

READ THIS MANUAL

PLEASE KEEP FOR PERMANENT REFERENCE

Part No. 108-1, Revised 10/03

This manual covers the preliminary installation, operation and general maintenance requirements for Aquafine Ultraviolet Water Treatment Equipment for the following applications:

- Disinfection
- Ozone Destruction
- TOC Reduction



SL Series

*Installation,
Maintenance and
Operation Manual*

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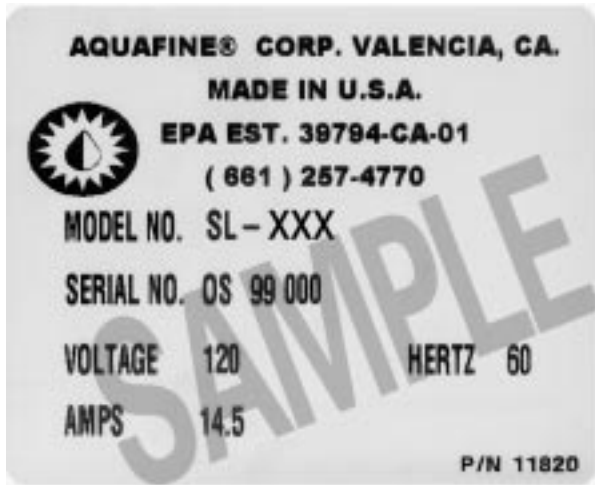
It is imperative that those responsible for the installation of this equipment, as well as operating personnel, read this manual and carefully follow all instructions and guidelines. **EQUIPMENT OPERATORS AND INSTALLERS MUST COMPLY WITH OPERATIONAL SAFETY REQUIREMENTS.**

Aquafine Corporation builds the finest quality ultraviolet equipment in the world. When properly installed and operated, Aquafine ultraviolet treatment units will provide many years of service.

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Refer to this nameplate decal on your unit when ordering parts or service.



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Installation and Operational Safety

safety requirements for UV equipment

The following safety requirements relate directly to operator safety. Please review with all appropriate personnel to ensure continuous compliance.

These safety requirements are **MANDATORY**.

Failure to carefully follow these requirements can cause injury to the operator and damage the UV unit.



This “Safety Issue” icon marks all items relating to safety issues. Please read and adhere to these comments carefully.

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 look at the lighted blue ultraviolet lamps. Do not operate the ultraviolet lamps outside of the UV treatment chamber. Exposure can severely burn and damage eyes and skin.
4. Supply the unit with the correct voltage and frequency as indicated on the nameplate decal, ensuring the unit is wired in accordance with local electrical codes.
5. Properly ground the unit. Failure to comply may result in severe or fatal electrical shock.
6. Install the unit away from undue vibration that can damage the electrical components and UV lamps.
7. Ensure all water connections (flanges and compression nuts) are tightly sealed before applying pressure to the UV unit. **Do not stand in a direct line with the end of the unit when inspecting for water leaks; observe from the front or back.**
8. Do not allow the unit to overheat by operating without water flow. Normal operating temperature for standard UV units is 35° to 100°F (2°- 38°C). For high temperature units, normal operating temperature is 35° to 150°F (2°- 66°C).
9. If the inlet water temperature exceeds 100°F (38°C), contact the factory for assistance.
10. Do not allow the water temperature to drop below 35°F (2°C).
11. Do not allow the flow rate to exceed the maximum rated capacity.
12. **DO NOT ELECTRICALLY CYCLE THE UV UNIT MORE THAN THREE (3) ON/OFF CYCLES IN A 24-HOUR PERIOD.**
13. Before start up, flush the UV unit and discharge piping to rinse out any debris left from installation.

**DO NOT LOOK
AT UV LIGHT**



Description of Equipment

SL series

The SL Series is the appropriate choice for many low volume indoor applications because it offers a compact footprint and easy installation. All three models combine the electrical components and the treatment chamber in one integral unit.

SL-10A

This unit mounts vertically. Inside the cabinet housing are the ballast and the UV treatment chamber. The housing has a front cover which allow access to all interior components. On the side of the treatment unit is a knockout for electrical input power.

SL-1

This unit mounts vertically. Inside the cabinet housing are the ballast and the UV treatment chamber. The housing has a front cover which allows access to all interior components. On the side of the unit is a knockout for electrical input power.

MP-2-SL

This unit mounts horizontally. Inside the electrical housing are the ballast and two UV treatment chambers. They operate serially, as this is the most efficient design. The housing has a front cover which allows access to all interior components. On the back is a knockout for electrical input power.

treatment chamber

On both ends of the UV treatment chamber are gasketed end plates which contain the stainless steel nipples, compression nuts, O-rings and lamp socket retainer assemblies. (This option is for RA finish cylinders).

Each treatment chamber is fitted with two raised-face stainless steel flanges (in the case of the MP-2-SL, each chamber has one flange each). The bottom flange is always designated as the inlet, while the top flange is the outlet.

Inside the inlet flange is a helical baffle that prevents laminar flow and maximizes the unit's performance. The quartz sleeves fit inside the UV treatment chamber through the threaded nipples. The UV lamps fit inside the quartz sleeves. The lamp sockets connect to the lamps, providing a waterproof seal and a vibration-proof grip.

Warranty Information

To maintain your UV units warranty, please fill out and mail the Warranty Registration Card in the back pocket of this manual to Aquafine Customer Service.

The following installation and operating conditions are considered hazardous or damaging to the equipment and can compromise 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 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 10 lbs (4.54kg) per flange.
8. Use of 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. Operating the unit without water flow.



**Aquafine®****WARRANTY**

Aquafine equipment is guaranteed to be free from defects in materials and workmanship (excluding ultraviolet lamps) for a period of one year from the date of purchase. Any part suspected of being defective should be returned prepaid to Aquafine Corporation. If upon our inspection, the part(s) proves to be defective, it will be replaced or repaired (our option) and returned to sender prepaid.

Before returning any part, contact Aquafine Corporation for return authorization and shipping instructions. This guarantee is void if the equipment has not been installed and maintained in accordance with instructions. This guarantee is in lieu of all other warranties, expressed or implied.

To keep your warranty valid and to ensure peak performance, fill out and return your warranty registration card (located in the back pocket of this manual) and use only genuine Aquafine replacement parts.



Unit Installation

where to install the unit

Install the UV treatment unit in a horizontal position in a sheltered area with ample ventilation. Ambient temperatures surrounding the unit should be between 35°F (2°C) and 110°F (43°C). Should your requirements differ, contact the factory for assistance.

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, fittings, etc. The base of the UV treatment unit should be mounted on suitable support to avoid undue strain on the unit or your related pipes and fittings.

Verify the location is free from vibration which could be caused by proximity to heavy equipment, erratic or improper pumps. Excessive vibration will damage internal electrical components and cause premature failure of the UV lamps.

Allow sufficient service access clearance. In making your plumbing connections, provide unions, valves, bypass and drain.

Please allow at least 40" of clearance on the lamp changing end of the unit.

how to protect your unit

The location should be free from undue vibration which could be caused by proximity to heavy equipment, erratic or improper pumps. Excessive vibration will damage internal electrical components and cause premature failure of the UV lamps.

Limit overhead piping load to 10 lbs (4.54 kg) per flange. 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.



A parts check list was included when this unit was shipped. Please refer to this list and note that some parts are small and can be easily overlooked when discarding packaging.

operating pressure

Standard units are rated for a maximum operating pressure of 120 psig (8.24 bar).

If your unit has the High Pressure Modification option (model number suffix "HP") operating pressure may increase to 150 psig (10.34 bar).

heat sanitization

For heat sanitization (temperatures exceeding 170°F (77°C) up to a maximum of 194°F (90°C)), it is recommended that stainless steel compression nuts be used in place of CPVC compression nuts. During heat sanitization the S-254 probe must be removed. (Adaptor available for maintaining Hydrostatic seal during sanitization.) The selection of the elastomers should be considered.

intermittent operation

Never operate the unit without water flow. Permanent damage is caused to the UV lamp(s), electronic ballast and related components without water flow.

Operating the ultraviolet unit without water flow through the chamber automatically voids the warranty.

If operated without water flow, the fluid within the ultraviolet chamber will become hot causing the UV lamp(s) to lose effectiveness. The heat can permanently damage the ultraviolet lamp(s). The heat can also damage the lamp ballast and related instrumentation.

Should the unit be used for specific batch flow operations, it can be turned "on" and "off" manually. Make sure the unit is allowed to warm up for at least one minute before use, and make sure the unit is turned "Off" after each session. Do not exceed 3 on/off cycles per 24 hour operation.

If you need help to determine the best method of operating your UV treatment unit under intermittent conditions, contact your local representative or the factory.

An optional Temperature Safety Control Device is available to prevent the overheat problems described above.



special piping requirements for users of ultrapure water

Ultrapure 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 material breakdown and/or structural failure.

Should your water application and piping material be so classified, we recommend you install “UV light traps” to isolate any such susceptible material from direct exposure to the ultraviolet light. One common practice is to install stainless steel 90° elbows at the inlet/outlet of the UV treatment chamber prior to the connection of any nonmetallic materials. UV light traps protect nonmetallic piping. Should you require any additional assistance, please contact your local Aquafine representative or the factory directly.

wiring the unit

A 1/2” conduit knockout (7/8” dia.) has been provided to attach a field installed junction box. This box should be directly attached to the enclosure. All wiring connections must be made within this junction box. The size and type of junction box should be made in accordance with local and applicable codes.

GROUNDING

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.

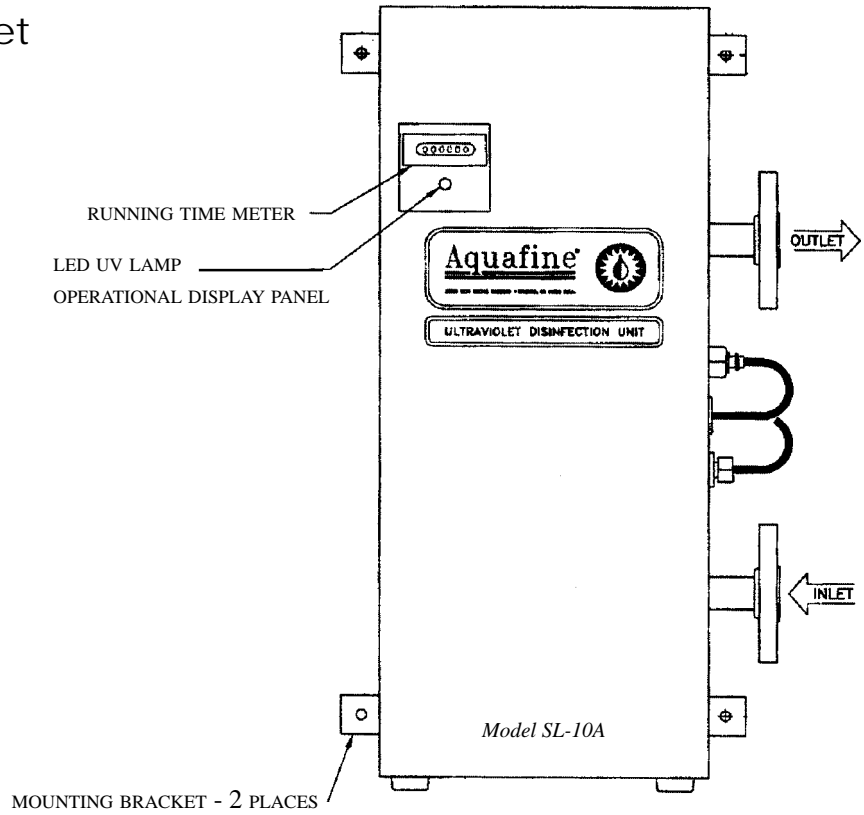
UV performance is line voltage sensitive. Line voltage should be $\pm 5\%$ of rating shown on the electrical nameplate decal. Voltage outside these limits can reduce the performance of the UV unit.

All supply connections are to be made in a UL-listed junction box suitable for the number and size of conductors. The instructions shall also specify that the junction box is to be directly attached to the unit.

Plumbing Requirements

plumbing schematic for all SL series ultraviolet treatment units

Service clearance required on this end.



Installing *the Quartz Sleeves*

quartz sleeve installation

The quartz sleeves designed for this unit are open on both ends. For first time unit installations, follow these quartz sleeve installation procedures:

1. Turn off all power to the unit.
2. Wear clean cotton gloves to prevent contamination of the quartz sleeves.
3. Carefully remove the quartz sleeve from the factory packaging. Handle with care as they are fragile.
4. Visually inspect all quartz sleeve(s) for cracks or other damage. Do not install damaged quartz sleeve(s).
5. Remove the covers from the treatment chamber.
6. Remove all compression nuts and any packaging material from the end plate (if installed).
7. Place the end of the quartz sleeve into the threaded nipple and slowly push the sleeve into the chamber through to the second end plate.
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.
9. Place the compression nut and o-ring onto the end of the quartz sleeve. Allow the quartz sleeve to extend an equal distance on both ends. Some pushing and twisting may be required. Deionized water may be used as a lubricant.
10. Tighten the compression nut approximately 1/2 turn after the threaded nipple and o-ring make contact.
11. Repeat this procedure for the second endplate.
12. Slowly pressurize the system and fill the chamber with water to check for leaks.
13. If the compression nut leaks, use the special tool to screw the compression nut assembly onto the threaded nipple. Do not exceed 40 inch-pounds of torque.
14. You are now ready to install the UV lamp(s).



Over tightening can break the quartz sleeves or create leaks.



Remove unit cover.



Insert quartz sleeve into threaded nipple.



Socket retainer cap on comp nut



Rotate compression nut clockwise

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Installing *the Ultraviolet (UV) Lamps*

installing the UV lamps

Once it has been verified that there are no leaks in the system, the UV lamps are ready for installation.

1. Remove all power to the UV unit.
2. Depressurize the system.
3. Wear clean cotton gloves to prevent contamination of the UV lamps.
4. Carefully remove the UV Lamp from the factory packaging. Handle the lamp with care, as it is fragile.
5. Insert one UV lamp into each open quartz sleeve and push it about 2"-3" (51-76mm) out beyond the opposite compression nut, so as to be able to hold the lamp with one hand.
6. Unscrew and pull back the retainer cap from the rubber lamp socket.
7. Insert the lamp base into the rubber socket. Push until you feel a firm "bottomed out" connection.
8. Carefully slide the rubber boot portion of the lamp socket over the end of the lamp. **CAUTION: DO NOT INSERT UV LAMPS WITH OPPOSING RETAINER CAP IN PLACE.** Verify no portion of the rubber boot has folded under during this process.
9. Screw the slotted retainer cap clockwise onto the compression nut, making sure the number on the socket lead wire and the end plate correspond.
10. Connect the right side rubber lamp sockets and spring-loaded lamp socket retainer assemblies onto each lamp. Pay special attention to match the numbers on the retainer assemblies with the numbers beside each steel nipple on the end plate.
11. Carefully pull out each rubber lamp socket from each spring-loaded socket retainer assembly.
12. With one hand, push the rubber socket boot onto the end of each ultraviolet lamp. When properly attached, a slight "snap" can be felt, which indicates a proper connection.
13. Carefully slide each lamp socket retainer assembly up and over the rubber lamp socket boot, until the retainer assembly reaches the male-threaded portion of the compression nut.
14. Then, turn clockwise until the socket retainer cap bottoms out against the compression nut. Avoid overtightening.

CAUTION! Prior to energizing the ballasts and lamps, ensure there is no water leaking into the quartz sleeves and compression nut cavities by properly installing these components. Even a small leak can flood a quartz sleeve and compression nut cavity.



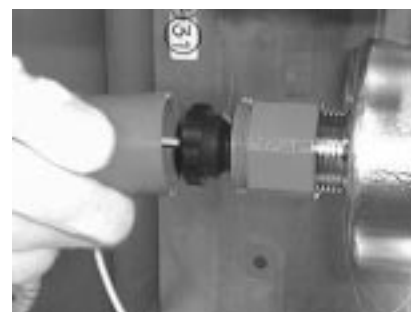
During operation, high voltage is present at the lamp pins and receptacles of the lamp connectors. Prolonged flooding of a quartz sleeve and compression nut cavity can cause premature failure of the lamp due to repeated arcing, overheating of the lamp connector cable, and may result in a meltdown of the cable insulation.



Step 5: Insert lamp into quartz sleeve.



Step 8: Slide boot onto lamp socket assembly.



Step 13: Slide lamp socket retainer assembly over boot.

Powering Up *the Ultraviolet (UV) Unit*

prior to turning on the UV unit, verify the following:

- With water flowing through the system, ensure there are no system leaks and no piping connection leaks
 - All earth ground connections are properly made
 - All lamp connections are properly made
1. Verify that all incoming power conductors, including the ground conductor, are properly terminated.

2. Turn on the electrical power to the UV unit.
3. Turn the power off until actual operational start up begins.

CAUTION! Rapid successive cycling of the power to the ballasts can cause premature failure of the system components.



Monitoring *Devices*

UV lamp operational display panel

To verify that all the UV lamps are operating properly, your UV treatment unit has been provided with a UV Lamp Operational Display Panel. The panel consists of as many LED indicators as there are ultraviolet lamps. Each LED indicator is electrically connected to the lamp circuitry of a specific UV lamp. The LED indicators are intended to operate “on” when the UV lamps are also turned “on”.

Should any UV lamp fail to operate electrically, the corresponding LED will automatically turn “off”.

Each UV lamp is numbered at the end of the UV treatment chamber, and the corresponding LED light carries the same number on the display panel; thus, if one or more LED lights fail to operate, you can easily determine which specific lamp requires attention.

We recommend you monitor the LED Panel daily to ensure proper performance.

running time meter

Your ultraviolet treatment unit has been furnished with a Running Time Meter, located on the front instrument panel. This non-resettable running time meter will log up to 99,999 hours. It is intended to remind you of the number of operating hours on the equipment, as certain maintenance functions need to be performed at certain time intervals.

A maintenance log is attached to the unit for your use. It should be kept current. This provides an immediate maintenance reference: when it was performed and when the next service is due. Additional service logs are available from Aquafine, and are intended to be placed on top of the existing service logs.



Running time meter with lamp LED indicator.



model S-254 UV optical sensor

The optional S-254 UV optical sensor measures the relative output of ultraviolet light within the UV treatment chamber. Degradation of the UV lamps, fouling of the quartz sleeves, and increased turbidity of the water will affect the sensor reading.

The UV meter assembly and instrumentation setpoint potentiometers are located on the electrical enclosure. The peripheral alarm contacts are accessible from the back side of the meter. A shielded signal cable connects the sensor meter assembly to the sensor probe. The sensor probe is located in the sensor port fitting on the UV treatment chamber.

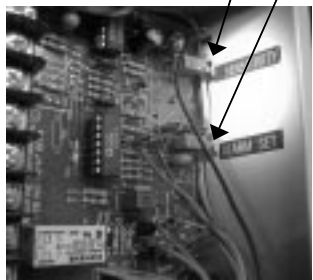


S-254 optical sensor meter

The meter must be reset after the first 100 hours of operation on new UV lamps, both at the time of installation and each time the UV lamps are replaced.

SETTING THE UV METER

1. Gradually start the normal flow rate.
2. Bring the unit up to normal operating pressure.
3. Turn the UV lamps on for a minimum of 15 minutes.
4. Open the S-254 meter door.
5. Locate the blue potentiometer for setting the sensitivity "R3L" and blue potentiometer for setting the alarm "R8L" located on the top right side of the PCB board.
6. Using a flat screwdriver, adjust the R3L sensitivity potentiometer to 100%.
7. Using a flat screwdriver, adjust the R3L sensitivity potentiometer to 50%.



8. Using a flat screwdriver, adjust the R8L alarm potentiometer until the red LED barely comes on.
9. Using a flat screwdriver, set the R3L sensitivity potentiometer back to 100%.
10. Turn the R3L sensitivity potentiometer to 50%; the red LED should light.
11. Turn the R3L sensitivity potentiometer back to 100%.

ALARM CONTACTS (OPTIONAL)

Normally Closed and Normally Open alarm contacts are also provided for use with user-supplied peripheral equipment, such as remote alarms or solenoid valves. Dry relay contacts are rated as follows: 0.52 AMP 120 VAC., 0.25 AMP 240 VAC

If your application requires higher contact ratings, use a slave relay. Connection of peripheral equipment is the responsibility of the user. See wiring schematic in back pocket of this manual

SENSOR ALARM

The S-254 UV optical sensor provides information about the relative amount of UV passing through the water. The reading is affected by quartz sleeve fouling and/or the germicidal lamp efficiency. The UV sensor is sensitive to, and reflects changes in, UV transmission when a substantial change occurs in the normal operating flow rate, temperature, operating pressure, or quality of the fluid flowing in the system.

When the UV intensity falls below the minimum standard due to any of the above conditions, the sensor alarm light (red LED) will come "on" and corrective action must be taken to optimize the performance of the UV treatment unit.

1. Examine your system for any significant changes in normal operating conditions.
2. Verify that all UV lamps are operating. Verify the quartz sleeves are clean.

If quartz sleeve fouling has caused the optical sensor alarm to activate, the quartz sleeves must be cleaned. At the same time, you must clean the sensor probe quartz window. Please find this information in the maintenance section of this manual.



4-20 mA sensor signal option

This option works with the optional S-254 optical sensor. It generates a 4-20 mA output signal based upon the relative UV intensity which may be monitored at a remote control panel or control PC. The customer is responsible for providing an appropriate 4-20 mA display instrument and connecting it.

A second NEMA-rated enclosure is provided and connected to the remote sensor enclosure. The customer is responsible for bringing peripheral instrument wires through the 1/2" electrical knockout on the bottom of the dedicated NEMA enclosure and connecting it to the indicated terminals.

T-120 temperature safety control option

The Temperature Safety Control consists of a heat-sensing probe. This device protects against inadvertent overheating inside the UV chamber, which can damage the UV lamps and the ballast/LED Display Panel circuitry.

The Temperature Safety Control senses raised water temperature and assumes the UV lamps are operating "on" with no water flow.

STANDARD UNITS

The device automatically turns the UV lamps off when the water temperature reaches 120°F (49°C) and automatically turns the UV lamps back on when the temperature falls to 100°F (38°C).

HIGH TEMPERATURE (HT) UNITS

The device automatically turns the UV lamps "off" when the water temperature reaches 170°F (77°C) and automatically turns the UV lamps back "on" when the temperature falls to 150°F (66°C).

This temperature spread prevents excessive stop/starts during no flow conditions, and it protects the UV lamps and the electrical components from overheating damage.

The temperature probe is located in the inlet riser. No operator intervention is required other than periodic visual verification that the UV lamp(s) are properly operating during normal water flow conditions.

The cutoff temperature has been preset at the factory. Should you require a different set point, please contact Aquafine for assistance.

lamp out alert indicator option

Lamp Out Alert is an optional accessory package that activates a relay when a UV lamp fails to operate. A visual inspection of the LED UV Lamp Display Panel will indicate which lamp has failed. Dry contacts are provided for customer connection. The dry contacts are rated at 3.0 Amps maximum @ 120 volts.

If the unit is equipped with the Lamp Out Alert Option, the three wires (COM, NC, NO) terminating from the LOA must be filed terminated within a filed installed junction box.

A main disconnect switch is also required, so that the electrical power can be completely isolated from the unit during servicing.

It is absolutely necessary that the unit be properly grounded for safe and proper operation.



It is essential that all non-operational lamps be changed immediately to maintain system efficiency.

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Troubleshooting

using the LED display

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. This should be done by an electrician or qualified facilities personnel. Follow these recommended procedures:

1. Turn power “off” to the UV unit.
2. Remove the cover.
3. Identify the “faulty” UV lamp which corresponds to the number on the LED display.
4. Remove the lamp socket(s) from the “faulty” UV lamp base.
5. Use a voltmeter and set an operating range at >700 VAC.
6. Measure the open circuit voltage:

For double-ended/and high-temperature lamps: connect one end of the voltmeter to one end of the lamp socket and the other end of the voltmeter of the opposite end of the lamp socket.
7. Turn power “on” to the UV unit.
8. Record the reading.
9. Turn power “off”.
10. Listed below please find the open circuit voltages for the various ballasts:

Ballast Type	
120 Volt Electronic	240 Volt Magnetic
550-650	575-675

If the voltage reading is zero or a number above or below the acceptable ranges, this indicates a ballast fault, and the ballast connected to the “faulty” UV lamp must now be replaced.

If the voltage reading is within acceptable ranges but the LED does not light, the LED board has failed and needs to be replaced.

Refer to the Replacement Parts Lists in the back of this manual to identify the proper ballast and/or LED part number.



Running time meter with lamp LED indicator.

CAUTION! Avoid touching the lamp tip after you remove the rubber lamp socket. This is a shock hazard.



Maintenance Requirements

cleaning the unit

The exterior surfaces of the Aquafine UV unit should be kept clean as part of routine maintenance. Use a soft cloth with soap and water or any commercial stainless steel cleaner. Avoid scratching the Lexan instrument window.

LED status display panel

Monitor the Status Display LED Panel daily. Immediately replace any failed UV lamp.

UV lamp replacement

Replace UV lamps after 8,000 hours of use.

THIS IS BASED ON NO MORE THAN 3 ON/OFF POWER CYCLES PER 24 HR. PERIOD.

Please follow the operating requirements outlined in the warranty section of this manual.

Premature lamp failure or lamp life deterioration can be expected if the UV unit is cycled on/off more than three (3) times a day. To replace the lamps, follow the procedures on page 10.

The Colorguard™ ultraviolet lamps are rated for 8,000 hours of continuous use or 24 months of intermittent use, whichever comes first. After this time, the lamp glass will photochemically change and no longer allow sufficient 254-nm shortwave UV, the germicidal ray of the lamp, through the glass to effectively kill bacteria.

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 ultraviolet lamp be used for more than 24 months of operation without replacement, regardless of the number of hours of operation, due to normal operational degradation of the UV lamp.

quartz sleeve cleaning & replacement

As water passes through the ultraviolet treatment unit, minerals, debris and other substances in the water will settle and deposit onto the quartz sleeve. This will impair the ability of the ultraviolet rays to penetrate the water.

If the water has been processed through deionization, reverse osmosis, or distillation, the cleaning frequency can be set at once per year. If clear, fresh water is used, the probable cleaning frequency will be anywhere from once every thirty days to once every six months. You can determine this cleaning frequency. This is done by visually inspecting any one quartz sleeve to see if any debris or film has settle on the outside of the quartz sleeve.

Recent studies have shown that degradation of the quartz sleeve from continuous exposure to UV reduces the amount of UV radiation transmitted into the water stream. Based on these findings, we recommend the annual replacement of the quartz sleeves in addition to routine cleaning.

cleaning the quartz sleeves

Visually inspect a quartz sleeve thirty days after use to see if any debris or film has settled on the outside. If dirty, use the cleaning procedures that follow.

CAUTION! Prior to removing the cover to access the lamps and quartz sleeves, you must release all pressure to the UV treatment chamber. Drain the chamber if required. Do not stand in a direct line with the end of the unit; observe from the front or back of the unit.



more **Maintenance Requirements**

1. Turn off the water to the unit.
2. Disconnect the electrical circuit.
3. Drain the UV treatment chamber.
4. Wear clean cotton gloves to prevent contamination of the quartz sleeves and UV lamps.
5. Remove the lamp sockets.
6. Remove the ultraviolet lamps from inside the quartz sleeves.
7. Using the appropriate compression nut tool, loosen the compression nuts and carefully remove the quartz sleeves.
8. Wash the quartz sleeves with mild soap and hot water and rinse with clean, hot water.

Should this be insufficient to clean the quartz sleeves, they should be replaced. To place an order, contact Aquafine or your local representative. To replace the quartz sleeves, follow the procedures on page 9.

cleaning the sensor probe window

1. Shut off the flow and release the pressure.
2. Shut off all power to the UV unit.
3. Remove the coaxial cable by pushing and turning the BNC terminal counterclockwise. The connector will slide off.
4. Twist and pull the probe from the sensor fitting.
5. Use a lint-free cloth with alcohol and very carefully wipe the lens face on the front of the probe. Failure to do so may result in false readings.
6. Replace the probe and the coaxial cable.
7. Turn the power on and resume operation. Whenever new lamps have been installed, follow instructions on page 12 under "Setting the UV Meter."

ballast replacement

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

1. Power down the UV unit by turning the unit isolator

switch, if installed, to the "OFF" position. If not, ensure that power to the unit is removed by opening the switch or breaker upstream of the UV unit.

2. Locate the old ballast to be replaced. Refer to the electrical diagram, if necessary.
3. Isolate the old ballast from rest of system by disconnecting the ballast connector.
4. Using 5/32 L-shaped hex wrench completely remove the bolt securing the ballast to the sub panel. Put the bolt aside.
5. Remove the old ballast by pulling it towards you. Discard the old or defective ballast.
6. Install the new ballast, securing it with the bolt removed earlier.
7. Tighten the bolt with 5/32 L-shaped hex wrench.
8. Reconnect ballast.
9. Restore the power to the UV unit by turning the unit isolator switch to the "ON" position or by closing the upstream switch or breaker.

measuring performance

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

Periodic sample collection and testing should be scheduled as often as the user deems sufficient to be assured the quality of the Aquafine ultraviolet unit effluent is acceptable.

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, and should you choose one, be sure to follow the manufacturer's recommended procedures.



more **Maintenance Requirements**

We have provided 1/4" NPT threaded fittings on both the intake and discharge UV chamber flange risers. We recommend you use these 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" (6 mm).

found that virtually all removable debris which may accumulate within a sample valve can be mechanically flushed during the procedures detailed above.

We recommend duplicate samples be taken at each test station, during each specific test, to avoid laboratory error and to ensure reasonable repeatability and validity through comparison.

sampling procedures

The following procedure is recommended for collecting samples for bacteriological analysis when sample valves are installed:

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 must not exceed 1/4" (6 mm) to ensure proper velocity. Prior to taking the sample, it is imperative that the test sample valve be fully opened under full pressure for a full three and one half minutes. Temporary tubing or some other material may be used to direct the water to a container or drain to avoid unnecessary spillage.
3. After the valve has been left fully open for three and one half minutes, reduce the flow to a reasonable stream of water (not less than 50% of full flow). Continue flowing to drain three 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 his finger to touch the inside of the cap or the 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 three hours of sample collection and should comply with accepted standard methods.

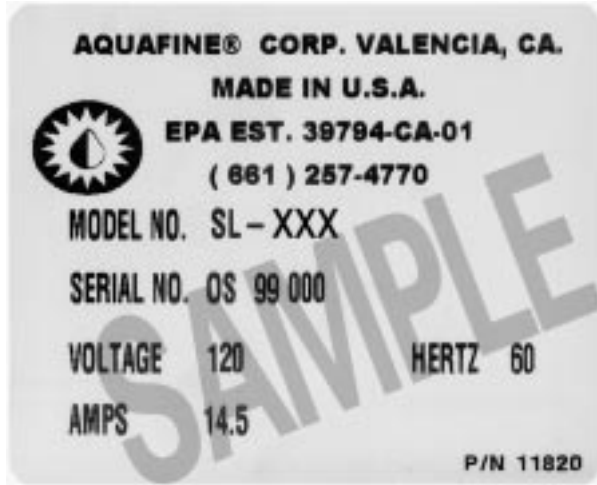
The above procedure was developed by a leading national pharmaceutical firm after an 18-month study. It has been



Replacement *Parts List*



Refer to this nameplate decal on your unit when ordering parts or service.



general part description..... part number

COMMON PARTS FOR ALL SL MODELS

1. O-rings	
EPDM	4253
Viton®	16458
Chemraz® (White)	16600
Silicone	12967
2. Lamp Socket	16184
3. Running Time Meter - 120 Volt	15843
4. Running Time Meter - 240 Volt	15844

COMMON TO ALL SL-1 & MP-2-SL APPLICATIONS

5. Quartz Sleeve	3184
6. Ballast (SL-1) - 120 Volt	4035
7. Ballast (SL-1) - 240 Volt	3493
8. Ballast (MP-2-SL) - 120 Volt	16518
9. Ballast (MP-2-SL) - 240 Volt	4125
10. Compression Nut	12422

Aquaafine®



general part description..... part number

SL-10A -- ALL APPLICATIONS

- | | | |
|-----|--|-------|
| 11. | Standard UV Lamps DE 254 nm Mauve
Disinfection and/or Ozone Destruction Application
Size: 15" Length | 3050 |
| 12. | Validated UV Lamps DE 254 nm Green
Disinfection and/or Ozone Destruction Applications
Size: 15" Length | 16714 |
| 13. | Standard UV Lamps DE 185 nm Blue
TOC Reduction Applications
Size: 15" Length | 3052 |
| 14. | Validated UV Lamps DE 185 nm Yellow
TOC Reduction Applications
Size: 15" Length | 16715 |
| 15. | Quartz Sleeve | 3150 |
| 16. | Ballast - 120 Volt | 4035 |
| 17. | Ballast - 240 Volt | 3493 |
| 18. | Compression Nut | 12422 |

SL-1 & MP-2 SL -- DISINFECTION AND OZONE DESTRUCTION

- | | | |
|-----|---|--------|
| 19. | Standard UV Lamps, DE 254 nm Mauve
Size: 30" Length | 3084LM |
| 20. | Validated UV Lamps, DE 254 nm Green
Size: 30" Length | 16676 |

SL-1 & MP-2 SL -- TOC REDUCTION

- | | | |
|-----|--|-------|
| 21. | Standard UV Lamps, DE 185 nm Blue
Size: 30" Length | 3087 |
| 22. | Validated UV Lamps, DE 185 nm Yellow
Size: 30" Length | 16678 |

