

# Remote CO2 Storage Safety Dual Alarm with Oxygen Monitor Operating Instructions

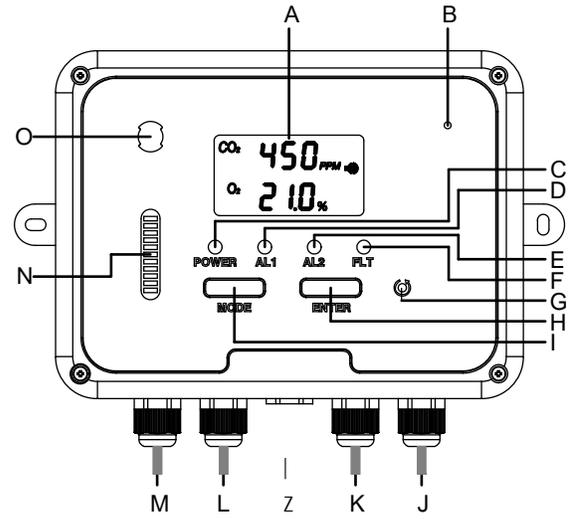
Model: RAD-0200

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NOTE: Remove Air Intake Plug (N) before powering SEU. Use Plug when cleaning SEU.

## SEU (Sensor Unit)



- A. LCD display
- B. Buzzer
- C. Green LED (Power indication)
- D. Red 1 LED (AL1)
- E. Red 2 LED (AL2)
- F. Yellow LED (Fault indication)
- G. Reset Button
- H. Enter Button
- I. Mode Button
- J. Relay 2 output (red & white: NO, Blue & white: NC)
- K. Relay 1 output (red & white: NO, Blue & white: NC)
- L. Communication Cable to RDU
- M. Power Supply
- N. CO2 entry
- O. O2 entry
- Z. Gas Calibration Port

## 1. Product Instructions

Thank you for selecting the RAD-0200 CO2 and O2 Monitor. It is designed to detect the presence of carbon dioxide and oxygen in the ambient air to protect people in confined spaces. High concentrations of CO2 or low concentrations of oxygen in confined spaces are dangerous, and may lead to health problems ranging from headaches and fatigue to asphyxiation and death. The RAD-0200 is widely used to protect workers and employees in CO2 storage areas, breweries, wineries, cellars, beverage dispensing areas, and fast food outlets. It has both audible and visual alarms which activate when CO2 or O2 concentrations reach user-defined levels. Detection of high levels of CO2 will also activate 2 relays that could be used for a fan or air-conditioning system to ventilate the confined space, and reduce CO2 concentration and add O2 concentration in the area.

The RAD-0200 CO2 & O2 Monitor is cost-effective and has many features:

1. Dual Beam NDIR (Non-Dispersive Infrared) technology is used to measure CO2 concentration up to 50,000ppm (parts per million) and electrochemical technology to measure O2 concentration up to 30%.
2. With the SEU (Sensor Unit) and RDU (Remote Display Unit), it can connect multiple RDUs for safety notices.
3. Large LCD display clearly indicates ambient CO2& O2 concentrations.
4. Relay outputs can control a fan to ventilate confined spaces.
5. Audible and visual alarm indications.
6. IP65 Water Proof Protection of SEU (Sensor Unit).

## 2. Package Content Check & Main Unit View

The RAD-0200 package comprises the following parts:

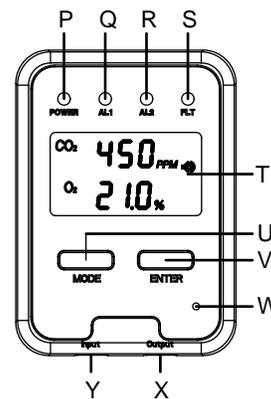
Main Unit:

SEU( Sensor Unit)	RDU (Remote Display Unit)	Panel holders
User manual	8 meters (26 feet) communication cable	

Accessories:

Plug lock	1 pcs	Screw	10pcs	Expansion plug	10 pcs
Nail cable clip	10 pcs	Warning signs	2 pcs		

## RDU (Remote Display Unit)



- P. Green LED (Power indication)
- Q. Red 1 LED (AL1)
- R. Red 2 LED (AL2)
- S. Yellow LED (Fault indication)
- T. LCD display
- U. Mode Button
- V. Enter Button
- W. Buzzer
- X. RJ45 Plug for next RDU (Output)
- Y. RJ45 Plug for SEU (Input)

### 3. LCD Display Symbol

Symbol	Meaning	Description
 <b>450 PPM</b>	CO2 Concentration ppm (Parts Per Million)	Ambient CO2 concentration
 <b>21.0%</b>	O2 Concentration	Ambient O2 concentration
	Alarm	Alarm icon
<b>DIAG</b>	Diagnostics	Test communications between the SEU and RDU
<b>AL1</b>	CO2/O2 First Alarm level	Relay 1 will be triggered when the CO2 concentration exceeds the first alarm level or O2 concentration drops below the first alarm level, the Red 1 LED will flash, and buzzer will sound.
<b>AL 2</b>	CO2/O2 Second Alarm level	Relay 2 will be triggered when CO2 concentration exceeds the second alarm level or O2 concentration drops below the second alarm level. The Red 1 & Red 2 LEDs will flash, and the buzzer will sound.
<b>CALIBRATING</b>	Calibration	Calibrate the CO2 / O2 sensors when the accuracy deviates from the actual concentration.
<b>ReFactSet</b>	Recover Factory Setting	Recover factory default settings and cancel customized settings.
<b>ESC</b>	ESC	Indicate the CO2 leakage once the CO2 level is above the second alarm level.
<b>Hi</b>	Hi	The CO2 concentration is above 5%, or the O2 concentration is lower than 30%.
	Fan	If CO2 > CO2 Alarm Level or O2 < O2 Alarm Level, fan will run.

### 4. SEU (Sensor Unit) Function Instructions

The SEU (Sensor Unit) should be placed in a room where the CO2 is likely to accumulate or O2 reduced, such as a room where CO2 canisters or tanks are stored. The large LCD displays the ambient CO2 & O2 concentration.

The SEU has the "DIAG", "AL1", "AL2""CALI", "ReFactSet" function. The "DIAG" function executes communication tests between the SEU and RDU. The user can do the calibration under the "CALI" mode when necessary. If data-setting is done incorrectly, the user can use the "ReFactSet" back to the original factory setting.

There are two alarm levels: "AL1" and "AL2". Both alarm levels are adjustable. The first alarm level of CO2 can be set to 5,000ppm, 1%, 1.5%, 2%. The default first alarm level is 1.5%. The first alarm level of O2 can be set to 18%, 18.5%, 19%, 19.5% or 20%. The default first alarm level is 19%. The second alarm level of CO2 can be set to 1.5%, 2%, 2.5%, 3%, 3.5% or 4% CO2. The default second alarm level is 3%. The second alarm level for O2 can be set to 16%, 16.5%, 17%, 17.5% or 18%. The default second alarm level for O2 is 17%.

When the RAD-0200 CO2 &O2 Monitor detects CO2 concentration exceeds the first alarm level or O2 concentration drops the first alarm level, the red 1 LED will blink and the buzzer will sound intermittently, and the relay will be

triggered. When CO2 concentration drops below the first alarm level, or O2 concentration raises to the first alarm level, the red 1 LED will stop blinking and the buzzer will stop beeping.

If the concentration of CO2 continues to rise above the second alarm level, or the concentration of O2 drops below the second alarm level, the red 1 and red 2 LED's will both flash together, the tempo of the buzzer will increase, and the second relay will be triggered. When the CO2 concentration drops below the first alarm level the red 1 and red 2 LED's will stop blinking, and the buzzer will stop beeping. However, the yellow FLT LED will stay on to show an event has occurred until the RAD-0200 is restarted with the reset button RAD-0200 or the AC adapter is unplugged and reconnected.

The green LED will light continuously when the power is normally supplied.

**Warning:** If the ambient CO2 concentration reaches the second alarm level on SEU & RDU, there will be a safety notice "ESC" displayed on the LCD. Careful action, such as ventilating the space, must be taken before entering the room where the SEU is placed.

If the communication cable between the SEU & RDU isn't connected properly, the fault LED on the SEU will blink. To fix this, reconnect the cable. If the cable is accidentally inserted into the output port on the RDU, after one minute "Er7" will flash on the LCD. Unplugging the cable and plugging it into the Input port will normally correct the problem.

### 5. RDU (Remote Display Unit) Function Instructions

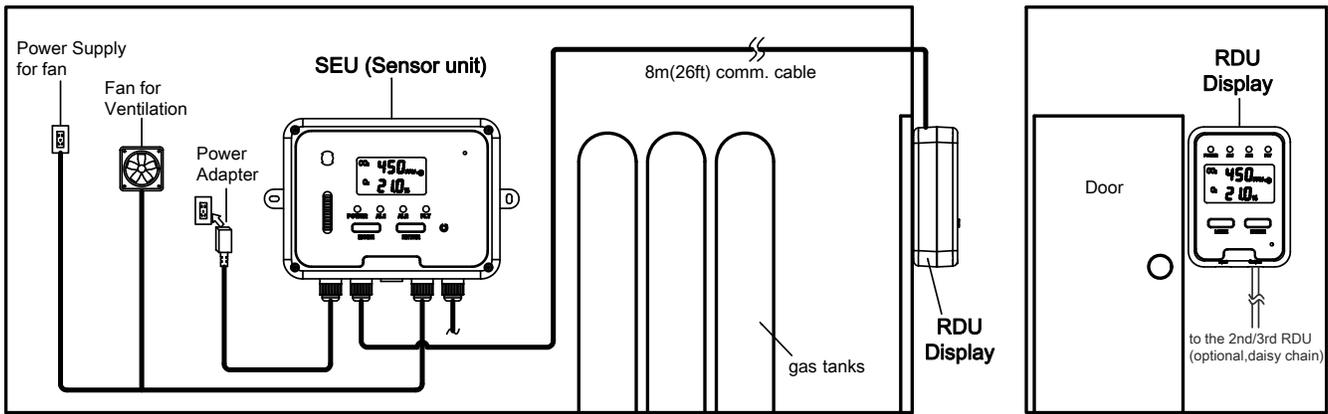
The RDU (Remote Display Unit) should be placed outside the CO2 storage room during use. The RDU is connected to the SEU with a CAT5 cable. An 8 meter (26 ft.) cable is supplied, although up to 3 daisy-chained RDUs over 76 meters (250 ft.) using CAT5 cable has been tested. The RDU should be placed where it can be conveniently observed before entering the room where the SEU is located. The RDU is a repeater, and displays the measurements made by the SEU on an easy-to-read digital LCD along with important safety information.

The RDU has "DIAG" function. The "DIAG" can test the communication between the SEU and RDU. Resetting the RAD-0200 CO2 and O2 Monitor is only available from SEU.

### 6. Safety Notes

**Warning:** Your safety is very important to us. To ensure to use the product correctly and safety, please read these warnings and the entire User Manual before using the product. Otherwise, the protection provided by the equipment may be impaired. These warnings provide important safety information and should be observed at all times.

1. Handle the device carefully; do not subject the product to impact or shock. Otherwise, this may cause the accuracy to drift.
2. Do not place the unit or the adaptor near a heat source. Heat can cause distortion of the unit, which may result in an explosion or fire.
3. Do not touch the exposed electronic circuitry of the device under any circumstances, as there is danger of electric shocks.
4. Use only the included power adaptor. Improper power adaptors or power sources can cause serious damage to the product, or result in injury or death to the user.
5. Use the "DIAG" function to verify the communication between SEU and RDU works normally.
6. Make sure that the power adaptor is secured tightly by a plug lock so the power adapter cannot be disconnected accidentally or by hand.
7. Do not enter into the room directly if there has safety notice "ESC" displayed on the LCD of SEU & RDU. Careful and protective action must be taken before entering the room where the SEU is installed.
8. Take care of cable connection between SEU and RDU. Make sure the cable from SEU is connected into the INPUT port of RDU.
9. Ensure the external power supply to a ventilation fan is tested while the relay is working. If there has no power to the fan, the relay will not turn it on, which may result in potentially dangerous high CO2 concentration or low O2 concentration in a confined space.



## 7. Caring For the Product

To receive the maximum benefit from using this product, please observe the follow guidelines.

1. Repair - Do not attempt to repair the product or modify the circuitry by yourself. Please contact your local dealer or a qualified repairman if the product needs servicing, including the replacement or calibration of the sensors.
2. Note -- The oxygen sensor must be replaced every 3 years.
3. Cleaning - Disconnect the power before cleaning. Clean with a damp cloth only. Do not use liquid cleaning agents such as benzene, thinner or aerosols, as these will damage the device.
4. Maintenance – We recommend testing the communication between the SEU and RDU under the ‘DIAG’ function to verify the SEU and RDU are working properly. If the four LED’s blink and the buzzers sound simultaneously, it indicates that SEU and RDU work normally.

When the LCD displays a safety icon “ESC”, please take immediate protective action to check if a CO2 leak has occurred. We suggest a calibration and thorough function check at least yearly to make sure that the RAD-0200 CO2 and O2 Monitor is working properly.

## 8. Installation Instructions

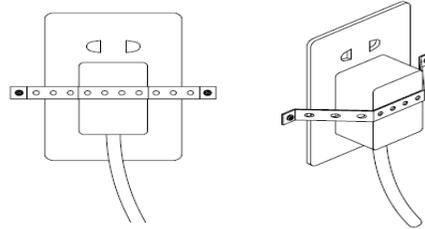
Please carefully take out the SEU (Sensor Unit), RDU (Remote Display Unit), panel holders, network cable connector, communication cable, user manual, plug lock, screws, expansion plugs, nail cable clips, and warning poster from the package.

Step-by-Step Installation:

1. Choose a suitable location to install the SEU. Fix a panel holder on the wall with the four screws (included); the recommend installation height is about 0.45 meters (1.5 feet) from the floor and as close to the manifolds and valves as possible.
2. Put the SEU on the panel holder. Remove the Air Entry Plug from the air entry port (N). Save plug for use when cleaning SEU.
3. Fix another panel holder in a suitable location outside the monitored space with screws (included). Push the RDU onto the panel holder, and stick the warning poster next to RDU.
4. The communication cable is pre-wired to the SEU. Route the cable to the RDU and fixed the communication cable to the wall by nail cable clips, and then plug the cable into the input port on the RDU. Communication is now ready between the SEU and RDU.
5. The RAD-0200 CO2 and O2 Monitor has two relay outputs: one is for AL1 and the other is for AL2. The relay cable is pre-wired to the SEU. Relays can control a fan or blower to ventilate monitored space when necessary and the relay will be triggered when the CO2 concentration exceeds the first alarm level or O2 concentration drops below the first alarm level.
6. After finishing the installation, Connected the AC power adapter into the electrical supply outlet. Mount the Plug lock by expansion plugs so that the power adapter cannot be disconnected without use of tools.

7. When the power has been connected, The SEU and the RDU will begin to work. Please use the “DIAG” function to verify the communication between SEU and RDU, the four LED’s will blink and buzzer will sound on SEU & RDU. Communication is ready when the information displayed is the same on the SEU & RDU.

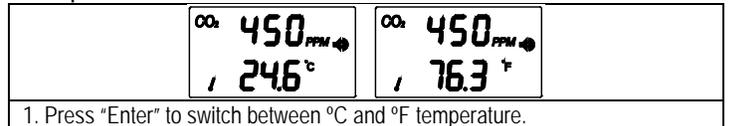
Mount the plug lock



## 9. Customizing Settings

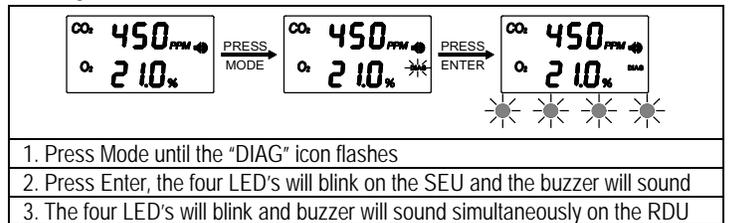
Once power has been connected, the SEU and RDU will begin to monitor the CO2 & O2 concentration. In order to get the timely alarm safety information or to meet personal requirements, you can customize the parameters as necessary.

Temperature °C/°F:



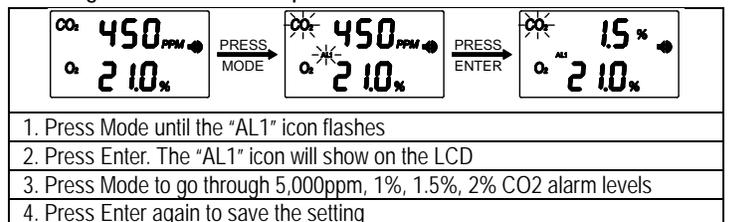
1. Press “Enter” to switch between °C and °F temperature.

Using the DIAG function:



1. Press Mode until the “DIAG” icon flashes
2. Press Enter, the four LED’s will blink on the SEU and the buzzer will sound
3. The four LED’s will blink and buzzer will sound simultaneously on the RDU

Setting the CO2 First Alarm parameter:



1. Press Mode until the “AL1” icon flashes
2. Press Enter. The “AL1” icon will show on the LCD
3. Press Mode to go through 5,000ppm, 1%, 1.5%, 2% CO2 alarm levels
4. Press Enter again to save the setting

### Setting the CO2 Second Alarm parameter:

1. Press Mode until the "AL2" icon flashes
2. Press Enter. The "AL2" icon will show on the LCD
3. Press Mode to go through 1.5%, 2%, 2.5%, 3%, 3.5%, 4% CO2 alarm levels
4. Press Enter again to save the setting

Note: The second alarm level must always be higher than the first alarm level when customizing the alarm level parameters.

### Setting the O2 First Alarm parameter:

1. Press Mode until the "AL1" icon flashes
2. Press Enter. The "AL1" icon will show on the LCD
3. Press Mode to go through 18%, 18.5%, 19%, 19.5%, 20% O2 alarm levels
4. Press Enter again to save the setting

### Setting the O2 Second Alarm parameter:

1. Press Mode until the "AL2" icon flashes
2. Press Enter, the "AL2" icon shows on LCD
3. Press Mode to go through 16%, 16.5%, 17%, 17.5%, 18% O2 alarm levels
4. Press Enter again to save the setting after selection

Note: The second alarm level for CO2 must be HIGHER than the first alarm level. The second alarm level for O2 must be LOWER than the first alarm level. Otherwise, the alarms will not function as expected.

### Using the CO2 CALI function:

"ZErO" Calibration means the SEU is saturated in nitrogen (0% CO2) gas.  
 "SPAN" Calibration means the SEU is saturated in 40,00ppm (4%) CO2.

1. Press Mode until the CO2 and "CALI" icon flashes.
2. Press Enter. The "CO2", "CALI" and "ZErO" icons will show on the LCD. Press and hold Mode for at least 10 seconds, The "CALIBRATING" and "ZErO" icons will flash simultaneously. The calibration will be done automatically. After about 3 minutes the LCD will display "Pass" or "Fail". If "Fail", please try again.
3. Press Enter until the "CO2", "CALI" and "SPAN" icons will show on the LCD. Press and hold Mode for at least 10 seconds. The "CALIBRATING" and "SPAN" icon will flash simultaneously and the calibration will be done automatically. After about 3 minutes the LCD will display "Pass" or "Fail". If your unit fails calibration, please try again before calling support.

Note: Before starting either a "ZErO" or "SPAN" calibration, wait at least 5 minutes for the CO2 level inside the SEU to stabilize. For calibration, gas cylinders connected to calibration port Z should be used.

### Using the O2 CALI function:

"ZEr" Calibration means the SEU is saturated in nitrogen gas.  
 "SPA" Calibration means the SEU is saturated in 21% Oxygen (outdoor air).

The O2 CALI function is as same as CO2, except that the "O2" icon flashes to signify calibration of the oxygen sensor.

Note: Before doing either a "ZEr" or "SPA" calibration, wait at least 5 minutes for the O2 level inside the SEU to stabilize. For Zero calibrations, a calibration bag connected to a nitrogen gas cylinder is typically used

### Using the ReFactSet function:

1. Press Mode until the "ReFactSet" icon flashes.
2. Press Enter, and then press Mode to choose either "Yes" or "No".
3. Press Enter again to save the setting.

Note: If the user sets the data or calibrates the sensor incorrectly, use the ReFactSet (recover the factory Setting) to come back the default factory setting.

## 10. Specifications

### CO2 & O2 & Temperature specifications:

CO2 & O2 Specification	
Measurement Range	CO2: 0 - 50,000ppm (5%) display O2: 0- 30% display
Display Resolution	CO2: 10ppm at 0~10,000ppm; 100ppm at 10,001~50,000ppm O2: 0.1%
Accuracy	CO2: ±100ppm or ±5% of reading, whichever is greater O2: Better than ± 3% of FS over 0.1 to 30%
Repeatability	CO2: ±20ppm @400ppm O2: Less than ±1.0%
Temperature Dependence	±0.2% of reading per °C or ±2ppm per °C, whichever is greater, referenced to 25 °C
Pressure Dependence	0.13% of reading per mm Hg
Response Time	CO2: <60 seconds for 90% response to step change O2: <30 seconds for 90% response to step change
AL1 (First Alarm Level)	CO2: 5000ppm, 1 / 1.5 / 2 % , Default AL1= 1.5% O2: 18%, 18.5%, 19%, 19.5%, 20%, Default AL1=19%
AL2 (Second Alarm Level)	CO2: 1.5 / 2 / 2.5 / 3 / 3.5 / 4 % , Default AL2= 3% O2: 16%, 16.5%, 17%, 17.5%, 18%, Default AL2=17%
Sound Alarm	80db@10cm
Warm-Up Time	<60 seconds at 22°C
Temperature Specifications:	
Temperature Range	0°C to 50°C (32°F to 122°F)
Display Resolution	0.1°C (0.1°F)
Display Options	°C/°F
Accuracy	±1°C(±2°F) when CO2 concentration is below first alarm level
Response Time	20-30 minutes (case must equalize with environment)

Operating Conditions:	
Operating Temperature	0°C to 40°C ( 32°F to 104°F)
Humidity Range	0 - 95% RH non-condensing
Storage Conditions:	
Storage Temperature	-20°C to 60 °C (-4°F to 140°F)

### 13. Fault Codes & Troubleshooting Guide

This section includes a list of Frequently Asked Questions for problems you may encounter with the RAD-0200 CO2 & O2 Monitor.

#### Power Supply & Relay Output:

Power Supply		AC adapter 110/220 VAC
AC Input	Voltage	100 ~ 240 VAC
	Frequency	50 / 60 Hz
	Power Requirement	1 W maximum @ 115 VAC 60 Hz 2 W maximum @ 230 VAC 50 Hz
	AC/DC Output	
	Voltage	6VDC
	Power	3.0 W
Peak Input Current		0.5 A from 6 VDC
Relay Output		Two Relay output: Relay 1 operates at alarm 1 for CO2 or O2, Relay 2 operates at alarm 2 for CO2 or O2. Peak Current < 2A@30 VDC or 250 VAC, SPDT.

No	LCD Fault Icon	Description (of the fault)	SEU Indication	RDU Indication	Suggested Actions
1	Er3	The ambient temperature has exceeded the temperature range 0°C to 50°C ( 32°F to 122°F)	"Er3" flash Fault LED blink, Buzzer beep	"Er3" flash Fault LED blink, Buzzer beep	This error will disappear when the temperature returns to the range between 0°C and 50°C ( 32°F to 122°F)
2	Er4	some wrong measurement or the sensor has exceeded its expected life	"Er4" flash Fault LED blink, Buzzer beep	"Er7" flash Fault LED blink, Buzzer beep	Please unplug the AC adapter and reconnect it. If the "Er4" always appears, please contact with the local dealer.
3	Er5 Er6	EEPROM System Problem	"Er5" & "Er6" flash, Fault LED blink, Buzzer beep	"Er7" flash Fault LED blink, Buzzer beep	Please unplug the AC adapter and reconnect it. If the "Er5, Er6" always appear, please contact with the local dealer.
4	Er7	Internal Data Transmission Error	"Er7" flash, Fault LED blink, Buzzer beep	"Er7" flash, Fault LED Blink, Buzzer beep	①Please unplug the AC adapter and reconnected it. ②Check the RJ45 plug is connected into the INPUT port of RDU, if the "Er7" displays on the RDU only.
5	Er8	The accuracy of CO2& O2 sensor may deviate from the actual concentration.	"Er8" flash Fault LED blink, Buzzer beep	"Er8" flash Fault LED blink, Buzzer beep	①Please unplug the AC adapter and reconnect it if the "Er8" still appears, please contact with the local dealer. ②Please calibrate the unit, after the calibration, If the "Er8" still appears, please contact with the local dealer.

### 11. Relay outputs

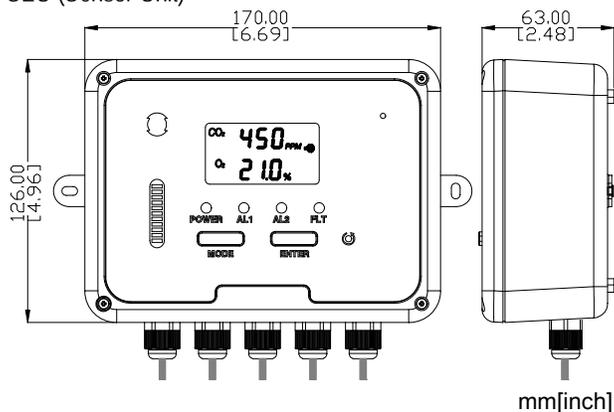
There are two relay output for this item. Relay 1 operates at alarm 1 for CO2 or O2, Relay 2 operates at alarm 2 for CO2 or O2. The relay 1 will be triggered when CO2 concentration exceeds the first alarm level or O2 concentration drops the first alarm level. The relay 2 will be triggered when CO2 concentration exceeds the second alarm level or O2 concentration drops below the second alarm level.

### 12. Weight & Dimensions

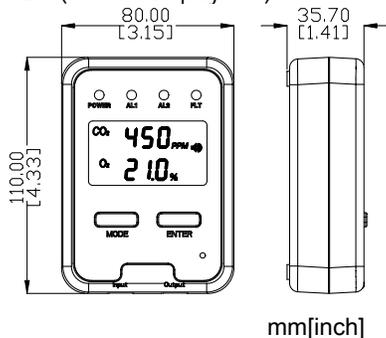
**Weight:** SEU (Sensor Unit):1200 g (include cables)  
RDU (Remote Display Unit): 120 g

#### Dimensions:

SEU (Sensor Unit)



RDU (Remote Display Unit)



### 14. Support & Warranty

#### Support

The quickest way to obtain technical support is via email. Please send all support enquires to [support@co2meter.com](mailto:support@co2meter.com). In your email, please include a clear, concise definition of the problem and any relevant troubleshooting information or steps taken so far, so we can duplicate the problem and quickly respond to your inquiry.

#### Warranty

This unit comes with a 1YEAR (warranty period) limited manufacturer's warranty, starting from the date the unit was shipped to the buyer. During this period of time, CO2Meter.com warrants our products to be free from defects in materials and workmanship when used for their intended purpose and agrees to fix or replace (at our discretion) any part or product that fails under normal use.

To take advantage of this warranty, the product must be returned to CO2Meter.com at your expense. If, after examination, we determine the product is defective, we will repair or replace it at no additional cost to you.

This warranty does not cover any products that have been subjected to misuse, neglect, accident, modifications or repairs by you or by a third party. No employee or reseller of CO2Meter.com's products may alter this warranty verbally or in writing.

**Returns**

If the product fails under normal use during the warranty period, an RMA (Return Material Authorization) number must be obtained from CO2Meter.com. After the item is received, CO2Meter.com will repair or replace the item at our discretion.

To obtain an RMA number, please call CO2Meter.com at **(385) 256-4910**. When requesting an RMA number, please provide the reason for return and original order number.

If we determine that the product failed due to improper use (water damage, dropping, tampering, electrical damage etc.) or abuse, or if it is beyond the warranty period, we will inform you of the cost to fix or replace your device.

If you are returning your device due to a warranty claim (with an RMA number) and you still have the unit original package, please use it to ship your unit to us. Please make sure to include the provided RMA number on the outside of the box, preferably on the shipping label. Make sure you secure the unit inside the package properly to prevent any damage during transit that could void your device's warranty. Finally, please ship your device to the address shown under the "Contact Us" section below. CO2Meter.com will not, under any circumstances, be responsible for your shipment expenses and no refund will be issued for shipping charges necessary for you to ship the unit to us.

**Liability**

All liabilities under this agreement shall be limited to the actual cost of the product paid to CO2Meter.com. In no event shall CO2Meter.com be liable for any incidental or consequential damages, lost profits, loss of time, lost sales or loss or damage to data, injury to person or personal property or any other indirect damages as the result of use of our products.

**Contact us: We're here to help!**

If the troubleshooting guide above doesn't help you solving your problem or for more information, please contact us using the information below.



support@co2meter.com

(386) 256-4910 (M-F 9:00am-6:00pm EST)



[www.co2meter.com](http://www.co2meter.com)



**CO2Meter, Inc.**  
 131 Business Center Drive, A-3  
 Ormond Beach, FL 32174  
 Phone: 386-872-7665 | Fax: 866-422-2356



Ref. No.:012013

**Appendix A**

CO2 level maximum standards in the US and worldwide.

For workplaces that fall under OSHA guidelines, you should monitor the display to assure that the CO2 level over an 8-hour day does is not over the 5,000ppm TWA exposure limit.

Note the 30,000ppm STEL exposure limit is the 2<sup>nd</sup> alarm level by default (3% CO2). This level can be lowered in the settings, but for worker and first-responder safety should never be raised.

**Agency Standards for CO<sub>2</sub> in the Workplace.**

<b>Agency</b>	<b>Low end CO<sub>2</sub> Concentration (ppm)<sup>1</sup></b>	<b>High-end CO<sub>2</sub> Concentration (ppm)<sup>2</sup></b>
OSHA PEL	5,000 TWA	30,000 STEL
ACGIH TLV	5,000 TWA	30,000 STEL
NIOSH REL	5,000 TWA	30,000 STEL

<sup>1</sup>Applies to CO<sub>2</sub> concentration in the workplace considered safe for a 40-hour week.

<sup>2</sup> Based on a 10-minute period for NIOSH and a 15-minute period for OSHA and ACGIH.

PEL = Permissible Exposure Limit

TLV = Threshold Limit Value

REL= Recommended Exposure Limit

TWA= Time Weighted Average

STEL= Short Term Exposure Limit

## Standards for Oxygen in the Workplace

OSHA does not have a permissible exposure limit (PEL) for oxygen.

Oxygen less than 19.5%	OSHA regulations define an oxygen-deficient atmosphere as one with an oxygen concentration less than 19.5%.
Oxygen less than 18%	Progressive onset of fatigue and other symptoms, Effects accelerate with exertion. O2 levels insufficient to sustain life indefinitely.
Oxygen less than 15%	Loss of reason, judgment, coordination. Dimming vision, nausea, vomiting, gasping for breath.
Oxygen less than 12%	Immediate unconsciousness. Asphyxiation within minutes. Progressive brain damage leading to death unless rescued.

### Appendix B

To conform with the National Boiler Inspection Code (NBIC) CO2 safety standards, 2 warning signs must be posted. You can download them here for printing:

<http://co2meters.com/Documentation/Other/NBIC-CO2-Warning-Sign.pdf>

### Appendix C

Wiring Diagram for Alarm 1 to control 120VAC, 10A exhaust fan.

