



Ultraviolet Disinfection Unit Installation and Owner's Manual

(PLEASE KEEP FOR PERMANENT REFERENCE)

READ THIS MANUAL

This manual covers installation, operation, and maintenance requirements for models E, EA, ES Series Ultraviolet Disinfection Units.

It is important that those responsible for installation of this equipment, as well as the owner/operator, read this manual and carefully follow the instructions and guidelines.

FUNCTION

The function of this ultraviolet disinfection unit is to provide in excess of 99% reduction of all water borne pathogenic (disease causing) bacteria.

MAXIMUM CONCENTRATION LEVELS BEFORE ULTRAVIOLET

Turbidity.....	5NTU	Suspended Solids.....	10.0ppm
Color.....	None	Iron.....	0.3ppm
Manganese.....	0.05ppm	pH.....	6.5ppm-9.5ppm

Important Note:

Pre-filtration equipment is recommended before the Ultraviolet Disinfection Unit.

GENERAL CONSIDERATIONS FOR ALL DISINFECTION UNITS

1. When installing the equipment, it is necessary that the unit be isolated from vibration, heavy equipment, and poorly connected piping.
2. Incoming water temperature to the unit should not exceed 35° minimum to 110° maximum degrees Fahrenheit.
3. The operating pressure should not exceed 100 psi.
- 4. Before putting the unit into final operation, follow sanitation procedures as outlined in this manual for proper disinfection. Sanitizing all discharge piping and fittings with household bleach from disinfection unit to point of use removes existing contaminants and gives the unit a “clean start.” Be sure to rinse with UV-treated water.**
5. A proper flow control must be used to insure only the designated flow through the unit.
- 6. It is highly recommended that a whole house “Filter Housing” be installed to the inlet of the UV Unit or before it. This installation will make it easier to sanitize the UV Unit and the water lines after the water leaves the UV Unit.**

INSTRUCTIONS FOR INSTALLING THE ULTRAVIOLET DISINFECTION UNIT

The UV is always placed after the pressure tank and any other type of treatment devices (*i.e.*, softeners, filters).

The Water Gem UV Series ultraviolet units are best mounted in a vertical position, with the inlet nipple located at the lower side of the chamber and the outlet nipple located at the topside of the chamber. The flow control retainer and flow control are installed in the outlet nipple. Use wall plugs with screws for sufficient support (not included).

If your piping system is subject to impulse pressure resulting in a “water hammer” condition, a surge tank or other means must be provided to remove this condition; otherwise, this extreme shock pressure condition may rupture or fracture the quartz sleeve.

Make all plumbing connections to allow for ease of service. Be sure to follow all local plumbing codes and UV restriction requirements where specified by local authorities.

This UV unit is designed to operate constantly and should not cycle on and off. It is recommended a trained technician install this unit.

The Water Gem UV System is a totally integrated UV system: each component, power supply, microprocessor and lamp assembly is specifically designed as a complete system.

- The Water Gem **E Series** is equipped with as electronic **ballast**, which has a LED, audible alarm & a reset button.
- The Water Gem **EA Series** is equipped with a **power supply control box** which operates on 120V. This unit also can accommodate a solenoid valve via the external power outlet located on the bottom right corner of the control box.
- The Water Gem **ES Series** is equipped with a **power supply control box w/UV intensity monitor**, which operates on 120V. This unit can also accommodate a solenoid valve via the external power outlet located on the bottom right corner of the control box.

Safety Precautions:

***Never troubleshoot this equipment while power is ON. Any maintenance performed should be done so with all power disconnected.** It is recommended this unit is installed and maintained by a trained technician.

WARNING: A UV hazard exists. **Always** protect eyes from ultraviolet light. **NEVER** look at UV lamps while in operation unless proper UV eye and skin protection is worn. Unplug or disconnect power before servicing. This unit is capable of operating on 120V.

WARNING: Make sure that input voltage provided to the system will be the same output voltage at the Solenoid Valve Power outlet connection located on the control box.

WARNING: A UV hazard exists. **Always** protect eyes from ultraviolet light. **NEVER** look at UV lamps while in operation. Unplug or disconnect power before servicing.

WARNING: Unit should only operate when installed. **DO NOT** operate the UV lamp outside of the vessel.

WARNING: In the event of accidental breakage of the ultraviolet lamp or after lamp replacement, please ensure the lamp is disposed of in accordance with local and state environmental laws regarding fluorescent lamps containing mercury.

Step By Step Installation:

****If installing a Water Gem ES Series UV System ONLY follow steps 1-3.***

1. Turn off the water before cutting into the water line.
2. Using the mounting brackets provided, secure unit to the wall in a **VERTICAL** position. Make sure to allow enough room to install, replace and clean the quartz sleeve and lamp. Installing a water shut-off valve before and after the unit is recommended to make servicing easy.
3. Install UV Ballast. **Skip this step if installing a Water Gem E Series UV System.*
EA Series Control Box (see page 4)
ES Series Control Box (see page 7-9)
4. After the unit and control box is mounted, install the lamp per instructions (see page 3).
5. Turn on the water slowly, check for leaks and repair as needed prior to full service operation.
6. After the unit is full of water and the ballast is properly connected, plug it into a grounded 120v outlet. Observe operation through the safety Site Port. The lamp will show a bright blue glow. If any problems are noted, consult general troubleshooting guide (see page 12).

****Note: We HIGHLY recommend plugging the UV ballast into a SURGE PROTECTOR!***

Installation of the UV Lamp:

****DO NOT POWER ON AT THIS TIME****

CAUTION: Never look directly at UV lamp while lit or operate a UV lamp outside the disinfection chamber.

Make sure unit is unplugged when installing or servicing UV lamp. Remove lamp and avoid allowing fingerprints and other debris to deposit. Plug the 4 pin connector, on the ballast, to the UV lamp. Care should be taken to be sure the lamp is tight on the connector. Carefully insert the lamp through the top gland nut down through the quartz sleeve inside the UV chamber.

Ultraviolet Lamp Maintenance Requirements:

The UV lamp is rated for 9,000 hours of continuous use. After this period of time, the UV lamp has undergone a photochemical change. While the lamp will not normally be burned out, the lamp no longer emits the 254nm short-wave UV to effectively kill bacteria. **Failure to replace the UV lamps every 9,000 hours or yearly may cause bacteriological breakthrough.** It is recommended that your water supply be tested periodically (yearly) through your local health department or approved certified laboratory.

Requirements for Cleaning the Quartz Sleeve:

As water passes through the UV, minerals, debris and other matter in the water may deposit onto the quartz sleeve. After sufficient film has formed on the quartz sleeve, the ability of the ultraviolet germicidal rays to pass through the quartz sleeve and into the water may be impaired. Therefore, it is necessary to determine a cleaning schedule for the quartz sleeve. The frequency will depend on the specific type of water conditions. If the water has been processed through deionization, reverse osmosis, or is distilled, cleaning may be required only once per year. If untreated water is used, the cleaning frequency will vary. A minimum of once yearly is standard recommendation for cleaning. Contact your local dealer for scheduling this service. Your specific situation will vary the frequency time according to the water quality of the home or facility application. *If the quartz becomes too dirty to clean, then replace it.

Quartz Sleeve Cleaning Procedures:

To clean the quartz sleeve, turn off the water flow to the disinfection unit, turn power off, and disconnect the electrical service to the lamp pins. Carefully remove the UV lamp. Loosen the compression nuts with O-rings and remove the quartz sleeve while draining the water from the chamber. The quartz sleeve may then be washed with a mild soap (ie: soft scrub bleach) and hot water solution and rinsed clean with hot water. Should this be insufficient to clean the quartz sleeve, a mild acid may be used. Be certain to follow all recommended safety and handling procedures on the acid container. It is important to handle the quartz sleeve with care to prevent breakage. Make certain that all fingerprints are wiped clean before reinstalling. (See installation of the quartz sleeve). Replace O-ring every time a quartz sleeve is cleaned or replaced.

Installation of the Quartz Sleeve:

Always handle quartz sleeves carefully to prevent breaking or chipping. The quartz sleeves are to be clean and free of fingerprints before installing. Denatured alcohol and cotton may be used for this.

The quartz sleeve is placed through the top opening stainless steel threaded nipple of the disinfection chamber and inserted all the way through until it rests on the quartz sleeve retainer located at the bottom of the chamber. Install the o-ring on the quartz sleeve. Thread the gland nut onto the stainless steel nipple, hand tighten only.

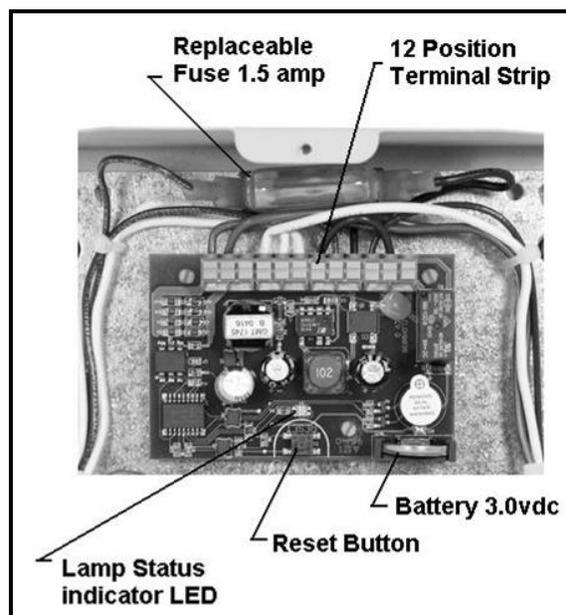
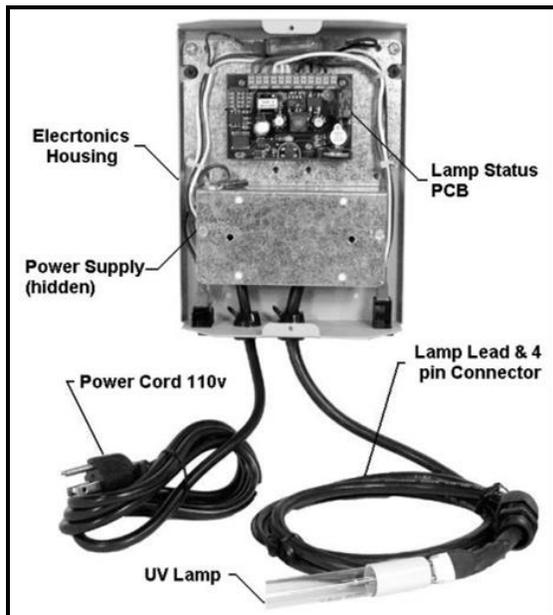
Electrical:

Electrical receptacles must be properly grounded for safe operation. **Improper grounding will void any warranty.** (When possible use a separate breaker to minimize voltage fluctuations and avoid accidental shut off)

****Note: We HIGHLY recommend plugging the UV ballast into a SURGE PROTECTOR!***

Installation for EA Control Box:

1. Determine a suitable location to install the Control Box. It will need to be within 6ft. of the lamp connection on the vessel. A 6ft. 110v power cord has been supplied and is attached to the control box. Mounting location should be of sufficient strength to support the control box otherwise reinforcement may be necessary.
2. Remove the cover from the control box.
3. Lift unit into place and fasten with four self- tapping screws.
4. Replace the cover on the control box.
5. Refer back to the **Step by step** instructions on page 2 and continue with steps 4-6.



Battery, UV lamp replacement and UV lamp counter reset:

For EA Series ONLY

Before power is applied to the unit – Complete step 1.

1. *Note: Complete this step ONLY if replacing the battery (battery replacement part # CR2032). **Make sure power is disconnected:** Remove the cover from the control box. Insert coin battery (+ side out, see drawing below) into battery holder on circuit board, **LED** should turn **RED** for approx. 10 seconds.

*If the LED does not turn **RED** rotate battery around while in holder. Check if the battery is in between the 2 conductors of the holder.

2. With the cover removed press down and hold the black **RESET** button, on the circuit board, for 10 seconds. The **LED** should turn **GREEN** while button is pressed and then turn off.

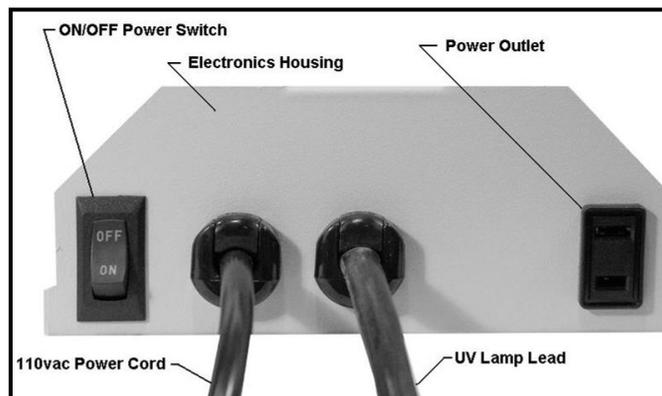
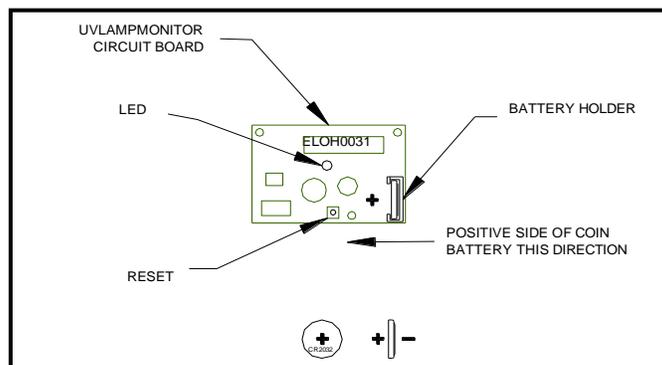
3. Release the black **RESET** button and the **LED** should return to **RED** for approximately 5 seconds and then turn off. You have now set the internal clock to zero insuring an accurate measurement of lamp life operating hours. The **LED** will turn **GREEN** and continue to operate once the power is turned ON.

Note: When replacing lamps after 9000 hours of operation (shut off power to the unit) only steps 2 & 3 will be required to set the clock back to 0 to begin counting the operating hours of the new lamp.

4. Install new lamp (see page 3).

5. Plug the power cord into a 120V wall outlet.

6. Replace cover, turn power switch ON and inspect operation. If any problems are noted, consult troubleshooting for EA Series (see page 6).



An LED indicator light located on the cover of the control box is provided to view the UV lamp Status.
A label on the cover of the unit provides UV hazard and Warnings.

Troubleshooting for EA Series ONLY:

In the unlikely event of a problem, please contact your local water treatment dealer directly.

Important information: It is a normal characteristic of all UV lamps to blacken around the filaments of the lamp. This does not signify the lamp is defective or not emitting Ultraviolet light.

The only time a UV lamp is defective is if it will not light. UV Lamps that illuminate will not qualify for Warranty.

Verify the unit has power 120vac.

Power cord is plugged in and you have power to the control box.

Lamp is securely plugged into their socket and properly oriented.

Pin orientation of the lamp is correct.

Verify fuse is not blown. Remove replaceable 1.5 amp fuse from fuse holder and visually inspect or perform a continuity test of the fuse.

Verify what signal or status if any the UV Lamp Monitor LED is emitting.

Verify if in fact the UV lamps are on or off. Do not look at the UV light without proper eye protection.

If there is no LED indicator light, and UV lamps are on: Replace the battery.

Lamp Status Indicator

LED Color	Audible Visual Alarm	Unit Status
Green	No audible	OK
Solid Red	No Audible	Replace lamp within 30 days
Flashing Red (Every 5 seconds)	Beep every 3 Minutes	Lamp has exceeded 1 year of operation replace lamps and reset
Pulsing Red (Every 1 second)	Beep every 1 second	UV lamp(s) are not lit

Please contact your local dealer for replacement lamps.

Refer servicing to qualified service personnel.

UV Monitor, Intensity Measurement System

The UV Monitor Intensity Measurement System is a power supply control box containing all the circuitry, power supply and digital display of the system. The System is supplied with a remote UV 254 Nanometer sensing probe that constantly monitors the intensity level of the lamp which is transmitted to the UV meter circuitry. The signal is processed and displayed on a digital meter in a relative percentage reading from 0% -100%. The UV Sensor Probe is attached to the water vessel in close proximity to the UV lamp and constantly monitors the UV intensity output of the lamp. The purpose of the UV intensity meter is to monitor the UV intensity levels being generated over the life of the UV lamp. Set and Scale adjustment points are located on the side of the control box cover.

The UV Monitor allows the system user to identify abnormalities in the UV output such as lamp fouling, or the normal declining levels of UV intensity over time, or a lamp out condition. These thresholds are set to activate an audible alarm system and a digital display of the lamp intensity in % to notify the system user of a potential problem.



Installation for ES Control Box:

1. Determine a suitable location to install the control box. It will need to be within 6ft. of the lamp connection on the vessel. A 6ft. 110v power cord has been supplied and is attached to the control box. The remote UV sensor probe is on a 6ft cable. Mounting location should be of sufficient strength to support the control box otherwise reinforcement may be necessary.
2. Remove the cover from the control box.
3. Lift unit into place and fasten unit with four self- tapping screws.
4. Install UV Sensor per instructions (see page 8).
5. Install UV Lamp per instructions (see page 3).
6. Plug the power cord into a 120V wall outlet and turn power switch on.
7. Calibrate the UV Intensity Monitor per instructions (see page 9), replace cover on control box and inspect operation. If any problems are noted, consult troubleshooting for ES Series (see page 10).

The Remote Sensor Probe is provided with a 6 ft. service cable. It is connected to the control box with a BNC Connector, and to the Vessel with a 3/4" Grey compression fitting and O-ring seal. The discrete sensor is housed within a waterproof quartz sleeve. The compression fitting is sealed with an internal O-ring and an external water proof liquid tight fitting.

UV Sensor Installation and Maintenance Instructions:

1. The Sensor Probe has an O-ring seal in place on the Quartz sleeve
2. The quartz sleeve should be bottomed out in the Grey compression nut.
3. The quartz sleeve should extend approximately 1/8"-1/4" beyond the end of the compression fitting when assembled.
4. Screw the Sensor Probe compression fitting (hand tighten only) onto the nipple of the vessel. Connect the BNC connector to the control box. Make sure the watertight fitting on the top of the compression nut has been tightened.

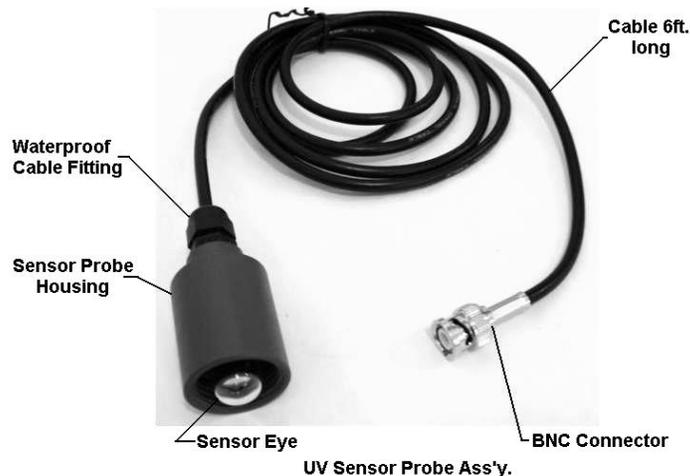
*NOTE: If leaking appears after water is turned on, tighten compression fitting until leaking stops.

Maintenance:

All maintenance should be performed by a certified technician, and done in accordance with all State and local Building codes. Power should be disconnected from the unit.

Cleaning the Quartz sleeve of the UV Sensor probe is critical and should be checked on a regular basis. Cleaning should be done with Lime Away or similar cleaning solution. Be cautious that no water gets into Sensor Probe housing. There are no replacement parts for this Assembly. If any additional information is required please consult your distributor.

UV SENSOR ASSEMBLY



UV Monitor Calibration Instructions: For Initial Startup and Annual Lamp Replacement: ***For ES Series ONLY***

The UV Monitor can *ONLY* be calibrated when the power is in the *ON* position and the UV lamp is on and operational. Allow the UV lamps to warm up for at least **2 minutes** prior to initial calibration to insure optimum UV output.

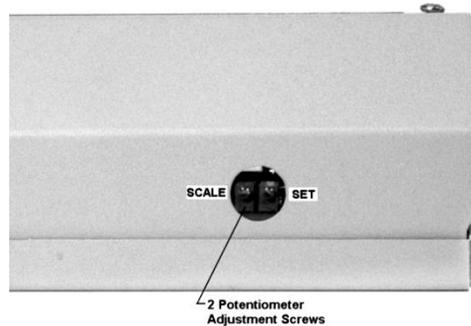
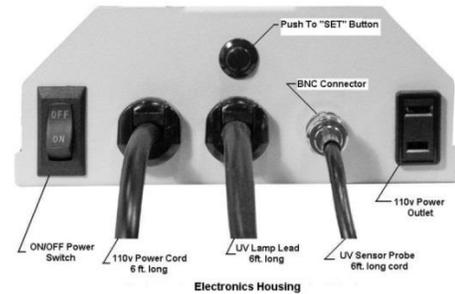
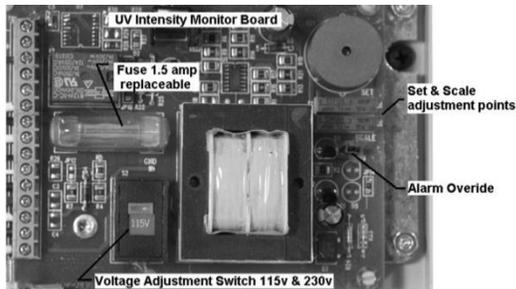
Make sure that water is running through the vessel during calibration. The calibration process may be repeated if required after the UV lamp that has been operational for 100 hrs. The Scale set point should be set at 100% after new lamp start up.

To set the low UV intensity alarm find the black *SET* Push Button located on the bottom of the control box.
NOTE: The alarm will continue to sound for 3 minutes and go off after initial start-up.

1. Push and hold down the SET pushbutton.
2. The low set point of the meter should be set at **40-50 %**.
If adjustment is needed turn the set point until the meter display reads **40-50%**.
Adjust the set point by turning the **set potentiometer** on the right side of the box.
(Be sure to turn the set point SLOWLY as to not strip out the threads)

Turn to **right** (clockwise) to raise the **SET POINT**
Turn to **Left** (counterclockwise) to lower the **SET POINT**
Release Push Button to run position.

3. To test for Low UV intensity turn the scale potentiometer adjusting 0-100% meter scale down below the % set point level.
4. Adjust the scale reading by turning the **scale potentiometer** on the right side of the control box until the display reads 100%. *(Be sure to turn the scale point SLOWLY as to not strip out the threads)*
5. If during operation an alarm condition triggers the Buzzer, the alarm will buzz for an additional 45 seconds after it is reset.



A digital display located on the cover of the control box is provided to view the UV intensity output of the lamp in % . A label on the cover of the unit provides UV hazard and Warnings.

Troubleshooting for ES Series ONLY:

Verify the unit has power 120vac.

Power switch is in the ON position.

Lamp is securely plugged into their socket.

Pin orientation is correct.

Verify fuse is not blown. Remove replaceable 1.5 amp fuse from fuse holder and visually inspect or perform a continuity test of the fuse.

Verify what % value is shown on the UV Lamp Monitor digital display.

Verify if in fact the UV lamps are on or off. Do not look at the UV light without proper eye protection.

Constant Buzzing:

Check to see if lamps are on or off.

Clean Quartz Sleeve of UV Sensor Probe

Clean Protective Quartz sleeve on UV lamps

UV Lamp Monitor

Visual Display	Audible Visual Alarm	Unit Status
60%-100%	No audible	OK
0%-59%	Constant buzz	Low UV intensity or UV lamp is not lit

Note: A constant buzzing of the audible alarm indicates the UV Sensor Probe has sensed the lamp in the unit is not on, or the UV intensity level has gone below the set point. This does not necessarily mean the lamps are defective or no longer emitting UV. The lamp out condition could be caused by other factors such as poor incoming water quality. In this case a service technician should be contacted to test the water quality is sufficient for proper UV transmission.

Refer servicing to qualified service personnel.

SANITATION PROCEDURE FOR INSTALLATION AND BULB REPLACEMENT

HOW TO DISINFECT USING AN INSTALLED WHOLE HOUSE FILTER HOUSING

Make sure the filter housing is installed before the UV Unit. Turn off the main water line. Remove the sump from the housing and take the old filter out. Fill the sump with unscented household bleach and put the sump back on the housing. Install the new lamp in the UV Unit. Then plug in the unit and turn it on. Next slowly turn on the main water line, go to the nearest cold water faucet and slowly turn it on. Run the water until you start to smell the bleach. Continue this process with every cold water faucet in and out of your house (Showers, tubs, sinks, toilets, outside faucets, etc). Follow up by running the hot water at the nearest faucet for about 30 seconds. You might have to check the housing periodically when running the water, as some larger houses might require more bleach. Then turn off the main water line again, remove the sump and dump out the excess bleach. Last, put a new filter in the housing, put the sump back on and slowly turn on the water. The filter should be changed every 3 months.

HOW TO DISINFECT A WATER SYSTEM AT THE WELL

(*Only use this method as a last resort as this will emphasize any iron in the water)

Every new well, or existing water supply system that has been disrupted for service or repair, should be disinfected before it is returned to use. Water in the well and storage tank should be treated with a strong chlorine solution to destroy disease organisms. All pipelines and fixtures in the disinfection system should be rinsed and flushed with chlorinated water. Upon installation of a UV disinfection unit or yearly bulb replacement service, disinfection with chlorine to initially flush the system is recommended to assure line sanitation prior to UV start up.

The source of chlorine can be ordinary household liquid laundry bleach (about 5.25% available chlorine). The quantity required depends on the volume of water to be treated. The United States Environmental Protection Agency (EPA) indicated that about 100 parts of chlorine, by weight, mixed in a million parts of water will destroy essentially all water-borne disease organisms.

GENERAL TROUBLESHOOTING GUIDE

PROBLEM	CAUSE	CORRECTION
UV lamp will not light	Check input voltage if below or above 120 volts	Install a voltage regulator
	Line cord disconnected or outlet defective	Check, replace
	Defective UV lamp	Replace
	Defective lamp ballast	Check output voltage Replace ballast
Leak at quartz nipple	Defective or cracked O-ring	Replace O-ring
	O-ring not seated properly	Replace O-ring
	Quartz fracture	Replace quartz sleeve
Alarm sounds continuously	Defective UV Lamp	Replace UV Lamp
	Loose wire connection	Repair

REPLACEMENT PARTS LIST

Unit Model	Replacement Part Number	Part Description
All Models	WG-9200	O-Ring (UV Quartz) One size fits all
All Models	WG-9201	Gland Nut
WMW8E, WMW8EA, WMW8ES W8E, W8EA, W8ES W10E, W10EA, W10ES	W8QS	Quartz Sleeve Dome (Requires one O-Ring)
WMW12E, WMW12EA, WMW12ES W12E, W12EA, W12ES	W12QS	Quartz Sleeve Dome (Requires one O-Ring)
W15E, W15EA, W15ES	QTZD009	Quartz Sleeve Dome (Requires one O-Rings)
WMW8E, W8E, W10E, WMW12E, W12E, W15E	WGEB-141R	Ballast
WMW8EA, W8EA, W10EA, WMW12EA, W12EA, W15EA	WG-EA	Ballast
WMW8ES, W8ES, W10ES, WMW12ES, W12ES, W15ES	WG-ES	Ballast
WMW8E, WMW8EA, WMW8ES W8E, W8EA, W8ES W10E, W10EA, W10ES	W8LMP	UV Lamp
WMW12E, WMW12EA, WMW12ES W12E, W12EA, W12ES	W12LMP	UV Lamp
W15E, W15EA, W15ES	WG203178I/4P	UV Lamp

