

# Ozomax Ltd

Ozone generators

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## OZONATORS VTTL series OZO 1VTTL to OZO 50 VTTL General specifications / installation and maintenance instructions



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Ozomax would like to congratulate you on your purchase of your ozone generator. This quality ozonator has been designed to give you many years of reliable service and represents the best value for your money. It requires little maintenance to achieve its best performance and many years of reliable service. It is relatively easy to install by a certified plumber and electrician or certified personnel. All components used in the manufacturing of the Ozonator are CSA & /or UL approved and/or meets the Canadian electrical CAN/CSA Code 22.2.

**!! Warning** Please read carefully all of the information contained within this manual and all other documents provided with your ozone generator model prior to installing it. This ozonator uses high voltages which, if not installed as per the instructions provided, can cause **Electrical shocks & Fire Hazards. This ozonator is made for indoor applications & should not be exposed to rain or condensation or any excessive moisture of any kind.**

Keep this manual for future reference. Save the packing and proof of purchase. If you need assistance or service, call your local distributor or Ozomax Ltd at 450-378-6825 from 9:00 a.m to 5:00 pm North American standard time (east cost)

This symbol !! is intended to alert the user of the presence of important operating and servicing (maintenance) instructions in the owner's manual.

## 1.0 Limited warranty

Ozomax Ltd warrants all the ozonators to be free from defects in components and workmanship to the original purchaser for (12) months from date of invoice under conditions of intended use as stipulated in this and the operating manual. The corona lamp is warranted against catastrophic failure for 5 years under conditions of normal use. The warranty is not extended to other peripheral equipment such as venturiers, compressors, air dryers or any other units not manufactured by Ozomax Ltd.

The warranty shall be null, void and non binding upon Ozomax, if Ozomax or its distributors determine that the cause of problems or defects to be a result of one or more of the following:

- 1) Operating the ozonator outside the normal use intended for, namely, water & air treatment in non explosion proof environment. (Explosion proof models are available and will be specified as such
- 2) Improper installation or installation made by uncertified personnel
- 3) Installation in an inappropriate location such as a humid , and/or wet, and/or hot and/or dirty environment
- 4) Improper adjustments made by the client after proper installation was done by certified personnel.

All warranty services will be provided by our factory service centers or by our distributors during normal working hours.

**Warrantor is not responsible for consequential damages (material or injuries).**

Under no circumstances Ozomax Ltd will be liable to any charges or damages caused directly or indirectly by its products.

This warranty might be extended to 5 years if the maintenance service is done by Ozomax Ltd or its certified distributors. This will require the signature of a maintenance contract upon purchasing the equipment. Usually 10 % of the purchase price per year will cover the maintenance cost of the ozonator only. This estimate might vary with location and from country to country.

## 2. 0 Ambient conditions and Operating parameters

**Table -1-**

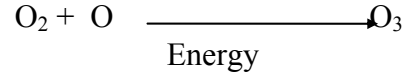
Conditions or parameters	Range of operation
Ambiant temperature	10°C to 35°C Max
Ambiant Relative Humidity	0 to 50% max
Ambiant particles count (Typical Class 100K)	100,000 particles per ft <sup>3</sup> or less (environment clean & free of dust)
Voltages	120 V 50/60 Hz for North America 220 to 240 V 56/60 Hz elsewhere Verify label found on the ozone generator. Voltage fluctuation and surges will damage power supply +/- 10% of nominal
Maximum delivery pressure to the ozonator	20 PSI
Maximum air or oxygen temperature for feed gas to the ozonator	25°C
Relative humidity of feed gases to the ozonator	Typically -40°C dew point or better. This achieved by manual or automatic air dryers. Manual dryers will require frequent regeneration and frequent supervision.
Flow rate of feed gas (Air) Flow rate of feed gas (O <sub>2</sub> )	15 CFH per Corona lamp type VTTL 5 CFH per corona lamp type VTTL
Ozone output is measured in units of Grams per hour or pounds/day. Concentrations will vary from 0.02 % by weight to 7 % by weight depending on corona lamp type and dry air feed flow rate. If Oxygen is used as feed, the concentration will be double that achieved when using a dry air feed .When using VTTL, HDHF or LTHF corona lamps ozone concentrations could reach 10 % at low oxygen feed flow rates.	UV absorption method is used under the following parameters conditions: Feed gas temperature = 20°C or lower Feed gas humidity = -40°C dew point or dryer Feed gas pressure = 15 PSI
Location for installation	Ozonator should be installed on a wall or against a wall which is not flammable and fire resistant. The ozonator should be surrounded by free space on all sides a minimum of 2 feet at above ambient conditions.

**Note: Warranty & performance of your equipment is contingent upon strict compliance with operating conditions and specifications defined in Table -1-.**

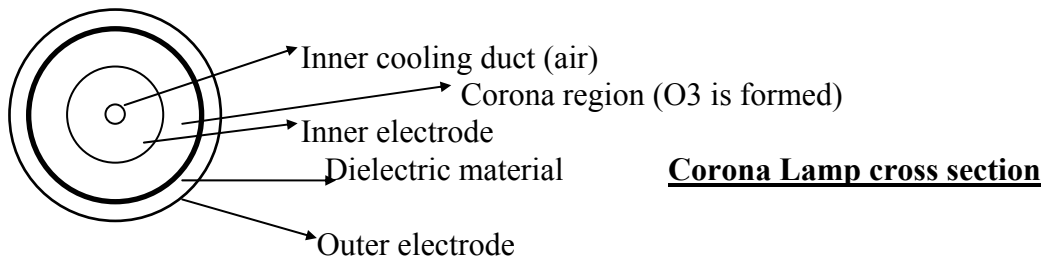
## 3.0 Theory of Operation of Ozomax Ozonators

Ozone is formed when an electrical discharge is produced between two electrodes separated by a dielectric.

Voltage is provided by a high voltage power supply which can vary from 5000 Volts to 20,000 Volts depending on the model. The process may be described by the following reaction,



Ozomax standard ozonators are air cooled. Water cooled units are also available. Models intended for outdoor installation include an air heat exchanger combined with either a chilled water or an air conditioning unit. The outdoor models are build in water tight NEMA enclosures.

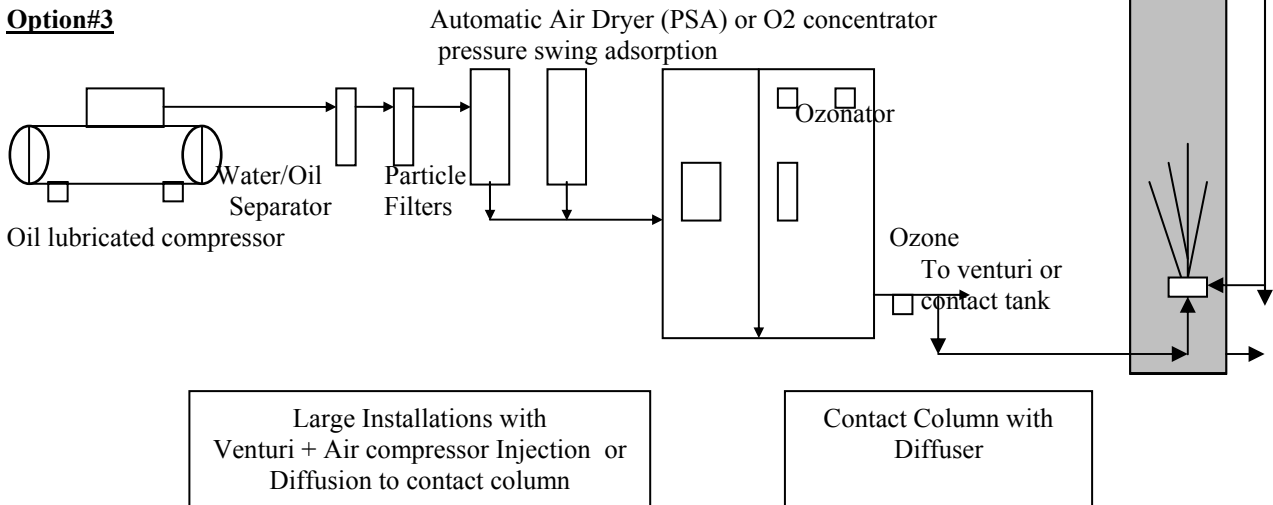
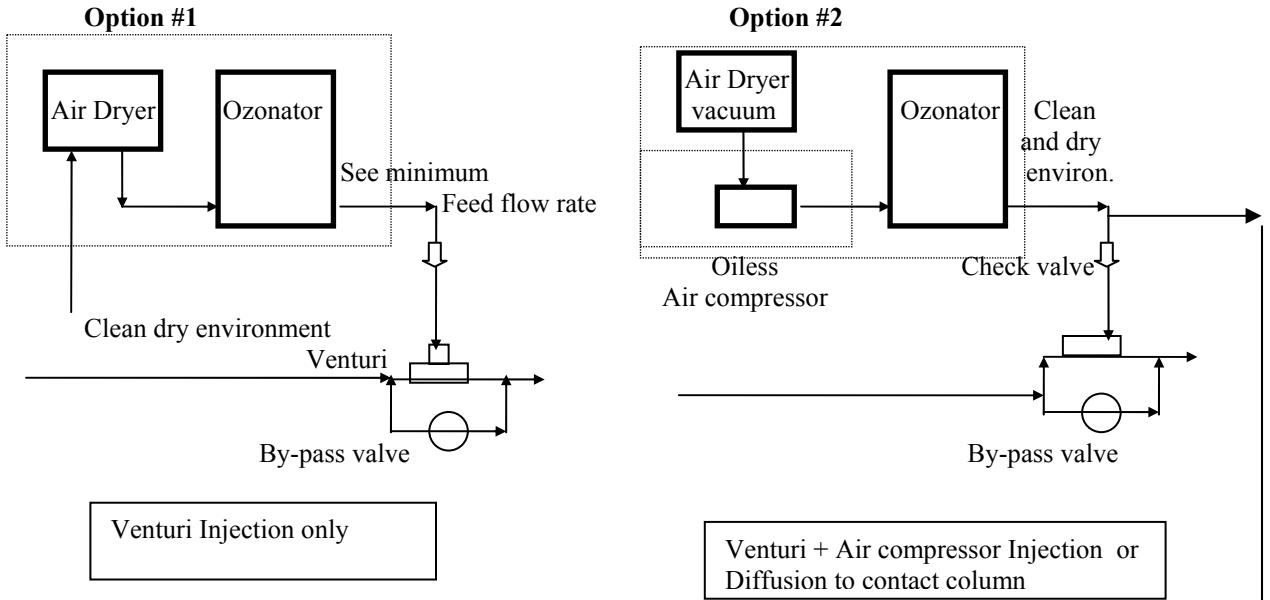


The quality of the feed gas is very pertinent to the ozone production process. If the air being used contains humidity, oil droplets from unfiltered compressed air, or particles the overall electrical impedance of the system will be affected which may lead to the premature failure of the corona lamp. In very extreme cases, out-of-spec air quality will cause a fire inside the ozonator enclosure. Good quality feed gas is obtained by using air filtration and air dryers. Please refer to the catalogues & technical articles provided to learn more about the theory of ozone & its applications. You may order these articles directly from Ozomax

or its distributors.

Ozomax ozonators are capable of operating under negative or positive pressure. Ozomax can supply the required air dryers, i.e., either heat regenerated types or the pressure regenerated types. See typical installation configurations below:

## **Set-up and installation configuration**



## 4- Preventive maintenance

Simple maintenance and appropriate operating conditions are the only requirements to keep the ozonator working under acceptable manufacturer's specifications. Introducing or performing any changes or modifications inside the ozonator will cause the unit to operate outside manufacturer's specifications and any damages to the unit will not be covered under the terms of the warranty. Maintenance should be done as per specified schedule by trained users, qualified personnel or certified electricians. **High Voltage !!!!**

!! Any maintenance inside the ozonator enclosure will require disconnecting all electrical current supplies.

Message for : Qualified personnel or certified electricians

After you disconnected current supplies proceed to do the following

Maintenance Activity	Frequency
Open Ozonator for general inspection (observe for dust accumulation) Wipe the Corona lamps to remove dust & debris.	Monthly-Quarterly
Corona lamp maintenance. Remove high voltage wires, open holding brackets, remove PVC tubing. Extract the lamp. Clean inside & outside with water & soap , followed by a warm water rinse , followed by wiping with a dry cloth. Leave to dry in ambient air in a safe location. After the lamp is clean & dry proceed in installing lamp as it was. Make sure that the tubing & wires are secured in their respective appropriate locations. If the lamp shows signs of cracking in the dielectric, arcing black spots, or melted spots in caps it should be changed immediately.	Quarterly- Yearly depending on ambient conditions and usage.  Not required IF CLEAN
Change all PVC Tubing connecting Corona lamps to venturi or contact tanks especially the ones that carry ozone.	Six month-Year depending on usage
Verify Teflon tubing .Change if signs of cracking exist. Teflon is used in models where dry Oxygen is use as feed.	Six month to a year
Verify the power supply. If possible, measure the secondary voltage and look for signs of broken insulation or overheating. Replace if voltage is below 5 KV. All measurements to be done by trained personnel with the right tools & equipment (Use high voltage probes) as regular probes are inadequate. Longevity of the power supply is function of primary voltage fluctuation and feed gas quality. It is recommended to change in case of first sign of voltage degradation.	Six month to a year
Visually inspect other electrical components such as variable transformers, relays, short circuit breakers, high voltage short circuit protection breakers, air solenoid valves, flow switches and thermostats. Changes of components may be required with re-occurring shut-downs	Six month to a year
Clean cooling fans and air filters. Change air filters once a year	Six month to a year
Inspect high voltage wiring and shields for signs of cracking and/or shorting. It is recommended to change the high voltage wires once every <b>TWO YEARS</b>	Six month to a year
Inspect all other components (flow meters, dials, pilot light, buzzers,etc....)	Six month to a year
Clean enclosure. Wipe and clean with a damp cloth the inside and outside without causing any damage to wiring or components. Let dry fully before powering on.	Six month to a year

After maintenance is done verify for leaks, shorts and ozone production (see *Trouble Shooting Section*)

**Note : All spare parts should be purchased from Ozomax Ltd or their distributors**

## 5. Trouble shooting guide

By qualified personnel or certified electricians with the right tools & equipment.

Symptom	Solution
<b>No Ozone is detected at the injection point. Detection is done by measuring residual ozone in water or in air.</b>	Is pilot (green) light is off? If so, this means the ozonator electrical cord is unplugged or the electrical outlet used to power the ozone generator is not

Symptom	Solution
<p>Green pilot light is OFF &amp; Yellow pilot light is OFF</p> <p>Green pilot light is ON &amp; Yellow light is OFF</p>	<p>supplying the correct voltage (120V or 220V depending on location).</p> <p>If above is OK and the Green pilot light still off, verify the ozonator fuse or circuit breaker. Change fuse or reset breaker if required.</p> <p>If Pilot Green pilot light is ON the fuse and/or circuit breaker is OK, put the variable transformer (in some models) to it's operating range at about 70 to 100%. The Yellow pilot light should come on</p> <p>If all the above checks are OK &amp; Yellow light is OFF, verify that enough feed flow is being supplied to the ozonator and that the flow switch actuates. Locate the flow switch. The minimum feed flow required for it to actuate will be indicated on its label. Ensure that the feed flow rate is more than this value. Open the valve found on the flow meter to increase feed flow through the ozonator. The Yellow light should turn ON.</p> <p>If, after increasing the feed gas flow through the ozonator, the Yellow light still does not turn ON, verify if the corona lamp is producing a bluish light. Open the ozonator cover and turn of the lights in the room where the ozonator is installed. If a blue light exists inside the corona lamp, then ozone is being produced and the Yellow light is defective. Replace the Yellow pilot light.</p> <p>If no bluish light is observed in the corona lamp, the ozonator thermostat may have detected that the ambient temperature is too high and is preventing the ozonator from turning on. To verify is this is the case, locate the relay found within the ozonator. Locate the override button. The override button is a small black button located on one of the sides of the relay. Press this button. If the Yellow light turns ON, then either the flowswitch or the thermostat has detected an out-of-spec condition. If the ambient temperature is too high, then take the required actions to bring it within spec (average 25C or lower). If ambient temperature is within spec then replace flowswitch. If flowswitch is functional, then replace the thermostat.</p> <p>At this point, you may chose to verify the secondary voltage being produced by the power supply. This is done by measuring the high voltage terminals on the power supply. These measurements should be done by an electrician. Verify with Ozomax if the measured voltage is within spec for your model Change the power supply if required or send the ozonator to the</p>

Symptom	Solution
<p>Green pilot light &amp; Yellow light are both ON</p>	<p>Ozomax service center nearest you.</p> <p>If both green &amp; yellow light are on and no ozone is produced make sure that the air &amp; ozone tubing are not obstructed and free flow of ozone to injection point is observed.</p> <p>If above is OK and still no ozone is being produced probably the inlet pressure is above the recommended 15 PSI. Reduce &amp; bring pressure to spec.</p> <p>If all above parameters is OK and still no ozone is produced verify if the feed gas is either air or oxygen and not nitrogen or CO2 or acetylene.</p>
<p><b>Ozonator requires several resets per day of the voltage circuit breaker or fuse.</b></p>	<p>This can be caused by a short in the wiring or a short in the corona lamp.</p> <p>Inspect wiring for shorts and replace defective wires with new wires. (This very rarely happens).</p> <p>Once the above is done verify if the corona lamp is shorted. Remove corona lamp from holder and follow the instructions found in Section 4 for cleaning the lamp from inside and the outside. Re-install lamp and verify if the ozonator operates normally.</p> <p>If once the lamp is the problem persists, verify if lamp is shorted or if the glass dielectric is broken. In this case change the lamp.</p>
<p><b>Ozonator requires several resets per day of the general circuit breaker</b></p>	<p>This may be due to a potential short in the power supply or to higher than specified input voltage (ie voltage peaks or power surges).</p> <p>Visually inspect the power supply for shorts (blackened components, black spots etc).</p> <p>If defective ,replace the high voltage transformer</p>
<p><b>Ozonator has water inside corona lamps.</b></p> <p><i>This could cause significant damage to the ozonator if it was in operation when this occurred.</i></p>	<p>Water can enter the ozonator via the tubing which is connected to the venturi or the contact column if the check valve fails. Change the check valve, clean the corona lamps as per the instructions found in Section 4. Ensure that the corona lamps are completely dry prior to powering on the ozonator. To speed up the process, you may run dry air or oxygen through the ozone generator (while it is off).</p>
<p><b>Corona sound (arcing) is abnormally high</b></p>	<p>This indicates the beginning of a short on the Corona lamp or High Voltage transformer.</p> <p>Stop the ozonator and follow the procedures of checking and cleaning corona lamps and ozonator as described in Section 4.</p>



Symptom	Solution
	Verify if after cleaning the arcing sound is back to its normal level. If not, replace the power supply and/or the corona lamp(s).
<b>Strong smell of ozone in &amp; around ozonator</b>	<p>This indicates that an ozone leak exists. It may be inside the ozone generator or outside the ozone generator. Begin by checking for leaks/cracks in all piping or tubing found outside the ozone generator. If none exists, check within the ozone generator.</p> <p>Change defective tubing, fittings or manifolds.</p> <p>If no leak is detected and smell persist it may be due to inadequate venting of the cabinet to the outside or to an ozone destruct unit. This is required for large models (ie OZO8VTTL &amp; above). It is normal to have a slight O3 smell as long as it is below 0.1 PPM.</p>
<b>Ozone concentration is low</b>	<p>This may be cause by the overheating of the ozone generator (especially the corona lamps) or high humidity in the feed gas.</p> <p>Verify &amp; set conditions as shown in Section 2 of this manual.</p> <p>Verify if fans are running and if the compressed air is connected to the air filter(s), air dryer(s) and/or oxygen concentrator(s).</p>
<b>Power consumption is above nominal</b>	<p>This is could be due overheating or high humidity.</p> <p>Follow above actions and bring all parameters with specs.</p>
<b>Other problems</b>	Call OZOMAX LTD or DISTRIBUTOR nearest you