User Manual

UV Dynamics®

Models: MR180E, MR240E, MR245E, MR320, MR320E, MR400, MR400E, MR485, MR485E, MR600

system listed by IAPMO R&T to:

NSF/ANSI 61
NSF/ANSI 372
CSA B483.1

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INTRODUCTION

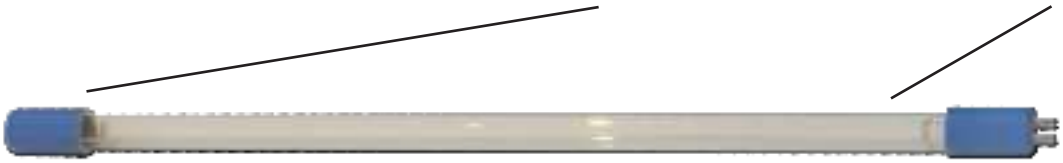
Thank you for trusting UVDynamics with your drinking water disinfection! Please read and follow all instructions. Proper installation and maintenance is required to ensure reduction of microbiological contaminants.

Your UVDynamics Mini Rack System consists of a stainless steel reactor chamber, quartz glass sleeve, UV lamp, electronic power supply, top plate, and filter housings. Water flows through the filter housings and into the reactor chamber where it is exposed to UV light from the lamp, which sits inside the quartz glass sleeve. The electronic power supply powers the UV lamp, alarms if it fails, and reminds you to change your lamp every year.

Even though it is able to light for several years, **the UV lamp must be changed after 1 year of service**. The amount of UV-C light emitted by a UV lamp decreases greatly after 1 year of use. Your UVDynamics system has a lamp change reminder timer that will notify you when you are nearing the end of lamp life.

Genuine UVDynamics lamps are made by knowledgable and trusted lamp manufacturers in North America. Installing a low-cost, knock-off lamp can compromise the effectiveness of your UV disinfection system and potentially damage your electronic power supply. Without a UV monitor there is no way to know if a third party lamp is outputting the amount of UV-C light needed to disinfect water.

Genuine UVDynamics lamps can be identified by their blue ceramic end caps, and UVDynamics logo.



SAFETY INFORMATION

Hg

UV lamp contains mercury (Hg). Dispose or recyle in accordance with local regulations. If the lamp breaks, avoid inhalation or ingestion; avoid exposure to eyes and skin. Do NOT use a vacuum cleaner or broom to clean mercury waste. Do NOT throw mercury into your household garbage

⚠ CAUTION

NEVER OPERATE UV LAMP OUTSIDE OF THE UV DISINFECTION CHAMBER EXPOSURE TO UV LIGHT CAN RESULT IN EXTREME BURNING OF SKIN AND EYES

- Do not use this unit for anything other than its intended potable water application.
- The use of attachments not recommended, approved or sold by the manufacturer/distributor may result in an unsafe condition.
- Before any cleaning or maintenance, always unplug the unit.
- Protect your unit from freezing. Drain all water from the unit if freezing temperatures exist.

⚠ DANGER

- Do not plug the unit in if any of the external surfaces or electrical parts is wet. Condensation on the disinfection chamber is normal.
- To avoid possible electric shock, special care should be taken since water may be present near electrical equipment.
- Unless referred to in these instructions, do not attempt repairs yourself. Contact the manufacturer for service advice.
- Do not operate this system if it has a damaged electrical cord or plug, is malfunctioning, or has been dropped or damaged in any way.

WATER QUALITY REQUIREMENTS

Turbidity	< 1NTU
Suspended Solids	< 10mg/L
Colour	none
Total Iron	< 0.3 mg/L
Manganese	< 0.05mg/L
Hardness	< 7 gpg
UV Transmittance	The flow rates and doses specified for these units assume a UVT of 95%. Installing a system on water with a lower UVT% will result in a lower effective UV dose.

Your UV disinfection system requires clean water for optimum performance. You should only operate your unit if the source water meets the following standards. If your water exceeds these limits you may require more pretreatment to correct these issues before installation of your UV disinfection system. **All input water, regardless of water quality, should have a 5 micron pre-filter installed prior to the UV system.**

INSTALLATION CAUTIONS

1 nnect your UV unit to a grounded (3 pronged) receptacle (120V, 60HZ) (a GFI is highly recommended) and ensure that the lamp connector ground wire is connected to the ground stud on the top of the UV chamber. Note: Power source for applications outside of North America must match requirements of the unit (eg. 240V, 50Hz).

2 It is strongly recommended to install your UV power source on a dedicated electrical line to prevent damage from large equipment such as pumps, freezers, refrigerators, compressors, etc. A CSA certified (or equivalent) surge protector is required to protect the electronic ballast from power surges. Damage due to power surges is not covered by warranty.

3 UVDynamics disinfection devices are designed to be installed on the cold water line only.

4 e unit must be installed with the lamp connector pointing upwards – the water source should only be connected to the inlet port on the first filter housing.
CAUTION: reversing the flow direction by connecting the water source to the side mounted output port could result in reduced disinfection performance and improper operation of flow regulator (if present).

5 Installing bypass plumbing with shut off valves around your UV disinfection unit will make it possible to still have emergency (non-potable) water in your building in the instance of a broken sleeve, or the need to remove the system for service.

6 Install your UV Dynamics disinfection system indoors in a protected area where the temperature does not fall below 4°C(40°F) and the humidity level is low (to prevent excessive condensation on the chamber). This unit functions ideally in a temperature range from 9°C - 29°C. (49 – 85F)

7 Use teflon tape on all pipe connections. DO NOT USE ANY OTHER SEALANT.

8 This UV System features a GloGuard™ port that protects PEX and other plastic plumbing from UV light.
Plastic plumbing can be connected directly to both the inlet and outlet ports.
NB. MR485(E) and MR605E do not have GloGuard™ porting; a metallic light dam of either 16"(40cm) straight piping, or an elbow should be installed on the outlet port to prevent damage to plastic plumbing.

9 Provide space above the gland nut equal to the length of the quartz sleeve to allow for UV lamp and quartz sleeve servicing.

10 Your Mini Rack System has a drain port at the bottom of the UV chamber for easy draining to assist with winterization.

GETTING TO KNOW YOUR UV SYSTEM

UV Chamber (1)

Quartz Sleeve (1) UV Lamp (1)

Gland Nut (1)
orange O ring is pre-installed

Electronic Ballast with Lampcord (1)

Top Plate (1)

Power Cord (1)

Ballast Mounting Hardware

Filter Housing(s)

O Ring (1)
located in lamp tube

Lamp Spring (1)

SUGGESTED INSTALLATION

1. Sediment Pre-Filter (5 micron minimum)
2. Drain Port (for winterization)
3. Bypass valve (allows water during off-line servicing) **NOTE:** Valve must remain closed during normal operation. A leaking bypass valve will result in untreated water entering plumbing distribution.
4. Electronic Ballast
5. Minimum clearance above system equal to quartz sleeve length
6. UV Chamber

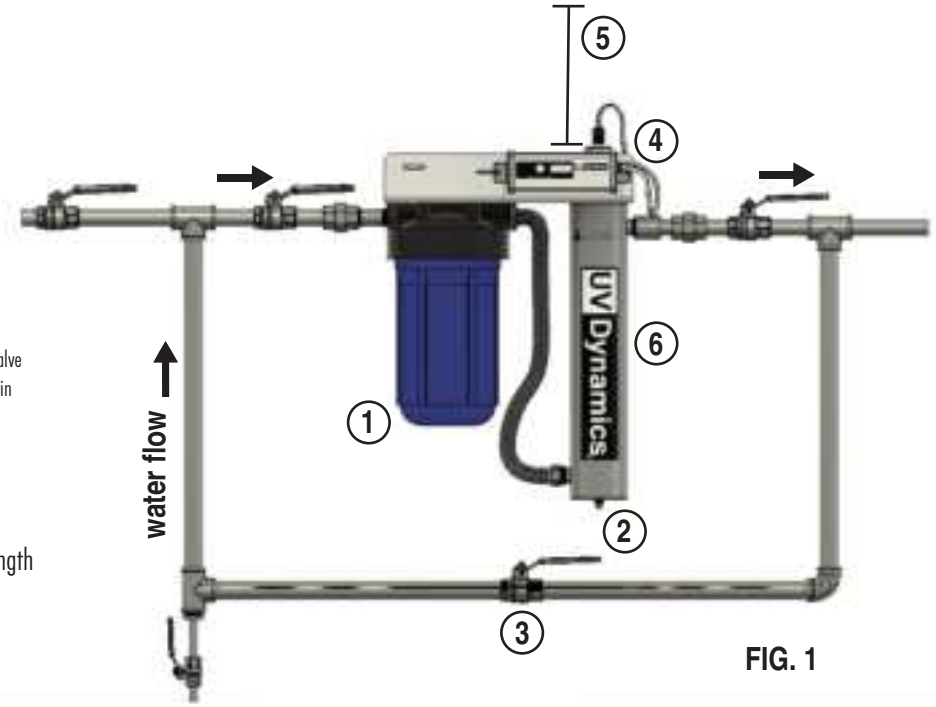


FIG. 1

The UV disinfection system should be the last step of your water treatment system. If your water treatment chain involves a pump and pressure tank the UV should be after the pressure tank, not between the pump and tank. Your UV system should be installed after all other water treatment equipment, before the plumbing splits into hot and cold.

INSTALLATION PROCEDURE

FIG. 2

1. Shut off the main water supply valve.

2. Mount the top plate to the wall using appropriate hardware (not provided). Once filled with water your Mini Rack System will be very heavy; it is important to fasten the top plate securely and structurally to the wall.

3. Install new plumbing using FIG. 1 as a guide. Pay attention to correct direction of water flow. **WARNING:** if soldering, do not allow heat near plastic threads or fittings.

4. Mount the electronic ballast on the front of the top plate, using the two (2) screws and two (2) nuts provided. See FIG 2.

NOTE: Use clean, dry gloves or cloth when handling the quartz sleeve and UV lamp. Do not touch quartz glass with bare hands.

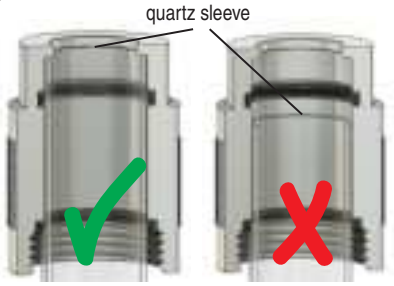


FIG. 3

5. Place black O ring over open end of quartz sleeve, approximately 1cm onto the sleeve. Gently insert open end of sleeve into glandnut, being sure to push quartz sleeve all the way in, past the orange O ring, until the top of the sleeve is seated against the inside top surface of the glandnut. See FIG. 3.

6. Slide glandnut and quartz sleeve into the opening at the top of the chamber and hand tighten firmly. Do not use tools to tighten; overtightening can cause leaks. Do not use any teflon tape, grease, or pipe dope on glandnut threads.

7. Drop the lamp spring into the quartz sleeve. Holding the lamp by the top ceramic cap, gently insert into the quartz sleeve (the spring will catch the lamp and keep the pins above the gland nut to make connecting the lamp cord easier).

8. Connect the white lamp connector at the end of the ballast lamp cord to the UV lamp. The pins are in a rectangle configuration and can be plugged in two ways - either way will work. The UV lamp pins fit snugly; the lamp should be secure when being held only by the lamp cord.

9. Push the lamp connector down snugly into the gland nut and hand tighten the retainer screw.

10. UV disinfection requires a minimum 5 micron pre-filter. Filter cartridges are not supplied by UVDynamics. Installing dealers may supply filter cartridges, or you may need to source them yourself. Filter cartridges must have plastic wrapping removed before installation. **Do not install filter cartridges until after chemical disinfection of plumbing has been finished.**

11. Remove the nut from the ground stud at the top of the unit. Next place the ground wire (green wire with yellow stripe) over the stud and re-install nut and tighten.

12. Open valves on either side of the disinfection chamber. Check for leaks. Open supply valve slowly and bleed air from system.

13. Connect electronic ballast to AC line via the surge protector. The ballast audio alarm will sound three times before lighting the lamp.

Your UV Dynamics disinfection system is now ready for service. Before service begins, all household plumbing lines should be chemically disinfected.

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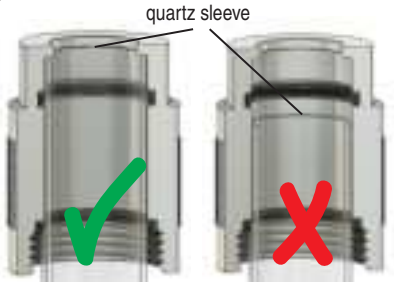

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DISINFECTION PROCEDURE

UV disinfection is a physical process that does not add any chemicals to your water, and does not provide any residual disinfection. Therefore, it is necessary to ensure your entire plumbing distribution system is chemically disinfected to prevent re-contamination of your water post UV system. This procedure should be performed immediately after installing your UV system, and following any power outage or service that requires the system to be shut down. It is recommended to disinfection your plumbing at least once per year, during the annual maintenance.

THE FOLLOWING DISINFECTION PROCEDURE IS GENERALLY ACCEPTED AS BEING SUITABLE FOR THE DISINFECTION OF PLUMBING SYSTEMS KNOWN TO BE CONTAMINATED. IF YOU ARE UNCERTAIN ABOUT THE EFFICACY OF THIS PROCEDURE YOU ARE ADVISED TO CONTACT THE LOCAL HEALTH AUTHORITY RESPONSIBLE FOR WATER SAFETY.

1. Shut off the water supply and de-pressurize the water treatment chain either by pressing the pressure release button on a filter housing, or opening a tap in the building.

2. Loosen filter housing(s) using the appropriate wrench and remove filter cartridge(s).

3. Add 2 cups of household chlorine bleach (5.25% concentration) to the empty filter housing and re-install. **NOTE:** Bleach can damage some types of filter cartridges. Do not re-install filter cartridges until disinfection procedure is complete. The UV system should be powered on during the disinfection procedure.

4. Open water supply, then operate a water fixture in the building until you can smell the chlorine bleach, then close it. Repeat this process for all cold and hot water faucets, fixtures, and appliances, adding bleach if necessary. *This includes showerheads, outside taps, dishwashers, laundry equipment and any other appliance connected to the plumbing system.*

5. Leave the bleach solution for at least 30 minutes.

6. Shut off the water supply and de-pressurize the water treatment chain once again. Loosen the filter housing(s) and reinstall filter cartridge(s). Open the supply valve and flush all fixtures and appliances thoroughly to complete the disinfection procedure.

NOTE: Adding chlorine bleach solution to a hot water heater that has been used with untreated water, or water with excessive iron, manganese, or other organic contaminants may lead to oxidization of these materials. If you feel that these conditions may apply to your installation, a thorough flushing of the hot water tank should be undertaken to eliminate the oxidized material from the system.

UV BALLAST FEATURES

The microprocessor controlled UV ballast supplied with your UVDynamics system has both audio and visual alarms to indicate lamp operation and an annual lamp change reminder timer.

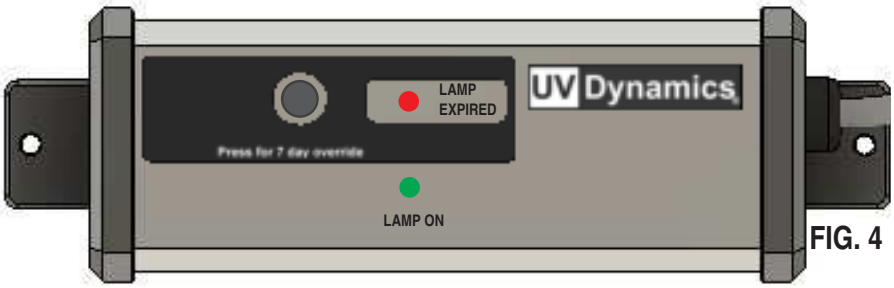

FIG. 4

UV Ballast Start-Up Sequence: When AC power is applied to the UV power source the lamp is lit as indicated by the green 'LAMP ON' LED. The ballast performs a self-test of the 'LAMP EXPIRED' LED and alarm buzzer consisting of three buzzer beeps and three red LED flashes. If a solenoid is connected to the UV power source it will activate on completion of the self-test sequence.

Normal Operation: During normal operation only the green 'LAMP ON' LED is illuminated.

Lamp Timer Operation: After eleven (11) months of operation, the 'LAMP EXPIRED' LED will flash and the buzzer will sound, indicating that the timer function is in the 28-day grace period. Pushing the button during the grace period will silence the buzzer for a seven-day period, but the LED will continue to flash. The buzzer can be silenced up to four times during the 28 day grace period. At the end of the 28-day grace period the ballast indicates the lamp is expired with a solid red LED and buzzer. The UV lamp is not shut down in this alarm mode and the solenoid valve drive is not disabled.

UV BALLAST FEATURES CONT'D

Time Remaining: When the lamp change reminder timer is not in the grace period or lamp change alarm mode, the number of months of lamp life remaining can be determined by pressing the timer button and counting the number of red LED flashes.

Solenoid Valve Output: Some UV power sources are capable of directly powering a solenoid valve, which will shut off water flow during lamp failure alarm conditions. On vertically mounted systems, a solenoid valve can be directly mounted to the inlet port. *Standard series systems have a solenoid valve output; E series systems do not have a solenoid valve output.*

Lamp failure: When the UV power source detects a lamp failure or enters the auto shut down mode due to abnormal operating conditions, the alarm buzzer sounds and the green 'LAMP ON' LED is extinguished. If connected, the solenoid valve will terminate the water flow. **Note:** The UV ballast is designed to shut down if the AC input voltage is outside of operating limits. When a lamp failure alarm is active you should unplug the unit from the AC power source, wait for fifteen seconds and then reconnect to the AC power source. If the failure was due to out of limit AC power the unit will re-ignite the lamp and operate normally. If this does not resolve your lamp failure condition refer to the trouble-shooting guide.

OPERATING and MAINTENANCE

Your UV system is on continuously during normal use. The system is not damaged by long periods of no water flow, but heat may build up during this time. **WARNING:** The first water used after a period of no water flow can be scalding. It is recommended to flush a toilet or run a tap to clear this hot water to prevent injury.
Note: Do not cycle your system on and off during short periods of non-use as this will shorten the life-span of your UV lamp.
Caution: Protect your unit from freezing. Drain all water from UV chamber and filter housings if freezing temperatures are possible.

Ultraviolet lamp replacement: The ultraviolet lamp located inside the chamber will operate effectively, around the clock, for approximately one year. The lamp will light longer than that. However, the UV light penetration may fall below the prescribed safety level. Therefore, **annual lamp replacement is necessary regardless of whether the lamp is still lit**.

Quartz sleeve replacement: The quartz sleeve should be cleaned annually, or more often if fouling is occurring. Quartz sleeves should be replaced every 3 years due to the potential for microscopic fouling not visible to the eye.

O ring replacement: The black O ring should be replaced annually to prevent leaks; replacement black O rings are included with genuine UVDynamics UV lamps. Water damage due to dried out O rings is not covered under warranty. The orange O ring in the gland nut should be replaced every 3 years; replacement orange O rings are included with genuine UVDynamics quartz sleeves.

Filter cartridge replacement: The frequency of filter cartridge replacement will depend on your input water and the specifications of your cartridge. Low water pressure usually indicates the end of service life for filter cartridges. Consult cartridge manufacturer. A sparing application of food grade silicone on filter housing O rings may ease future disassembly.
Note: Filter housings need to be depressurized (via a pressure release button or opening a faucet after the supply is closed) in order to be opened.

Replacing the UV Lamp and Cleaning the Quartz Sleeve
Note: Do not touch the lamp or the quartz sleeve with your fingers. Handle by ends only; wear soft gloves.

1. Turn off all water supplies to the unit and unplug the system from the electrical outlet. Depressurize the UV system by opening a faucet and then close the valve at the UV system outlet. **CAUTION:** The ceramic UV lamp end cap can be hot. Wait for it to cool.

2. Unscrew the ground nut and remove the green and yellow striped ground wire. Loosen the black screw on the side of lamp cord.

3. Carefully extract the lamp connector from the sleeve gland nut assembly to expose just the top of the lamp. While holding the top of the lamp firmly, remove the lamp connector. Be careful not to drop the lamp into the quartz sleeve as it is easily broken.

4. Carefully slide the UV lamp out of the quartz sleeve and discard according to local regulations. Do not lose lamp spring.

5. Remove the quartz sleeve by loosening the gland nut and carefully extracting it from unit. **CAUTION:** The quartz sleeve is fragile and is easily chipped or broken – use care when removing or installing. Remove and discard black O ring.

Replacing the UV Lamp and Cleaning the Quartz Sleeve Cont'd

6 Clean the quartz sleeve with a vinegar solution or a readily available scale removal product (Limeaway, CLR etc.) and a soft cloth. Do not use abrasive materials. If the quartz sleeve cannot be fully cleaned it should be replaced.

7 Follow steps 5 through 12 in the Installation Procedure section to reassemble your UV system, using a new black O ring and new UV lamp.

RESETTING THE LAMP CHANGE TIMER

The lamp change timer is reset by disconnecting the UV ballast from the AC supply, waiting for fifteen seconds, pressing and holding the reset button and then reconnecting the AC supply while the button is held down. Do not release the button until the UV ballast emits a long, solid beep, indicating the reset was successful.

It is not possible to reset the lamp change timer unless the timer is in the grace period or lamp change alarm mode. If you need to reset the lamp change timer before the full one year time period has expired there are special instructions included with all replacment UV lamps describing the necessary procedure.

It is important to reset the lamp timer every time a new UV lamp is installed, even if the system was not in the lamp change timer mode at the time of the lamp change.

TROUBLESHOOTING

GREEN LED	RED LED	AUDIO	POSSIBLE ISSUE	SUGGESTED ACTION
●	● FLASHING	intermittent	System is in lamp change timer mode.	Silence alarm by pressing override button. Install new lamp. If new lamp has been installed, follow lamp timer reset procedure.
●	●	intermittent	System is in lamp expired alarm mode.	Install new lamp. If new lamp has been installed, follow reset lamp timer procedure.
		intermittent	System is in lamp failure alarm.	Unplug ballast from AC supply, wait 15 seconds, then plug back in. If this does not resolve the issue, replace first the UV lamp then, if not successful, UV ballast.
		constant/ squealing	Ballast has suffered severe damage - likely causes include power surges, water damage, or third party lamp catastrophic failure.	Replace ballast.

PROBLEM	POSSIBLE ISSUE	SUGGESTED ACTION
Leak at gland nut	Gland nut is either too loose or too tight. O ring has failed due to age.	Replace black O ring. Hand tighten gland nut firmly.
Leak at inlet/outlet port	Plumbing fittings are too loose. Teflon tape is missing.	Clean threads and reseal with teflon tape. Retighten.
Hot water coming out of faucet	UV system is too large for building, or installed very close to faucet. First water usage after prolonged period of no water flow.	Flush hot water after long periods of non use by flushing a toilet or running a tap. Locate UV system far from faucet; metal plumbing will dissipate heat more effectively than plastic plumbing will.
Black marks on UV lamp ends	This is expected and normal.	UV lamps have a small amount of excess mercury that will oxidize on the inside of the lamp tube almost immediately after being lit. If a brand new lamp has these markings it was lit momentarily as part of a QC process.
Condensation on chamber exterior	High humidity in installation site.	Moderate condensation is normal. Protect floor below unit from dripping water, install ballast above UV chamber. Severe condensation can result in moisture forming inside the quartz sleeve which can damage the lamp.
Lamp is on, but treated water fails bacterial testing	Recontamination is occurring in plumbing distribution system.	Disinfect plumbing distribution system. Check bypass valve, if present, for leaks.
	Input bacterial counts are so high the UV system cannot reduce them, even when operating at normal parameters.	Can be confirmed by diluting test samples. Shock disinfect holding tanks, increase pretreatment, or oversize your UV system.
	Input water quality does not meet requirements, which is impeding system performance.	Improve pre-treatment to meet water quality requirements.
Drop in water pressure	Filter cartridge is still in plastic packaging. Filter cartridge needs replacing.	Remove filter cartridge packaging. Replace filter cartridge.
Can't open filter housing	Filter housing is still pressurized.	Depressurize filter housing by closing water supply and opening a tap to release some water.

PRODUCT SPECIFICATIONS

	MR180E	MR240E	MR245E	MR320(E)		MR400(E)		MR485(E)		MR600
				E series	standard	E series	standard	E series	standard	
Rated Flow Rate◆	4.5gpm @ 40mJ/cm2 6gpm @ 30mJ/cm2	6gpm @ 40mJ/cm2 8gpm @ 30mJ/cm2		8gpm @ 40mJ/cm2 10gpm @ 30mJ/cm2		10gpm @ 40mJ/cm2 13gpm @ 30mJ/cm2		12gpm @ 40mJ/cm2 16gpm @ 30mJ/cm2		15gpm @ 40mJ/cm2 20gpm @ 30mJ/cm2
Isolated Solenoid Drive	no			available on standard series; not on E series						yes
AC Supply Voltage	120V 47-63 Hz .7A (240V 47-63Hz .35A)									
Power Consumption	31 watts	33 watts	31 watts	40 watts		44 watts		63 watts		63 watts
Chamber Material	passivated 304 SS manufactured from A249 pressure rated tube									
Max. Operating Pressure	100 psi									
Max. Ambient Temp.	50C (122F)									
Water Temp. Range	4 - 37C (40 - 99F)									
Lamp Service Life	9000 hours (approx. 1 year)									
Lamp Change Timer	yes (audio and visual)									
Inlet/Outlet Port Size	3/4" MNPT							1" MNPT		

◆ flow rates assume 95% UVT

REPLACEMENT PARTS

UV Lamp		400434	400152	400434	400152		400128		400269		400269
Quartz Sleeve		400435	400151	400435	400151		400129		400273		400273
Electronic Ballast	120V	400235	400201	400235	400235	400203	400255	400156	400255	400156	400156
	240V	400416	400416	400416	400416	400122	400416	400122	400416	400122	400416
O ring Kit		400202									
Gland Nut		400103									
Lamp Spring		400111									

WARRANTY

UVDynamics water disinfection systems are supported with a 'free from defects' **Workmanship and Material** warranty as follows:

- A ten year pro-rated warranty on the stainless steel disinfection chamber
- A three year warranty on the UV power source
- A one year warranty on UV lamps, sleeves, sensor and solenoid

Warranty commences from date of purchase. Proof of purchase required UVDynamics will repair or replace, at its option, any defective parts covered by the warranty. Shipping and handling are not included in this warranty. Parts for warranty evaluation will be collected from you by your Dealer. Replacement parts provided under warranty will be sent to your UVDynamics dealer. Parts repaired or replaced under the pro-rated warranty will be covered under warranty to the end of the original warranty period. This warranty is also subject to the conditions and limitations outlined under the heading "General Conditions and Limitations" below.

Warranty for Replacement Lamps and Parts

UVDynamics warrants replacement lamps, purchased for annual routine maintenance and other parts purchased to repair product components that are no longer covered by the original warranty, to be free from defects in material and workmanship for a period of one (1) year from the date of purchase. During this time, UV Dynamics will repair, or replace at its option, a defective replacement lamp or part free of charge except for shipping and handling charges. The warranty period on replacement lamps and parts will be verified using date codes and/or purchase receipts. Your UVDynamics Dealer will advise you on whether the defective item needs to be returned to UVDynamics for analysis.

General Conditions and Limitations

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 product. The warranties also do not cover products that are not installed as outlined in the applicable Owner's manual. These limited warranties outline the exclusive remedy for all claims based on a failure or defect in any of these products. They are in lieu of all other warranties whether written, oral or implied or statutory. Under no circumstance shall UVDynamics have any liability for liquidated damages for collateral, consequential or special damages or for loss of profits, or for actual losses or for loss of production or progress of construction, regardless of the cause of such damages or losses. In any event, UVDynamics aggregate total liability shall not exceed the specific product purchase price. The purchaser agrees to indemnify and hold harmless UVDynamics from all claims by third parties in excess of these limitations. UVDynamics does not assume any liability for personal injury or property damage caused by the use or misuse of any of its products. UVDynamics shall not in any event be liable for special, incidental, indirect or consequential damages. UVDynamics liability shall, in all instances, be limited to replacement of the defective product or part and this liability will terminate upon expiration of the applicable warranty period.

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