Installation, Operation & Maintenance

UVAQUAFINE

Owner's Manual

CE

ULTRA VIOLET WATER DISINFECTION SYSTEM

TABLE OF CONTENTS

These instructions generally describe the installation, operation and maintenance of the Aqua Best UV sterilizer systems. Questions that are not specifically answered by these instructions should be directed to the Factory. Aqua Best Technology takes all possible precautions when packaging equipment to prevent damage. Carefully inspect and report all damage upon receipt of product. Do not install damaged equipment.

IMPORTANT

Read and Understand this Manual Completely to Provide Correct Installation and Maintenance, ensuring Optimal System Safety, Performance and Life

PRODUCT APPLICATION

Ultraviolet (UV) light treatment is a widely recognized and proven method of disinfection of water and has several advantages over other disinfection methods such as chlorination, ozonation, etc.... UV light does not add anything to the water, such as undesirable color, odor, taste or flavor, nor does it generate harmful byproducts. It adds only energy in the form of ultraviolet radiation. Also, UV disinfection requires only a fraction of the contact times required by other disinfection methods. It is fast, efficient, effective, economical and environmentally-friendly.

Principle of Operation

UV water disinfection system design has been carefully conceived to provide adequate germicidal dosage throughout the disinfection chamber. The dosage, as it applies to ultraviolet disinfection, is a function of time and the intensity of ultraviolet radiation to which the water is exposed. Exposure time is related to the flow rate; the higher the flow rate, the lower the exposure time or the lower the flow rate, the higher the exposure time. The ultraviolet intensity is the amount of energy, per unit time, emitted by the germicidal lamp. The Dosage is the product of ultraviolet intensity and the exposure time. The operation is as follows:

1) Water enters the system and flows into the annular space between the quartz sleeve and the chamber wall.
2) Suspended microorganisms are exposed to the ultraviolet rays emitted by the germicidal lamp.
3) The LED indicator light provides visual indication of germicidal lamp operation.
4) Water leaving The UV water disinection system is instantly ready for using. No further contact time is required.

Limitation of Use

The UV water disinfection system is intended for the use with visually clear water, not colored, cloudy or turbid. See "Water Quality" section below.

The UV water disinfection system is NOT intended for the treatment of water that has an obvious contamination or intentional source, such as raw sewage; nor is the unit intended to convert wastewater to microbiologically safe drinking water.

Water Quality

Water quality plays a major role in the transmission of germicidal ultraviolet rays. It is recommended that the water does not exceed the following maximum concentration levels:

Maximum Concentration Levels:

Iron	< 0.3 ppm (0.3 mg/L)
Hardness*	< 7 gpg (120 mg/L)
Turbidity	< 1NTU
Manganese	< 0.05 ppm (0.05 mg/L)
Tannins	< 0.1 ppm (0.3 mg/L)
UV Transmittance	> 75%

Effectively treating water with higher concentration levels than listed above can be accomplished, but may require added measures to improve water quality to treatable levels. If, for any reason, it is believed the ultraviolet transmission is not satisfactory, contact the factory.

UV Dose

The units generate a UV dosage of at least 30,000 microwatt-seconds per square centimeter (**µW-s/cm^2**), even at the **end-of-lamp life (EOL)**, which is more than sufficient to destroy most waterborne microorganisms, such as bacteria, yeasts, algae etc.....

DOSAGE is the product of Intensity & Time

DOSAGE=IntensityxTime=micro Watt/cm^{2}xtime=microwatt-seconds per square centimeter (**µW-s/cm^2**)

Note: 1000 µW-s/cm^2 = 1 mJ/cm^2 (milli-Joule/cm^2)

UV Disinfection is affected by many factors and the following should be looked at prior to the installation of the UV system; **UV Transmission (transmittance)** deals with the effectiveness in which the **2537 Angstrom units (254 nanometers, 254nm) wavelength of ultraviolet light** is transmitted through the water. The higher the transparency of the water, the more

effective the UV system becomes. This optical clarity is evaluated by performing a test which passes incident light through a 1 cm depth of water and recording this against the same test using distilled water as a reference. Distilled water will pass 100% of the incident light through a 1cm depth.

The basic design of the units has taken into account a typical transmission at the desired wavelength. In practical terms this means that a system designed to flow at 24 gallons per minute, at a typical transmissibility could actually have a higher flow rate in liquids with a higher transmissibility and a lower flow rate in liquids with a lower transmissibility. As a general guideline, the following are some typical UV transmission rates (UVT):

City water supplies	85-98%
De-ionized or Reverse Osmosis water	95-98%
Surface waters (lakes, rivers, etc)	70-90%
Ground water (wells)	90-95%
Other liquids	1-99%

INSTALLATION CAUTIONS

1. UVAQUAFINE UV disinfection devices are designed to be installed on the cold water line only.
2. Install the UVAQUAFINE UV disinfection system indoors in a protected area where the temperature does not fall below 4° C(40° F) and the humidity level is low (to prevent condensation on the chamber). This unit functions optimally 9-29° C(49-85° F).
3. Use Teflon tape on all plumbing connections. Do not use other sealants.

Note!!!

The Quartz Sleeve has been factory Installed.

SYSTEM INSTALLATION

1. **Disconnect power to The UV water disinfection system and Shut Off the main water supplier Valve before installation.**
2. UV System should be protected from the elements and from temperatures below freezing. The ambient temperature, in the area surrounding the UV water sterilizer, should be between 33°F and 100°F.
3. Electrical power supplied to the system **MUST** match power requirements listed on the UV water disinfection system.
4. The UV system should be located in a dry, well-lit area, which provides enough room to perform routine maintenance. This includes a **MINIMUM DISTANCE of ONE CHAMBER LENGTH from the CHAMBER END**, to allow for cleaning and/or the changing of the lamp and quartz sleeve.
5. The UV system should always be located closest to the point of use. This reduces the chance of the purified water being re-contaminated by bacteria in the water distribution system after UV system.
6. The UV system should be located **after all other water devices**, such as De-ionizers, Water Softeners, Carbon, Filters, Pre-Filters, Reverse Osmosis, Pressure Tanks, and Pumps. This reduces the chance of the purified water being re-contaminated by bacteria in any of these units.
7. In order to increase the radiation, please **make the Quarts Sleeve and Ultra-Violet Lamp clean before their installation.**
8. Put the Quarts Glass Sleeve into the housing slowly, seal with the O-ring & Washer and screw on nuts tightly then. Be sure not to use hard appliances, so as to avoid the damage of Quarts Glass Sleeve.

⚠ **CAUTION: Lamp and quartz sleeve are easily damaged. Exercise care when installing lamp**

⚠ **WARNING: Avoid exposure to direct or strongly reflected germicidal ultraviolet rays. Germicidal ultraviolet rays are harmful to the eyes and skin.**

9. **If Vertical installation** applied, please install as the way of **Low-level-water-IN** and **High-level-water-OUT** for reducing the water flow, and increasing working condition of Ultraviolet Radiation.
10. Please install a flow controller if there exit a high water flow rate.

11. It's recommended that the pre-treatment units shall be installed if the turbidity of raw water is high. The working condition of UV will be impacted in a negative way under such a situation.
12. **Choose a port connecting with feed water as Inlet** and check another port (outlet) whether it exist leaks when connecting to use. Ensure everything is under good condition and Install the Ultra-Violet Lamp then safely.
13. Do not take the Ultra-Violet Lamp out when applying to electrical power. **Watching the Ultra-Violet Lamp by eyes without any protection is prohibited!**
14. UV systems are designed for continuous operation and too much shut-down would affect Ultraviolet Radiation and Service Life. **Do not electrically cycle the UV unit more than THREE (3) on/off cycles in a 24-hour period.**
15. **Before Start Up, Flush UV system and chemically disinfect the plumbing system prior to the initialization of the UV system.**
16. Ensure all water connections are tightly sealed before applying pressure to the UV unit.
17. **Do not allow the unit to overheat by operating without water flow.**
18. **Visual & Audible Alarms** (LED indicator lights and Buzzer).

MAINTENANCE

The UV system is designed to operate with a minimal amount of maintenance, providing the water quality does not exceed maximum concentration levels. Ordinary maintenance consists of;

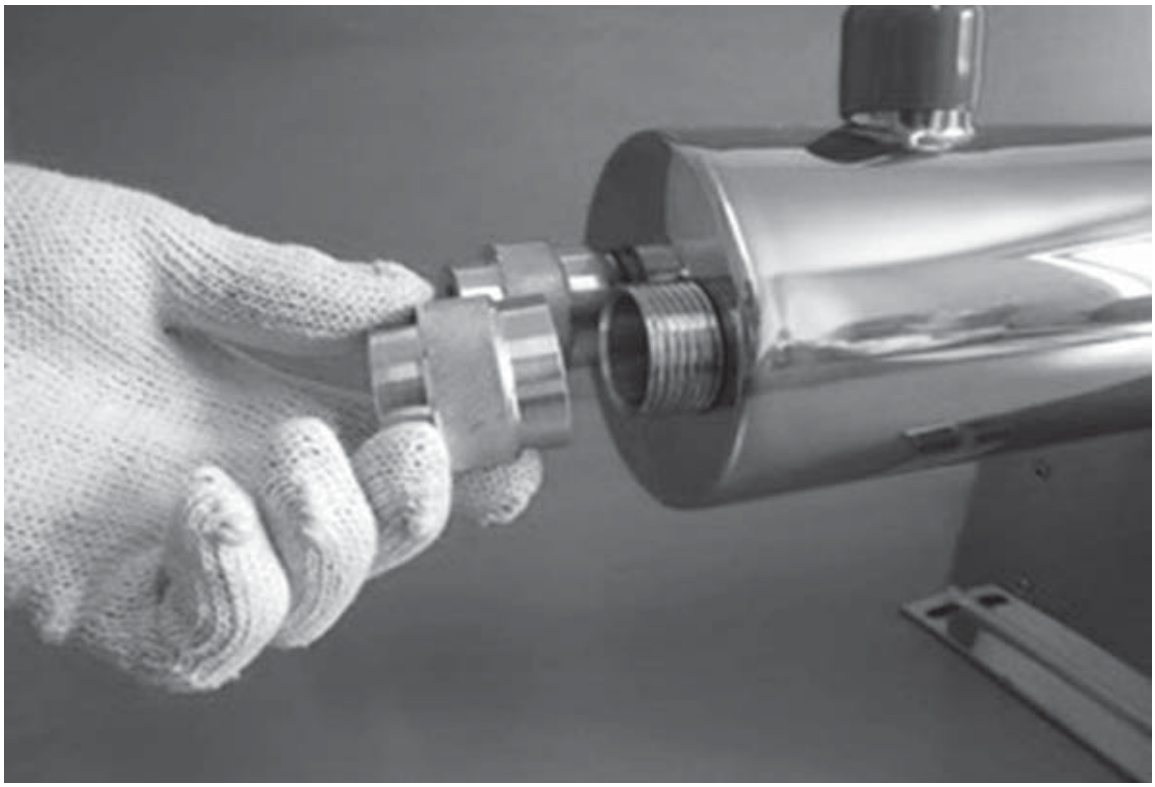
- Testing monthly or before each use.
- Lamp replacement is recommended every 9,000 hours of operation, approximately 12 months of continuous service.
- Cleaning of the quartz sleeve, when conditions warrant.
- Always disconnect the water supply and completely drain the water purifier if it will be subjected to temperatures below freezing for extended periods of time.

Lamp & Quartz Sleeve Installation

Note:

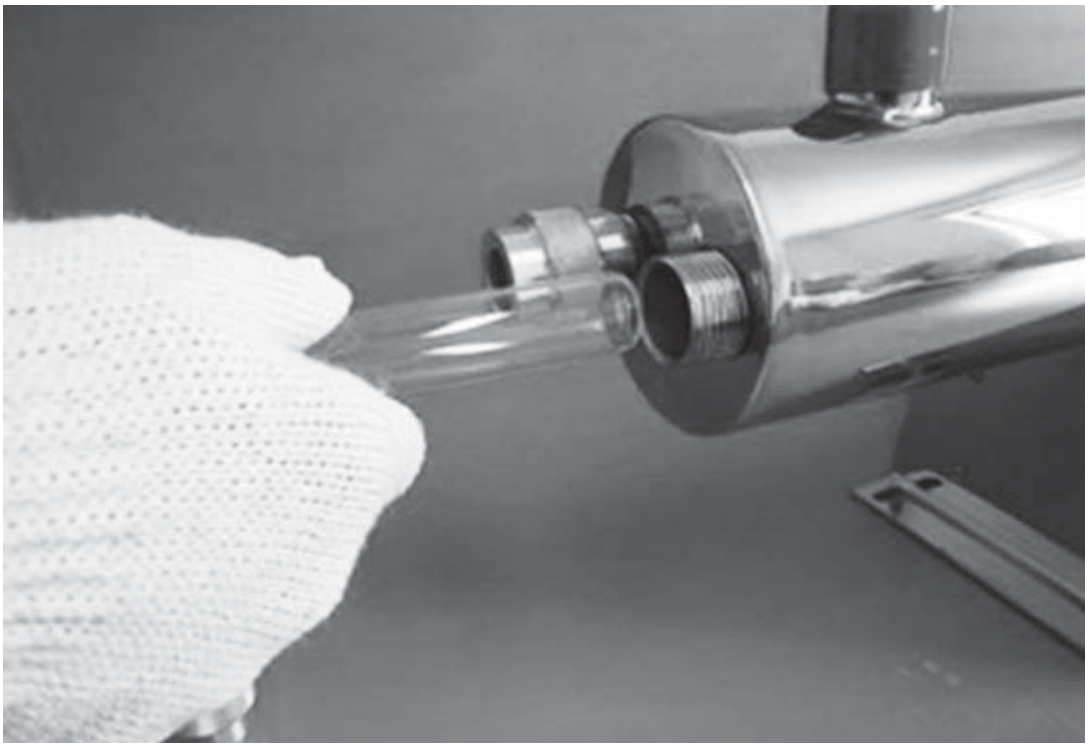
Do not touch the lamp or quartz sleeve with your fingers. Handle by the ends only or wear soft non-abrasive gloves.

1. Disconnect power to The UV system
2. Remove Nuts from both sides of Reactor chamber

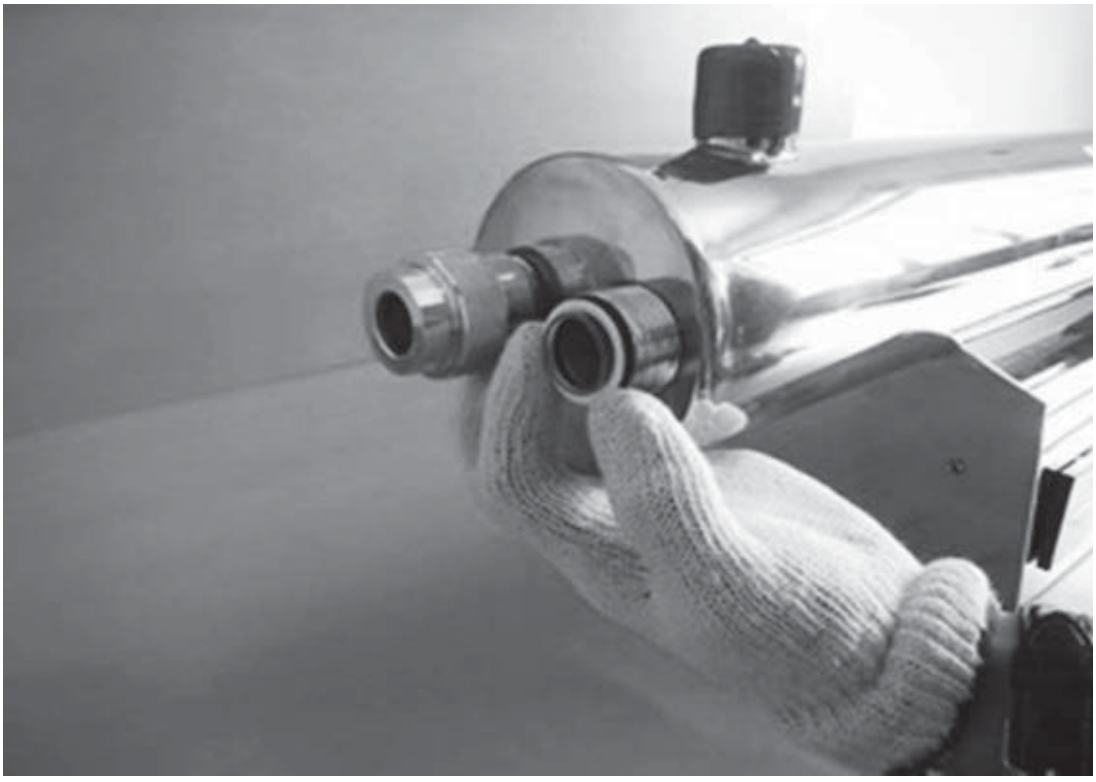


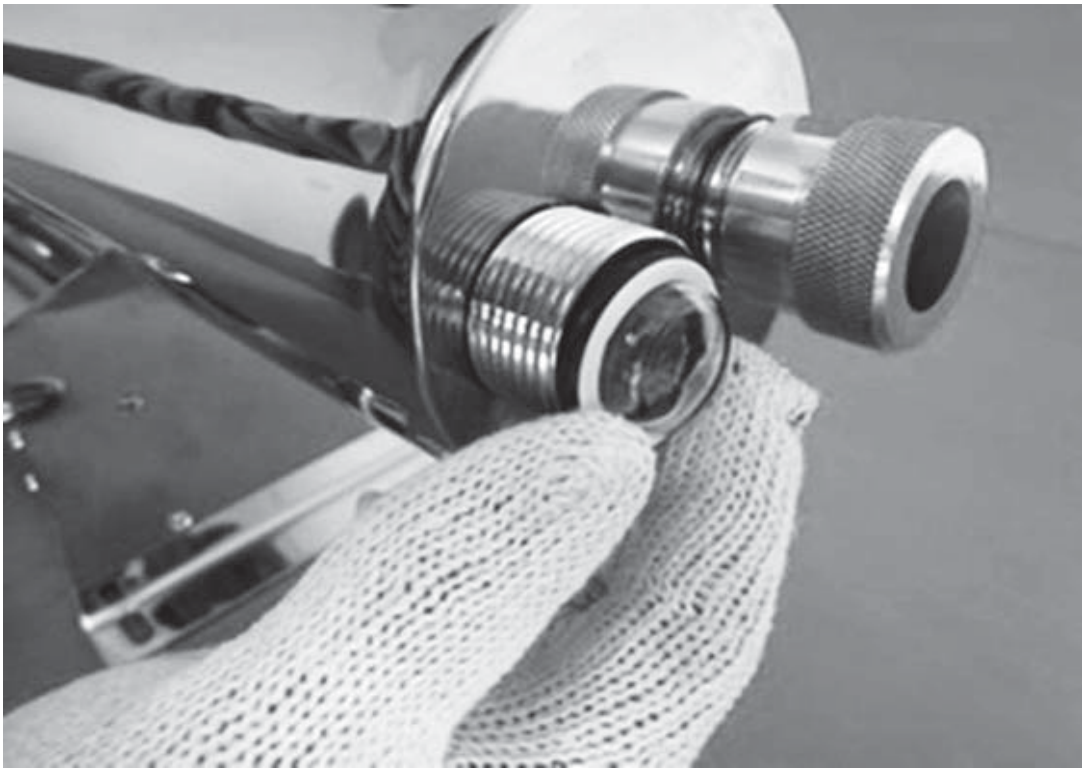
3. Slide Quartz Sleeve into chamber carefully. NOTE: Use care to keep the quartz

sleeve Parallel to the chamber.

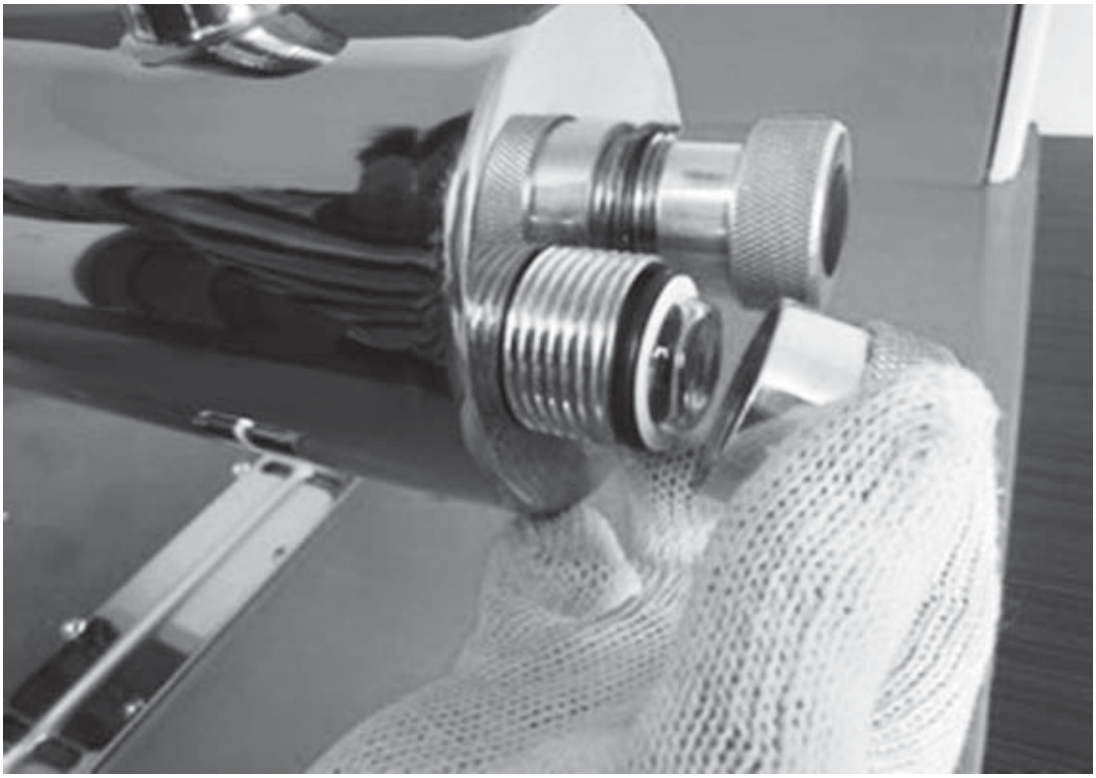


4. Install O-ring and Washer on both ends of Quartz Sleeve and Be sure **O-rings are placed on quartz sleeve before Washer.**

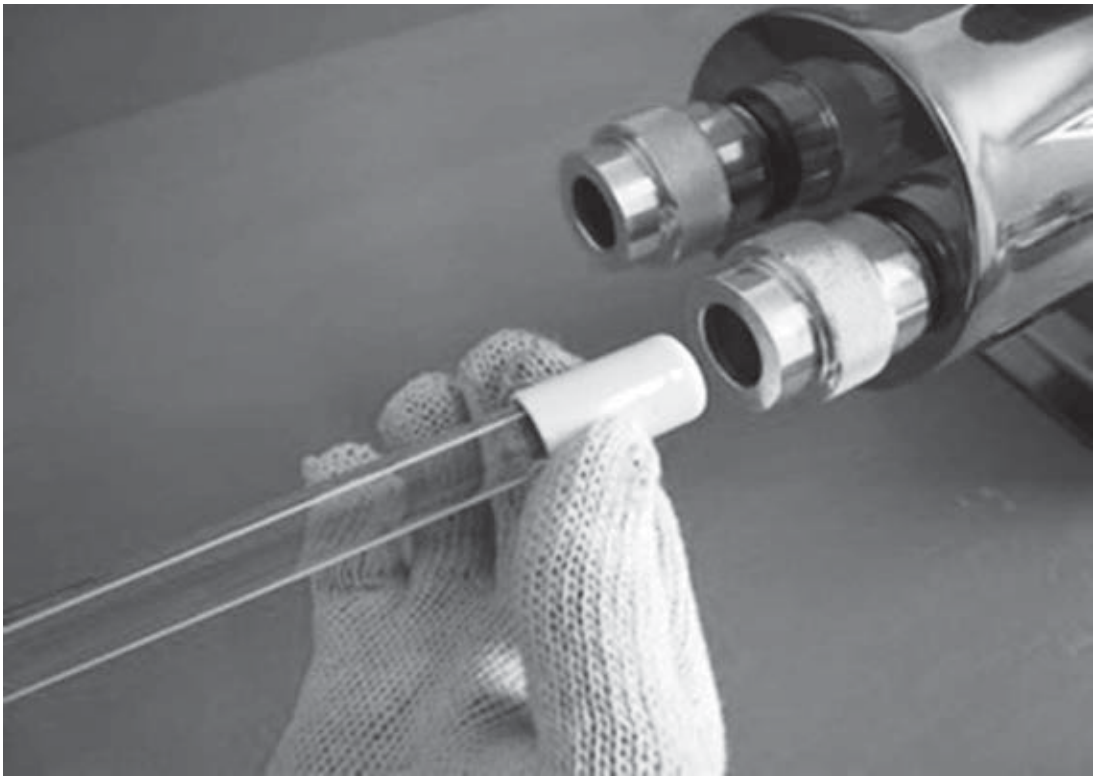




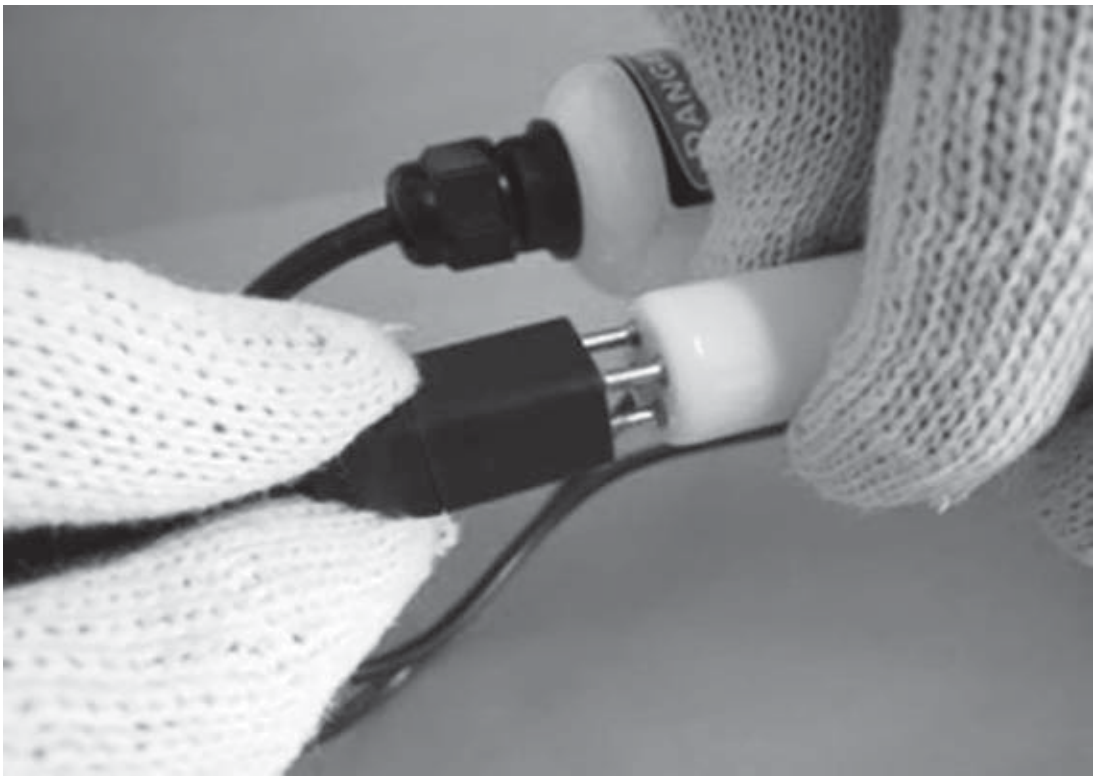
5. Reinstall Nuts on both sides of reactor chamber. Tighten nuts firmly by hand only. **DO NOT USE HAND TOOLS.** Tightening with hand tools is likely to cause quartz sleeve to break.



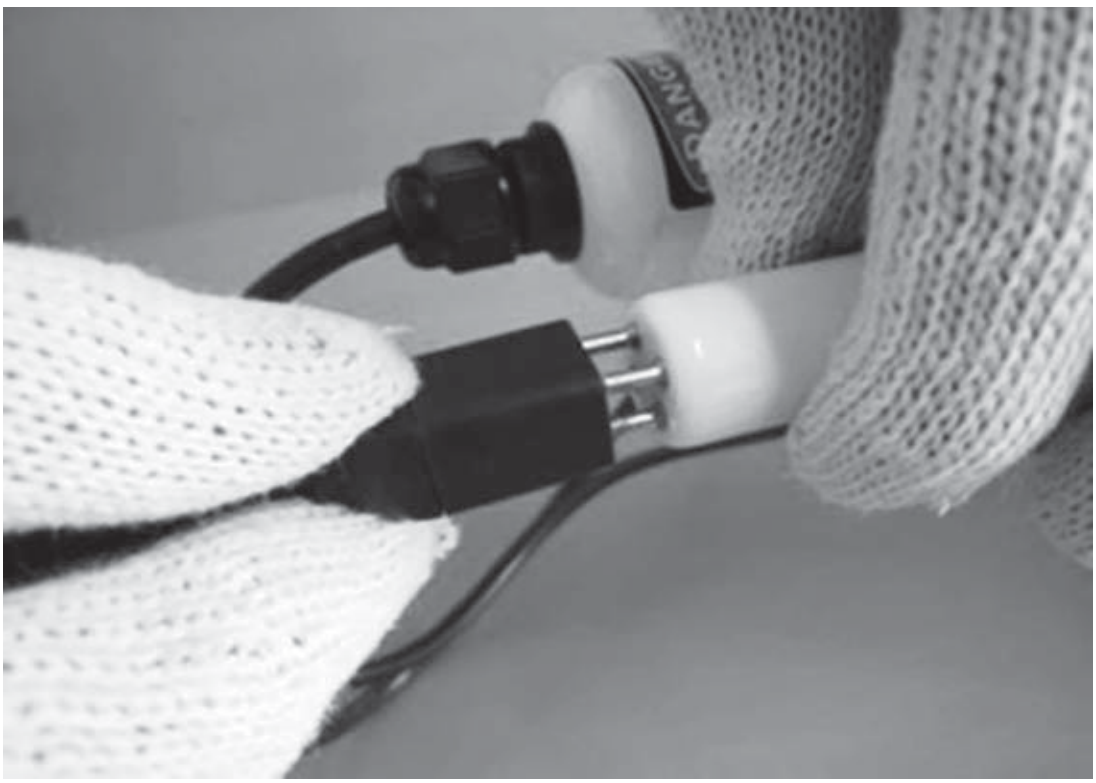
6. Slide UV Lamp into Quartz Sleeve carefully. Be sure to slide into quartz sleeve without angling.



7. Connect 4-pin Electrical Socket with Lamp.



8. Install the Cover Cap (PC) and Tighten Electrical Cable Gland Connector & Setscrew.




DANGER
Disconnect
before


DANGE
Disconnect
before

9. Connect the Power for Start Up.

CAUTION

Lamp and quartz sleeve are easily damaged. Exercise care when removing or replacing.

WARNING

Germicidal ultraviolet rays are harmful to eyes and skin. Do not restore power to UV system until lamp and end caps have been properly installed.

Lamp Replacement

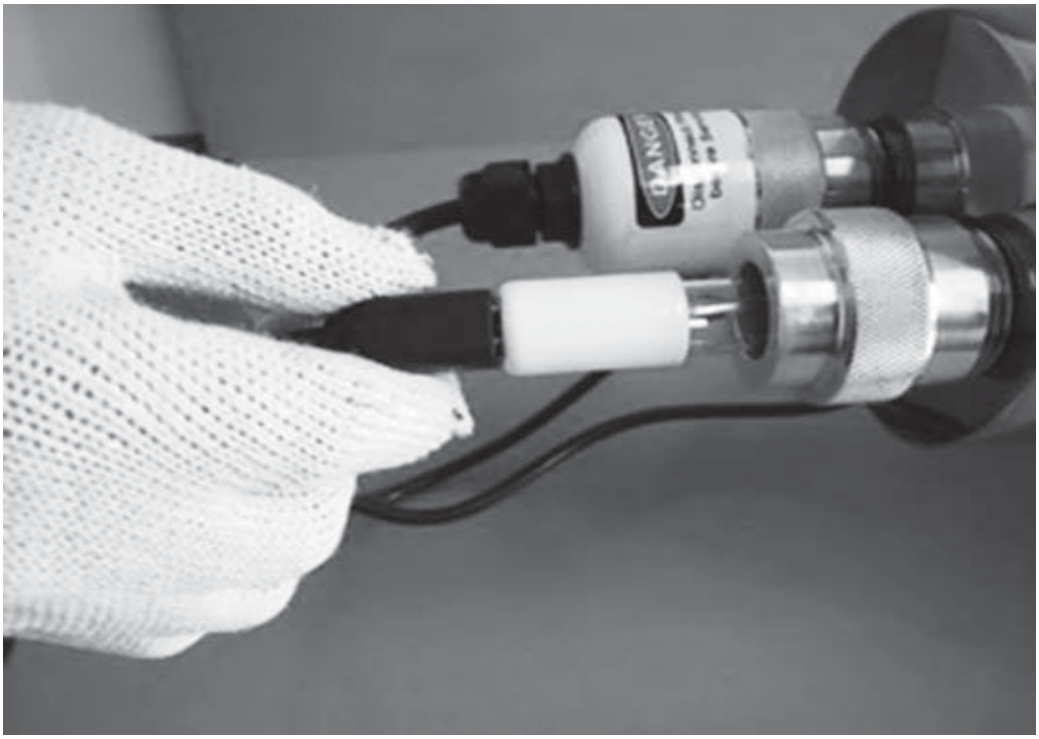
WARNING

THE ULTRAVIOLET LAMP INSIDE THE REACTOR CHAMBER WILL OPERATE EFFECTIVELY ROUND THE CLOCK, FOR **APPROXIMATELY ONE YEAR OR 9000 HOURS**. THE LAMP WILL LIGHT LONGER THAN THAT, HOWEVER, THE UV LIGHT PENETRATION MAY FALL BELOW THE PRESCRIBED SAFETY LEVEL.

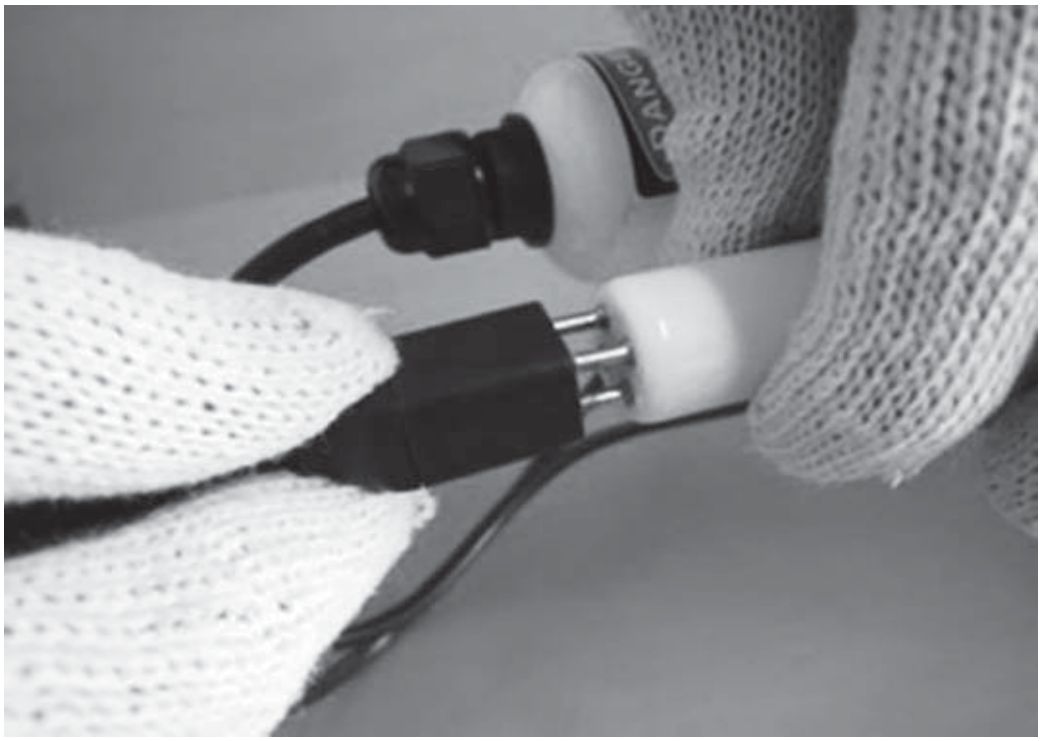
THEREFORE, ANNUAL LAMP REPLACEMENT IS NECESSARY REGARDLESS OF APPARENT LAMP CONDITION.

1. Disconnect power to The UV system.
2. No need to Shut off water supply to UV system.
3. Remove Cover Cap (PC).

4. Withdraw wire with lamp carefully until approximately 2 inches of the lamp is exposed. **Lamp base can be very hot - be careful not to drop the lamp into the quartz as both are easily broken.**



5. Remove 4-pin Electrical Socket from Lamp Pins.

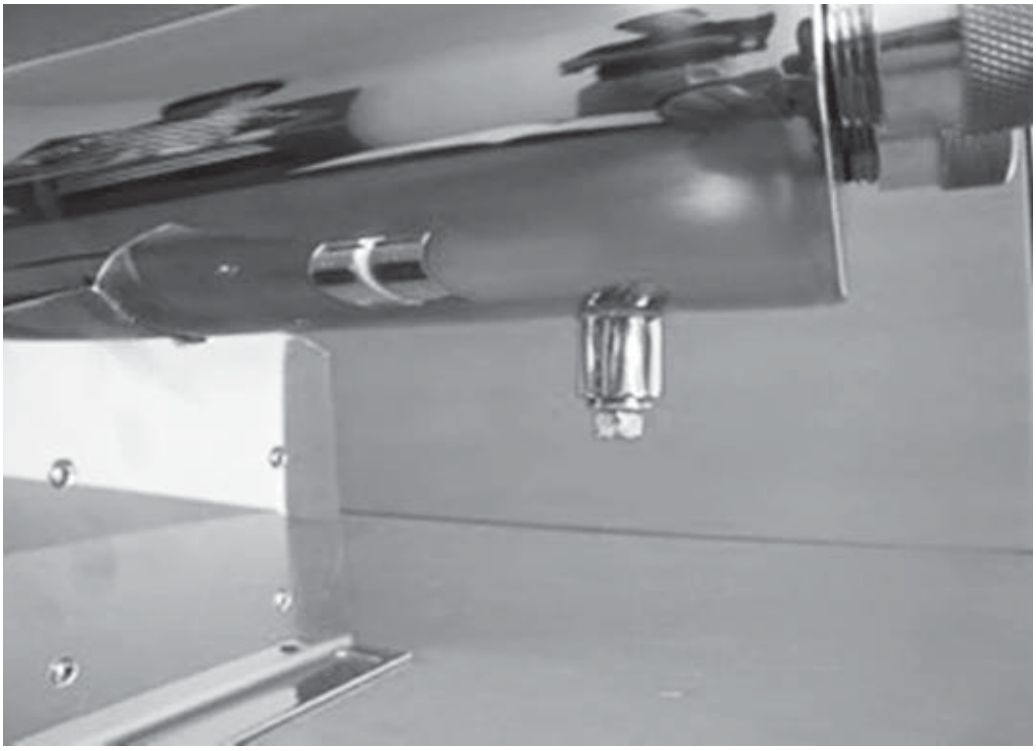


6. Withdraw lamp from quartz sleeve carefully. Be sure to withdraw lamp straight out without angling until completely clear of quartz sleeve.

7. Follow up Lamp installation steps to reinstall new lamp.

Quartz Sleeve REPLACEMENT (OR BROKEN) & CLEANING

1. Disconnect power to The UV system.
2. **Shut off water supply to UV system via inlet and outlet valves.**
3. Drain chamber by removing drain plug. Once the chamber is completely drained, remove any old sealing tape from the threads of the drain plug, rewrap with thread sealing tape, reinstall and tighten the drain plug.



4. Follow up Lamp replacement steps.
5. Remove Nuts from both sides of chamber. Avoid striking quartz sleeve with nut.
6. Remove O-ring and Washer.
7. Withdraw Quartz Sleeve from chamber carefully. NOTE: It is advisable to support the quartz sleeve on the opposite end with your finger so that it does not drop to the bottom of the chamber as it slides into the chamber.
8. Once the quartz sleeve is removed, clean with alcohol or a mild, non-abrasive detergent. Stubborn stains usually can be removed with a dilute hydrochloric acid.
9. In case of Quartz Sleeve broken, please follow next steps before reinstallation.
    i. Carefully remove as much of the broken quartz sleeve as possible from both ends of the chamber.
    ii. **To remove fragments of quartz sleeve, hold the system VERTICALLY** and **SHAKE**. The quartz fragments will break and drop out from threaded fitting of the chamber. Flush water through chamber being careful to remove all quartz fragments from the interior of the chamber.
    iii. Carefully discard all pieces of the broken quartz sleeve.
10. Follow up Installation steps to reinstall.
11. Slowly restore water supply to UV system and check for leaks before install UV lamp.

Plumbing System Disinfection Procedure

THE FOLLOWING DISINFECTION PROCEDURE IS GENERALLY ACCEPTED AS BEING SUITABLE FOR THE DISINFECTION OF PLUMBING SYSTEMS KNOWN TO BE CONTAMINATED.

IF YOU ARE UNCERTAIN ABOUT THE EFFECTIVENESS OF THIS PROCEDURE YOU ARE ADVISED TO CONTACT YOUR LOCAL HEALTH AUTHORITY RESPONSIBLE FOR WATER SAFETY.

During the UV disinfection process the only place disinfection takes place is within the reactor chamber. There is no residual disinfectant capacity. Therefore it is necessary to chemically disinfect the plumbing system prior to the initialization of the UV system.

1. Turn the UV system shut off valves to the closed position.
2. The disinfection of the plumbing system is most readily accomplished by removing the 5 micron pre-filter cartridge and adding 250-500ml (1-2 cups) of a standard 5% concentration of unscented household bleach into the empty filter housing and re-attaching.
3. Verify that the UV system is connected to the AC power voltage and operating properly.
4. Turn the valves to the open position and let the water flow.
5. Open all faucets, fixtures and appliances in turn until you can easily smell chlorine. This includes outside faucets, laundry machines, showerheads and any device or appliance attached to the plumbing system. Close the fixtures and let the system sit for 30-60 minutes. **Do not use or consume system water during this process.**
6. Close the valves on the UV system. Re-install the pre-filter. Open the valves and flush all fixtures and lines thoroughly.

The introduction of a chlorine disinfectant to a hot water heater that has been used with untreated water, or water with excessive amounts of iron, manganese or other organic materials may lead to the oxidation of these particulates. If you feel that these conditions may apply to your installation, a thorough flushing of the hot water tank after the disinfection should be undertaken to eliminate the oxidized material from the system. Consider replacing an aged hot water tank at this time.

UVAQUAFINE Power Ballast Features

The microprocessor controlled power BALLAST supplied with your AquaLight Systems has both visual and audible alarm enunciation to indicate lamp operation/failure.

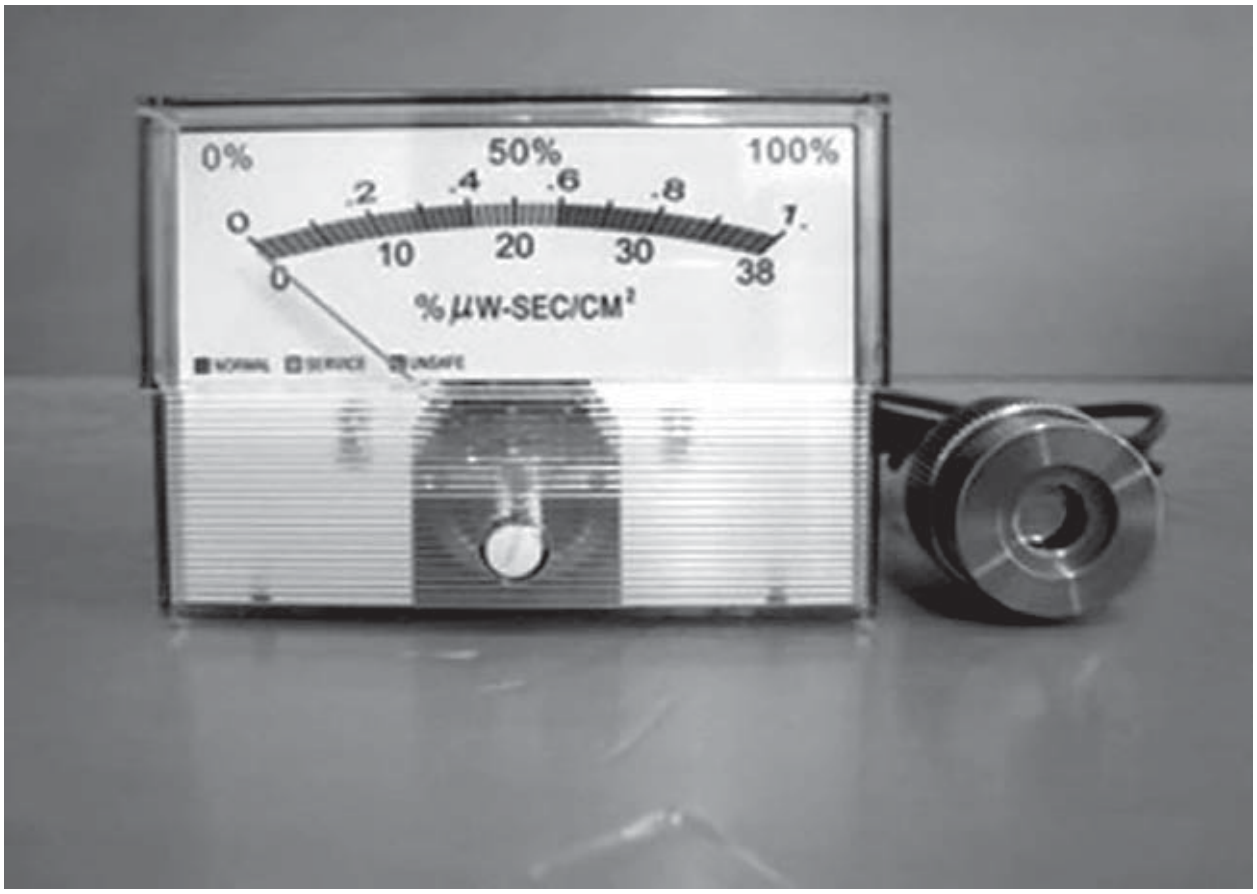
Normal Operation:

During normal operation only the **green** Lamp on LED is illuminated.

Lamp Failure:

When the UV power source detects a lamp failure, the alarm buzzer sounds and the **Red** Lamp on LED is illuminated the **Green** Lamp on LED is extinguished.

UV Intensity Monitor



1. Green : Normal Operation
2. Yellow : Service
3. Red : Unsafe Operation

TECHNICAL SPECIFICATIONS

UVAQUAFINE Models S-1~ S-12

Model:	S-1	S-2	S-6	S-8	S-12
Flow Rate (GPM): ①	1	2	6	8	12
Flow Rate (m3/hr):	0.25	0.5	1.5	2	3
Water Chamber:	SS304 (SS316 Available on Request)				
Dimension (LxW: mm)	266 x 51	349 x 63	590 x 63	708 x 63	935 x 63
Inlet/Outlet:	1/4" MNPT	1/4" MNPT	1/2" MNPT	3/4" MNPT	3/4" MNPT
Number of Lamps:	1				
Lamp Model Part No.:	GPH212T5	GPH287T5L	GPH436T5L	GPH645T5L	G36T5L
Rated Life (hr)	9000				
Wavelength	254nm (185nm Available on Request)				
Voltage:	100V~240V				
Frequency:	50/60Hz				
Lamp Watts:	10 Watts	14 Watts	24Watts	32 Watts	39 Watts
Power Consumption: ②	14 Watts	18 Watts	28 Watts	36 Watts	44 Watts
Max Operating Pressure:	125 PSI				
Ambient Temperature:			2° C - 40°	C	
Number of Quartz Sleeve:	1				
Quartz Sleeve Part No.:	QS245	QS331	QS460	QS665	QS890
Quartz Sleeve Part No.:	1				
Electronic Ballast Part#	DCW-0640B				
Visual Lamp Failure	YES				
Audible Lamp Failure	YES				
Elapsed Time Meter	NO				
UV Intensity Monitor	NO				
Certificate	CE				

① *Flow Rate Stated at 30mJ/cm^2 with 95% UVT EOL (End of Lamp Life)*

② *Total power consumption, including ballast loss.*

UVAQUAFINE Models SUV-12~SUV-100

Model:	SUV-12	SUV-24	SUV-35	SUV-50
Flow Rate (GPM): ①	12	24	35	50
Flow Rate (m3/hr):	3	6	8	11
Water Chamber:	SS304 (SS316 Available on Request)			
Dimension (LxWxH: mm)	1040x285x330	1040x285x330	1040x340x440	1040x340x440
Inlet/Outlet:	1" MNPT	1" MNPT	1-1/2" MNPT	1-1/2" MNPT
Number of Lamps:	1	2	3	4
Lamp Model Part No.:	G36T5L			
Rated Life (hr)	9000			
Wavelength	254nm (185nm Available on Request)			
Voltage:	100V~240V			
Frequency:	50/60Hz			
Lamp Watts:	39 Watts	78 Watts	120 Watts	160 Watts
Power Consumption: ②	44 Watts	86 Watts	130 Watts	175 Watts
Max Operating Pressure:	125 PSI			
Ambient Temperature:	2° C - 40° C			
Quartz Sleeve Part No.:	QS890			
Number of Quartz Sleeve:	1	2	3	4
Electronic Ballast Part#	DCW-0640B			
Number of Ballast	1	2	3	4
Visual Lamp Failure	YES			
Audible Lamp Failure	YES			
Elapsed Time Meter	YES			
UV Intensity Monitor	Available On Request			
Certificate	CE			

① *Flow Rate Stated at 30mJ/cm²with 95% UVT EOL (End of Lamp Life)*

② *Total power consumption, including ballast loss.*

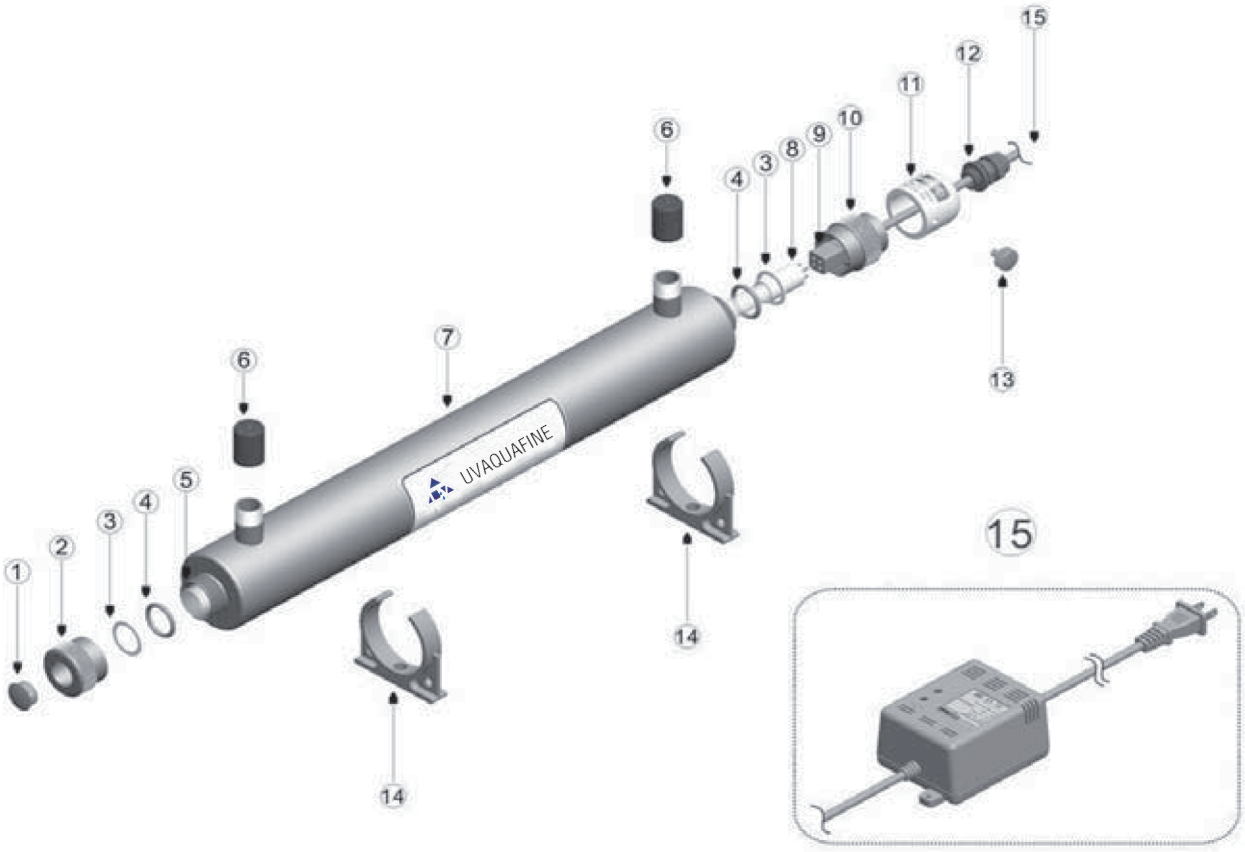
UVAQUAFINE Models SUV-12~SUV-100

Model:	SUV-60	SUV-80	SUV-100
Flow Rate (GPM): ①	60	80	100
Flow Rate (m3/hr):	14	18	32
Water Chamber:	SS304 (SS316 Available on Request)		
Dimension (LxWxH: mm)	1040x340x440	1040x340x440	1200x365x775
Inlet/Outlet:	2" MNPT	2″ MNPT	2″ MNPT
Number of Lamps:	5	6	8
Lamp Model Part No.:	G36T5L		
Rated Life (hr)	9000		
Wavelength	254nm (185nm Available on Request)		
Voltage:	100V~240V		
Frequency:	50/60Hz		
Lamp Watts:	200 Watts	240 Watts	320 Watts
Power Consumption: ②	220 Watts	260 Watts	350 Watts
Max Operating Pressure:	125 PSI		
Ambient Temperature:	2° C - 40° C		
Quartz Sleeve Part No.:	QS890		
Number of Quartz Sleeve:	5	6	8
Electronic Ballast Part#	DCW-0640B		
Number of Ballast	5	6	8
Visual Lamp Failure	YES		
Audible Lamp Failure	YES		
Elapsed Time Meter	YES		
UV Intensity Monitor	Available On Request		
Certificate	CE		

① *Flow Rate Stated at 30mJ/cm^2 with 95% UVT EOL (End of Lamp Life)*

② *Total power consumption, including ballast loss.*

REPLACEMENT PARTS



Item No.	Description	Part No.
1	Black Cover(for short nut)	S-19
2	Short Aluminum Nut	S-30130190
3	Washer (Teflon)	S3222
4	O-ring (EPDM)	S3022
5	Quartz Sleeve	QS245 (for S-1)
		QS331 (for S-2)
		QS460 (for S-6)
		QS665 (for S-8)
		QS890 (for S-12 & S-12 ~100)
6	Inlet/Outlet Ports Cover	S-12 (for S-1&2)
		S-20 (for S-6)
		S-27 (for S-8&12)
7	SUS Chamber	NONE
8	Quartz Germicidal Lamp	GPH212T5L (for S-1)
		GPH287T5L (for S-2)
		GPH436T5L (for S-6)
		GPH645T5L (for S-8)
		G36T5L (for S-12)
		GHH212T5L (for S-12 & S-12 ~100)
9	4-pin Electrical Socket with Wire	S030503
10	Long Aluminum Nut	S30140195
11	White Cap	S344140
12	Electrical Cable Gland Connector	S16AS
13	Setscrew	S007
14	Plastic Bracket	S2000W (for S-1)
		S2500W (for S-2 ~12)
15	Ballast, 100V ~ 240V	DCW-0640B

SAFETY INSTRUCTIONS

WARNING

To guard against injury, basic safety precautions should be observed, including the following.

1. Read and follow all safety instructions
2. Do not use this system for other than its intended purpose as described in this manual.
3. Do not alter design or construction

To prevent the risk of severe or fatal electrical shock, special precautions must be taken since water is present near electrical equipment. Always disconnect power before performing any maintenance.

WARNING

Avoid exposure to direct or strongly reflected germicidal ultraviolet rays. Germicidal ultraviolet rays are harmful to the eyes and skin.

4. Intended for indoor use only. The water disinfection system should be protected from the elements and from temperatures below freezing.
5. Electrical power supplied, **MUST** match power requirements listed on the systems.
6. **Do not operate if Power Cord or Plug is Damaged.**
7. Do not exceed system's maximum rated flow capacity.
8. Do not exceed maximum operating pressure of 125psi.

WARRANTY

Aqua Best Technology Limited warrants the ultraviolet disinfection system's hardware and electrical systems to be free from defects in material and workmanship for a period for one (1) years from the dates of purchase by the original owner (consumer) on a pro-rated basis. **Aqua Best Technology Limited** warrants the ultraviolet lamps and sensor probes to be free from defects in material and workmanship for a period of 9000 hours and the reactor chamber for a period of one (1) year. **Aqua Best Technology Limited** will at its option and expense, either repair or replace such units subject to the following conditions, exceptions, and exclusions.

CONDITIONS, EXCEPTIONS, AND EXCLUSIONS

The foregoing limited Warranty is subject to the following terms and conditions:

1. Water passed through the unit must fall within the following parameters:
   a) Iron: < 0.3 ppm (0.3mg/L)
   b) Hardness* : < 7 gpg (120 mg/L)
   c) Turbidity: < 1NTU
   d) Manganese: < 0.05 ppm (0.05 mg/L)
   e) Tannins: < 0.1 ppm (0.3 mg/L)
   f) UV Transmittance: > 75% (call factory for recommendations on applications where UVT < 75%)

   **Where total hardness is less than 7gpg, the UV unit should operate efficiently provided*

the quartz sleeve and/or sensor probe is cleaned periodically. If total hardness is over 7gpg, the water should be softened.

Warranty will be void, if the proper steps are not taken to ensure that these impurities are not present.

2. This limited Warranty shall not apply to any unit which has been repaired or altered by anyone other than the Warrantor or by a person authorized by the Warrantor, not to any units which have been subject to misuse, neglect, or accident.
3. This limited Warranty runs exclusively to the original Consumer and with respect to the original installation only.
4. WARRANTOR SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES
5. This limited Warranty excludes the cost of labor in removing any defective unit or installing any replacement unit. This limited Warranty applies only to a unit when returned to the Warrantor at the owner's expense and in accordance with shipping instructions received from the Warrantor.

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