# QU Series

## Water Vending UV Disinfection System

## *Installation, Operation and Maintenance Manual*

**KEEP THIS MANUAL ON HAND**

**IT IS IMPORTANT THAT THOSE RESPONSIBLE FOR THE INSTALLATION OF THIS EQUIPMENT, AS WELL AS THE OWNER/OPERATOR, READ THIS MANUAL AND CAREFULLY FOLLOW THE INSTRUCTIONS AND GUIDELINES**

MADE IN USA

UV SUPERSTORE

*One Source for All Your UV Needs!*

Dear Customer:

Thank you for selecting UV Superstore, Inc. to provide the equipment for your ultraviolet treatment needs. The QU Series is specifically intended for use in multiple water vending stations and/or for multiple water types. Your QU Series system reflects our broad experience in UV solutions for numerous applications and our commitment to quality craftsmanship. When properly installed and maintained, your UV Superstore, Inc. equipment will provide years of reliable service.

Please review the Installation, Operation and Maintenance (IOM) Manual carefully and keep it on hand for readily available assistance. UV Superstore, Inc. designs its models for service maintenance ease. The manual provides essential information to safely install and service your system.

UV Superstore, Inc. manufactures ultraviolet equipment with the highest quality components available. Your equipment has met thorough testing procedures ensuring the efficiency of your system. As with any equipment regular maintenance procedures are required. You will have to replace your UV lamps and other items from time to time. UV Superstore, Inc. offers a complete line of replacement parts, not only for your products, but for most lines of ultraviolet water treatment equipment. Please call us for details.

UV Superstore, Inc. has built an industry-leading reputation by providing a reliable and knowledgeable technical support team. We stand by ready to assist you in all of your UV water treatment needs. Please contact us with any questions you may have regarding your system.

Best regards,

**The UV Superstore, Inc. Team**

**820 Tucker Court**

**Winder, GA 30680**

**(p) 770.307.3882 (f) 770.307.3872**
**www.uvsuperstore.com info@uvsuperstore.com**

# Table of Contents

# SAFETY INSTRUCTIONS

In order to protect end users and operators from injury, safety precautions must be followed. This installation, operation and maintenance manual outlines important safety issues. The following **WARNING SYMBOLS** will be found throughout the manual to alert the end users to take important precautions:

## EYE PROTECTION

This symbol indicates that eye protection must be worn to protect from UV light as well as debris.

## HAND PROTECTION

This symbol signifies that hand protection must be worn to protect the lamps from skin oils as well as protect the operator from UV light and sharp materials caused by a broken lamp/ quartz.

## ELECTRIC SHOCK

This symbol signifies electrical shock possibility.

## CAUTION

This symbol indicates a potentially dangerous situation. Failure to adhere to this warning may lead to serious injury and/or death.

## INFORMATION

This symbol signifies helpful information.

# 1) Information

Please read this manual prior to installing, starting up and operating the equipment. The equipment uses the latest in UV technology, and has been designed to make operation and maintenance easy.

Your UV system needs to be maintained and does require annual replacement parts.
We recommend that key spare and replacement parts be kept on hand. For best operation, correct replacement parts are recommended. Incorrect replacement parts could result in damage to the system and void the warranty.

# 2) About Ultraviolet (UV) Disinfection

The technology uses UV light to target and disable disease-causing microorganisms pathogens).

Over 100 years ago, scientists discovered that if you exposed pathogens to UV light, their reproduction was limited. The UV light source they used resided in the UVC range of the light spectrum. Specifically, they discovered that light in the 254 nanometer (NM) range was the most effective wavelength for this process.

When many pathogens are exposed to UV light, their cells become damaged and this damage inhibits reproduction. The UV light, produced by a special UV lamp, damages the cell's DNA and RNA and once damaged, they are unable to replicate. This physical process renders them harmless. The amount of damage is a result of the intensity of the UVC output multiplied by the time the pathogens are exposed to the light. The applied dosage is commonly referred to as microwatts or millijoules and is often expressed as μWs/cm² or mJ/cm². Most residential applications require a UV dosage ranging from 16,000 up to 40,000 μWs/cm² or 16 up to 40 mJ/cm² depending on the desired flow rate.

*Why are more consumers selecting UV technology?*

a) UV is considered a green technology
b) No chemicals are added, so there is no need for chemical removal
c) No chemical storage
d) UV works instantly without requiring a residence time
e) Easy maintenance

*What are the limitations of UV technology?*

a) The quality of the liquid entering UV system needs to be monitored.
b) The UV system needs to be cleaned on a periodic basis based on liquid conditions.

## 3) Equipment Design

The QU Series models are designed for low-flow rates and for specification requirements listing alternatives to stainless steel wetted parts. The liquid passes through a quartz sleeve disinfection chamber. The ultraviolet lamp is located in close proximity to the furthest distance or outer wall of the quartz sleeve chamber. Units can be mounted vertically or horizontally.

The ultraviolet disinfection chamber is quartz material with removable gland nuts. The ends have CPVC threaded nipples, through which the quartz sleeve is inserted and then tightened by use of O-rings and gland nuts. The ultraviolet lamp is located outside the quartz sleeve. The inlet/outlet connections are ½ or ¾ inch FNPT and can be installed with liquid flow in either direction.

The QU Series is fully customizable and can be configured as a single pass system, 2 pass system, 3 pass system, or 4 pass system. The CPVC threaded nipples are held in place with locknuts and can be added or removed at will.

The QU Series enclosure is a powder-coated, galvanized steel enclosure with a removable top panel. The top panel has a lamp view port and is safety interlocked to de-energize power to the ultraviolet lamp when the top panel is removed. The electronics are situated on a removable tray located inside the enclosure, designed for quick removal/replacement for repair by field personnel.

## 4) Preparation for Installing UV System

***Before you begin, perform the following pre-installation steps:***

### *a) System Inspection*

Inspect ultraviolet unit and components. Flow rate must not exceed rated capacity.

### *b) Water Quality*

For optimum performance of your UV system, water quality is extremely important. Proper pretreatment is essential for the UV disinfection system to operate as intended.

UV disinfection dosages are dependent upon the quality and clarity of incoming water. Impurities in water can interfere with UV intensity and cause dosage to fall to unsafe levels. Have your water tested to determine it meets the standards in the below table. If any of the elements exceed the maximum levels shown in the table, contact your water professional for recommendations for proper pretreatment. All QU Series models are rated for a UV Transmission (UVT) rate of 95% or greater. If your UVT is less than 95%, contact your water professional.

The following table shows levels that are recommended for installation:

**Table 1**

| Element | Recommended Maximum Levels (1mg/L=1ppm) | Actual Value |
|---|---|---|
| Turbidity | <5 NTU | |
| Suspended Solids | <5 mg/l or 10 mg/l | |
| Color | None | |
| Iron | 0.3 mg/l | |
| Manganese | 0.05 mg/l | |
| pH | 6.5 to 9.5 | |
| Hardness | <120 ppm | |

### *c) Location Selection*

Select a location that meets the following guidelines:

- The disinfection unit can be installed either horizontally or vertically.
- Install the unit as close as possible to the point of use. Operating pressure should not exceed 125 PSI.
- **Temperature**—Inlet water temperature should not exceed 100°F. Ambient temperatures in the area surrounding the QU unit should be between 25-90°F.
- **Vibration**—The unit must be isolated from vibration. Vibration of ultraviolet equipment will damage lamps and lead to premature system failure. Potential vibration sources include heavy equipment, poorly connected pipes and erratic or improper pumps. A water hammer may cause O-ring failure. If your system is subject to water hammer conditions, we recommend that you install water surge suppressor.
- There must be enough clearance to remove the UV lamp and quartz sleeve for regular maintenance and replacement. It is recommended to leave enough clearance at one end equal to the overall length of the chamber plus 4" for removal of the quartz sleeve(s).

### *c) Environmental Issues relating to UV Lamps*

UV lamps need to be recycled like fluorescent lamps because they contain mercury. Please follow your local recycling laws. Please visit www.lamprecycle.org for help finding a recycling center in your area. In the event you are unable to find a disposal location, please contact manufacturer's representative.

### *d) System Sanitization*

Before the initial use of the unit, it is recommended to sanitize the system through all the discharge piping and fittings to the point(s) of use. Using a sanitizing solution to remove any existing contaminants will give the unit a "clean start". Once sanitized, turn on the unit and flush out the sanitizing solution with ultraviolet treated water.

# 5) Installation Procedures

The QU Series UV systems are designed to be installed in a vertical or horizontal position. The quartz sleeve can be removed from either end.

The unit should be mounted properly to support the base of the unit while eliminating possible strain on the mating pipe fittings. This system comes with four mounting holes. It is recommended when designing the plumbing schematic that the units are installed using a union, by-pass valve system on both the inlet and outlet connections.

## *a) Quartz Sleeve Installation*

Remove the gland nut(s) from each end of the disinfection unit. Slowly and carefully slide the quartz through the DPVC nipple until it protrudes beyond the nipples of both ends of the unit an equal distance. Place a lubricated O-ring over each end of the quartz, and push the O-ring back until it stops at the nipple.

Be very careful when installing the gland nuts over the quartz sleeve. Only tighten the gland nuts by hand. **NEVER USE PLIERS OR A CHANNELLOCK.** Gradually alternate tightening each end of the quartz sleeve. Fully tightening one end first may cause the quartz sleeve to shatter. Make sure as you tighten the gland nut that you maintain a clearance between the stop ridge machined in the gland nut and the edge of the quartz sleeve. Hand tightening will provide the required 125 PSIG seal.

After you have tightened the gland nuts and all other plumbing connections, open the outlet valve. Slowly open the inlet valve and flush out all remaining air. Then, close the outlet valve and slowly open the inlet valve fully, and check the unit for leaks. If you find a leak at the gland nut, tighten the nut further. If the leak continues, drain the unit and inspect the quartz O-ring and quartz for possible damage. Once you complete checking the unit, carefully reassemble O-ring, and tighten gland nut. Re-pressurize the unit and check again for leaks.

## b) *Lamp Installation*

**WARNING: DO NOT LOOK AT THE ULTRAVIOLET LIGHT WITH THE NAKED EYE. VIEW ONLY THROUGH ULTRAVIOLET PROTECTIVE GLASSES. ULTRAVIOLET LIGHT WILL CAUSE BURNING AND IRRITATION TO THE UNPROTECTED EYE.**

The UV lamp is very fragile. Do not handle it with bare hands. Use **clean cotton gloves or cloth** when handling lamp to keep it free of dust or fingerprints. If dust or fingerprints get on the lamp, wipe it with a clean cloth and denatured alcohol.

Insert the ultraviolet lamp into the lamp fixture. First insert one end of the ultraviolet lamp into the spring activated lamp socket. Next, place the other end of the ultraviolet lamp into the fixed lamp socket and allow the spring tension to hold the lamp in place. The ultraviolet lamp is now installed.

## c) *Sanitization Procedure*

It is recommended before the initial use of your UV disinfection system and after routine maintenance procedures, to sanitize your system to ensure that no organisms are present.

**NOTE: Always follow the sanitizing procedures required by applicable state or local laws.**

## *d) Installation of Additional Pass*

The QU series is designed to be a highly flexible unit with additional passes easily added for a higher flow rate, additional UV dosage, or in multiple vending applications, to disinfect a different type of water (flavored water, vitamin added water, etc.).

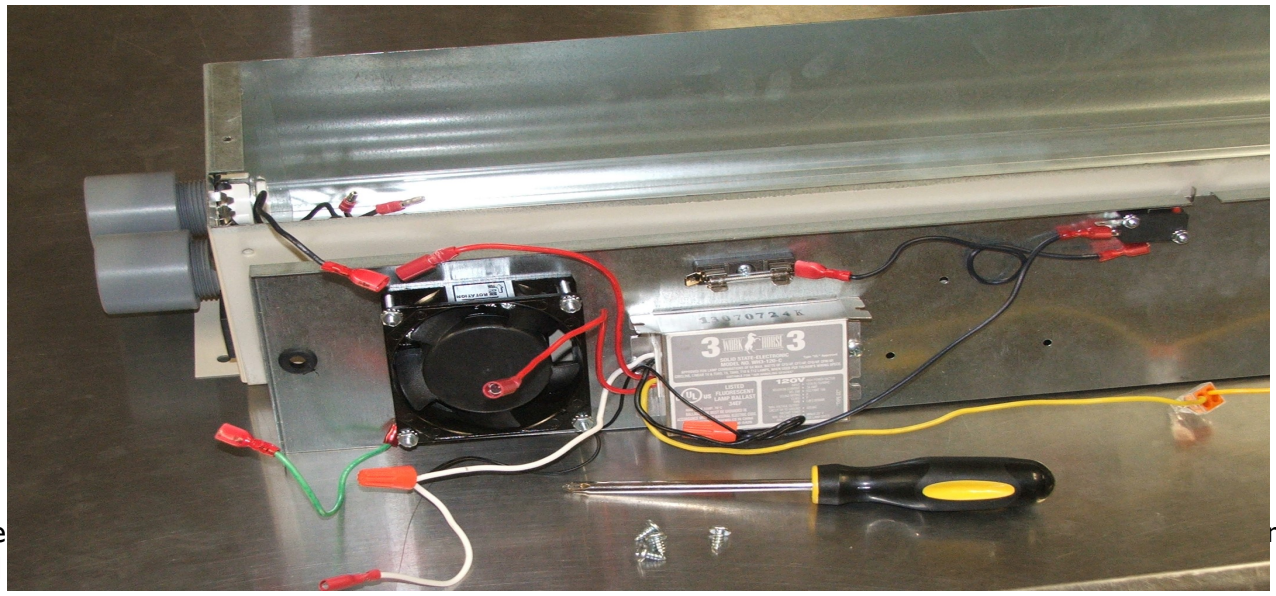
An additional pass kit consists of the following components: 2 Nipples, 2 Locknuts, 2 O-Rings, 2 Gland Nuts, and a Quartz Sleeve

The QU series comes with 4 pass holes pre-punched on both ends of the unit to accommodate up to four passes. To add a pass, unplug the power cord from the end of the unit, open the cover and remove the lamp, and set it aside in a safe place in order to avoid breaking the lamp when adding the pass. Choose a pair of holes and remove the hole plugs from the ends of the unit. Insert the nipples into the holes from the outside of the unit with the long end of the nipple facing outward until the stop on the nipple butts up to the outer case of the unit. Secure the nipple by tightening the locknut onto the short end of the nipple on the inside of the unit. If hand tightening the nipple is not enough to secure the nipple, gently tighten the locknut by tapping one of the tabs of the locknut with the end of a screwdriver. **Be careful to not over tighten the locknut as this can cause the nipple to break.** Once both nipples have been fastened into place, install the quartz sleeve following the directions provided in the Quartz sleeve installation section.

## ***High Output Lamp Option***

The QU series comes with a standard output (400ma) lamp. However, in keeping with the philosophy of having maximum flexibility, an optional high output (800ma) lamp is available for the QU series. If you initially ordered the QU with the high output option, no further wiring is needed.

If you desire to change the lamp from standard output to high output, or from high output to standard output, some wiring modification will be needed. The ballast used in the QU series will power either a standard output lamp (GS692) or a high output lamp (GS692HO). To power a standard output lamp, only one



mp, both red

For the high output lamp, both red wires with the female quick connect terminals coming out of the ballast need to be connected to the two black wires with the male quick connectors leading to the lamp socket.

The standard output lamp needs only one red wire connected to one black wire, the other pair should be tied off. ***Do not connect both red wires when using a standard output lamp. It will overdrive the lamp and cause premature failure.***

Remember that no wiring needs to be changed unless you are changing the type of lamp from the one that was provided with your unit.

# 6) Maintenance Procedures

## *a) General Information*

- **DISINFECT THE ENTIRE SYSTEM AFTER SHUTDOWN OR SERVICING.**
- **Keep a record of ultraviolet lamp replacement, quartz sleeve cleaning & replacement as well as O-ring replacement dates and servicing dates. A maintenance log has been provided in back of the manual.**

## *b) Ultraviolet Lamp Maintenance*

### *Replacement*

The ultraviolet lamps are rated to provide 9,000 hours of continuous use. After 9,000 hours the lamp hard glass sleeve will photo-chemically change and the lamp will not allow sufficient amount of the ultraviolet wavelength to destroy the bacteria. The **lamps should be replaced** when any one of the following conditions occurs: 9,000 hours of use have elapsed or 12 months have passed.

### *Cleaning*

If it becomes necessary to clean the lamp due to dust or fingerprints, the lamps can be cleaned with denatured alcohol. Use clean cotton gloves and a clean cloth when cleaning the lamps. Wait for lamps to cool before cleaning.

## *c) Quartz Sleeve Maintenance*

Significant film or debris deposits formed on the quartz sleeves will impair the ability of the ultraviolet rays to penetrate through the quartz and into the fluid. To a great extent, your frequency of cleaning will depend upon the water quality (i.e. amount of minerals present in the fluid). The more minerals present in the fluid the more frequently the quartz will require cleaning.

A periodic visual inspection of the quartz will be necessary to determine the frequency of cleaning. Initial inspection should take place after thirty (30) days of operation. If the quartz is dirty, shorten the cleaning intervals. If the quartz is clean, lengthen the cleaning intervals.

To clean quartz sleeves, depressurize the unit by first turning off the isolation valves on the inlet and then the outlet of the vessel. Remove the power cord from the unit. Remove the gland nuts and o-rings from the end nipples. Slowly and carefully slide the quartz sleeve(s) out either end. The quartz sleeves may be cleaned with denatured alcohol. If this is not adequate, a mild non-abrasive solution can be used.
**FRAGILE: Be careful when handling quartz.**

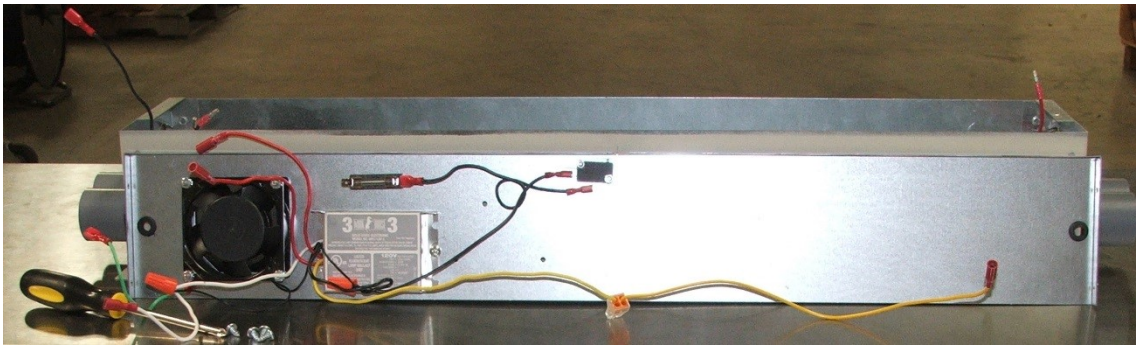
Whenever a quartz sleeve is cleaned, the quartz O-rings should be replaced. Install the quartz sleeves with clean cotton gloves.

## *d) Removable Electronics Tray*

The QU Series is equipped with a removable electronics tray for easy servicing. It can either be removed for easy access for repair, or to be replaced with another tray and the repairs done at another location.

**To remove the electronics tray:**

1. **Disconnect the power cord from the end of the unit.**
2. Remove the top cover from the unit.
3. Remove the four Phillips head screws holding the electronics tray to the ends of the QU unit.
4. Disconnect the quick connect terminals from the lamp sockets on either end of the unit. Remove the female spade terminal from the end of the fuse. The tray can be slowly lifted out, exposing spade terminals connected to the power cord housing. Remove the terminals connecting to the power cord housing, and the tray can be removed. **Caution!** Be sure to remove the power cord from the end of the unit. Voltages will be present on some terminals if the power cord is not disconnected!



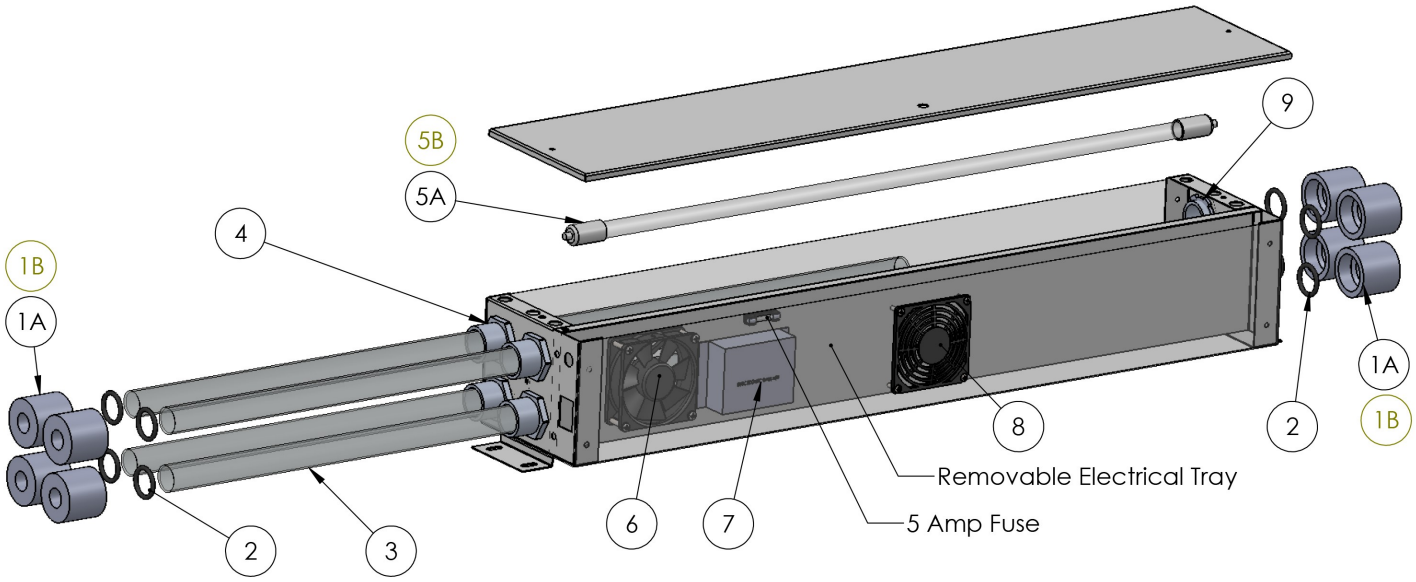
With the tray removed, internal parts are easily accessible. To replace the electronics tray is the reversal of removal.

**Warning – To guard against injury, basic safety precautions should be observed, including the following:**

1. **READ AND FOLLOW ALL SAFETY INSTRUCTIONS.**
2. **DANGER** – To avoid possible electrical shock, special care should be taken since water is employed in the use of this equipment. Do not operate any appliance if it has a damaged cord or plug, or if it is malfunctioning, or if it is dropped or damaged in any manner.
3. Always unplug an appliance from an outlet when not in use, before putting on or taking off parts, and before cleaning. Never yank cord to pull plug from outlet. Grasp the plug and pull to disconnect.
4. Do not use an appliance for other than intended use. The use of attachments not recommended or sold by the appliance manufacturer may cause an unsafe condition.
5. Read and observe all the important notices on the appliance.

# QU Series

## Replacement Parts List




| Item No. | Description | Part No. | Quantity Required | | | |
|---|---|---|---|---|---|---|
| | | | QU1 | QU2 | QU3 | QU4 |
| 1A<br>1B | Compression Nut—1/2”<br>Compression Nut—3/4” | 2-0252<br>2-0252-3 | 2<br>2 | 4<br>4 | 6<br>6 | 8<br>8 |
| 2 | Sleeve Cushion O-Ring | ORNG0009 | 2 | 4 | 6 | 8 |
| 3 | Quartz Sleeve, Open | G36-3184 | 1 | 2 | 3 | 4 |
| 4 | Aluminum Nipple | QUNP0001 | 2 | 4 | 6 | 8 |
| 5A<br>5B | Lamp—Standard Output<br>Lamp—High Output | GS692<br>GS692HO | 1 | 1 | 1 | 1 |
| 6 | Cooling Fan 120V | FAN0006 | 1 | 1 | 1 | 1 |
| 7 | Electronic Ballast, 120V | BLST0013 | 1 | 1 | 1 | 1 |
| 8 | Fan Filter | FANF0004 | 1 | 1 | 1 | 1 |
| 9 | Nipple Locknut | QU LOCKNUT | 2 | 4 | 6 | 8 |

# Limited Warranty

UV Superstore's QU Series Water Vending Water Treatment systems are provided with a limited warranty. These units carry a warranty to be free from defects in materials and workmanship for one year from date of purchase under the conditions of normal usage and service for the complete system and a four year warranty for the treatment chamber. If the product fails or malfunctions during the warranty period, UV Superstore shall inspect the inoperative product and have the option to repair or replace any components, which, in the assessment of UV Superstore were originally defective or became so under normal conditions of use and service. Customers must first call UV Superstore and be issued a Return Authorization number before returning any product or component. The equipment or component must be returned to UV Superstore freight prepaid and insured to the address below.

## Warranty Statement

UV Superstore warrants replacement lamps, purchased for routine maintenance, to be free from defects in material and workmanship for a period one year from the date of purchase. During this time, UV Superstore will repair or replace, at its option, a defective lamp free of charge except for shipping and handling charges and any prorated charges (where applicable).

The warranty period on replacement lamps will be verified using date codes and/or purchase receipts. UV Superstore will advise whether the defective item needs to be returned for failure analysis.

None of the above warranties cover damage caused by improper use or maintenance, accidents, acts of God or minor scratches or imperfections that do not materially impair the operation of the lamp. The warranties also do not cover products that are not installed as outlined in the applicable IOM Manual.

The limited warranties described above are the only warranties applicable to the lamps outlined. These limited warranties outline the exclusive remedy for all claims based on a failure of or defect in any of these lamps, whether the claim is based on contract, tort (including negligence), strict liability or otherwise. These warranties are in lieu of all other warranties whether written, oral, implied or statutory. Without limitation, no warranty of merchantability or of fitness for a particular purpose shall apply to any of these lamps.

UV Superstore, Inc. does not assume any liability for personal injury or property damage caused by the use or misuse of any of the above products. UV Superstore, Inc. shall not in any event be liable for special, incidental, indirect or consequential damages. UV Superstore liability shall, in all instances, be limited to repair or replacement of the defective product or part and this liability will terminate upon expiration of the applicable warranty period.

For all warranty claims you must contact UV Superstore at the below address. All claims must be filed within 30 days.

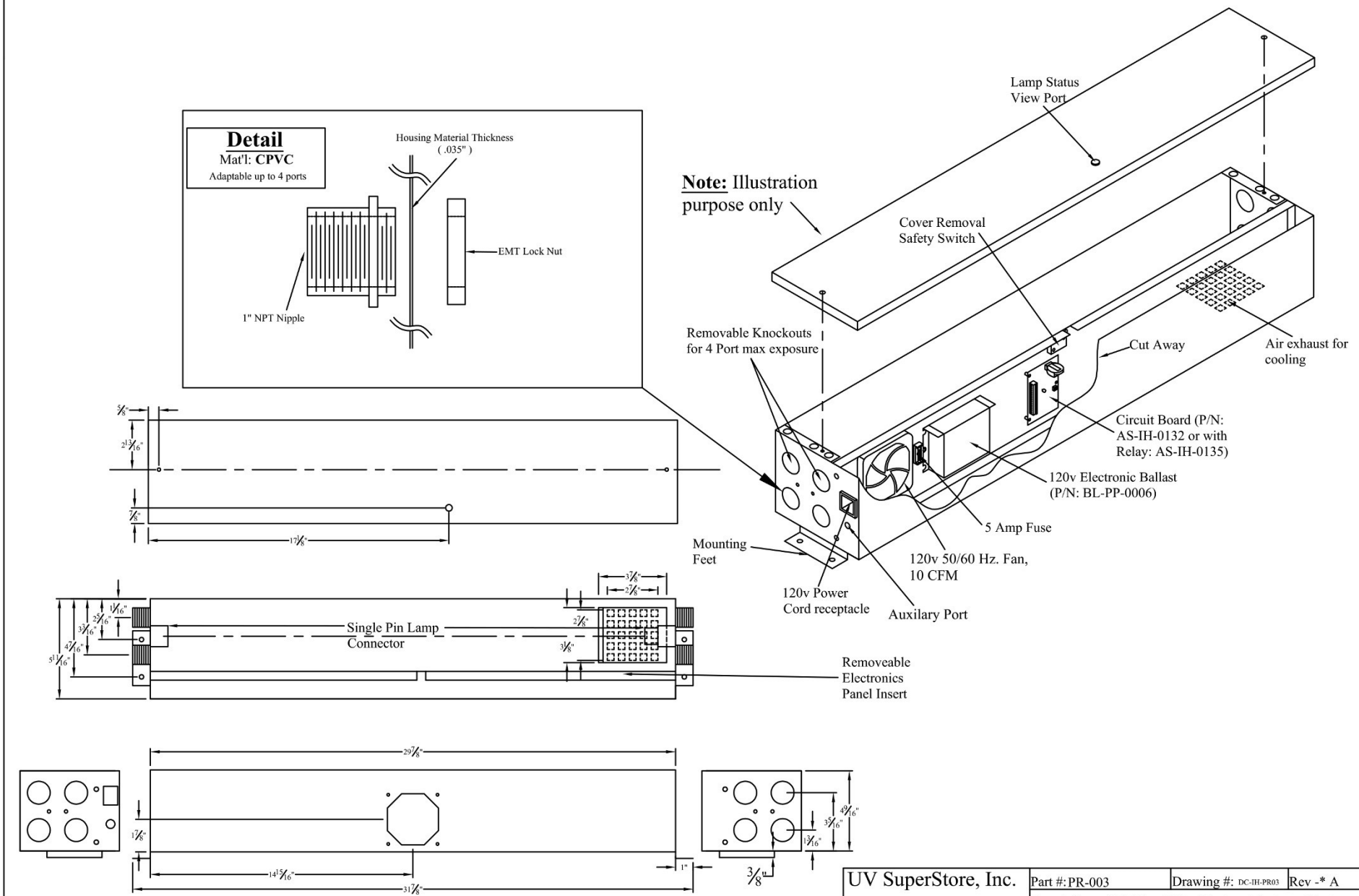
820 Tucker Court, Winder, GA 30680

**Phone: 770-307-3882**

**Fax: 770-307-3872**

**sales@uvsuperstore.com**

**www.uvsuperstore.com**

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| Part #: PR-003 | Drawing #: DC-IH-PR03 | Rev -* A |
|---|---|---|
| Description: Multi-Pass Water Treatment System, 4 Port max exposure. Fan cooled housing, and quick disconnect removable electronics tray. | | |
| Date: 6/04/08 | Scale: NTS | Creator: JSM |

**Maintenance Log**

You must perform routine maintenance in order to achieve optimum performance levels from your QU Series UV system. As you perform routine maintenance or necessary service on your system, record the dates in the maintenance log. The maintenance section of the IOM Manual provides instructions for servicing and maintenance procedures.

| Replace Lamp (every 9000 hours or every 365 days) | Clean Sleeve (as needed) | Replace Quartz Sleeve (every 3 years) | Replace O-Rings (with Quartz sleeve change) |
|---|---|---|---|
| | | | |
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| | | | |
| | | | |
| | | | |

Model Number

_____

Serial Number

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NOTES:


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