



Air Check ✓ O₂ Deficiency Monitor

Instruction Manual



PureAir Monitoring Systems, Inc.

557 Capital Drive
Lake Zurich, Illinois 60047
Phone: 847-726-6000
Fax: 847-726-6051
Toll-Free: 888-788-8050
pureairemonitoring.com

Please Read Before Installation

The following will damage the Air Check Oxygen monitor.

1. The Air Check O₂ monitor requires **24 VDC regulated power**. **Please Do Not connect** the monitor to any voltage that exceeds 24 Volts DC, or **ANY AC Voltage**.

2. Do not power the Air Check Oxygen monitor with the oxygen sensor unplugged from the main PC board. **Do Not Connect** the O₂ sensor to the PC board while the monitor is powered. This Will Damage the O₂ sensor.

3. When calibrating or challenging the Air check O₂ Ex monitor,
 - a. Do not expose the monitor to flow rates that exceed ½ liter per minute, (500 cc per minute) flow.

 - b. Please open the valve on the span gas cylinder before connecting the tubing to the Oxygen monitor to prevent a flow fault.

 - c. Expose the monitor to span gas blends that consist of Oxygen and Nitrogen only.
Do Not expose the monitor to any combustible gas, i.e. Methane, Hydrogen, etc. Exposure to combustible span gases can damage the oxygen zirconium sensor cell.
Contact PureAire for questions about specific applications

4. Do not expose the Oxygen monitor to silicone compounds. They can cause a loss of sensitivity.

5. When using the ambient, (non-extractive) Air Check O₂ monitor, Do not expose the oxygen sensor directly to a water stream. In areas requiring wash downs, cover and protect the monitor. Contact PureAire for details on a waterproof enclosure.

Table of Contents

1: Introduction	2
1.1 Key Features	2
1.2 Component identification	3
2: Specifications	9
2.1 Performance Specifications	9
2.2 Gas Detection System.....	9
2.3 Signal Outputs	9
2.4 Electrical Requirements	9
2.5 Physical Characteristics	9
2.6 System Default Factory Settings	10
3: Installation	11
3.1 Site Requirements	11
3.2 Mounting.....	11
3.3 Wiring	12
3.4 Initial Startup	12
4: Normal Operation.....	13
4.1 Signal Outputs	13
4.2 Instrument Faults	13
4.3 Routine Maintenance Schedule	14
4.4 Loss of Power Indicator	14
4.5 Alarm Reset	14
5: Air Check O ₂ Monitor Programming	16
5.1 Joystick Operation	16
5.2 Program Flowchart	17
5.3 Entering the Password	20
5.4 Entering the Menus	21
5.4.1 Set 4-20mA Loop	21
5.4.2 Set Formats	23
5.4.3 Set Alarm Threshold Polarity	25
5.4.4 Set Latching	27
5.4.5 Set Alarm Delay	30
5.4.6 Set Zero Suppression.....	31
5.4.7 Set Alarm Thresholds	31
5.4.8 Set Alarm Hysterisis	33
5.4.9 Set Sensor Adjust.....	35
5.4.10 Main Operation Mode.....	36
6: Maintenance & Cell Verification	37
6.1 Sensor Verification.....	37
6.2 Sensor Verification Procedure	38
7: Appendix	41

1: Introduction

The *Air Check* ✓O₂ Deficiency Monitor is a compact gas monitoring system that's ideal for the continuous monitoring of inert gas storage areas, confined spaces, and other locations where low oxygen levels may pose a hazard to personnel. Unlike electrochemical sensor cells the *Air Check* ✓O₂ zirconium cell provides stable oxygen readings even in areas where temperature and humidity levels are changing. The PureAire *Air Check* ✓O₂ Deficiency Monitor is suitable for either indoor or outdoor use.

The heart of the monitoring system is a long lasting zirconium sensor, which responds to low oxygen conditions within seconds and provides accurate measurements over a wide temperature and humidity range. The zirconium O₂ sensor cell will operate continuously for 10 or more years and requires an absolute minimum of maintenance. There are no zero or span calibration pots to adjust and when compared to disposable type sensors, our long life zirconium O₂ sensor can save up to hundreds of dollars in annual maintenance.

Ideal for continuously monitoring oxygen levels in confined spaces or areas where inert gases are used, the *Air Check* ✓O₂ Deficiency Monitor does not drift or lose sensitivity when the weather or temperature changes. The electronics are housed in a Nema 4X housing.

Each system consists of a long life zirconium oxide sensor cell and three-wire transmitter. The *Air Check* ✓O₂ monitor may be used as a stand-alone gas detector, linked to optional PureAire single and multipoint controllers, or connected to your own centralized control and surveillance system. This manual covers the installation, operation, and maintenance of the *Air Check* ✓O₂ deficiency monitor.

1.1 Key Features

The *Air Check* ✓O₂ monitor incorporates a number of user-friendly features designed to simplify installation, operation, and maintenance.

1.1.1 Long Life Zirconium Oxide O₂ Sensor

The system's O₂ sensor cell has a life of well over 10 years of continuous operation. Unlike concentration O₂ cells, PureAire's exclusive zirconium oxide sensor cell does not need an oxygen reference gas for proper operation. The *Air Check* ✓O₂ monitor can detect low oxygen levels in confined spaces and process tools without the need of a reference gas.

1.1.2 Smart Electronics

The *Air Check* ✓O₂ monitor incorporates a special electronic circuit that continuously monitors sensor operation. With the addition of the alarm relay option, any cell degradation or complete failure will immediately be detected. This smart circuitry alerts the user to sensor faults and other electrical problems that may interrupt surveillance through the standard mA signal output signal or through the optional fault relay option.

1.1.3 Calibration

The *Air Check* ✓ O₂ monitor incorporates a stable zirconium oxide sensor that rarely requires calibration. Changing barometric pressure changes or changes in temperature and humidity do not affect the zirconium oxide oxygen cell. The earth is a wonderful source of calibrated oxygen at 20.9%, therefore under ambient conditions verification of the *Air Check* ✓ O₂ monitor to 20.9% oxygen is constantly being performed. There are no zero or span pots to adjust. The O₂ monitor only requires periodic testing with nitrogen to verify the cells response to low oxygen levels. See Section 6.2 for the testing procedure to nitrogen.

1.2 Component Identification

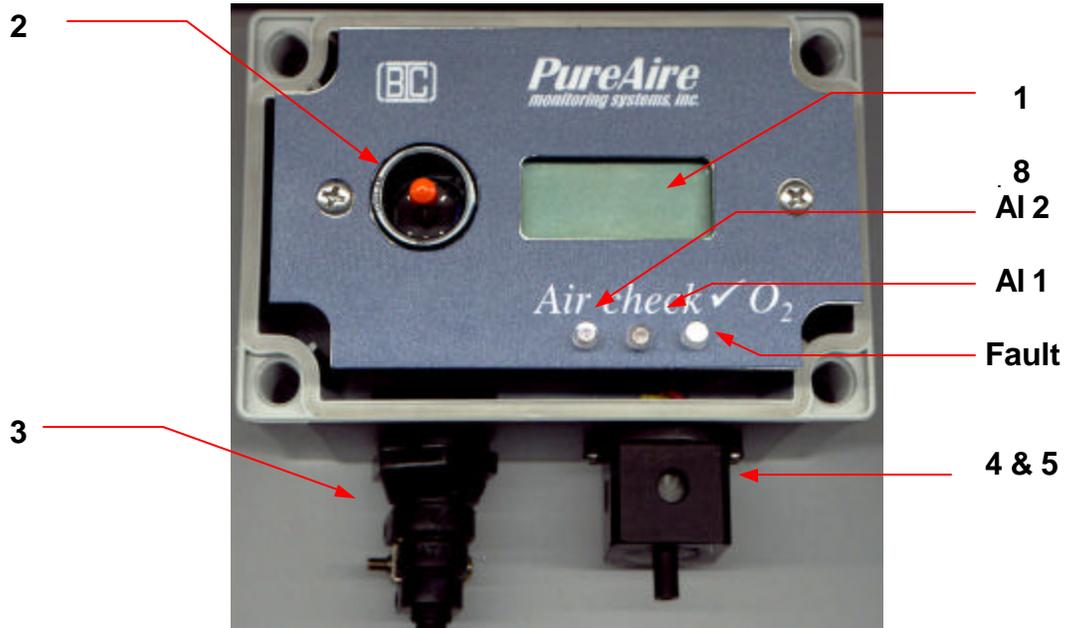
1.2.1 Front View Exterior



1. **Digital Display** — 3-digit backlit LCD digital display for showing the oxygen levels in percent.
2. **Joystick** — Used for selecting and adjusting the built-in menus. The *Air Check* ✓ O₂ monitor is available with optional dual level user selectable relays. The joystick is also used to select alarm levels, relay settings and resetting any latching visual and audio alarms.
3. **Cable Port** — This is the opening in the transmitter housing for connecting the 4-20 mA output and 24 VDC power cable.
4. **Sensor Protector**—The O₂ sensor is heated and the sensor protector shields the cell as well as provides airflow to the cell. It also has a ¼“ diameter tube fitting to permit connecting a nitrogen cylinder for testing the O₂ cell response.
5. **Oxygen Sensor** — A zirconium oxide sensor, which detects and measures the level of oxygen. When exposed to oxygen, the sensor outputs an electrical signal proportional to the actual concentration of oxygen.

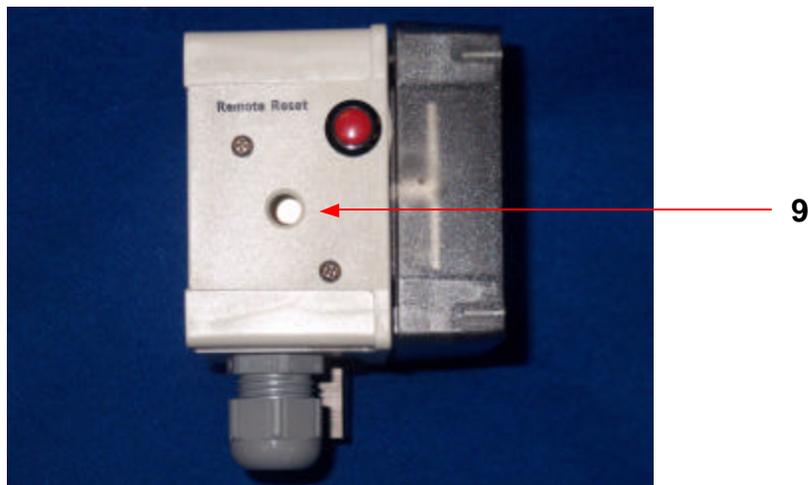
- 6. **Transmitter Cover** — A removable cover that protects the interior of the transmitter.
- 7. **Transmitter Cover Fasteners** — These captive screws secure the transmitter cover in place.

1.2.2 Front View Exterior with Relay Option



- 8. **Alarm Indicators** — 3 multi colored LED indicators for showing:
 - Alarm level 1 Orange LED
 - Alarm level 2 Red LED
 - Fault Alarm Yellow LED

1.2.3 Side View Exterior with Audio Alarm



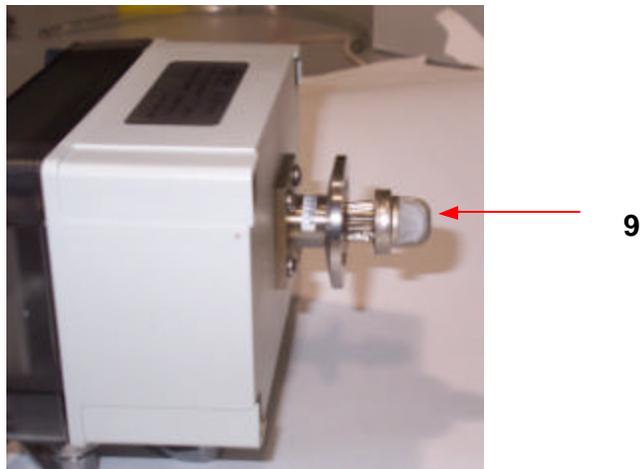
9. Audio Horn — This optional built-in horn is a 90dB high pitched audio sound that will activate when the oxygen levels go below the selected alarm thresholds. The audio alarm is non-latching and will automatically turn off when the oxygen levels go above the alarm thresholds

➔ **NOTE:** The audio alarm is an immediate alarm. Oxygen levels must recover above the alarm thresholds before the horn turns off. There is no alarm delay function or latching capability available.

1.2.4 Front view TX-1100-KF25 for vacuum chamber monitoring



Side view TX-1100-KF25 for vacuum chamber monitoring



9. KF-25 vacuum sensor assembly — Consists of the oxygen sensor cell and KF25 vacuum fitting. The vacuum sensor assembly is designed to mount directly into a mating KF-25 vacuum fitting.

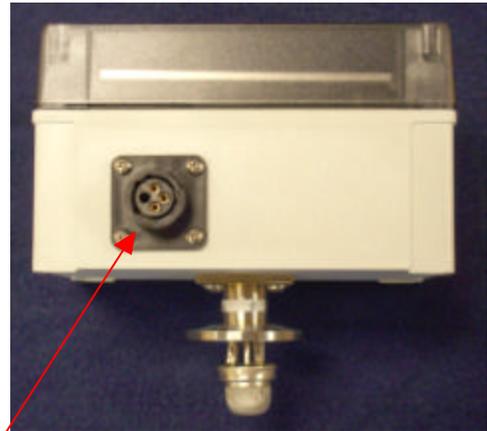
➔ **WARNING:** The Oxygen sensor cell must be handled with care. Never bounce or drop the cell. Mating the cell into the KF-25 flange will support oxygen monitor electronics and protect the cell



Oxygen cell and KF-25 flange



Oxygen monitor with KF flange attached directly to the monitor
NOTE: Cell is delicate. When mounted in the corresponding flange it is protected



Strain relief for power, analog output and alarm relay wiring

1.2.5 Front view TX-1100-DRAP for glove box mounting



Strain relief for power and relay outputs

Mounting Plate

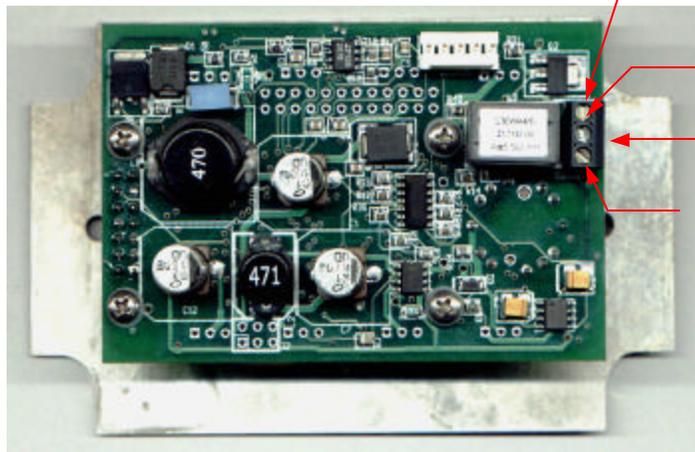


NOTE: The O-ring must be installed to insure an airtight seal.

It rests inside the O-ring groove on the bottom of the mounting plate

Oxygen monitor for glove box Bottom View

1.2.6 Transmitter Interior



1. Power Analog output Terminal Block

Common

mA output

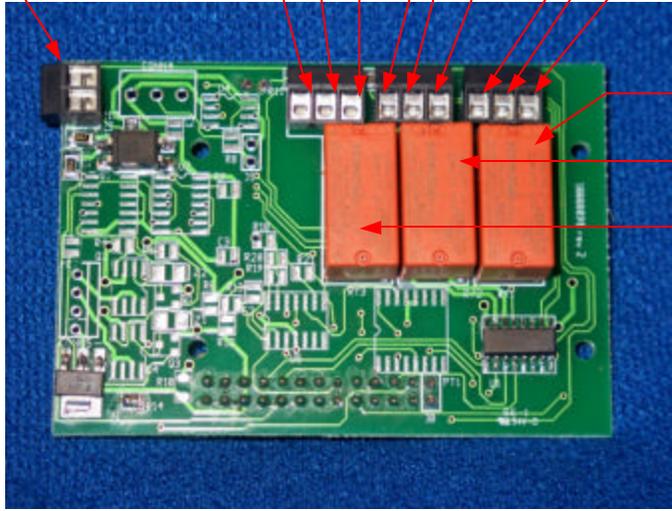
+ 24VDC

1. Power Analog Terminal Block — This terminal block is where the 24VDC power and 4-20 mA analog output connection is made.

1.2.7 Alarm Relay Board

Remote
Reset

C NC NO C NC NO C NC NO



Alarm 2 Relay Conn 1

Alarm 1 Relay Conn 2

Fault Relay Conn 3

1.2.8 Enclosure Mounting Feet



Mounting Feet
Can be oriented
in any direction

Feet can also be
removed for
mounting the O₂
monitor flush
with a wall or
other surface



2: Specifications

➔ **NOTE:** Due to our commitment to continual product improvement, all specifications are subject to change without notice.

2.1 Performance Specifications

Sensor Type:	Long Life Zirconium Oxide Sensor Cell
Response Time:	Within 1 second of any change in O ₂ .
Repeatability:	± 1% of reading
Fault Indicators:	Loss of VDC power (analog signal drops to 0 mA). Sensor cell failure: Fault relay activated. (Must have Alarm relay option for cell failure to operate)
Operating Temp:	40° to 122°F (-40° to +50°C); consult PureAire for lower or higher operating temperatures.
Humidity:	0 to 95% RH; consult PureAire for sensors which can operate in 100% condensing RH environments.

2.2 Gas Detection System

Type:	Long Life Zirconium Oxide Sensor Cell
Sensor Life:	10 + years under normal conditions.
Transmitter:	Microprocessor electronics with built-in 3-digit backlit LCD display Joystick operated menus

2.3 Signal Outputs

Standard	Analog Output:	DC 4-20 mA
Optional	Relay Output:	Dual level user selectable alarm relays and one fault relay Rated, 2amps @ 30VDC; 2amps @ 250VAC

2.4 Electrical Requirements

Power:	24 VDC external power. A regulated 24VDC power supply is required.
Consumption:	Approximately 100mA (2.4 watts)

2.5 Physical Characteristics

Dimensions:	4.9 (W) x 3 (H) x 3 (D) inches; 125 x 75 x 75 mm
Weight:	1.1 pounds (0.5 kg)
Enclosure Type:	General purpose; not intended for explosive atmospheres.

2.6 AirCheck O₂ System Default Factory settings

The *Air Check* ✓ O₂ Deficiency Monitor, when supplied with the optional Relay module, is shipped with factory defaults for the alarm relay settings. The following are the factory defaults:

Menu Function	Factory Default	Menu Defined
Alarm Thresholds	Alarm 1 = 19.5% Alarm 2 = 18% Audio = 19.5% *	At what level do you want to alarm?
Set Alarm Threshold Polarity	Alarm 1 = Inverted Alarm 2 = Inverted Audio = Inverted *	Do you want to alarm at a level higher, (normal) or lower, (inverted) than the alarm threshold?
Alarm Delay	Alarm = 5 seconds	How long do you want to wait until the alarms activate?
Set Alarm Hysterisis	Alarm 1 = 0.0 % Alarm 2 = 0.0 % Audio = 0.0 %	For use when using the O ₂ monitor for control. See Section 5.4.8
Relay Latching	Alarm 1 = Non-latching Alarm 2 = Non-latching Audio = Non-latching	Do you want the alarm to automatically reset? (non-latching) or do you want to manually reset the alarm? (latching)
Format Relay - LED State **	Alarm 1 = Normal Alarm 2 = Normal Fault = Normal	Do you want the relays to energize, (normal) or de-energize, (fail safe) when the alarm activates?

➔ **NOTE:** The built in relay settings may be changed by the user in the field. Refer to Section 5.4.2

* **NOTE:** The Audio alarm feature is optional.

** **NOTE:** The LED indicators on the front panel are connected directly to the alarm relays.

3: Installation

3.1 Site Requirements

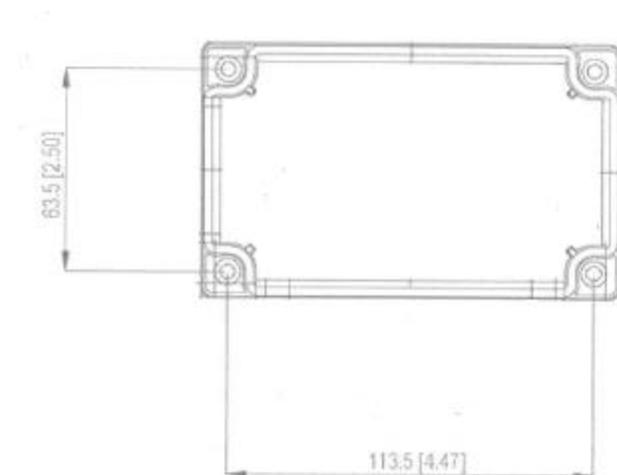
The *Air Check* ✓ O₂ monitor enclosure should be mounted in an area free of vibration and electrical noise or interference. If possible, avoid areas with high temperatures or condensing humidity.

➔ **WARNING:** *The Air Check* ✓ O₂ monitor is not designed for installation in hazardous areas. Consult PureAire for information on enclosures for use in hazardous environments.

3.2 Mounting

3.2.1 Transmitter Enclosure

The *Air Check* ✓ O₂ monitor is designed primarily for wall mounting and should be installed at a height convenient for operation, maintenance, and viewing of the instrument display. The following is a drawing of the mounting dimensions.

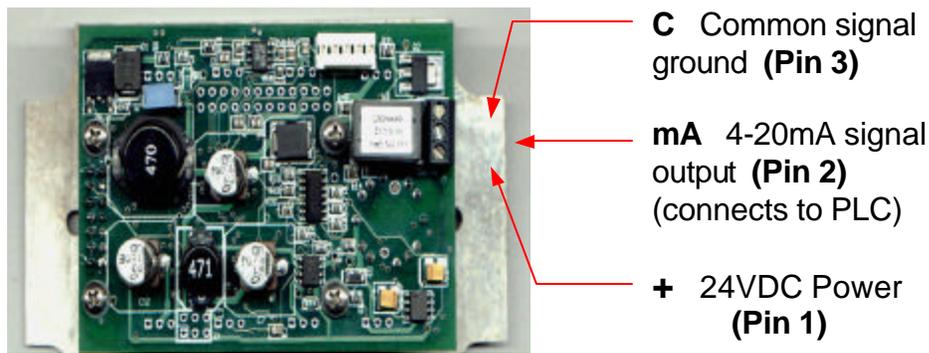


3.2.2 *Air Check* ✓ O₂ monitor

The transmitter and sensor should be installed in a location where gas leaks are likely to occur or where released gases may accumulate. It should be mounted no closer than 12 inches above floor level. Airflow within the monitored area, the characteristics of the gas (lighter or heavier than air), and the position of workstations and personnel should all be considered in determining the most suitable installation location.

3.3 Wiring

The **Air Check ✓** O₂ monitor requires a single, 3-wire shielded cable for analog output and 24 VDC power input. A three-wire shielded cable; 3-conductor, 18 AWG stranded General Cable E2203S.30.860, or equivalent is recommended for the connection. The maximum permissible cable length is 0.62 miles (1 km). The analog out and VDC power in connections are made on the terminal block inside the transmitter housing.



These connections are made as follows:

Pin #	Connection	Description
1	Power	DC +24V Input
2	Signal Out	DC 4-20mA Output
3	Common (Signal Ground)	0V

3.4 Initial Startup

Once installation of the gas detector has been completed, it is ready for startup. The following procedures should be performed before putting the instrument into operation:

1. Check the integrity of all wiring.
2. Apply 24 VDC power.

The instrument should now be powered up. Upon power up, the **Air Check ✓** O₂ monitor LCD displays the PureAire logo and then starts a 4-minute, (240 second) count down as the zirconium oxide O₂ sensor stabilizes. The monitor will output a 4 mA signal during the entire warm-up period

- ➔ **NOTE:** The **Air Check ✓** O₂ monitor requires a 4-minute warm-up before detecting oxygen.
- ➔ **NOTE:** When the **Air Check ✓** O₂ monitor is supplied with an Audio Horn, it will activate momentarily at the completion of the warm up.

**Oxygen
239 WARM**

- ➔ **NOTE:** The **Air Check ✓** O₂ monitor's reading may be adjusted to the ambient oxygen level. See section 5.4.8. for instructions on adjusting.

4: Normal Operation

The *Air Check* O₂ monitor is a single point monitor designed for the continuous detection and measurement of ambient oxygen concentration levels.

4.1 Signal Outputs

The *Air Check* ✓ O₂ monitor outputs a continuous 4-20 mA analog signal proportional to the measured concentration of oxygen. 4 mA represents 0% O₂ and 20 mA represents 25% O₂ which is the full range. In the event of a system fault, a specific factory defined code will be displayed on the local digital display. This code will indicate the exact nature of the system fault.

4.2 Instrument Faults

The *Air Check* ✓ O₂ monitor incorporates a number of self-checking features to ensure reliable operation. In the event that a fault condition is detected, the analog output signal is altered as follows:

Condition	Analog Signal
Power to transmitter lost	Analog output drops to 0 mA
Transmitter cable cut	Analog output drops to 0 mA
O ₂ Cell complete failure Fault Code 128	Analog output drops to 2 mA (0 mA on request) Fault Relay activates (Available with Relay Option Only)
O ₂ System Warm Up	Analog output drops to 4 mA Fault Relay activates and turns off when system is in the Oxygen operation mode (Available with Relay Option Only)
O ₂ Cell degrades Fault Code 128	Analog output drops to 2 mA (0 mA on request) Fault Relay activates (Available with Relay Option Only)
No Flow to the Oxygen sensor Fault Code 32	Analog output drops to 2 mA (0 mA on request) Fault Relay activates (Available with Relay Option Only)
EEPROM Fault 08	Analog output drops to 2mA (0 mA on request)

➔ **NOTE: All system faults are displayed on the front panel. Each fault has it's own specific code to identify the specific problem. Please contact PureAire whenever a fault is displayed.**

4.3 Routine Maintenance Schedule

Continuous gas detection systems depended upon to measure and detect hazardous gas leaks in the workplace requires periodic maintenance to ensure proper operation. The frequency with which this routine maintenance is required depends on the environment. The following table is intended to serve as a general guideline for routine maintenance. The conditions in your particular application, as well as your organization’s maintenance policies, will ultimately determine the best routine maintenance schedule for your equipment. Routine Visual Checks

Items to check	Check for power and proper operation
Condition / status when operating properly	Unit should be outputting a 17.37 mA signal when the oxygen level is at 20.9%. The LCD digital display should also indicate 20.9% O ₂ when the oxygen is at ambient levels.

4.3.2 Recommended Routine Maintenance Schedule

Routine Visual Checks	Every 6 - 12 months
Sensor Verification with nitrogen	Every 6 - 12 months**

** The ambient oxygen level is 20.9%; therefore, under ambient conditions verification of the *Air Check* ✓ O₂ monitor to 20.9% oxygen is constantly being performed. The O₂ monitor only requires periodic testing with nitrogen to verify the cells response to low oxygen levels. See Section 5.4.9 for how to make minor adjustments.

4.4 Loss of Power Indicator

In the event the *Air Check* ✓ O₂ monitor loses 24VDC power, the 4-20 mA analog output signal drops to 0mA. The LCD display will also display a blank screen.

4.5 Alarm Reset

If the *Air Check* ✓ O₂ monitor is supplied with the optional alarm relays, whenever the monitors alarms are activated, the built-in alarm relays, panel mounted LED’s and optional audio horn will also activate. When the relay settings are non latching, the alarm relays, LED’s and horn will automatically reset. If the relay settings are latching, then a manual reset of the alarms are required. Resetting the alarms can be performed through use of the joystick or through the use of the remote reset function.

Joystick – You must enter the password to enter the reset function. After the password is entered and accepted, push the joystick in; (enter) to reset the alarms.

Remote Reset – See Pg. 7. The alarm relay board has a two pin connector for wiring to a remote switch. When connected to a switch, this remote reset will bypass the joystick and a password will not be needed to reset the alarms.

➔ **NOTE:** The oxygen levels must recover above the alarm thresholds before the horn can be reset from the remote reset switch or joystick.

Optional Built-in reset switch – See Pg. 4. PureAire offers a built-in switch to reset the audio and visual alarms. This switch will bypass the joystick and a password will not be needed to reset the alarms.

5: Air Check ✓ O₂ Monitor Programming

The *Air Check* ✓ O₂ Deficiency Monitor is supplied with user selectable settings to adjust the alarm settings, 4 and 20mA output and minor sensor adjustments. The settings are arranged in menus that are accessed by moving the joystick. To access the menus a factory set password is used.

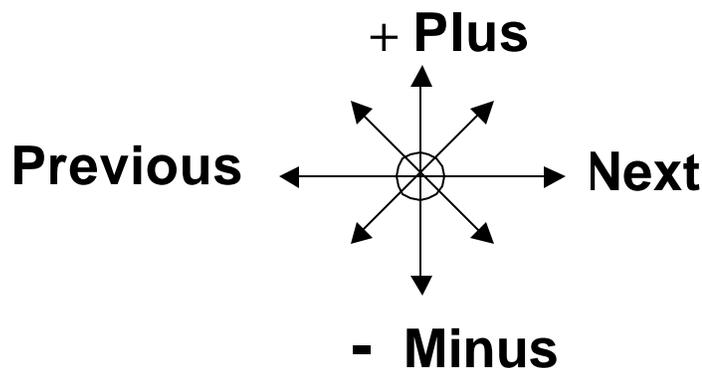
NOTE: The *Air Check* ✓ O₂ Deficiency Monitor will continuously monitor oxygen while accessing the menus. **The alarm, fault relays and mA output are all active and on line while making any changes to the menus.**

5.1 Joystick Operation

The *Air Check* ✓ O₂ monitor uses an 8-position joystick with a center pushbutton for selecting menus and changing values. The joystick is programmed to standard protocol as follows:

➡ **NOTE:** *The joystick has a built-in delay to prevent accidental tampering of the menus. deliberate entries are required.*

➡ **CAUTION:** *Only qualified personnel should perform programming, maintenance and sensor verification*



Plus – Pushing the joystick in this direction increases the value

Minus – Pushing the joystick in this direction decreases the value

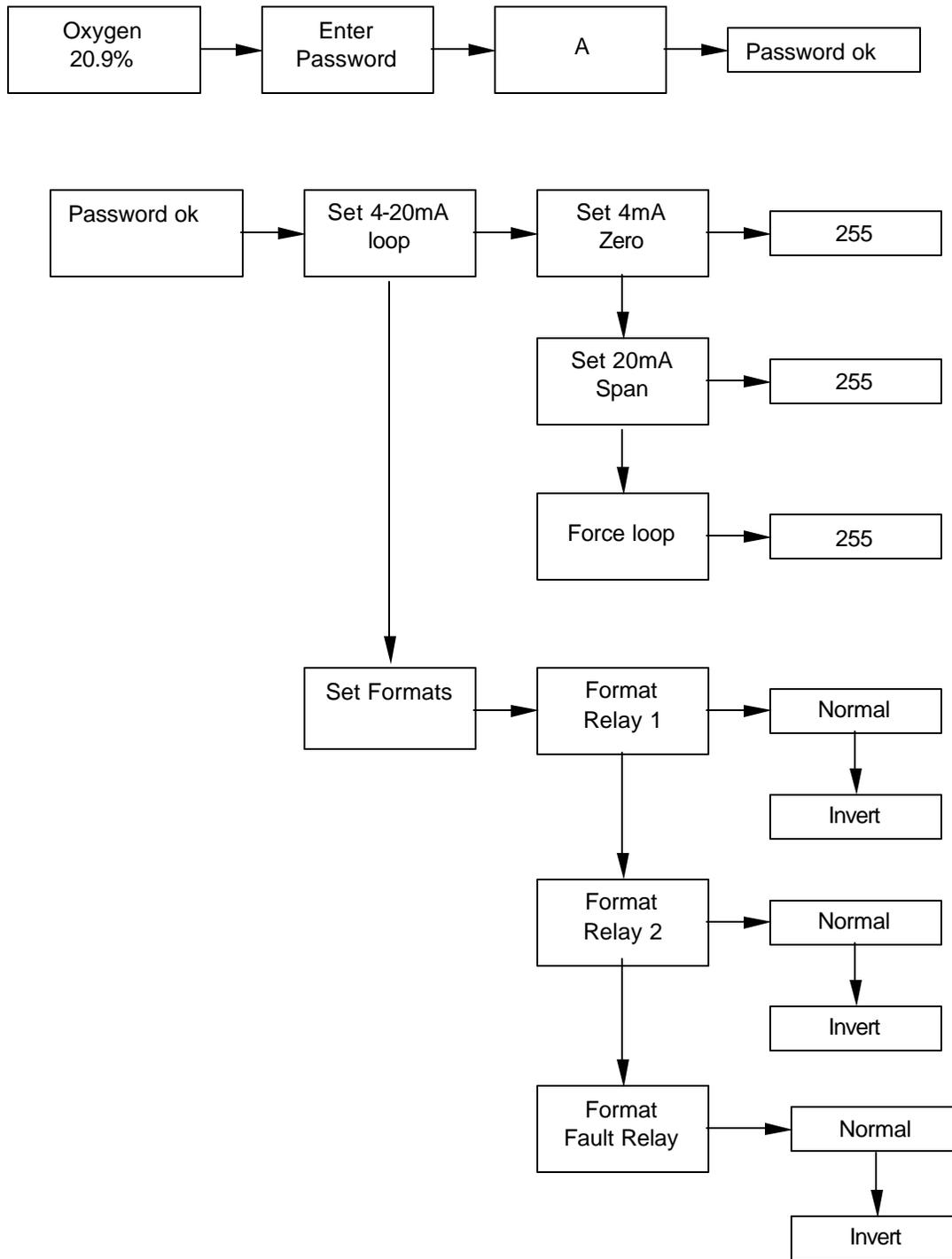
Next – Pushing the joystick in this direction moves you to the next level of the menu hierarchy.

Previous – Pushing the joystick in this direction takes you out to the last level of menu hierarchy.

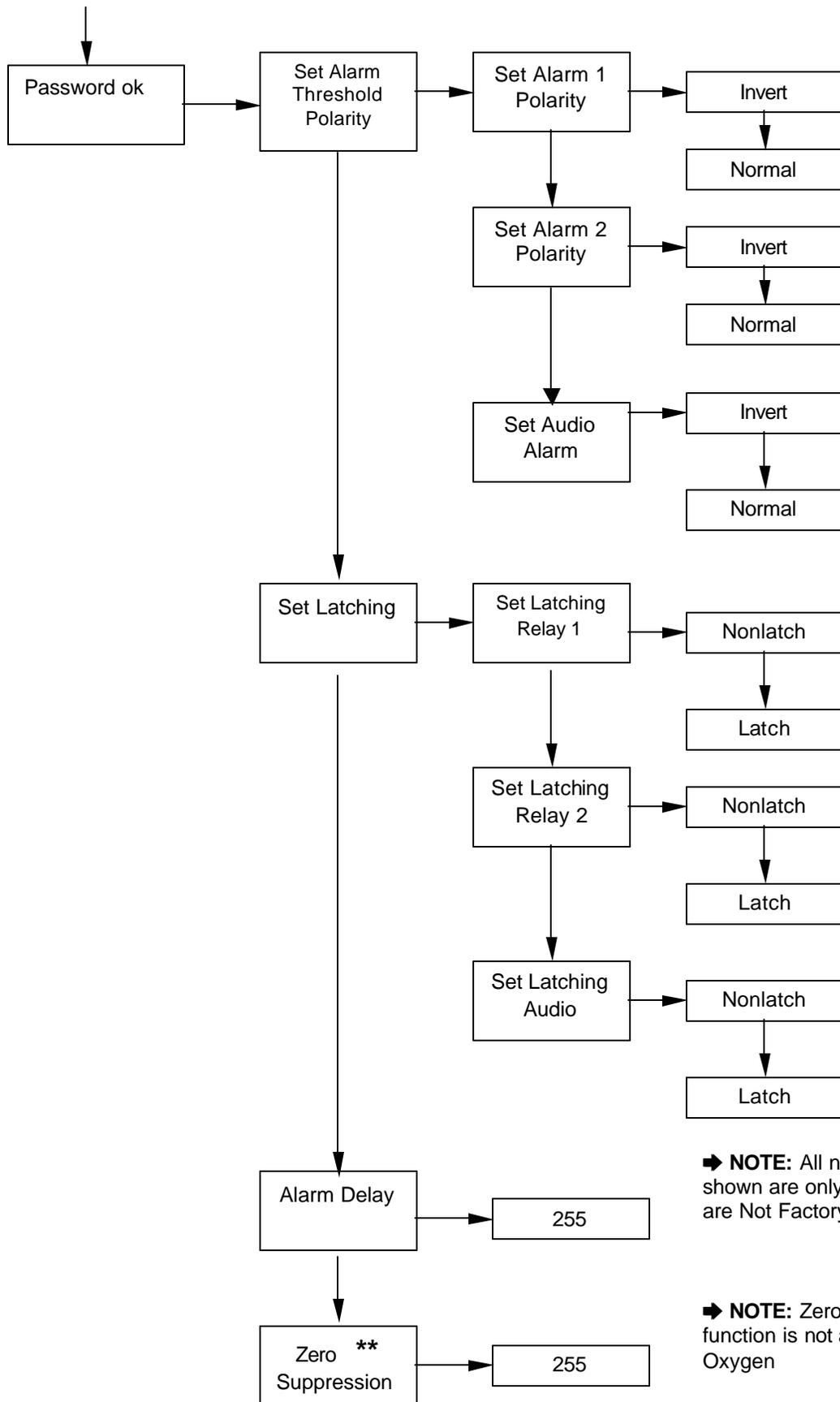
Enter – Pushing the joystick directly in the center enters the information into the microprocessor

➡ **NOTE:** *The joystick has four other positions that are only used to only access factory menus. A separate factory password is required obtain entry.*

5.2 Program Flowchart

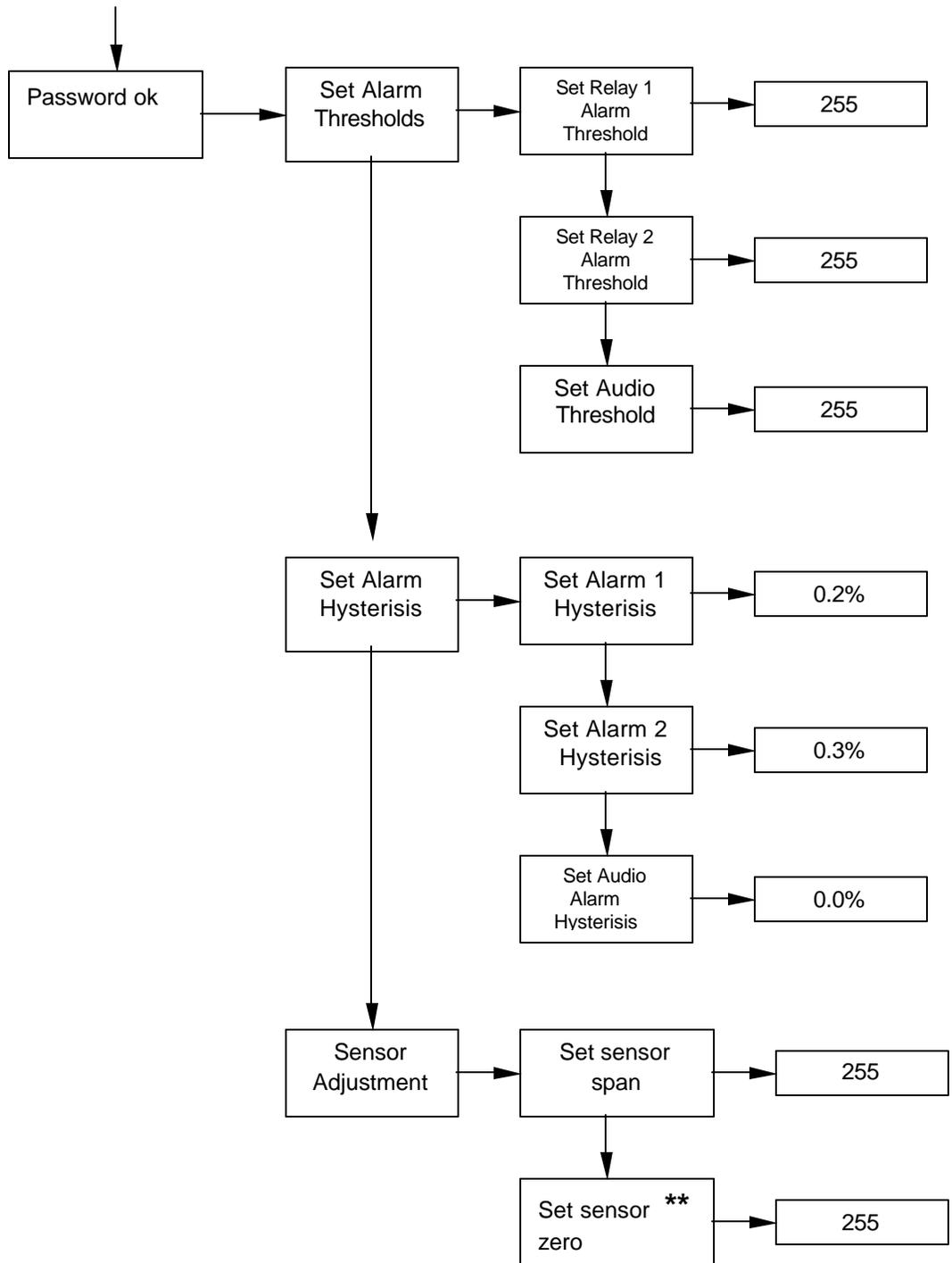


➡ **NOTE:** All numerical values shown are only examples and are Not Factory Defaults



➡ **NOTE:** All numerical values shown are only examples and are Not Factory Defaults

➡ **NOTE:** Zero suppression function is not available for Oxygen



➡ **NOTE:** All numerical values shown are only examples and are Not Factory Defaults

**** NOTE:** This function is not used for Oxygen. It is factory set at 000. Please DO NOT change this setting.

5.3 Entering the Password

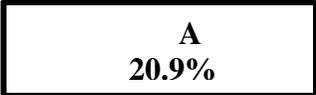
The *Air Check* ✓ O₂ monitor is supplied with a factory set password to prevent unauthorized access to the menus. **The Password is 557.** The following explains how to enter the password.

1. Push the joystick once to the right. **Enter Password** will scroll on the first line of the digital display. The second line will still display the current oxygen level.



..Enter password...
20.9%

2. Push the joystick again once more to the right to enter the input screen. **The letter A will appear and flash.**



A
20.9%

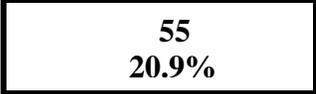
➔ **NOTE:** *The display has characters that start with A through Z and 0 through 9. Pushing the joystick up or down will permit you to scroll through the alphanumeric characters.*

3. Push the joystick up or down to enter the first digit. The display is an alphanumeric display and toggles from A through Z followed by 0 to 9. The character to be entered will flash.



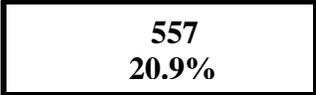
5
20.9%

4. Push the joystick again to the right to select the second entry. Push the joystick up or down to select the second digit. The character being entered will flash and the first character entered will remain lit.



55
20.9%

5. Push the joystick again to the right to select the third entry. Push the joystick up or down to select the third and final digit. The character being entered will flash and the first and second characters entered will remain lit. You are now ready to enter the 3-digit password.



557
20.9%

6. Push the joystick in the center to enter the password. If you entered it correctly the display will scroll **Password OK.**



...Password OK.....
20.9%

➔ **NOTE: If an incorrect password has been entered, the display will indicate Password Failed. Push the joystick to the left to access the monitoring mode. From this mode you can reenter the password again.**

5.4 Entering the Menus

The *Air Check* ✓ O₂ monitor is supplied with main menus with sub menus to adjust mA outputs, alarm relay settings, sensor adjustments and zero suppression for toxic and corrosive gas sensor cells.

5.4.1 Set 4-20mA loop

.Set 4-20mA loop..
20.9%

This main menu will permit the adjusting of the 4mA and 20mA output from the Air Check O₂ Monitor. It also provides a function that will send an actual output between 4mA and 20 mA to test any remote control and alarm system attached to the O₂ monitor.

➔ **NOTE:** *To read the mA output, Air Check O₂ monitor must either be connected to a remote PLC controller or SCADA system. You can also connect the Air Check O₂ monitor to a volt meter to read the mA output. You'll need to add a 200 ohm resistor between the mA and common terminals. Please consult PureAire for more information.*

From this main menu, pushing the joystick to the right will select the sub menu and the digital display will scroll the following:

..Set 4mA zero...
20.9%

This is the menu at which to adjust the 4mA output being sent from the Air Check O₂ Monitor.

To change this value, push the joystick right to display the 4 mA setting. The display will indicate a value between 0 and 255 counts. Pushing the joystick up increases the value and pushing the joystick down decreases the value. The 4mA output being sent from the Air Check O₂ monitor will change as the number on the digital display changes. Press **ENTER** to accept the value.

255
20.9%

Push the joystick to the left brings you back to the previous Main menu. The digital display will scroll the following:

...Set 4mA zero.....
20.9%

Push the joystick down to access the next sub menu; **Set 20mA Span will scroll.**

...Set 20mA Span...
20.9%

This is the menu at which to adjust the 20mA output being sent from the Air Check O₂ Monitor.

To change this value, push the joystick right to display the 20mA span setting. The display will indicate a value between 0 and 255 counts. Pushing the joystick up increases the value and pushing the joystick down decreases the value. The 20mA output being sent from the Air Check O₂ monitor will change as the number on the digital display changes. Press **ENTER** to accept the value.

255
20.9%

Push the joystick to the left brings you back to the pervious Main menu. The digital display will scroll the following:

...Set 20mA span.....
20.9%

Push the joystick down to access the next sub menu; **Force loop will scroll.**

....Force Loop....
20.9%

This is the sub menu at which to test the full 4mA to 20mA output from the Air Check O₂ Monitor. Increasing and decreasing the value will send out an oxygen reading from 0% to a maximum of 25%. By increasing or decreasing the value, the O₂ monitor will transmit a continuous mA signal in a range between 4 to 20 milliamps.

➡ **NOTE: The Force Loop function is not available on the Air Check O₂ monitor. It was designed for toxic and corrosive gases.**

To access this function push the joystick right to display the numeric setting. The display will indicate a value between 0 and 100% of the full scale. Pushing the joystick up increases the value and pushing the joystick down decreases the value. The mA output being sent from the Air Check O₂ monitor will change as the number on the digital display changes. Press **ENTER** to exit this menu.

➡ **NOTE: The Force Loop function will automatically reset back to 0 when the Enter button is pushed.**

0
20.9%

Push the joystick to the left brings you back to the pervious menu. The digital display Will scroll the following:

...Set 4mA loop....
20.9%

5.4.2 Set Formats

This is the menu at which to adjust the relay states for the two gas alarm relays and the individual instrument fault relay.

➔ **NOTE:** *The O₂ system must have the relay module installed to access this menu. If no relay module is installed the display will indicate N/A, (not available)*

Push the joystick down to access the next main menu, **Set Formats**. The display will scroll the following:

...Set Formats...
20.9%

This menu will permit the setting of the two alarm relays and the fault relay settings from normally de-energized state, **Normal**, to normally energized state, **Inverted**.

From this main menu, pushing the joystick to the right will select the sub menu and the digital display will scroll the following:

..Format Relay 1...
20.9%

This is the menu at which to adjust the first level alarm relay state on the Air Check O₂ Monitor.

To change this value, push the joystick right to display the relay state. The display will Indicate **INVERT**. Pushing the joystick down will change the relay state from **INVERT** to **NORMAL**. Press **ENTER** to accept the value.

INVERT
20.9%

↕

NORMAL
20.9%

After entering the relay state the display will default back to the Set Formats menu. The display will scroll the following:

..Set Formats...
20.9%

From this main menu, pushing the joystick to the right will select the sub menu and the digital display will scroll the following:

..Format Relay 1...
20.9%

Push the joystick down to access the next main menu, **Set Formats**. The display will scroll the following:

... Format Relay 2..
20.9%

This is the menu at which to adjust the second level alarm relay state on the Air Check O₂ Monitor.

To change this value, push the joystick right to display the relay state. The display will indicate **INVERT**. Pushing the joystick down will change the relay state from **INVERT** to **NORMAL**. Press **ENTER** to accept the value.

INVERT
20.9%



NORMAL
20.9%

After entering the relay state the display will default back to the Set Formats menu. The display will scroll the following:

..Set Format ...
20.9%

From this main menu, pushing the joystick to the right will select the sub menu and the digital display will scroll the following:

..Format Relay 1...
20.9%

Push the joystick twice to select the fault relay to be adjusted. The display will scroll; **Format Fault Relay**.

..Format Fault Relay...
20.9%

This is the menu at which to adjust the fault alarm relay state on the Air Check O₂ Monitor.

To change this value, push the joystick right to display the relay state. The display will indicate **INVERT**. Pushing the joystick down will change the relay state from **INVERT** to **NORMAL**. Press **ENTER** to accept the value.

INVERT
20.9%

↕

NORMAL
20.9%

After entering the relay state the display will default back to the Set Formats menu. The display will scroll the following:

..Set Formats...
20.9

5.4.3 Set Alarm Threshold Polarity

Alarm Threshold Polarity determines if an alarm concentration is set above or below a threshold value. For example, if an alarm of 19.0% for Oxygen is selected, the Alarm Threshold Polarity must be set to **Invert** for the monitors alarm to activate when the reading goes below 19.0%. For toxic and corrosive gases selecting a **Normal** setting for the Alarm Threshold Polarity means that the system will alarm when the gas concentration exceeds, goes above, an alarm set point. This menu will permit the selection of the alarm polarity. To access this menu from the “Set Formats” menu, push the joystick down to display the **Set Alarm Threshold Polarity** adjustment menu. This will scroll on the digital display.

..Set Alarm Threshold Priority..
20.9%

Push the joystick right to access the first sub menu; **Set Alarm 1 Polarity** will scroll on the display. This is the menu at which to adjust the first level alarm polarity state on the Air Check O₂ Monitor.

**..Set Alarm 1 Polarity...
20.9%**

To change this value, push the joystick right to display the relay state. The display will indicate **INVERT**. Pushing the joystick down will change the relay state from **INVERT** to **NORMAL**. Press **ENTER** to accept the value.

**INVERT
20.9%**



**NORMAL
20.9%**

After entering the relay state the display will default back to the Set Alarm 1 Polarity menu. The display will scroll the following:

**..Set Alarm Polarity..
20.9%**

Push the joystick down to access the next sub menu; **Set Alarm 2 Polarity** will scroll on the display. This is the menu at which to adjust the second level alarm polarity state on the Air Check O₂ Monitor.

**..Set Alarm 2 Polarity ..
20.9%**

To change this value, push the joystick right to display the relay state. The display will indicate **INVERT**. Pushing the joystick down will change the relay state from **INVERT** to **NORMAL**. Press **ENTER** to accept the value.

**INVERT
20.9%**



**NORMAL
20.9%**

After entering the relay state the display will default back to the Set Relay 2 Alarm Threshold menu. The display will scroll the following:

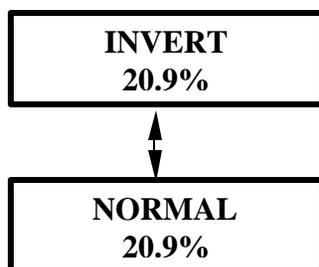
**..Set Alarm 2 Polarity..
20.9%**

Push the joystick down to access the next sub menu; **Set Audio Alarm Polarity** will scroll on the display. This is the menu at which to adjust the second level alarm polarity state on the Air Check O₂ Monitor.

..Set Audio Alarm Polarity...
20.9%

➔ **NOTE:** *The O₂ system must have the audio alarm option module installed to access this menu. If this option is installed the display will indicate N/A, (not available)*

To change this value, push the joystick right to display the relay state. The display will indicate **INVERT**. Pushing the joystick down will change the relay state from **INVERT** to **NORMAL**. Press **ENTER** to accept the value.



After entering the relay state the display will default back to the **Set Audio Alarm Polarity** menu. The display will scroll the following:

..Set Audio Alarm Polarity...
20.9%

5.4.4 Set Latching

This is the menu at which to adjust the relay alarm state for the two gas alarm relays and the individual instrument fault relay. The selection permits setting the relays to a latching or non-latching state. In a latching state, the relay will remain activated until the user manually selects the Enter Key. In a non-latching state, the alarm relay will automatically reset once the gas concentration has returned to 20.9% for oxygen.

➔ **NOTE:** *The O₂ system must have the relay module installed to access this menu. If no relay module is installed the display will indicate N/A, (not available)*

.Set Latching...
20.9%

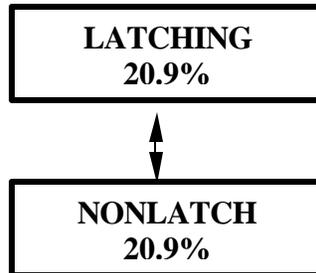
This menu will permit the setting of the two alarm relays and the fault relay settings from a latching to a non latching state when they are activated.

From this main menu, pushing the joystick to the right will select the sub menu and the digital display will scroll the following:

**..Set Latching Relay 1...
20.9%**

This is the menu at which to adjust the first level alarm relay state on the Air Check O₂ Monitor.

To change this value, push the joystick right to display the relay state. The display will indicate **LATCH**. Pushing the joystick down will change the relay state from **LATCHING** to **NON-LATCHING**. Press **ENTER** to accept the value.



After entering the relay state the display will default back to the **Set Latching** menu. The display will scroll the following:

**..Set Latching....
20.9%**

From this main menu, pushing the joystick to the right will select the sub menu and the digital display will scroll the following:

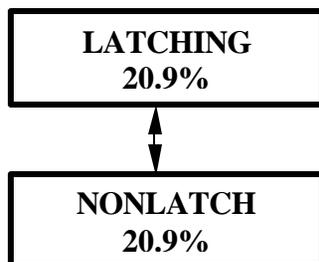
**..Set Latching Relay 1...
20.9%**

Push the joystick down to select the next relay to be adjusted. The display will scroll the following, **Set Latching Relay 2**.

**..Set Latching Relay 2...
20.9%**

This is the menu at which to adjust the second level alarm relay state on the Air Check O₂ Monitor.

To change this value, push the joystick right to display the relay state. The display will indicate **LATCHING**. Pushing the joystick down will change the relay state from **LATCHING** to **NONLATCH**. Press **ENTER** to accept the value.



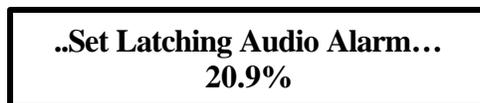
After entering the relay state the display will default back to the **Set Latching** menu. The display will scroll the following:



From this main menu, pushing the joystick to the right will select the sub menu and the digital display will scroll the following:



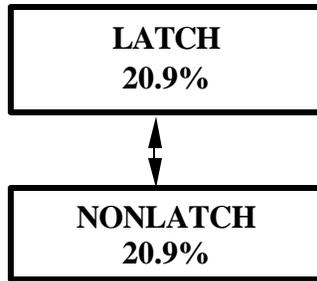
Push the joystick twice to select the Audio Alarm relay to be adjusted. The display will scroll; **Set Latching Audio Alarm**.



This is the menu at which to adjust the Audio alarm relay state on the Air Check O₂ Monitor.

➔ **NOTE:** *The O₂ system must have the audio alarm option module installed to access this menu. If this option is installed the display will indicate N/A, (not available)*

To change this value, push the joystick right to display the relay state. The display will indicate **LATCHING**. Pushing the joystick down will change the relay state from **LATCHING** to **NONLATCH**. Press **ENTER** to accept the value.

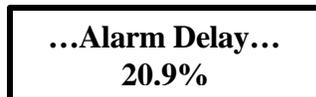


After entering the fault relay state the display will default back to the **Set Latching** menu. The display will indicate the following:



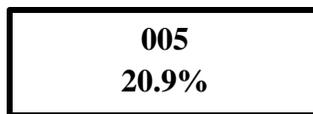
5.4.5 Set Alarm Delay

Push the joystick down to access the next main menu, **Alarm Delay**. The display will scroll the following:

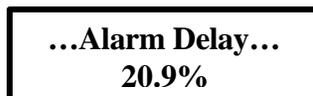


This is the amount of time an alarm level concentration of oxygen must be present before the instrument's gas concentration alarm(s) will be activated. This menu will permit setting a user selected time delay for activating alarm relays 1 and 2. You can select from 0 seconds up to 255 seconds after an alarm level has been exceeded before the alarm relays to activate.

To change this value, push the joystick right to display the time screen. The display will indicate a value between 0 and 255 seconds. Pushing the joystick up increases the value and pushing the joystick down decreases the value. Press **ENTER** to accept the value.



After entering the alarm delay, the display will default back to the Alarm Delay menu and the display will scroll the following:



➔ **NOTE:** *The alarm delay is only available for alarms 1 and 2. There is no delay for the fault relay. Any system fault will immediately activate the Fault Relay.*

5.4.6 Set Zero Suppression

This setting is used to decrease the sensitivity of selected gas sensors. It essentially programs the instrument to ignore gas measurements that are below the programmed % level (% full scale).

➔ **EXAMPLE:** *If the measurement range of the instrument is 0 to 10 ppm, gas measurements below 0.5 ppm will be displayed and output as 0 (zero) when the suppress level is set at 5%.*

➔ **NOTE:** **This function is not available on the Air Check Oxygen monitor.**

...Zero Suppression...
20.9%

To change this value, push the joystick right to display the Zero Suppression screen. The display will indicate a value between 0 and 100%. Pushing the joystick up increases the value and pushing the joystick down decreases the value. Press **ENTER** to accept the value.

005
20.9%

After entering the zero suppression value, the display will default back to the **Zero Suppression** menu and the display will scroll the following:

...Zero Suppression...
20.9%

5.4.7 Set Alarm Thresholds

..Set Alarm Thresholds..
20.9%

This main menu will permit adjusting the oxygen concentration percentage that will activate alarm levels 1 and 2. If the Audio alarm output module is installed, it will also permit setting the level at which the audio alarm will activate.

➔ **NOTE:** *To activate the audio alarm, the AirCheck O₂ monitor must have the audio alarm option.*

From this main menu, pushing the joystick to the right will select the first sub menu and the digital display will scroll the following: **Set Relay 1 Alarm Threshold.**

**..Set Relay 1 Alarm Threshold...
20.9%**

This is the gas concentration at which the instrument's first level alarm will be activated. To change the displayed value, push the joystick to the right to display the first level alarm setting. The display will indicate a value between 00.0% and 25.5%. **(A value of 195 = 19.5% oxygen).**

Pushing the joystick up increases the value and pushing the joystick down decreases the value. Press **ENTER** to accept the value.

**195
20.9%**

After entering the relay state the display will default back to the **Set Relay 1 Alarm Threshold** Menu. The display will scroll the following:

**..Set Relay 1 Alarm Threshold...
20.9%**

Push the joystick down to access the next sub menu; **Set Relay 2 Alarm Threshold**, will scroll on the digital display.

**..Set Relay 2 Alarm Threshold...
20.9%**

This is the gas concentration at which the instrument's second level alarm will be activated. To change the displayed value, push the joystick to the right to display the second level alarm setting. The display will indicate a value between 00.0% and 25.5%. **(A value of 180= 18.0% oxygen).**

Pushing the joystick up increases the value and pushing the joystick down decreases the value. Press **ENTER** to accept the value.

**180
20.9%**

After entering the relay state the display will default back to the **Set Relay 2 Alarm Threshold** Menu. The display will scroll the following:

**..Set Relay 2 Alarm Threshold...
20.9%**

Push the joystick down to access the next sub menu; **Set Audio Alarm Threshold**, will scroll on the digital display.

**..Set Audio Alarm Threshold...
20.9%**

This is the gas concentration at which the instrument's audio alarm will be activated. To change the displayed value, push the joystick to the right to display the second level alarm setting. The display will indicate a value between 00.0% and 25.5%. **(A value of 195= 19.5% oxygen).**

Pushing the joystick up increases the value and pushing the joystick down decreases the value. Press **ENTER** to accept the value.

➔ **NOTE:** *The O₂ system must have the audio alarm option module installed to access this menu. If this option is installed the display will indicate N/A, (not available)*

**145
20.9%**

➔ **NOTE:** *The audio can be set into only one alarm level. You can choose between alarm level 1 or alarm level 2 or set a completely different setting.*

After entering the relay state the display will default back to the **Set Audio Threshold**. Menu. The display will scroll the following:

**..Set Audio Alarm Threshold...
20.9%**

5.4.8 Set Alarm Hysteresis

PureAire's oxygen monitor may be used as a control system. When used to regulate oxygen levels the need of a dead band, "hysteresis" may be required. This menu will permit the setting of the alarm hysteresis to a desired concentration of Oxygen. When using hysteresis, the alarm set point now becomes an average alarm setting for an action to occur. When adding the hysteresis value to the alarm set point, this then defines the alarm and dead band for an action to occur.

For example, if you require a valve to close at 14.9% oxygen level and to reopen again at 15.5% oxygen level, you would set the Alarm Threshold at 15.2% and set the hysteresis value at 0.3%.

Average Alarm set point = 15.2% - Hysteresis 0.3% = 14.9%, Valve Off
Average Alarm set point = 15.2% + Hysteresis 0.3% = 15.5%, Valve On

NOTE: If you wish to calculate the upper and lower setpoint, you can use the following formula to calculate the hysteresis:

$$\frac{\text{Upper Limit} - \text{Lower Limit}}{2} = \text{Alarm Hysteresis Value}$$

$$\frac{20.9\% - 20.5\%}{2} = 0.2\%$$

$$\text{Alarm Hysteresis} + \text{Lower Limit} = \text{Alarm Set Point}$$

$$0.2\% + 20.5\% = 20.7\%$$

To access this menu push the joystick down to display the **Set Alarm Hysteresis** menu. This will scroll on the digital display.

..Set Alarm Hysteresis...
20.9%

Push the joystick right to access the **Set Alarm 1 Hysteresis**. Pushing the joystick again to the right will display a value 0.0%, (factory default). Pushing the joystick up increases the percentage up to a maximum value of 2.5%. Adjust the digital display until the desired hysteresis value is selected.

0.3%
20.9%

Press **ENTER** to accept this value. The digital display will revert back to **Set Alarm 1 Hysteresis**.

..Set Alarm 1 Hysteresis...
20.9%

Push the joystick down to access the next sub menu; **Set Alarm 2 Hysteresis** will scroll on the digital display. Pushing the joystick again to the right will display a value 0.0%. Pushing the joystick up increases the percentage up to a maximum value of 2.5%. Adjust the digital display until the desired hysteresis value is selected.

..Set Alarm 2 Hysteresis...
20.9%

Press **ENTER** to accept this value. The digital display will revert back to **Set Alarm 2 Hysterisis**.

**..Set Alarm 2 Hysterisis...
20.9%**

Push the joystick down to access the next sub menu; **Set Alarm Audio Hysterisis** will scroll on the digital display. Pushing the joystick again to the right will display a value 0.0%. Pushing the joystick up increases the percentage up to a maximum value of 2.5%. Adjust the digital display until the desired hysteresis value is selected.

**..Set Audio Alarm Hysterisis...
20.9%**

5.4.9 Set Sensor Adjust

This menu will permit fine-tuning of the oxygen readout to a known concentration of Oxygen. It is recommended to adjust the oxygen display to ambient oxygen levels of 20.9%. To access this menu push the joystick down to display the **Sensor Adjustment** menu. This will scroll on the digital display.

➔ **NOTE: It is recommended to warm up the Air Check Oxygen monitor for two hours before making any adjustments to the sensor.**

**..Sensor Adjustment...
20.9%**

Push the joystick right to access the first sub menu; **Set Sensor Span** will scroll on the display. This is the menu that will permit fine adjustment of the ambient oxygen reading to 20.9%.

**..Set Sensor Span..
20.9%**

Push the joystick right to access the sensor span. The display will indicate a value between 0 and 255 counts. Pushing the joystick up increases the counts and decreases the percent oxygen value displayed on the Air Check. Pushing the joystick down decreases the counts and increases the oxygen value displayed on the Air Check. As the counts increase and decrease the percent oxygen displayed will also increase and decrease. Adjust the digital display until 20.9% +/- 0.1% is displayed. The actual oxygen reading will fluctuate from 20.8% to 21.0%.

093
20.9%

Press **ENTER** to accept this value. The digital display will revert back to **Set Sensor Span**.

..Set Sensor Span..
20.9%

Push the joystick down to access the next sub menu; **Set Sensor Zero** will scroll on the digital display.

..Set Sensor Zero..
20.9%

➔ **NOTE: The Set Sensor Zero function is not available on the Air Check O₂ monitor. It was designed for toxic and corrosive gases. When selected, the display will indicate N/A, (not available)**

Press the joystick to the left to revert back to the **Set Sensor Zero** menu.

..Set Sensor Zero..
20.9%

5.4.10 Main Operation Mode

To select the main menu from any sub menu, push the joystick left until the Main Menu appears. The digital display will indicate the following:

Oxygen
20.9%

6: Maintenance & Sensor Verification

Only qualified personnel should perform maintenance and sensor verification

6.1 Sensor Verification

The earth is a wonderful source of calibrated oxygen at 20.9%, therefore under ambient conditions; verification of the *Air Check ✓ Lite* O₂ monitor to 20.9% oxygen is constantly being performed. As the oxygen sensor ages over time, it may require a slight adjustment to 20.9%. The O₂ monitor also requires periodic testing with nitrogen to verify the cells response to 0% oxygen.

6.1.1 Sensor Verification Gas

For testing the *Air Check ✓ Lite* O₂ monitor, PureAire recommends the use of nitrogen. This can be purchased from your gas supplier or from PureAire Monitoring Systems.

6.1.2 Sensor Verification Equipment

The following equipment is available from PureAire to facilitate gas calibration:

Part Number	Description	Quantity
8880110	Nitrogen 105 liter cylinder, 99.99%	1
8880001	Regulator, 500 cc per minute flow	1

➔ **NOTE:** If the instrument is connected to a controller, set the controller to the standby mode to avoid accidental alarms.

➔ **NOTE:** If your safety protocol requires, you may subject the Air Check monitor to different concentrations of oxygen span gas.

6.2 Sensor Verification Procedure

➔ **CAUTION:** *Be sure to observe all safety guidelines when generating and using nitrogen.*

Under ambient non-oxygen deficient environments, **Air Check ✓ O₂** monitor will indicate a display reading of 20.9%. As the sensor ages, the reading may decrease in value. The following procedure should be used to adjust the reading to 20.9%.

- 1) Insure that the **Air Check ✓ O₂** monitor is in a clean non-oxygen deficient environment.
- 2) Enter the password. **Refer to Section 5.3**
- 3) Select the **Sensor Adjust** menu.

This menu will permit fine-tuning of the oxygen readout to a known concentration of Oxygen. It is recommended to adjust the oxygen display to ambient oxygen levels of 20.9%. To access this menu push the joystick down to display the **Sensor Adjustment** menu. This will scroll on the digital display.

➔ **NOTE:** **It is recommended to warm up the Air Check Oxygen monitor for two hours before making any adjustments to the sensor.**

**..Sensor Adjustment...
20.9%**

Push the joystick right to access the first sub menu; **Set Sensor Span** will scroll on the display. This is the menu that will permit fine adjustment of the ambient oxygen reading to 20.9%.

Push the joystick right to access the first sub menu; **Set Sensor Span** will scroll on the display. This is the menu that will permit fine adjustment of the ambient oxygen reading to 20.9%.

**..Set Sensor Span..
20.9%**

Push the joystick right to access the sensor span. The display will indicate a value between 0 and 255 counts. Pushing the joystick up increases the counts and decreases the percent oxygen value displayed on the Air Check. Pushing the joystick down decreases the counts and increases the oxygen value displayed on the Air Check. As the counts increase and decrease the percent oxygen displayed will also increase and decrease. Adjust the digital display until 20.9% +/- 0.1% is displayed. The actual oxygen reading will fluctuate from 20.8% to 21.0%.

093
20.9%

Press **ENTER** to accept this value. The digital display will revert back to **Set Sensor Span**.

..Set Sensor Span..
20.9%

Push the joystick down to access the next sub menu; **Set Sensor Zero** will scroll on the digital display.

..Set Sensor Zero..
20.9%

➡ **NOTE: The Set Sensor Zero function is not available on the Air Check O₂ monitor. It was designed for toxic and corrosive gases. When selected, the display will indicate N/A, (not available)**

Press the joystick to the left to revert back to the **Set Sensor Zero** menu.

..Set Sensor Zero..
20.9%

6.2.1 Sensor Verification to Nitrogen

PureAire recommends challenging the O₂ monitor with nitrogen every 6 to 12 months. The sensor protector has a 1/4" male tube fitting designed for connecting sample tubing from a Nitrogen cylinder. Expose the O₂ cell to N₂ at a flow rate of 500 cc/min. The reading will drop off to 1% or below in less than one minute when the O₂ sensor is exposed to pure N₂. The system will recover to 20.9% when the nitrogen is removed.

➡ **NOTE: The Sensor Protector has four air relief holes that will prevent the complete exposure of nitrogen to the oxygen sensor. To see a true zero oxygen level, the entire Air Check ✓ O₂ monitor needs be completely immersed into a zero oxygen environment. Covering the holes will help to prevent dilution of the span gas to ambient air.**

6.2.2 Sensor Verification to a known concentration of Oxygen

When testing the O₂ monitor to a known concentration of oxygen, the sensor inlet has a ¼" compression tube fitting designed for connecting the dust filter. You can connect ¼" OD sample tubing from a Nitrogen cylinder directly to the dust filter. Expose the O₂ cell directly from the nitrogen cylinder at a flow rate of 500 cc/min. The reading will drop off to the span gas concentration in less than 1 minute. The final reading should be within ± 0.3% of the span gas concentration. **To see the exact span gas concentration the entire Air Check O₂ monitor needs to be completely immersed into a the span gas environment.**

➔ **NOTE:** The Oxygen monitor should be tested in an upright position to allow the span gas to fully saturate the sensor cell.

➔ **CAUTION:** For best results the Oxygen monitor should be protected from wind and high airflow when gas calibrating with test gas.

➔ **NOTE:** To see a true zero, the entire Air Check ✓ O₂ monitor needs be completely immersed into a zero oxygen environment.

➔ **NOTE:** When calibrating the TX-1100-DRAP Oxygen monitor for glove box, the sensor cell is recessed inside the sensor protector. **To obtain an accurate reading the entire sensor protector MUST be fully exposed to the span gas.**

**O₂ monitor
Connected to gas cylinder**



7.0 Appendix

Remote Display for Oxygen monitor (part number DPM942-R)

This optional Remote display is designed to send remote oxygen concentration information from any of PureAire's oxygen monitors. All PureAire O₂ monitors have a built in 4-20mA output and the remote display easily connects to the monitor's input power and mA output connection. An 18 AWG, two conductor, stranded control and instrumentation cable, Belden 8461 or equivalent is recommended for the connection. The maximum permissible cable length is 250 feet. You can connect up to two remote displays to one Air Check Oxygen monitor.

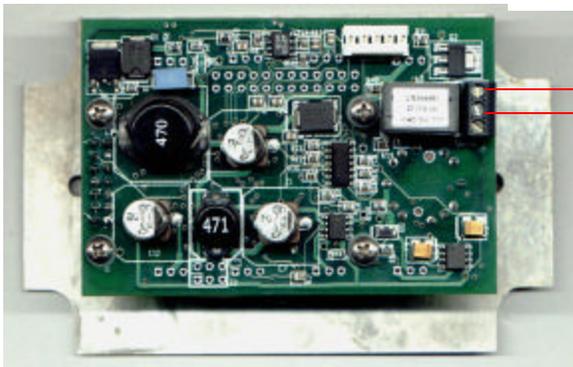
➔ **NOTE:** *When connecting two remote displays, they must be connected to the Oxygen monitor in series.*



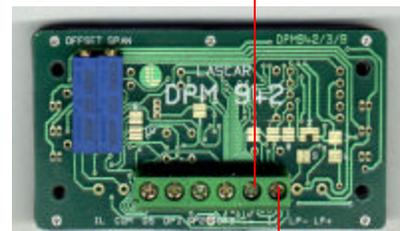
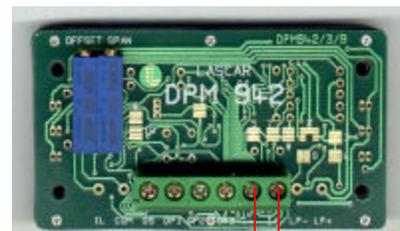
CAUTION
DO NOT CONNECT THE DISPLAY DIRECTLY TO THE 24VDC Supply

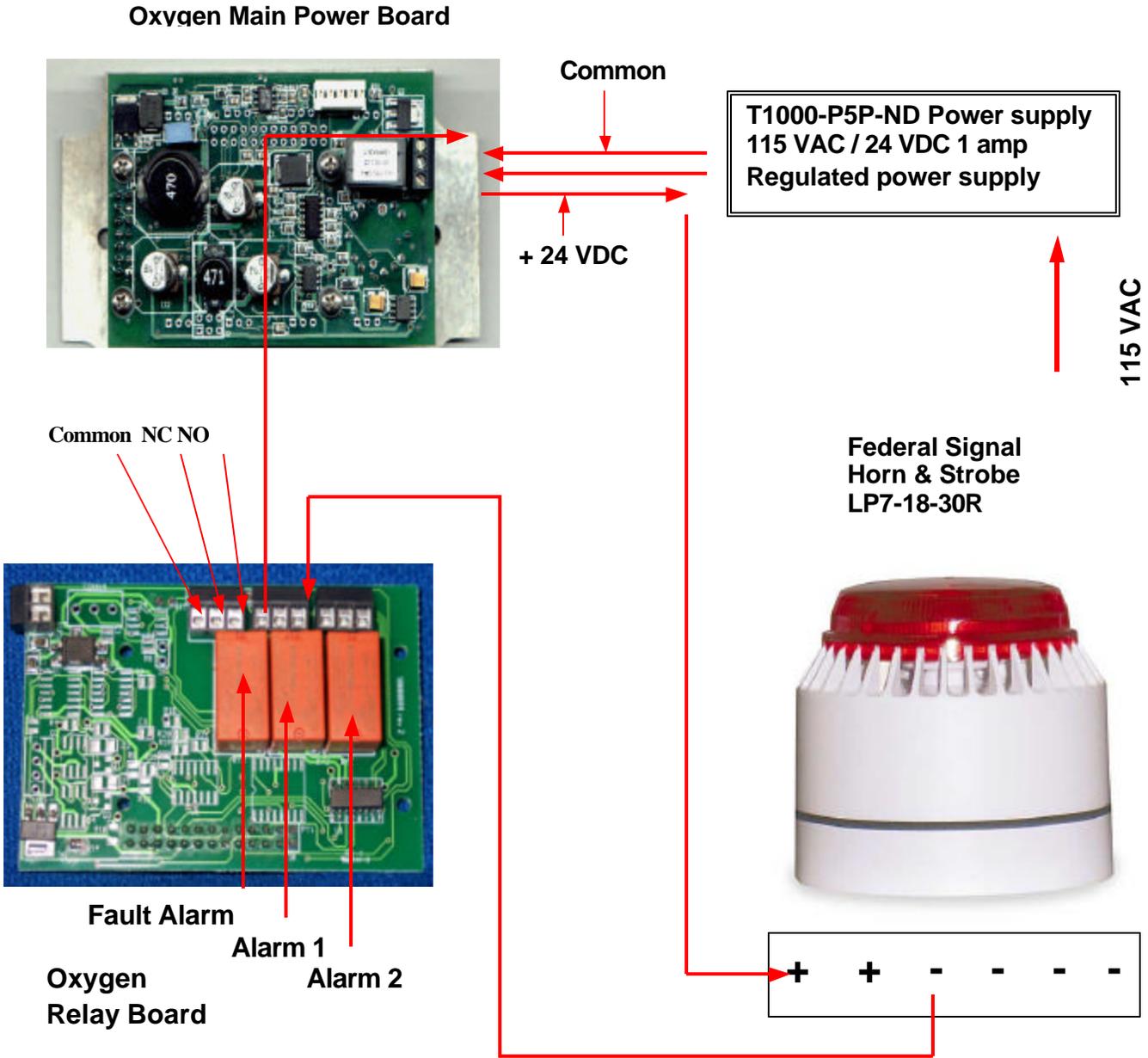
Please verify wiring to the display before powering the O₂ monitor.

DPM942-R



Max distance 250 feet





This drawing shows how to connect a remote Horn and strobe to PureAire's Oxygen monitor with the relay set to a Normally Open position.