OZONATORS HDHF series
OZO 1 HDHF to OZO 4 HDHF
Operating manual

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 is relatively easy to install by a certified plumber & 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 shock & Fire Hazard. 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 & 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 venturies, 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 unappropriate 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 Inc. 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
Ambient temperature	10°C to 35°C Max-nominal 25 C
Ambient Relative Humidity	0 to 50% max or more if AC is used with enclosure
Ambient particles count (Typical Class 100K)	100,000 particles per ft^3 or less (environment clean & free of dust)
Voltages	120 V 50/60 Hz for North America 220 to 240 V 56/60 Hz elsewhere Voltage fluctuation and surges will damage power supply +/- 5% 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. or used with O2 concentrators
Flow rate of feed gas (Air) Flow rate of feed gas (O2)	10-20 CFH per Corona lamp type HDHF 5-10 CFH per corona lamp type HDHF
Ozone output measurement is measured in units of Grams per hour or pounds/day. Concentrations will vary from 0.02 % by weight to 3 % by weight depending on corona lamp type and dry air feed flow rate. If Oxygen is used as feed, the concentration would double the dry air feed .With Corona lamp type VTTL & VLT the concentration could reach 10 % at low oxygen feed flow rate.	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 Flow rate of feed gas air 10-20 CFH per corona lamp and 5 -10 CFH for O2 feed per corona Example: Air flow for 2HDHF = 10 x2 = 20-40 CFH
Location for installation	Ozonator should be installed on a wall or against a wall which is not flammable & fire resistant and surrounded by free or can be skid mounted

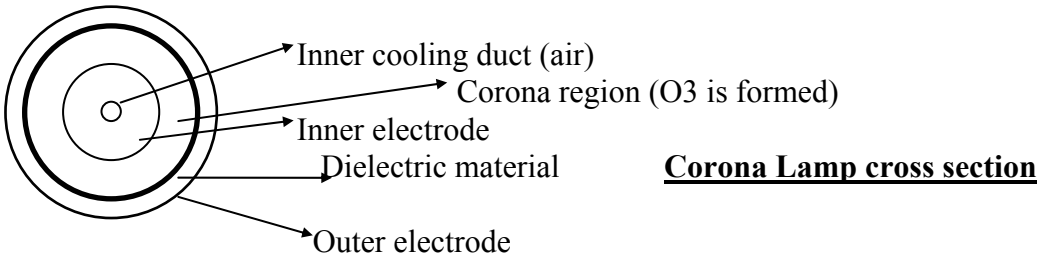
Note: Warranty & performance of your equipment is contingent upon strict compliance with operating conditions and specifications defined in Table -1-.

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 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,

$$O_2 + O \xrightarrow[\text{Energy}]{} O_3$$

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.



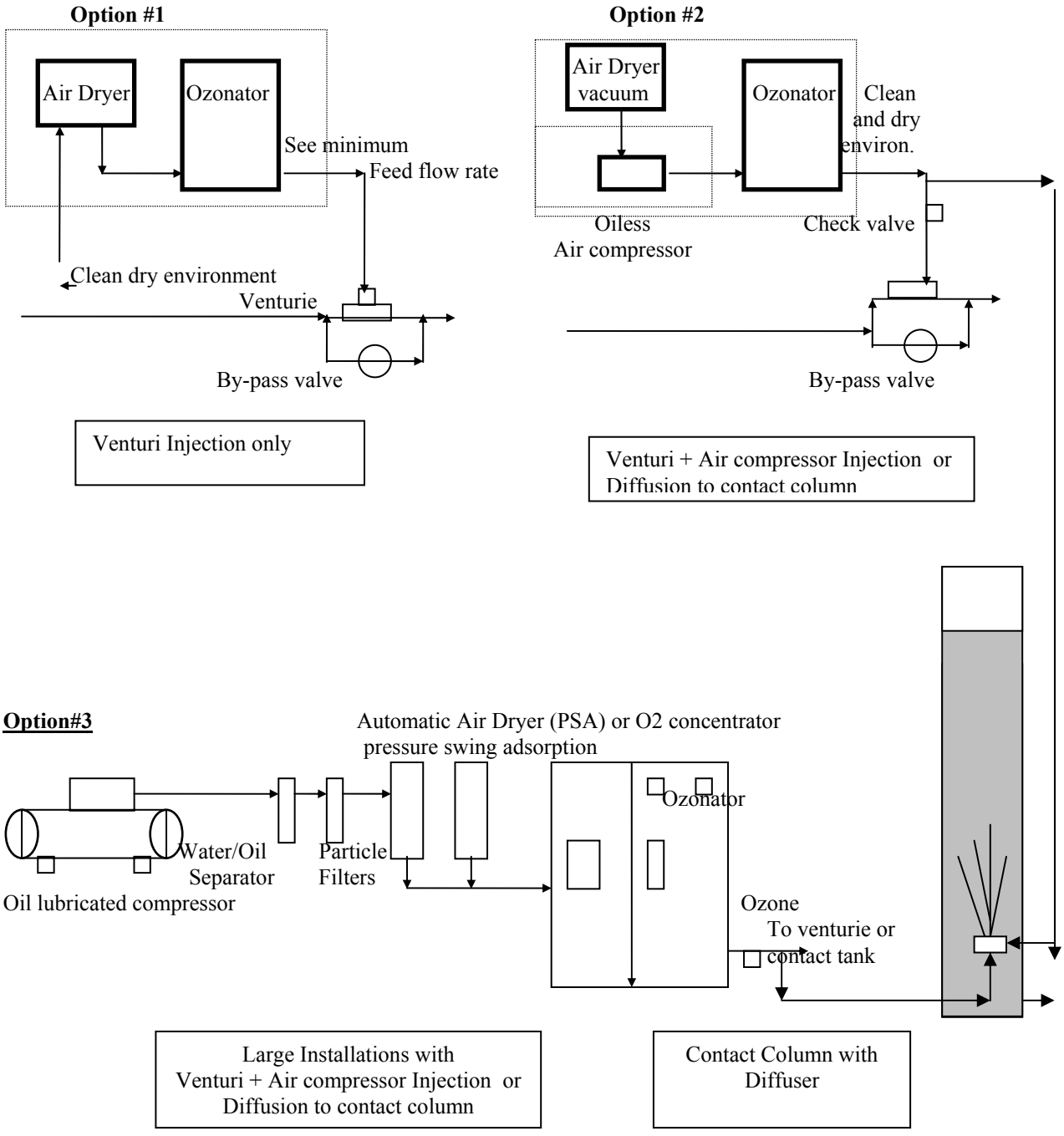
Corona Lamp cross section

The quality of feed gas is very pertinent to the ozone production process as shown in Table-1-. If air 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 the heat regenerated type or the pressure regenerated type. 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 & 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 terms of 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. Not required with AC enclosure	Quarterly
Make sure that the tubing & wires are secured in their respective appropriate location. If corona lamp is showing signs of cracks in the dielectric, arcing black spots, you should change lamp carefully without twisting the caps nor glass tube during connecting & disconnecting tubings. If you have dust or white deposits due to high humidity correct situation at once by placing the unit in a clean, dry & cool place, clean corona as follows: **Corona lamp maintenance (Do only if deposits/dust/dirt are seen inside the lamp)** : Remove high voltage wires, open holding brackets, remove connecting flexible tubings. Extract the corona tube (lamp). Clean inside through the air inlet or O3 outlet connectors with water & soap or alkaline 10-15 % solution , shake the water inside the tube till all deposits are dislodged followed by warm water rinse , followed by wiping with a dry cloth of the outside and leave to dry in ambient air in a safe location. You can use alcohol rinse & compressed air to speed up drying .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 location.	Quarterly- Yearly.
Teflon Tubing to be checked	Six month to a year
Inspect power supply for any signs of overheating	Six month to a year
Other electrical components such as variable transformers, relays, short circuit breakers, High voltage short circuit protection breaker , air solenoid valve, flow switches and thermostats to be visually inspected only . Changes of components is 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 & shields for signs of cracks and shorts.	Six month to a year
Inspect all other components (flowmeters, dials, pilot light, buzzers,....) for any defects and change as required	Six month to a year
Main Chassis ,wipe & clean with a damp cloth the inside and outside without causing any damage to wiring or components.	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
No Ozone is detected at the injection point. Detection is done by measuring residual ozone in water or in air.	If pilot (green) light is off . This means bad contact or ozonator electrical cord is unplugged. Plug it.
Green pilot light is OFF & Yellow light is OFF	If Pilot (green) light still off. This means that either the fuse or circuit breaker needs to be changed or reset. If Pilot (green) light is on & no problems with fuse or breaker put the variable transformer (in some models) to it's operating range at about 70 to 100%.The yellow pilot light should come on
Green pilot light is ON & Yellow light is OFF	Check for Purple light inside coronas by bypassing flow switch relay if you do not see it then change power supply . If you have no purple light inside corona lamp by not bypassing relay then the flow switch needs cleaning or replacement . Relay may be bypassed by pressing the back button found on on of its long sides. After that orange light should come one if not then the orange light itself need changing. If everything is OK and still no ozone is produced probably the inlet pressure is above the recommended 15 PSI. Reduce & bring pressure to spec. If all above parameters is OK and still no zone is produced check if you are feeding the right gas (air or oxygen) & not nitrogen or CO2 or Acetylene.
Green pilot light & Yellow light are both ON	This is good working condition
Symptoms	**Solutions**
Ozonator requires several resets per day of circuit	This can be caused by a short in the wiring or

breaker or fuse	a short in the corona lamp. Inspect wiring for shorts and replace shorted wires with new wires. (very rare to happen). Corona lamp is shorted & the high voltage circuit breaker is tripping. If lamp is dust free and still tripping the high voltage circuit breaker inspect if lamp is shorted or glass dielectric is broken. In this case change the lamp.
Ozonator has water inside corona lamps This can totally damage ozonator if power is on. But if it happens at testing or after a maintenance procedure prior to power on go to solution.	Water can enter ozonator via the tubing which is connected to the venturi or contact column. This is due to a leaky check valve. Change valve and clean corona lamps & ozonator & leave to dry prior to power on. Also if ozonator is placed in a very humid location or outside. Make sure that the whole ozonator is dried prior to power on by sending low pressure compressed air.
High noise of arcing & clacking	This is due to a beginning of a short on Corona lamp or High Voltage transformer. Stop Ozonator & follow procedures of checking & cleaning corona lamps and ozonator. Verify if after cleaning & stopping arcing elements if ozone is produced ,if not follow steps as stated in section (no ozone is produced).
Strong smell of ozone in & around ozonator	Probably a leak in the tubing inside or outside ozonator. Find leak & change defective tubing or manifold. If no leak is detected and smell still persist it might be due to inadequate venting of the cabinet to the outside or to an ozone destruct unit .
Ozone concentration is low	This is could happen due to either overheating or high humidity in the feed gas. Verify & set conditions as per specs Verify if fans are running & if compressed air is connected to air filters & dryers
Power consumption is above nominal	This is could be due overheating or high humidity. Follow above actions & bring all parameters to spec
Other problems	Call OZOMAX Inc. or DISTRIBUTOR nearest you

Steps for trouble shooting power supply:

1- Make sure that the Ozonator is plugged into a 120V/60Hz line or 220v depending on model.

2- Verify the input fuse found inside the ozonator. If it's burned, replace it.

3- Put the Main Power Switch in the ON position. The GREEN light of the Ononator should turn ON and the Voltmeter on the Ozonator should indicate 120V.

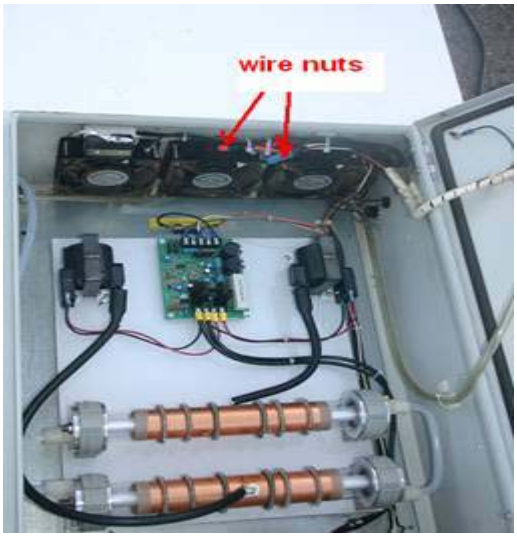
4- Adjust the flowmeter at flow rate appropriate (20 CFH per corona lamp for feed gas air and 10 CFH for O2 feed per corona). The ORANGE light should turn ON. If not check the relay.

5- At this moment the Ozonator should produce ozone.

If not, proceed as follows:

1- Verify the voltage at the input of power supply board. Must be found: 120V.

If not: You have to check if the black and white wires are twisted in their wire nuts, as shown belew.

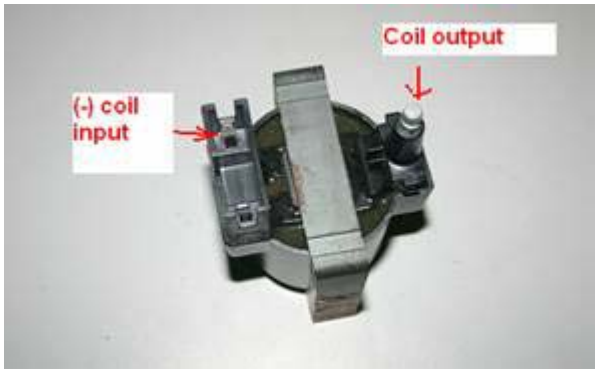


2- Check the fuse (3A) inside the board. If it's burned, replace the board.

3- Check the signal at the output of the board using an oscilloscope. You will find a square wave with amplitude 170v. If not, replace the board (board burned).

4- Finally, if the board works properly, the coil voltage may be burned.

In this case, remove from the Ozonator and measure its input resistance (Between (-) coil input and (+) coil output), as shown belew. It should measure 7.76 K Ohms.



6- Wiring Instructions for HDHF Power Supply and High Voltage Transformer

1) HDHF Module

Each HDHF Module Consists of the following items :

- (1) HDHF corona lamp
- (1) HDHF power supply (PCB)
- (2) High voltage Transformers

The following instructions describe how to wire the HDHF module.

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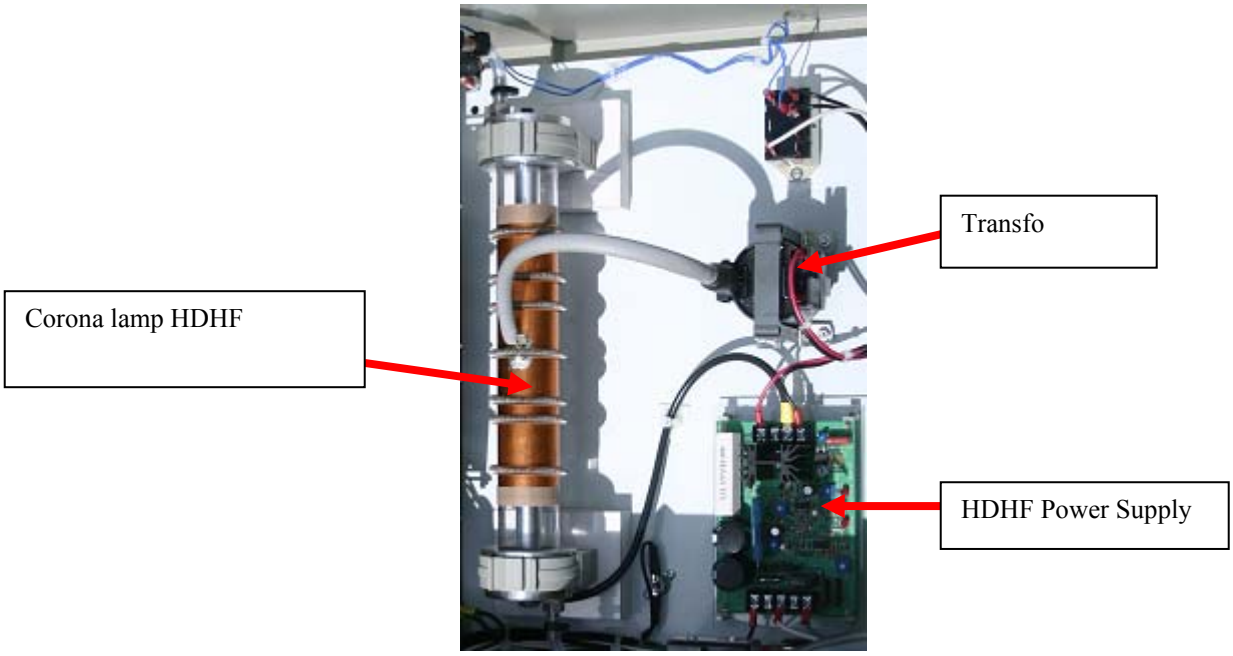
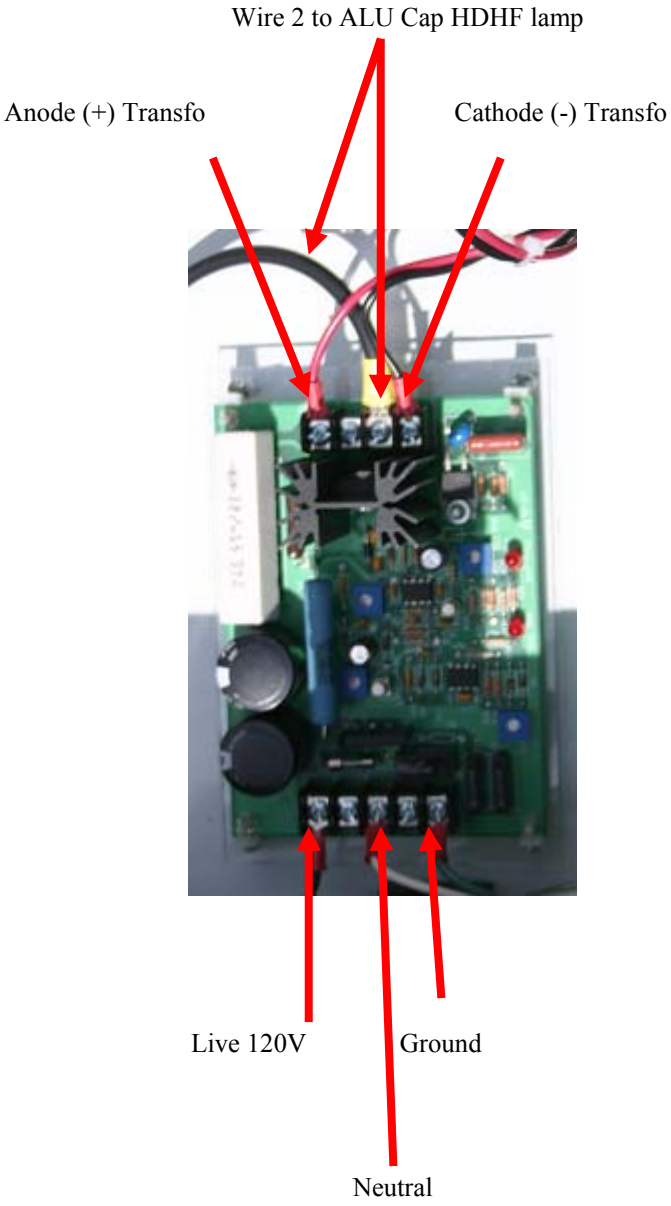
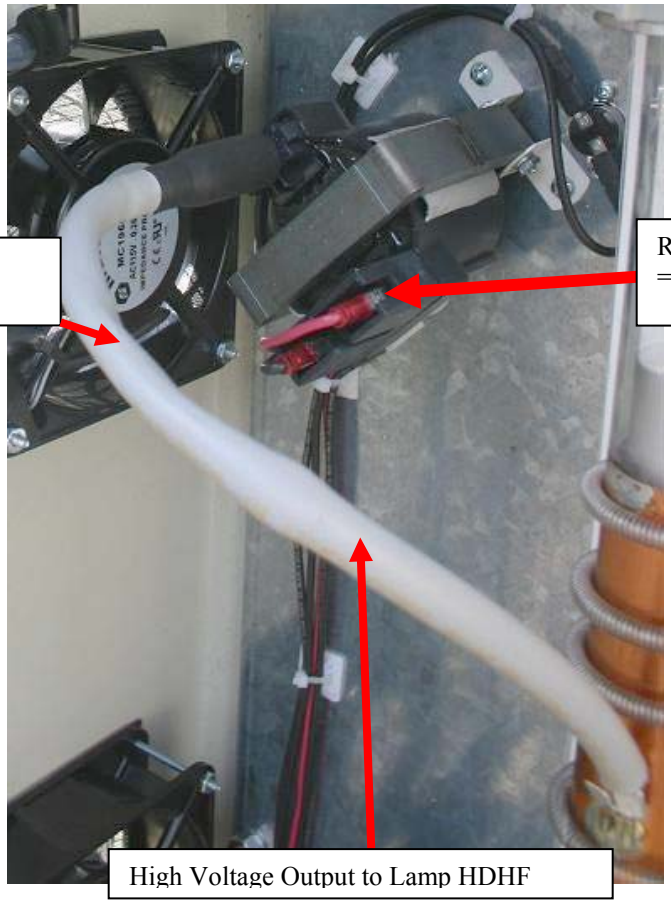


2) Wiring of HDHF Power Supply



3) Wiring of HDHF High Voltage Transformer



7- Electric Diagram:

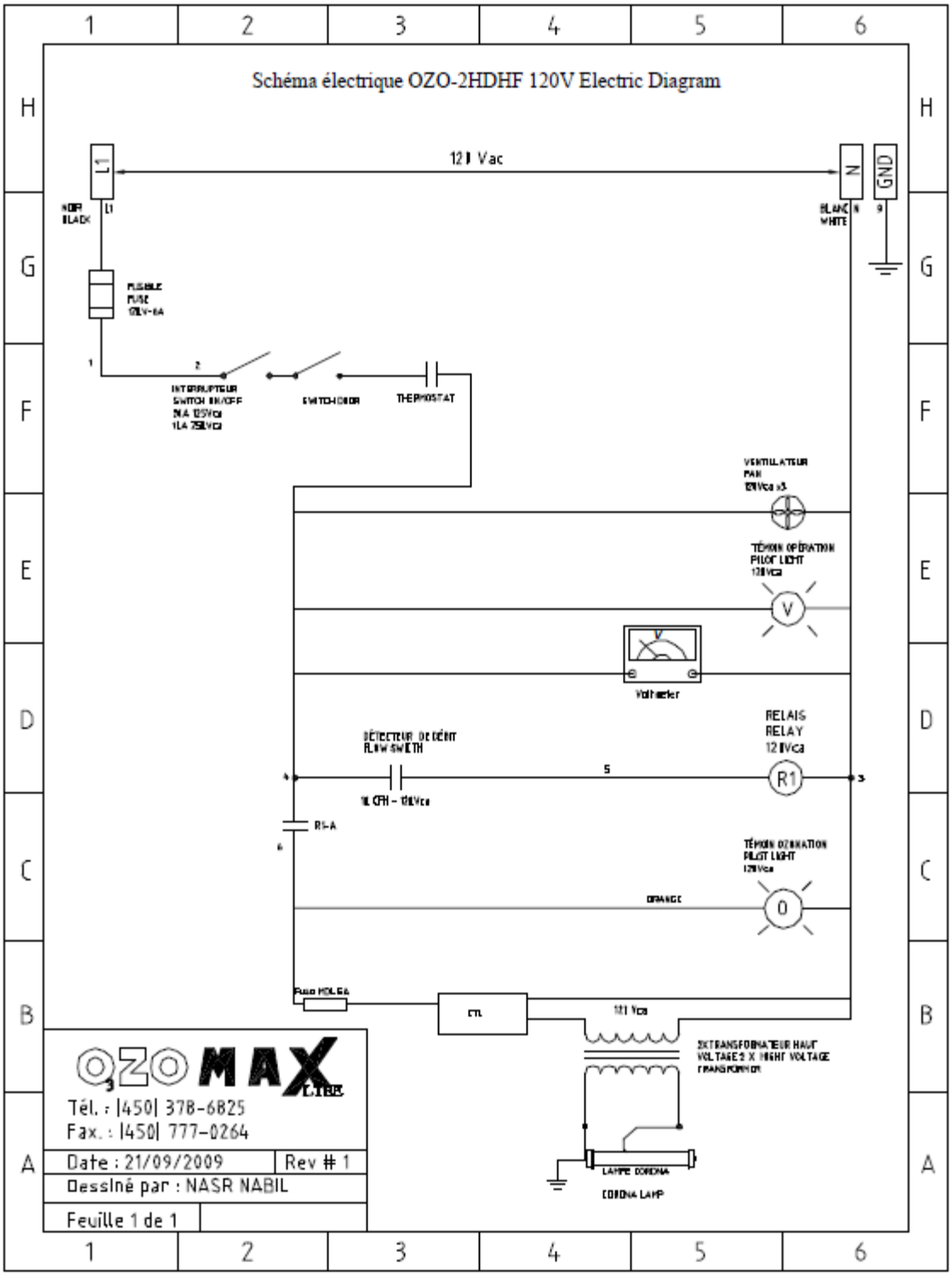


Schéma électrique OZO-2HDHF 120V Electric Diagram
120 Vac
L1
N
GND
NOIR
BLACK
BLANC
WHITE
FUSIBLE
FUSE
INTERRUPTEUR
SWITCH ON/OFF
THERMOSTAT
VENTILATEUR
FAN
TÉMOIN OPÉRATION
PILOT LIGHT
Voltmeter
DÉTECTEUR DE DÉBIT
FLOW SWITCH
RELAIS
RELAY
R1
R1-A
TÉMOIN OZONATION
PILOT LIGHT
ORANGE
Fuse HOLDER
CTL
121 Vac
2X TRANSFORMATEUR HAUT
VOLTAGE 2 X HIGH VOLTAGE
TRANSFORMER
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CORONA LAMP
OZO MAX
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