CO2 Controller Operating Instructions

Models: RAD-0501, RAD-0501A, RAD-0501E

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.

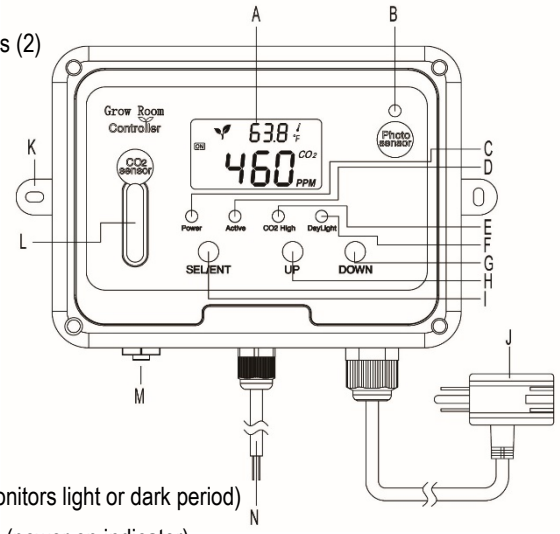
RAD-0501E European Version: Same as RAD-0501 Greenhouse mode, includes Schuko CEE 7/3 (socket) and CEE 7/4 (plug).

Main Features (All 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 (monitors light or dark period)

C. Power - Red LED (power on indicator)

D. Active - Green LED (lights when relay is active)

E. CO2 High - Red LED (lights when CO2 concentration is above Target Hi)

F. Daylight - Yellow LED (verifies photo sensor is working properly)

G. DOWN Button (changes menu settings)

H. UP Button (changes menu settings)

I. SEL/ENT Button (selects menu settings)

J. Unit power and relay-controlled power “piggyback” plug

K. Case screw mounts

L. CO2 sensor

M. Tube fitting for bottled gas calibration

N. 4-20mA Linear Analog Output for CO2 level

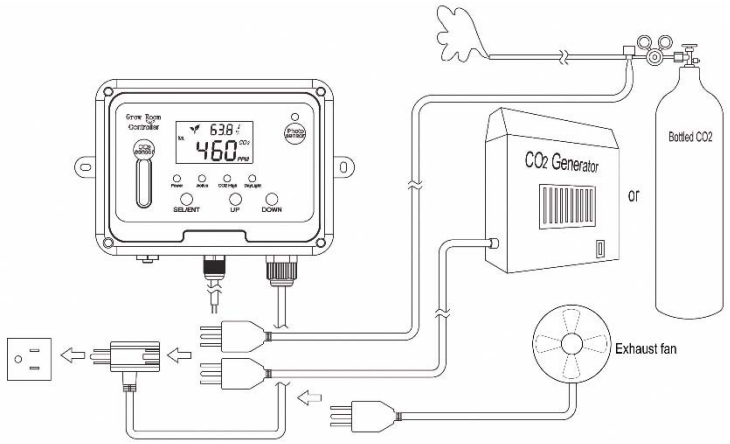
© CO2Meter, Inc. Rev. 5/8/18 and S/N: E7044002386 or higher

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 the piggyback plug controls CO2 regulator or generator. In Ventilation Mode the piggyback plug controls an exhaust fan.

4.1. How it Works

1. The Power (Red LED) is on when the power is supplied.
2. Greenhouse Mode: The DayLight (yellow) LED will light when the photo sensor is active. The photo sensor detects the presence or absence of light. When light is present, and CO2 levels are between the Target Lo and Target Hi CO2 levels, the Active (green) LED is on and power will be supplied to the piggyback plug. When CO2 levels reach the Target Hi level, the Active (green) LED will turn off, the CO2 High (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 Hi level, the Active (green) LED will turn on and power will be supplied to the piggyback plug. When CO2 levels decrease below the Target Lo, the Active (green) LED will go off and power will be cut to the piggyback plug. In ventilation mode, the photo sensor is always disabled.

5. LCD Display Icons

Symbol	Meaning	Description
650 CO2 PPM	CO2 Level	CO2 Concentration in ppm (Parts Per Million)
25.4 °C/°F	Temperature	Display the current temperature. Switch °C / °F with UP key
BAR 30.2 inHg	Barometric Pressure	Displays air pressure. Switch inHg / hPa with DOWN key
RCFS	Recover Factory Setting	Restore factory default settings and delete all custom settings
CAL	Calibration	Fresh air or known CO2 level gas calibration in process
TARGET Hi	Setting CO2 Target High value	CO2 High level when relay is turned on or off depending on mode
TARGET Lo	Setting CO2 Target Low value	CO2 Low level when relay is turned on or off depending on mode
HI	High CO2 value	CO2 Levels have exceeded 10,000PPM
ON	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, Relay on above CO2 set-point,

6. Safety Notes

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.

7. Installation Instructions

1. Choose a suitable location at plant level to install the controller. Mount the controller securely using the 2 included screws.
2. Plug the piggyback plug into a 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.

8. Changing Settings

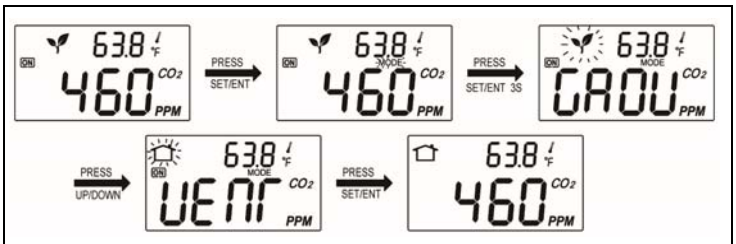
The settings that can be changed are: Mode, Target, Calibration, Advanced and Reset Factory Defaults. Each is described below.

9. 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 the house icon is displayed, the controller is in Ventilation Mode. This mode powers the piggyback plug when the CO2 level is above the Target Hi and remains on until the CO2 level falls below the Target Lo level. In Ventilation Mode, the photo sensor is ignored.

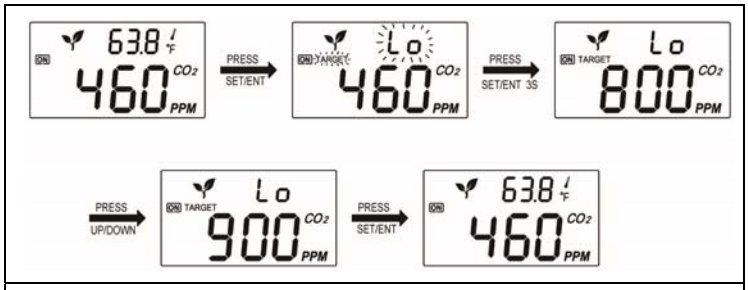
To change the Mode:



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

10. Changing the Target Lo CO2

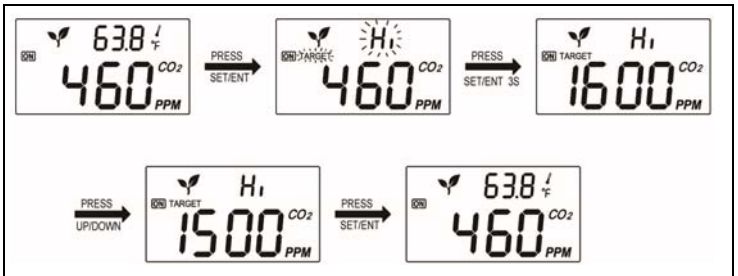
The default Target Lo CO2 level is pre-set at 800 ppm. Depending on the types of plants you are growing, you may wish to change the Target Lo level. To change the Target Lo:



1. Press the SEL/ENT button once. The TARGET Lo icon flashes.
2. Press SEL/ENT button for 2-3 seconds to enter Target Lo mode.
3. Press the UP or DOWN buttons to adjust the Target CO2 level.
4. Press the SEL/ENT button again to Save the Target Lo value.

11. Changing the Target Hi CO2

The default Target Hi CO2 level is pre-set at 1,500 ppm. Depending on the types of plants you are growing, you may wish to change the Target Hi level.



1. Press the SEL/ENT button twice. The TARGET Hi icon will flash.
2. Press the SEL/ENT button for 2-3 seconds to enter the Target Hi Mode.
3. Press the Up or Down buttons to select Target CO2 value.
4. Press SEL/ENT button again to Save the Target Hi Value.

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 3 times. The CAL icon will flash.
2. Press the SEL/ENT button for 2-3 seconds to enter the CAL mode. The CO2 level on the LCD will flash.
3. 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.
4. Press the SEL/ENT button again to start calibration. Calibration will take 3-5 minutes.
5. If the word PASS is displayed, calibration is complete.
6. If the word FAIL is displayed, retry the procedure.
7. If the word Er9 is displayed, refer to Error Codes below.

13. Advanced Menu

The advanced menu is for modifying the Daylight and Barometric Pressure functions.

To access the Advanced Menu:

1. Press and Hold both the UP and DOWN buttons for 10 seconds.
2. The screen will show LED.

In Greenhouse mode, the Daylight Mode uses the Photo Sensor to detect light. The Power LED (Red) shows power to the unit. The default mode is LED OFF at night. If LED is ON, the Power LED (Red) will remain on at night.

Note: Some growers believe an active Power LED (Red) at night provides enough light to continue the photosynthesis process.

To change the LED mode:

1. With LED showing, Press ENTER.
2. Press UP or DOWN to toggle between YES and NO.
3. Press SEL/ENT to Save.

The Barometric Pressure function compensates for altitude adjustment. The default setting is BAR ON. If BAR is OFF, the unit will default to sea level barometric pressure and not compensate the CO2 level for altitude.

Note: CO2 levels are effected by altitude and could show incorrect readings.

To change the BAR Mode:

1. With LED showing, press UP or Down to show BAR, Press ENTER.
2. Press the UP or DOWN button to toggle between YES and NO.
3. Press SEL/ENT to Save.

14. Reset Factory Defaults

RCFS fixes improperly set Target or manual calibration problems and returns the meter 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 10 - Changing the Mode).

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

15. Specifications

CO2 Specifications:

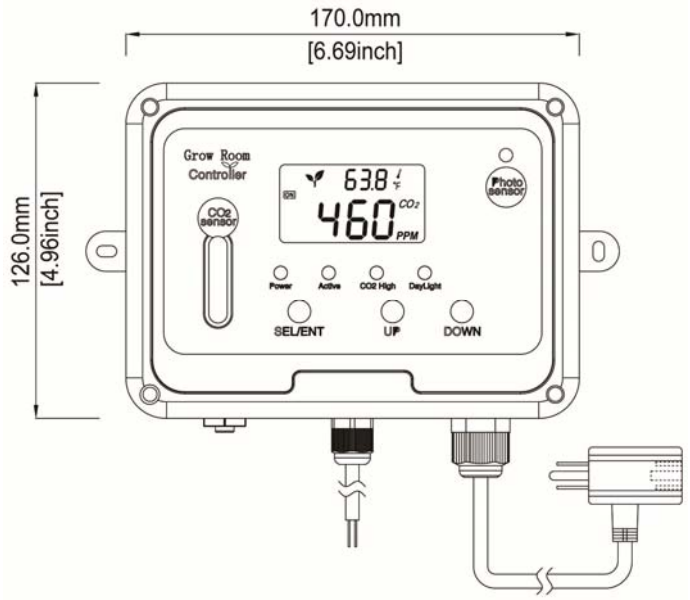
Measurement Range	0 - 2,000ppm for rated specifications 0 - 10,000ppm output for 4-20mA output
Display Resolution	1ppm at 0~1,000ppm; 10ppm above 1000ppm
Accuracy	0 - 2,000ppm: ±70ppm or ±5% of reading, whichever is greater. >2,000ppm: ±7% of reading
Repeatability	±20ppm @400ppm
Pressure Dependence	0.13% of reading per mm Hg
Response Time	< 2 minutes for 63% response to step change

Target Lo	800 ppm for all models
Target Hi	1500 ppm for all models
Warm-Up Time	< 60 seconds at 72°F (22°C)
Splash Proof Grade	IP54 non-sealed enclosure
Operating Conditions:	
Operating Temperature	32°F to 122°F (0°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)

Power Supply & Relay Output:

Power Supply		RAD-0501A: 110/220 VAC w. AC Adapter RAD-0501E: 220-240 VAC w. Schuko CEE 7/3 (socket) and CEE 7/4 (plug)
AC Input	Voltage	100 ~ 240 VAC
	Frequency	50 / 60 Hz
	Power Requirement	3 W maximum
Relay Socket		Peak Current < 5A@ 250 VAC, SPST. Normally Open.
Analog Output		Linear current 4-20mA = 0-10,000ppm. RL < 150Ω. Red (+) signal, White ground.

Dimensions



16. Fault Codes & Troubleshooting Guide

No.	LCD Fault Icon	Fault Description	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 the "Er4" always appears, please contact place of purchase.
3	Er5 Er6	EEPROM System Problem	Unplug the AC adapter and reconnect it. If the "Er5, Er6" still appears, please contact place of purchase.
4	Er8	The accuracy of CO2 sensor may deviate from the actual concentration.	①Unplug the AC adapter and reconnect. If the "Er8" still appears, please contact place of purchase. ②Calibrate the unit. After calibration if the "Er8" still appears, please contact place of purchase.
5	Er9	Calibration failure caused by too large a difference between the calibration value selected and the CO2 level read during calibration.	①Select the correct calibration value before calibrating. ②If Er9 still appears, please contact place of purchase.
6	None	Greenhouse mode: regulator plugged in but does not power on.	Check CO2 level on LCD. Regulator will not be powered on until CO2 level falls below target low level (default 800ppm)
7	none	Ventilation mode: exhaust fan plugged in but does not power on..	Check CO2 level on LCD. Exhaust fan will not be powered on until CO2 level rises above target high level (default 1,500ppm)

17. Support

Support

The quickest way to obtain technical support is via email. Please send all support enquires to 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.

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–5:00pm EST)

www.CO2Meter.com

See CO2Meter, Inc. Terms & Conditions at,
www.CO2Meter.com/pages/terms-conditions

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