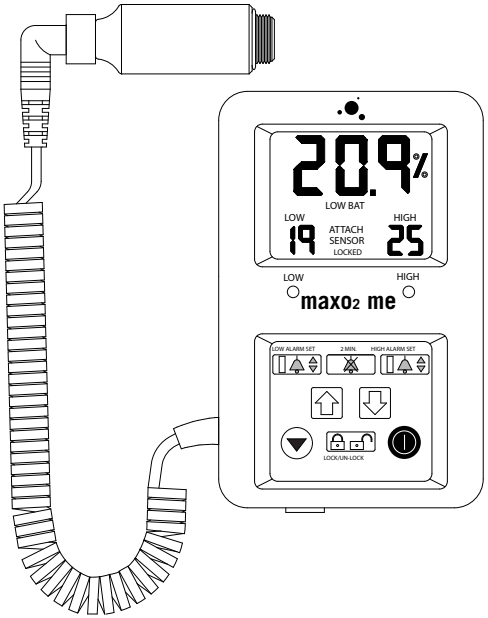

OM-25RME / RMEi

OPERATING MANUAL &
INSTRUCTIONS FOR USE

R213M48 Rev. A

PREFACE

This manual describes the function, operation and maintenance of the Maxtec™ Model OM-25RME oxygen monitor. All referances to the OM-25RME apply to the OM-25RMEi with the only differance being that the OM-25RMEi version comes with a Termination Interface enclosure with an AC input. This is described more in the Setup Procedure chapter. As a member of Maxtec's MAXO2® line of oxygen analyzers and monitors, the OM-25RME utilizes the Maxtec MAX-250E oxygen sensor and is engineered for fast response, maximum reliability and stable performance. Adjustable high and low level alarm setpoints make the OM-25RME ideal for applications requiring oxygen threshold monitoring. The expansion output port gives the OM-25RME many new unique features, such as logging data, analog output and remote alarm switching.

THANK YOU

Thank you for your purchase of a Maxtec™ MAXO2® oxygen monitor. We appreciate the time and energy you invest in selecting the equipment best suited to your needs. As repayment, we are supplying you with a reliable, high-quality instrument that, with proper care and operation, will provide you with years of exceptional service. We also encourage your comments or suggestions as to how our equipment, in any way, can better serve your needs. Please feel free to write, fax or e-mail us at the address on the back of this manual c/o the Maxtec Marketing Department.

NOTE: In order to obtain optimum performance from your MAXO2® monitor, all operation and maintenance must be performed in accordance with this manual. Please read the manual thoroughly before using the monitor and do not attempt any repair or procedure that is not described herein. Maxtec cannot warrant any damage resulting from misuse, unauthorized repair or improper maintenance of the instrument.

⚠ **WARNING:** The seller assumes no liability for consequential damages of any kind, and the buyer, by acceptance through purchase of this product, will assume all liability for the consequences of its use or misuse by the buyer, his employees, or others.

It is the sole responsibility of the buyer / user to determine if this product is suitable for intended application.

⚠ **WARNING:** Before use, all individuals who will be using the MAXO2® must become thoroughly familiar with the information contained in this Operation Manual. Strict adherance to the operating instructions is necessary for safe effective product performance. This product will perform only as designed if installed and operated in accordance with the manufacturer's operating instructions.

⚠ **WARNING:** Use only genuine Maxtec accessories and replacement parts. Failure to do so may seriously impair the monitor's performance. Repair or alteration of the MAXO2® beyond the scope of the maintenance instructions or by anyone other than an authorized Maxtec service person could cause the product to fail to perform as designed.

ATTENTION: Calibrate the MAXO2® weekly when in operation and if enviromental conditions change significantly. (ie, Temperature, Humidity, Barometric Pressure. --- Refer to Calibration section of this manual).

CAUTION: Use of the MAXO2® near devices that generate electrical fields may cause erratic readings.

⚠ **WARNING:** If the MAXO2® is ever exposed to liquids (from spills or immersion) or to any other physical abuse, turn the instrument OFF and then ON. This will allow the unit to go through its self test and make sure everything is operating correctly.

⚠ **WARNING:** Never use a MAXO2® monitor with a cable that appears worn, cracked or has damaged insulation.

⚠ **WARNING:** Never autoclave, immerse or expose the MAXO2® (including sensor) to high temperatures (>70°C). Never expose the device to pressure, irradiation vacuum, steam, or chemicals.

ATTENTION: Remove the AA batteries in the event that the MAXO2® is not likely to be used for a period of time,

CAUTION: Failure to comply with these warnings and cautions could result in instrument damage.

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1.0 SYSTEM OVERVIEW

1.1 Base Unit Description

The MAXO2® (Model OM-25RME) provides unparalleled performance and reliability, due to an advanced design that includes the following features and operational benefits.

- Fast-responding, oxygen-specific, galvanic sensor that achieves 90% of final value in approximately 15 seconds at room temperature.
- Extra-life oxygen sensor of approximately 900,000 O2 percent hours (minimum 2 years in most applications).
- External probe with 10 ft., extendible cable.
- Operation using only 2 AA alkaline batteries (2 x 1.5 volts) for approximately 1500 hours of performance in typical usage (not in alarm conditions or continuous RS-232 output). AC Power (87-265VAC) input on the OM-25RMEi version.
- Durable, compact case that weighs less than 1 pound and permits comfortable, hand-held operation.
- Large, easy-to-read, 3 1/2-digit LCD display for readings in the 0-100% range.
- Adjustable high-level and low-level alarming capability with flashing LED and audible indication of alarm conditions.
- Simple operation and calibration using quick-calibrate key functions.
- Self-diagnostic check of analog and microprocessor circuitry.
- Low battery indication.
- Unidirectional RS-232 output for remote monitoring. Fixed baud rate - 4800 (Need to purchase R212P52 Computer Interface Cable)
- Analog calibrated output 1Volt Full Scale into 1K to 1M ohm load impedance for remote monitoring.
- High and Low Alarms with relays for “dry contact” interface.
- Pluggable terminal strips for interface wiring.

1.2 Components Description (please refer to page 3)

A LCD Readout

1 **3 1/2-Digit Display-** The 3 1/2-digit liquid crystal display (LCD) provides direct readout of oxygen concentrations in the range of 0-100%. It also displays “CAL” when the calibration mode is entered.

2 **“%” Sign-** In the calibration mode, the “%” sign flashes every second.

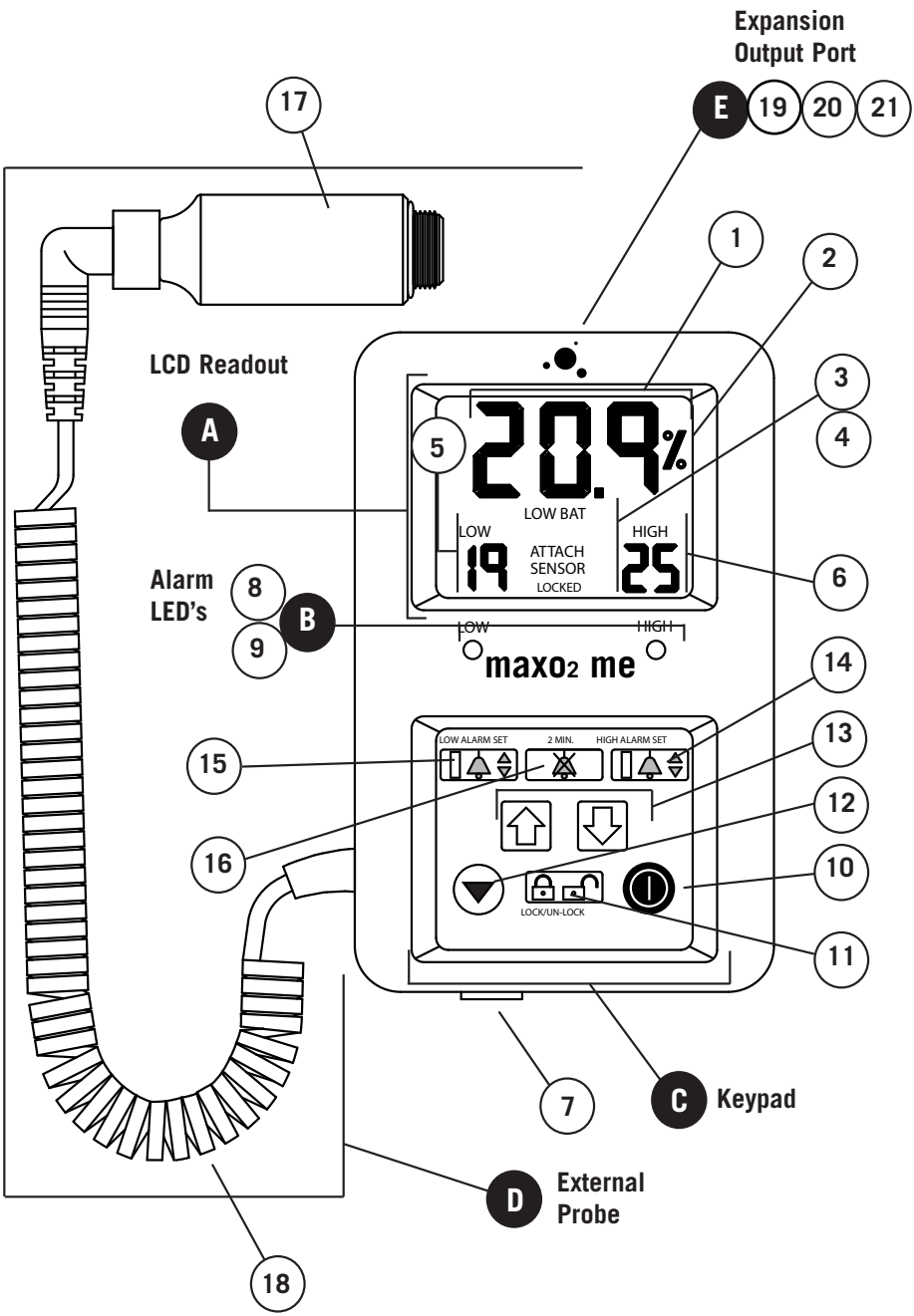
3 **Low Battery Indicator-** The low battery indicator appears on the LCD display when the power supply voltage drops below acceptable limits. When the “LOW BAT” icon is visible, batteries should be replaced immediately.

4 **LOCKED Status Indicator-** The presence of the “LOCKED” icon on the LCD readout is an indication that the unit is in its normal “LOCKED” state. The unit must be unlocked, using the “LOCK” key, in order to be calibrated or to change the high and low alarm settings.

5 **Low Alarm Indicator-** The low alarm setting is displayed at all times just below the “LOW” icon on the LCD readout. The indicated value represents the oxygen percentage at which the low alarm will be activated. In the low alarm set mode, the “LOW” icon will flash at a 1 second rate. In a low alarm condition, the low alarm value will flash in conjunction with the low alarm light emitting diode (LED).

6 **High Alarm Indicator-** The high alarm setting is displayed at all times just below the “HIGH” icon on the LCD readout. The indicated value represents the oxygen percentage at which the high alarm will be activated. In the high alarm set mode, the “HIGH” icon will flash at a 1 second rate. In a high alarm condition, the high alarm value will flash in conjunction with the high alarm LED.

7 **Threaded Mounting Bushing-**Threads to Table Top Swivel Stand. Also may be used with many third party camera mounting accessories.


Expansion
Output Port
E
19
20
21
17
1
2
3
4
5
6
LCD Readout
A
20.9%
LOW BAT
LOW
19
ATTACH
SENSOR
LOCKED
HIGH
25
Alarm
LED's
8
B
9
LOW
HIGH
maxo2 me
14
13
12
10
11
15
16
LOW ALARM SET
2 MIN.
HIGH ALARM SET
LOCK/UN-LOCK
7
C
Keypad
D
External
Probe
18

B Alarm LEDs

8 **Low Alarm LED-** In a low alarm condition, the red "LOW ALARM" LED will flash each second, accompanied by the alarm beeper.

9 **High Alarm LED-** In a high alarm condition, the red "HIGH ALARM" LED will flash each second, accompanied by the alarm beeper.

C Keypad

10 **ON/OFF Key-** This key is used to turn the instrument on or off. When the batteries are applied to the unit and the unit is in the power off mode, the display will be blank. When the ON/OFF key is pressed once, the unit will start to display the oxygen concentration and the keypad is activated. If the ON/OFF key is pressed again, the unit reverts to the power off mode.

11 **LOCK/UNLOCK Key-** Pressing the "LOCK/UNLOCK" key will unlock the keypad and cause the "LOCKED" icon to disappear from the LCD readout. The unit can then be calibrated and alarm settings can be changed if desired. If no other keys are pressed within 10 seconds, the "LOCKED" icon will reappear and the unit will revert to the "LOCKED" mode. When the unit is in the unlocked state, pressing the "LOCK/UNLOCK" key will also cause the "LOCKED" icon to reappear.

12 **CALIBRATE Key-** The Unit will force you to Calibrate the first time power is applied or the sensor is changed. This is indicated on the LCD by the word "CAL". Pressing the "CALIBRATE" key will allow the "↑" and "↓" arrow keys to calibrate the unit. Also when the keypad is unlocked, the "CALIBRATE" key is used in conjunction with the "↑" and "↓" arrow keys to calibrate the unit. When the "CALIBRATE" key is pressed, "CAL" appears on the LCD readout for 1 second and then the measured calibration concentration is displayed. The calibration value can then be changed using the "↑" and "↓" arrow keys. During calibration, the "%" sign will flash at a once per second rate. When the calibration value is set, pressing the "CALIBRATE" or "LOCK/UNLOCK" key will cause the unit to exit the calibration mode and return to normal operation. The unit will also revert to normal operation if 10 seconds elapse and no keys are pressed.

13 **↑ and ↓ Keys-** The "↑" and "↓" arrow keys are used in conjunction with the "CALIBRATE" key to calibrate the unit or in conjunction with the "LOW SET" and "HIGH SET" keys to adjust the alarm settings. When used after pressing the "CALIBRATE" key, pressing the "↑" or "↓" key

will raise or lower the displayed oxygen value in .1% increments. When either of these keys are held down for more than 1 second, the display will scroll at a rate of .4% per second. When used after pressing either the "LOW SET" or "HIGH SET" keys, pressing the "↑" or "↓" key will raise or lower the displayed alarm setting in 1% increments. In the alarm set mode, holding these keys down for more than 1 second will cause the display to scroll at a rate of 4% per second.

(14) **LOW SET Key-** When the keypad is unlocked, pressing the "LOW SET" key will cause the "LOW" icon to flash. The low alarm setting can then be changed using the "↑" and "↓" arrow keys. When the low alarm value is set and the "LOW SET" or "LOCK/UNLOCK" key is pressed again, the unit exits the alarm set mode and returns to normal operation. The unit will also revert to normal operation (storing the most recent alarm value) if 10 seconds elapse and no keys are pressed.

(15) **HIGH SET Key-** When the keypad is unlocked, pressing the "HIGH SET" key will cause the "HIGH" icon to flash. The high alarm setting can then be changed using the "↑" and "↓" arrow keys. When the high alarm value is set and the "HIGH SET" or "LOCK/UNLOCK" key is pressed again, the unit exits the alarm set mode and returns to normal operation. The unit will also revert to normal operation (storing the most recent alarm value) if 10 seconds elapse and no keys are pressed.

(16) **SILENT Key-** In an alarm condition, pressing the "SILENT" key will deactivate the alarm beeper, but the alarm LED and display will continue to flash. In 120 seconds, the alarm beeper will sound again. This process will be repeated until the alarm condition is cancelled. For an alarm condition to be cancelled, the concentration must be .1% higher than the alarm setting (in the presence of a low alarm condition) or .1% lower than the alarm setting (in the presence of a high alarm condition).

D External Probe

(17) **Sensor with M16 x 1.0 thread-** The sensor is designed to fit the M16x1 nut, barbed adapter or flow through head that comes with the analyzer. See the section on "Gas Sample Options for the OM-25 RME Analyzer"

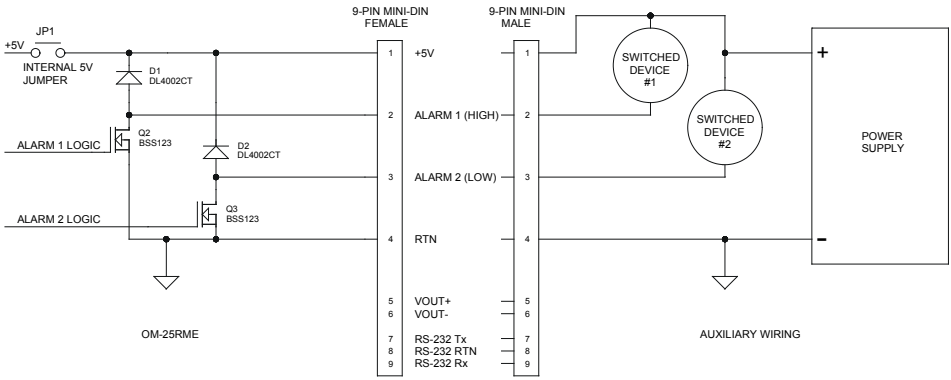
(18) **Extendible Cable-** The extendible cable allows the sensor to be positioned up to 10 feet from the side of the unit.

E Expansion Output Port

19 **Unidirectional RS-232 Output-** (Also may be called a Digital Output) uses the RS-232 protocol set to 4800 BAUD, 8 DataBits, No Parity, 1 StopBit and No flow control. When connection is made to a terminal emulater and the unit is first turned on, a header file is sent to indicate the beginning of a new Log Session. A Logging compression algorithm is used to minimize the size of file created and to conserve battery life. When the sensor output is stable the unit will only log every 10 minutes. When a change of greater or less then 0.2 $\%O_2$ occurs the unit will automatically change its log interval to once every second. After the output has stablized the log interval will revert back to once every 10 minutes. Also noted as part of file data is Alarm Activity. On the following page is a sample logging session with added notes to further clarify operation.

20 **Analog Output-** The Analog output is a varying DC voltage value that is directly proportional to $\%O_2$ being displayed. This relationship may be expressed as 10 mV/$\%O_2$ into a 1K to 1M ohm load impedance.

21 **High and Low Alarm Outputs-** Interface to the Alarm Setpoints is available with two supplied Open Drain FETs (O.D. FET rated at 100V, 170mA) configured as a active low state. This may also be called GND Start Logic where the systems share a return and the switched voltage is supplied externally. The following schematic details the actual wiring interface requirements.



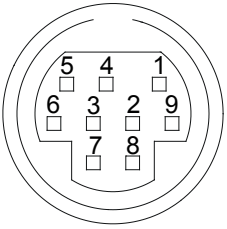
Alarm Wiring Interface

TITLE:_____

DATE:_____ ← Header File: Completed manually by operator

TIME:_____

00:00:00 20.9%
00:00:16 21.1%
00:00:34 20.9%
00:00:56 21.1%
00:01:28 20.9%
00:02:09 20.6%
00:02:10 20.8%
00:02:12 22.2% ← 99.5 % Oxygen Sampled
00:02:13 28.9%
00:02:14 39.5%
00:02:16 59.4% H-AL ← 50.0% Alarm Threshold Exceeded
00:02:17 66.8% H-AL
00:02:18 72.8% H-AL
00:02:19 77.7% H-AL
00:02:20 81.5% H-AL
00:02:21 84.6% H-AL
00:02:22 87.1% H-AL
00:02:23 89.0% H-AL
00:02:24 90.7% H-AL
00:02:25 91.9% H-AL
00:02:26 90.4% H-AL
00:02:27 91.4% H-AL
00:02:28 92.6% H-AL
00:02:29 93.5% H-AL
00:02:30 94.1% H-AL
00:02:31 94.6% H-AL
00:02:32 95.0% H-AL
00:02:33 95.3% H-AL
00:02:34 95.6% H-AL
00:02:35 95.8% H-AL
00:02:36 96.1% H-AL
00:02:38 96.4% H-AL
00:02:40 96.6% H-AL
00:02:42 96.8% H-AL
00:02:45 97.0% H-AL
00:02:49 97.2% H-AL
00:02:55 97.4% H-AL
00:03:03 98.6% H-AL
00:03:29 98.8% H-AL
00:04:53 99.4% H-AL
00:05:08 99.4% H-AL
00:05:39 99.5% H-AL ← Sample becomes stable at 99.5%
00:05:49 99.5% H-AL
00:05:53 99.4% H-AL
00:05:54 99.5% H-AL
00:05:55 99.1% H-AL
00:05:56 97.1% H-AL ← 20.9 % (Air) Sampled
00:05:57 94.2% H-AL
00:05:58 87.5% H-AL
00:05:59 78.7% H-AL
00:06:00 69.4% H-AL
00:06:01 61.1% H-AL
00:06:02 53.9% H-AL
00:06:03 48.1% H-AL
00:06:05 39.6%
00:06:06 36.6%
00:06:07 34.3%
00:06:08 32.5%
00:06:09 30.9%
00:06:10 29.8%
00:06:11 28.9%
00:06:12 28.2%
00:06:13 27.5%
00:06:14 27.1%
00:06:15 26.8%
00:06:16 26.5%
00:06:17 26.2%
00:06:18 26.1%
00:06:19 25.9%
00:06:21 25.6%
00:06:24 25.4%
00:06:28 25.2%
00:06:34 24.8%
00:06:35 24.4%
00:06:36 24.1%
00:06:38 24.0%
00:06:42 23.7%
00:06:46 23.5%
00:06:50 23.3%
00:06:56 23.6%
00:06:57 23.4%
00:07:01 23.2%
00:07:05 23.0%
00:07:09 22.8%
00:07:18 22.6%
00:07:24 22.9%
00:07:25 22.4%
00:07:36 22.2%
00:07:52 21.7%
00:07:56 21.5%
00:08:13 21.3%
00:08:49 21.1%
00:10:00 21.0%
00:20:00 20.9%
00:30:00 20.8% ← Sample becomes stable at room air
00:40:00 21.0%
00:50:00 20.9%
00:60:00 20.9%



9 PIN MINI-DIN

9 PIN MINI-DIN PIN NO.	FUNCTION	DESCRIPTION
7	RS-232 TX	RS-232 OUTPUTS
9	RS-232 RX	
8	RS-232 RTN	
6	VOUT -	ANALOG OUTPUTS
5	VOUT +	
1	+5V	ALARM OUTPUTS
2	ALARM 1 H	
3	ALARM 2 L	
4	RTN	

EXPANSION OUTPUT PORT PIN LEGEND

1.3 MAX-250E Oxygen Sensor

MAX-250E oxygen sensors offer quick response, stability and extra life on the order of 900,000 percent hours.

The MAX-250E is a galvanic, partial pressure sensor that is specific to oxygen. It consists of two electrodes (a cathode and an anode), a teflon membrane and an electrolyte. Oxygen diffuses through the teflon membrane and immediately reacts electrochemically at a gold cathode. Concurrently, oxidation occurs electrochemically at a lead anode, generating an electrical current and providing a voltage output. Electrodes are immersed in a unique gelled weak acid electrolyte which is responsible for the sensors long life and motion insensitive characteristic. Since the sensor is specific to oxygen, the current generated is proportional to the amount of oxygen present in the sample gas. When no oxygen is present, there is no electrochemical reaction and therefore, negligible current is produced. In this sense, the sensor is self-zeroing.

CAUTION: The Maxtec MAX-250E oxygen sensor is a sealed device containing a mild acid electrolyte, lead (Pb), and lead acetate. Lead and lead acetate are hazardous waste constituents and should be disposed of properly, or returned to Maxtec for proper disposal or recovery.

CAUTION: Do not use ethylene oxide for sterilization. Do not immerse the sensor in any cleaning solution, autoclave or expose the sensor to high temperatures.

Do not throw away. Dispose of properly in accordance with local regulations.

2.0 SET-UP PROCEDURE

2.1 Battery Installation

All MAXO2® units are powered by two, AA, alkaline batteries (2 x 1.5 Volts) and are shipped without the batteries installed. The battery compartment is accessible from the back side of the unit. To install the batteries:

1) With the thumb, press down on the center of the battery compartment cover and slide the cover off of the instrument case.

2) Install the two, AA, alkaline batteries (2 x 1.5 Volts) in the unit, observing the orientation shown on the label inside the compartment

3) Slide the battery compartment cover back onto the case. Make sure the tabs on the cover snap into position, securing the cover flush against the case.

When batteries are installed in the MAXO2®, the unit initiates a self-diagnostic test. All segments of the LCD readout are turned on for approximately 2 seconds. On OM-25RME units, the alarm beeper sounds and the high and low alarm LEDs are illuminated. When the diagnostic test is completed successfully, the word “CAL” will appear on the display, indicating that the unit is ready for calibration.

2.2 Calibrating the MAXO2® Monitor

2.2.1 Before You Begin

A protective film covering the threaded sensor face must be removed; wait approximately 20 minutes for the sensor to reach equilibrium. Next, the MAXO2® Oxygen Monitor should be calibrated. Thereafter, Maxtec™ recommends calibration on a weekly basis. However, more frequent calibration will not adversely affect product performance.

More frequent calibration is recommended when:

- Calibration of the instrument should be performed when the temperature of the gas stream changes by more than 3 degrees Celsius.

- Changes in elevation result in calibration error of approximately 1% of reading per 250 feet. In general, calibration of the instrument should be performed when the geographic elevation at which the product is being used changes by more than 500 feet.

The sensor is best calibrated while mounted in the industry standard, 15mm I.D. “T” adapter. As in normal operation, the oxygen sensor responds best when installed in a vertical position with the sensor facing down.

In addition, calibration is recommended if the user is unsure when the last calibration procedure was performed or if the measurement value displayed is in question.

It is best to calibrate the MAXO2® Monitor to a known oxygen documented concentration which has been documented at a pressure and flow similar to your application. Calibrating the MAXO2® at lower concentrations with a known oxygen value is also acceptable and may provide additional accuracy if the calibration gas is closer to the environment in which the MAXO2® will be used. A “known” value of oxygen is defined as an oxygen source which has a traceable certificate and / or USP certification.

Note: Before beginning calibration the MAX-250E sensor must be in thermal equilibrium. You may also need to be aware of other factors which affect device calibration values. For more information, refer to "Factors Influencing Calibration and Performance" in this manual.

2.2.2 To Calibrate the MAX02® Monitor

1) Place the external probe in a stream of gas of known oxygen concentration. Expose the sensor to the calibration gas at a regulated pressure and flow.

2) Using the "ON/OFF" key, make sure the unit is in the power on mode.

3) Allow the oxygen reading to stabilize. This will normally take about 30 seconds or more.

4) Press the "LOCK/UNLOCK" key to unlock the keypad. The "LOCKED" icon will disappear from the display.

5) Press the "CALIBRATE" key on the keypad. The word "CAL" will appear on the display for about 1 second and then the "%" sign will start to flash.

6) Use the "↑" and "↓" arrow keys to adjust the displayed oxygen concentration to the level of the known concentration. Pressing the arrow keys changes the value in .1% increments. If the keys are held down for more than 1 second the display will scroll at a rate of .4% per second.

Note: If 10 seconds elapse between key actuations, the system will store the latest calibration value and will revert to normal operation. If this occurs inadvertently, simply repeat the calibration procedure.

7) When the calibration value is set, press the "CALIBRATE" or "LOCK\UNLOCK" key again to accept the calibration setting and return to normal operation.

Note: If the message "CAL," followed by the message "Er" flashes on the display after entering the desired calibration value, the system has determined that the entered value will not allow operation within the specified output range of the sensor. This situation may occur if:

a) the operator has inadvertently entered the wrong concentration for the calibration gas.

b) the concentration of the calibration gas is not correct.

c) the sensor is in need of replacement.

d) the operator attempted to adjust the monitor before allowing sufficient time for the calibration gas to purge out the previous sample.

e) the flow and pressure of the calibration gas was not properly regulated.

ATTENTION: Check these items and repeat calibration. If calibration error continues to occur, contact the service department of the distributor from which the unit was purchased, or you may call Maxtec's Customer Service Department directly.

2.2.3 Automatic Calibration to Room Air

The MAXO2® Monitor can quickly be calibrated to room air (20.9%) using a quick-key shortcut command. This function saves time by setting the calibration value to 20.9% without scrolling the display.
To use this function:

1) Place the external probe in room air.

2) Press the "LOCK\UNLOCK" key to unlock the keypad.

3) Press and hold down the "CALIBRATE" key. When the "%" sign starts to flash, press the "↓" arrow key to set the calibration value to 20.9%.

4) Release both the "CALIBRATE" key and the "↓" key.

The unit will automatically enter the "LOCKED" condition and return to normal operation.

2.2.4 Factors Influencing Calibration

The primary factors influencing the MAXO2® Monitor are temperature, pressure, and humidity.

Effects of Temperature

The MAXO2® Monitor will hold calibration and read correctly within A3% when in thermal equilibrium within the operating temperature range. The device must be thermally stable when calibrated and allowed to thermally stabilize after experiencing temperature changes before reading are accurate. For these reasons, the following is recommended:

1) Allow adequate time for the sensor to equilibrate to a new ambient temperature.

2) For best results, perform the calibration procedure at a temperature close to the temperature where analysis will occur.

Pressure Effect

Readings from the MAXO2® Monitor are proportional to the partial pressure of oxygen. The partial pressure is equal to the concentration times the absolute pressure. Thus the readings are proportional to the concentration if the pressure is held constant. Flow rate of sample gas can affect pressure at the sensor in that back pressure at the sensing point may change. For these reasons, the following is recommended:

1) Calibrate the MAXO2® Monitor at the same pressure as the sample gas.

2) If sample gases flow through tubing, use the same apparatus and flow rates when calibrating as when measuring.

3) The MAXO2® Monitor oxygen sensor has been validated at pressures up to 2 atmospheres absolute. Calibration or operation above this pressure is beyond the intended use.

Humidity Effect

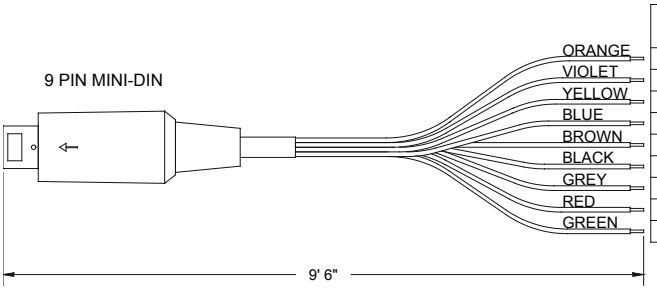
Humidity has no effect on the performance of the MAXO2® Monitor other than diluting the gas, as long as there is no condensation. Depending on the humidity, the gas may be diluted by as much as 4%, which proportionally reduces the oxygen concentration from the dry concentration. Environments where condensation may occur are to be avoided since condensate may obstruct passage of gas to the sensing surface, resulting in erroneous readings and slower response time. For this reason, the following is recommended:

1) Avoid usage in environments greater than 95% relative humidity.

2.2.5 Expansion Output Port

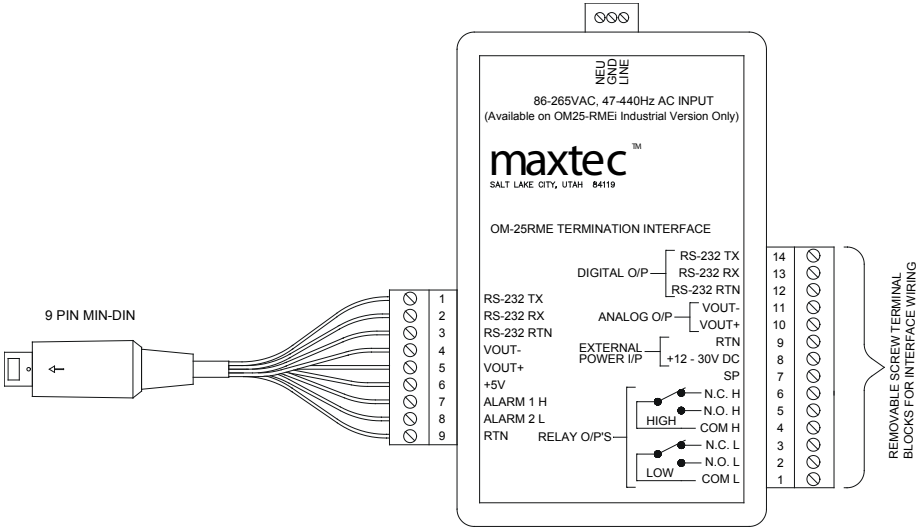
The Expansion Output port becomes active as soon as the batteries are placed in the unit and the unit is turned on. The following are general quidelines and information on the available Expansion Output Port accessories.

R212P51 Multi-Function Cable:



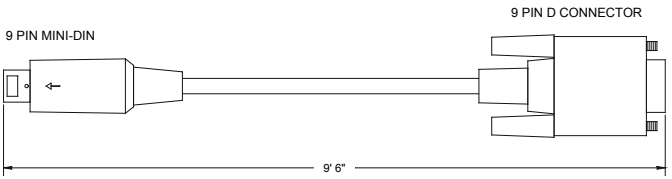
FUNCTION	DESCRIPTION
RS-232 TX	RS-232 OUTPUTS
RS-232 RX	
RS-232 RTN	
VOUT -	ANALOG OUTPUTS
VOUT +	
+5V	ALARM OUTPUTS
ALARM 1 H	
ALARM 2 L	
RTN	

The Muti-Function Cable is a 9-pin mini din to wire pigtail allowing easy access to the three featured options outlined under the component description. The following diagram outlines the wiring interface.



R212P53 Termination Interface Enclosure:
The Termination Interface Enclosure provides the same features as the Multi-Function Cable with the addition of removable screw terminal blocks and isolated relay contacts for high and low alarms. The relay contacts are rated at 8A, 250V DC. The OM-25RMEi version comes with an A.C. power cable that plugs into the top of the enclosure. With A.C. applied to the enclosure the batteries internal to the OM-25RMEi now act as a battery backup. This is an important feature that helps retain all calibration data and alarm setting information in the event that A.C. power is lost. The fixed label on the front of the enclosure further identifies all interface connections.

R212P52 Computer Interface Cable:
To simplify connection to a PC (Personal Computer), the Computer Interface Cable will plug into the OM-25RME and to an available 9 pin serial port on the PC. With the cable in place the OM-25RME will output continuously to the PC. This feature will be useful for data collection where the user may wish to record the output of the monitor over a given period of time. See the OPERATING INSTRUCTIONS section 3.4 for help on setting up a Hyper Terminal Session in Windows 95/98 for this purpose.



3.0 OPERATING INSTRUCTIONS

3.1 Alarm Setting Procedure

3.1.1 Low Alarm Setting

To adjust the low alarm setting:

1) Press the “LOCK/UNLOCK” key to unlock the keypad.

2) Press the “LOW SET” key. The “LOW” icon will start to flash.

3) Use the “↑” and “↓” arrow keys to set the low alarm to the desired value. Pressing the arrow keys changes the value in 1% increments. If the keys are held down for more than 1 second the display will scroll at a rate of 4% per second.

Note: If 10 seconds elapse between key actuations, the system will store the latest low alarm value and will revert to normal operation. If this occurs inadvertently, simply repeat the alarm setting procedure.

The low alarm value cannot be set lower than 18%, nor can it be set closer than 1% from the high alarm value due to ASTM specifications (special applications requiring alarms below 18% can be accomodated by the model OM-25MEL Monitor). For example, if the high alarm is set at 25%, the system will not accept a low alarm setting greater than 24%.

4) When the low alarm value is set, press the “LOW SET” or “LOCK/UNLOCK” key again to accept the low alarm setting and return to normal operation.

Note: To automatically set the low alarm to 18% without scrolling the display, hold the “LOW SET” key down and press the “↓” arrow key when the “LOW” icon is flashing.

3.1.2 High Alarm Setting

To adjust the high alarm setting:

1) Press the “LOCK/UNLOCK” key to unlock the keypad.

2) Press the “HIGH SET” key. The “HIGH” icon will start to flash.

3) Use the “↑” and “↓” arrow keys to set the high alarm to the desired value.

The high alarm value cannot be set closer than 1% from the low alarm value due to ASTM specifications. For example, if the low alarm is set at 50%, the system will not accept a high alarm setting less than 51%. Setting the high alarm to 100% turns off or deactivates the high alarm.

4) When the high alarm value is set, press the "HIGH SET" key again to accept the high alarm setting and return to normal operation.

Note: To automatically set the high alarm to 50% without scrolling the display, hold the "HIGH SET" key down and then press the "↓" arrow key when the "HIGH" icon is flashing. To automatically turn off the high alarm or set it to 100%, hold the "HIGH SET" key down and then press the "↑" arrow key when the "HIGH" icon is flashing.

3.2 Basic Operation

To check the oxygen concentration of a sample gas:

1) Place the external probe in the sample gas stream. When using a standard "T" adapter, make sure the sensor is mounted in the adapter with the flow diverter pointing downward. This will prevent moisture from draining into the sensor membrane.

Note: It is important that a tight fit exists between the probe and the "T" adapter.

2) Initiate flow of the sample gas to the sensor.

3) Using the "ON/OFF" key, make sure the unit is in the power on mode.

4) Allow the oxygen reading to stabilize. This will normally take about 30 seconds or more.

3.3 Alarm Conditions

In the event of either a low alarm or high alarm condition, the corresponding LED will begin to flash, accompanied by the alarm beeper. Pressing the "SILENT" key will deactivate the buzzer but the LED and the alarm value digits on the display will continue to flash until the alarm condition has been rectified. If the alarm condition still exists 120 seconds after silencing the alarm beeper, the beeper will start to sound again.

A low alarm condition will remain until the actual concentration is .1% higher than the low alarm setting. A high alarm condition will remain until the the actual concentration is .1% lower than the high alarm setting.

3.4 HyperTerminal for Windows 95/98

The following instructions assume some familiarity with Personal Computers and the Windows 95/98 Operating system:

1) The first step is to verify Hyper Terminal has been installed on the PC. The default location is under Start\Programs\Accessories there should be an Icon called HyperTerminal. If the Icon is not present install HyperTerminal from the master Win 95/98 CD-ROM that came with the computer, proceed to Step 2. If Hyper Terminal has been loaded proceed to Step 3.

2) With the Win 95/98 CD-ROM loaded open Start\Setup\Control Panel and double click on Add/Remove Programs, then Click on the Windows Setup Tab. A number of components should be displayed, double click on Communications. The sub-components of communications should now be displayed with HyperTerminal being an option. Click the check box in front of HyperTerminal and then the OK box twice. Then the "Insert Windows 95/98 CD into your CD-ROM" message should appear. Click OK and the program should now begin to install. After install do a clean reboot before configuring a new HyperTerminal Session.

3) To configure a new HyperTerminal Session open Start\Programs\Accessories and double click on the Icon called HyperTerminal. A Windows Box should appear with a number of Icons. Double click on the one called Hypertrm. A New Connection Window should appear. Name this session OM-25RME and hit enter. A Phone Number Window should appear. Select the down arrow on the option "Connect using" and select "Direct to Com 1" option or the free chosen Com Port followed with OK. A COM x Properties Windows should appear. Change the variables to;

    - Bits per second: 4800
    - Data bits: 8
    - Parity: None
    - Stop bits: 1
    - Flow control: None

    and then select OK.

    With the cable connected from the OM-25RME to the PC a Terminal connection has been made. Press the ON/OFF switch on the OM-25RME and a Header should appear followed by 00.00.00 20.9% in the HyperTerminal display window. Now the collected data can be cut and pasted into other Windows application to make essential calculations or charts for analysis.

4.0 SENSOR REMOVAL AND REPLACEMENT

The OM-25RME is shipped with a new MAX-250E oxygen sensor installed. Although the sensor has a very long expected life, eventually the sensor will require replacement. Removing or installing a sensor, when necessary, is a very simple procedure. To remove and install a new sensor:

1) Grasp the sensor in one hand and, with the other hand, unscrew the cable connector counter-clockwise at the sensor.

2) Pull out the cable connector plug from the expired sensor.

3) Unscrew the flow diverter from the sensor and discard the expired sensor.

Note: The sensor contains lead and lead acetate, be sure to dispose of expired sensors in accordance with hospital, local, state and federal regulations.

4) Remove the new sensor from the packaging and remove the protective film from the sensor face.

5) Insert the cable connector plug into the receptacle of the new sensor and tighten the cable connector.

6) Screw the flow diverter onto the new sensor.

7) Wait approximately 20 minutes for the sensor to reach equilibrium.

8) Calibrate the new sensor.

 Do not throw away. Dispose of properly in accordance with local regulations.

Note: If the monitor is on when the sensor is detached and replaced, the monitor will automatically force a re-calibration. The display will read CAL.

5.0 PROBLEM SOLVING

- If the LCD readout is completely blank, the batteries are either not installed or they are in need of replacement.

- If the “LOW BAT” icon is displayed on the LCD readout at any time, the batteries should be replaced as quickly as possible.

- When the unit is in the power on mode and the LCD displays “000%,” the sensor is not connected properly. The “ATTACH SENSOR” icon will also appear on the display. Check the sensor connection and if the condition persists, contact Maxtec’s Customer Service Department.

- If, at any time, “ErX” (i.e. Er1, Er4, etc.) appears on the LCD readout, contact Maxtec’s Customer Service Department.

6.0 CLEANING AND MAINTENANCE

- When cleaning or disinfecting the MAXO2® Monitor, take appropriate care to prevent any solution from entering the instrument.

- The MAXO2® Monitors surface may be cleaned using a mild detergent and a moist cloth.

- The MAXO2® Monitor may be disinfected using standard topical disinfectants.

- The MAXO2® Monitor is not intended for steam, ethylene oxide or radiation sterilization.

- Store the MAXO2® Monitor in a temperature similar to its ambient environment of daily use.

7.0 SPECIFICATIONS

7.1 Base Unit Specifications

Measurement Range:	0-100%
Resolution:	0.1%
Accuracy and Linearity:	±1% of full scale at constant temperature, R.H. and pressure when calibrated at full scale.
Total Accuracy:	±3% Actual Oxygen Level over full operating temperature.
Response Time:	90% of final value in approximately 15 seconds at 23LC

Warm-up Time:	none required
Operating Temperature:	15LC - 40LC (59LF - 104LF)
Storage Temperature:	-15LC - 50LC (5LF - 122LF)
Humidity:	0-95% (non-condensing)
Power Requirements:	2, AA Alkaline batteries (2 X 1.5 Volts)
Battery Life:	approximately 1500 hours in typical use (not in alarm conditions or with constant RS232 output)
Low Battery Indication:	“LOW BAT” icon displayed on LCD
Sensor Type:	Maxtec MAX-250E galvanic fuel cell
Expected Sensor Life:	>900,000% O2 Hours over 2 years in typical applications
Alarm System:	high/low alarms, flashing red LEDs, nominal 2300Hz audible alarm beeper
Low Alarm Range:	0%-98% (>1% lower than high alarm)
High Alarm Range:	1%-99% (>1% higher than low alarm)
Alarm Accuracy:	exact to displayed alarm value
Dimensions:	3.5”(W) x 5.5”(H) x 1.5”(D) [89mm x 140mm x 38mm]
Weight:	approximately .92 lbs. (417g)
Cable Length:	10 ft. (3m) fully extended
Diverter Fitting:	fits industry standard, 15 mm “T” adapter
RS-232 output:	Unidirectional output fixed baud rate - 4800
Analog output:	1VDC Full Scale into 1K-1M ohm load impedance.
High and Low Alarms:	O.D. FET, active Low outputs

8.0 APPLICATIONS

8.1 Calibration Techniques in Pressurized Systems

Similar to other oxygen sensors, the Maxtec Max series sensors measure the partial pressure of oxygen in a gas stream. This is correlated to read "percent oxygen" on the MAXO2® Monitors. It is important to note that the sensor output is directly proportional to the pressure of oxygen. Thus, one must take into consideration the effect of exposing the sensor to various gas sample pressures.

For example, if a monitor is calibrated to read 20.9% in ambient air (atmospheric pressure) and then exposed to a pressurized gas sample containing a known concentration of oxygen, the monitor will display a reading greater than the actual oxygen percentage. This is because the monitor was originally calibrated at atmospheric pressure (0 psig) then exposed to a higher pressure sample (eg, 5 psig). The greater the difference in pressure, the greater the difference in sensor signal (oxygen reading on the monitor).

By the same token, if a monitor is calibrated on a pressurized gas sample containing a known concentration of oxygen and then exposed to ambient air (atmospheric pressure), the monitor will display a reading less than the actual oxygen percentage.

To avoid confusion, the monitor can be calibrated at a single point on a gas stream similar to the application. If, for example, the purpose of the monitor is to measure oxygen in a concentrator or anesthesia application, the optimal results may be attained by calibrating the instrument on a gas of similar concentration and pressure. This would typically be done by connecting to a cylinder of a known high concentration of oxygen calibration gas and adjusting the flow and pressure to match the application before calibrating the instrument.

8.2 Calibration Errors

The MAXO2® Monitors have a self test feature built into the software to detect faulty calibrations. During calibration, if the signal from the oxygen sensor is outside the limits stored within the instrument's memory, a flashing "CAL Er" is displayed. The error code is displayed to indicate that either the sensor should be replaced or that there is a fault in the calibration process. A few simple hints can prevent calibration errors.

If you try to adjust the monitor display before the reading has stabilized, the "CAL Er" may appear. For example, if the monitor had just been calibrated on

a known high concentration of oxygen source gas and then exposed to ambient air, you should wait until the reading has stabilized. If you try to adjust the display to read 20.9% before the sample line has cleared of high concentration O2, the sensor may actually be exposed to residual high % oxygen. The signal from the sensor would still be high and considered “out of spec” for air, thus resulting in a “CAL Er”. The proper procedure is to wait for the reading to stabilize before adjusting the display. This may take 30 seconds or more.

Externally mounted sensors, as found on the OM25-RME come equipped with diverter tips. The tips help direct the gas in a “T” fitting up to the sensor for analysis. The diverter tips should be only used with a flowing gas. When calibrating in a non-flowing environment, remove the diverter tip.

8.3 Atmospheres of High Humidity

The MAXO2® Monitor can be used in applications where the relative humidity of the sample gas ranges from 0 to 95%, non-condensing. However, it should be noted that water vapor exerts its own pressure in the same manner as oxygen does in a sample gas stream.

For example, if the monitor is calibrated in dry gas and then the gas is humidified, the monitor will correctly display a reading which is slightly lower than previously displayed. This is due to the dilution of oxygen in the sample gas by water vapor.

This fact is important to note in systems where there exist both “wet” and “dry” gas streams such as in a ventilator circuit. If the monitor is measuring oxygen on the “dry side” of the ventilator, it will correctly indicate an oxygen concentration slightly greater than actually found in the “wet side” (delivered to the patient). The water vapor has diluted the gas stream.

Additionally, gas streams of high humidity may tend to condense on the sensor. Condensation on the sensor may eventually affect performance. For this reason, it is recommended that the sensor be mounted in a vertical position, facing downward to prevent condensate from flowing onto the sensing surface.

9.0 SPARE PARTS AND ACCESSORIES

Part Number	Item
R125P03-002	Max-250E Sensor
R212P91	Battery Cover
R103P16	Monitor/Analyzer External Cable
R212P17	Keypad
R212P10	LCD Display
R212P30-001	PCBA Board
R212P31	PCBA Expansion Board

Accessories

R106P15	Concentrator Adapter for Sensor Probe
RP205P86	Monitor/Analyzer Wall Mount Bracket
R206P75	Monitor/Analyzer Pole Mount Clamp
R213P02	Monitor/Analyzer Protective Carrying Case
R213P31	Swivel Mount Stand
RP16P02	“T” Adapter (15 mm I.D.)
RP16P10	“T” Oxygen Sensor Activator System
R213M48	OM-25RME Manual (OM-25RMEi)
R212P51	Multi-Function Cable
R212P53	Termination Interface Enclosure
R212P52	Computer Interface Cable
RP59P03	1.5V AA Lithium battery
R212M66	Technical Service Manual

Although normal usage will not require repair, Maxtec will make available, on request, diagrams, descriptions and instructions to assist user’s appropriately qualified technical personnel in repairing and replacing broken or worn components.

Included With Your Unit:

Part Number	Description	RME	RMEi
R101P01	M16 FLOW THRU HEAD	X	X
R205P86	WALL MOUNT, ANALYZER	X	X
R213M48	MANUAL, OM-25RME	X	X
RP27P02	POWER ADAPTER, 9V	X	
RP02P04	AC CORD SET, NEMA 5-15P PLUG		X
R100P92-002	TUBING, PVC, CLEAR, 3/8" OD 18"	X	X
R106P01-005	ADAPTER, CONCENTRATOR MOLDED	X	X
R212P52	CABLE, OM-25RME COMP INTERFACE	X	
R212P51	CABLE, OM-25RMEi TERMINATION INT		X
R214P03	SUB ASSY, TERMINATION INTERFACE		X

10.0 WARRANTY

The MAXO2® Monitor is designed for medical oxygen delivery equipment and systems. Under normal operating conditions, Maxtec warrants the MAXO2® Monitor to be free from defects of workmanship or materials for a period of two (2) years from the date of shipment from Maxtec, provided that the unit is properly operated and maintained in accordance with Maxtec's operating instructions. Based on Maxtec's product evaluation, Maxtec's sole obligation under the foregoing warranty is limited to making replacements, repairs, or issuing credit for equipment found to be defective. This warranty extends only to the buyer purchasing the equipment directly from Maxtec or through Maxtec's designated distributors and agents as new equipment.

Maxtec warrants the Max-250E oxygen sensor in the MAXO2® Monitor to be free from defects in material and workmanship for a period of two (2) years from Maxtec's date of shipment in a $MAXO_2$® unit. Should a sensor fail prematurely, the replacement sensor is warranted for the remainder of the original sensor warranty period.

Routine maintenance items, such as batteries, are excluded from warranty. Maxtec and any other subsidiaries shall not be liable to the purchaser or other persons for incidental or consequential damages or equipment that has been subject to abuse, misuse, mis-application, alteration, negligence or accident. **These warranties are exclusive and in lieu of all other warranties, expressed or implied, including warranty of merchantability and fitness for a particular purpose.**