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Instruction Manual — UltraDynamics®  
Series 8300 Open Channel Ultraviolet  
Disinfection System



**ULTRADYNAMICS**



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These instructions describe the installation, operation and maintenance of the subject equipment. Failure to strictly follow these instructions can lead to equipment rupture that may cause significant property damage, severe personal injury and even death. If you do not understand these instructions, please call Severn Trent Water Purification for clarification before commencing any work at 215-997-4000 and ask for a Field Service Manager. Severn Trent Water Purification, Inc. reserves the rights to make engineering refinements that may not be described herein. It is the responsibility of the installer to contact Severn Trent Water Purification, Inc. for information that cannot be answered specifically by these instructions.

**Any customer request to alter or reduce the design safeguards incorporated into Severn Trent Water Purification equipment is conditioned on the customer absolving Severn Trent Water Purification from any consequences of such a decision.**

Severn Trent Water Purification has developed the recommended installation, operating and maintenance procedures with careful attention to safety. In addition to instruction/operating manuals, all instructions given on labels or attached tags should be followed. Regardless of these efforts, it is not possible to eliminate all hazards from the equipment or foresee every possible hazard that may occur. It is the responsibility of the installer to ensure that the recommended installation instructions are followed. It is the responsibility of the user to ensure that the recommended operating and maintenance instructions are followed. Severn Trent Water Purification, Inc. cannot be responsible deviations from the recommended instructions that may result in a hazardous or unsafe condition.

Severn Trent Water Purification, Inc. cannot be responsible for the overall system design of which our equipment may be an integral part of or any unauthorized modifications to the equipment made by any party other than Severn Trent Water Purification, Inc.

Severn Trent Water Purification, Inc. takes all reasonable precautions in packaging the equipment to prevent shipping damage. Carefully inspect each item and report damages immediately to the shipping agent involved for equipment shipped "F.O.B. Colmar" or to Severn Trent Water Purification for equipment shipped "F.O.B Jobsite". Do not install damaged equipment.

**SEVERN TRENT SERVICES, COLMAR OPERATIONS  
COLMAR, PENNSYLVANIA, USA  
IS ISO 9001: 2000 CERTIFIED**

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# 1 INTRODUCTION

Severn Trent Services UltraDynamics® Series 8300 Packaged Open Channel UV disinfection Systems provide effective and economical control of water-borne microorganisms through the use of low pressure mercury vapor lamps. The packaged system includes a channel designed specifically for the quantity of modules provided with the system. Flexible connections are provided at each end of the channel for ease of connection to the process piping. A Power Supply Center (PSC) provides system control and supplies power to the lamp modules through water-tight cables and connectors.

## 1.1 Safety Precautions

Only authorized personnel should be allowed to operate and service the UV disinfection equipment. The ultraviolet light produced by the lamps can cause serious damage to eyes and skin if the proper precautions are not taken. Always disconnect power to module assemblies prior to removing from channel. As a precaution, a UV full face shield, gloves and long clothing should be worn when removing a module to prevent exposure from adjacent modules and lamps still in service. It is not recommended to service and open source of UV light. Ordinary eyeglasses, safety glasses or face shields are not adequate protection from UV light. Channel covers supplied with the system should be kept in place during system operation.

**WARNING: DIRECT EXPOSURE TO UV LIGHT WILL DAMAGE EYES AND SKIN.**

## 1.2 Specifications

### 1.2.1 Lamp Module:

**Materials:** Stainless steel

**O-rings:** Silicone

**Lamp Lead Wire:** UV resistant Teflon insulated

**Module Lead Wire:** PVC insulated jacket

**Connectors:** Waterproof, molded, gold-plated contacts

**Weight:**

4-lamps: 20 lbs

6-lamps: 30 lbs

**Lamp Spacing:** 3" on center

### 1.2.2 Power Supply Center (PSC)

**Materials:** steel

**Rating:** NEMA 4X

**Control:** Power On/Off

**Outputs:** contact outputs: common lamp failure, low and low-low intensity, 0-100% analog UV intensity

**Power Requirements:** 240 Vac, 50/60 Hz, 1 phase, 90 watts/lamp (approximate)

**Overload Protection:** Fused

**Cooling:** Forced air fan with filter - Thermostatically powered on above 65°F

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### 1.2.3 UV Intensity Sensor: (Optional)

**Type:** Submerged direct sensing

**Location:** Positioned between 2 lamps

**Display:** 3-segment LED

**Range:** 0-100% relative intensity

**Alarms:** LOW intensity, LOW/LOW intensity

**Outputs:** 4-20 mAdc and N.O. and N.C. contacts, 120 Vac @ 3 amps

### 1.2.4 Elapsed Time Meter: (Optional)

**Type:** LCD, Non-resettable from front panel (back panel resettable)

**Reading:** Hours and Minutes

## 1.3 Principle of Operation

The UltraDynamics® 8300 series UV system incorporates germicidal UV lamps submerged in the process stream. The lamps emit UV energy which is passed through the process liquid as it flows through the channel. Absorption of the UV energy by microbiological organisms within the process liquid causes photochemical damage to the reproductive process of the DNA within the cell and stops cell reproduction. A cell which cannot reproduce is considered deactivated and microbiologically dead. Low pressure lamps used in Severn Trent Services products, emit maximum energy at a wavelength of 253.7 nanometers (nm), often referred to as 254 nm, which is within the range required for absorption by the DNA.

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## 2 INSTALLATION

### 2.1 Channel

- 2.1.1 Position the prefabricated channel on the level surface. It is recommended to allow 2-4 feet (64 to 122 cm) of straight flow prior to the UV modules. Secure the channel including center support (if supplied) to the floor using 1/2" anchor bolts.

**NOTE:** The channel must be installed level. If not installed level, the system may not perform as designed and a hazardous condition may result as UV lamps are exposed above the effluent surface.

- 2.1.2 Pipe connections are provided at the channel ends for inlet and outlet connections. It is recommended the channel be connected using flexible rubber connectors available as an option from Severn Trent Services company. Alternatively, flanges may be welded to the channel pipe connections.

### 2.2 Lamp Modules

- 2.2.1 Install UV lamps and sleeves (refer to section 4.2).

- 2.2.2 Place the UV modules in the channel. Cable connections may be at the inlet or outlet end of the channel. Each module is supplied with 10 feet (4.6 meters) of cable with water-tight connections for mating to the bulkhead style connectors at the control panel.

**CAUTION: QUARTZ SLEEVES ARE FRAGILE, USE CAUTION WHEN PLACING INTO THE CHANNEL.**

### 2.3 Power Supply Center (PSC)

The PSC must be mounted on a wall or similar support surface (handrail, power struts, etc.). Place the control panel in a location such that all module power cords can be plugged into the bulkhead connectors on the control panel. Secure the PSC with 3/8" anchor nuts and bolts.

### 2.4 Electrical Connections

**NOTE:** All wiring must comply with applicable local and national electrical codes. The power supply must be sufficient to handle the load as listed in the specification and should have over-current protection. Refer to Severn Trent Services customer wiring diagram included with the equipment for terminal designations. Lamp modules are pre-wired with multi-pin connectors for ease of installation and service. Be sure to test incoming power for proper voltage before connection.

**CAUTION: TO PREVENT EXPOSURE OF OPERATING PERSONNEL TO UV LIGHT, THE CHANNEL MUST BE FULL OF WATER WITH PROTECTIVE COVERS IN PLACE BEFORE APPLYING POWER TO THE SYSTEM.**

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## 3 OPERATION

### 3.1 Start-Up

3.1.1 Plug all UV lamp modules into their respective receptacle in the base of the PSC.

**CAUTION: DO NO OPERATE LAMP POWER SUPPLIES WITHOUT THE LAMP MODULE PLUGGED IN, DAMAGE MAY OCCUR.**

3.1.2 Turn power switches on all power supplies to the off position (down).

3.1.3 Turn the front panel selector switch to the **LOCAL** position.

3.1.4 Verify the cooling fan is operating. The fan draws air in from the left side of the enclosure and air exists at the right side.

**NOTE:** The fan is thermostatically controlled. The fan turns off below 40°F and on at 65°F.

3.1.5 One at a time, turn on each power supply (switch up) and observe the green LED lamp status indicator on the front panel. If the fan is not operating, or any LEDs are not illuminated, do not continue but refer to Troubleshooting section 5. Once proper operation of the fan is verified, and all lamp status LEDs are on, process flow through the channel be started.

### 3.2 UV Intensity Monitor

3.2.1 Install the UV intensity sensor by positioning the probe between two quartz sleeves using the stainless steel clip provided. Route the sensor wire through the slotted end of the UV module and plug into the sensor cable terminating in the PSC. Sensors are factory calibrated, however, upon start-up, the intensity meter at the control panel must be adjusted to read 100% on actual process water. New lamps have a 100 hour stabilization period during which time their output decreases rapidly. Allow for 100 hours operation prior to adjusting the meter reading.

3.2.2 To adjust the reading, press the function key and with a clean quartz sleeve and typical wastewater conditions, adjust the reading to read 100%. To adjust the alarms, press the function key again and adjust the LOW alarm to the desired level (typically 70%). Press the function key to adjust the LOW/LOW alarm to the desired level (typically 65%).

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## 4 SERVICE

**CAUTION: UV FACE SHIELD, GLOVES AND LONG CLOTHING SHOULD BE WORN WHEN REMOVING A LAMP MODULE TO PREVENT EXPOSURE FROM ADJACENT MODULES AND LAMPS STILL IN SERVICE.**

### 4.1 Cleaning Quartz Sleeves

To maintain peak efficiency of the UV system, the quartz sleeves surrounding the UV lamps must be kept clean. The UV sensor reading must be maintained as high as possible. Lower readings indicate fouling of the sleeve or possible lamp failure. Sleeve coating will result in the reduction of UV energy transmitted to the process fluid. Some deposits can be hosed off the sleeves, however, in more cases, a very thin layer of minerals, usually invisible to the eye, can cause reduced UV output. Cleaning frequently is site specific and will vary depending upon effluent quality and water mineral content. An automatic cleaning cycle program should be established based upon this cycle. Typically, this cleaning cycle should be done at least once per month unless the site experience dictates a more frequent time schedule.

- 4.1.1 Turn the relative power supply switch(es) to the **OFF** (down) position prior to removing the module(s) for cleaning.

**NOTE:** Never remove a module from the channel before the power is disconnected.

The recommended cleaner is Lime-A-Way, available in one gallon containers from Severn Trent Services (part number R-6674).

- 4.1.2 To clean sleeves, disconnect power to the module by placing the corresponding power switch in the **OFF** (down) position. Remove the module from the channel and place on the hangers provided on the side of the channel. The operator must wear protective clothing, rubber gloves and face protection when handling cleaning solution. Refer to the MSDS data for health and safety information for Lime-A-Way cleaner.

Apply the cleaner to a soft cloth and wipe the sleeve along the full length until all deposits are removed. A clean, soft cloth is best, however, a fine *Scotchbright* pad may be used with limited force. Abrasion of the quartz surface can be caused by rough wipers or cleaning media containing abrasives. Replace the module assembly in the channel. The process flow will rinse off the residual cleaner. Repeat the process for each module assembly in the channel. Frequency of cleaning will depend upon the process liquid and will vary for each installation.

- 4.1.3 If the system is provided with an optional UV intensity monitor, clean the sensor surface following the previous procedure.

### 4.2 Lamp Replacement (Refer to Figures 1 and 2)

Lamps should be replaced after 1 year of operation or when the bacterial level increases to an intolerable level.

**NOTE:** To protect the quartz sleeve and new lamp, **DO NOT TOUCH THE SLEEVE WITH BARE HANDS.**

- 4.2.1 Use clean rubber or cotton gloves or handle sleeve and lamp with clean soft cloth.
- 4.2.2 Disconnect the power to the module being removed by placing the respective power supply switch(es) in the **OFF** (down) position. Remove the module from the channel and place it on the hangers located on the channel side.
- 4.2.3 Loosen the sleeve nut with your hand until it disengages from the module and slide the sleeve holder at the opposite end of the lamp module about six (6) inches.
- 4.2.5 Remove the lamp socket at the open end of the sleeve.
- 4.2.6 Push the sleeve to the side to allow the lamp to clear the module and, while supporting the sleeve, remove the lamp.

- 4.2.7 Replace the sleeve sealing o-ring when replacing the lamp.
- 4.2.8 To install the new lamp, repeat the previous procedure in reverse order. When reassembling the module, be sure the sleeve is fully engaged in the sleeve cup.
- 4.2.9 Engage the threads of the sleeve nut on the module and gently twist the sleeve while tightening the sleeve nut. Hand tighten the sleeve nut until resistance is felt on the sleeve.

### 4.3 Quartz Sleeve Replacement

- 4.3.1 Follow the steps outlined in section 4.2.
- 4.3.2 Remove the sleeve sealing o-ring and sleeve nut from the quartz sleeve and gently slide the sleeve from the sleeve support at the opposite end of the lamp module.
- 4.3.3 Install the new sleeve reversing the previous procedure and slide through sleeve support six (6) inches).
- 4.3.4 Install a new sleeve sealing o-ring in the sleeve nut.
- 4.3.5 Install the sleeve nut on the open end of the quartz sleeve and slide back two (2) inches.
- 4.3.6 Complete lamp and sleeve installation following procedures outlined in section 4.2.
- 4.3.7 It is recommended to clean the quartz sleeve after sleeves or lamps have been replaced. Follow procedures outlined in section 4.1.

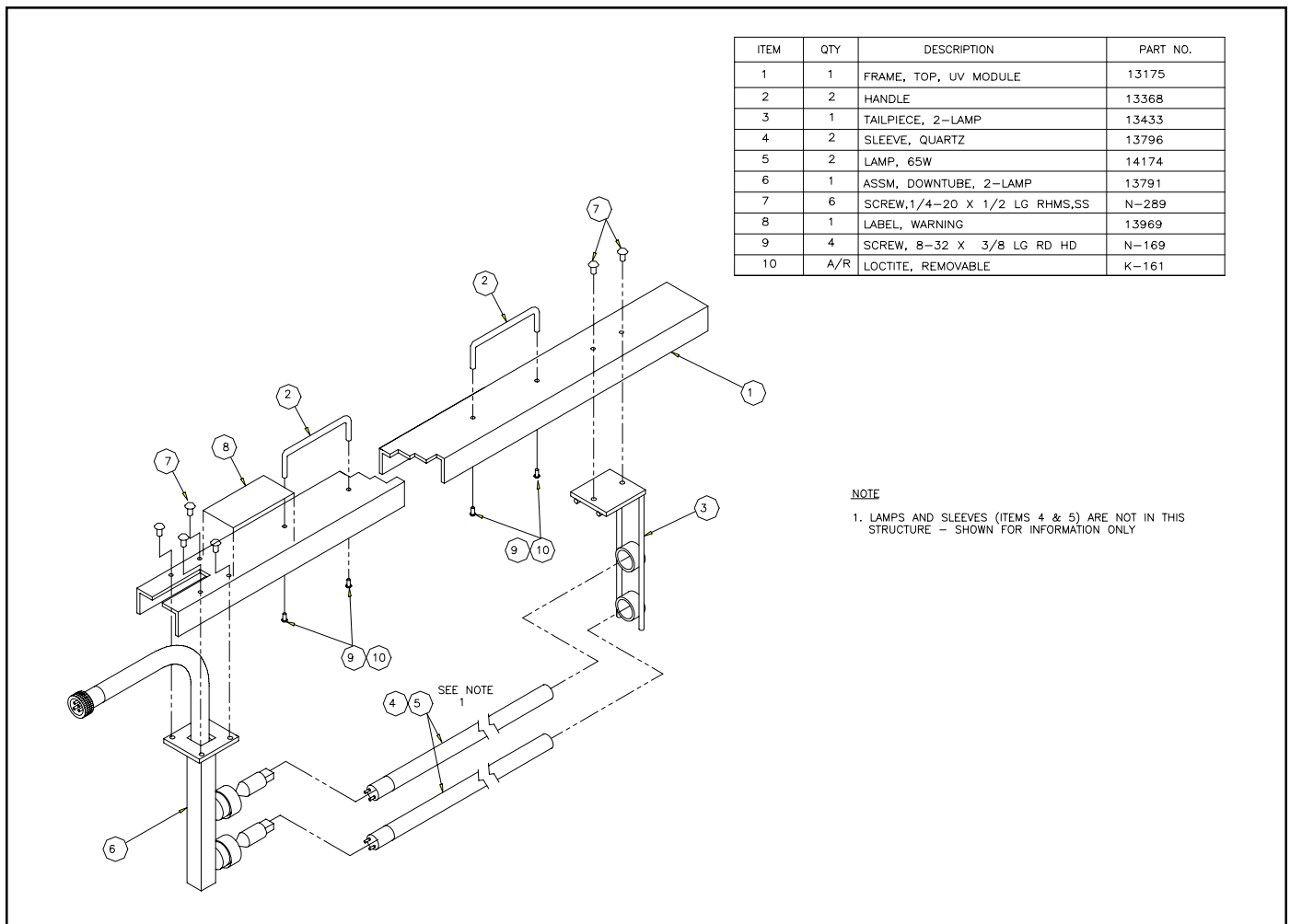


Figure 1 - UV Lamp Module- 2 Lamp

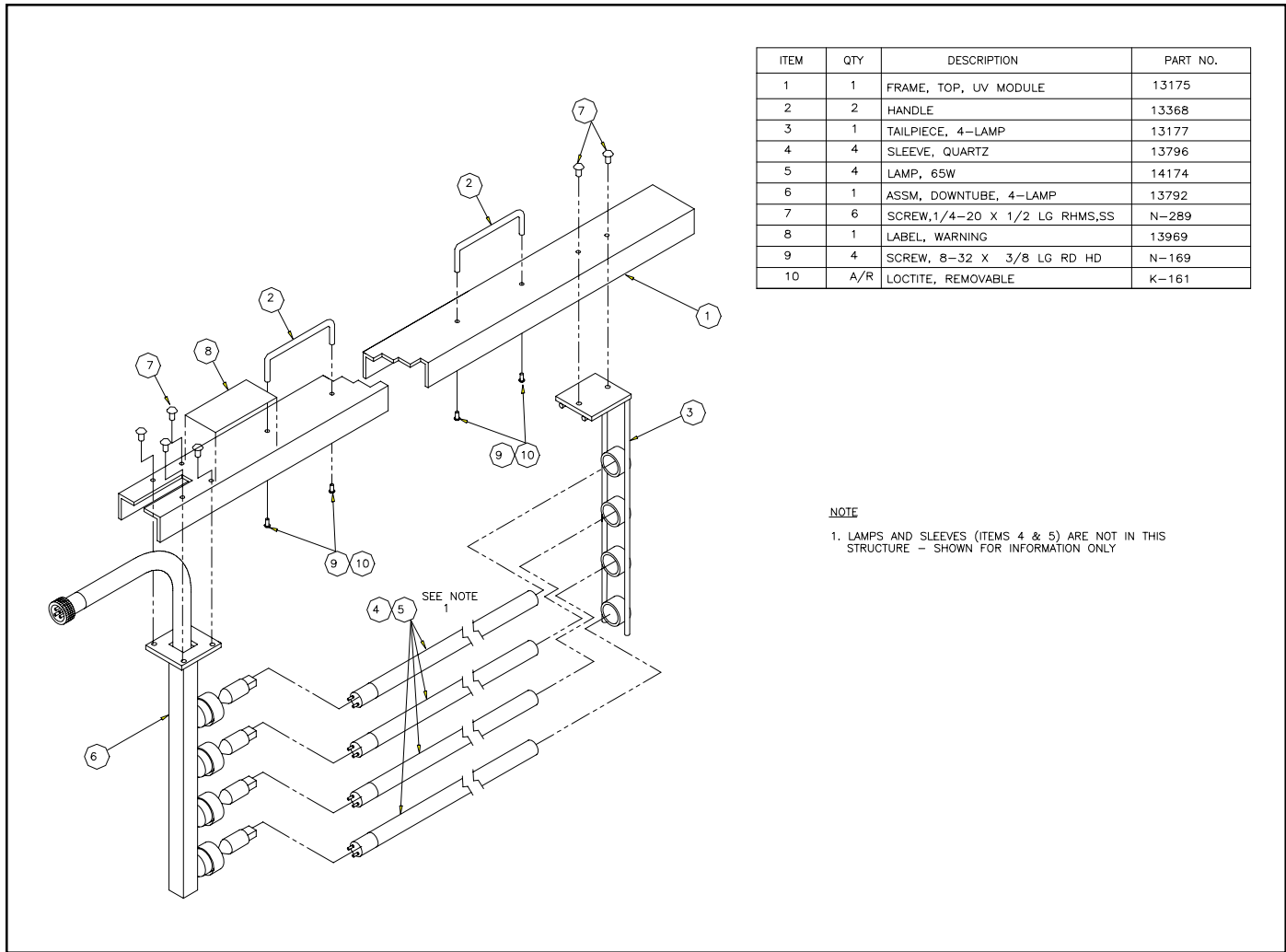


Figure 2 - UV Lamp Module 4-Lamp

#### 4.4 Power Supply Replacement (Refer to Figure 3)

4.4.1 Switch power supply power switch to the OFF position (down).

**CAUTION: ALLOW 1 MINUTE AFTER DISENGAGING POWER SUPPLY BEFORE COMPLETELY REMOVAL.**

4.4.2 Remove two (2) screws holding the power supply in place and pull firmly on the power supply handle to disengage from the socket.

4.4.3 Remove the power supply and install a new power supply by following the previous steps in reverse order.

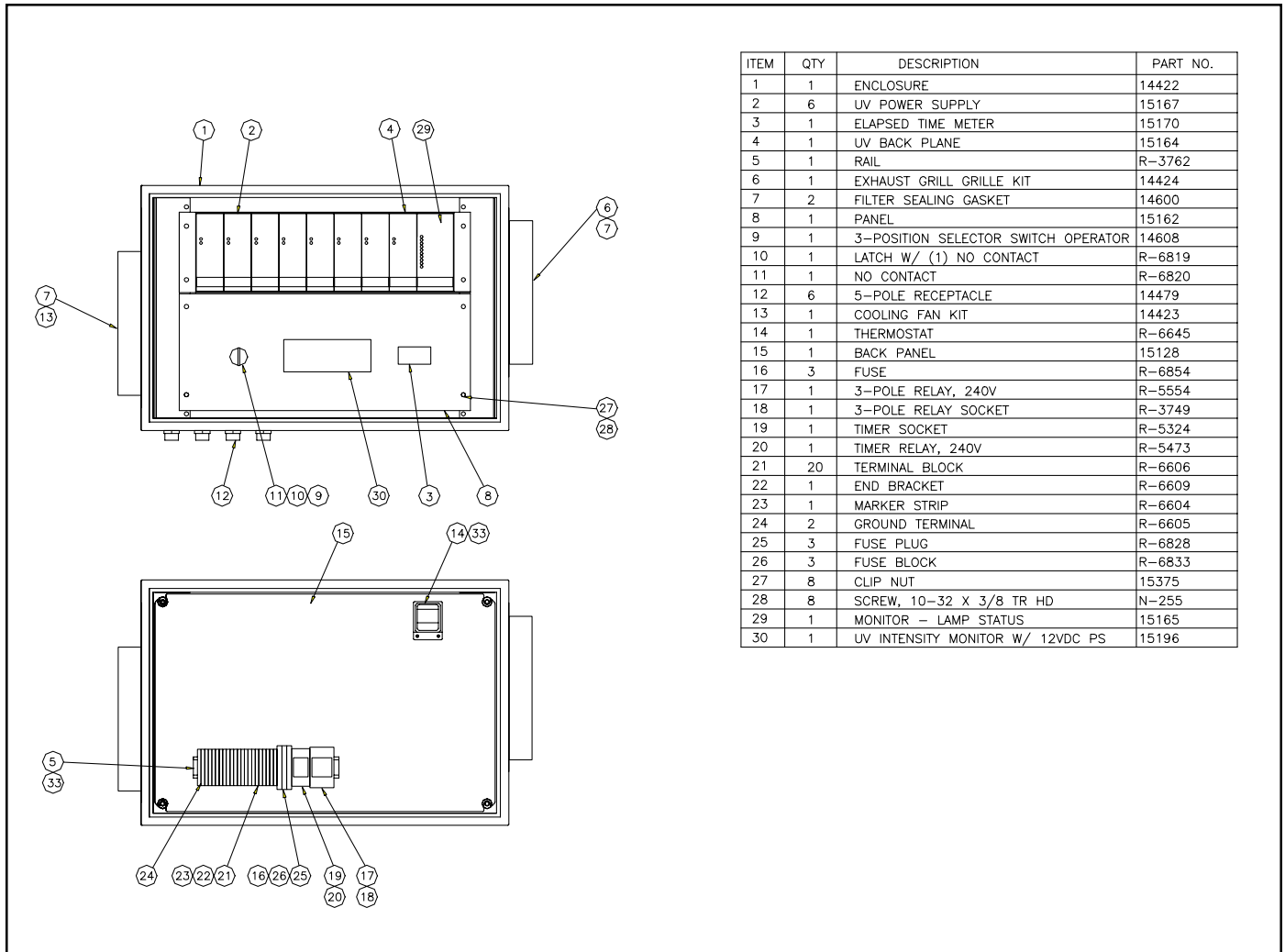


Figure 3 - Enclosure UV Power Supply Center 16 Lamp, 240 VAC

## 4.5 Filter Screen Cleaning

**CAUTION: AIR FILTERS MUST BE KEPT CLEAN OR DAMAGE FROM OVERHEATING MAY OCCUR - CLEAN FILTERS OFTEN.**

- 4.5.1 The PSC is supplied with filter screens for the fan inlet and exhaust louvers. Periodically check the screens and clean if necessary.

**CAUTION: ROTATING FAN BLADES ON THE COOLING FAN ARE DANGEROUS. FOLLOW PROCEDURES BEFORE SERVICING.**

- 4.5.2 Turn the front panel selector switch to the OFF position. The fan will stop rotating. Remove the fan and discharge vent covers. Slide the filter out.
- 4.5.3 Clean the screens and louvers with mild soapy water, rinse and dry.
- 4.5.4 Replace screens by following the previous steps in reverse order.

## 5 TROUBLESHOOTING CHART

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
1. All LED indicators are out, fan not running.	a. Tripped circuit breaker at power source. b. blown fuse. c. Fan burned out.	a. Check and reset breaker. b. Replace fuse. c. Replace fan.
2. One or more LEDs are out, fan running.	a. Lamp(s) burned out. b. Power supply failure.	a. Switch modules, if problem follows module, lamp(s) are burned out. Replace lamp(s). b. If same LEDs are out, power supply has failed, Replace power supply.
3. All lamps in one module are out.	a. Tripped GFCI. b. Blown sub-fuse.	a. Reset GFCI. b. Replace sub-fuse.
4. Bacterial test is high.	a. Water quality has decreased. b. Sleeves coated. c. Lamps are old.	a. Check water quality, adjust process. b. Clean sleeves. c. Replace lamps.

## 6 REPLACEMENT PARTS LIST

Table 1 - Open Channel UV Systems - Series 8200, 8300, and 8400

Description	Part No.	Model			
		Oxi-Free	8200 Series	8300 Series	8400 Series
<b>Standard Intensity UV Systems</b>					
<b>Magnetic Ballasts</b>					
Ballast, 2-Lamp, 120 Vac/60 Hz	4310UD		X		
Ballast, 2-Lamp, 220 Vac/50 Hz	9280UD		X		
<b>Electronic Ballasts</b>					
Ballast, 2-Lamp, 120 Vac/50/60 Hz -End Wired	10467	X			
Ballast, 2-Lamp, 120 Vac/50/60 Hz- Side wired	10662	X			
Ballast, 2-Lamp, 240 Vac/50/60 Hz	17541UD		X		X
Ballast, 2-Lamp, 120 Vac/50/60 Hz	17928UD		X		
Power Supply (240VAC)	15167			X	X
<b>High Output UV Systems</b>					
Ballast, 2-Lamp, 240 Vac/50/60 Hz	17541UD		X		X
UV Lamp, Nonozone Type( Short lamps)	5340UD				
UV Lamp, Nonozone Type (Long lamps)	9410UD		X	X	X
UV Lamp, Nonozone Type (Long lamps) - Old P/N R-5900	1530UD				
UV Lamp, Nonozone Type (High Output lamps)	19566UD		X		X
Quartz Sleeve, Open One End ( Long lamps)	R-5845	X			
Quartz Sleeve, Open One End ( Long lamps)	13796	X			
Quartz Sleeve, Open One End ( Long lamps)	6540UD		X	X	
Quartz Sleeve, Open One End ( Long lamps)	17200UD				X
Quartz Sleeve, Open One End (Short lamps)	17211UD		X	X	
Quartz Sleeve, Open One End (Short lamps)	R-6597	X			
Nipple, Quartz	17036UD	X	X	X	
Nipple, Quartz	2840LUD				X
O-Ring for Quartz, EPR	R-6578	X		X	
O-Ring for Quartz, EPR	6590UD		X	X	
O-Ring for Quartz, EPR	1090UD				X
Quartz Sleeve Cushion O-Ring	20700UD		X	X	
Quartz Sealing SS Washer	1080UD				X
Grommet	16177UD				X

**Table 1 - Open Channel UV Systems - Series 8200, 8300, and 8400 (continued)**

Description	Part No.	Model			
		Oxi-Free	8200 Series	8300 Series	8400 Series
UV Module	21241UD		X		
UV Module	21742UD			X	
UV Module	CF	X			X
Lamp Harness Assembly	1710S-2UD	X	X	X	
Lamp Harness Assembly	18862UD				X
LED Pilot Light, Green	16070UD	X	X	X	X
Resistor for LED Light	16071UD		X		X
Running Time Meter	19090UD		X		X
Fan, Cooling, 230 Vac	14423			X	X
Fan, Cooling, 110 Vac/60 Hz	16755UD		X		
Fan, Cooling, 220/240Vac/60 Hz	18322UD		X		X
GFCI breaker	18557UD		X		
Remote UV Sensor	18598UD		X	X	X
UV Monitor (Panel mount)	8102-DMP		X		X
UV Monitor Panel Mount	8300-DM			X	X
UV Sensor Mounting clip	15472		X	X	X
Cotter Pin	17424UD				X
Wiper Ring	1190UD				X
Wiper Ring- Horizontal automatic wiper systems	22620UD		X		

Design improvements may be made without notice.

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