

Troubleshooting & Specs

CPPM-1

Amps / Volts requirements	15 amps @ 120 volts
Remote sensor cable length	16ft (can be up to 100')
Min / Max operating temperature	32 to 120° F
Min / Max operating Humidity	0-99% RH
Light Sensor sensitivity	Adjustable
CO2 Measurement range	0-2500 PPM
CO2 Accuracy	+/- 75 PPM
CO2 sensor warm-up time	Less than 10 minutes
Computer Interface *Optional	RS 232 / 9-pin D-sub
Weight / Dimensions	5lbs / 8" x 6.5" x 3.1"
Life Expectancy	> 10 years

Instruction Manual

CPPM-1

CO₂ PPM Controller



All Sentinel Timers and
Controllers offer a
3-year warranty.

Ask your retailer for
details.



Sentinel products are distributed by:

GPS / Global Product Solutions LLC.



www.growgps.com



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If you are “guessing” what CO₂ level you really have, the CPPM-1 eliminates guesswork while it controls your CO₂ (carbon-dioxide) levels with Part-per-million accuracy. It uses a CO₂ sensor that is extremely accurate and features a ten-year life expectancy. Our combination CO₂ & light level sensor is housed in a separate remote sensor enclosure that can be located up to 100 ft from the controller. (Standard 16 ft cable)

CONTENTS

A quick look at the CPPM-1
Installation of the CPPM-1
Operating the CPPM-1
Connecting temp controllers
Calibrating the CPPM-1
CO₂ control Modes
Photocell sensitivity
Change display F to C
Using with electronic ballasts
Connection Examples
Troubleshooting & Specs

As with the other controllers from Sentinel, it features a easy to read LED display and simple pushbuttons to enter the desired PPM settings and to display the current CO₂ PPM reading. The CPPM-1 can also be connected to other controllers so that the CO₂ is disabled (useful when operating exhaust fans) It can be operated in Fuzzy-logic mode (for compressed CO₂) , or ON-OFF (for CO₂ generators)

Increasing the CO₂ from normal atmospheric level of 375 PPM to between 1250 PPM by using either compressed CO₂ or operating a combustible gas CO₂ generator has never been easier. The CPPM-1 measures the carbon dioxide level and automatically turns ON and OFF the CO₂ device to accurately keep the CO₂ level at the desired level.

The combination remote sensor assembly is also a great feature that allows the user to place the sensor up to 16 ft from the controller. The combo-probe contains a highly accurate temperature, humidity, light and CO₂ sensor. The sensors are enclosed in a shielded body and use high-quality shielded wiring to resist electronic noise from electronic ballasts or other EMI / EFI noise sources.

Troubleshooting & Specs

Problem: The unit does not power up at all.

Check and reset the circuit breaker on the bottom of the unit.

Problem: The CO₂ outlet does not turn on.

- 1) There are 2 different modes that can be selected. Refer to CO₂ Modes to see how the modes affect the CO₂ function.
- 2) The Photocell inside the combination probe may affect the CO₂ function. Ensure the photocell is receiving enough light to activate it. The sensitivity of the photocell can also be adjusted if required.

Problem: The display reads **Err SEn**

The remote combination probe has been disconnected or is not communicating with the unit. Check the cable and the remote sensor. If resetting (OFF / ON) the power does not help, contact the factory. (See below also)

Problem: The CO₂ reading does not seem to be accurate.

A quick check of the calibration of the CO₂ sensor can be performed. Refer to Calibrating CO₂ to recalibrate the sensor.

Problem: The unit has scrolling 8s for more than 10 minutes.

Turn the power switch Off for 5 seconds, then turn the switch On. After 10 minutes, the unit should complete the start-up and begin to display conditions of the area. If it does not, contact the factory.

Problem: The device I have connected to the CO₂ receptacle, cycles On & Off too much.

If you have selected Fuzzy logic mode, cycling On / Off is normal. If using generator mode, the CO₂ dead-band can be increased to reduce cycling of the device.

Problem: I would like to return the unit to its default settings.

The unit can be returned to its original factory setpoints. Pressing and holding the **Enter / Reset** and **Down** pushbuttons for 2 seconds will change the display to read **f.Set**. Pressing **Enter / Reset** again will return the unit to its factory default settings.

Problem: The digital display is frozen or changing rapidly.

Certain devices such as Electronic (Digital) Ballasts and Ozone generators produce a huge amount of electronic “noise”. If you are operating these other devices, locate them as far away from the controller as possible.

Connection examples

For people using exhaust fans for cooling, it is best to coordinate the Temperature and CO2 functions. If the functions are not coordinated, the exhaust fan can pull the compressed CO2 out of the growing area as fast as it is being released which is very wasteful and expensive.

The supplied 12-volt power supply connects to any temperature controller so that the CO2 device will be disabled when the fan is operating.

EVC-2



The 12 volt DC adapter allows the CPPM-1 to be coordinated with other controllers like the EVC-2.



Optional RS-232 computer interface connection



OR

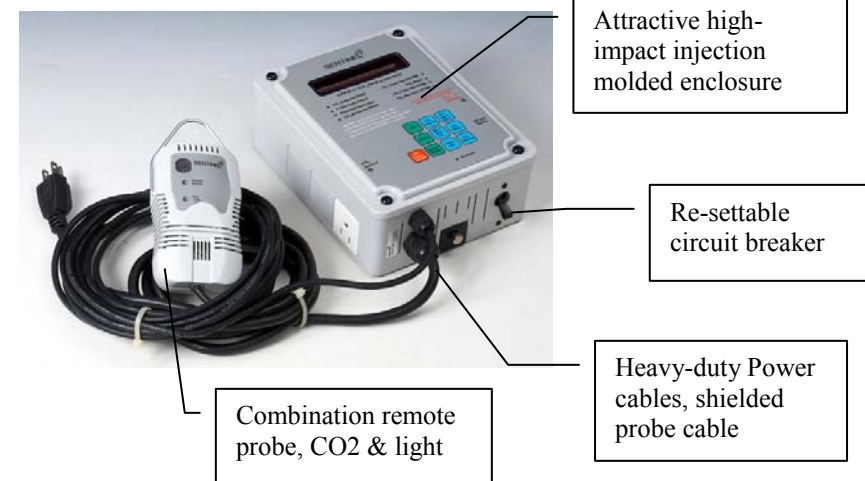
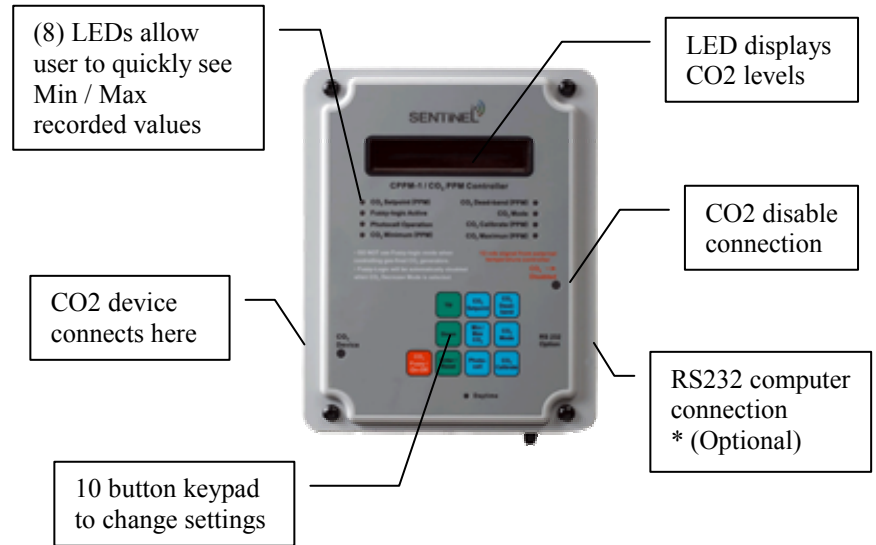


Connect your 120 volt compressed CO2 solenoid / regulator assembly to the CO2 receptacle.

Hand sized remote combination probe senses CO2 PPM and light levels in one small enclosure.



A quick look at the CPPM-1...



Installing the CPPM-1

- 1) Locate a suitable location for the controller.
- 2) First secure the provided bracket to the wall. Next snap the controller into place and tighten the (2) thumb-screws top & bottom.
- 3) Place the remote probe assembly where it can accurately sense the environmental conditions. **The sensor is NOT water proof.** Do not locate the sensor where it may get sprayed with water.
- 4) Hang the remote sensor probe at plant height for best accuracy. The combination sensor is fragile and should be handled with care.
- 5) The controller requires a 120 volt, 15-amp power supply. Plug the power cable into a standard Nema 5-15 wall outlet.
- 6) Connect the CO2 device to the receptacle marked CO2 Device. You can operate a CO2 generator or a compressed CO2 regulator.
- 7) The light sensor inside the remote probe needs to be exposed to light. The sensitivity of the photocell is adjustable. (See Photocell sensitivity)
- 8) Turn the power switch to the ON position and the unit will begin to “warm-up”. While warming up, the display will show a series of the number 8 moving across the display. Warm-up takes about 4 minutes.

NOTE: In order for the CPPM-1 to work correctly for YOUR application, you may need to first check and change some factory set-points. Refer to Operating the CPPM-1 section of this manual.

There are 10 buttons on the CPPM-1 . Below is a brief descrip-

Photocell sensitivity

If necessary, the sensitivity of the photocell can be adjusted. The factory setting normally activates “daytime” with very low light levels required. If you need to change the sensitivity of the photocell, follow the procedure below.

Pressing and hold the **Enter / Reset** and **UP** button for 2 seconds will bring up the current photocell setpoint. To increase the sensitivity (turn ON Daytime mode with less light), increase the number setting. To decrease the sensitivity (require more light to activate Daytime mode), lower the number setting.

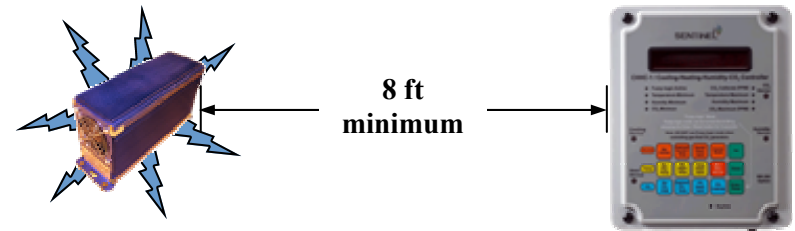
Changing display from F to C

The CPPM-1 can display the temperature in either in F or C. To change the temperature display, press and hold the **Up** and **Down** pushbuttons for 3 seconds.

Using with electronic (digital) ballasts

Warning!!!

Some electronic devices such as Electronic (Digital) HID ballasts and Ozone generators produce large amounts of electronic noise, which can affect other equipment. The Sentinel line of controllers and timers have been “hardened” by using shielded cable and shielded enclosures however... some EBs do not have proper shielding. For best results it is highly recommended to position your controller at least 8 ft away from any EBs (Electronic Ballasts). It is also a good idea to route the cables going from the EB to the HID lamp away from the controller and the remote temperature probe cable attached



Keep Electronic ballast at least 8 ft away from other electronic equipment.

CO2 control modes

There are 2 CO2 “modes” of operation. One mode is used when controlling **CO2 generators**, the other mode is used with **compressed CO2** that comes in high pressure tanks. Selecting the appropriate mode before using the CPPM-1 is important for proper operation.

CO2 Generators:

The default mode of operation is **gEnErAt** for CO2 generators. In generator mode, the unit CO2 will be turned ON whenever the CO2 level is below the desired setpoint. The CO2 Deadband is also used in this mode. The deadband prevents the CO2 from turning ON / OFF too quickly and is factory set at 50PPM. If the setpoint is 1250 PPM, the CO2 outlet will be turned ON until it reaches 1300 PPM (1250 setpoint + 50 deadband = 1300 PPM) Once it reaches 1300, the CO2 is turned OFF. Once the CO2 level drops back to the setpoint of 1250 PPM, the CO2 is turned ON again and the process repeats until the unit senses it is night time.

NOTE: ALWAYS select generator mode for mushroom cultivation when a fan is used to reduce the amount of CO2 in the area.

Compressed CO2 tanks:

The optional mode of CO2 operation is Fuzzy Logic mode **LogIcoN**. It is used **ONLY** when using compressed CO2. This is because the logicon mode will be turning the CO2 device connected to the CPPM-1 ON and OFF at short intervals to attempt to keep the CO2 level inside the growing area as close as possible to the setpoint. When the CO2 level is close to the setpoint, the CO2 outlet will be turning ON and OFF every few seconds, this is normal. When the CO2 level is either well below or well above the setpoint, the output will remain steadier either ON or OFF.

NOTE: The rapid cycling of the CO2 outlet would cause problems if a CO2 generator was connected to the CPPM-1 in **LogIcoN** mode. Only use **gEnErAt** mode when using CO2 generators.

tion, the next sections explain all of the functions in detail.

- **CO2 Setpoint:** Press this button to display and change the current CO2 Part-Per-Million setting [Factory setpoint 1250 PPM](#).
- **CO2 Dead-band:** Press this button to display and change the current CO2 Dead-band. [Factory setpoint 50 PPM](#).
- **Photocell:** Press this button for 1 second to display and change the Photocell Mode for CO2 (Day, Night or 24 hours). [Factory setpoint day](#).
- **CO2 Calibrate:** Press this button to re-calibrate the CO2 sensor. * Refer to the Calibration section. [Factory setpoint 380 PPM](#).
- **CO2 Mode:** Press this button for 1 second to display and change the CO2 Mode (Increase or Decrease). [Factory setpoint increase](#).
- **CO2 Fuzzy On-Off:** Press this button to change the CO2 mode from Generator mode (On/ Off) to Fuzzy logic mode (Fuzzy-logic). [Factory setpoint Generator](#)
- **Min / Max CO2:** Pressing this button repeatedly will recall the stored high and low readings for the CO2 PPM. Pressing and holding the Enter / Reset button while the recorded value is displayed will reset the Min / Max values.
- **UP:** Press this button to display to increase the setting.
- **Down:** Press this button to display to increase the setting.
- **Enter/Reset:** Press this button accept and enter the new setpoint and also to reset the Min / Max recorder values.

Operating the CPPM-1

The CPPM-1 has 10 pushbuttons that are used to select the settings. This section explains each of the pushbutton functions in detail.

Setting the CO2 PPM level:

CO2 Setpoint To change the CO2 PPM setting, press the **CO2 Setpoint** button on the keypad. Use the **Up** or **Down** button to change the setting, example **1500_PP**. Press **Enter** to accept the new setpoint. [Factory setpoint 1250 PPM](#)

Setting the CO2 Dead-band:

Set CO2 Deadband The CO2 Dead-band can be set by the user. The dead-band is the range of measurement that the control will allow the CO2 level to vary by. Press the **CO2 Dead-band** button on the keypad to display the current setting. It is suggested to leave the setting at **0050_PP**. If necessary use the **Up** or **Down** buttons to change the display to the desired setting. Press **Enter** to accept the change. * This setting is only used for generator mode.
[Factory setpoint 50 PPM](#)

Recalling minimum and maximum recorded values:

Min / Max Recall The user can recall the minimum and maximum recorded values for the CO2 levels easily. Press the **Min / Max Recall** button on the keypad. The Min and Max recorded value is identified with a small green LED on the front of the unit. The Min / Max values can be reset by pressing and holding the **Enter / Reset** button for 2-3 seconds.

Selecting the CO2 mode:

CO2 Mode The only time this setting will need to be changed is if the CPPM-1 will be used to reduce the CO2 level as required for mushroom cultivation. Pressing the **CO2 Mode** button will allow the CPPM-1 to be changed from Increase (for agricultural use) to decrease mode (for mushroom cultivation). Use the **Up** or **Down** buttons to change the display to the desired mode. Press **Enter** to accept the change. [Factory setpoint increase](#)

Calibrating the CPPM-1

CO2 Calibrate Even though the CPPM-1 has been designed for many years of trouble-free operation, occasional the need arises to re-calibrate the CO2 sensor. Calibrating the unit will restore the sensor's ability to accurately measure the CO2 levels.

NOTE: Recalibration of the CO2 sensor must be completed away from all animals and people OUTDOORS! Follow the procedure exactly.

The CO2 sensor has a lifetime of over 10 years. However, over the life of the sensor, dust and other contaminants can accumulate on the inner optical surfaces of the sensor cell itself. To adjust for the contamination, the calibration feature is provided. If the unit appears to not be measuring the CO2 levels correctly or if the unit has been dropped or jarred severely, you should recalibrate the unit.

NOTE: Annual calibration is HIGHLY recommended.

- 1) Locate an area outdoors away from people, animals and high traffic areas. The unit must be shaded and NOT placed in direct sunlight.
- 2) Plug in the unit in and allow the unit to warm up for approximately 30 minutes. **Note:** Waiting longer (1+ hours) provides more accurate calibration.
- 3) Try not to exhale or breath on the unit while activating the calibration function. Once activated, leave the unit alone for at least 10 minutes.
- 4) To activate the automatic calibration sequence, press the **CO2 Calibrate** button. will display the "new" ambient CO2 level **_380_PP**. If the unit will be calibrated in an area of high vehicular traffic, or near people, a slightly higher calibration point should be selected.
- 5) The calibration level can be changed by using the **UP** and **Down** buttons. If you live in a highly populated city, you may increase the calibration level to 400-475 PPM.
- 6) Pressing **Enter / Reset** will start the calibration process. The display will read **Co2_CAL** and a small green LED will be flashing. LEAVE THE UNIT ALONE! The process takes about 2-6 minutes. When complete, the display returns to normal operation.
- 7) The CO2 sensor calibration can be repeated as often as necessary

Temperature controllers (continued)



Optional
12 VDC CO2
disable jack

The CO2 Disable function is an optional feature which allows the user to connect the supplied low-voltage 12 volt DC power supply to the CPPM-1. The power supply (shown below) is plugged into a device like the EVC-2 Temperature receptacle. When the Temperature receptacle on the EVC-2 is turned ON, the 12-vdc power supply connected to the side of the CPPM-1 will disable the CO2 receptacle on the CPPM-1 while the temperature control device is activated reducing the amount of CO2 being used.

12 volt DC
power supply



NOTE: If you are using a CO2 generator, you may want to choose to disable the CO2 generator while the air conditioner is operating to reduce the amount of heat it needs to remove. Connecting the 12 volt power supply to the temperature controller that is controlling your air conditioner will disable CO2 when the air conditioner is operating.

Selecting photocell operation:

Photocell Pressing the Photocell button will allow you to select when you want to have the CO2 control activated. For most agricultural uses, supplemental CO2 is only used during the day. You can however select to have the CO2 control active during the day, night or 24-hours continuously. When the **Photocell** button is pressed, you can select either **dAY**, **nIgHt** or **24-Hour** mode. Use the **Up** or **Down** buttons to change the display to the desired mode. Press **Enter** to accept the change.
[Factory setpoint day](#)

Selecting Fuzzy-logic CO2 mode:

CO2 Fuzzy On-Off Pressing the **CO2 Fuzzy On-Off** button will allow you to select generator mode **gEnErAt** for CO2 generators or Fuzzy Logic mode **LogIcoN** when using compressed CO2. Use the **Up** or **Down** buttons to change the display to the desired mode. Press **Enter** to accept the change. [Factory setpoint Generator](#)
(See CO2 control modes section for more information)

Connecting to temperature controllers

For some situations, it is best to coordinate the Temperature control and CO2 control functions. This is done to eliminate an exhaust fan and the CO2 device inside the growing area from operating at the same time.

The temperature control should almost ALWAYS over-ride the CO2 control. If the functions are not coordinated, the exhaust fan can pull the compressed CO2 out of the growing area as fast as it is being released which is very wasteful and expensive.

NOTE: There are exceptions to this rule. However, if you are operating compressed CO2, it is important to disable the CO2 while the ventilation fan is operating, because of the high cost of compressed CO2.

Some users may choose to interface an additional temperature controlling device to the CPPM-1. For instance, the EVC-2 which has separate Day and Night temperature setpoints. Connecting the EVC-2 to the CPPM-1 gives you Day / Night temperature control with coordinated CO2 use during the day.