

# Laundry Systems

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## Installation & Operation Manual

*Eco*<sub>3</sub>*Tex*<sup>TM</sup>  
*The Cold Water Catalyst*

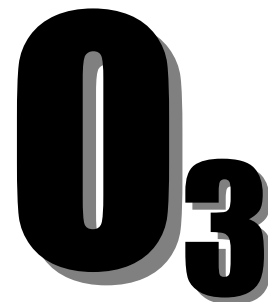


**ClearWater Tech, LLC.**

Integrated Ozone Systems

850-E Capitolio Way, San Luis Obispo, Ca 93401 • 805-549-9724 • Fax: 805-549-0306 • E-mail: [service@cwtozone.com](mailto:service@cwtozone.com) • [www.cwtozone.com](http://www.cwtozone.com)

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## **INTRODUCTION**

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This Installation and Operation Manual is written to assist in the installation, operation and maintenance of ozone delivery systems manufactured by ClearWater Tech, LLC. This equipment has been designed using the most modern materials and technology available.

Please read this manual carefully and in its entirety before proceeding with any installation, operation or maintenance procedure associated with this equipment. Failure to follow these instructions could result in personal injury, damage to the equipment or reduced product performance.

In an ongoing effort to improve reliability and operating efficiency, ClearWater Tech may find it necessary to make changes to its products. Therefore, the information contained in this manual may not conform in every respect to earlier versions of ClearWater Tech ozone system found in the field. If you have any questions, please contact your ClearWater Tech dealer or the ClearWater Tech service department.

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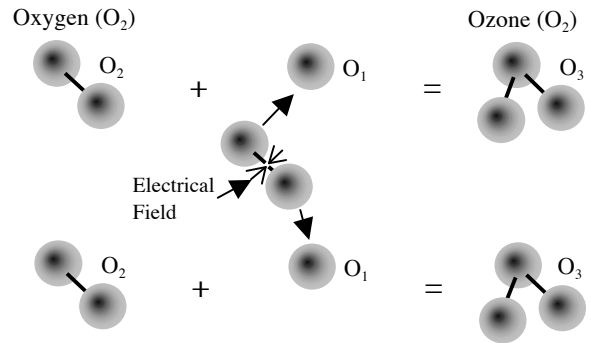
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# OVERVIEW

## How Ozone Is Generated

Ozone is generated by exposing oxygen molecules ( $O_2$ ) in an air stream to a controlled, high energy electrical field. As the air stream passes through the electrical field produced inside the ozone generator, some oxygen molecules are split, forming single oxygen atoms ( $O_1$ ). These oxygen atoms then recombine with other oxygen molecules in the air stream, forming ozone ( $O_3$ )



## Properties of Ozone

Ozone is the most powerful oxidizer available that can be safely used in water treatment<sup>1</sup>. It is used to treat drinking water, bottled water, swimming pool water, waste water, food and beverage processing water, and in many other applications. Ozone is effective in performing the following:

- **Disinfection** – Bacterial disinfection, inactivation of viruses and cysts.
- **Oxidation of Inorganics** – Precipitates, iron, manganese, sulfides nitrides and organically-bound heavy metals
- **Oxidation of Organics** – Including organics causing color, taste, and odor problems. Some detergents and pesticides, phenols, VOCs, turbidity control and micro-floccuity control and micro-flocculation of soluble organics.

Molecular Weight	48
Odor	Readily detectable at concentrations above 0.02 ppm in air
Color	Bluish in ozone generator cell, but ozone/air mixture exiting generator is invisible – even at high ozone concentrations.
Gas Density:	2.144 grams/liter at 32°F (Approximately 150% that of oxygen).
Solubility	Only partially soluble in water, but about 10-20 times more soluble than oxygen (at 68°F).

## Benefits of Ozone Use



- Ozone is generated on site – no transportation or storage is required
- The most powerful oxidizer commercially available – very effective for disinfection and oxidation without handling problems.
- Ozone creates no potentially harmful by-products (such as THMs) – the only by-product is oxygen.
- Ozone leaves no telltale taste or odor.

<sup>1</sup> Water Quality Association, "Ozone for POU, POE and Small Water System Water Treatment Applications," Lisle, IL, 1999

# Safety Information

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## Safety Warnings

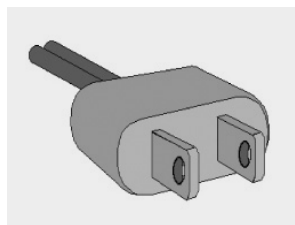
Two aspects of ClearWater Tech ozone generators represent potential dangers – ozone gas and high voltage electricity.

**OZONE GAS – WARNING: HIGH CONCENTRATIONS OF OZONE GAS ARE DANGEROUS TO HUMANS. LOW CONCENTRATIONS CAN CAUSE IRRITATION TO THE EYES, THROAT AND RESPIRATORY SYSTEM.**

This ClearWater Tech *ECOTEX* Series corona discharge ozone generators are designed to operate under a pressurized condition. While safety precautions have been taken, entering the equipment area should be avoided if ozone gas is detected. Ozone has a very distinctive odor and is detectable at very low concentrations (0.02 ppm), which is far below OSHA's maximum permissible exposure level of 0.1 ppm.




**HIGH VOLTAGE – WARNING: CLEARWATER TECH OZONE GENERATORS OPERATE AT HIGH VOLTAGE. DO NOT TAMPER WITH OR DELIBERATELY BYPASS THE SAFETY FEATURES BUILT INTO THE OZONE GENERATOR UNLESS INSTRUCTED TO DO SO BY THIS MANUAL. IF CONTACT IS MADE WITH OPERATING HIGH VOLTAGE COMPONENTS, ELECTRIC SHOCK WILL OCCUR.**



ClearWater Tech corona discharge ozone generators take line voltage and convert it DC current. A high voltage transformer then boosts the voltage. While each ozone generator has safety interlocks, proper care must be used by a qualified electrician when making any internal adjustments or performing any maintenance procedures.

# IMPORTANT SAFETY INSTRUCTIONS

When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:

1. **READ AND FOLLOW ALL INSTRUCTIONS.**
2. Warning: For indoor use only. This unit is not intended for outdoor use.
3. Install at least 5ft from tub water using nonmetallic plumbing. Install ozone generator no less than 1 ft above the maximum water level to prevent water from contacting electrical equipment. Install in accordance with the installation instruction.
4. Warning: Short term inhalation of high concentration of ozone and long term inhalation of low concentrations of ozone can cause serious harmful physiological effects. Do not inhale gas produced by this device.
5. A green colored terminal or a terminal marked G, GR, Ground, Grounding, or the symbol  is located inside the supply terminal box or compartment. To reduce the risk of electric shock, this terminal must be connected to the grounding means provided in the electric supply service panel with a continuous copper wire equivalent in size to the circuit conductors supplying this equipment.
6. At least two lugs marked "BONDING LUGS" are provided on the external surface or on the inside of the supply terminal box or compartment. To reduce the risk of electric shock, connect the local common bonding grid in the area of the hot tub or spa to these terminals with an insulated or bare copper conductor not smaller than No. 6 AWG.
7. All field—installed metal components such as rails, ladders, drains or other similar hardware within 3 m of the spa or hot tub shall be bonded to the equipment grounding bus with copper conductors not smaller than No. 6 AWG.
8. All electrical connections should be made by a licensed, qualified electrician.
9. Before attempting any electrical connections, be sure all power is off at the main circuit breaker.
10. CAUTION: THE EQUIPMENT AND CONTROLS SHALL BE LOCATED NOT LESS THAN 1M HORIZONTALLY FROM THE SPA OR HOT TUB
11. The electrical supply for this product must include a suitably rated switch or circuit breaker to open all ungrounded supply conductors to comply with Section 422-20 of the National Electrical Code, ANSI/NFPA 70-1987. The disconnecting means must be readily accessible to the operator(s) but installed at least five feet from any open body of water.
12. The system should be sized appropriately for its intended use by a qualified professional familiar with the application. This equipment must be validated by the manufacturer for its intended use; failure to do so may void the warranty.
13. **SAVE THESE INSTRUCTIONS.**

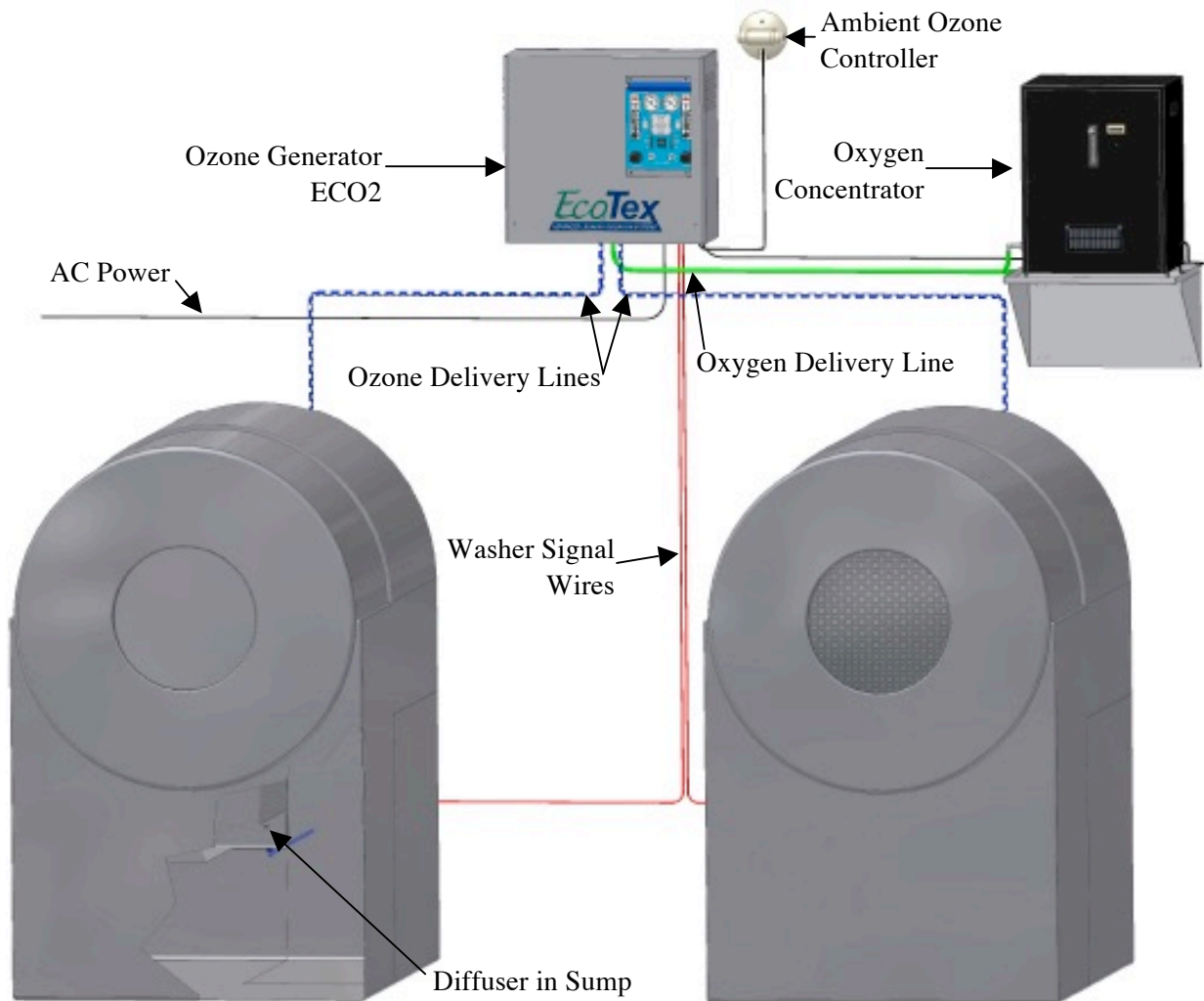
# Theory of Operation/Product Description

*ECOTEX*<sup>™</sup> Advanced Laundry Oxidation Systems by ClearWater Tech are designed for safe, effective use to provide the power of oxidation in industrial laundry washers. The *ECOTEX* advantage in industrial laundering is achieved by reducing the use of natural resources, such as water and energy, reducing wash chemicals and labor, and an added benefit of extended fabric life. Each complete integrated system include the components required for reliable, efficient ozone production and delivery, which can be divided into four general segments:

## Complete Laundry System

Figure 1

**Air Preparation System • Ozone Generator • Diffusion • Ambient Ozone Controller**



## Air Preparation System

*ECOTEX* corona discharge ozone generators require a source of clean, dry, oil-free, oxygen-enriched air for effective ozone production. To meet that need the *ECOTEX* system employs pressure swing adsorption (PSA) oxygen technology with oil-less compressor to increase the concentration of oxygen and reduce the moisture content in the feed gas (the air supplied to the ozone generator). This substantially improves the output capability of the ozone generator and prevents premature failure of key internal components. These air preparation systems deliver 90%+/-3% oxygen purity at -60°F dew point and at very low pneumatic pressures, minimizing noise and

reducing compressor wear. The PSA system is rated with a continuous duty cycle in conditions up to 90% relative humidity non-condensing. In an effort to save valuable equipment room space the *ECOTEX* systems have been designed to use one oxygen concentrator with up to four ozone generators.

## Ozone Generator

The feed gas produced by the PSA air preparation system is supplied to the *ECOTEX* ozone generator at a maximum pressure of 5-10 pounds per square inch (PSI). A built-in pressure regulator air flow meter and pressure gauge is used to control and monitor the air flow and pressure through the ozone generator. Pressure from the air preparation system compressor provides the force to move the feed gas through the ozone generator.

As the feed gas enters the thermally-protected reaction chambers inside the ozone generator, some of the oxygen molecules are split while passing through the high voltage electrical field (the “corona”), forming single oxygen atoms (O<sub>1</sub>). These oxygen atoms then recombine with other oxygen molecules in the air stream, forming ozone.

The *ECOTEX* ozone generator may be interlocked with a variety of input and output signals used for alarms and auxiliary power. Many other safety features are also built in, including a main power breaker switch, fuses, and thermal protection.

The *ECOTEX* line of ozone generators are designed for simplicity of installation and to reduce required space within the equipment room by reducing equipment required. **NOTE: Laundry washer size (rated in pounds or kilograms) may be greater based on linen type and soil load.**

- *ECO1*: Typically used with one 35 to 110 lb. (16 to 50 kg) commercial washer, incorporates a laundry control board, pneumatic controls and gauges, an LED display board, ozone generator control boards, and a single ozone reaction chamber.
- *ECO2*: Typically used with one 110 to 200 lb. (50 to 90 kg) commercial washer or two 35 to 110 lb. (16 to 50 kg) commercial washers, includes a laundry control board, dual pneumatic controls and gauges, dual LED display boards, ozone generator control boards, and dual ozone reaction chamber. This dual operation and function of the *ECO2* allows the system to either be interfaced to one washer or two independent washers.
- *ECO3*: Typically used with one 200 to 400 lb. (90 to 180 kg) commercial washer, incorporates a laundry control board, pneumatic controls and gauges, an LED display board, ozone generator control boards, and a single ozone reaction chamber.
- *ECO4*: Typically used with one 400 to 600 lb. (180 to 272kg) commercial washer or two 200 to 400 lb. (90 to 180 kg) commercial washers, includes a laundry control board, dual pneumatic controls and gauges, dual LED display boards, ozone generator control boards, and dual ozone reaction chamber. This dual operation and function of the *ECO4* allows the system to either be interfaced to one washer or two independent washers.

## *ECOTEX* Diffusion

The *ECOTEX* diffuser has been designed to easily interface an industrial laundry washer system. The diffuser serves two purposes. One, it provides a means by which the ozone and oxygen gas can be delivery to the wash water and two, it produces extremely tiny bubbles These bubbles must be as small as possible in order to increase the ratio of bubble surface area to the amount of ozone entering the water.

## Ambient Ozone Controller

With safety in mind the *ECOTEX* systems can be purchased with an ambient ozone controller that can interrupt ozone generation if ozone is sensed in the laundry room/facility. This ambient ozone controller may be set to alarm at specific ozone parts per million (PPM) set points, to conform with all local, state and national health regulations.

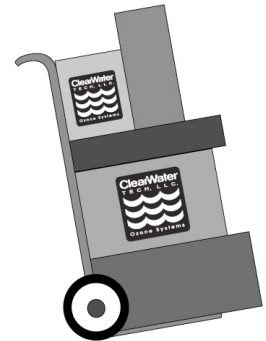


# Installation Procedures – Getting Started

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## Unpacking

Compare the *ECOTEX* system equipment received to the packing list provided. Before beginning any installation procedures, thoroughly inspect all components for damage. If damage is noticed, promptly notify the freight carrier and request an on-site inspection. Inspect all packing materials for small parts before discarding. Inspect all plumbing, fittings and tubing for packing material that may have become lodged in openings.



## Equipment Placement

- When placing the system components in the equipment room, make sure to consider safety, maintenance requirements, local building and fire codes, etc. The components should be easily accessible by the operators, including equipment access doors and electrical hook-up boxes. All meters, gauges, indicator lights, and switches should be visible and accessible. Dimensional drawings of the air preparation system and ozone generator are included in Section A of the Appendix.
- The air preparation system and ozone generator should be located as close as possible to the point of ozone diffusion (within 20 feet is recommended). Ozone is an unstable gas and will begin reverting back to oxygen very quickly.
- Like any electronic component, performance and longevity is enhanced by favorable operating conditions. Also, since each air preparation system and ozone generator is air-cooled, a relatively dust-free, well-ventilated area is required. Do not store caustic laundry chemicals in the immediate area surrounding the equipment. A minimum clearance of six inches from the vents on either side of the ozone generator is required.
- The equipment is heavy and requires proper support. Therefore, a clean, dry, level surface should be provided for the air preparation system and a flat vertical surface for the ozone generator. The *ECOTEX* ozone generator must be mounted to the wall above the typical water level of the washer. The *ECOTEX* system provides a dual Z-bar mounting system. Mount the wall-mount Z-bar to wall using the mounting holes provided. Once secured, the *ECOTEX* ozone generator Z-bar mounted to the back of the ozone generator can be hung from the wall-mount Z-bar. Internal to the *ECOTEX* ozone generator are two hex type security screws (see Appendix-Section A) that can be used to secure the *ECOTEX* ozone generator to the wall-mount Z-bar. There are two leveling feet located on the back-side of the *ECOTEX* ozone generator, which can be adjusted to level the unit to the wall.
- The air preparation system and ozone generator are not designed to withstand outdoor elements, including direct contact with water and/or temperature extremes. Therefore, the equipment must be installed in an environment consistent with the following operating parameters:
  - Ambient temperature range: 20°F to 95°F continuous. If the temperature around the equipment consistently exceeds 95°F, additional air-cooling must be provided.
  - Humidity: 0 - 90% relative humidity, non-condensing environment.
  - Line voltage: +/-10% of rated input

**Note: Equipment installed in extreme environmental conditions will void manufacturer's warranty.**

# Installation Procedures – Plumbing

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The *ECOTEX* ozone diffuser should be plumbed either into the main drain line (see Figure 2) or into the washer sump (see Figure 3). The main drain connection requires a length of PVC pipe to be drilled out to receive the diffuser, then inserted into the main drain and coupled between the washer sump and the main drain valve. The washer sump connection will require a hole to be drilled into the sump of the washer, and then the *ECOTEX* diffuser would be installed into the hole creating a watertight seal.

**NOTES: Plumbing connections to the washer should be made in accordance to the washer manufactures warranty.**

## Main Drain Diffuser Installation

The steps below and collar specifications in Figure 4 represent the use of a typical 3inch washer drain line. These steps and specifications should be altered appropriately to match the dimensions of the drain used.

Step 1: Cut a piece of 3” PVC pipe to 5” in length. See Figure 4

Step 2: Drill a  $\frac{3}{4}$ ” diameter hole into the middle of the pipe on one side. Then place the *ECOTEX* ozone diffuser into the  $\frac{3}{4}$ ” diameter hole drilled into the pipe. Tightening the hex-head of the diffuser clock-wise will begin to lock the diffuser in place, making a watertight seal. **Note: Use silicone RTV adhesive as required on the threads of the diffuser and seal bushing to ensure a watertight seal.**

Step 3: Locate washer’s main drain valve. Disconnect the drain valve from the washer. Using 3” sanitary couplers, attach a coupler to both sides of the diffuser assembly securing with a hose clamp on both sides. Then attach one coupler of the diffuser assembly to the drain port of the washer securing with a hose clamp, then attach the other side of the coupler to the drain valve, securing with hose clamps. See Figure 2. **Note: The Collar must be installed in a vertical position so that the gas is diffused directly into the sump or basin of the washer.**

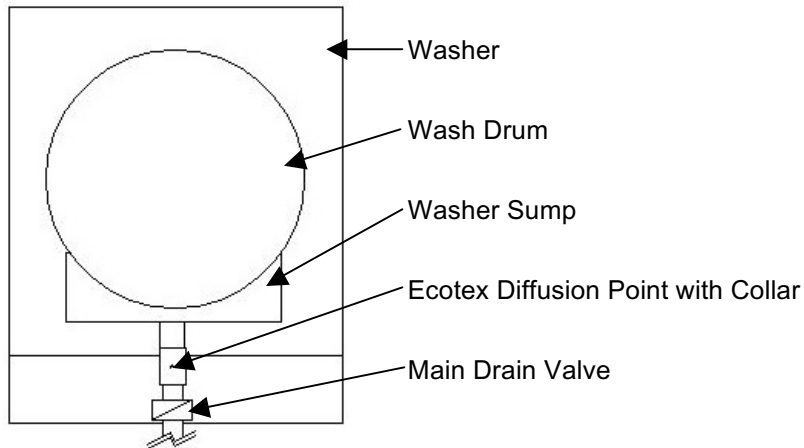
## Washer Sump Diffuser Installation

Step 1: Locate a suitable place for the diffuser in the sump of the washer.

Step 2: Drill a  $\frac{3}{4}$ ” diameter hole in the wall of the sump. Tightening the hex-head of the diffuser clock-wise will begin to lock the diffuser in place, making a watertight seal. **Note: Use silicone RTV adhesive as required on the threads of the diffuser and seal bushing to ensure a watertight seal (see Figure 3).**

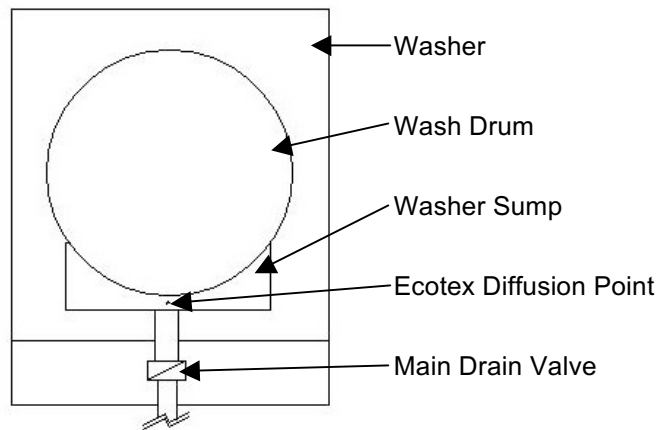
### Main Drain Diffuser Diagram

Figure 2



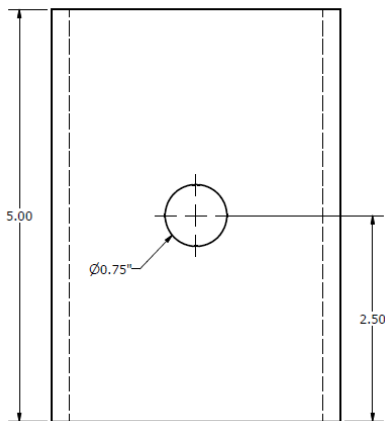
### Washer Sump Diffuser Diagram

Figure 3

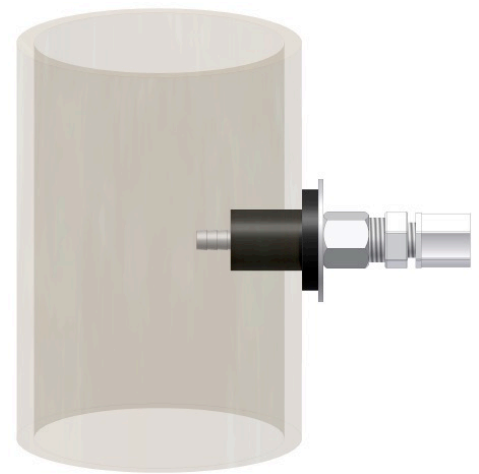


### ECOTEX Diffuser – Collar Specifications

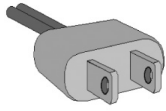
Figure 4



- Pipe Diameter: 3" inches
- Pipe Length: 5" inches
- Hole Placement: 2.5" inches
- Hole Dimension: 3/4" inch diameter



# Installation Procedures – Electrical



The *ECOTEX* ozone generators accept input voltages of 120/208-240VAC (+/-10%) at 50/60Hz, single phase (1 $\phi$ ). This section will outline the electrical installation and interface of the *ECOTEX* ozone generator with the oxygen concentrator, washer control signals and alarm signals. All possible pre wiring has been completed at the factory.

## Notes:

- All electrical connections should be made by a licensed, qualified electrician. All local, state and national codes must be observed.
- Make sure all power is off at the main circuit breaker before making any electrical connections.
- Supplying voltage to any dry contact interface will cause damage and void warranty.
- All electrical voltages must be the same phase, when energizing multiple ozone generators.
- Signal wires used in the installation must meet the following requirements:
  - Certified for hard or extra-hard usage in wet locations (eg, types SOW, STW, SJOW, SJTW)
  - Routed and secured to avoid mechanical damage
  - Voltage rating, ampacity, and temperature ratings of the flexible cord are suitable for the application.
  - An insulating bushing is provided at each point at which a flexible cord passes through the metal enclosure.
  - The strain relief provided in the chassis through which the flexible cord passes is appropriately tightened to reduce the risk of mechanical strain on the flexible cord.

**Step 1: Main Power:** Wire power from the main electrical service panel to the laundry control board (located inside the ozone generator). The system will accept input voltages of 120/208-240VAC 50/60Hz, single phase. When main

<b>ECOTEX™ Power Consumption (Unit Only)</b>				
<b>Ozone Generator</b>	<b>120/208-240VAC 50/60Hz</b>	<b>120VAC 60Hz</b>	<b>220VAC 50Hz</b>	<b>240VAC 60Hz</b>
<i>ECO1</i>	1.4 - 0.8 amps			
<i>ECO2</i>	2.0 - 1.1 amps			
<i>ECO3</i>	1.6 - 0.8 amps			
<i>ECO4</i>	2.8 - 1.4 amps			
<b>Oxygen Concentrator</b>				
Aerous 8		3.0 amps	1.6 amps	1.5 amps
Aerous 15		3.8 amps	2.1 amps	1.9 amps

power is initiated, the “System Power” LED will illuminate. **Notes: If multiple ozone generators are used wire main power to each unit independently. A main power cord can be feed through one of the ½” conduit knockouts located at the bottom of the ozone generator. The main power cord wire gauge should be sized correctly to the systems amperage draw. No more than two individual units can be interconnected (daisy chained) together to a single source of power. See Figure 5.**

**Step 1:** Wire a main power L1 to the “Mains In/Out” (left side), L1 Terminal.

**Step 2:** Wire a L2 or a neutral main power wire to the “Mains In/Out” (left side), L2/N Terminal.



**Step 2: Oxygen Concentrator Power:** The oxygen concentrator must be calibrated to its prescribed airflow at “atmospheric pressure” prior to wiring the unit to the ozone generator, follow Step 1 of the “Start-up & Calibration” section. **Warning: Failure to calibrate may lead to premature failure of the oxygen concentrator.** When calibration is completed follow the steps below to wire the power cord of the oxygen concentrator to the “Air Prep In/Out” terminals of the ozone generator. **Notes: The output voltage of this terminal is dependent of the main power input voltage. If the main power input voltage were 120VAC the output voltage of the “Air Prep In/Out” terminals would be 120VAC, similarly if the main power input voltage were 240VAC the output voltage of the “Air Prep In/Out” terminal would be 240VAC. THE MAIN POWER INPUT VOLTAGE MUST MATCH THAT OF THE OXYGEN CONCENTRATOR VOLTAGE REQUIRED. IMPROPER VOLTAGE TO THE OXYGEN CONCENTRATOR MAY CAUSE DAMAGE AND VOID WARRANTY.**

**Step 1:** If not already done so, cut off the standard nema plug from the end of the oxygen concentrator power cord and strip back the cord jacket and wires. Feed the cord through one of the ½” conduit knockouts provided on the bottom of the ozone generator.

**Step 2:** Wire the black 18AWG wire from the oxygen concentrator power cord to the “Air Prep In” (left side), L1 Terminal.

**Step 3:** Wire the white 18AWG wire from the oxygen concentrator main power cord to the “Air Prep In” (left side), L2/N Terminal.

**Step 4:** Connect 18AWG ground wire of the oxygen concentrator main power cord to the ground stud/ground lug located inside the ozone generator. If using the ground stuff attach a ground ring to the green 18AWG ground wire and use the keeper nut supplied. See Appendix-Section A, for ground stud/ground lug location.

**Notes: If multiple ozone generators are required, use an 18AWG 3-wire cord to relay from the “Air Prep Out” terminals of an ozone generator to the “Air Prep In” terminals, of the subsequent ozone generator, be sure to also attach the ground wire and secure with keeper nut supplied. This will allow the oxygen concentrator to be energized when each ozone generator is in operation. See Figure 5**

**Step 3: Washer Input Signal:** The *ECOTEX* laundry control board is equipped with a 100-240VAC input terminal and a “dry contact” (no voltage) input terminal, either one of these terminals can be used to activate the *ECOTEX* system. This input signal will initiate the systems “Delay Adjustment” timer (see step 4 below), and then power the “Air Prep In/Out” terminals, pneumatic controls and ozone generator, which will also illuminate the “Output Level” LED’s. This signal can be obtained from, the main drain valve, a chemical signal voltage or water level pressure switch. **Note: The *ECO2* and *ECO4* may be used to supply ozone to one washer or two washers. If ozone is supplied to one washer the washer input signal must be wired to either the Washer 1 or W1 input terminals, a jumper must then be used to connect from the Washer 1 terminal to Washer 2 terminal or from the W1 terminal to the W2 terminal, this will allow both washer 1 and washer 2 ozone generators to produce ozone simultaneously with a single input signal.**

**Washer 1 and Washer 2 Input Signal – 100-240VAC:**

**Step 1:** Wire from the signal source to “Washer 1” and/or “Washer 2,” L1 Terminal.

**Step 2:** Wire from the signal source to “Washer 1” and/or “Washer 2,” L2/N Terminal.

**W1 and W2 Input Signal – “Dry Contact”:**

**Step 1:** Wire a two-wire continuity loop from the signal source to “W1” Relay and/or “W2” Relay.

**Notes:** There is no specific orientation of this connection. To use the “dry contact” terminal with a voltage input signal, a single pole single throw (SPST) normally open relay may be used to create a dry contact interface.

**Step 4: Delay Adjustment:** The “On Delay” adjustment timer is available to allow for a suitable water level in the washer to be achieved prior to ozone production. This delay is installer set and can be adjusted between 0-60 seconds. **Note:** If “0” (zero) seconds is selected ozone production will begin when the washer signal is present.

**Step 5: Auxiliary Power Out VAC:** This terminal receives power directly from the main power input terminal and may be used to provide power to an external device. The output voltage will be based on the main power input voltage. If the input voltage were 120VAC the auxiliary voltage output would be 120VAC. The amperage draw will be dictated by the size of the main breaker at the sub-panel and less the amount of draw of the ozone system. **Example:** Sub-panel breaker load, 15amps, less the ozone system load, 8amps, equals 7amps. The auxiliary main power terminal load must not exceed 7amps.

**Auxiliary Power Out – 120/208-240VAC:**

**Step 1:** Wire from the external device to “Mains In/Out”(right side), L1 Terminal.

**Step 2:** Wire from the external device to “Mains In/Out” (right side), L2/N Terminal.

**Note:** Improper voltage may damage the external device. Be sure the external device main power requirements match that of the auxiliary terminals output power voltage and amperage rating.

**Step 6: Auxiliary Power Out VDC:** The auxiliary 12VDC power output terminal may be used to provide power to an external device. The amperage draw must not exceed 0.5 amps. This terminal will provide a power output when the ozone generator is energized with main power.

**Auxiliary Power Out – 12VDC:**

**Step 1:** Wire a “positive” voltage wire from the external device to the “Auxiliary Power Out,” positive (+) Terminal.

**Step 2:** Wire a “negative” voltage wire from the external device to the “Auxiliary Power Out,” negative (-) Terminal.

**Note:** Improper voltage and wiring may damage the external device. Be sure the external device main power requirements match that of the auxiliary terminals output power voltage and amperage rating.

**Step 7: Washer Alarm:** The laundry control board is equipped with individual “Washer 1” and “Washer 2” dry contact (no voltage) input terminals. This alarm can be used to interrupt the ozone production and pneumatic controls and illumination of the “Output Level” and “Air Prep” LED’s, to Washer 1 or Washer 2 when a continuity signal is present, which will illuminate the “Washer Alarm” LED on the control panel display.

**Washer 1 and Washer 2 Relay Alarm Input Signal – Dry Contact:**

**Step 1:** Wire a two-wire continuity loop from the signal source to “Washer 1” Relay and/or “Washer 2” Relay. **Notes:** There is no specific orientation of this connection. To use the “dry contact” terminal with a voltage input signal, a single pole single throw (SPST) normally open relay may be used to create a dry contact interface.

**Step 8: Room Alarm:** The laundry control board is equipped with a 5-48VDC and 100-240VAC input terminals and also equipped with a “Relay” dry contact (no voltage) input terminal. The “Room Alarm Jumpers” located on the laundry control board will dictate the function of the room alarm.

Condition	Alarm	System Function
<b>J25/J29 Position 1-2, J26/J30 Position 1-2</b>		
Room Alarm VDC input terminal has 5-48VDC present OR Room Alarm VAC input terminal has 90-260VAC present OR Room Alarm “Relay” terminal has continuity present	Yes	All LEDs remain on, system looks normal. Air Preparation system is inactivated thus inactivating ozone production. Room Alarm LED does not illuminate
Room Alarm VDC input terminal has no voltage present AND Room Alarm VAC input terminal has no voltage present AND Room Alarm “Relay” terminal has no continuity present	No	System Runs Normally
<b>J25/J29 Position 1-2, J26/J30 Position 2-3</b>		
Room Alarm VDC input terminal has 5-48VDC present OR Room Alarm VAC input terminal has 90-260VAC present OR Room Alarm “Relay” terminal has continuity present	No	System Runs Normally
Room Alarm VDC input terminal has no voltage present AND Room Alarm VAC input terminal has no voltage present AND Room Alarm “Relay” terminal has no continuity present	Yes	All LEDs remain on, system looks normal. Air Preparation system is inactivated thus inactivating ozone production. Room Alarm LED does not illuminate
<b>J25/J29 Position 2-3, J26/J30 Position 1-2</b>		
Room Alarm VDC input terminal has 5-48VDC present OR Room Alarm VAC input terminal has 90-260VAC present OR Room Alarm “Relay” terminal has continuity present	Yes	Ozone Production inactivated along with Ozone Output Level LEDs. Air Preparation inactivated along with Oxygen Flow LED. Room Alarm LED illuminated
Room Alarm VDC input terminal has no voltage present AND Room Alarm VAC input terminal has no voltage present AND Room Alarm “Relay” terminal has no continuity present	No	System Runs Normally
<b>J25/J29 Position 2-3, J26/J30 Position 2-3 – Default Setting</b>		
Room Alarm VDC input terminal has 5-48VDC present OR Room Alarm VAC input terminal has 90-260VAC present OR Room Alarm “Relay” terminal has continuity present	No	System Runs Normally
Room Alarm VDC input terminal has no voltage present AND Room Alarm VAC input terminal has no voltage present AND Room Alarm “Relay” terminal has no continuity present	Yes	Ozone Production inactivated along with Ozone Output Level LEDs. Air Preparation inactivated along with Oxygen Flow LED. Room Alarm LED illuminated



The amperage draw to the VDC and VAC terminals does not exceed 2.5mA. An ambient ozone monitor/controller is recommended to signal the room alarm if the ambient ozone level exceeds the Occupational Safety and Health Administration guidelines measured in parts per million (PPM). **Notes: If multiple ozone generators are used with only one room alarm input signal, a 2-wire cable should be used to relay the room alarm signal to the subsequent ozone generators' room alarm terminals. This will shut down each ozone generator if the room alarm terminals are signaled.**

**Room Alarm Input Signal – 5-48VDC:**

**Step 1:** Wire a “positive” voltage wire from the signal source to the “Room Alarm,” positive (+) Terminal.

**Step 2:** Wire a “negative” voltage wire from the signal source to the “Room Alarm,” negative (-) Terminal.

**Room Alarm Input Signal – 100-240VAC:**

**Step 1:** Wire from the signal source to the “Room Alarm,” L1 Terminal.

**Step 2:** Wire from the signal source to “Room Alarm,” L2/N Terminal.

**Room Alarm Input Signal – Dry Contact:**

**Step 1:** Wire a two-wire continuity loop from the signal source to the “Room Alarm,” Relay terminal.

**Notes: There is no specific orientation of this connection. To use the “dry contact” terminal with a voltage input signal, a single pole single throw (SPST) normally open relay may be used to create a dry contact interface.**

**Step 9:** External Loop (EXT. LOOP): The external loop, noted on the control panel LED display as “EXT. LOOP”, is a true dry contact interface. **Note: The term ‘dry contact’ means that this loop does not supply output nor except input voltages. Warning: Supplying voltage to the external loop will cause damage to the ozone generator and void warranty.** Under normal operation the external loop will effectively interrupt the ozone output, when the loop has lost continuity, this will also illuminate the “EXT. LOOP” LED and turn “OFF” the “Output Level” LED’s on the control panel. **Note: When the external loop has lost continuity main power to the ozone generator will remain “ON” providing power for all other operations within the system.** When continuity is present through the external loop ozone output will continue. This continuity will effectively turn “OFF” the “EXT. LOOP” LED and will again illuminate the “Output Level” LED’s. The *ECO2* and *ECO4* are equipped with two external loops, one for each ozone reaction chamber, these loops operate independent of each other allowing one ozone reaction chamber to be operational while interrupting ozone production of the other reaction chamber.

The external loop, a removable two-position plug with a white 18AWG wire located at the bottom panel of the ozone generator (see Appendix-Section A), can be interfaced to any control device, i.e. ambient ozone monitor/controller. To interface a control device to the external loop, cut the white 18AWG wire in half. Connect the control device to each leg of the external loop. If the control device used supplies an output voltage a single pole single throw (SPST) normally open relay may be used to create a dry contact interface (see Figure 7, “External Loop Electrical Interface”). **Note: Attached to the white 18AWG external loop is a warning, “THIS CONNECTION IS A DRY CONTACT ONLY, DO NOT APPLY VOLTAGE”.**

**Step 10: Ozone Output Control:** The *ECOTEX* Series ozone generators are equipped with two options for controlling the ozone output. The first is a manual 0-100% ozone output control and the second option is a remote 4-20mA control signal. The manual ozone output adjustment knob is located on the front cover control panel, which can be accessed by either removing the control panel acrylic cover or removing the cover of the ozone generator (see Appendix-Section A). The remote 4-20mA control leads (orange and

purple), are located at the bottom of the ozone generator (see Appendix-Section A). The *ECO2* and *ECO4* have dual ozone output controls and 4-20mA control leads, which can control each ozone reaction chamber independently.

**1. Manual Ozone Output Adjustment:** Turning the output adjustment knob counterclockwise will decrease the ozone output down to 0%, while turning the knob clockwise will increase the ozone output up to 100%. The percent of ozone output is indicated by the “Output Level” LED’s on the control panel of the ozone generator, with each LED representing 10% output (see Figure 11).

**2. Remote 4-20mA Control:** A 4-20mA control signal to the ozone generator may be used to control the ozone generator output. The ozone generator will automatically sense the 4-20mA input signal and override the setting of the manual ozone output set point. Based on the 4-20mA signal, ozone output will increase or decrease: 4mA = 0% ozone output, 20mA = 100% ozone output. The percent of ozone output is indicated by the “Output Level” LED’s on the front of the ozone generator, with each LED representing 10% output (see Figure 11). **Note: If the remote 4-20mA signal fails or is missing, the system will default to the manual ozone output setting. Check and adjust the manual ozone output control knob to avoid over-ozonation.**

**Step 1:** Mount the 4-20mA controller to a suitable vertical surface according to the installation manual supplied with the controller.

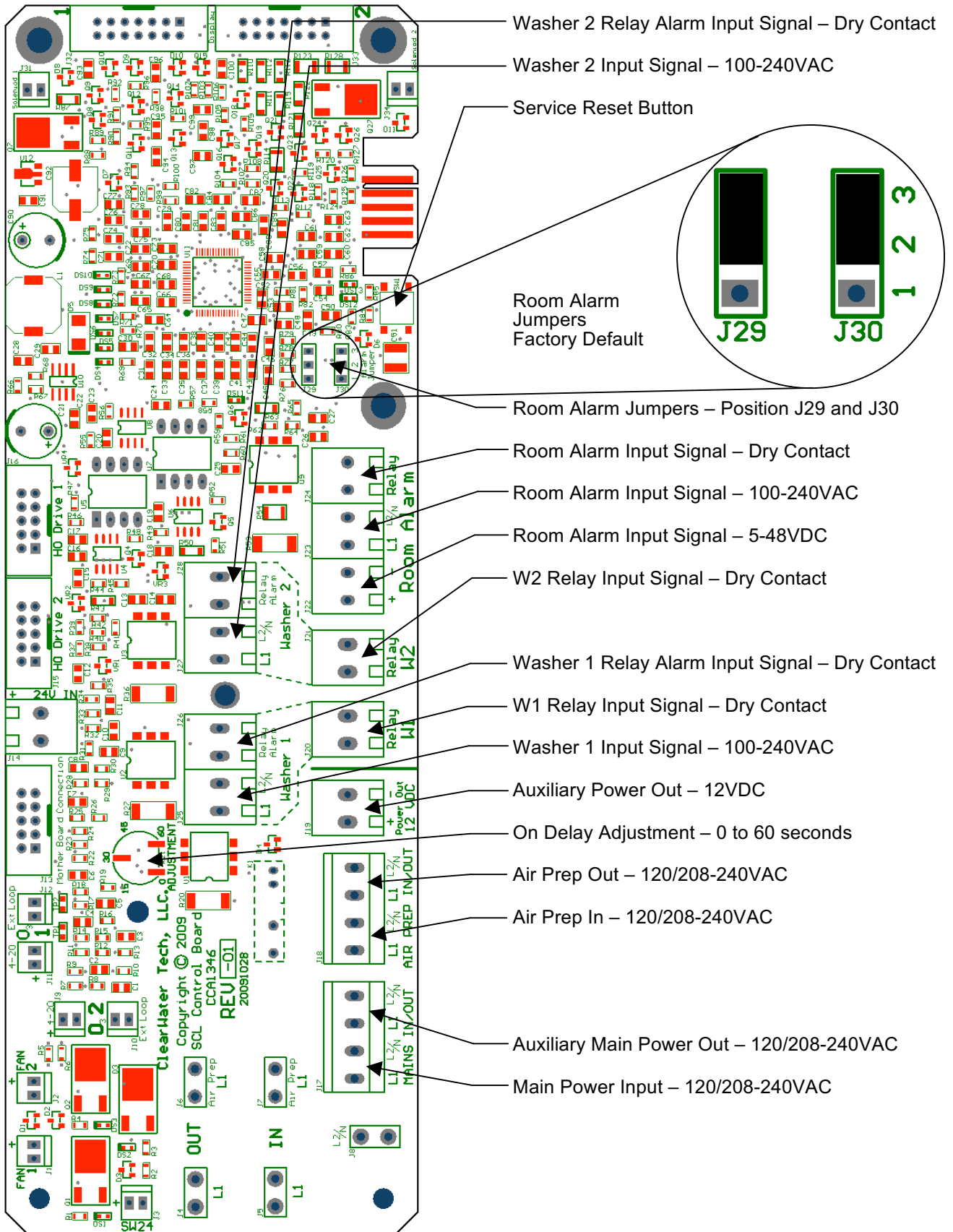
**Step 2:** Wire the #22 AWG orange “positive” (+) lead from the ozone generator to the 4-20mA controller according to the manual supplied with the controller.

**Step 3:** Wire the #22 AWG purple “negative” (-) lead from the ozone generator to the 4-20mA controller according to the manual supplied with the controller.

**Step 4:** Complete the required programming and calibration steps as outlined in the installation manual supplied with the 4-20mA controller.

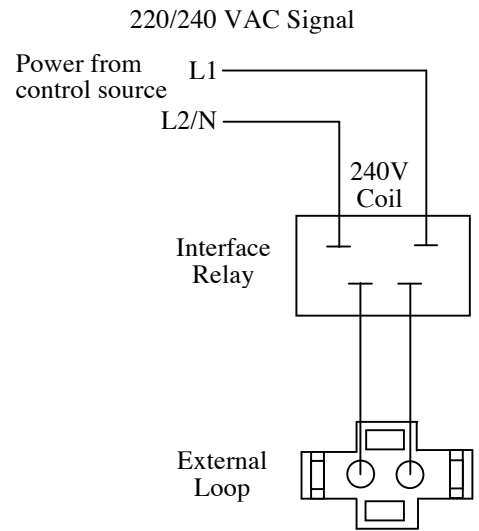
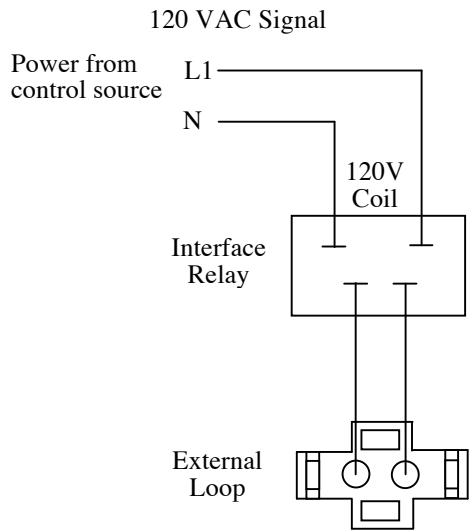
# Laundry Control Board

Figure 6



# External Loop Electrical Interface

Figure 7



# Installation Procedures – Pneumatic

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This section outlines the steps required to complete the *ECOTEX* system pneumatic hook-ups. The system components include the air preparation system, ozone generator, and diffuser assembly. The air preparation system provides the ozone generator with a source of oil-free oxygen-enriched air (90% +/- 3% oxygen purity at -60°F dew point). The oxygen produced is pressurized through the ozone generator (where ozone is produced from the oxygen in the air stream) and delivered to the diffuser. The diffuser then distributes the ozone to the water of the washer's sump or main drain.

## Air Preparation System-to-Ozone Generator

The *ECOTEX* system has been designed to use up to four ozone generators and only one oxygen concentrator. Typical concentrators used include, the Aerous 8, which has an output of 8 standard cubic feet per hour (scfh) at 90% oxygen, the Aerous 15, which has an output of 15 scfh at 90% oxygen. As more ozone generators are required for multiple washers more scfh is required. Therefore the oxygen concentrator used must match the total flow rate required. **Examples:** Two 110lb washers would require an *ECO2* ozone generator, which would require four (4) scfh of oxygen; therefore a Aerous 8 should be used. Two 200lb washers would require two *ECO2* ozone generators, which would require eight (8) scfh of oxygen; therefore, a Aerous 15 should be used. See the Pneumatic Operating Parameters chart Figure 12.

**Step 1:** Teflon® tape and attach the brass barb provided to the outlet of the oxygen concentrator.

**Step 2:** Using a suitable length of 3/8" braided tubing provided, attach the tubing from the oxygen concentrator to the ozone generator oxygen inlet barbed fitting, located at the bottom of the ozone generator (see Appendix-Section A), and secure with a hose clamp.

**Step 3:** If multiple ozone generators are used follow the "*ECOTEX* Pneumatic Diagrams" Figure 9. Using the barbed tee(s) provided, use a suitable length of 3/8" braided tubing provided, attach the tubing from the oxygen concentrator to one end of the barbed tee and secure with a hose clamp. Then using a suitable length of 3/8" braided tubing, attach the tubing from the barbed tee to the each ozone generator and secure each end with a hose clamp.

## Ozone Generator-to-Diffuser

The *ECOTEX* diffuser is designed to easily interface with a commercial washer. ClearWater Tech has designed two types of diffusers, a single or dual diffuser, which can be used dependent upon the size of the washer, see Figure 10 and the "Pneumatic Operating Parameters" chart Figure 12.

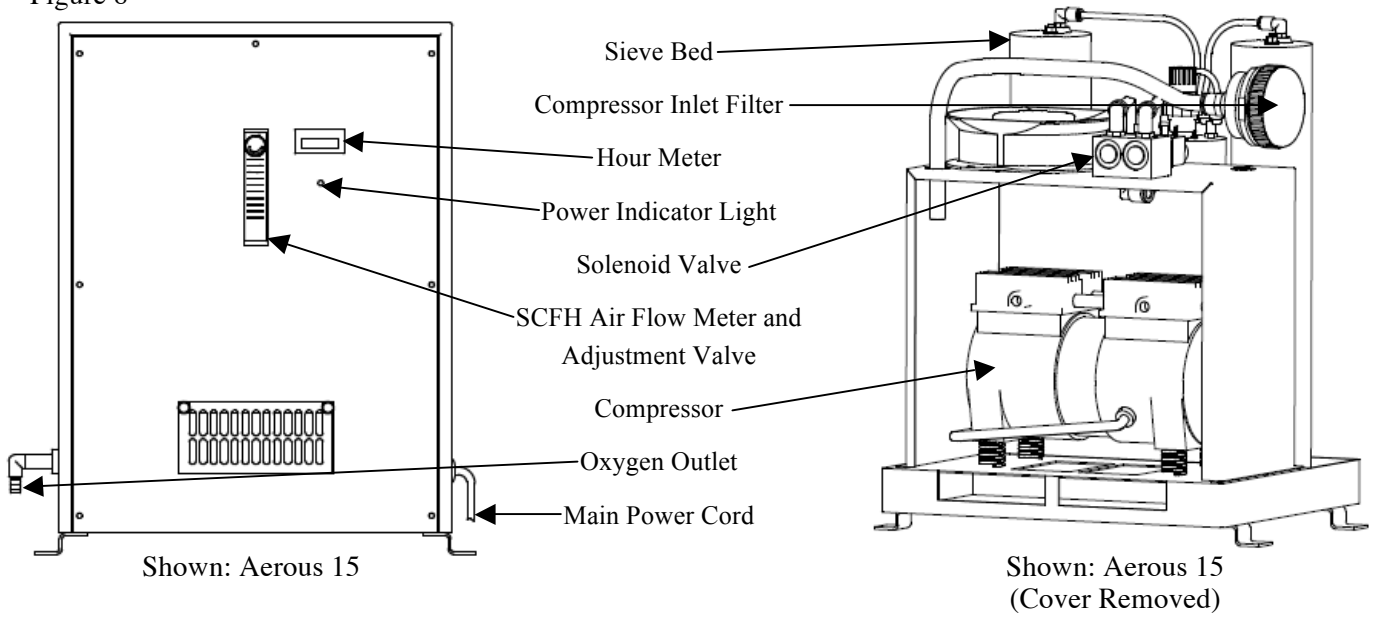
**Step 1:** Teflon® tape and attach the kynar compression fitting provided to the outlet(s) of the ozone generator.

**Step 2:** Using a suitable length of Teflon® delivery line provided, attach the delivery line from the ozone generator ozone outlet fitting(s) to the diffusers' ozone inlet compression fitting.

**NOTE: IF THE ECO2 OR ECO4 OZONE GENERATORS ARE SUPPLYING OZONE TO A SINGLE WASHER, CONNECT THE TWO OZONE DELIVERLY LINES TOGETHER (BELOW THE OZONE GENERATOR) WITH THE COMPRESSION FITTING TEE PROVIDED IN THE PARTS BAG.**

## Oxygen Concentrator

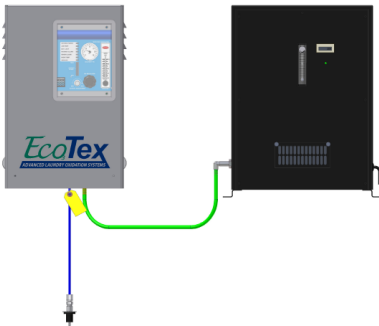
Figure 8



## ECOTEX Pneumatic Diagrams

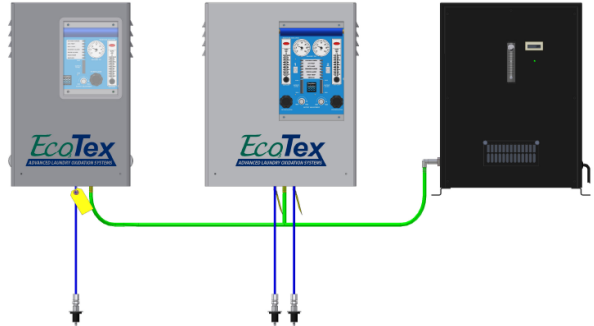
Figure 9

Single Washer Installation with Single Diffuser



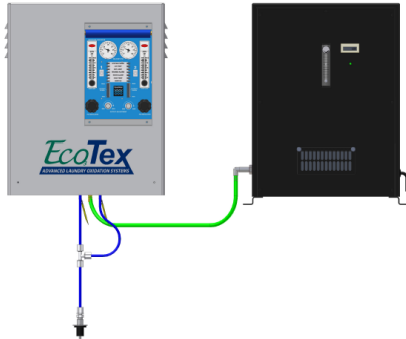
Shown: *ECO1*, Oxygen Concentrator and Diffuser. A single *ECO3* will use the same configuration

Three Washer Installation with Single Diffuser



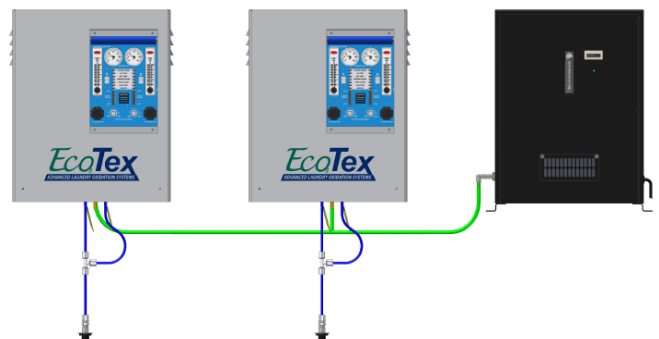
Shown: *ECO1*, *ECO2*, Oxygen Concentrator and Diffusers. Any combination of an *ECO1* or *ECO3* and an *ECO2* or *ECO4* will use the same configuration

Single Washer Installation with Dual Diffuser



Shown: *ECO2*, Oxygen Concentrator and Diffuser. A single *ECO4* will use the same configuration

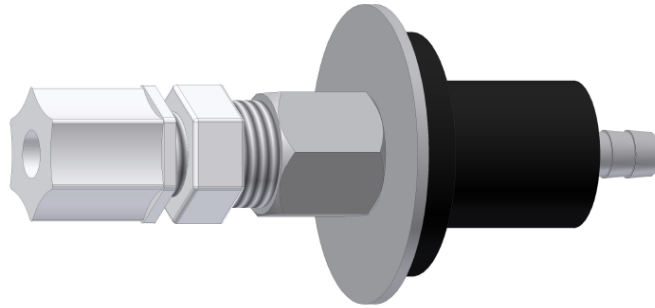
Two Washer Installation with Dual Diffuser



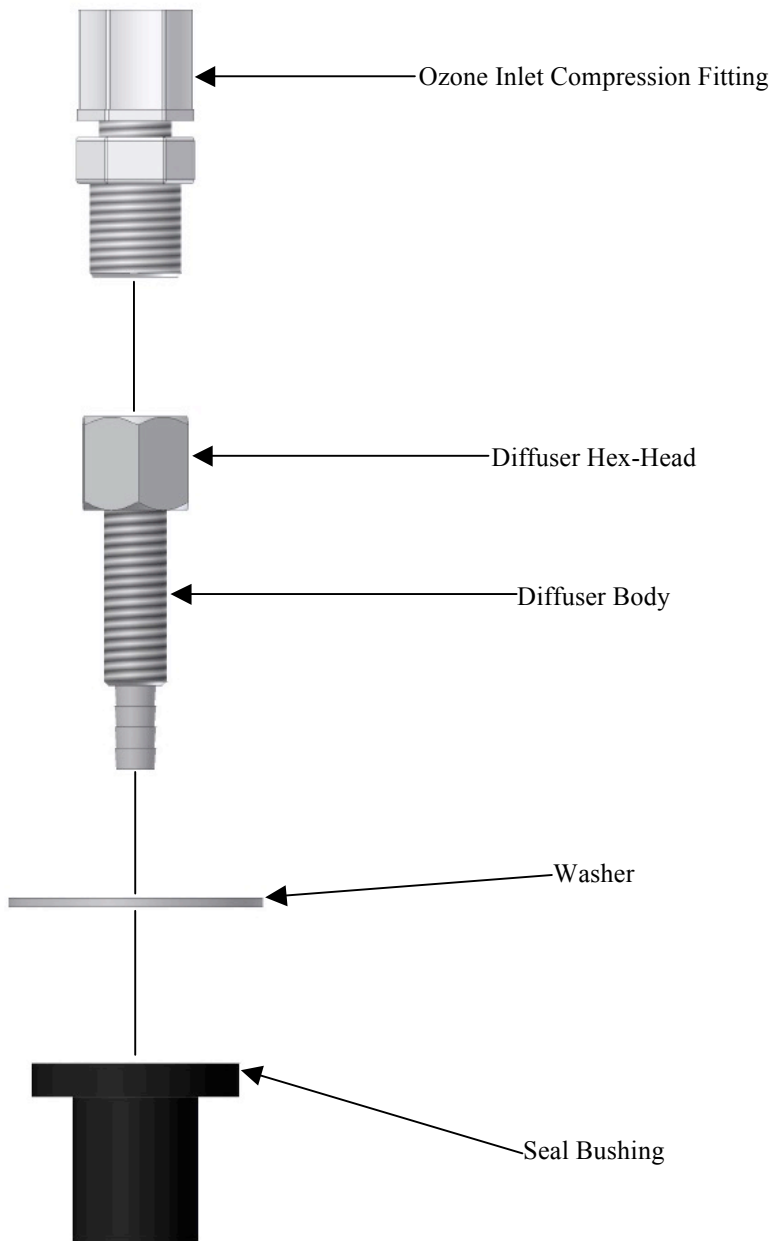
Shown: *ECO2s*, Oxygen Concentrator and Diffusers. Two *ECO4s*, or one *ECO2* and one *ECO4* will use the same configuration

**ECOTEX Diffuser**

Figure 10



**Single Diffuser Exploded View**



# Start-Up and Calibration

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The previous sections of this manual have involved comparatively static procedures: making electrical and pneumatic connections, etc. This section involves the theory of ozone washing and drying programs, dynamic process of starting up and balancing the components of the *ECOTEX* system. All start-up and calibration procedures should be made with “test linen,” such as rags or no linen in the washer(s). **Note: Ozone may be detected in the ambient air with out linen in the washer(s).**

## Theory of Washer and Dryer Programming

The *ECOTEX* advantage in industrial laundering is achieved by reducing the use of natural resources, such as water and energy, reducing wash chemicals and labor, and an added benefit of extended fabric life. Traditional wash formulas can be changed by, eliminating flushes or pre soak steps and some high level fills may be changed to low level fills, reducing water consumption. Most hot water steps can be changed to cold-water steps including the break or suds step reducing natural gas or electricity used to heat the water. However, for proper bleaching hot water must be used, typically 100° to 115° F. A traditional formula, without a bleach step, break or suds step can use a low pH chemical, as ozone provides better oxidation at neutral pH levels. Formulas that include a bleach step will require a pH level between 8-11, this will be just enough for a proper burn off of the bleach with out excessive pH levels. Lower pH levels will also reduce the amount of sour required in an ozone wash formula. Sour is used to reduce the pH, which can typically be as high as 13. Souring chemicals can leave the linen feeling rough to the touch, a softener is used to coat the linen and make it feel softer. Because less sour is used, ozone wash formulas can typically eliminate the softener step. The added advantage of using less sour and eliminating a softener comes in the drying time of the linen. Because the linen is coated with chemicals in a traditional wash, the heat from the dryer must penetrate the chemical coating before the linen can dry. Therefore, ozone washed linen can dry quicker, and with less drying time the fibers of the linen will not burn, which will extend fabric life.

Before ozone wash formulas are made, the current or traditional formulas must be analyzed, so that a formula that best suits the facilities needs may be addressed. It is in the best interest of customer to have all participating parties available to decide upon the best wash formulas, including facility management, the chemical provider, the laundry equipment provider, and the ozone system provider. It is always a good idea to set up wash formulas so that there are no new procedures for the on-site staff. However, do not eliminate the original wash formulas. Duplicate the original wash formulas and use them as a base to design the new ozone wash formulas.

## Air Preparation, Ozone Generator & Industrial Washer

**Step 1:** The oxygen concentrator air preparation system must be set to “atmospheric pressure” prior to full start up of the system. Disconnect the oxygen delivery line from each oxygen concentrator (if delivery has already been attached). **Note: This step should have been completed in step 2 of “Installation Procedures, Electrical.”** Using the correct voltage for the oxygen concentrator used, apply power to the oxygen concentrator. Be sure that the main power switch is in the “ON” position (if so equipped; see Figure 8).

**Step 2:** Check to make sure the compressor of the oxygen concentrator is operating.

**Step 3:** Using the airflow gauge adjustment valve on the oxygen concentrator (see Figure 8), adjust the airflow according to the “Air Prep System Airflow” line of the Pneumatic Operating Parameters chart Figure 12. Make sure the air preparation system you select can deliver the required amount of air flow without over drawing the sieve beds. **Warning: Make sure to read and follow the operating instructions of the air preparation system as damage could occur to the air preparation system if the flow rate is too high.**



**Step 4:** Apply main power to the *ECOTEX* ozone generator. Toggle the systems main power switch to the “ON” position, see Appendix-Section A. Observe all indicating LED’s on the main control panel of the ozone generator (see Figure 11).

**Step 5:** Once new formulas have been created for the washer(s), begin a wash cycle. Observe all indicating LED’s on the main control panel of the ozone generator (see Figure 11).

**Step 6:** Adjust the manual ozone output knob to desired output level setting. The typical ozone set point will be based on the washer size rated in capacity and the soil load of the linen washed. Contact the EcoTex distributor or ClearWater Tech for the best desired settings.



















**Step 7:** With the ozone generator clear acrylic cover or ozone generator main cover removed, adjust the pressure regulator(s) and SCFH gauge(s), located on the ozone generator main control panel, according to the “Pneumatic Operating Parameters” chart Figure 12.

**Step 8:** Perform a final check of all pneumatic connections from the air preparation system to the ozone diffuser. Check the ozone diffusion point and all washer connections for leaks. Repair leaks as required.

**Step 9:** Perform all necessary titration tests to insure proper wash chemistry for each new wash formula.

### Display Board LED Description

Figure 11

LED	Function	Display
SYSTEM POWER	This LED will be illuminated when the ozone generator main power switch is in the “ON” position.	SYSTEM POWER 
AIR PREP	This LED will be illuminated when a signal is present the W1 or W2 relay terminals or Washer 1 or Washer 2, L1 and L2/N terminals. The pneumatic controls will be energized and oxygen is flowing through the system.	AIR PREP 
EXT LOOP	The External Loop or EXT LOOP has continuity through it when the LED is <i>not</i> illuminated, which indicates ozone is being produced, when the Output Level Control LED’s are illuminated. The External Loop <i>does not</i> have continuity, when the LED is illuminated, which indicates no ozone production.	EXT LOOP 
WASHER ALARM	When this LED is illuminated a washer alarm signal is present at the “Washer 1” or “Washer 2” alarm terminal. When illuminated oxygen and ozone will not be produced, and the Oxygen Flow and the Output Level LED’s will not be illuminated.	WASHER ALARM 
ROOM ALARM	When this LED is illuminated a Room Alarm signal is present to one of the Room Alarm terminals. When illuminated oxygen and ozone will not be produced, and the Oxygen Flow and the Output Level LED’s will not be illuminated.	ROOM ALARM 
HIGH TEMP	The High Temp LED will not be illuminated during normal operation. If the ozone generator’s internal temperature is in excess of 150°F the High Temp LED will illuminate, which will also discontinue ozone production. <i>ECO3</i> and <i>EXO4</i> , this LED means the unit’s high voltage drive boards are in fault mode. See Troubleshooting section “System Fault”	HIGH TEMP 
SERVICE	The Service LED will become illuminated after the unit has been powered for approximately 2 years. For information on resetting the service alarm see Troubleshooting section “Service Alarm”	SERVICE 
MAX		MAX 
OUTPUT LEVEL		OUTPUT LEVEL 
MIN		MIN 
MIN		MIN 
MIN		MIN 
MIN		MIN 
MIN		MIN 
MIN		MIN 
MIN		MIN 
MIN		MIN 
MIN		MIN 

## Pneumatic Operating Parameters

Figure 12

<b>Air Preparation</b>	<b>Range</b>	<b>Optimum</b>
Aerous 8 – air preparation system air flow	6 to 8 scfh	8 scfh
Aerous 15 – air preparation system air flow	13 to 15 scfh	15 scfh
<b>Note: The air preparation systems must be set at atmospheric pressure. See step 2 of “Installation Procedures, Electrical.”</b>		

<b>Air Preparation System/ Ozone Generator Matching</b>	<b>ECO1 (Oxygen : Ozone)</b>	<b>ECO2 (Oxygen : Ozone)</b>	<b>ECO3 (Oxygen : Ozone)</b>	<b>ECO4 (Oxygen : Ozone)</b>
Aerous 8	1 : 4	1 : 2	1 : 2	1 : 1
Aerous 15	1 : 4	1 : 3	1 : 4	1 : 2
<b>The air preparation system must be matched depending upon the type and number of ozone generators used per facility. One air preparation system for up to four ozone generators.</b>				

<b>ECO1 – Ozone Generator</b>	<b>Range</b>	<b>Optimum</b>
Ozone Generator – Oxygen Flow Meter	1 to 3 scfh	2 scfh
Pressure Gauge	4 to 6 psi	5 psi

<b>ECO2 – Ozone Generator</b>	<b>Range</b>	<b>Optimum</b>
Ozone Generator – Oxygen Flow Meter (Each Flow Meter)	1 to 3 scfh	2 scfh
Pressure Gauge	4 to 6 psi	5 psi

<b>ECO3 – Ozone Generator</b>	<b>Range</b>	<b>Optimum</b>
Ozone Generator – Oxygen Flow Meter	3 to 5 scfh	3 scfh
Pressure Gauge	8 to 10 psi	10 psi

<b>ECO4 – Ozone Generator</b>	<b>Range</b>	<b>Optimum</b>
Ozone Generator – Oxygen Flow Meter (Each Flow Meter)	3 to 5 scfh	3 scfh
Pressure Gauge	8 to 10 psi	10 psi

# Maintenance

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Maintenance of the ozone system is critical to its longevity and operating efficiency. While all system components are built to provide years of reliable service with minimum maintenance, following the procedures outlined below is strongly recommended.

All maintenance procedures have been segmented by interval: daily, monthly, semi-annual and annual. Daily procedures involve quick visual checks for changes in normal operating conditions. Monthly, semi-annual and annual procedures include cleaning and/or replacement of certain critical parts.

## NOTES:

- **The ozone generator warranty states that it “does not extend to any product or part which has been damaged or rendered defective as a result of use of parts not sold by ClearWater Tech, or service or unit modification not authorized by ClearWater Tech.” Please contact your ClearWater Tech dealer if you have questions about any maintenance procedure *before* you begin that procedure.**
- **CAUTION: Observe all common safety practices and review the “Safety Warnings and Instructions” (Chapter 2) before attempting any maintenance procedure that requires the use of tools and/or shutting down the ozone system.**

## Daily Procedures

### Air Preparation System

- **Power Switch:** Check to make sure the power switch is in the “ON” position.
- **Air Flow:** Check the air flow meter on the air preparation system (see Figure 8). Make sure the air flow is within the SCFH range shown on the “Air prep system air flow” line of the “Pneumatic Operating Parameters” chart (Figure 12). Adjust if necessary by following Step 1-3 of the “Start-Up & Calibration” section.

### Ozone Generator

- **Indicator Lights:** Check the indicator lights on the ozone generator. See Figure 11 for Ozone Generator LED Display function.
- **Indicator Cartridge:** Inspect the indicator cartridge located on the ozone generator control panel, see Appendix- Section A. A change in the blue crystals to light pink or white in color indicates the presence of moisture in the feed gas coming from the air preparation system. If such a change is observed, refer to the Troubleshooting Guide.
- **Air Flow:** Check the Standard Cubic Feet per Hour (SCFH) gauge(s), located on the ozone generator control panel. Make sure air flow is within the SCFH range of the “Pneumatic Operating Parameters” chart (see Figure 12). Adjust if necessary by following Step 7 of the “Start-Up & Calibration” section.
- **Pressure:** Check the pressure gauge(s) located on the ozone generator’s main control panel. Make sure pressure is within then range shown on the “Pneumatic Operating Parameters” chart (see Figure 12). Adjust if necessary by following Step 7 of the “Start-Up & Calibration” section.

## Monthly Procedures

### Air Preparation System

- **Cooling Fan Operation:** Check to make sure the cooling fan mounted on the side panel of the air preparation system is operating. If not, refer to the Troubleshooting Guide.
- **Cover Filter:** Check the cover filter element mounted on the side of the air preparation system (if so equipped) and clean as required. Operating conditions in the equipment area will dictate the frequency required for this procedure. Remove the filter element and clean with soap and water, drying completely before re-installing.

### Ozone Generator

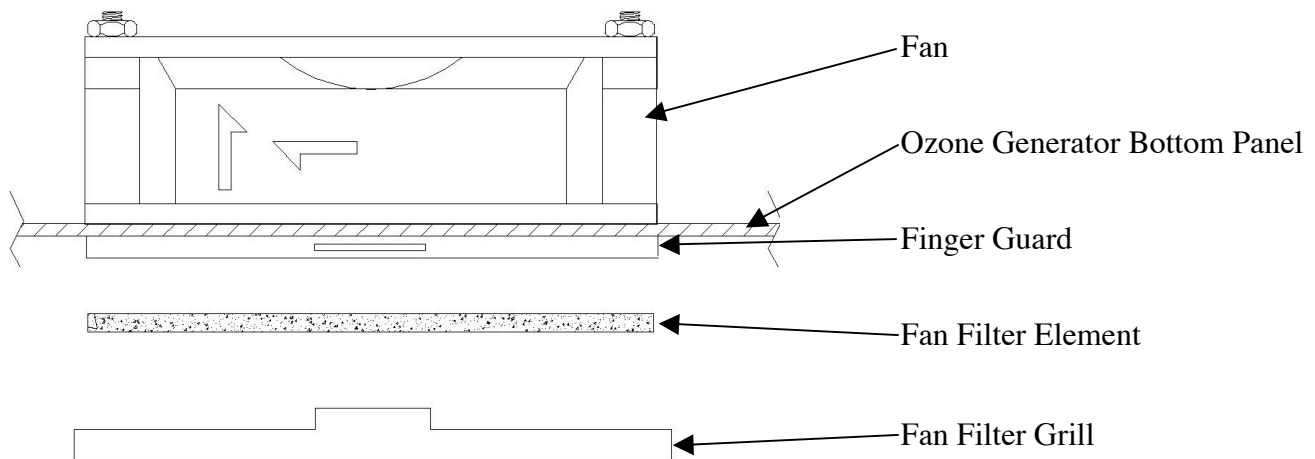
- **Cooling Fan Operation:** Check to make sure the cooling fan mounted on the bottom panel of the ozone generator is operating. If not, refer to the Troubleshooting Guide.
- **Cooling Fan Filters:** Check the cooling fan filter element mounted on the fan assembly located at the bottom panel of the ozone generator and clean as required. Operating conditions in the equipment area will dictate the frequency required for this procedure. Remove the filter element and clean with soap and water, drying completely before re-installing (see Figure 13).

### Ambient Ozone Monitor

- See the ambient ozone monitor Installation and Operation manual for service intervals.

## Ozone Generator Cooling Fan Assembly

Figure 13



## System Shutdown Procedures

**CAUTION: The ozone generator operates at high voltages and may be energized by more than one source. Follow these steps carefully before performing any semi-annual or annual maintenance procedures.**

- Step 1:** Turn off power to any peripheral system components, such as the washer, which the system obtains its signals from.
- Step 2:** Toggle the Main Power switch of the ozone generator to the “OFF” position. The LED display on the front cover should not be illuminated.
- Step 3:** Disconnect the power to the ozone system either at the service disconnect box (if so equipped) or main circuit breaker.

## Semi-Annual Procedures

**CAUTION: Follow system shutdown procedures (outlined on the previous page) before performing any of the following steps.**

### Air Preparation System

- Air Inlet Filter: Replace the air compressor inlet filter on the air preparation system module (see Figure 8). **Note: Manufacturers' recommended replacement interval is 4,000 hours of operation. Operating conditions in the equipment area will dictate the required frequency of this procedure.**

### Ozone Diffuser

- Inspect the ozone diffuser for lint build up. Remove the diffuser from the washer sump or drain line and inspect, if lint has built up in or on the diffuser, clean the diffuser thoroughly.

## Annual Procedures

**CAUTION: Follow system shutdown procedures before performing any of the following steps.**

**The Service LED on the front of the unit will illuminate after the unit has been powered for approximately 2 years. This is a friendly reminder to perform this annual procedure.**

### Air Preparation System

- Compressors: Following the procedures outlined in the compressor rebuild kit, rebuild the two compressor heads on each air preparation system module. **Note: Manufacturers' recommended interval is 5,000 to 12,000 hours of operation. Compressor performance and/or operating conditions in the equipment area will dictate the required frequency of this procedure.**
- Cover Filter: Replace the cover filter element mounted on the side of the air preparation system (if so equipped) and clean as required. Operating conditions in the equipment area will dictate the frequency required for this procedure. Remove the filter element and clean with soap and water, drying them completely before re-installing.

### Ozone Generators

- Cooling Filters: Clean or replace the cooling fan filter element as required.
- Inline Particulate Filter: Replace the inline particulate filter.
- Reaction Chamber(s): Remove and disassemble the reaction chamber(s) according to the steps outlined below (see Figure 14 or Figure 15). Check the chamber interior and dielectric tube for oil, dirt or moisture.

## Reaction Chamber Removal and Disassembly

**Note: Disassembly and service of the reaction chamber is a technical, delicate and critical procedure. Please consult your ClearWater Tech dealer before attempting this procedure.**

**Step 1:** Make sure all power to the ozone generator has been disconnected according to the “System Shutdown Procedures” outlined above.

**Step 2:** Disconnect the high voltage lead from the reaction chamber(s).

**Step 3:** Remove reaction chamber(s) from the ozone generator.

**Step 4:** Remove retaining screws and washers from the two end caps (3 each or 4 each).

**Step 5:** Using a gentle back-and-forth twisting motion, remove the non-high voltage end cap (the one without the high voltage attachment screw) from the heat sink/cathode assembly. **Note: Orientation of the end cap on the heat sink/cathode assembly. ECO3 and ECO4 do not remove stainless steel clamp.**

**Step 6:** Remove the high voltage end cap and dielectric from the heat sink/cathode assembly. **Note: Orientation of the end cap on the heat sink/cathode assembly.** Remove end cap and contact brush from dielectric glass anode. **Note: ECO3 and ECO4 do not remove stainless steel clamp.**

**Step 7:** With contact brush attached, remove the brush adapter nut from the high voltage end cap.

**Step 8:** Inspect the dielectric, end caps and cathode for breakage, corrosion or debris, and then follow the assembly and re-installation steps below.

## Reaction Chamber Assembly and Re-installation

**Step 1:** Make sure the glass dielectric is clean (free of dust, dirt, grease, oils, etc.).

**Step 2:** Prepare the end caps for re-assembly by replacing the O-rings. Thread the hex brush adapter nut, with contact brush attached, onto the end of the high voltage end cap (cap with the high voltage attachment screw) center screw.

**Step 3:** Using a gentle twisting motion, press the non-high voltage end cap onto the heat sink/cathode assembly until flush with the heat sink cooling fins. **Note: Correct orientation of end cap.**

**Step 4:** Slide the 3 or 4 end cap retaining screws with washers through the holes in the non-high voltage end cap, aligning them with the heat sink screw bosses. Thread screws into screw bosses until heads are snug against the end cap.

**Step 5:** Slide the dielectric into the heat sink/cathode assembly. Seat the dielectric into the O-rings of the non-high voltage end cap by applying pressure with a gentle twisting motion. There must not be any dirt, debris, oils or fingerprints on the dielectric upon re-installation.

**Step 6:** ECO3 and ECO4, roll the high voltage anode (foil-like material) lengthwise, preserving the *longer* dimension. Insert the rolled anode into the dielectric. Center the anode in the dielectric (approximately 1/2" from either end of the glass), making sure it is rolled squarely.

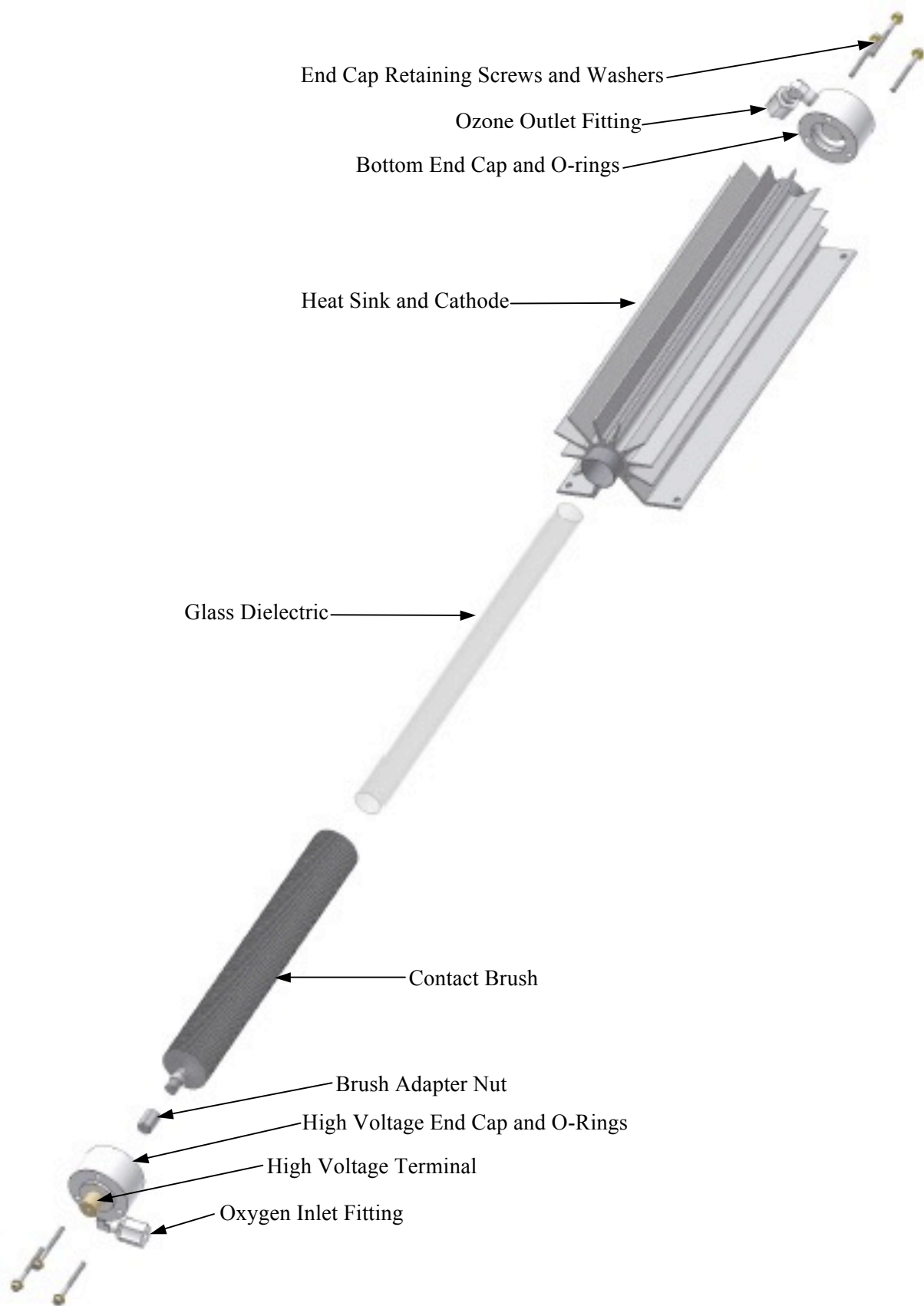
**Step 7:** Slowly insert the high voltage end cap assembly into the dielectric. **Note: Do not bend center wire of the brush during this procedure.** ECO1 and ECO2 It is normal for the bristles to bend flat against the dielectric glass. Using a gentle twisting motion, press the high voltage end cap onto the heat sink/cathode assembly until flush with the heat sink cooling fins. **Note: Correct orientation of end cap.**

**Step 8:** Slide the 3 or 4 end cap retaining screws with washers through the holes in the end cap, aligning them with the heat sink screw bosses. Thread screws into screw bosses until heads are snug against the end cap.

**Step 9:** Re-install complete reaction chamber assembly into the ozone generator by following the "Removal and Disassembly" instructions in reverse order, from Step 3 to Step 2. Follow steps outlined in the "Start-Up and Calibration" section to re-start the ozone system.

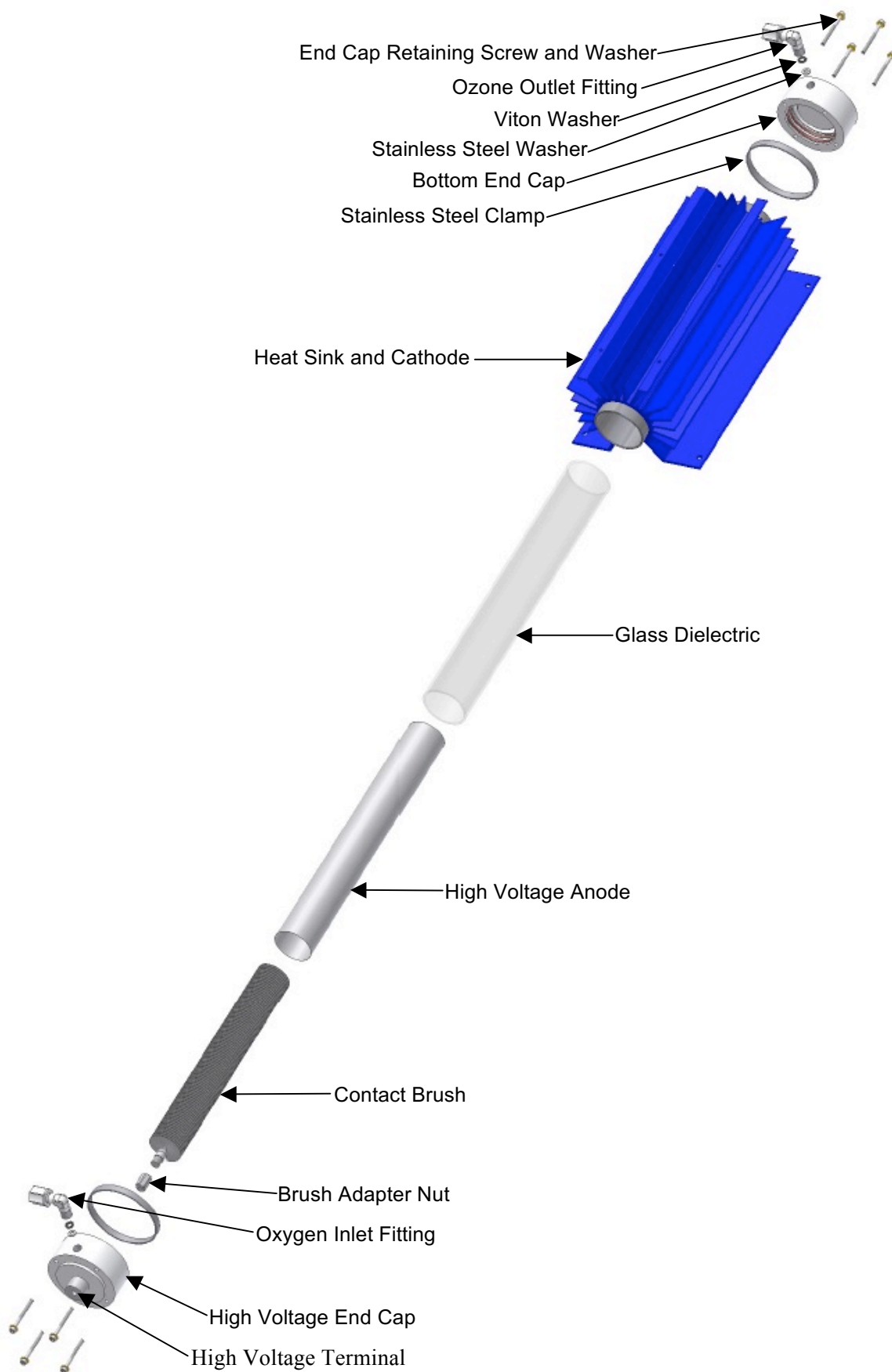
### *ECO1 and ECO2 1" Reaction Chamber - Exploded View*

Figure 14



# ECO3 and ECO4 2" Reaction Chamber – Exploded View

Figure 15





# Troubleshooting

## Air Preparation

<b>Problem/Symptom</b>	<b>Possible Cause</b>	<b>Solution</b>
Unit not operating	<ul style="list-style-type: none"> <li>• Ozone generator or Air Prep power switch is in “OFF” position</li> <li>• No power to system</li> <li>• Ozone generator breaker is tripped (<i>ECO3</i> and <i>ECO4</i>)</li> <li>• A washer input signal is not available to the <i>ECOTEX</i> laundry control board</li> <li>• Incorrect wiring</li> </ul>	<ul style="list-style-type: none"> <li>• Toggle switch to “ON” position</li> <li>• Check main power wiring to unit</li> <li>• Reset ozone generator breaker</li> <li>• See “Installation Procedures – Electrical”</li> <li>• See “Installation Procedures – Electrical”</li> </ul>
Low air flow or no air flow	<ul style="list-style-type: none"> <li>• Flow meter out of adjustment</li> <li>• Fouled compressor inlet filter</li> <li>• Compressor not functioning</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust flow meter, see “Start-Up and Calibration” steps 1-3</li> <li>• Replace inlet filter</li> <li>• Rebuild or replace as required</li> </ul>
Compressor pressure relief valve making noise	<ul style="list-style-type: none"> <li>• Pressure relief valve not operating</li> <li>• Excessive back pressure in system</li> <li>• Pinched tubing</li> <li>• Compressor not functioning</li> </ul>	<ul style="list-style-type: none"> <li>• Replace pressure relief valve</li> <li>• Check the check valve for proper operation, replace as required</li> <li>• Replace tubing</li> <li>• Rebuild or replace as required</li> <li>• Replace sieve beds as required</li> </ul>
Unit is making excessive noises	<ul style="list-style-type: none"> <li>• Unit not properly secured</li> <li>• Shipping damage</li> <li>• Fan Blocked</li> <li>• Packaging material not removed</li> </ul>	<ul style="list-style-type: none"> <li>• Place unit on a flat level surface</li> <li>• Locate damage and repair/replace parts</li> <li>• Clear obstructions</li> <li>• Remove packaging material</li> </ul>

## Ozone Generator

<b>Problem/Symptom</b>	<b>Possible Cause</b>	<b>Solution</b>
Indicator cartridge desiccant has changed from blue & white to all pink or white	<ul style="list-style-type: none"> <li>• Moisture has entered air prep system</li> </ul>	<ul style="list-style-type: none"> <li>• Check &amp; tighten fittings</li> <li>• Rebuild/replace compressor or sieve bed as required</li> <li>• Replace indicating desiccant cartridge</li> </ul>
Main circuit breaker trips	<ul style="list-style-type: none"> <li>• Incorrect wiring</li> <li>• Circuit breaker amperage does not match draw</li> </ul>	<ul style="list-style-type: none"> <li>• See “Installation Procedures – Electrical”</li> <li>• Replace with correct circuit breaker</li> </ul>
Circuit breaker on chassis trips ( <i>ECO3</i> and <i>ECO4</i> only)	<ul style="list-style-type: none"> <li>• Incorrect wiring</li> <li>• Amperage draw exceeds 20 amps</li> </ul>	<ul style="list-style-type: none"> <li>• See “Installation Procedures – Electrical”</li> <li>• Push breaker button inward to reset</li> </ul>

Ozone Generator - Continued

<b>Problem/Symptom</b>	<b>Possible Cause</b>	<b>Solution</b>
LED display is not illuminated	<ul style="list-style-type: none"> <li>No power to unit</li> <li>Main power switch is in the “OFF” position</li> <li>Ozone generator breaker is tripped (<i>ECO3</i> and <i>ECO4</i>)</li> <li>Incorrect wiring</li> <li>LED display board ribbon cable is disconnected from the laundry control board</li> <li>Excessive amperage draw on the auxiliary 12VDC output terminal</li> </ul>	<ul style="list-style-type: none"> <li>Check main power to unit</li> <li>Toggle switch to the “ON” position</li> <li>Push breaker button inward to reset</li> <li>See “Installation Procedures – Electrical”</li> <li>Connect ribbon cable (be sure all of the pins are properly inserted into the output control board)</li> <li>See “Installation Procedures – Electrical” step 6</li> </ul>
“System Power” LED is not illuminated, but all other LEDs are illuminated.	<ul style="list-style-type: none"> <li>LED display board inoperable</li> </ul>	<ul style="list-style-type: none"> <li>Replace LED display board</li> </ul>
“System Power” LED is not illuminated	<ul style="list-style-type: none"> <li>System does not have power connected</li> <li>Ozone generator breaker is tripped (<i>ECO3</i> and <i>ECO4</i>)</li> </ul>	<ul style="list-style-type: none"> <li>See “Installation Procedures – Electrical”</li> <li>Push breaker button inward to reset</li> </ul>
“Air Prep” LED is not illuminated	<ul style="list-style-type: none"> <li>Signal is not present to W1 or W2 relay terminals or to Washer 1 or Washer 2 L1 L2/N terminals</li> <li>Room or Washer Alarm signal is present</li> <li>LED display board inoperable</li> </ul>	<ul style="list-style-type: none"> <li>See “Installation Procedures – Electrical”</li> <li>These signal are installer defined</li> <li>Replace LED display board</li> </ul>
“EXT Loop” LED is illuminated	<ul style="list-style-type: none"> <li>The external loop does not have continuity</li> </ul>	<ul style="list-style-type: none"> <li>See “Installation Procedures – Electrical” step 9 for function</li> </ul>
“Washer Alarm” LED is illuminated	<ul style="list-style-type: none"> <li>An alarm signal is present to the Washer 1 or Washer 2 alarm terminal</li> </ul>	<ul style="list-style-type: none"> <li>This signal is installer defined</li> </ul>
“Room Alarm” LED is illuminated	<ul style="list-style-type: none"> <li>An alarm signal is present to the room “Room Alarm” terminal</li> </ul>	<ul style="list-style-type: none"> <li>This signal is installer defined</li> </ul>
“High Temp” LED is illuminated	<ul style="list-style-type: none"> <li>Unit is overheating</li> <li>Unit’s high voltage drive boards are in fault mode (<i>ECO3</i> and <i>ECO4</i> only)</li> </ul>	<ul style="list-style-type: none"> <li>Check fan for proper operation and clean fan filter</li> <li>Check operating temperature</li> <li>See “Installation Procedures – Getting Started, Equipment Placement”</li> <li>See “System Fault” problem description below</li> </ul>
“Service” LED is illuminated	<ul style="list-style-type: none"> <li>Unit has been powered for approximately 2 years and is in need of service</li> </ul>	<ul style="list-style-type: none"> <li>See “Annual Procedures” in the Maintenance section to know which service procedures are required.</li> <li>Press the Service Reset button on the control board once while the unit is powered to turn off the Service LED and begin another 2 year cycle.</li> </ul>

Ozone Generator - Continued

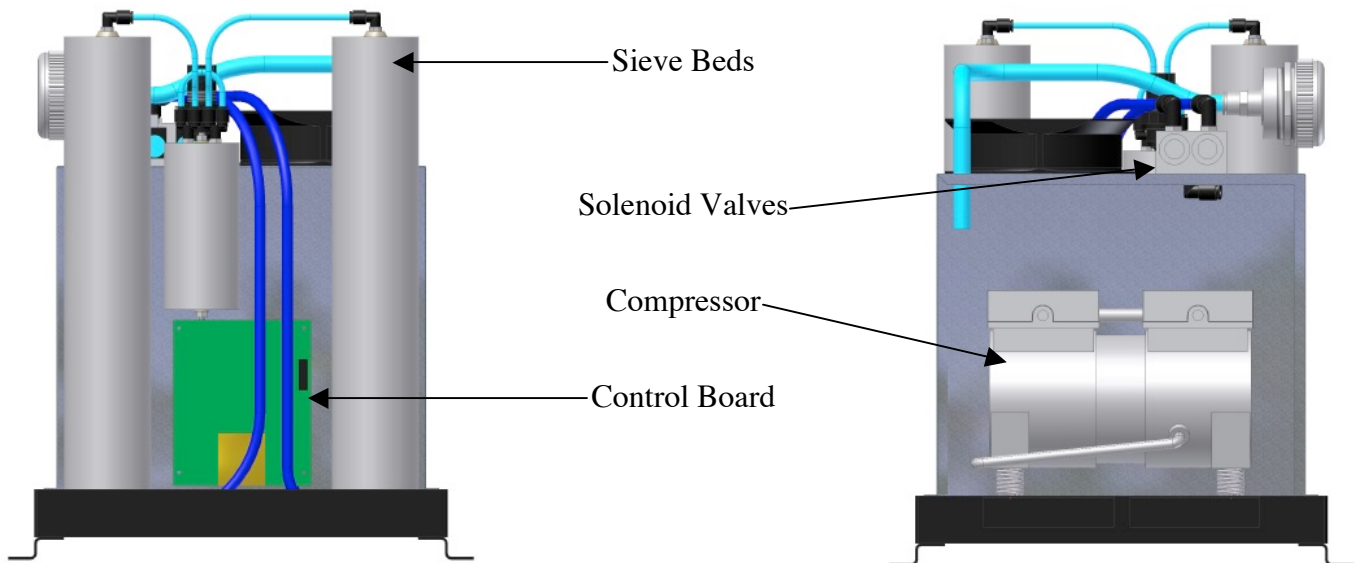
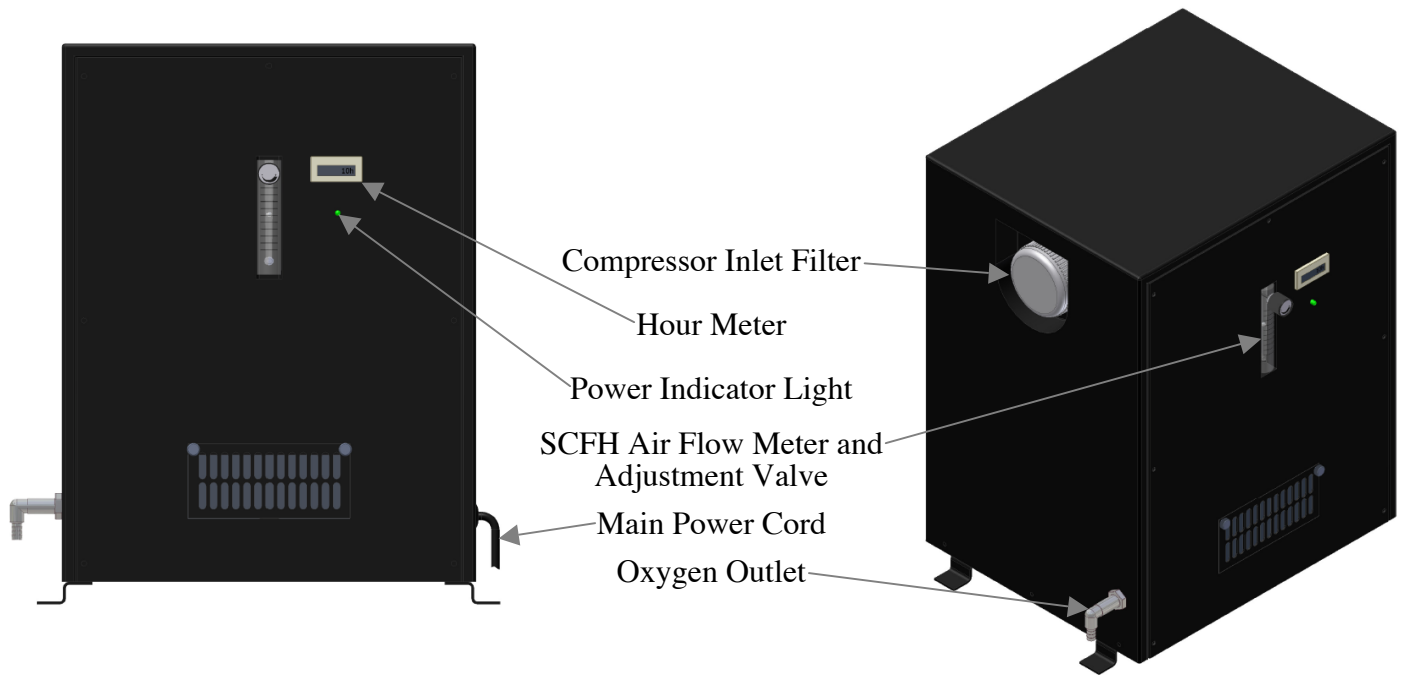
<b>Problem/Symptom</b>	<b>Possible Cause</b>	<b>Solution</b>
<p>“Output Level” LEDs are not illuminated</p>	<ul style="list-style-type: none"> <li>• The manual 0-100% output potentiometer is set to 0% output</li> <li>• Remote 4-20mA controller is sending a 4mA signal, which will indicate 0% output</li> <li>• A signal is not available to W1 or W2 relay terminals or Washer 1 or Washer 2 L1 L2/N terminals</li> <li>• A Washer Alarm signal or a Room Alarm signal is present</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust potentiometer clock wise to desired set point</li> <li>• No solution required, controller will adjust LEDs automatically</li> <li>• Provide a signal to the W1 or W2 relay terminals or Washer 1 or Washer 2 L1 and L2/N terminals</li> <li>• This signal is installer defined</li> </ul>
<p>System Fault – Single Flash of Fault LED on drive board (<i>ECO3</i> and <i>ECO4</i> only) The drive board can not get enough power into the reaction chamber.</p>	<ul style="list-style-type: none"> <li>• Loose wire harness connection from the drive board to the drive transformer</li> <li>• Drive board incorrectly characterized the system on startup</li> <li>• Loose or disconnected High Voltage Lead to transformer</li> <li>• Excessive dirt or debris in ozone reaction chamber</li> <li>• Water in ozone reaction chamber</li> <li>• Broken dielectric</li> <li>• Failed drive board</li> <li>• Failed drive transformer</li> </ul>	<ul style="list-style-type: none"> <li>• Check all wires and connectors</li> <li>• With pressure and flow at normal operating conditions, restart the ozone generator.</li> <li>• Attach High Voltage Lead to transformer</li> <li>• Clean the dielectric and replace O-rings</li> <li>• Clean the dielectric and replace O-rings</li> <li>• Replace dielectric</li> <li>• Replace drive board</li> <li>• Replace drive transformer</li> </ul>
<p>System Fault – Dual Flash or Fault LED on drive board (<i>ECO3</i> and <i>ECO4</i> only) The drive board’s feedback had a series of sudden dips indicative of unusual arcing occurring somewhere in the system.</p>	<ul style="list-style-type: none"> <li>• Loose wire harness connection from the drive board to the drive transformer</li> <li>• Loose or disconnected High Voltage Lead to transformer</li> <li>• Excessive dirt or debris in ozone reaction chamber</li> <li>• Water in ozone reaction chamber</li> <li>• Broken dielectric</li> <li>• Failed drive board</li> <li>• Failed drive transformer</li> </ul>	<ul style="list-style-type: none"> <li>• Check all wires and connectors</li> <li>• Attach High Voltage Lead to transformer</li> <li>• Clean the dielectric and replace O-rings</li> <li>• Clean the dielectric and replace O-rings</li> <li>• Replace dielectric</li> <li>• Replace drive board</li> <li>• Replace drive transformer</li> </ul>
<p>System Fault – Triple Flash of Fault LED on drive board (<i>ECO3</i> and <i>ECO4</i> only) The thermal switch on the board has closed indicating that it was exposed to temperatures exceeding 140F.</p>	<ul style="list-style-type: none"> <li>• Unit is overheating</li> </ul>	<ul style="list-style-type: none"> <li>• Check fan for proper operation and clean fan filter</li> <li>• Check operating temperature</li> <li>• See “Installation Procedures – Getting Started, Equipment Placement”</li> </ul>
<p>Internal Mother Board green “Power” LED not illuminated</p>	<ul style="list-style-type: none"> <li>• No power to mother board</li> <li>• Inoperable mother board</li> </ul>	<ul style="list-style-type: none"> <li>• See “Installation Procedures – Electrical”</li> <li>• Replace mother board</li> </ul>

**Ozone Generator - Continued**

<b>Problem/Symptom</b>	<b>Possible Cause</b>	<b>Solution</b>
Receive an electrical shock upon touching the unit	<ul style="list-style-type: none"> <li>• Incorrect wiring</li> <li>• Unit is not grounded</li> <li>• Unit flooded with Water</li> </ul>	<ul style="list-style-type: none"> <li>• See “Installation Procedures – Electrical”</li> <li>• Ground unit according to local codes</li> <li>• Assess damage, correct cause and rebuild as required. Ozone generator must be placed above typical washer water level</li> </ul>
Fan not operating	<ul style="list-style-type: none"> <li>• Debris caught in fan</li> <li>• Fan inoperable</li> </ul>	<ul style="list-style-type: none"> <li>• Remove debris</li> <li>• Replace fan</li> </ul>
Low air flow or no air flow	<ul style="list-style-type: none"> <li>• Air prep system not operating properly</li> <li>• Ozone generator flow meter or pressure regulator out of adjustment</li> <li>• Fouled inline filter</li> <li>• Air leak</li> </ul>	<ul style="list-style-type: none"> <li>• See “Start Up &amp; Calibration” steps 1-3</li> <li>• Adjust flow meter and/or regulator, see “Start Up &amp; Calibration”</li> <li>• Change inline filter</li> <li>• Check all fittings, tighten as required</li> </ul>
Unit flooded with water	<ul style="list-style-type: none"> <li>• Unit must be mounted above the typical water level of the wash</li> </ul>	<ul style="list-style-type: none"> <li>• Assess damage, correct cause and rebuild as required. Ozone generator must be placed above typical washer water level</li> </ul>
Ozone smell detected from or near ozone generator	<ul style="list-style-type: none"> <li>• Excessive air flow and pressure from the ozone generator</li> <li>• Loose internal fittings</li> <li>• Defective O-ring seals in reaction chamber(s)</li> <li>• Defective dielectrics</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust flow meter and pressure regulator located on the ozone generator control panel. See “Start-up and Calibration”</li> <li>• Check all fittings, tighten as required</li> <li>• Check and replace as required</li> <li>• Check and replace as required</li> </ul>
Ozone smell detected from washer	<ul style="list-style-type: none"> <li>• Excessive air flow and pressure from the ozone generator</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust flow meter and pressure regulator located on the ozone generator control panel. See “Start-up and Calibration”</li> </ul>

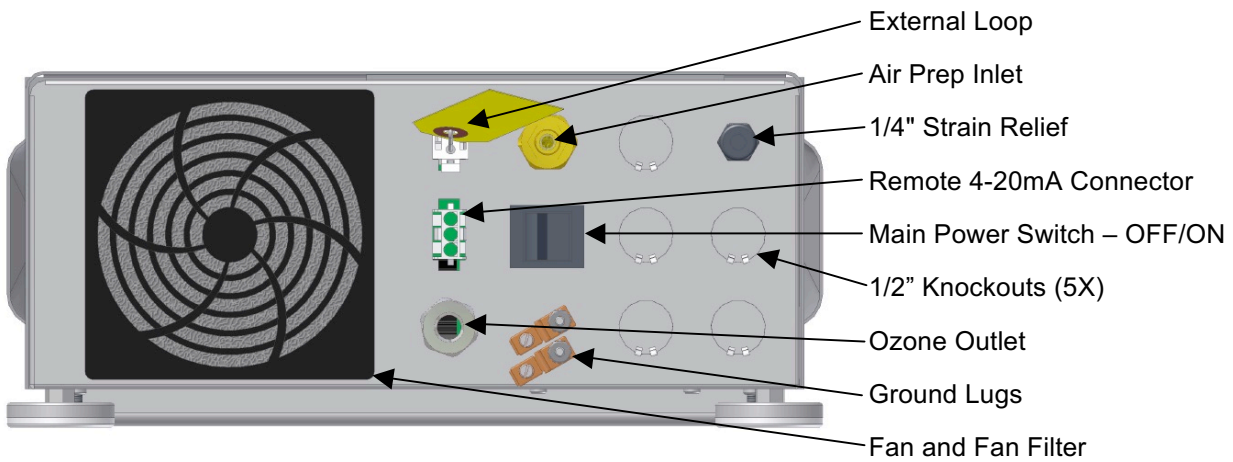
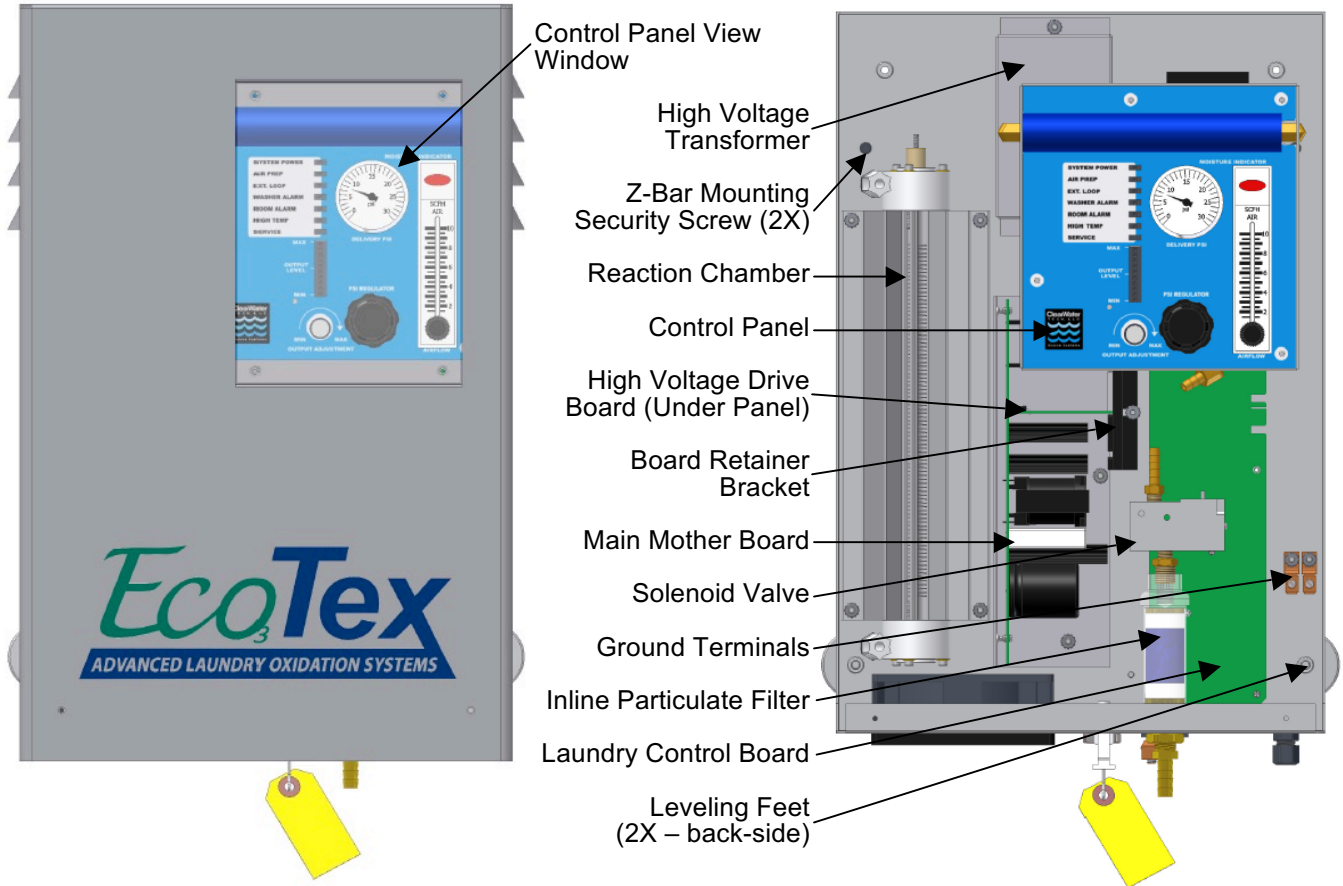
# Appendix A – Specifications

## Air Preparation System (Aerous 15 Shown)



Air Prep System	Specifications	Oxygen Output/SCFH
Aerous 8	19.75" H x 11.89" W x 13.75" D 68 lbs (with cover)	90% (+/-3%) @ 8 scfh, 10 PSI
Aerous 15	20.50" H x 12.64" W x 15.10" D 75 lbs (with cover)	90% (+/-3%) @ 15 scfh, 10 PSI

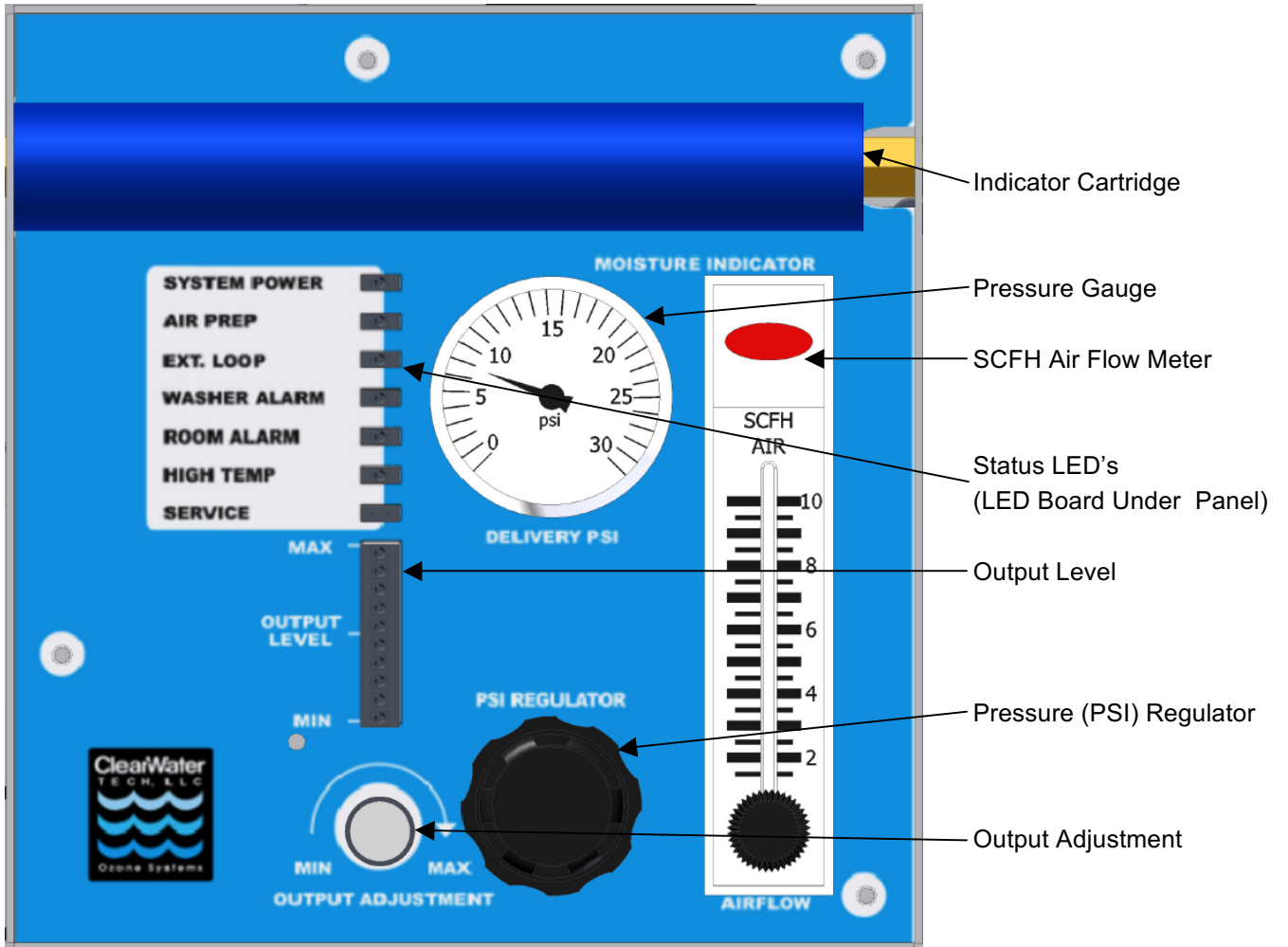
**ECO1 – Ozone Generator**



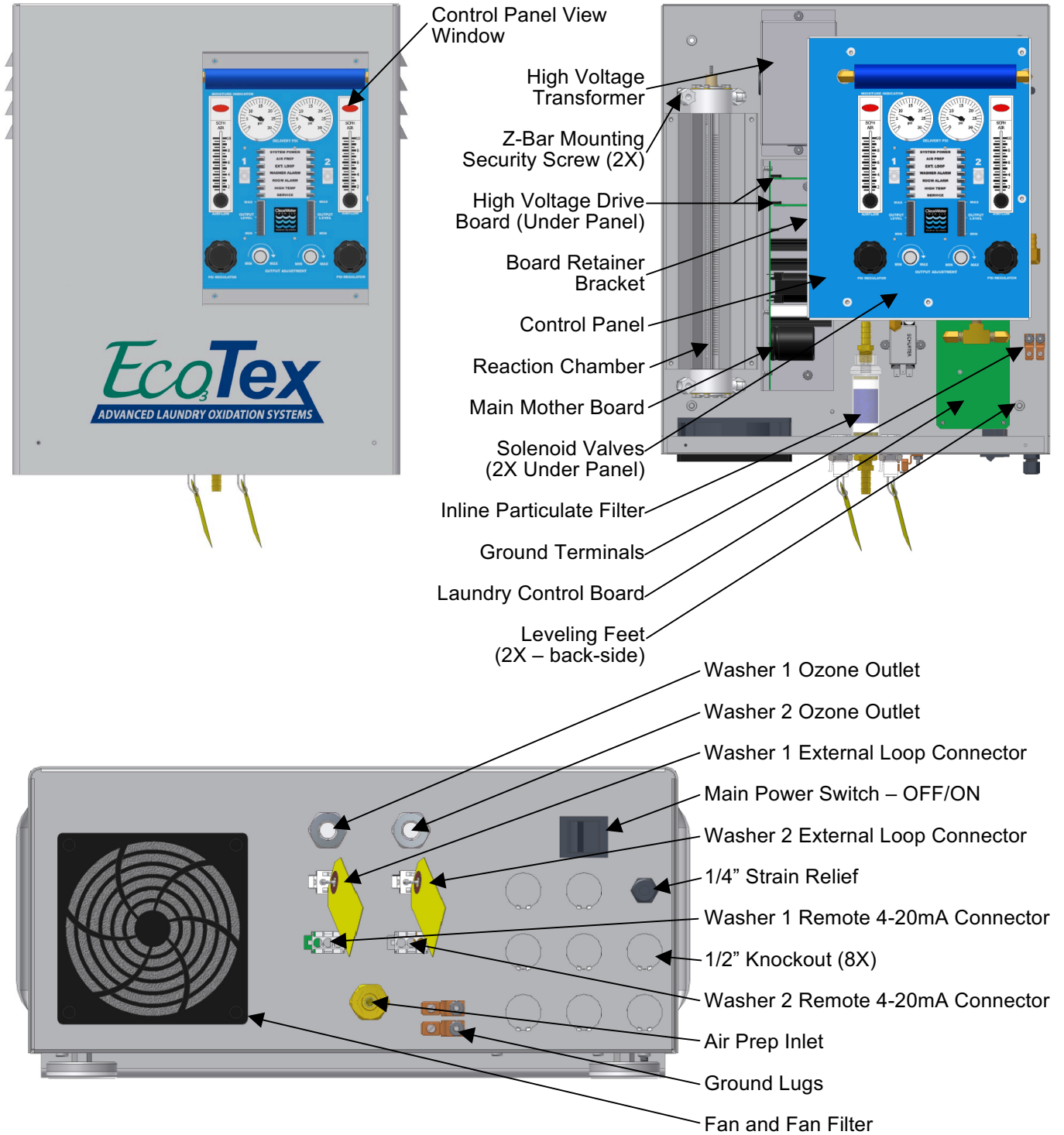
Shown: ClearWater Tech ECO1 Ozone Generator

Ozone Generator	Specifications	Ozone Output/SCFH
ECO1	20.5" h x 12.75" w x 5.5" d, 21 lbs	4g/h, 2.7% @ 4 scfh, 5PSI PSA Oxygen
Mounting	Z Bar – 16" On Center	

ECO1 – Control Panel



**ECO2 – Ozone Generator**

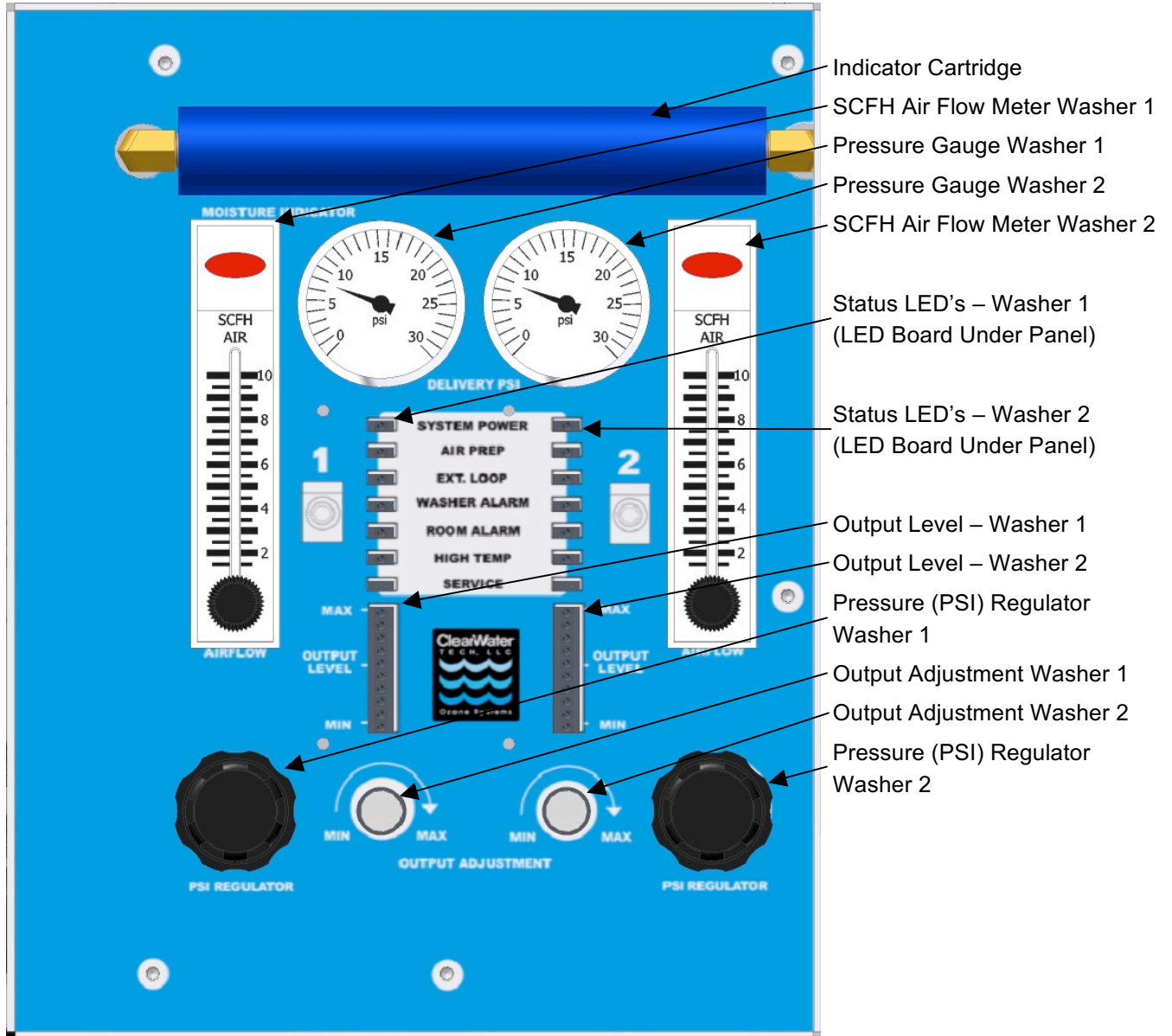


Shown: ClearWater Tech ECO2 Ozone Generator

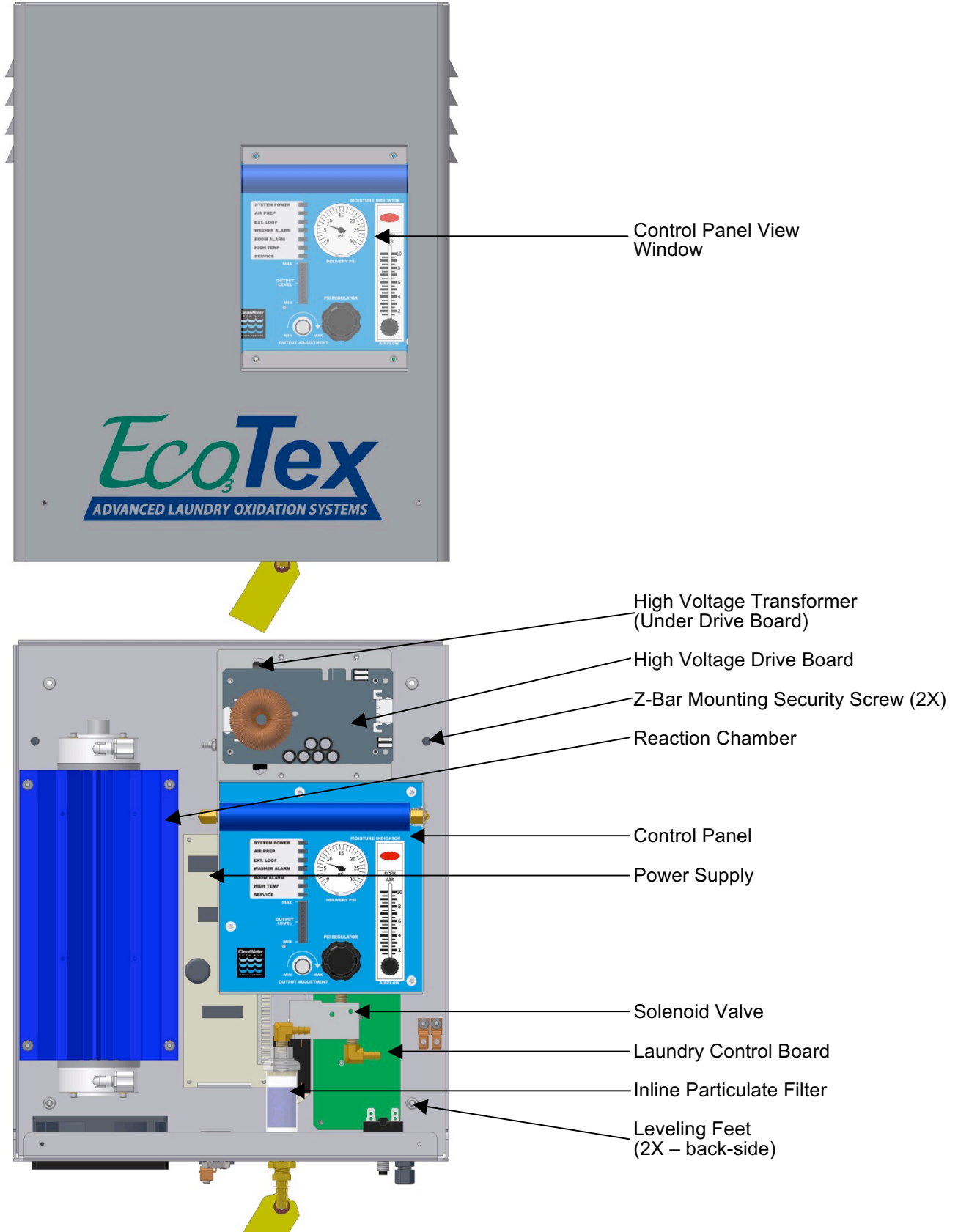
Ozone Generator	Specifications	Ozone Output/SCFH
ECO2	20.5" h x 16" w x 7.5" d, 30 lbs	8g/h, 2.7% @ 8 scfh, 5PSI PSA Oxygen
Mounting	Z Bar – 16" On Center	



ECO2 – Control Panel

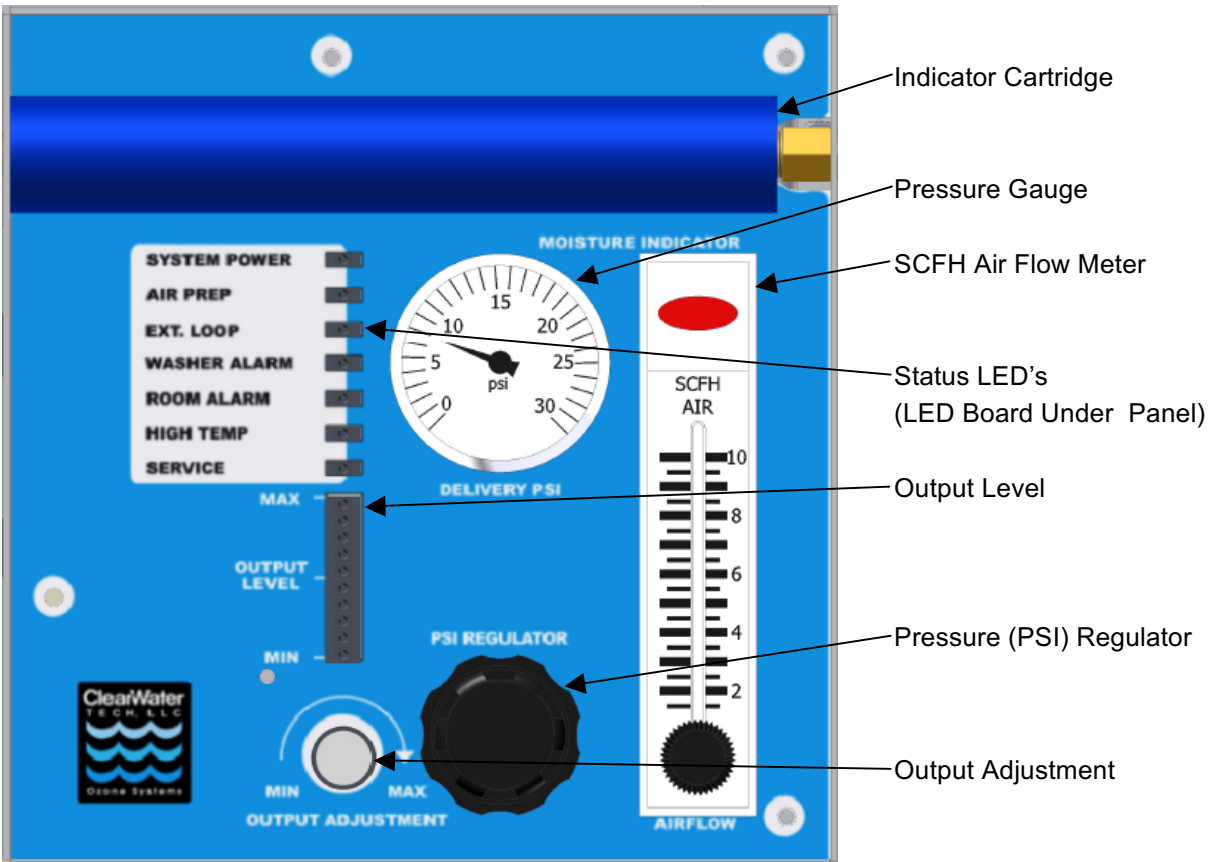
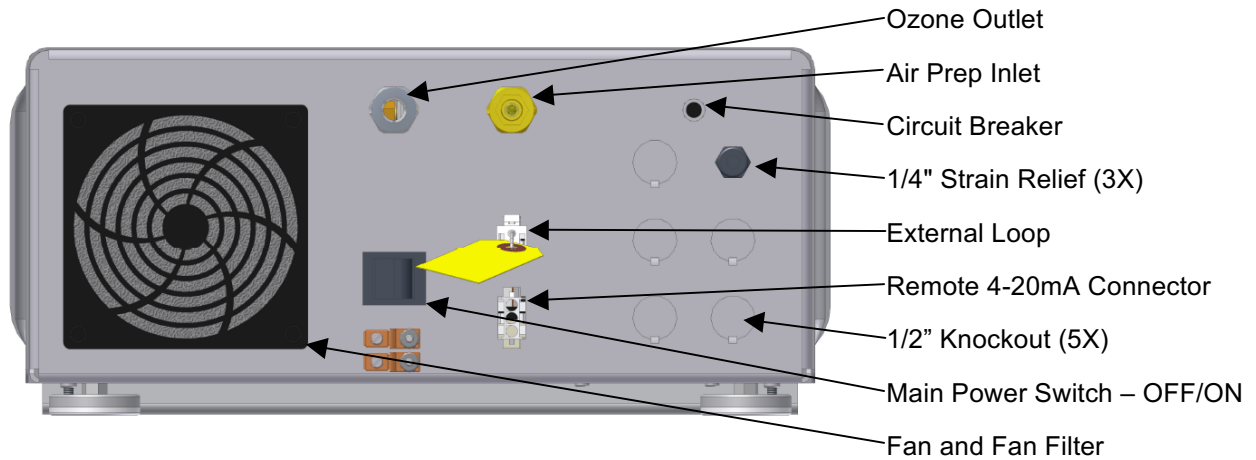


**ECO3 – Ozone Generator**



Shown: ClearWater Tech ECO3 Ozone Generator

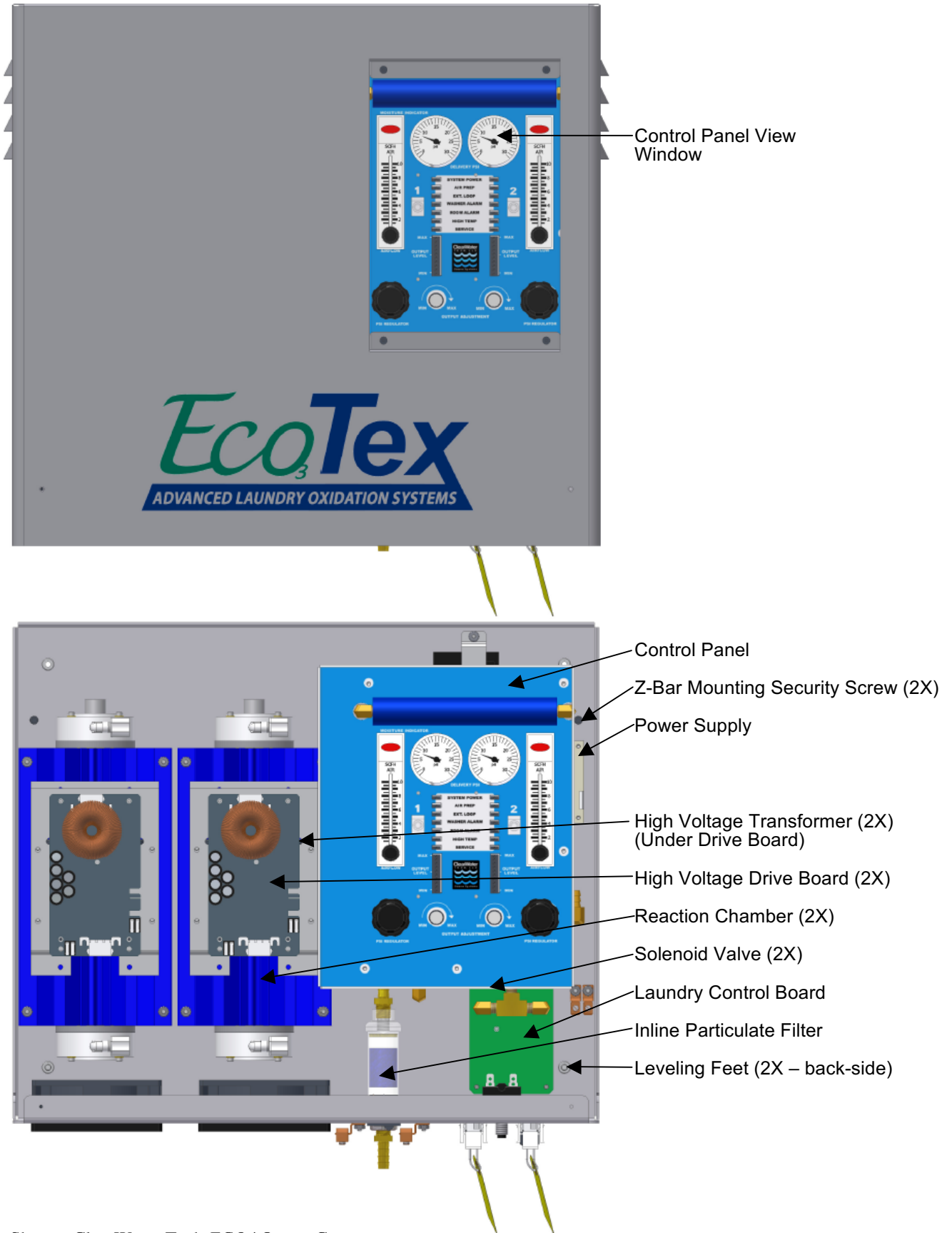
**ECO3 – Ozone Generator**



Shown: ClearWater Tech ECO3 Ozone Generator

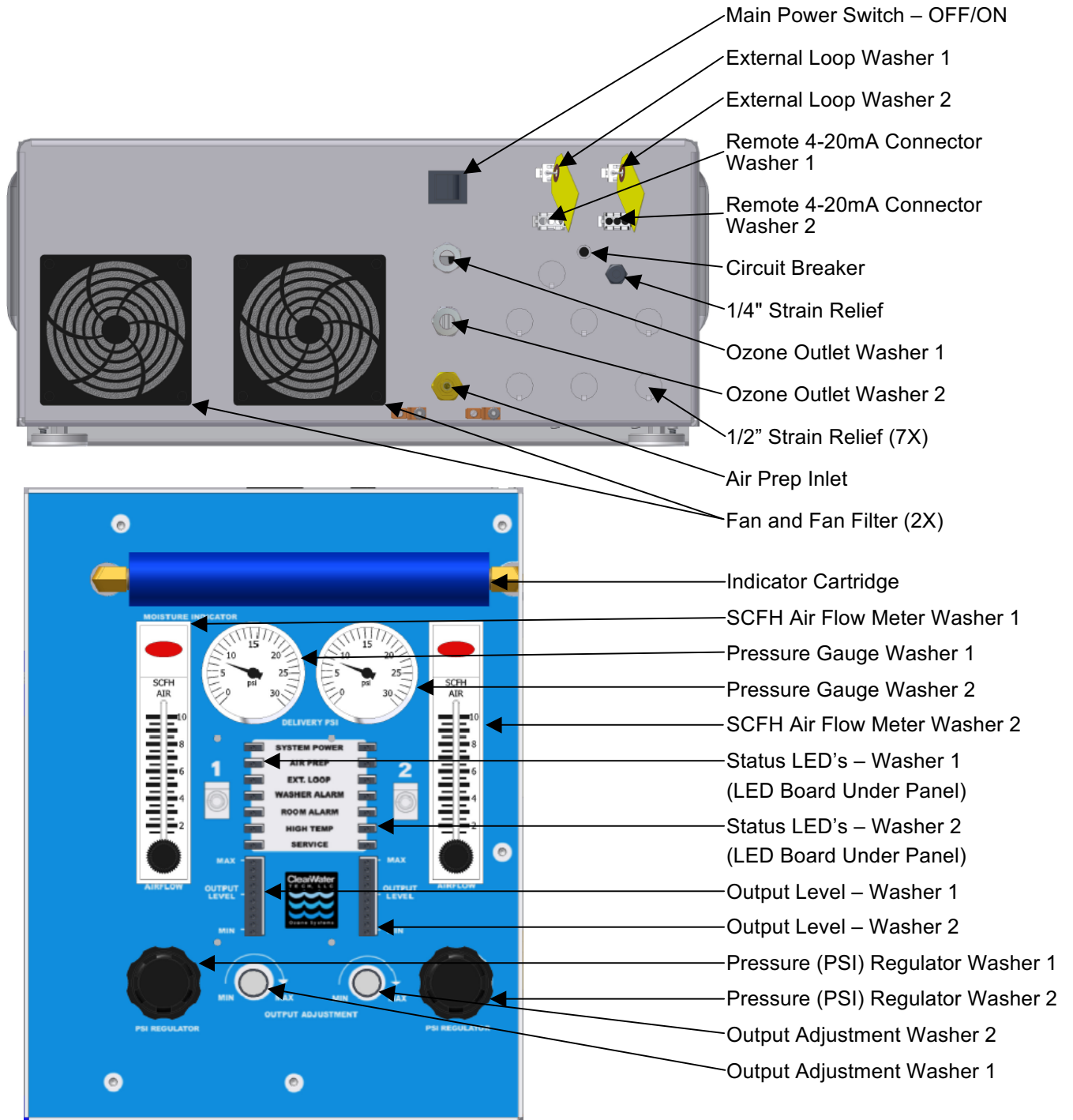
Ozone Generator	Specifications	Ozone Output/SCFH
ECO3	19.5" h x 15.75" w x 6.5" d, 38 lbs	13.5g/h, 6% @ 6 scfh, 10PSI PSA Oxygen
Mounting	Z Bar – 16" On Center	

**ECO4 – Ozone Generator**



Shown: ClearWater Tech ECO4 Ozone Generator

**ECO4 – Ozone Generator**



Shown: ClearWater Tech ECO4 Ozone Generator

Ozone Generator	Specifications	Ozone Output/SCFH
ECO4	19.5" h x 20.75" w x 9" d, 55 lbs	27g/h, 6% @ 12 scfh, 10PSI PSA Oxygen
Mounting	Z Bar – 19.5" On Center	

# Appendix B – Parts List

## Air Preparation System

Description	AEROUS 8 Part Number	AEROUS 15 Part Number
Control PCB 120 VAC 60Hz	OXU372	OXU377
Control PCB 220/240 VAC 50/60Hz	OXU386	OXU378
Solenoid Valve Assembly	OXU379	OXU379
Compressor 120VAC 60Hz	OXU373	OXU340
Compressor 220/240 VAC 50/60Hz	OXU374	OXU345
Encloser Filter	OXU350	OXU351
Inlet Filter Package	OXU371	OXU371
Maintenance Kit	ASP70A	ASP75A
Rebuild Kit	ASP71A	ASP76A

## Ozone Generator – ECO1 and ECO2

Description	Part Number
Reaction Chamber – Complete ECO1	RCC21
Reaction Chamber – Complete ECO2	RCC18
Dielectric Anode 1”	RCC76
Non-High Voltage End Cap	RCC57
High Voltage End Cap	RCC53
O-ring Set	ORS50
Mother Board	CCA1325
High Voltage Drive Board – ECO2	ELPC5040
High Voltage Drive Board – ECO1 and ECO2	CCA1149
LED Display Board	CCA1174
Laundry Control Board	CCA1346
High Voltage Transformer – ECO1	ELTR110
High Voltage Transformer – ECO2`	ELTR105
Solenoid Valve, 24VDC	SV220
Indicating Desiccant Chamber	DES40
Pressure Regulator	REG60
Gauge – Pressure 0-30 psi	GAG540
Gauge – Flow Meter 0-10 scfh	GAG330
Cooling Fan	FA47
Cooling Fan Filter	FA40
Inline Particulate Filter	FLT34

**Ozone Generator – ECO3 and ECO4**

<b>Description</b>	<b>Part Number</b>
Reaction Chamber – Complete	RCC10
Dielectric Anode 2”	RCC71
Non High Voltage End Cap	Contact Dealer
High Voltage End Cap	Contact Dealer
O-ring Set	ORS40
Drive Module Transformer	HVT275
Drive Module Board	CCA1231
Power Supply	PSR820
LED Display Board	CCA1174
Laundry Control Board	CCA1346
Solenoid Valve, 24VDC	SV220
Indicating Desiccant Chamber	DES40
Pressure Regulator	REG60
Gauge – Pressure 0-30 psi	GAG540
Gauge – Flow Meter 0-10 scfh	GAG330
Cooling Fan	FA47
Cooling Fan Filter	FA40
Inline Particulate Filter	FLT34

# Appendix C – Maintenance Kit

## Air Preparation System

<b>ASP70A – Maintenance Kit – AEROUS 8</b>		
Part Number	Quantity	Description
OXS371	1	Oxygen Concentrator – Replacement Compressor Inlet Filter
OXS350	1	Oxygen Concentrator – Replacement Enclosure Filter

<b>ASP71A – Rebuild Kit – AEROUS 8</b>		
Part Number	Quantity	Description
OXS379	1	Oxygen Concentrator – Solenoid Valve Assembly
OXS375	2	Oxygen Concentrator – Sieve Bed

<b>ASP75A – Maintenance Kit – AEROUS 15</b>		
Part Number	Quantity	Description
OXS371	1	Oxygen Concentrator – Replacement Compressor Inlet Filter
OXS351	2	Oxygen Concentrator – Replacement Enclosure Filter

<b>ASP71A – Rebuild Kit – AEROUS 15</b>		
Part Number	Quantity	Description
OXS379	1	Oxygen Concentrator – Solenoid Valve Assembly
OXS381	2	Oxygen Concentrator – Sieve Bed

**Note:** Air Preparation System voltage must be provided when ordering replacement parts

## Ozone Generator

<b>Contact Dealer for Part Number – Maintenance Kit – <i>ECO1</i> Ozone Generator</b>		
Part Number	Quantity	Description
FA40	1	Filter – Fan filter, element only
FLT34	1	Filter – Inline particulate filter
ORS50	1	O-Ring Set

<b>Contact Dealer for Part Number – Maintenance Kit – <i>ECO2</i> Ozone Generator</b>		
Part Number	Quantity	Description
FA40	1	Filter – Fan filter, element only
FLT34	1	Filter – Inline particulate filter
ORS50	2	O-Ring Set



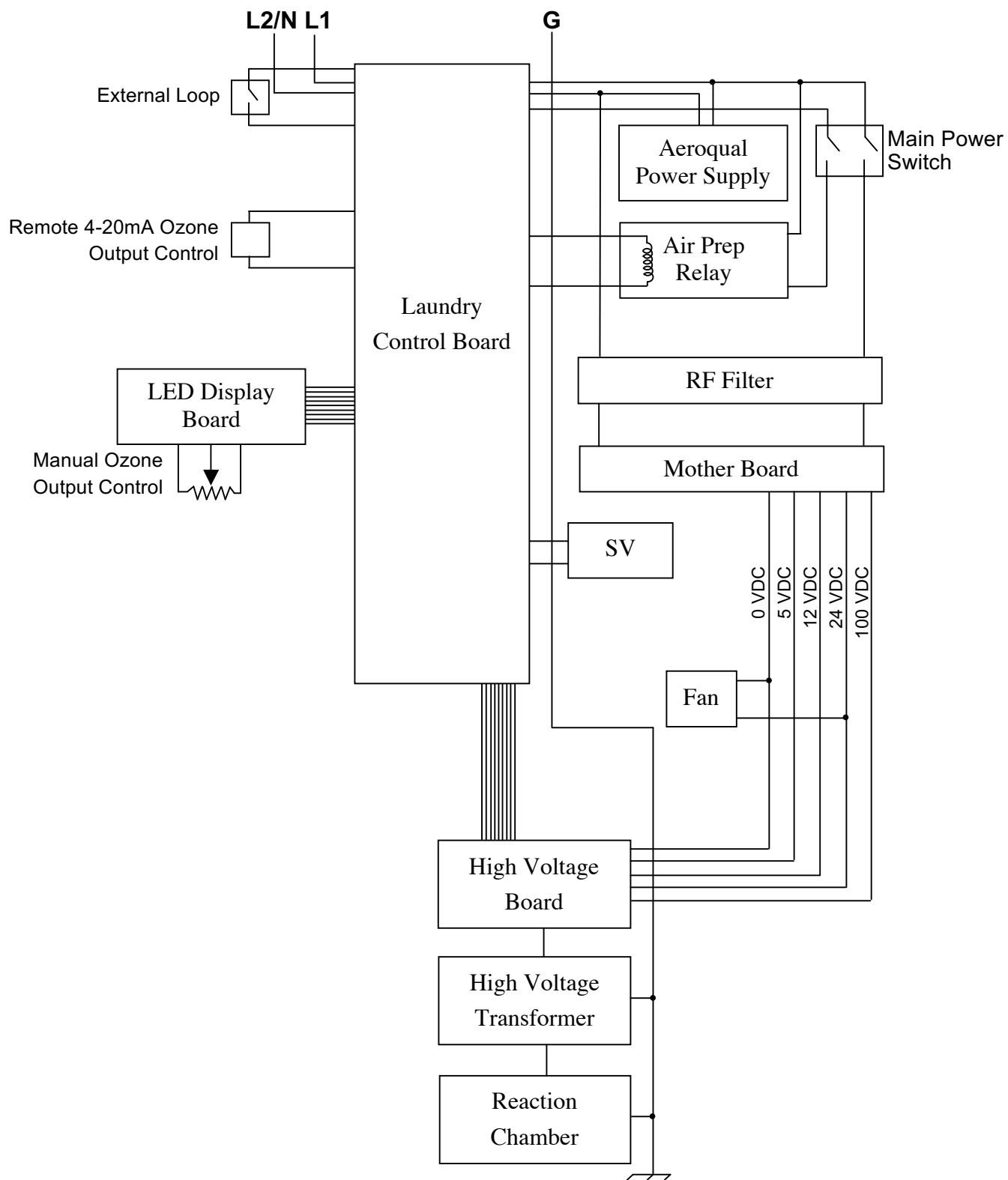
**Ozone Generator – Continued**

<b>Contact Dealer for Part Number – Maintenance Kit – <i>ECO3</i> Ozone Generator</b>		
<b>Part Number</b>	<b>Quantity</b>	<b>Description</b>
FA40	1	Filter – Fan filter, element only
FLT34	1	Filter – Inline particulate filter
ORG110	4	O-ring – 2” CD reaction chamber, pressurized end cap, large
ORG120	4	O-ring – 2” CD reaction chamber, pressurized end cap, small
HSW100	2	Sealing washer, Viton
HWW9004	2	Hardware washer - #6, flat, S.S.

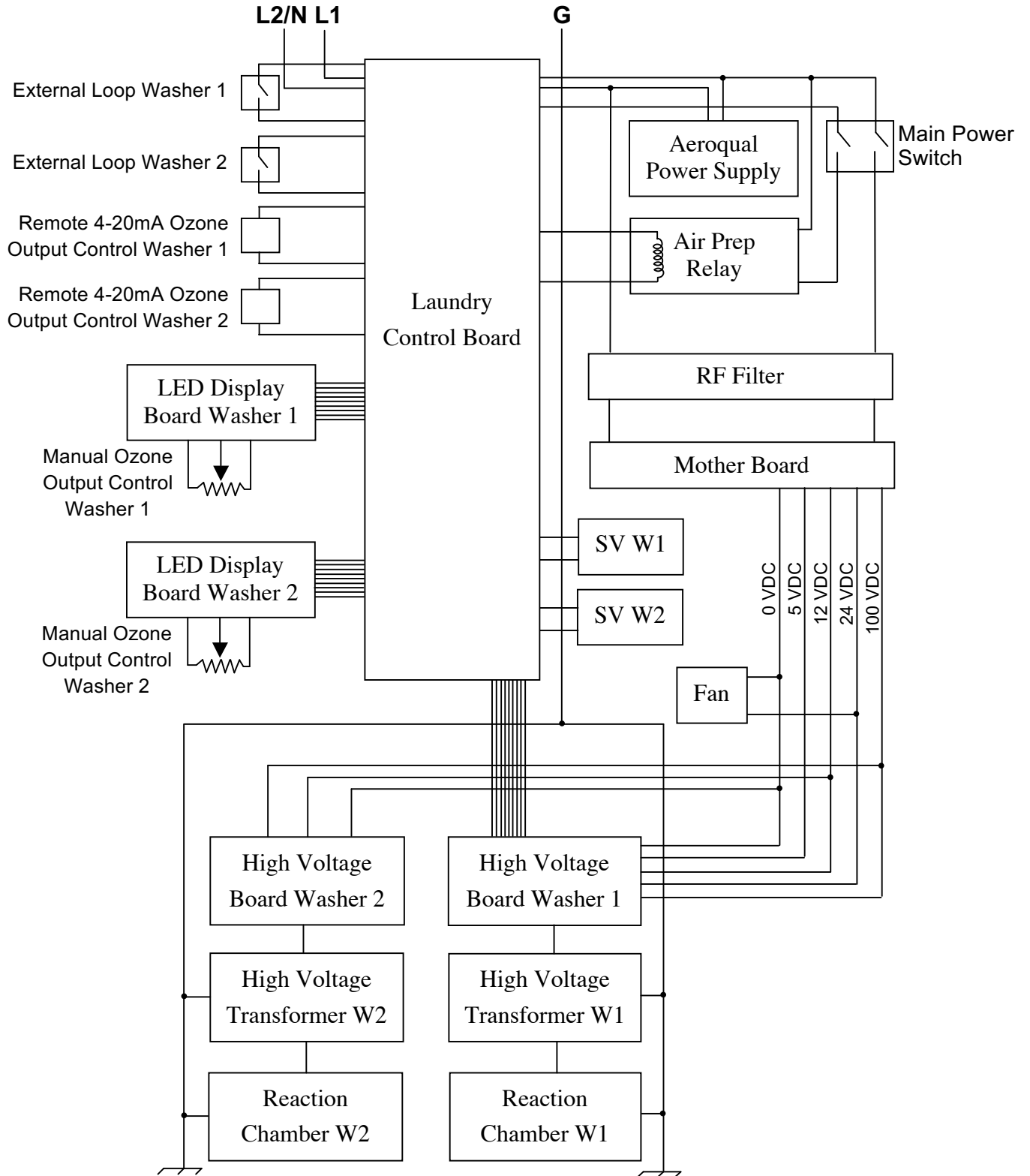
<b>Contact Dealer for Part Number – Maintenance Kit – <i>ECO4</i> Ozone Generator</b>		
<b>Part Number</b>	<b>Quantity</b>	<b>Description</b>
FA40	1	Filter – Fan filter, element only
FLT34	1	Filter – Inline particulate filter
ORG110	8	O-ring – 2” CD reaction chamber, pressurized end cap, large
ORG120	8	O-ring – 2” CD reaction chamber, pressurized end cap, small
HSW100	4	Sealing washer, Viton
HWW9004	4	Hardware washer - #6, flat, S.S.

# Appendix D – Logic Schematics

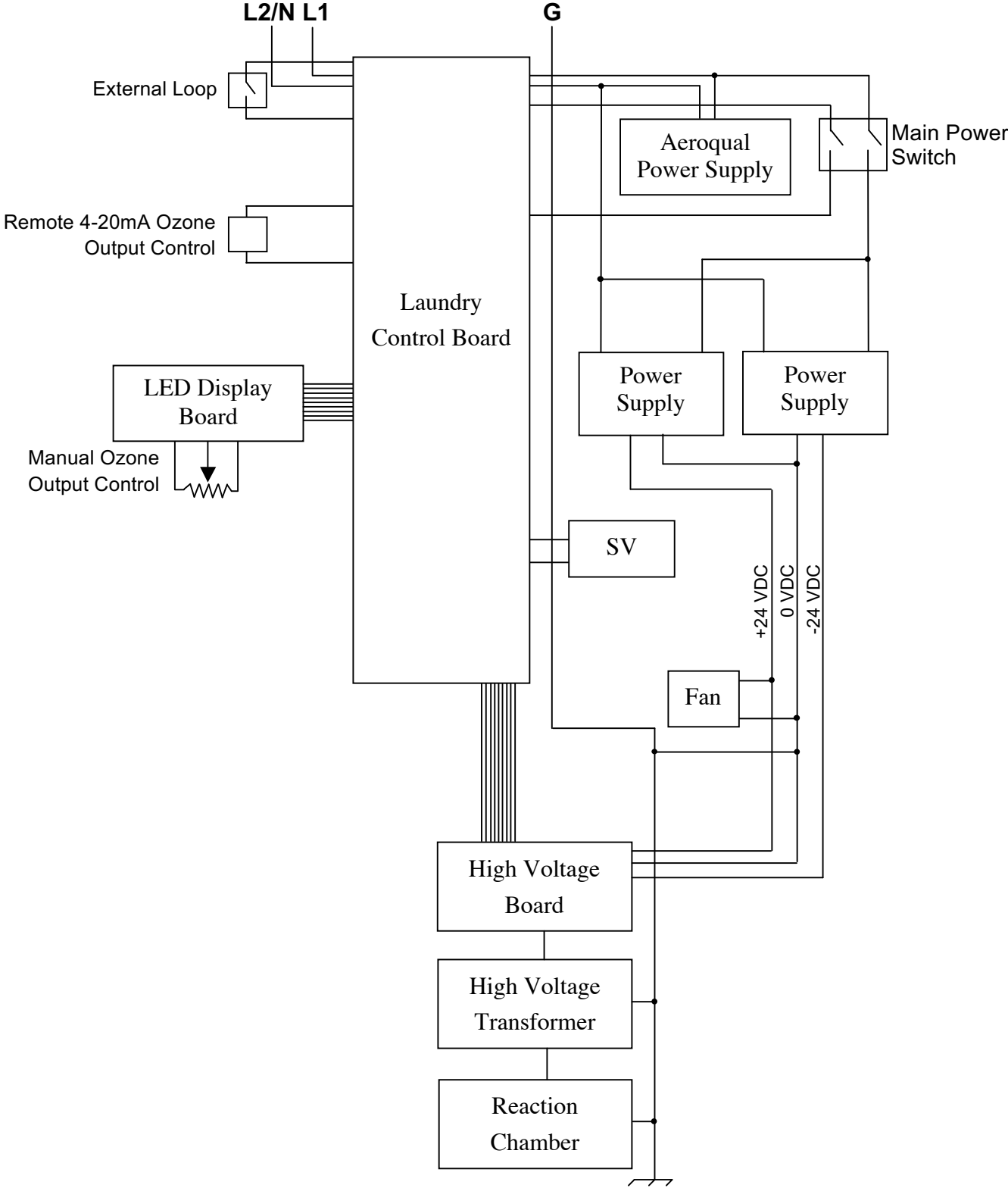
ECO1



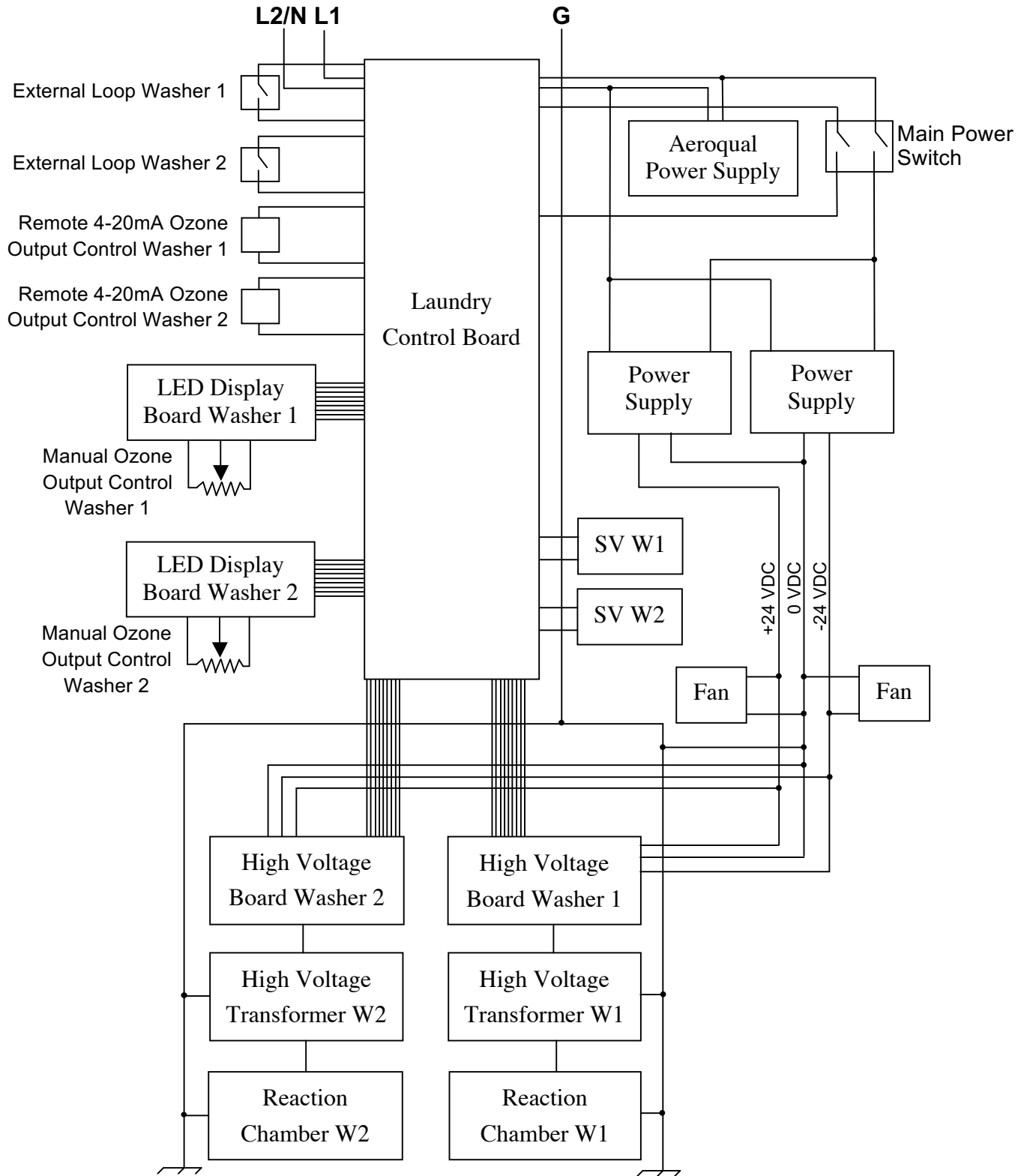
ECO2



ECO3



ECO4



# Appendix E – Warranty Information

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## ClearWater Tech, LLC. Limited Three-Year Warranty

### Summary of the Warranty

ClearWater Tech, LLC (“CWT”) makes every effort to assure that its products meet high quality and durability standards and warrants the products it manufactures against defects in materials and workmanship for a period of three (3) years, commencing on the date of original shipment from CWT, with the following exceptions: 1) The warranty period shall begin on the installation date if the installation is performed within 90 days of the original shipment from CWT; 2) The warranty period shall begin on the date of the bill of sale to the end user if the installation date is more 90 days after the original shipment date. To validate the warranty, a warranty card, accompanied by a copy of the bill of sale, must be returned to CWT and must include the following information:

- End user name
- Complete address, including telephone number
- Date installed
- Complete model and serial number information
- Name of company from which the unit was purchased

Repairs and replacement parts provided under this warranty shall carry only the unexpired portion of this warranty or 90 days, whichever is longer.

### Items Excluded from the Warranty

This warranty does not extend to any product and/or part from which the factory assigned serial number has been removed or which has been damaged or rendered defective as a result of:

- An accident, misuse, alteration or abuse
- An act of God such as flood, earthquake, hurricane, lightning or other disaster resulting only from the forces of nature
- Normal wear and tear
- Operation outside the usage parameters stated in the product user’s manual
- Oxygen systems and Ozone sensors have a one (1) year warranty
- Use of parts not sold by CWT
- Service or unit modification not authorized by CWT
- Check valve/solenoid valve failure
- Damage which may occur during shipping
- Failure to meet service requirements as outlined in the I & O manual

### Obtaining Service Under the Warranty

Any product and/or part not performing satisfactorily may be returned to CWT for evaluation. A Return Goods Authorization (RGA) number must first be obtained by either calling or writing your local authorized dealer, distributor or CWT direct, prior to shipping the product. The problem experienced with the product and/or part must be clearly described. The RGA number must appear prominently on the exterior of the shipped box(es). The product and/or part must be packaged either in its original packing material or in comparable and suitable packing material, if the original is not available. You are responsible for paying shipping charges to CWT and for any damages to the product and/or part that may occur during shipment. It is recommended that you insure the shipment for the amount you originally paid for the product and/or part.

If, after the product and/or part is returned prepaid and evaluated by CWT, it proves to be defective while under warranty, CWT will, at its election, either repair or replace the defective product and/or part and will return ship at lowest cost transportation prepaid to you **except for shipments going outside the 50 states of the United States of America**. If upon inspection, it is determined that there is no defect or that the damage to the product and/or part resulted from causes not within the scope of this limited warranty, then you must bear the cost of repair or replacement of damaged product and/or part and all return freight charges. Any unauthorized attempt by the end user to repair CWT manufactured products without prior permission shall void any and all warranties. For service, contact your authorized dealer or distributor or CWT direct at (805) 549-9724.

### Exclusive Warranty

There is no other expressed warranty on CWT products and/or parts. Neither this warranty, nor any other warranty, expressed or implied, including any implied warranties or merchantability of fitness, shall extend beyond the warranty period. Some states do not allow limitation on how long an implied warranty lasts, so that the above limitation or exclusion may not apply to you.

### Disclaimer of Incidental and Consequential Damages

No responsibility is assumed for any incidental or consequential damages; this includes any damage to another product or products resulting from such a defect. Some states do not allow the exclusion or limitation of incidental or consequential damages, so that above limitation or exclusion may not apply to you.

### Legal Remedies of Purchaser

This warranty gives you specific legal rights and you may also have other rights, which vary from state to state.  
**THIS STATEMENT OF WARRANTY SUPERSEDES ALL OTHERS PROVIDED TO YOU AT ANY PRIOR TIME.**