



Aquafine® Corporation

# READ THIS MANUAL

PLEASE KEEP FOR PERMANENT REFERENCE

Part No. 124 Rev B 12/05

This manual covers the installation, operation and general maintenance requirements for Aquafine Ultraviolet Water Treatment equipment.

**DISINFECTION • TOC REDUCTION • OZONE DESTRUCTION • CHLORINE/CHLORAMINE DESTRUCTION**



SCD-H Series

*Installation & Operation Manual*

**⚠ CAUTION**

**It is imperative that those responsible for the installation of this equipment, as well as operating personnel, read this manual and carefully follow all instructions and guidelines. EQUIPMENT OPERATORS AND INSTALLERS MUST COMPLY WITH OPERATIONAL SAFETY REQUIREMENTS.**



# TABLE OF CONTENTS

<b>TABLE OF CONTENTS</b> .....	1
<b>INSTRUCTION</b> .....	3
PURPOSE & SCOPE .....	3
WARNING .....	3
<b>DESCRIPTION</b> .....	5-6
KEY FEATURES .....	5
UNIT DESCRIPTION.....	5
QUARTZ SLEEVES AND LAMPS.....	6
CONTROL PANEL.....	6
<b>INSTALLATION</b> .....	7-10
LOCATION .....	7
ELECTRICAL POWER.....	7
PLUMBING.....	7-8
SE QUARTZ SLEEVES.....	9
SE LAMPS .....	10
<b>OPERATION</b> .....	11
OPERATIONAL GUIDELINES .....	11
POWERING UP.....	11
<b>UV VISION-2000 G400 CONTROLLER</b> .....	13-18
DESCRIPTION .....	13
OPERATION.....	15-18
CONTROL SCREENS.....	15
MAINTENANCE .....	16
SETUP.....	17-18
<b>MAINTENANCE</b> .....	19-24
RECOMMENDED MAINTENANCE GUIDELINES.....	19
PREVENTATIVE MAINTENANCE SCHEDULE .....	19
SAFETY REQUIREMENTS.....	20-24
OPERATING CONDITIONS.....	20
CLEANING THE UNIT.....	20
QUARTZ SLEEVE MAINTENANCE.....	21
CLEANING THE DETECTOR WINDOW .....	21
INSPECTION FOR LEAKS .....	21
INSPECTION FOR LAMP OPERATION .....	22
REPLACEMENT OF UV LAMPS .....	22
LAMP SOCKET INSPECTION .....	22
COOLING FAN INSPECTION .....	22
LED DISPLAY MAINTENANCE .....	23
REPLACEMENT OF BALLASTS .....	23
SAMPLE PROCEDURES .....	23-24
REPLACING/CLEANING AIR FILTER .....	25
<b>WARRANTY</b> .....	22-34
<b>TROUBLESHOOTING</b> .....	27-36
UNIT .....	27-31
UV G400 CONTROLLER .....	32-36
<b>PARTSLIST</b> .....	37





## PURPOSE & SCOPE

The purpose of this manual is to provide instructions for the installation and operation of the SCD-H Series models and intended for personnel that have a working knowledge of servicing electrical and mechanical equipment.

## WARNING!

- Remove all electrical power to the unit before servicing the unit. The electrical panel is an electrical hazard. Death can result if the proper precautions and safety are not obeyed. All electrical power to the equipment, including power from the signal and control systems must be completely isolated.
- Never service the system under pressure. The treatment chamber must be valved off from the water source, the pressure released and then the system drained.
- Never look at UV lamps! The lamps produce harmful radiation and will damage the eyes and skin. Always use protective gear.



FIG. A SCD-H SERIES MODEL WITH UV G400 CONTROLLER



# DESCRIPTION

## THE SCD-H SERIES

The SCD-H Series is an advanced generation of ultraviolet equipment designed to provide enhanced efficiency. The unit consists of an individual UV treatment chamber and an electrical control enclosure. The chamber contains single ended UV lamps, encased inside individual single ended quartz sleeves with reduced lamp disconnects. Inside the treatment chamber, a helical baffle prevents laminar flow and maximizes the unit's performance. By reducing lamp and plumbing connections, this advanced design saves you time and money on routine maintenance and power consumption. It includes the critical quality and performance features that have made Aquafine the standard in UV water treatment for over 50 years, while doing so in a highly cost-effective manner.

## KEY FEATURES

- All wetted components made from 316L SS
- UV Vision-2000 Series™ Controller
- 150psig (10.34 bar) rated treatment chamber
- Remote/Local operation
- All models are CE® and UL® (pending)

## UNIT DESCRIPTION

Elements to identify the SCD-H Series are:

1. Socket Cover
2. Quartz Sleeves & Lamps - *located inside*
3. Treatment Chamber
4. Control Cabinet
5. Sample Port - *optional*
6. Drain Port
7. End plate

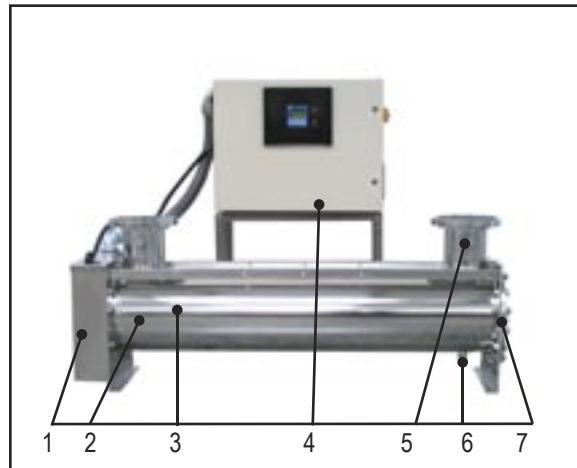


FIG. A SCD-H SERIES UNIT IDENTIFIED ELEMENTS

## SOCKET COVERS

The socket cover on the end of the treatment chamber provides protection of the lamp socket assemblies.

## TREATMENT CHAMBER

The UV treatment chamber is manufactured from 316L stainless steel.

## SAMPLE PORTS

Two optional ports are available for obtaining water samples pre and post UV chamber. Sanitary sampling valves should be installed on the ports.

## DRAIN PORT

The treatment chamber is provided with a drain port to drain the cylinder completely. A drain valve should be installed on the port.

## END PLATE

The treatment chamber is provided with two removal end plate assemblies. They are installed with sealing O-rings located between the end plate and the treatment chamber.



# DESCRIPTION

## QUARTZ SLEEVES & LAMPS

The quartz sleeves and lamps fit inside the UV chamber. The lamp sockets connect to the lamps, creating a water resistant seal and a vibration proof grip. The socket cover on either end of the chamber protect the lamp socket assemblies from the environment. The Single-Ended (SE) assembly is depicted below.

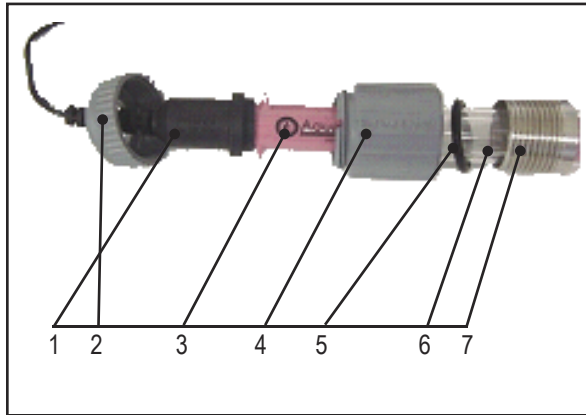


FIG. B SE LAMP SOCKET ASSEMBLY IDENTIFIED ELEMENTS

Elements to identify the Lamp Socket Assembly are:

1. SE Lamp Socket
2. SE Lamp Cap
3. Compression Nut
4. O-ring
5. UV Lamp
6. Quartz Sleeve

## STANDARD CONTROL PANEL

The control panel contains the ballast(s) and controller for the unit. Different electrical configurations are available. The UV G400 controller is shown below in a carbon steel cabinet, both standard in the SCD-H series.

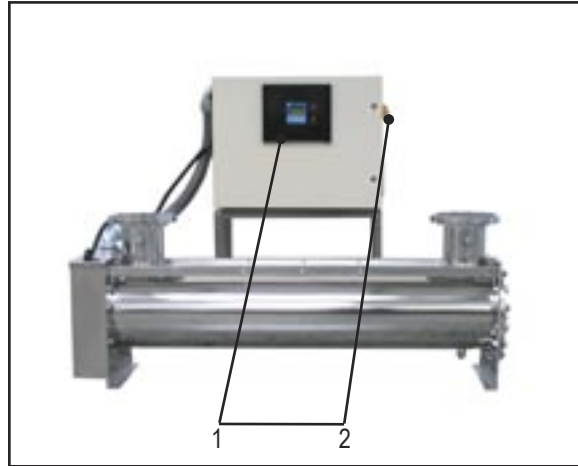


FIG. C STANDARD CARBON STEEL CABINET WITH UV-G400

Elements to identify the Lamp Socket Assembly are:

1. UV Vision-2000 Series™ controller
2. Main Power Switch - *isolates all electrical power to unit*





## INSTALLATION GUIDELINES

The following are the guidelines and procedures for installing the SCD-H Series.

### LOCATION

- A. Install the UV treatment unit in a horizontal position in a sheltered, well ventilated area. Ambient temperatures surrounding the unit should be between 35° (2°C) and 100°F (38°C).
- B. Operating water temperature should be between 40°F (4°C) to 80°F (27°C).
- C. Protect the equipment from the environment. Do not expose the equipment to direct water spray.
- D. As an ultraviolet UV treatment unit does not introduce any chemical residue within the water, it is desirable to install the unit as close as possible to the point-of-use in order to avoid potential recontamination by discharge pipes, fitting, etc.
- E. The base of the UV treatment unit should be mounted on suitable support to avoid undue strain on the unit or related pipes and fittings.
- F. Allow sufficient service access clearance, at least 72" (183 cm) of clearance on the lamp-changing end of the unit. At the opposite end, there should be a minimum of 24" (61 cm) of clearance for maintenance. *Refer to mechanical drawings.* Clearance for servicing the electrical cabinet should be allowed.

### ELECTRICAL POWER

- A. The power requirements for each unit depends on the number and type of lamps used in the treatment chamber. The overall power consumption of each unit is indicated on the equipment nameplate decal on the unit. The unit's circuit breaker, or main fuse, provides primary over-current protection. *Refer to wiring diagram.*
- B. UV Performance is line voltage sensitive. Line voltage should be  $\pm 5\%$  of rating shown on the electrical nameplate decal. Voltage outside these limits will affect the performance of the UV equipment.
- C. Control wiring should reference the appropriate wiring diagram. Control wiring is based upon customer requirements and installed options.

*Should your requirements differ, please contact your local Aquafine® representative or Aquafine® Customer Service.*

- D. During service and maintenance, the electrical power must be removed.

### PLUMBING

- A. Limit overhead piping load to 25lbs (11.3kg), for 2" & 3", 50lbs (23kg), for 4" and 75lbs (34kg), for 6" or above. Additional bracing and supports should be installed on any additional piping and valves in order to reduce the stress on the treatment chamber Inlet/Outlet nozzles.
- B. Verify the location is free from vibration, which could be caused by proximity to heavy equipment and the erratic or improper pumps. Excessive vibration will damage internal electrical components and cause premature failure of the UV lamps.
- C. Each unit has been designed with a 1/2" drain connection. Install a drain valve and pipe to drain.
- D. Install sample port valves, if equipped.
- E. If your piping system is subject to impulse pressure resulting in a "water hammer" condition, a surge tank or other means must be provided to remove this condition; otherwise the extreme momentary pressure may rupture and fracture the quartz sleeves.
- F. All units are rated for a maximum operating pressure of 150psig (10.3 bar).
- G. Ultra pure water users have reported that over time, exposure to ultraviolet light may photochemically degrade nonmetallic piping materials, including most or all fluoro-polymers, resulting in a material breakdown and/or structural failure. Should your water application and piping material be so classified, we recommend that you install "UV light traps" to isolate any susceptible material from direct exposure to the ultraviolet light. Install the UV light trap to the inlet/outlet of the UV treatment chamber prior to the connection of any non-metallic piping.
- H. Provide isolation valves on the inlet and outlet nozzles.

**WARNING**

**NOTE:** *It is imperative that the unit be properly grounded for safe and proper operation. FAILURE TO PROPERLY GROUND THE UV TREATMENT UNIT AUTOMATICALLY VOIDS ALL EQUIPMENT WARRANTY.*



# INSTALLATION

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Isolation valves will allow safe maintenance of the equipment.

- I. After installation of quartz sleeves, always pressure test the system prior to installation of the UV lamps and applying electrical power. During pressure testing, DO NOT stand in direct line with quartz sleeves.
- J. Before start-up, flush the UV unit and discharge piping to rinse out debris left from installation.
- K. The UV chamber should be filled with water.



# INSTALLATION

## SE QUARTZ SLEEVE INSTALLATION

The quartz sleeves designed for these Series are single-ended (SE), open on one end and closed on the other. The closed end of the quartz is inserted into the threaded nipple and then through the baffle system in the chamber. Within the baffle, Teflon bushings provide additional support to the quartz sleeves. The following are the guidelines and procedure for quartz sleeve installation.

1. Turn off all electrical power to the unit. Depressurize the system and isolate all piping.
2. Wear clean cotton gloves to prevent contamination of the quartz sleeve.
3. Carefully remove each quartz sleeve from the factory packaging. Handle these with care, as they are fragile.
4. Visually inspect all quartz sleeve for cracks or damage. *DO NOT install damaged quartz sleeves.*
5. Remove the socket cover on the end of the treatment chamber.
6. Remove all compression nuts and any packaging material from the end plate (if installed).
7. Place the closed end of the quartz sleeve into the threaded nipple and slowly push the sleeve into the chamber. Some resistance may be felt from the Teflon bushing. See Fig A
8. Install the compression nut and O-ring by placing the O-ring into the internal relief of the compression nut below the threaded area. The O-ring should fit into the compression nut. If stainless steel compression nuts are used, a smaller size O-ring is to be placed at the bottom of the compression nut shoulder.
9. Place the compression nut at the end of the quartz sleeve until it touches the end of the compression nut. Some pushing and twisting may be required. Deionized water may be used as a lubricant. See Fig B
10. Tighten the compression nut approximately 1/2 turn after the threaded nipple and O-ring make contact. Repeat this procedure with the remaining quartz. See Fig C
11. Slowly pressurize the system and fill the chamber with water to check for leaks. If there are leaks in any compression nut assembly, depressurize the system and use the compression nut tool to slightly tighten the leaking compression nut assembly.
12. Retest until a leak-free installation is verified.
13. You are now ready to install the UV lamps.

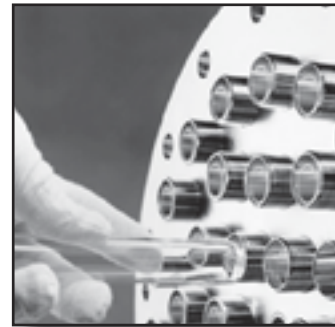


FIG. A QUARTZ SLEEVE INSTALLATION

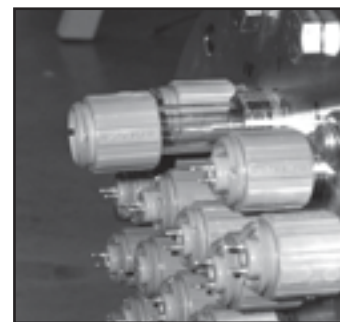


FIG. B COMPRESSION NUT ASSEMBLY

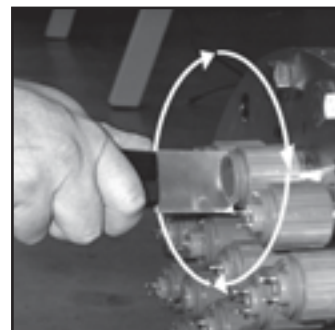


FIG. C COMPRESSION NUT TOOL



# INSTALLATION

## SE UV LAMP INSTALLATION

The following procedures are for units manufactured with Single-ended (SE) lamp design. Once it has been verified that there are no leaks in the system, the unit is ready for UV lamp installation.

1. Remove all power to the UV unit. Depressurize the system.
2. Wear clean cotton gloves to prevent contamination of the UV lamps.
3. Carefully remove each UV lamp from the factory packaging. *Handle these with care, as they are fragile.*
4. Visually inspect all lamps for cracks or damage. Do not install damaged lamps.
5. Using both hands, *slowly* insert the lamp into the quartz sleeve by pushing one end of the lamp with one hand, while continuing to support the lamp in a level horizontal position with the other. *This is very important; if not installed properly, lamp or quartz sleeve breakage will occur.*
6. Twist the lamp into the locking mechanism of the compression nut. This ensures that the lamp is secure within the quartz sleeve. *See Fig A*
7. Each lamp socket is identified with a number that corresponds to each lamp position marked on the end plate. Match the lamp socket and connect to the appropriate lamp. *See Fig B*
8. The pins in the lamp must be pushed down to fit securely into the lamp socket connector.
9. Rotate and screw the lamps socket cap into place. Only hand tightening is required. **DO NOT OVERTIGHTEN!** *See Fig C*



FIG. A INSERT LAMP INTO QUARTZ SLEEVE



FIG. B IDENTIFIED LAMP SOCKET NUMBER



FIG. C SCREW RETAINER CAP ONTO COMP. NUT

### CAUTION

**NOTE:** *Prior to energizing the lamps and ballasts, ensure there is no leaking water into the quartz sleeves and comp. nut cavity. High voltage is present at the lamp pins and receptacles of the lamp connectors during operation. Prolonged flooding of a quartz sleeve and comp. nut cavity can cause premature lamp failure due to repeated arcing, overheating of the lamp connector cable and may result in a meltdown of the cable insulation.*



## OPERATIONAL GUIDELINES

1. Release the pressure in the UV treatment chamber before attempting to remove the protective covers and sealing items.
2. Disconnect all power to the UV unit before servicing. The unit operates on high voltage and *should only be serviced by qualified personnel*.
3. Do not allow the unit to overheat by operating without water flow. Standard flow rates are based on water temperatures of 40°F (4.4°C) to 80°F (26.7°C). For applications outside these temperatures, *contact customer service for assistance*. In no case should the water temperature be below 40°F (4.4°C) or above 80°F (26.7°C). For heat sanitization above 170°F, Viton elastomers and stainless steel compression nuts are recommended. With these components, sanitization up to 250°F (121°C) is allowed in a non-operating state.
4. Intermittent operation is allowed as long as the water temperature does not exceed 80°F (26.7°C); optional devices are available to prevent this problem. Should the unit be used for batch flow operations, it can be turned “ON” and “OFF” manually. Make sure the unit is allowed to warm up for at least 3 minutes before use, and make sure the unit is turned “OFF” after each session.
5. Do not allow the flow to exceed the maximum rated capacity.
6. DO NOT electrically cycle the unit more than 3 “ON/OFF” cycles in a 24 hour period. Cycling more than this will reduce End-of-Life output and/or premature lamp failure.



**NOTE:** DO NOT look at lighted UV lamps. DO NOT operate the UV lamps outside of the UV treatment chamber. **EXPOSURE CAN SEVERELY BURN AND DAMAGE EYES AND SKIN!**

## POWERING UP

Prior to turning on the UV unit, the following must be verified:

- A. The UV chamber should be filled with water. The flow of water for the initial filling should not exceed 50 GPM. Failure to comply may result in quartz sleeve breakage. Ensure there are no system leaks and no piping connection leaks.
- B. All earth ground connections are properly made.
- C. All lamp connections are properly made.
- D. The socket cover is secured to the end of the UV treatment unit.
- E. All excess air has been removed from the chamber.
- F. Verify that all incoming power conductors, including the ground conductor, are properly terminated.
- G. Verify that the primary over-current protection device, molded case circuit breaker (MCCB) is in the closed position.
- H. Turn the main power disconnect switch to the “ON” position. The enclosure fans, UV Vision-2000 display screens and the ballasts will be energized.
- I. Using a digital multi-meter (DMM), verify that the correct voltages are present at terminal block TB-IN and terminal No.1L on the isolator switch and/or between TB-3HI and TB-4NI. Measure the voltages for L-N.
- J. For local ON/OFF control, push the START/STOP button of the UVG400 controller. To turn the individual treatment chamber “ON” and “OFF” manually, LOCAL option of the “operator control options” should be selected. *Refer to Controller section of this manual.*
- K. For remote ON/OFF control, set the UV G400 controller to REMOTE mode. For remote operation of the unit, the enclosure is provided with an isolation relay. This HOA relay is controlled by a customer-supplied voltage source (24V DC maintained) which is to be wired to a connection point within the enclosure. Opening or closing the 24V DC will energize and de-energize the HOA relay and the individual treatment chamber will be turned ON/OFF accordingly.
- L. When the ballasts are energized and all the lamps are turned “ON”, a green “SYSTEM ON” indicator light underneath the UV G400 controller display will illuminate. If one or more lamps are not operating, a red “SYSTEM FAULT” indicator light will illuminate.





# DESCRIPTION

## UV VISION-2000 SERIES

The UV Vision-2000 Series system consists of two main components. The Controller and the Multiplexer Printed Circuit board (MUX). Both components are connected via a 6 conductor cable.

The MUX board processes individual lamp operations into a digital signal. Each of the signals are then processed together into the Controller. There are several types of MUX boards installed into the unit. The design is based upon the quantity of lamps in the system.

Two microprocessor based controllers are available, the UVG400 and the UVTS600. Each model is based upon the user interface and features. The following section will cover the operation of the UVG400.

1. Graphic screen display.
2. Low UV Alarm set point.
3. End of Lamp Life Alarm set point.
4. Local/Remote Operation



FIG. A UV VISION-2000 SERIES™ G400 MODEL







# OPERATION

## UV-G400 CONTROLLER

The UV G400 controller can operate a single UV unit. The controller should be preset at the factory to operate the number of UV lamps and configured options.

The system consists of two main components: The controller and the Multiplexer board (MUX). There is one MUX board per UV unit, which digitizes each lamp signal.



FIG. A UV VISION-2000 SERIES™ G400 MODEL

## CONTROLS/SCREENS

The controller has four main buttons for operating, not including the arrows, for toggling, ESCAPE for returning to the home screen and the set button for setting an action. They are all easily identifiable on the controller face. The following identifies the four main buttons and describes the screens corresponding with each.

Buttons to identify the Controller are:

1. START/STOP
2. STATUS
3. MAINTENANCE
4. SETUP

## START/STOP

The START/STOP is a touch button switch which activates the lamps.

1. Pressing the START/STOP will switch the UV lamps ON or OFF if the "Local" option is selected.

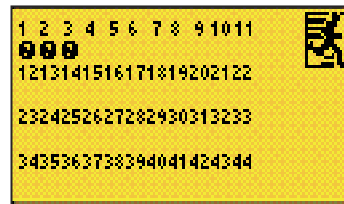
## STATUS

The main function of this multiple menu is to view the status of the system.

1. Pressing the STATUS key will navigate into the System Status menus.
2. Continue pressing the STATUS key and you will view through three screens: Lamp Status Table, Alarm Status and Lamp Profile.

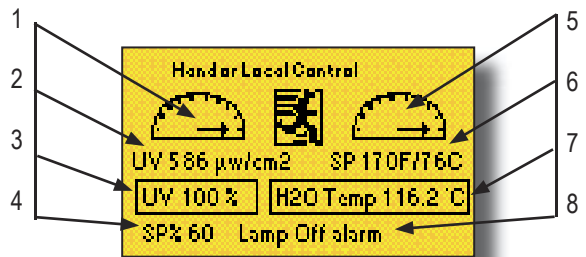
## Lamp Status Screen

This screen provides a visual indication of the operational status of each UV lamp.



When the lamp is operating, the symbol below the lamp number will be filled, as seen above. When the lamp is not operating, it will be empty.

## Alarm Status Screen - detector option included



1. Relative UV Display
2. Absolute UV Intensity Display
3. Relative UV Intensity Display
4. UV Alarm Set Point
5. Relative Temperature Display
6. Water Temperature Alarm Set Point
7. Actual Water Temperature
8. System Status / Alarm Message



# OPERATION

1. **Relative UV Display** - This graphic is a representation of the 0-100% relative UV output.
2. **Absolute UV Intensity Display** - The absolute UV output is displayed in this area.
3. **Relative UV Intensity Display** - The relative UV output is displayed in this area.
4. **UV Alarm Set Point** - UV alarm set point is displayed.
5. **Relative Temperature Display** - This graphic is a representation of the 0-250° F temperature scale.
6. **Water Temperature Alarm Set Point** - This is the water alarm set point of the system.
7. **Actual Water Temperature** - The system water temperature is displayed.
8. **System Status/Alarm Message** - System text messages are displayed in this location. Listed below are the alarm text messages.

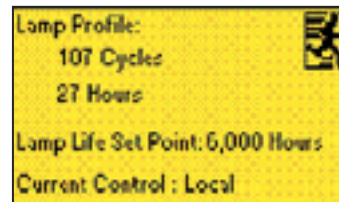
## Alarm Text Messages

- A. **SYSTEM OK** - Displayed when no alarms are present.
- B. **LOW UV ALARM** - activates when UV is below UV alarm set point.
- C. **1000 HOURS TO LAMP REPLACE** - activates when accumulated hours are within 1,000 hours of the lamp replacement set point.
- D. **TIME TO CHANGE LAMPS** - activates when accumulate lamp hours exceeded lamp replacement set point.
- E. **HIGH TEMP WARNING** - activates when water temperature exceeds 115 F or when the water temperature set point has been reached.
- F. **ENCLOSURE TEMP TO HIGH** - activates when the cabinet temperature has exceeded its set point. *If option provided.*
- G. **WATER TEMP TO HIGH** - activates when the water temperature has exceed its set point.
- H. **LAMP OFF ALARM** - activates when one or more UV lamps is not operating.
- I. **LAMP FAULT** - activates when one or more UV lamps are not engaged to the Lamp Sockets. *Featured only on Ultima UX units.*

## Alarm Status Screen - option not included



## Lamp Profile Display Screen



Screen displays lamp operating hours and cycles along with the current operating controls mode.

## MAINTENANCE

The maintenance menu is typically used by service personnel only. The main features are the resetting of the lamp hours, setting the UV sensor to 100%, viewing the parts list and other software information.

1. Pressing the MAINT. key will navigate into the system maintenance menu.
2. This selection has been password protected to prevent unauthorized resetting of the software.
3. Enter password 1234
4. The MAINT. menu will be displayed.
5. Pressing the ESC. key at any time will exit the MAINT. menu.
6. Continue pressing the MAINT. key to view through the entire maintenance menu.

## Lamp Data/System Screen




# OPERATION

This menu allows the display of the two timers on the UV unit and resetting of the lamp timer. Lamp Data is the current operating hours and numbers of cycles on the lamps. Total run data is the total operating hours on the UV unit, and cannot be reset.

*Depressing the SET key will reset the lamp hours and cycles to "0". This is completed when new lamps are installed.*

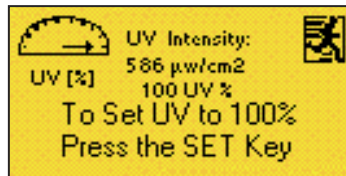
## Parts List Screen



Parts List:	
Bal H 120/240	41634 - 1
Lamp 30 STD SE	17998
Qtz oring - EPDM	4253
Qtz slv 60x25 SE	16791

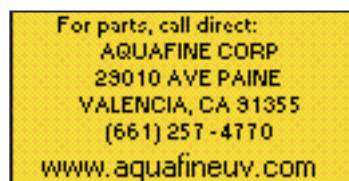
Views consumable spare parts based upon software selection and SETUP menu.

## UV Detector Set RelativeUV to 100% Screen



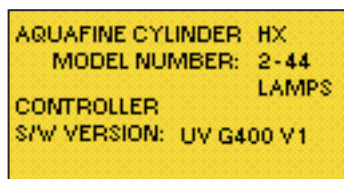
This menu sets the relative UV to 100%. Depressing the SET key will set the relative detector.

## Aquafine Contact Screen



This screen displays information for contacting Aquafine for spares parts and service.

## **SOFTWARE SCREEN**



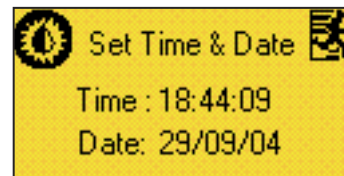
This screen provides the current software information.

## **SETUP**

The set up menu is typically completed at the factory. The user generally will not have to reset the features inside this menu.

1. Pressing the SETUP key will navigate into the system SETUP menu.
2. This selection has been password protected to prevent unauthorized setting of the software.
3. Enter password 1234
4. The SETUP menu will be displayed.
5. Pressing the ESC. key at any time will exit the SETUP menu.
6. Continue pressing the SETUP key to view through the entire setup menu.

## Set Time & Date Screen



This menu allows the local time and date to be set for date stamping and trending functions.

## Set Up Display 1 Screen



For UV units which have the detector installed, "Set temperature reading to" option will display the temperature within the treatment chamber either in °F or °C.

The operator control offers two options, LOCAL and REMOTE. If LOCAL is selected, the UV unit can be operated by the START/STOP button. If REMOTE is selected, the UV unit can be operated by the remote contact ONLY.

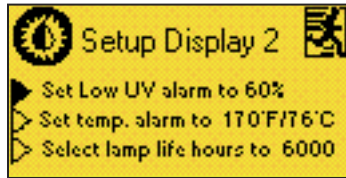


# OPERATION

ON/OFF UV Detector would be "ON" if a UV Detector is installed, and "OFF" if not.

- Press the up and down arrows to scroll the menu options.
- Depressing the SET key toggles between °F or °C, LOCAL or REMOTE and ON/OFF.

## Set Up Display 2 Screen



SET LOW UV ALARM allows the setting of the low level UV Alarm. *Used with detector option.*

SET TEMPERATURE ALARM allows the setting of the low level Temperature Alarm. *Used with detector option.*

SELECT LAMP LIFE HOURS allows the lamp life to be set according to the manufacturers rated lamp life. When the lamp hours reach the set point, the "System Fault" RED indicator will be displayed.

- Press the up and down arrows to scroll the menu options.
- Depressing the SET key toggles between the selections.

## Set Up Display 3 Screen



This menu is used with any unit containing a MUX board.

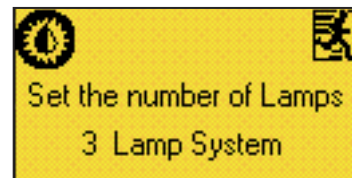


This menu is used with any unit not containing a MUX board.

The PARTS LIST SETUP enables the end user to select the replaceable parts installed within the unit (i.e. ballasts, O-rings, lamps, etc.) This same menu will appear when you press the MAINT. function key and enter the correct password. It is also located at the back of this manual.

- Press the up and down arrows to scroll the menu options.
- Depressing the SET key toggles between the selections.

## Set Number of Lamps Screen



This sets the software to match the number of lamps installed in the UV unit.

*Pressing the SET key increases or decreases the number of lamps.*



# MAINTENANCE

## RECOMMENDED MAINTENANCE GUIDELINES

The following provides users of Aquafine UV treatment equipment with recommendations and procedures that will maximize the efficiency, consistency, reliability and longevity of the equipment. Once the equipment is properly installed and fully operational, this will provide time-oriented guidelines for:

1. Performance monitoring.
2. Recognizing the need for time based preventative measures.
3. Organized analysis of performance, based on your particular operational environment.
4. Establishing optimum parameters for periodic replacement of vital components.

Keep in mind that operating conditions can differ substantially for identical UV models even within the same building due to such variables as:

- Water quality (tap water, DI water, pH level, chemical content, solids, etc.)
- Entering water temperature
- Flow rate (high, low or constant)
- Process status (continuous, intermittent)

Because of these variable, each UV unit may have to be serviced differently. For instance, those with continuous high flow, or with lower quality water require more frequent cleaning of the quartz sleeves than those exposed to cleaner water, lower flow rates and/or intermittent usage.

Regarding UV lamp replacement, the rule is to replace the lamps every 8,000 hours or every 24 months, whichever comes first. This means that the units, which are continuously used for 24 hours a day, will reach 8,000 hours limit within 375 days, or slightly over 1 year. This excludes HX lamps, which have a lamp life of 9,000 hours.

The following table represents the recommended PM for the equipment.

PREVENTATIVE MAINTENANCE SCHEDULE			
MAINTENANCE	INITIAL START-UP	DAILY/MONTHLY	ANNUALLY
OPERATING CONDITIONS	X		X
CLEANING THE UNIT	X		X
QUARTZ SLEEVE MAINTENANCE	X	X	X
CLEANING THE DETECTOR WINDOW	X	X	X
INSPECTION FOR LEAKS	X	X	X
SET DETECTOR 100%	X		X
INSPECTION FOR LAMP OPERATION	X	X	X
REPLACEMENT OF UV LAMPS			X
LAMP SOCKET INSPECTION			X
COOLING FAN INSPECTION	X	X	X



The most important consideration for proper installation, operation and maintenance of any piece of equipment is operator safety. The following caution statements directly relate to operator safety. Please review with all applicable personnel to ensure continuous compliance.



# MAINTENANCE

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## SAFETY REQUIREMENTS

The following safety requirements are mandatory. Failure to carefully follow them can cause injury to the operator and damage to the UV unit.

### OPERATING CONDITIONS

- A. Never look at lighted blue ultraviolet lamps. Never operate the ultraviolet lamps outside the UV treatment chamber. *UV lamp exposure can severely burn and damage eyes and skin.*
- B. Properly ground the UV treatment unit. *Failure to do so can result in severe electrical shock hazard.*
- C. Provide watertight piping and compression nut seal. Failure to do so can cause damage to electrical components, as well as create an electrical hazard to operating personnel.
- D. Disconnect power before servicing unit. The UV lamps and electrical components are operated with high voltage electrical power. *DO NOT* attempt to service the UV treatment unit without first disconnecting power to the unit. Shut off the source of power at the equipment main panel breaker and use appropriate tag-out or lockout procedures to prevent accidental power-up by other personnel. *Only qualified personnel should perform service.*
- E. Remove pressure before servicing unit. The UV unit has components under pressure.



**Never operate the unit for more than 20 minutes without flow of water.** Elevated water temperatures can be dangerous and damaging to the unit. Do not exceed three (3) "START/STOP" cycles per 24-hour period; otherwise lamp filaments will be subjected to excessive thermal stress, which could cause premature failure.

## SAFETY REQUIREMENTS

### TO BE OBSERVED AT ALL TIMES

## CLEANING THE UNIT

1. Depending on the environment of the installation, clean the exterior surfaces of the UV treatment chamber, and electrical enclosure. The frequency of cleaning will be dependent upon the environmental condition. In some cases, it may be necessary to clean the unit from once a month to yearly.
2. Use a soft cloth with soap and water, or any commercial stainless steel cleaner.
3. Avoid scratching the display screen.
4. Interior of the electrical cabinet should be inspected for debris. Any dirt, dust or external material should be removed with a vacuum. The electrical terminal should be cleaned with a commercial electrical contact cleaner.

## QUARTZ SLEEVE MAINTENANCE

As water passes through the UV treatment unit, debris and other matter in the water will settle and deposit on the quartz sleeves. This will impair the ability of the ultraviolet rays to penetrate into the water. Therefore, it is imperative to determine a cleaning schedule for the quartz sleeves. The frequency will depend on the specific type of water being processed, such as its turbidity, flow rate, and on the duty cycle, i.e. 24 hour continuous or intermittent at planned or random intervals. Replacement of the quartz sleeves should be completed every 2 years of operation.

Inspect the quartz sleeves one month after the first installation for a good indication of the degree of contamination you can expect over subsequent or longer periods. Then you will be able to determine a reasonable schedule for periodic cleaning.

If the water has been conditioned through deionization, reverse osmosis or distillation, the cleaning frequency can be set at once per year. If clear, fresh water is used, the cleaning frequency should be anywhere from once every thirty days to once every six months. With super clean water, this can be extended even further. Determine cleaning frequency by visually inspecting any one quartz sleeve to see how much debris or film has settled on the outside of it.

Clean In Place (CIP) cleaning is sometimes effective in the removal of debris from the sleeves. A test should be completed to determine the effectiveness of a CIP cleaning. After a chemical CIP has been completed, the quartz sleeves should be visually inspected for the removal of material. If CIP is not effective, then a manual cleaning or replacement of the sleeves will be required.



# MAINTENANCE

## CLEANING THE QUARTZ SLEEVES

Visually inspect the quartz sleeve thirty days after use to see if any debris or film has settled on the outside. If dirty, use the following procedures. Should this be insufficient, they should be replaced.

1. Turn off the water to the unit.
2. Disconnect the electrical circuit.
3. Drain the UV treatment chamber.
4. Remove the socket cover.
5. Wear clean gloves to prevent contamination of the quartz sleeves and UV lamps.
6. Remove retainer caps and lamp sockets.
7. Remove UV lamps from inside the quartz sleeves.
8. Using the compression nut tool, loosen the compression nuts and carefully remove the quartz sleeves.
9. Wash the quartz sleeves with mild soap and water. Rinse in clean, hot water.
10. The UV sensor window should be cleaned during the quartz sleeve cleaning and maintenance.

## CLEANING THE DETECTOR WINDOW

1. Shut off the flow and release the pressure.
2. Shut off all power to the UV unit.
3. Remove the cable by twisting the connector terminal counterclockwise. The connector will slide off.
4. Unscrew the Detector.
5. Use a lint-free cloth with alcohol and very carefully wipe the lens face on the front of the Detector.
6. Replace the Detector and the cable.
7. Turn the power "ON" and resume operation.

## INSPECTION FOR LEAKS

To ensure there are no leaks, a visual inspection of the treatment chamber should be made. The source of any leaking should be found and repaired.

Visually inspect the bottom pans at both ends of the cylinder for dripping water. If a leak is detected, follow this procedure:

1. Shut off all electrical power. Shut off source power at the facilities main panel and use appropriate tag-out safety procedures to prevent accidental power-up by other personnel.
2. Remove the socket cover from the leaking end.
3. Determine whether the leak comes from one or more of the lamp socket nipples (leaking quartz tube), or from the main end plate gasket.

## IF TUBE QUARTZ TUBE IS LEAKING

- Release the pressure. Open the drain valve connected to the bottom fitting of the cylinder and drain fluid from the cylinder until water level is below the leaking tube.
- Unscrew the lamp socket and lamp from leaking nut.
- Remove compression nut and O-ring from the end of the quartz tube.
- Place new O-ring into the leaking compression nut and reassemble all parts mentioned above in the reverse order.
- Refill the treatment chamber to test all seals before restoring electrical power.

## IF END PLATE O-RING IS LEAKING

- Do not use any gasket compounds and make sure the O-ring and all seal surfaces are clean before reassembling.
- Torque the perimeter bolts evenly approximately 5-10 ft/lbs. above their present torque, using a cross-symmetrical tightening progression. *See the torque label on the end plate.*
- If that does not stop the leaking, the gasket/O-ring may require replacement. Remove all UV lamps.
- Remove all quartz sleeves.
- Remove end plate O-ring.

## CAUTION

The most important consideration for proper installation, operation and maintenance of any piece of equipment is operator safety. The following caution statements directly relate to operator safety. Please review with all applicable personnel to ensure continuous compliance.



# MAINTENANCE

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- Replace O-ring and then reassemble all components in reverse order.



**NOTE:** Failure to perform quartz sleeve cleaning maintenance may cause inadequate UV treatment and low sensor values. The quartz sleeve maintenance is very important to the overall operation of the equipment. If the quartz sleeves are not properly maintained, the UV efficiency will be reduced.

## SET DETECTOR 100%

See Controller section, Setting UV Detector to 100%.

## INSPECTION FOR LAMP OPERATION

A visual check of the Lamp Status screen should be made.



**NOTE:** The Lamp Out Alert alarm and function will not activate after the first 30 seconds of operation after the lamps have been turned "ON".

## REPLACEMENT OF UV LAMPS

The UV lamps are rated for 8,000 hours or every 24 months, whichever comes first. This means that the units, if continuously used for 24 hours a day, will reach 8,000 hour limit within 365 days, or slightly over 1 year. This excludes HX lamps, which have a lamp life of 9,000 hours. After this time, the lamp glass will photochemically change and no longer allow sufficient 254 N.M. short wave UV, the germicidal ray of the lamp, through the glass to effectively kill bacteria.



**NOTE:** Failure to replace the ultraviolet lamps on a timely basis of at least once every 8,000 hours may cause the equipment to fail. With intermittent use, in no case should the UV lamps be used for more than 24 months, regardless of the number of hours of operation, due to normal operational degradation of the UV lamp.

## LAMP SOCKET INSPECTION

When replacing lamps, inspect the lamp socket contacts and related hardware. They should be inspected for corrosion of the metal contact, deterioration of the metal or burning.

1. Be sure all power to the equipment is disconnected.
2. Inspect the condition of the socket retainer caps. If they show signs of cracking or any chemical degradation, they should be replaced.
3. Inspect the condition of the lamp socket (resilient boot) and the metal lamp contact imbedded in the end with the lip seal.
4. Metal contacts must be clean, free of corrosion and straight.
5. Resilient boots must be clean, free of cracks and free of any chemical degradation.
6. Lip seals must be pliable, unbroken and fit snugly over the ceramic lamp sockets.
7. The wires must be clean, with all insulation and no signs of brittleness.

If none of the descriptions are prevalent, replace entire lamp socket assembly.

## COOLING FAN INSPECTION

While the unit is in normal operating mode, check to see that there is airflow at the exhaust ports and that no obstructions are present. If there is no airflow, the fan(s) should be replaced immediately.

## LED DISPLAY MAINTENANCE - ANALOG

NOT APPLICABLE TO ALL UNITS

If an LED bulb does not light after you replace a UV lamp, you need to verify the electrical output of the ballast connected to that specific UV lamp. This is done by testing the ballast open circuit voltage and should be performed by an electrician or qualified facilities personnel. Follow these recommended procedures:

1. Shut the power to the UV unit "OFF".
2. Remove the socket cover.
3. Identify the faulty UV lamp, which corresponds to the number on the LED display.





# MAINTENANCE

4. Remove the lamps socket(s) from the faulty UV lamp base.
  5. Use a voltmeter and set an operating range at >700 V AC.
  6. Measure the open circuit voltage. For single-ended (SE) UV lamps, connect the voltmeter across the receptacles of the lamp socket. For double-ended (DE) and High Temperature (HT) unit UV lamps, connect one end of the voltmeter to one end of the lamp socket and the other end of the voltmeter to the opposite end of the lamp socket.
  7. Turn the power to the UV unit "ON".
  8. Record the reading.
  9. Shut the power to the UV unit "OFF".
  10. The open circuit voltage for the various ballasts vary, as noted in the corresponding chart below.
3. Isolate the old ballast from the rest of the system by disconnecting the ballast connector.
  4. Remove and discard the old or defective ballast.
  5. Install the new ballast.
  6. Reconnect the ballast connector(s).
  7. Turn the power to the UV unit "ON".

## SAMPLE PROCEDURES

1. Prior to taking the water sample, have on hand an adequate supply of sterile bottles. These should be obtained from a source laboratory and should have been autoclaved and contained within a plastic outer wrapping.
2. The inside diameter of a sample valve may not exceed 1/4" (6mm) to ensure proper velocity. Prior to taking a sample, it's imperative that the test sample valve be fully opened under full pressure for a full three and a half minutes. Temporary tubing or some other material may be used to direct the water into a container or drain to avoid unnecessary spillage.
3. After the valve has been left fully open for three and a half minutes, reduce the flow to a reasonable stream of water (not less than 50% of full flow). Continue flowing to drain 3 additional minutes.
4. Remove any temporary tubing used for flow diversion.
5. Open the sterile bottle. Holding the cap in a down position, the operator should then hold his breath while taking the sample so as to avoid atmospheric contamination of the sample. The operator must also not allow any fingers to touch the inside of the cap or neck of the bottle.
6. After the water sample has been taken, the cap should be immediately secured on the sample container.
7. The sample container should be labeled and placed in a plastic wrapping and must be taken to the laboratory for plating as soon as possible. Processing should begin within 3 hours of sample collection and should comply with accepted standard methods.

BALLAST TYPE		
120V ELECTRONIC	240V MAGNETIC	240V HE
550-650	575-675	450-850

## REPLACEMENT OF BALLASTS

Ballast replacement is not part of the UV units routine maintenance. However, in the event that the ballast needs to be replaced, the following procedure should be followed:

1. Shut the power to the UV unit "OFF".
2. Locate the old ballast to be replaced. Refer to the electrical diagram if necessary.



**NOTE:** If the voltage reading is zero, or a number above or below the acceptable range, this indicates a ballast fault and the ballast connected to the faulty UV lamp must now be replaced. If the reading is in the acceptable range, but the LED does not light, the LED board has failed and needs to be replaced.



# MAINTENANCE

## MEASURING PERFORMANCE

Every UV unit should be tested periodically to verify actual efficiency. Regardless of the intended application or any optional equipment that may have been provided with the unit, the most accurate and dependable procedure is to conduct post-UV sample analysis in accordance with standard testing methods.

## OBTAINING PROPER WATER SAMPLES

Our experience has shown that the vast majority of unsatisfactory post-UV bacteriological samples are directly related to improper sample taking techniques. There are a variety of commercial sample collection apparatuses available. Should you choose one, be sure to follow the manufacturer's recommended procedures.

Optional sample unit fittings on both the intake and discharge UV chamber flange risers can be provided. We recommend you use the fittings to collect "before and after UV" water samples to eliminate the possibility of contamination by nearby piping, fittings, etc. We recommend you select a valve with a discharge orifice no larger than 1/4" (6mm).

## REPLACING/CLEANING THE AIR FILTER

An air filter, provided for select units, is located at the bottom of the enclosure.

Visually inspect the air filter every 30 days or sooner, depending on the environment of the site installation, to see if any debris or film has settled. If the filter is dirty, the following procedures are provided:

1. Remove the filter. See Fig. A

For remote enclosures: Pull the air filter from intake fan shroud on the underside of the enclosure.

For fixed enclosures: The air filter is held in place by a bracket fixed to the bottom of the enclosure. Using both hands, reach around and locate the filter by touch. Pull the air filter towards you, out of the bracket. See Fig. B and C

2. For cleaning, use a soft sponge with soap and water, or any commercial stainless steel cleaner.
3. Replace filter after air drying.

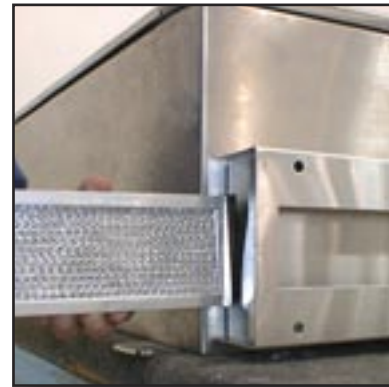


FIG. A REMOVE THE FILTER

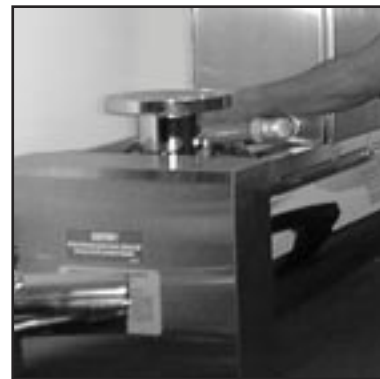


FIG. B REACH FOR FILTER



FIG. C LOCATE FILTER BY TOUCH



# WARRANTY

The following installation and operating conditions are considered hazardous and damaging to the equipment, compromising the ability of the Aquafine unit to perform as intended.

Any of the following conditions will void the equipment warranty:

1. Failure to connect proper electrical service to the unit.
2. Failure to properly ground the unit.
3. Failure to eliminate excessive vibration, piping, movement, or "water hammer".
4. Failure to exercise caution in the handling of the sensitive and delicate components (such as lamps, quartz sleeves, electronic boards, etc.) during installation and/or maintenance procedures.
5. Failure to avoid excessive stops and starts. Not more than three (3) "ON/OFF" cycles per 24 hours of operation.
6. Operation of visibly damaged equipment.
7. Failure to avoid undue overhead piping stress, which can result in structural damage to the UV unit. Limit the load to 25 lbs (11.3 kg), for 2" & 3", 50 lbs (23 kg), for 4" and 75 lbs (34 kg), for 6" or above. Torsion loads or side loading of the risers should be eliminated.
8. Use the components other than those provided or authorized by Aquafine.
9. Failure to correct overhead piping connection leaks or compression nut seal leaks which result in damage to the electrical components.
10. Allowing operating water temperature to exceed 120°F.
11. Operating the units with out water flow.





## TROUBLESHOOTING

SYSTEM ALARM MESSAGE		
ALARM MESSAGE	PROBABLE CAUSE	REMEDY
SYSTEM OK	Activates when there are no system alarms.	
LAMP OFF ALARM	UV lamp	Activates when one or more UV lamps is not ON. The UV lamps should be inspected for damage. Replace UV lamp.
	Ballast	The ballast maybe defective.
	Enclosure temp High	Cabinet temperature has reached its set point. System will automatically shut OFF . Check cooling fans for operation
	Water temperature	Water temperature has reached its set point. System will automatically shut OFF and restart when temperature has cooled 20 °F. Let system cool or allow cooler water to enter the treatment chamber.
LAMP FAULT	Activates when the UV lamp and lamp socket are not engaged properly.	Inspect lamp socket and lamp connection. Repair and replace lamp if required.
	Water Temperature	Water temperature has reached its set point. System will automatically shut OFF and restart when temperature has cooled 20 °F. Let system cool or allow cooler water to enter the treatment chamber.

SYSTEM ALARM MESSAGE		
ALARM MESSAGE	PROBABLE CAUSE	REMEDY
TIME TO CHANGE LAMPS	Lamp Operating Hour	The lamp operating hours has reached the alarm set point. Replace lamps and reset the lamp operating hours.
1000 HOURS TO LAMP replacement	Lamp Operating Hours	Activates when lamp run hours are within 1000 hours of lamp replacement set point. Prepare to change UV lamps.
LOW UV ALARM	UV Lamps	As the UV lamps age, the lamps solarize. After a normal operation of 8000 hours, the lamps should be replaced. Please note that the lamps will remain lit for many hours after 8000 hours but the UV output will decline.
	Quartz Sleeve/ Detector Fouling	In raw water applications (non RO/DI), minerals or debris will attach to the quartz sleeves. The material will block the transmission of the UV energy into the water. The quartz sleeves must be replaced or cleaned. CIP does not always properly clean the quartz sleeves.
	Water Quality	Any changes in the water transmission or quality will cause the sensor reading to change. In some applications where the water is blended, the transmission properties can change.



# TROUBLESHOOTING

SYSTEM ALARM MESSAGE		
ALARM MESSAGE	PROBABLE CAUSE	REMEDY
LOW UV ALARM	Temperature	UV output of the lamps is sensitive to temperature. If the UV detector is set with a water temperature of 70°F and the operational temperature is 50°F, the sensor reading will be less. The detector should be set to the "normal" operating temperature.
	Low UV Alarm Set Point Wrong	Reset the alarm set point.
HIGH TEMP WARNING	Water temperature	Water temperature is approaching the alarm set point. Provide cooler water.
WATER TEMP TO HIGH	Water temperature	Water temperature has reached its set point. System will automatically shut OFF and restart when temperature has cooled 20°F. Let system cool or allow cooler water to enter the treatment chamber.
	Defective Detector	Check the detector temperature display and the water temperature.

SYSTEM NOT OPERATING		
SYMPTOM	PROBABLE CAUSE	REMEDY
SYSTEM NOT OPERATING	Defective Detector	If the Detector is installed, the detector provides a temperature signal to the controller. If the system has a Water Temperature Too High Alarm and the water temperature is below the set point, the detector may be defective.
	Blown fuse/Circuit breaker	Check main fuse or circuit breaker. A complete inspection to determine the cause of failure should be completed.
SYSTEM NOT OPERATING	GFI (option)	Some UV units are equipped with a GFI. Resetting the GFI will restore power to the unit.
	Power to the Unit	Main power to the unit should be checked.
	Auto Mode Operation	If the unit has been set to operate in Auto mode, the START/STOP button will not start the unit.
	Lamp Fault	Inspect and check lamp socket connection.



# TROUBLESHOOTING

SYSTEM NOT OPERATING			SYSTEM LEAKING		
SYMPTOM	PROBABLE CAUSE	REMEDY	SYMPTOM	PROBABLE CAUSE	REMEDY
	High Water Temperature (Option)	If water temperature too high message is displayed, the unit will not start. The water temperature must be 20 °F below the set point to restart.	<b>LEAKING</b>	Compression Nut	Inspect the compression nut and O-ring to insure that they are installed properly.
	High Cabinet Temperature (Option)	If there is a High Cabinet Temperature message, the cabinet temperature is too high. The cooling fans must be checked for operation.		Over Pressure	System pressure greater than the design pressure will cause the sealing material to fail.
	Lamp Fault	Inspect and check lamp socket connection.		O-ring Failure	The O-rings should be inspected for deterioration. These materials can be subjected to UV, Ozone and heat that is damaging to the material.
	High Water Temperature (Option)	If water temperature too high message is displayed, the unit will not start. The water temperature must be 20 °F below the set point to restart.		O-ring Installation	O-rings that are not compressed properly will cause the quartz sleeves to leak. Reinstall and replace the O-ring.
	High Cabinet Temperature (Option)	If there is a High Cabinet Temperature message, the cabinet temperature is too high. The cooling fans must be checked for operation.		Sealing Material	O-ring materials that are damaged due to UV, Ozone and physical damage will result in leaking. The material should be changed.
				Water Hammer	Water hammer pressure can be 5-10 times higher than the static pressure of a water system can cause leaking and breakage to the quartz sleeves.
				Broken Quartz Sleeves	The ends of the sleeves should be inspected for cracks and chips. Any broken sleeves should be replaced.



# TROUBLESHOOTING

LAMP FAILURE			UV SYSTEM PERFORMANCE		
SYMPTOM	PROBABLE CAUSE	REMEDY	SYMPTOM	PROBABLE CAUSE	REMEDY
PREMATURE LAMP FAILURE	Leaking/Water in Quartz Sleeve	If water is present in the quartz sleeve, the leak should be repaired immediately. Water can cause the lamp socket to arc, corrosion on the lamp pins, burning of the lamp sockets and damage to the electrical components.	UV SYSTEM NON-PERFORMANCE, BACTERIA	UV Lamp Maintenance	The lamps may require maintenance.
	Lamp Cycling	Systems in which the UV is turned ON /OFF frequently (more than 3 times) will cause the lamp filament damage.		Quartz Sleeve Maintenance-Dirty	The quartz sleeves may need maintenance
	Electrical Power	Low equipment power causes damage to the electrical equipment. The electrical power should be within 5% of the name plate voltage. Small transformers may be required to boost low voltages.		Sampling Procedures	Sampling procedures can contribute to measuring errors.
	Electrical Connection	Vibration can cause the electrical connects to become loose. The connection should be inspected and repaired.		Concentration Spikes	Contamination or concentration spikes can result in temporary negative performance.
	Heat	Excessive heat from no flow conditions can damage the lamps.		Piping Contamination	System sanitation is critical. If the pipe system is contaminated, then performance may be flawed.
	Mechanical Vibration	Vibration from water hammer, pumps and unsupported piping can cause excess stress to the lamp filament and equipment.		Leaking	Leaking can result in system contamination.
				TOC and Chlorine Performance	For TOC and Chlorine applications, lamps with 185nm output must be used.
		Water Flow to High	If the capacity of the equipment exceeds the design capacity, then performance will be compromised.		
		Water Quality	If the water has debris, chemicals or materials which absorb the UV energy, the performance will be compromised.		





# UV G400 TROUBLESHOOTING

SYSTEM ALARM MESSAGE		
MESSAGE	PROBABLE CAUSE	REMEDY
System OK	Activates when there are no system alarms	
Lamp OFF alarm	UV lamp	Activates when one or more UV lamps in not ON.  The UV lamps should be inspected for damage.  Replace UV lamp(s).
	Ballast	Ballast may be defective.
	Enclosure temperature ( <i>option</i> )	When enclosure temperature has reached its set point, system will automatically shut OFF.  Check that cooling fans are operating.  Fan filter blockage.
	Water temperature	When enclosure temperature has reached its set point, system will automatically shut OFF and restart when temperature has cooled to 20°F.  Let system cool, or allow cooler water to enter the treatment chamber.
Time to change lamps	Lamp operating hours	The lamp operating hours has reached the ALarm Set Point.  Replace lamps and reset the lamp operating hours.
1,000 hours to lamp replacement	Lamp operating hours	Activates when lamp run hours are within 1,000 hours of lamp replacement set point.  Prepare to change UV lamps.
Low UV Alarm	UV lamps	As the UV lamps age, the lamps solarize. Lamps should be replaced after specified lamp life, which is determined by lamp life.  Please note, lamps will remain lit many hours after specified lamp life, but the UV out put will decline.
	Quartz sleeves/Detector fouling	In raw water applications (non RO/DI), minerals or debris will attach to the quartz sleeves. The material will block the transmission of the UV energy into the water. The quartz sleeves must be replaced or cleaned.  CIP does not always properly clean the quartz sleeves.
	Water quality	Any changes in the water transmission or quality will cause the sensor reading to change. In some applications where the water is blended, the transmission properties can change.



## TROUBLESHOOTING *UV G400*

SYSTEM ALARM MESSAGE		
MESSAGE	PROBABLE CAUSE	REMEDY
Low UV Alarm	Temperature	UV output of the lamps is sensitive to temperature. If the UV sensor is set with a water temperature of 70°F and the operational temperature is 50°F, the sensor reading will be less.  The Detector should be set to the “normal” operating temperature.
	Low UV Alarm Set Point wrong	Reset Alarm Set Point.
High Temperature Warning	Water temperature	Water temperature is approaching the Alarm Set Point.  Provide cooler water.
Water Temperature Too High	Water temperature	Water temperature has reached its set point. System will automatically shut OFF and restart when temperature has cooled to 20°F.  Let system cool, or allow cooler water to enter the treatment chamber.
	Defective Detector	Check the Detector temperature display and the water temperature.

SYSTEM NOT OPERATING		
SYMPTOM	PROBABLE CAUSE	REMEDY
System NOT Operating	Defective Detector	The Detector provides a temperature signal to the controller.  If the system has a Water Temperature Too High warning and the water temperature is below the set point, the detector may be defective.
	Blown fuse/Circuit breaker	Check main fuse or circuit breaker.  A complete inspection to determine the cause of failure should be completed.
	Control fuses	There are two fuses for the controller, AC and 24V/DC.  Both fuses need to be checked.  On multiple units (skids), each unit has an individual 24V/DC fuse.



# UV G400 TROUBLESHOOTING

SYSTEM NOT OPERATING		
SYMPTOM	PROBABLE CAUSE	REMEDY
System Not Operating	Power to the Unit	Main power to the unit should be checked.
	GFI <i>(option)</i>	Some UV units are equipped with a GFI. Resetting the GFI will restore power to the unit.
	Local/Remote Operation	If the unit has been set to operate in Remote mode, the START/STOP button will not start the unit.
	Lamp Fault <i>(option)</i>	Inspect and check lamp socket connection.
	High water temperature <i>(option)</i>	If “Water Temperature Too High” message is displayed, the unit will not start. The water temperature must be below 20°F below the set point to restart.
	Enclosure temperature <i>(option)</i>	If “High Cabinet Temperature” message is displayed, the enclosure temperature is too high. The cooling fans should be checked for operation.

LEAKING		
SYMPTOM	PROBABLE CAUSE	REMEDY
Leaking	Compression nut	Inspect the compression nut and O-ring to insure that they are installed properly.
	Over pressure limit	System pressure greater than the design pressure will cause the sealing material to fail.
	Gasket failure	The gasket and O-rings should be inspected for deterioration.  These materials can be subjected to damage by UV, Ozone and heat.
	O-rings	The gasket and O-rings should be inspected for deterioration.  These materials can be subjected to damage by UV, Ozone and heat.  Reinstall and replace the O-ring.
	Sealing material	The gasket and O-rings should be inspected for deterioration.  These materials can be subjected to damage by UV, Ozone and heat.



## TROUBLESHOOTING *UV G400*

<b>LEAKING</b>		
<b>SYMPTOM</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
Leaking	“Water Hammer”	“Water hammer” pressure can be 5-10X higher than the static pressure of a water system and can cause leaking and/or breakage to the quartz sleeves.
	Broken quartz sleeves	Inspect the ends of the sleeves for cracks and chips.  Any broken sleeves should be replaced.

<b>LAMP FAILURE</b>		
<b>SYMPTOM</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
Premature lamp failure	Leaking/Water in Quartz Sleeve	If water is present in the quartz sleeve, repair the leak immediately.  Water can cause the lamp socket to arc, corrosion on the lamp pins, burning of the lamp sockets and damage to the ballast and LED components.
	Lamp cycling	Systems in which the UV is turned ON and OFF frequently (more than 4X) will cause the lamp filament damage.
	Electrical power	Low/High equipment power will cause damage to the electrical equipment.  The electrical power should be within 5% of the name plate voltage.  Small transformers may be required to boost low voltages.
	Heat	Excessive heat from no flow conditions can damage the lamps.
	Mechanical vibration	Vibration from “water hammer”, pumps and unsupported piping can cause excess stress to the lamp filament and equipment.
	Electrical connection	Vibration can cause the electrical connections to become loose.  All connections should be inspected and repaired if damaged.

<b>UV SYSTEM PERFORMANCE</b>		
<b>SYMPTOM</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
UV system non-performance -  Bacteria, TOC, Ozone	UV lamp maintenance	The lamps may require maintenance.
	Quartz sleeve maintenance	The quartz sleeves may need maintenance



## UV G400 TROUBLESHOOTING

UV SYSTEM PERFORMANCE		
SYMPTOM	PROBABLE CAUSE	REMEDY
<b>UV system non-performance - Bacteria, TOC, Ozone</b>	Sampling procedures	Sampling procedures can contribute to measuring errors.
	Concentration spikes	Contamination or concentration spikes can result in temporary negative performance.
	Piping contamination	System sanitation is critical. If the pipe system is contaminated, then performance may be flawed.
	Leaking	Leaking can result in system contamination.
	TOC & Chlorine performance	For TOC and Chlorine applications, lamps with 185nm output must be used.
	Water flow too high	If the capacity of the equipment exceeds the design capacity, then performance will be compromised.
	Water quality	If the water has debris, chemicals or materials which absorb the UV energy, the performance will be compromised.



# PARTS LIST

Part	Part No.
<b>UV Vision-2000 CONTROLLER</b>	
UV G400C operating control system with 2 Analog input	41959
UV G400 operating control system with 1 Analog input	41958
Expansion Module 4-20mA	42119
Adaptor Module 4-20mA	42117
Cable for 4-20mA Expansion Module	42417
Multiplexer PCB Board	41963
<b>UV TEMPERATURE DETECTOR</b>	
UV & Temperature Detector	41115
Detector (w/20 ft cable)	41174-2
Detector NIST Traceable (w/20 ft cable)	41174-3
Annual Certificate & Calibration of Reference Sensor	19712
<b>LAMPS, QUARTZ SLEEVES</b>	
<b>Standard Lamps</b>	
254nm SE	GOLD-L
185nm SE	SILVER-L
<b>Validated Lamps</b>	
254nm SE	CREAM-L
185nm SE	TAN-L
<b>Quartz Sleeves</b>	
Domed End 25mm	16791
<b>Lamp Socket components</b>	
30" Lead Wires	40569-3
90" Lead Wires	40569-8
16' Lead Wires	40569-16
Lamp Socket Cap	17489
<b>Compression Nut</b>	
CPVC 25mm	19685
316L Stainless Steel 25mm	40357
Compression Nut Tool	19737
<b>O-RINGS &amp; ENDPLATES</b>	
<b>O-rings</b>	
EPDM	4253
Viton	40413
Viton (for detector)	40432
<b>For SCD-H 1000, 1200, 1350 &amp; 1450</b>	
Cylinder O-ring EPDM	16063
Cylinder O-ring Viton	40429



# PARTS LIST

Part	Part No.
<b>For SCD-H 600 &amp; 700</b>	
Cylinder O-ring EPDM	15601
Cylinder O-ring Viton	40428
<b>For SCD-H 1750</b>	
Cylinder O-ring - SCD 1750H VITON	42344
<b>BALLASTS</b>	
Ballast Assembly 120V-240V	41634-1
<b>SPARE PARTS</b>	
Fan 120V	3901
Fan 240V	3903
Teflon Quartz Bushing 25mm	19737



\* MUST BE SOLD TOGETHER