

# ECO SENSORS, INC.

## OZONE SENSING MODULE

### Model SM-4

## INSTRUCTIONS FOR USE

This product is a microprocessor-based digital ozone sensing module. It is supplied as a system component with the Eco Sensors model OS-4 Ozone Switch™, as a stand-alone digital ozone sensor (to feed the customer's PC or other readout device), and as a component of other Eco Sensors ozone sensing and control systems. Normally, the sensor reads 0-20 ppmv (0-20,000 ppbv) but modifications to the SM-X can give lower ranges. Different calibrations of the SM-X replaceable sensor board will result in different SM-4 ranges.

Operation of this sensing module will require:

- 1 – A nominal 12 VDC (8-24 VDC) power or an AC adapter
- 2 – A SM-X replaceable calibrated ozone sensing board (This is incorporated into the OS-4 as a plug-in mini board).

For general views of the instrument, circuit board connections, and replacing the sensor board, see Appendix A.

For wiring connections and communications parameters, see Appendix B.

## AC ADAPTER

For use in 120 V 60 HZ areas, the Eco Sensors P-20 adapter should be used. For other areas adapters should be purchased local that fit local wall sockets and conform to local codes. The output should be 12 volts DC unregulated, 50 mA, minimum. If the SM-4 is connected to the OS-4, at least 300 mA will be required. The plug to our instrument should fit a 5.5/2.5 mm socket with the center pin +. For further details see our Tech Note P-101. The DC power can also be connected to terminal block TB-2.

## SPECIFICATIONS

*Sensor:* Heated metal oxide semiconductor.

*Sensitivity:* Depends on the SM-X calibration, but typically first responds at .05 ppm.

*Response time:* Within one minute of when gas reaches the sensor.

*Temperature and humidity range:* 5-40 deg C and 0-80% relative humidity.

*Supply voltage required:* 8-24 volts DC, 50 mA (300 mA if connected to OS-4) Ground -.

*Adapter plug:* 5.5 mm/2.5 mm female, center +.

*Size of SM-4 Sensor Module* 76 mm (H) X 64 mm (W) X 29 mm (D) (3.00" X 2.50" X 1.12")

Horizontal mounting centers: 73 mm (2.87")

*Cable from SM-4 sensor module to host unit:* Up to 100 meters (390 feet) 3 conductor cable such as used for indoor telephone wiring. Wires preferably are color coded red, black and white to correspond with the terminal block notations. The conductors should be as large as possible to reduce resistance loss (20-22 AWG recommended).

## SERVICE AND MAINTENANCE

Do not attempt to do board level repairs or microprocessor programming yourself. This will void the warranty. We recommend checking the calibration monthly and replacing the sensor module annually. General repairs should be done at the factory or by an Eco Sensors authorized service representative.

Calibration of the sensor on its board (SM-X) is done by computer in a special laboratory at the factory. Therefore in most cases it is lowest cost to replace the SM-X board than to request that it be recalibrated.

Instruments with problems during the warranty period should be returned as system (SM-4 and SM-X) to the factory or authorized service representative for diagnosis and repair.

## SAFETY FEATURES

*Enclosure:* Self-extinguishing ABS plastic.

*Sensor:* Heated element is flame arrestor protected.

*Electrical:* (a) Circuits operate at 12-24 volts (b) Self-resetting fuse to protect against excess input current flow. (d) Overvoltage protection diode barrier to protect against supply voltage surges, spikes, overvoltage, and reverse polarities.

## PRECAUTIONS

- Do not open or service the sensor module or board with power connected to the SM-4.
- Allow at least 1-4 hours warm-up for functionality testing and 24 hours warm-up for operational use.
- Read all instructions in this manual.
- Keep instrument dry. Never let water or other liquids into the sensor.
- Do not drop the instrument or subject it to continuous vibration.
- Do not store in high levels of dust.
- Do not clean the instrument with cleaning chemicals or solvents. Clean it with a damp cloth.
- Do not operate near heavy aerosols (spray) usage or where oxygen is being administered.
- Call a qualified electrician if you have any doubts about voltages, currents, electrical practice, etc.
- Do not operate the instrument or rely on its readings where there are high concentrations of:
  - Chlorine or other halogen compounds
  - Sulfur compounds
  - Strong VOCs such as solvent vapors.
  - Silicone compounds such as RTV.
  - Urine residues and ammonia compounds
  - Acid gases such as sulfuric acid or nitric acid fumes.
- Keep at least a meter above fruit in food storage applications to avoid the negative influence of ethylene ripening agent emitting from the fruit.

When in doubt, operate the instrument in your worst case conditions for at least 24 hours to see if it will operate properly.

## 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 as a result of misuse, accident, damage, modifications or alterations, and it does not apply if the instructions in this manual are not followed.

If a defect develops during the warranty period, Eco Sensors at its election 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 Goods Authorization (RGA) number.

Except as provided herein, Eco Sensors makes no warranties, express or implied, including warranties of merchantability and fitness for a particular purpose. Eco Sensors 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.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

RECORD YOUR SERIAL NUMBER  
HERE \_\_\_\_\_

KEEP THIS MANUAL AND WARRANTY FOR YOUR RECORDS.

Eco Sensors is a registered trademark of Eco Sensors, Inc.

© Eco Sensors, Inc. 2007. SM-4 REV 1 and SM-X, Manual rev 5/07.

For brochures, application and tech notes, and other useful information, visit our extensive website at [www.ecosensors.com](http://www.ecosensors.com). E-mail us at [sales@ecosensors.com](mailto:sales@ecosensors.com).

## APPENDIX A

### SM-4 CONNECTIONS AND COMMUNICATIONS PARAMETERS

#### Terminal Block TB-1

“Sensor Cable“

Red Power  
White Signal  
Black Ground

#### Cable

Red: +5V (if OS-4 is used, connects with OS-4 5 V bus)  
 White or Yellow: RS232 TXD (output to PC)  
 Black: GND  
Serial Port pinout:  
 White or Yellow TXD to Pin 2 of DB9 Connector  
 Black (GND) to Pin 5 of DB9 Connector

#### 2.5 mm jack or TB-2

8-24 VDC (center + on jack)

### **Communications Parameters**

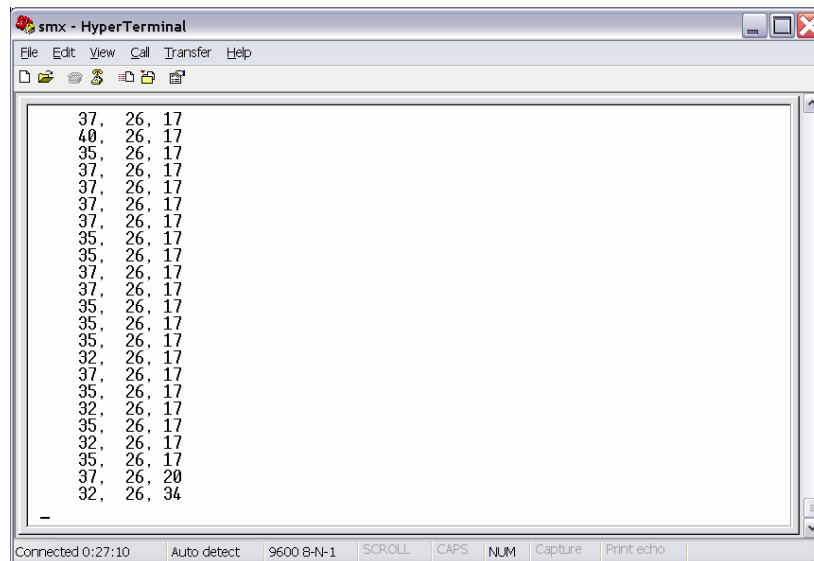
The output of the SM4 is a RS232 serial string, output at one second intervals. The communications parameters are as follows:

Bits per second: 9600  
 Data Bits: 8  
 Parity: None  
 Stop Bits: 1  
 Flow Control: None

### **Output Format**

Comma delimited stream:

Ozone (PPB), Temperature (deg C), Humidity



SM-4 data bottom line above: .032 ppm, 26 deg C, 34% relative humidity

## APPENDIX B

### REPLACING THE SENSOR MODULE

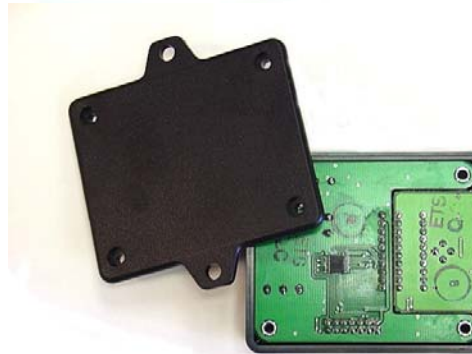
- 1- Locate SM-4 sensor module and put on workbench.

Sensor mounting centers are 23 mm (2 7/8")



#### **IMPORTANT!!**

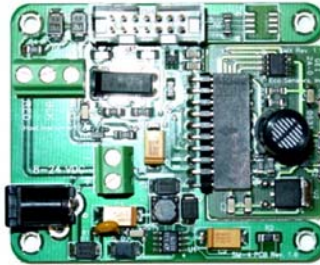
- 2 - **Disconnect power cable at OS-4 or SM-4 (wherever it is connected).**
- 3 - Remove back cover.



- 4 - Examine SM-4 board.
- 5 - Check for tight connections at the terminal blocks.

+8-24V Gnd Signal  
TB-1 — Red — Black — White —>

Terminal block (TB-2) and power jack for powering at sensor module end instead of OS-4 —>



- 6 - Carefully replace SM-X sensor module. Reassemble SM-4 module. Connect power.

SM-4 main board

SM-X replaceable sensor module

