
# ES-600 Ozone Controller Operation Manual

**Questions about your product?**
**Find answers here:**

**Web: www.ozonesolutions.com/ES-600**
**Phone: 712-439-6880**

# Ozone Solutions
# OZONE CONTROLLER
# Model ES-600
# Instructions for Use

## General and New Features

The ES-600 is an industrial grade Ozone controller and monitor. The ES-600 design has been optimized for accuracy, ease of installation, setup and operation:


- All connections and controls are on the front to allow mounting of the unit before setup.
- Rugged, splash resistant enclosure and connectors for industrial environments.
- Set points for Ozone control relays are digitally controlled and are set to numeric values. This makes precise Ozone control easy to set up, even if Ozone is not currently present.
- Front panel indicator lights display a variety of important Ozone control parameters including when level exceeds 0.1ppm OSHA limit.
- Generator Control “enable” allows for disabling the generator for maintenance at the ES-600 panel.
- User selectable ranges for analog outputs (4-20 mA and 0-2 VDC)
- Full digital display.

## Initial Operation

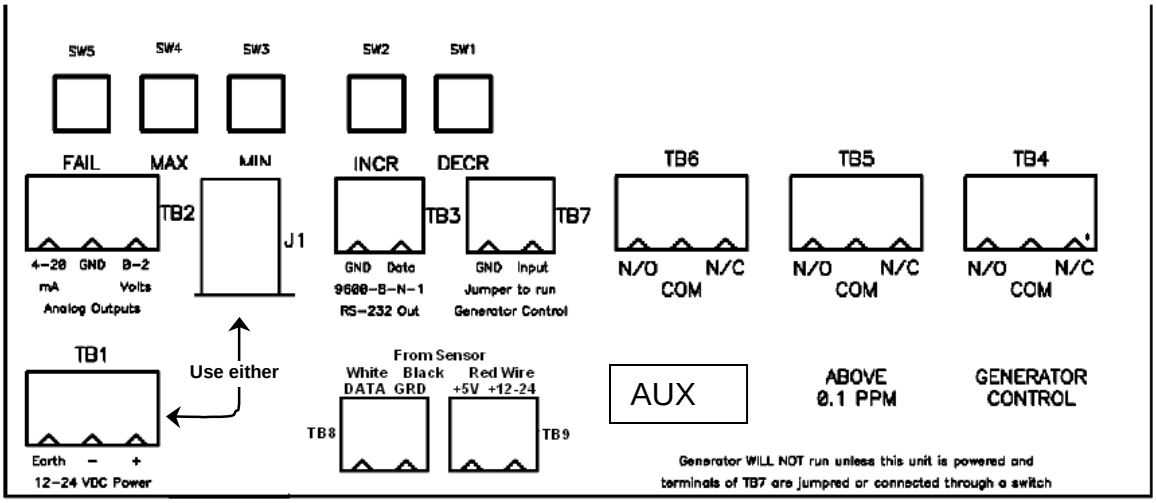
All connections between the ES-600 and the SM-4 sensor unit are made at the factory. Connect the P20 power adaptor included (US, Canada and Mexico only) or your 8-24 VDC supply to terminals + and - of the terminal block TB1. The green LED Power indicator should light and then begin blinking at 1-second intervals and Digits should show on the display. This indicates that the ES-600 is receiving sample data from the SM-4 sensing module.

## Warm-up

In order to burn off any chemicals that the sensor may have absorbed during shipping and storage, you should let the ES-600 run with power on and the sensor module connected for 1 hour before response testing or overnight before the first use on site. We recommend testing the instrument for positive response with an ozone generator when the instrument is received and again at the site where the instrument is installed.

# External Outputs

Terminal Blocks listed in order and descriptions.




- **TB1: 12-24 VDC POWER:** Power input and earth grounding for the ES-600
- **TB2: ANALOG OUTPUT:** 4-20mA and 0-2 VDC to external control equipment. See “Analog Range Selection” section for range setup options. Default range is 0-20 PPM. [**NOTE**: the 4-20 mA output is a DRIVER rather than a current-sink type output.]
- **TB3: RS-232 OUT:** Serial data output. Refer to “Data Connection” instructions for details.
- **TB4: GENERATOR CONTROL:** User adjustable relay to turn off or on equipment.
- **TB5: ABOVE 0.1 PPM:** Relay tied to OSHA human safety limit.
- **TB6: USER-ADJUSTABLE:** User adjustable alarm relay
- **TB7: GENERATOR ENABLE:** Jumper to enable generator control. Remove to perform maintenance on the generator components. If these terminals are not connected, the generator will never run
- **TB8: Sensor Data and Ground:** Run cable from **SM-4 TB-1** Blk (grd) and WHT (data) to TB8
- **TB9: SENSOR POWER:** Power to sensor. Connect Red wire either from:
    - **+5V out** to **SM-**4 **TB1 +5V OR**
    - **+12-24V out** to **SM-4 TB2 12-24V+**

**Do not connect ‘+12-24 Out’ terminal on the ES-600 to the SM-4 TB1 ‘+5V’. This will damage the SM-4! The +12-24 terminal is in place to power the SM-4 over long cable lengths. Normally, the SM-4 will be shipped with a 6’ 3-wire cable connect to TB1 +5V, BLK (grd) and WHT (data).**

## Indicator Lights and Display

- **Ozone:** Auto ranging digital display in PPM (Parts per Million)
- **Control Relay High:** On when Ozone reading above the upper set point
- **Sensor OK:** Blinks at 1-second intervals when receiving data from Sensor.
- **Control Relay Low:** On when Ozone reading below the lower set point.
- **Aux. Relay:** User-adjustable alarm relay.
- **Safety Relay:** On when reading exceeds 0.1 PPM (OSHA safety limit)
- **Control Relay:** On when relay is controlling Ozone.


## Data Connection

The serial digital data stream from the SM-4 is also available for connection to a computer. Data is sent at 1-second intervals. The parameters are: **9600 bps, 8 data bits, Parity: None, Stop bits: 1, Flow Control: None**

Output example at 1PPM: Ozone, (PPB) Temperature, (Celsius) and Relative Humidity:

1000, 24, 34
1000, 23, 33

## AC Adapter

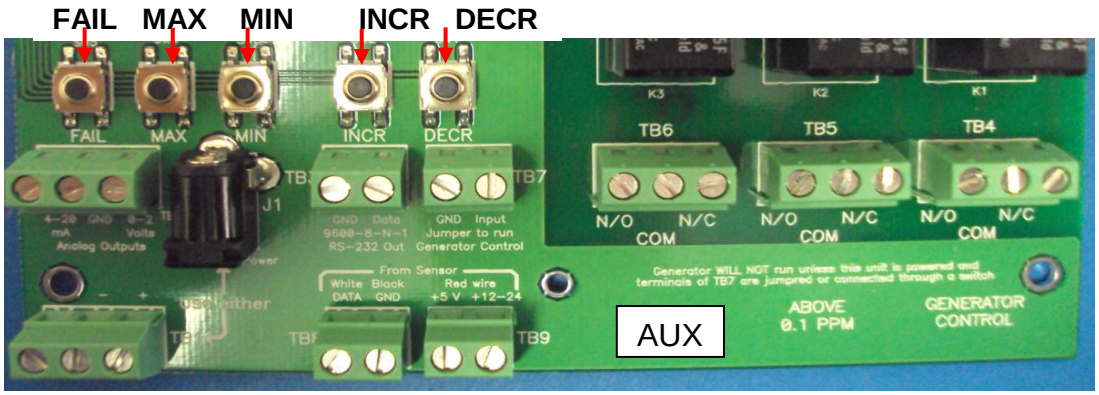
For 120 V 60 HZ areas, the Ozone Solutions P-20 adapter should be used (included with device). For all other areas, adapters should be purchased locally that fit local wall sockets and conform to local codes. The output should be 12 volts DC unregulated, 300-500 mA. The plug to our instrument should fit a 5.5/2.5 mm socket with the center pin +.

## Set Point and Alarm Condition Adjustment

Five push-buttons are mounted on the circuit board behind the wiring compartment cover. Remove cover (two screws) and locate the buttons in the upper-left corner. From left to right, they are: FAIL, MAX, MIN, INCR and DECR.

**FAIL**: Time (in minutes) ozone level may remain above MAX set point or below MIN set point before the "Unable to control" indicator and relay are switched on.

**MAX**: Maximum ozone set point, at which the generator is turned off.




**MIN**: Minimum ozone set point, at which the generator is turned off.

**INCR**: Increase set point value.

**DECR**: Decrease set point value.

Select the set point to change by holding down one of the first three buttons. The current value of that set point will appear on the display while the button is pressed. Press the INCR or DECR button to adjust the value. Note that MIN will not adjust higher than MAX (and vice-versa).

**To adjust AUX Relay (TB6) set point:**

1. Remove bottom front panel.
2. Locate 5 black buttons on the left side of the board
3. Press and hold the FAIL button. The audible alarm should sound, and the digital display will show the alarm set-point.
4. If you would like to move the set-point up, continue holding down the FAIL button. At the same time, push the INCR button until the desired set-point is reached, as indicated on the digital display.
5. If you would like to move the set-point down, continue holding down the FAIL button. At the same time, push the DECR button until the desired set-point is reached, as indicated on the digital display.
6. Replace front panel.

## Analog Range Selection

Full-scale ranges for the 0-2 Volt and 4-20 mA analog outputs may be selected by adding or removing up to three push-on jumpers on header J4, which is located on the back of the display circuit board. Access this area by removing four screws from the display bezel.

| Jumpers | A | B | C | Range selected |
|---|---|---|---|---|
| | OFF | OFF | OFF | 0-2 PPM |
| | ON | OFF | OFF | 0-5 PPM |
| | OFF | ON | OFF | 0-10 PPM |
| | ON | ON | OFF | 0-20 PPM |

| | | | |
|---|---|---|---|
| ON | OFF | ON | 0-50 PPM |
| ON | OFF | ON | 0-100 PPM |
| OFF | ON | ON | 0-200 PPM |
| ON | ON | ON | 0-500 PPM |

**IMPORTANT NOTE:** The range of an ES-600 is limited by the sensor module. The currently available SM-4 operates from 0-20 PPM. Higher ranges may be available on future sensor modules. Please contact Ozone Solutions for details.

## Specifications

Wall mounted polycarbonate enclosure resists water spray and splash (NEMA 4X).
**Size:** H = 6.3”/160mm, W = 6.5”/166mm, D = 4.6”/118mm.
**Wiring:** Conduit or cable gland knock-outs along bottom of enclosure.
**Power in:** 12-24 VDC.
**Power out:** +5 or +12-24 VDC to sensor.
**Data in:** RS-232 serial data from remote sensor module (SM-4 or equivalent).
**Data out:** RS-232, 9600 Baud 8N1 format.
**Analog out:** 0-2 V and 4-20 mA, full scale range settable by internal jumpers.
**Control in:** Generator enable (contact closure).
**Control outputs:** Relays, 10A @ 25VDC, 0.25A @ 250VDC, 2.0 KVA AC (resistor).
**Relay functions:** Ozone generator control, >100 PPB safety limit, failure to control.
**User controls (internal):** MAX setpoint, MIN setpoint, FAIL time, increase, decrease.
**Numeric display:** Four digits, 0.5”/12mm, auto-ranging, with backlight.
**LED indicators:** Sensor, above MAX, below MIN, >100 PPB, generator on, failure.

## Service and Maintenance

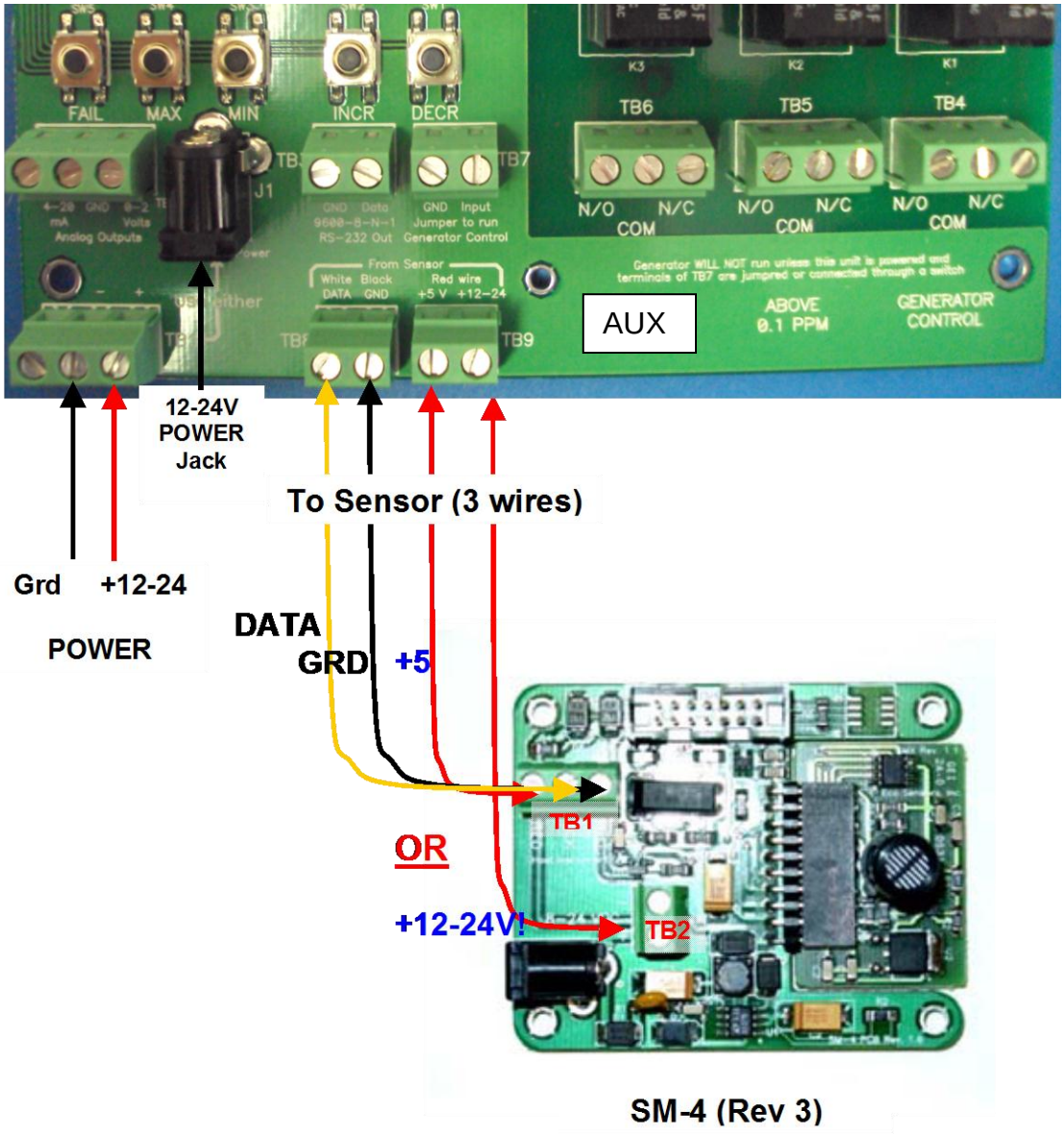
Do not attempt to perform board level repairs or microprocessor programming. This will void the warranty. We recommend checking the calibration monthly and replacing the sensor module annually. The unit should be returned to Ozone Solutions for repairs. **Tampering with or attempting repairs to the unit will void the warranty.**

Calibration of the sensor on its board (SM-X) is done electronically in a specially constructed facility at the factory. Therefore it is more cost effective to replace the SM-X board than to request that it be recalibrated.

Instruments with problems during the warranty period should be returned as a system (ES-600 and SM-4) to Ozone Solutions for diagnosis and repair. Call to coordinate a Return Materials Authorization (RMA).

## Appendix A:

### Wiring Illustration (ES-600 Rev 4.0):



## APPENDIX B

## CONNECTING ES-600 RS232 OUTPUT TO COMPUTER

**Connections:**

The connections from the ES-600 to the serial COM port of a PC are as follows:

| ES-600 TB3 | | COM port DB9 Connector |
|---|---|---|
| Data Out | ⟷ | Pin 2 RxD |
| GND | ⟷ | Pin 5 SGND |

The output data stream is OUTPUT ONLY at 1-second intervals. There is no input from the PC to the ES-600.

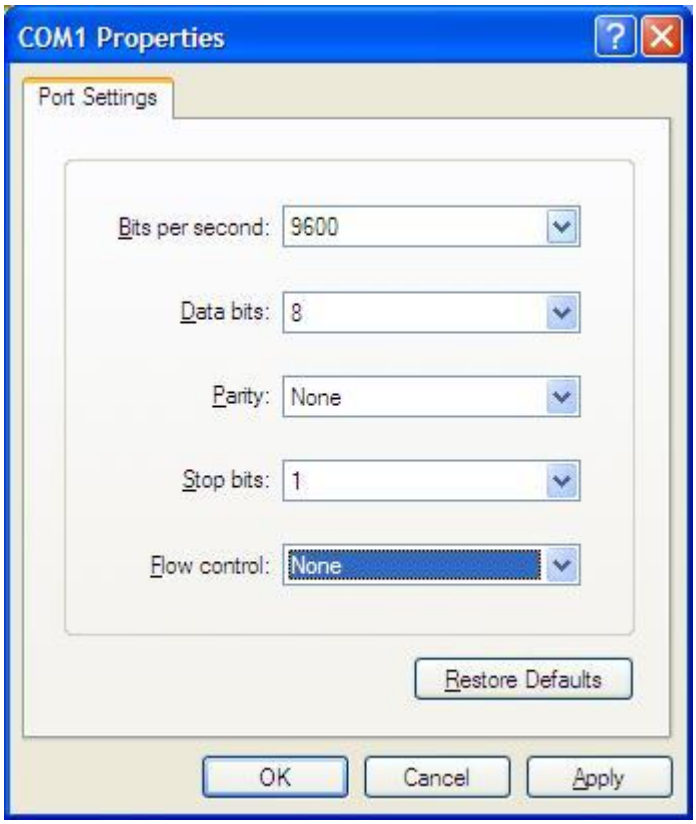
## *Example Terminal Setup in Windows*

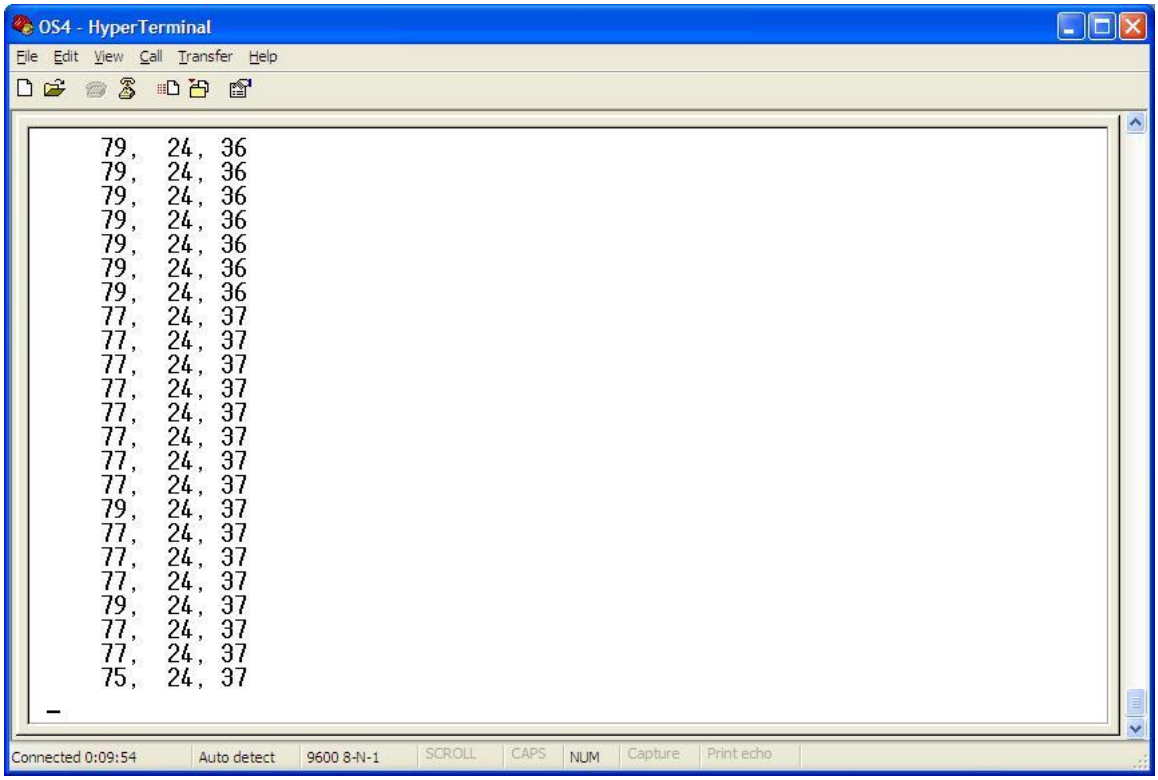
The terminal program in Windows is HyperTerminal. It is located in **Start>>All Programs>>Accessories>>HyperTerminal**

1. Open HyperTerminal

2. Enter COM port to be used:


3. Enter the serial communications parameters as shown:



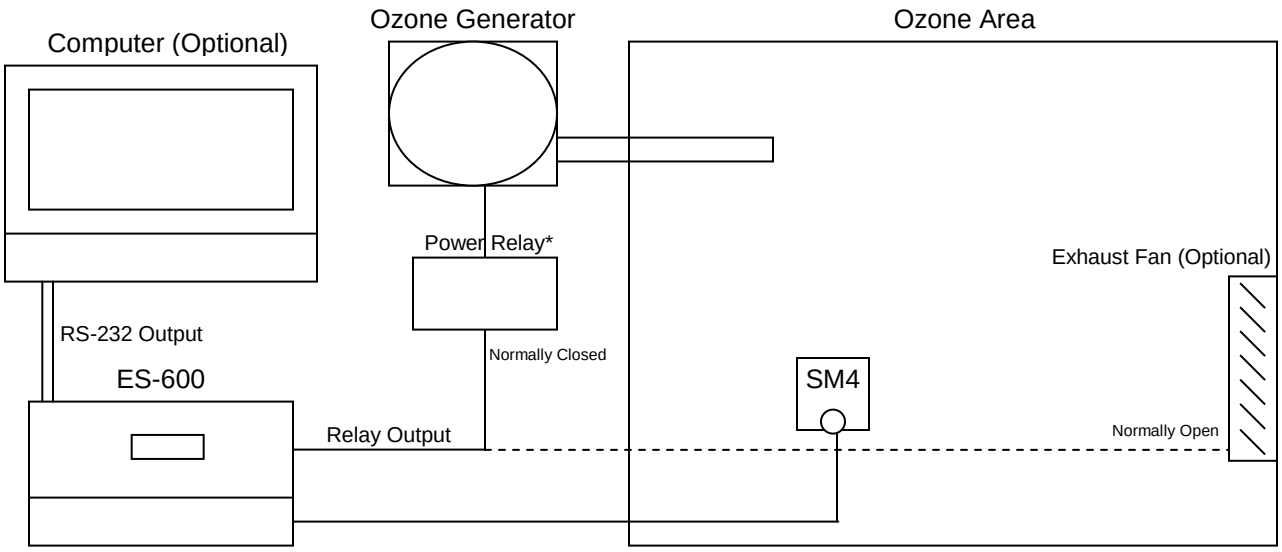



Output shown: 0.079PPM (79 ppbv), 24 degrees C, 37% Relative Humidity. The ES-600 outputs one data point every second.

# Appendix C

## Typical ES-600 Application Diagram

(For reference purposes only)




*Power relay is required if Ozone generator load exceeds ES-600 relay

# WARRANTY

This product is warranted against defects in materials and workmanship for one year following the date of purchase by the original owner. This warranty does not include damage to the product that results from misuse, accident, dropping, modifications or alterations, and it does not apply if the instructions in this manual are not followed, or if the unit is otherwise used outside its intended specifications.

If a defect develops during the warranty period, Ozone Solutions, in its sole discretion, will repair the instrument or replace it with a new or reconditioned model of equivalent quality. In the event of replacement with a new or reconditioned instrument, the replacement unit will continue the warranty of the original unit.

If the product should become defective during the warranty period, please return it through Ozone Solutions at (712) 449-6880 or e-mail at sales@ozonesolutions.com to receive return instructions and a Return Materials Authorization (RMA) number.

Except as provided herein, Ozone Solutions makes no warranties, express or implied, including warranties of merchantability and fitness for a particular purpose. Ozone Solutions shall not be liable for loss of use of this instrument or other incidental or consequential damages, expenses or economic loss, or claims for such damage or economic loss.

RECORD YOUR SERIAL NUMBER HERE_____

KEEP THIS MANUAL AND WARRANTY FOR YOUR RECORDS.