbaro, 145/D - S.S. 115, Km 36.4 - Phone (+39) 0923 969409 - Fax (+39) 0923 960235
Subsidiary: 55049 VIAREGGIO (LU) - Via M. Coppino, 67 - Phone / Fax (+39) 0584 395408
www.tecnicomar.it - E-mail: info@tecnicomar.it

Fig. 7.3 (Declaration of "CE" Conformity form)

7.4 Targets of the Manual

This manual represents the principal instrument for the authorised staff caring for the system in its whole. Here are listed all the professional profiles, involved into the plant management.

USER: The user is the person, body or firm that bought or rented the system and wants to use it for the appropriate ends. He has the responsibility of the system and of the training of the operating staff.

TECNICOMAR TECHNICIANS: Technical and authorised staff, available from Tecnicomar for system installation and staff training. He is capable of carry out complex operations on the system and in particular situations.

SYSTEM MANAGER: Authorised and expert operator, trained by Tecnicomar technician on the working and maintenance of the system. He must be present during every work on the system as the only manager and must overview the observance of the accident prevention measures. He only must have the keys for access the system and for the activation of the operative modes. He is, besides, responsible for the system maintenance. He is not authorised to carry out maintenance on the electrical system or on mechanical parts.

MECHANICAL MAINTENANCE OPERATOR: Qualified technician, with perfect mechanical knowledge of the system, capable of intervening on mechanical parts and drives to carry out all the maintenance and repairs needed. He is not authorised to carry out maintenance on the electrical system.

ELECTRICAL MAINTENANCE OPERATOR: Qualified technical staff, capable of working in presence of voltage in cabinet, electrical boards or connecting box. He is not authorised to carry out maintenance on mechanical parts.

DANGER: The use of operators and maintenance staff with different qualification other than what is required could seriously compromise the safety of all the staff involved and of all the people near the system.

DANGER: All the maintenance and setting operations must be carried out, where not specified, with ECOmar S STP turned off and power supply off, considering that also the remote management, if provided, must be turned off. Before executing any maintenance operation it is necessary to switch off the power supply.

If the maintenance operations are well done, the advantage will be to the user since that at restarting of the work he will find the system under the best conditions. If the operator is authorised and possess the necessary competence and capacity, he can carry out the control operations and maintenance following the instructions reported in this manual. The complex maintenance operations must be handled by qualified staff and not by the operator that is still responsible of the maintaining in good state of the system. The validity and qualification of the maintenance operations are determinant factors for the system efficiency. For that reason the maintenance must be adequate to avoid damage of the most stressed organs and to maintain a high system reliability.

7.5 Safety Instructions and Prevention

7.5.1 Generalities

The safety of the operator represents one of the principal issue for a manufacturer. When producing a system, the manufacturer tries to expect all the possible danger situation that can verify to adopt all the appropriate safety preventions. There are anyway accidents caused by improper use of the system and equipment. It is good to remember that caution is necessary to prevent accidents during the system working.

DANGER: It is forbidden to remove panels and protections of the module and of its loose parts, especially during the working. Same for electrical equipment, that can also be a danger even when placed in not operative mode for having parts on permanent voltage. Remember that to operate with partially removed boarding and protections means to be in contact with hazardous voltages, moving parts or too much hot parts that could provoking accidents even lethal. Nevertheless, in certain cases, for inspections and/or maintenance activities it can be necessary to turn on the sewage treatment plant leaving open some board or protections. These working conditions are only allowed to qualified and authorised staff, aware of the possible danger, which must adopt all the possible precautions to avoid injuries.

The electrical board and all the electrical equipment are realized according to the applicable norms. The electrical safety is assured by all the necessary equipment and precautions. This not mean that it cannot be source of danger and lethal accidents. It is recommended to not remove or open boards unless upon possession of the necessary experience and knowledge in electrical field and aware of the potential danger. The protection against electrical shock, caused by open contacts is only assured with closed boards. It is not allowed to turn on the system without verification of the closure of the electrical boards.

WARNING: The use of ECOmar S STP causes the overheating of some parts of the system. So it is good that eventual controls are done with system turned off and after cooling.

DANGER: The light of ultraviolet lamps may cause severe burning to unprotected skin and eyes. Avoid connecting the appliance to the electricity supply before fitting the UV lamp into the socket and fitting the protective covers.

7.5.2 Noise

Before to approach the plant or any of its loosed parts it is necessary to equip protection instruments to protect the hearing (headphones, plugs, etc.).

7.5.3 Protections

It is necessary to consider that even if a system possess all the precautions and protections, it will never represent a zero risk level.

DANGER: This paragraph highlights some aspects linked to the risk caused by thermal factors. The system components that may be more subjected to overheating are the U.V. sterilizer, the filling, sea water and macerating pumps. These components even if equipped with all the precautions needed to limit the dangers from contact with hot parts, will never assure the absolute harmlessness since there are parts that could reach temperature higher than 60°C.

WARNING: The trained operator when approaching the system must observe all the warning panels.

7.5.4 General Instructions for Safety Use

WARNING: Before start-up the system or any of its loose parts, it is recommended that the operator memorize the previous paragraphs and all the following informations:

- The manufacturer cannot prevent all possible dangerous situations in the conditions of use, installation and maintenance of the ECOmar S STP;
- The operations and/or procedures for use not recommended and/or indicated in the manual will always be notified to Tecnicomar for confirmation;
- If a not recommended procedure will be used, the user must check for safety of people, things and pet;
- It is necessary to consider that even if a system possess all the precautions and protections, it will never represent a zero risk level. It is forbidden to remove boards and protections of the system, especially during the working;
- Same for electrical systems, they can represent a danger also when placed in not operative mode since they have parts under permanent voltage;
- The electrical board and all the electrical systems are realized according to the applicable norms.

WARNING: For safety, it is necessary to observe the following precautions:

- Before operating the maintenance on the system or on any of its loose parts it is necessary to assure that it has been turned off and no one can, accidentally, change its configuration or turn it on;
- When turned on, the system presents moving parts, pay attention to not approach the system with flapping objects, smocks, jackets, ties, chains, bracelets, etc.;
- The system produces noise, the use of the headphones is necessary;
- It is forbidden to turn on the system before finishing the installation and carrying out the test with positive result. Even so, the system can represent source of danger and lethal accidents.

7.6 Before Turning on

7.6.1 Checks before Turning On

Before turning on the system, it is necessary to carry out the following controls:

- ✓ Verify that every mechanical parts, included all the elements and fitting , are well installed;
- ✓ Verify that instruments and materials are not left around;
- ✓ Verify that the earthing system connections are correctly done;
- ✓ Verify the efficiency of the system earthing;
- ✓ Verify that the lamps of the U.V. sterilizer are correctly fitted into their sockets with the relative protective covers.
- ✓ In case of three-phase supply, verify the phases correspondence between ECOmar S STP and electrical source;
- ✓ Verify that the hydraulic circuit ensures a perfect seal.

7.6.2 Useful Advice

- Familiarize yourself with the sewage treatment plant so that you know all the details and to promptly report any anomaly that, if neglected, could lead to heavy faults;
- Maintenance intervention and settings on the plant must be done with system turned off and with no power supply;
- Disposal of waste from maintenance operation of the system or of any of its subparts (exhausted oil, additives, etc.) and management of the life cycle, must be done according to the local norms and to the ambient respect. They must be delivered to the appropriate authorised firms or bodies for the disposal;
- Spare parts must be original ones;
- Do not carry out repair operations if not authorised and trained;
- Check the noise or vibration sources that can be cause of faults or failures;
- Immediately report leaks of oil, water or other liquid;

- Do not tamper with the components of the sewage treatment plant to obtain different performances than the ones expected from the manufacturer;
- Do not wear fluttering clothes, rings and/or chains when working near moving parts;
- Use protective gloves and glasses:
  - During the use of chemical products (hydrogen peroxide solution 35%, or similar others).
  - During refilling of the tank for the hydrogen peroxide solution (H_2O_2);
  - During refilling of the tank for the flocculants solution (ECOFLOC);
  - During the replacement of the U.V. lamps;
- Immediately replace overalls and/or clothes wet or soaked with oil or grease;
- During work on under-voltage parts be sure to have dry hands and feet. Where necessary use isolating platforms; if not able to carry out these operations let the qualified staff to intervene;
- Do not try repairing operations if not in possess of the competence;
- Keep the ECOmar S STP clean, removing oil spots and liquids;
- Put away soaked rags in flames-proof containers;
- Do not leave rags on the ECOmar S STP.

7.7 Danger Informations

Precautions and warnings for safety are in this manual and in the system, where many warning plates are present, be sure to make them readable. Every damaged plate must be replaced or cleaned with a cloth.
When replacing a component with plates, be sure that the spare part too has a plate, otherwise put a new plate before installation.
Here are listed the safety labels of the system:

Fig. 7.7-1 (Safety Labels)

Where necessary, in the maintenance procedures are reported the following warnings:

PROCEDURE TO CARRY OUT WITH SYSTEM TURNED OFF.
Turn off the sewage treatment plant, and deactivate the remote management (if provided).Push the STOP SYSTEM key on the electric box and switch off the external power supply.

Fig. 7.7-2 - (Warning tag)

Fig 7.7-3 - (Individual Protection Devices-IPD)

Note: Signs and relative writings are reported in every procedure depending on necessity. When the shutdown of the ECOmar S STP is needed before an operation, place the "Do not operate" warning sign near the command and control panel.

In general, adopt the following precautions:

- Do not wear big clothes or jewels that can get caught in moving and rotating parts;
- Wear helmet, gloves and any other protection clothes/devices needed;
- Be sure that all the protections and covers are well fixed on the moving and rotating parts;
- Remove from the ECOmar S STP any unrelated material;
- Remove rubbles, oil, instruments and other objects from platform, passages and steps;
- Do not keep maintenance liquids in glass containers;
- Discharge all liquids in an appropriate container;
- Ensure that no liquids come out when carry out an operation. Be prepared to gather the fluid in appropriate containers when opening a compartment or disassembling components containing fluid. Under pressure liquid can cause splashes and liquid projections causing heavy lesions;
- Always use a piece of cardboard or a panel to check for leak from a hole. A leak from an hole, even if little, can cause heavy lesions;
- Dispose the exhausted materials observing the ambient norms in force.

7.8 Fire and Explosion Prevention

Most of the lubricants, disinfectant liquids and other chemicals solutions are inflammable. Spreading of these inflammable substances can cause fires. Put away lubricants in appropriate marked containers away from not authorised people. Put away soaked rags and inflammable materials in protective containers. Don't smoke in areas used to keep inflammable materials. Do not expose the ECOmar S STP, especially the dosing systems, to any kind of flames. Wiring must be in perfect condition, all the electrical wires must be well placed and fixed. Remove all the disconnected and not necessary cables. Arc discharge or sparks could cause a fire, electrical connections submitted to an appropriate maintenance will help to avoid arc discharge and sparks formation. Check that the pipes and hoses are not worn and that they have adequate support and secure clamps. Keep any free flame or sparks away from the ECOmar S STP, especially the dosing system and the U.V. sterilizer. Make sure that there is always a fire extinguisher nearby, understand the operation of the fire extinguisher, carry out the regular maintenance and follow the instructions on the label. Do not bend or hit high pressure piping. Do not install damaged piping and verify the state of piping, do not check for leaks bare hands, use a cardboard or a brush.

If one of these condition is present, replace the component:

- Damaged fittings or with leakages;
- Damaged or cut external covers;
- Cables with no protection;
- Swelling of the external protection;
- Parts of flexible tubes crushed;
- Fittings moved.

Be sure that all the clamps, protections and heat shields are well installed.

7.9 Cuttings Prevention

Adequately support components when working under them. Stay away from moving and rotating parts, let the protections installed until ready to perform the maintenance and reinstall them at the end.

7.10 Fluid Recommendations

7.10.1 Hydrogen Peroxide (H_2O_2) solution

The hydrogen peroxide solution is essential for the correct functioning of the sewage treatment process inside the treatment tank. An absence or poor quantity of H_2O_2 can cause a plant malfunctioning, affecting the efficiency of the sewage treatment process with consequent outboard discharge of treated water that doesn't meet international standards (IMO-MARPOL regulation). Check every day the hydrogen peroxide solution inside the tank and refill it if necessary as prescribed in the **Maintenance Instructions** section.
For details of safe use of the Hydrogen Peroxide (H_2O_2) solution, refer to its Safety Data Sheet.

7.10.2 ECOFLOC solution

The flocculants solution is essential for the correct functioning of the sewage treatment process inside the treatment tank. An absence or poor quantity of ECOFLOC can cause a plant malfunctioning, affecting the efficiency of the sewage treatment process with consequent outboard discharge of treated water that doesn't meet international standards (IMO-MARPOL regulation). Check every day the ECOFLOC flocculants solution inside the tank and refill it if necessary as prescribed in the **Maintenance Instructions** section.
For details of safe use of the ECOFLOC solution, refer to its Safety Data Sheet.

8 INSTALLATION

NOTE: This section concern only the standard supply configuration of the ECOmar S STP for the optional items installation, refer to the specific item manual.

8.1 Components to be supplied by Owner*

Some plumbing and electric components are to be supplied by owner. These components are listed below:

a) On board sewage collecting tank; complete with all the necessary external interfaces (such as Air Vent, Tank Overflow Outlet, etc.), arrangement for the supplied level sensor installation and all the filling pump suction line, complete with the relative fittings and all the necessary accessories (refer to the **Filling Section** section);

b) 3-Way valve for untreated sewage outboard discharge, according to IMO/MARPOL regulation (refer to the **SPECIAL PROCEDURES** section), with all the filling pump delivery line, with the relative fittings and all the necessary accessories;

c) Seacock, with all the clean sea water line, complete with the relative fittings and all the necessary accessories (it is suggested to use for the salty water lines the proper material, corrosion resistant such as naval bronze, PVC, Stainless Steel, etc.);

d) Air Relief for the Treatment Tank of the Main Unit; with all the vent line, complete with the relative fittings and all the necessary accessories (refer to the **Installing the air relief** section);

e) Outboard discharge to the sea line, complete with the relative fittings and all the necessary accessories;

f) On board sludge tank; with all the sludge discharge line, complete with the relative fittings and all the necessary accessories;

g) Connection piping between the discharge outlet of the Main Unit and the inlet of the Sludge Discharge Valve (V2), complete with the relative fittings and all the necessary accessories;

h) Connection piping between the outlet of the Multimedia Filter Station and the inlet of the U.V. Sterilization System, complete with the relative fittings and all the necessary accessories;

i) Connection piping between the clarified water outlet of the Sludge Discharge Valve (V2) and the inlet of the Multimedia Filter Station, complete with the relative fittings and all the necessary accessories;

j) Backwash Discharge outlet of the Multimedia Filter Station, complete with the relative fittings and all the necessary accessories (refer to the **Installing the Multimedia Filter Station** section);

k) Fresh not-chlorinated water supply for the Backwash inlet of the Multimedia Filter Station, complete with the relative piping, fittings and all the necessary accessories (refer to the **Installing the Multimedia Filter Station** section);

l) Power cable with the proper power protection based on the system power consumption. Power supply line must be protected by an automatic all-pole thermal and differential protection/disconnection device;

m) Floating level probe for Sludge Tank Absolute Maximum Level to be connected to main control box;

n) All the electrical cables needed for the connections of the supplied loose parts (each part supplied standard with 3m cable).

8.2 Qualification of the Installation Crew

Technicians must have technical knowledge and ability in the following fields:

• Electrical, electronic, electric motors and circuits.

• Electromechanical and mechanical systems.

• Hydraulic and liquid pressure and flow systems.

• Piping and plumbing systems.

• Water suction and pressure lines.

• Thru-hull fitting below and above water level.

8.3 Fixing the skid

The Main Unit skid should be plain fixed on the 4 vibration damping supplied and then to the floor by 8 screws (M8), split/grower washer and washer. While the Level Probe Control Box and Ant-syphon Valve set are arranged for wall mounting using the appropriate bolts; all the other loose parts are installed each one on a base-frame to be fixed on horizontal stable plain

* Some items such as inox clamps and some hoses are supplied with the installation kit.

(refer to attached G.A. drawings). Remember to leave enough room between the bulkheads and the installed skid and base-frames for the wiring, the pipeline and the future maintenance (a margin of at least 10 cm is suggested). For the correct maintenance space of the plant refer to the specific attached G.A. drawing.

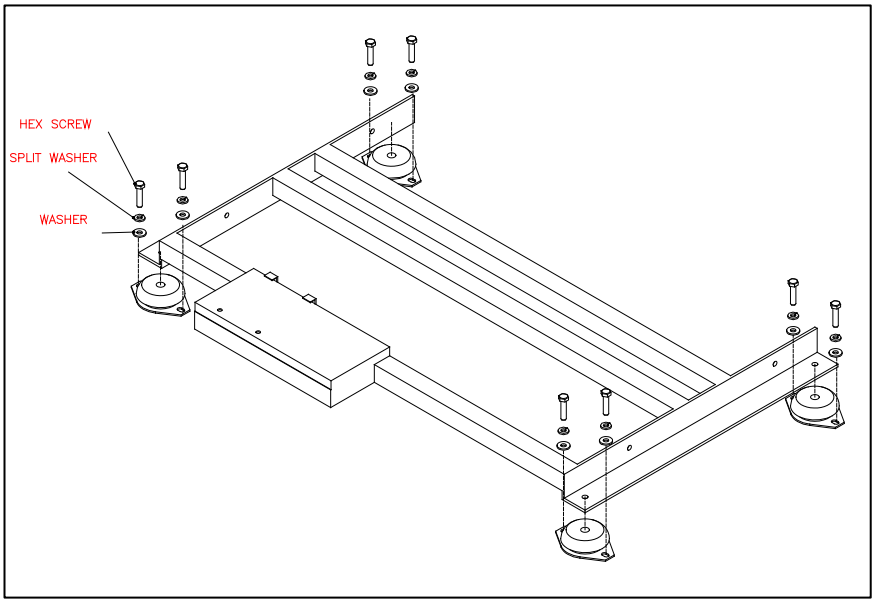


Fig. 8.3 - Scheme for skid fixing indications

8.4 Installation of the level sensor for Sludge Tank

For the correct operation of the plant, it is necessary to install a level probe (your supply) on the sludge tank, to stop the plant in case of max level avoiding any sludge tank overflow. Install the level probe (your supply) as to detect the sludge max reachable level inside the sludge tank. The main control box of the ECOmar S STP has to interface with a max level signal (N.C.) from this level probe. More in detail, the probe must give a closed free voltage contact when the level is not reached; and an open free voltage contact when the level is reached (refer to attached Electrical Connections Diagrams).

8.5 Main unit plumbing connections

Once the Main Unit skid of the ECOmar S STP is well fixed on board, you have to make the piping between the Main Unit and all the items that has to be connected to it, using appropriate pipes and fittings (for the interconnection piping size refer to the attached Flow and P&ID diagrams).

8.5.1 Installing the H_2O_2 dosing line

The outlet of the $H2O_2$ dosing system must be connected to dosing inlet of the Treatment Tank, using the supplied injector, pipe and fittings. First of all you have to install the supplied Tee fitting on the dosing inlet of the Treatment Tank. Then install the supplied injector on one of the two free interfaces of the Tee fitting. Finally connect the injector to the H_2O_2 dosing pump outlet using the supplied pipe. After the installation one interface of the Tee fitting must remain free for the connection of the injector of the ECOFLOC dosing system.

8.5.2 Installing the ECOFLOC dosing line

The outlet of the ECOFLOC dosing system must be connected to dosing inlet of the Treatment Tank, using the supplied injector, pipe and fittings. First of all you have to install the supplied Tee fitting on the dosing inlet of the Treatment Tank. Then install the supplied injector on one of the two free interfaces of the Tee fitting. Finally connect the injector to the ECOFLOC dosing pump outlet using the supplied pipe. After the installation one interface of the Tee fitting must remain free for the connection of the injector of the H_2O_2 dosing system.

8.5.3 Installing the filling line

The Main Unit filling inlet must be connected to the Filling Pump outlet (refer to the **Installing filling pump** section) using the proper pipes and fittings. The filling line must be as straight and short as possible and free from any obstructions.

8.5.4 Installing the seawater line

The Main Unit seawater inlet must be connected to the Seawater Pump outlet (refer to the **Installing seawater pump** section) using the proper pipes and fittings. The seawater line must be as straight and short as possible and free from any obstructions.

8.5.5 Installing the air relief

Air intake assure the air exchange from outside to internal tank, during normal operations. When sewage is being treated, air flows from internal tank to outside in order to avoid internal overpressure; for these reasons the air intake must be left free of any device that could obstruct the piping such as filters or other devices. In case a general failure occurs and the pumps do not stop, and the motorized three way valve does not open to the outboard discharge, the liquid inside the tank will be evacuated by means of the air intake until the pumps are manually stopped by the operator. Install the piping from air intake to outside as straight as possible avoiding any curves or restrictions along the line.

DO NOT USE ANY FILTERS ALONG ALL THE AIR RELIEF LINE

8.5.6 Installing the Main Unit and Sludge Discharge Valve (V2) interconnection line

The clarified water discharge from the Main Unit takes place through the motorized discharge valve (V1) free outlet; and has to be connected to the inlet of the Sludge Discharge Valve (V2). This discharge outlet is provided with a hose barb for the model with the PP tank. While the models with stainless steel tank are equipped with female threaded discharge outlet. This interconnection line must be as straight and short as possible and free from any obstructions.

8.6 Loose parts installation

Once the base-frame are been well fixed on board, using the appropriate bolts (refer to attached G.A. drawings), you have to install and make the piping connections of each of the supplied loose parts, as described in the following sections.

8.6.1 Installing Filling section

The filling section mainly consists of the management system of the level inside the collecting tank is essentially, composed by the supplied Level Probe and by the relative Level Probe Control Box; and the filling pump.

8.6.1.1 Installing the Level Probe on the collecting tank

The conductive 3-rods Level Probe (standard supply) matched with the Level Probe Control Box level probe represents an efficient solution for monitoring the level of liquids with a minimum conductivity value of 1mS, and an easy installation and maintenance from the top of the tank. The installation of the level sensor on the top of the collecting tank should be done by qualified technicians. The standard supplied Level Probe consists of 3 coated electrodes (if it is require TECNICOMAR S.P.A. con supply a 4-rods Level Probe for the alarm signaling in case of reaching the collecting tank Absolute Maximum Level).

The conductive level probe is supplied with all the rods uncut. Before install the probe on the collecting tank, it is necessary to cut the rods according the following sizing procedure.

For a proper system operation it is necessary to size the length of each of the 3 rods of the Level Probe, according to the dimensions of the holding tank. The lengths of the rods must be adapted to the tank and the installer must cut them, following strictly the steps below (see also the figure below):

- Measure the total height of the collecting tank;
- Measure the distance between the collecting tank bottom and the suction hole, where to connect the filling pump.
- Place the Level Probe on a stable horizontal plain;
- Before cutting the rods (electrodes) identify the numbering of each electrode. It must be as follow:
    - (1) for the Common, that must be the longest,
    - (2) for the min level,
    - (3) for the Max level that must be the shortest;
- Cut the electrode (1) for Common as to have that its final length is 3-4 cm less than the total height of the tank and however that, when installed, it is always below the suction hole;
- Cut the electrode (2) for min level as to have that, when installed, it is always 2-5cm above the suction hole;
- Cut the electrode (3) for max level as to have that its length is 60% of the collecting tank total height (for example with tank total height of 120cm the rod 3 for max level must be: 0.6*120 = 72cm).

In this way, the system will work correctly and its performances will be optimized (few continuous cycles).

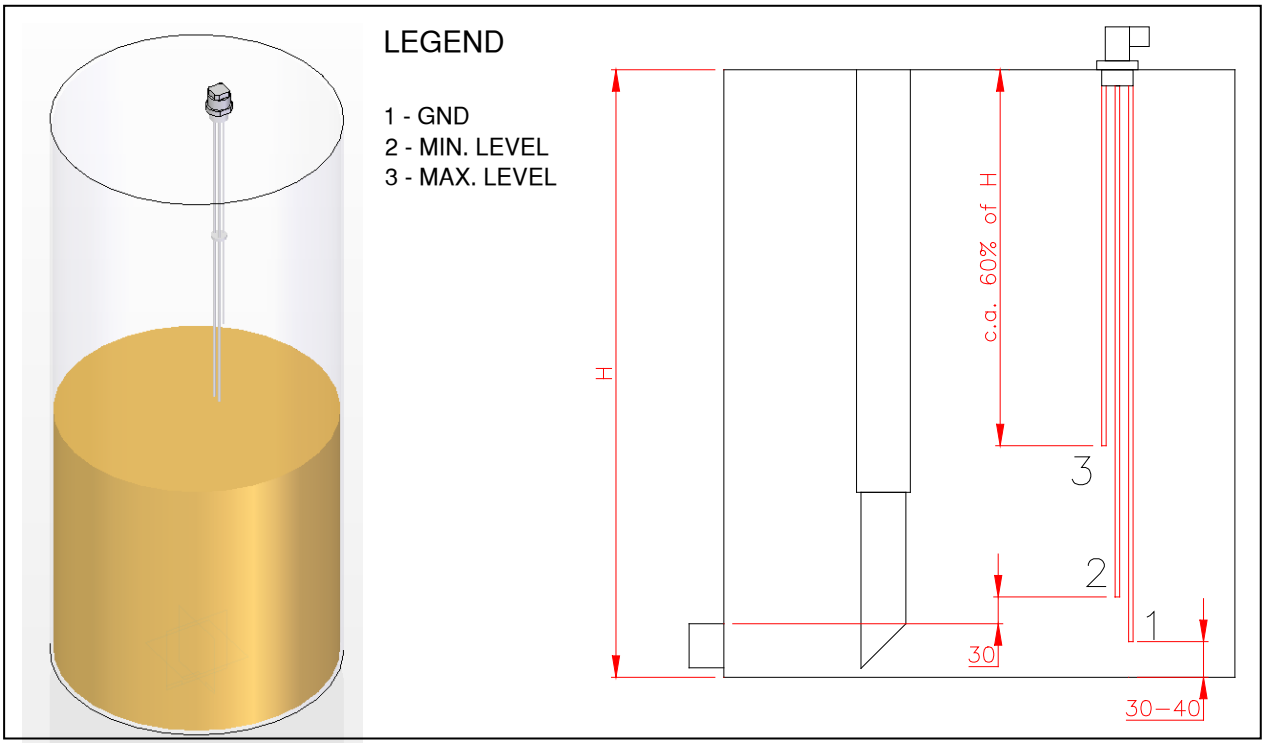


Fig. 8.6.1.1-1 - Collecting tank and 3-rods level sensor

Hints for rods cutting:

- While cutting one rod, take care not to damage the isolation of the others.
- Take-off 1cm of isolation tape from the end of each rod only after they have been cut to the correct size.
- The size of the rods has to be taken including the thread of the plastic connector cap they are fixed in.
- The rods are connected together passing through a blocking plate with three holes. This plate needs to be repositioned and re-fixed according to the new size with PVC-sheath on each rod.

For the system supplied with 4-rods Level Probe, follow the same sizing procedure, as per the 3-rods Level Probe; and cut the Absolute Max (alarm) rod in a way that its length is 1/3 of the tank total height (refer to figure below).

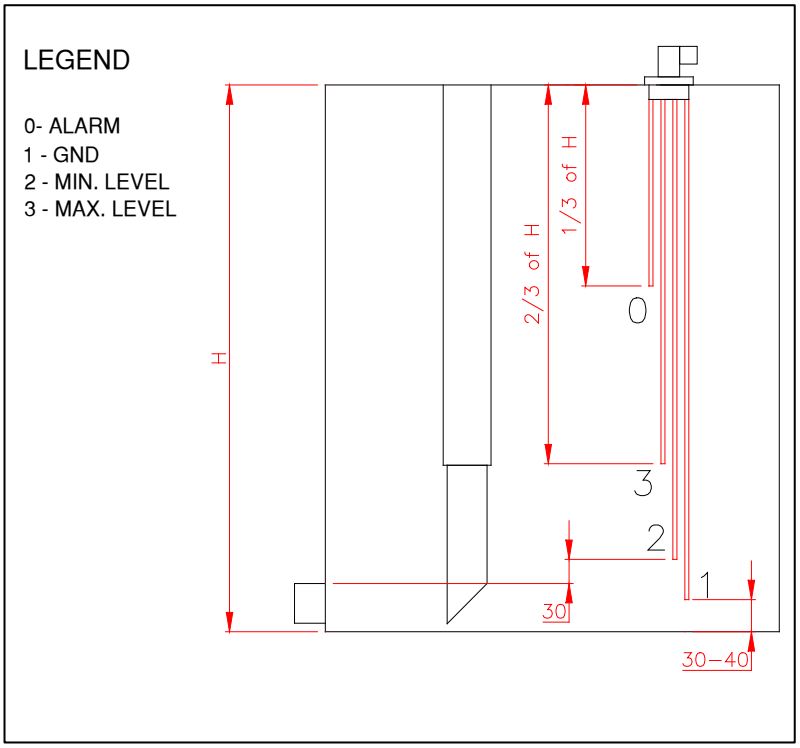


Fig. 8.6.1.1-2 - Collecting tank and 4-rods level sensor

As alternative to the rods Level Probe, it is possible to install no. 2 (even 3 when is required alarm for Absolute Maximum level) lateral mounting level probes. In this case the collecting tank must be prepared with 2 (or 3 in case of absolute maximum alarm) ½" female threaded sleeves, each one installed at the correct tank height as described in the following.
The minimum level sensor must be installed 2-5cm above the suction hole, with floating element facing up. The maximum level sensor must be installed at 60% of the tank total height, with floating element facing down. The absolute maximum level sensor (when supplied) must be installed at 1/3 of the tank total height (refer to the figure below).

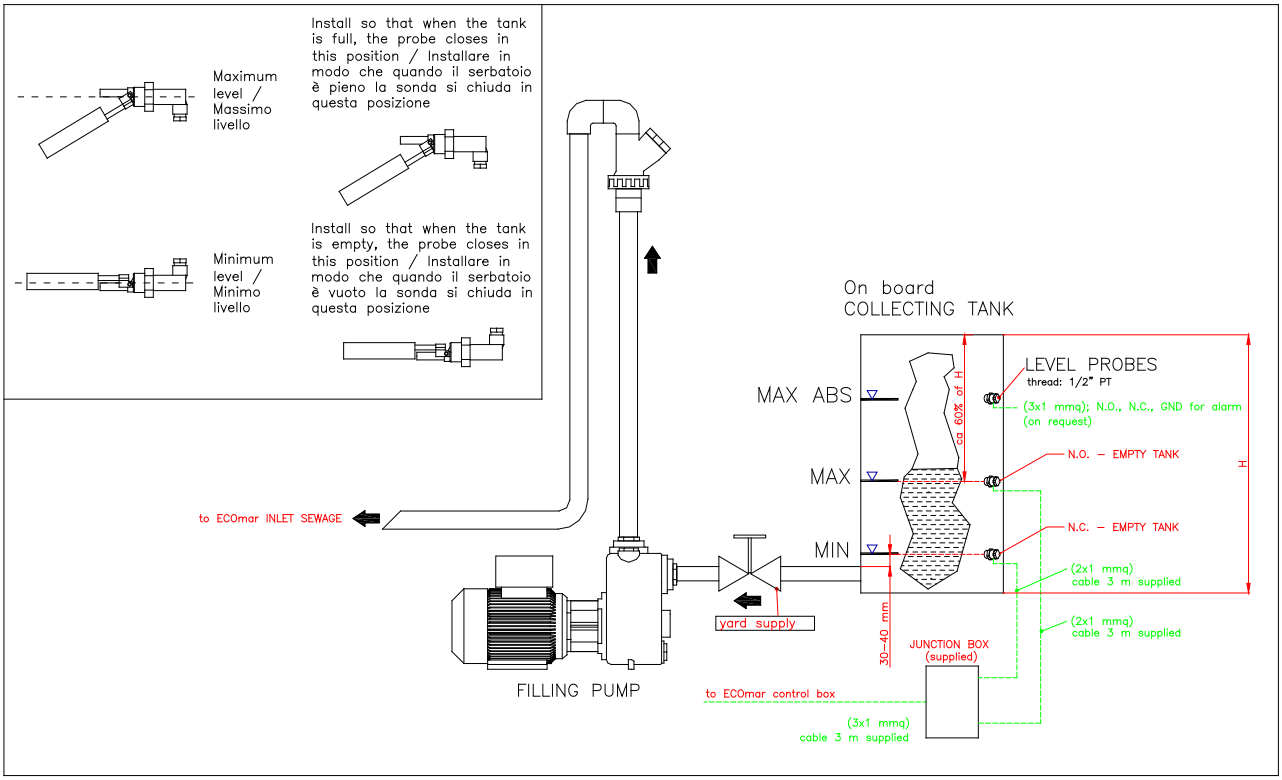


Fig. 8.6.1.1-3 - Collecting tank and lateral mounting level probes

8.6.1.2 Installing filling pump

The Filling Pump, to move the sewage from the collecting tank, should be fixed on a stable horizontal plane, below the minimum level of collecting tank, using the proper bolts (refer to attached G.A. Drawings).

⚠ The plant filling pumps are not-designed to treat sewage containing paper, diapers or other similar.

On the collecting tank side (pump suction side) it is necessary to fit a manual ball-valve (not supplied), using proper pipes and fittings (refer to attached G.A. drawings for the interfaces identification; and to Flow and P&ID Diagrams for the piping sizing). The supplied anti-siphon valve set has to be fitted on the delivery side 2-3 cm above the maximum level of the collecting tank (refer to the figure below). Moreover, a 3-Way valve for untreated sewage outboard discharge, according to IMO/MARPOL regulation (refer to the **SPECIAL PROCEDURES** section), with all the filling pump delivery line, with the relative fittings and all the necessary accessories should be installed along the filling line.

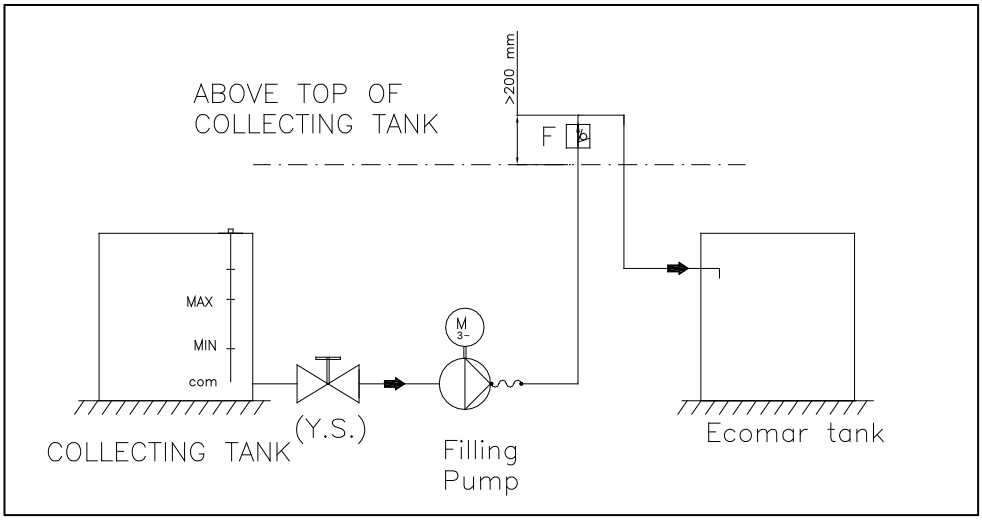


Fig. 8.6.1.2-1 - Connection scheme for filling anti-siphon valve set

The pump should be bolted to a firm, flat base in a dry, well ventilated area. If mounted outside, it is recommended that the motor be protected from the elements with a well ventilated weather proof cover. If mounted near walls, it is recommended a distance of at least 100mm between the suction grid of the cooling fan of the motor and the wall. The pump should be accessible for inspection and repair.

At first start up you can check it manually following the manual procedure (refer to the **Manual mode** *section*).

BEFORE OPERATING ON THE PUMP, MAKE SURE THAT PUMP IS POWERED OFF AND THAT IT CANNOT BE ACCIDENTALLY POWERED ON.

Fill the pump casing with liquid, connect the inlet and the outlet of the pump to the respective piping. The pump must rotate anti-clockwise. Check that the direction of rotation is as shown by the arrow on the pump casing, otherwise disconnect electrical power and reverse the connections of two phases.

ATTENTION: Never run the pump dry. Start the pump only after filling completely with liquid. FILL THE PUMP WITH LIQUID BEFORE STARTING. NEVER LET THE PUMP RUN DRY.

We recommend to adopt the following precautions during the installation and the operation of the pump:

- ✓ For some installation configurations, the stop of the pump may cause the complete emptying of the pump case. In this case, it is necessary to install a not return valve on the suction piping.
- ✓ Make sure that the pump never run dry.
- ✓ When a foot valve filter is installed on the pump suction side, check periodically its efficiency and cleanness.
- ✓ Check that the rotor never blocks, this may cause serious damage to the motor. If this happens clean well the pump case and the rotor. If it is necessary replace the rotor.

WARNING: The installation and maintenance operations must be performed by qualified personnel, using suitable means and the appropriate individual protections such us gloves.

8.6.1.2.1 Installation of the suction pipe of the filling pump

When the ECOmar S treatment plant has to treat water with high concentration of sewage, it is recommended to install the suction pipe of the filling pump in the collecting tank at a distance of 20-30 cm from the tank bottom, in order to perverse instruments and mechanical parts of the plant from any damages. Moreover, in the case of sewage with high concentration the sediment should not reach the suction pipe and therefore the tank should be periodically monitored by the board crew to prevent this to happen.

8.6.2 Installing sea water pump

The sea water pump should be fixed on a stable horizontal plain, below the sea water line so that to avoid priming failures, using the proper bolts (refer to attached G.A. Drawings). Remember that this pump is not self-priming and that at first start up it is necessary to check the priming. In case of problem we suggest to run the pump manually following the manual procedure described in the **Manual mode** section. This pump must be installed whit the rear axis horizontal and feet downwards. For safety reasons avoid the position with the motor under the pump. Place the pump as close as possible to the suction source (on board seacock), and make sure that the surrounding is adequately ventilated.
The adduction pipeline has to be preceded by a safety valve (not supplied). Remember also that the anti-siphon valve has to be fitted above the water line, on the delivery side.
Provide a diameter assuring e liquid flow not greater than 1.5 m/s for suction and 3 m/s for delivery. The pipe diameters must never be smaller than the pump connections. Secure all the pipes to rests and connect them so that they are not under stress and do not transmit vibration or flexing strain to the pump.
We recommend to adopt the following precautions during the installation of the pump suction piping:

- ✓ The suction pipe must be perfectly airtight and be led upwards in order to avoid air pockets.
- ✓ For pump working in suction lift operation condition, fit a foot valve with strainer which must always remain immersed.
- ✓ For pump working in suction from a storage tank condition, fit a check valve.
- ✓ For pump working with a positive suction head, fit a gate valve.
- ✓ When the pump is located above the water level (suction lift operation), fill the suction pipe and the pump through the priming hole, on the pump front side.
- ✓ When the liquid level on the suction side is above the pump (inflow positive suction head), fill the pump by opening the suction gate valve slowly and completely, keeping the delivery gate valve open to release the air.

ATTENTION: never run the pump dry- not even for a short trial run. Start the pump after filling completely with liquid.

We recommend to adopt the following precautions during the installation of the pump delivery piping:

- ✓ Fit a gate valve into the delivery pipe to adjust delivery, head, and absorbed power.
- ✓ Install a pressure gauge to check the pump operation.
- ✓ With a geodetic head outlet over 15 meter fit a check valve between the pump and the gate valve in order to protect the pump from water hammering.

✓ When the liquid level on the suction side is above the pump (inflow positive suction head), install the sea water anti siphon valve set, on the delivery line 20-30 cm above the water line (refer to figure below).

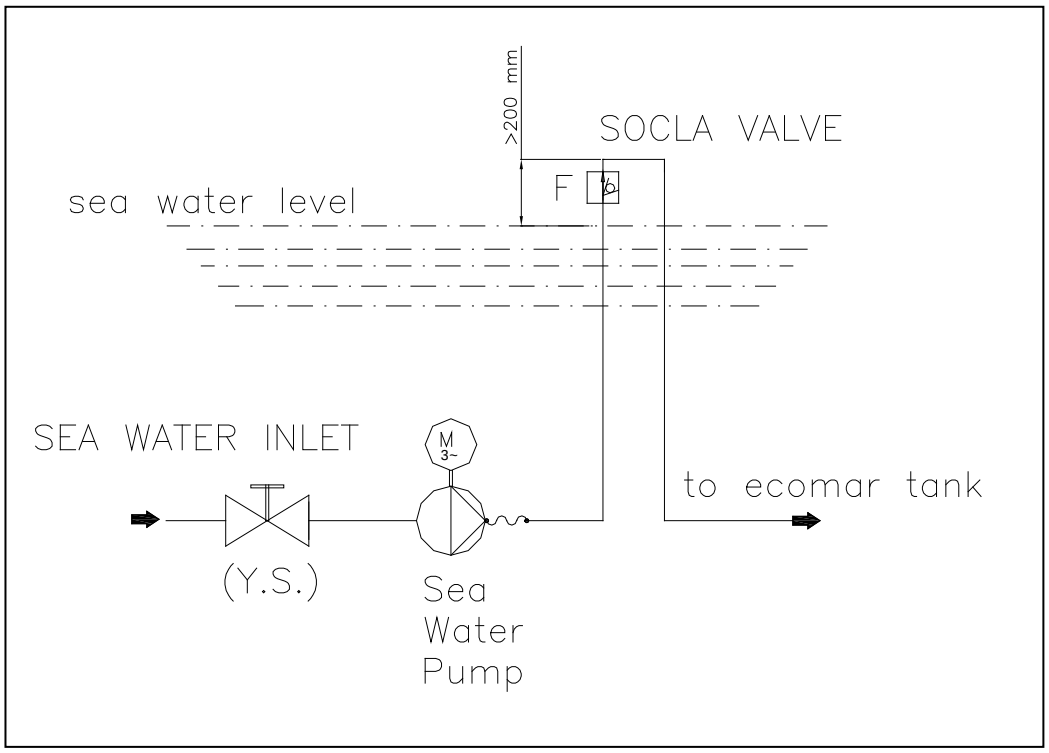


Fig. 8.6.2 - Connection scheme for Sea Water anti-siphon valve set

When the pump is supplied with a three-phase motor, check that the direction of rotation is as shown by the arrow on the pump casing, otherwise disconnect electrical power and reverse the connections of two phases.

Check that the pump works within its field of performance, and that the absorbed current shown on the name-plate is not exceeded.

8.6.3 Installing H_2O_2 dosing system

The base frame of the H_2O_2 Dosing System must be fixed on a stable horizontal plane, using the proper bolts (refer to attached G.A. Drawings). After this, check that the liquid inside the tank is enough to ensure the correct operation of the system. This disinfecting agent must be efficient and well stored (refer to attached H_2O_2 Safety Data Sheet). Verify that the injector is correctly installed on the treatment tank and connected to the dosing pump. If all the electric and hydraulic connections are made (refer to attached Flow and P&ID Diagrams and to attached Electric Connections Diagrams), it is possible to start the dosing pump. Be sure that pump fill the pipe. If the pipe is long and completely empty this should require some minutes.

8.6.3.1 Transfer of H_2O_2 solution

Before running the dosing system, it necessary to fill the dosing system tank with the H_2O_2 solution.

Proceed with caution using gloves and protecting glasses in order to avoid direct contact with the corrosive chemical (refer to H_2O_2 Safety Data Sheet).

To fill the tank, perform the following procedure:

- Prepare the supplied hand operated diaphragm pump.
- Unscrew the caps both of the system's disinfecting liquid tank and of the can with fresh disinfecting liquid.
- Close the drain cock of the diaphragm pump.
- Submerge the other end of the pump in the can containing disinfectant liquid to be transferred.
- Pump until the circuit of the diaphragm pump will be filled with disinfectant liquid (refer to the figures below).
- Place the cock on the filling hole of the system's disinfecting liquid tank and open the cock. It is recommended to transfer about half of the disinfecting liquid contained in the can.
- Once the transfer is completed, close the cock, lift it vertically and open it again to empty the drainage pump (see figure below).

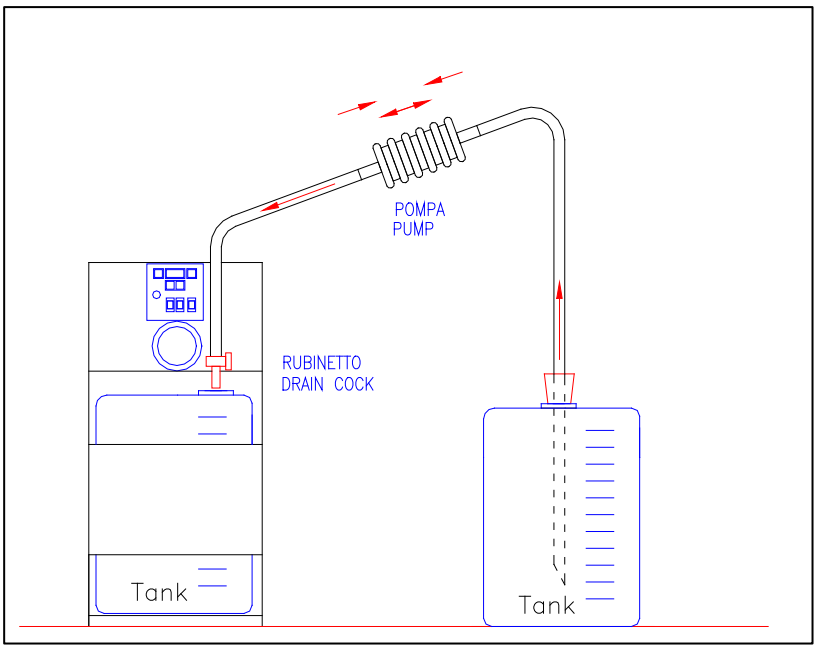


Fig. 8.6.3.1-1 - Filling the dosing system tank

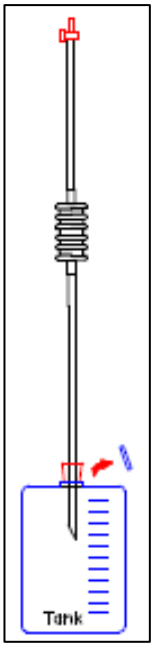


Fig. 8.6.3.1-2 - Empting the diaphragm pump

8.6.4 Additional Unit

The Additional Unit is standard supplied with all its sub-parts as loose, but on request it can be supplied in a common skid (with all its components already connected each other) or in any other customizable configurations.

8.6.4.1 Installing ECOFLOC dosing system

The base frame of the ECOFLOC Dosing System must be fixed on a stable horizontal plane, using the proper bolts (refer to attached G.A. Drawings). After this, check that the liquid inside the tank is enough to ensure the correct operation of the system. Verify that the injector is correctly installed on the treatment tank and connected to the dosing pump. If all the electric and hydraulic connections are made (refer to attached Flow and P&ID Diagrams and to attached Electric Connections Diagrams), it is possible to start the dosing pump. Be sure that pump fill the pipe. If the pipe is long and completely empty this should require some minutes.

8.6.4.1.1 Transfer of ECOFLOC solution

Before running the dosing system, it necessary to fill the dosing system tank with an ECOFLOC solution at 20%.

Proceed with caution using gloves and protecting glasses in order to avoid direct contact with the corrosive chemical (refer to ECOFLOC Safety Data Sheet).

To fill the tank, perform the following procedure:

- Prepare the hand operated diaphragm pump.
- Prepare a can with a solution of fresh water and ECOFLOC at 20% (for example, you have to add 2 litres of ECOFOLC every 8 litres of fresh water you use to prepare the solution).
- Unscrew the caps both of the system's disinfecting liquid tank and of the can with a solution of ECOFLOC at 20%.
- Close the drain cock of the diaphragm pump.
- Submerge the other end of the pump in the can containing disinfectant liquid to be transferred.
- Pump until the circuit of the diaphragm pump will be filled with disinfectant liquid (refer to the figures below).
- Place the cock on the filling hole of the system's disinfecting liquid tank and open the cock. It is recommended to transfer about half of the disinfecting liquid contained in the can.
- Once the transfer is completed, close the cock, lift it vertically and open it again to empty the drainage pump (see figure below).

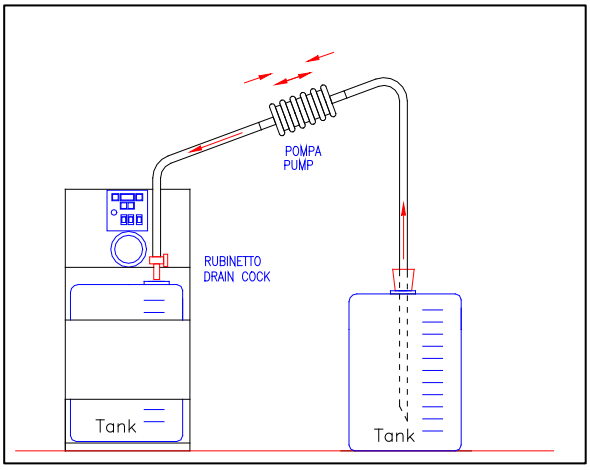


Fig. 8.6.4.1-1 - Filling the dosing system tank

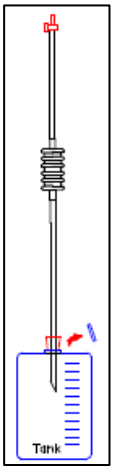


Fig. 8.6.4.1-2 - Empting the diaphragm pump

8.6.4.2 Installing the Sludge Discharge Valve (V2)

The Sludge Discharge Valve (V2) must be fixed on a stable wall, using the proper bolts (refer to attached G.A. drawings), as near as possible to the ECOmar S Main Unit. Once fixed it has to be connected to the discharge of the Main Unit; to the sludge tank (your supply) interposing a 3-way manual valve (your supply) for maintenance operation (refer to **SPECIAL PROCEDURE** section); and to the inlet of the Multimedia inlet, using appropriate pipes and fittings (refer to attached G.A. drawings for the identification of each valve interface; and to Flow and P&ID Diagrams for the piping sizing).

8.6.4.3 Installing the Multimedia Filter Station

The base frame of the Multimedia Filter Station must be fixed on a stable horizontal plane, using the proper bolts (refer to attached G.A. Drawings). Once fastened the Multimedia Filter Station, you have to remove the manual multiport valve installed on each of the tank that make up the system. Then pour on all the tanks of the first stage of the Multimedia Filter Station the proper quantity of coarse quartzite and of Zeolite (for the correct quantity of fine Quartzite and Zeolite refer to the attached Test Report). At this point, you have to pour (refer to the **MAINENACE INSTRUCTIONS** section)on all the tanks of the first stage of the Multimedia Filter Station the proper quantity of coarse and fine Quartzite (for the correct quantity of coarse and fine Quartzite refer to the attached TEST REPORT). After each tank is correctly filled, re-install the head valve, with all the connected piping, on each tank. Finally the Multimedia Filter Station has to be connected to the clarified water outlet of the Sludge Discharge Valve (V2); to the inlet of the U.V. Sterilization System; to a not-chlorinated fresh water supply (it is advisable to interpose a two-way isolation valve); and to the untreated sewage outboard discharge, according to IMO/MARPOL regulation (refer to the **SPECIAL PROCEDURES** section), or to the on board collecting tank, for the re-sending back of the backwash waste water; using proper pipes and fittings (refer to attached G.A. drawings for the interfaces identification; and to Flow and P&ID Diagrams for the piping sizing).

8.6.4.4 Installing the U.V. Sterilizer

Before fixing the base-frame of the U.V. Sterilizer on a stable horizontal plain, using the proper bolts (refer to attached G.A. Drawings); check that there is enough space above it to allow easy extraction of the bulb and the quartz, and that there is enough space to perform maintenance. The sterilizer must be positioned in an area protected against accidental splashes or dripping condensation. Do not position the sterilizer in particularly damp and dusty environments.
Once the U.V. Sterilization System is well fixed, you have to connect it to the Multimedia Filter Station and to the discharge line, using proper pipes and fittings (refer to attached G.A. drawings for the interfaces identification; and to Flow and P&ID Diagrams for the piping sizing). It is recommended to install two cut-off valves, one at the inlet and the other at the outlet of the system. We suggest also to install to install an anti-vibration joint at the inlet/outlet of the U.V. Sterilizing System, since any vibrations on the pipes could cause breakage of the quartz tube and/or jeopardize the seal of the pressure nozzle. Flow rates which cause pressure surges must be avoided at all cost.

⚠ **WARNING:** Under no circumstances must the sterilizer be subject to mechanical stress from the pipes.

After completing the hydraulic connection, insert all the supplied quartz tubes into the U.V. sterilization chamber.

DANGER: Quartz tubes are fragile and may cause serious injury when broken. Consequently they must be handled with care, protecting the hands by wearing gloves that guarantee adequate protection.

Pay attention when inserting the tube to avoid accidental breakage. Lubricate the o-ring with Vaseline and position it outside the. Insert the pressure nozzle and turn it clockwise without forcing it.

Caution: sometimes the o-ring tends to stick to the outer surface of the tube.

Insert each supplied germicide U.V. lamp inside the corresponding protective quartz tube. Fit each quadripolar connector from the electrical control panel of the U.V. Sterilizing System to the head of each U.V. lamp.

DANGER: U.V. lamps are fragile and can cause serious injury when broken. Consequently they must be handled with care, protecting the hands by wearing gloves that guarantee adequate protection. They also contain considerable amounts of mercury and must be disposed of in observance of the laws in force.

WARNING: Avoid touching the quartz of the lamp with your fingers so that greasy finger marks are not left on it. If this occurs, clean it using a soft cloth and alcohol.

Tighten each PVC collar onto the corresponding pressure nozzle. Tighten each cable gland onto the corresponding collar, ensuring that you do not twist the cable.
Finally open each sump of the supplied safe filter and check that the bag cartridge is installed and in good conditions, if not install a new bag cartridge on each sump of the supplied safe filter.

8.7 Outboard discharge line

The treated clarified water discharge takes place through the U.V. Sterilization System outlet. The discharge outlet is provided with threaded discharge outlet. The overboard discharge must be installed below the waterline, and it is necessary to install the discharge anti-siphon valve set, placed 20-30 cm above the waterline, between the discharge line. It is also possible to directly install the overboard discharge 20-30 cm above the waterline, but it is not recommended.

8.8 Electrical connections

8.8.1 Main Control Box

The external main power supply (your supply) has to be brought into the Main Control box and connected (refer to attached Electrical Connections diagrams) to the "power supply" terminal inside it, by a cable equivalent to those described in the table below. Moreover, when the plant is supplied with the standard (*1 Tank Control*) configuration for the 3 phases power supply, an auxiliary power supply 230 V AC (your supply) has to be brought into the Main Control box and connected (refer to attached Electrical Connections diagrams) to the proper terminals inside by a cable equivalent to those described in the table below.

We recommend to assign the power connections to skilled personnel and that the power supply line be disconnected during the work.

A safety cut-out switch in the main panel is recommended just for the electrical consumption of the unit.

Main Control Box has also to be connected to all loose supplied parts using the proper cables as described in the table below.

	ELECTRICAL CONNECTION TO THE MAIN CONTROL BOX	CABLE TYPE	
		ECOmar 20-32 S	*ECOmar 45-145 S*
230 V single-phase	**MAIN POWER SUPPLY (ns)**	FROR 3G2.5mm^2	FROR 3G4mm^2
	SEA WATER PUMP (s)	FROR 3G1.5mm^2	FROR 3G1.5mm^2
	FILLING PUMP (s)	FROR 3G1.5mm^2	FROR 3G1.5mm^2
	H2O2 DOSING SYSTEM (s)	FROR 3G1mm^2	FROR 3G1mm^2
	ECOFLOC DOSING SYSTEM (s)	FROR 3G1mm^2	FROR 3G1mm^2
	SLUDGE DISCHARGE VALE (V2) (s)	FROR 3x1mm^2	FROR 3x1mm^2
	U.V. STERILIZER (s)	FROR 3G1mm^2	FROR 3G1mm^2
	LEVEL PROBE CONTROL BOX (s)	FROR 3x1mm^2	FROR 3x1mm^2
	REMOTE CONTROL (supplied 15m)	4x0.5mm^2	4x0.5mm^2
	MAX. LEVEL OF SLUDGE TANK–NC (ns)	FROR 2x1mm^2	FROR 2x1mm^2
230/400V three-phase	**MAIN POWER SUPPLY (ns)**	FROR 4G2.5mm^2	FROR 4G4mm^2
	AUX. POWER SUPLLY 230 V AC (ns)	FROR 3G1.5mm^2	FROR 3G1.5mm^2
	SEA WATER PUMP (s)	FROR 4G1.5mm^2	FROR 4G1.5mm^2
	FILLING PUMP (s)	FROR 4G1.5mm^2	FROR 4G1.5mm^2
	H2O2 DOSING SYSTEM (s)	FROR 3G1mm^2	FROR 3G1mm^2
	ECOFLOC DOSING SYSTEM (s)	FROR 3G1mm^2	FROR 3G1mm^2
	SLUDGE DISCHARGE VALE (V2) (s)	FROR 3x1mm^2	FROR 3x1mm^2
	U.V. STERILIZER (s)	FROR 3G1mm^2	FROR 3G1mm^2
	LEVEL PROBE CONTROL BOX (s)	FROR 3x1mm^2	FROR 3x1mm^2
	REMOTE CONTROL (supplied 15m)	4x0.5mm^2	4x0.5mm^2
	MAX. LEVEL OF SLUDGE TANK-NC (ns)	FROR 2x1mm2	FROR 2x1mm^2

Note: **ns**:= not supplied; **s**:= supplied standard (= 3 meters)

Table. 8.8.1 - Sizing of the cables for Main Control Box connection

8.8.2 H2O2 DOSING SYSTEM

The power supply for the H_2O_2 dosing pump is normally (standard supply) sourced on from the plant Main Control Box and the operator has only to connect the plug that comes from the dosing pump to the correct terminals of the ECOmar S main control box (refer to attached Electrical Connections Diagrams).
This is valid only for the ECOmar S plant supplied with the standard (*1 Tank Control*) configuration. While, when the plant is supplied with the *2 Tanks Control* configuration, on the rear side of the H_2O_2 Dosing System (see figure below) there is an electrical box, to be connected to the Main Control Box. Moreover, when the plant is supplied with the 2 *Tanks Control* configuration for the 3 phases power supply, an auxiliary power supply 230 V AC (your supply) has also to be brought into the electrical box of the H2O2 Dosing System (refer to attached Electrical Connections diagrams).

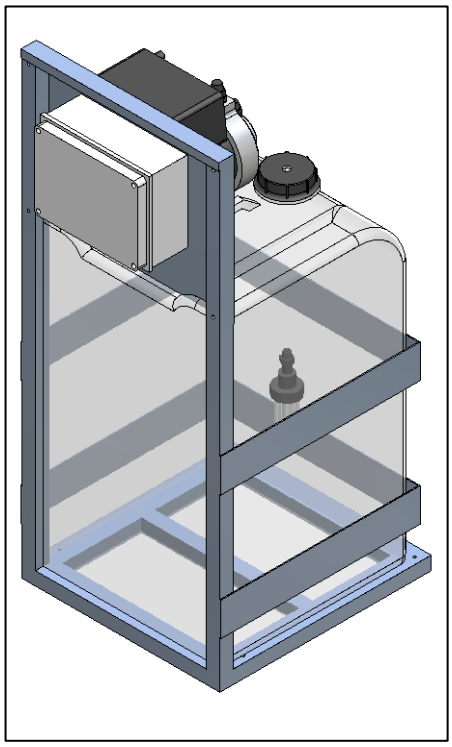


Fig 8.8.2 – H_2O_2 dosing system for 2 Tanks Control configuration

In detail the box, installed on the rear side of the H_2O_2 Dosing System when the plant is supplied with the *2 Tanks Control* configuration for the single-phase power supply, has to be connected to (refer to attached Electrical Connections Diagrams):

1. Power Supply 230 V-AC from Main Control Box (supplied 3m cable FROR 3G1.5mm2);
2. H2O2 Dosing Pump (supplied 3m cable FROR 3G1mm2);
3. ECOFLOC Dosing Pump (supplied 3m cable FROR 3G1mm2);
4. U.V. Sterilizer control box (supplied 3m cable FROR 3G1mm2);
5. Starting signal for Dosing Pumps from Main Control Box (supplied 3m cable FROR 2x1mm2).

While, when the plant is supplied with the *2 Tanks Control* configuration for the three-phase power supply, the electrical box of the H_2O_2 Dosing System has to be connected to (refer to attached Electrical Connections Diagrams):

1. External Power Supply (your supply) 230 V-AC (suggested cable FROR 3G1.5mm^2);
2. H_2O_2 Dosing Pump (supplied 3m cable FROR 3G1mm^2);
3. ECOFLOC Dosing Pump (supplied 3m cable FROR 3G1mm^2);
4. U.V. Sterilizer control box (supplied 3m cable FROR 3G1mm^2);
5. Starting signal for Dosing Pumps from Main Control Box (supplied 3m cable FROR 2x1mm^2).

8.8.3 LEVEL PROBE CONTROL BOX

The power supply 230 V AC of the Level Probe Control Box has to be brought from an external source (your supply), for any ECOmar S configuration. The Level Probe Control Box has also to be connected to the Main Control Box and to the Level Probe, installed on collecting tank. In particular, the electrical connections of the level probe control box are:

1. External Power Supply 230 V-AC (supplied 3m cable FROR 2x1mm^2);
2. ECOmar S control box, installed on ECOmar S STP Main Unit (supplied 3m cable FROR 3x1mm^2);
3. Conductive level probe installed on sewage collecting tank (supplied 3m cable FROR 3x1mm^2).

For the exact connections scheme of level probe control box, please refer to the annexed Electrical Connections Diagrams**.**

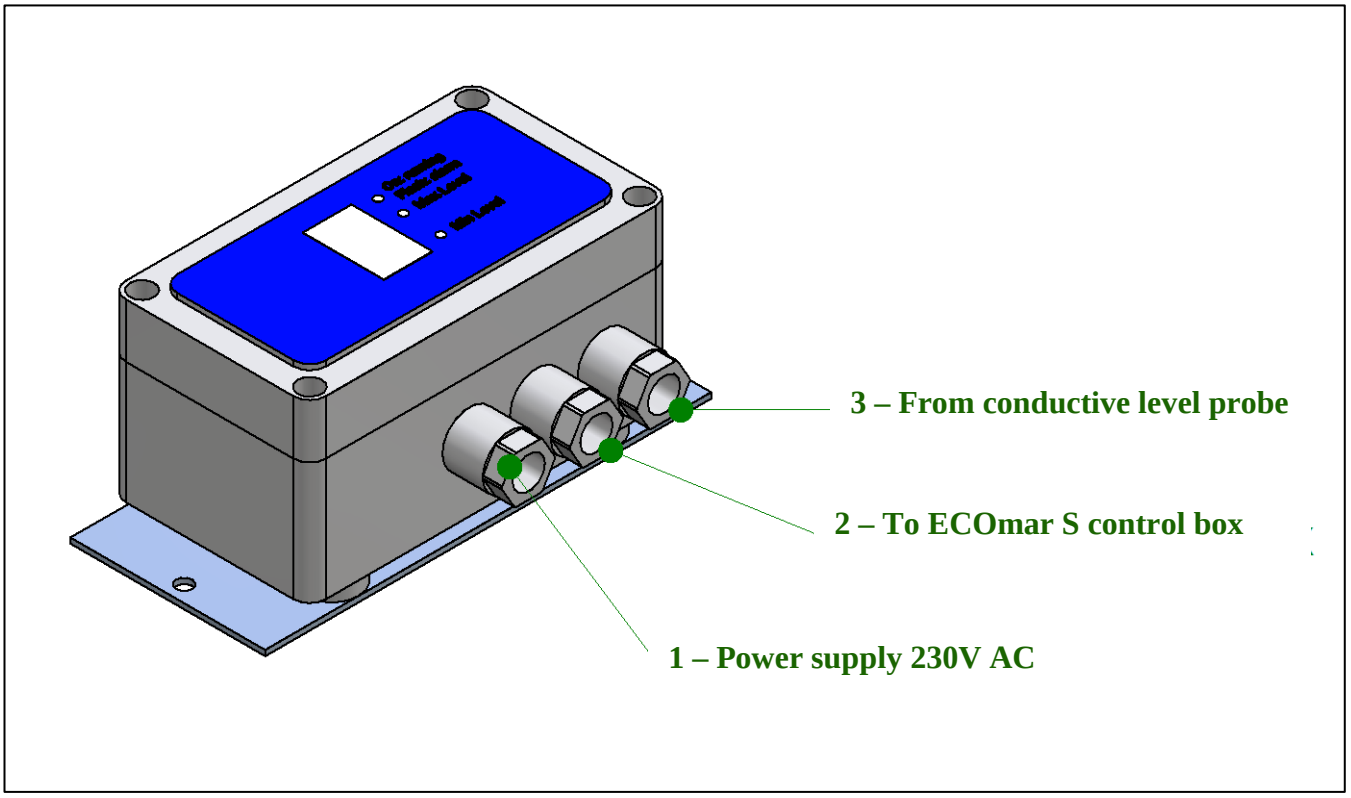


Fig 8.8.3 - Electrical connection of the control box for level probe

8.8.4 REMOTE CONTROL (OPTIONAL)

The power supply 12/24 V DC for the Remote control (if supplied) has always to be brought from an external source (your supply), for any ECOmar S configuration, using the appropriate electrical cable (suggested FROR 2x1mm^2). Moreover the supplied remote control has also to be connected to the Main Control Box, using a proper electrical cable (supplied standard 15m cable 4x0.5mm^2). For the exact connections scheme of the supplied remote control, please refer to the relative annexed Electrical Diagram**.**

9 PCB CONTROL PANEL – Functional Description

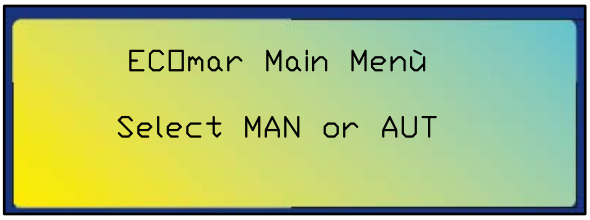
If the ECOmar S plant has been correctly installed you can power it electrically. By default after powering the system always request to select the Automatic or the Manual mode. The PCB control panel (see Fig. 9 – PCB control panel) shows the main page from which you can choose the operation *mode*.

Fig. 9 – PCB control panel

Some strings visualized on the display depend on the selected display language (check the Display Language parameter - "*Lang (0 = I, 1= E, 2 = C):"* settings). In this section, we refer to the strings showed when the selected display language is English.

9.1 Main page

When on the screen of the PCB control panel appears the main page, the display shows:



From this screen, you can select one of the following operation *modes*:

- Manual - MAN
- Automatic - AUT

The Manual mode must be used only for commissioning or start-up of the ECOmar S STP or to check the correct functioning of the main devices connected to the system in case of any system fault occurs.

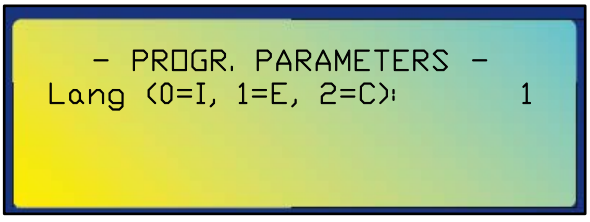
9.1.1 Programming the parameters of the Electronic board PRO14/02 for ECOmar S

When the PCB (Printed Circuit Board) control panel is powered up, it is possible to set the operational parameters of the plant.

The ECOmar S S.T.P. is always supplied with the parameters set to the correct operating values according to the supplied model. Never set the parameters to different values from those specified on the attached Test Report, without TECNICOMAR S.P.A. authorization.

In order to enter the setting parameters pages of the system follow this procedure:

- Power on the system;
- Push the emergency stop on the Main Control Box;
- Press and hold the STOP/ESC key and at the same time release the Emergency Button;
- Release the key button when the screen backlight will light on, giving you access to the setting parameters pages.



From this screen you can change each parameter of the system, by do the following steps:

- Press the arrow keys ▲/F1-AUTO and down ▼/F2-MAN to change the value of the parameter displayed;
- Press the "START/ENTER" or "STOP/ESC" key to update the displayed desired value;
- Press the "STOP/ESC" key to return to the previous parameter;
- Press the "START/ENTER" key to go to the next parameter;
- Power down the unit and then power up the unit, using the emergency stop button;
- At this point starts an initializing phase lasting few seconds, during which the screen show the firmware release;
- Now the electronic card will be operational with the new set parameters.

In particular the PCB control panel manages fifteen parameters, each of which manages a particular aspect of the system functioning. For more details about the functional description of each parameter refer to the list below.

ECOmar S Parameters List:

01) Display Language (0=I, 1=E, 2=C): allows to choose the display language between Italian, English and Russian (Cyrillic).

02) Dosing Timer (sec.): allows to set the dosing pumps activation time per cycle, according to the model (do not change).

03) Maceration Timer (min.): allows to set the maceration time per cycle (do not change).

04) Discharge Timer (sec.): allows to set the clarified water discharge time per cycle (adjust according to discharge distance).

05) Washing Timer (sec): allows to set the treatment tank washing time per cycle (do not change).

06) Washing Option (0=B, 1=L, 2=E): allows to choose the factory set washing mode (do not change).

07) Failure Delay (sec.): allows to set a fault holding time after which each alarm is managed (do not change).

08) Discharge Valve (V1) Delay (sec.): allows to set the time necessary for the activation of the valve V1 (do not change).

09) Filling Failure Alarm (min.): allows to set a filling time after which the *Filling Alarm* occurs (do not change).

10) Sea-water Failure Alarm (min.): allows to set a dilution time after which the *Seawater Alarm* occurs (do not change).

11) Display Backlight Timer (sec): allows to set the display backlight time (when set to 0 the display never lights off).

12) Dosing Option (0=L, 1=B): allows to choose the factory set dosing mode (do not change).

13) Flocculation Timer (sec): allows to set the flocculation time per cycle (do not change).

14) Sludge Discharge Valve (V2) Delay (sec): allows to set the time needed for sludge valve V2 activation (do not change).

15) Sludge Discharge Timer (sec): allows to set the sludge discharge time, according model (adjust according distance).

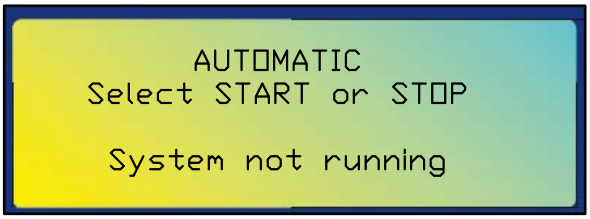
The factory setting values of each parameter are record in the attached Test Report. For the string shown on the display of the Main Control Box, for each parameter refer to the table here below as an example of that reported on the Test Report.

P/N	PARAMETER	Setting Value	Unit	Note
01.	Lang (0=I,1=E,2=C):		**0; 1; 2**	0 : = Italian, 1 : = English, 2 : = Russian (Cyrillic)
02.	DOSING_T (s):		**sec.**	H_2O_2 pump: % ECOFLOC pump: %
03.	MACERATING_T (m):		**min**	
04.	DISCHARGE_T (s):		**sec.**	
05.	WASHING_T (s):		**sec.**	
06.	WASH. (0=B,1=L,2=E):		**0; 1; 2**	
07.	FAILURE_DLY (s):		**sec.**	
08.	3WAY_V1_T (s):		**sec.**	
09.	FIL_FLT_T (m):		**min.**	
10.	SEA_FLT_T (m):		**min.**	
11.	BACKLIGHT (s):		**sec.**	
12.	TY DOS (0=L,1=B):		**0; 1**	
13.	T_FLOC (s):		**sec.**	
14.	3WAY_V2_T (s):		**sec.**	
15.	DISCH_SLUDGE_T (s):		**sec.**	

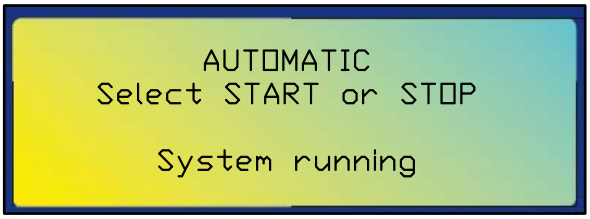
Table.9.1.1 – Parameters Settings table from the plant TEST REPORT

9.2 Automatic mode

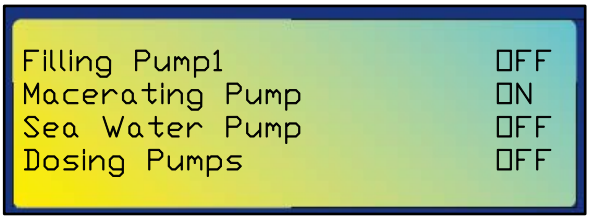
From the main page it is possible to select the Automatic mode, by pressing the key ▲/F1-AUTO.
When set in the *automatic mode* menu, the display will show the following screen:



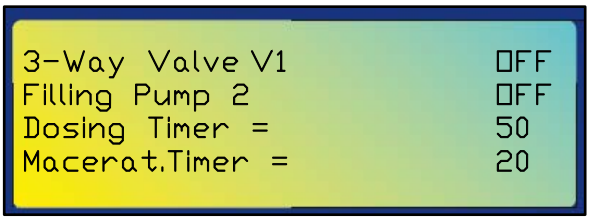
To start the Automatic mode push START/ENTER. At this point, the display will show:

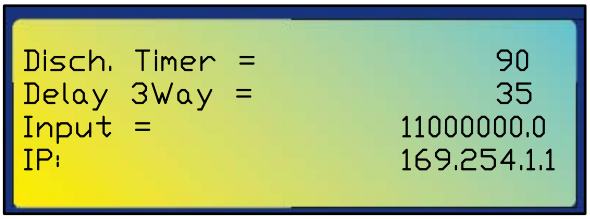


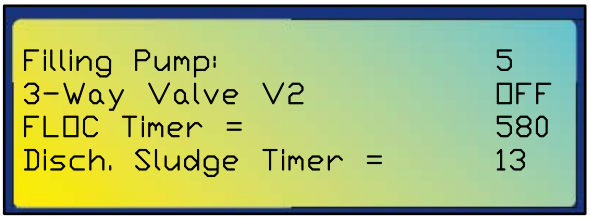
The unit PCB will run all the plant functions and will activate (automatically) a treatment cycle every time the fixed level (max level signal from Level Probe Control Box) is reached inside collecting tank. To stop the plant press STOP/ESC key.
The real activation of the automatic mode is shown on the 4th line of the display (*System running / System not running*). During the system automatic operation, it is possible to check the system status (devices activation - ON/OFF) by pushing the RESET/STATUS key. The display of the Main Control Box will show the following screen:



By pushing the arrow down ▼/F2-MAN key, the display will show the rest of the pages concerning the status of the system:







The screen can show four status pages that can be scrolled back and forth by pressing the arrow keys ▲/F1-AUTO and down ▼/F2-MAN. Each status page is continuously and automatically updated in real time. The first status page shows the activation status of filling, macerating seawater and dosing pumps. The second status page displays the activation status of discharge valve (V1) and of second filling pump (optional); and two timers with countdown in real time. The first timer is for the dosing pumps activation that occurs contemporaneously. While, the second one is for the maceration activation time. In the third status page will appear two timers, the Input Row on the 3rd line and the IP Address of the PCB in last line of this status page. The first timer shows a countdown in real time during the discharge of the clarified water. The second one, instead displays a countdown for the discharge valve (V1) activation time. The IP Address is an identification code of the PCB installed on the

supplied ECOmar S STP, necessary only for the connection of the system with a remote PC or Laptop. The Input Row is useful to check the status of all the level sensors connected to the plant. This row is composed by 9 bits, the first of which is separated from the others by a dot. In detail, the Input (9) is for first bit on the left after the "=" sign, Input (8) for second bit and so on up to Input (1) that is for last bit on the left just after the dot (first bit on the right).
As shown in the table below, the value of each bit is related to each level monitored by the level sensors connected to the plant.

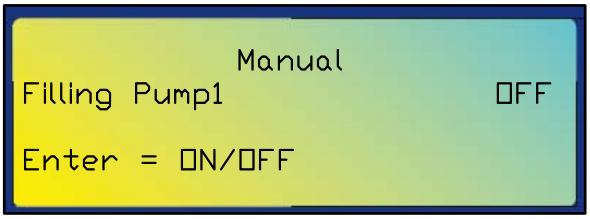
INPUT PIN	*DESCRIPTION*	*EVENT*	
Input (1)	**Sludge Tank – Maximum level**	**1 = reached**	**0 = not reached / probe not connected**
Input (2)	**2nd Collecting Tank - Maximum level**	**1 = reached**	**0 = not reached / probe not connected**
Input (3)	**Treatment Tank - Maximum level**	**1 = reached**	**0 = not reached / probe not connected**
Input (4)	**Treatment Tank - Minimum level**	**1 = reached**	**0 = not reached / probe not connected**
Input (5)	**2nd Collecting Tank - Minimum level**	**1 = not reached**	**0 = reached / probe not connected**
Input (6)	**Treatment Tank - Absolute Max level**	**1 = overflow**	**0 = normal operation / probe not connected**
Input (7)	**1st Collecting Tank - Maximum level**	**1 = reached**	**0 = not reached / probe not connected**
Input (8)	**1st Collecting Tank - Minimum level**	**1 = not reached**	**0 = reached / probe not connected**
Input (9)	**NOT USED**	**Do not care (always 1)**	

Table.9.2 – Parameters Settings table from the plant TEST REPORT

In the fourth and last status page will appear a cycle counter on the 1st line, the activation status of the sludge discharge valve (V2) on the 2nd line and two timers in real time. The cycle counter displays the number of filling pump starts. The timer on the 3rd line is for the flocculation time and that on the last line shows the countdown for the sludge discharge time.
Once visualized the desired status informations, to go back to the *automatic mode* menu push STOP/ESC key. More generally the STOP/ESC key button can be used every time you need to delete an action or go back with the displayed screens.
To stop the plant when running in *automatic mode* go back to the system main page, by pressing the STOP/ESC key.

9.3 Manual mode

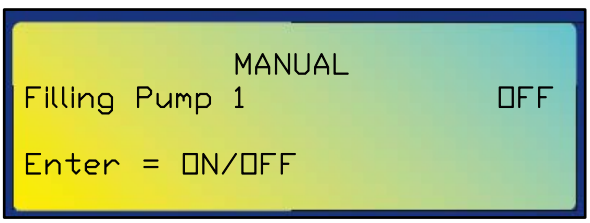
From the system main page it is possible to select the *manual mode*, by pressing the key ▼/F2-MAN.
When set in the *manual mode* menu, the display will show the following screen:

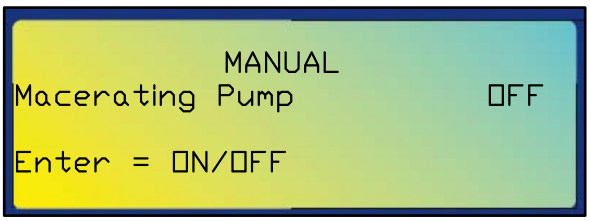


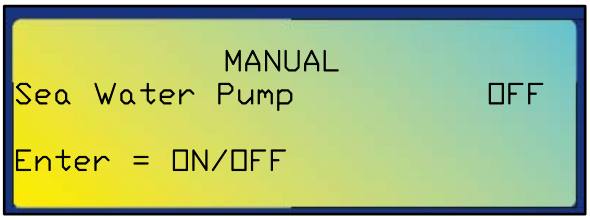
This operation mode allows to manually activate the devices connected to the system. This is useful to check the devices correct functioning when searching for failures, to perform the unit commissioning, plant first start-up or some maintenance operations.

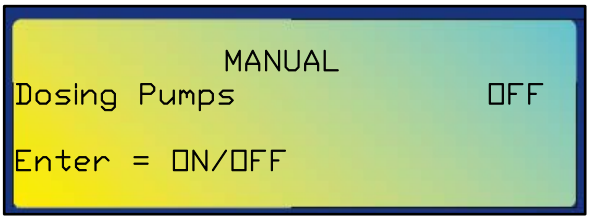
Warning: *The system is designed to operate in automatic mode. The manual mode is not recommended since the control of the unit is fully demanded to the operator. This function must be performed only by qualified operators.*

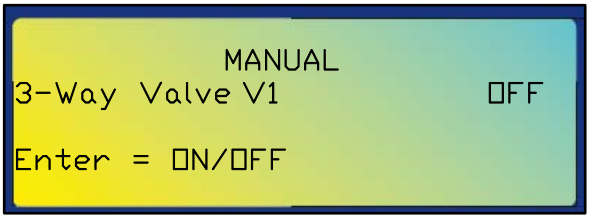
In *manual mode* the display will show eight different screens. From each of the first seven pages, it is possible to start or stop only the specific device, indicated on screen, by pushing START/ENTER key. Each time you press the START/ENTER key, the status will change from OFF to ON and vice versa. The arrows ▲/F1-AUTO and ▼/F2-MAN allow to browse the pages, to check the specific device status and activate or de-activate it. It is not possible to de-activate or activate a device from the screen of another device. The pages, showed in manual mode are the below:

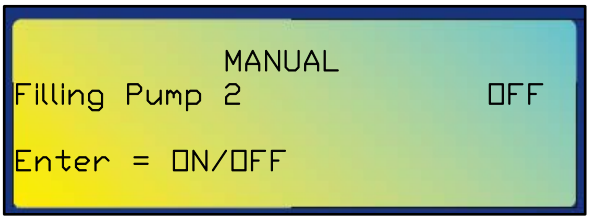


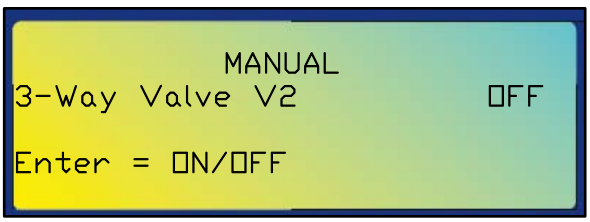


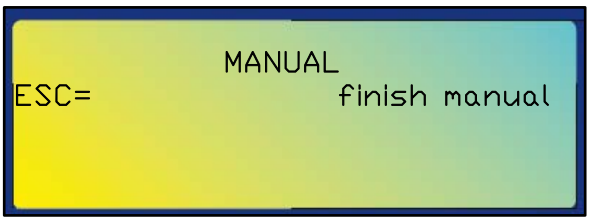












The last page has no operational functions. It has to be considered only as a reminder.

In *manual mode*, it is also possible to visualize the system status pages pushing the RESET/STATUS key, following the same procedure as the one previously described for *automatic mode*.

Warning: *Before exit the manual mode make sure that all the devices are turned off. Moreover before exit a device activation page make sure to stop it.*

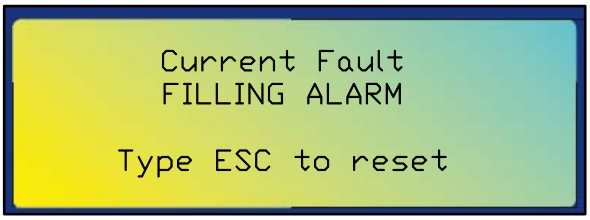
To exit the *manual mode* push the STOP/ESC key. The display will show the system main page.

9.4 Alarms Description

The Main Control Box can manage six different types of possible system fault each one related to a different alarm signaling. The alarms signaled by the plant main control box are: *Filling Alarm*, *Seawater Alarm*, *Sludge Tank Overflow Alarm*, *Tank Overflow Alarm*, *Overload Alarm* and *High Pressure Alarm*. The High Pressure Alarm is available only for the models supplied with the treatment tank in PP. The Overload Alarm and the High Pressure Alarm are visualized by the same page.

9.4.1 Filling Alarm

If the filling pump does not transfer any liquid to the treatment tank, or the minimum level of the treatment tank is not reached, within the set time, (refer to the value of the *Filling Failure Alarm* parameter shown on the attached Test Report) the system will trip; and on the display of the Main Control Box will appear the Filling Alarm screen.
In case that a fault for Filling Alarm occurs, the plant display shows the following flashing screen:

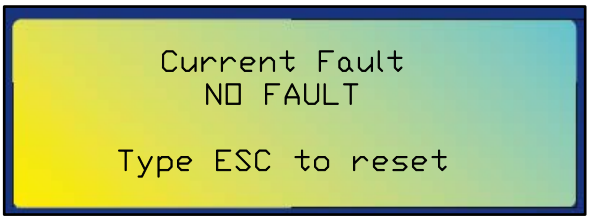


Check the multilevel sensor (ball type) installed on Treatment Tank for any blockages or malfunctioning. Then, check that the filling pump is running in the correct way, without any blockages or any other malfunctioning. Finally, check that the value of the relative parameter (*Filling Failure Alarm*) is set to the correct value, otherwise adjust it. You can find the correct setting value of the *Filling Failure Alarm* parameter on the attached Test Report and compare the reported value with that shown by the display in the *Filling Failure Alarm* parameter setting page.

Example:

09.	FIL_FLT_T (m):	**5**	**min.**

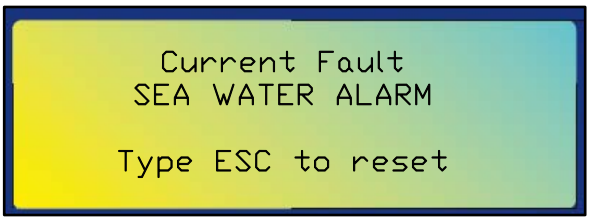
Once the fault that has caused the alarm signaling is solved, you can reset the alarm signaling by pressing the STOP/ESC key. At this point the alarm signaling will be reset and the display will show:



Press again the STOP/ESC key to return to the system main page. Then, restart the plant by pressing the START/ENTER key, the system will begin to run from the filling step.

9.4.2 Seawater Alarm

If the seawater pump does not transfer any liquid to the treatment tank, or the maximum level of the treatment tank is not reached, within the set time, (refer to the value of the *Sea-water Failure Alarm* parameter shown on the attached Test Report) the system will trip; and on the display of the Main Control Box will appear the Seawater Alarm screen.
In case that a fault for Seawater Alarm occurs, the plant display shows the following flashing screen:

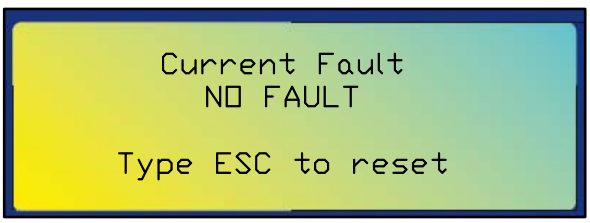


Check the multilevel sensor (ball type) installed on Treatment Tank for any blockages or malfunctioning. Then, check that the seawater pump is running in the correct way, without any blockages or any other malfunctioning. Then, check that the value of the relative parameter (*Sea-water Failure Alarm*) is set to the correct value, otherwise adjust it. You can find the correct setting value of the *Sea-water Failure Alarm* parameter on the attached Test Report and compare the reported value with that shown by the display in the *Sea-water Failure Alarm* parameter setting page.

Example:

10.	SEA_FLT_T (m):	**5**	**min.**

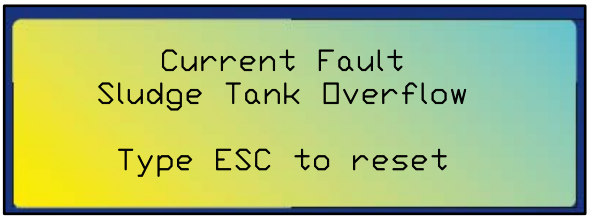
Once the fault that has caused the alarm signaling is solved, you can reset the alarm signaling by pressing the STOP/ESC key. At this point the alarm signaling will be reset and the display will show:



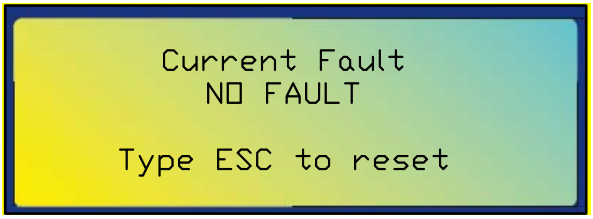
Press again the STOP/ESC key to return to the system main page. Then, restart the plant by pressing the START/ENTER key, the system will begin to run from the chemical dosing phase.

9.4.3 Sludge Tank Overflow Alarm

When the discharged sludge level inside the sludge tank reaches the maximum level, detected by the installed level probe (your supply), the system will trip; and on the display of the Main Control Box will appear the Sludge Tank Overflow Alarm screen.
In case that a fault for Sludge Tank Overflow Alarm occurs, the plant display shows the following flashing screen:



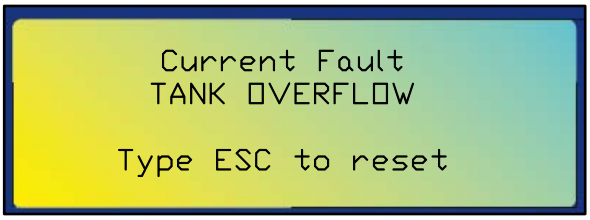
Check that the sludge tank is empty; if it is not, empty it according to IMO/MARPOL regulation, otherwise check the correct functioning of the level probe (your supply) installed on the sludge tank.
Once the fault that has caused the alarm signaling is solved, you can reset the alarm signaling by pressing the STOP/ESC key.
At this point the alarm signaling will be reset and the display will show:



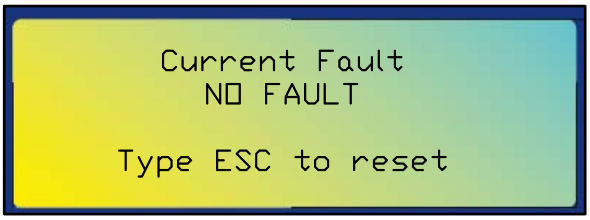
Press again the STOP/ESC key to return to the system main page. Then, restart the plant by pressing the START/ENTER key, the system will begin to run from the filling step if the liquid level inside the Treatment Tank is below the min level of multilevel sensor; otherwise from the chemical dosing phase.

9.4.4 Tank Overflow Alarm

When the liquid inside the Treatment Tank reaches the absolute maximum level, detected by the multilevel probe (ball type), the system will trip; and on the display of the Main Control Box will appear the Tank Overflow Alarm screen.
In case that a fault for Tank Overflow Alarm occurs, the plant display shows the following flashing screen:



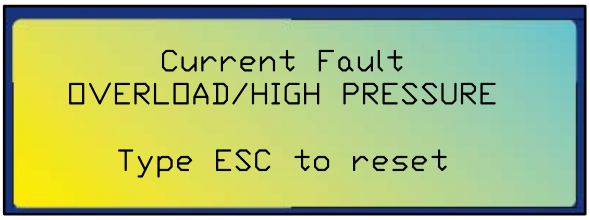
Check the multilevel sensor (ball type) installed on Treatment Tank for any blockages or malfunctioning. Verify that the liquid inside the Treatment Tank is above the Absolute Max level, and empty the treatment tank (refer to the **SPECIAL PROCEDURES** section), resending the liquid back to the collecting tank or discharging it according to IMO/MARPOL regulation. Check that all pumps are working correctly.
Once the fault that has caused the alarm signaling is solved, the alarm signaling will be automatically reset and the display will show the following screen:



Press again the STOP/ESC key to return to the system main page. Then, restart the plant by pressing the START/ENTER key, the system will begin to run from the filling step.

9.4.5 Overload Alarm

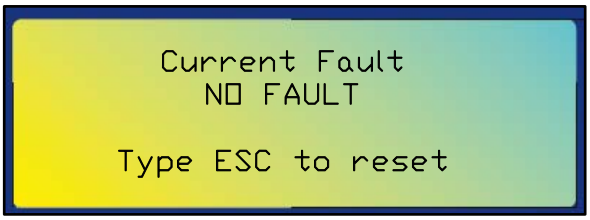
If the current absorption of the plant is higher than the maximum value (refer to attached Test Report) set on the switch circuit breaker installed inside the Main Control Box; (see the component on the figure below), the system will trip; and on the display of the Main Control Box will appear the Overload Alarm screen.
In case that a fault for Overload Alarm occurs, the black switch button of the circuit breaker (refer to the figure below) is in the OFF position (pushed out from the breaker) and the plant display shows the following flashing screen:



Verify that black switch button of the breaker, installed inside Main Control Box (refer to figure below), is in OFF position, with the switch button pushed out from the switch circuit breaker.

Fig. 9.4.5 – Mother Board – Switch breaker (inside Main Control Box)

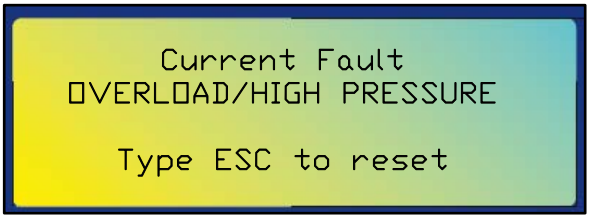
Check if any mechanical obstacles inhibit the correct operation of any pumps, connected to the system and remove them, if present. Then check electrical absorption of each pump and verify that it is below of that indicated on the relative nameplate.
Once the fault that has caused the alarm signaling is solved, you can reset the alarm signaling by setting the black switch button of the switch breaker into the ON position (pressed inside the breaker) and then pressing the STOP/ESC key.
At this point the alarm signaling will be reset and the display will show:



Press again the STOP/ESC key to return to system the main page. Then, restart the plant by pressing the START/ENTER key, the system will begin to run from the filling step if the liquid level inside the Treatment Tank is below the min level of multilevel sensor; otherwise from the chemical dosing phase.

*9.4.6 High Pressure Alarm**

If the pressure inside the Treatment Tank rises above the set value (refer to the attached Test Report - usually 0.2bar) of the pressure switch, installed on the Treatment Tank, the system will trip; and on the display of the Main Control Box will appear the Overload Alarm screen.
In case that a fault for High Pressure Alarm occurs, the black switch button of the switch breaker (refer to the figure shown in the previous section) is in ON position (pressed inside the breaker) and the plant display shows the following flashing screen:

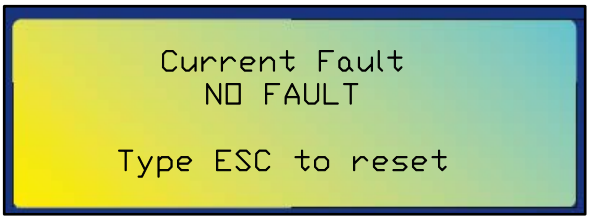


*Only for ECOmar S supplied with Treatment Tank in PP.

Check if there are any obstacles that block any of the outlet piping lines connected to the Treatment Tank. Remove the pressure switch from the ECOmar S treatment tank; clean it; and check if it is correctly set. If the pressure switch is not set to the correct value (refer to the attached Test Report - usually 0.2bar), reset it according to the following steps:

1. Install the pressure switch between a pressure gauge (your supply) and a two-way ball valve (your supply);
2. Remove the connector on the top of the pressure switch;
3. Connect the probes of the ohmmeter (your supply) to the pressure switch terminals. The ohmmeter will measure the electrical continuity signal;
4. Totally open the two way ball valve installed after the pressure switch;
5. Pressurize the line by closing slowly the two way valve;
6. If the ohmmeter gives no electrical continuity signal, before reaching the correct pressure value (refer to the attached Test Report - usually 0.2bar), tighten the pressure switch screw and repeat the steps starting with step 3 of this list.
7. Bring the line to correct pressure (refer to the attached Test Report - usually 0.2bar), closing slowly the two way ball valve, and turn the pressure switch screw counterclockwise until the ohmmeter gives no electrical continuity signal.
8. Repeat the procedure for further adjustment of the pressure switch threshold.
9. At this point the pressure switch is set to shut down the system at the correct pressure value (usually 0.2bar).
10. Re-install the pressure switch on the ECOmar S treatment tank.

Once the fault that has caused the alarm signaling is solved, you can reset the alarm signaling by pressing the STOP/ESC key. At this point the alarm signaling will be reset and the display will show:



Press again the STOP/ESC key to return to system the main page. Then, restart the plant by pressing the START/ENTER key, the system will begin to run from the filling step if the liquid level inside the Treatment Tank is below the min level of multilevel sensor; otherwise from the chemical dosing phase.

9.5 Remote control for ECOmar S - model: CDMAR2 (optional)

The remote control CDMAR2 is available only when the *automatic* mode is active (in *manual* mode the system can be run only from the Main Control Box); otherwise an error message appears on the display “Local Control”.

The remote control is provided with three key buttons with the following functions:

- **START** - Run the system. If the system is running, pushing it repeatedly to show the system status.
- **STOP** - Stop the system.
- **RESET** - Clear further warning alarms for any failure.

This remote control displays all the alarms signaling as the Main Control Box, except the Sludge Tank Overflow Alarm that has the same signaling as the Filling Alarm. This remote control also allows to examine the system status pages.

WARNING: It is not possible to run the system with more than one different model/type of remote control at the same time, even if the Main Control Box is arranged to be connected to several remote controls.

Fig. 9.5 – Remote Control – CDMAR2

9.6 Remote control for ECOmar S - model: PC link (optional)

It possible to connect the ECOmar S S.T.P. with a personal computer or a Laptop, in this case TECNICOMAR S.P.A. will provide an additional software and an ethernet cable for the direct connection to the PC or Laptop ethernet port TCP/IP. With the PC link, it is possible to start and stop the plant only in *automatic mode (in manual mode the system can be run only from the main panel)*, directly from the PC. This remote control also allows to examine the system status pages.

9.7 Remote control for ECOmar - model: Touch screen (optional)

The remote control TOUCH SCREEN is available only when the *automatic* mode is active (in *manual* mode the system can be run only from the Main Control Box). The remote control allows to start and stop the plant, and to examine the system status pages. This remote control also shows all the plant alarms and registers the alarm data log.

Fig. 9.9 – Remote Control – TOUCH SCREEN

10 FIRST START UP PROCEDURE

10.1 Start-up Procedure

For a correct start-up of the ECOmar S STP perform the following procedure:

- Check that the black switch button of the switch circuit breaker, installed inside the Main Control Box (refer to **Alarms Description** section) is in ON position (pressed inside the breaker);
- Verify that the direction of rotation of each motorized actuator, the one installed on the Discharge Valve (V1) and that on the Sludge Discharge Valve (V2) is set in Y2 (refer to figure below);

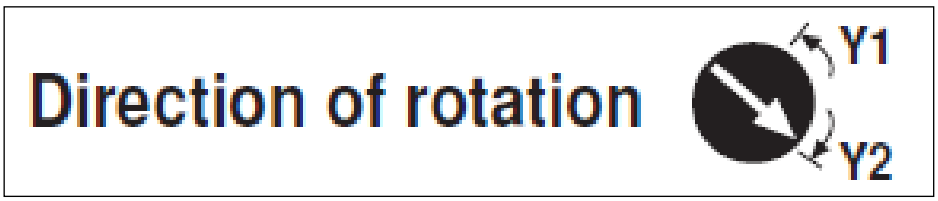


Fig. 10.1-1 – Indicator for the sense of rotation on actuator* of the motorized valves (V1) & (V2)

- Verify the correct installation of each supplied anti-siphon valve set;
- Control that the H2O2 Dosing System complete with injector and piping is correctly installed and that its tank is full;
- Check that the ECOFLOC Dosing System complete with injector and piping is correctly installed and that its tank is full;
- Verify that the U.V. Sterilizing System is correctly installed with the U.V. lamps inside;
- Check that all valves along the system filling, seawater, dosing, sludge discharge and outboard discharge piping are correctly installed and set in the proper operation position (refer to attached P&ID Diagram);
- Control that a max level sensor (your supply) is installed on sludge tank and rightly connected to the Main Control Box;
- Verify that the Multimedia Filter Station is correctly installed and filled with the proper media;
- Set all the head valves of the Multimedia Filter Station into the "*RINSE*" position (refer to attached P&ID diagram);
- Set all 3-way manual valves of the Multimedia Filter Station into the "*RINSE*" position (refer to attached P&ID diagram);
- Rinse for few minutes all the tanks of the Multimedia Filter Station (checking that there is no water leaks or air infiltrations), by opening the isolation valve (your supply) installed on the fresh not-chlorinated water inlet; thus letting fresh not-chlorinated water pass throughout Multimedia Filter Station;
- Stop the water flow throughout the Multimedia Filter Station, by closing the isolation valve (your supply);
- Reset all the Multimedia Filter Station valves into the *"OPERATION"* position (refer to attached P&ID diagram);
- Connect all the require external power supply and check that the displays of the Main Control Box, Level Probe Control Box and U.V. Sterilizer Control Box correctly lights on;
- Verify that the Management system of the level signals from the collecting tank sensors is correctly installed and send the correct level signaling to the system Main Control Box;
- Set the unit in *manual mode* (refer to the **Manual mode** section) by pressing the ▼/F2-MAN key;
- Activate the sea water pump (refer to the **Manual mode** section), control its rotation direction, verify that it is correctly primed (otherwise prime it manually), and check that there no water leaks or air infiltration in the seawater line;
- De-activate the seawater pump (refer to the **Manual mode** section);
- Activate each supplied filling pump (refer to the **Manual mode** section), control its rotation direction, verify that it is correctly primed (otherwise prime it manually), and check that there no water leaks or air infiltration in the filling line;
- De-activate teach supplied filling pump (refer to the **Manual mode** section);
- Activate the Discharge Valve (V1) to check its correct functioning and then de-activate it (refer to **Manual mode** section);
- Activate Sludge Discharge Valve (V2) to check its correct operation and deactivate it (refer to **Manual mode** section);
- Activate the Dosing Pumps (refer to **Manual mode** section) and check that both dosing pumps start running, if not startup them pushing the START BUTTON on the panel of each dosing pump;
- Let the Dosing pumps run for few minutes to fill the dosing pipes, checking that there are no water leaks neither air infiltration all along the dosing lines, then deactivate the dosing pumps (refer to **Manual mode** section);
- Check that the U.V. Sterilizer is running, otherwise start it up by pressing the System On Button ⏻ on its control box;
- Exit from the *manual mode* by pressing the STOP/ESC key (refer to the **Automatic mode** section);
- Set the unit in *automatic mode* (refer to the **Automatic mode** section) by pressing the ▲/F1-AUTO key;
- Start-up the system by pushing the START/ENTER key;
- Check that the system works correctly without any water leaks or air infiltration in all the connected piping;
- Check and record the reading value of the inlet pressure measured by the pressure gauge of the Multimedia Filter Station;

- Verify that during the discharge step, the macerating pump discharge all the liquid inside the Treatment Tank. This pump, in fact, will discharge the clarified water and the sludge for the time set by the relative factory set parameters (refer to the attached Test Report to check the setting values of the *Discharge Timer* and the *Sludge Discharge Timer* parameters). If the clarified water discharge piping, the sludge discharge piping or both are particularly long*, this times should be not adequate to the system installation configuration. To check this, open the inspection flange (refer to attached G.A. drawing) of the Treatment Tank and inspect the liquid level inside the tank during the discharge. If at the end of the cycle some liquid remains inside the Treatment Tank; the *Discharge Timer* parameter, the *Sludge Discharge Timer* parameter or both parameters need to be increased. If the Treatment Tank emptying occurs before the cycle ends the Treatment Tank; the *Discharge Timer* parameter, the *Sludge Discharge Timer* parameter or both parameters need to be decreased.
- If necessary, stop the plant by pushing the STOP/ESC key, go to the parameter programming pages and adjust the *Discharge Timer* parameter, the *Sludge Discharge Timer* parameter or both according to the system configuration (refer to the **Main page** section), exit from the programming pages by pressing the STOP/ESC key (refer to the **Main page** section) and restart the plant;
- Otherwise, if the *Discharge Timer* and *Sludge Discharge Timer* parameters need no adjustment; ignore the previous step.

10.2 Shutdown Procedure

For a correct and safe system power-off, follow the SHUT DOWN steps, listed below:

- Push the STOP-ESC key to stop the plant. The ECOmar STP will switch from System Running to System not Running;
- At this point you can push the STOP-ESC key to go to the system Main Page;
- Switch off all the external power supply.

11 ROUTINE OPERATION

After having carried out the first start-up procedure (refer to the **FIRST START-UP PROCEDURE** section), the everyday start-up and operation of the ECOmar S STP will be simple and fast.

For a correct start-up of an ECOmar S STP perform the following start-up procedure:

- Check that the system is ready for operation (refer to **FIRST START-UP PROCEDURE** section).
- Set the unit in *automatic mode* (refer to the **Automatic mode** section) by pressing the ▲/F1-AUTO key.
- Start up the system by pressing the START-ENTER key.

For a correct and safe system power-off, follow the SHUT DOWN steps, listed below:

- Push the STOP-ESC key to stop the plant. The ECOmar STP will switch from System Running to System not Running;
- At this point you can push the STOP-ESC key to go to the system Main Page;
- Switch off all the external power supply.

* Moreover, in the case of long distance pipe or required higher delivery head for the treated (clarified) water discharge, the installation of an additional discharge pump (supplied on request) between the Sludge Discharge Valve (V2) and the Multimedia Filter Station could be necessary.

12 SPECIAL PROCEDURES

12.1 Overboard (Untreated Sewage) Discharge procedure

The ECOmar S S.T.P. allows to discharge the untreated sewage directly overboard, according to IMO/MARPOL regulation. Perform the overboard (untreated sewage) discharge procedure only when permitted by the IMO/MARPOL regulation.

To perform an overboard (untreated sewage) discharge, follow this procedure:

1. From the main page of the Main Control Box choose *Manual mode* (refer to the **Manual mode** section);
2. Set a your supply 3-way ball valve (G), installed between the filling pump and the ECOmar S S.T.P. Main Unit (refer to figure below and to attached flow diagrams), in the outboard discharge position;
3. From the *Manual mode* page of the Main Control Box, activate the filling pump (refer to the **Manual mode** section);
4. In case of systems provided with 2 Tanks Control configuration, repeat all the steps for each filling pump, otherwise for systems supplied with 1 Tank Control configuration ignore this step;
5. Once the Collecting Tank (your supply) is empty, stop the filling pump (refer to the **Manual mode** section);
6. Re-set three-way ball valve (G), in to ECOmar S operation position (refer to figure below and to attached flow diagrams);
7. Exit the *manual mode*, and reset the plant in *automatic mode* (refer to the **Manual mode** section);
8. To re-start the system follow the evert-day start-up procedure (refer to the **ROUTINE OPERATION** section).

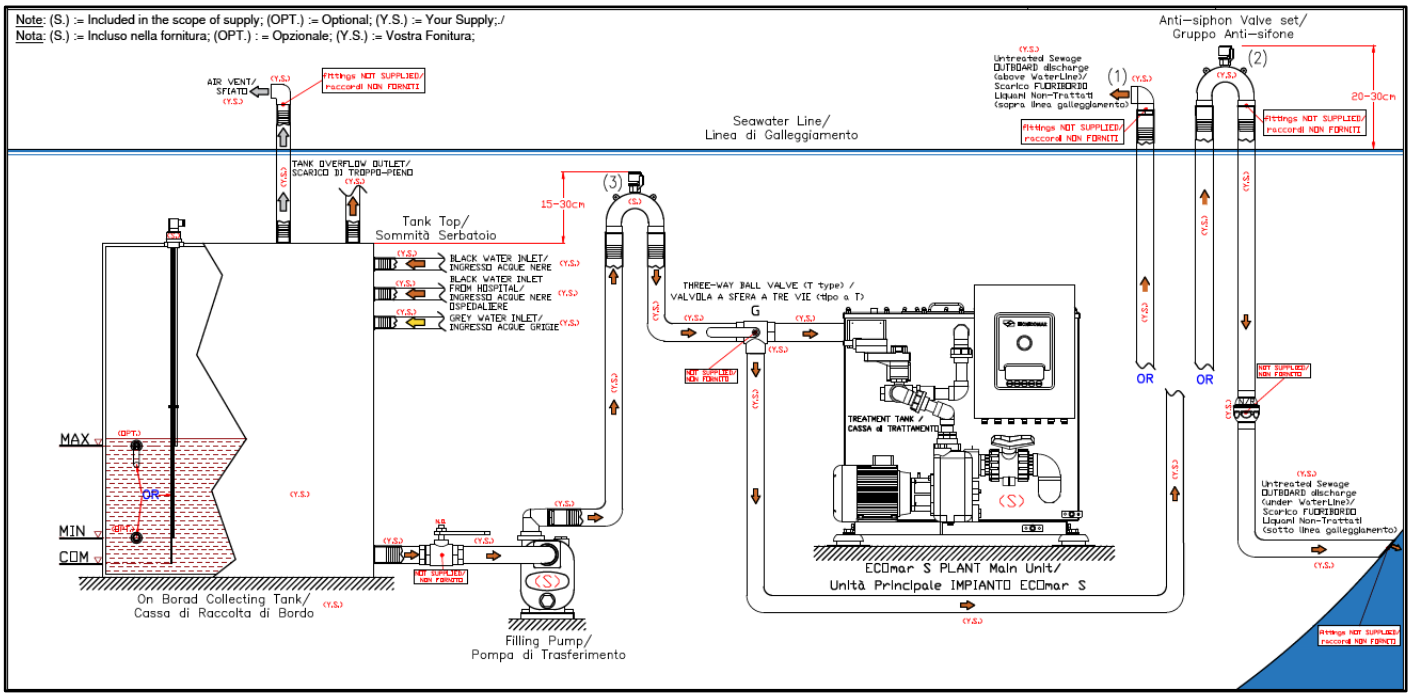
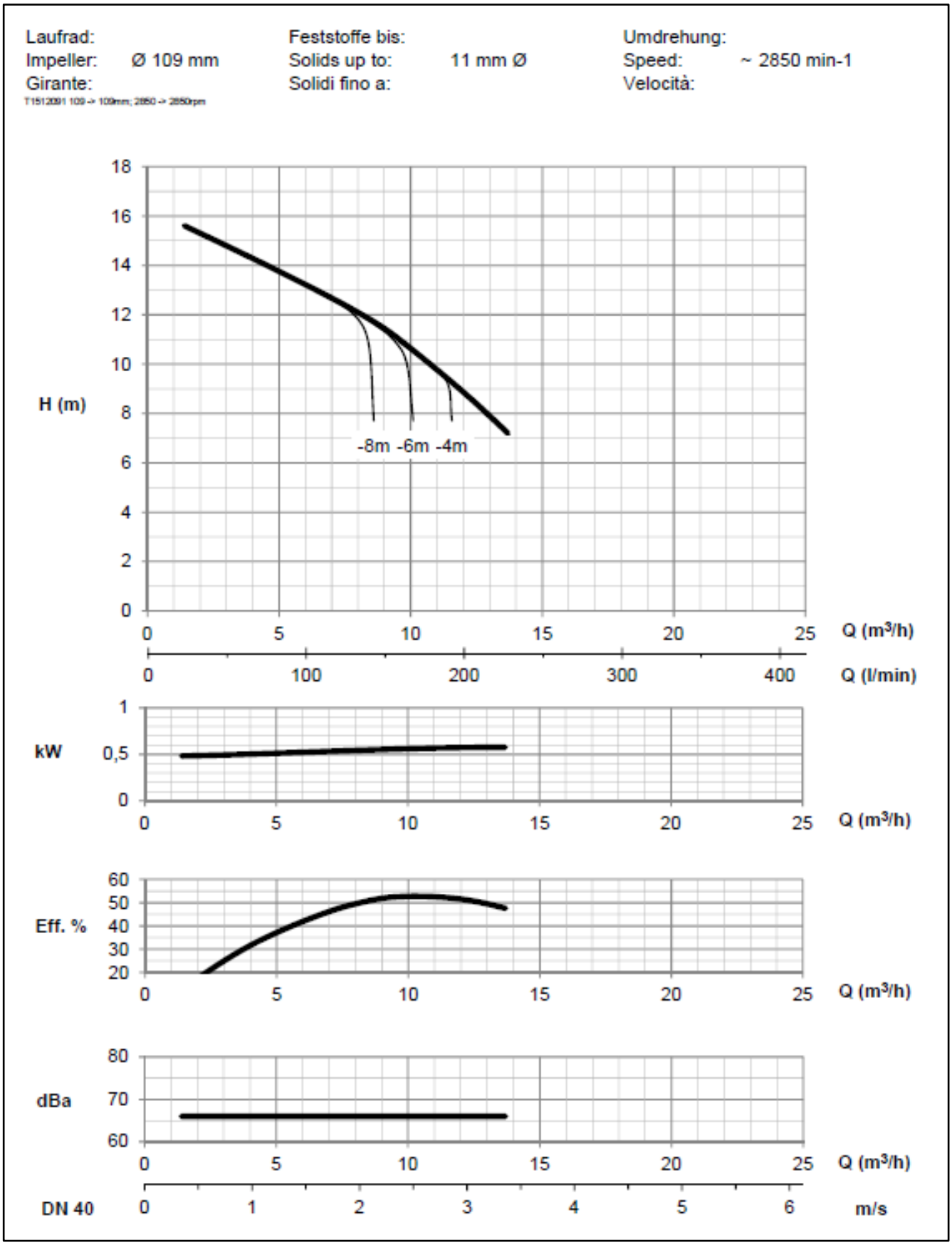


Fig. 12.1 – Untreated Sewage outboard discharge flow diagram

12.1.1 Macerating/Discharge pumps performance curves



<u>Fig. 12.1.1-1</u> – C30-50Hz performances (ECOmar 20-32 S)

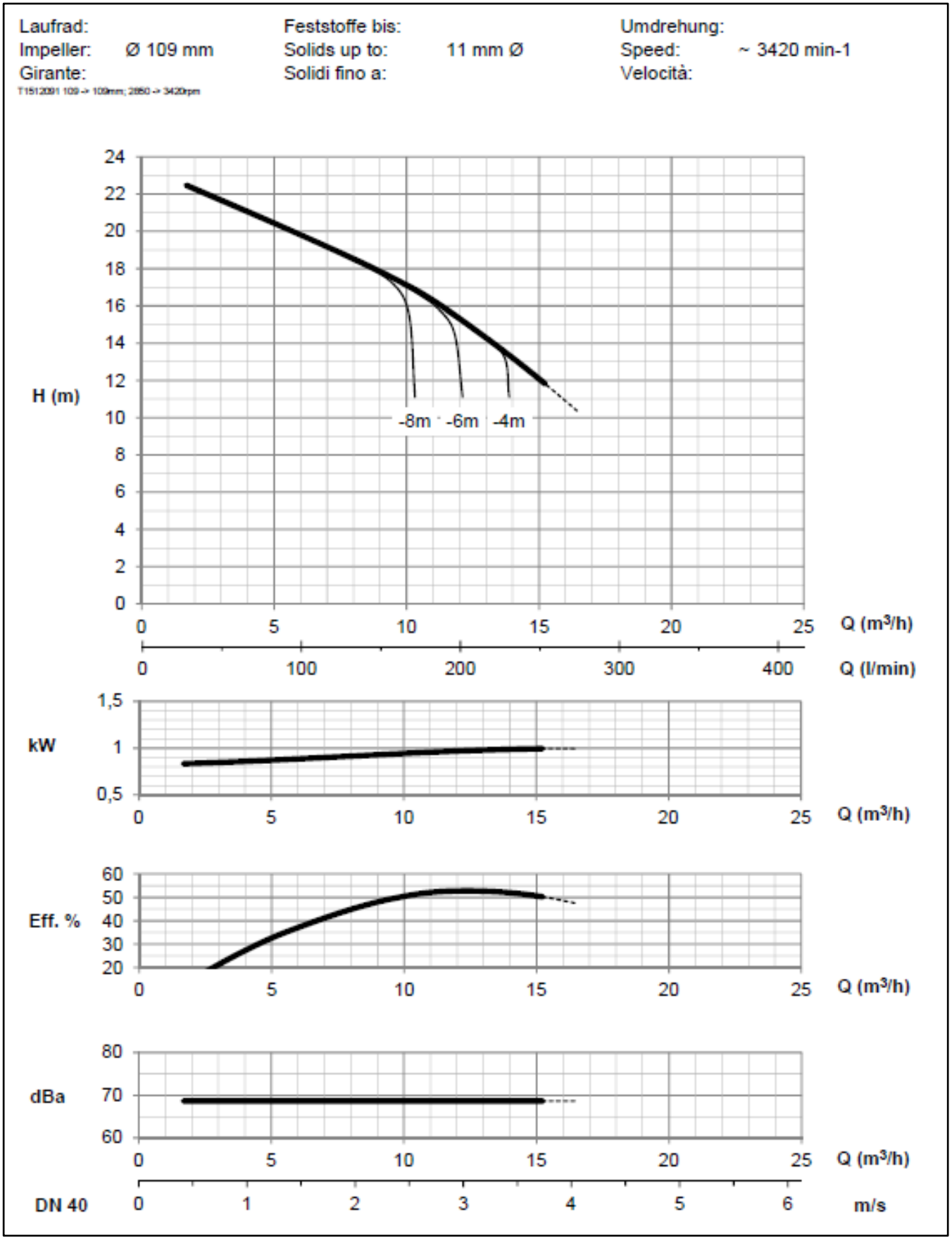


Fig. 12.1.1-2 – C30-60Hz performances (ECOmar 20-32 S)

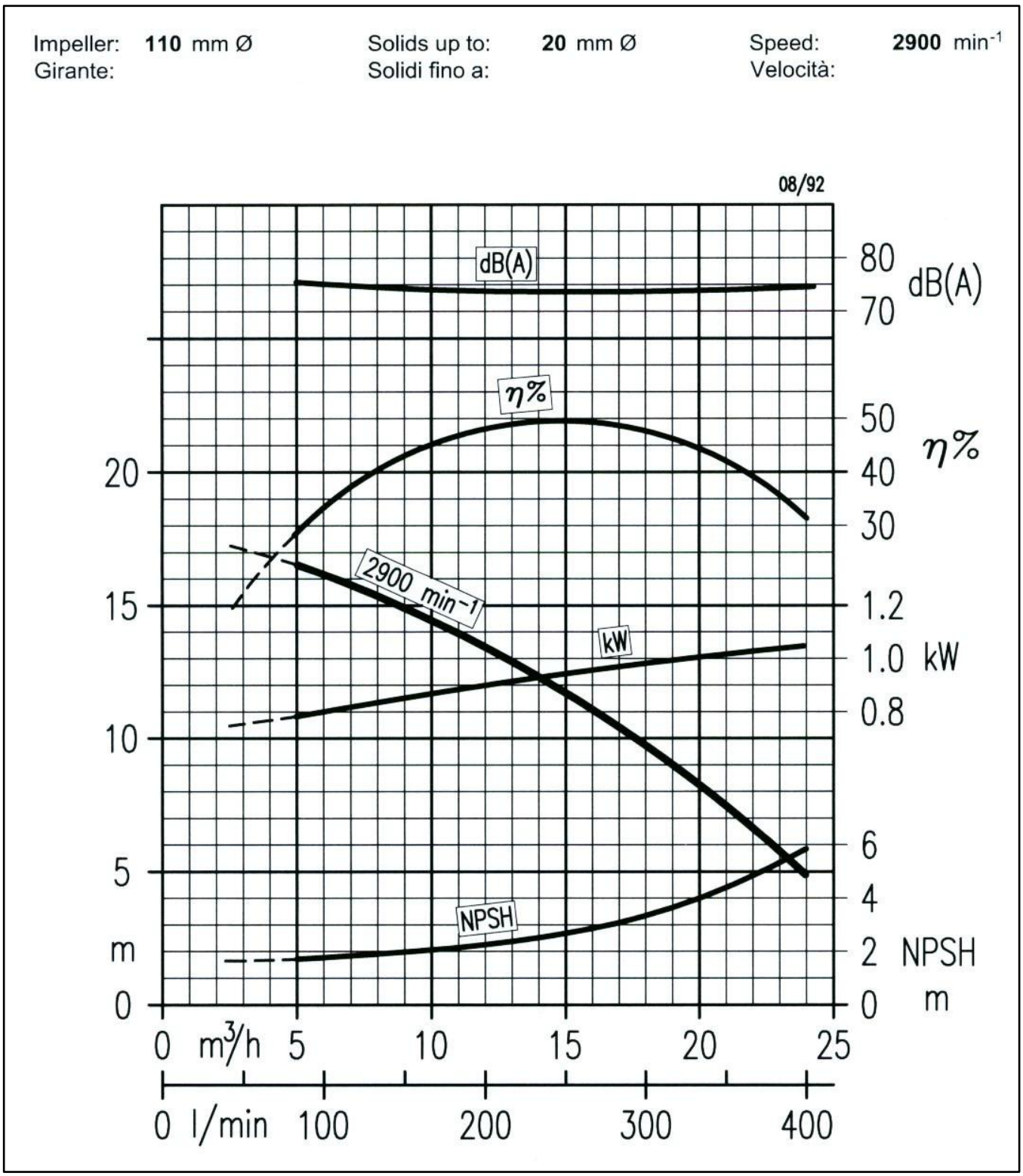


Fig. 12.1.1-3 – S42-50Hz performances (ECOmar 45-70-145 S)

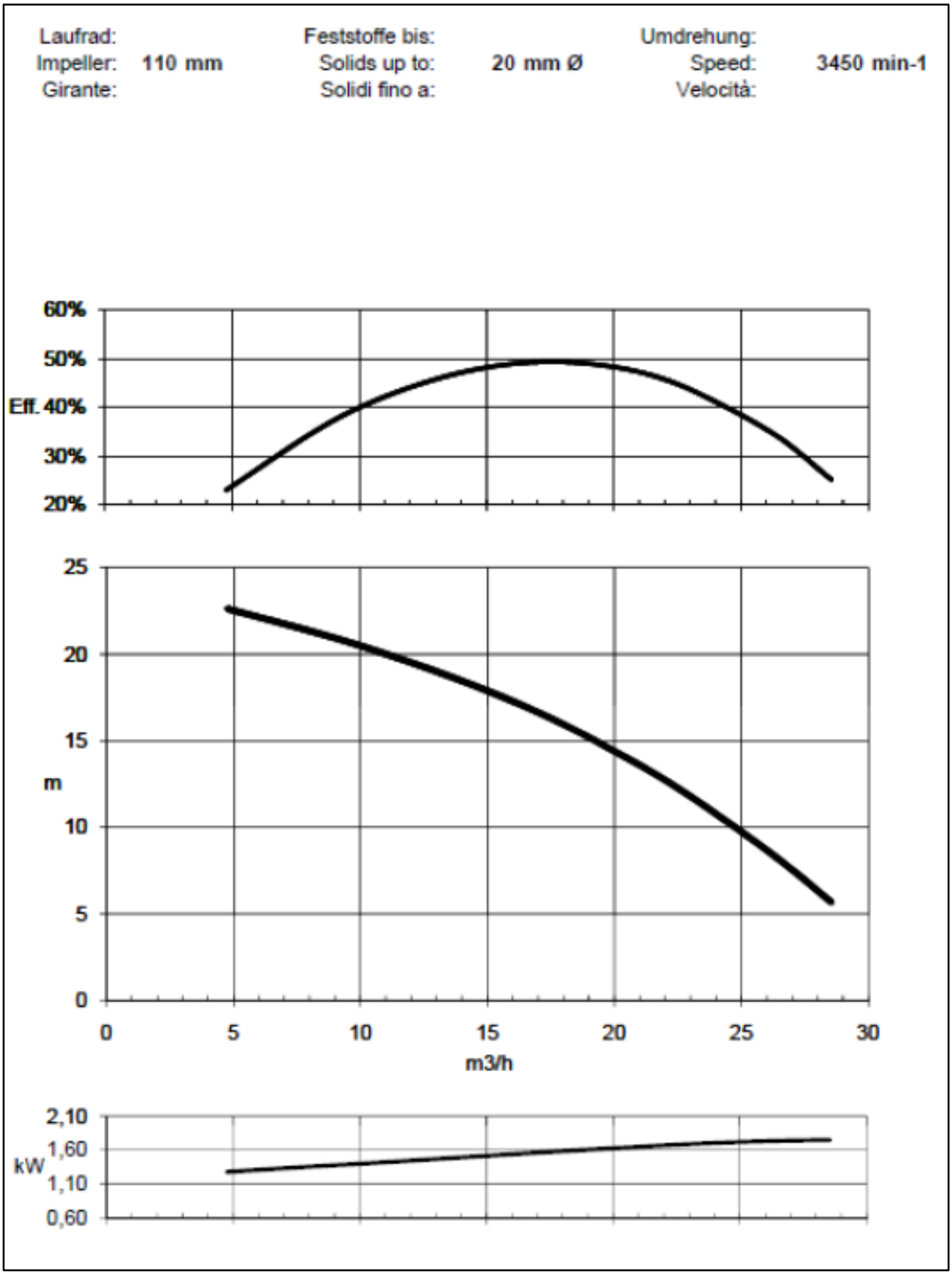


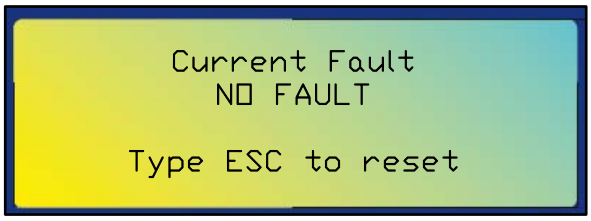
Fig. 12.1.1-4 – S42-60Hz performances (ECOmar 45-70-145 S)

12.2 Emptying the Treatment Tank procedure (in case of Tank Overflow Alarm)

In the case the ECOmar S STP goes into system fault for Tank Overflow Alarm, it will be necessary to empty the Treatment Tank. The tank can be emptied resending the untreated liquid back the on board sewage collecting tank; or discharging the untreated sewage directly overboard, according to IMO/MARPOL regulation. The untreated liquid can be discharged overboard only when permitted by the IMO/MARPOL regulation.

To empty the Treatment Tank, discharging the untreated sewage, follow this procedure:

1. Make sure that a your supply 3-way ball valve (H) , installed between the sludge discharge outlet of the Sludge Discharge Valve (V2) and the inlet of the Sludge tank, is correctly connected to the collecting tank or to an outboard discharge (the untreated liquid can be discharged overboard only when permitted by the IMO/MARPOL regulation).
2. Set the 3-way ball valve (H) (refer to figure below and to attached flow diagrams), in the discharge position;
3. From the Tank Overflow Alarm flashing screen (refer to the **Alarms Description** section) press the key ▼/F2-MAN on the Main Control Box, to start the automatic emptying of the Treatment Tank;
4. Wait until the automatic emptying of the Treatment Tank ends. It will be signaled by the visualization of the following screen on the Main control box:



5. Re-set three-way ball valve (H), in to ECOmar S operation position (refer to figure below and to attached flow diagrams);
6. Press the STOP/ESC key on the Main Control Box, to return to the system main page.
7. Reset the plant in *automatic mode* (refer to the **Manual mode** section);
8. To re-start the system follow the evert-day start-up procedure (refer to the **ROUTINE OPERATION** section).

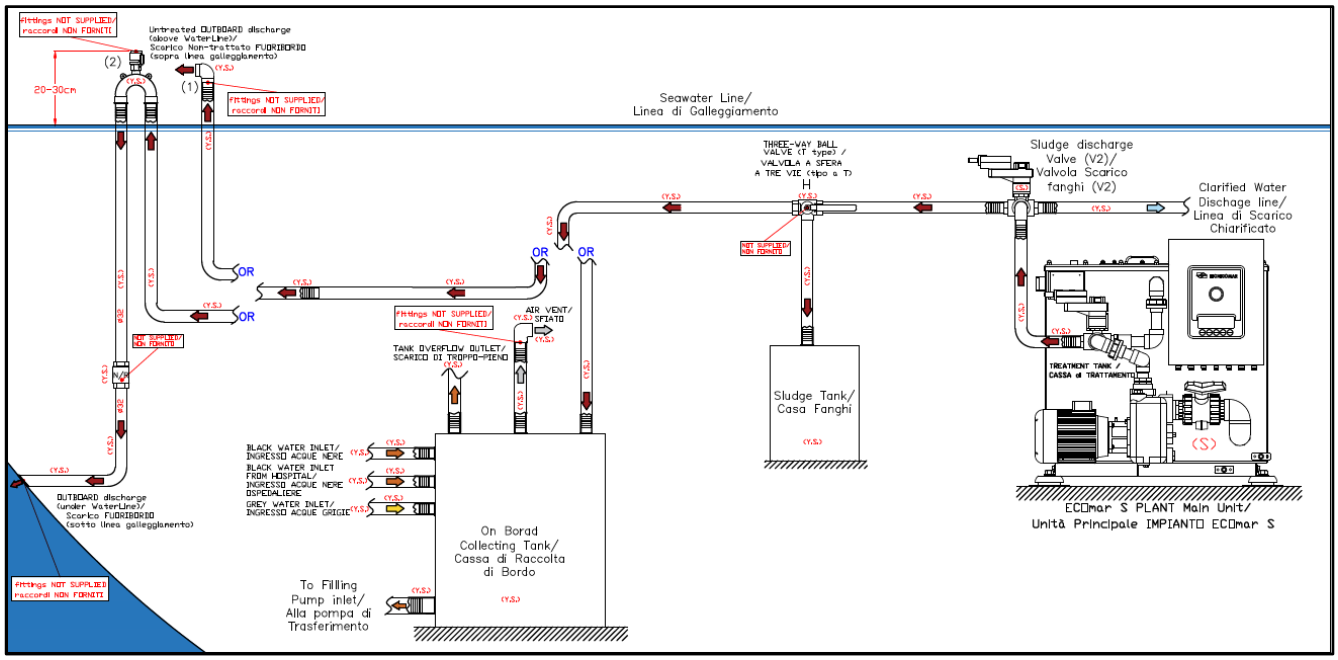


Fig. 12.2 – Treatment Tank Emptying flow diagram

12.3 Winterizing procedure

When the ECOmar S plant has to be stored or set out of service for a long period, it is necessary to perform a special winterizing procedure to avoid any problem at any further system start up and to preserve the plant components and performance.

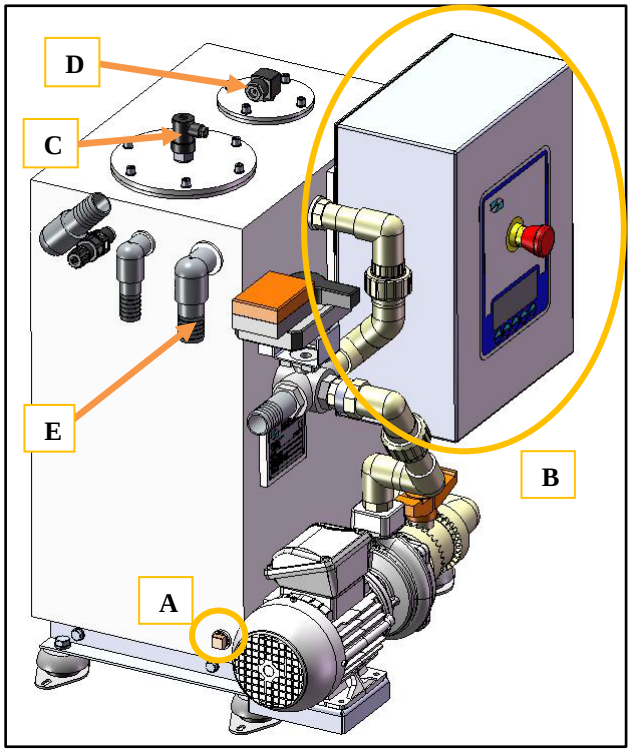
To perform a Winterizing procedure for the ECOmar S STP follow the steps, listed below:

1. Empty completely the system, no liquids presence may remain inside any parts of the system;
   1.1. Activate necessary treatment cycles to empty the collecting tank (your supply);
   1.2. Switch the system to manual mode as described in the **Manual mode** section;
   1.3. Activate the macerating pump till the pump is suctioning air (recognizable by a different noise), to totally empty the Treatment Tank. Otherwise it is possible to verify the tank emptying, by checking from the inspection flange;
   1.4. Use the drain plug (item **A** on the picture below), located at the bottom of the tank to discharge any residue;
2. Empty all the hoses connected to the ECOmar S STP;
3. Empty all the system pumps unscrewing the plugs located at the bottom of the pump body, with a suitable wrench;

4. Empty the dosing pumps of both the supplied dosing system (H_2O_2 and ECOFLOC);
5. Empty and clean well the tanks both the supplied dosing system (H_2O_2 and ECOFLOC);
6. Close all the insolation valves installed for each loose supplied parts, if any;
7. Empty the sump of the safe filter (refer to the **MAINTENACE INSTRUCTIONS** section) of the U.V. Sterilizing system, remove and the bag cartridge and re-install the sump;
8. Empty the radiation chamber and uninstall all the related U.V. lamps and quartz sleeves (refer to the **MAINTENACE INSTRUCTIONS** section) and store them in a safe place at a temperature from 0°C to 50°C;

DANGER: Quartz tubes are fragile and may cause serious injury when broken. Consequently they must be handled with care, protecting the hands by wearing gloves that guarantee adequate protection.

9. Empty each of the tank of the Multimedia Filter Station (refer to the **MAINTENACE INSTRUCTIONS** section);
10. Close all the pump inlet valves, i.e. valve between collecting tank and filling pump, valve between sea water inlet and sea water pump. And be sure pipes and valves are completely empty;
11. If the temperature exceeds -30÷60 °C range, remove the Main Control Box (item **B** on the picture below) from the Main Unit, disconnecting all cables through the cable glands and store it in a safe place at a temperature from -30°C to 60°C.
12. If the temperature exceeds -20÷200 °C range, disconnect all the level sensors (item **D** on the picture below) installed on the treatment tank and store in a safe place at a temperature from -20÷200 °C.
13. If the temperature exceed -40÷80 °C range, uninstall the motorized actuator (item **E** on the picture below) of the Discharge Valve (V1), and store it in a safe place at a temperature from -40°C to 80°C.
14. If the temperature exceed 1÷80 °C range, uninstall the pressure switch (item **C** on the picture below) installed on the treatment tank (only for the plants with the tank in PP), and store it in a safe place at a temperature from 1°C to 80°C.



15. **Fig. 15.1-1 – ECOmar S main unit**

16. If the temperature exceeds 5÷40 °C range, uninstall both the supplied dosing system (H_2O_2 and ECOFLOC) and store them in a safe place at a temperature from 5°C to 40°C.
17. The storage temperature of the H_2O_2 solution must be that indicated in the relative safety data sheet and it may never be exposed to direct sunlight or to high humidity conditions. If any abnormal condition, indicated in the safety data sheet, occurs the solution is no longer effective, therefore replace the chemical solution (refer to the item safety data sheet).
18. The storage conditions and temperature of the supplied ECOFLOC must be those indicated in the related safety data sheet. If any abnormal condition, indicated in the safety data sheet, occurs the ECOFLOC is no longer effective, therefore replace the chemical mixture (refer to the item safety data sheet).
19. If the temperature exceed -40÷80 °C uninstall the motorized actuator of the Sludge Discharge Valve (V2), and store it in a safe place at a temperature from -40°C to 80°C;
20. If the temperature exceed 5÷45°C uninstall the Multimedia Filter Station, and store in a safe place at a temperature from 5°C to 45°C.
21. The storage conditions of the fine and coarse Quartzite must be those indicated in the related safety data sheet. If any abnormal condition, indicated in the safety data sheet, occurs the media is no longer effective, therefore replace the media (refer to the item safety data sheet).

22. The storage conditions of the Zeolite must be those indicated in the related safety data sheet. If any abnormal condition, indicated in the safety data sheet, occurs the media is no longer effective, therefore replace the media (refer to the item safety data sheet).
23. If the temperature exceed 0÷50 °C uninstall the U.V. Sterilizing System, and store in a safe place at a temperature from 0°C to 50°C;
24. If the temperature exceeds 30÷60 °C range, store all the supplied Level Probe Control Box in a safe place at a temperature from -30°C to 60°C.
25. If the temperature exceeds 1÷100 °C range, uninstall the supplied level probes from the collecting tank and store them in a safe place at a temperature from 1°C to 100°C.
26. Unscrew all screws obtaining a moment of torque up to 10-12 Nm, if out of 0÷55 °C temperature range.

12.3.1 Washing the treatment tank

Periodic cleaning of the Main Unit Treatment Tank is recommended (at the end of the season or when you plan a long period shut down for the ECOmar S STP, however, depending on the state of scale deposited) to avoid possible deposits of solid material that may hinder the correct operation of the plant.

To perform a Treatment Tank cleaning procedure, follow the steps listed below:

1. Go to the main page of the Main Control Box (refer to **Manual mode** section);
2. Set the plant in manual mode by pushing the ▼/F2-MAN key (refer to **Manual mode** section);
3. Go to "*3-WAY VALVE V1*" page, and then open the valve by setting it to ON (refer to **Manual mode** section);
4. Wait for the complete opening of the three-way valve (about 40 seconds).
5. Go to "*3-WAY VALVE V2*" page, and then open the valve by setting it to ON (refer to **Manual mode** section);
6. Wait for the complete opening of the three-way valve (about 40 seconds).
7. Go to "*SEAWATER PUMP*" page, and then starts the sea water pump, setting it ON (refer to **Manual mode** section);
8. Wait for no longer than 30-40 seconds to allow the washing of the ECOmar S treatment tank by the sea water pump;
9. Stop the sea water pump, setting it OFF (refer to **Manual mode** section);
10. Make sure that a your supply 3-way ball valve (H) , installed between the sludge discharge outlet of the Sludge Discharge Valve (V2) and the inlet of the Sludge tank, is correctly connected to the collecting tank or to an outboard discharge (the untreated liquid can be discharged overboard only when permitted by the IMO/MARPOL regulation).
11. Set the 3-way ball valve (H) (refer to the ***Emptying the treatment tank procedure***), in the discharge position;
12. Go to "*MACERATING PUMP*" page, and then start up the pump, setting it ON (refer to **Manual mode** section);
13. Then wait until the tank is full empty, checking the liquid level inside from the inspection flange installed on the top of the treatment tank of the ECOmar S Main Unit (refer to attached G.A. drawing);
14. Stop the macerating pump, setting it OFF (refer to **Manual mode** section);
15. Check the inside of the treatment tank and repeat steps 7 to 13 of this procedure, if necessary;
16. Close the three-way valve (V1), by setting it OFF (refer to **Manual mode** section);
17. Close the three-way valve (V2), by setting it OFF (refer to **Manual mode** section);
18. Set the 3-way ball valve (H) (refer to the ***Emptying the treatment tank procedure***), in the operation position;
19. Return to the system main page (refer to **Manual mode** section).

At this point the treatment tank is clean and the ECOmar S plant is ready for start the normal operation.

12.3.2 Washing the Level Sensor of the treatment tank

When you plan a long period shut down for ECOmar S plant, it is recommend to perform a cleaning of the level sensors installed on the Treatment Tank of ECOmar S Main Unit.

If the plant is supplied with a Multi-level (ball type) Sensor (ECOmar 20 S-32 S-45 S-70 S-145 S); to clean the level probe installed inside the ECOmar S treatment tank, remove it from the top of the treatment tank, by uninstall the relative flange (refer to the attached G.A. drawing) and disconnect it form the Main control Box. Once the multi-level probe is removed from the system, accurately wash it with fresh water. Finally re-install the Multi-level probe on the tank and connect it to the Main Control Box (refer to attached Electrical Connection Diagrams).

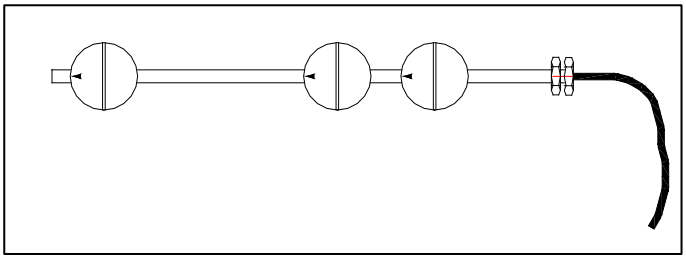


Fig. 12.3.2-1 – Multi-level sensor installed on the Treatment Tank for ECOmar 20 S- 32 S - 45 S - 70 S – 145 S

13 COMMON PROBLEMS AND TROUBLESHOOTING

This section deals with the most common faults that may occur for an ECOmar S STP.

NOTE: This section concern only the standard supply configuration of the ECOmar S STP for the optional items troubleshooting, refer to the specific item manual.

Some occurrences may have many different causes. For each symptom, one or more causes are given. In turn, each cause has one or more corresponding tests to help to identify whether the occurrence cause is the correct one. When the tests have confirmed the source of the problem, the appropriate remedies are given to correct it.
There may be more than one cause of a problem. The tests given are designed to determine whether or not the cause of the problem is the correct one. When diagnosing the causes of a problem in this case, eliminate the listed causes one by one until the correct cause is found. Then the appropriate remedy has to be performed.
Diagnosing and correcting the various faults in this manner, makes troubleshooting easier and less time consuming.

Warning: *before opening any electrical box remember to un-power the unit.*

If it is necessary, stop the unit by the Emergency Stop button located on control panel. Before re-starting the system, turn clockwise the Emergency Stop button to release it.

However remember that the shut-down of the unit implies the reset of any cycle and relative timers in progress. So in case of failures you can stop the system but on re-starting it, you have to re-enter the operation mode. If it was in automatic mode the unit will start again by itself from the interrupted step, but the timers will be anyway reset.

13.1 Troubleshooting Table

SYMPTOM	POSSIBLE CAUSES	VALIDATION CHECKS	REMEDY
Excessive noise and vibrations.	System pulsation.	Filling/Seawater pump cavitation.	Check the Filling /Seawater pump correct priming and the presence of any leaks or restrictions on their suction piping, and correct it.
		Worn seals of any pump (filling, seawater, macerating).	Replace pumps (filling, seawater, macerating) seals.
	Air presence inside any plant circuit.	Check the presence of any air inlet all along the piping lines (*filling*, *seawater*, *sludge discharge*, *clarified water discharge*) connected to system.	Pressurize the affected circuit (*filling*, *seawater*, *sludge discharge*, *clarified water discharge*), by filling it activating the relative pump (refer to **Manual mode** section). This operation will help to eliminate the infiltrated air.
The system shuts down for **FILLING ALARM** fault. (*The display shows the FILLING ALARM screen*).	Min. Level Sensor of the Treatment Tank malfunctioning.	Check if the floating element of the min. level sensor is stuck.	Clean the level sensor and re-install it.
		Check if the min. level sensor works correctly giving the correct free voltage signal.	Repair or replace the level sensor.
	Each supplied Filling Pump malfunctioning.	Check that all the valves installed along each pump suction / delivery line are open.	Open all the valves installed along each filling pump suction / delivery piping.
		Check the correct installation of filling anti-syphon valve sets.	Correct the installation of anti-syphon valve sets along each pump delivery line.
		Check if each filling pump is, correctly primed.	Ensure each filling pump is correctly primed, filling it before start the system.
		Check all along each filling line piping for any leaks, air infiltration or blockages.	Restore and well tighten the piping section interested by any leakage, blockage or air infiltration.
		Check that the rotation direction of each filling pump is correct. (*Only for three-phase systems*).	Correct the rotation direction by inverting the electrical connections of the motor two phases on the main control box or on each pump terminal box.
		Check each supplied filling pump for any blockage or malfunctioning.	Repair or replace each supplied pump.
	Broken control box.	All previous checks have not been successful.	Repair or replace the main control box.

The system shuts down for **SEAWATER ALARM** fault. (*The display shows the SEAWATER ALARM screen*).	Max. Level Sensor of the Treatment Tank malfunctioning.	Check if the floating element of the max level sensor is stuck.	Clean the level sensor and re-install it.
		Check if the max level sensor works correctly giving the correct free voltage signal.	Repair or replace the level sensor.
	Seawater Pump malfunctioning.	Check that all the valves installed along the pump suction line are open.	Open all the valves installed along seawater pump suction piping.
		Check the correct installation of seawater anti-syphon valve set.	Correct the installation of anti-syphon valve set along the pump delivery line.
		Check if the seawater pump is, correctly primed.	Ensure seawater pump is correctly primed, filling it before start the system.
		Check all along the filling line piping for any leaks, air infiltration or blockages.	Restore and well tighten the piping section interested by any leakage, blockage or air infiltration.
		Check that the rotation direction of the seawater pump is correct. (*Only for three-phase systems*).	Ccorrect the direction of rotation by inverting the electrical connections of the motor two phases on the main control box or on the pump terminal box.
		Check the seawater pump for any blockage or malfunctioning.	Repair or replace the pump.
	Broken control box.	All previous checks have not been successful.	Repair or replace the main control box.
The system shuts down for **SLUDGE TANK OVERFLOW ALARM** fault. (*The display shows the SLUDGE TANK OVERFLOW ALARM screen*).	Sludge Tank Overflow.	Check the liquid level inside the sludge collecting tank.	Empty the tank according the IMO/MARPOL regulation.
	Sludge tank level sensor (your supply) malfunctioning.	Check if the level sensor is correctly installed on the sludge tank; and adequately connected to the Main Control Box.	Install the sensor in a suitable way and make the correct electrical connections.
		Check if the floating element of the level sensor is stuck.	Clean the level sensor and re-install it.
		Check if the level sensor works correctly giving the correct free voltage signal.	Repair or replace the level sensor.
	Broken control box.	All previous checks have not been successful.	Repair or replace the main control box.
The system shuts down for **TANK OVERFLOW ALARM** fault. (*The display shows the TANK OVERFLOW ALARM screen*).	Treatment Tank Overflow.	Check the liquid level inside the treatment tank of the Main Unit.	Verify the correct installation of the filling and seawater anti-syphon valve sets and correct it. Perform an emptying the treatment tank procedure (refer to **SPECIAL PROCEDURE** section).
	Absolute Max. Level Sensor of the Treatment Tank malfunctioning.	Check if the floating element of the absolute maximum level sensor is stuck.	Clean the level sensor and re-install it.
		Check if the absolute max level sensor works correctly giving the correct free voltage signal.	Repair or replace the level sensor.
	Broken control box.	All previous checks have not been successful.	Repair or replace the main control box.

The system shuts down for **OVERLOAD ALARM** fault. (*The display shows the OVERLOAD / HIGH PRESSURE ALARM screen*).	Wrong settings of the black switch button of the circuit switch breakers.	Verify that black switch button of the circuit switch breakers, installed inside Main Control Box, is in OFF position, with the switch button pushed out from the switch circuit breaker.	Set the black switch button of the circuit switch breakers, in ON position, with the switch button pressed inside the switch circuit breaker; by pushing the black switch button.
	Incorrect settings of the circuit switch breakers threshold.	Check the threshold setting value of the circuit switch breakers, installed inside the Main Control Box.	Operate on the circuit switch breakers to set the threshold to the correct value shown on the attached Test Report.
	Circuit switch breakers keep tripping.	Short circuit of the system.	Solve the system short circuit.
		Circuit switch breakers unusable or of incorrect rating.	Replace the circuit switch breaker.
	Wrong power supply voltage.	Verify the match between the voltage of the power supply line and the ECOmar S STP admissible voltage.	Power the plant with a voltage suitable to that indicated on the system nameplate; or if it is not possible, replace the ECOmar S STP with one suitable with the power supply line voltage.
	Any filling pump overload.	Check the absorption of each supplied filling pump.	Individuate the pump overload cause and solve it.
	Seawater pump overload.	Check the absorption of the seawater pump.	Individuate the pump overload cause and solve it.
	Macerating pump overload.	Check the absorption of the macerating pump.	Individuate the pump overload cause and solve it.
	Broken control box.	All previous checks have not been successful.	Repair or replace the main control box.
The system shuts down for **HIGH PRESSURE ALARM** fault*. (*The display shows the OVERLOAD / HIGH PRESSURE ALARM screen*).	Wrong settings of the black switch button of the circuit switch breakers.	Verify that black switch button of the circuit switch breakers, installed inside Main Control Box, is in OFF position, with the switch button pushed out from the switch circuit breaker.	Set the black switch button of the circuit switch breakers, in ON position, with the switch button pressed inside the switch circuit breaker; by pushing the black switch button.
	Wrong or inefficient ventilation of the treatment tank.	Check the presence of any obstructions or blockage in the air relief or along the vent line.	Remove any obstructions from the air relief and leave it as free as possible. Remove any obstructions from the vent line and leave it as free as possible.
	Pressure switch malfunctioning.	Check the correct setting of the pressure switch threshold.	Calibrate the pressure switch to the value reported in the attached Test Report (refer to **Alarms Description** section).
		Check if the pressure switch works correctly giving the correct free voltage signal.	Repair or replace the pressure switch.
	Broken control box.	All previous checks have not been successful.	Repair or replace the main control box.
The ECOmar S STP starts up, but there is no or low quality visualization on the display.	The display need contrast calibration.	Open the main control box and check the display contrast calibration, by acting on the trimmer P2.	Re-calibrate the display contrast by acting on the trimmer P2 installed on the rear side of the P.C.B. PRO14 (refer to the **MAINTENANCE INSTRUCTIONS** section).
	Incorrect settings of the display backlight.	Check the set value of the "*Display Backlight Timer*" parameter on the parameter programming page.	Set properly the "*Display Backlight Timer*" parameter (refer to parameters programming procedure).
	Broken control box.	All previous checks have not been successful.	Repair or replace the main control box.

* Only for ECOmar S supplied with Treatment Tank in PP.

The unit is powered correctly and set in *automatic mode*, with System Running visualization on the screen, but it does not start.	Collecting Tank Level Probes malfunctioning.	Check the correct installation and electrical connections of each supplied level probe.	Referring to attached connections diagrams, ensure each supplied sensor is correctly installed and connected.
		Check if each supplied level probe works correctly giving the correct level signals to the related level probe control box, checking the level probe control box outputs (refer to attached Electrical Drawings).	Clean, repair or replace each supplied level sensor.
	Level Probe Control Box malfunctioning.	Check the correct installation and electrical connections of each level probe control box.	Referring to attached connections diagrams, ensure each supplied level probe control box is correctly installed and connected.
		Check firstly that 1st collecting tank has reached the MAX level and then check that the contact of the max level sensor is closed. In the system status menu (third page) check IN7 (max storage tank) and IN8 (min storage tank) to be respectively 1 and 0. Repeat the same checks for the 2nd collecting tank (if provided) verifying that IN2 and IN5 are respectively 1 and 0 (refer to **Automatic mode** section).	Repair or replace each supplied level probe control box.
	Broken control box.	All previous checks have not been successful.	Repair or replace the main control box.
There is no or low flow throughout the clarified water outboard discharge.	Safe filter clogged.	Open the safe filter installed on the U.V. Sterilizing System, and check the status of the bag cartridge, installed inside.	If necessary, empty and clean the bag cartridge or replace it.
	Multimedia Filter Station clogged.	Check if the reading value of the inlet pressure, measured by the pressure gauge is 30% higher than the value measured at the plant first start-up.	Perform a backwash of the Multimedia Filter Station (refer to **MAINTENACE INSTRUCTIONS** section).
		Check if after performing a backwash procedure the reading value of the inlet pressure, measured by the pressure gauge is still 30% higher than that measured at plant first start-up.	Replace Zeolite, coarse and fine Quartzite of the Multimedia Filter Station (refer to **MAINTENACE INSTRUCTIONS** section).
	Long distance piping or high required delivery head for the clarified water discharge.	All previous checks have not been successful.	The installation of a supplementary booster pump between the clarified water outlet of the Sludge Discharge Valve (V2) and the clarified water outboard discharge is required.

The treated and discharged water are dark.	H_2O_2 Dosing System malfunctioning.	Verify that the H_2O_2 dosing pump and the Dosing Timer parameter are correctly set.	Set the Dosing Timer parameter and the dosing pump flow regulation (refer to **MAINTENACE INSTRUCTIONS** section) to the correct values shown on the attached Test Report.
		Check if the tank of the H_2O_2 Dosing System is empty.	Refill the H_2O_2 tank (refer to the **INSTALLATION** section).
		Set system in manual mode and verify that when set dosing pumps ON it correctly activates.	Repair or replace the dosing pump.
	ECOFLOC Dosing System malfunctioning.	Verify if the ECOFLOC dosing pump and the Dosing Timer parameter are correctly set.	Set the Dosing Timer parameter and the dosing pump flow regulation (refer to **MAINTENACE INSTRUCTIONS** section) to the correct values shown on the attached Test Report.
		Check if the tank of ECOLOC Dosing System is empty.	Refill the ECOFLOC tank (refer to the **INSTALLATION** section).
		Set system in manual mode and verify that when set dosing pumps ON it correctly activates.	Repair or replace the dosing pump.
	Safe filter clogged.	Open the safe filter installed on the U.V. Sterilizing System, and check the status of the bag cartridge, installed inside.	If necessary, empty and clean the bag cartridge or replace it.
	Multimedia Filter Station clogged.	Check if the reading value of the inlet pressure, measured by the pressure gauge is 30% higher than the value measured at the plant first start-up.	Perform a backwash of the Multimedia Filter Station (refer to **MAINTENACE INSTRUCTIONS** section).
		Check if after performing a backwash procedure the reading value of the inlet pressure, measured by the pressure gauge is still 30% higher than that measured at plant first start-up.	Replace Zeolite, coarse and fine Quartzite of the Multimedia Filter Station (refer to **MAINTENACE INSTRUCTIONS** section).
	Wrong set of Discharge Timer parameter.	Open the inspection flange of treatment tank and verify if some sludge is discharged during the clarified discharge.	Adjust the Discharge Timer parameter setting value according to the plant on board installation condition.

The *Discharge Valve (V1)* does not open/close.	Motorized valve malfunctioning.	Check if the rotation direction of the actuator* is correctly set (refer to the **FIRST START UP PROCEDURE** section).	Set the rotation direction of the actuator to Y2 (refer to the **FIRSAT START UP PROCEDURE** section).
		Check if the valve actuator* is set in manual mode (refer to the **Manual opening activation for motorized valves** section).	Set the actuator in the automatic mode (refer to the **Manual opening activation for motorized valves** section).
		Check the correct installation and electrical connections of the Discharge Valve (V1).	Referring to attached flow and connections diagrams, ensure the valve is correctly installed and connected.
		Check if manually operating the three-way valve (refer to the **Manual opening activation for motorized valves** section), the valve rotation is blocked.	Unblock or replace the three-way valve.
		Set the system in manual mode and verify that when set valve (V1) ON it will not activate (refer to **Manual mode** section).	Repair or replace the motorized actuator.
	Broken control box.	All previous checks have not been successful.	Repair or replace the main control box.
The *Sludge Discharge Valve (V2)* does not open/close.	Motorized valve malfunctioning.	Check if the rotation direction of the actuator* is correctly set (refer to the **FIRST START UP PROCEDURE** section).	Set the rotation direction of the actuator to Y2 (refer to the **FIRSAT START UP PROCEDURE** section).
		Check if the valve actuator* is set in manual mode (refer to the **Manual opening activation for motorized valves** section).	Set the actuator in the automatic mode (refer to the **Manual opening activation for motorized valves** section).
		Check the correct installation and electrical connections of the Discharge Valve (V2).	Referring to attached flow and connections diagrams, ensure the valve is correctly installed and connected.
		Check if manually operating the three-way valve (refer to the **Manual opening activation for motorized valves** section), the valve rotation is blocked.	Unblock or replace the three-way valve.
		Set the system in manual mode and verify that when set valve (V2) ON it will not activate (refer to **Manual mode** section).	Repair or replace the motorized actuator.
	Broken control box.	All previous checks have not been successful.	Repair or replace the main control box.

13.1.1 Manual opening activation for motorized valves

When the Discharge Valve (V1), the Sludge Discharge Valve (V2) or both the valves ore blocked or do not automatically open for any other cause, it will be necessary to perform a Valve Manual Opening procedure on the valve that faults.

To perform a Valve Manual Opening procedure follow the steps, listed below:

1. Press the appropriate black button on the top of the actuator and block it in this position (refer to figure below);
2. Then work manually on the lever of the valve and turn it manually, using the lever extension supplied with the plant;
3. Finally reset the actuator in automatic mode by pressing and release the black button (refer to figure below).

* For every ECOmar S model, except ECOmar 545 S. For ECOmar 545 S ignore this step.

You can also operate on the lever while pressing the black button, without blocking it (refer to figure below).

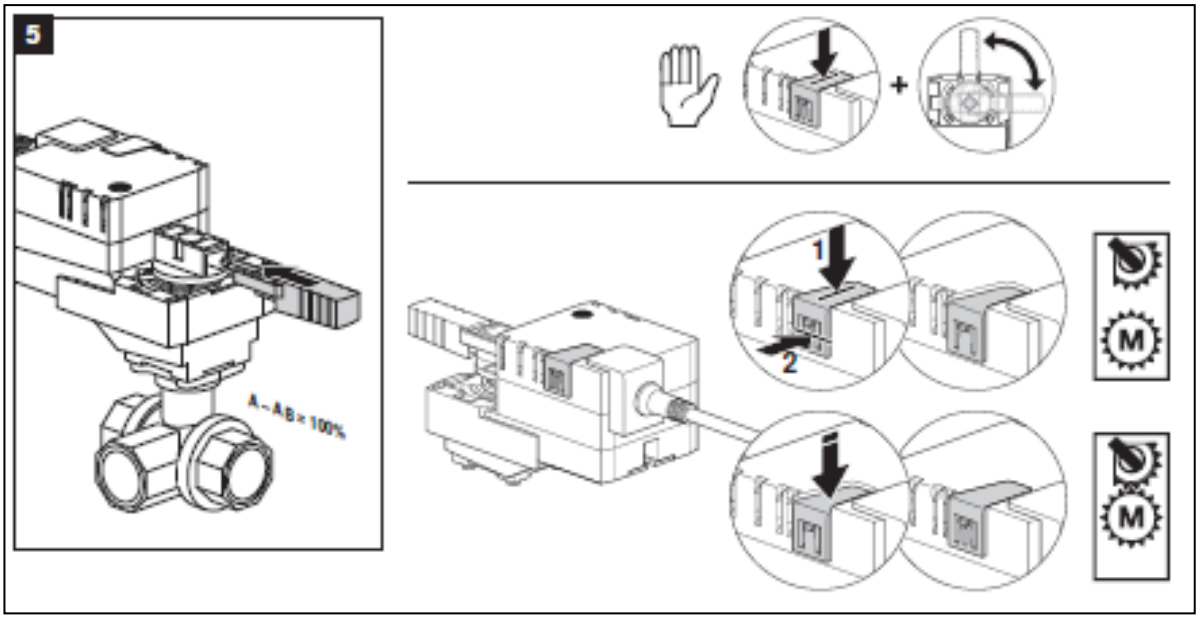


Fig. 13.1.1-1 –Manual opening activation for motorized valves V1 & V2 (ECOmar 20 S-32 S -45 S-70 S-145 S)

14 MAINTENANCE INSTRUCTIONS

The ECOmar S STP requires some ordinary and extraordinary maintenance.

NOTE: This section concern only the standard supply configuration of the ECOmar S STP for the optional items maintenance, refer to the specific item manual.

Some components of the ECOmar S STP, such us the *bag cartridge* of the *safe filter* of the *U.V Sterilizing System*, need to be periodically cleaned and replaced (*ordinary maintenance*). Other safety components, such as the *3-way solenoid valves* and the *seawater pump*, need no periodic maintenance but must be checked periodically and maintained only if necessary (*extraordinary maintenance*). Moreover some electrical devices, such as the *Dosing Pumps*, may need some *calibration*. Periodically perform the following maintenance instructions to ensure a safe use and longer life to the ECOmar S plant.

14.1 Ordinary Maintenance

The components of the ECOmar S STP, that require periodic ordinary maintenance, are the H_2O_2 Dosing System, the ECOFLOC Dosing System, the Multimedia Filter Station and the U.V. Sterilizing System. However it is recommended to daily perform a general check and inspection of the whole plant.

14.1.1 H2O2 Dosing system

While the ECOmar S STP is operating periodically check that the dosing pump is correctly running; if it is not running verify the cause of the problem (refer to the **Extraordinary Maintenance** section), fix it and restart the pump.

ATTENTION: If the chemical solution inside the tank ends up, the dosing pump continues to run and the ECOmar S STP will continue to run without treating the sewage. To restore the plant correct functioning fill the tank. The pump will automatically re-start to inject the chemical solution inside the treatment tank.

Check daily the level of the H_2O_2 solution inside the tank; and refill it (refer to the **Transfer of H_2O_2 solution** section) before the liquid inside the tank ends up. The periodic check of tank chemicals level is essential to avoid the plant operating without the addition of H_2O_2 solution; because it will bring to a sewage treatment failure. Sewage treatment is not possible without the addition of any of the two chemical solutions.
The H_2O_2 solution consumption depends on the system running period, on the ECOmar S supplied model, on the relative dosing pump flow regulation and on the setting value of the Dosing Timer parameter.
Here below a table with the indicative plant consumption of H_2O_2 solution:

Model	Valve Regulation* (%)	Timer* (sec.)	Indicative consumption† (liters/month)
ECOmar 20 S	40 %	26	20÷75
ECOmar 32 S	40 %	40	30÷120
ECOmar 45 S	40 %	50	40÷165
ECOmar 70 S	54 %	60	60÷260
ECOmar 145 S	54 %	137	115÷530

Table 14.1.1 – H2O2 dosing system consumption table

14.1.2 ECOFLOC Dosing system

While the ECOmar S STP is operating periodically check that the dosing pump is correctly running; if it is not running verify the cause of the problem (refer to the **Extraordinary Maintenance** section), fix it and restart the pump.

ATTENTION: If the chemical solution inside the tank ends up, the dosing pump continues to run and the ECOmar S STP will continue to run without treating the sewage. To restore the plant correct functioning fill the tank. The pump will automatically re-start to inject the chemical solution inside the treatment tank.

Check daily the level of the ECOFLOC solution inside the tank; and refill it (refer to the **Transfer of ECOFLOC solution** section) before the liquid reach the minimum level of the tank. The periodic check of tank chemicals level is essential to avoid the plant operating without the addition of ECOFLOC solution; because it will bring to a sewage treatment failure. Sewage treatment is not possible without the addition of any of the two chemical solutions.
The H_2O_2 solution consumption depends on the system running period, on the ECOmar S supplied model, on the relative dosing pump flow regulation and on the setting value of the Dosing Timer parameter.
Here below a table with the indicative plant consumption of ECOFLOC solution 20%:

* Refer to attached Test Report
† Max value refer to plant continuous functioning (24h/24h). Min value refer to plant operating 160 hours a month.

Model	Valve Regulation* (%)	Timer* (sec.)	ECOFLOC indicative consumption† (liters/month)	ECOLOC solution 20% Indicative consumption† (liters/month)
ECOmar 20 S	21 %	26	2÷10	10÷40
ECOmar 32 S	21 %	40	3÷12	13÷62
ECOmar 45 S	21 %	50	4÷18	18÷84
ECOmar 70 S	27 %	60	6÷28	30÷132
ECOmar 145 S	27 %	137	12÷54	60÷270

Table 14.1.2 – ECOFLOC dosing system consumption table

14.1.3 Multimedia Filter Station

While the ECOmar S STP is operating periodically check the reading value of the pressure gauge, installed on the Multimedia Filter Station; if it is higher than the 30% of the value recorded during first start-up (refer to **FIRST START UP PROCEDURE** section) the Multimedia Filter Station needs that a backwash procedure is performed.

ATTENTION: Ensure to record the pressure gauge reading value (start-up pressure) during initial operation.

After a period of time, the accumulated dirt and debris in the filter causes a resistance to flow, and the flow diminishes. The filter pressure drop (and as a consequence the pressure gauge readings) will start to increase and the flow throughout the Multimedia Filter Station will start diminishing. When the inlet pressure is 30% higher than the initial inlet pressure value, recorded during plant first start-up, it is time to backwash (clean) the system. A periodic backwashing will prevent packing, reclassifying the Multimedia Filter Station bed and maintaining high flow rates. During BACKWASH, the water flow is automatically reversed through the filter so that it is directed to the bottom of the filter vessel, up through all the installed media, flushing the previously trapped dirt and debris out the waste line.

To perform a Multimedia Filter Station BACKWASH procedure follow the steps listed below:

- Make sure that any water flow throughout the Multimedia Filter Station is not allowed.
- Set all the head valves of the Multimedia Filter Station into the "*BACKWASH*" position (refer to attached P&ID diagram);
- Set all 3-way manual valves of Multimedia Filter Station into "*BACKWASH*" position (refer to attached P&ID diagram);
- Start the flow the through the Multimedia Filter Station, by opening the isolation valve (your supply) installed on the fresh not-chlorinated water inlet; thus letting fresh not-chlorinated water pass throughout Multimedia Filter Station;
- Let the fresh not-chlorinated water flow through the Multimedia Filter Station (checking that there is no water leaks or air infiltrations) for about 5 minutes, according to the backwash discharge conditions;
- Stop the water flow throughout the Multimedia Filter Station, by closing the isolation valve (your supply);
- Reset all the Multimedia Filter Station valves into the *"OPERATION"* position (refer to attached P&ID diagram).

14.1.4 U.V. Sterilizing System

With the time and the use, the bag cartridge inside the safe filter, installed on the U.V. Sterilizing system inlet, may wear out or clog; in this cases, it is advisable to replace the bag cartridge inside the filter. The necessity and frequency of replacing the bag cartridge depends on the treated water characteristics. As line guide replace the filter cartridge every year.

To replace the bag cartridge, follow the steps listed below:

- Shut down the U.V. sterilizer, by pushing the System On Button on its control box;
- Stop the water flow through the U.V. Sterilizing System;
- Drain totally the water inside the safe filter;
- While holding the sump from the bottom, unscrew it using the supplied SW wrench, until it comes off.
- Empty the sump and take out the bag cartridge;
- Clean the sump inside. Use neutral detergents (Ph. = 7) to prevent damage to the sump;
- Replace the bag cartridge and make sure that the O-ring is well set and lubricated (use silicon grease);
- Reinstall the sump, tightening it manually;
- Restore the water flow through the U.V. Sterilizing System;
- Start the U.V. sterilizer, by pushing the System-On Button on its control box.

With the time and the use, the U.V. lamps inside the sterilizer may wear out, in this cases, it is advisable to replace the lamps.

* Refer to attached Test Report
† Max value refer to plant continuous operation (24h/24h). Min value refer to plant operating 160 h/month (only ECOFLOC).

DANGER: The light of the ultraviolet lamps may cause serious burns to the skin and eyes if not protected, we therefore recommend that you do not connect the appliance to the electricity supply until the UV lamp has been mounted in its casing with the protective coverings. You must therefore strictly avoid looking at the lamps when on, or else wear goggles specifically designed to offer protection from UV rays.

To replace the U.V. lamps, follow the steps listed below:

- Shut down the U.V. sterilizer, by pushing the System On Button on its control box;
- Stop the water flow through the sterilizer;
- Switch off the U.V. Sterilizer external power supply;
- Loosen the cable gland, ensuring that you do not twist the cable;
- Unscrew the cable gland from the collar, ensuring once again that you do not twist the cable;
- Unscrew the PVC collar from the pressure nozzle;
- Detach the white connector from the head of the lamp (it is only pressed in);
- Gently remove the lamp from the quartz tube and put it in a safe place;
- Fir the new lamp;

WARNING: Avoid touching the quartz of the lamp with your fingers so that greasy finger marks are not left on it. If this occurs, clean it using a soft cloth and alcohol.

DANGER: Germicide lamps are fragile and can cause serious injury when broken. Consequently they must be handled with care, protecting the hands by wearing gloves that guarantee adequate protection. They also contain considerable amounts of mercury and must be disposed of in observance of the laws in force.

- Restore the water flow through the U.V. Sterilizing System;
- Start the U.V. sterilizer, by pushing the System-On Button on its control box.

During the normal operation of the system, substances contained in suspension in the water or incrustations due to the precipitation of salts may form on the quartz tube. These deposits prevent the passage of the UV rays and reduce the performance of the system. Therefore you must regularly clean the quartz.

To replace the U.V. lamps, follow the steps listed below:

- Shut down the U.V. sterilizer, by pushing the System On Button on its control box;
- Stop the water flow through the sterilizer;
- Switch off the U.V. Sterilizer external power supply;
- Remove the germicide lamp;
- Drain the sterilization chamber by opening the drainage valve under the chamber;
- Remove the quartz tube;
- Clean the tube using a soft cloth soaked in a cleansing solution suited to the type of deposit;

WARNINGS: The use of soapy water is recommended and, in the case of lime scale, a slightly acid solution, such as a diluted acetic or citric acid solution. Never use sharp or abrasive tools.

- After cleaning, rinse thoroughly with drinking water;
- Refit the quartz and lamp;

DANGER: Lamps and quartz tubes are fragile and can cause serious injury when broken. Consequently they must be handled with care, protecting the hands by wearing gloves that guarantee adequate protection.

- Restore the water flow through the U.V. Sterilizing System;
- Start the U.V. sterilizer, by pushing the System-On Button on its control box.

14.2 Extraordinary Maintenance

Hereafter are described the maintenance operations to carry out, in case of necessity, for the ECOmar S main components.

14.2.1 Collecting Tank level probes instructions

To maintain the probes, supplied for the level monitoring of the collecting tank (your supply) in a good conditions, you have to verify periodically the conditions of the electrodes and their coatings, if the probes are rods type. Otherwise if the system is supplied with the lateral probes, it is recommended to periodically check the condition of the floating element. If necessary, clean each rods or floating element with non-corrosive liquids.

14.2.2 Filling pump instructions

Periodically check that macerating pump works within its field of performance, and that absorbed current shown on nameplate is not exceeded. After plant first start-up, inspections of macerating pump should take place monthly according use conditions. Before any maintenance, disconnect the power supply and make sure the pump cannot be accidentally switched on.

WARNING: When pump is not used, never forget liquid inside pump casing during cold weather! Water may freeze and break the pump casing.

Before restarting the unit, check that the shaft is not jammed and fill the pump casing completely with liquid.
Each 3 months, if necessary, lubricate the mechanical seal. If after seal lubrication, the pump continues to leak replace the seal.
When it is necessary to replace the mechanical seal, clean well, with water or with ethyl alcohol, the seat on the delivery case.

WARNING: Do not use grease, soap, hand cream etc. These products will damage the mechanical seal of the pump.

Each 6 months open the inspection cover or the casing and check inside. Remove possible foreign parts blocked inside the casing. Flush the pump with clean water before draining. Clean the pump and the motor. If necessary, check more frequently.
Each 5-10 years make a general pump recondition.

ATTENTION: Never run the pump dry. Start the pump only after filling completely with liquid. FILL THE PUMP WITH LIQUID BEFORE STARTING. NEVER LET THE PUMP RUN DRY.

14.2.3 Treatment Tank Level probes instructions

To ensure the correct functioning of the plant, it is recommended to make periodic inspections of the probe to check the presence of any incrustations on each floating element; and to clean well the probe to remove the incrustations, if present.

14.2.4 Pressure switch instructions*

The pressure switch installed on the main unit treatment tank is maintenance free. However, tests should be carried out once a year, to verify the correct setting of the pressure threshold (refer to **High Pressure Alarm** section).
If the pressure switch threshold is not that indicated in the attached Test report, it is recommended to re-set it (refer to **High Pressure Alarm** section). If the pressure switch does not work properly, it is recommended to replace it.

14.2.5 Dosing Systems (H_2O_2 & ECOFLOC) instructions

Check each dosing pump operating condition at least every 6 months, pump head position, screws, bolts and seals.
While each dosing pump is running, especially verify the correct setting of the flow regulation knob (refer to the **System Settings** section); and the ignition of the injection pulse LED, of the 100% flow full-scale LED and of the power on LED (refer to the **System Settings** section). Also check the injected solution concentration in the pipework, a reduction of this concentration could be caused by the wearing of the valves, in which case they need to be replaced; or by the clogging of the filter which then has to be cleaned. It is suggested to periodically clean off the hydraulic parts (valves and filter).
Periodically check the tank for any leakage or damage and repair or replace it if necessary.
Check the level of the chemical solution inside the tank, and refill it before the liquid ends up.
While the ECOmar S STP is running periodically check that each dosing pump is correctly running; if it is not running verify the cause of the problem, fix it and restart the pump.
To check the cause of problem, firstly check the correct connection of each dosing pump (refer to attached Electrical Drawings). Then verify the correct setting of the flow regulation knob and of the Dosing Timer parameter. At this point, if the dosing pumps does not still start, press the pump START pump and activate it in manual mode (refer to **Manual mode** section) to verify its functioning. If the problem is still not solved, dismount the suction and discharge valves of the interested dosing pump, clean them and replace. If this check is not successful, check clogging of the filter and clean or replace it clogged or damaged. Finally if all the previous checks have been not successful, the dosing pump is damaged and must be replaced.

14.2.6 Seawater pump instructions

Before any maintenance, disconnect the power supply and make sure the pump cannot be accidentally switched on.
Periodically check that the pump works within its field of performance, and that absorbed current shown on the name-plate is not exceeded. When the pump is located above the water level (suction lift operation), make sure that the suction pipe and the pump are always totally filled with liquid.

ATTENTION: Never run the pump dry. Start the pump only after filling completely with liquid. FILL THE PUMP WITH LIQUID BEFORE STARTING. NEVER LET THE PUMP RUN DRY.

The mechanical seal does not require any preventive maintenance and must be replaced only if the pump is leaking. When the pump is not used, empty it completely if freezing may be expected. Flush the pump with clean water before draining. Remove the drain plug and totally empty the pump.
Before restarting the unit, check that the shaft is not jammed and fill the pump casing completely with liquid.
For pump dismantling close the suction and delivery valves and drain the pump casing before dismantling the pump.
For dismantling and re-assembly see construction in the cross section drawing.

*Only for ECOmar S supplied with Treatment Tank in PP.

14.2.7 Macerating pump instructions

Periodically check that macerating pump works within its field of performance, and that absorbed current shown on nameplate is not exceeded. After plant first start-up, inspections of macerating pump should take place monthly according use conditions. Before any maintenance, disconnect the power supply and make sure the pump cannot be accidentally switched on.

WARNING: When pump is not used, never forget liquid inside pump casing during cold weather!
Water may freeze and break the pump casing.

Each 3 months, if necessary, lubricate the mechanical seal. If after seal lubrication, the pump continues to leak replace the seal.

Each 6 months open the inspection cover or the casing and check inside. Remove possible foreign parts blocked inside the casing. Flush the pump with clean water before draining. Clean the pump and the motor. If necessary, check more frequently. Each 5-10 years make a general pump recondition.

ATTENTION: Never run the pump dry. Start the pump only after filling completely with liquid. FILL THE PUMP WITH LIQUID BEFORE STARTING. NEVER LET THE PUMP RUN DRY.

14.2.8 Three-Way Motorized Valves (V1&V2) instructions

It is recommended to periodically check each of the installed three-way motorized valves (V1 & V2), for any leaks or blockages and repair them, if necessary. Moreover, it is advisable to periodically check the correct functioning of each valve.

If a three-way motorized valve does not work correctly, check:

- The correct electrical connections between the valve and the main control box (refer to attached Electrical Drawings).
- The motorized actuator of the valve is correctly set in the automatic mode.
- The rotation direction of the valve is correctly set to Y2.
- The valve and the connected pipe are clean and free from any blockage.
- The electrical absorption of the valve to be below the max permitted absorption of the valve.
- The electric continuity of the valve circuit for short circuit or coil interrupted.

If after performing all these checks the three-way motorized valve is still malfunctioning, it must be replaced.

14.2.9 Multimedia Filter Station instructions

While the ECOmar S STP is operating periodically check the reading value of the pressure gauge, installed on the Multimedia Filter Station; if it is higher than the 30% of the value recorded during first start-up (refer to **FIRST START UP PROCEDURE** section) the Multimedia Filter Station needs that a backwash procedure is performed.

ATTENTION: Ensure to record the pressure gauge reading value (start-up pressure) during initial operation.

A periodic backwashing will prevent packing, reclassifying the Multimedia Filter Station bed and maintaining high flow rates. If after performing a backwash procedure the Multimedia Filter Station does not restore its performance it may be necessary to replace the media. The media replacement intervals depends on the incoming clarified water and on the flow that passes through the Multimedia Filter Station.
To replace the Multimedia Filter Station content follow the procedures reported below.

MEDIA REMOVING PROCEDURE

- Stop the water flow through the Multimedia Filter Station;
- Prepare a container to collect the exhausted media;
- Remove the manual multiport valve installed on the top of each tank that make up the system, together with all the connected fittings;
- Remove the media, inside each tank by scooping it out through the tank top port, vacuuming it out with a suitable wet/dry shop vacuum or may be flushed out of the filter;
- Rinse the internal piping, especially the top and the bottom diffuser, to remove any traces of media or dirty.

MEDIA FILLING PROCEDURE

- Ensure that each filter is already empty and clean; and that the multiport valve, together with all the connected fittings are removed from each tank;
- Well clean the bottom and the top diffusers and make sure that they are free from scale, before refilling each tank;
- Insert the bottom diffuser complete with the relative pipe inside each tank and center it, before adding any media;
- Slowly pour the appropriate amount of coarse Quartzite into each tank;
- Level the surface of the Quartzite;
- Pour the appropriate amount of Zeolite into the tanks of the 1st stage;
- Pour the appropriate amount of fine Quartzite into the tanks of the 2nd stage.
- Wash away any media or dirt particles in the threads in the top of each tank.
- Re-install the head valve, complete with the relative top diffuser and all the connected piping, on each tank, ensuring each bottom diffuser pipe to the relative head multiport valve;

- Make sure to correct re-connect the Multimedia Filter Station to the system (refer to **INSTALLATION** section);
- Perform a "RINSE" procedure (refer to the **FIRST START UP PROCEDURE** section);
- Set Multimedia Filter Station into "OPERATION" configuration (refer to **FIRST START UP PROCEDURE** section);

Moreover, the pressure gauge, installed on the inlet of the Multimedia Filter Station, is maintenance free, but tests should be carried out on regular basis, using a reference instrument, to guarantee the measuring accuracy of the pressure gauge.
If a pressure gauge does not work properly, it is recommended to clean it. To perform a pressure gauge cleaning procedure, perform the steps listed below:

- Unscrew the pressure gauge from its fittings to remove it from the Multimedia Filter Station.
- Clean the pressure gauge orifice, using a suitable tool and paying attention to not damage the inner part of the gauge as this can cause the internal fluid spillage and gauge breakage.
- Re-install the pressure gauge on the Multimedia Filter Station.

If after performing a pressure gauge cleaning procedure; the pressure gauge is still malfunctioning, replace it.

14.2.10 U.V. Sterilizing System instructions

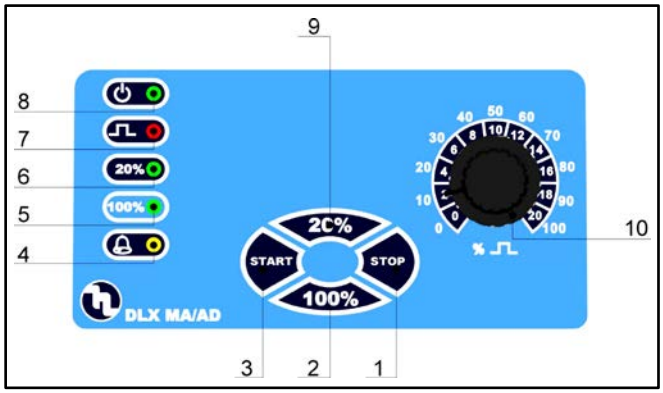
The operation of the U.V Sterilizer is completely automatic and very little maintenance is required. The only vital operations are the regular replacement of the germicide lamps and the cleaning of the protective quartz, according to requirements. In fact, with the time and the use, the U.V. lamps inside the sterilizer may wear out, in this cases, it is advisable to replace the lamps. The real duration of the lamps depends on various factors, such as the number of times the sterilizer is switched on every day and shifts from rated voltage. Under normal operating conditions, the useful life of the lamps can be estimated at between 7,000 and 9,000 hours. However, it is advisable to replace the lamp at least once a year.
During the normal operation of the system, substances contained in suspension in the water or incrustations due to the precipitation of salts may form on the quartz tube. These deposits prevent the passage of the UV rays and reduce the performance of the system. Therefore you must regularly clean the quartz.
It is not possible to indicate the frequency of cleaning. This depends essentially on the quality of incoming water. Should it become necessary to clean the quartz too frequently, consider the use of a pre-treatment process (filtering and/or softening).
However, it is advisable to check the surface of the protective quartz tube at least once a quarter, cleaning it if necessary, to guarantee maximum efficiency of irradiation inside the sterilization chamber at all times.

14.3 System Settings

Some electronic components of the ECOmar S STP may need to be set. For the correct setting procedure of each device follow the instructions reported on the setting instructions section of the specific device, reported below.

14.3.1 H_2O_2 Dosing pump setting

Before operating the H_2O_2 dosing system, it is recommended to check the correct setting of its dosing pump, verifying that the pump flow regulation matches the value reported on the attached Test Report. If the pump flow regulation need adjustment, operate on the pump control panel (refer to the figure below); performing a dosing pump flow regulation procedure.



Pos.	Item Description
1	STOP button
2	100% flow full-scale button
3	START button
4	"Yellow" LED level alarm (if supplied)
5	"Green" LED 100% flow full-scale
8	"Green" LED 20% flow full-scale
7	"Red" LED injection pulse flashing
8	"Green" LED power on
9	20% flow full-scale button
10	Flow regulation knob

Fig. 14.3.1 – H_2O_2 Dosing pump control panel

To perform a dosing pump flow regulation procedure follow the steps listed below:

- Make sure that the pump is power, by checking the power on LED (8) ignition;
- Stop the dosing pump by pushing the STOP button (1), if it is running otherwise ignore this step;
- Press the 100% flow full-scale button (2) and verify the ignition of the 100% flow full-scale LED (5);
- Set pump flow regulation, according to supplied model (refer to table below) by operating on flow regulation knob (10).

Once the dosing pump flow has been set, you have to check the setting of Dosing Timer parameter on the parameter programming page of the Main Control Box (refer to **Main page** section). If the parameter setting value does not match that reported on the attached Test Report (refer to the table below) adjust the parameter setting value (refer to **Main page** section).

Model	Valve Regulation* (%)	Timer* (sec.)
ECOmar 20 S	40 %	26
ECOmar 32 S	40 %	40
ECOmar 45 S	40 %	50
ECOmar 70 S	54 %	60
ECOmar 145 S	54 %	137

Table 14.3.1 – H_2O_2 dosing pump regulation and settings table

14.3.2 ECOFLOC Dosing pump setting

Before operating the ECOFLOC dosing system, it is recommended to check the correct setting of its dosing pump, verifying that the pump flow regulation matches the value reported on the attached Test Report. If pump flow regulation need adjustment, operate on the pump control panel (refer to figure on previous section); performing a dosing pump flow regulation procedure.

To perform a dosing pump flow regulation procedure follow the steps listed below:

- Make sure that the pump is power, by checking the power on LED (8) ignition;
- Stop the dosing pump by pushing the STOP button (1), if it is running otherwise ignore this step;
- Press the 100% flow full-scale button (2) and verify the ignition of the 100% flow full-scale LED (5);
- Set pump flow regulation, according to supplied model (refer to table below) by operating on flow regulation knob (10).

Once the dosing pump flow has been set, you have to check the setting of Dosing Timer parameter on the parameter programming page of the Main Control Box (refer to **Main page** section). If the parameter setting value does not match that reported on the attached Test Report (refer to the table below) adjust the parameter setting value (refer to **Main page** section).

Model	Valve Regulation* (%)	Timer* (sec.)
ECOmar 20 S	21 %	26
ECOmar 32 S	21 %	40
ECOmar 45 S	21 %	50
ECOmar 70 S	27 %	60
ECOmar 145 S	27 %	137

Table 14.3.2 – ECOFLOC dosing pump regulation and settings table

14.3.3 Display Contrast Calibration

To calibrate the contrast of ECOmar S STP display; it is necessary to operate through a suitable screwdriver on the trimmer P2, installed on the rear side of PRO14 printed circuit board of the Main Control Box cover, to optimize the display visibility.

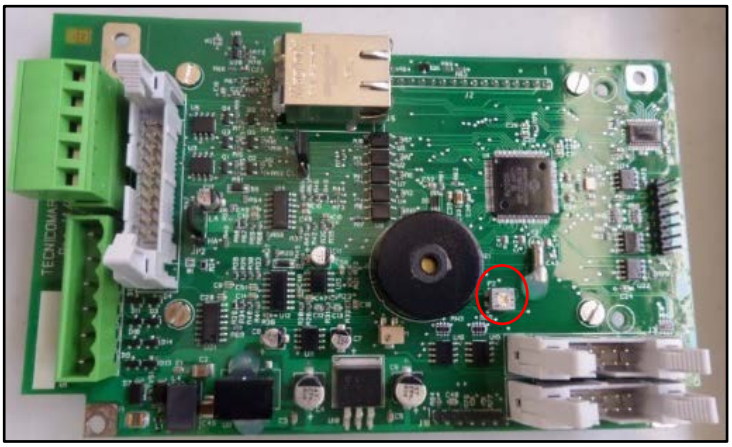


Fig. 14.3.3 (Trimmer P2 on PRO14 P.C.B. rear side)

* Refer to attached Test Report

14.4 MAINTENANCE PLAN FOR SEWAGE TREATMENT PLANT ECOMAR S

P/N	SCHEDULE	COMPONENT	MAINTENANCE ROUTINE	WARNINGS IF NEGLECTED
1	Every day	The whole ECOmar S plant.	System general check and inspection.	Undetected malfunctioning could occur.
2	Every day	▪ Hydrogen Peroxide tank; ▪ ECOFLOC tank.	Check the level of the chemical products. **Note:** The level must never be below 10 cm.	Undetected plant malfunctioning, due to H_2O_2, ECOFLOC or both solutions missing, could occur.
3	Every month / On condition	▪ Hydrogen Peroxide tank; ▪ ECOFLOC tank.	Add chemical products if necessary. **Note:** The level must never be below 10 cm.	Sewage treatment is NOT possible without chemical products.
4	Every month	Air intake	• Check if air is released properly. • Check that air intake is not obstructed. • Check if exhaust pipe is straight in vertical dimension.	Burst of the treatment tank.
5	Every 1-2 months / On condition	Level probe(s) (inside ECOmar S treatment tank)	Uninstall and clean the floating probes, installed on treatment tank.	Dirty probe gives no signal, so in case of no signal to the electronic card then the treatment tank might get overfull and liquids could escape from the air outlet.
6	Every 2 months	Dosing pumps	▪ Inspection of the suction ball check valve and discharge ball check valve. ▪ In case of obstruction clean the valves with fresh water. ▪ In case of corrosion replace the valves.	Dosing pumps stop working and consequently the sewage does not get properly treated.
7	Every 3 months / On condition	Stainless Steel and PVC fittings	▪ Inspection. ▪ In case of leakage tighten properly with dedicated tool.	Leakages.
8	Every 3 months	Supplied Level Probes (inside collecting tank)	Clean the contacts with abrasive paper.	Probe may not work properly due to oxidation. Misleading or missing level signals.
9	Every 3 months / On condition	Sterilizer of U.V. Sterilizing System	Empty the system radiation chamber, remove the quartz tube(s) and clean or replace quartz tube(s), if necessary.	Undetected plant malfunctioning, due to U.V. Sterilizing system out of service, could occur.
10	Every 3-6 months	▪ 3-Way Discharge Valve (V1) (controlled by motorized actuator); ▪ 3-Way Sludge Discharge Valve (V2) (controlled by motorized actuator).	Check the correct activation / de-activation of 3-Way valve, without any blockage (refer to **COMMON PROBLEMS AND TROUBLESHOOTING** section).	Correct system operation impossible in case of locked valves. Motorized actuators burn due to dirty gear.
11	Every 3-6 months	▪ Filling pump(s) ▪ Macerating pump ▪ Seawater pump ▪ Discharge pump*	Check and, if needed, replace: - seal kits - impellers	System does not work effectively.

12	Every 6 months*	Pressure switch on treatment tank*	Reset pressure switch installed on treatment tank flange*.	The tank is not more protected by the pressure switch and it may explode* due to overpressure.
	* only for the ECOmar S model in PP			
13	Every 6 months / Before prolonged stop	Treatment tank	Remove inspection flange and wash with direct water jets.	Dirty tank may cause bacteria growth & bad odors during prolonged stop.
14	Every 6 months / On condition	Multimedia Filter Station	Perform a Backwash procedure (refer to the **MAINTENANCE INSTRUCTIONS** section)	Dirty filter may cause bacteria growth & bad odors during prolonged stop and/or obstruction.
15	Every year / On condition	Safe Filter of U.V. Sterilizing System	▪ Open filter sump, remove bag cartridge and empty it. ▪ Wash housing and bag cartridge. ▪ Reinstall or replace the bag cartridge.	Dirty filter may cause bacteria growth & bad odors during prolonged stop and/or obstruction.
16	Every year / Every 9000 working hours	Sterilizer of U.V. Sterilizing System	Empty the system radiation chamber, remove the germicide lamp(s) and replace the lamp(s), if necessary.	Undetected plant malfunctioning, due to U.V. Sterilizing system out of service, could occur.
17	Every 5-10 years	▪ Filling pump(s) ▪ Macerating pump ▪ Discharge pump*	Make a general pump recondition	System does not work effectively.
18	Before prolonged stop	Dosing pumps	Rinse the dosing pumps with clean fresh water stored in a different collection tank.	Corrosion of the dosing pumps and floating level probes.
19	Before prolonged stop	Multimedia Filter Station	Perform a Backwash procedure (refer to the **MAINTENANCE INSTRUCTIONS** section)	Dirty filter may cause bacteria growth & bad odors during prolonged stop and/or obstruction.
20	Before prolonged stop	Safe Filter of U.V. Sterilizing System	▪ Open filter housing, remove bag cartridge and empty it. ▪ Wash housing and bag cartridge by using a dish-washing detergent. ▪ Reinstall the bag cartridge in the housing and close it well to the filter plug.	Dirty filter may cause bacteria growth & bad odors during prolonged stop and/or obstruction.
21	Before prolonged stop	Sterilizer of U.V. Sterilizing System	Empty the system radiation chamber, remove the germicide lamp(s) and store lamp(s) in a safe place.	Temperature below 0°C may freeze the water inside the sterilization chamber and cause serious damages.
22	Before and after prolonged stop	All items	Perform the related Special Procedure (refer to the **Winterizing procedure** section), if any.	Specific damages or malfunctions to STP system.
23	After a prolonged stop	Macerating pump (on skid)	▪ Manually start the pump and stop immediately in case of no rotation of the impeller. ▪ Remove the back cover and rotate the axis manually.	Motor burns due to locked impeller.
24	After a prolonged stop	Filling pump(s)	▪ Manually start the pump and stop immediately in case of no rotation of the impeller. ▪ Remove the back cover and rotate the axis manually.	Motor burns due to locked impeller.

25	After a prolonged stop / On condition	Seawater pump	▪ Manually start the pump and stop immediately in case of no rotation of the impeller. ▪ Remove the back cover and rotate the axis manually.	Motor burns due to locked impeller.
26	After a prolonged stop	▪ Hydrogen Peroxide tank; ▪ ECOFLOC tank.	Replace the chemical products.	Sewage treatment is no longer assured.
27	After a prolonged stop	Multimedia Filter Station	▪ Rinse Multimedia Filter Station (refer to **FIRST START UP PROCEDURE** section) for the media stabilization. ▪ Replace all the media in each tank, if necessary.	Sewage treatment is no longer assured.
28	After a prolonged stop	Bag filter	Replace bag cartridge and O-ring(s) if necessary.	Sewage treatment is no longer assured.
29	After a prolonged stop	U.V. Sterilizer	▪ Reinstall the germicide lamp(s) in the U.V. chamber(s) or replace if necessary; ▪ Clean and sanitise pipes downstream the U.V. system.	Sewage treatment is no longer assured.
30	After a prolonged stop	Complete system (only for 3-phase power supply)	▪ On Main Control box set operation mode to “manual”. ▪ Check the rotation sense of each pump.	System does not work effectively.

15 TECHNICAL SPECIFICATIONS

15.1 ECOmar 20 S – Data Sheet

Main data

- **Model name**: ..... **ECOmar 20 S**
- **Capacity**: ..... **2000 l/day**
- Duration of each cycle: ..... about 22 min. – approx. 3 cycles per hour
- Acoustic pressure level at 1 meter (Leq): ..... 72 dB(A)
- Treatment tank material: ..... Polypropylene or A316L
- Paint: ..... RAL 9016

Power supply and installed power

- Main Power supply (to be confirmed in case of purchase order): 230V-50Hz-1Ph, 400V-50Hz-3Ph, 415V-50Hz-3Ph, 440V-60Hz-3Ph, 460V-50Hz-3Ph, 690V-50Hz-3Ph, 690V-60Hz-3Ph, *other voltages available on request.*
- Power consumption (max): .....0,85 kW
- Heat dissipation (max):..... 0,22 kW
- Filling pump*: .....0,75 kW
- Macerator/discharge pump*: .....0,75 kW
- Sea water pump*: .....0,37 kW
- Dosing pumps*: .....2 x 0,037 Watt
- UV Sterilizer*: ..... 80 Watt
- Auxiliary power supply*: ..... 24 VAC

Equipment details

- Sterilizing chemical product: .....Hydrogen peroxide (35%)
- Flocculant chemical product: ..... ECOFLOC
- Dosing pump model: .....5 litres/h at 7 Bar
- Dosing system tank (Hydrogen peroxide): ..... 20 litres
- Dosing system tank (ECOFLOC):..... 10 litres
- Power supply of dosing pump*: ..... 230 VAC
- Three-way sludge valve (V2) size:..... 1” FFF
- Pressure switch (0.1 – 1) setting (only on PP treatment tank configuration): .....0.2 Bar
- Filtration station – 1st filter FBR vessel model / quantity: ..... 8 x 35 / 1
- Filtration station – 1st filter Zeolite quantity: ..... 12,5 kg
- Filtration station – 1st filter Course quartzite quantity: ..... 10 kg
- Filtration station – 2nd filter FBR vessel model / quantity: ..... 8 x 35 / 1
- Filtration station – 2nd filter Fine quartzite quantity: ..... 18 kg
- Filtration station – 2nd filter Course quartzite quantity: ..... 10 kg
- Bag filter - model / quantity: .....BB-10 / 1
- Bag filter – housing model / quantity: ..... PBH-410 (1”) / 1
- Bag filter – cartridge model / quantity: ..... BP-410-5 / 1
- UV Sterilizer – model:..... TC 5000
- UV Lamp – model / quantity: ..... 38 Watt / 2

*Power supply derived from Main control box.

15.2 ECOmar 32 S – Data Sheet

Main data

- **Model name**: ..... **ECOmar 32 S**
- **Capacity**: ..... **3200 l/day**
- Duration of each cycle: ..... about 22 min. – approx. 3 cycles per hour
- Acoustic pressure level at 1 meter (Leq): ..... 72 dB(A)
- Treatment tank material: ..... Polypropylene or A316L
- Paint: ..... RAL 9016

Power supply and installed power

- Main Power supply (to be confirmed in case of purchase order): 230V-50Hz-1Ph, 400V-50Hz-3Ph, 415V-50Hz-3Ph, 440V-60Hz-3Ph, 460V-50Hz-3Ph, 690V-50Hz-3Ph, 690V-60Hz-3Ph, *other voltages available on request.*
- Power consumption (max): .....0,85 kW
- Heat dissipation (max):..... 0,22 kW
- Filling pump*: .....0,75 kW
- Macerator/discharge pump*: .....0,75 kW
- Sea water pump*: .....0,37 kW
- Dosing pumps*: .....2 x 0,037 Watt
- UV Sterilizer*: .....80 Watt
- Auxiliary power supply*: ..... 24 VAC

Equipment details

- Sterilizing chemical product: .....Hydrogen peroxide (35%)
- Flocculant chemical product: ..... ECOFLOC
- Dosing pump model: .....5 litres/h at 7 Bar
- Dosing system tank (Hydrogen peroxide): ..... 20 litres
- Dosing system tank (ECOFLOC):..... 10 litres
- Power supply of dosing pump*: ..... 230 VAC
- Three-way sludge valve (V2) size: ..... 1” FFF
- Pressure switch (0.1 – 1) setting (only on PP treatment tank configuration): .....0.2 Bar
- Filtration station – 1st filter FBR vessel model / quantity: ..... 8 x 35 / 1
- Filtration station – 1st filter Zeolite quantity: ..... 12,5 kg
- Filtration station – 1st filter Course quartzite quantity: ..... 10 kg
- Filtration station – 2nd filter FBR vessel model / quantity: ..... 8 x 35 / 1
- Filtration station – 2nd filter Fine quartzite quantity: ..... 18 kg
- Filtration station – 2nd filter Course quartzite quantity: ..... 10 kg
- Bag filter - model / quantity: .....BB-10 / 1
- Bag filter – housing model / quantity: ..... PBH-410 (1”) / 1
- Bag filter – cartridge model / quantity: ..... BP-410-5 / 1
- UV Sterilizer – model:..... TC 5000
- UV Lamp – model / quantity: ..... 38 Watt / 2

*Power supply derived from Main control box.

15.3 ECOmar 45 S – Data Sheet

Main data

- **Model name**: ..... **ECOmar 45 S**
- **Capacity**: ..... **4500 l/day**
- Duration of each cycle: ..... about 22 min. – approx. 3 cycles per hour
- Acoustic pressure level at 1 meter (Leq): ..... 72 dB(A)
- Treatment tank material: ..... Polypropylene or A316L
- Paint: ..... RAL 9016

Power supply and installed power

- Main Power supply (to be confirmed in case of purchase order): 230V-50Hz-1Ph, 400V-50Hz-3Ph, 415V-50Hz-3Ph, 440V-60Hz-3Ph, 460V-50Hz-3Ph, 690V-50Hz-3Ph, 690V-60Hz-3Ph, *other voltages available on request.*
- Power consumption (max): .....1,6 kW
- Heat dissipation (max):..... 0,44 kW
- Filling pump*: .....1,1 kW-1Ph / 1,5 kW-3Ph
- Macerator/discharge pump*: .....1,1 kW-1Ph / 1,5 kW-3Ph
- Sea water pump*: .....0,37 kW
- Dosing pumps*: .....2 x 0,037 Watt
- UV Sterilizer*: .....2 x 80 Watt
- Auxiliary power supply*: ..... 24 VAC

Equipment details

- Sterilizing chemical product: .....Hydrogen peroxide (35%)
- Flocculant chemical product: ..... ECOFLOC
- Dosing pump model: .....5 litres/h at 7 Bar
- Dosing system tank (Hydrogen peroxide): ..... 30 litres
- Dosing system tank (ECOFLOC):..... 10 litres
- Power supply of dosing pump*: ..... 230 VAC
- Three-way sludge valve (V2) size:..... 1” FFF
- Pressure switch (0.1 – 1) setting (only on PP treatment tank configuration): .....0.2 Bar
- Filtration station – 1st filter FBR vessel model / quantity: ..... 10 x 35 / 1
- Filtration station – 1st filter Zeolite quantity: ..... 20 kg
- Filtration station – 1st filter Course quartzite quantity: ..... 12,5 kg
- Filtration station – 2nd filter FBR vessel model / quantity: ..... 10 x 35 / 1
- Filtration station – 2nd filter Fine quartzite quantity: ..... 31,5 kg
- Filtration station – 2nd filter Course quartzite quantity: ..... 12,5 kg
- Bag filter - model / quantity: .....BB-20 / 1
- Bag filter – housing model / quantity: ..... PBH-420 (1”) / 1
- Bag filter – cartridge model / quantity: ..... BP-420-5 / 1
- UV Sterilizer – model:..... TC 8000
- UV Lamp – model / quantity: ..... 80 Watt / 2

*Power supply derived from Main control box.

15.4 ECOmar 70 S – Data Sheet

Main data

- **Model name**: ..... **ECOmar 70 S**
- **Capacity**: ..... **7000 l/day**
- Duration of each cycle: ..... about 22 min. – approx. 3 cycles per hour
- Acoustic pressure level at 1 meter (Leq): ..... 72 dB(A)
- Treatment tank material: A316L
- Paint: ..... RAL 9016

Power supply and installed power

- Main Power supply (to be confirmed in case of purchase order): 230V-50Hz-1Ph, 400V-50Hz-3Ph, 415V-50Hz-3Ph, 440V-60Hz-3Ph, 460V-50Hz-3Ph, 690V-50Hz-3Ph, 690V-60Hz-3Ph, *other voltages available on request.*
- Power consumption (max): .....1,6 kW
- Heat dissipation (max):..... 0,44 kW
- Filling pump*: .....1,1 kW-1Ph / 1,5 kW-3Ph
- Macerator/discharge pump*: .....1,1 kW-1Ph / 1,5 kW-3Ph
- Sea water pump*: .....0,55 kW
- Dosing pumps*: .....2 x 0,037 Watt
- UV Sterilizer*: .....2 x 80 Watt
- Auxiliary power supply*: ..... 24 VAC

Equipment details

- Sterilizing chemical product: .....Hydrogen peroxide (35%)
- Flocculant chemical product: ..... ECOFLOC
- Dosing pump model: .....5 litres/h at 7 Bar
- Dosing system tank (Hydrogen peroxide): ..... 30 litres
- Dosing system tank (ECOFLOC):..... 20 litres
- Power supply of dosing pump*: ..... 230 VAC
- Three-way sludge valve (V2) size:..... 1-1/4” FFF
- Pressure switch (0.1 – 1) setting (only on PP treatment tank configuration): .....not available
- Filtration station – 1st filter FBR vessel model / quantity: ..... 10 x 35 / 1
- Filtration station – 1st filter Zeolite quantity: ..... 20 kg
- Filtration station – 1st filter Course quartzite quantity: ..... 12,5 kg
- Filtration station – 2nd filter FBR vessel model / quantity: ..... 10 x 35 / 1
- Filtration station – 2nd filter Fine quartzite quantity: ..... 31,5 kg
- Filtration station – 2nd filter Course quartzite quantity: ..... 12,5 kg
- Bag filter - model / quantity: .....BB-20 / 1
- Bag filter – housing model / quantity: ..... PBH-420 (1”) / 1
- Bag filter – cartridge model / quantity: ..... BP-420-5 / 1
- UV Sterilizer – model:..... TC 8000
- UV Lamp – model / quantity: ..... 80 Watt / 2

*Power supply derived from Main control box.

15.5 ECOmar 145 S – Data Sheet

Main data

- **Model name**: ..... **ECOmar 145 S**
- **Capacity**: ..... **14500 l/day**
- Duration of each cycle: ..... about 22 min. – approx. 3 cycles per hour
- Acoustic pressure level at 1 meter (Leq): ..... 72 dB(A)
- Treatment tank material: A316L
- Paint: ..... RAL 9016

Power supply and installed power

- Main Power supply (to be confirmed in case of purchase order): 230V-50Hz-1Ph, 400V-50Hz-3Ph, 415V-50Hz-3Ph, 440V-60Hz-3Ph, 460V-50Hz-3Ph, 690V-50Hz-3Ph, 690V-60Hz-3Ph, *other voltages available on request.*
- Power consumption (max): .....1,6 kW
- Heat dissipation (max):..... 0,44 kW
- Filling pump*: .....1,1 kW-1Ph / 1,5 kW-3Ph
- Macerator/discharge pump*: .....1,1 kW-1Ph / 1,5 kW-3Ph
- Sea water pump*: .....0,55 kW
- Dosing pumps*: .....2 x 0,037 Watt
- UV Sterilizer*: .....2 x 80 Watt
- Auxiliary power supply*: ..... 24 VAC

Equipment details

- Sterilizing chemical product: .....Hydrogen peroxide (35%)
- Flocculant chemical product: ..... ECOFLOC
- Dosing pump model: .....5 litres/h at 7 Bar
- Dosing system tank (Hydrogen peroxide): ..... 30 litres
- Dosing system tank (ECOFLOC):..... 20 litres
- Power supply of dosing pump*: ..... 230 VAC
- Three-way sludge valve (V2) size:..... 1-1/4” FFF
- Pressure switch (0.1 – 1) setting (only on PP treatment tank configuration): .....not available
- Filtration station – 1st filter FBR vessel model / quantity: ..... 10 x 35 / 1
- Filtration station – 1st filter Zeolite quantity: ..... 20 kg
- Filtration station – 1st filter Course quartzite quantity: ..... 12,5 kg
- Filtration station – 2nd filter FBR vessel model / quantity: ..... 10 x 35 / 1
- Filtration station – 2nd filter Fine quartzite quantity: ..... 31,5 kg
- Filtration station – 2nd filter Course quartzite quantity: ..... 12,5 kg
- Bag filter - model / quantity: .....BB-20 / 1
- Bag filter – housing model / quantity: ..... PBH-420 (1”) / 1
- Bag filter – cartridge model / quantity: ..... BP-420-5 / 1
- UV Sterilizer – model:..... TC 8000
- UV Lamp – model / quantity: ..... 80 Watt / 2

*Power supply derived from Main control box.

16 SPARE PARTS LISTS

Here below are listed the main spare parts that you can order from one of our service centers or from our factory.
For detailed spare parts lists and exploded views of the supplied pumps and U.V. Sterilizer refer to the attachments.

ECOmar 20 S				
P/N	**DESCRIPTION**	**TYPE**	**PART NUMBER**	**QUANTITY**
1	Filling Pump	Self-priming - Qmax 6 m^3/h - Hmax 18 m (230V-50Hz-1ph) Self-priming - Qmax 6 m^3/h - Hmax 18 m (230/400V-50Hz-3ph)	221PMAT0250ET3 221PMAT0252351	1*/2†
2	Seawater Pump	Centrifugal- Qmax 4.8 m^3/h - Hmax 12.5 m (230V-50Hz-1ph) Centrifugal- Qmax 4.8 m^3/h - Hmax 12.5 m (230/400V-50Hz-3ph)	211PBBCM202351 211PBBC20A4053	1
3	Macerating Pump	Centrifugal - Qmax 14 m^3/h - Hmax 16 m (230V-50Hz-1ph) Centrifugal - Qmax 14 m^3/h - Hmax 16 m (230/400V-50Hz-3ph)	221PM00C302351 221PM00C300ET3	1
4	Manual two-way valve	2-Way – Ball TYPE – DN 40 - PP	201VLF004000PP	1
5	Discharge Valve (V1)	3-Way Motorized-1”- L - PP tank 3-Way Motorized-1”- L - SS tank	A24VL000EC0541 A24VL00XEC0541	1
6	Sludge Discharge Valve (V2)	3-Way Motorized -1” - L TYPE	A24VL00XEC0541	1
7	Valve-actuator adaptation kit	Stainless Steel	A24VLAT1140001	1
8	Actuator for 3-way valve	IP54 – 24 V AC – 20 Nm	221AT0035S0001	2
9	3-way valve	L TYPE - 1” FFF – A316	221VLFF001G3V0	2
10	Level probe for Treatment Tank	Ball TYPE - Multilevel (3) - A316	204ES000000013	1
11	Main Control Box	230V-50/60Hz-1ph 230/400V-50/60Hz-3ph	A24CE000EC0230 A24CE000EC0400	1
12	H_2O_2 Dosing system	H_2O_2 – 20 liters	022SD000EC0032	1
13	ECOFLOC Dosing system	ECOFLOC – 10 liters	022SD000ECF045	1
14	Dosing pump	Diaphragm - Qmax 13 l/h; Pmax 7 bar	261PDMAAD57230	2
15	Disinfectant tank	20 liters – PE (polyethylene)	261PD000SB0020	1
16	Disinfectant tank	10 liters – PE (polyethylene)	261PD000SB0010	1
17	Hydrogen Peroxide	Refer to relative Safety Data Sheet	221LD000EC01KG	20 l‡
18	ECOFLOC	Refer to relative Safety Data Sheet	221ECOFLOPA085	10 l‡
19	Treatment Tank	81 liters – PP (polypropylene)§ 81 liters - SS (A316)	A24SE00000EC06 A24SEM000XEC20	1
20	Pressure Switch§	N.C. 0-0.2bar	204ES000000016	1
21	Vibration damper	Compression-Shear–75 kg Load	211AV6550M100X	4
22	Anti-siphon valve	BRONZE – ½”M	221VL00012VABR	3*/4†
23	Level Probe Control Box	IP 55 – 230V-50/60Hz-1ph	A24CE00000SOLV	1*/2†
24	Level probe for Collecting Tank	Conductive - Rods (3/4) TYPE	221SO253X10000	1*/2†
25	Multimedia Filter station	2x835 - Fiberglass	A24GF0083500AB	1
26	Coarse Quartzite	Refer to relative Safety Data Sheet	251QZGR3560000	20 kg**
27	Zeolite	Refer to relative Safety Data Sheet	221ZL00072KG01	12,5 kg**
28	Fine Quartzite	Refer to relative Safety Data Sheet	251QZGI3150008	18 kg**
29	Manual Head Valve	Lever – 1”F - 2”1/2	251VL00001FM00	2
30	Three-way manual valve	3-Way - 1” - T TYPE - PVC	211VLTE0323V00	2
31	Pressure gauge	Radial – DN63 – 0-6 bar	211MB63006R140	1
32	U.V. Sterilizing System	5 m^3/h->30.000 micwS/cmq-8 bar	A24UV050052351	1
33	Safe filter for U.V. sterilizer	Bag TYPE – 10”	A24BFEC0200001	1
34	Bag cartridge	Bag – 10”	2801F150360000	1
35	U.V. lamps	38 W - 136 µW/cm2 @ 1m	243UVL30TC5000	2
36	Quartz Tube for U.V. lamps	Øi 20 mm - Øe 23mm	243UVQSH013000	2

* Only for the systems supplied for the 1 Tank Control configuration.
† Only for the systems supplied for the 2 Tanks Control configuration.
‡ Supplied on 25 liters plastic cans of chemical product.
§ Only for the models supplied with the treatment tank in PP.
** Supplied on 25 kg bags of product.

ECOmar 32 S				
P/N	**DESCRIPTION**	**TYPE**	**PART NUMBER**	**QUANTITY**
1	Filling Pump	Self-priming - Qmax 6 m^3/h - Hmax 18 m (230V-50Hz-1ph) Self-priming - Qmax 6 m^3/h - Hmax 18 m (230/400V-50Hz-3ph)	221PMAT0250ET3 221PMAT0252351	1*/2†
2	Seawater Pump	Centrifugal- Qmax 4.8 m^3/h - Hmax 12.5 m (230V-50Hz-1ph) Centrifugal- Qmax 4.8 m^3/h - Hmax 12.5 m (230/400V-50Hz-3ph)	211PBBCM202351 211PBBC20A4053	1
3	Macerating Pump	Centrifugal - Qmax 14 m^3/h - Hmax 16 m (230V-50Hz-1ph) Centrifugal - Qmax 14 m^3/h - Hmax 16 m (230/400V-50Hz-3ph)	221PM00C302351 221PM00C300ET3	1
4	Manual two-way valve	2-Way – Ball TYPE – DN 50 - PP	201VLF005000PP	1
5	Discharge Valve (V1)	3-Way Motorized-1”- L - PP tank 3-Way Motorized-1”- L - SS tank	A24VL000EC0541 A24VL00XEC0541	1
6	Sludge Discharge Valve (V2)	3-Way Motorized -1” - L TYPE	A24VL00XEC0541	1
7	Valve-actuator adaptation kit	Stainless Steel	A24VLAT1140001	1
8	Actuator for 3-way valve	IP54 – 24 V AC – 20 Nm	221AT0035S0001	2
9	3-way valve	L TYPE - 1” FFF – A316	221VLFF001G3V0	2
10	Level probe for Treatment Tank	Ball TYPE - Multilevel (3) - A316	204ES000000013	1
11	Main Control Box	230V-50/60Hz-1ph 230/400V-50/60Hz-3ph	A24CE000EC0230- A24CE000EC0400	1
12	H_2O_2 Dosing system	H_2O_2 – 20 liters	022SD000EC0032	1
13	ECOFLOC Dosing system	ECOFLOC – 10 liters	022SD000ECF045	1
14	Dosing pump	Diaphragm - Qmax 13 l/h; Pmax 7 bar	261PDMAAD57230	2
15	Disinfectant tank	20 liters – PE (polyethylene)	221TA000DP0020	1
16	Disinfectant tank	10 liters – PE (polyethylene)	261PD000SB0010	1
17	Hydrogen Peroxide	Refer to relative Safety Data Sheet	221LD000EC01KG	20 l‡
18	ECOFLOC	Refer to relative Safety Data Sheet	221ECOFLOPA085	10 l‡
19	Treatment Tank	127 liters – PP (polypropylene)§ 127 liters – SS (A316)	A24SE00000EC08 A24SEM000XEC08	1
20	Pressure Switch§	N.C. 0-0.2bar	204ES000000016	1
21	Vibration damper	Compression-Shear–75 kg Load	211AV6550M100X	4
22	Anti-siphon valve	BRONZE – ½”M	221VL00012VABR	3*/4†
23	Level Probe Control Box	IP 55 – 230V-50/60Hz-1ph	A24CE00000SOLV	1*/2†
24	Level probe for Collecting Tank	Conductive - Rods (3/4) TYPE	221SO253X10000	1*/2†
25	Multimedia Filter station	2x835 - Fiberglass	A24GF0083500AB	1
26	Coarse Quartzite	Refer to relative Safety Data Sheet	251QZGR3560000	20 kg**
27	Zeolite	Refer to relative Safety Data Sheet	221ZL00072KG01	12,5 kg**
28	Fine Quartzite	Refer to relative Safety Data Sheet	251QZGI3150008	18 kg**
29	Multiport Manual Head Valve	Lever – 1”F - 2”1/2	251VL00001FM00	2
30	Three-way manual valve	3-Way - 1” - T TYPE - PVC	211VLTE0323V00	2
31	Pressure gauge	Radial – DN63 – 0-6 bar	211MB63006R140	1
32	U.V. Sterilizing System	5 m^3/h->30.000 micwS/cmq-8 bar	A24UV050052351	1
33	Safe filter for U.V. sterilizer	Bag TYPE – 10”	A24BFEC0200001	1
34	Bag cartridge	Bag – 10”	2801F150360000	1
35	U.V. lamps	38 W - 136 µW/cm2 @ 1m	243UVL30TC5000	2
36	Quartz Tube for U.V. lamps	Øi 20 mm - Øe 23mm	243UVQSH013000	2

* Only for the systems supplied for the 1 Tank Control configuration.
† Only for the systems supplied for the 2 Tanks Control configuration.
‡ Supplied on 25 liters plastic cans of chemical product.
§ Only for the models supplied with the treatment tank in PP.
** Supplied on 25 kg bags of product.

ECOmar 45 S				
P/N	**DESCRIPTION**	**TYPE**	**PART NUMBER**	**QUANTITY**
1	Filling Pump	Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230V-50Hz-1ph) Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230/400V-50Hz-3ph)	221PM00S422351 221PM00S420ET3	1*/2†
2	Seawater Pump	Centrifugal- Qmax 4.8 m^3/h - Hmax 12.5 m (230V-50Hz-1ph) Centrifugal- Qmax 4.8 m^3/h - Hmax 12.5 m (230/400V-50Hz-3ph)	211PBBCM202351 211PBBC20A4053	1
3	Macerating Pump	Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230V-50Hz-1ph) Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230/400V-50Hz-3ph)	221PM00S422351 221PM00S420ET3	1
4	Manual two-way valve	2-Way – Ball TYPE – DN 50 - PP	201VLF005000PP	1
5	Discharge Valve (V1)	3-Way Motorized-1”- L - PP tank 3-Way Motorized-1”- L - SS tank	A24VL000EC0541 A24VL00XEC0541	1
6	Sludge Discharge Valve (V2)	3-Way Motorized -1” - L TYPE	A24VL00XEC0541	1
7	Valve-actuator adaptation kit	Stainless Steel	A24VLAT1140001	1
8	Actuator for 3-way valve	IP54 – 24 V AC – 20 Nm	221AT0035S0001	2
9	3-way valve	L TYPE - 1” FFF – A316	221VLFF001G3V0	2
10	Level probe for Treatment Tank	Ball TYPE - Multilevel (3) - A316	204ES000000013	1
11	Main Control Box	230V-50/60Hz-1ph 230/400V-50/60Hz-3ph	A24CE000EC0230 A24CE000EC0400	1
12	H_2O_2 Dosing system	H_2O_2 – 30 liters	022SD000EC0145	1
13	ECOFLOC Dosing system	ECOFLOC – 10 liters	022SD000ECF045	1
14	Dosing pump	Diaphragm - Qmax 13 l/h; Pmax 7 bar	261PDMAAD57230	2
15	Disinfectant tank	30 liters – PE (polyethylene)	261PD000SB0030	1
16	Disinfectant tank	10 liters – PE (polyethylene)	261PD000SB0010	1
17	Hydrogen Peroxide	Refer to relative Safety Data Sheet	221LD000EC01KG	30 l‡
18	ECOFLOC	Refer to relative Safety Data Sheet	221ECOFLOPA085	10 l‡
19	Treatment Tank	160 liters – PP (polypropylene)§ 160 liters -SS (A 316)	A24SE00000EC16 A24SEM000XEC16	1
20	Pressure Switch§	N.C. 0-0.2bar	204ES000000016	1
21	Vibration damper	Compression–Shear–350 kg Load	221AVCAM1600SI	4
22	Anti-siphon valve	BRONZE – ½”M	221VL00012VABR	3*/4†
23	Level Probe Control Box	IP 55 – 230V-50/60Hz-1ph	A24CE00000SOLV	1*/2†
24	Level probe for Collecting Tank	Conductive - Rods (3/4) TYPE	221SO253X10000	1*/2†
25	Multimedia Filter station	2x1035 - Fiberglass	A24GF0103500AB	1
26	Coarse Quartzite	Refer to relative Safety Data Sheet	251QZGR3560000	25 kg**
27	Zeolite	Refer to relative Safety Data Sheet	221ZL00072KG01	20 kg**
28	Fine Quartzite	Refer to relative Safety Data Sheet	251QZGI3150008	31,5 kg**
29	Multiport Manual Head Valve	Lever – 1”F - 2”1/2	251VL00001FM00	2
30	Three-way manual valve	3-Way - 1” - T TYPE - PVC	211VLTE0323V00	2
31	Pressure gauge	Radial – DN63 – 0-6 bar	211MB63006R140	1
32	U.V. Sterilizing System	8 m^3/h->30.000 micwS/cmq-8 bar	040UV0800L2351	1
33	Safe filter for U.V. sterilizer	Bag TYPE – 20”	A24BFEC0450001	1
34	Bag cartridge	Bag – 20”	2802F150367000	1
35	U.V. lamps	80 W - 270 µW/cm2 @ 1m	243UVL004P0064	2
36	Quartz Tube for U.V. lamps	Øi 20 mm - Øe 23mm	243UVQSH013000	2

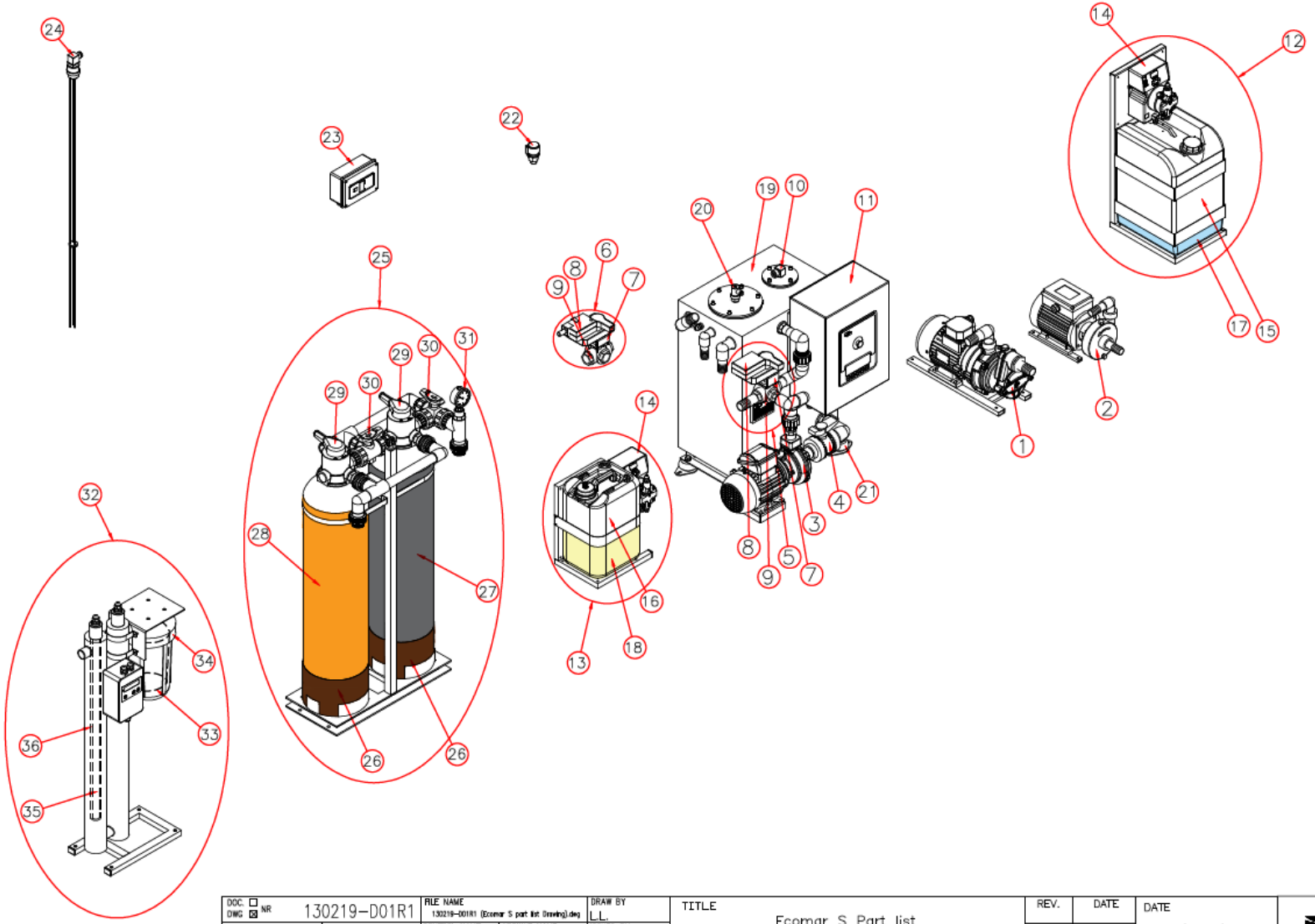
* Only for the systems supplied for the 1 Tank Control configuration.
† Only for the systems supplied for the 2 Tanks Control configuration.
‡ Supplied on 25 liters plastic cans of chemical product.
§ Only for the models supplied with the treatment tank in PP.
** Supplied on 25 kg bags of product.

ECOmar 70 S				
P/N	**DESCRIPTION**	**TYPE**	**PART NUMBER**	**QUANTITY**
1	Filling Pump	Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230V-50Hz-1ph) Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230/400V-50Hz-3ph)	221PM00S422351 221PM00S420ET3	1*/2†
2	Seawater Pump	Centrifugal- Qmax 6.6 m^3/h - Hmax 20 m (230V-50Hz-1ph) Centrifugal- Qmax 6.6 m^3/h - Hmax 20 m (230/400V-50Hz-3ph)	211PBBCM222351 211PBBC22E4053	1
3	Macerating Pump	Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230V-50Hz-1ph) Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230/400V-50Hz-3ph)	221PM00S422351 221PM00S420ET3	1
4	Manual two-way valve	2-Way – Ball TYPE – DN 50 - PP	201VLF005000PP	1
5	Discharge Valve (V1)	3-Way Motorized -1”1/4 - L TYPE	A24VL000EC5114	1
6	Sludge Discharge Valve (V2)	3-Way Motorized -1”1/4 - L TYPE	A24VL00XEC5114	1
7	Valve-actuator adaptation kit	Stainless Steel	A24VLAT1140001	2
8	Actuator for 3-way valve	IP54 – 24 V AC – 20 Nm	221AT0035S0001	2
9	3-way valve	L TYPE - 1”1/4 FFF – A316	221VLFF114G3V0	2
10	Level probe for Treatment Tank	Ball TYPE - Multilevel (3) - A316	204ES000000013	1
11	Main Control Box	230V-50/60Hz-1ph 230/400V-50/60Hz-3ph	A24CE000EC0230 A24CE000EC0400	1
12	H_2O_2 Dosing system	H_2O_2 – 30 liters	022SD000EC0145	1
13	ECOFLOC Dosing system	ECOFLOC – 20 liters	022SD000ECF145	1
14	Dosing pump	Diaphragm - Qmax 13 l/h; Pmax 7 bar	261PDMAAD57230	2
15	Disinfectant tank	30 liters – PE (polyethylene)	261PD000SB0030	1
16	Disinfectant tank	20 liters – PE (polyethylene)	261PD000SB0010	1
17	Hydrogen Peroxide	Refer to relative Safety Data Sheet	221LD000EC01KG	30 l‡
18	ECOFLOC	Refer to relative Safety Data Sheet	221ECOFLOPA085	10 l‡
19	Treatment Tank	248 liters - SS (A316)	A24SEM000XEC24	1
21	Vibration damper	Compression–Shear–350 kg Load	221AVCAM1600SI	4
22	Anti-siphon valve	BRONZE – ½”M	221VL00012VABR	3*/4†
23	Level Probe Control Box	IP 55 – 230V-50/60Hz-1ph	A24CE00000SOLV	1*/2†
24	Level probe for Collecting Tank	Conductive - Rods (3/4) TYPE	221SO253X10000	1*/2†
25	Multimedia Filter station	2x1035 - Fiberglass	A24GF0103500AB	1
26	Coarse Quartzite	Refer to relative Safety Data Sheet	251QZGR3560000	25 kg§
27	Zeolite	Refer to relative Safety Data Sheet	221ZL00072KG01	20 kg§
28	Fine Quartzite	Refer to relative Safety Data Sheet	251QZGI3150008	31,5 kg§
29	Multiport Manual Head Valve	Hand wheel – 2”F; 1”1/2F - 4”	251VL00001FM00	2
30	Three-way manual valve	3-Way - 1” - T TYPE - PVC	211VLTE0323V00	2
31	Pressure gauge	Radial – DN63 – 0-6 bar	211MB63006R140	1
32	U.V. Sterilizing System	8 m^3/h->30.000 micwS/cmq-8 bar	040UV0800L2351	1
33	Safe filter for U.V. sterilizer	Bag TYPE – 20”	A24BFEC2300112	1
34	Bag cartridge	Bag – 20”	2801F150356000	1
35	U.V. lamps	80 W - 270 µW/cm2 @ 1m	243UVL004P0064	2
36	Quartz Tube for U.V. lamps	Øi 20 mm - Øe 23mm	243UVQSH013000	2

* Only for the systems supplied for the 1 Tank Control configuration.
† Only for the systems supplied for the 2 Tanks Control configuration.
‡ Supplied on 25 liters plastic cans of chemical product.
§ Supplied on 25 kg bags of product.

ECOmar 145 S				
P/N	**DESCRIPTION**	**TYPE**	**PART NUMBER**	**QUANTITY**
1	Filling Pump	Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230V-50Hz-1ph) Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230/400V-50Hz-3ph)	221PM00S422351 221PM00S420ET3	1*/2†
2	Seawater Pump	Centrifugal- Qmax 6.6 m^3/h - Hmax 20 m (230V-50Hz-1ph) Centrifugal- Qmax 6.6 m^3/h - Hmax 20 m (230/400V-50Hz-3ph)	211PBBCM222351 211PBBC22E4053	1
3	Macerating Pump	Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230V-50Hz-1ph) Centrifugal - Qmax 24 m^3/h - Hmax 17 m (230/400V-50Hz-3ph)	221PM00S422351 221PM00S420ET3	1
4	Manual two-way valve	2-Way – Ball TYPE – DN 50 - PP	201VLF005000PP	1
5	Discharge Valve (V1)	3-Way Motorized -1”1/4 - L TYPE	A24VL00XEC5114	1
6	Sludge Discharge Valve (V2)	3-Way Motorized -1”1/4 - L TYPE	A24VL00XEC5114	1
7	Valve-actuator adaptation kit	Stainless Steel	A24VLAT1140001	2
8	Actuator for 3-way valve	IP54 – 24 V AC – 20 Nm	221AT0035S0001	2
9	3-way valve	L TYPE - 1”1/4 FFF – A316	221VLFF114G3V0	2
10	Level probe for Treatment Tank	Ball TYPE - Multilevel (3) - A316	204ES000000013	1
11	Main Control Box	230V-50/60Hz-1ph 230/400V-50/60Hz-3ph	A24CE000EC0230 A24CE000EC0400	1
12	H_2O_2 Dosing system	H_2O_2 – 30 liters	022SD000EC0145	1
13	ECOFLOC Dosing system	ECOFLOC – 20 liters	022SD000ECF145	1
14	Dosing pump	Diaphragm - Qmax 13 l/h; Pmax 7 bar	261PDMAAD57230	2
15	Disinfectant tank	30 liters – PE (polyethylene)	261PD000SB0030	1
16	Disinfectant tank	20 liters – PE (polyethylene)	261PD000SB0010	1
17	Hydrogen Peroxide	Refer to relative Safety Data Sheet	221LD000EC01KG	30 l‡
18	ECOFLOC	Refer to relative Safety Data Sheet	221ECOFLOPA085	10 l‡
19	Treatment Tank	483 liters - SS (A316)	A24SEM000XEC50	1
21	Vibration damper	Compression–Shear–350 kg Load	221AVCAM1600SI	4
22	Anti-siphon valve	BRONZE – ½”M	221VL00012VABR	3*/4†
23	Level Probe Control Box	IP 55 – 230V-50/60Hz-1ph	A24CE00000SOLV	1*/2†
24	Level probe for Collecting Tank	Conductive - Rods (3/4) TYPE	221SO253X10000	1*/2†
25	Multimedia Filter station	2x1035 - Fiberglass	A24GF0103500AB	1
26	Coarse Quartzite	Refer to relative Safety Data Sheet	251QZGR3560000	25 kg§
27	Zeolite	Refer to relative Safety Data Sheet	221ZL00072KG01	20 kg§
28	Fine Quartzite	Refer to relative Safety Data Sheet	251QZGI3150008	31,5 kg§
29	Multiport Manual Head Valve	Hand wheel – 2”F; 1”1/2F - 4”	251VL00001FM00	2
30	Three-way manual valve	3-Way - 1” - T TYPE - PVC	211VLTE0323V00	2
31	Pressure gauge	Radial – DN63 – 0-6 bar	211MB63006R140	1
32	U.V. Sterilizing System	8 m^3/h->30.000 micwS/cmq-8 bar	040UV0800L2351	1
33	Safe filter for U.V. sterilizer	Bag TYPE – 20”	A24BFEC2300112	1
34	Bag cartridge	Bag – 20”	2801F150356000	1
35	U.V. lamps	80 W - 270 µW/cm2 @ 1m	243UVL004P0064	2
36	Quartz Tube for U.V. lamps	Øi 20 mm - Øe 23mm	243UVQSH013000	2

* Only for the systems supplied for the 1 Tank Control configuration.
† Only for the systems supplied for the 2 Tanks Control configuration.
‡ Supplied on 25 liters plastic cans of chemical product.
§ Supplied on 25 kg bags of product.



DOC. ☐ DWG ☒ NR 130219-D01R1	FILE NAME 130219-D01R1 (Ecomar S part list Drawing).dwg	DRAW BY L.L.	TITLE Ecomar S Part list	REV.	DATE	DATE 13/02/2019	TECNICOMAR
Prog.	CONTROL NAME E.L. DE VITA	ARCHIVE NAME B. BARRACO	ISSUED BY TECHN. DEPT				
	SIGNATURE	SIGNATURE	SCALE ---	Overall dimensions (mm)	2	---	SHEET 1 OF 1	

17 WARRANTY FOR TECNICOMAR EQUIPMENTS

The General Terms and Conditions of TECNICOMAR S.P.A. (Manufacturer) apply as a matter of course within the bounds of statutory warranty obligation, insofar as nothing else has been agreed in writing in the contract of sale.

The Manufacturer warrants the quality of the Products for a period of 12 (twelve) months following the date of the putting into operation (start-up) of the Products, under the condition that the relevant start-up card has been filled in and sent to the Manufacturer within 8 (eight) days from the stat-up of the Products, failing which no warranty shall apply.
Without prejudice to the above-mentioned condition, it is in any event understood that under no circumstances the warranty period shall exceed 18 (eighteen) months as of the date of delivery of the Products to the Buyer.
The warranty shall be subject to the Buyer duly informing the Manufacturer in writing, within 8 (eight) days following the discovery thereof, of the detected failure, indicating type, model and serial number of the defected Products or parts of Products (it being understood that the warranty shall not be extended to those parts where serial number is missing or erased), failing which the Buyer shall lose its rights under the warranty in respect thereof.
The warranty consists in either the repair or replacement, at the Manufacturer's sole discretion and at its expense (EXW TECNICOMAR S.P.A. (Incoterms 2010), excluding transportation, freight and/or importation costs relating to the warranty management), of the Products which may prove to be broken or defective due to manufacturing defects. The Manufacturer shall replace or repair the defective parts in the shortest time possible (to be determined on a case by case basis).
The warranty does not cover: the natural wear and tear of the Products and damage resulting therefrom (including but not limited to the corrosion due to galvanic current); consumables (such as gaskets, fittings, fillers); spare parts; parts which can be repaired or corrected with minimum action, such as changing of seals, tightening or adjusting etc.; all those defects which may arise due to transportation, improper use, inappropriate storage or maintenance of the Products and/or to any conducts or acts which are not in line with the instructions and warnings supplied by the Manufacturer; any defects in materials provided by the buyer or a third party or any defects arising out of a design provided and agreed by the Buyer or its representatives; any costs such as labour cost for assembling/disassembling the defective Products, travel costs, importation, insurance and similar costs, even when said activities are carried out by the Manufacturer, its dealers, distributors and/or at the Manufacturer's authorized technical service outlets (in which case any of such costs and expenses shall be charged to the Buyer); any transportation, freight, importation or insurance costs, downtime costs etc.
The warranty of the replaced or repaired parts expires at the same time as the original warranty of the supplied Products.
No claim shall be considered, and warranty shall be considered null and void, if:

1. other than the parts supplied by the Manufacturer have been used within the Product and system components as replacement parts or accessories;
2. the Product has been installed using different procedures and materials other than those described in the User's Manual, without a written authorization by the Manufacturer;
3. the Product has been repaired or modified by personnel not authorized by the Manufacturer;
4. the maintenance standards suggested by the Manufacturer have not been respected;
5. the Product has been required to deliver superior or different performance than the one for which it was designed and supplied.

The Buyer shall retain the Products or relating parts claimed as defective for three (3) months, even for the Manufacturer's inspection, and the Buyer, on the Manufacturer's request, shall send at its own expense said claimed Products or parts to a destination designated by the Manufacturer. The defective Products or parts, after replacement, shall become the property of the Manufacturer.
Under no circumstances and in no condition the Manufacturer's liability under these warranty terms shall exceed the original value of the supplied Products (*i.e.* the price received by the Manufacturer). The Manufacturer shall not be liable for any direct or indirect damages (including, for example but without limitation, consequential, special or incidental damages or damages of a punitive nature).
This is the only warranty applicable to the Products and expressively replaces any other warranties, expressed or implied, including any other warranties or liabilities against vices or defects, hidden or otherwise and any other obligation or liability whether in contract or in law.

17.1 WARRANTY CLAIM

Any claim shall be made by delivering the part for inspection to a Manufacturer's authorized dealer or by giving written notice to the Manufacturer (info@tecnicomar.it - Fax +39.0923.960235) in order for the latter to arrange for any necessary inspection and subsequent repair or replacement (which may be conducted at the Manufacturer's facilities), provided that such services are due under this warranty.

RETURN PRODUCT TO TECNICOMAR S.P.A. ONLY AFTER HAVING RECEIVED WRITTEN AUTHORIZATION INCLUDING THE ASSIGNMENT OF A RETURN MATERIAL AUTHORIZATION NUMBER. THIS NUMBER MUST BE CLEARLY MARKED ON THE OUTSIDE OF THE BOX USED FOR SHIPPING.

Buyer shall pay for all related labor and materials and any shipping, transportation and other expenses associated with the above services.

17.1.1 ECOmar S - WARRANTY REGISTRATION CARD

(Type or hand write in capital letter and mail to info@tecnicomar.it or fax to +39.0923.960235)

CUSTOMER INFORMATION

Client Name:	Home harbour:
Type of vessel:	Number of persons on board:
Main Contact:	
Address:	
Tel:	Fax:
E-mail:	

SYSTEM INFORMATION

Model:
Serial number :
Purchase (order no. / date):
Dealer:

INITIAL PERFORMANCE TABLE

Check before starting the test (refer to the description in the manual):
PIPING, VALVES, FITTINGS
☐ Connections to the black water collection tank(s) (valves, pipe size):
☐ Connections to the filling pump(s) inlet/outlet piping (valves, pipe size):
☐ Connections to the sea water inlet/outlet piping (valves, pipe size):
☐ Connections to the sea water pump inlet/outlet piping (valves, pipe size):
☐ Connections to the sea water inlet device (if supplied) inlet/outlet piping (valves, pipe size):
☐ Connections to the outboard (treated water) discharge piping (valves, tubing size):
☐ Connections to the sludge tank discharge piping (valves, tubing size):
☐ Correct sizing of level sensor in the sludge tanks:
☐ Connections of Dosing pumps to the “Main treatment unit” by piping (valves, pipe size):

☐ Connections of “Main treatment unit” to the “Additional treatment unit” by piping (valves, pipe size):
☐ Correct sizing of level sensor(s) in the sewage collection tank(s):
☐ Correct positioning of the anti-siphon valves: ☐ Sewage filling line (at least 20/30 cm above the maximum level of the collecting tank 1): ☐ Sewage filling line (at least 20/30 cm above the maximum level of the collecting tank 2, if present): ☐ Sea water filling line (at least 20/30 cm above the sea water line): ☐ Out-board discharge line (at least 20/30 cm above the sea water line, if above s.w.l.):
☐ Connections to the air relief outlet piping (valves, pipe size):
☐ No obstructions in the line of air relief (presence of filters-not authorized by Tecnicomar: ☐YES ☐ NO)
☐ Chemical products, properly stored, having adequate chemical and physical characteristics.
ELECTRICAL CONNECTIONS
☐Grounding - ☐ Presence of electromagnetic interference - ☐ Circuit breaker ☐ else: _____
☐ Correct wiring position at control box according to the Main power supply (voltage):
☐ Correct wiring position at seawater pump according to the power supply (voltage):
☐ Correct wiring position at seawater inlet device (if supplied) according to the power supply (voltage):
☐ Correct wiring position at “filling pump 1” according to the power supply (voltage):
☐ Correct wiring position at “filling pump 2” according to the power supply (voltage):
☐ Correct wiring position at H_2O_2 dosing system according to the power supply (voltage):
☐ Correct wiring position at ECOFLOC dosing system according to the power supply (voltage):
☐ Correct wiring position at “sludge discharge valve (V2)” according to the wiring connections:
☐ Correct wiring position at “UV Sterilizer” according to the wiring connections (voltage):
☐ Correct wiring position at “level probe(s)” according to the wiring connections (voltage):
☐ Correct wiring position at “level probe(s) control box(es)” according to the wiring connections (voltage):
☐ Correct wiring position at “Remote control” according to the wiring connections (voltage):
☐ Correct wiring position at “sludge tank sensor” to STP control box according to the wiring connections:

After installation is completed, provide the following performance data:

1. Location of test:	
Date of test:	
Power supply during test operation (voltage, frequency, phase):	
Clockwise rotation of Macerating pump checked:	☐ YES ☐ NO
Clockwise rotation of Sea Water Pump checked:	☐ YES ☐ NO
Open/Close of Solenoid valve (seawater inlet device, if supplied) checked:	☐ YES ☐ NO
Pressure regulator valve at seawater line (if supplied) checked (calibrated at approx. 1 Bar):	☐ YES ☐ NO
Clockwise rotation of filling pump 1 checked:	☐ YES ☐ NO
Complete priming of the filling pump 1 checked:	☐ YES ☐ NO
(if present) Clockwise rotation of filling pump 2 checked:	☐ YES ☐ NO
(in present) Complete priming of the filling pump 2 checked:	☐ YES ☐ NO
Complete priming of the H_2O_2 dosing pump and check settings:	☐ YES ☐ NO
Complete priming of the ECOFLOC dosing pump and check settings:	☐ YES ☐ NO
Complete opening of “sludge discharge valve (V2)” checked:	☐ YES ☐ NO
Activation pressure switch (only on PP version) (check pressure activation as per commissioning certificate)	☐ YES ☐ NO
Set correctly the “discharge time” (emptying the treatment tank):	☐ YES ☐ NO
Set correctly the “sludge discharge time” (emptying the treatment tank):	☐ YES ☐ NO
Max Power consumption (kW):	

Installer's name and address

_____

_____

_____

Installer (Name in capitals and signature)

_____

_____

ANNEXES

INSTALLATION & ELECTRICAL DRAWINGS

- G.A. DRAWINGS
- P&ID DIAGRAM
- FLOW DIAGRAMS
- ELECTRICAL CONNECTIONS DIAGRAMS
- INPUT CONTROL DIAGRAM
- PARTS LIST DRAWING

SAFETY DATA SHEETS

- *Hydrogen Peroxide solution 35%* Safety Data Sheet
- *ECOFLOC* Safety Data Sheet
- *Coarse Quartzite* Safety Data Sheet
- *Zeolite* Safety Data Sheet
- *Fine Quartzite* Safety Data Sheet

MAIN COMPONENTS PARTS LISTS

- FILLING PUMP (Parts list – exploded view)
- SEAWATER PUMP (Parts list – exploded view)
- MACERATING PUMP* (Parts list – exploded view)
- DOSING PUMP (Parts list – exploded view)
- U.V. STERILIZER (Parts list – exploded view)

IMO MARPOL 227 CERTIFICATION

- Test Report (Factory Acceptance Test)
- Module B Certificate
- Declaration of Conformity with Module D Certificate
- Module D Certificate
- European Community Declaration of Conformity (CE)

* Only if of different model from that of the filling pump.