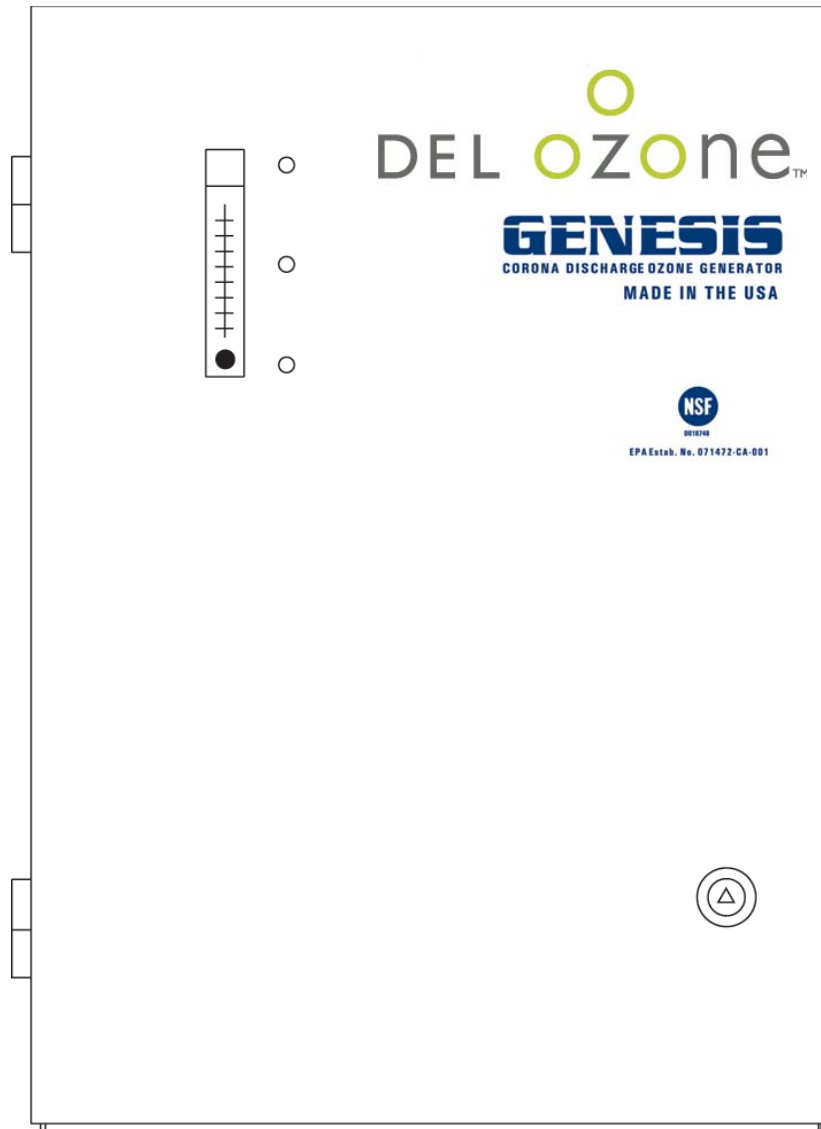


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# GENESIS™ CORONA DISCHARGE OZONE GENERATORS

## CD-2G, CD-5G, & CD-7G



## INSTALLATION & OPERATIONS MANUAL

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**ALL Genesis CD Ozone Generators are  
NSF Listed.**



## IMPORTANT SAFETY INSTRUCTIONS

### READ AND FOLLOW ALL INSTRUCTIONS.

- Read this manual completely before attempting installation.
- Install at least 5 feet (1.5meters) from wall of spa or pool water using nonmetallic tubing. Install ozone generator no less than one (1) foot above maximum water level to prevent water from contacting electrical equipment. Install in accordance with the installation instructions.
- Connect to a grounded, grounding type receptacle only.
- Do not bury cord.
- Warning - To reduce the risk of electrical shock, replace damaged cord immediately.
- Follow all applicable electrical codes.
- Electric shock hazard. Be sure to turn power OFF and disconnect from power source before any service work is performed. Failure to do so could result in serious injury or death.
- Warning - Short term inhalation of high concentrations of ozone and long term inhalation of low concentrations of ozone can cause serious harmful physiological effects. DO NOT inhale ozone gas produced by this device.
- For your safety, do not store or use gasoline, chemicals or other flammable liquids or vapors near this or any other appliance.
- A spontaneous and violent ignition may occur if oil, grease or greasy substances come in contact with oxygen under pressure. These substances must be kept away from oxygen regulators, cylinder valves tubing and connections, and all other oxygen equipment.

**SAVE THESE INSTRUCTIONS!**

## SECTION 1 General Information

### 1A. Description

The Genesis™ Corona Discharge (CD) series ozone generator described in this manual is designed to provide the benefits of ozonated water in an environmentally safe and effective manner. Genesis™ generators are National Sanitation Foundation (NSF) listed. The high quality, specially engineered components ensure efficient ozone output and reliable performance.

As a result of proper use of the Genesis™ CD ozone generators, unpleasant effects of traditional chemical use are virtually eliminated. The Genesis™ CD ozone generator is safe and harmless to your equipment if installed properly.

### 1B. Specifications

Ozone Output:	CD-2	CD-5	CD-7G
Ozone output ( $\pm 10\%$ ):	2 g/hr	5 g/hr	7 g/hr
Flow rate (max):	2 scfh	6 scfh	7 scfh
% weight O <sub>3</sub> :	2.5-3%	2-2.5 %	3%

#### Power Requirements:

Domestic:	CD-2	120VAC, 60 Hz, 1Ø, 5.0 Amp
	CD-5	120VAC, 60 Hz, 1Ø, 5.5 Amp
	CD-7G	120VAC, 60 Hz, 1Ø, 6.0 Amp

#### Shipping Weight:

CD-2:	Approx. 50 pounds / 23 kg
CD-5:	Approx. 52 pounds / 24 kg
CD-7G:	Approx. 61 pounds / 27.5 kg

#### Location Requirements:

Mounting:	Wall mount in a clean, protected area. Floor mounting kit <b>optional</b> .
Ambient Temp:	40°F - 100°F (5°C - 40°C)
Ventilation:	Room should provide 6 air changes per hour minimum.
Clearance:	Provide a minimum of 4" clearance around unit.

Protection from weather elements must be provided for outdoor installations. Operating outside of the recommended temperature ranges may result in damage not covered under the manufacturer's warranty.

### 1C. Warranty Summary (see warranty for more details)

#### Limited Warranty:

2 years on entire generator

Exceptions Include:

1 year on CD cells

2 years on compressors that are maintained according to operation and maintenance manual.

## SECTION 2 Installation

### 2A. Location

The CD-2, CD-5 and CD-7G are designed for wall mounting. **See figure 1.** Mount generator in a clean, protected area, either indoors or outdoors. (See LOCATION REQUIREMENTS section 1B) They can also be mounted to the floor or deck with optional feet. (See REPLACEMENT PARTS section 5B) Locate generator out of reach of sprinklers or drainage spouts. Allow sufficient access for maintenance and all tubing and electrical wires. Ozone generator should be installed no less than one foot above the maximum water level.

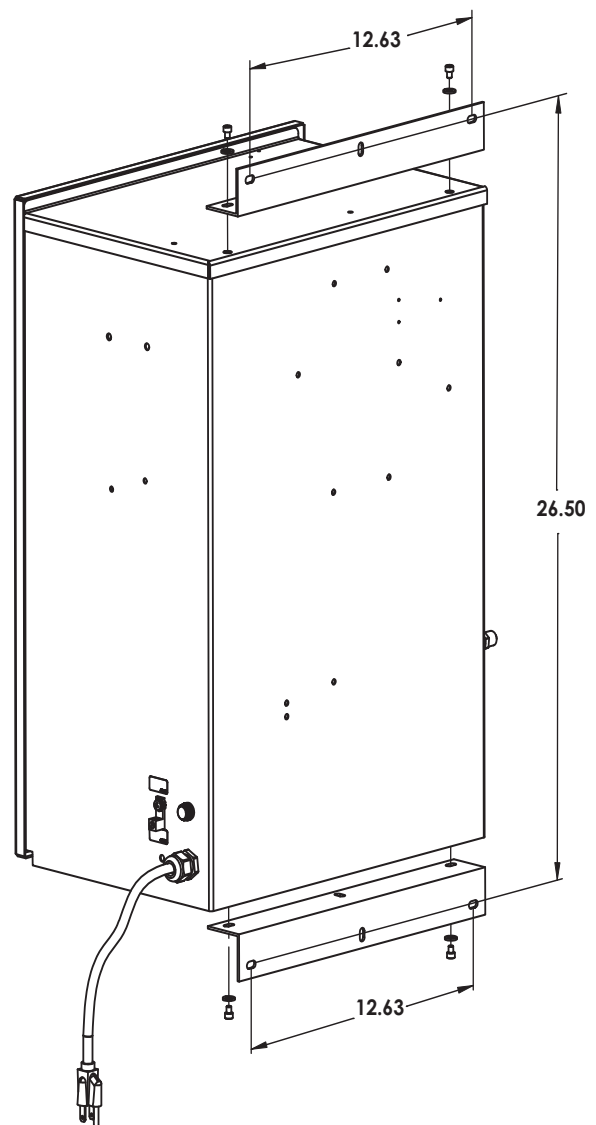


Figure 1: Wall Mount

## 2B. Mounting

### 2B-1. Wall Mount

1. Attach the Wall Mounting Brackets to the base and top of the enclosure using the four 1/4" x 1" long bolts and washers provided.
2. Refer to Figure 1. Mark the locations for the four mounting bolts and install anchors appropriate for the mounting surface.
3. Install the four mounting bolts through the Wall Mounting Brackets and into the anchors.

### 2B-2. Floor Mounting (optional)

The enclosure can be floor mounted to a solid, flat surface using the optional Floor Mounting Kit Part Number 9-5004.

## 2C. Electrical

**2C-1. Main power circuit:** The CD-2, CD-5 and CD-7G are supplied with a standard power cord. Plug the cord into a standard 110V grounded, grounding type receptacle only. **NOTE:** The circuit must be protected by a ground-fault circuit interrupter (GFCI) installed in accordance with electrical codes. (A transformer is required for export power requirements).

**2C-2. Pool Timer / Controller Connection:** Make sure that the Pool Timer / Controller switch is properly rated for the ozone generator. Plug or wire the ozone generator into the system timer / controller so that the ozone generator operates simultaneously with the main pool pump.

## 2D. Plumbing

Ozone gas is introduced to the pool circulation line using a venturi injector. Suction developed by the venturi allows the CD generator to operate safely under vacuum.

**2D-1: Injector Assembly:** Plumb the Injector and/or Degas Assembly into the water line according to the installation instructions for that assembly. **The Injector/Degas Assembly must be installed in the main return line after all other pool equipment.**

**2D-2. Water Check Valve (optional item):** If the pool equipment is mounted above the water line, a 1/3# DELCheck™ check valve (P/N CO-0101) must be installed between the pump outlet and the injector assembly.

### 2D-3. Ozone Gas Line

1. Install the ozone check valve (contained in parts bag) into the ozone output fitting on the generator. Apply Teflon tape, Mil T-27730A or equivalent, to threads. Flow direction is away from the generator. Install elbow or straight MPT-to-compression fitting (contained in parts bag) onto check valve. Insert one end of ozone tubing into the fitting, hold the tubing in place and tighten the fitting.

Note: use a back-up wrench when tightening all fittings.

2. The injector assembly is also equipped with a Compression fitting. Connect the other end of ozone tubing to the injector suction port as described in step 1. **See figure 2.**

**WARNING: The ozone gas supply line *must have* a back flow prevention device (such as a check valve) installed between the ozone generator cabinet and the point of injection to prevent water from backing up into the generator system. An ozone supply check valve is included.**

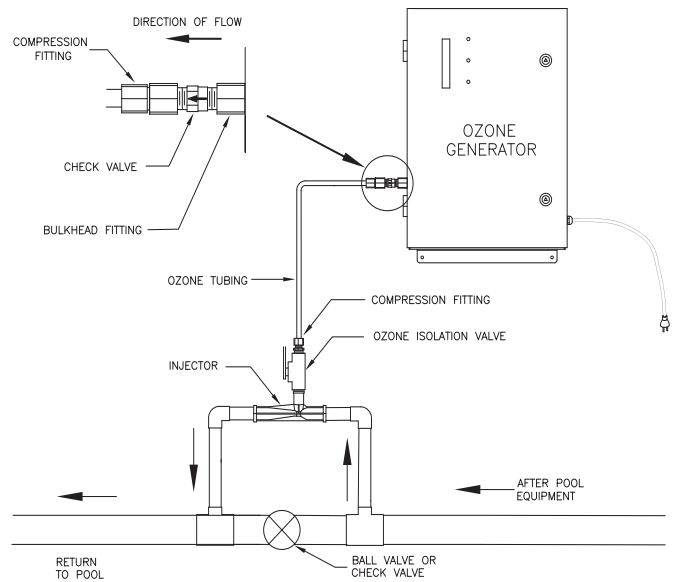


Figure 2: with Injector Assembly in Main Line

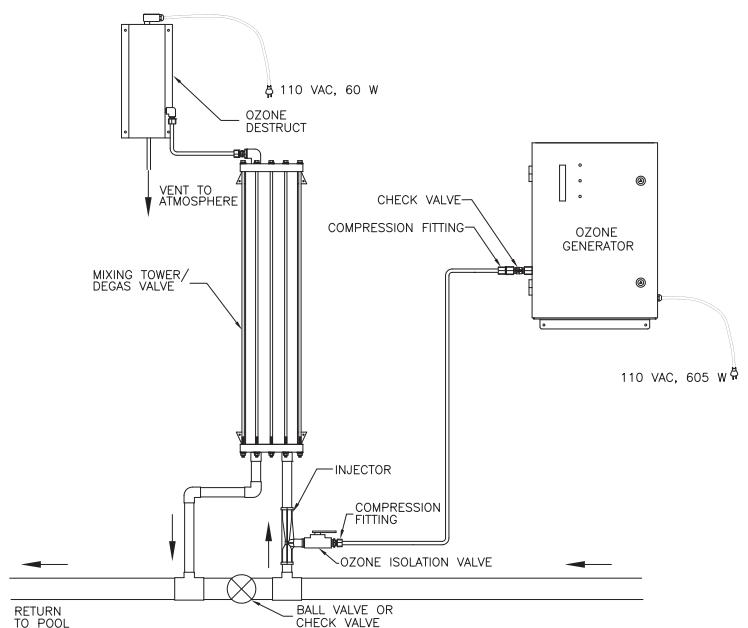


Figure 2A: with DVX

## SECTION 3

### Operation

#### 3A. General

To achieve optimal performance from the ozone system, the pool must be as clean as possible to start with.

1. Backwash or clean filters one day before starting the ozone generator.
2. Superchlorinate pool water using a chlorine based shock treatment.
3. Test pool chemistry and adjust pH between 7.4 and 7.6. Adjust total alkalinity between 80 and 120 ppm.
4. Run pool filtration continuously for 24 hours prior to starting ozone system.

#### 3B. Initial System Start-Up

Upon completing all of the generator system connections and cleaning the pool as outlined above, you are ready to begin start up procedures.

1. Check electrical fittings.
2. Check for proper voltage.
3. Turn on pool circulation system.
4. Check for leaks.
5. With the ozone isolation valve closed, adjust injector bypass valve and/or filtration sidestream valve to flow water through the injector.
6. Open ozone isolation valve.
7. Turn ozone generator on.

**Note:** OK

**NOTE:** If your Injector Assembly is equipped with a ball valve, close the valve by turning the handle clockwise until the proper suction is indicated as described in Section 3C.

#### 3C. Normal Operation

At this point, the system's cooling fans will start up and the oxygen concentrator will begin operating. The **green** power indicator should be illuminated and the **red** vacuum indicator should turn off when sufficient vacuum is obtained. The **green** ozone indicator should then illuminate.

If the indicator lights are OK and the flowmeter is reading the proper flow (~2.5 scfh: CD-2, ~6 scfh: CD-5, ~7 scfh: CD-7G), then the ozone generator is producing ozone and the injector assembly is injecting the ozone into the pool return/inlet line.

Make further adjustment to the injector bypass valve until vacuum light turns off and the ozone light turns on.

**Note:** Do not exceed the max flow rate specification as indicated in the specification sticker.

If you experience complications see TROUBLESHOOTING section 4D or contact DEL technical support (See Section 4E).

#### 3D. System Shut-Down

The following sequence of steps must be followed for servicing or for storage.

1. Unplug the ozone generator.
2. Close the ozone isolation valve on the ozone supply line.

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**WARNING:** Pool pump flow *must not be shut down* when the ozone generator is operating. Doing so may cause water to back flow into the system and *damage the generator module*.

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#### 3E. Water Chemistry

Regular chlorine or bromine testing should be performed as normal. Ozone will be eliminating the majority of contaminants. Therefore, only a small amount of chemicals will need to be added - just enough to maintain a minimum of residual level of 0.5 - 1.0 ppm chlorine or 1.0 - 2.0 ppm bromine. Ozone is pH neutral thus minimizing pH adjustments.

## SECTION 4

### Maintenance and Service

#### 4A. System Electromechanical Overview

*Refer to Figure 4* for component locations.

##### 4A-1. Indicator Lights

1. **Main Power:** Green light indicates that power is being supplied to the ozone generator. Compressor should be running.
2. **Ozone Power:** Green light indicates that power is being supplied to the high voltage Corona Discharge circuits and that ozone is being produced.
3. **Vacuum:** Red light indicates a vacuum fault. When sufficient suction is being supplied from the venturi injector, the red light will turn off.

##### 4A-2. Internal Components

1. **Corona Discharge (CD) Module:** The Generator module consists of a High Voltage electrode wrapped around a Teflon core inserted in a ceramic insulating tube. The assembly is encased in a thermally protected aluminum heat sink.
2. **Power Supply:** The fuse protected, self-regulated, High Voltage High Frequency Power Supply provides the ideal electrical signal for efficient ozone production.
3. **Air Compressor:** Compressor produces and supplies compressed air to oxygen concentrator.
4. **Oxygen Concentrator:** Supplies concentrated, dry, oxygen feed gas to the ozone generator.
5. **Lo Limit Vacuum Switch:** If the vacuum in the ozone output supply line falls below 2 in. Hg the switch will open causing the system to shut down.
6. **Ventilation Fan:** Cooling fan operates whenever the ozone generator is plugged in.
7. **Intake Screens:** Easily removable screens keep debris from entering the enclosure. See figure 3.

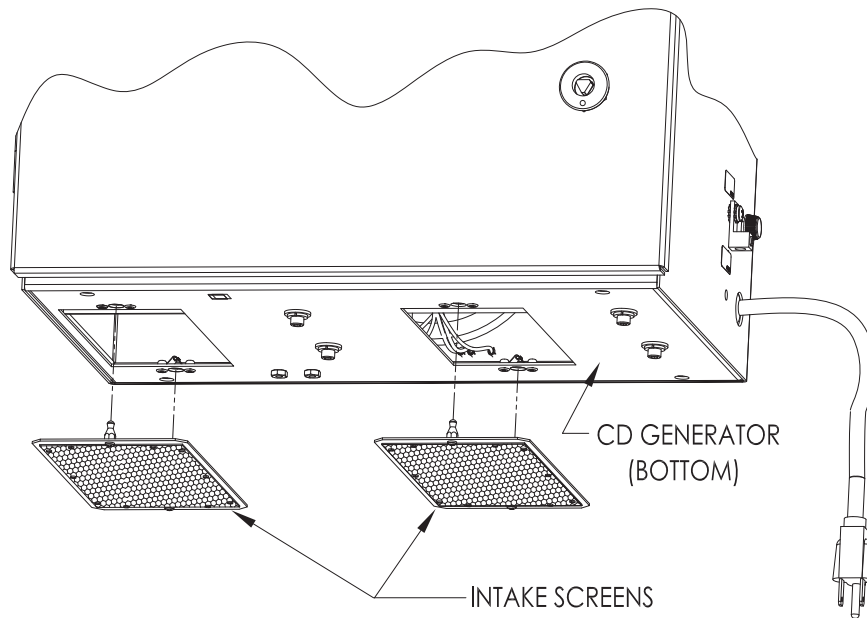


Figure 3: Intake Screen Replacement

#### 4B. Preventative Maintenance Schedule

The Genesis™ Corona Discharge ozone system requires very little maintenance beyond general housekeeping practices.

##### DAILY:

1. Check ozone generator for proper operation.
2. Make sure red indicator light is not illuminated.
3. Make sure flow meter is indicating proper air flow. (~2.5 scfh: CD-2, ~6 scfh: CD-5, ~7 scfh: CD-7G).

##### MONTHLY:

1. Clean intake screens.
2. Perform general cleaning of cabinet interior.
3. Visually inspect compressor filter element. Replace as required.
4. Visual inspection of all plumbing, mechanical, and wiring in system.

##### ANNUALLY (Every 8750 hours):

1. Rebuild compressor.
2. Rebuild / replace ozone supply line check valve.
3. Replace oxygen supply line check valve.
4. Verify oxygen output.

##### BIANNUALLY (Every 16000 hours):

1. Replace CD ozone module and o-rings.

#### 4C. Air Compressor Servicing

Before performing any servicing to the ozone generator, make sure the power is off by disconnecting electrical plug from wall socket.

Air compressor requires a rebuild after one (1) year or every 8760 hours, whichever is reached first.

1. Purchase rebuild kit from DEL Industries, Inc.  
See REPLACEMENT PARTS section 5B for ordering information.
2. Follow instructions in kit to rebuild compressor.

#### 4D. Troubleshooting

Knowledge of electrical applications is required for Troubleshooting. Contact a certified electrician if you are unsure of your ability to service the equipment. Improper servicing will void generator warranty. If any condition persists, Contact DEL technical support for assistance. (See section 4E.)

**Symptom:** “Main power” light out when system is on.

1. No power to the generator module from the power source:
  - a. Check circuit breaker at the power distribution box.
  - b. Check for loose connections or wiring breaks from the power distribution box to the generator.
2. G.F.C.I. has tripped.\*
  - a. Check power cord and reset G.F.C.I.

\*If G.F.C.I. or breaker continues to trip after reset, call for technical assistance.

**Symptom:** “Ozone power” indicator light out.

1. Ozone power fuse is bad.
  - a. Check fuse and replace if necessary.
2. Loss of Vacuum.
  - a. Check red vacuum indicator light. If light is on refer to corresponding symptom and corrective action below.

**Symptom:** “Vacuum” indicator light is on indicating out of range vacuum being supplied.

1. Injector not supplying adequate suction.
  - a. Check pump and ensure water is flowing through injector.
  - b. Check by-pass valve and adjust if necessary to obtain proper pressure differential in order to reestablish suction.

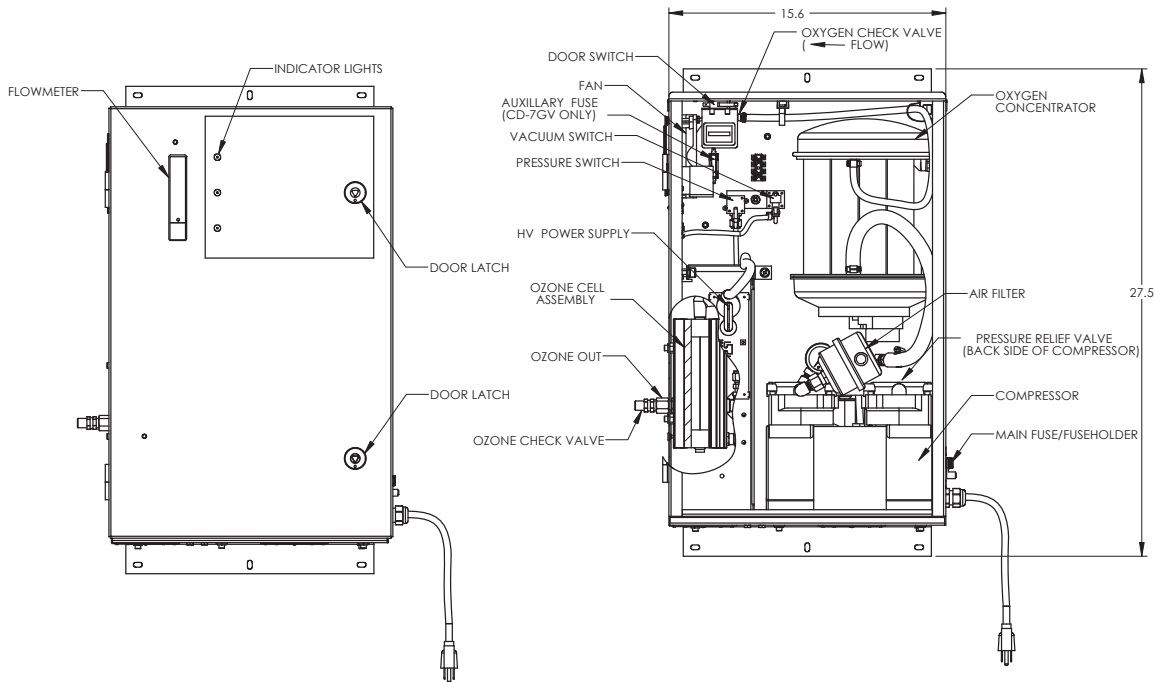


Figure 4: Component Locations

**Symptom:** CD Module is not operating. Ozone output has dropped.

1. *No power to the generator module from the power supply:*
  - a. Check fuse.
  - b. Check H.V. cables for breaks or loose connections, replace if necessary.
  - c. Check for power at input terminals of the H.V. transformers.\*
  - d. Check ozone power relay for loose connections or faulty operation.

\***CAUTION:** HIGH VOLTAGE.

**Symptom:** No air flow through the generator. The air flow meter indicates 0 scfh flow.

1. *Injector not set properly.*
  - a. Adjust injector bypass valve until proper air flow is indicated (~3 scfh for CD-2, ~6 scfh for CD-5, ~7 scfh for CD-7G).
2. *Air compressor is not operating properly.*
  - a. Listen for air compressor operation.
  - b. Check all tubing connections from the air compressor through the system for leaks.
2. *Ozone supply tubing damaged.*
  - a. Check tubing for blockage or kinks.
  - b. Check for loose or damaged fittings.

**4E. Contact Information:**

For Technical assistance:

Call: (800) 676-1335  
 Email: service@delozone.com  
 Or visit our web site: www.delozone.com

**SECTION 5**

**Replacement Parts and Order Information**

**5A. Ordering information:**

For replacement parts call DEL at **1-800-676-1335**.

Be prepared with the following information:

- Customer Name    -Customer Address
- DEL Model #        -DEL Serial Number
- Date Purchased    -Proof of Purchase

**5B. Standard replacement parts list:**

1. Compressor rebuild kit  
 CD-2, CD-5, & CD-7G ..... 2-0923-01
2. Air intake screen ..... 8-0928-01
3. Ozone tubing, 3/8" Teflon .....7-0126
4. Ozone tubing, 1/4" Teflon .....7-0741
5. Installation & Operations Manual.....4-0153
6. CD Ozone Cell  
 CD-2 (one required) .....9-0925  
 CD-5 (one required) .....9-0925  
 CD-7G (one required) .....9-0927
7. Replacement door key..... 2-0015/KEY
8. Compressor Air Filter Element .....7-1120
9. Check valve  
 (external on ozone supply line).....8-0330
10. Check valve  
 (internal on oxygen supply line)..... 7-1140-01

## DEL OZONE COMMERCIAL PRODUCT LIMITED TWO YEAR WARRANTY

The limited warranty set forth below applies to products manufactured by DEL OZONE – 3580 Sueldo Street, San Luis Obispo, California 93401, and sold by DEL OZONE or its authorized dealers. This limited warranty is given only to the first retail purchaser of such products and is not transferable to any subsequent owners or purchasers of such products. Systems sized 65 grams or greater require factory commissioning and startup to maintain warranty as set forth below.

DEL OZONE warrants that DEL or DEL authorized dealers will repair or replace, at DEL's option, any part of such products proven to be defective in materials or workmanship within two (2) years of the date of receipt. Parts are covered under the two (2) year warranty when and only when the stated maintenance requirements are met. Contact Tanks and degas valves have a ninety (90) day warranty. Compressor(s) must be maintained per operation and maintenance manual. Required maintenance includes a compressor rebuild after one (1) year or every 8,760 hours, which ever is reached first. Warranty does not include parts for compressor(s) rebuild kit(s), or other consumable items. See owner's manual for complete maintenance details. This Warranty specifically excludes any components not manufactured by DEL OZONE that are external to the products covered, such as pumps, air compressors, monitors, tanks, or related components. DEL OZONE will assist with warranty claims for such components purchased through DEL OZONE; limited to the extent of the manufacturer's standard warranty. ANY REPAIR OR REPLACEMENT WILL BE WARRANTED ONLY FOR THE BALANCE OF THE ORIGINAL TWO (2) YEAR WARRANTY PERIOD

**NOTE: USE ONLY DEL AUTHORIZED DEL REPLACEMENT PARTS. USE OF ANY OTHER PART(S) WILL VOID THIS WARRANTY.**

*Any replaced parts must be returned to DEL OZONE for warranty evaluation.*

**THIS LIMITED WARRANTY DOES NOT INCLUDE ANY OF THE FOLLOWING:**

- (a) Any labor charges for troubleshooting, removal, or installation of such parts.
- (b) Any repair or replacement of such parts necessitated by faulty installation, improper maintenance, improper operation, misuse, abuse, negligence, accident, fire, flood, repair materials, and/or unauthorized accessories.
- (c) Any such products installed without regard to required local codes and accepted trade practices.
- (d) Damage to unit caused by water backflow;
- (e) Any implied warranty of merchantability or implied warranty of fitness for particular purpose, and such warranties are hereby disclaimed.
- (f) DEL Ozone shall not be liable under any circumstances for loss of use of such product, loss of profits, direct damages, indirect damages, consequential damages, and / or incidental damages.

This warranty gives you specific legal rights. You may have other rights which vary from state to state.

**Extended Warranties and Service Agreements are available. Contact DEL for additional details.**

**TO OBTAIN WARRANTY SERVICE:**

DEL OZONE Commercial Department  
PO Box 4509, San Luis Obispo, CA 93403  
Customer Service Number: (800) 676-1335  
Fax Number: (805) 541-8459  
E mail: [service@delozone.com](mailto:service@delozone.com)

**PROVIDE:**

1. Project, contact name, mailing address and telephone.
2. Installer/Mechanical Contractor.
3. Unit Part Number, Serial Number, and date of purchase.
4. The date of failure.
5. A description of the failure.

After this information is provided, DEL Ozone may release a *RETURN GOODS AUTHORIZATION (RGA) NUMBER*. After receiving the RGA number the part in question must be returned to DEL Ozone, freight prepaid, with the RGA number clearly marked on the outside of the package. All preauthorized defective parts must be returned to DEL Ozone within thirty (30) days. Under no circumstances may any product be returned to DEL Ozone without prior authorization. Returns without the assigned RGA number on the outside of the package will be refused and shipped back to the sender at their expense. Upon receipt of preauthorized returned goods, DEL Ozone will repair or replace, at DEL Ozone's option, the defective product(s) and return them (freight prepaid for products under warranty). Buyer's acceptance of the product and use thereof constitutes acceptance of these terms

# **APPENDIX “A” SAFETY**

## HEALTH HAZARDS OF OZONE

### Detection Levels

Ozone can be detected in air by its distinctive odor at concentrations of about 0.02 ppm. Although each nose varies, olfactory fatigue occurs quickly. As a result, **DO NOT RELY ON ODOR AS A WARNING OF HIGH OZONE CONCENTRATIONS.**

The permissible exposure level (PEL) or time weighted concentration for ozone to which workers may be exposed is 0.1 ppm averaged over 8 hours, 5 days a week (OSHA). The short term exposure limit is 0.3 ppm average over 15 minutes. The concentration of 10 ppm ozone in air is generally accepted as immediately Dangerous to Life or Health (DLH).

### Effects on Humans

Ozone acts as a primary irritant, affecting mainly the eyes, upper respiratory tract and the lungs. Onset of pulmonary edema (fluid buildup in the lungs) may be delayed for a few hours after exposure. Inhaling ozone at concentrations of 50 ppm for 30 minutes can be fatal. Many people exposed to airborne ozone rapidly develop a headache, which often disappears after a few minutes in fresh air.

Reduction in lung function due to scar tissue forming in the lung may occur due to long-term exposure to ozone at concentrations above 0.2 ppm, or a single high exposure. Although medical studies show no evidence of ozone causing cancer or lung allergies or harming the unborn, there is some evidence that the oxidizing power of ozone could lead to premature aging of the body as a whole.

The owner of any ozone installation should advise any person who may be exposed to ozone that those with a history of heart or respiratory disease should take every precaution to avoid exposure to ozone.

## FIRST AID

### General

#### First Action

1. If exposure to ozone causes headache or shortness of breath, immediately remove the patient to a fresh air environment.

#### Second Action

1. Workers who have been exposed to low concentrations of ozone should be given oxygen to breathe while under the observation of trained personnel.
2. If exposure is severe, send for medical assistance immediately.

### Inhalation

#### First Action

1. Assess patient's breathing.
2. All unconscious patients must be placed in the drainage position (on their sides), so that fluids can drain from the airways once breathing has been restored.
3. Check pulse.

#### Second Action

1. If breathing has ceased, start artificial respiration (rescue breathing is the most effective) method until breathing has been restored.
2. Send for medical assistance immediately.
3. If absent, begin cardiopulmonary resuscitation (CPR).

### Eye Contact

#### First Action

1. Effective irrigation should start immediately. Eyes should be irrigated for 30 minutes by the clock with running tap water or preferably normal saline.

#### Second Action

1. Effective irrigation must be continued while en route to hospital.

### Precautions

Workers with a previous cardiopulmonary (heart and lung) condition must consult their physician prior to working in an area in which they may be exposed to ozone. Significant alterations in cardiopulmonary functions have been documented when such workers have been exposed to low concentration of ozone.

### END OF DOCUMENT.

## OZONE

## Material Safety Data Sheet

## SECTION I: MATERIAL IDENTIFICATION

<b>IDENTITY:</b> OZONE (Gaseous)	<b>ISSUED:</b> February, 1992
<b>FORMULA:</b> O <sub>3</sub>	<b>REVISED:</b> March, 2009
<b>Description (origin/uses):</b> Occurs in atmosphere from UV light action on oxygen at high altitude. Commercially obtained by passing air between electrodes carrying a high voltage alternating current. Also found as a by-product in welding areas, high voltage equipment, or UV radiation. Ozone is used as an oxidizing agent in air and water disinfection: for bleaching textiles, oils, and waxes; organic synthesis as in processing certain perfumes, vanillin, camphor; for mold and bacteria control in cold storage.	
<b>Cautions:</b> A powerful oxidizing agent, ozone generally exists as a gas and is highly chemically reactive. Inhalation produces various degrees of respiratory effects from irritation to pulmonary edema (fluid in lungs) as well as affecting the eyes, blood, and central nervous system.	
<b>Manufacturer/Supplier:</b> On-site generation, equipment available from various suppliers, including: DEL Ozone Phone: (805) 541-1601 3580 Sueldo Street FAX: (805) 541-8459 San Luis Obispo, CA 93401	

## SECTION II: INGREDIENTS AND HAZARDS

<b>Ozone, CAS No. 10028-15-6: NIOSH RTECS No. RS8225000</b>	
1991 OSHA PELs 8-hr TWA: 0.1 ppm vol. (0.2 mg/m <sup>3</sup> ) 15-min STEL: 0.3 ppm vol (0.6 mg/m <sup>3</sup> )	1991-1992 ACGIH TLV Ceiling: 0.1 ppm (0.2 mg/m <sup>3</sup> )
1990 IDLH 10 ppm	1990 DFG (Germany) MAK TWA: 0.1 ppm (0.2 mg/m <sup>3</sup> ) Category 1: Local Irritant Peak Exposure Limit: 0.2 ppm 5 min momentary value, 8 per shift
1990 NIOSH REL Ceiling: 0.1 ppm vol. (0.2 mg/m <sup>3</sup> )	
<b>Other Designations:</b> Triatomic oxygen: CAS No. 10028-15-6, NIOSH RTECS No. RS8225000	

## SECTION III: PHYSICAL DATA

<b>Boiling Point:</b> . . . . . -169° F	<b>Melting Point:</b> . . . . . -315.4° F (-193° C)
<b>Vapor Pressure:</b> . . . . . >1 ATM	<b>% Volatile by Volume:</b> . . . . . 100%
<b>Vapor Density (AIR = 1):</b> . . . . . 1.6	<b>Molecular Weight:</b> . . . . . 48 Grams/Mole
<b>Solubility in Water:</b> . . . . . 0.49 ml @ 32° F (0° C), 3 ppm @ 20 ° C	<b>pH:</b> . . . . . Not Listed
	<b>Critical Temperature:</b> . . . . . 10.22° F (-12.1° C)
<b>Appearance and Odor:</b> Colorless to blue gas (greater than -169° F): characteristic odor often associated with electrical sparks or lightning in concentrations of less than 2 ppm and becomes disagreeable above 1-2 ppm. CAUTION: Olfactory fatigue develops rapidly, so do not use odor as a preventative warning device.	

## SECTION IV: FIRE AND EXPLOSION HAZARD DATA

<b>Flash Point:</b> . . . . . Nonflammable
<b>Extinguishing Media:</b> . . . . . Use large amounts of water spray or fog to put out fires involving ozone. Use appropriate fire-fighting techniques to deal with surrounding material.
<b>Special Fire Fighting Procedures:</b> . . . . . Wear a self contained breathing apparatus with full face pieces operated in a pressure-demand or other positive-pressure mode.
<b>Unusual Fire/Explosion Hazards:</b> . . . . . Decomposition of ozone into oxygen gas, (O <sub>2</sub> ), can increase strength of fire.

## SECTION V: REACTIVITY DATA

<b>Stability:</b> Ozone is not stable. Hazardous polymerization cannot occur.
<b>Chemical Incompatibilities:</b> Ozone is chemically incompatible with all oxidizable materials, both organic and inorganic.
<b>Conditions to Avoid:</b> Ozone is unstable at room temperatures and spontaneously decomposes to oxygen gas. Avoid ignition sources such as heat, sparks, and open flame. Keep away from strong reducing agents and combustible materials such as grease, oils, and fats.
<b>Products of Hazardous Decomposition:</b> Ozone spontaneously decomposes to oxygen gas, even at room temperatures.

4-0697\_ Rev.B

**SECTION VI: HEALTH HAZARD DATA**

**Carcinogenicity:** Ozone is not listed as a carcinogen by the NTP, IARC, or OSHA.

**Primary Entry:** Inhalation

**Target Organs:** Respiratory system, eyes, blood.

**Summary of Risks:** There is no true threshold limit and so no exposure (regardless of how small) is theoretically without effect from ozone's strong oxidative ability. Ozone passes straight to the smallest bronchioles and alveoli and is not absorbed by mucous membranes along the way. Initial small exposure may reduce cell sensitivity and/or increase mucous thickness producing a resistance to low ozone levels. Short exposure to 1-2 ppm concentrations causes headache as well as irritation to the respiratory tract. but symptoms subside when exposure ends. High concentrations of ozone produce severe irritation of the eyes and respiratory tract. Exposure above the ACGIH/OSHA limits produce nausea, chest pain, coughing, fatigue, reduced visual acuity, and pulmonary edema. Symptoms of edema from excessive exposure can be delayed one or more hours. Inhalation of >20 ppm for an hour or more (>50 ppm for 1/2 hour) can be fatal.

**Acute Effects:** Acute damage from ozone appears to be mainly from its oxidizing effect on contact with tissue.

**Chronic Effects:** Respiratory disease. Deleterious effects on lungs and acceleration of tumors have been reported.

**Medical Conditions Generally Aggravated by Long-Term Exposure:** History of respiratory or heart disorders.

**First Aid:** Remove from ozone containing air, get prompt medical help\*, administer oxygen if necessary.

**Eye Contact** - Gently lift eyelids and flush eyes continuously with flooding amounts of water for 15 minutes or until transported to a medical facility\*.

**Inhalation** - Remove exposed person to fresh air, support breathing, administer humidified oxygen as needed, get medical help\*.

**Ingestion** - Highly unlikely since ozone is a gas until -169° F,

\* **GET MEDICAL ASSISTANCE = APPROPRIATE IN-PLANT, PARAMEDIC, or COMMUNITY.** Get prompt medical assistance for further treatment, observation, and support after first aid.

**SECTION VII: PRECAUTIONS FOR SAFE HANDLING AND USE****Steps to be Taken in Case of Spill/Leak:**

1. Discontinue production
2. Isolate and vent area
3. Immediately notify personnel
4. Deny entry
5. Follow applicable OSHA regulations

**Disposal:** Provide ventilation to dilute and disperse small amounts of ozone (below OSHA PELs) to outside atmosphere. Follow federal, state, and local regulations.

**Handling/Storage Precautions:** Ensure proper personnel training and establish emergency procedures.

**SECTION VIII: CONTROL MEASURES**

**Respiratory Protection:** High Level (>10 ppm) - Self Contained Breathing Apparatus: MISH/NIOSH approved.

Low Level (0.3 - 10 ppm) - Canister Type (carbon) respirator may be used.

**Eye Protection:** Wear chemical safety goggles if necessary to work in high ozone (>10 ppm).

**Skin Protection:** Effects of ozone on skin are minimal to non-existent.

**Ventilation:** Provide general and local exhaust ventilation to dilute & disperse small amounts of ozone into outside atmosphere.

**SECTION IX: SPECIAL PRECAUTIONS AND COMMENTS**

**Storage Segregation:** Prevent ozone from coming into direct physical contact with strong acids or bases or with strong oxidizing/reducing agents.

**Engineering Controls:** Install ventilation systems capable of maintaining ozone to concentrations below the ACGIH/OSHA exposure limits (see sect. II). Install ambient ozone monitor(s) configured to shut down ozone equipment and turn high speed ventilation on.