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**MST, INC.  
MODEL 2002  
OXYGEN  
MONITOR  
(AMBIENT-TYPE)**

# **OWNER'S MANUAL**

**IMPORTANT WARNING**

**WHEN THE OXYGEN MONITOR IS CORRECTLY INSTALLED AND  
MAINTAINED, IT MONITORS THE LEVEL OF OXYGEN IN ITS  
SURROUNDINGS**



**MST MODEL 2002  
OXYGEN MONITOR**

**SPECIFICATIONS:**

RANGE:	0.0-25.0% O <sub>2</sub>
POWER REQUIREMENTS:	120/240 VAC-50/60 Hz, 1 PH, OR 12 VDC; 2 A
INTERNAL RELAYS (RL1 & RL2) DRY CONTACT-TYPE MAXIMUM CURRENT RATING:	5A@12 VDC/120 VAC
SENSOR TYPE: ELECTROCHEMICAL. SENSOR LINEARITY AT 68F:	+/-2.5% OF READING
SENSOR TEMPERATURE COEFFICIENT:	+/-10% OF READING PER SIGNAL OVER RANGE 32 - 122F
OPERATING TEMPERATURE (AMBIENT):	32 - 104F (0 - 40C)
STORAGE TEMPERATURE (AMBIENT):	14 - 122F (-10 - 50C)
PHYSICAL DIMENSIONS:	
WIDTH:	7-5/8" (194 mm)
HEIGHT:	7-5/8" (194 mm)
DEPTH:	4-1/8" (105 mm)
WEIGHT:	2.3 LBS. (1 kg)

## MST MODEL 2002 OXYGEN MONITOR



## **MST MODEL 2002 OXYGEN MONITOR**

### **I. INTRODUCTION**

The MST, Inc. Model 2002 OXYGEN (O<sub>2</sub>) Monitor is a continuous O<sub>2</sub> monitor utilized to monitor AREA locations such as parking garages, maintenance rooms, and the like.

**WARNING: THE MST MODEL 2002 OXYGEN MONITOR IS NOT APPROVED FOR USE IN HAZARDOUS OR EXPLOSIVE ATMOSPHERES. PERSONAL INJURY, PROPERTY DAMAGE OR DEATH COULD RESULT FROM IMPROPER USE OF THIS DEVICE.**

The Model 2002 Monitor comes with internal dry contact-type relays that can be utilized to switch external devices such as solenoid valves, alarms, etc. As shipped from the factory, 1/2 of each of the internal relays is powered with 12 VDC to provide power to the audible and visual alarms located on the front of the unit. Should you wish to utilize both sides of the internal relays for other applications, please consult factory prior to making any changes.

The internal relays are preset at the factory to activate when the Oxygen in the sample either exceeds 23 1/2 % (red lamp), or drops below 19 1/2 % (audible alarm). These can be adjusted, if required. Please consult this manual.

### **II. DETAILED DESCRIPTION**

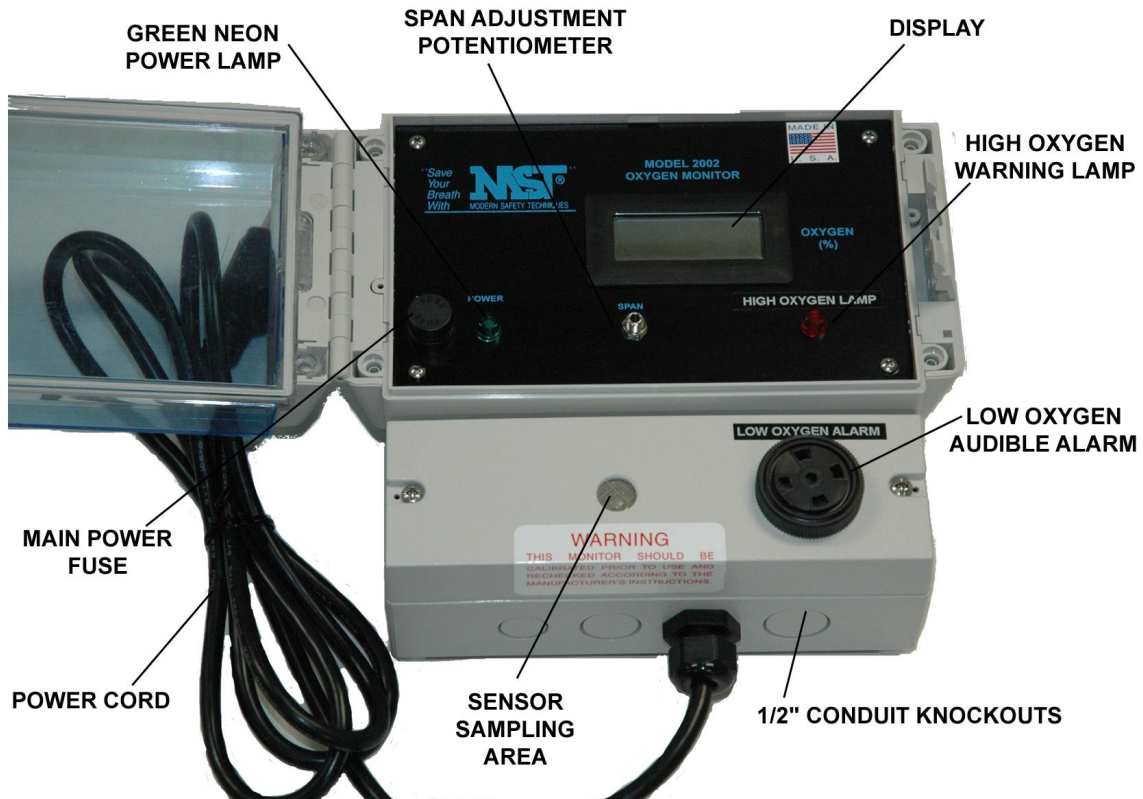
#### **INSIDE CLEAR COVER**

DISPLAY:	Indicates the percent (%) of O <sub>2</sub> present in the air sample.
FUSE:	Main Power Fuse, 0.2 A 3AG (TYPE 312).
POWER LAMP:	Green LED Lamp indicates power supplied to unit.
SPAN:	SPAN Adjustment for calibration.
HIGH OXYGEN LAMP:	Red LED Lamp indicates high oxygen level

#### **BOTTOM OF UNIT**

KNOCK OUTS:	For direct wiring in various applications.
POWER CORD:	3-Prong Grounded cord for power connection.
AUDIBLE ALARM:	Piezo buzzer type alarm - energized when low O <sub>2</sub> alarm level activated.
SENSOR SAMPLING OPENING:	Where actual O <sub>2</sub> Sensor is located.

## MST MODEL 2002 OXYGEN MONITOR



### III. OPERATION

#### PRELIMINARY

1. Connect the Power Cord to a suitable SWITCHED receptacle according to Local, State and National Regulations. Follow proper electrical codes.
2. Observe that the green "Power" lamp illuminates and that the display is operating showing (3) digits such as "xx.x".
3. With the included calibration screwdriver (P/N 80044), carefully adjust the SPAN Adjustment Screw, noting the reading on the display before turning and slowly turn the adjustment clockwise to increase the reading, counter-clockwise to decrease the reading. At the alarm level setting you will hear the relay(s) activate and, depending on whether the reading is low (below 19 ½ % factory preset audible alarm) or high (above 23 ½ % factory preset-red warning lamp), you will observe the actual alarming device. Verify the setting is correct. To adjust the alarm level setting(s), consult this manual.
4. Perform the calibration procedure as outlined in this manual.

#### IV. NORMAL OPERATION

During normal operation of MST's Model 2002 O<sub>2</sub> Monitor, a continuous air sample is taken by the sensor. The sensor outputs a current proportional to the amount of O<sub>2</sub> that is present in the air sample and this current is converted to % Oxygen and read on the display. When O<sub>2</sub> levels above or below the alarm set point is achieved, the internal relay(s) are activated, and the appropriate alarm device is activated, and/or some other suitable device that is connected to its own power supply (relays operated as "dry" contacts). The internal relays have the capability of operating in a "Normally Open" or "Normally Closed" position. When powering the monitor's internal devices, the unit is factory wired so the low oxygen setting (19 ½ % factory preset-RL2, controlling SK2) is connected to the "normally open" terminal, and the high oxygen setting (23 ½ % factory preset-RL1, controlling SK1) is connected to the "normally closed" terminal.

## V. MONITOR CALIBRATION

### CALIBRATION FREQUENCY

The MST Model 2002 O<sub>2</sub> Monitor should be calibrated PRIOR TO USE and rechecked after the first (2) weeks. The monitor should then be calibrated on a MONTHLY basis if it is used on a daily or continuous basis. The monitor should be calibrated on a "PRIOR TO USE" basis if it is only used occasionally (non-continuous or non-daily basis).

### CALIBRATION PROCEDURE

(MST Calibration Kit P/N 8003107 required  
or ambient air of known oxygen content)

Before calibrating the instrument, connect the power cord to the appropriate power source and verify that the green lamp illuminates and the display is operating properly. Allow the instrument to warm up for a period of five (5) minutes or longer prior to the following calibration procedure.

Connect one end of the supplied PVC Calibration tubing (3/16" ID) to the barbed fitting on the gas regulator. Connect the gas regulator to the calibration gas bottle and hold the open end of the Calibration tubing almost directly on the sensor. Allow approximately 1-2 minutes for the sensor to stabilize before making any adjustments as noted below. NOTE: When using the 8003107 Small Calibration Kit, unscrew regulator immediately following any necessary adjustments to conserve your calibration gas.

### CALIBRATION STEPS:

1. Remove the protective plastic cap (if supplied) from the ZERO AIR (21% O<sub>2</sub>) cylinder outlet.
2. Open the clear cover on the Model 2002 CO Monitor by depressing the latch on the right side and opening the cover by pulling up on the right side of the cover and swinging it to the left (cover is hinged on left side of monitor).
3. Screw the regulator valve onto the ZERO AIR (21% O<sub>2</sub>) cylinder outlet, making sure not to "cross thread" the regulator on the cylinder outlet port, and tighten regulator firmly. Hold the calibration tubing almost directly on the sensor. Allow approximately 1-2 minutes for the sensor to stabilize before making any adjustments.
4. Observe the display on the instrument. The reading should move to 20.9% after approximately (1) minute. If the display does not read 20.9%, adjust the SPAN potentiometer such that display now reads between 20.9 and 21.0%.
5. When the above steps have been completed, un-screw the regulator valve from the Zero Air (21% O<sub>2</sub>) cylinder and replace plastic protective cap (if supplied).



Place all calibration kit components back into protective plastic case to prevent damage or loss of components.

**WARNING: ONLY QUALIFIED AND TRAINED ELECTRICAL TECHNICIANS SHOULD PERFORM ANY REPAIRS OR ADJUSTMENTS INTERNAL TO THE MONITOR. PROPERTY DAMAGE, PERSONAL INJURY OR DEATH COULD RESULT.**

## VI. INTERNAL RELAY ADJUSTMENTS

To change/set the internal relays to activate when the OXYGEN level reaches a specified point, refer to the following procedure (Note: You must have 21% O<sub>2</sub> available to properly perform this procedure).

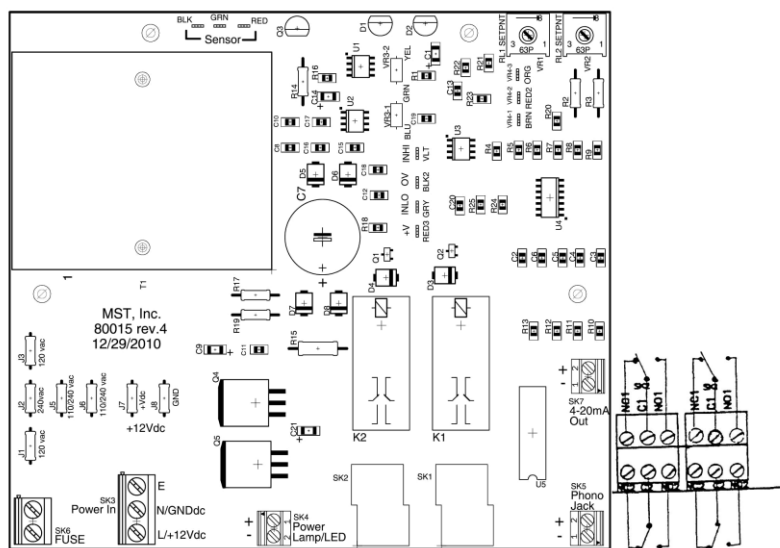
1. Disconnect power source from the monitor and open front clear cover as described in the "Calibration Procedure" noted above.
2. With the proper screwdriver, remove the four (4) small phillips-head screws located on the front cover plate to expose the main circuit board. Carefully lift off the cover by grasping the fuse holder diameter and gently pulling upward. **DO NOT USE EXCESSIVE FORCE AND DO NOT PULL COVER FURTHER THAN WIRING WILL ALLOW. DAMAGE TO MONITOR COULD OCCUR.**
3. Move faceplate cover slightly to the left of the monitor's plastic housing, being careful not to damage any wiring or components.
4. Locate the two (2) small potentiometers situated in the UPPER RIGHT HAND corner of the main circuit board. The one on the left adjusts RL1(Low O<sub>2</sub> alarm) and the one on the right adjusts RL2 (High O<sub>2</sub> alarm) .
5. Making sure that no components are interfering or contacting any of the internal main circuit board components, connect appropriate power source and observe that monitor green power lamp illuminates and display is operating properly.
6. To adjust the **"high-level"** relay set point, slowly adjust the SPAN calibration potentiometer to force the display to read the **high-level** alarm setting you wish the internal relay to be activated at. Then, slowly adjust **RL1** potentiometer **counter-clockwise** until the High Oxygen Warning Lamp turns on (if not already on), then turn the potentiometer **clockwise** until lamp turns off, then **very slowly counter-clockwise** until the lamp just turns on. Check setting by turning the SPAN adjustment potentiometer counter-clockwise (below high level setting) and then clockwise, noting when the high level alarm activates.
7. To adjust the **"low-level"** relay set point, slowly adjust the SPAN calibration potentiometer to force the display to read the **low-level** alarm setting you wish the internal relay to be activated at. Then, slowly adjust **RL2** potentiometer **clockwise** until the Low Oxygen Audible Alarm activates (if not already activated), then turn the potentiometer **counter-clockwise** until the Low Oxygen Audible Alarm deactivates, then **very slowly clockwise** until the alarm just activates. Check setting by turning the SPAN adjustment potentiometer clockwise (above low alarm level setting) and then counter-clockwise, noting when the Low Oxygen Audible Alarm activates.

8. Disconnect power source and carefully replace front faceplate, making sure wires are not caught under edge of faceplate and nothing is interfering with internal components or wiring.
9. Reconnect power source and retest both alarm settings by turning the SPAN calibration potentiometer clockwise to high oxygen set point and counter-clockwise to low oxygen alarm set point to verify correct settings.
10. Reconnect power source and retest the setting per #7 above.
11. Re-calibrate the monitor using ZERO (21% O<sub>2</sub>) air as outlined in the "Calibration Procedure" noted above.

## VII. INTERNAL WIRING

Except for sensor replacement, this device contains no user-serviceable parts, however a trained electrical technician may, at their option, attach various control and alarm devices to the terminal strip located under the sensor access door. Electrical "knockouts" are provided at the lower end of the monitor for purposes of connecting various devices to this monitor. Refer to the following schematic for proper location and connections to terminal strips.

The two (2) banks of two (2) terminal strips on the lower right hand side on the main circuit board are used to provide dry contact relay connections. The relays in the monitor are DPDT-type relays and one half (1/2) of each relay is utilized by the factory to power the internal alarm devices (audible and visual alarms, powered by main circuit board). The remaining side of each relay are dry contact-type only. The bank on the farthest right is activated by the alarm setting made by the RL1 adjustment potentiometer. The next bank left of that is activated by the alarm setting by the RL2 adjustment potentiometer. **Proper wiring practices shall be followed in all instances regarding connections to these terminal strips.**



## VIII. MAINTENANCE

Except for fuse replacement, sensor replacement and calibration, this device does not require any maintenance unless subjected to abuse or neglect. Make sure the air sample supply is free from any oils, water or solvent to prevent the sensor from premature failure. Keep all solvents away from plastic housing at all times.

### SENSOR REPLACEMENT

1. Disconnect the monitor from the power source.
2. Loosen the two (2) screws from the front access cover to allow the cover to be removed.
3. The sensor is a circular device located inside a gray housing and secured in place by the cover when assembled. The sensor has a red and a black wire soldered to tabs on the sensor.
4. Snip the red and black wire close to the actual sensor tab, noting the correct location of each wire on the sensor (+ or -, + is red, - is black). Remove and discard the old sensor, keeping in mind that the sensor contains a small amount of sulphuric acid.
5. Strip and tin the two wires and solder them neatly to the two tabs on the new sensor. **DO NOT USE EXCESSIVE HEAT OR SENSOR DAMAGE MAY OCCUR AND THIS WILL VOID YOUR WARRANTY.**
6. Slide new sensor and wiring back down into the gray housing, arranging such that the two tabs on the sensor face the recess in the gray housing.
7. Replace the access cover, arranging all internal wires such that no wire is caught when the cover is secured and the wires are not interfering with the sensor end and sealing foam. Secure cover with two (2) screws.

**WARNING: SULFURIC ACID IS POISONOUS AND CAN CAUSE SEVERE BURNS. DO NOT ALLOW ACID TO CONTACT SKIN OR EYES. IF EYES ARE EXPOSED TO ACID, FLUSH THOROUGHLY AND SEEK IMMEDIATE MEDICAL ATTENTION. ALWAYS WASH HANDS THOROUGHLY AFTER HANDLING DETECTOR CELL.**

8. Calibrate instrument according to the above "Calibration Procedure."

### REPLACEMENT PARTS

(Please contact your local distributor to purchase these parts.)

REPLACEMENT O<sub>2</sub> SENSOR:  
REPLACEMENT POWER LAMP

80589  
80055-G

SMALL CALIBRATION KIT	8003107
REPLACEMENT CALIBRATION GAS	80023
REPLACEMENT FUSE	80569
HIGH OXYGEN LEVEL WARNING LAMP	80055-R

Consult Factory for any other replacement parts.

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For further information, or questions about service or maintenance care of this unit, contact your local distributor or MST, Inc. at (800) 542-6646.