User Manual and Installation Guide

CM-902
Industrial O2 Detector

Warning!

This product should only be used as described in this manual. If the equipment is used outside of the manner specified by CO2Meter, the protection provided by the equipment may be diminished. This equipment should be installed/serviced by qualified personnel only.

Please contact Support@CO2Meter.com for more information.

Contents

GENERAL INFORMATION ON

Oxygen SAFETY

Oxygen deficiency and oxygen enrichment in any confined space may not be noticeable, but that does not mean it isn't dangerous. Failing to properly monitor spaces that are using or storing hazardous gases could lead to severe health and fire hazards. It's important to prioritize gas detection safety monitoring, to safeguard yourself and employees as well as properly understand the hazard when working near dangerous gases.

O2 SAFETY STANDARDS

CGA.
Compressed Gas Association
The Standard For Safety Since 1913

CGA G-4.1-2018

Any surface or environment that encounters oxygen concentration higher than **23.5%** should adhere to the cleaning standards promoted.

OSHA®

29 CFR 1910.101

Standards are set for the handling, use, and storage of compressed gas cylinders in applications other than welding and cutting.

NIOSH

An oxygen deficient atmosphere is further defined as any environment that holds less than 19.5% available oxygen. This environment is noted to not be entered without an approved oxygen safety monitor or self-contained breathing appartus.

PHYSICAL SYMPTOMS

19.5% - 11%
Increased breathing, accelerated heart rate, impaired thinking

10% - 6%
Nausea, vomiting, lethargy, leading to unconsciousness

< 6%
Convulsions, cessation of breathing, coma, and fatalities

OSHA LIMITS

19.5%
Minimum "safe level" per OSHA and often the low level alarm of most O2 detectors

HAZARD AREAS

Anywhere hazardous gases or "Liquid Nitrogen/Liquid Helium is stored or used

Areas where compressed gases are transported or used

Rooms containing tanks of stored gases such as laboratories, food production facilities, and cryogenic chambers.

Venting from Cryogenic Gas Cylinders

Oxygen use in cutting and welding

LEARN MORE!

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Introduction to the CM-902

The CM-902 Industrial Oxygen Deficiency Safety Monitor is a (12-24) VDC powered monitor that is designed to reliably and accurately sense the O2 levels present in confined spaces, harsh environments, or industrial settings. The safety alarm utilizes zirconia sensing technology to measure the depleting oxygen levels in areas of potential risk. The monitor is designed to notify workers of potential risks of environments lacking in oxygen prior to compromising the health or wellbeing of those workers. The CM-902 is equipped with (3) safety alarms that trigger across the (0-23%) measurement range. CO2Meter, Inc. is committed to delivering quality safety solutions that allow its partners to operate without the added complexity of O2 depletion safety creating workflow distractions.

Key Features

- (3) Configurable safety alarms (Audible and Visible)
- Zirconia sensor with extended lifespan
- Rugged powder coated aluminum enclosure (IP64)
- Quick release connectors design to last in harsh environments
- Push button configuration (NO CONTROL PANEL NEEDED)
- 4-20mA output for communication with **B**uilding **M**aintenance **S**ystems
- (2) Dry contact relays triggered by AL1 and AL2 (NO or NC)
- (1) Dry contact relays triggered by power loss (NO or NC)
- Back-up battery connection available
- Easy calibration function
- Temperature compensation
- Alarm latching function
- Internal heating element
- Strobe Siren accessories available: CM-1029 (Click HERE)
- Hydrophobic filters that prevent water intrusion

Display

Icons and Symbols

Icon/Symbol	Description
20.9%	O2 Level Icon: Displays the live ambient oxygen levels of the area being monitored. Updates every 2 seconds.
DIAG	Technician diagnostics feature. Communication test.
AL1	1st Alarm Icon: Configurable 1st alarm (19.5% O2). LED Flash Frequency : 2Hz Buzzer Frequency: 2Hz
AL2	2nd Alarm Icon: Configurable 2nd alarm (17% O2). LED Flash Frequency : 4Hz Buzzer Frequency: 4Hz
AL3	3rd Alarm Icon: Fixed 3rd alarm (Default 12% O2). LED Flash Frequency : 6Hz Buzzer Frequency: 6Hz
CALI	Calibration Icon: See page 13 for calibration instructions.
RCFS	Reset Factory Setting Icon: See page 14 for reset instructions.
HI	High O2 Icon: Indicated O2 levels greater than 23%
🔊	Alarm Icon: Appears after AL1 is triggered and will remain on display while the monitor is in alarming state.
✹	Ventilation Icon: O2 Levels drops lower than AL2 and Relay2 has been triggered.

Specifications

O2 Specification	
Measurement Range	0-23% display
Display Resolution	0.1%
Accuracy	Better than 2%FS
Pressure Dependence	Not pressure dependent
Response Time	O2: <2min by 90%
O2 AL1	19.5% Default (15.5%, 16%, 16.5%, 17%, 17.5%, 18%, 18.5%, 19%, 19.5%, 20%)
O2 AL2	16.5% Default (12.5%, 13%, 13.5%, 14%, 14.5%, 15%, 15.5%, 16%, 16.5%)
O2 AL3	Default 12.0% (Fixed)
Sound Alarm	80db@10cm
Warm-Up Time	600 seconds (10 minutes) for full operating temperature range
Monitor Specification	
Power Input	9~32VDC (12~24VDC recommended),2A.
Backup Battery	6VDC (5.4V~7.0V), recommended capacity is 12AH
Relay 1	Dry contact relay controlled by AL1 (2Amp) (NO or NC)
Relay 2	Dry contact relay controlled by AL2 (2Amp) (NO or NC)
Relay 3	Dry contact relay (Triggered by power loss to monitor)
4-20mA O2	O2: Range 0-23%
Dimensions	8.25-inch x 7.8-inch x 3-inch
Weight	1.5lbs (Monitor only)
Operating Conditions:	
Temperature	-58°F to 122°F (-50°C to 50°C)
Humidity Range	0 ~ 95% RH non-condensing
Storage Conditions:	
Storage Temperature	-4°F to 140°F (-20°C to 60 °C)

Dimensional Drawings

(Dimensions are in inches)
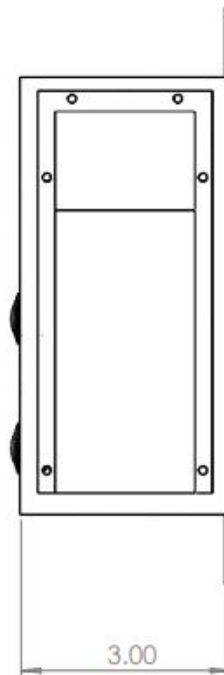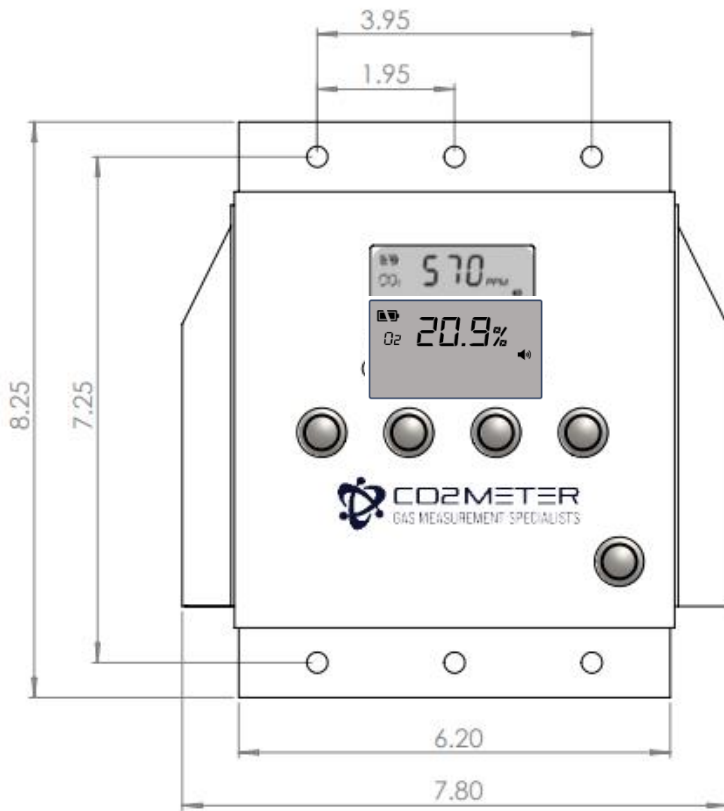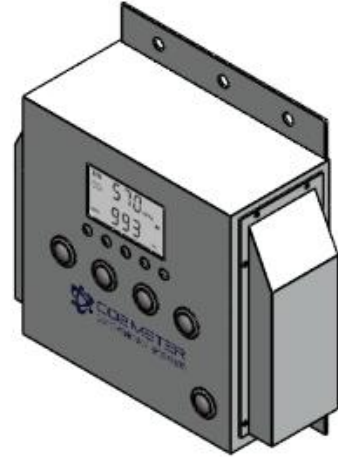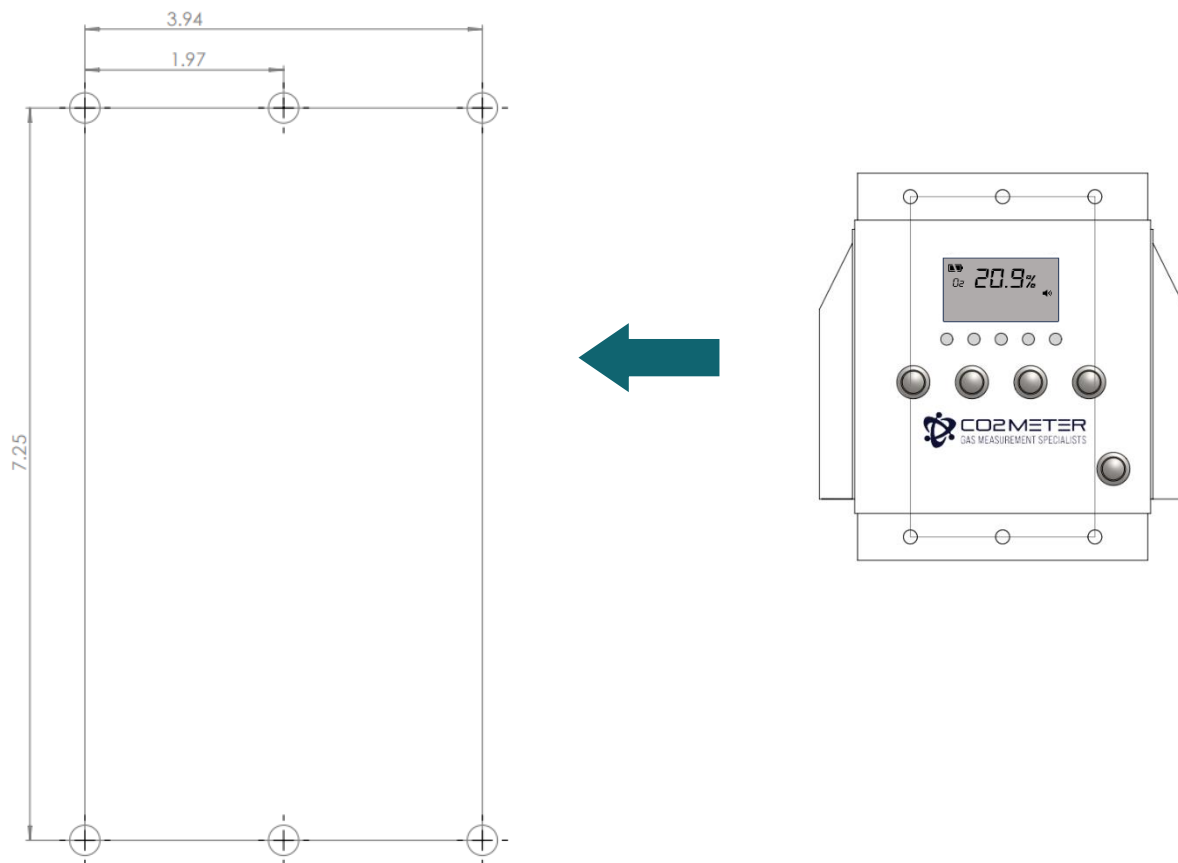
Installation

Choosing Mounting Location

The CM-902 is designed to withstand harsh environments that would compromise other comparable safety monitors. Varying temperature, humidity, and dust/debris levels will not negatively impact the performance of the CM-902. For optimal use, a few considerations should be reviewed while selecting a mounting location:

- Avoid a location that risks high pressure washdown directed at the monitor.
- Avoid a location that would subject the monitor to impact or continuous vibration.
- Mount the monitor 12-72 inches from the ground.
        (Application dependent/ask a CO2Meter special for more information)
- Avoid high temperature applications without consulting with a product specialist.
- Be sure to mount in a location where 12~24VDC is available to power the monitor.

Mounting Hole Pattern

(Dimentions are in inches)

Wiring

The CM-902 can be hardwired using (1 of 2) available accessories purchasable with the monitor. **The CM-900-CON** or the **CM-900-CBL** are available to wire and configure the monitor based on the requirements of the installation. The following diagram represents the pinout of the 16pin connector located on the bottom of the monitor. Once the cable or connector is properly wired and verified with the below diagram, remove the weather cap from device connector and mate the cable or connector. The connection can be confirmed with press fit and snap sound. The CM-902 is now ready to be powered and to begin taking measurements.

Position	Function	Wire Color
1.	NOT USED	White
2.	GND	Green
3.	(O2) 4~20mA	Yellow/Brown
4.	Battery -	Blue
5.	Battery + 6VDC 7V max	Brown
6.	GND	Black
7.	12-24 VDC IN	Red
8.	Relay3_NO	Yellow
9.	Relay3_COM	Grey
10.	Relay3_NC	Pink
11.	Relay2_NO	Violet
12.	Relay2_COM	Grey/Pink
13.	Relay2_NC	Red/Blue
14	Relay1_NO	White/Green
15.	Relay1_COM	Brown/Green
16.	Relay1_NC	White/Yellow
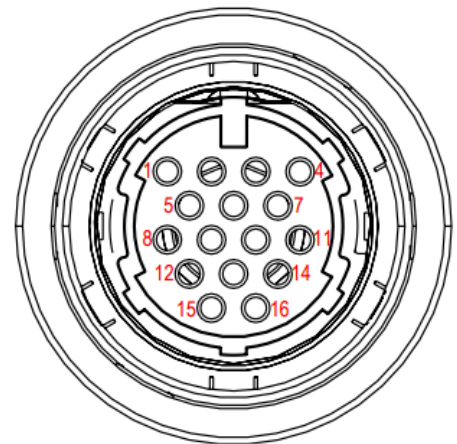
16 Positions

CM-900-CON

CM-900-CBL

Operation

Start-up

Verify that the CM-902 is properly wired, and 12-24VDC power is being supplied to the correct pin positions in the mating connector (see page 10). Check all wiring connections before powering. After power-up, the monitor provides accurate O2 measurements after a 10-minute warm up (Sensor requires brief warm-up period).

Quick Test the System

1) Apply 100% Nitrogen to the vents on the side of the device. Check that all alarms trigger and the oxygen levels begin to drop.
2) Alm1 will trigger Relay 1.
3) Alm2 will trigger Relay 2.
4) Alm3 will alarm.
5) The device will sound and flash audible and visible alarms.
6) If a CM-1029 Strobe Siren is connected, it will sound and flash.

***Allow 5 minutes for the device to come out of O2 alarm status.***

Unlocking/Locking Settings

1) Press Up & Enter button for 10 seconds.
2) Press Mode until Aln is displayed.
3) Use Up/Down arrow to change lock to unlock.
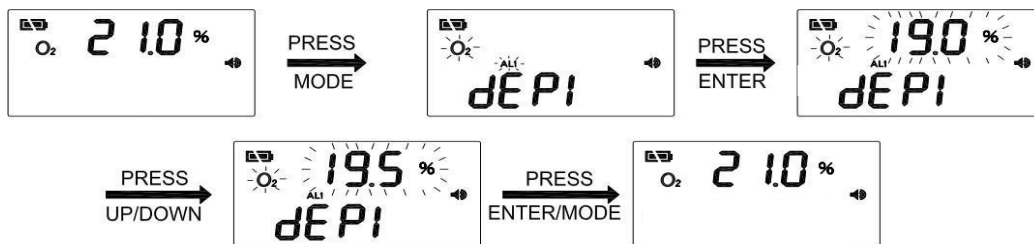4) Press Enter to save.
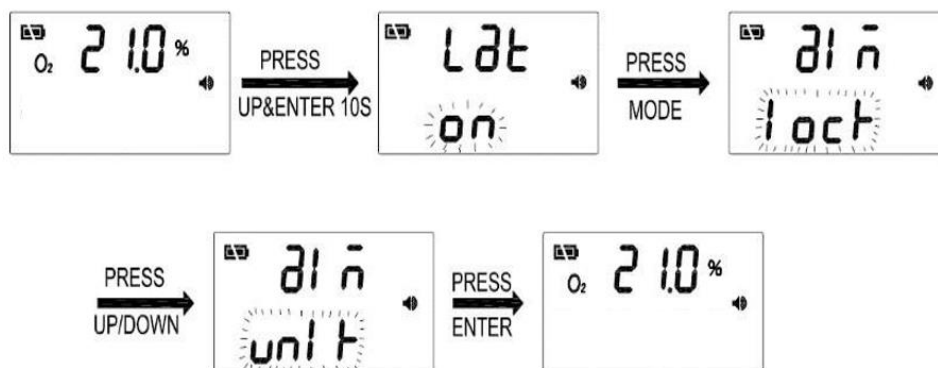
Configuring AL1

1. Press Mode until the "AL1" & "O2" icon flash
2. Press Enter to select. AL1 level will flash.
3. Use Up/Down arrow to select new alarm level.
4. Press Enter to confirm.
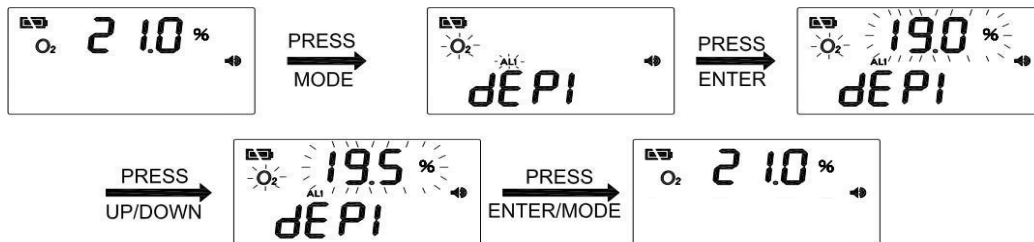
Configuring AL2

1. Press Mode until the "AL2" & "O2" icon flash
2. Press Enter to select alarm 2. AL2 level will now flash.
3. Use Up/Down arrow to select new alarm level.
4. Press Enter to confirm.

Latch ON/OFF

1. Press Up & Enter button for 10 seconds
2. Change to Advance Mode by pressing Mode, and choose Lat Mode
3. Press Up/Down to set Latch Mode On or Off.
4. Press Enter to Save
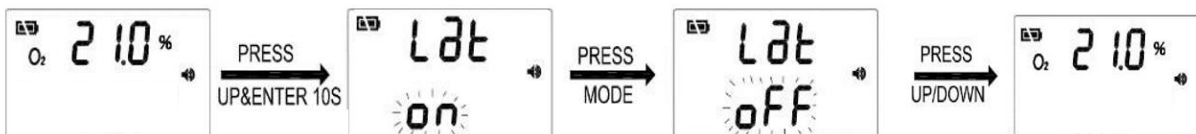
(Fault light will keep flashing if AL3 is activated, indicating unit went into alarm status.)

Calibration

1. Flow certified 21% Oxygen calibration gas into one of the 2 venting slots on the side of the aluminum enclosure. Wait 3-5 minutes before starting calibration, then execute the "SPAn" calibration.

    (Continue to flow calibration gas through entire process)
2. Press Mode until CALI is flashing in small print under the O2 reading.
3. Press Enter to view the calibration settings.
4. "SPAn" and "O2" will be flashing.
5. Press Enter again to begin the calibration. "CALIBRATING" will begin flashing.

    (Continue to flow calibration gas throughout entire process)
6. After approximately 3 minutes, the display either "PASS" or "FAIL".
7. If "PASS" press enter to save.
8. If "FAIL" repeat the process.
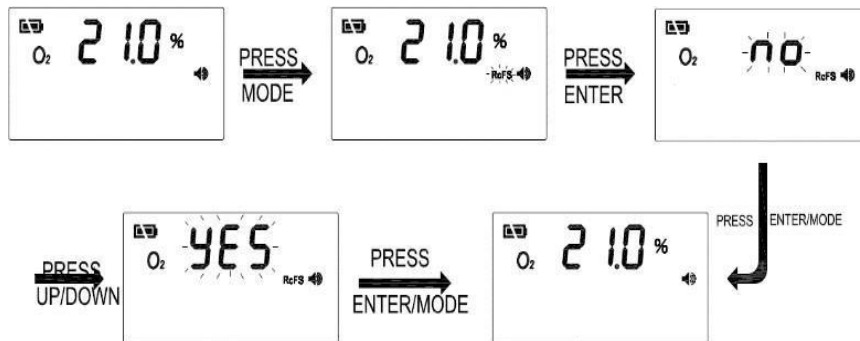9. If "FAIL" more than twice, contact CO2Meter technical support.
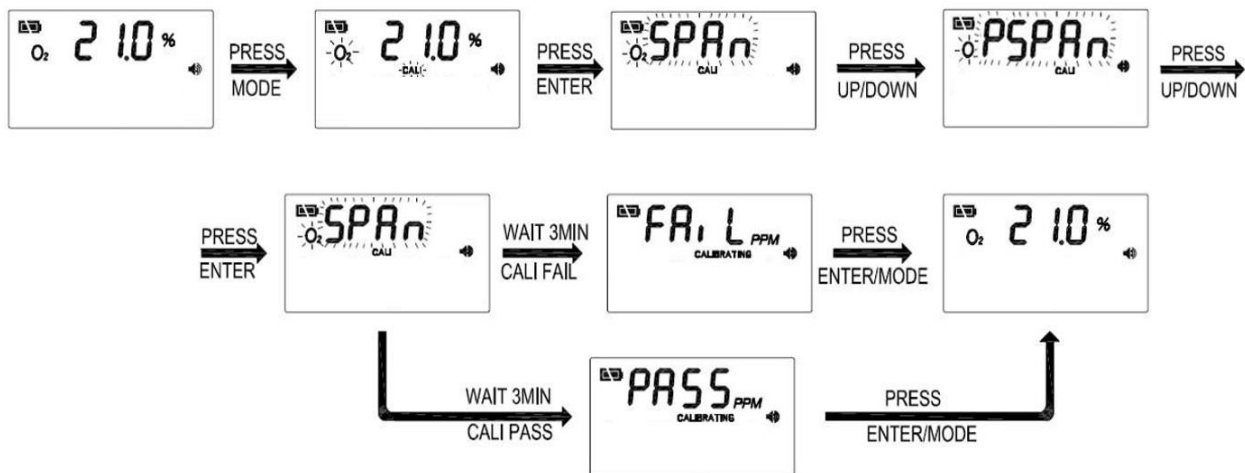
System Test

1. Press Mode until the "DIAG" icon flashes
2. Press Enter, the five LEDs will blink, and the buzzer will sound.

Factory Reset

1. Press Mode until the "ReFactSet" icon flashes.
2. Press Enter Up/Down to choose either "Yes" or "No".
3. Press Enter again to save the setting or press Mode to quit the setting.

Maintenance

The CM-902 is a low maintenance safety monitor that requires little maintenance after initial installation. It is recommended to calibrate the internal zirconia O2 sensor annually. This calibration can be completed in the field, or the monitor can be returned to CO2Meter to perform the calibration. A calibration certificate can be provided with every calibration service. Be sure to ask your CO2Meter technician for more information.

Fault Codes

NO.	Fault Code	Indicator	Suggested Actions
1	Er3	"Er3" flash, Fault LED blink	This error will disappear when the temperature returns to the range between 0°C and 50°C (32°F to 122°F).
2	Er5	"Er5" flash, Fault LED blink	Power on again or press reset button, if the "Er5" always appear, please contact CO2Meter.
3	Er7	"Er7" flash, Fault LED blink	Press reset button on SEU or power cycle the unit.

Warranty

CO2Meter warrants the products to be substantially free of defects in workmanship and materials when used for their intended purposes for a period of either one (1) year or ninety (90) days from the date of shipment of the applicable products as specified for each product on the individual product pages located at www.co2meter.com (the "Manufacturer's Limited Warranty"). No employee or representative of CO2Meter may alter the terms of the Manufacturer's Limited Warranty verbally or in writing.

To take advantage of the Manufacturer's Limited Warranty, the product must be returned to us at your expense. If after examination, we determine that the product is defective, CO2Meter at its election will repair or replace the defective product. The foregoing is customer's exclusive remedy in the event of a valid warranty claim.

Notwithstanding anything contained herein, the Manufacturer's Limited Warranty shall not apply to: (i) any product that has been customized, altered, or repaired by any person not authorized to do so by CO2Meter; or (ii) any product that has been subject to misuse, neglect, or accidental damage. This warranty does not apply to calibration of any product.

In the event of an alleged warranty claim, you agree to contact us to request a return authorization prior to returning any products to us. We will only honor valid warranty claims of which we have been given notice prior to the expiration of the applicable limited warranty period. You agree to comply with all commercially reasonable rules and policies governing warranty claims which we may institute from time to time. Such rules and policies may be located at www.co2meter.com/pages/faq#warranty.

If you return a product to us, and we determine in our reasonable discretion that it falls within an exception to the Manufacturer's Limited Warranty as described herein, we will have no obligation to You other than to return the Product(s) at your sole cost and expense.

It is our customer(s) responsibility to share your application with the CO2Meter sales team so they can help identify any potential issues your application may cause with our devices. important information to share will be: expected CO2 concentration, temperature, humidity, and any other particles or gases in your application. Applications with interfering gases can damage our sensors and devices. Those applications with high humidity can damage the electronics and the CO2 sensors beyond repair.

Product Returns

If any product fails under normal use, you may return it to us, by first submitting a customer case support ticket (submission here). Policies and procedures for returns and refunds related to the same are located at www.co2meter.com/pages/faq.

All returns for refund after thirty (30) days from shipment of the applicable product will incur a 25% re-stocking fee. No product will be accepted for return or refund after 45 days from shipment.

Non-refundable clause, if a product is refunded, and your purchase included a calibration certificate charge, due to the calibration being a service, not an actual product item your refund will not include the certification charge in your refund.

Support

If the User Manual/Installation guide above does not contain the needed operation, installation or trouble shooting information, please contact CO2Meter at:
Support@CO2Meter.com

Contact Us

We are here to help! For information or technical support, please contact us using the information below. For further guidelines on CO2Meter Terms & Conditions, click here.

✉ support@co2meter.com

📞 (386) 256-4910 (Technical Support)

📞 (386) 872-7665 (Sales)

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