

# CO2 Controller Operating Instructions

Models: RAD-0501, RAD-0501A

## 1. Product Description

**RAD-0501 Greenhouse Mode:** Controls CO2 generator or regulator to increase CO2 levels during daylight for plant growth.

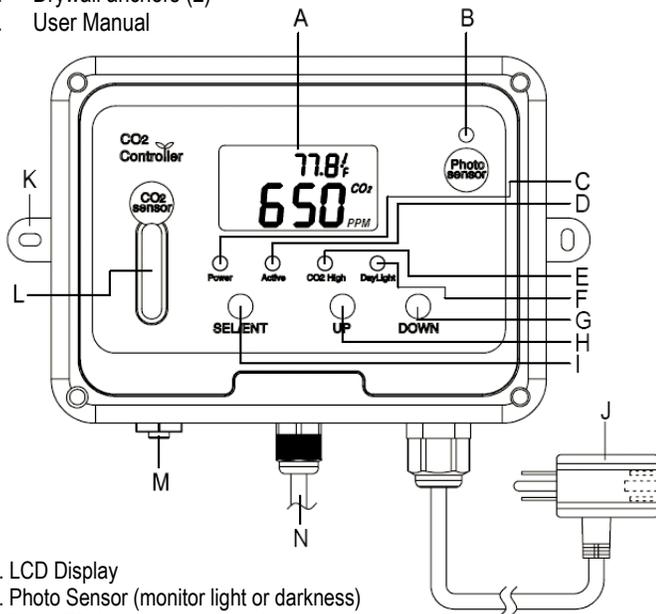
**RAD-0501A Ventilation Mode:** Controls an exhaust fan when CO2 levels are higher than recommended maximum for your application.

Main Features (Both Models):

1. Accurately measures CO2 concentrations up to 2,000ppm
2. Built-in temperature (°C or °F) measurement
3. Automatic altitude compensation via built-in barometric sensor
4. Relay-controlled outlet regulated by long-lasting CO2 sensor.

## 2. Contents & Description

1. CO2 Controller
2. Wall panel holder (1)
3. Screws (2)
4. Drywall anchors (2)
5. User Manual



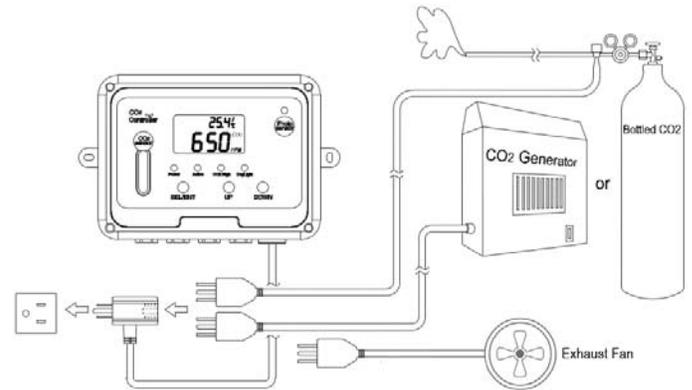
- A. LCD Display
- B. Photo Sensor (monitor light or darkness)
- C. Red LED (power on indicator)
- D. Green LED (lights when CO2 concentration is below SetPoint)
- E. Red LED (lights when CO2 concentration above SetPoint)
- F. Yellow LED (verifies photo sensor is working)
- G. Down Button
- H. Up Button
- I. SEL / ENT Button
- J. Unit power and relay-controlled power "piggyback" plug
- K. Panel Holder
- L. CO2 sensor
- M. Tube fitting for bottled gas calibration
- N. 4-20mA Linear Analog Output for CO2 level

## 3. Caring for the Product

To get the most out of this product, please observe the following

1. **Repair** - Do not attempt to repair the product or modify the circuitry by yourself. Contact CO2Meter.com if the product needs servicing, including the replacement or calibration of the sensor.
2. **Cleaning** - Disconnect the power before cleaning. Use a damp cloth. Do not use liquid cleaning agents such as benzene, thinner or aerosols, as these will damage the device.

## 4. Connection Diagram



Note: In Greenhouse Mode piggyback plug controls CO2 regulator or generator.  
In Ventilation Mode piggyback plug controls an exhaust fan.

## 5. How it Works

1. The Red LED (power) is on when the power is supplied.
2. **Greenhouse Mode:** The Yellow LED is lit when the photo sensor is active. The photo sensor is used to detect the presence or absence of light. When light is present, and CO2 levels are lower than the Target CO2 level, the Green LED is on and power will be supplied to the piggyback plug. When CO2 levels reach the Target level, the Green LED will go off, the Red LED will turn on, and power will be cut to the piggyback plug. In darkness, the piggyback plug is not powered regardless of the CO2 level.
3. **Ventilation Mode:** If CO2 levels are higher than the Target level, the Green LED will turn on and power will be supplied to the piggyback plug. When CO2 levels decrease below the target, the Green LED will go off and power will be cut to the piggyback plug. The photo sensor is disabled.

## 6. LCD Display

Symbol	Meaning	Description
<b>650</b> <sup>CO2</sup> PPM	CO2 Level	CO2 Concentration in ppm (Parts Per Million)
<b>74.5</b> <sup>F</sup>	Temperature	Displays current temperature. Switch °C / °F with UP key
<b>30.2</b> <sup>BAR</sup> inHg	Barometric Pressure	Displays air pressure. Switch inHg / mmHg with DOWN key
<b>RCFS</b>	Restore Factory Settings	Restore factory default settings and delete all custom settings
<b>CAL</b>	Calibration	Fresh air or known CO2 level gas calibration in process
<b>TARGET</b>	Set CO2 Value	CO2 level when relay is turned on or off depending on mode
<b>[ON]</b>	Relay is Activated	When the relay is powered ON will be shown on the LCD
	Greenhouse Mode (default)	Relay on below CO2 set-point, photo sensor enabled
	Ventilation Mode	Relay on above CO2 set-point, photo sensor disabled

## 7. Safety Notice

Your safety is very important to us! To ensure correct and safe use of the product, please read this entire User Manual before using the CO2 controller. Otherwise, the protection provided by the equipment may be impaired. These warnings provide important safety information and should be observed at all times:

1. Do not subject the unit to impact or shock. This may decrease the sensor's precision.
2. Do not place the unit or the power plug near a heat source. Heat can cause distortion of the unit, which may result in fire.
3. Do not open the CO2 Controller or touch any exposed electronic circuitry under any circumstances. This could result in electric shock.
4. Use the attached power adaptor and cord in a grounded plug only. Ungrounded power sources can cause serious damage to the product, or result in injury or death to the user.
5. Only connect devices to the controller that use grounded plugs.

## 8. Installation Instructions

1. Choose a suitable location at plant level to install the controller. Fix the panel holder on the wall with the included screws.
2. Plug the piggyback plug into a 110-220 VAC (US only) grounded wall socket to power the controller.
3. Greenhouse Mode: Plug a CO2 generator or bottled CO2 control regulator into the piggyback plug.
4. Ventilation Mode: Plug an exhaust fan into the piggyback plug.

Note: Electrical devices plugged into the piggyback plug must draw less than 5A at 110-250 VAC or less than 5A @ 30 VDC.

## 9. Changing Settings

The settings that can be changed are: Target, Mode, Calibration and Reset Factory Defaults. Each is described below.

## 10. Changing the Target CO2

The default Target CO2 levels are 1,000ppm in Greenhouse Mode, and 1,200ppm in Ventilation Mode. Depending on the types of plants you are growing, you may wish to change the Target levels. Using advanced hysteresis logic, the displayed CO2 level will slightly vary around the Target level to minimize piggyback plug power cycles. This variance is small, and is normal.

To change the Target:

			
1. Press the SEL/ENT button once. The TARGET icon flashes.			
2. Press SEL/ENT button for 2-3 seconds to enter Target mode.			
3. Press the UP / DOWN buttons to adjust the Target CO2 level.			
4. Press the SEL/ENT button again. SAVE appears on the LCD.			

## 11. Changing the Mode



When the leaf icon is displayed, the controller is in Greenhouse Mode. This mode maintains a pre-set CO2 level by powering the piggyback plug during daylight only.



When if house icon is displayed, the controller is in Ventilation Mode. This mode powers the piggyback plug when the CO2 level is above the SetPoint level. In Ventilation Mode, the photo sensor is ignored.

To change the Mode:

			
1. Press the SEL/ENT button 3 times The MODE icon will flash.			
2. Press SEL/ENT button for 2-3 seconds to enter the MODE setting.			
3. Press the UP / DOWN buttons to change from GROU or VENT			
4. Press the SEL/ENT button again. SAVE appears on the LCD			

## 12. Calibration

Between growing cycles or at least once a year, you should manually recalibrate the unit. We recommend you use fresh air (400ppm) for calibration by taking the unit outdoors, plugging it in, and following the procedure below. Optionally, you can calibrate using a cylinder of known CO2 gas (0-2000ppm) connected to the "M" fitting. Wait at least 5 minutes for the CO2 level on the LCD to stabilize, then follow this procedure.

1. Press the SEL/ENT button 2 times. The CAL icon will flash.			
3. Press the SEL/ENT button for 2-3 seconds to enter the CAL mode. The CO2 level on the LCD will flash.			
4. Press the UP or DOWN buttons to select the CO2 calibration value. Select 400ppm for outdoor/fresh air, or select the number that matches the known CO2 gas cylinder rating.			
5. Press the SEL/ENT button again to start calibration. Calibration will take 3-5 minutes.			
6. If the word PASS is displayed, calibration is complete.			
7. If the word FAIL is displayed, retry the procedure.			
8. If the word Er9 is displayed, refer to Error Codes below.			

## 13. Reset Factory Defaults

Fix improperly set Target or manual calibration problems and return to Greenhouse Mode by restoring the factory default settings:

Note: If you reset the Factory Defaults, the controller will revert to Greenhouse Mode. If you are using a fan, you should immediately change to Ventilation Mode for the device to work properly for your application (See step 11 - Changing the Mode).

1. Press the SEL/ENT button 4 times. The RCFS icon will flash.			
2. Press the SEL/ENT button for 2-3 seconds to enter the RCFS mode.			
4. Press the UP or DOWN button to Select "Yes".			
5. Press the SEL/ENT button to Save and reset factory defaults.			

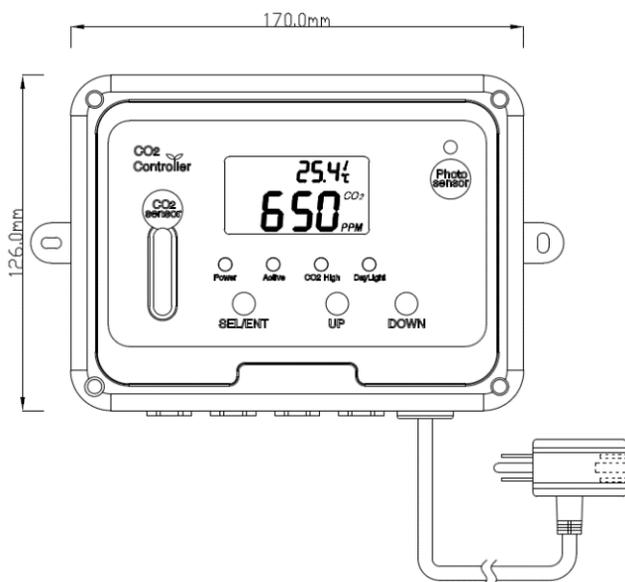
## 14. Specifications

CO2 Specification	
Measurement Range	0 - 2,000ppm for rated specifications 0 - 10,000ppm output for 4-20mA output
Display Resolution	1ppm at 0~1,000ppm; 10ppm above 1,000ppm
Accuracy	0 - 2,000ppm: $\pm 70\text{ppm}$ or $\pm 5\%$ of reading, whichever is greater. $>2,000\text{ppm}$ : $\pm 7\%$ of reading
Repeatability	$\pm 20\text{ppm}$ @400ppm
Pressure Dependence	0.13% of reading per mmHg
Response Time	< 2 minutes for 63% response to step change
SetPoint	RAD-0501 Greenhouse Mode = 1,000ppm RAD-0501A Ventilation Mode = 1,200ppm
SetPoint Hysteresis	$\pm 200\text{ppm}$ around Target
Sensor Warm-Up Time	< 60 seconds at 72°F (22°C)
Splash Rating	IP54 non-sealed enclosure
Operating Conditions:	
Temperature	32°F to 122°F (0°C to 50°C)
Humidity	0 ~ 95% RH non-condensing
Storage Conditions:	
Temperature	-4°F to 140°F (-20°C to 60 °C)

### Power Supply & Relay Output:

Power Supply	AC adapter 110/220 VAC (U.S. Only)	
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
	Relay (Piggyback plug)	Peak Current < 5A@ 250 VAC, SPST. Normally Open.
Analog Output	Linear current 4-20mA = 0-10,000ppm. RL < 150Ω. Red (+) signal, White ground.	

## 15. Dimensions



## 16. Error Codes & Troubleshooting

No	LCD Fault Icon	Description (of the fault)	Suggested Actions
1	Er3	The ambient temperature has exceeded the temperature range 0°C to 50°C (32°F to 122°F).	This error will disappear when the temperature returns to the range between 0°C and 50°C (32°F to 122°F).
2	Er4	Inaccurate measurement or the sensor has exceeded its expected life	Unplug the AC adapter and reconnect it. If Er4 still appears, contact CO2Meter.com.
3	Er5 Er6	EEPROM System Problem	Unplug the AC adapter and reconnect it. If Er5 or Er6 still appears, contact CO2Meter.com.
4	Er8	The accuracy of CO2 sensor may deviate from the actual concentration.	1. Unplug the AC adapter and reconnect. If the "Er8" still appears, recalibrate. 2. Calibrate the unit. If the "Er8" still appears, contact CO2Meter.com.
5	Er9	Calibration failure caused by too large a difference between the calibration value selected and the CO2 level read during calibration.	1. Select the correct calibration value before calibrating. 2. If Er9 still appears, contact CO2Meter.com

## 17. 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 1 YEAR (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.

### Return Instructions

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](mailto:Support@CO2Meter.com)

(386) 256-4910 (M-F 9:00am-5:00pm EST)



[www.CO2Meter.com](http://www.CO2Meter.com)



CO2Meter, Inc.

131 Business Center Drive

Ormond Beach, FL 32174

Phone: 386-872-7665 | Fax: 866-422-2356

Email: [Sales@CO2Meter.com](mailto:Sales@CO2Meter.com)



Ref. No.:062015