ADI5807-C

CONCOA
PRECISION GAS CONTROLS
Certified ISO 9001

Dual O_2 / CO_2 Monitor



For continuous monitoring of gas levels

INSTALLATION AND OPERATION INSTRUCTIONS

Before Installing or Operating, Read and Comply with These Instructions

Controls Corporation of America
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To Order Call 1-800-225-0473 or 757-422-8330 • Fax 757-422-3125
www.concoa.com

September 2021

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Please Read Before Installation

The following will damage the Air Check Oxygen monitor.

1. The Dual O_2/CO_2 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 Dual with the Oxygen sensor or Carbon Dioxide sensor unplugged from the main PC board. **Do not connect** the O_2 or CO_2 sensor to the PC board while the monitor is powered. This Will Damage the sensors.

3. The Oxygen sensor cell is matched to the electronics. **Never exchange** the electronics with an Oxygen sensor from a different monitor.

4. When calibrating or challenging the Dual O_2/CO_2 monitors,

   a. Do not expose the monitor to flow rates that exceed ½ liter per minute (500 cc per minute) flow.
   b. Expose the monitor to span gas blends that consist of oxygen, nitrogen or carbon dioxide 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.

5. Do not expose the Dual O_2/CO_2 monitor to silicone compounds. They can cause a loss of sensitivity.

6. Do not expose the monitor to high flow air or install it directly in front of fans. The high air flow can cool the oxygen sensor and cause an inaccurate reading.

7. When using the Dual O_2/CO_2 monitor, do not expose the Oxygen sensor directly to a water stream. In areas requiring wash downs cover and protect the monitor and power supply. Contact CONCOA for details on a waterproof enclosure.

8. Please refer to section 6.3 of this manual regarding the CO_2 sensor. **YOU MUST** choose a calibration method before use.

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1: Introduction

The ***Dual O2/CO2*** 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 ***Dual O2/CO2*** Zirconium oxygen cell and patented NDIR CO_2 cell provide stable readings even in areas where temperature and humidity levels are changing. The ***CONCOA Dual O2/CO2*** Monitor is suitable for either indoor or outdoor use. Factory calibrated against a NIST traceable reference standard and CE approved.

The heart of the monitoring system is a long-lasting zirconium sensor for oxygen and NDIR self-calibrating carbon dioxide sensor. The oxygen cell responds to low oxygen conditions within seconds and provides accurate measurements over a wide temperature and humidity range. The Zirconium O_2 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 O_2 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 ***Dual O2/CO2*** Monitor does not drift or lose sensitivity when the weather or temperature changes. The electronics are housed in a Nema 3 housing.

Each system consists of a long life zirconium oxide sensor cell and three-wire transmitter. The ***Dual O2/CO2*** monitor may be used as a stand-alone gas detector, linked to optional CONCOA single and multipoint controllers, or connected to your own centralized control and surveillance system. This manual covers the installation, operation, and maintenance of the ***Dual O2/CO2*** monitor.

1.1 Key Features

The ***Dual O2/CO2*** monitor incorporates a number of user-friendly features designed to simplify installation, operation, and maintenance.

1.1.1 Long Life Zirconium Oxide O_2 Sensor

The system's O_2 sensor cell has a life of well over 10 years of continuous operation. Unlike concentration O_2 cells, CONCOA's exclusive zirconium oxide sensor cell does not need an oxygen reference gas for proper operation. The ***Dual O2/CO2*** monitor can detect low oxygen levels in confined spaces and process tools without the need of a reference gas.

1.1.2 NDIR CO_2 IR sensor

The system's CO_2 sensor cell is a patented Non-Dispersive Infrared (NDIR) cell designed to detect continuous levels of CO_2. It's fast responding and has a built-in auto calibration feature that adjusts the sensor to ambient every 180 hours.

1.1.3 Smart Electronics

The ***Dual O2/CO2*** 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 output signal or through the optional fault relay option.

1.1.4 Calibration O_2

The ***Dual O2/CO2*** monitor incorporates a stable zirconium oxide sensor that rarely requires calibration. Changing barometric pressures 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 ***Dual O2/CO2*** monitor to 20.9% oxygen is constantly being performed. There are no zero or span pots to adjust. The O_2 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.

1.1.5 Calibration CO_2

The ***Dual O2/CO2*** monitor incorporates an NDIR CO_2 sensor that provides an accurate reading that is the difference between a reference baseline setting and the measured gas concentration. The sensor is factory calibrated and requires no user calibration but, as typical with most NDIR sensors, long term drift can affect the baseline setting. Under normal conditions, the sensor provides automatic baseline adjustments and no further action is required by the user. However, under certain conditions, manual adjustments may be required. See Section 6.3 for further explanation and procedures for adjusting the baseline setting.

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.

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 and provides airflow to the cell.
   NOTE: The sensor protector will feel HOT to the touch. This is normal.

5. **Oxygen Sensor** — A Zirconium Oxide sensor, which detects and measures the level of Oxygen.

6. **CO2 Sensor**— An NDIR sensor housed inside the cell protector.

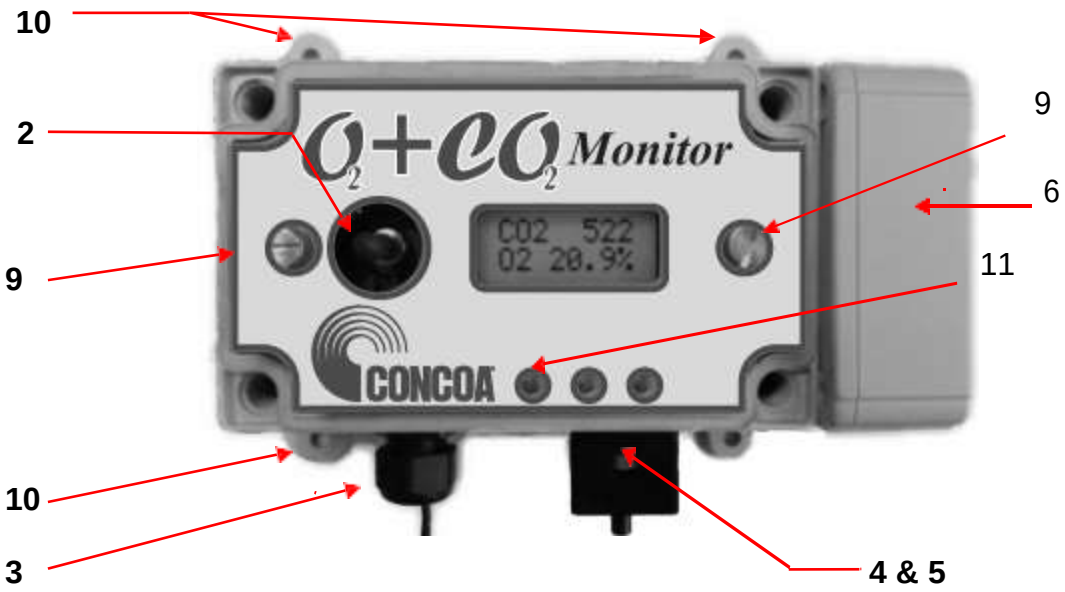
7. **Transmitter Cover** — A removable cover that protects the interior of the transmitter.

8. **Transmitter Cover Fasteners** — 4 captive screws secure the transmitter cover in place.

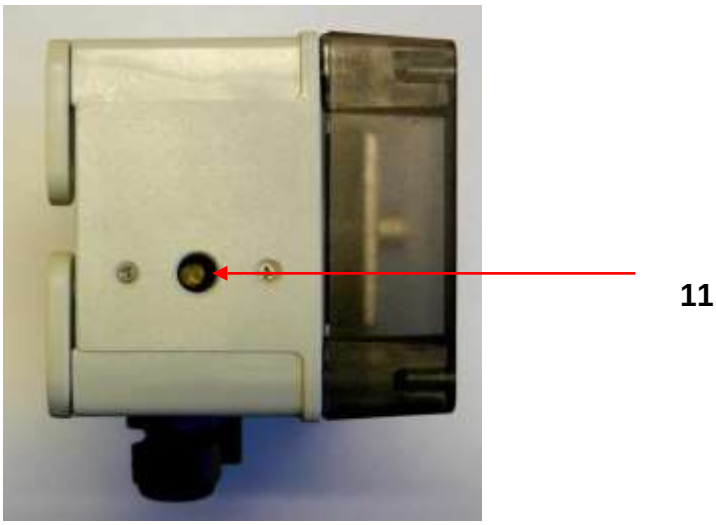
9. **Electronics Fasteners** — Captive screws secure the electronics to the enclosure.

10. **Mounting Feet** — 4 feet to mount the Oxygen monitor to a wall or other flat surface.

1.2.2 Front View Exterior with Relay Option



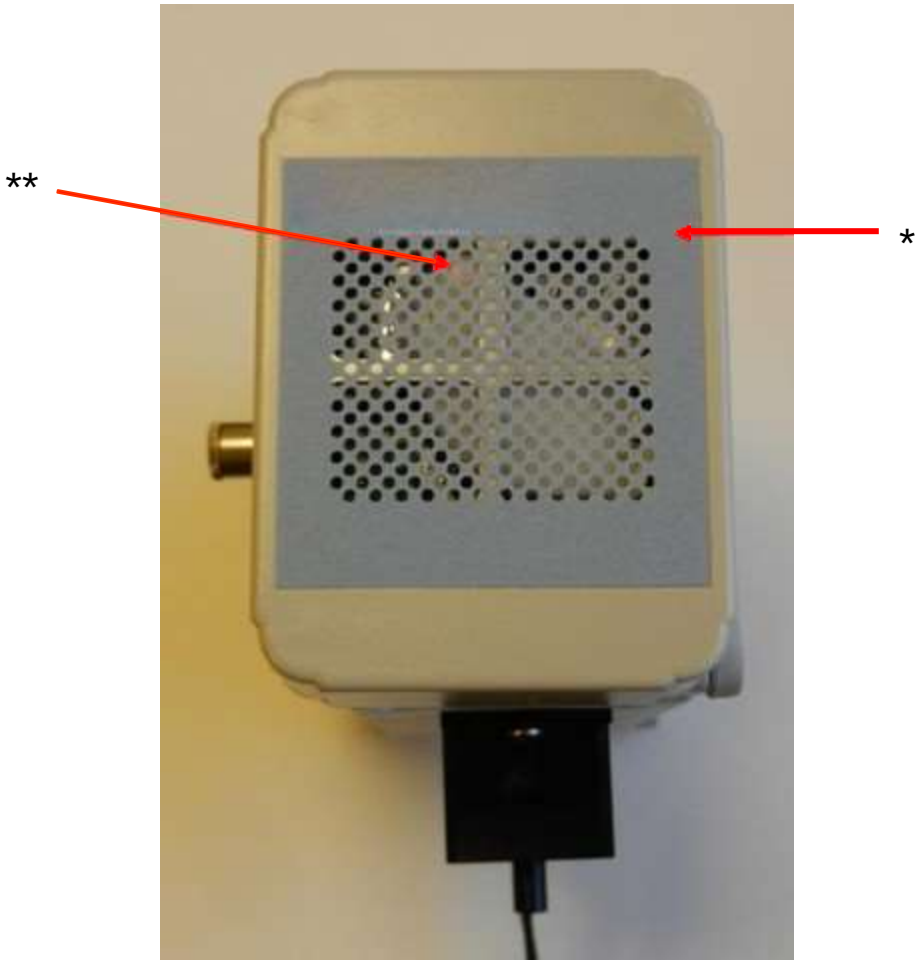
1.2.3 Side View Exterior with Audio Alarm



11. Audio Horn — This built-in horn is a 90dB high pitched audio sound which will activate when either oxygen levels go below the selected alarm thresholds or CO2 levels go above the selected alarm threshold. The audio alarm is non-latching and will automatically turn off when the alarm condition clears.

NOTE*:* The audio alarm is an immediate alarm. Alarm levels must recover to safe levels before the horn turns off. There is no audible alarm delay function available.

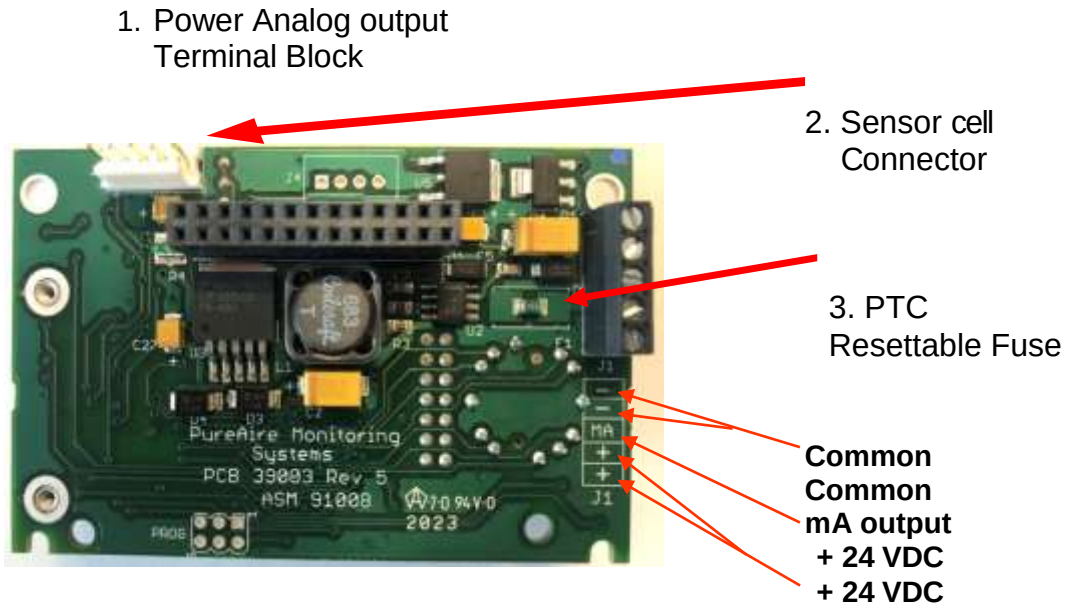
1.2.4 Side view of the CO_2 Sensor



*** CO_2 Sensor**— An NDIR sensor housed inside the cell protector.

**** NOTE: The CO_2 sensor is an NDIR type that is continuously monitoring ambient levels. You will see a blinking orange LED flash approximately every 2 seconds. This is normal.**

1.2.5 Transmitter Interior

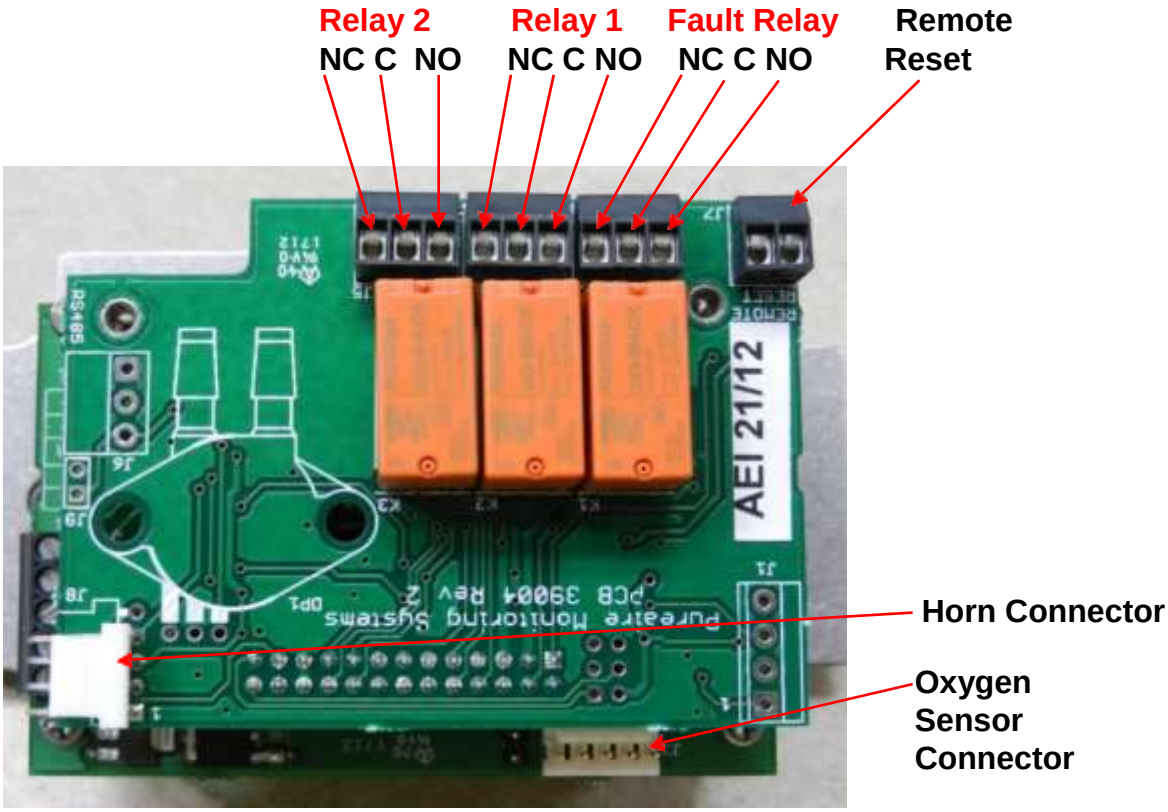


1. **Power Analog Terminal Block** — This terminal block is where the 24VDC power and 4-20 mA analog output connection is made.

2. **Sensor Cell Connector** — This connector is where the Oxygen sensor cell is connected. NOTE: Never connect the Oxygen sensor to this connector while the monitor is powered. This will damage the Oxygen sensor

3. **PTC Resettable Fuse -** The PCB is protected with a PTC Fuse that is resettable and never needs to be replaced. If it trips, you will need to turn power off to the monitor. When power resumes, the fuse will reset.

1.2.7 Alarm Relay Board



1.2.8 Enclosure Mounting Feet



Mounting Feet can be oriented in any direction.

Feet can also be removed for mounting the Dual O_2/CO_2 monitor flush with a wall or other surface.

2: Specifications

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

2.1 Performance Specifications Oxygen Sensor Type: Long Life Zirconium

Oxide Sensor Cell 0-25% Response Time: Within 1 second of any change in O_2.

Accuracy: ±1% of full scale

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 134°F (-40° to +55°C); consult CONCOA for lower or higher operating temperatures.

Humidity: 0 to 95% RH; consult CONCOA for sensors which can operate in 100% condensing RH environments.

Environment: Max. Altitude 2000 m, Pollution Degree 3, Intended for Indoor Use.

CE EN 61000-3-2:2006 EMC, EN 61000-3-3:2008 EMC, EN61010-1-3-2013 LVD

2.2 Performance Specifications Carbon Dioxide sensor

Sensor Type: Long Life NDIR Sensor 0 10,000ppm

Response Time: Within 1 second of any change in CO_2.

Accuracy: ±5% of measured value.

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: 32° to 122°F (0° to +50°C); consult CONCOA for lower or higher operating temperatures.

Humidity: 0 to 95% RH.

Environment: Max. Altitude 2000 m, Pollution Degree 3, Intended for Indoor Use.

CE EN 61000-3-2:2006 EMC, EN 61000-3-3:2008 EMC, EN61010-1-3-2013 LVD

2.3 Gas Detection System

Transmitter: Microprocessor electronics with built-in 3-digit backlit LCD display Joystick operated menus

2.4 Signal Outputs

Local Display: Digital display calibrated for oxygen and carbon dioxide.
The range is stated on the serial number and can be accessed via the joystick on the front panel. In the measurement mode pushing the joystick down will scroll the gas and range on the display. Push the joystick down again to stop the scrolling and display the gas again.
Standard Analog Output: DC 4-20 mA

Optional Relay Output: Dual level user selectable alarm relays and one fault relay. Rated, 2amps @ 24VAC or 24VDC

2.5 Electrical Requirements

Power: 24 VDC external power. A regulated 24VDC power supply is required.
Consumption: Approximately 250mA

2.6 Physical Characteristics

Dimensions: 6.5 (W) x 3.15 (H) x 3.00 (D) inches; 165 x 80 x 76 mm (Max with feet)

Weight: 1.1 pounds (0.5 kg)

Enclosure Type: General purpose; not intended for explosive atmospheres.

2.7 Dual O2/CO2 System Default Factory Settings

The ***Dual O2/CO2*** monitor is shipped with factory defaults for the alarm relay settings. The following are the factory defaults:

Menu Function	Factory Default	Menu Defined
Set 4-20mA loop	The mA output is set at the factory using a calibrated Fluke meter.	Use this function to adjust the monitor's 4mA, (Zero) and 20mA, (Span) to your PLC or distributive control system.
Set Formats LED and alarm relay 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?
Set Alarm Threshold Polarity	Alarm 1 = Normal Alarm 2 = Inverted Audio = Inverted	Do you want to alarm at a level higher (normal) or lower (inverted) than the alarm threshold?
Set 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)?
Alarm Delay	Alarm = 5 seconds	How long do you want to wait until the alarms activate?
Zero Suppression	000 = 0.00% Refer to section 4.5.6	**This function is Not Enabled on the Dual monitor.**
Set Alarm Thresholds	Alarm 1 = 5,000ppm Alarm 2 = 19.5%	At what level do you want to alarm?
Set Alarm Hysteresis	Alarm 1 = 00 PPM Alarm 2 = 0.0 %	For use when using the O2 monitor for control of valves and process. See Section 5.4.8
Sensor Adjustment	Set O2 sensor span Turn CO2 autocal on Turn CO2 autocal off Calibrate CO2 sensor	For use when dynamically gas calibrating the oxygen and CO2 monitor. See Section 6.2
Manage Passwords	Factory default is **557**	For use when changing the password from factory default to a new password of your choice.

NOTE*:* The built in relay settings may be changed by the user in the field. Refer to Section 5.5.2
**** NOTE: The LED indicators on the front panel are connected directly to the alarm relays.**

3: Installation

3.1 Site Requirements

The ***Dual O2/CO2*** 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 **Dual O2/CO2** monitor is not designed for installation in hazardous areas. Consult CONCOA for information on enclosures for use in hazardous environments.*

3.2 Mounting

3.2.1 Transmitter Enclosure

The ***Dual O2/CO2*** 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.

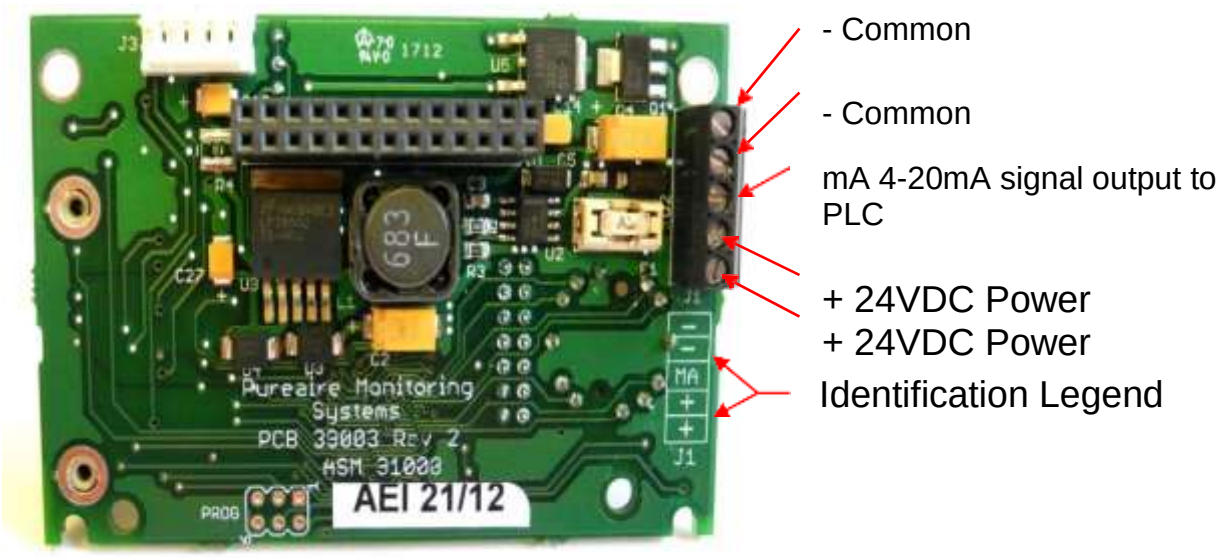


3.2.2 *Dual O2 /CO2* monitor

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 Dual O2/CO2 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.



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

NOTE: ***CONCOA has added additional contacts for +24VDC power and common to accommodate additional wiring for remote horns and strobes***

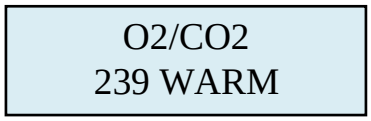
3.4 Initial Startup

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 ***Dual O2/CO2*** monitor LCD displays the CONCOA logo and then starts a 4-minute (240 second) count down as the current to the zirconium oxide O_2 sensor stabilizes. The monitor will output a 4 mA signal during the entire warm-up period. After the countdown, the oxygen sensor will continue to reach its operating temperature for approximately 30 minutes and the reading displayed will slowly increase to ambient. **Do not make any adjustments to the reading until after the monitor has been powered for at least an hour.**

NOTE: The *Dual O2/CO2* monitor is supplied with an audio horn, it will activate momentarily at the completion of the warm up.



NOTE: The *Dual O2/CO2* monitor's oxygen reading may be adjusted to the ambient oxygen level. The CO_2 sensor has an auto calibration feature. It also may be manually calibrated to span gas. See section 6.1 for instructions on adjusting.

4: Normal Operation

The ***Dual O2/CO2*** monitor is a single point monitor designed for the continuous detection and measurement of ambient oxygen concentration levels.

4.1 Signal Outputs

The ***Dual O2/CO2*** monitor outputs a continuous 4-20 mA analog signal proportional to the measured concentration of either oxygen or carbon dioxide. ***The 4-20 mA output can only be used for gas.*** When oxygen is selected 4 mA represents 0% O_2 and 20 mA represents 25% O_2 which is the full range for oxygen. When carbon dioxide is selected 4 mA represents 0ppm and 20 mA represents 10,000ppm which is the full range for carbon dioxide. 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 ***Dual O2/CO2*** 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**
**Supply Voltage Out of Range Fault code 16	Analog output drops to 2 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 / CO_2 System Warm-Up	Analog output drops to 2 mA Fault Relay activates and turns off when system is in the Oxygen operation mode (Available with Relay Option Only)
O_2 Cell voltage fault Fault Code 64	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 its own specific code to identify the specific problem. Please contact CONCOA whenever a fault is displayed.

**** When using your own power supply please ensure that the voltage is regulated to 24VDC +/- 0.5 volts. If the voltage is too low or high you will activate a Supply Voltage Out of Range fault and disable the monitor.**

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 17.4 mA signal when the oxygen level is at 20.9% or approximately 4.6mA when the Carbon Dioxide is at ambient 400ppm. The LCD digital display should also indicate 20.9% 0_2 and approximately 450ppm level when the Oxygen and Carbon Dioxide levels are at ambient.

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 ***Dual O2/CO2*** monitor to 20.9% oxygen is constantly being performed. The oxygen sensor only requires periodic testing with nitrogen to verify the cells response to low oxygen levels. See Section 5.5.10 for how to make minor adjustments to the oxygen sensor.

The ambient CO_2 level is 400ppm and the sensor provides automatic baseline adjustments to ambient levels on a regular time schedule. However, the CO_2 sensor can be manually calibrated by using span gas. See section 6.3 for how to manually calibrate the CO_2 sensor.

4.4 Loss of Power Indicator

In the event the ***Dual O2/CO2*** 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

The ***Dual O2/CO2*** monitor is supplied with individual alarm relays for each gas. Whenever the monitor's alarms are activated, the built-in alarm relays, panel mounted LED's and 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 is 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 section1.2.7. 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.

5: *Dual O2/CO2* Monitor Programming

The ***Dual O2/CO2*** 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.

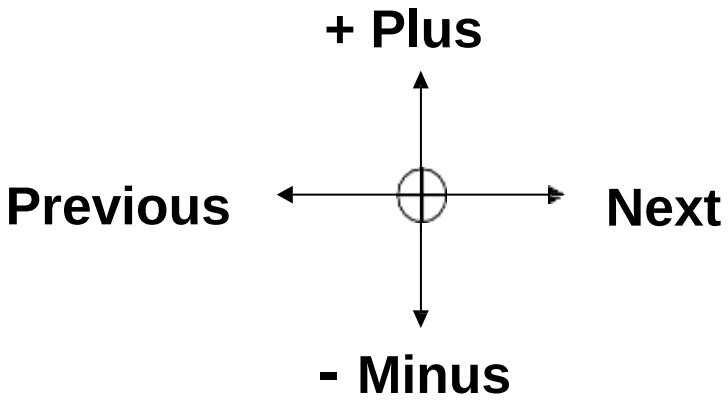
NOTE: The **Dual O2/CO2** monitor will continuously monitor oxygen while accessing the menus. **The alarm, fault relays and mA output are all active and on line while making any changes to the menus.**

5.1 Joystick Operation

The ***Dual O2/CO2*** monitor uses a 4-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.

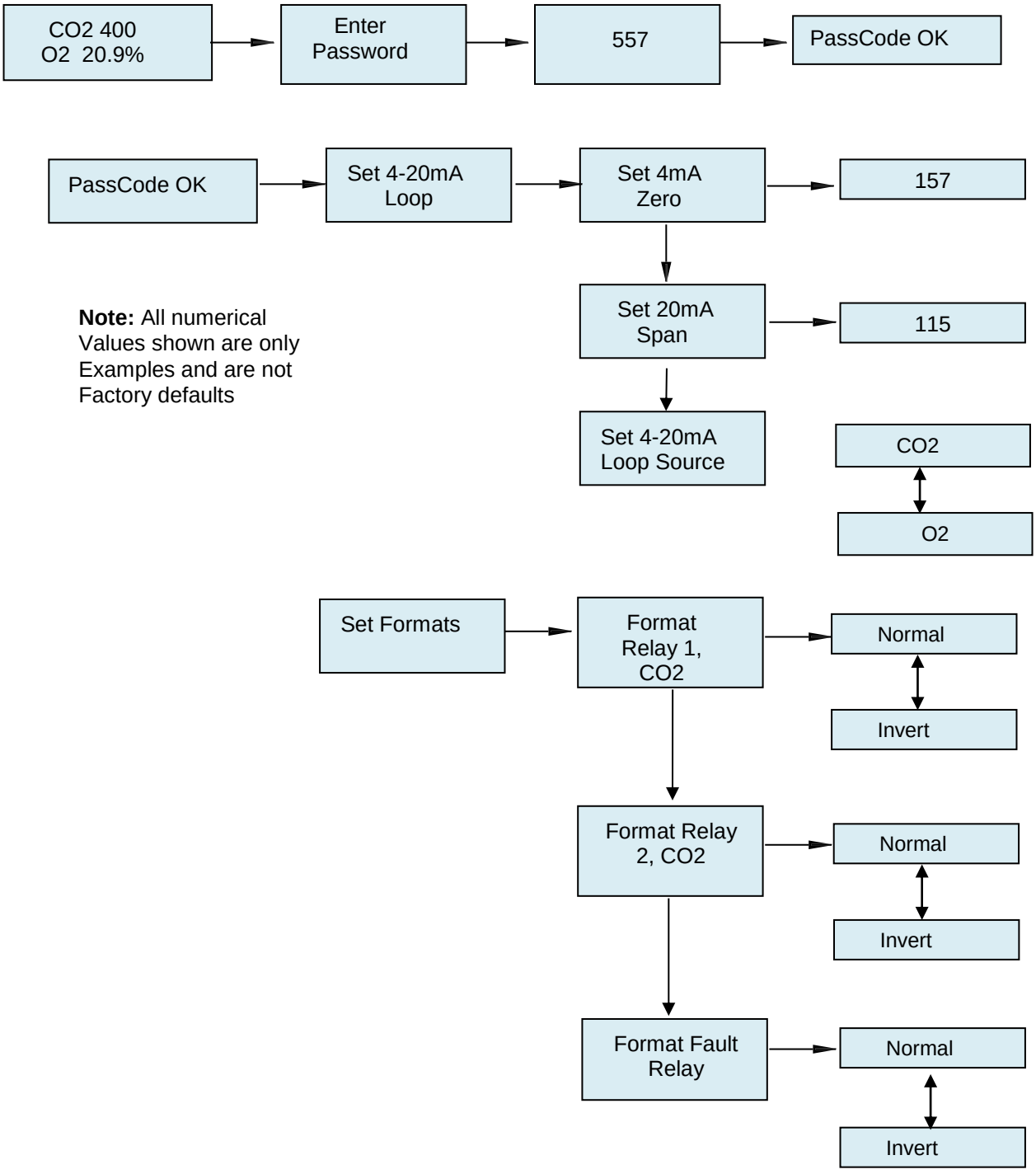
Minus – Pushing the joystick in this direction decreases the value.

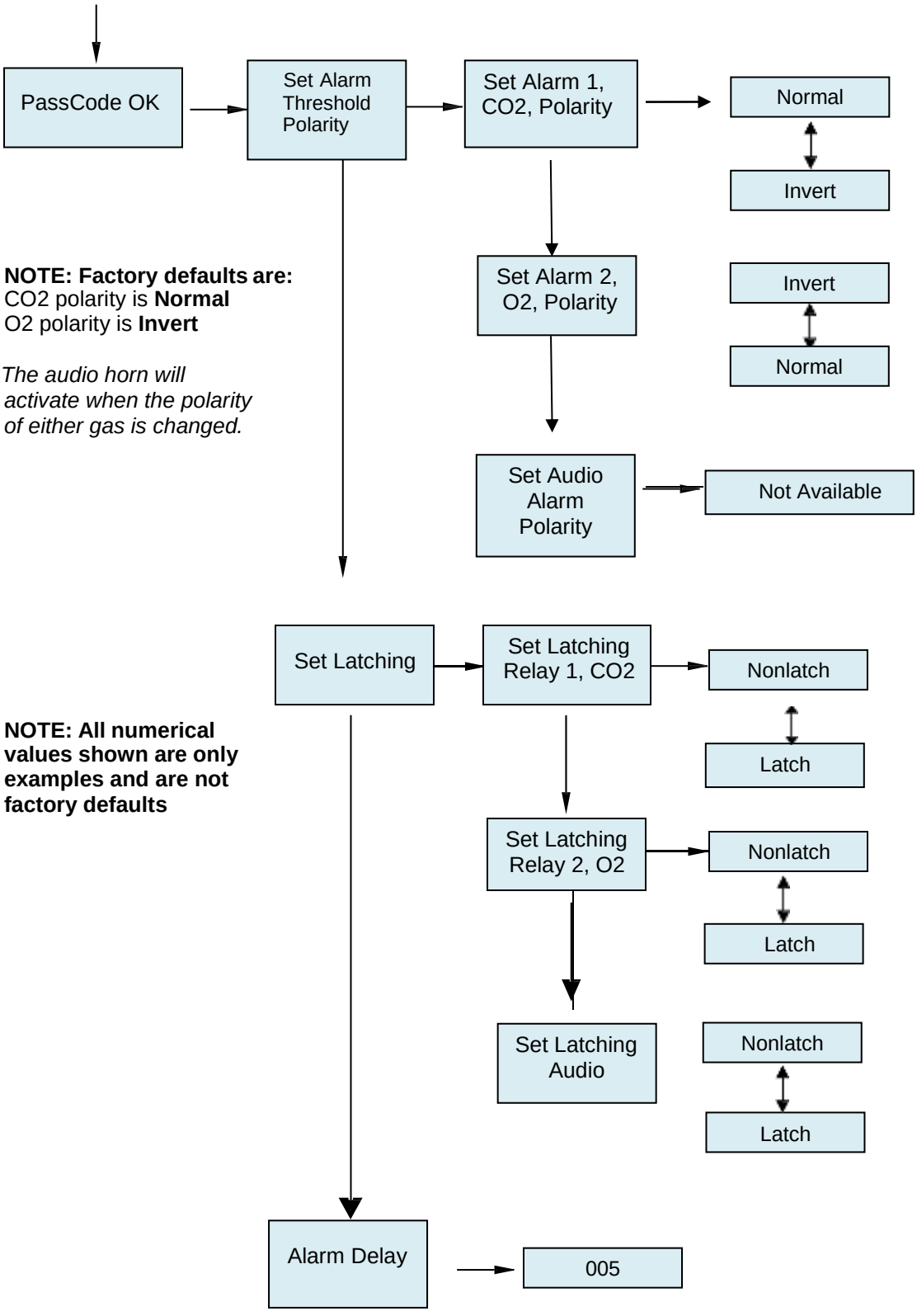
Next – Pushing the joystick in this direction moves you to the next level of the menu hierarchy.

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.

5.2 Program Flowchart

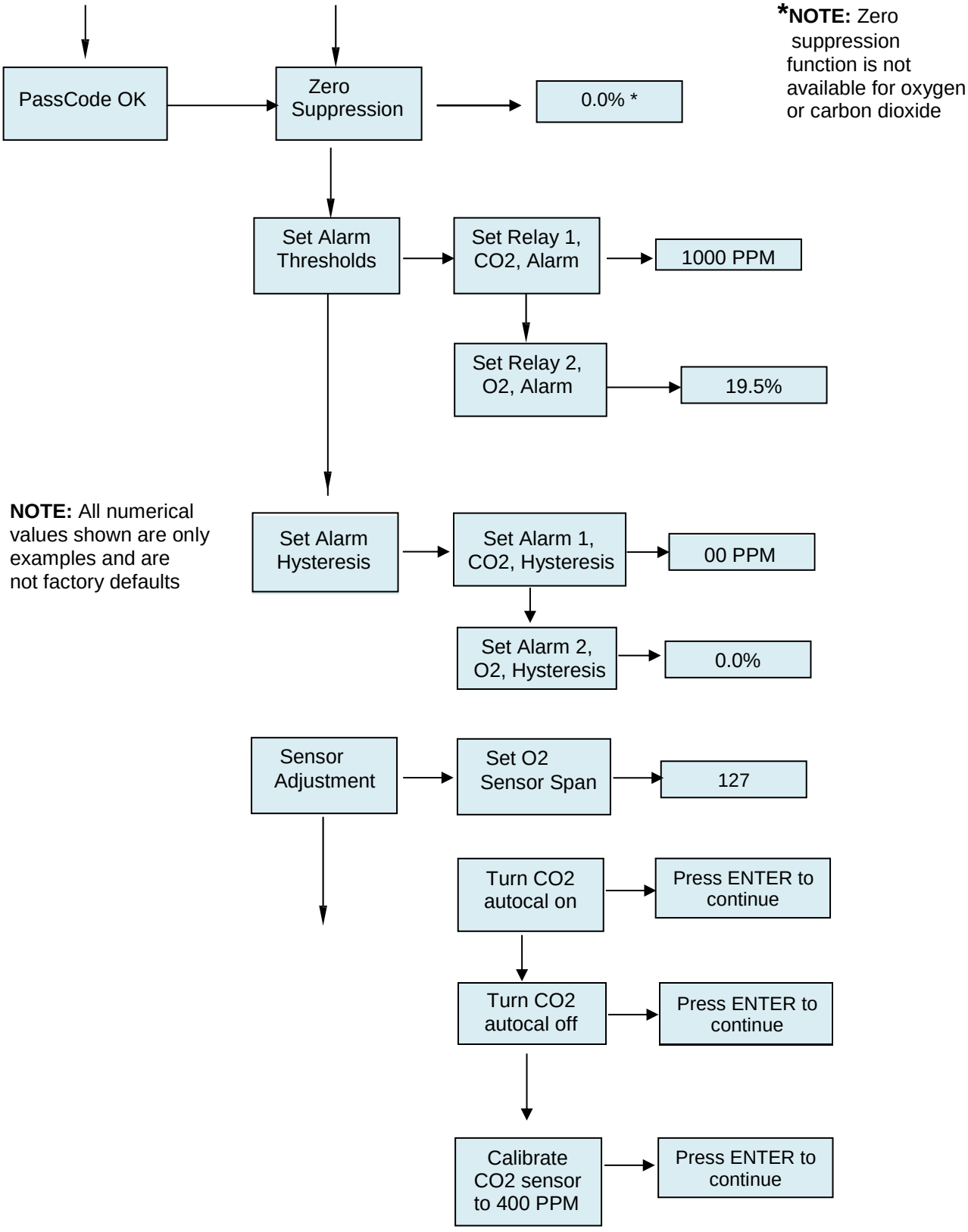


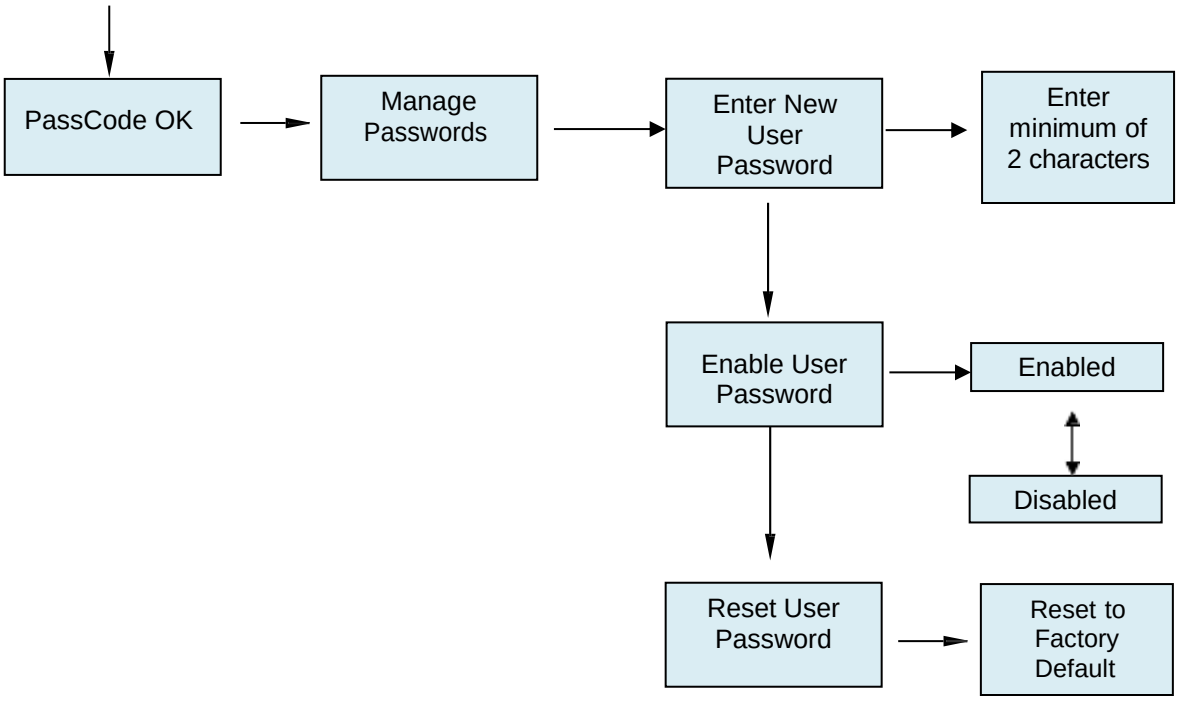


NOTE: Factory defaults are:
CO2 polarity is **Normal**
O2 polarity is **Invert**

The audio horn will activate when the polarity of either gas is changed.

NOTE: All numerical values shown are only examples and are not factory defaults

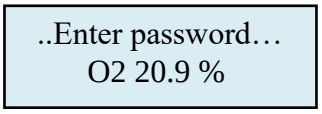

PassCode OK
Zero Suppression
0.0% *
*NOTE: Zero suppression function is not available for oxygen or carbon dioxide
Set Alarm Thresholds
Set Relay 1, CO2, Alarm
1000 PPM
Set Relay 2, O2, Alarm
19.5%
NOTE: All numerical values shown are only examples and are not factory defaults
Set Alarm Hysteresis
Set Alarm 1, CO2, Hysteresis
00 PPM
Set Alarm 2, O2, Hysteresis
0.0%
Sensor Adjustment
Set O2 Sensor Span
127
Turn CO2 autocal on
Press ENTER to continue
Turn CO2 autocal off
Press ENTER to continue
Calibrate CO2 sensor to 400 PPM
Press ENTER to continue


PassCode OK
Manage Passwords
Enter New User Password
Enter minimum of 2 characters
Enable User Password
Enabled
Disabled
Reset User Password
Reset to Factory Default

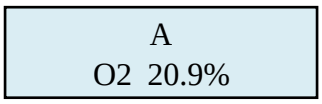
5.3 Entering the Password

The ***Dual O2/CO2*** Air Check Oxygen 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.

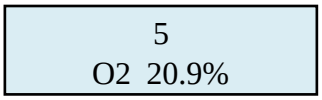


2. Push the joystick again once more to the right to enter the input screen. **The letter A will appear and flash.**

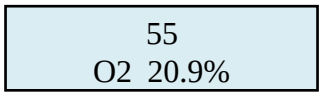


NOTE: ***The display has characters that start with A through Z and 0 through 9. Pushing the joystick up or down will permit you to scroll through the alphanumeric characters.***

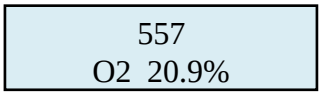
3. Push the joystick up or down to enter the first digit. The display is an alphanumeric display and toggles from A through Z followed by 0 to 9. The character to be entered will flash.



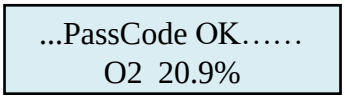
4. Push the joystick again to the right to select the second entry. Push the joystick up or down to select the second digit. The character being entered will flash and the first character entered will remain lit.



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.



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

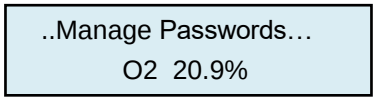


NOTE: If an incorrect password has been entered, the display will indicate Password Failed. Push the joystick to the left to access the monitoring mode. From this mode you can reenter the password again.

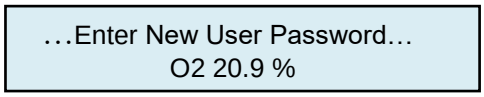
5.4 Changing the User Password

The Dual O_2/CO_2 monitor is supplied with a factory set password to prevent unauthorized access to the menus. Using the following procedure the user can learn how to change the password.

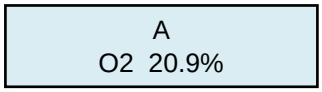
1. Push the joystick down to access the **Manage Passwords Menu**. **Manage Passwords** will scroll on the first line of the digital display. The second line will still display the current oxygen level.



2. Push the joystick to the right to enter the input screen. **Enter New User Password** will scroll on the first line of the digital display

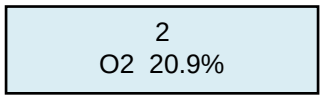


3. Push the joystick to the right to enter the input screen. **The letter A will appear and flash.**

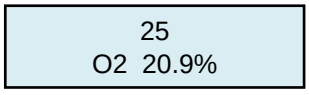


NOTE: ***The display has characters that start with A through Z and 0 through 9. Pushing the joystick up or down will permit you to scroll through the alphanumeric characters.***

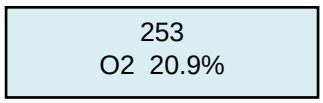
4. Push the joystick up or down to enter the first digit. The display is an alphanumeric display and toggles from A through Z followed by 0 to 9. The character to be entered will flash.



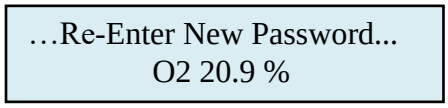
5. Push the joystick again to the right to select the second entry. Push the joystick up or down to select the second digit. The character being entered will flash and the first character entered will remain lit.



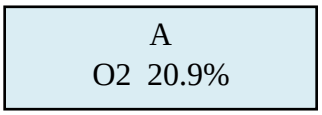
6. Push the joystick again to the right to select the third entry. Push the joystick up or down to select the third and final digit. The character being entered will flash and the first and second characters entered will remain lit. You are now ready to enter the 3-digit password.



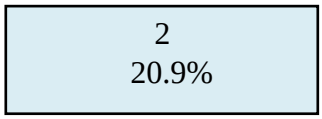
7. Push the joystick in the center to enter the password. This will display the next command, **Re-Enter New Password**



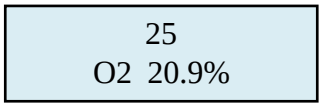
8. Push the joystick to the right to enter the input screen. **The letter A will appear and flash.**



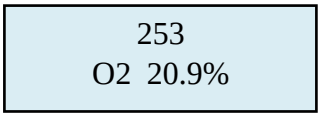
9. Push the joystick up or down to enter the first digit. The display is an alphanumeric display and toggles from A through Z followed by 0 to 9. The character to be entered will flash.



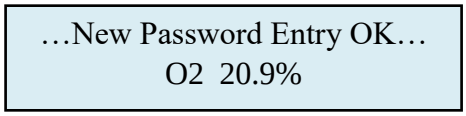
10. Push the joystick again to the right to select the second entry. Push the joystick up or down to select the second digit. The character being entered will flash and the first character entered will remain lit.



11. 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.



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



NOTE: If on the second entry the password entered was not the same as the first, the display will take you back to the "Re-enter Password Screen." You'll need to repeat steps 2 through 11. If you do not enter the password correctly, the monitor remembers the last password that was properly input.

5.4.1 Enable User Password

This menu permits the user to activate or disable the password function on the Oxygen monitor. Push the joystick down. **Enable User Password** will scroll on the first line of the digital display

…Enable User Password…
O2 20.9%

Push the joystick right to display the status. If enabled it will display **Enabled**

Enabled
O2 20.9%

Push the joystick up or down to change the status. Once enabled or disabled is selected, Push the joystick in the center to enter the new status. If entered correctly the display will scroll **Enable User Password**

…Enable User Password…
O2 20.9%

5.4.2 Reset User Password

This menu permits you to reset the password back to 557, as set at the factory.

…Reset User Password…
O2 20.9%

Push the joystick right to display the menu, **Reset to factory Default.**

…Password Reset to factory Default…
O2 20.9%

Push the joystick in (like a doorbell) to reset the password back to 557. Push the joystick left 4 times to go back to the measuring mode.

Oxygen
O2 20.9%

NOTE: If you lose your password please contact CONCOA with your serial number or DTM number.

5.5 Entering the Menus

The ***Dual O2/CO2*** 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.

NOTE: The *Dual O2/CO2* monitor can only output <u>one</u> analog mA signal. You must select either O2 or CO2. See the section Set 4-20mA loop source.

5.5.1 Set 4-20 mA Loop

.Set 4-20mA loop.. O2 20.9%

This main menu will permit the adjusting of the 4mA and 20mA output from the ***Dual O2/CO2*** monitor for only one gas; oxygen or carbon dioxide. Once you select the gas this menu will provide the function that will send an actual output between 4mA and 20 mA to test any remote control and alarm system attached to the Dual O_2/CO_2 monitor.

NOTE: To read the mA output, Dual O2/CO2 monitor must either be connected to a remote PLC controller or SCADA system. You can also connect the Dual O2/CO2 monitor to a DC ammeter to read the mA output. Please consult CONCOA 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… O2 20.9%

This is the menu at which to adjust the 4mA output being sent from the Dual O2/CO2 monitor.

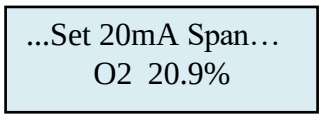
To change this value, push the joystick right to display the 4 mA setting. The display will indicate a value between 0 and 255 counts. Pushing the joystick up increases the value and pushing the joystick down decreases the value. The 4mA output being sent from the Dual O2/CO2 monitor will change as the number on the digital display changes.

255 O2 20.9%

Push the joystick to the left to enter the value and bring you back to the pervious main menu. The digital display will scroll the following:

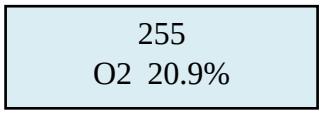
...Set 4mA zero….. O2 20.9%

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

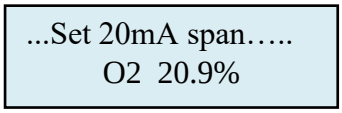


This is the menu at which to adjust the 20mA output being sent from the Dual O2/CO2 monitor.

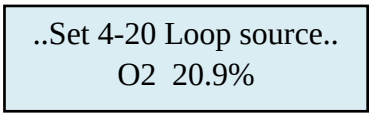
To change this value, push the joystick right to display the 20mA span setting. The display will indicate a value between 0 and 255 counts. Pushing the joystick up increases the value and pushing the joystick down decreases the value. The 20mA output being sent from the Dual O2/CO2 monitor will change as the number on the digital display changes.



Push the joystick to the left to enter the value and bring you back to the pervious main menu. The digital display will scroll the following:

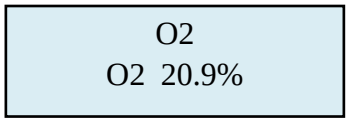


Push the joystick down to access the next sub menu; **Set 4-20 mA loop source.**

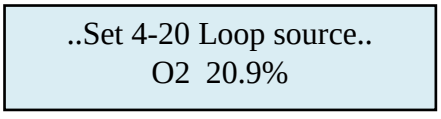


This is the sub menu used to select the individual gas (O_2 or CO_2) that will output the 4-20mA analog signal to your PLC or SCADA system.

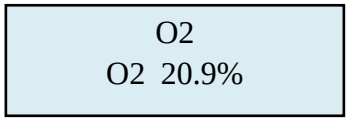
To select the gas, push the joystick right once. The first gas to display is O2.



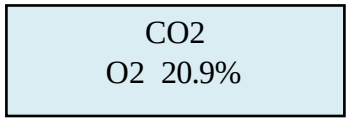
If oxygen is the gas that you wish to send the 4-20mA signal from, push the joystick left once to set this gas and bring you back to the previous main menu. The digital display will scroll the following:



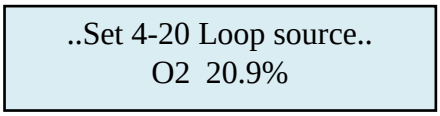
To select CO_2 gas, push the joystick right once. The first gas to display is O2.



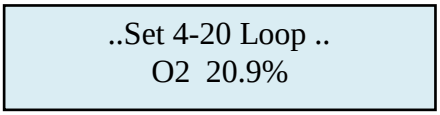
Push the joystick down once to display CO2



If CO_2 is the gas that you wish to send the 4-20mA signal from, push the joystick left once to set this gas and bring you back to the previous Main menu. The digital display will scroll the following:



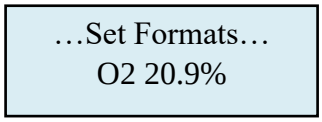
After selecting the gas, push the joystick left once to get you back to the next menu. The display will scroll the following:



5.5.2 Set Formats

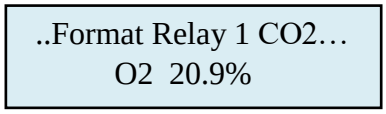
This is the menu at which to adjust the relay states for the two gas alarm relays and the individual instrument fault relay.

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



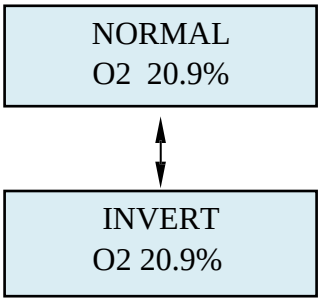
This menu will permit the setting of the two alarm relays and the fault relay settings from normally de-energized state, **Normal**, to normally energized state, **Inverted.**

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



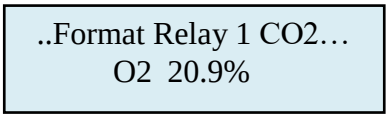
This is the menu at which to adjust the CO2 alarm relay state on the Dual O2/CO2 monitor.

To change this value, push the joystick right to display the relay state. The display will indicate **NORMAL.** This is the factory default state for the alarm relay. Pushing the joystick down will change the relay state from NORMAL to INVERT.

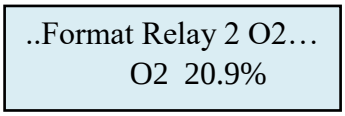


NOTE: When the CO2 relay state is changed to INVERT, the internal horn and orange alarm LED will illuminate.

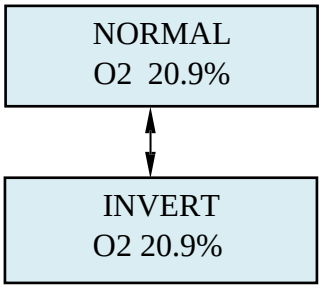
After entering the relay state push the joystick left to enter the setting. The display will scroll the following:



From this main menu, pushing the joystick down will select the next sub menu to adjust the O2 alarm relay state. The digital display will scroll the following:

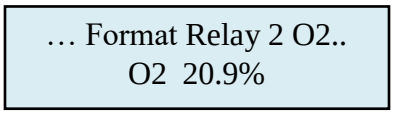


To change this value, push the joystick right to display the relay state. The display will indicate **NORMAL.** This is the factory default state for the alarm relay. Pushing the joystick down will change the relay state from NORMAL to INVERT.

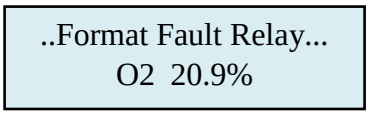


NOTE: When the O2 relay state is changed to INVERT, the internal horn and red alarm LED will illuminate.

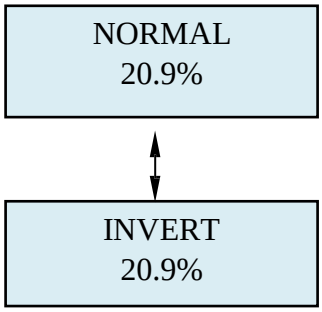
After entering the relay state push the joystick left to enter the setting. The display will scroll the following:



From this main menu, pushing the joystick down will select the next sub menu to adjust the fault alarm relay state. The digital display will scroll the following:

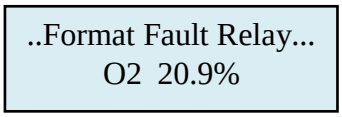


To change this value, push the joystick right to display the relay state. The display will Indicate **NORMAL.** This is the factory default state for the fault relay. Pushing the joystick down will change the relay state from NORMAL to INVERT.

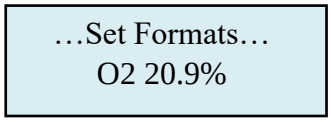


NOTE: When the fault relay state is changed to INVERT, the internal horn and yellow alarm LED will illuminate.

After entering the relay state push the joystick left to enter the setting. The display will scroll the following:

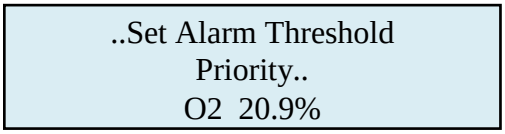


Push the joystick left again to get back to the previous. The display will scroll the following:

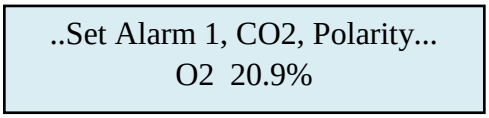


5.5.3 Set Alarm Threshold Polarity

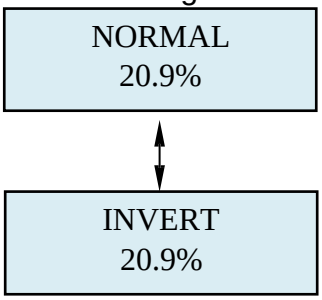
Alarm Threshold Polarity determines if an alarm concentration is set above or below a threshold value. For example, if an alarm of 19.0% for oxygen is selected, the Alarm Threshold Polarity must be set to **Invert** for the monitors alarm to activate when the reading goes below 19.0%. For CO_2 gases 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.



Push the joystick right to access the first sub menu; **Set Alarm 1 CO2 Polarity** will scroll on the display. This is the menu at which to adjust the CO_2 alarm polarity state on the Dual O2/CO2 Monitor.

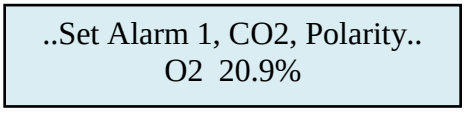


To change this value, push the joystick right to display the relay state. The display will indicate **NORMAL.** Pushing the joystick down will change the relay state from NORMAL to INVERT.

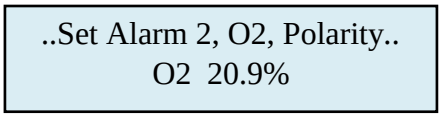


NOTE: When the CO2 relay state is changed to INVERT, the internal horn and Orange alarm LED will illuminate.

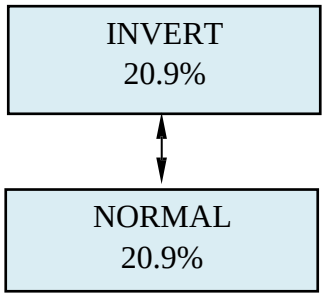
After entering the polarity push the joystick left to enter the setting. The display will scroll the following:



Push the joystick down to access the next sub menu; **Set Alarm 2, O2, Polarity** will scroll on the display. This is the menu at which to adjust the second level alarm polarity state on the Dual O2/CO2 Monitor.

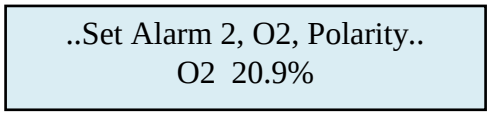


To change this value, push the joystick right to display the relay state. The display will indicate **INVERT.** Pushing the joystick down will change the relay state from INVERT to NORMAL.



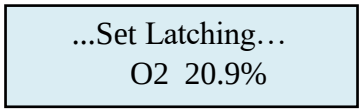
NOTE: When the O2 relay state is changed to NORMAL, the internal horn and red alarm LED will illuminate.

After entering the polarity push the joystick left to enter the setting. The display will scroll the following:

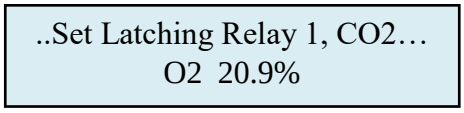


5.5.4 Set Latching

This is the menu at which to adjust the relay alarm state for both O_2 and CO_2 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.

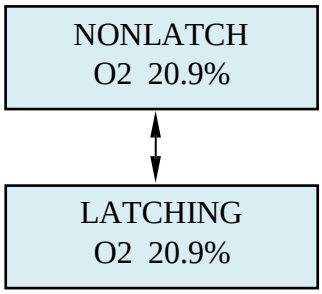


From this main menu, pushing the joystick to the right will select the sub menu and the digital display will scroll the following:

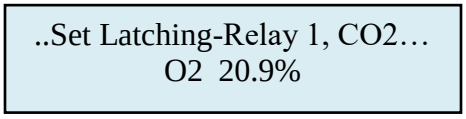


This is the menu at which to adjust the CO_2 alarm relay state on the dual O2/CO2 Monitor.

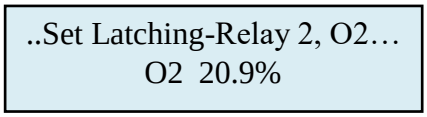
To change this value, push the joystick right to display the relay state. The display will indicate **NONLATCH.** Pushing the joystick down will change the relay state from NONLATCHING to LATCHING.



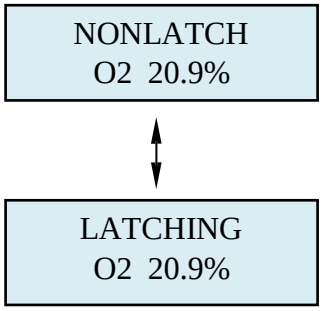
After entering the relay setting push the joystick left to enter the setting. The display will scroll the following:



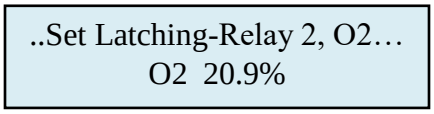
Push the joystick down to access the next sub menu; **Set Latching-Relay 2, O2,** will scroll on the display. Use this menu to adjust the O_2 alarm relay state on the dual O2/CO2 monitor.



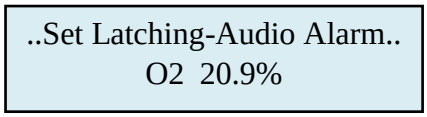
To change this value, push the joystick right to display the relay state. The display will indicate **NONLATCH.** Pushing the joystick down will change the relay state from NONLATCH to LATCHING.



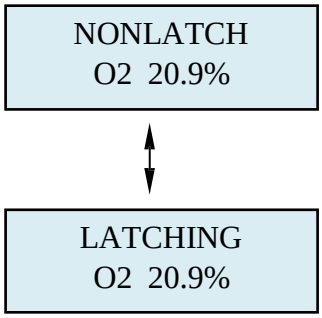
After entering the relay setting push the joystick left to enter the setting. The display will scroll the following:



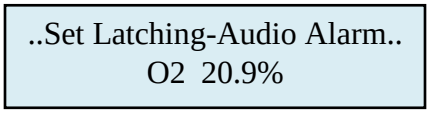
Push the joystick down to access the next sub menu; **Set Latching-Audio Alarm** will scroll on the display. This is the menu at which to adjust the Audio alarm relay state on the dual O2/CO2 monitor.



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



After entering the relay setting push the joystick left to enter the setting. The display will scroll the following:

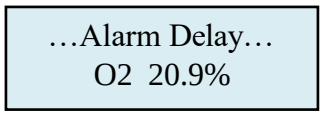


5.5.5 Resetting a Latching Alarm

To reset a latching alarm relay, you must enter the password correctly and then push the joystick down to enter the reset command. The Dual O2/CO2 monitor also has an internal 2-pin terminal block for connecting a remote reset switch. (See Alarm Relay board, section 1.2.7)

5.5.6 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 either oxygen or carbon dioxide must be present before the instrument's gas concentration alarms will be activated. This menu will permit setting a user selected time delay for activating the O_2 and CO_2 alarm.

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

005 O2 20.9%

After entering the relay setting push the joystick left to enter the setting. The display will scroll the following:

…Alarm Delay… O2 20.9%

NOTE: The alarm delay is only available for O2 and CO2 alarms 1 and 2. There is no delay for the fault relay. Any system fault will immediately activate the Fault Relay.

5.5.7 Set Zero Suppression

This function is not used on the Dual O2/CO2 monitor. It is only used to decrease the sensitivity of selected toxic and corrosive gas sensors. It is totally disabled in the dual monitor.

5.5.8 Set Alarm Thresholds

..Set Alarm Thresholds.. O2 20.9%

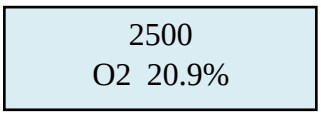
This main menu will permit adjusting the oxygen concentration percentage and carbon dioxide ppm level that will activate their respective alarm relays. It will also activate the internal audio horn.

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, CO2, Alarm Threshold.**

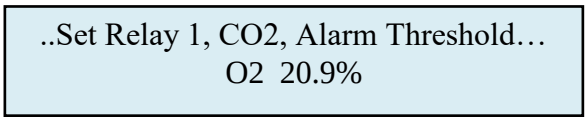
..Set Relay 1, CO2, Alarm Threshold… O2 20.9%

This is the gas concentration at which the CO_2 level must be displaying to activate the alarm. To change the displayed value, push the joystick to the right to display the CO_2 level alarm setting. The display will indicate a value between 0 ppm and 10,000 ppm.

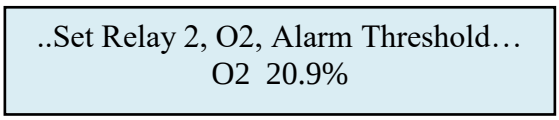
Pushing the joystick up increases the value and pushing the joystick down decreases the value.



After entering the alarm setting push the joystick left to enter the setting. The display will scroll the following:

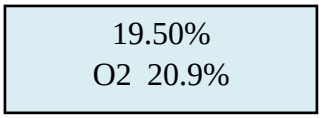


Push the joystick down to access the next sub menu; **Set Relay 2 Alarm Threshold,** will scroll on the digital display.

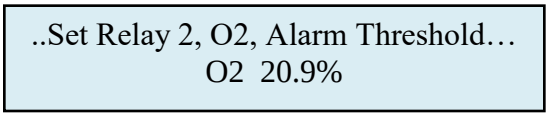


This is the gas concentration at which the O_2 level must be displaying to activate the alarm. To change the displayed value, push the joystick to the right to display the O_2 level alarm setting. The display will indicate a value between 0% and 25%.

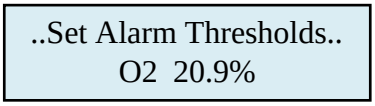
Pushing the joystick up increases the value and pushing the joystick down decreases the value.



After entering the alarm setting push the joystick left to enter the setting. The display will scroll the following:



Push the joystick left once to return to the **Set Alarm Thresholds menu.** The display will scroll the following:



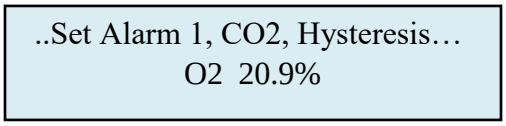
5.5.9 Set Alarm Hysteresis

CONCOA's Dual O2/CO2 monitor may be used as a control system. When used to regulate oxygen or carbon dioxide levels the need of a dead band, "hysteresis" may be required for the alarm relays. This menu will permit the setting of the alarm hysteresis to a desired concentration of both oxygen and carbon dioxide. 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.

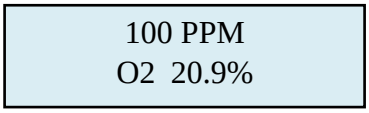
For example, if you require a valve to close at 14.9% oxygen level and to reopen again at 15.5% oxygen level, you would set the Alarm Threshold at 15.2% and set the hysteresis value at 0.3%.

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

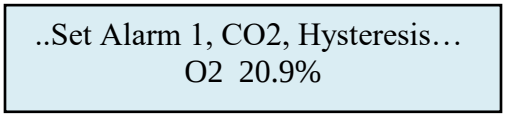
To access this menu push the joystick down to display the **Set Alarm Hysteresis** menu. This will scroll on the digital display.



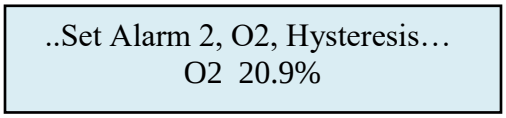
Push the joystick right to access the **Set Alarm 1, CO2, Hysteresis**. It will display a value 00 PPM, (factory default). Pushing the joystick up increases the CO_2 PPM to a maximum value of 500 PPM. Adjust the digital display until the desired hysteresis value is selected.



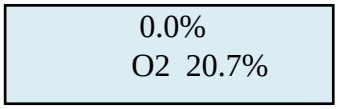
After entering the alarm setting push the joystick left to enter the setting. The display will scroll the following:



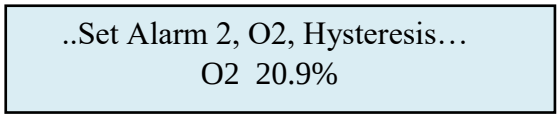
Push the joystick down to access the next sub menu; **Set Alarm 2, O2, Hysteresis** on the digital display.



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.



After entering the alarm setting push the joystick left to enter the setting. The display will scroll the following:

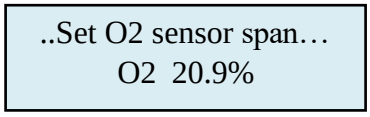


5.5.10 Set Sensor Adjust (Menu used to adjust both Oxygen and Carbon Dioxide)

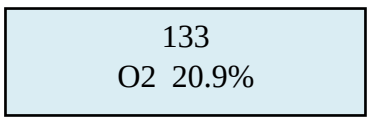
Set O2 sensor span

NOTE: **It is recommended to warm up the Dual O2/CO2 monitor for two hours before making any adjustments to the sensor.**

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 right to display **Set O2 sensor span.** This will scroll on the digital display.



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 Dual O2/CO2. 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%.



After entering the alarm setting push the joystick left to enter the setting. The display will scroll the following:

..Set O2 sensor span…
O2 20.9%

5.5.11 Auto Calibrate feature for CO_2 NDIR sensor

The CO_2 sensor can be set to automatically calibrate itself to the ambient carbon dioxide level on earth. The ambient CO_2 level is 400 PPM. The Dual O2/CO2 monitor has a menu that permits you to activate this feature by turning on this feature. If the Dual O_2/CO_2 monitor is not exposed to constant high levels of CO_2, the sensor will automatically adjust the baseline setting and there is no further action required by the user. The sensor is factory calibrated and requires no user calibration.

To access this menu, go to the **Sensor Adjustment** main menu.

..Sensor Adjustment..
O2 20.9%

Press the joystick right to access the **Set O2 sensor span** sub menu.

..Set O2 sensor span..
O2 20.9%

Push the joystick down to access the **Turn CO2 autocal on** menu. The display will scroll the following:

..Turn CO2 autocal on..
O2 20.9%

To turn ON this feature push the joystick right. The display will scroll the following:

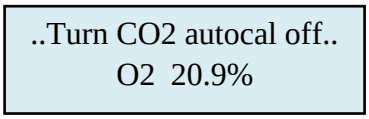
..Press ENTER to continue..
O2 20.9%

Push the joystick in (like a doorbell) to activate the autocal feature. Every week the CO_2 sensor will automatically adjust back to 400PPM which is the ambient level on earth.

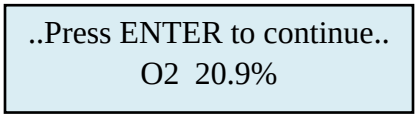
NOTE: DO NOT use the auto calibration feature if you are monitoring continuous levels of CO2 for control of grow rooms. The monitor needs to be in ambient levels for the autocal feature to operate properly.

You can also disable or turn off the auto calibration feature. If the Dual O_2/CO_2 monitor is exposed to constant high levels of CO_2, the user **MUST** inhibit, turn off the autocal feature and preform a manual baseline adjustment approximately every six months or more often if desired. To turn OFF the auto calibration feature, push the joystick down to access the menu.

The display will scroll the following:



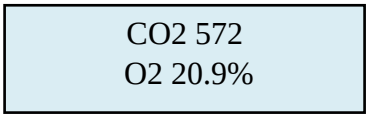
To turn OFF this feature push the joystick right. The display will scroll the following:



Push the joystick in (like a doorbell) to activate the autocal feature. The auto calibration feature has now been disabled. You can now **manually** calibrate the CO_2 sensor to ambient 400 PPM on demand. ***Refer to section 6.3, Sensor calibration CO_2.***

5.5.12 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:



6: Maintenance & Sensor Verification

Only qualified personnel should perform maintenance and sensor verification

6.1 Sensor Verification, O_2

The earth is a wonderful source of calibrated oxygen at 20.9%, therefore under ambient conditions verification of the ***Dual O2/CO2*** 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 O_2 monitor also requires periodic testing with nitrogen to verify the cell's response to 0% oxygen.

6.1.1 Sensor Verification Gas

For testing the ***Dual O2/CO2*** O_2 monitor, CONCOA recommends the use of nitrogen. This can be purchased from your gas supplier or from CONCOA Monitoring Systems.

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, O_2

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

Under ambient non-oxygen deficient environments, ***Dual O2/CO2*** 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%.

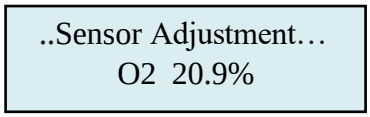
1) Ensure that the ***Dual O2/CO2*** monitor is in a clean non-oxygen deficient environment.

2) Enter the password. ***Refer to Section 5.3***

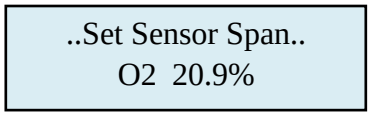
3) Select the ***Sensor Adjust*** menu.

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.

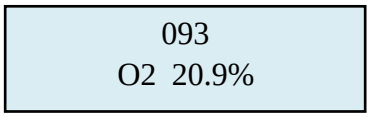
NOTE: **It is recommended to warm up the Dual O2/CO2 monitor for two hours before making any adjustments to the sensor.**



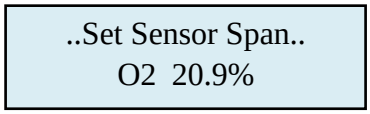
Push the joystick right to access the first sub menu; **Set Sensor Span** will scroll on the display. This is the menu that will permit fine adjustment of the ambient oxygen reading to 20.9%.



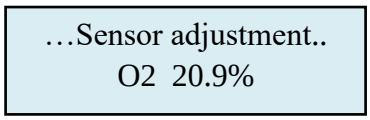
Push the joystick right to access the sensor span. The display will indicate a value between 0 and 255 counts. Pushing the joystick up increases the counts and decreases the percent oxygen value displayed on the Dual O2/CO2. Pushing the joystick down decreases the counts and increases the oxygen value displayed on the Dual O2/CO2. As the counts increase and decrease the percent oxygen displayed will also increase and decrease. Adjust the digital display until 20.9% +/- 0.2% is displayed.



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



Press the joystick to the left to revert to the **Sensor Adjustment** menu.



6.2.1 Sensor Verification to Nitrogen

CONCOA recommends challenging the O_2 monitor with nitrogen every 6 to 12 months. The sensor protector has a ¼" male tube fitting designed for connecting sample tubing from a nitrogen cylinder. Expose the O_2 cell to N_2 at a flow rate of 500 cc/min. The reading will drop off to 1% or below in less than one minute when the O_2 sensor is exposed to pure N_2. 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 Dual O2/CO2 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

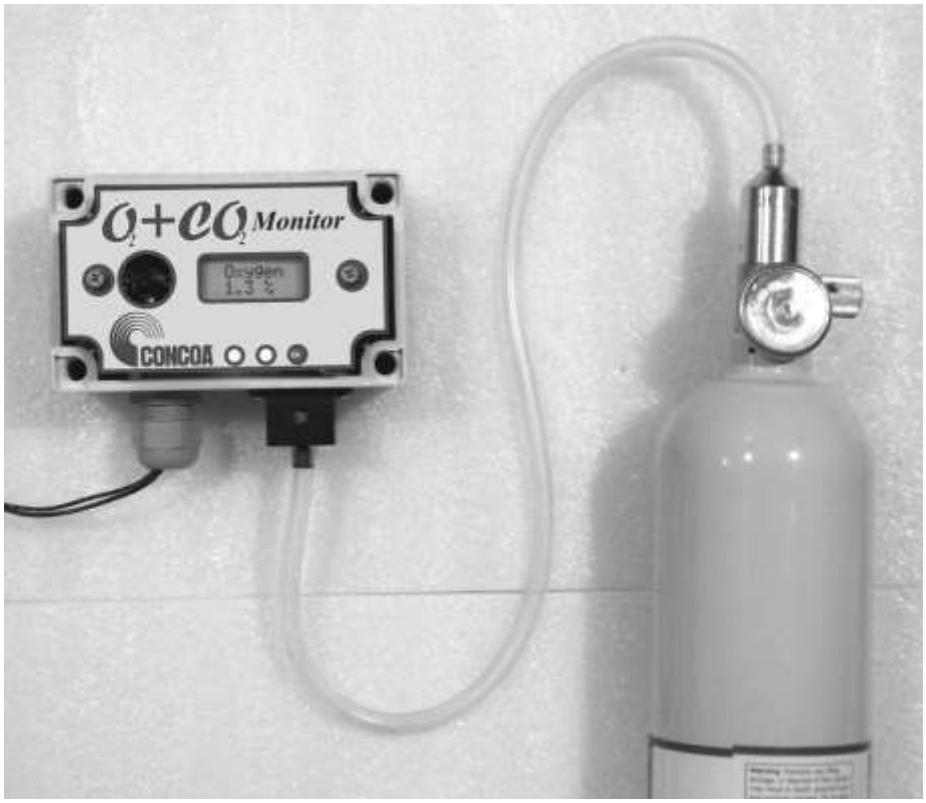
When testing the O_2 monitor to a known concentration of oxygen, the sensor inlet has a ¼" compression tube fitting designed for connecting the dust filter. You can connect ¼" OD sample tubing from a nitrogen cylinder directly to the dust filter. Expose the O_2 cell directly from the nitrogen cylinder 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 Dual O2/CO2 monitor needs to be completely immersed into the span gas environment.**

NOTE: The Dual 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 Dual O2/CO2 monitor needs be completely immersed into a zero oxygen environment.

O2 monitor
connected to gas cylinder



6.3 Sensor Calibration, CO_2

CONCOA incorporates the use of an **NDIR** (Non-Dispersive InfraRed) CO_2 sensor in the Dual O_2/CO_2 Monitor. The sensor is factory calibrated and will always provide an accurate reading that is the difference between a baseline setting and the actual CO_2 measurement. As typical with most NDIR sensors, long term drift can affect the baseline setting. To compensate for this drift, an automatic background calibration function is built into the sensor and is enabled by default from the factory. This calibration feature assumes that during a 24 hour period, the monitored CO_2 levels return to normal ambient conditions, such as in an office environment or spaces that are unoccupied during the evening.

If the monitor is constantly exposed to elevated levels of CO2, for example, in an agricultural growing room, the auto calibration feature should be inhibited, turned off and a manual calibration preformed approximately every six months. *See Section 5.5.11 to turn off the autocal feature.*

CAUTION: DO NOT ADJUST the CO2 sensor unless you are certain that the CO2 level has returned to normal ambient conditions, such as in an outdoor environment or spaces that are unoccupied.

To perform a manual adjustment of the CO2 sensor to ambient 400PPM, use the following procedure. Push joystick to enter the password, then push the joystick to the right and navigate to the Sensor Adjustment menu. The display will scroll

…Sensor adjustment..
O2 20.9%

Push the joystick right once and the display will scroll:

…Set O2 sensor span..
O2 20.9%

Push the joystick down three times to access the **calibrate CO2 sensor to 400PPM** menu The display will scroll:

…Calibrate CO2 sensor to 400 PPM..
O2 20.9%

To manually adjust the baseline setting, expose the monitor to ambient air, either outside or in a well ventilated room for about 5 minutes. Then push the joystick right to set the new ambient CO2 ppm level. The display will scroll **press ENTER** to continue.

…Press ENTER to continue..
O2 20.9%

Push the joystick in (like a doorbell) to set the reading to 400PPM. You have now reset the CO_2 sensor to 400PPM. To exit the calibration menu, push the joystick left three times to display the monitoring mode.

CO2 572
O2 20.9%

7.0 Appendix

Remote Display Alarm Indicator for Oxygen monitor

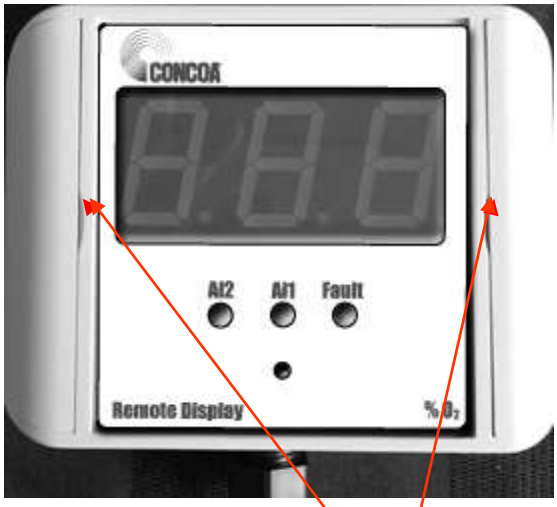
(Part number 5803005)

The Remote Display Alarm Indicator is designed to display remote oxygen concentration information from CONCOA' Oxygen monitors. All CONCOA O_2 monitors have a built in 4-20mA output. The remote display alarm easily connects to the monitor's input power and mA output connection. An 18 AWG, three conductor, shielded control and instrumentation cable, Belden 8770, or equivalent, is recommended for the connection. The maximum permissible cable length is 250 feet. You can simultaneously connect one remote display to one Air Check Oxygen monitor and one programmable logic controller, PLC.

NOTE: The 4-20mA output is only used for the Oxygen sensor. The Remote Display Alarm Indicator can be used for Oxygen only. The CO2 sensor has a voltage output that does not connect to the Remote Display.



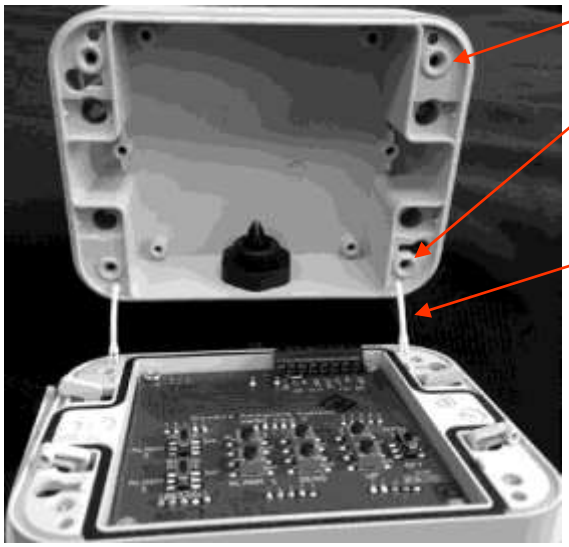
How to mount the Remote Display Alarm Indicator





1) Open the two side doors to expose the front panel screws.

2) Loosen the 4 screws to separate the front panel from the case.

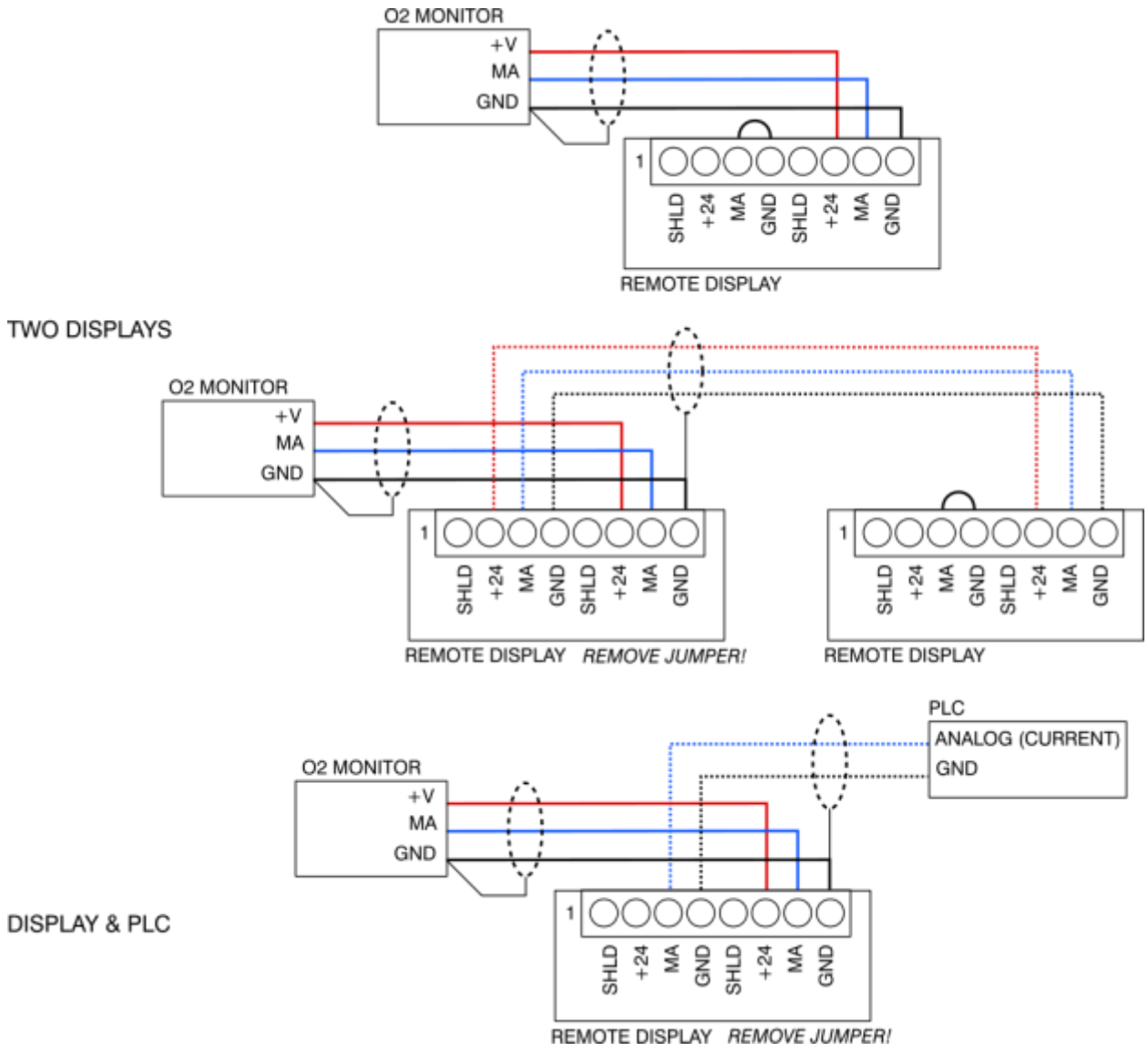


Mount the case to a wall or other flat surface. There are 4ea. through holes for fastening the case.

The case is designed to be flush mounted.

NOTE: The front cover can be removed from the case by gently pulling on the plastic hinges. (They will stay connected to the front cover.)
To connect the front cover, just push the plastic hinge into the case.

How to wire the Remote Display Alarm Indicator



18 AWG, three conductor, shielded control and instrumentation cable, Belden 8770 or equivalent Max distance 250 feet

When connecting to PLC, remove jumper and connect MA to PLC+ and SHIELD to PLC-. Do not remove jumper unless connecting to PLC.

CAUTION!

CAUTION: Make all wire terminations with the power OFF. Failure to do so can damage the oxygen monitor and remote display and void your warranty.

Identification of switches and controls

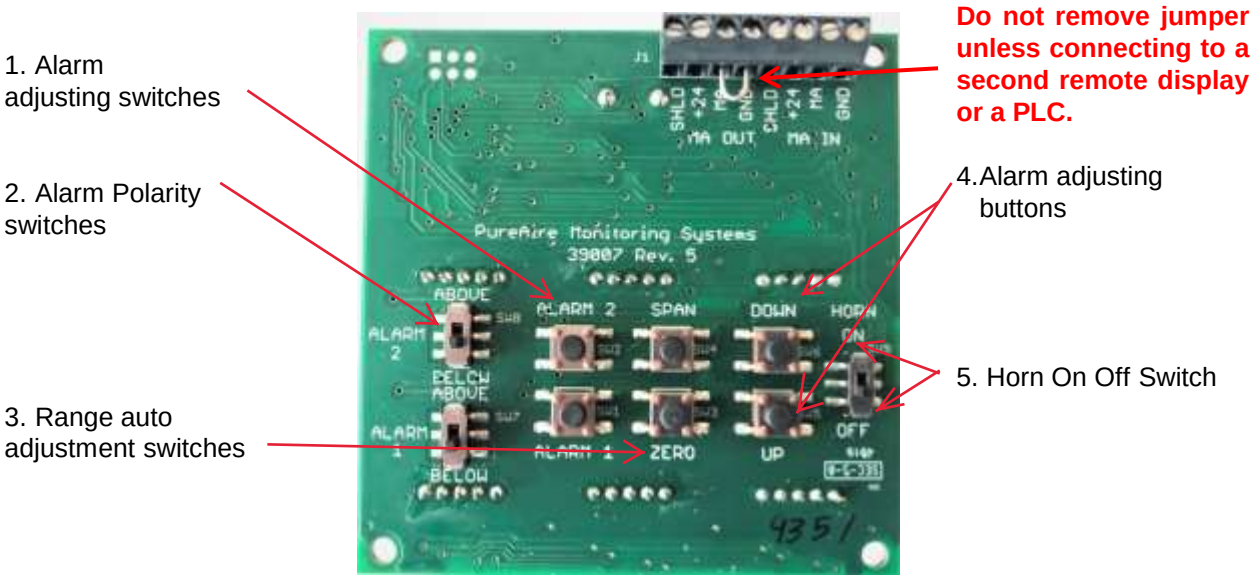
1. **Alarm Adjusting Switches** – These switches are used select the alarm level to be adjusted. They are factory set at 19.5% for Alarm 1 and 18% for Alarm 2. (Normally set at the factory)

2. **Alarm Polarity Switches** – These switches are used to select when the alarms will activate. For oxygen, the alarm switches are set for “Below.” If the readings go below an ambient level, (i.e., 19.5%), then the internal horn and LED’s will activate. When used with our toxic gas monitors, the polarity is set to “Above.” (Normally set at the factory)

3. **Range Auto Adjustment Switches** – These switches are used to adjust the zero and full scale reading on the Remote Display Alarm Indicator. When sending a 4mA and 20mA signal from your Oxygen monitor, pushing these switches will automatically adjust the zero and full scale readings on the Remote Digital Display.

4. **Alarm Adjusting Buttons** – These buttons are used to increase (UP), or decrease (DOWN), the alarm settings.

5. **Horn On/Off Switch** – This switch is used to turn the internal audio horn on and off. In the On position, any alarm will activate the audible horn. To disable the internal horn, turn the switch to Off.



How to Setup and Operate the Remote Display

CAUTION!

CAUTION: Entering the set up menus will disable the real time oxygen readings

After wiring the remote display to your oxygen monitor, turn on the power to your oxygen monitor. During the warm up the remote display will illuminate a yellow fault LED and the display will read FLt, (indicating that the oxygen monitor is in fault). This will clear after the oxygen monitor completes the 4 minute warm-up.



During warm-up



After warm-up

How to set the zero and full scale range

This will need to be set up in the field to adjust to the length of cable between the Oxygen monitor and the remote display alarm indicator. To perform this in the field first enter the password on your oxygen monitor and select the “Set 4-20mA loop” menu (See Section 5.5.1 Set 4-20mA loop).

On your oxygen monitor, use the joystick to select “Set 4mA Zero”. This sends a 4mA signal to the remote display. On the back of the remote display push the ZERO button for 3 seconds. You’ll see the display reset and automatically adjust itself to the new zero. If necessary, you can push the joystick up or down to fine tune the zero reading.
NOTE: *Both AL1 and AL2 LED’s will also be illuminated.*

Once adjusted, use the joystick to select “Set 20mA Span”. This sends a 20mA signal to the remote display. On the back of the remote display push the SPAN button for 3 seconds. You’ll see the display reset and automatically adjust itself to the new span of 25%. If necessary you can push the joystick up or down to fine tune the full scale reading.





NOTE: To fine tune the reading to match the reading on the oxygen monitor, use the “Set 20mA Span” menu. Push the joystick up or down until both displays match.

CAUTION!

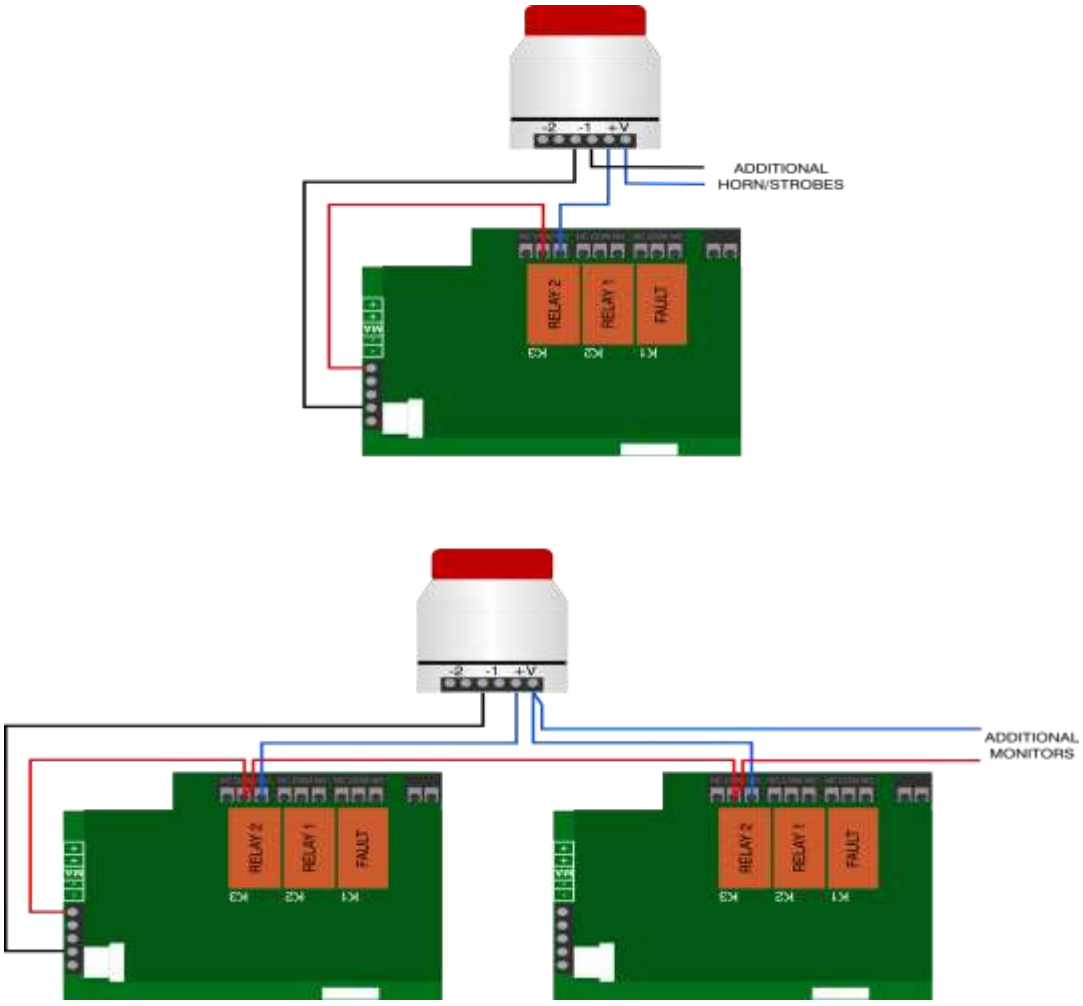
CAUTION: If the oxygen monitor is in the measuring mode and the ZERO push button is pressed an “Err” will be displayed on the remote display and no readings will be recorded. **If the SPAN push button is pressed in the measuring mode, the remote display will automatically adjust to 25.0%.** You will need to repeat the above adjustment procedure again for the remote display to mirror the oxygen monitor. **NEVER PUSH THE SPAN** in the measuring mode.

How to set the internal alarms on the Remote Display

The Remote Display has two user selectable alarms with a separate horn tone to identify Alarm 1 from Alarm 2. Both are preset at the factory; AL1 = 19.5% and AL2 = 18%. They can be changed in the field.

To set Alarm 1, Press Alarm 1 for two seconds to enter the alarm change mode. The display will show the current alarm setting and the right most decimal point will be lit. Use the UP or DOWN buttons to increase or decrease the alarm value. When done, push the Alarm 1 button for 2 seconds to get back to the monitoring mode.

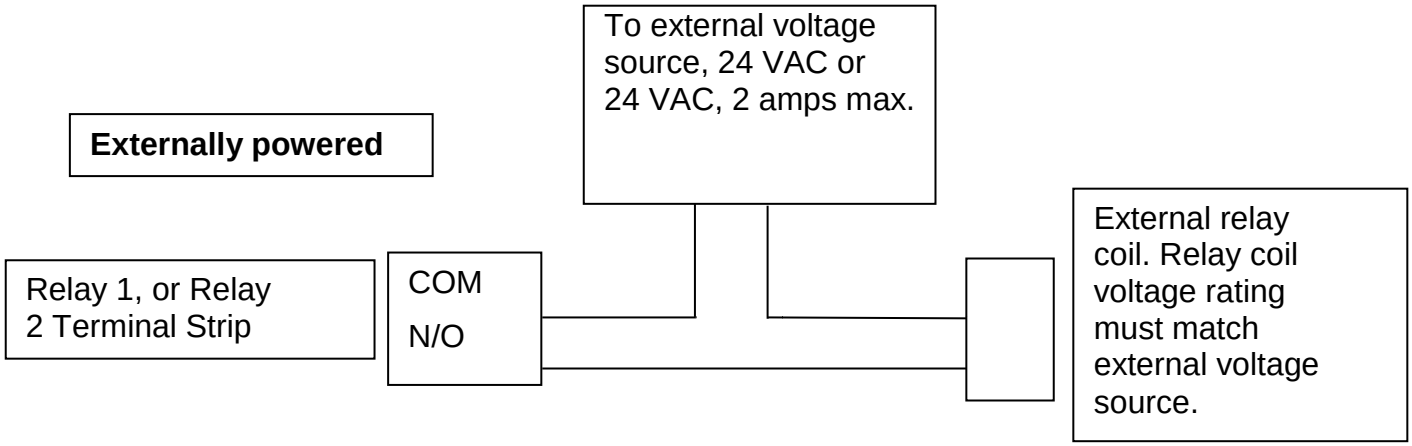
How to connect a Horn and Strobe to the O2 monitor



This drawing shows how to connect a remote Horn and strobe to Concoa's Oxygen monitor with the Alarm relay #1 set to a Normally Open position.

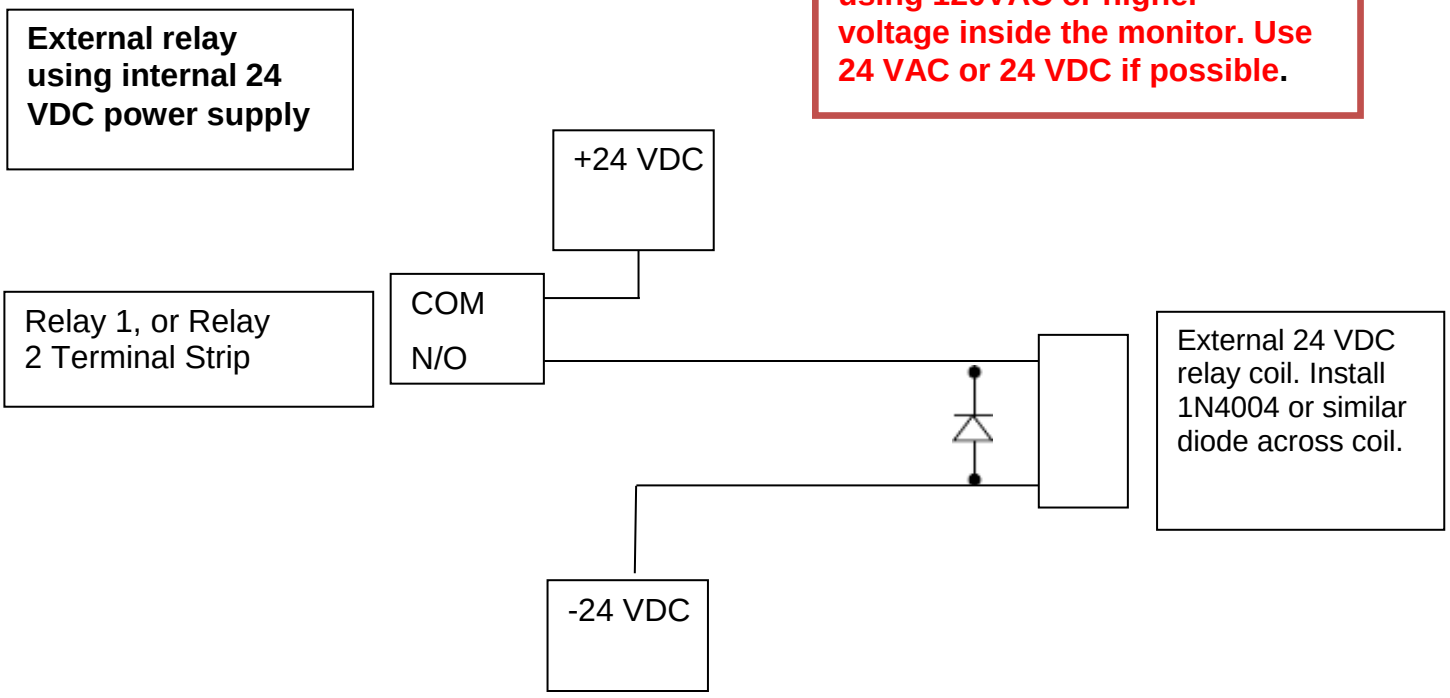
***Note: Federal Signal Horn/Strobe or equivalent (24VDC)**

How to connect a remote fan contactor to the O2 monitor

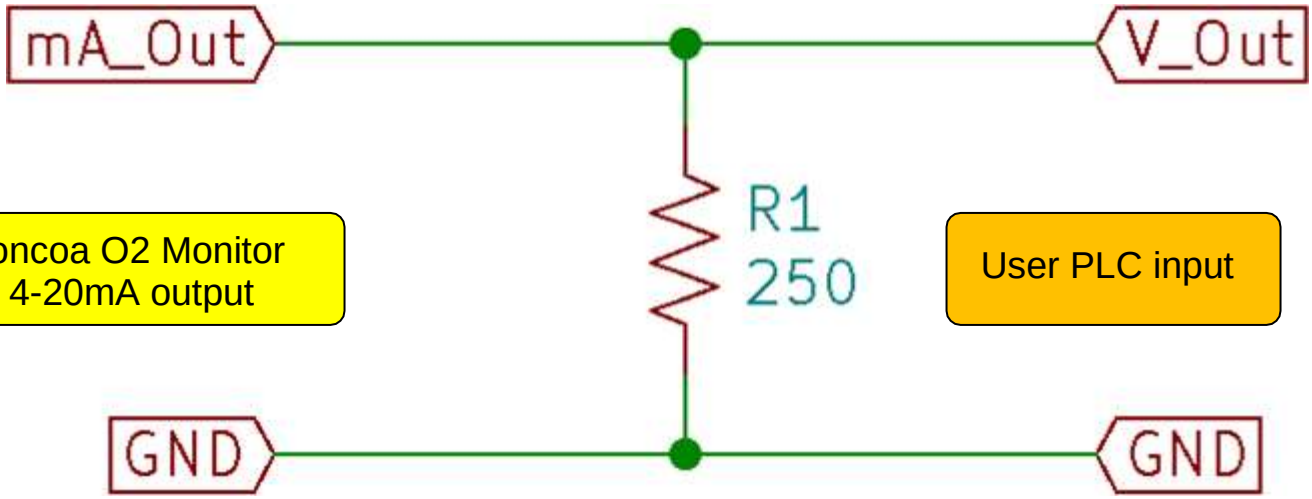


CAUTION!

CAUTION: CONCOA Monitoring Systems does not recommend using 120VAC or higher voltage inside the monitor. Use 24 VAC or 24 VDC if possible.

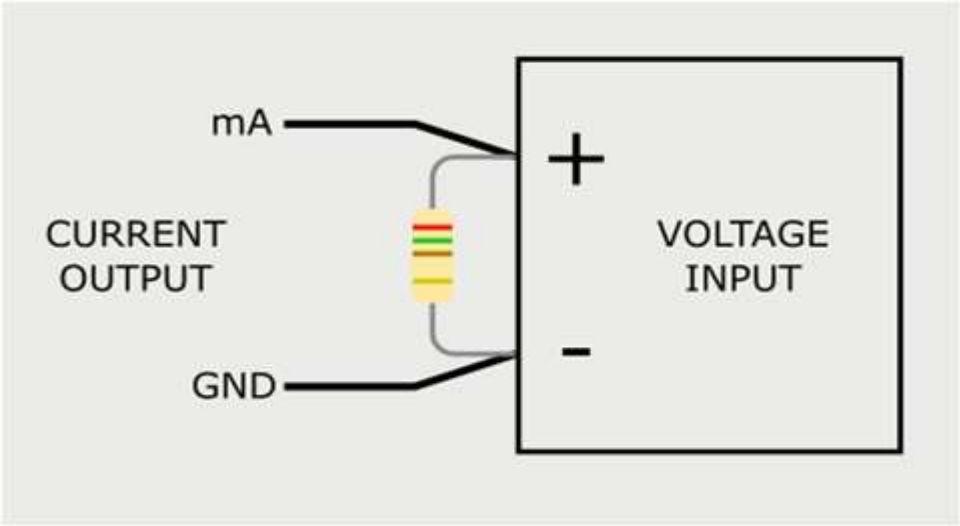


How to convert 4-20mA current output to a 1-5 VDC voltage output



Concoa O2 Monitor
4-20mA output

User PLC input



Attach 250-ohm resistor to the PLC or device input

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Warranty Information

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