



MANUAL

OZONE GENERATOR (250VA)

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250VA OZONE GENERATOR

Technical Specifications:

Construction	Modular system mounted on bakelite sheet as integrated plug and play unit.
Capacity	250VA maximum.
Supply Input	220VAC, 50Hz +/- 5% supply with earthing.
Supply output	High Voltage, High frequency about 5KHz to ozone cells.
Ozone Generation	Based on corona discharge principle
Electronic Control	Micro controller based intelligent system with inputs, status, Audio alarm and outputs to take care of system operation
Input	Dry air or Dry Oxygen, Dry air-- Approx. 25-30 lpm, Dry oxygen--Approx. 8 lpm.
Output Components	Ozone output is provided by 2 meters of Silicon tubing SS "T" or "Y" used to add ozone cell outputs.
HT Transformer	Air-cooled HT Transformer.
Power Control	Set at 200VA for optimum performance. Connector is provided to measure voltage and current to calculate power. Voltage Tapping on power transformer is provided to adjust power fed to ozone cells.
Cell Power (One Cell)	100VA
Cell Output	2 gms/hour with Air 8 - 10gms/hour with Oxygen
Cell Diameter	40 mm (Quartz).
Cell Length	250 mm .
Cell Material	Ozone resistant quartz glass, SS 316 and silicon rubber.
Ambient Temp	Optimum performance at ambient temperature not exceeding 25 C
Weight	Approx. 16.0 Kg (17 Kg. with box packing).
Dimensions	Mounted on 12 mm thick, 12 inch X 16 inch on bakelite sheet. Height: 175 mm approximately.
Accessories	2 meters Plastic tube for Inlet and 2 meters silicon tube for Ozone Output.



Introduction:

The Model OG250 is highly efficient Ozone Generator designed for stringent requirement and environmental conditions of Water Treatment Industry. The generator will give you trouble free service for years to come. The use of micro controller at the heart of circuit not only gives instantaneous fault protection but also controls all major functions like on /off, over current and over temp. Protection, safety interlock etc. and audio alarm (Beeper) are also provided for operator attention. The use of MOSFET/IGBT in power inverter stage gives fault tolerant power circuit, which can sustain short circuit even on HT side. The operating frequency is about 5KHz, which gives uniform and highest ozone output for rated power.

Construction:

The Ozone Generator System is completely modular in construction. All necessary parts are mounted on a single base plate 300x400x12 mm Bakelite sheet. All the components are mounted and pre wired on the base plate. Sufficient care is taken for high voltage clearance to avoid sparking.

It comprises of various parts namely Electronic Module, HT Transformer, and Control cum Power Transformer, Ozone cell assembly, cooling fans, Wiring accessories and Tubing accessories. Refer to the block diagram of the Ozone Generator else where in this manual.

The incoming voltage (230V) is fed to power cum control Transformer and cooling fans. The Electronic module is self contained Rectifier/Inverter which requires 19VAC(750mA) control supply for controlling internal circuitry & separate power supply for power inverter. Module output (Low Voltage high frequency) is connected to HT Transformer whose function is to step up the supply & drive the ozone cell. The module has few control inputs and outputs. The inputs are ON/OFF switch for starting and stopping of ozone, Temperature switch input to sense temperature of electronic module's heat sink and Safety input, which can be, used for interlocking safety aspects in panel design. Ex. Door Lock.

RED LED is provided for multifunction status output indication near connector 3, 4 and same output is available on pin 3, 4. 24V DC Lamp (max. - 5W) should be used for external status output indication. This output gives multifunction indications of different states of Ozone Generator. Variable power transformer output (60V-110V) is given to electronic module depending upon electrode construction, No. Of cells, Rated Current and in turn total power can be adjusted using these tapings. Tapings are also provided on HT Transformer for similar purpose as per voltage requirement for ozone cells. Pots (Frequency and Over Current) on electronic module should not be disturbed. They are factory set



default value.

HT Transformer requires forced air-cooling. While mounting the unit ensure that there is a space of 1 foot on all sides of module for proper air circulation. Another important part of the system is ozone cell. It has typical construction as air-cooled ozone cell. The forced air-cooling for ozone cell is necessary. The power fed to ozone cell has to be restricted at 100VA to avoid over heating, which in turn would reduce the Ozone output. Connector is provided to connect voltmeter and ammeter for measuring VA. The input to ozone cell should be dry air or dry oxygen (O₂) only. The output of ozone cell which is having ozone content should be carried up to its application points using silicon tubing and any other accessory of SS only like "Y" or "T" joints. For the ozone path use only ozone resistance material like silicon, glass, stainless steel 316 or better. The special care has to be taken in layout designing for placement of different components namely control cum power transformer, electronic module, HT Transformer, ozone cell, cooling fans, Acrylic partition etc. fitted on Bakelite sheet. Disturbing this layout may cause undesirable results in operation and performance of the system.

Operation and Maintenance:

The electronic unit does not require any maintenance. Some precautions must be taken while operating the system. It will ensure trouble free operation.

A. Operating Procedure:

The Ozone Generator is extremely easy to operate. Connect air / oxygen supply to input pipe (dry air flow 25-30 lpm or oxygen flow 8 lpm) and Connect the power cord of the Ozone Generator to 230V AC socket (50Hz, with earthing) and switch "ON" the supply. The status lamp flashes at regular interval indicating that Ozone Generator is ready for operation. Now put the on/off switch to ON position. The violet / blue corona will be visible at the end of cell and hissing sound will also be heard. The ozone will appear at the Ozone out end. You can smell the ozone, but never take the tube near your nose.

The Status lamp provides multifunction status indication of Ozone Generator System as mentioned below:

- 1) REGULAR FLASH - Continuous regular flashing indicates ready for operation.
- 2) TWO FLASH - Two flashes with interval indicates that any of the safety interlock is open. Check for the door switches etc. Close the door properly.
- 3) THREE FLASH - Three flashes with interval indicates over current or short circuit fault tripping. To reset the fault indication, simply toggle ON/OFF switch to OFF position and status will show ready for operation. Then you can again



switch ON the system. Also refer to trouble shooting if fault persists.

4) FOUR FLASH - Four flashes with interval indicates over temperature of Electronic Module Heat Sinks. The fault will automatically clear when temperature returns to normal value. To reset the fault put ON/OFF switch to OFF position and status should show regular flashing indicating "ready for operation" if fault is clear.

b. Precautions:

1) Do not exceed power beyond 200VA & current beyond 2.0A to 2.5A. This will increase the cell temperature and ozone output will fall.

2) Ensure that all cooling fans are working. Fan airflow directions must be maintained towards ozone cell and HT Transformer as mentioned in drawing. A cool and dry place is essential for proper operation.

3) HT Transformer is air-cooled. Always ensure uniform forced air-cooling for HT Transformer and ozone cells.

4) Do not run ozone generator without air or oxygen feed at required flow.

5) Only dried and chilled air or oxygen should be fed to ozone cells. For air based system use of dryer is must and chiller is recommended. Ozone output increases with dry air feed. Filter must be used to avoid dust and tiny particles entering ozone cells.

6) Do not open the Ozone Generator door / Acrylic Cover, when generator is "ON", dangerous high voltage exists inside the panel.

7) Ozone leakage must be avoided. Use silicon rubber sealant for sealing.

8) Always ensure that tube do not get bend and restrict the flow.

9) Do not adjust the factory set pots.

10) High voltage wire must have sufficient clearance with ground potential.

11) Proper separate earthing must be provided.

12) Connector is provided for measuring secondary current and voltage. If not used secondary current terminals must be shorted and voltage terminals should be kept open. This facility is provided so that voltmeter and Ammeter can be used on front panel using this connector. The product of this voltage and current represents power consumed in cells and it should not exceed approximately 200VA (Voltage in volts X Current in Amperes).



13) Never inhale the ozone coming from ozone out pipe. The concentration level is very high.

14) Ozone Cell is fragile , handle with great care.

C. Maintenance:

Mov of 270 Volt is connected across input 230 VAC supply of control cum power transformer for overload protection. All necessary precautions must be taken for correct operation and optimum performance of the ozone generator system. The system will require very little maintenance if proper care is taken. The electronic system does not require any maintenance as such. Keep the environment dust free and cool. Cell must be handled carefully to avoid damage or breakage.

Broken cell or dirty cell should be replaced with new cell. All parameters should be maintained in specified limits like flow, VA (power) etc.

Tripping of the system occurs in many different situations.

- 1) Short Circuits.
- 2) Over Current.
- 3) High voltage discharge with ground due to insufficient isolation.
- 4) Breakage/puncture in electrode assembly.
- 5) Safety interlock is open.
- 6) Over Temperature of electronic module heat sink.
- 7) Dust on both ends of ozone cell, HT Coil and HT Path (Clean it).
- 8) Dew formed and very cold ozone cell. Allow warm up of cell.

To restart the systems please refer to '**Operation**'.

If the system fails to work properly please refer to '**Precautions**' as mentioned above.

If Problem is not solved please refer to '**Trouble shooting**'.

Trouble Shooting:

If the ozone fails to appear after starting the unit as given in operation, the fault finding can be done as per the instructions given below:

No power and status lamp is off

*Check the incoming power supply.

*Check Control Fuse.

*Check AC Supply on control transformer primary.

*Check AC supply on control transformer secondary that should be 19 volts AC.

Status Lamp with two flashes

*Safety interlock is open.

*Check the interlock circuit and rectify the problem.

*Check if LED is on.

Status Lamp with three flashes



- *Over Current fault.
- *Check if ozone cells for puncture or breakages.
- *Check if HT Wire touching or near to ground (Min. 25 mm gap).
- *Reduce the tapping position on Power transformer.

Status Lamp with four flashes

- *Over temperature fault.
- *Check if the fans in panel are running.
- *Check if the fan near HT Transformer is running and check direction of airflow.
- *Reduce the tapping position.

Status Lamp is continuously ON but no ozone

- *Check if power LED is on and also check power fuse.
- *Check for cable connection of HT Transformer primary.
- *Check for electrode connection to secondary of HT Transformer and ground.
- *Check for probable fault in electronic module or HT Transformer.

Frequent tripping on over current

- *Reduce the tapping position.
- *Check if cell is puncture.
- *Check for if HT wire to cell is not touching the ground.
- *The clearance of minimum 25 mm between HT Wire and ground.
- *Check if ferrite core is loose.
- *Clean ozone cell externally carefully.

Power is insufficient

- *Increase the tapping position. The VA ratings must not exceed max.250 VA.
- *Check if ferrite core is loose.
- *Check if ferrite core is broken.
- *Maximum power should not exceed the rated power.
- *Remove wires going from module to HT Transformer and switch "ON" the ozone, if tripping on three flashes still continue, this indicate fault in Electronic Module and you can send the electronic module for repairs immediately.

Insufficient Ozone output

- *Check input feed gas flow.
- *Check VA (power). Over or under power will give insufficient ozone. Check corona discharge visually (Blue / Violet and uniform).
- *Check ambient temperature (Not exceeding 25 C).

Insufficient ozonation

- *Check ozone mixing and contact time.
- *Check ozone leakage / escape.
- *Check water quality and ozone dosing (grams/hour) required.