

# CO2 Controller Operating Instructions

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

## 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).

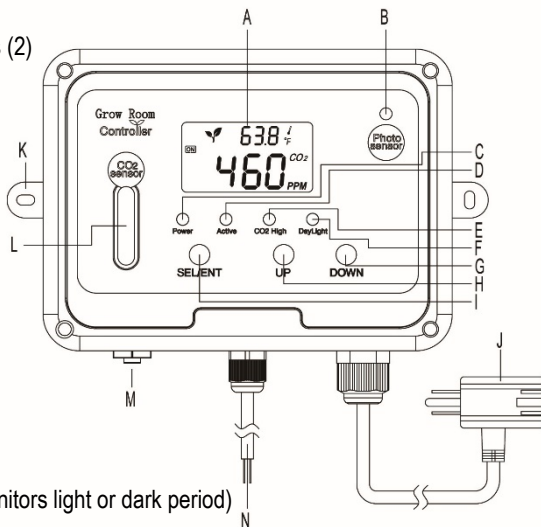
**RAD-0501W Wifi Version:** Same as RAD-0501 Greenhouse mode, includes Wi-Fi Monitoring Capabilities and Unique Network Cloning Feature.

### 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



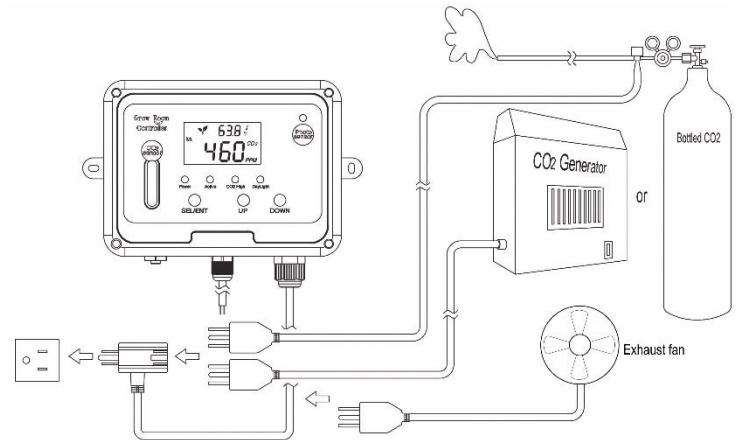
- A. LCD Display
- B. Photo Sensor (monitors light or dark period)
- C. Power - Red LED (power on indicator)
- D. Active - Green LED (lights when relay is active)
- E. CO2 High - Red LED (lights when CO2 concentration is above Target Hi)
- F. Daylight - Yellow LED (verifies photo sensor is working properly)
- 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

## 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
	CO2 Level	CO2 Concentration in ppm (Parts Per Million)
	Temperature	Display the current temperature. Switch °C / °F with UP key
	Barometric Pressure	Displays air pressure. Switch inHg / hPa with DOWN key
<b>RCFS</b>	Recover Factory Setting	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<sub>Hi</sub></b>	Setting CO2 Target High value	CO2 High level when relay is turned on or off depending on mode
<b>TARGET<sub>Lo</sub></b>	Setting CO2 Target Low value	CO2 Low level when relay is turned on or off depending on mode
<b>HI</b>	High CO2 value	CO2 Levels have exceeded 10,000PPM
	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:

- Do not subject the unit to impact or shock. This may decrease the sensor's precision.
- 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.
- Do not open the CO2 Controller or touch any exposed electronic circuitry under any circumstances. This could result in electric shock.
- 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.
- Only connect devices to the controller that use grounded plugs.

## 7. Installation Instructions

- Choose a suitable location at plant level to install the controller. Mount the controller securely using the 2 included screws.

- Plug the piggyback plug into a grounded wall socket to power the controller.
- Greenhouse Mode:** Plug a CO2 generator or bottled CO2 control regulator into the piggyback plug.
- 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.



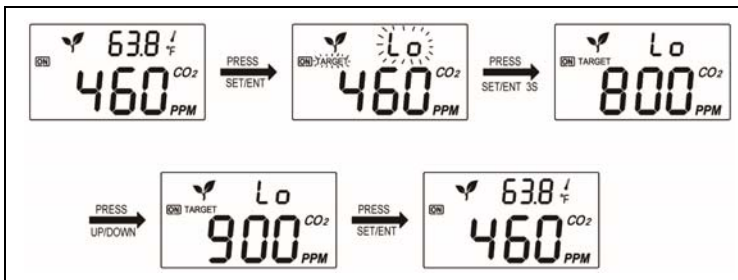
When the house icon is displayed, the controller is in Ventilation Mode. This mode powers the piggyback plug when the CO2 level is above the Target Hi and remains on until the CO2 level falls below the Target Lo level. In Ventilation Mode, the photo sensor is ignored.

To change the Mode:

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

## 10. Changing the Target Lo CO2

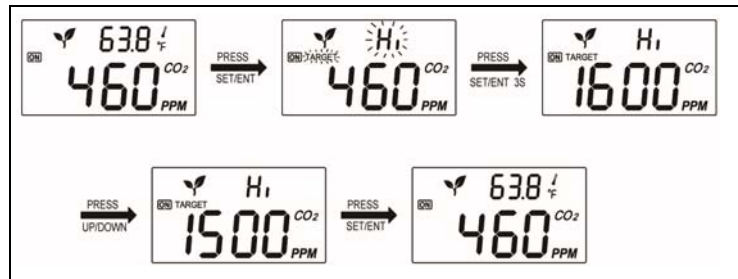
The default Target Lo CO2 level is pre-set at 800 ppm. Depending on the types of plants you are growing, you may wish to change the Target Lo level. To change the Target Lo:



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 begin to flash.
2. Press the SEL/ENT button for 2-3 seconds to enter the calibration mode/menu. The CO2 level on the LCD screen will begin to 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 and hold the SEL/ENT button to start calibration. The CAL icon will start flashing CALING. This 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:

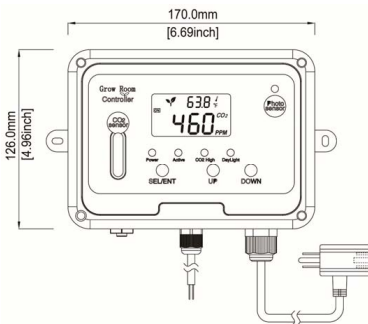
Measurement Range	0 - 2,000ppm for rated specifications 0 - 10,000ppm output for 4-20mA output
Display Resolution	1ppm at 0~1,000ppm; 10ppm above 1000ppm
Accuracy	0 - 2,000ppm: ±70ppm or ±5% of reading, whichever is greater. >2,000ppm: ±7% of reading
Repeatability	±20ppm @400ppm
Pressure Dependence	0.13% 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
<b>Operating Conditions:</b>	
Operating Temperature	32°F to 122°F (0°C to 50°C)
Humidity Range	0 ~ 95% RH non-condensing
<b>Storage Conditions:</b>	
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



## 17. Operations

### 1. Button Click:

Clicking the button (i.e. a very short press) will wake up the device. The Green LED will flash to indicate that the device is active. If no network is configured, the Green LED will go off and the Red LED will blink twice to indicate that there is no network configured.

If the device has a network configuration, the button click will wake up the device and force it to transfer its current log data to the Network. The Green LED will blink slowly. After taking a sensor reading, the Red LED will start blinking along with the Green LED to indicate that the device is connecting to the wireless network. When the connection to the local wireless network is established, the Red LED will stop blinking. If both the Green and Red LEDs continue to blink together, the local connection cannot be established.

### 2. Long Press:

Holding the button down causes the device to present various configuration modes. Each configuration mode is indicated by a pattern of the LEDs. If the button is released, the indicated mode is entered. After the three modes are presented, both LEDs will remain on until the button is released. Releasing the button when both LEDs are steady on causes no action.

### 3. Configuration Options:

**Fast Blinking Green:** This mode is called Access Point Mode and is used to enter the built in Wireless Access Point and Web Server. The device will remain in this mode for up to 5 minutes or until configuration is complete. In Wireless Access Point mode, the device can be configured using a Mobile Phone, Tablet, or other device. (See Network Configuration section below). This mode is also used to configure automatically from another device that is in "Clone Server" mode.

**Alternating Red and Green:** This mode is called Clone Server Mode. If the device has been configured with a network configuration, you can use the Clone Server Mode to quickly configure another device. (See Cloning section below)

**Fast Blinking Red:** This mode is used to clear the current network configuration and return the device to deep sleep mode. Be careful not to release the button in this mode unless you intend to clear the network configuration. If you accidentally clear the configuration, you will have to enter it again (or Clone it from another device).

## 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.	① Unplug the AC adapter and reconnect. If the "Er8" still appears, please contact place of purchase. ② Calibrate 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.	① Select the correct calibration value before calibrating. ② If 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)



# 18. Network Configuration

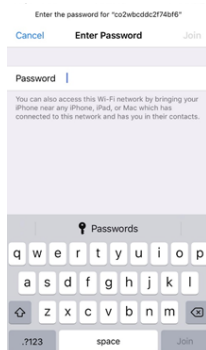
## Access Point Mode

The Access Point Mode (Fast Blinking Green) provides a WiFi access point and Webserver that can be used to configure the device WiFi connection. The connection requires a network SSID (Service Set Identifier) and a Password. The network configuration also includes the name of the server that supports the device. In most cases the default server is used.

Once the Access Point Mode is started and the device Green LED is blinking fast, you can connect to the device with a mobile phone or tablet. The SSID and Password for this connection is provided on the label on the rear of the device.

Once you connect your mobile to the sensor device's Access Point, you can connect to the configuration page from your browser. The internal web server is located at the address 10.8.8.8. Type this address into the address bar of your browser. This will take you to a page that will look similar to the figure below.

### Step 1. Enter the device password. Pw: co2meter



### Step 2. Follow configuration setup page.



The Network Configuration provides a drop-down list of the Wireless 2.4GHz networks in range. The strongest network is normally displayed first. Select the network that you wish the device to use and the password for that network. Note that passwords are case sensitive and may include spaces.

Press the "Press to Configure" button. This will cause the device to save this Network Configuration to permanent storage. The device will return a "Configuration Saved" similar to the figure below.

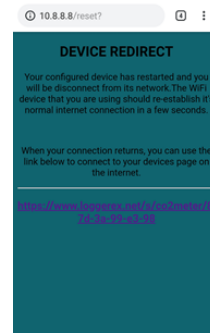
### Step 3. Restart Device



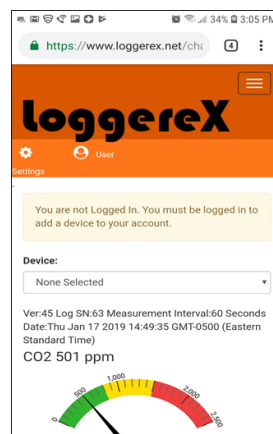
Press the "Restart Device" button to restart your device. The Green LED should stop blinking and the following page will be displayed to your browser.

### Step 4. Continue to LoggerX webpage to view CO2, temperature and humidity readings remotely.

**Device Redirect:** When the "Device Redirect" page is displayed the Access Point will shut down. When the Access Point shuts down, your mobile device will lose the wireless connection to the sensor device. The mobile should then reconnect to another network if available. Normally this network will have connectivity to the Internet. The link displayed on the "Device Redirect" page will take you to the Internet web-page for your device.



If your mobile device is not logged into the Loggerex network then the devices Internet page will normally display similar to the image below. This display is only shown when the device has not yet been added to a particular account. Once you add the device to a Loggerex account, this page will no longer be available. The device will instead appear in the Dashboard for that account.



# 19. Network Cloning Feature

## Cloning

The network configuration can be easily transferred from one device to another using the Clone Server Mode. The Clone Server Mode (Alternating Red and Green) provides a wireless access point that provides its network configuration to other devices. When a device is placed into Clone Server Mode, other devices can be configured by simply starting their access point mode. Note that Clone Server Mode cannot be entered unless the device has been configured with a WiFi network configuration.

The configuration can be cloned to a device by simply starting the target device's Access Point Mode. This is the mode normally used to configure the target device using a Mobile Phone or Tablet. Before entering the Access Point Mode, the device scans for an access point in Clone Server Mode. If it finds a Clone Server, it will request the Network configuration from that device. The network configuration is encrypted so that the network password will not be revealed.

A device in Clone Server Mode will remain in that mode for 5 minutes or until the configuration button is clicked. Each time the configuration is transferred to a device, the 5 minute timer is reset. This allows a number of devices to be easily cloned.

## Reset

The device can be reset by release the button when Red LED is rapidly flashing. Reset will clear the network configuration from the device and place the device in deep sleep. The device can only awakened by clicking the button.


## 21. Support

### 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.

### 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)

 See CO2Meter, Inc. Terms & Conditions at,  
[www.CO2Meter.com/pages/terms-conditions](http://www.CO2Meter.com/pages/terms-conditions)



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