

# **UV-C DISINFECTION**

EQUIPMENT FOR THE TREATMENT OF DRINKING WATER

# **DOMESTIC SERIES**

UV 405-412-440-450-480-550-80/2 LCD - LCD PLUS



MANUAL OF INSTALLATION, USE AND SERVICING

CE

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# 1. Introduction

This manual is for the following models of LCD SERIES:

### UV 405-412-440-450-480-550-80/2 LCD-LCD PLUS

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 into operation, to ensure the safe use of the UV system. The operating instructions are an integral part of the equipment supply.

Before putting into operation, all the conditions necessary for 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 affect 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 and Safety Instructions

# Information about UV irradiation:

The UV disinfection system of the LCD series have been planned specially for destroying harmful bacteria and viruses present in your water.

Their working is based on a physical principle which is a warranty of security: the output of ultra-violet irradiation.

The UV light given out by special mercury vapours lamps (UV-C rays  $\lambda$ = 254nm) is highly germicidal because it interacts with DNA and RNA, at a molecular level.

The deep bio-structural disorder caused by such irradiation interferes with the development and the ability of reproduction of every kind of micro-organism, making it harmless.

Generally it is better to mount a pre-filter before the UV sterilizer, in this way the impurities of every nature and consistence are kept.

This system comes to be necessary if we want to have a high degree of sterilization, infact the non-filtration and removal of suspended particles in the water has, as a consequence, a decrease of the sterilizer's efficiency.

If the water to be treated contains sulphydric acid or more than 0.3 p.p.m. of iron or filtrable solids, once passed through the sterilizer, it leaves a residual sediment on the quartz sleeve, which, therefore, must be periodically cleaned (the frequency depends on the quantity and quality of water treated).

### 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 2006/95/CE) must be connected to a current-tap provided with grounding.

# **Electrical Safety Instructions:**



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 main supply is isolated. The main supply must not be restored as long as the equipment is open. This applies to both the electrical panel and the UV reactor vessel.

**ATTENZION**: Working on live equipment is forbidden.

# UV Light Danger:



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

# Pressure Danger:

The UV chamber could be under water pressure. Max working pressure is 10 bar. UV chamber must be installed in accordance with our installation and commissioning instructions and used in accordance with operating and maintenance instructions.

**ATTENTION:** Ensure that system is depressurized before attempting any service or repair *Indications for the disposal:* 

We remind that, according to what is fixed by D.L.25 july 2005, № 151 "Accomplishment of directives 2002/CE, 2002/96/CE and 2003/108/CE, concerning the reduction of the use of dangerous substances in electric and electronic equipments, and the disposal of waste" 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.

# 3. Instructions for installation and setting at work

**General premise:** The installation of the DOMESTIC SERIES disinfection units must be carried out by specialized staff, scrupolously following the instructions hereby given. It has been moreover considered necessary to give some general information about the electrical and water connections.

**Cautions:** check that the UV panel is not connected to the power supply and that the tap of the water to be treated is turned off.

- •Connect the delivery of the water to be treated to the special water connection
- •Turn on water and check for possible leaks in any part of the unit
- •Connect the plug to the current tap
- •Check that the disinfected water comes out and that the LEDS on the panel of the control board, signal the correct working

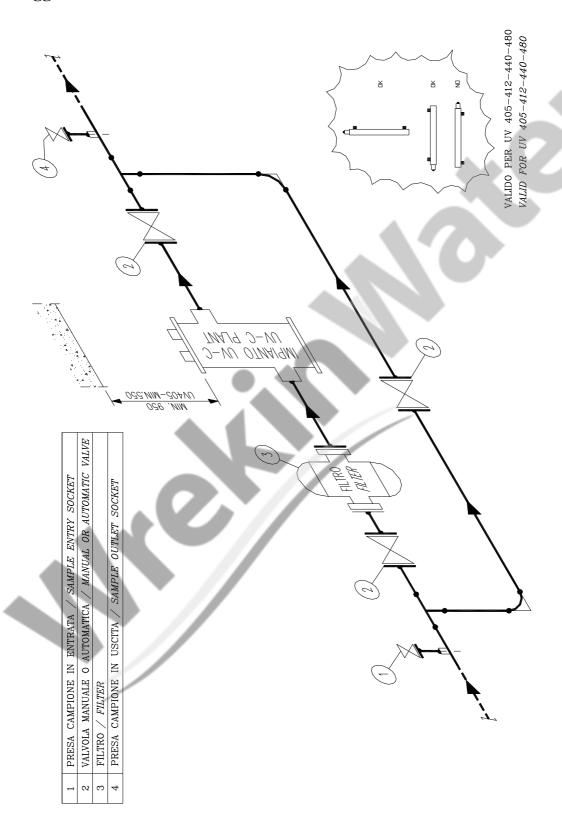
Let the disinfected water flow down to outlet for at least 10 minutes before using it, in order to make the possible impurities present in the unit drain out.

NOTE: it is recommended to install a water filter directly before the UV sterilizer in order to remove the suspended particles, eventually present in the water to be treated, which could limit the efficiency of sterilization.

### **CHECKS**

The DOMESTIC SERIES is ready for producing disinfected water, once the connection to the water system and to the electrical grid is carried out. The unit works automatically, the electronical boards which control the signals reaching the control panel, allow the visualizing (or the sounding) of the correct working or of anomalies which may occur during the operating of the unit.

# 3.1 Suggested Installation Scheme

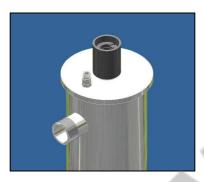


# 4. UV Chamber Installation

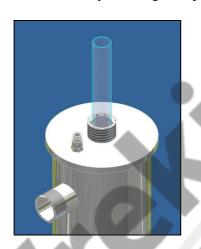
# 4.1 UV chamber assembling

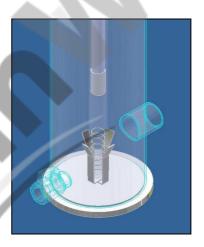
Mount the valves kit supplied with the system .

Unscrew the sleeve bolts:



Insert the quartz sleeves carefully centring the spring at the bottom plate of the UV chamber:

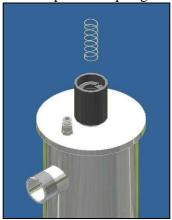




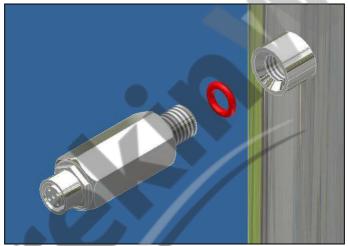
Insert the o-ring Ø 23x4 into the quartz sleeve:



Screw again the sleeve bolts and insert the lamp holder spring into the sleeve:

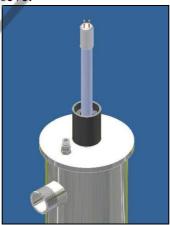


In case of LCD PLUS UV system: Mount the o-ring (3043 type) on the probe holder and screw this one on the  $\emptyset$  ¼" bush welded in the middle part of the UV chamber. Finally, connect the pertinent electrical cable:



Carry out the hydraulic test, verifying that the o-rings are watertight and that there're not water leaks outside the sleeve bolts or inside the quartz sleeves.

Insert the UVC lamp into the quartz sleeve:

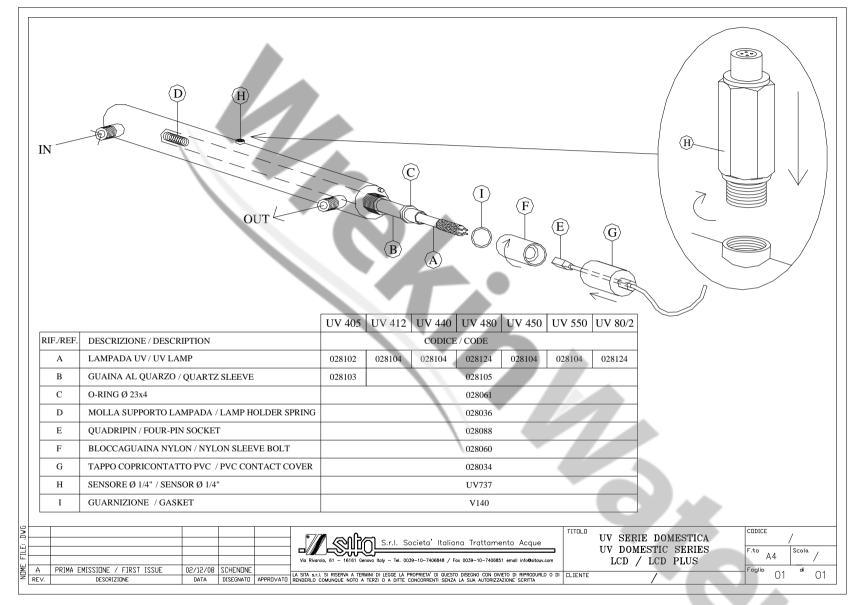




Important!

Handle the lamps using gloves

# 4.2 UV Chamber Detailed Drawing



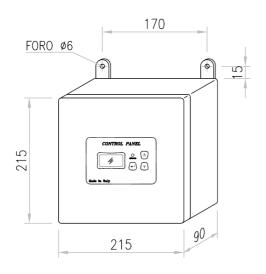
# 5. Electrical panel installation and operation5.1 Control Panel Description



CONTROL PANEL	LCD (PLUS)		
Material and colour	Black Polypropylene		
Dimensions	215 x 215 x 90 mm		
Protection class	IP 55 (IP 65 on request)		
Ambient temperature range	5 – 45 °C		
Power supply	230 V - 50/60 Hz (115V – 50/60 Hz on request)		
Lamp cable	1 m		
Power supply cable	1 m		
Monitor display	LCD SITA		
Hour meter	Yes for total system life		
Resettable hour meter	Yes for lamp life control		
Lamp function control	Yes		
Alarm led	Yes		
Free contact (NO - NC)	Yes – general alarm		
230 V output (NO - NC)	Yes – general alarm		
Remote ON/OFF contact	Yes (settable)		
ON/OFF Timer	Yes (settable)		
Reactor temperature	Yes (°C) – settable value (shut off for high temperature)		
measurement and alarm	on PLUS MODELS		
UV Irradiance measurement	Yes (% or W/m <sup>2</sup> optional) – settable value on PLUS		
and alarm	MODELS		
4/20 mA output	Optional – for Irradiance and water temperature on		
	PLUS MODELS		
Audio alarm	Optional		

# 5.2 Electrical panel installation and operation

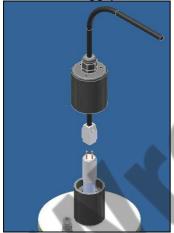
The electrical panel of the LCD series is equipped with 2 fixing brackets for wall mounting. Rotating the panel cover the user can have the cable out on the desired sides of the panel.





Connect the lamp socket to the lamp and close the contact cover cap, then connect the power supply

plug to the main supply.





Once connected to the power supply the UV lamp will light on.

Do the following at the first start up and on every lamp replacement:

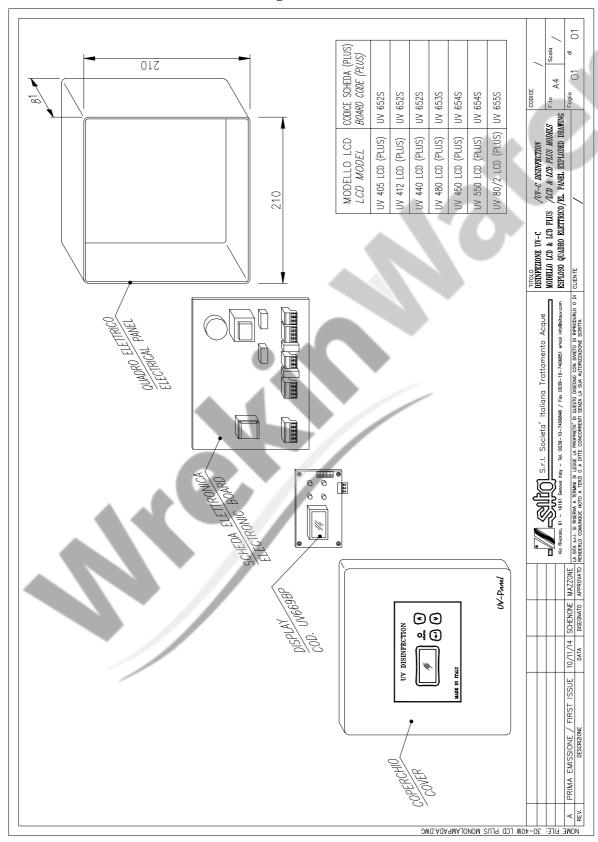
- -) Activate the lamp life count down hour meter (see display description)
- -) In case of LCD PLUS system with UV sensor then operate the sensor calibration. This operation must be done after at least 5 minutes from lamp start, with quartz sleeve clean, with sensor measuring window clean and with steady water flow.

# 5.3 Switch ON / Switch OFF the lamps

Because of the small power of the electrical panel this is not equipped with power selector. Therefore the panel is always powered but lamps can be switch ON/OFF in the following ways:

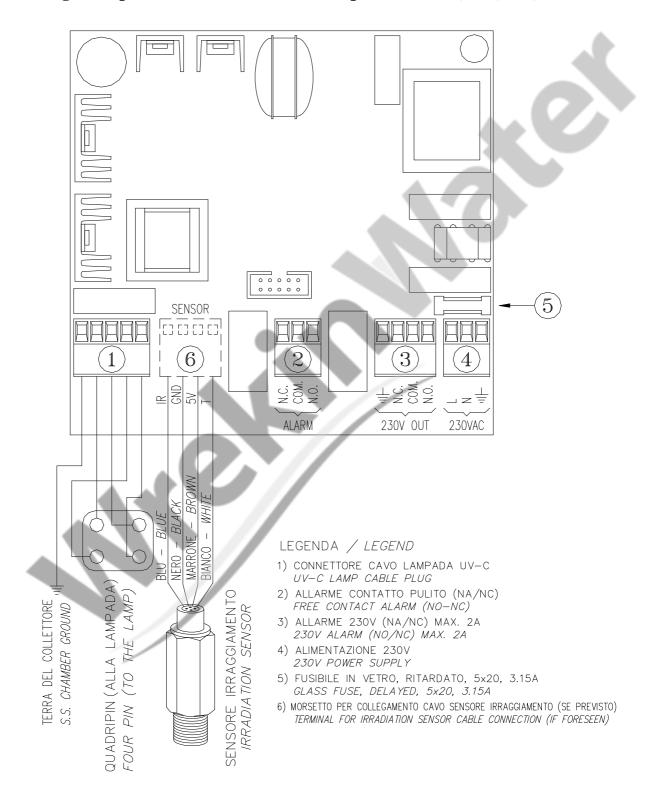
- 1. Keeping pushed the OK ( $\blacktriangleleft$ ) button for 5 seconds (see display description)
- 2. Closing the remote ON/OFF contact (see electrical scheme)
- 3. Setting the timer (see display description)

# **5.4 Control Panel Detailed Drawing**

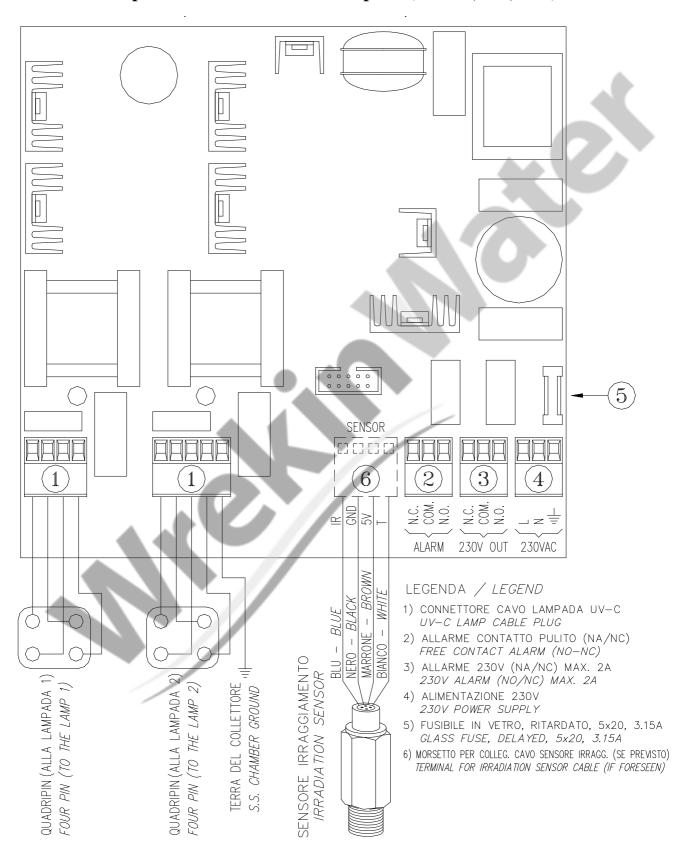


# 6. LCD Electrical Board Description

# 6.1 Single-lamp LCD electrical board description (UV 405, 412, 440, 480)



# 6.2 Two-Lamp LCD electrical board description (UV 450, 550, 80/2)



# **6.3 LCD Display board Description**

Following are described the standard and optional terminals connection to the display board:

- o It is possible to connect the sensor cable (usually this is connected on the main board).
- o It is possible to connect the REMOTE ON/OFF contact, this is powered with 5Vdc that if closed to the RMT contact shuts of the lamps. The user can set the working of the remote ON/OFF contact by the display between N/O and N/C. The factory setting is N/O because it let the system working with nothing connected to the remote ON/OFF terminal.
- o In case of LCD PLUS systems with optional 4/20 mA output then it's possible to connect to the 4/20 mA terminal. This signal is available for the water temperature and the UV irradiance.

The temperature signal has the following correspondence:

 $4mA = 0^{\circ}C$ 20 mA = 100 °C

The irradiance signal has the following correspondence:

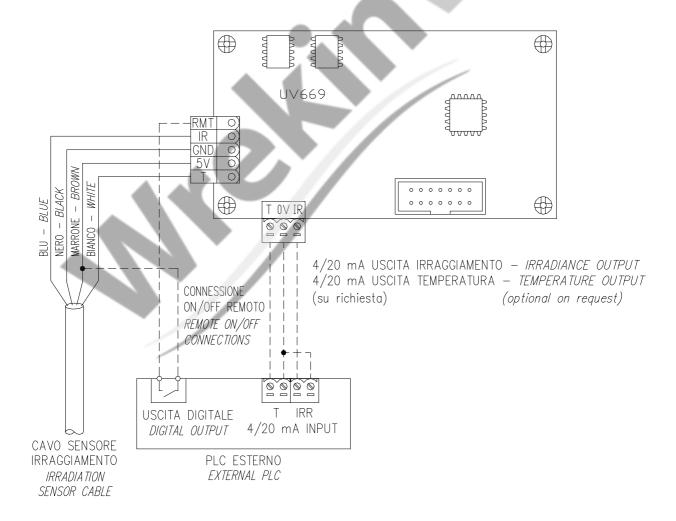
4mA = 0%

20 mA = Settable value on the display (factory setting 20 mA= 100%)



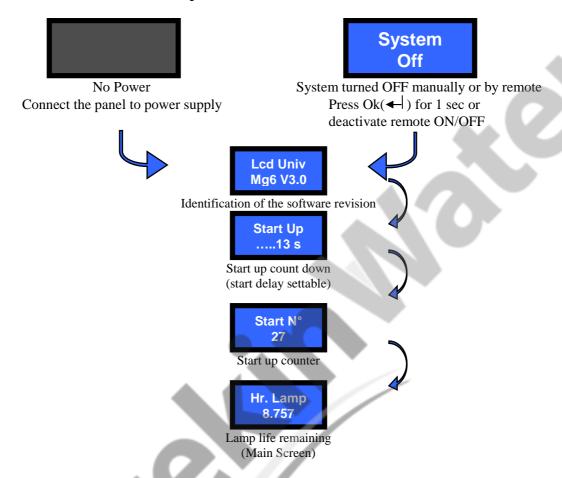
### **Important**

The 4/20 mA output signal can work with a max load of 150 ohm

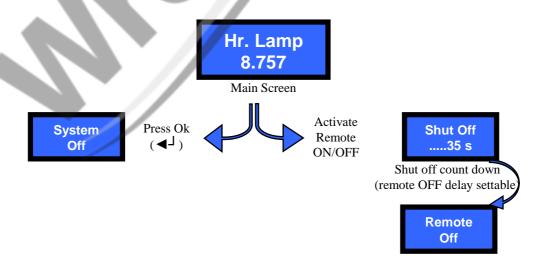


# 7. Display Information (Troubleshooting)

# LCD DISPLAY MESSAGES – Start up:

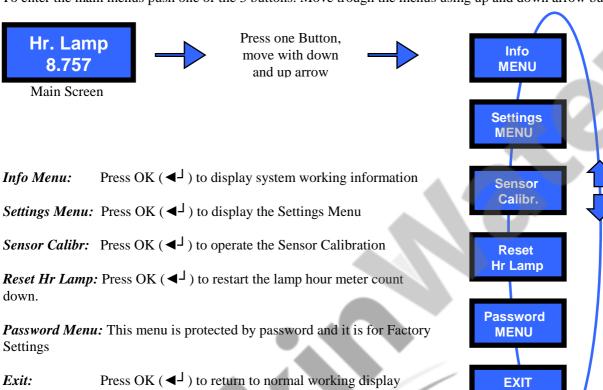


# LCD DISPLAY MESSAGES – Shut Off:



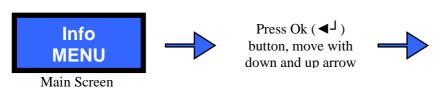
### LCD DISPLAY MESSAGES - Main MENU:

The main MENU describes the main functions of the control Panel To enter the main menus push one of the 3 buttons. Move trough the menus using up and down arrow buttons.



NOTE: After 3 seconds the display returns to the main screen.

### LCD DISPLAY MESSAGES - Info MENU:



*Hr. Tot:* Displays the system working hours

*UVC*: Displays the UVC Intensity (only LCD PLUS)

UVSensor: Displays the signal coming from the UV sensor (only LCD

PLUS)

*Temp:* Displays the water temperature (only LCD PLUS)

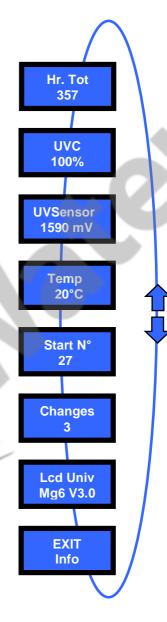
Start  $N^{\bullet}$ : Displays the number of start up

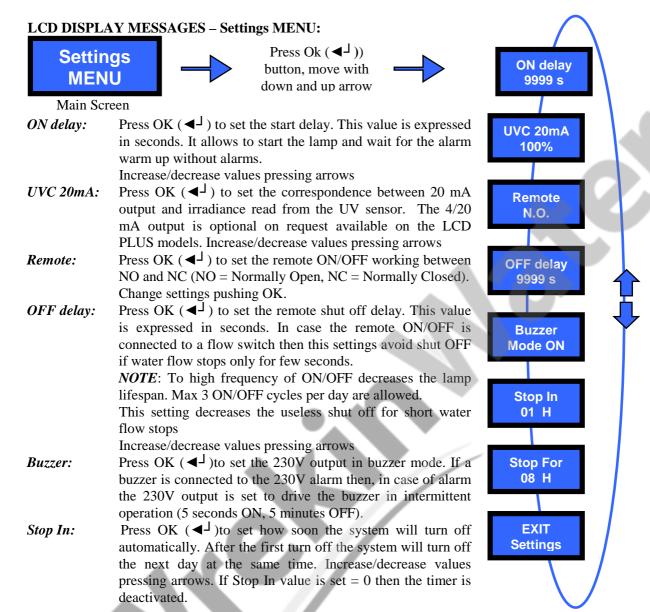
**Changes:** Displays the number of lamp changes

Software Rev: Displays the software revision

*Exit Info:* Press OK ( $\blacktriangleleft$ ) to return to normal working display

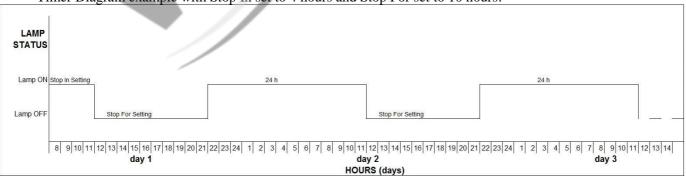
NOTE: The display <u>does not</u> return automatically to the main screen. Therefore the user can let the choosen screen as standard visualizing.





Stop For: Press OK (◄」) to set how long the system will remain off before automatic restart. Increase/decrease values pressing arrows. If Stop In value is set = 0 then the timer is deactivated.

Timer Diagram example with Stop In set to 4 hours and Stop For set to 10 hours:

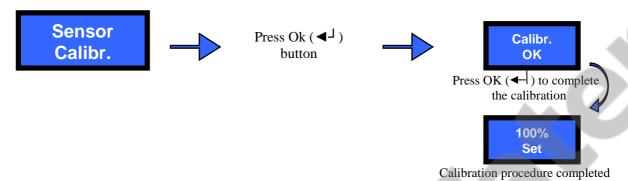


*Exit:* Press OK ( $\blacktriangleleft$ ) to return to normal working display

NOTE: After 3 seconds the display returns to the main screen.

# LCD DISPLAY MESSAGES - Sensor Calibr. (Only PLUS version):

This operation must be done at the first start up and on every lamp replacement, with quartz sleeves and sensor measuring window clean. Wait 5 minutes from the lamp start before operating the sensor calibration.



# LCD DISPLAY MESSAGES –Reset Hr Lamp.:

This operation starts the count down of the lamp life hour meter. This operation must be done at the first lamp start and on every lamp replacement



### LCD DISPLAY MESSAGES - Alarms/troubleshooting:



In case of any alarm the red LED is flashing.

List of alarms:

Lamp Off Indicates the lamp failure. If the system has 2 lamps the failed lamp is identified. Check:

- Connection to the lamp
- o If lamp has failed
- If lamp starter has failed.

Change Lamps Indicates that the count-down hour meter of lamps life comes to zero. In such case replace the lamps and restart lamp hour.

# **Only for Plus**

Low UVC % Indicates low irradiation. Check:

- o If lamp life has expired
- o If quartz sleeves are dirty
- o If sensor windows is dirty
- o If water quality has changed

High Temper. Indicates high temperature in the UV chamber. This may happen when either there is no flow or there is air in the UV chamber. In such cases the system switches off.

Reset the alarm: Push  $OK(\blacktriangleleft^{J})$  for 5 sec to put the system in standby then press  $OK(\blacktriangleleft^{J})$  again to restart the UV system.

NOTE: In case of high temperature the panel turns off the lamp and this remains off even if temperature drops below the threshold level. This is necessary in case of no flow to avoid this cycling:

Lamp ON→ High Temperature→lamp turned off→Temperature lower then threshold→ lamp started again→ High Temperature→....

This can destroy the UV lamp, in case the user can accept this risk then ask the factory for setting change instructions.

### **LCD DISPLAY MESSAGES – Other Problems:**



Display OFF in case of no electrical feeding or burned fuses

# 8. Maintenance

The UV System of DOMESTIC SERIES have been projected and realized by S.I.T.A. Srl with simple and functional principles which make the checking procedures and the periodical servicing particularly easy.

The main points which characterize the ordinary servicing are the following: check quarterly the quartz sleeves, which contain the UV lamps, in order to ensure the maximum disinfection, for the cleaning. 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:

UV lamp change - once per 9000 hours

UV quartz sleeve clean - frequency depends on the quality of the water

O-ring for quartz sleeve-once per year

# Procedure for the UV lamp replacement (9000 h max.)

- 1) Disconnect the electrical box from the electrical power supply
- 2) Lift the cover slightly turning, carefully loosen the electrical 4-pins connection and extract the lamp from the quartz sleeve
- 3) Remove the lamp from the packing, handling it carefully by its ends or using gloves
- 4) Insert the new lamp into the quartz sleeve of the sterilizer
- 5) Connect the lamp to the electrical connection and put again the cover
- 6) Connect again the equipment.

### Important!

For lamps replacement it is not necessary to stop the water flow and drain the UV chamber

# Procedure for the quartz sleeve cleaning

- 1) Disconnect the electrical box from the electrical grid and turn off water
- 2) Remove the lamp, as for the replacement
- 3) Depressurized and drain the UV system
- 4) Unscrew the sleeve-bolt and extract the quartz sleeve with care
- 5) Clean the quartz sleeve by wiping it with a cloth soaked with an acid solution such as vinegar or lemmon
- 6) Reassemble the sleeve being sure to center the guide-spring fixed on the bottom, put the o-ring on the quartz sleeve, then tighten the sleeve-bolt; place the o-ring in the seat of the sleeve-bolt, insert the sleeve inside it, till it leans, then screw on the S/S chamber.
- 7) Turn on water checking for eventual leaks
- 8) Mount again lamp, its electrical connection and cover
- 9) Turn on the UV system.

# 9. Warranty Conditions

## WARRANTY CONDITIONS

**SITA** works in compliance with ISO 9001-2008 quality procedures and subjects all equipments to accurate checks and tests.

The SITA supplies and progressing are anyway guaranteed only in the limits of technical specifications and request and/or of the certificates and/or of the specific checks as agreed, for 24 months from the delivery date or 30 days from the purchase date, provided that eventual defects are stated as fixed by art. No. 1495 of the civil code.

The stainless steel chamber is covered by warranty of 5 years only if used for compatible liquids and correctly installed.

In no case the integral replacement of the product is foreseen and any responsibility of Sita is excluded for delays in the delivery of the goods to the customer, for claims of third parties towards the customer, for losses of goods, costs (installation, servicing and maintenance, transports, and so on) and damages of the customer due to the defect.

Moreover the product repaired or tampered by non-authorized third parties, and the product on which an intervention has been made for defect of for convenience tests, is excluded from the warranty.

Repairs are normally carried out in SITA warehouse or in authorized after-sales service centers signalled by SITA.

# The warranty does not cover:

- 1. Accidental breakages due to the transport.
- 2. Breakages due to the use of equipments not in compliance with what is indicated on the use and maintenance manual or to carelessness.
- 3. Breakages to the connection to a power grid fed with a tension different than the foreseen one  $(\pm 10\%$  of the nominal value as fixed by CEI rules)

### DO NOT TAMPER THE ADHESIVE LABELS OF IDENTIFICATION

The adhesive label with the QC (Quality Control) number must be intact and readable; such number allows to enter the data bank of tests and to find the values obtained in the electrical test of the equipment.

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.

In case of dispute the court of Genova will be competent.

# 10. Declaration of Conformity EC

Unit produced in the factory of:

# S.I.T.A. Società Italiana Trattamento Acque

# EC DECLARATION OF CONFORMITY

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

# **UV DISINFECTION SYSTEM**

# **DOMESTIC LCD SERIES**

Mod. 405-412-440-450-480-550-80/2 LCD-LCD PLUS

Complies with what is foreseen by

2006/95/CE (low voltage directive) 2004/108/CE (electro-magnetical compatibility) 2002/95/CE (RoHS) 2002/96/CE (WEEE)

IEC -EN 60204-1 norms (safety of machinery-electrical equipment of machinery) IEC -EN 55022 norms (characteristics of radio interference)

D.Lgs. 31/2001 (Implementation of Directive 98/83/CE on the quality of water intended for human consumption)

97/23/CE (art.3 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.