



CUP OPERATOR'S MANUAL



*by* **EMPEROR AQUATICS, INC.**





## SafeGUARD CUP Series UV Systems

### Congratulations on your purchase!

All Emperor Aquatics, Inc. UV Sterilizers are proudly made in the U.S.A.

Emperor Aquatics, Inc. takes great pride in the design, fabrication, service and safety of all our products. We always want to hear from you, our customer. If you have internet access, you can visit our website 24 hours a day at [www.emperoraquatics.com](http://www.emperoraquatics.com) for the latest information available regarding your product and our support services, or to purchase equipment and replace parts.

We can also be reached at [info@emperoraquatics.com](mailto:info@emperoraquatics.com) or by calling 610-970-0440

Thank you for choosing EMPEROR AQUATICS, Inc.

### Models Covered



CUP4 High-Output Series  
CUP6 High-Output Series



CUP4 Amalgam Series  
CUP6 Amalgam Series

### Product Specifications

Product specification features may change without notice or obligation since Emperor Aquatics, Inc. is committed to a policy of continuous improvement.

UL 508A Listed

### Owners Registration Reply Card

Please take a moment to complete and return the Owner's Registration Reply Card on page 41. When you do, you'll be on file at Emperor Aquatics, Inc. This will help ensure timely, no-questions-asked warranty work should you need it. You may also register on our website at [www.emperoraquatics.com](http://www.emperoraquatics.com)



Note: Other port styles and sizes available.

Note: Flange mating halves not included.

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## Section One: INTRODUCTION

### 1.1 General Information

In this manual you will find user information for this UV system. It is an important document for safety guidance, installation, operation and maintenance. Read and understand all sections of this Manual before starting the installation or operation of this UV system. Strictly follow this Manual and all safety notes, they are for your own safety.

Custom-made, project specific modifications of the UV system and/or additionally integrated components may result in non-conformity of the system and void the warranty.

The information contained in this manual represents our most recent experiences and technical knowledge. This information does not hold a legally binding promise of certain characteristics or suitability for a specific application. The user of the UV system will be required to perform his/her own verifications and safety measures.

Emperor Aquatics, Inc. accepts no responsibility for any problems arising from incorrect installation, lack of routine maintenance as specified in this manual or modifications of the UV system.

For answers to questions pertaining to the use of the UV system please contact your supplier or the Emperor Aquatics, Inc. sales office at 610-970-0440 or [info@emperoraquatics.com](mailto:info@emperoraquatics.com)

### 1.2 Contact Information

Emperor Aquatics, Inc.  
2229 Sanatoga Station Road  
Pottstown, PA. 19464

Phone: 610-970-0440 (Customer Service Ext. 10)  
Fax: 610-970-0443  
e-mail: [info@emperoraquatics.com](mailto:info@emperoraquatics.com)

### 1.3 Glossary

Term	Description
Disinfection	The inactivation of harmful microorganisms
End of Useful Lamp Life	Recommended time to replace a UV lamp
External On/Off Switch	Manually operated switch to isolate the UV System
Fouling	Build up of scale in the vessel, sensor or quartz sleeve
Isolation Valve	Manually or automatically operated valve(s) used to isolate the UV vessel.
J/m <sup>2</sup>	Joule per square meter A Unit of UV Dose 10 J/m <sup>2</sup> = 1 mJ/cm <sup>2</sup> = 1,000 uWs/cm <sup>2</sup>
Minimum UV Intensity	Required value at end of lamp life (alarm threshold value) to maintain the minimum UV dose at a given flow rate and a given UV transmission.
nm	Nanometer – Light wavelength measurement
Personal Protective Equipment	Hard Hat, Safety Glasses, Rubber Gloves, Safety Shoes
Power Supply Enclosure	NEMA 4X cabinet housing electrical hardware, instruments and PLC control/monitor
Text Display	Screen used to view PLC Controller/Monitor data
UV-C	Specific UV area of the light spectrum (200 – 280 nm)
UV Dose	Indicates amount of UV light
UV Intensity	Indicates the strength of UV light

UV Output	Amount of UV light emitted from a UV lamp
UVT	Ultraviolet Transmissibility
UV Sensor	Sensing-probe installed on the UV vessel to measure UV intensity-UV light wavelength 254nm
UV System	Entire UV System that includes the Power Supply Enclosure and UV Vessel
UV Vessel	Wet portion of the UV System that generally consists of: quartz sleeve(s), UV lamp(s), stainless steel or plastic vessel, and valve(s)

## Section Two: HEALTH & SAFETY PRECAUTIONS

### 2.1 Safety Symbols



Caution



High Voltage



Warning



Chemical (Corrosive)



Protective Eyewear (UV Light)



Sharp Object







Recycle



### 2.2 Safety Instructions

#### IMPORTANT SAFETY INSTRUCTIONS PLEASE READ PRIOR TO INSTALLATION AND OPERATION

Strictly follow the instructions within this manual to ensure the health and safety of both, yourself and the UV system. The installation, operation and maintenance of the UV system can only be carried out after reading and understanding the information contained in this manual.

The installation of the UV system must be carried out in accordance with local regulations and codes.

	<b>WARNING:</b> Water and electricity can be a dangerous combination. Help us ensure your safety <b>READ AND FOLLOW ALL SAFETY INSTRUCTIONS.</b>
	<b>DANGER:</b> UV lamps and quartz sleeves are fragile and if broken and handled incorrectly may cause serious injury.
	<b>IMPORTANT:</b> READ AND OBSERVE ALL IMPORTANT NOTICES AND LABELS ON THE UNIT. <b>REMOVAL OF PRODUCT LABEL WILL VOID WARRANTY!</b>
	<b>IMPORTANT:</b> For your safety the quartz sleeve and/or the UV lamp in this product may have been broken or damaged during shipping. It is <b>ESSENTIAL</b> that the unit be <b>CAREFULLY INSPECTED BEFORE CONNECTING TO ELECTRIC POWER.</b>
	<b>WARNING:</b> DO NOT exceed PSI indicated on label during operation.
	<b>DANGER:</b> To avoid possible electric shock special care should be taken since water is employed in the use of the UV System. For each of the following situations, <u>do not</u> attempt repairs yourself. Call Emperor Aquatics, Inc. customer service department at 610-970-0440 Ext. 10 for services or discard the appliance.
	<b>DANGER:</b> If the unit falls into the water, <b>DO NOT REACH FOR IT!</b> First unplug it and then retrieve it. If the internal electrical components of the unit get wet, unplug the unit immediately.
	<b>DANGER:</b> If the unit shows any sign of water leakage, immediately unplug it from the power source.
	<b>DANGER:</b> DO NOT operate this unit if it has a damaged cord or plug, if it is malfunctioning, or if it has been dropped or damaged in any manner.

	<b>IMPORTANT:</b>	Close supervision is necessary when any appliance is used by or near children, this UV system is no exception.
	<b>IMPORTANT:</b>	Always unplug the unit from the electrical outlet when it's not in use, before servicing, cleaning or removing parts. Never yank the cord to pull the plug from the outlet. Grasp the plug and pull to disconnect.
	<b>IMPORTANT:</b>	Each UV system is designed for a specific water-pressure. DO NOT use the Emperor Aquatics, Inc. UV system for any application other than its intended use. The use of attachments not recommended or sold by Emperor Aquatics Inc. may cause unsafe conditions and possibly void any warranty.
	<b>IMPORTANT:</b>	Only (3) three wire grounded cables suitable for outdoor use should be used to connect this unit. If joining cables for outdoor use, a suitable watertight cable connector must be used. If an extension cord is necessary, a cord with a proper rating should be used. A cord rated for less ampere or watts than the appliance's rating may overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled. If in doubt consult a qualified electrician.
	<b>IMPORTANT:</b>	Only operate the UV system when it is properly maintained and in good working order.
	<b>IMPORTANT:</b>	DO NOT modify the UV system without authorization from Emperor Aquatics, Inc.
	<b>DANGER:</b>	BLUE-LIGHT HAZARD Ultraviolet light will cause serious damage to your eyes and skin! DO NOT handle or stare at an operating UV lamp. UV lamps become hot during operation, DO NOT handle them during operation.

## 2.3 Hazardous Situations & Appropriate Actions

Situation	Location	Hazard	Actions
Lamp or Quartz Sleeve Removal	UV Vessel	Burn	Isolate UV system from water source, shutdown system using external On/Off switch and lock-out/disconnect from input power source.
Broken Quartz Sleeves/ UV Lamps	UV Vessel	Sharp Object	Handle quartz sleeves and UV lamps with extreme care, wear clean cotton gloves.
UV lamp Replacement	UV Vessel	Blue-Light Hazard	DO NOT operate UV lamps outside the UV vessel, wear protective eyewear against ultraviolet light.
Drain UV Vessel	UV Vessel	Pressure	Isolate UV system from water source and shutdown system using external On/Off switch and lock-out/disconnect from input power source. Open valves carefully to depressurize and drain the UV Vessel.
Vessel Cleaning	UV Vessel	Corrosive/ Chemical	Isolate the UV vessel and secure against unauthorized operation. Wear appropriate protection equipment. No smoking or food allowed.
Electrical Work	UV System	Electrical Shock	Shutdown system using the UV systems external On/Off switch and lock-out/disconnect from input power source. All electrical work should be carried out by authorized and qualified personnel only.





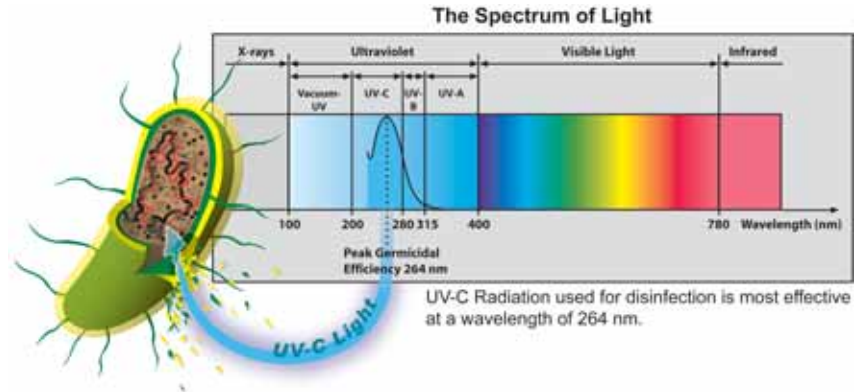
## Section Three: UV DISINFECTION

### 3.1 What is Ultraviolet Light

Ultraviolet light is a specific section of the Light Spectrum used primarily for germicidal disinfection. It is broken down into four sections: Vacuum UV (100-200 nm), UV-C (200-280 nm), UV-B (280-315 nm) and UV-A (315-400 nm).

### 3.2 Introduction to UV Disinfection

Ultraviolet light is most effective in the UV-C range, specifically between 240 and 280 nanometers. Input watts (voltage + current) are supplied to the UV lamp creating an electrical arc with the mercury inside the lamps glass envelope. This reaction creates the specific range of UV-C light (240-280 nm) required for germicidal disinfection. Achieving successful UV disinfection requires the UV-C light to penetrate a target microorganism's cell wall/membrane at a specific wavelength (UV Dose) for a specific amount of time (flow-rate).



Ultraviolet disinfection is efficient, economical and environmentally friendly.

### 3.3 Factors Effecting UV Disinfection

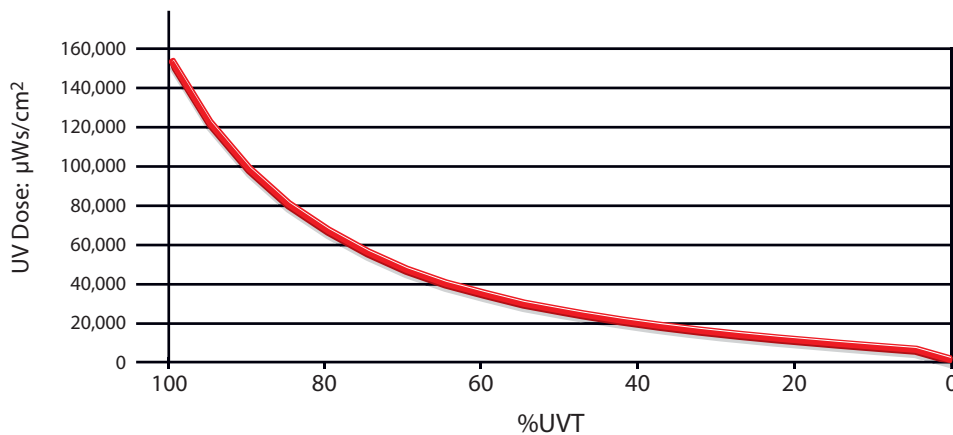
#### Target Microorganism

Microorganisms vary in type, size and life cycle. Selecting a target microorganism (Algae, Bacteria etc.) and identifying it's life cycle and established UV Dose are prerequisites for eliminating that particular microorganism.

#### UV Transmittance

The most critical UV performance factor is "UV Transmittance" (UVT). UV light that is absorbed by substances in the water is unavailable to inactivate waterborne microorganisms. The greater the amount of UV light absorbed by these substances (i.e. low %UVT) the more UV capacity will be required. UV transmittance is not turbidity but rather absorption by both visible particles and non-visible substances. For example: metals in water, especially iron, absorb UV light.

These two graphs demonstrate how a lower %UVT parallels a diminished UV dose when operating our model CLP6780A8 (3 – 260 Watt Amalgam UV lamps) at a flow rate of 150 GPM.



%UVT	µWs/cm <sup>2</sup> at End of Lamp Life	Total % Loss
100	151,800	0%
95	120,800	-20.42%
90	97,400	-35.84%
85	79,600	-47.56%
80	65,900	-56.59%
75	55,100	-63.70%
70	46,500	-69.37%
65	39,600	-73.91%
60	34,000	-77.60%
55	29,300	-80.70%
50	25,400	-83.27%
45	22,000	-85.51%
40	19,200	-87.35%
35	16,700	-89.00%
30	14,600	-90.38%
25	12,700	-91.63%
20	11,000	-92.75%
15	9,400	-93.81%
10	7,900	-94.80%
5	6,400	-95.78%



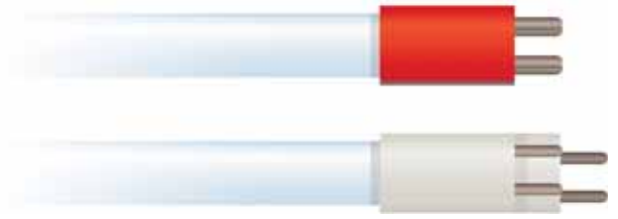
## Quartz Sleeve Condition

Materials (dirt, waste, bio-flocculent, plant material and scale) all absorb UV light. The more material on the quartz sleeve the greater UV absorption. The result: reduced UV performance. For quartz sleeve cleaning instructions See Section 10.4.2



## UV Lamp Performance

A UV lamp degrades over its operating life thus explaining why Emperor Aquatics suggests water flow-rates for our UV systems based on “end of useful lamp life” performance. Your CUP Series UV System is designed to utilize its lamps UV-C output to their maximum potential and should not be modified. Lamps reaching the end of their useful life should be changed-out. UV lamps that are operated past their “end of useful lamp life” can reduce the ballasts operating efficiency.



## Ballast Performance

The ballast/power supply must be sized appropriately to the specific “input watt” requirement of the UV lamp. Under-driving the lamp will result in diminished UV-C output while over-driving the lamp will result in reduced “useful lamp life”.

## Water Flow Rate

The water’s “flow rate” must consider all critical operating coordinates of the specific UV system combined with the intended applications percent UV transmissibility (%UVT). Each model UV system and application is unique and therefore must be calculated independently.

## UV System Design

Your Emperor Aquatics, Inc. UV system is designed and manufactured to deliver many years of dependable operation. The UV system is unique and designed to utilize its UV lamps output to their maximum potential. Combining critical performance criteria that include: UV lamp output, power supply performance and lamp array are calculated using the Bolton Photosciences “UV CALC Modeling Program” to verify each UV system’s operating capacity. The Bolton Photosciences UV CALC Modeling Program is recognized by the United States Environmental Protection Agency (EPA).





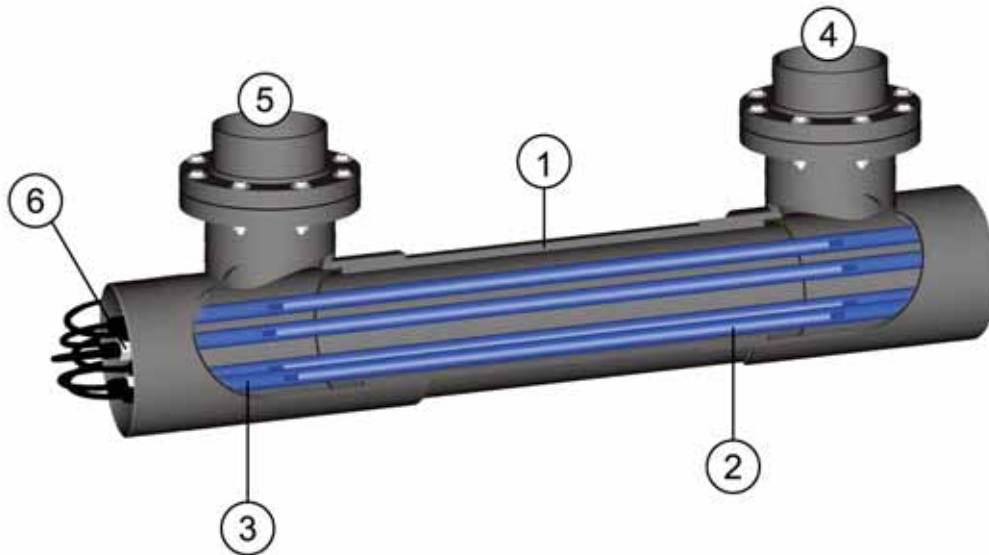
## Section Four: SYSTEM OVERVIEW

### 4.1 System Features

- “U Style” Vessel Design
- Corrosion-Resistant, Heavy-Wall Plastic UV Vessel Construction maximizes durability and operating dimensions.
- Watertight Design allows for safe operation in wet environments.
- Single-End UV Lamp/Quartz Sleeve removal allows for quick and easy change-outs.
- UV Lamp array utilizes each lamp’s UV-C output to its maximum potential.
- T5 High-Output or Amalgam “L Glass” (non-ozone emitting) UV Lamps produce a higher UV output than standard output UV Lamps (80% efficient after 9,000 hours of continual operation).
- Protective Quartz Sleeves thermally protect the UV Lamps, resulting in maximum UV output and safety.
- UL 508A listed Power Supply Enclosure.
- NEMA 4X High-Impact, Thermoplastic Enclosure with professionally assembled electrical hardware and instrumentation.
- Basic Control or optional PLC (Programmable Logic Control) Power Supply Enclosure.

### 4.2 UV Vessel

All SafeGUARD CUP Series models are designed using the same design criteria, although individual model dimensions and lamp numbers may differ.



The vessel (1) houses one or more UV lamps (2) that are arranged in an array that utilizes their UV output to their maximum potential. Each lamp is thermally protected by its own quartz sleeve (3) made from transparent hard quartz glass. The quartz sleeve is open on one end and allows for easy removal of the lamp. Quartz sleeves are held in place by the Quartz Sleeve Module(s) and the Internal Quartz Sleeve Coupler located inside the UV vessel on the non-electrical end.

The vessel can have multiple sensor ports, usually a UV Intensity Sensor Port accompanied by a Water Temperature Sensor Probe Port and a Vessel Drain Port that accepts a 0.5” PVC Ball Valve and an auxiliary service port (used for chemical cleaning). The vessel Inlet Port (4) is available with union (up to 4”) or flange fittings. The Outlet Port (5) is available with the same options.

The quartz sleeve modules allow for single-end quartz sleeve and UV lamp removal/loading and are male threaded to accept the Quartz Sleeve Retaining Nut (6). A EDPM Rubber Gasket positioned inside the quartz sleeve retaining nut creates a watertight seal.

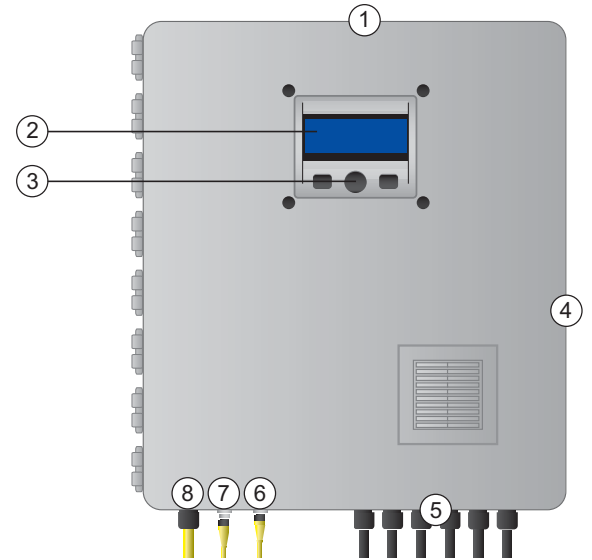
## 4.3 Power Enclosures

The Remote Power Enclosure houses all components used for operation, monitoring and control of the entire UV system (monitoring and control vary depending on model). The power enclosure is designed for remote mounting from the vessel and is equipped with 10' lamp cables and mounting hardware. The PLC Controls come standard, while the Basic Controls are offered as an option.

### PLC (Programmable Logic Controller) Models

Features:

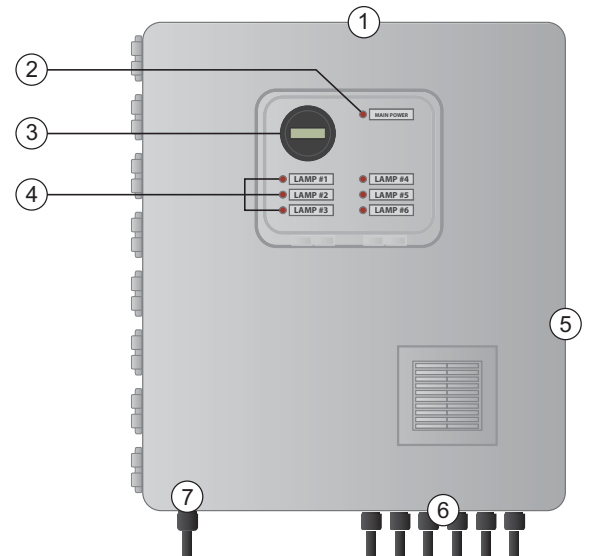
1. PLC Power Enclosure
2. Liquid Crystal Display Screen
3. Touch Pad Control
4. External On/Off Switch
5. Lamp/Power Cables
6. UV Intensity Sensor
7. Temperature Sensor
8. Main Power Cable



### Basic Control Models

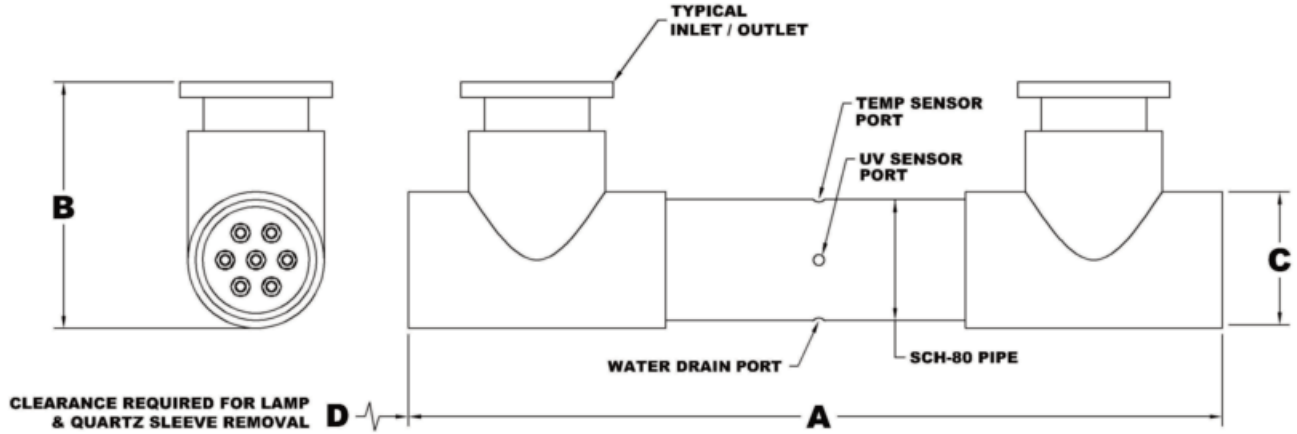
Features:

1. Basic Control Power Enclosure
2. Input Power Light
3. Resettable Hour Meter
4. Lamp Status LED
5. External On/Off Power Switch
6. Lamp/Power Cables
7. Main Power Cable
8. Optional Temperature Sensor (not shown)





## Section Five: SYSTEM SPECIFICATIONS



### 5.1 Dimensional & Electrical Specifications



Model No.	Inlet/Outlet Ports	Apprx. Length A	Apprx. Height B	Body Diameter C	Min. Clearance D	Power Supply H x W x D	Amps Max Load @ 120/230VAC	Max. Rated Valve Pressure	Max. Head Loss
CUP4640HO10-3F	ø3"	58"	18"	ø12.2"	52"	27" x 20.5" x 12"	10.1/5.0	50	1 - PSI
CUP6300HO6-4F	ø4"	69"	12"	ø7.5"	66"	18.5" x 16" x 9.5"	3.7/1.8	50	1 - PSI
CUP6450HO6-4F	ø4"	69"	12"	ø7.5"	66"	18.5" x 16" x 9.5"	5.5/2.75	50	1 - PSI
CUP6600HO6-4F	ø4"	69"	12"	ø7.5"	66"	18.5" x 16" x 9.5"	7.5/3.75	50	1 - PSI
CUP61200HO10-3F	ø3"	72"	18"	ø12.2"	66"	33" x 24.5" x 14"	15.0/7.5	50	1 - PSI
CUP6780A6-3U	ø3"	75"	14"	ø7.5"	70"	27" x 20.5" x 12"	9.0/4.5	50	1 - PSI

Model No.	Input Watts	UV-C Output Watts	No. - Lamps	Flow Rate @ 90% UVT 30 mJ/cm <sup>2</sup> Suggested/Maximum	Flow Rate @ 90% UVT 90 mJ/cm <sup>2</sup> Suggested/Maximum	Flow Rate @ 90% UVT 180 mJ/cm <sup>2</sup> Suggested/Maximum
CUP4640HO10-3F	640	208	8-80 Watt	395 GPM / 494 GPM	131 GPM / 165 GPM	65 GPM / 83 GPM
CUP6300HO6-4F	300	110	2-150 Watt	160 GPM / 200 GPM	53 GPM / 66 GPM	27 GPM / 33 GPM
CUP6450HO6-4F	450	165	3-150 Watt	225 GPM / 282 GPM	73 GPM / 94 GPM	37 GPM / 47 GPM
CUP6600HO6-4F	600	220	4-150 Watt	310 GPM / 388 GPM	103 GPM / 129 GPM	52 GPM / 65 GPM
CUP61200HO10-3F	1200	440	8-150 Watt	870 GPM / 1088 GPM	290 GPM / 363 GPM	145 GPM / 182 GPM
CUP6780A6-3U	780	270	3-260 Watt	298 GPM / 372 GPM	99 GPM / 124 GPM	50 GPM / 62 GPM





## Section Six: INSTALLATION

### 6.1 Pre-Installation Inspection

#### Purpose

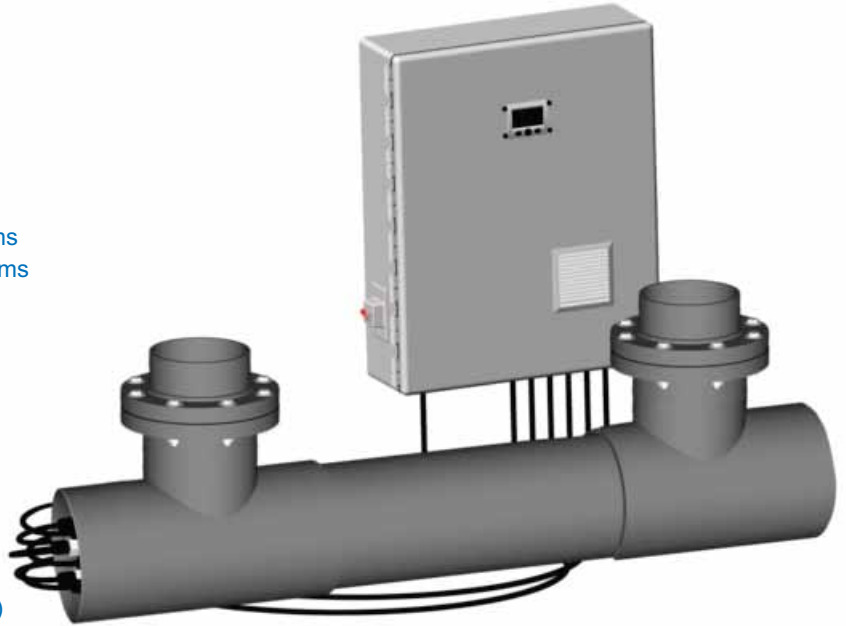
To familiarize the installer/operator with the UV systems components, to assure proper delivery of all the systems components and to inspect each component for shipping damages.

#### Frequency

To be conducted prior to installation.

#### Parts and Required Equipment

- Box Cutter
- Hammer/Nail Remover
- Flashlight
- 1.5" Socket Wrench or Quartz Sleeve Tool (included)



During pre-installation there is a general risk due to load.



Quartz Sleeves and UV Lamps are fragile and potentially dangerous if broken. Handle with care.

#### Procedure

**Note:** Vessels are shipped with their quartz sleeves installed.

**Note:** UV Lamp(s) are shipped in a separate package either inside the vessel crate or separately.

1. Unpack and inspect vessel for shipping damage. A box cutter or hammer/nail remover may be needed to unpack the UV System.
2. Conduct an internal, visual inspection of models shipped with their quartz sleeves assembled. A flashlight will help with the internal inspection.

The UV System consists of:

1. UV Intensity Sensor (not included with Basic Control)
2. Temperature Sensor (not included with Basic Control)
3. Quartz Sleeve Retainer Nut (one for each quartz sleeve)
4. Quartz Sleeve Rubber O-Ring (one for each quartz sleeve retainer nut)
5. Quartz Sleeve Rubber Gasket (one for each quartz sleeve. Amalgam Lamp units only)
6. Quartz Sleeve (one for each UV Lamp)
7. UV Lamp(s)
8. 4-Pin Connector(s) (attached to lamp cables)
9. Vessel
10. Drain Valve Assembly

Power Supply Enclosure style varies with model.

## 6.2 UV Vessel Installation

### Purpose

Proper installation of the UV Vessel achieves expected results and ensures safe operation.

### Frequency

Required with new construction, retro-fit or replacement of outdated equipment.

### Parts and Required Equipment

- Socket Wrenches
- Adjustable Wrenches
- Set of Slotted and Phillips Head Screwdrivers
- Lifting Equipment with Slings
- Vessel Mounting Brackets
- Required Isolation Valves
- Plumbing Components
- Personal Safety Equipment



General risk due to load.



General risk due to pressurized piping or UV Vessel.



Quartz Sleeves are fragile and potentially dangerous if broken. Handle with care.

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### Procedure

**Important:** The installation of the UV system must be carried out in accordance with local regulations and codes.

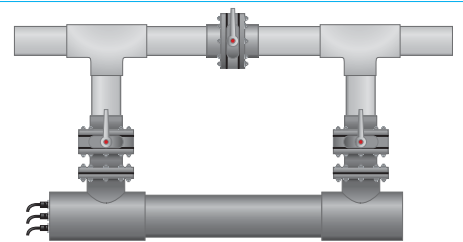
1. Install the UV system after the mechanical filtration eliminating the possibility of debris from entering the vessel and potentially damaging the quartz sleeve(s) and UV lamp(s).
2. Install inlet and outlet isolation valves (to be supplied by others).
3. Install UV vessel mounting brackets if required (to be supplied by others).

**Note:** A 46" clearance for CUP4 Series models and a 76" clearance for CUP6 Series models is required for lamp and quartz sleeve removal.

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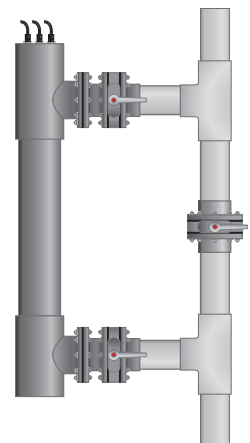
### Horizontal Installation

Horizontal installation requires the vessel outlet port to face upwards, allowing trapped air to escape. If installed on a "by-pass filter loop" or isolated using valves, an automatic air bleed system is required. *Failure to remove trapped air can result in rupture or heat damage to the vessel.*



### Vertical Installation

Vertical installation requires the vessel inlet port at the bottom and the port closest to the electrical end to be used as the outlet, allowing trapped air to escape. If installed on a "by-pass filter loop" or isolated using valves, an automatic air bleed system is required. *Failure to remove trapped air can result in rupture or heat damage to the vessel.*





4. Models equipped with inlet/outlet union fittings are ready for piping installation. Models equipped with inlet/outlet raised flanges require mating pipe flanges (to be supplied by others). Depending on port type ordered further fabrication may be required by the installer.
5. Isolation Valves are necessary for vessel removal and chemical cleaning procedure. It is recommended to install the valves directly at the inlet/outlet ports of the vessel. If this installation arrangement is not possible, install in a way that chemical cleaners or freshwater rinse can be drained completely from the vessel without contaminating the process water.
6. The UV System (models w/ diameters of 10" and larger) may have been shipped without its quartz sleeves installed in the vessel, please install now. See Section 6.3
7. The vessel is equipped with a 0.5" female threaded drain port for installation of the Drain Valve Assembly. Use Teflon Tape on the threads when installing the drain valve assembly.
8. The vessel may be equipped with sensor ports (UV Intensity and Water Temperature Sensors) depending on the model or options purchased with the UV System. All sensor ports will be labeled on the vessel based on their respective function. Use Teflon Tape on the threads to create a reliable seal with all sensors. Sensors should be threaded into their respective vessel ports prior to connection to the power supply enclosure to avoid cable twisting.

## 6.3 Quartz Sleeve Installation

### Purpose

To thermally protect the UV lamp and isolate it from water.

### Frequency

Quartz Sleeve(s) are installed after being inspected/cleaned or damaged. Water quality conditions may warrant more frequent inspection/cleaning. Fouled quartz sleeves absorb UV light and therefore may reduce the UV intensity.

Replace broken quartz sleeve(s).

### Parts and Required Equipment

- Quartz Sleeve(s)
- Quartz Sleeve Retaining Nut O-Ring or Rubber Gasket
- Adjustable Wrench
- Cotton or Silicon Gloves
- Personal Safety Equipment



General risk due to electricity.



General risk due to pressurized piping or UV Vessel.



Quartz Sleeves are fragile and potentially dangerous if broken. Handle with care.

### Procedure

**Note:** Use clean cotton or silicon gloves when handling the quartz sleeve(s). Skin oils absorb ultraviolet light and reduce UV intensity.

**Note:** Quartz Sleeve installation procedures vary depending on the style of UV system. Be sure you refer to the correct installation procedure for your UV system.

<b>CUP LPHO (Low-Pressure High-Output) UV Systems.....</b>	<b>13</b>
<b>CUP Amalgam UV Systems.....</b>	<b>14</b>

## CUP LPHO (Low-Pressure High-Output) Model Quartz Sleeve Installation

1. Apply water (wet) or a small amount of water soluble lubricant such as Ideal Industries Clear Glide to the domed-end of the quartz sleeve. Lubricating will aid in inserting the domed-end of the quartz sleeve into the vessels internal quartz sleeve coupler "port".
- 

2. Carefully slide the quartz sleeve(s) into the Quartz Sleeve Faceplate's "Quartz Sleeve Module" (QSM) allowing approximately 12" to of the quartz sleeve to remain outside the UV vessel.



3. With 12" of the quartz sleeve outside the UV vessel, assemble the Quartz Sleeve Retaining Nut (with O-Ring in place) onto the open-end of the quartz sleeve by simply pushing it onto the sleeve as shown to the right.

Continue to push the Quartz Sleeve Retaining Nut onto the open-end of the quartz sleeve until the lip of the quartz sleeve mates with the internal lip of the Quartz Sleeve Retaining Nut.



4. With the Quartz Sleeve Retaining Nut properly assembled onto the open-end of the quartz sleeve, push the entire assembly (retaining nut and quartz sleeve) through the Quartz Sleeve Module and into the UV vessel.

As you are pushing the retaining nut/quartz sleeve assembly into the Quartz Sleeve Module, elevate the domed-end of the quartz sleeve slightly by gently pushing down on the retaining nut approximately 1/2". This will guide the domed-end of the quartz sleeve into the vessel's internal quartz sleeve coupler.



5. Thread the Quartz Sleeve Retaining Nut onto the Quartz Sleeve Module and tighten using a 1.5" socket wrench or the supplied EA Quartz Sleeve Tool (shown). Tighten down until snug (5 ft/lb). Over-tightening can break the Quartz Sleeve Module and potentially the Quartz Sleeve. The quartz sleeve is now properly assembled.



6. The quartz sleeve is now properly assembled.
-

## CUP Amalgam Model Quartz Sleeve Installation

1. Apply water (wet) or a small amount of water soluble lubricant such as Ideal Industries Clear Glide to the domed-end of the quartz sleeve. Lubricating will aid in inserting the domed-end of the quartz sleeve into the vessels internal quartz sleeve coupler.

2. Carefully slide the quartz sleeve(s) into the Quartz Sleeve Faceplate's "Quartz Sleeve Module" (QSM) allowing approximately 12" to of the quartz sleeve to remain outside the UV vessel.



3. With 12" of the quartz sleeve exposed outside the vessel, carefully place the Quartz Sleeve Rubber Gasket Seal onto the open-end of the quartz sleeve. Apply water or a small amount of water soluble lubricant onto the end of the quartz sleeve, this will act as lubricant allowing you to easily slide the Rubber Gasket onto the quartz sleeve.



4. Push the Rubber Gasket onto the quartz sleeve leaving approximately 1/2" of the sleeve exposed past the gasket.



5. As you push the remaining portion of the quartz sleeve into the vessel (through the Quartz Sleeve Module) elevate the domed-end of the quartz sleeve by gently pushing down on the open-end approximately 1/2". This will help guide the domed-end of the quartz sleeve into it's correct Internal Quartz Sleeve Coupler "Port".

6. Finish sliding the remainder of the quartz sleeve into the vessel until it is stopped by the Quartz Sleeve Rubber Gasket.

As you thread and tighten the Quartz Sleeve Retaining Nut onto the Quartz Sleeve Module the Quartz Sleeve Retaining Nut's internal lip will automatically set the quartz sleeve in its proper position.



7. Thread the Quartz Sleeve Retaining Nut onto the Quartz Sleeve Module and tighten using a 1.5" socket wrench or the supplied EA Quartz Sleeve Tool (shown). Tighten down until snug (5 ft/lb). Over-tightening can break the Quartz Sleeve Module and potentially the Quartz Sleeve. The quartz sleeve is now properly assembled.



## 6.4 UV Lamp Installation

### Purpose

To instruct the operator how to appropriately install the UV lamp(s).

### Frequency

Lamp installation in new unit or lamp replacement change-out (after every 9,000 hours of continual operation).

### Parts and Required Equipment

- UV Lamp(s)
- Wire Cutters
- Adjustable Wrenches
- Cotton or Silicon Gloves
- Personal Safety Equipment



General risk due to electricity.



UV Lamps are fragile and potentially dangerous if broken. Handle with care.

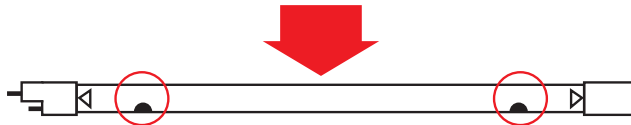
### Procedure

**Important:** Before installing the UV Lamp(s) a **MANDATORY WATER TEST must be performed.** See Section 7

**Note:** Use clean cotton or silicon gloves when handling the UV lamp(s). Skin oils absorb ultraviolet light and reduce UV intensity. Skin oils may also lead to premature lamp failure.

1. Remove the white Teflon ring from the UV lamp by snipping it off using wire cutters.
2. Gently slide the UV Lamp into the Quartz Sleeve Retaining Nut leaving 6" of the UV lamp exposed.

**IMPORTANT:** INSTALL AMALGAM LAMPS WITH AMALGAM IN DOWN POSITION!



Note: Lower wattage amalgam lamps contain a single mass of amalgam while higher wattage amalgam lamps contain multiple masses of amalgam.



**Note:** Each Lamp cable (1) is equipped with a "black" male threaded cable adapter (2). This cable adapter is made up of three components and they are: Nut (3), Rubber Gasket (4) and Male-Threaded Body (5).



3. Loosen (not remove) the lamp cable adapter nut to release tension on the lamp cable allowing the cable to slide freely through the adapter. This will allow the MPT portion of the lamp cable adapter to be threaded into the white quartz sleeve retaining nut without twisting the lamp cable (after lamp installation).

4. With the UV lamp installed inside the quartz sleeve and six inches exposed attached the lamp cables 4-Pin Connector on to the four pins of the UV lamp.



5. With the lamp cable/lamp connection complete gently slide the remainder of the lamp w/ cable through the Quartz Sleeve Retaining Nut and into the quartz sleeve. With the lamp now inside the quartz sleeve, gently continue to push the lamp (w/ connected lamp cable) into the quartz sleeve until it stops, then pull out 0.5" of the lamp cable. This will position the lamp properly inside the quartz sleeve avoiding heat damage to the Quartz Sleeve Module Faceplate and Quartz Sleeve Module.

6. With the UV lamp in its correct position inside the quartz sleeve, thread the cable adapter into the Quartz Sleeve Retaining Nut.



7. With the "black" cable adapter threaded into the Quartz Sleeve Retaining Nut, tighten the cable adapter nut to create a watertight seal on the lamps cable. Take care not to bend or damage the cable adapters "gasket prongs" during this process.

The UV lamp is now properly installed.



## 6.5 Power Supply Installation

### Purpose

To instruct the operator how to properly install the Power Supply, Temperature and UV Intensity Sensors.

### Frequency

Required with new construction, retro-fit or replacement of outdated equipment.

### Parts and Required Equipment

- Set of Slot and Phillips Head Screwdrivers
- Wrench
- Pliers
- Wall Struts or Braces
- Supplied Enclosure Mounting Hardware
- Personal Safety Equipment
- Teflon Thread Tape



General risk due to suspended load.



General risk due to electricity.



General risk due to pressurized piping or UV Vessel.

### Procedure

1. Use the supplied enclosure mounting feet if the Power Supply Enclosure is going to be mounted on a wall.
2. Mount the Power Supply Enclosure close to the UV Vessel so that the lamp cables reach between the Power Supply Enclosure and the UV Vessel.
3. The Power Supply Enclosure should be mounted so that controls are visible to the operator. The location used for mounting the Power Supply Enclosure should be as dry and cool as possible.

4. The Power Supply Enclosure should be located in a place that provides sufficient weather protection in the case of outdoor installation. Sufficient space near the cooling fans intake and exhaust must be provided.
5. The Power Supply Enclosure must be supplied with the correct operating voltage (120/230 VAC). Electrical requirement information is located on the Power Supply Enclosure labeling and can be found in Section Five (Dimensions and Electrical Specifications) of this manual. Failure to supply the UV System with the correct operating voltage can damage the ballasts and other electrical hardware. Use only a well-ground electrical circuit.
6. The UV System is equipped with an equipment-grounding conductor and a grounding lug. The grounding lug must be installed and grounded in accordance with all local codes and ordinances. Improper connection of the equipment-grounding conductor can result in electrocution. Check with a qualified electrician or service personnel if you question whether the equipment is properly grounded.
7. Input power to the Power Supply Enclosure is switched on and off using the enclosure's External On/Off switch or optional Remote On/Off control.



All UV control enclosures that utilize our PLC controls should be mounted with considerations to other devices that emit, or are suspected of emitting, any EMI & RFI noise and that any sensors used in conjunction with our PLC controls should use industry standard procedures to avoid EMI & RFI noise issues.

## 6.5.1 Temperature & UV Intensity Sensor Installation

### Procedure

1. Install the Temperature and UV Intensity Sensors into their respective port locations as labeled on the vessel using Teflon Thread Tape to properly seal the sensor threads in the vessel. To avoid possible sensor damage from cable twisting, **DO NOT** connect the sensor cables to the power supply until after they are installed into the vessel. Leave the sensor cables coiled up close to the sensor during the installation process to allow the cable to rotate as the sensor is being screwed into the vessel. If the cable becomes twisted during the installation process, untwist it before proceeding.



PLC Temperature Sensor



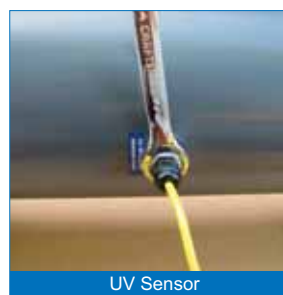
B.C. Temperature Sensor with Vulcan Sleeve

**Note:** Insert the Vulcan Sleeve into the vessel's sensor port first, then insert the Basic Control's temperature sensor.

2. Use a wrench to *carefully* tighten the UV sensor and Basic Control temperature sensor's white vulcan sleeve. These two components are made of soft teflon and can be easily damaged.
3. Once the sensors have been installed into the vessel you can attach to cables to their respective connection points located on the bottom of the Power Supply Enclosure.



UV Sensor



UV Sensor



Input Connection

**WARNING:** Sensor-cables should be isolated from other electrical devices, preventing electrical interference. UV intensity sensor-cables must also be separated from UV lamp cables to minimize electrical interference.

**Note:** The sensor cables are approximately 12' long, if you find that you require a greater length you can purchase 12' cable extensions using the following part numbers:

- Optional UV Intensity Sensor Extension Cable: **#20214-EXTCABLE**
- Optional Temperature Sensor Extension Cable: **#20217-EXTCABLE**
- Not Shown = Optional Lamp Field Safety Extension Cable: **#20252-EXTCABLE**



#20214-EXTCABLE



#20217-EXTCABLE

**Note:** The Temperature Sensor must be installed in the vessel with its cable adapter properly connected to its respective port located on the power supply enclosure. *A Temperature Sensor Cable connection interruption will automatically shut down the system.*





## Section Seven: MANDATORY WATER TEST

### 7.1 Mandatory Water Test

#### Purpose

The Mandatory Water Test identifies a potential quartz sleeve assembly seal failure. During normal UV system operation, a quartz sleeve assembly failure can result in extensive damage to the UV lamp, quartz sleeve and ballast.

#### Frequency

The Mandatory Water Test must be performed after quartz sleeve/retaining nut seal (EDMP O-Ring) inspection/replacement. Quartz Sleeve inspection/retaining nut seal replacement must be carried out annually, at minimum.

#### Parts and Required Equipment

- Paper Towels
- Personal Safety Equipment



General risk due to pressurized piping and or UV Vessel!



Quartz Sleeves are fragile and potentially dangerous if broken. Handle with care.

#### Procedure

**Important:** Failure to perform a water test could lead to conditions that will void your product's warranties.

1. With the quartz sleeves installed inside the UV vessel, but without the UV lamps installed, a water test is to be performed. For quartz sleeve removal See Section 10.4.1 for installation See Section 6.3



2. Thread all sensors into their respective ports on the UV vessel.

3. Place a rolled-up piece of paper towel into the Quartz Sleeve Retaining Nut. During the water test, the paper towel will absorb any moisture, identifying that a quartz sleeve seal failure (leak) has occurred.



4. Inspect all piping connections to the UV Vessel and confirm that valves are in their correct position prior to start-up.
5. With the piping and valves inspected and deemed satisfactory, operate the system allowing water to flow through the UV Vessel. Allow the system to operate for no less than fifteen minutes.
6. After fifteen minutes of flowing water through the UV vessel, remove the paper towel from each Quartz Sleeve Retaining Nut and inspect closely for any sign of moisture. If leaks are detected, shut the system down and make the appropriate adjustment. For quartz sleeve removal/installation See Section 10.4
7. If no leaks were detected you are now ready to install the UV Lamp(s). See Section 6.4





## Section Eight: COMMISSIONING

### 8.1 Start-Up

#### Purpose

This section contains the necessary steps required prior to proper UV system operation, it is meant to assist in the preparation of the UV system for operation.

#### Frequency

Required with new construction, retro-fit or replacement of outdated equipment.

#### Parts and Required Equipment

- Personal Safety Equipment



General risk due to pressurized piping and UV Vessel!



General risk due to electricity!

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Hydraulic shock (water hammer) may occur as a result of improper use of valve(s) or trapped air inside the vessel. Hydraulic shock and trapped air can damage the vessel.

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Trapped air or no-flow situations may damage the vessel and/or the UV lamps due to overheating.

#### Procedure

1. Confirm that all personnel operating this UV system have thoroughly reviewed these instructions prior to operating.
  2. Remove all dirt/debris from power supply enclosure, vessel and installation area resulting from installation activities.
  3. Inspect all plumbing connections and immediate plumbing network to ensure safe start-up.
  4. Inspect the vessel's Quartz Sleeve Module Faceplate to ensure proper assembly.
  5. Inspect quartz sleeve assemblies (Quartz Sleeve Retaining Nuts) confirming that they are tight.
  6. Inspect Power Supply Enclosure, confirm that it has been mounted properly and input power is in accordance with local ordinances and codes.
  7. Inspect all sensors ensuring that the probes are properly installed in the vessel and cable adapters are properly connected to their respective Power Supply Enclosure ports.
  8. Verify that a successful Water Test (See Section 7) has been completed.
-



## Section Nine: OPERATION

### 9.1 Optional Basic Control Operation

#### Operation

The operation of the UV system may only be carried out by authorized personnel. The personnel responsible for the operation of this system must read and understand Section 9, Section 2 (Health & Safety) and strictly comply with all relevant rules for accident prevention and local health and safety regulations.

Check all relevant safety measures before you switch on the UV system.

#### Basic Control Power Supply Enclosure

##### Operating Modes

The UV system is operated “manually” by using the “External” ON/OFF Switch located on the outside of the UV system Power Supply Enclosure. With the UV system’s External ON/OFF Switch turned “On” the monitoring controls will function.

##### Switches

The UV system’s Power Supply Enclosure is equipped with an external “Main Power” ON/OFF Switch.

With the Main Power ON/OFF Switch in the “On” position, power is supplied to the UV system monitoring controls and the UV lamps.

With the Main Power ON/OFF Switch in the “OFF” position, power is cut-off from the entire UV system.



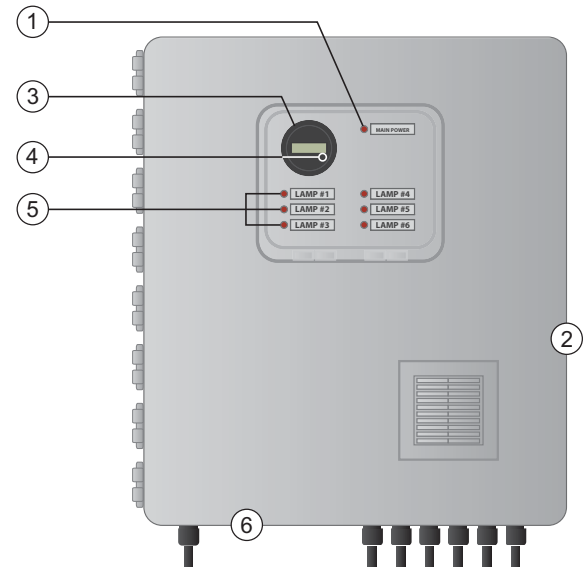
##### Monitoring Controls

“Main Power Indicator Lamp” (1) identifies that power is reaching the Power Supply Enclosure when the External ON/OFF Switch (2) is in the “On” position.

“Elapsed Run-Time Hour-Meter” (3) identifies “operating hours” of the UV lamps. When the lamp reaches 9,000 hours of operation a lightbulb icon will continuously blink, indicating the lamp’s need to be changed. The hour meter will continue to track the lamp’s operating hours until the meter is manually reset. After the UV lamp(s) are replaced, the run-time hour meter will need to be reset by pressing the “hour-meter” reset button (RST) (4) located on the meter. When the hour-meter reset button is pressed, the existing meter reading will clear and restart at zero and the lightbulb icon will disappear. With the power turned on the decimal point will blink to confirm the hour meter is running properly. This meter is only available with “Basic Control UV Systems”. UV lamps must be replaced after 9,000 hours of continuous operation, failure to do so may damage the lamp ballasts.

“UV Lamp Status Indicators” (5) when brightly lit, identify that the lamp(s) are operating properly. A “Dim” LED identifies a lamp not operating properly or one that is completely out. An LED that is completely out (not dimly lit) signifies that the lamps ballast is not operating and requires service. Lamp Status LED’s are available with only “Basic Control” UV Systems.

“Optional Over-Temperature Shut-Down System” (6 - not shown) is equipped with a temperature sensor located on the UV vessel. When the water inside the vessel exceeds 120° F the Temperature Sensor triggers the Lamp Shutdown Circuit; turning off the lamps, avoiding heat damage and potential failure.



## Section Nine: OPERATION

### 9.2 PLC (Programmable Logic Control) Operation

#### Operation

The personnel responsible for the operation of this system must read and understand Section 9, Section 2 (Health & Safety) and strictly comply with all relevant rules for accident prevention and local health and safety regulations.

Check all relevant safety measures before you switch on the UV system.

#### PLC Power Supply Enclosure

##### Operating Modes

Generally, the UV system is operated in "LOCAL" mode. An optional, discrete input circuit is provided to allow for either "LOCAL/REMOTE" or "LOCAL" mode. If this option has been ordered there are two terminal blocks (brown) located inside the Power Supply Enclosure. The UV system is supplied with both the brown terminals jumped together as the default "ON" setting.

To operate the UV system in the "REMOTE" mode, the "Factory-Installed Jumper" must be removed. Both the brown terminals need to be wired to an external switch (not included) capable of handling 120/230-volt AC @ 1-amp.

##### Switches

The UV system Power Supply Enclosure is equipped with an External "Main Power" ON/OFF Switch.

With the Main Power ON/OFF Switch in the "On" position, power is supplied to the PLC Controller/Monitor, and the UV lamps.

With the Main Power ON/OFF Switch in the "Off" position, power is cut-off from the entire UV system.

**Note:** The Main Power Switch must be in the "On" position if the optional Remote On/Off feature is being used.

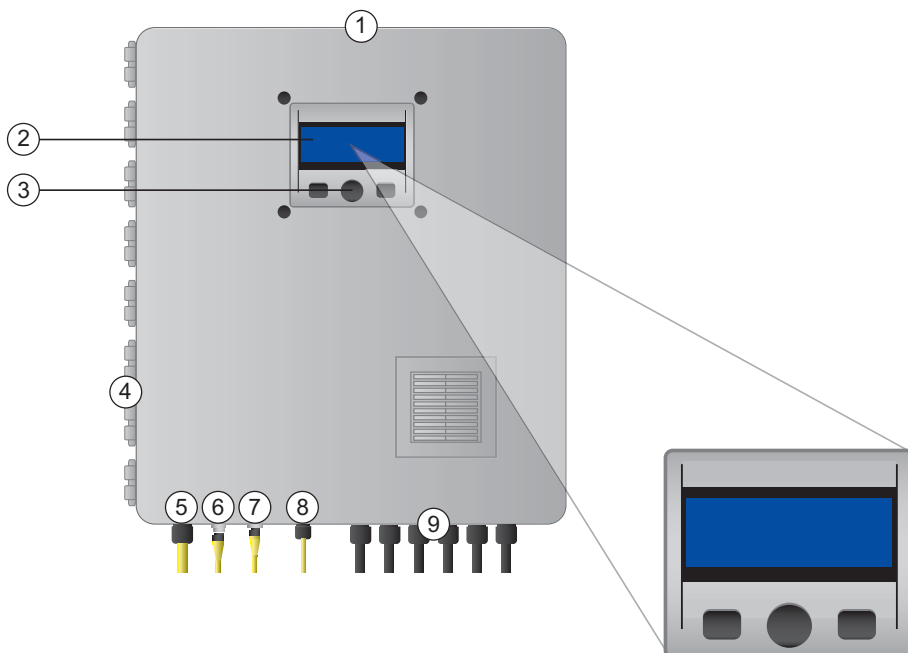


#### PLC Power Enclosure

1. PLC Power Enclosure
2. Liquid Crystal Display Screen
3. Touch Pad Control
4. External On/Off Switch
5. Main Power Cable
6. Temperature Sensor
7. UV Intensity Sensor
8. Lamp Field Safety Cover Cable
9. Lamp/Power Cables

The Text Display shows the current operating status of the UV system that includes the following parameters:

- Lamp Operating Status
- Lamp Operating Hours
- UV Intensity (UV%)
- Voltage Range
- Temperature



## 9.2 PLC Control Descriptions

### Incoming AC Voltage Monitor

The Incoming AC Voltage Monitor monitors the input voltage to the UV system. If the value goes outside the acceptable threshold an alarm will be activated. For 120 VAC the threshold parameter is 95 – 140 VAC, for 230 VAC the threshold parameter is 210 – 260 VAC. Your unit's input voltage parameter is identified on the power supply enclosure and vessel label.

### Total Operating Hours Meter

The Total Operating Hours Meter measures in increments of one for each hour the unit is in operation. The hour meter may be reset by the operator using the appropriate SETUP Text Display. The hour meter will roll over at 65,536 hours if not reset prior to reaching this number.

### Lamp Status & Lamp Life Monitor

The Lamp Status & Lamp Life Monitor scans all active lamp inputs from 1 to 13 depending on the UV system's number of lamps. If the PLC detects an inactive lamp an alarm will be activated and the ALARM Text Display will identify which lamp is malfunctioning. The alarm may be reset but will continue to activate every twenty-four (24) hours until the lamp is replaced and the SETUP individual lamp reset is completed.

Each lamp is equipped with an individual hour meter stored in EEPROM for data retention on power removal. At the end of each hour when the "Total Lamp Hour Meter" is incremented; all active lamps will have their individual hour meter incremented. Each individual lamp hours will be monitored for End of Lamp Life (9,000 hours) and a 72-hour recurring alarm will also be set.

### Power Supply Enclosure Temperature Monitor

The Power Supply Temperature Monitor uses a temperature sensor mounted inside the UV system's Power Supply Enclosure that monitors the enclosure's internal temperature. The temperature monitor is used to protect the UV system's electronics from overheating, a condition that could damage the unit. The enclosure's factory-set temperature threshold is 140° F. If the enclosure's internal temperature reaches 140° F the PLC controller will shutdown the lamp field and activate an alarm. The PLC controller must be powered off to reset the system and to restore lamp field operation.

### UV Vessel Water Temperature Monitor

The Water Temperature Monitor uses a sensor located on the UV vessel that monitors its internal water temperature. The UV Vessel Water Temperature Monitor is used to protect the vessel from no or low-flow conditions that may allow the lamp field to overheat causing damage to the UV vessel. The UV Vessel Water Temperature Monitor's factory-set threshold is 120° F and if reached, will cause the PLC to shut down the lamp field and activate an alarm. The PLC controller must be powered off to reset the system and to restore lamp field operation.

Additionally, if the water temperature sensor cable is interrupted/disconnected the entire UV system will shutdown and activate an alarm. The PLC Controller must be powered off to reset the system and to restore lamp field operation.

### UV Intensity Sensor

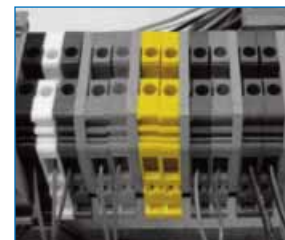
A UV Intensity Sensor is provided to monitor the quality of the UV energy that is being produced inside the unit's vessel. The PLC monitoring system displays the UV intensity as a function of percent (0%-100%), this UV intensity measurement is a relative power measurement of the UV energy inside the vessel and not an absolute measurement of UV dose because UV dose is a function of flow, the transmissibility of the water being treated, and the total UV power being applied to the flow path inside the UV vessel. The relative UV intensity (power) must be calibrated in order for the intensity measurement/reading to have any useful meaning. This calibration process is done once the system has been in service for 100 hours, the calibration screen will show a value representing percentage of UV. A button on the screen will allow setting of the 100% reading.

### Lamp Field Safety Cover

On all NSF-50 certified units there is a safety cap that covers the lamp's electrical cables that terminate into the unit's quartz sleeves. This safety cover must be installed into the vessel with its respective cable properly connected to its respective port located on the power supply enclosure. Removing the Lamp Field Safety Cover or a cable connection interruption will automatically shut off the UV system's lamp field and generate an alarm signal.

### Alarm Relays (standard)

One discrete output relay circuit (200 milliamp, normally open "Form A" contact) is provided to allow for alarm enunciation of any of the following monitored conditions: lamp failure, low UV intensity, vessel water over-temperature, enclosure over-temperature, end of lamp life, under/over input voltage alarm and optional lamp field safety cover.



### Remote Main System On/Off Capability (optional)

A discrete input circuit is provided to allow for Remote On/Off control of the control system. Located inside the main control enclosure there are two terminal blocks (brown). For remote on/off capability these terminals would be wired to an external switch capable of handling your unit's voltage; for example, 230-volt AC @ 1-amp.

**Note:** The system is supplied with these terminals jumped together as the default ON setting, to use this option the jumper must be removed and replaced by the user's own external switch. **WARNING: DO NOT SUPPLY ADDITIONAL POWER TO TERMINALS!**



**Note:** This option MUST be purchased with original equipment.

### Operator Text Display

The PLC Text Display is used to present information to the operator as well as serving as a command interface. The microprocessor performs various functions that include intercepting operator commands and updating displayed data. In addition, the software verifies voltage, lamp operation and saves current hours to EEPROM, etc.

#### Function Keys

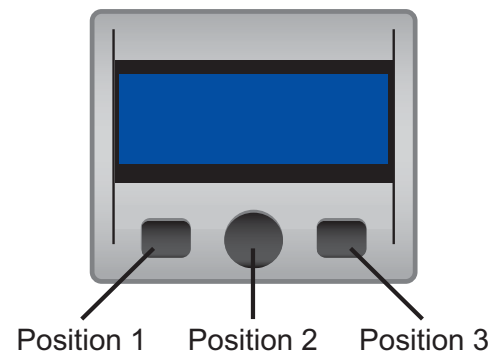
Command initiation is performed using the "Function Keys" labeled: Position 1, Position 2 and Position 3.

The "Function Keys" functions are as follows:

- Position 1 = Left
- Position 2 = Enter
- Position 3 = Right

Position 1 & 2 (pressed simultaneously) = "Big Left"

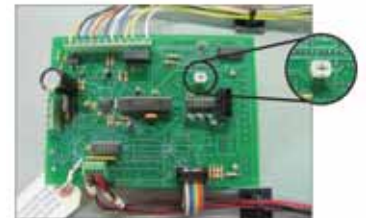
Position 2 & 3 (pressed simultaneously) = "Big Right"



When using a function key, press and hold down until the desired action occurs. The function key must be released when selecting another key. For example: when pressing the "Enter" function key to move to the SETUP menu, press and hold "Enter" until the text display begins to change, then let go.

#### Text Display Contrast Adjustment

Your location will determine the required brightness of the Text Display. Inside the enclosure, on the back of the Text Display, on the printed circuit board, you will find an adjustment potentiometer. Carefully, use a screw driver to adjust display brightness. See image to the right.



#### Initialize

With the External Power Switch turned "ON", the text display will be active for a few seconds while background system checks are made. Your unit's model number, serial number, and PLC number will display before the main screen loads.



### MAIN UV System Text Display

The “MAIN UV System Text Display” will appear after initialization. On this screen you will see: Total System Operating Hours, Input Voltage, and UV Intensity. Total Hours may be reset and the UV scaling adjusted via the “SETUP” menu. High and Low Input Voltage (95 – 140 VAC or 210 – 260 VAC depending on the specific unit’s control voltage requirements) are preset at the factory and may not be changed.

Press “ENTER” to move to the “SETUP” screen or “RIGHT” to move to the “STATUS” menu.

---



### STATUS Menu Text Display

Four lines of text will appear on the STATUS Menu Text Display. Use the “Right” key to advance the selection arrow (“>”) through the options of the STATUS Menu. Press the “Enter” key to select the desired option. Use the “Left” key to return to the “MAIN UV System Text Display”.

After selecting the desired STATUS Menu option, a brief description will appear on the Text Display. Press the “Left” key to return to the STATUS MENU. Failing to press any “Function Keys” within a couple minutes will automatically revert the Text Display back to the MAIN UV System Screen.

---



### STATUS Menu Text Display Options

#### Lamp Status

Displays the current On/Off status of lamps 1 through X. 0 = OFF, 1 = ON. For example, a “four lamp” UV system’s lamps are identified on the bottom of the screen in ascending order from right > left. The display example shown here indicates all lamps are in operation, except for lamp 3.

---



#### Lamp Hours

Displays the current “total” operating hours of each lamp, six per screen. Each lamp’s status is checked once an hour and “Total” operating hours are incremented by a factor of one. Here, all four lamps show one hour of operation.

---



#### UV% Lo Setting

Displays the active UV low set-point as well as the actual UV % intensity. XXX shown here is an operator editable UV% parameter accessible through the SETUP screens. YYY is the actual UV % intensity reading taken from the sensor probe positioned on the UV vessel. The actual UV % intensity (YYY) is updated continuously.





### Voltage Range

Displays the Factory-set “Low - Hi” Voltage set-points as well as the actual input voltage (YYY/incoming AC voltage). The UV System will not operate properly if operated outside the Voltage set-point range. Damage may incur to ballasts and lamps if the UV System is operated outside of the Voltage set-point range. DO NOT OPERATE THE UV SYSTEM UNDER “OUT OF RANGE” CONDITIONS.



### Temperature Hi (optional)

Displays the Factory set UV Vessel “Hi Water Temperature” and “Box (Power Supply Enclosure) “Hi Air Temperature” set-points. Both the “actual” vessel’s water and the enclosure’s air temperature (YYY) are displayed.

## SETUP Menu Text Display

The following options appear on the SETUP Text Display. Four lines of text are viewed on the screen at a given time. Use the “Right” key to advance the arrow (“>”) through the SETUP options. Use the “Enter” key to select the desired SETUP option. Use the “Left” key to return to the MAIN UV System Text Display. Use the “Enter” key to select the desired SETUP option.



### SETUP Options

- 1.) Reset Hour Counter
  - 1A.) Rest Master Counter
  - 1B.) Reset Single Lamp
  - 1C.) Reset All Lamps
- 2.) Scale UV
- 3.) Set UV Low Alarm

The following are brief descriptions of SETUP options. Press the “Left” key to return to the SETUP Menu Text Display for list of options. Once the Text Display returns to the SETUP Menu, press the “Left” key again to return to the MAIN UV System Text Display. If a command is not initiated by using either key within a couple of minutes the system will automatically revert to the MAIN UV System Text Display.

## Initializing Commands/Settings

Use the “Right” key (“>”) to change increment numbers by a factor of one and change NO to YES and YES to NO. The “Big Left” and “Big Right” arrow keys will increment or decrement numbers by a greater amount. Pressing the “Enter” key will accept your adjustments, then return you to the SETUP Menu Text Display.





## SETUP Menu Text Display Options

### RESET Master Counter

Resets the “Master” hour counter. Press the “Right” key to select “Yes”, then press the “Enter” key to complete the command. To exit without making an adjustment select “Left”, this will return you to the SETUP Menu Text Display.

---



### RESET Single Counter

Resets individual lamp hours. Use the “Right” key to select the desired lamp to reset. Press “Enter” to complete the command. To exit without making an adjustment select “Left”, this will return you to the SETUP Menu Text Display.

---



### RESET All Lamp Counters

Resets all lamp hour counters by pressing the “Right” key and selecting YES. Press the “Enter” key to complete the command. To exit without making an adjustment select “Left”, this will return you to the SETUP Menu Text Display.

---



### SCALE UV% (optional)

Resets the UV Intensity Scale. The actual scale is shown on the screen in the numeric display window. Adjust the UV sensor probe (located on the UV vessel) to the desired distance for a 100% reading. When the distance is set, press the “Enter” key and the UV Intensity reading will be scaled to read 100%. To exit without making an adjustment select “Left”, this will return you to the SETUP Menu Text Display.

---



### ALARM UV% LOW (optional)

With the UV Intensity (UV 100%) scaling complete, a “Low Alarm” set-point may be set. Use the “Right” key, “Big Left” keys and “Big Right” keys to select desired “Low Alarm” set-point, then press “Enter” to complete the command. To exit without making an adjustment select “Left”, this will return you to the SETUP Menu Text Display.

## ALARM Menu Text Display

The ALARM Menu Text Display uses a “blinking border” to better alert the operator from a distance. The following ALARM Messages appear on the Text Display. Below, a brief description accompanies each ALARM message.

Upon reaching the ALARM Text Display, pressing the “Right” key will advance the operator through additional ALARM screens if more than one ALARM has been activated. Pressing “Enter” will acknowledge the ALARM which will not re-occur after 5 minutes. If no keys are pressed within a couple of minutes the system will automatically return to the MAIN UV System Text Display. All system checks are conducted from the MAIN UV System Text Display and alarms will not re-display until the MAIN UV System Text Display is active.



### ALARM Menu Text Display Messages

#### TEMP Sensor Alarm (optional)

If the water temperature sensor cable is interrupted/disconnected the entire UV system will shutdown and activate an alarm. The PLC Controller must be powered off to reset the system and to restore lamp field operation.



#### VOLTAGE Over Alarm

Identifies that the actual input voltage has exceeded the Factory “High Voltage” Set-Point. DO NOT OPERATE THE UV SYSTEM WHEN THIS ALARM IS ACTIVATED. HIGH VOLTAGE CAN DAMAGE BALLASTS! This alarm turns off the UV lamp(s) and can only be reset by turning the UV System off briefly, then turning it back on.



#### VOLTAGE Under Alarm

Identifies that the actual input voltage has fallen below the Factory “Low Voltage” Set-Point. DO NOT OPERATE THE UV SYSTEM WHEN THIS ALARM IS ACTIVATED. LOW VOLTAGE CAN AFFECT UV OUTPUT! This alarm turns off the UV lamp(s) and can only be reset by turning the UV System off briefly, then turning it back on.



#### ULTRAVIOLET % Under Alarm (optional)

Is activated when UV Intensity has fallen below the operator set “Low” Set-Point. This alarm will re-occur after 5 minutes.



### LAMP Failure Alarm

Identifies that a lamp has failed. The failed lamp number is displayed on the screen. The failed lamp should be replaced within 24 hours or the alarm will reactivate. An investigation should be performed to reveal the cause (water-damage, ballast or lamp) of the failure. After replacing the failed lamp the operator must reset the individual lamp hour counter using "RESET Single Counter" on the SETUP Menu Text Display.

---



### Lamp End of Life Alarm

Identifies that the lamp(s) have reached their end of useful lamp life cycle (9,000 hours of continuous operation). Lamps should be replaced at this time as their UV output has degraded below the lamp manufacturer's suggested minimum. After replacing a lamp the operator must reset the individual lamp hour counter using "Reset Single Counter" or if all lamps are changed out, use "Reset All Lamp Counter" with both of these reset options made on the SETUP Menu Text Display.

---



### Water Temperature OVER Alarm (optional)

Identifies that the water temperature inside the UV vessel has exceeded the Factory High set-point. This alarm, when activated, turns all UV lamps off and can only be reset by turning the UV System off briefly, then turning it back on. This alarm is triggered by over-heating inside the UV vessel that may be a result of an absence of water inside the vessel or identifying a "no-flow" occurrence.

---



### Enclosure Temperature OVER Alarm

Identifies that the interior of the UV System's Power Enclosure has exceeded the Factory-Set Box/Enclosure Set-point. This alarm, when activated, turns all UV lamps off and can only be reset by turning the UV system off briefly, then turning it back on. This alarm is triggered by the air temperature inside the Power Enclosure exceeding 140° F that may be the result of dirty/clogged air cooling fan filter pads.

---



### UV Lamp Field Off Due to Remote Start or Cover Removal Alarm (optional)

If the cover switch or remote start option is installed on your system the following message will overlay the main screen whenever the cover is off or the remote start is off. This is to alert the user to the reason the lamps may be off and to remind them to replace the cover when completing maintenance.



## Section Ten: MAINTENANCE

### 10.1 Routine Inspection

The following are required routine maintenance actions:

- A. Daily inspection of the UV Systems power supply enclosure control panel (Basic Control or PLC models) should be performed, confirming that the unit is operating satisfactorily (lamp operation).
- B. Daily visual inspection of the UV vessel and piping for leakage should be performed.
- C. Monthly inspection for damage/corrosion should be performed.
- D. Vessel interior inspection/cleaning should be performed annually.
- E. Quartz sleeve inspection/cleaning, rubber o-ring replacement (suggested every six months)
- F. Lamp replacement (after 9,000 hours of continual operation).
- G. Cooling Fan Filter Mat cleaning/replacement (monthly, more frequently in dusty environments)
- H. Sensor calibration (if applicable)

### 10.2 UV Lamp Replacement

#### 10.2.1 Lamp Removal

##### Purpose

To replace expired UV lamp(s)

##### Frequency

A complete set of UV lamps must be replaced after 9,000 hours of continual use (manufacturer's suggested useful lamp life rating) or when the UV Intensity is lower than the PLC threshold value.

##### Parts and Equipment Required

- UV Lamp(s)
- Adjustable Wrench
- Wire Cutters
- Clean Cotton or Silicon Gloves
- Personal Safety Equipment



General risk due to pressurized piping and UV vessel!



General risk due to electricity!



DO NOT operate UV Lamp(s) outside of the vessel. UV light may cause severe irritation/damage to eyes and skin.



UV lamp(s) become hot during operation. Handle with care.



UV Lamps are fragile and potentially dangerous if broken. Handle with care.

---

##### Procedure

Read and understand this chapter prior to performing lamp change-out

**Note:** Use clean cotton or silicon gloves when handling the UV lamp(s). Skin oils absorb ultraviolet light and reduce UV intensity. Skin oils may also lead to premature lamp failure.

---

1. Turn off Power Supply Enclosure by using the External ON/OFF Switch and unplug UV system from electrical outlet.

2. With an adjustable wrench loosen (not remove) the Lamp Cable Adapter Nut that will allow the complete Lamp Cable Adapter fitting to be unthreaded from the Quartz Sleeve Retaining Nut without twisting the lamp cable.



3. Unthread the Cable Adapter Fitting from the Quartz Sleeve Adapter Nut.



4. Carefully slide the lamp cables Adapter Fitting and lamp out of the quartz sleeve (through the Quartz Sleeve Retaining Nut). With part of the UV lamp outside of the vessel, disconnect the lamp cables 4-Pin Connector from the UV lamp. Use caution connecting/disconnecting UV lamps in vessels mounted vertically. Avoid dropping lamps into and breaking the quartz sleeve(s).  
*UV Lamps may be hot, handle with care.*



5. With the lamp disconnected from the 4-Pin Connector, carefully slide the lamp out of the quartz sleeve and place in a safe location to avoid breakage.

## 10.2.2 UV Lamp Recycling

Emperor Aquatics, Inc. offers a "Hazardous Waste Disposal Service" for Mercury Vapor UV Lamps. This service is intended to provide our customers with disposal service in compliance with State and Federal standards. This service may be utilized by our customers who are environmentally responsible or legally required. Your Emperor Aquatics, Inc. Sales Representative can assist you with this service.



## 10.2.3 Lamp Installation

See Section 6.4 for UV Lamp installation procedure.

## 10.3 Quartz Sleeve Replacement/Cleaning

### 10.3.1 Quartz Sleeve Removal

#### Purpose

To clean or replace dirty or broken quartz sleeve(s) in order to maintain required/expected UV intensity.

#### Frequency

Quartz Sleeve(s) should be removed, inspected and cleaned at least once annually (water quality conditions may warrant more frequent inspections/cleaning). Fouled quartz sleeves absorb UV light and therefore may reduce the UV intensity.

## Parts and Equipment Required

- Quartz Sleeve(s)
- Quartz Sleeve Retaining Nut O-Ring
- 1.5" Socket Wrench or supplied EA Quartz Sleeve Tool
- Clean Cotton or Silicon Gloves
- Personal Safety Equipment



General risk due to pressurized piping and UV vessel!



General risk due to electricity!



Quartz Sleeves are fragile and potentially dangerous if broken. Handle with care.

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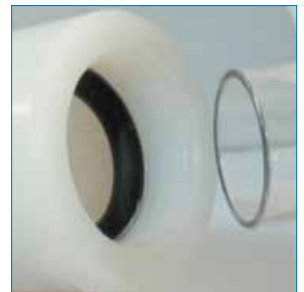
## Procedure

1. Turn off the Power Supply Enclosure by using the external ON/OFF Switch and unplug UV system from electrical outlet.
2. Drain the vessel completely.
3. Remove UV lamp(s). See Section 10.2.1 Removal

4. Thread the Quartz Sleeve Retaining Nut onto the Quartz Sleeve Module and tighten using a 1.5" socket wrench or the supplied EA Quartz Sleeve Tool (shown). Tighten down until snug (5 ft/lb). Over-tightening can break the Quartz Sleeve Module and potentially the Quartz Sleeve. The quartz sleeve is now properly assembled.



5. Wearing clean cotton or silicon gloves gently slide the quartz sleeve from the UV vessel. DO NOT use pliers or any tools that may break the quartz sleeve. Place quartz sleeve on a safe, level surface to avoid breakage.



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**Note:** CUP LPHO models use a Quartz Sleeve O-Ring and CUP Amalgam models use a Quartz Sleeve Rubber Gasket. See Section 6.3

---

6. Continue removing the quartz sleeves until all are removed from the vessel.



7. Inspect all quartz sleeves for cracks, chips and scaling. If required, clean the quartz sleeve(s). See Section 10.4.2 Quartz Sleeve Cleaning. Replace damaged (cracked, chipped) quartz sleeves.
-



## 10.3.2 Quartz Sleeve Cleaning

### Purpose

To manually check and clean quartz sleeve(s).

### Frequency

When required, at least once annually.

### Parts and Equipment Required

- Cleaning Agent (dish detergent, soporific or muriatic acid)
- Acid-Proof Bucket
- Clean Cloth
- Acid-Proof Drop Cloth
- Clean Cotton or Silicon Gloves
- Freshwater
- MSDS Sheet
- Personal Protective Equipment



General risk due to pressurized piping and UV vessel!



General risk due to caustic cleaning agent!



Quartz Sleeves are fragile and potentially dangerous if broken. Handle with care.

### First Aid Measures:

In case of skin exposure to cleaning agent remove by washing with soap and water immediately.

In case of eye exposure to cleaning agent wash eyes for several minutes with water and contact a physician immediately.

In case of ingestion of cleaning agent contact physician immediately.

---

### Procedure

1. See Section 10.4.1 for quartz sleeve removal.
  2. Inspect quartz sleeve and clean as needed with a soft, clean cloth and mild dish detergent.
  3. For calcium deposits use soporific or muriatic acid to dissolve/clean deposits.
  4. Rinse quartz sleeve thoroughly with clean freshwater.
  5. See Section 6.3 for quartz sleeve installation.
- 

## 10.3.3 Quartz Sleeve Installation

See Section 6.3 for quartz sleeve installation procedure.

## 10.4 UV Vessel Cleaning

### Purpose

Over a period of time, dissolved matter can build up on the surface of the quartz sleeves and the interior of the vessel affecting the efficiency of the UV disinfection process. Due to fouling, the available intensity will decrease continuously (Note: The use of the optional wiping system merely helps to decrease the frequency of the manual cleaning cycle). Please be aware that such a decrease also may be caused by ageing of the UV lamps or changes in the water quality (UV transmission). Repeat of visual inspections of the UV Sensor or of some example quartz sleeves will help to determine the necessary cleaning intervals needed. The removal of this build-up (calcium, etc.) can be carried out with a cleaning pump. A cleaning agent based upon phosphoric acid like citric acid or commercially available cleaners such as Lime-A-Way or CLR may be used. Materials within the vessel chamber are highly resistant against these chemicals.



## Frequency

When necessary.

## Parts and Equipment Required

- Cleaning Agent (dish detergent, acid cleaning agent based upon phosphoric acid (>25%) or commercially available cleaners such as: Lime-A-Way or CLR in a sufficient quantity to fill the vessel)
- Acid-Resistant Transfer Pump
- Acid-Resistant Hose (used to transfer the cleaner from the container to the UV vessel)
- Fittings to connect to vessel
- Acid-Resistant Bucket
- Clean Cloth
- Acid-Resistant Drop Cloth
- Clean Cotton or Acid-Resistant Gloves
- Freshwater
- MSDS Sheet
- Personal Safety Equipment



General risk due to pressurized piping and UV vessel!



General risk due to caustic cleaning agent!



Quartz Sleeves and UV lamps are fragile and potentially dangerous if broken. Handle with care.

### First Aid Measures:



In case of skin exposure to cleaning agent remove by washing with soap and water immediately.

In case of eye exposure to cleaning agent wash eyes for several minutes with water and contact a physician immediately.

In case of ingestion of cleaning agent contact physician immediately.

---

## Procedure

1. With the quartz sleeves still installed in the UV vessel, turn off the Power Supply Enclosure with the External ON/OFF Switch and unplug the UV system from the electrical outlet.
  2. Isolate the UV vessel from the water flow using the required isolation valves and drain the vessel completely.
  3. Clear the work area and layout protective drop cloths under the UV vessel.
  4. Set up the acid transfer pump and attach the acid input hose to the vessel's water drain valve.
  5. Attach an acid return/overflow hose to the UV vessel's upper auxiliary service port and route it back to the acid-resistant bucket. This will be used as the Acid Overflow Recovery Bucket.
  6. With all of the hoses attached to the UV vessel and the acid transfer pump attached to the acid supply container, pump acid into the UV vessel until full.
  7. Once the UV vessel has been filled with acid, allow the acid to remain in the vessel for 30 minutes.
  8. Disconnect the acid transfer pump's vessel feed hose from the transfer pump and use this hose to drain the acid from the UV vessel through the vessel's drain valve and into an acid-resistant bucket.
  9. After all of the acid has been drained from the UV vessel and the cleaning procedure completed, rinse the vessel chamber thoroughly to avoid process water from coming in contact with the cleaning agent. The rinse water may be taken from a water tap with the help of a hose and filled and drained through the unit's drain valve port.
  10. Neutralize old cleaning agent with bases, e.g. sodium hydroxide solution, sodium carbonate solution in compliance with all relevant rules for accident prevention and local regulations.
-

## 10.5 Cooling Fan Filter Mat Replacement/Cleaning

### 10.5.1 Cooling Fan Filter Removal

#### Purpose

The Cooling Fan is equipped with a Filter Mat used to trap airborne particles and dust. This Filter Mat must be routinely inspected and if required, cleaned. A clogged Filter Mat reduces air circulation in and out of the enclosure, potentially allowing electrical hardware to over-heat. If damaged replace Filter Mat.

#### Frequency

Minimum every six months, but more routine inspections may be required due to increased airborne dirt/dust.

#### Parts and Equipment Required

- Slotted Screwdriver
- 

#### Procedure

1. Remove Cooling Fan cover to access Filter Mat.
  2. Remove Cooling Fan Filter Mat
- 

### 10.5.2 Cooling Fan Filter Cleaning

#### Purpose

To increase air circulation in and out of the enclosure. If damaged replace Filter Mat. A dirty Filter Mat may cause electronic ballast failure.

#### Frequency

Minimum every six months, but more routine inspections may be required due to increased airborne dirt/dust.

#### Parts and Equipment Required

- Compressed Air
  - Dish Detergent
- 

#### Procedure

Read and understand this chapter prior to cleaning Cooling Fan Filter Mat.

1. Remove dust from mat by blowing it out with compressed air or washing it out with soap and water.
  2. Dry mat, or use new replacement filter mat.
- 

### 10.5.3 Cooling Fan Filter Installation

#### Purpose

To replace cleaned or new Cooling Fan Filter Mat.

#### Frequency

Minimum every six months, but more routine inspections may be required due to increased airborne dirt/dust.

#### Parts and Equipment Required

- Slotted Screwdriver
- 

#### Procedure

Read and understand this chapter prior to cleaning Cooling Fan Filter Mat.

1. Place Cooling Fan Filter Mat into fan.
  2. Replace fan cover.
-



## Section Eleven: REPLACEMENT PART INVENTORY

SafeGUARD CUP Series UV Systems are available in two styles and they are: Low-pressure CUP High-Output and CUP Amalgam. Among these UV System styles, there are variations that include: vessel dimensions, port styles/sizes and controller/monitor options.

When contacting us for replacement parts for your UV system, we suggest you have the UV systems serial number readily available. The serial number can be found on both the Power Supply Enclosure and UV vessel.

Many of these systems are unique and knowing the serial number allows us to process your request/order quickly and accurately.

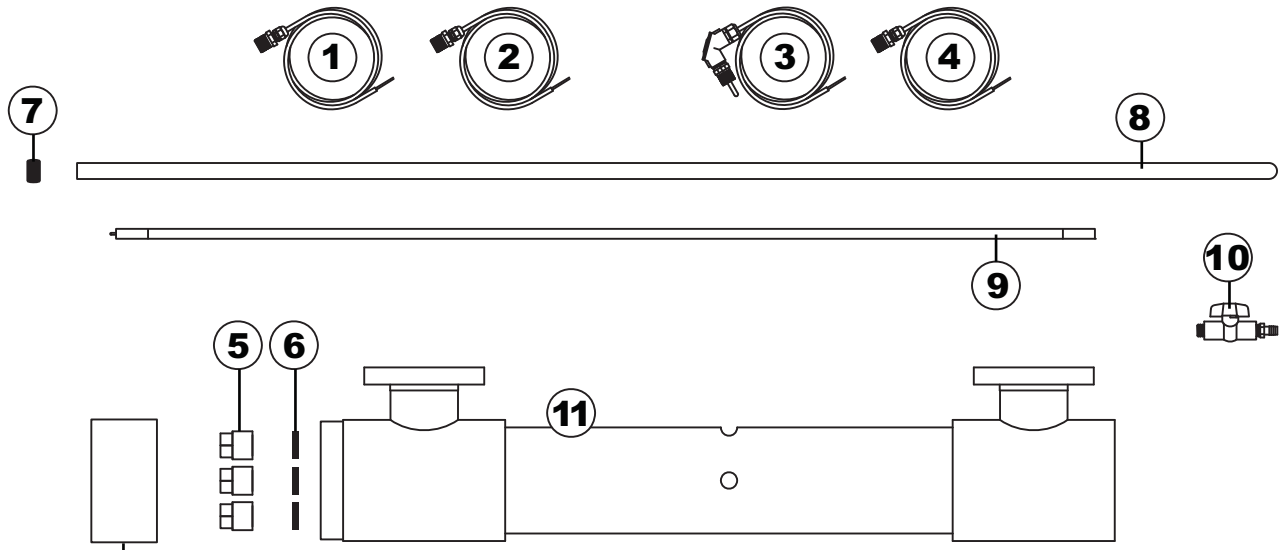
### 11.1 Quartz Sleeve & UV Lamp Matrix

CUP Series UV Systems are available with different size ports and use varying lengths of quartz sleeves. Below we match your CUP UV System with the correct quartz sleeve and UV lamp.

#### CUP Series Quartz Sleeve & UV Lamp Matrix

CUP Series	Vessel Diameter	Port Size	Quartz Sleeve Length	Quartz Sleeve Part number	UV Lamp Watts	UV Lamp CUP LPHO Part Number	UV Lamp CUP Amalgam Part Number
CUP4 / LPHO	6"	2"	46.5"	2031181	80	20080	-
CUP4 / LPHO	6"	3"	46.5"	2031181	80	20080	-
CUP4 / LPHO	6"	4"	46.5"	2031181	80	20080	-
CUP4 / LPHO	6"	6"	46.5"	2031181	80	20080	-
CUP4 / LPHO	8"	3"	50.875"	2031290	80	20080	-
CUP4 / LPHO	8"	4"	50.875"	2031290	80	20080	-
CUP4 / LPHO	8"	6"	50.875"	2031290	80	20080	-
CUP4 / LPHO	8"	8"	50.875"	2031290	80	20080	-
CUP4 / LPHO	10"	4"	50.875"	2031290	80	20080	-
CUP4 / LPHO	10"	6"	50.875"	2031290	80	20080	-
CUP4 / LPHO	10"	8"	55"	2031397	80	20080	-
CUP4 / LPHO	10"	10"	55"	2031397	80	20080	-
CUP6 / LPHO	6"	2"	75"	2031905	150	200150	-
CUP6 / LPHO	6"	3"	75"	2031905	150	200150	-
CUP6 / LPHO	6"	4"	75"	2031905	150	200150	-
CUP6 / LPHO	6"	6"	75"	2031905	150	200150	-
CUP6 / LPHO	8"	3"	75"	2031905	150	200150	-
CUP6 / LPHO	8"	4"	75"	2031905	150	200150	-
CUP6 / LPHO	8"	6"	75"	2031905	150	200150	-
CUP6 / LPHO	8"	8"	75"	2031905	150	200150	-
CUP6 / LPHO	10"	4"	75"	2031905	150	200150	-
CUP6 / LPHO	10"	6"	75"	2031905	150	200150	-
CUP6 / LPHO	10"	8"	75"	2031905	150	200150	-
CUP6 / LPHO	10"	10"	75"	2031905	150	200150	-
CUP4 / Amalgam	6"	2"	46.5"	2081181	130	-	200130
CUP4 / Amalgam	6"	3"	46.5"	2081181	130	-	200130
CUP4 / Amalgam	6"	4"	46.5"	2081181	130	-	200130
CUP4 / Amalgam	6"	6"	46.5"	2081181	130	-	200130
CUP4 / Amalgam	8"	3"	50.875"	2081290	130	-	200130
CUP4 / Amalgam	8"	4"	50.875"	2081290	130	-	200130
CUP4 / Amalgam	8"	6"	50.875"	2081290	130	-	200130
CUP4 / Amalgam	8"	8"	50.875"	2081290	130	-	200130
CUP4 / Amalgam	10"	4"	50.875"	2081290	130	-	200130
CUP4 / Amalgam	10"	6"	50.875"	2081290	130	-	200130
CUP4 / Amalgam	10"	8"	55"	2081397	130	-	200130

CUP Series	Vessel Diameter	Port Size	Quartz Sleeve Length	Quartz Sleeve Part number	UV Lamp Watts	UV Lamp CUP LPHO Part Number	UV Lamp CUP Amalgam Part Number
CUP4 / Amalgam	10"	10"	55"	2081397	130	-	200130
CUP6 / Amalgam	6"	2"	75"	2081905	260	-	200260
CUP6 / Amalgam	6"	3"	75"	2081905	260	-	200260
CUP6 / Amalgam	6"	4"	75"	2081905	260	-	200260
CUP6 / Amalgam	6"	6"	75"	2081905	260	-	200260
CUP6 / Amalgam	8"	3"	75"	2081905	260	-	200260
CUP6 / Amalgam	8"	4"	75"	2081905	260	-	200260
CUP6 / Amalgam	8"	6"	75"	2081905	260	-	200260
CUP6 / Amalgam	8"	8"	75"	2081905	260	-	200260
CUP6 / Amalgam	10"	4"	75"	2081905	260	-	200260
CUP6 / Amalgam	10"	6"	75"	2081905	260	-	200260
CUP6 / Amalgam	10"	8"	75"	2081905	260	-	200260
CUP6 / Amalgam	10"	10"	75"	2081905	260	-	200260
CUP6 / Amalgam	12"	6"	75"	2081905	260	-	200260
CUP6 / Amalgam	12"	8"	75"	2081905	260	-	200260
CUP6 / Amalgam	12"	10"	75"	2081905	260	-	200260
CUP6 / Amalgam	12"	12"	75"	2081905	260	-	200260
CUP6 / Amalgam	14"	6"	75"	2081905	260	-	200260
CUP6 / Amalgam	14"	8"	75"	2081905	260	-	200260
CUP6 / Amalgam	14"	10"	75"	2081905	260	-	200260
CUP6 / Amalgam	14"	12"	75"	2081905	260	-	200260
CUP6 / Amalgam	14"	14"	75"	2081905	260	-	200260
CUP6 / Amalgam	16"	8"	75"	2081905	260	-	200260
CUP6 / Amalgam	16"	10"	75"	2081905	260	-	200260
CUP6 / Amalgam	16"	12"	75"	2081905	260	-	200260
CUP6 / Amalgam	16"	14"	75"	2081905	260	-	200260
CUP6 / Amalgam	16"	16"	75"	2081905	260	-	200260
CUP6 / Amalgam	18"	10"	75"	2081905	260	-	200260
CUP6 / Amalgam	18"	12"	75"	2081905	260	-	200260
CUP6 / Amalgam	18"	14"	75"	2081905	260	-	200260
CUP6 / Amalgam	18"	16"	75"	2081905	260	-	200260
CUP6 / Amalgam	18"	18"	75"	2081905	260	-	200260
CUP6 / Amalgam	20"	12"	75"	2081905	260	-	200260
CUP6 / Amalgam	20"	14"	75"	2081905	260	-	200260
CUP6 / Amalgam	20"	16"	75"	2081905	260	-	200260
CUP6 / Amalgam	20"	18"	75"	2081905	260	-	200260
CUP6 / Amalgam	20"	20"	75"	2081905	260	-	200260
CUP6 / Amalgam	24"	14"	75"	2081905	260	-	200260
CUP6 / Amalgam	24"	16"	75"	2081905	260	-	200260
CUP6 / Amalgam	24"	18"	75"	2081905	260	-	200260
CUP6 / Amalgam	24"	20"	75"	2081905	260	-	200260
CUP6 / Amalgam	24"	24"	75"	2081905	260	-	200260



**Note: This is not a removable part.**

## 11.2 Replacement Parts

1. UV Sensor	.....	.20214
2. UV Sensor Extension Cable	.....	.20214-EXTCABLE
3. Temperature Sensor	.....	.20217
4. Temperature Sensor Extension Cable	.....	.20217-EXTCABLE
5. Quartz Sleeve Retainer Nut - 25mm	.....	.CL-QSR-25
or Quartz Sleeve Retainer Nut - 28mm	.....	.CL-QSR-28
6. Quartz Sleeve O-Ring (25mm for HO)	.....	.CL-QSROR-10P
7. Quartz Sleeve Gasket (28mm for Amalgam)	.....	.CL28QSRG-10P
8. Quartz Sleeve	.....	.SEE MAIN LABEL
9. UV Lamp	.....	.SEE MAIN LABEL
10. Drain Valve Assembly	.....	.SVP-DVA-1/2
11. UV Vessel		



## Section Twelve: TROUBLESHOOTING

SITUATION	INSPECT
UV system will not function with the External ON/OFF Switch in the "On" position	<ol style="list-style-type: none"><li>1. No Input Voltage Available</li><li>2. Temperature Sensor Cable Plug is Interrupted/Defective</li><li>3. Input Voltage is lower than the Factory Set Threshold (PLC models)</li></ol>
UV Lamp does not light	<ol style="list-style-type: none"><li>1. Faulty Contact (four-pin connector/lamp pins)</li><li>2. Defective Electronic Ballast</li><li>3. Defective UV Lamp</li><li>4. Water Damage due to Quartz Sleeve Seal Failure</li></ol>
UV Intensity too low	<ol style="list-style-type: none"><li>1. Decreased UV Transmissibility</li><li>2. UV Lamp reached "End of Life"</li><li>3. Quartz Sleeve Fouled</li><li>4. Faulty UV Sensor</li></ol>
Enclosure Over-Heating	<ol style="list-style-type: none"><li>1. Ambient Temperature above 145° F</li><li>2. Defective Thermal Switch</li><li>3. Cooling Fan Filter Mat needs to be cleaned</li><li>4. Defective Cooling Fan</li></ol>
Lamp LED "OUT" (Basic Control Models)	<ol style="list-style-type: none"><li>1. Defective Electronic Ballast</li><li>2. LED Connection Interrupted</li></ol>
Quartz Sleeve Seal Failure	<ol style="list-style-type: none"><li>1. Cracked/Broken Quartz Sleeve</li><li>2. Failed Quartz Sleeve Retaining Nut O-Ring Seal</li></ol>



## Section Thirteen: WARRANTY

### 13.1 Warranty

Emperor Aquatics, Inc. warrants to the original purchaser, its UV System to be free from defects in workmanship or materials for a period of (1) year from the original date of purchase on the power supply and all gasket seals. A three (3) year warranty on the UV system's plastic vessel due to failure of the plastic from UV light exposure. Water leaks caused by failing to follow proper assembly and protection procedures void warranty. There is a 90-day warranty on the UV lamp for electrical operation only. The UV lamp and the quartz sleeve are not warranted against breakage due to being made of glass. This warranty is only in effect provided that the equipment is installed in accordance with the factory instructions and recommendations and when operated within the environment and limitations for which it was designed. Should any of the integral parts of the unit become defective within their time constraints from the date of purchase, they will be repaired or replaced, if proven defective in workmanship or material in the opinion of the manufacturer, also not including damage by freezing or the reuse of gasket seals that are more than twelve (12) months old.

Any costs incurred for the labor or removing the unit shall be the responsibility of the original purchaser, as will be all shipping charges to and from Emperor Aquatics, Inc. factory. Damage or failure of any part of the UV System covered by this warranty, which results from causes, directly or indirectly connected with the installation, operation, environment, use or willful abuse; including, without limitation, improper packaging and damage incurred during shipping is not covered by this warranty. Otherwise, any implied warranties, which accompany the sale of these goods, are limited to their respective time constraints from the date of purchase. The manufacturer will only be responsible for the repair or replacement of any of its products or parts thereof that are found to be defective and will not bear the cost of any incidental or consequential damages arising out of the occurrence of such a defect.

### 13.2 Service and Repair

Your retailer or distributor is not an authorized service or repair center! If trouble develops, DO NOT take the unit back to your retail store. Instead, call Emperor Aquatics, Inc. at 610-970-0440 to discuss the problem. Then, if necessary, we will issue you an RMA number so you may return the unit to us for proper service. After being given an RMA number carefully pack the unit to avoid shipping damage. The return address will be provided to you when you receive your RMA number.

## **DO NOT RETURN ANY PRODUCT WITHOUT PRIOR AUTHORIZATION**

Insure your package prior to shipping it. Clearly indicate the problem you are having on a sheet of paper and place it in the package. Please DO NOT forget to give us your return address and a daytime phone number where you can be reached. Upon receipt of your unit, we will repair or replace the unit at no charge if the warranty is still in effect (proof of date of purchase will be required). We will call/send you an estimate of the cost of the repairs and it will require your authorization in order for us to proceed.







## PRODUCT REGISTRATION

**For your warranty to be valid you must submit a filled out information card or complete an online registration form within 30 days of purchase.**

(PLEASE PRINT)

Purchaser's Name: \_\_\_\_\_

Phone #: \_\_\_\_\_ Fax #: \_\_\_\_\_

Street Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Serial #: \_\_\_\_\_ Model #: \_\_\_\_\_ Purchase Date: \_\_\_\_\_

Email Address: \_\_\_\_\_

### How do you like our product?

We at Emperor Aquatics, Inc. take your comments about our products very seriously. Please take a few moments to answer these questions and return this form with your product registration.

1. Was this product packaged well? \_\_\_\_\_
2. Did you receive all of the parts and instructions with the unit? \_\_\_\_\_
3. Were the instructions easy to understand? \_\_\_\_\_
4. Were you satisfied with the quality of the product? \_\_\_\_\_
5. Are you satisfied with the products performance? \_\_\_\_\_
6. Would you recommend our products to someone else? \_\_\_\_\_
7. Where did you purchase the unit? \_\_\_\_\_
8. Application? \_\_\_\_\_

Send to:

 **EMPEROR AQUATICS, INC.**<sup>®</sup>  
**www.emperoraquatics.com**

RE: Product Registration  
Emperor Aquatics, Inc.  
2229 Sanatoga Station Road  
Pottstown, PA 19464





