

## **OZONE CONTROLLER**

### **Model OS-6**

### **User Manual**

### **OS-6 Features**

The OS-6 is an industrial grade ozone controller and monitor. The OS-6 design is optimized for accuracy and ease of installation, setup and operation.

- Front panel digital LCD displays ozone level.
- Rugged, splash resistant NEMA 4X enclosure for industrial environments.
- Easily accessible connection terminals and controls allow the unit to be setup after it is mounted.
- Indicators display when ozone exceeds the 0.1 ppm OSHA limit and a variety of other important ozone control parameters.
- Set points for ozone generator control relays are digitally controlled with numeric set points. This makes precise ozone control easy to set up, even when ozone is not present.
- Ozone generator failure mode detection warns when the connected ozone generator is not maintaining the desired ozone set points. This option can be disabled.
- “Monitor Mode” can be enabled at the OS-6 panel. This mode disables the ozone generator controller and generator failure mode status indicators while maintaining ozone measurement and limit warning indicators.
- Analog outputs (4-20 mA and 0-2 VDC) are compatible with PLCs and other process controllers.
- Digital serial (RS-232) output of ozone (ppb), temperature (°C), and relative humidity (%) for convenient connection to a computer.



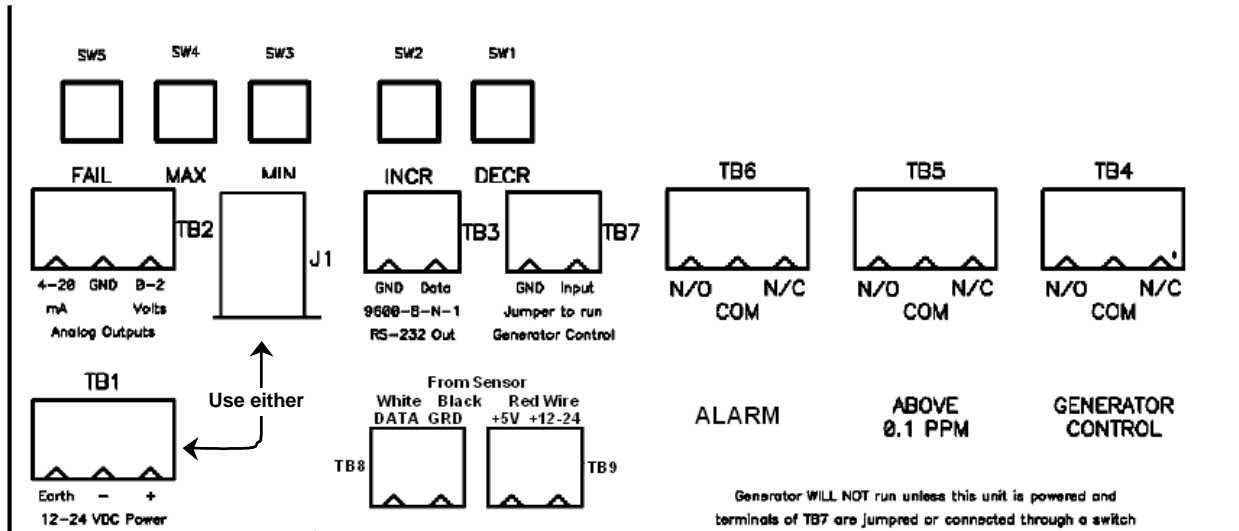
## OS-6 Indicator Lights and Display



- **PPM Ozone:** Auto ranging digital display in ppm (parts per million).
- **Above MAX Limit:** Illuminates when ozone reading is above the upper set point.
- **Data From Sensor:** Blinks at 1-second intervals when receiving data from sensor.
- **Below MIN Limit:** Illuminates when ozone reading is below the lower set point.
- **Unable to Control Ozone:** Illuminates when the ozone generator (TB4) is not maintaining the desired set points. A relay (TB6) engages with this indicator to provide remote alarm capability. This option may be disabled by setting the FAIL time to 0999. Refer to "Set Point and Alarm Condition Settings" for more details. This option is also disabled when the instrument is in Monitor Mode. Refer to "External Connections – TB7: Generator Enable" for more details.
- **Above 0.1 PPM Safety Limit:** Illuminates when the measured ozone exceeds 0.1 ppm (OSHA 8hr time-weighted average safety limit). A relay (TB5) engages with this indicator to provide remote alarm capability.
- **Generator Control:** Illuminates when the ozone generator relay is engaged, indicating the ozone generator is on.
- **Wiring Compartment:** Contains buttons for adjusting set point and alarm conditions as well as wiring terminals for sensor module connections, OS-6 power input, analog outputs, relay outputs, and Monitor Mode selector.
- **Display Compartment:** Contains jumper pins for selecting the analog output full-scale range.

## External Connections

The wiring terminals for the sensor module connections, OS-6 power, analog outputs, relay outputs, and Monitor Mode selector are located in the Wiring Compartment. For access, remove the two screws and cover. The connection board will resemble the following diagram.



- **TB1: 12-24 VDC POWER:** Power input and earth grounding for the OS-6
- **TB2: ANALOG OUTPUT:** 4-20 mA and 0-2 VDC to external control equipment. Refer to “Analog Range Selection” for details. 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 OUTPUT:** Serial data output. Refer to “Data Connection” for details.
- **TB4: GENERATOR CONTROL:** Relay contacts with user adjustable control limits for operating an ozone generator. Refer to “Set Point and Alarm Condition Settings” for details.
- **TB5: ABOVE 0.1 PPM:** Relay contacts tied to OSHA human safety limit (for remote indicator/alarm).
- **TB6: UNABLE TO CONTROL OZONE:** Relay contacts tied to Unable to Control Ozone error condition (for remote indicator/alarm).
- **TB7: GENERATOR ENABLE:** A jumper is installed at the factory to enable Generator Control (TB4). If the jumper is removed and these terminals are not connected, an ozone generator connected to TB4 will never run. Remove the jumper or replace it with a switch to disable the ozone generator when performing maintenance. Also remove the jumper to operate the OS-6 in “Monitor Mode”. In this state, when the jumper is removed, the Generator Control relay (TB4) will be disabled, as well as the “Generator Control” indicator and the “Unable to Control Ozone” indicator.

- **TB8: SENSOR DATA AND GROUND:** Connect data and ground (black) conductors from SM-module, TB1 to OS-6, TB8. Refer to Appendix A for an illustration and more details.
- **TB9: SENSOR POWER:** Refer to Appendix A for an illustration and more details. Connect power conductor (red) from either:
  - +5 V out to SM-module TB1 +5 V
  - OR
  - +12-24 V out to SM-module TB2 +12-24 V

**WARNING:** Do not connect '+12-24 V Out' terminal on the OS-6 to the SM-module TB1 '+5 V'. This will damage the SM-module and void the warranty.

## AC Adapter

For locations with 120 V, 60 HZ power, the Eco Sensors P-20 adapter may be used. For all other areas, adapters should be purchased locally that fit local wall sockets and conform to local codes. The output should be 12 VDC (maximum), 300 mA (minimum). The instrument's power socket, J1, accepts a 5.5/2.5 mm plug with a positive center pin. For further details see our Tech Note P-101.

## Initial Operation

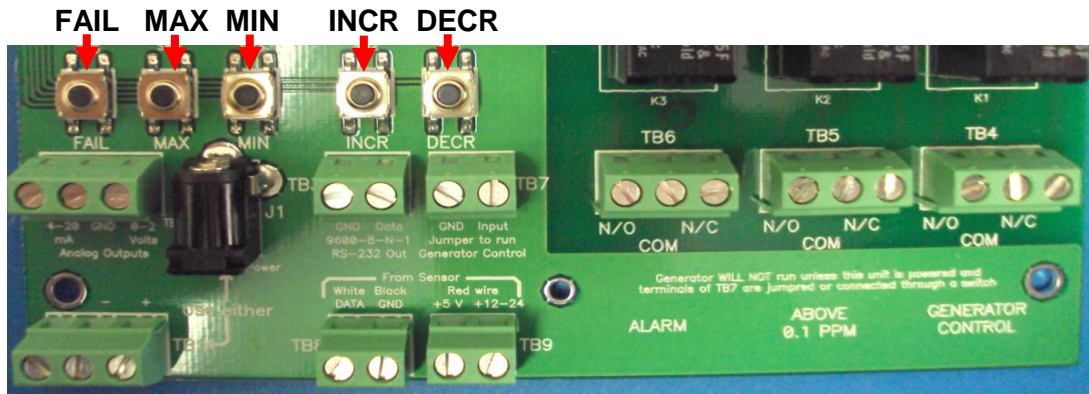
All connections between the OS-6 and the SM-module are made at the factory. Connect the included P-20 power adaptor (US, Canada and Mexico only) or your 12-24 VDC supply to terminals + and - of the terminal block, TB1. The green LED power/data indicator will illuminate and then blink at 1-second intervals. The LCD will power on and display digits. This indicates that the OS-6 is receiving sample data from the SM-module.

## Warm-up

To burn off any chemicals that the sensor may have absorbed during shipping and storage, let the OS-6 and connected SM-module run with the power on for 1-hour before response testing. Run with power on for 24-hours before on-site process integration. 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.

## Set Point and Alarm Condition Settings

Five push-buttons are mounted on the circuit board behind the wiring compartment cover. Remove the 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) that the ozone level can remain above MAX set point or below MIN set point before the “Unable to Control Ozone” indicator and relay engage. To disable the “Unable to Control Ozone” indicator and relay (TB6), set FAIL to 0999 (available on instruments shipped after 2012-10-15, call us for details).
- MAX:** Maximum ozone set point at which the generator is turned off.
- MIN:** Minimum ozone set point at which the generator is turned on.
- INCR:** Increase set point value.
- DECR:** Decrease set point value.

Change a set point by pressing FAIL, MAX, or MIN. The current value of that set point will appear on the display. Press INCR or DECR to adjust the value. MIN will not adjust higher than MAX.

## Data Connection

Data from the OS-6 and connected SM-module can be streamed to a computer via RS-232 serial cable. Basic communication parameters are provided below. For more details please consult the **OS-6 Communication Manual**.

Serial communication parameters:

| <b>Parameter</b> | <b>Value</b> |
|------------------|--------------|
| Speed (baud)     | 9600         |
| Data bits        | 8            |
| Stop bits        | 1            |
| Parity           | None         |
| Flow Control     | None         |

Serial data is updated from the SM-module approximately once per second. An example serial data output stream is given below for 1 ppm ozone, 23 °C, and 33% relative humidity:

Ozone (ppb), Temperature (°C), and Relative Humidity (%):

1000, 23, 33

1000, 23, 33

1000, 23, 33

1000, 23, 33

1000, 23, 33

1000, 23, 33

## Analog Output Full-Scale Range Selection

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

| Jumpers |     |     | Analog Output<br>Full-Scale Range<br>(ppm) |
|---------|-----|-----|--|
| A       | B   | C   |  |
| OFF     | OFF | OFF | 0-2  |
| ON      | OFF | OFF | 0-5  |
| OFF     | ON  | OFF | 0-10                                       |
| ON      | ON  | OFF | 0-20                                       |
| OFF     | OFF | ON  | 0-50                                       |
| ON      | OFF | ON  | 0-100                                      |
| OFF     | ON  | ON  | 0-200                                      |
| ON      | ON  | ON  | 0-500                                      |

Changing the analog output full-scale range will not change the OS-6 display, which will always read in the within range 00.00 to 99.99 ppm. The actual measurement range of the OS-6 display is determined by the attached SM-module. Refer to the specification sheet of the attached SM-module to determine the measurement range.

The OS-6 is shipped from the factory with the Analog Output Full Scale Range set to match the installed SM-module. Refer to the specification sheet of the attached SM-module for details.

## Service and Maintenance

- Instruments with problems during the warranty period should be returned as a system (OS-6 and SM-module) to the factory or authorized service representative for diagnosis and repair.
- We recommend checking the calibration monthly and replacing the SM-module annually. An increasing baseline response in the absence of ozone is an indication that the SM-module needs to be replaced.
- Calibration of the SM-module is done in a specially constructed facility at the factory. Therefore, it is more cost effective to replace the SM-module than to recalibrate it.
- Always remove power from the OS-6 and SM-module before making electrical connections. Follow the Wiring Diagram in Appendix A.
- **Tampering with or attempting repairs to the unit will void the warranty.** The unit should be returned to Eco Sensors for repairs or performed by an Eco Sensors authorized service representative.

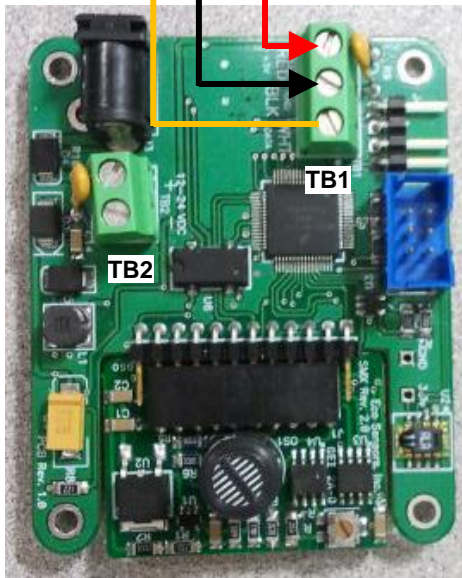
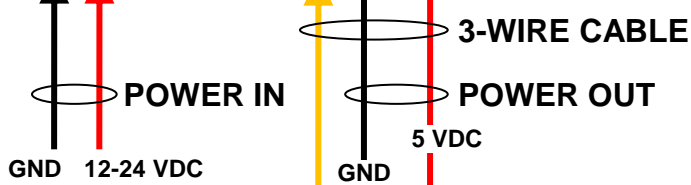
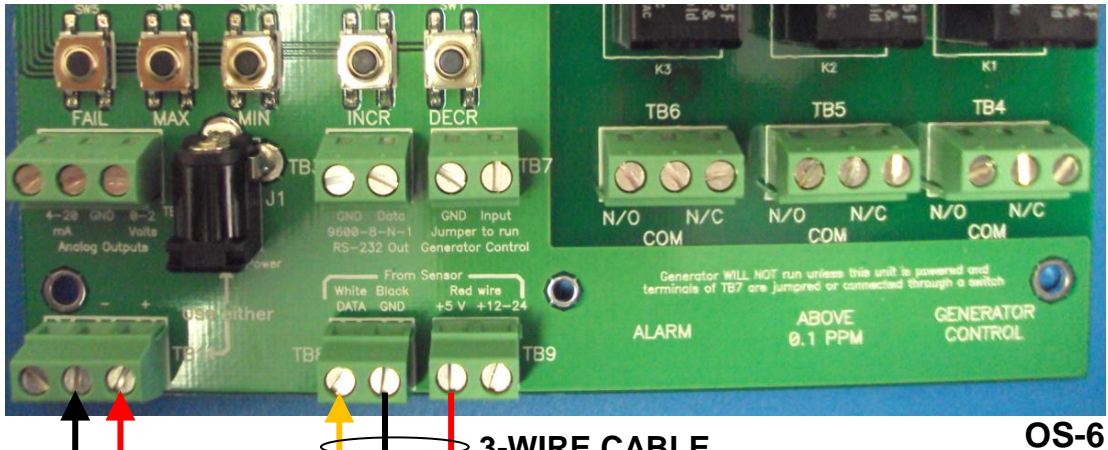
## Specifications

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



# Appendix A

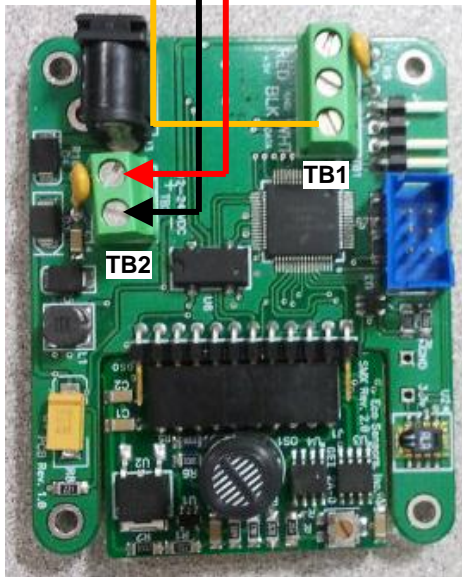
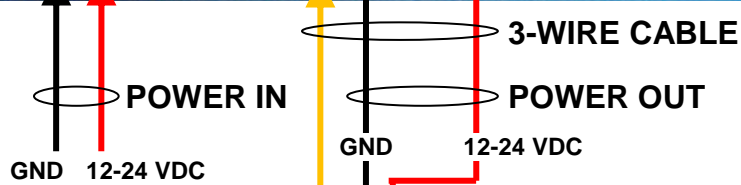
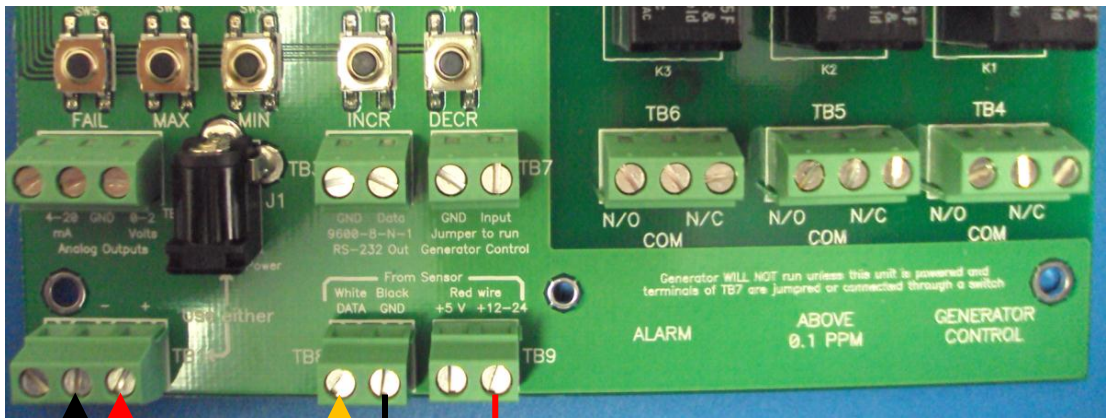
## SM-Module Wiring Illustration #1 (Typical)



SM-Module

**WARNING:** Never connect OS-6 TB9: +12-24 V to SM-module TB1. This will damage the SM-module and void the warranty.

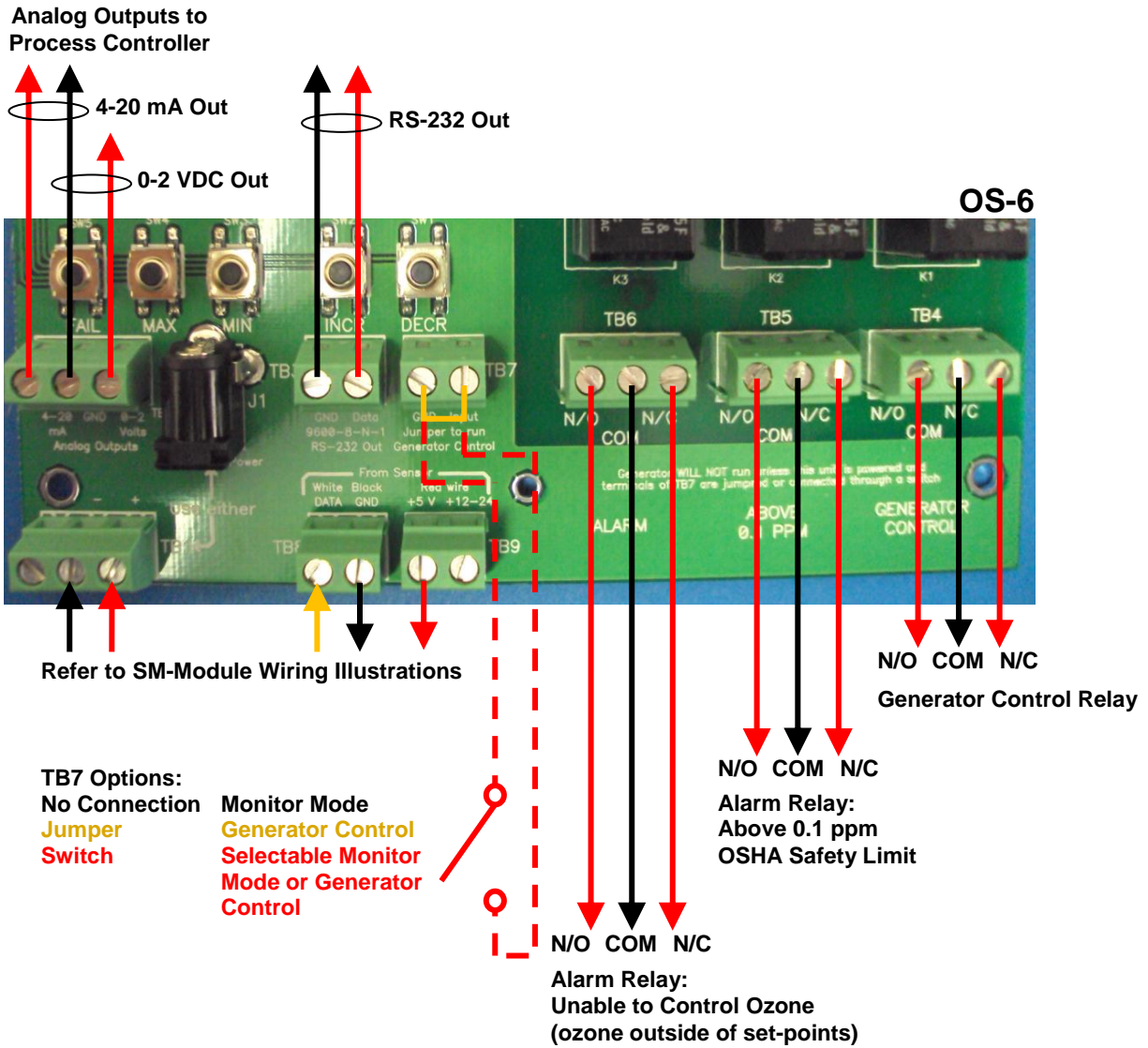
## SM-Module Wiring Illustration #2 (Alternate)



**SM-Module**

**WARNING:** Never connect OS-6 TB9: +12-24 V to SM-module TB1. This will damage the SM-module and void the warranty.

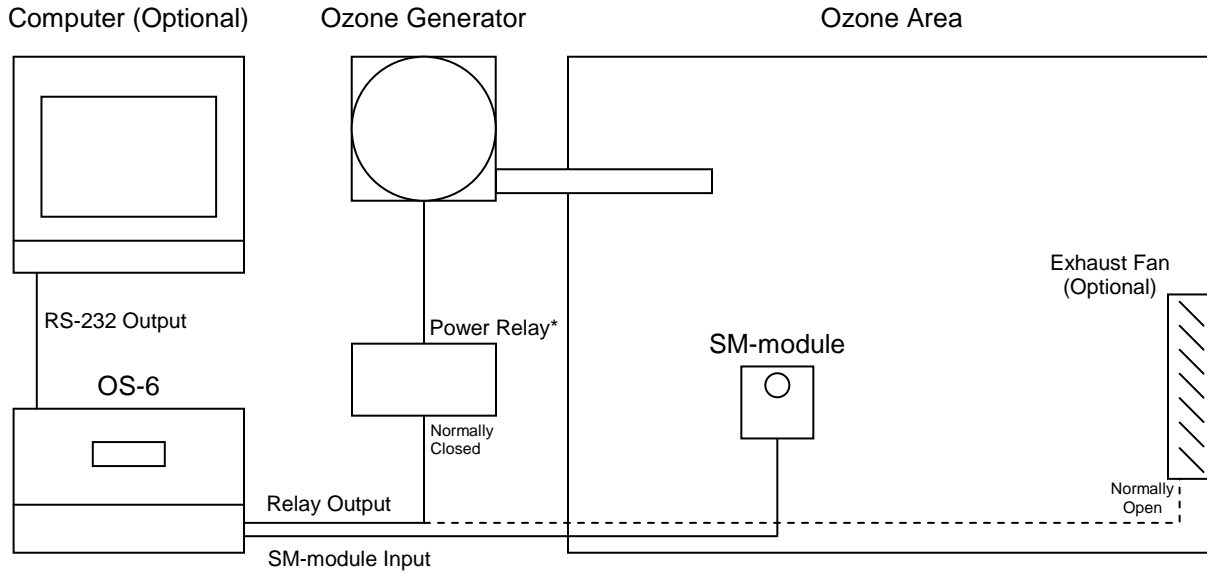
# OS-6 Wiring Options Illustration



# Appendix B

## Typical OS-6 Application Diagram

(For reference only)



\*Power relay is required if generator load exceeds OS-6 relay ratings.

## 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, Eco Sensors, 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 your distributor, or call Eco Sensors at (800) 472-6626 or e-mail at [sales@ecosensors.com](mailto:sales@ecosensors.com) to receive return instructions and a Return Materials Authorization (RMA) number.

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