

ENMET Corporation
PO Box 979
Ann Arbor, MI 48106-0979

Ozone Generator Manual

80003-118

MCN-282, 05/14/04

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Reference information:

NOTE: [important information about use of instrument]

CAUTION: [affects equipment]

WARNING: [affects personnel safety]

1.0 Introduction

NOTE: *All specifications stated in this manual may change without notice.*

1.1 Unpack

Unpack the **OZONE GENERATOR** and examine it for shipping damage. If such damage is observed, notify both **ENMET** customer service personnel and the commercial carrier involved immediately.

Regarding Damaged Shipments

NOTE: It is your responsibility to follow these instructions. If they are not followed, the carrier will not honor any claims for damage.

- This shipment was carefully inspected, verified and properly packaged at our company and delivered to the carrier in good condition.
- When it was picked up by the carrier at **ENMET**, it legally became your company's property.
- If your shipment arrives damaged:
 - Keep the items, packing material, and carton "As Is." Within 5 days of receipt, notify the carrier's local office and request immediate inspection of the carton and the contents.
 - After the inspection and after you have received written acknowledgment of the damage from the carrier, contact **ENMET** Customer Service for return authorization and further instructions. Have your Purchase Order and Sales Order numbers available.
- ENMET** either repairs or replaces damaged equipment and invoices the carrier to the extent of the liability coverage, usually \$100.00. Repair or replacement charges above that value are your company's responsibility.
- The shipping company may offer optional insurance coverage. **ENMET** only insures shipments with the shipping company when asked to do so in writing by our customer. If you need your shipments insured, please forward a written request to **ENMET** Customer Service.

Regarding Shortages

If there are any shortages or questions regarding this shipment, please notify **ENMET** Customer Service within 5 days of receipt at the following address:

ENMET Corporation
680 Fairfield Court
Ann Arbor, MI 48108
734-761-1270 734-761-3220 Fax

1.2 Check Order

Check the contents of the shipment against the purchase order. Verify that the **OZONE GENERATOR** is received as ordered. If there are accessories on the order, ascertain that they are present. Check the contents of calibration kits. Notify **ENMET** customer service personnel of any discrepancy immediately.

1.3 Serial Numbers

Each **OZONE GENERATOR** is serialized. These numbers are on tags on the equipment and are on record in an **ENMET** database.

2.0 OZONE GENERATOR Features Section

See Figure 1 for location of features

Feature	Description
Flowmeter	This Flowmeter allows the user to verify and monitor the flow rate of the Ozone Generator. Proper flow rate, approximately 0.5 lpm(liter per minute).
Air Inlet Port	Fitting for <i>optional</i> connection of inlet air. Normally ambient room air is used.
Cal Gas Outlet Port	Fitting for connection of tubing to the Ozone sensing unit or gas bag.
Power Switch	Toggle switch
Operational Voltage:	<ul style="list-style-type: none"> ▪ 110 VAC 50/60 Hz ▪ 220 VAC 50/60 Hz (optional, must specify when ordering)

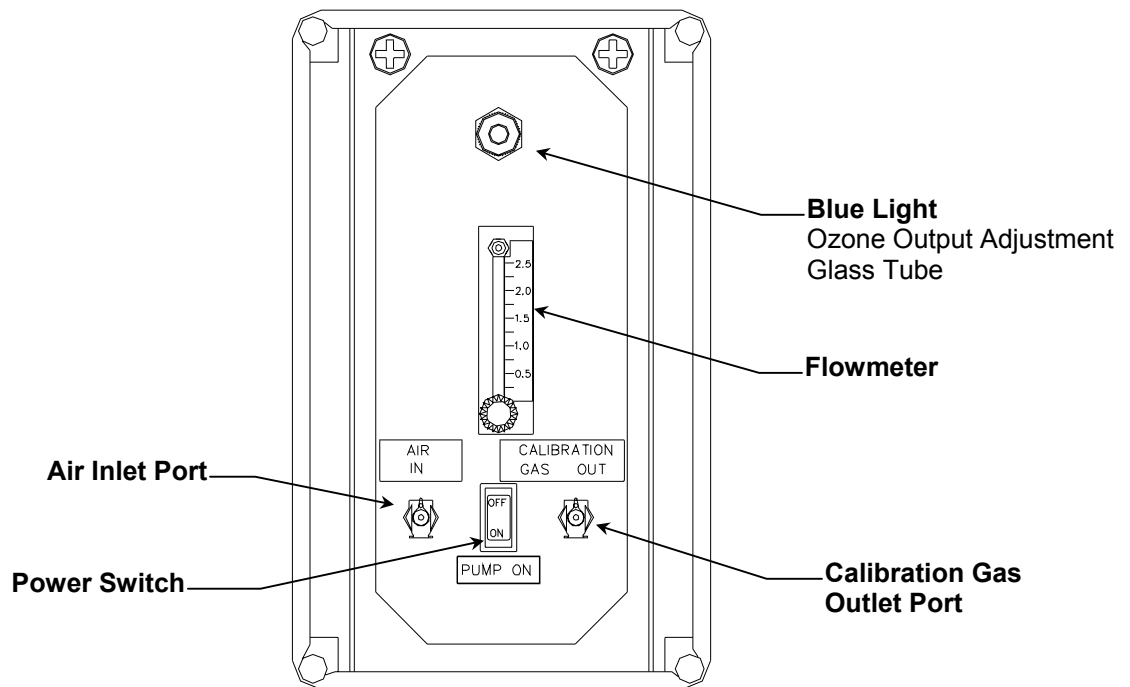


Figure 1: Ozone Generator Features

Operation

OZONE GENERATOR CALIBRATION KIT: part numbers

- ♦04056-0800-2(110 VAC)
- ♦04056-0800-3(220 VAC).

WARNING: This device is capable of generating ozone at concentrations above its Permissible Exposure Limit (PEL). This instrument should be used in a well ventilated area.

The Ozone generator is preset at the factory to produce an output of 0.3ppm of Ozone. See the following procedures for verification and or adjustment.

- Place the instrument in an upright position.
- Plug the instrument into an appropriate VAC outlet and turn the instrument on.
- The factory preset flow rate is 0.5 lpm and ozone out put is 0.3 ppm.
- Allow the generator to operate for at least 60 minutes for stabilization.
- Review and understand the operation of the detector tube pump, prior to beginning.

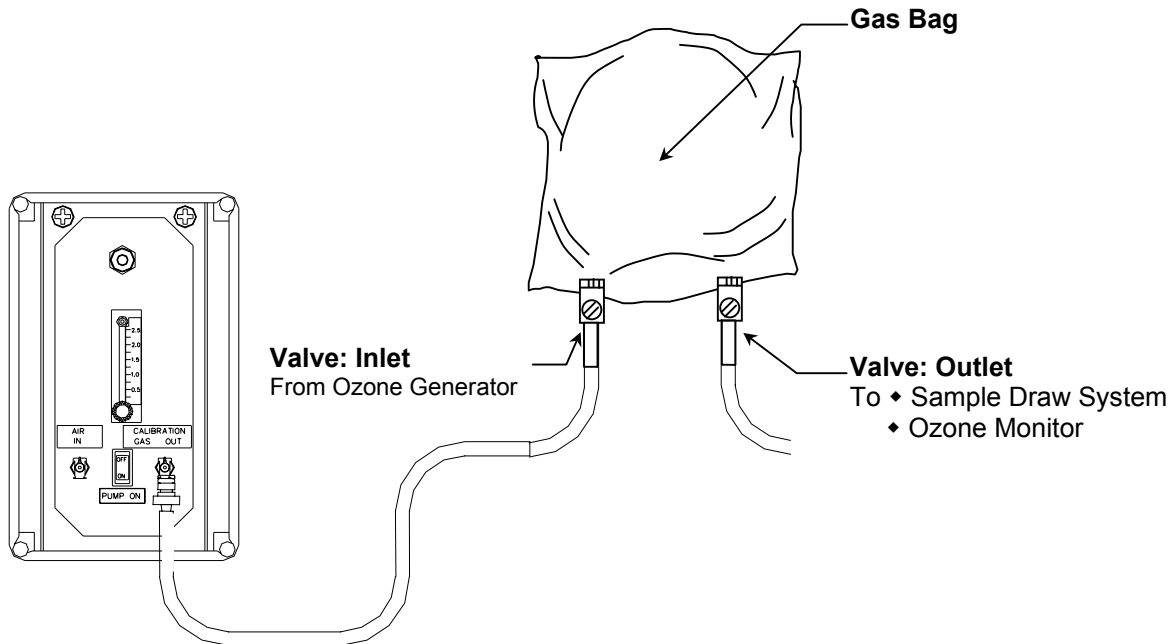


Figure 2: OZONE GENERATOR Calibration Connection

Detector Tube Pump Operation

Checking Output with Ozone Detector Tubes:

Each box of detector tubes includes instructions for use of the pump and tubes, and for reading the tube after sampling.

CAUTION: Do not use any other manufacturer’s tubes with this pump, or another manufacturer’s pump with these tubes. Doing so may result in erroneous reading.

Tests of Pump Performance

Before making gas concentration determinations, the pump should be checked for proper performance using the leakage test described in the next section.

To ensure accuracy and reliability these tests should be performed whenever:

- The pump is used after an extended idle period
- In routine use should be repeated after every 10 – 12 samples.

Check for Leakage:

- a) Insert an unused sealed detector tube in the pump inlet; do not break the tips.
- b) Line up the guide marks (red dots) on the pump shaft and stopper, and pull the handle back all the way. It locks automatically.
- c) Wait exactly two minutes; then release the pump handle with a One-quarter turn.
- d) When the handle is released, the piston should spring back all the way to 0cc.
 - If it does not, the pump is not leak-tight, and the amount of leakage is indicated by the position of the handle as it comes to rest.
 - If there is more than 5cc of leakage in two minutes, the accuracy of any concentration determination will be subject to error. Do not use the pump until this is corrected.

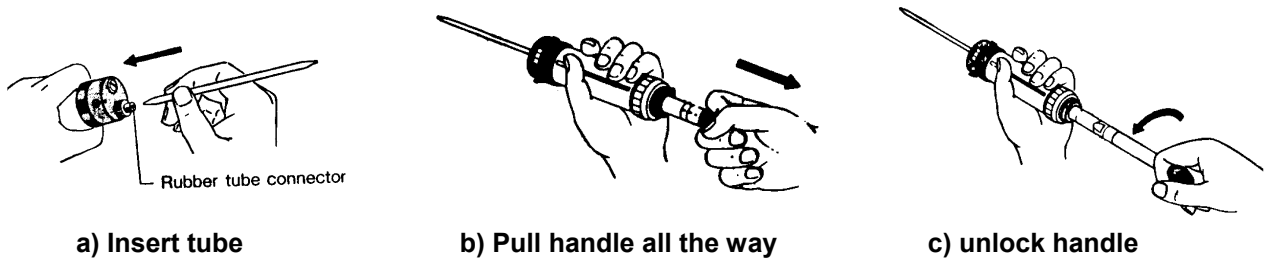


Figure 3: Gas Detector Tube Pump

Correction of Pump Leakage

If excessive leakage is found, it usually takes place either at the pump inlet, or between the piston & cylinder walls. The latter source of leakage is much less likely than the former.

Leakage between piston & cylinder can usually be eliminated simply by cleaning and re-lubricating.

Leakage at the inlet may result from a poor seal between the detector tube and the rubber inlet tip, or between the flange of the rubber inlet tip and the pump body.

To check for leakage at the tip:

- Carefully reposition the sealed detector tube or replace it with another one, and repeat steps a – c leak check.
- If the leakage persists, it is probably at the flange-body interface, and simply tightening down the inlet clamping may suffice to eliminate it.
- If tightening the clamp does not work, remove the rubber inlet and examine it for cracks and/or foreign matter on its sealing surface.
- If it is clean and undamaged, replace it in the pump inlet, and repeat the leak test.
- If necessary, replace a worn rubber inlet with a fresh one.

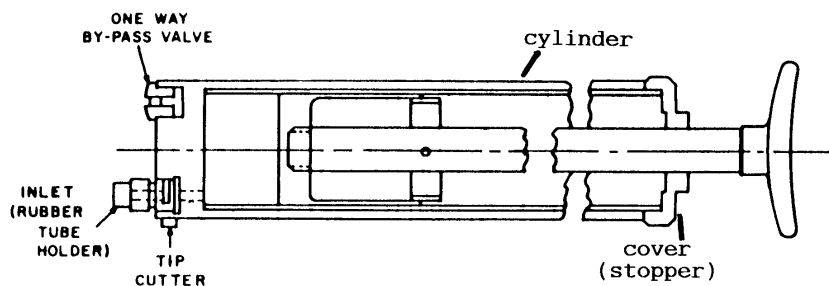


Figure 4: Cutaway View of Pump

Pump Maintenance

In normal use, the pump should be taken apart, cleaned and re-lubricated after 100 to 200 samples have been drawn.

To disassemble:

Unscrew the cylinder and cover

Slowly pull the pump and pressure-relief valve from the front and of the pump

Clean all the bearing surfaces carefully using non-abrasive wipers and a good degreasing solvent such as trichloroethylene or perchloroethylene.

Lubricate all surfaces that make metal-to-metal contact with the special silicone grease supplied with the pump kit.

Reassemble the pump carefully, making sure that abrasive particles that could score the walls do not get inside the pump.

Verification of Ozone Output

Verify, and if necessary, adjust flow rate to 0.5 lpm. After the generator has been on for 60 minutes or longer, open the valves on the gas bag. Next flatten and roll it up to empty as much of the air from the bag as possible.

Close one valve and attach the bag to the output port on the generator.

Allow the bag to fill partially with ozone, remove it from the generator and empty the bag again, as described above.

Reattach the bag to the generator and partially fill. Open the second valve on the bag, insert the end of the detector tube into the valve on the bag and draw a sample.

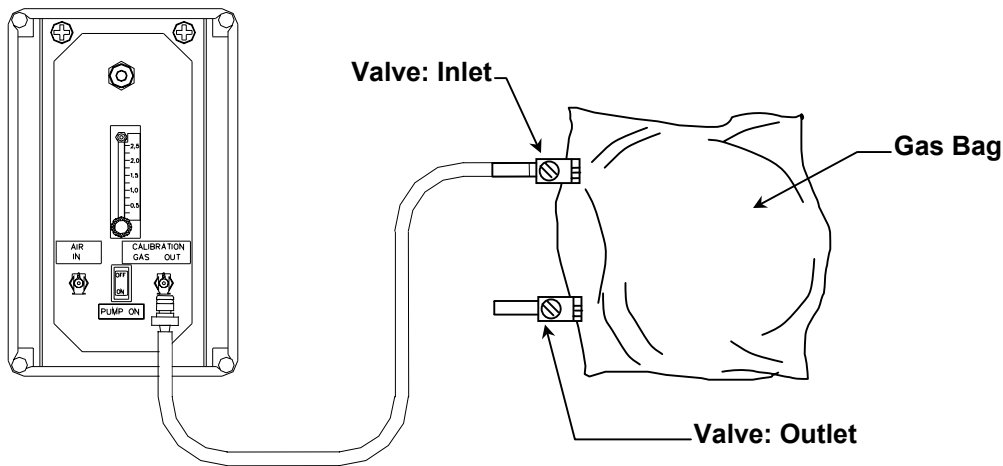


Figure 5: OZONE GENERATOR with Gas Bag

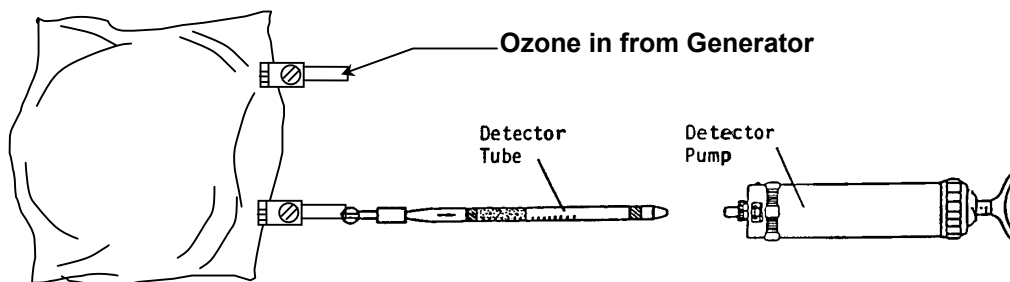


Figure 6: Gas Bag with Detector Tube

When sampling cycle is complete, check tube for Ozone concentration.

If within 10% of desired output, generator is working properly.

If not within 10% of desired output, see Ozone Output Adjustment section for Ozone Generator.

Ozone Output Adjustment:

If the output is not the required level:

Verify that the flow meter is set to 0.5 lpm.

When the Ozone output is close to the desired concentration, adjustment should be made by a change in the position of the glass tube. This can be made by single turns of the knurled adjustment collar. Pushing the glass tube in decreases Ozone output and pulling the glass tube out increases the Ozone output.

CAUTION: Small changes to the position (length of exposed lamp) will greatly affect the output of the generator.

Loosen the retaining knurled collar on the ozone generator light (blue light).

- If the level of output is low, pull the glass tube out slightly.
- See section on verification of Ozone output.
- If it is too high, push the glass tube in slightly.
- See section on verification of Ozone output.

Tighten the retaining ring on the generator light.

Allow the generator to stabilize for at least 60 minutes and repeat the verification steps.

When output level is correct apply Ozone to monitor.

NOTE: A sample draw system is used with the **ENMET** Ozone monitors. The sample bag must be in place during monitor calibration.

(See Figure 2: Ozone Generator out to sample bag, sample bag out to sample draw system.)

Replacement Part Numbers

ENMET replacement part numbers:

Description	Part Number
Ozone Generator	04052-009
Tubing (per inch)	73073-000
Pump Kit, for Detector Tube	90000-111
Detector Tube, Ozone (box of 10)	90182-200
Gas Bag, (2 liter, 2 valve)	04052-014

WARRANTY

ENMET warrants new instruments to be free from defects in workmanship and material under normal use for a period of one year from date of shipment from **ENMET**. The warranty covers both parts and labor excluding instrument calibration and expendable parts such as calibration gas, filters, batteries, etc... Equipment believed to be defective should be returned to **ENMET** within the warranty period (transportation prepaid) for inspection. If the evaluation by **ENMET** confirms that the product is defective, it will be repaired or replaced at no charge, within the stated limitations, and returned prepaid to any location in the United States by the most economical means, e.g. Surface UPS/RPS. If an expedient means of transportation is requested during the warranty period, the customer is responsible for the difference between the most economical means and the expedient mode. **ENMET** shall not be liable for any loss or damage caused by the improper use of the product. The purchaser indemnifies and saves harmless the company with respect to any loss or damages that may arise through the use by the purchaser or others of this equipment.

This warranty is expressly given in lieu of all other warranties, either expressed or implied, including that of merchantability, and all other obligations or liabilities of **ENMET** which may arise in connection with this equipment. **ENMET** neither assumes nor authorizes any representative or other person to assume for it any obligation or liability other than that which is set forth herein.

NOTE: When returning an instrument to the factory for service:

- Be sure to include paperwork.
- A purchase order, return address and telephone number will assist in the expedient repair and return of your unit.
- Include any specific instructions.
- For warranty service, include date of purchase
- If you require an estimate, please contact **ENMET** Corporation.

There are Return for Repair Instructions and Form, on the last pages of this manual. This Form can be copied or used as needed.

Notes:



PO Box 979
680 Fairfield Court
Ann Arbor, Michigan 48106-0979
734.761.1270 Fax 734.761.3220

Returning an Instrument for Repair

ENMET instruments may be returned to the factory or any one of our Field Service Centers for regular repair service or calibration. The **ENMET** Repair Department and Field Service Centers also perform warranty service work.

When returning an instrument to the factory or service center for service, paperwork must be included which contains the following information:

- A purchase order number or reference number.
- A contact name with return address, telephone and fax numbers
- Specific instructions regarding desired service or description of the problems being encountered.
- Date of original purchase and copy of packing slip or invoice for warranty consideration.
- If a price estimate is required, please note it accordingly *and be sure to include a **fax number***.

Providing the above information assists in the expedient repair and return of your unit.

Failure to provide this information can result in processing delays.

ENMET charges a one hour minimum billing for all approved repairs with additional time billed to the closest tenth of an hour. All instruments sent to **ENMET** are subject to a minimum \$30 evaluation fee, even if returned unrepaired. Unclaimed instruments that **ENMET** has received without appropriate paperwork or attempts to advise repair costs that have been unanswered, after a period of 60 days, may be disposed of or returned unrepaired COD with the evaluation fee.

Service centers may have different rates or terms. Be sure to contact them for this information.

Repaired instruments are returned by UPS/FedEx Ground and are not insured unless otherwise specified. If expedited shipping methods or insurance is required, it must be stated in your paperwork.

Note: Warranty of customer installed components.

If a component is purchased and installed in the field, and fails within the warranty term, it can be returned to **ENMET** and will be replaced, free of charge, per **ENMET**'s returned goods procedure.

If the entire instrument is returned to **ENMET** Corporation with the defective item installed, the item will be replaced at no cost, but the instrument will be subject to labor charges at half of the standard rate.



Repair Return Form

Mailing Address:
ENMET Corporation
PO Box 979
Ann Arbor, Michigan 48106

Shipping Address:
ENMET Corporation
Attn: Repair Department
680 Fairfield Court
Ann Arbor, Michigan 48108

Phone Number: 734.761.1270
FAX Number: 734.761.3220

Your Mailing Address:

Your Shipping Address:

Contact Name: _____ **Your Phone:** _____

Your PO/Reference Number: _____ **Your FAX:** _____

Payment Terms: **COD**
(check one) **VISA / MasterCard** _____
Card number Expiration

Return Shipping Method:
 UPS: Ground 3 Day Select Next Day Air ND Air Saver 2-Day Air
 Federal Express: Ground Express Saver P-1 Standard 2-Day Air
 FedEx Account number: _____

Would you like ENMET to insure the return shipment?
 No Yes **Insurance Amount:** \$ _____

