

ULTRAVIOLET DISINFECTION
EQUIPMENT FOR THE TREATMENT OF DRINKING WATER

SMP 11-22-33-44 TC
SMP 11-22-33-44 TC PR
SMP 11-22-33-44 TC RA PR



MANUAL OF INSTALLATION, USE AND SERVICING

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1. Introduction

This manual is for the following models:

SMP 11 TC - SMP 11 TC RA
SMP 22 TC - SMP 22 TC RA
SMP 33 TC - SMP 33 TC RA
SMP 44 TC - SMP 44 TC RA

This Pressure UV Systems is manufactured by **S.I.T.A. s.r.l.**

Warning: This equipment requires regular maintenance to ensure the requirements of the drinking water treated and the maintenance of the improvements as stated by the manufacturer.

These operating instructions contain important information for the operation and maintenance of the equipment.

Please ensure that these operating instructions are carefully read by all relevant persons before putting the unit into operation, this ensures the safe use of the UV system. The operating instructions are an integral part of the equipment supply.

Before putting the unit into operation, all conditions necessary for the safe operation of the equipment must be fulfilled.

The installation, commissioning and maintenance of the equipment should only be carried out by qualified personnel.

The equipment should only be operated by authorized personnel who have been trained accordingly.

No modifications should be made to the equipment without consulting S.I.T.A., as this could effect the safe operation of the unit. S.I.T.A. shall not be held responsible for damage resulting from unapproved modifications.



INSTRUCTION:

The operating instructions are to be kept where they will be accessible for operating and maintenance personnel.

2. General Principles

Information about UV irradiation

The use of UV RADIATION is now recognised as one of the finest technologies for disinfecting water. The UV rays are reproduced using special very pure quartz lamps containing mercury vapour that, when suitably activated by means of a current passing between electrodes, emits photons with varying amounts of energy in the deactivation phase, which results in the characteristic UV spectrum.

The inactivity of the pathogen microorganisms is due to the damage caused to the molecules of the nucleic acids by this radiation, which results in their cellular replication being compromised.

The fact that the water's chemical/physical and organoleptic qualities are not altered, and the complete absence of sub-products of disinfection, means that it is currently one of the safest and most commonly used technologies for disinfecting water.

Depending on their operating conditions, MERCURY VAPOUR LAMPS are able to emit radiation at differing wavelengths. Where the gases they contain are at low pressure and temperature, they produce the characteristic monochromatic spectrum (UV-C, $\lambda = 253,7$ nm). Higher pressures and temperatures make it possible for other wavelengths to be produced that provide the polychromatic spectrum that is typical of MEDIUM PRESSURE lamps (UV-A, UV-B, UV-C).

In addition to the effective germicide action of the UV-C rays, the other UV components emitted cause the photochemical degradation of some substances such as chloramines.

SITA has made use of these favourable characteristics and has added MEDIUM PRESSURE lamps to their UV-C de-bacterial UV plants (that use low pressure lamps), in order to take advantage of all the potential of ultraviolet light.

Due to the higher output from the lamps, SITA's MEDIUM PRESSURE UNITS are able to treat large water flow-rates, while remaining compact in size. When suitably sized for its germicidal action, UV-C also provides a photochemical degradation effect.

General Directions

According to the European rules EN 60204-1 (safety of the set-up off the electrical equipment-general rules) the low tension electrical instruments (rule 2014/35/CE) must be connected to a current-tap provided with grounding.

Safety directions



The light of ultra-violet lamps can cause serious burns to unprotected skin and eyes, therefore it is strictly recommended not to connect it to the current tap without having before ensured the UV lamp in its housing and inserted the PVC cover.

Run-down lamps with mercury vapors should be considered special refuse.

For this reason you **must** get rid of them according the law.


Indications for the disposal

We remind that, according to D.L. 4 May 2014, N°27 "Accomplishment of directive 2011/65/CE, concerning the reduction of dangerous substances in electric and electronic equipments" both mercury vapours lamps and electrical panels, when no more used, must be considered as special waste, and in the same way disposed of.

To do that, it is possible to address to specialized centres for the recovery of dangerous materials, or to contact directly our technical department.



INFORMATION TO USERS pursuant to art. 14 of the 2012/19 / EU DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 on waste electrical and electronic equipment (WEEE)

 The crossed bin symbol on the appliance or on its packaging indicates that the product at the end of its useful life must be collected separately and not disposed of together with other mixed urban waste.

Please contact your municipality, or local authority, for all information regarding the separate collection systems available in the area. The retailer is obliged to collect the old equipment free of charge when buying new equipment of an equivalent type, for the purpose of starting the correct recycling / disposal.

Appropriate separate collection for the subsequent start-up of the disused equipment for recycling, treatment and environmentally compatible disposal helps to avoid possible negative effects on the environment and on health and favors the re-use and / or recycling of the materials it is composed of the equipment

Electricity:



The lightning flash and arrowhead symbol is to alert the user to the presence of un-insulated "DANGEROUS VOLTAGE" within the enclosure.

The equipment may only be opened if the mains supply is isolated. The mains supply must not be restored as long as the equipment is open. This applies to both the electrical control panel and the reactor vessel.



Attention:

Working on live equipment is forbidden.

3. Installation Guidance

Each UV Systems is made of an electrical panel and a stainless steel collector. The reactor control panel uses air cooling. The following guidelines must be followed.

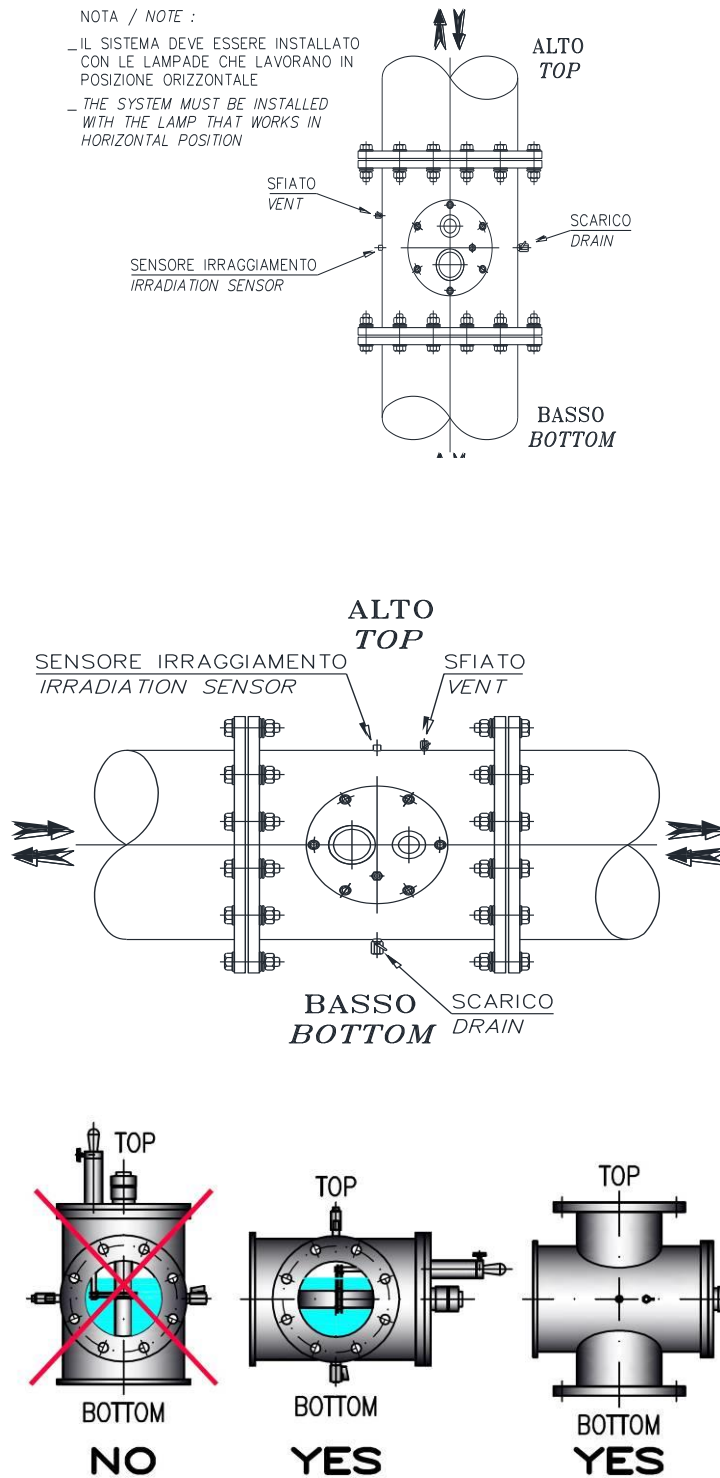
IMPORTANT:

- ✓ The reactor and control panel must not be located in a position where the ambient air temperature exceeds 45°C.
- ✓ The reactor and control panel must not be located adjacent to other equipment that directly emit heat.
- ✓ The reactor and control panel must not be located adjacent to any chemical equipment that is likely to emit fumes(eg. Chlorine).
- ✓ If the system is installed after the filters, it is recommended that a fine mesh strainer basket should be incorporated downstream of the reactor to protect against glass particles entering the pool in the unlikely event of the reactor internal glass quartz breaking in operation or during routine maintenance.
- ✓ It is recommended that the main piping incorporates a valved bypass around the reactor as well as isolating valves for the inlet and outlet connections thereby allowing the pool flow to be bypassed around the reactor during maintenance.
- ✓ Chemical dosing connections should, where possible, be incorporated downstream of the reactor.

Failure to comply with any of the above criteria could effect the operation and warranty of the unit and have an adverse effect on the long term reliability and lifespan of the system.

3.1. Mechanical Connection

1. Install the reactor as suggested in the following technical drawing.

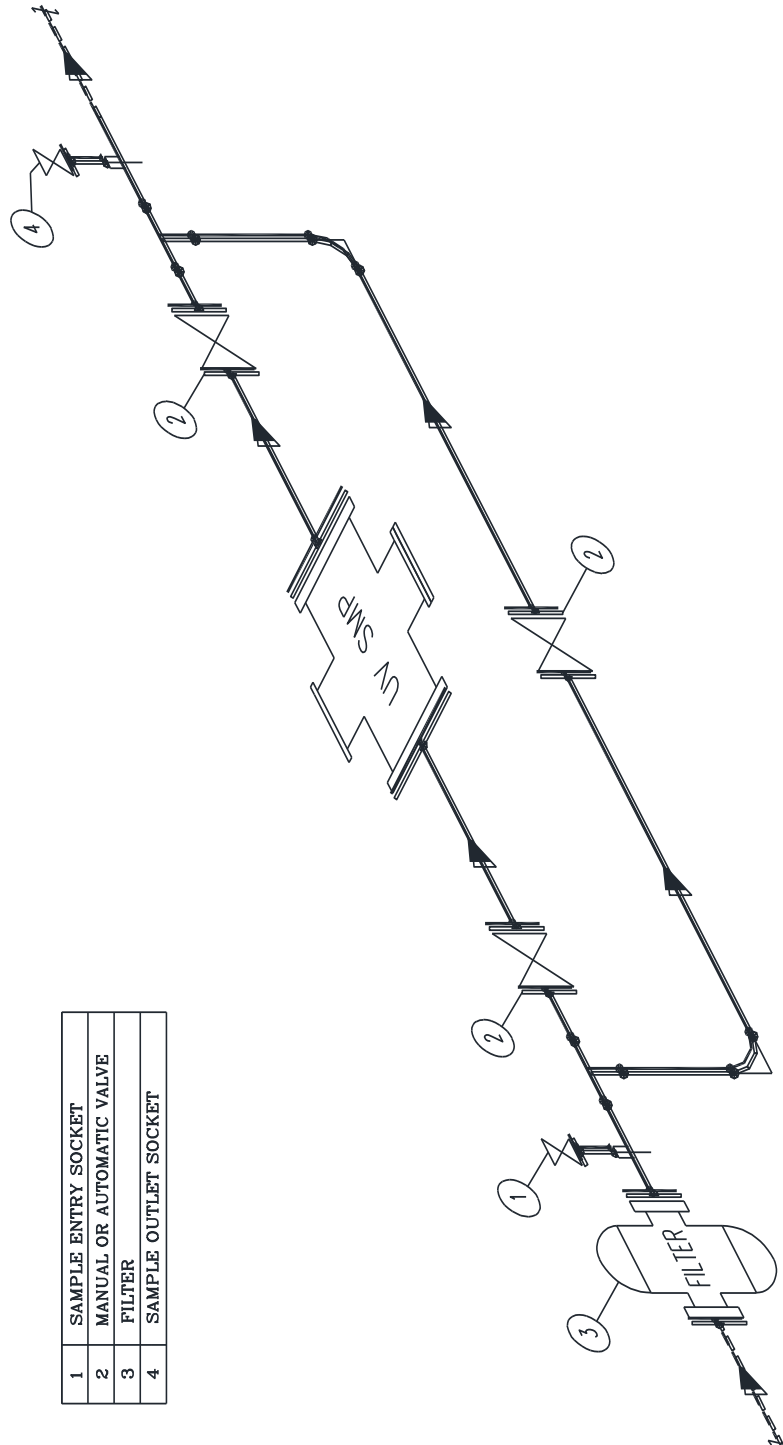


- It is recommended that the main piping incorporates a valved bypass around the reactor as well as isolating valves for the inlet and outlet connections thereby allowing the flow to be bypassed around the reactor during maintenance.



IMPORTANT:

Do not install plastic valves directly connected to the UV system.
UV radiation may ruin the plastic of valves sealing.



3. Insert sensor (with o-ring) into the chamber port.



4. Install drain and vent valves.
5. Open the vent valve and close the by-pass.
6. Vent the air out of the reactor.
7. Let the water pass through the SMP and check if there are signs of leaking inside the quartz sleeve.

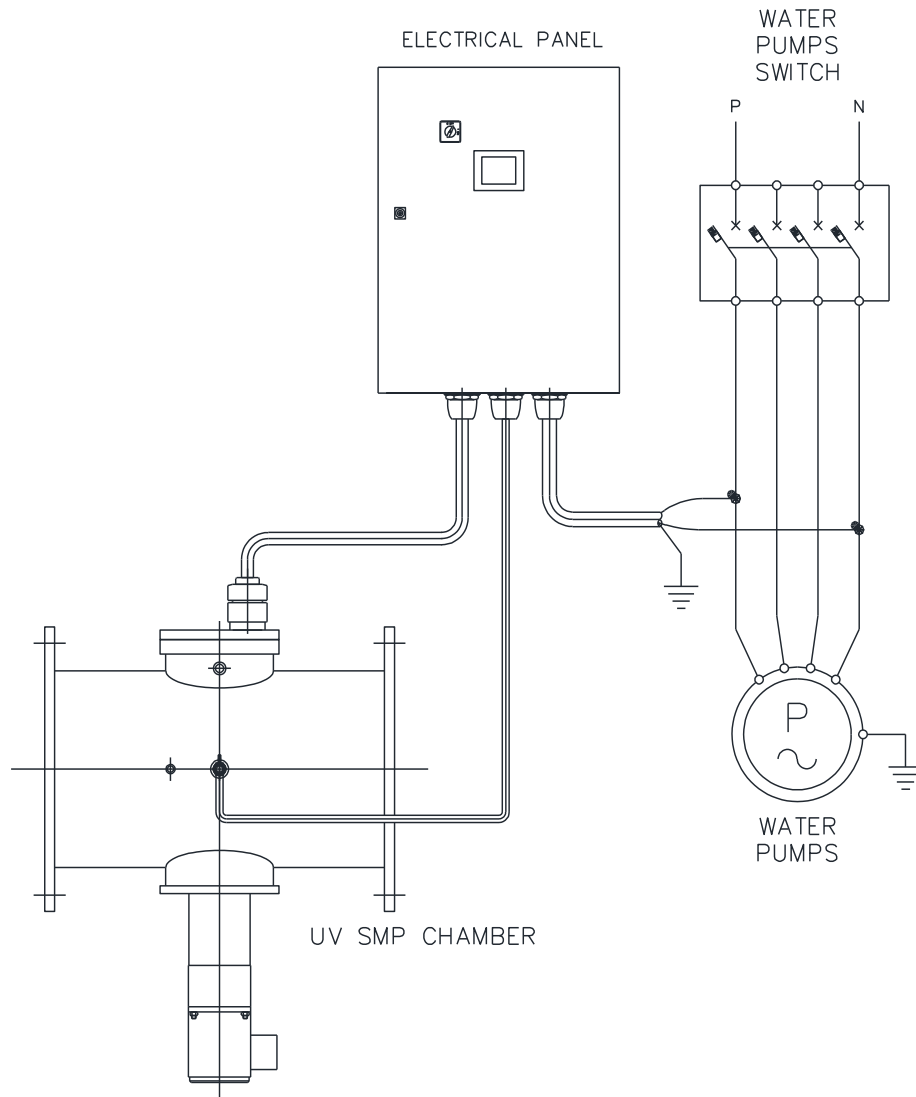
3.2 Electrical Connection

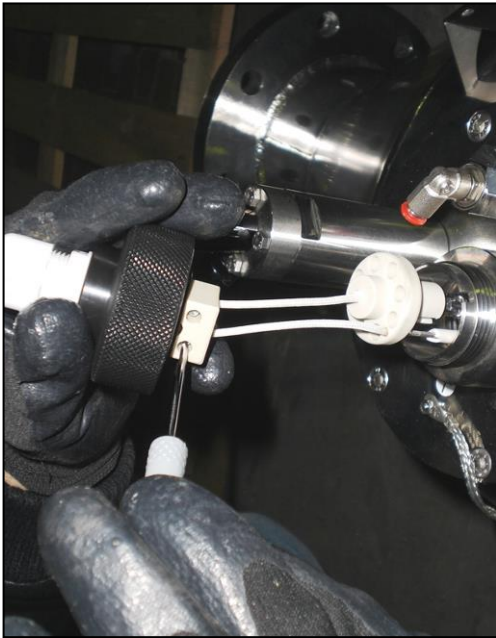
The electrical installation must only be carried out by a qualified electrical engineer. The electrical supply to the unit must be earthed.

1. Feed the electrical panel as in the following technical drawing.

SMP TC (RA)

NOTE: SMP ELECTRICAL PANEL MUST BE SUPPLIED FOLLOWING THIS DRAWING. IN THIS WAY TURNING OFF THE PUMP, SMP WILL TURN OFF.



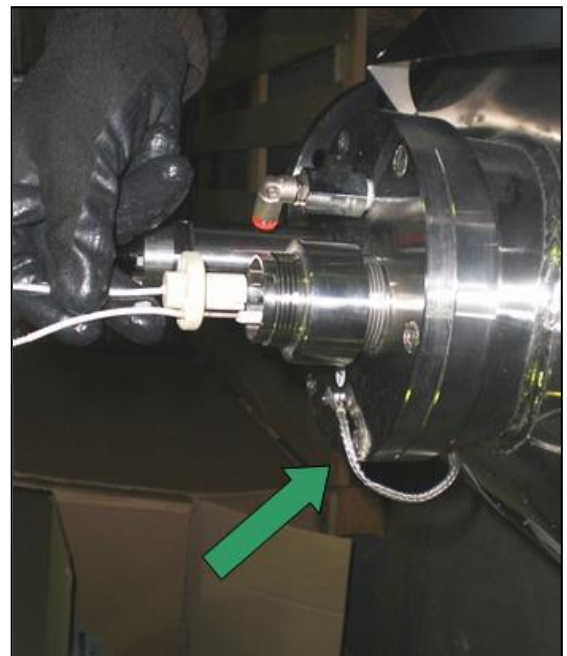
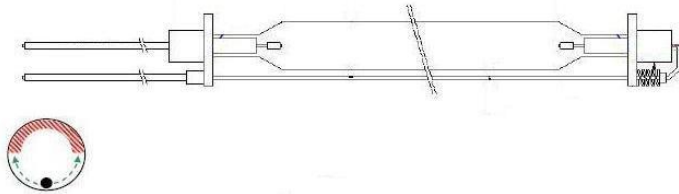


2 Connect the lamp's terminals.

3 Insert the lamp into the quartz already present in the stainless steel chamber.

4 Make the grounding of the stainless steel chamber.

5 Lamp return wire has to be placed bottom side (between 3:00 and 9:00 o'clock)



6 Screw the ring nuts on the sleeve bolts.

7 Connect the temperature sensor:



a) Remove the cable gland cap



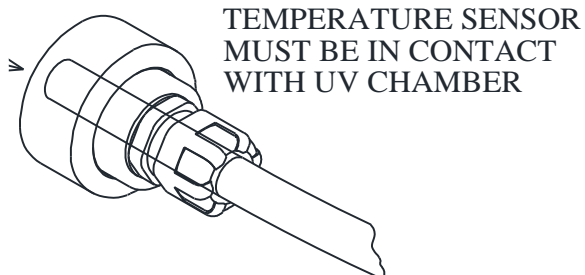
b) Insert the cable first in the cap and then in the cable gland



c) Make sure that the sensor element (at the end of the cable) is in contact with the bottom of the bush



d) Screw the cap maintaining the cable pressed on the bush bottom



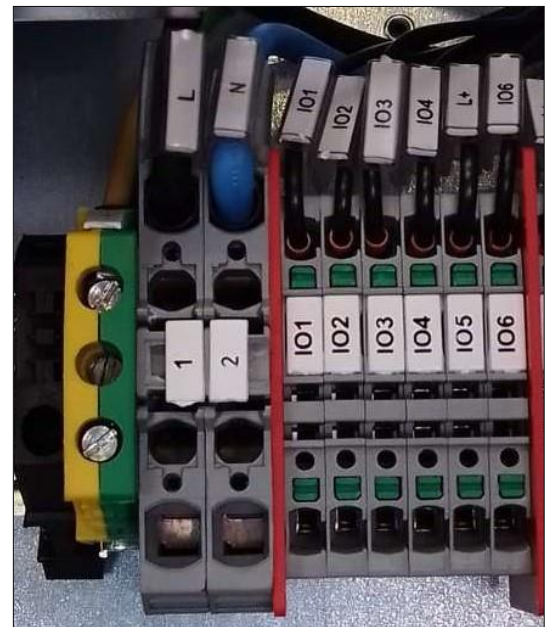
IMPORTANT:

If the temperature sensor element doesn't touch the chamber surface, then the shut down for high temperature may not work.



8 Connect the UV sensor cable.

9 Connect the power supply and the I/O terminals. (See section Electrical Panel Description).



10 Turn the UV system on with the general switch (the lamp will light after few minutes). Do not open the electrical panel without turning off the general switch. We remind you to test the differential switch every month.

10 After 30 working minutes calibrate the sensor (see section “UV Controller”)

4. Safety measures and regulations

The equipment must be installed, put into operation and maintained by trained specialists. The owner and/or user must ensure that the operating personnel has been suitably instructed.

The equipment has been subjected to a hazard analysis, corresponding precautionary measures regarding the safety of persons and domestic animals have been made. Nevertheless, it is still possible that **danger could arise** as a result of incorrect use, bad maintenance, material changes, etc. These dangers are associated with:

- ✓ Electricity
- ✓ Mechanical dangers
- ✓ Exposure to high intensity UV light

4.1 Electricity

The lightning flash and arrowhead symbol is to alert the user to the presence of un-insulated **"DANGEROUS VOLTAGE"** within the enclosure.

The equipment may **only** be opened if the mains supply is isolated. The mains supply must **not** be restored as long as the equipment is open.



ATTENTION:
Working on live equipment is forbidden.

4.2 Mechanical dangers

The equipment contains glass which must be handled with care. Broken lamps emit dangerous mercury vapours.

4.3 Exposure to high intensity UV light

The reactor contains UV emitting lamps and if exposed while energized can cause serious eye and skin damage. Ensure that the mains supply is isolated before opening any of the covers of the reactor.

5. Run the System

The commissioning personnel authorised by the owner and/or user, must read and understand the operating instructions.

The commissioning personnel must be familiar with the safety measures and regulations applicable to the country/area in which the system is installed.

Turn On/Off the system

The preconditions for starting are:

- ✓ Water is flowing through the vessel.
- ✓ The electrical panel is powered
- ✓ The lamps have been turned off for 10 minutes

If all these conditions are respected turn on the general switch.



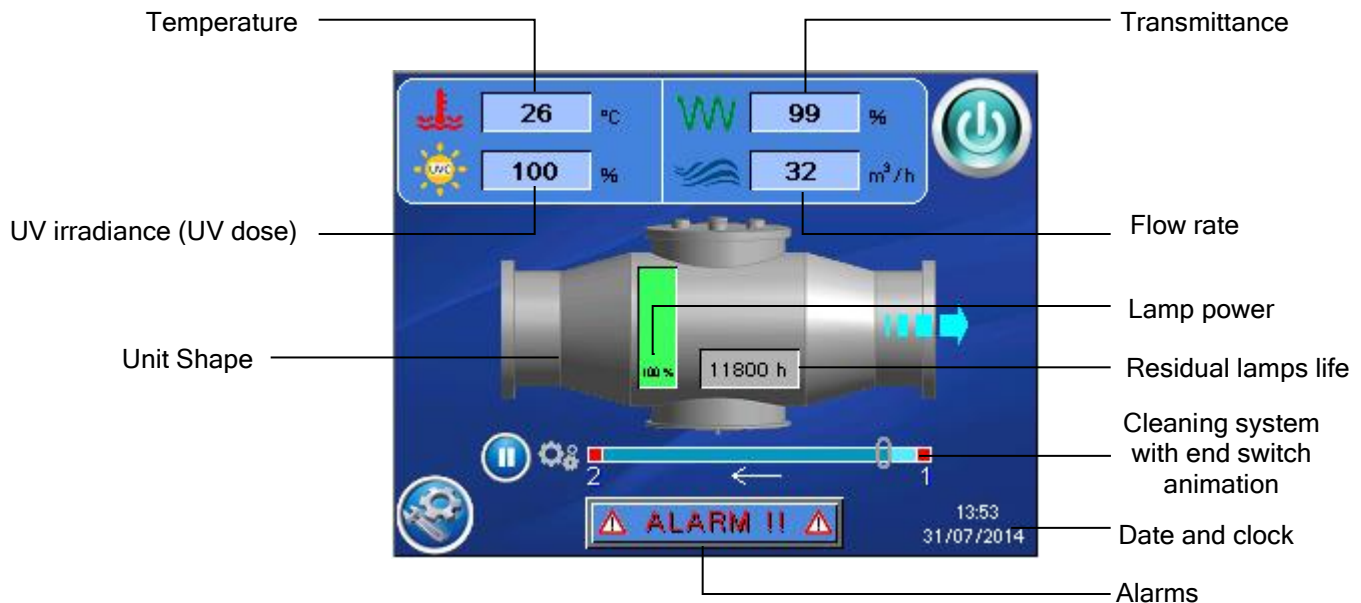
To shut OFF the system turn off the general switch.

6. Touch Screen Panel





6.1. Main Screen

Main screen of the system.

It displays the parameters of flow rate, transmittance, temperature, irradiation, lamps hour meter and quartz cleaning system (if available). It also displays the lamps power. In case of alarm flashing "ALARM button" is displayed.

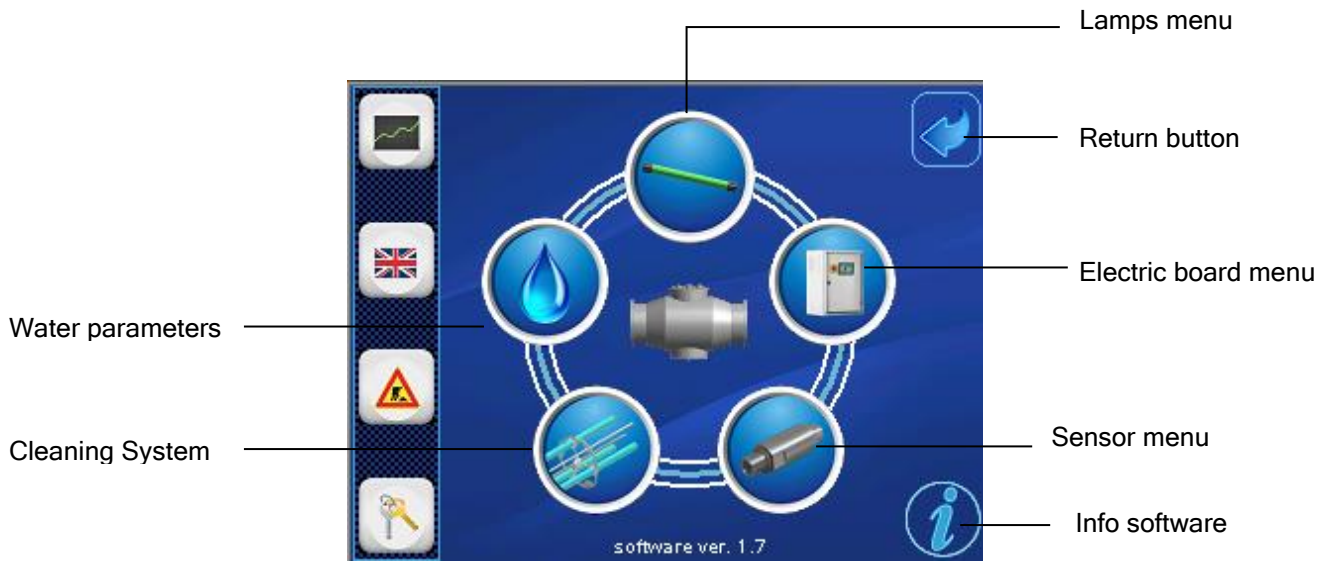



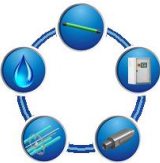
Buttons

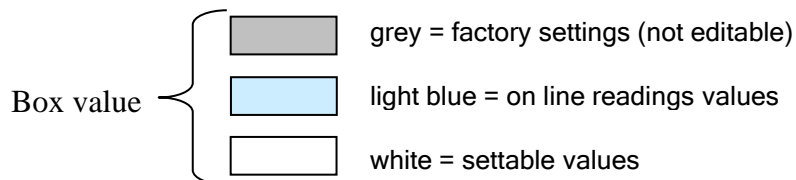
| | |
|---|--|
|  | ON/OFF -) Turn on and off the UV lamps. |
|  | SETTING MENU -) It allows to access the settings menu. The user can set all the parameters useful measures and operation of the system, operate the UV system and read all the parameters that the system records or stores (see "Main menu"). |
|  | Manual Start/Stop cleaning system -) If the system is equipped with a cleaning system, it allows to start and stop the cleaning system (when automatic cleaning system is activated the button is disabled). |
|  | Alarms button -) Visible in case of alarm. Touch to access to the alarm and lamps status visualization (see "Alarm screen"). |

6.2. Setting menu

In this menu the user can set, read and manage all the necessary parameters for the measures and the operation of the system.



| | |
|---|--|
| BAR MENU  | <p>DATALOG - EVENTS -) It allows to visualize the datalog and the events of the system.</p> <p>LANGUAGES MENU -) It allows to change the language both of the user and the system.</p> <p>MAINTENANCE MODE -) It allows to set the system in maintenance mode (disable the alarms and stop the cleaning system motor).</p> <p>PASSWORD MENU -) It allows to access password-protected menu. The user cannot enter this menu unless authorized by the manufacturer.</p> |
| CIRCLE MENU  | <p>SETTINGS MENU OF THE SYSTEM -) Each button allows the access to the setting of a specific component / system optional (if not available the button will appear greyed and the submenu is not available):</p> <ul style="list-style-type: none"> - lamps - electric board - irradiation sensor - temperature - cleaning system - water parameters (flow rate and transmittance) |






return button = it allows to return to the previous screen

6.3. Lamps menu

The sub-menu where the user can read and set the parameters that control the lamps:

Module 1: Lamps

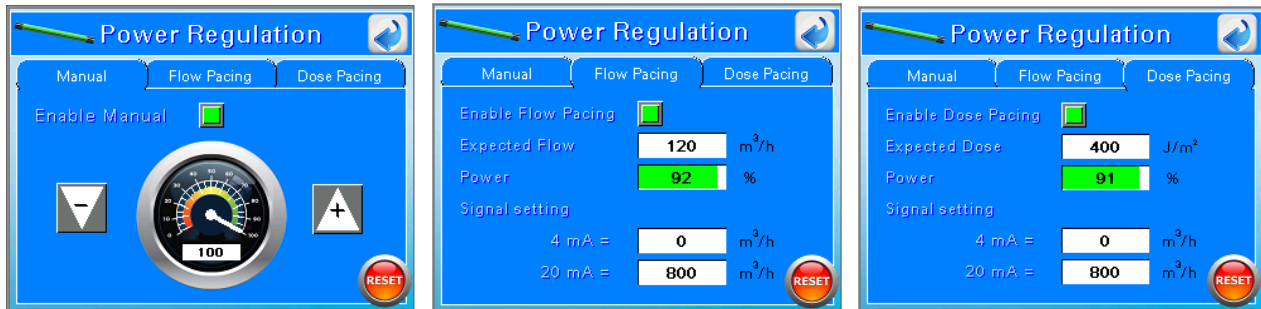


- **N° lamps:** represents the number of lamps of the UV system.
- **Lamps lifespan:** represents the lamps maximum working hours.
- **Residual lamp life:** represents the lamps remaining working hours. It 'a countdown indicative of the residual lamps life from their last exchange.
*When this countdown reaches zero, an alarm alerts the user that lamps must be changed.
The countdown must be reactivated at every lamp change.*
The button  restarts the countdown.
This operation sets the "Lamp Life Hour Meter" to the value of the useful life of the lamp. When the operator does this operation the number of lamp changes is also automatically updated.
- **Lamps changes:** counter displays the number of lamp changes.
At each lamp change the countdown must be restarted by touching  and the number of changes is automatically updated.
- **Lamp power:** displays the lamp's power level. The value range is from 50% to 100%.
With the button  the user can access the power regulation screen and set the power value (see next screen). Access to the screen is protected by a 5-digit password.

Power Regulation (only for PR)

When needed, UV control can reduce emitted UV power. Reducing UV power also results in energy savings.

To do this, UV control system offers 3 different power reduction modes:



Module 1: Manual

Enabling Manual mode, the user can adjust the lamps power level manually from a minimum of 50% to a maximum value of 100%. With the **RESET** button user can restore the default value to 100%.

Module 2: Flow Pacing

Enabling Flow Pacing mode, UV control can reduce UV power according to the amount of water flowing through the chamber. With a water flow higher than the “Expected flow” value UV control will increase lamps power and vice versa.

- **Expected flow:** setting the expected flow.
- **Signal Setting:** shortcut to set start and end flow 4-20mA input scale of UV control. Associate values 4mA and 20mA as the minimum and maximum flow rate according to external flowmeter.

Press button **RESET** to restore the factory setting value.

Module 3: Dose Pacing

Enabling Dose Pacing mode, UV control can reduce UV power to maintain Dose constant. UV control will automatically regulate lamp power to maintain this value.

E.g.: If flowrate increases then UV dose decreases. UV control will increase lamp power to compensate the increased flowrate.

- **Expected dose:** setting the expected dose.
- **Signal Setting:** shortcut to set start and end flow 4-20mA input scale of UV control. Associate values 4mA and 20mA as the minimum and maximum flow rate according to external flowmeter.

Press button **RESET** to restore the factory setting value.

Module 2-3: Ballast 1-6 (7-12)



This screen shows the actual values of temperature, power, current and voltage of each lamp.

6.4. Electrical Panel menu

Submenu where the user can read and set the framework parameters of the system. The panel menu is divided into 4 modules.

Module 1: Model



- **Model:** displays the control panel type.
- **Absorption:** shows the theoretical panel value of absorption preset by password menu
- **Panel temperature:** displays the temperature inside the panel in Celsius Degree.



Important!



If UV cabinet temperature is higher than the guard threshold, UV system will automatically shutdown. A message will appear “SHUTDOWN DUE TO HIGH PANEL TEMPERATURE”.

- **Total hour:** represents the total life of the system.
- **Startup:** represents the number of ignitions.

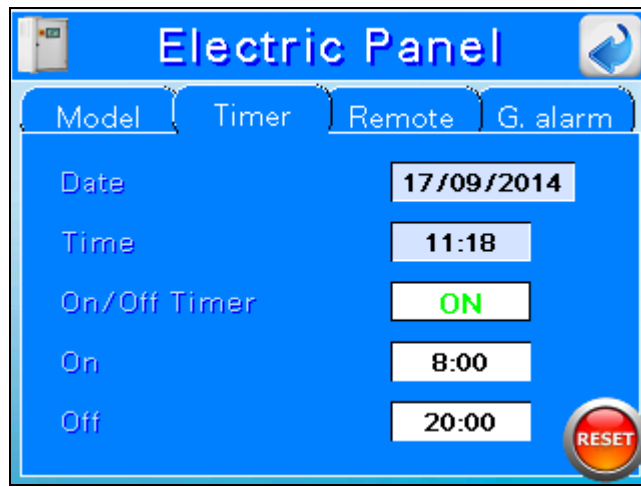


Important!

If the frequency of switching on / off is too high UV lamps reduce their efficiency and their useful lives.

- **After power failure:** Press  to set the behaviour of plant in case of power failure. Selecting “Stay ON”, once the panel is powered up, lamps will automatically turn on again, vice versa selecting “Stay OFF”, lamps will remain off and UV system in Standby.
- **System config:** Press  to modify the PLC system configuration (E.G.: System time, Network address).

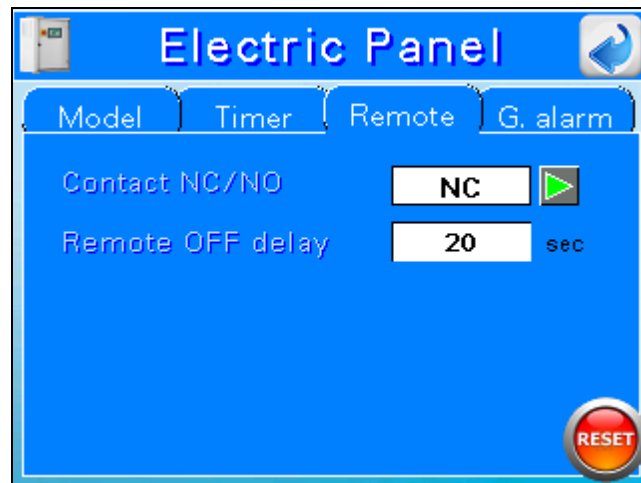
Module 2: Timer



- **Date:** shows the current date.
- **Time:** shows the current time
- **On/Off Timer:** it allows to able/disable the automatic start and stop of the lamps.
- **On:** sets the time for automatic start up.
- **Off:** sets the time for automatic shutdown.

Press **RESET** to restore the factory setting value.

Module 3: Remote



- **Contact NC/NO:** It allows to set the remote ON/OFF contact.
NO (factory settings) = The UV system works when the REMOTE ON/OFF contact is open (see electrical diagram).
NC = The UV system works when the REMOTE ON/OFF contact is closed (see electrical diagram).



Important!

This setting fulfils the Fail Safe Open requirement (in case the cable connected to the remote ON/OFF contact is cut then the system turns OFF).

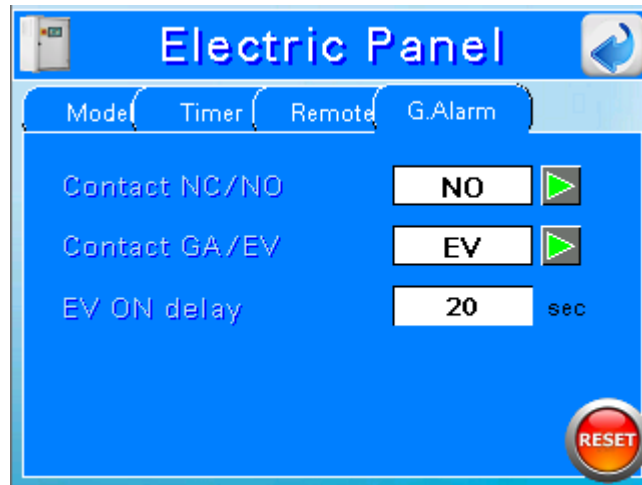
- **Remote OFF delay:** It allows to set the shutdown delay from remote contact. This setting can help when the remote ON/OFF contact is directly connected to a flow switch. Increasing the remote off delay the system does not shut off for short flow stop.



Important!

The remote off delay cannot be too long otherwise the chamber may reach over temperature.


Module 4: G. alarm



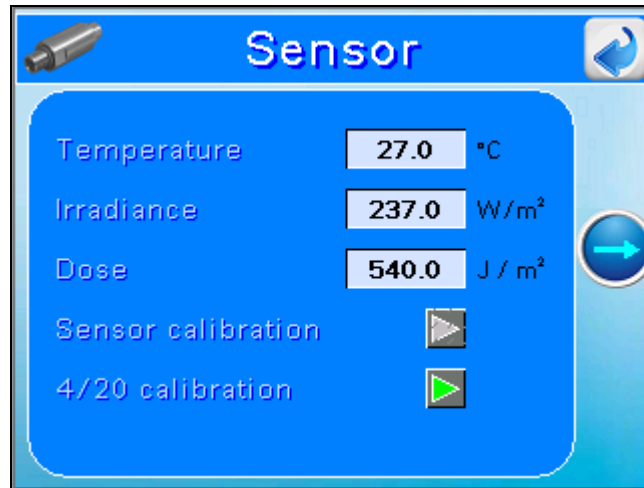
- **Contact NC/NO:** General Alarm contact configuration.
NO (factory settings) = it allow to set UV system General Alarm in normal open condition (see electrical diagram).
NC = it allow to set UV system General Alarm in normal close condition (see electrical diagram).
- **Contact GA/EV:** It allows to set the general alarm contact status in case of shutdown from the user.
GA (factory settings) = In this case water flow does not stop if an electrovalve is driven by the General Alarm Contact
EV = In this case water flow stops if an electro valve is driven by the General Alarm Contact.
- **EV ON delay:** delay in opening the valve. This delay is activated only when UV system is turned off and then on. UV control doesn't open the valve until this delay has expired.

6.5. Sensor menu


Submenu where the user can read and set the parameters that control the irradiance/temperature sensor.

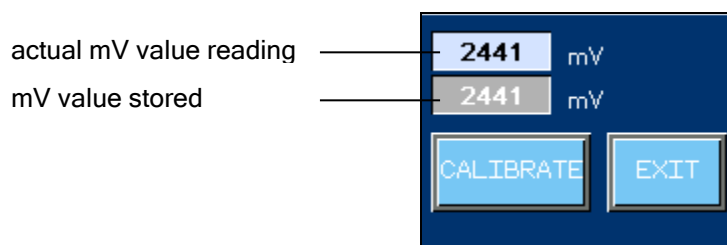
With the button  you can switch from screen 1 to screen 2.

Screen 1:



- **Temperature:** displays the collector temperatures in Celsius Degrees.
- **Irradiance:** shows the UV-C irradiance read by the sensor placed at the edge of the collector. The signal of the radiation can be displayed in % or in W/m².
- **Dose:** in case of panel connected to a flow signal, the system can also calculate UV dose expressed in J/m² UV dose.
- **Sensor calibration:** if irradiance is displayed as % then it will be possible to calibrate the sensor.

Touching on  the user can open the pop-up calibration:



Touching on "CALIBRATE" the user confirms that the signal read by the sensor corresponds to 100% of the radiation of the lamps.



Important!

The sensor must be calibrated at every lamps changing.



Important!


To calculate the radiation factor % it is necessary that the lamps reach the steady state conditions. Delay time depends on lamps type and water temperature. We therefore advice to wait 30 min from the system start up.

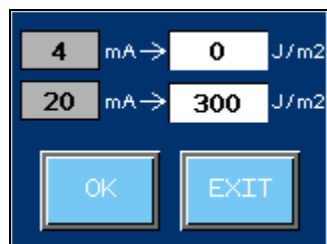


Important!

The same operation can be done if the irradiation is shown in W/m2 (or the dose in J/m2.) This operation can be performed only by authorized personnel.


- **4/20 mA calibration:** The PLC has a 4/20 mA output signal which describes the water temperature and the UV dose (or UV Irradiance) calculated from PLC. The temperature signal in mA has a linear correspondence: 4mA= 0°C and 20mA=100°C. The output signal of the UV dose can be set:

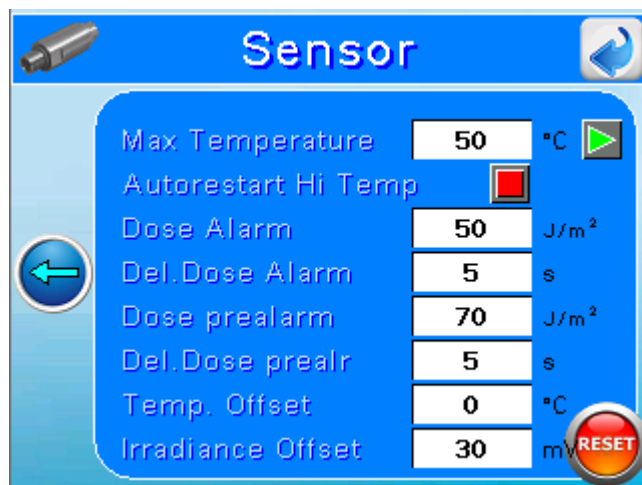
Touch on  to open 4/20mA calibration popup menu:



Associate the values 4 and 20 mA to the minimum and maximum Dose (Irradiance). Touching "OK", the user calibrates the 4/20 mA output.

Screen 2:

With the button  user can switch from screen 2 to 1.



this screen allows to set alarm thresholds.

- **Max temperature:** settable threshold that defines the maximum acceptable temperature in the plant before shut off for safety.

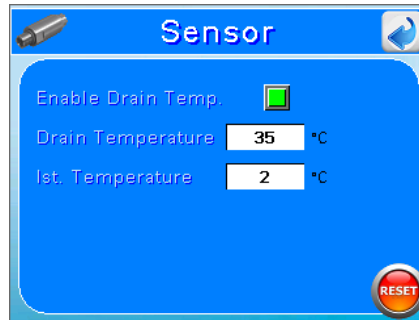


Important!

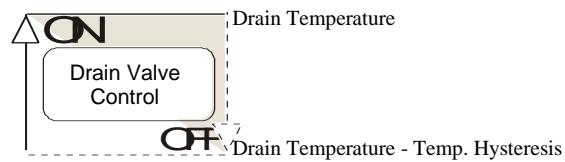
If there's no water flow in the vessel, UV lamps can increase water temperature. Over "Max Temperature" threshold, lamps and UV system could be damaged, so UV system will automatically turn off. A message will appear "SHUTDOWN DUE TO HIGH CHAMBER TEMPERATURE".

Factory setting: 50°C

- Touching on  the following screen is displayed. There operator can activate the flushing contact in case of high temperature (high temperature contact in the electrical scheme).



1. **Drain Temperature:** temperature value which causes activation of drain valve.
2. **Temp. Hysteresis:** variation below the "Drain Temperature" for which the activation of drain valve is considered expired.

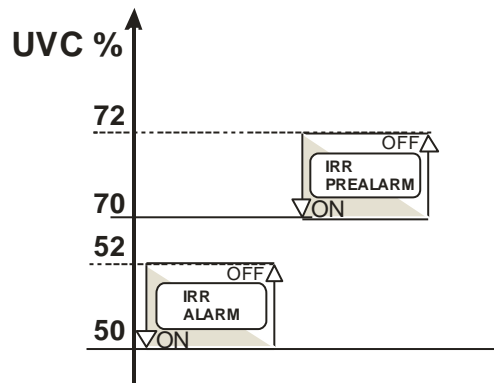


- **Irradiance (dose) pre-alarm:** If UV irradiance (dose) decreases below the pre-alarm threshold an alert is displayed.
To avoid this warning, clean the quartz containing lamps, replace the lamps or improve water quality.



Important! The pre-alarm threshold must be set always higher than alarm threshold (+10°C). The irradiance can be displayed in % or in W/m2. In any case, thresholds will have the same value.

- **Irradiance (dose) alarm:** If UV irradiance (dose) decreases below the alarm threshold an alarm is displayed.
- **Del. Irr. (dose) Alarm (Prealar):** delay time before showing (pre-alarm) or activating (alarm) a irradiance (dose) alarm (prealarm)




When Dose is below the alarm threshold, water can't be fully disinfected. To avoid this warning, clean the quartz containing lamps, replace lamps or improve water quality with an adequate pre-treatment.

Press button RESET to restore the factory setting values for entire screen.

- **Temp Offset:** offset of the chamber temperature sensor in °C.
- **Irradiance Offset:** offset of the irradiance sensor in mV .


6.6. Automatic cleaning system

Submenu where the user can read and set the parameters that control the automatic cleaning system.


With the button  operator can switch from screen 1 to screen 2.

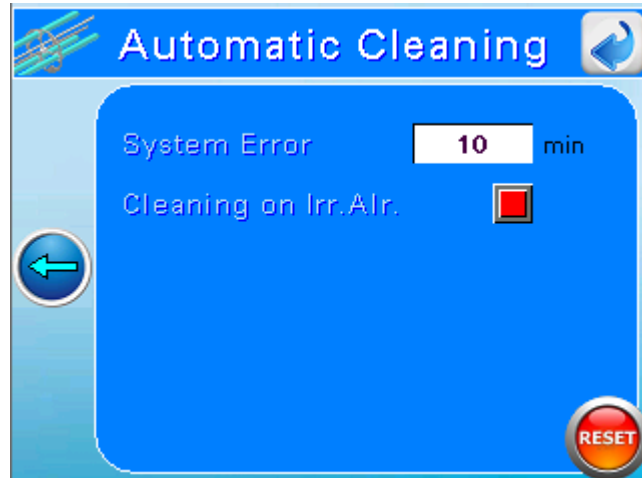
Screen 1:



- **Auto Cleaning ON/OFF:** It allows to able/disable the automatic cleaning system.
- **Wipers cycles:** counter displays the number of wiper cycles
Touch the button  to reset the numbers of wiper cycles .
- **Days:** to set the week days in which it is active the automatic cleaning system (green on, grey off)
- **Start:** to set the time start for automatic cleaning system.
- **Stop:** to set the time stop for automatic cleaning system.
- **Frequency:** to set the frequency of the automatic cleaning cycle between start and stop times.

Screen 2:


With the button  user can switch from screen 2 to 1.



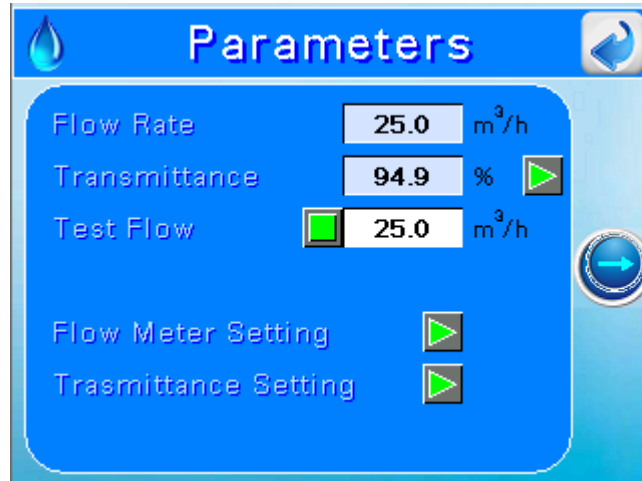
- **System Error:** Delay time before alarm in case of no signal from cleaning system endswitches.
- **Cleaning on Irr Alarm:** Activate the automatic start of a cleaning cycle in case of low irradiance/dose.

6.7. Parameters

Submenu where the user can read and set the water parameter.

With the button  you can switch from screen 1 to screen 2.

Screen 1:




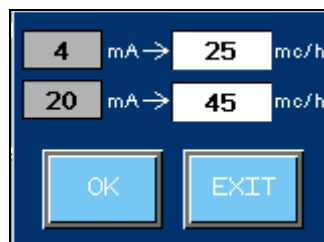
- **Flow rate:** displays the flow rate in mc/h (or gpm).
- **Transmittance:** shows the water transmittance read by the UVT meter sensor in %.
- **Test Flow:** by activating this option it is possible to simulate a flow rate for the calculation of the dose. This option can be used when the flow meter is not installed and especially in systems with almost constant flow rates.



Important!


Remember to check that the automatic shutdown for high and low flow alarms is disabled and that the alarm thresholds comply with the desired test range.

- **Flow meter setting :** the UV707MBS2 special board has a 4/20 mA input signal which describes the water flow rate. The signal can be set:
Touch on  to open 4/20mA calibration popup menu:



Associate the values 4 and 20 mA to the minimum and maximum flow rate input. Touching "OK", the user calibrates the 4/20 mA input.

- **Transmittance setting :** the UV707MBS2 special board has a 4/20 mA input signal which describes the UVT transmittance. The signal can be set:

Touch on  to open 4/20mA calibration popup menu:

Associate the values 4 and 20 the minimum and maximum flow rate input. Touching "OK", the user calibrates the 4/20 mA input.

Screen 2:



this screen allows to set alarm thresholds.

- **Max Flow:** settable threshold that defines the maximum acceptable flow rate in the plant before having the alarm. If the “**High Flow Shutdown**” button is activated the plant shut off for safety.

Factory setting: 9999 mc/h

- **Min Flow:** settable threshold that defines the minimum acceptable flow rate in the plant before having the alarm. If the “**Low Flow Shutdown**” button is activated the plant shut off for safety. If the “**Autorestart Low Flow**” button is activated the plant turn on automatically when flow rate exceeds the minimum acceptable flow rate.

Factory setting: 0 mc/h



Important!

In case of absence of flow the UV lamps can increase chamber temperature. This can damage lamps and UV system. If the temperature is higher than the threshold then the system will automatically turn off. In this case, this message will appear “SHUTDOWN DUE TO HIGH CHAMBER TEMPERATURE”.

Touch button **RESET** to restore the factory setting value.

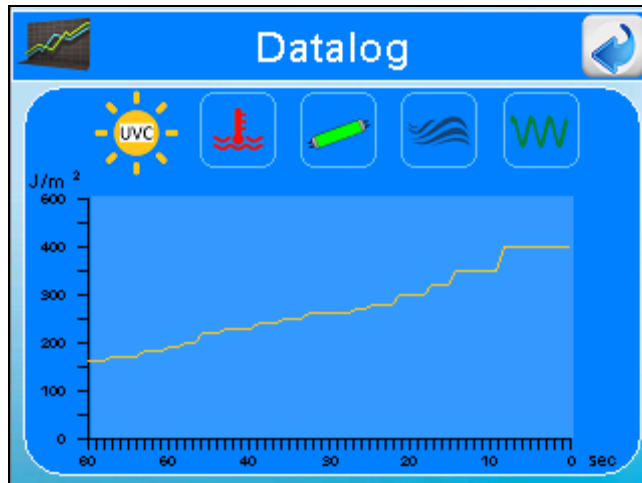
6.8. 6.8 Datalog - Events

Touching “datalog- event” button either the datalog screen or the event screen can be visualized.








Datalog screen:

Submenu where the user can view the trend of system parameter:



Parameters:

- Irradiance (Dose)  (scale is settable in the password menu)
- Temperature (chamber and panel) 
- Power lamps 
- Flow rate (if available)  (scale is settable in the password menu)
- Transmittance (if available) 

Touching on the different symbols the user has access to the respective chart.

Datalog displayed parameters values on line is carried out every 600 seconds with a frequency of 10s.

Datalog saved parameters values (with a frequency of 10s) is carried out every 2 years.

After this time the oldest data will be overwritten.



Important!

To save the datalog it is necessary to connect an USB memory stick (of min 1 GB) on the PLC USB plug.

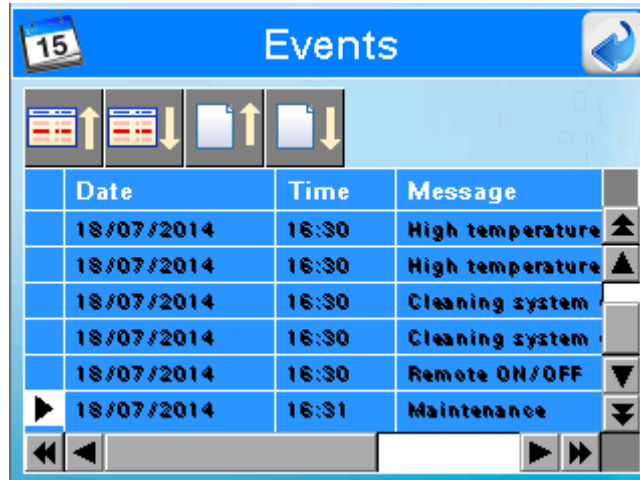


Important!

The files stored on a USB pen have .dat extension. Those files can be converted to .csv file, accessible with software Excel, Calc or similar, with a special conversion software. Obtain details on how to get the software.

Events screen:

In this section alarms and events of the system are displayed:



The screenshot shows a software interface titled "Events". At the top left, there is a calendar icon displaying the number "15". Below the title bar, there are four icons: a list with an up arrow, a list with a down arrow, a document with an up arrow, and a document with a down arrow. The main area contains a table with the following data:

| | Date | Time | Message | |
|---|------------|-------|------------------|---|
| | 18/07/2014 | 16:30 | High temperature | ▲ |
| | 18/07/2014 | 16:30 | High temperature | ▲ |
| | 18/07/2014 | 16:30 | Cleaning system | |
| | 18/07/2014 | 16:30 | Cleaning system | |
| | 18/07/2014 | 16:30 | Remote ON/OFF | ▼ |
| ▶ | 18/07/2014 | 16:31 | Maintenance | ▼ |

At the bottom of the screen, there are navigation controls including a play button, a left arrow, a right arrow, and a double right arrow.

The events are displayed in chronological order.

When the event is active, it is highlighted in red.

Displays shows up to 100 events, after which the oldest events will be overwritten.

The last 100 day events are saved into USB pen every day.



Important!

The files stored on a USB key events are in .csv extension. Use Excel, Calc or similar software to open the files.

6.9 List of alarms and troubleshooting

Each alarm activates the main relay (dry contact and 24 Vdc output). The message ALARM! on the Main Screen starts flashing. Touch “ALARMS” button on the screen to visualize the alarms. The screen lists all the possible alarms and shows the status of lights



LAMP FAULT → Each lamp of the UV system is identified by a number. This message visualizes the lamp number which is not working.

Possible Causes:

Solutions:

- ✓ Lamp Burned
- ✓ Lamp Driver Failure
- ✓ Lamp Driver Missing Communication

- ✓ Change the lamp
- ✓ See below

Lamp Driver Visual Diagnosis:

For visual diagnosis, communication status and device status will be indicated by LEDs:

| LED State Color | LED State Color | LED State Color |
|-----------------|--|-----------------|
| Communication | Switched on during frame reception or sending. | Yellow |
| Error | On: internal fault Flashing: communication fault or configuration fault | Red |
| Device Status | On: device powered | Green |
| Lamp on | On: Lamp on | Blue |

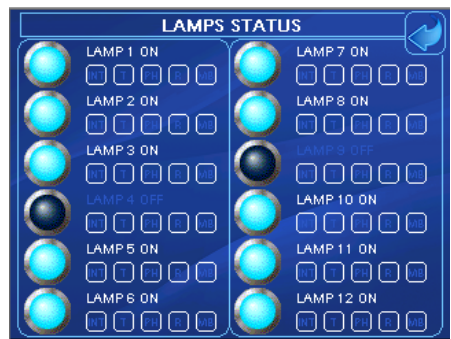


Important!

Replace and connect the lamps only with panel switched off, wait 20 seconds before you restore power to allow the reset lighter. Otherwise, the igniter is not reset and the new lamp is not recognized.

Lamps status Diagnosis:

Push the “LAMPS FAULT” light  to access in the lamps status panel.



In this screen the user can see all the lamps status. In ModBus mode it is possible to read the lamp driver informations:

INT: If highlighted then describes either a “*System Failure*” or a “*Lamp Driver Failures*” (Input-Voltage Fault; Hardware Protect Fault; Fan Fault; Lamp Driver Internal Voltages Fault)

A system failure will occur in case of :

Input voltage too high. High limit 305V.

Remark when input voltage is below 180V the lamp will be automatically dimmed to attempt to continue operation..

A Lamp Driver failure will occur in case of:

1. Internal Lamp Driver error.

Possible causes:

a. Fan:

Keep airflow area open and clean for maximum cooling capacity.

After removing AC-mains input power wait at least 1 minute before working on the fan. After 1 minute the fan can easily be removed, using a screw driver see below:



Note: re-position the fan wiring exactly in the same way as the original fan wiring!

b. Internal error. Please ask the manufacturer for troubleshooting.

T: If highlighted then a “temperature error” or “over temperature” occurred (Cooling unit Temp Fault; Intake Air Temp Fault)

A temperature error will occur in case of:

1. Intake air temperature too high or too low. Low limit 0°C, High limit 50°C

2. Cooling unit temperature too high. High limit 85°C

PH: If highlighted then lamp driver is in “Lamp Reignition status”.

Lamp Driver tries to ignite the lamp 12 times (18 sec interval) without success. Possible causes:

a. Lamp still too hot.

b. Lamp defect.

c. Cable not connected

R: If highlighted then the lamp could be: open, disconnected, in short, lamp for 5 min below 85% power, lamp for 2 min below 85%.

When the lamp does not reach the 85% of the output power level within 5 minutes.

Possible causes:

a. Overcooling of the lamp.

b. Wrong lamp type.

c. Lamp defect.

d. Lamp end of life.

When the lamp is remotely switched on and the 85% of the output power level is reached. However when the output power drops below the 85% of the powerset level for 2 minutes the lamp will be shut off as well. Possible causes:

- a. Overcooling of the lamp.
- b. Wrong lamp type.
- c. Lamp defect
- d. Lamp end of life.

MB: : If highlighted then the SITA touch screen is not able to communicate with the lamps driver. Check the modBus communication cables.

LOW IRRADIANCE (DOSE) → It's visualized in case the UV Irradiance (or Dose) is under the threshold level.

Possible Causes:

- ✓ Deposit on quartz sleeves lamp protection
- ✓ Variation on UV transmittance of the water
- ✓ Decrease of the UV-C output in lamp(s) due to the lamp ageing
- ✓ Deposit on quartz of the UV sensor

Solutions:

- ✓ Clean the quartz sleeve
- ✓ Filter the water
- ✓ Change the lamps
- ✓ Clean the sensor

PREALARM LOW IRRADIANCE (DOSE) → It's visualized in case the UV Dose is under the threshold level

Possible Causes:

- ✓ Deposit on quartz sleeves lamp protection
- ✓ Variation on UV transmittance of the water
- ✓ Decrease of the UV-C output in lamp(s) due to the lamp ageing
- ✓ Deposit on quartz of the UV sensor

Solutions:

- ✓ Clean the quartz sleeve
- ✓ Filter the water
- ✓ Change the lamps
- ✓ Clean the sensor



Important!


This alarm doesn't switch the main relays.

LAMPS EXHAUST → It's visualized in case the countdown of lamp life reaches 0 h. This means that the lamp worked for more than their lifespan.

Possible Causes:

- ✓ Lamp lifespan finished

Solutions:

- ✓ Change the lamp(s) and press  to restart the lamp hour meter count down

PREALARM LAMPS EXHAUST → Displayed if the countdown of lamp life reaches 200 h. This means that the lamps has almost reached their lifespan.

Possible Causes:

- ✓ Lamp lifespan finished

Solutions:

- ✓ Prepare to replace the lamps



Important!

This alarm doesn't switch the main relays.

COMMUNICATION ERROR → It's visualized in case the plc doesn't receive any signal from the UV707MBS2 or the ballast modbus communication.

Possible Causes:

- ✓ No Communication between PLC and 707MBS2 card or Modbus Ballast (cable broken or disconnected)
- ✓ No Communication between PLC and the ballast

Solutions:

- ✓ Connect the cable
- ✓ Ask the manufacturer

CLEANIG SYSTEM ERROR → It's visualized in case of problems in the automatic cleaning system.

Possible Causes:

- ✓ End switches broken
- ✓ Cleaning system clogged

Solutions:

- ✓ Ask the manufacturer

CHAMBER HIGH TEMPERATURE



Shutdown Due To High Chamber Temperature

This alarm shut down the panel. It's visualized in case the water temperature inside the chamber is higher then the setttable threshold level (*factory setting 50°C*)

Possible Causes:

- ✓ No Flow
- ✓ Non correct signal from the temperature sensor

Solution:

- ✓ Check pumps, valves
- ✓ Check the temperature sensor



Important!

In case of high water temperature the system shuts down for safety. The user must find the over temperature reason and restart the system manually. Automatic restart is not possible because it could generate cycling of over temperature shut down, cooling and automatic restart.

PANEL HIGH TEMPERATURE

Shutdown Due To High Panel Temperature

This alarm shut down the panel. It's visualized in case the panel temperature is higher than the setttable threshold level (*factory setting 50°C*).

Possible Causes:

- ✓ Problem on the fan
- ✓ Non correct signal from the temperature sensor

Solution:

- ✓ Check the fan
- ✓ Check the temperature sensor
- ✓ Clean/change the filter



Important!

In case of high panel temperature the system shuts down for safety. The user must find the over temperature reason and restart the system manually. Automatic restart is not possible because it could generate cycling of over temperature shut off, cooling and automatic restart.



Important!

This alarms activates alarm relay that will be deactivated only when both a good temperature is restored and the system is restarted manually.

LOW FLOW



If shut down option is activated this alarm shuts down the panel . It's visualized in case the flow rate inside the chamber is lower than the settable threshold level (*factory setting 1 mc/h*)

Possible Causes:

- ✓ Low Flow
- ✓ Non correct signal from the flowmeter

Solution:

- ✓ Check pumps, valves
- ✓ Check the flowmeter



Important!

In case of low flow the system shuts down for safety. The user must find the low flow reason and restart the system manually. Automatic restart is not possible because it could generate cycling of low flow shut down.

HIGH FLOW



If shut down option is activated this alarm shutdowns the panel . It's visualized in case the flow rate inside the chamber is higher than the settable threshold level (*factory setting 9999 mc/h*)

Possible Causes:

- ✓ High Flow
- ✓ Non correct signal from the flowmeter

Solution:

- ✓ Check pumps, valves
- ✓ Check the flowmeter

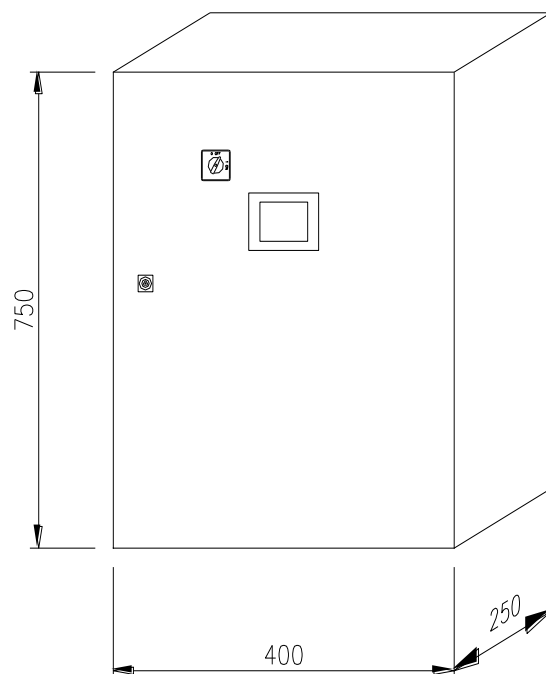


Important!

In case of high flow the system shuts down for safety. The user must find the high flow reason and restart the system manually. Automatic restart is not possible because it could generate cycling of high flow shut down.

7. Electrical Panel Description

7.1. External View



7.2 Mains Power Connections/ Input-Output Terminals

See attachment to the manu

8. Reactor Dimensions

a.SMP 11 TC (RA)

(see the attachments to the manual)

b.SMP 22 TC (RA)

(see the attachments to the manual)

c. SMP 33 TC (RA)

(see the attachments to the manual)

d.SMP 44 TC (RA)

(see the attachments to the manual)

9. Technical Data Sheet

a.SMP 11 TC (RA)

(see the attachments to the manual)

b.SMP 22 TC (RA)

(see the attachments to the manual)

c. SMP 33 XL TC (RA)

(see the attachments to the manual)

d.SMP 44 XL TC (RA)

(see the attachments to the manual) Maintenance

10. Maintenance

Maintenance work may only be carried out by personnel who have been trained and authorized for this work by the owner and/or user. The owner and/or user must ensure that the maintenance personnel are familiar with the safety measures and regulations, and that they also comply with them, in addition to having read and understood the operating instructions.

Only original replacement parts from the supplier must be used.

The following are the recommended service intervals for replacement parts:

- | | |
|---|---|
| ✓ <u>UV Lamp:</u> | Replacement every 10.000 h. |
| ✓ <u>Quartz sleeve:</u> | Clean every week, replacement depends on wear |
| ✓ <u>O-Rings:</u> | Replacement every year. |
| ✓ <u>Control Panel filter mat:</u> | Replacement or cleaning every year |

Replacement of the UV lamp

UV Replacement must be done when the Partial Hour Timer display 10000 hours.

Operations:

1. Switch off the electrical panel. Check that the main power supply is isolated to the control panel.
2. Make sure that the power has been isolated or that the UV lamp has been OFF for at least 15 minutes before carrying out the following procedure. This is to ensure that any residual heat on the lamp has been dissipated.
3. Screw out the ring nuts.
4. Short-circuit the feeding cable (for example with a screwdriver) to run down the capacitor.



ATTENTION: Do not touch the feeding cable without creating a short circuit

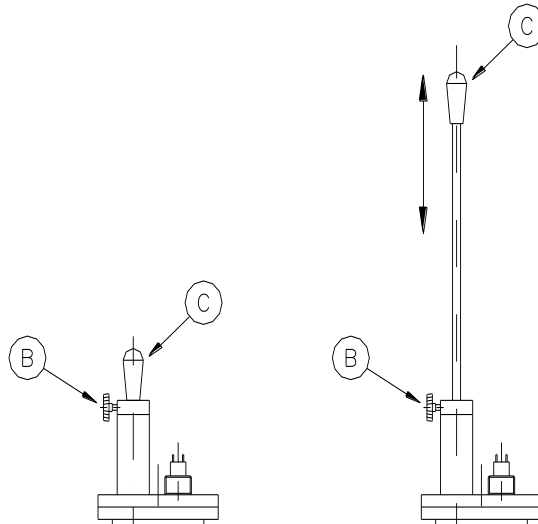
5. Screw out the ceramic terminal that secure the lamp terminal plate to the reactor glad nut.
6. Visually check the internals of the vessel sleeve for any signs of cracking or water leakage that could have occurred during operation.

INFORMATION: *The UV lamp glass and quartz sleeve must never be handled with a bare hand. When handling the glass, clean white cotton gloves must always be worn.*

7. Insert the new lamp, securing with the fixing ceramic terminal.
8. Block by screwing the ring nuts on the sleeve bolts.
9. Ensure that the fixing screws are re-fitted as they form the Earth connection for the cover.
10. Reset the Partial Hours (See Section “Reset Partial Hours”)
11. Calibrate the sensor (See Section “Calibrate the sensor”).

Clean the quartz sleeve (SMP Model)

Clean must be done every month (suggested range 1 week) to preserve the correct working of the system. The UV system is provided with a manual cleaning system piston.



Cleaning procedure:

Unscrew the B screw (this screw blocks the cleaning bar in standard working)



ATTENTION:

If the chamber is pressurized: After the B screw is unscrewed the piston will lift because of the water pressure.

Move UP and DOWN the cleaning bar using the C handle. The number of cleaning cycles depends on the water quality. When the cleaning is finished, block the cleaning bar with the B screw.

Clean the quartz sleeve (SMP RA Model)

See paragraph “Cleaning system setting”.

See paragraph “Manual cleaning”.

Replacement of the quartz sleeve

The replacement of the quartz sleeve must be done only if its wear compromises the correct working of the systems. It depends on the quality of the water.

Operation:

1. Switch off the electrical panel. Check that the main power supply is isolated to the control panel.
2. Make sure that the power has been isolated or that the UV lamp has been OFF for at least 15 minutes before carrying out the following procedure. This is to ensure that any residual heat on the lamp has been dissipated.
3. Screw out the ring nuts.
4. Remove the UV lamp.

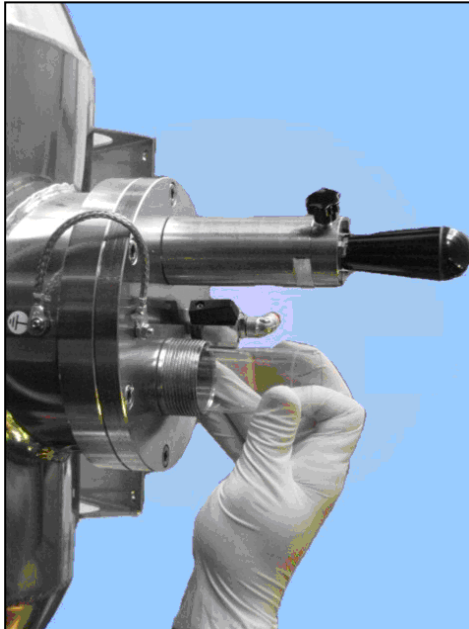
INFORMATION: *The UV lamp glass and quartz sleeve must never be handled with a bare hand. When handling the glass, clean white cotton gloves must always be worn.*

5. Stop the flow of water through the reactor by operating the by-pass valve or by stopping the main circulation pump(s) and drain the water in the reactor.
6. Screw out the sleeve bolts and take the o-ring.
7. Remove the quartz sleeve and change it with the new one.

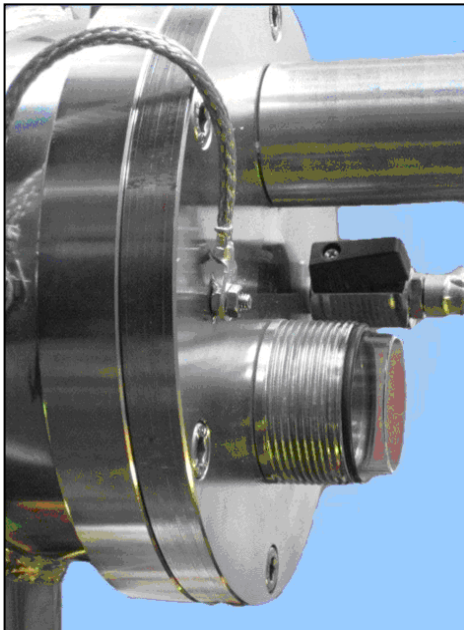
INFORMATION: *The quartz sleeve must never be handled with a bare hand. When handling the glass, clean white cotton gloves must always be worn.*

INFORMATION: *Insert the new quartz sleeve, taking care to ensure that it locates through the scraper ring.*

8. Place the O-Ring between the quartz sleeve and the sleeve bolt.
9. Insert the gasket in the sleeve bolt and screw the sleeve bolt to fix the quartz sleeve.
10. Insert the lamp and connect it as described before.
11. Slowly open the water isolating valves and slowly flood the reactor with the water (vent the reactor). Check the o-ring seal and sleeve for signs of leakage
12. Turn on the electrical panel.



Insert the quartz sleeve in the chamber (point 7)



Insert the o-ring on the sleeve (point 8)

Insert the gasket in the sleeve bolt (point 9).



Screw the sleeve bolt (point 9)

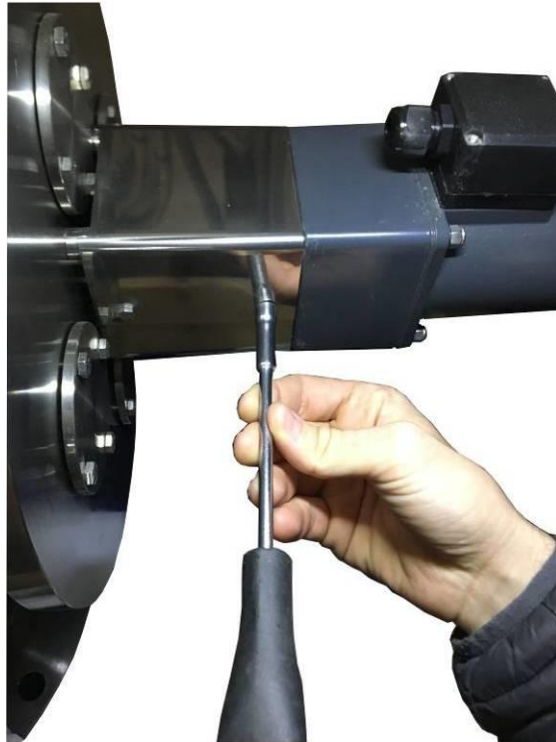
Replacement of the fan filter

Depending on the environment where the control panel is installed, the filter fitted to the inlet fan grills must be cleaned or changed on a regular basis. It is recommended that after commissioning, the filter mat is checked on a monthly basis. Thereafter, depending on the results of these checks this could be reduced to between 3 to 6 months.

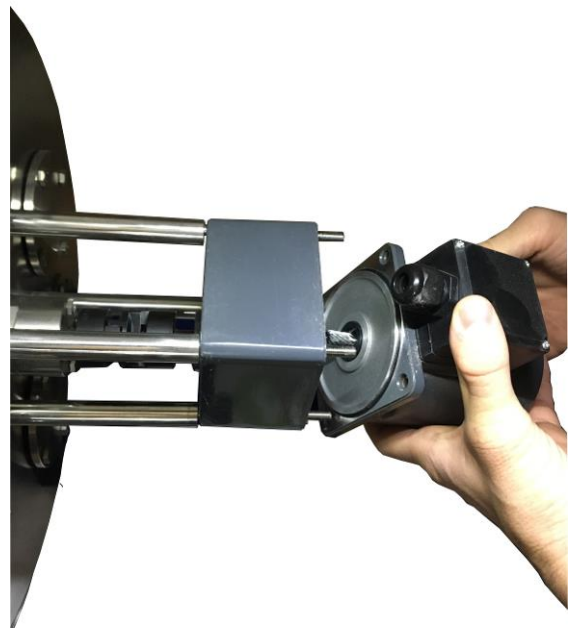
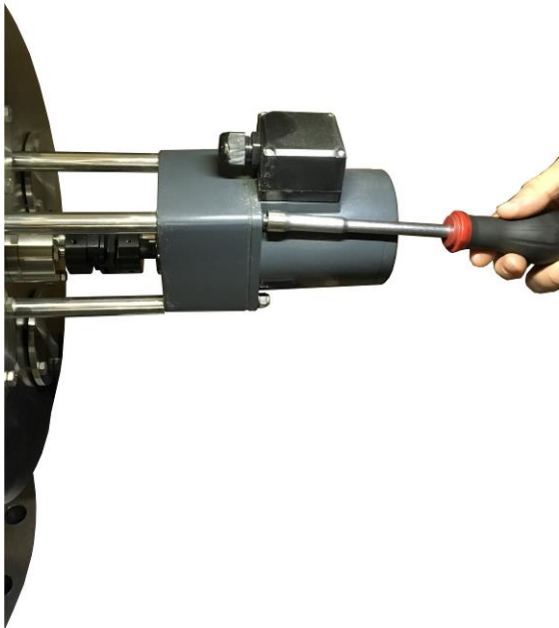
11. Replacement of motor shaft seal for UV SMP RA series

Disconnect electrical power, interrupt the water flow and drain the UV system.

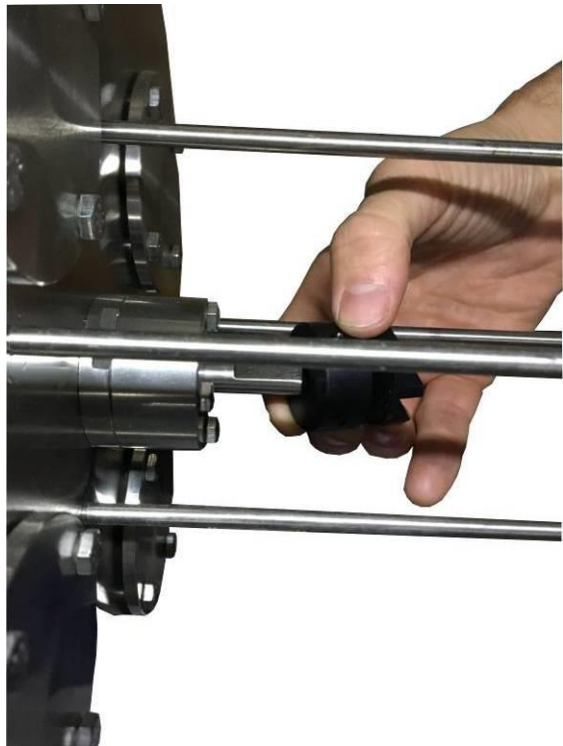
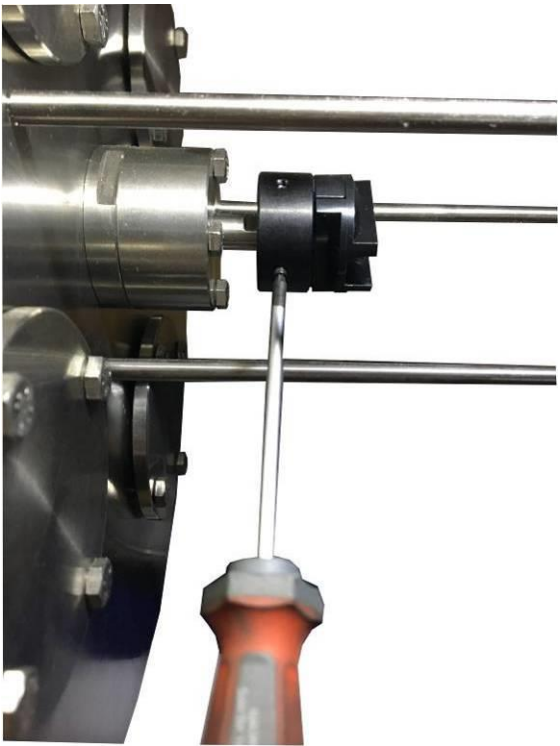
Open the metallic cover which protects the motor shaft joint (Use socket wrench size 7).



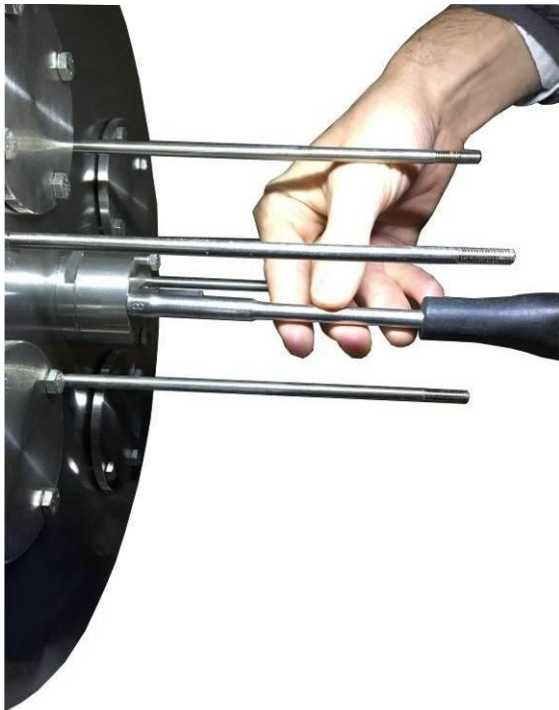
Unscrew the motor nuts and disconnect it (Use socket wrench size 10).



Unscrew the joint locking nut and extract it (Use Torx size 8).



Remove seal housing by unscrewing its bolts (Use socket wrench size 8).



Using the screwdriver, remove the motor shaft seal and replace with the new one. Reassemble all and restart the UV system.



D1>D2

In order to ensure the correct sealing, assemble the components in the order shown in the previous figure.

ATTENTION: First insert the disc with greater internal diameter, then the ball group and finally the disc with lower internal diameter

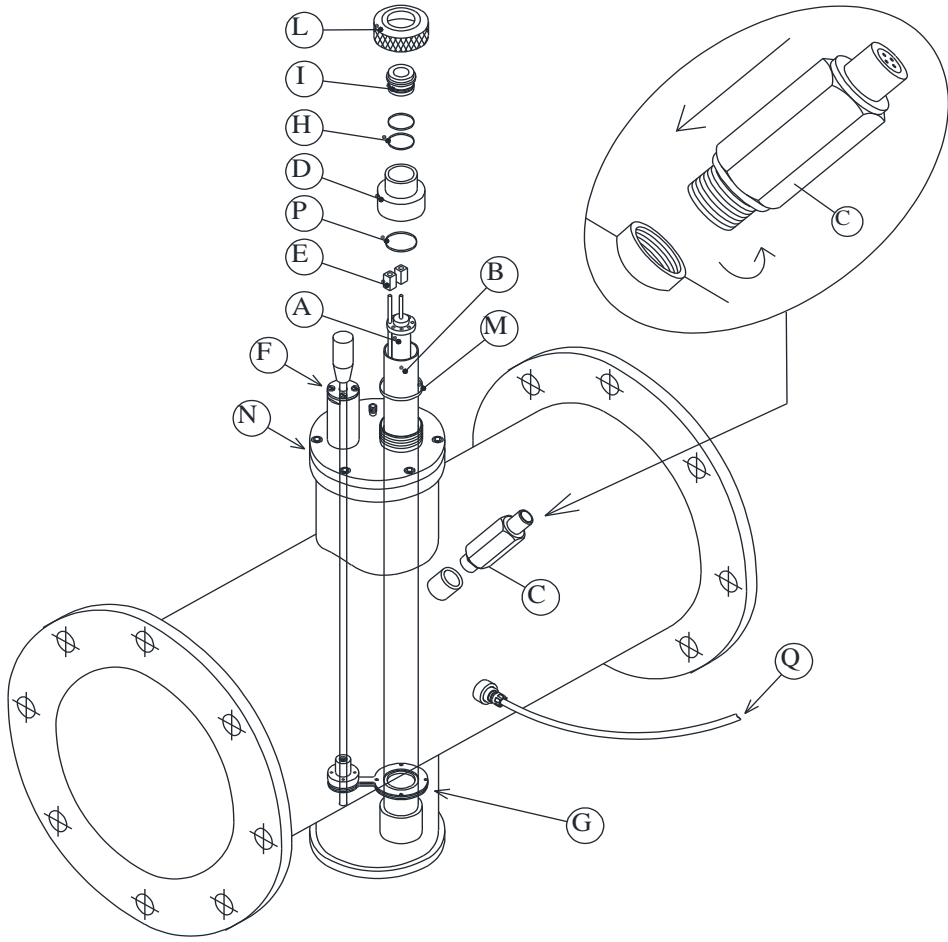
| Item | Code |
|-----------------|------|
| Mechanical seal | R083 |
| Contrast spring | R082 |
| Ball bearing | R079 |

After assembly, perform the hydraulic test, check the seal of the new gasket and only then insert the lamps and perform the electrical test.

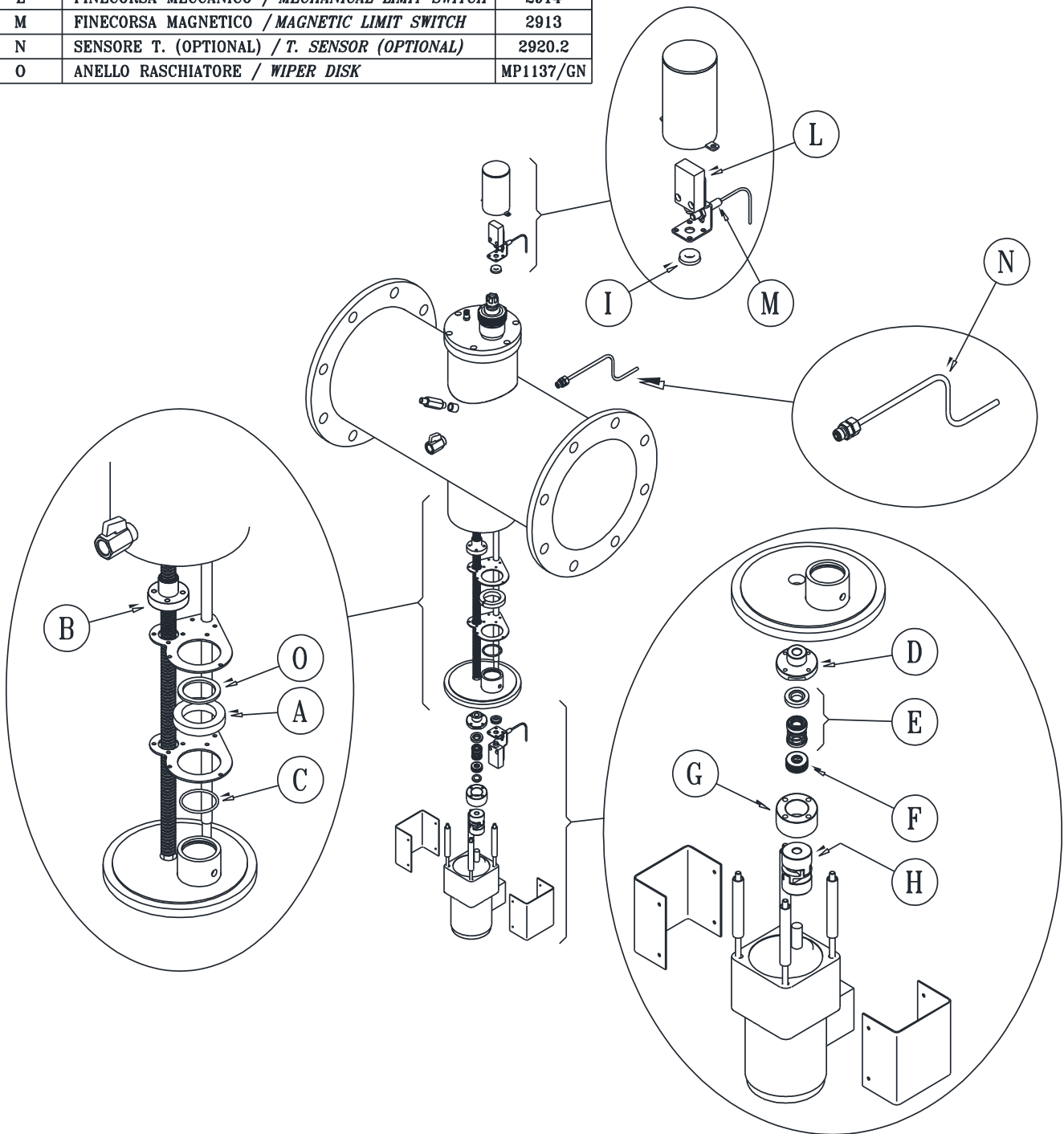
12. Spare Part Lists

Relevant spare part lists

| RIF. REF. | DESCRIZIONE DESCRIPTION | CODICE CODE |
|-----------|--|-------------|
| A | LAMPADA UV / UV LAMP SMP 7-11 | MP1426 |
| | LAMPADA UV / UV LAMP SMP 22 | MP1427 |
| | LAMPADA UV / UV LAMP SMP 33 | MP1428 |
| B | GUAINA AL QUARZO / QUARTZ SLEEVE SMP 7-11 | MP1405 |
| | GUAINA AL QUARZO / QUARTZ SLEEVE SMP 22 | MP1400SY |
| | GUAINA AL QUARZO / QUARTZ SLEEVE SMP 33-44 | MP1409 |
| C | SENSORE Ø 1/4" / SENSOR Ø 1/4" | MP1128 |
| D | BLOCCAGUAINA / SLEEVE BOLT | 026425/516 |
| E | MORSETTO DI CERAMICA / CERAMIC CLAMP | UV752 |
| F | GUARNIZIONE PER ALBERO / GASKET FOR MAST | R105 |
| G | DISCO TEFLON Ø38 / TEFLON DISK | MP1137/TRM |
| H | O-RING 2112 | OR2112 |
| I | ADATTATORE QUADRIPIN / FOUR PINS ADAPTOR | 026431 |
| L | GHIERA / NUT | 026426 |
| M | O-RING 38x4 | 028207 |
| N | O-RING 3500 (SMP 7-11-22-33-44) | 028208A |
| | O-RING 4825 (SMP 50-70-105) | 028214 |
| | O-RING 3975 (SMP 140) | MP1142 |
| | O-RING 41200 (SMP 175) | 028215 |
| P | GUARNIZIONE / GASKET | 026425G |
| Q | SENSORE TEMPERATURA / TEMPERATURE SENSOR (TC ONLY) | 2920.2 |



| RIF. REF. | DESCRIZIONE DESCRIPTION | CODICE CODE |
|--------------|--|----------------|
| A | DISCO TEFLON $\phi 38$ / <i>TEFLON DISK $\phi 38$</i> | MP1137/T |
| B | DISCO TEFLON / <i>TEFLON BUSH</i> | R102/E |
| C | O-RING 3150 / <i>O-RING 3150 TYPE</i> | MP1156 |
| D | BOCCOLA $\phi 45$ / <i>BUSH $\phi 45$</i> | R080/I |
| E | MOLLA / <i>SPRING</i> | R082 |
| E | TENUTA MECCANICA / <i>MECHANICAL SEAL</i> | R083 |
| F | CUSCINETTO / <i>BEARING</i> | R079 |
| G | DISCO $\phi 45 \times 23$ / <i>DISK $\phi 45 \times 23$</i> | R080 |
| H | GIUNTO / <i>COUPLING</i> | MP1170K |
| I | GUARNIZIONE / <i>GASKET</i> | R105 |
| L | FINECORSA MECCANICO / <i>MECHANICAL LIMIT SWITCH</i> | 2914 |
| M | FINECORSA MAGNETICO / <i>MAGNETIC LIMIT SWITCH</i> | 2913 |
| N | SENSORE T. (OPTIONAL) / <i>T. SENSOR (OPTIONAL)</i> | 2920.2 |
| O | ANELLO RASCHIATORE / <i>WIPER DISK</i> | MP1137/GN |



13. Electrical Panel Spare Parts

Details of all the relevant electrical control panel components are contained in the electrical drawings (see the attachments to the manual).

14. Electrical Diagram

(see the attachments to the manual)

15. Warranty Conditions

| |
|--|
| WARRANTY CONDITIONS EX ART. 1490 C.C. |
|--|

SITA works in compliance with ISO-9001:2015 quality procedures and subjects all equipments to accurate checks and tests.

The equipments are covered by warranty for 24 months from the date of purchase, while the stainless steel chambers are guaranteed 5 years for manufacturing defects.

Our Company engages itself to repair or replace without charge those parts which should prove to be non efficient, upon its judgement.

The warranty does not cover:

- Accidental breakages due to the transport
- Accidental breakages due to the uncorrect use or to carelessness
- Breakages due to the connection to a power grid feeded with a tension different from the forecast one ($\pm 10\%$ of the nominal value, as fixed by the CEI rules)

The warranty does not cover the product repaired or tampered by non-authorized third party, and the product on which an intervention has been made for defect or for convenience tests.

In no case the integral replacement of the product is foreseen and no request for indemnities for eventual damages undergone will be recognized.

Repairs are normally carried out in our warehouse or in authorized after-sales service centers.

DO NOT TAMPER THE ADHESIVE LABELS FOR QC IDENTIFICATION!

- The adhesive label with the number of QC (Quality Control) indicates the form of the electrical test specific for that unit, which, upon request, can be sent to the Customer.
- The adhesive label with the S/N (Serial Number) number must be intact and readable; such number allows to enter the data bank of tests and to find the values obtained in the hydraulic test of the equipment.

16. Declaration Of Conformity

Unit produced in the factory of:

S.I.T.A.
Italian Company for Water Treatment

EC DECLARATION OF CONFORMITY

The undersigned hereby declares, under full responsibility, that the unit:

UV DISINFECTION SYSTEM

SMP 11/22/33/44 TC MODELS
SMP 11/22/33/44 TC RA MODELS

IS IN COMPLIANCE WITH

- 2014/35/EU (low voltage directive)
- 2014/30/EU (electromagnetic compatibility)
- 2015/863/EU (RoHS³)
- 2012/19/EU (WEEE)
- IEC-EN 60204-1 norms (safety of machinery-electrical equipment of machinery)
- IEC -EN 55016-2 norms (methods of measurement of disturbances and immunity - conducted disturbance measurements)
- Directive (EU) 2020/2184 (on the quality of water intended for human consumption)
- Regulation (EC) No 1935/2004 (on materials and articles intended to come into contact with food)
- 2014/68/EU (art.4 comm.3) (PED)

The validity of CE marking is subordinated to the equipment integrity. Any modification, if not authorized, will cancel the use of the CE marking. This will occur in case the relevant risks have not been previously analyzed by our company, and a new EC Declaration of Conformity has been issued.