

Install the monitor indoors in a location representing an even air mix from plant zone atmosphere. Do not locate near heaters, drafts or CO2 producing equipment. Avoid locations where sensor may be vulnerable to impacts, vibrations or water. Breathing near the sensor will cause high CO2 readings. Mount the Sequence Controller in a convenient, dry location near a 120V power outlet. All valuable electrical equipment should be plugged into a surge protection device. Approved for indoor use only. For information about advanced settings and features of this product, or using this sensor with a device other than the CDDS-2 controller, or for complete instructions manual please refer to www.greenair.com/cdmc.htm

Features

This carbon dioxide monitor controller model CDMC-7 package includes the CDM-7001 monitor with LCD display and a CDDS-2 digital sequencer with event programmer and photo sensor. The monitor samples atmosphere once each second and displays current CO2 values in parts per million (ppm) on its display screen, while transmitting linear millivolt signals to the Digital Event Sequencer logic translating circuits. The sequencer then interprets these signals and functions the CO2 equipment outlet according to predetermined values. The built in photo sensor automatically defeats the CO2 equipment outlet during darkness periods.

Description

This booklet will discuss the features and functions of the Green Air Products Infrared Carbon Dioxide Monitor and Digital Event Sequencer system. This system is designed to detect atmospheric CO2 levels and function CO2 producing equipment according to user programmable set points. It employs the most advanced detection providing precise, accurate and dependable performance.

Introduction

Installation and Operation Manual CDMC-7



Carbon Dioxide Monitor Controller

The CDDS-2 Carbon Dioxide Digital Sequencer features Overshoot Protection Logic programming which will automatically maintain the proper dosing parameters necessary to keep any size area enriched within a set tolerance regardless of the particular characteristics of the enclosure. If on the initial cycle the controller senses that excess CO2 has been administered it will automatically compensate for the next dosage. This will assure that the proper levels are constant and maintained at all times with complete accuracy.

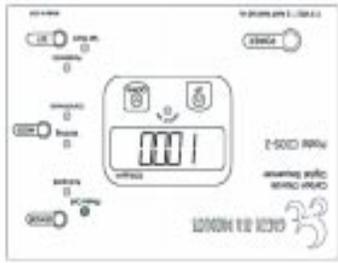
CO2 level. The MODE button switches between CO2 enrichment or CO2 venting functions. *Enrichment* is the normal mode for CO2 enrichment operations. *Venting* mode is for purposes of removing excessive levels of CO2. This is used primarily for mushroom cultivation or HVAC control where CO2 is to be removed from the area.

The SET button allows you to choose an enrichment level *setpoint* and *hysteresis* value. The hysteresis is the value between "On" and "Off" functions. This value determines at what point the CO2 equipment will turn "Off". In the example below a 50 ppm hysteresis setting will turn CO2 "Off" at 1050 ppm. Example : Set point = 1000 ppm Hysteresis = 50

In the example if the CO2 level falls below the setpoint (1000 ppm) the CO2 equipment outlet will come "On" and enrichment will continue until a level of 1050 is reached and then it will shut off.

To make setpoint adjustments press SET and the LED will flash the current setpoint value. Press the UP or DOWN buttons to achieve any desired value. Press SET again to enter your hysteresis. The system will return to operation mode automatically after five seconds and continuously display the current CO2 level.

The SENSOR button toggles between photo sensor "on" and "off" modes. If the *activated* LED is lit the controller will operate only when light is present. This is the normal setting for CO2 enrichment. This mode will defeat enrichment during darkness periods. When the *activated* LED is off, the controller will operate continuously regardless of the photoperiod.



Feature Identification

Specifications for CO2 Monitor

Method - Dual Beam Absorption Infrared
Sample Method - Diffusion or flow through (50 - 100 ml/min)
Warranty - 18 months parts and labor

Performance of CO2 Channel

Measurement Range - 0-4,000 ppm output (0-10,000 ppm display)
Sensitivity - ± 1 ppm
Accuracy - ± 50 ppm or $\pm 5\%$ of reading
Repeatability - ± 20 ppm
Temperature Dependence - $\pm 0.1\%$ of reading per $^{\circ}\text{C}$ or ± 2 ppm per $^{\circ}\text{C}$, @ 25°C
Pressure Dependence - 0.13% of reading per mm Hg
Annual Drift - ± 20 ppm typical
Response Time - <60 seconds for 90% of step change
Warm-Up Time - <60 seconds at 22°C
Operating Conditions - 32 to 122°F (0 to 50°C) 0-95% RH, non-condensing
Storage Temperatures - (-40 to 140°F or -40 to 60°C)
Calibration Interval - 12 months, full factory calibration available

Temperature Channel

Voltage output - (32 to 104°F or 0 to 40°C)
Display - (32 to 122°F or 0 to 50°C)
Display Resolution - (0.1°F or 0.1°C)
Display Options - $^{\circ}\text{F}$, $^{\circ}\text{C}$, or Off. Set with panel button.
Accuracy - $\pm 2^{\circ}\text{F}$ or $\pm 1^{\circ}\text{C}$
Response Time - 20-30 minutes (case must equilibrate with environment)
Calibration Interval - 12 months, full factory calibration available

Output - Analog

CO2 - 0 to 4 VDC, 1mV/ppm (4,000 ppm max)
Temperature - 0 to 4 VDC linear, 32 - 104°F (0 - 40°C)
Output Impedance - 100 Ohms
Wiring Connection - Via RJ45 to (accessory cable 2070 or 2071)

Output - Digital

Wiring Connection - Via RJ45 to DB9 serial port cable
Display - LCD with independent CO2/ temperature readings

Power Supply

Battery Type - four AA batteries, not included
Battery Operation - 48 hours (alkaline)
External - 6 VDC from external AC/DC adapter included
Power Requirements - 400 mA Peak, 20 mA average from 6V
Certification - FCC Class 15 Part B

Accessories

2070 Datalogging cable for analog output
2071 Datalogging cable Recordaire
2075 Calibration kit
1058 Recordaire data logger, 4-channel
105BGSW VG Graphing software

All specifications and instructions subject to change without notice. Protected by United States Patents - 5,060,508 and 5,163,332.

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Features

- Lightweight** - Made of ABS plastic.
- Display** - CO2 and Temperature and adjustments to mode settings.
- Soft Touch** - Attractive, gives comfort and durability.
- Up/Down Button** - Used to increase or decrease values while in the edit mode.
- Mode Button** - Toggles between menu options.
- Power** - Turns the power on and off.
- Enter** - Enter button will select desired menu option for editing (e.g. Altitude settings). After changes have been made, the Enter key will also confirm settings and return to the main menu.
- Calibration Port** - Gas connection for calibration.
- Calibration Activation Switch** - Located in the battery compartment, used to activate the calibration process for CO2 or Temperature.
- Voltage Output** - The sensor is equipped with an output for data logging. (see accessories).
- Built-in Kickstand** - Supports in upright position.
- Power Connection** - For 6V power adapter.
- Batteries** - 4 AA Batteries for portable operation.
- Battery Cover**

Display

Modes of operation visible on the display and accessible through the on-board buttons.

- Warm-Up Mode** - One minute warm-up indicated by the word WARM-UP in the upper left corner.
- Normal Operating Mode** - After warm-up the sensor will stabilize and display current conditions.
- Elevation Settings Mode** - This feature allows the user to correct the monitor for elevation changes.
- Calibration Settings Mode** - Set the CO2 concentration or temperature when calibrating.
- Calibration in Prog Mode** - Displays when calibration is in progress.
- Low Battery** - Displays when the power source is low.

Start - Up

- Battery Operation** - For portable use, the monitor operates on 4 AA batteries. Normal (Non-Alkaline) up to 50 hrs - Alkaline up to 70 hrs - Rechargeable up to 60 hrs.
- Battery Installation** - Remove the battery cover (located on the back) by pressing the pressure clip (located on the bottom near the kickstand) and pull upward. Follow the battery diagram imprinted on the plastic on the back cover for proper installation.
- Low Battery** - Depending on the battery a warning signal will flash (indicated by the blinking Low Battery LCD) when there is less than 30 minutes of battery life. At this point the batteries should be replaced or the AC adapter should be used as a substitute. If operation continues, the unit will become inoperable and only the Low Battery will be blink on the LCD display.
- AC Power** - The sensor is shipped with a 6V DC 500mA AC/DC adapter. To use the AC adapter, connect the plug into the back of the unit and plug the transformer into any standard wall outlet.
- NOTE:** Use the supplied adapter. Using the wrong adapter may cause damage to the unit. If power is lost during operation, battery operation will not function as a back up.

Model 7001



Portable Infrared Carbon Dioxide Monitor

CO2 Monitor Operation

Power-Up

- Press the Power button. A two second delay will occur before the display becomes visible. A 10 second delay before current CO2 readings are displayed. "Warm-up" will display for one minute.
- Elevation Correction** - Factory elevation is set at "zero" (sea level). For altitudes greater than 500 feet, adjustment will assure sensor accuracy. For elevation correction follow the steps below.
 - While in Normal Mode press the "Mode" button once. The LCD will begin blinking. Press Enter.
 - Press mode to toggle the elevation reading between feet (ft) and meters (m).
 - Use the Up/Down button to adjust the altitude. The altitude can be adjusted in increments of 500 (feet) or 100 (meters). Once the correct altitude is set, press Enter to lock the setting.
- Display in Fahrenheit or Celsius** - To change the temperature to read in Celsius or Fahrenheit, or to turn the temperature display off, use the Up or the Down button.
- Stand-alone Monitoring** - Once the batteries have been installed the sensor will begin to accurately display current room conditions.
- Monitoring using an External Data Logger** - Voltage outputs for both CO2 and temperature are available via an RJ-45 jack on the rear of the unit.

CO2 Calibration

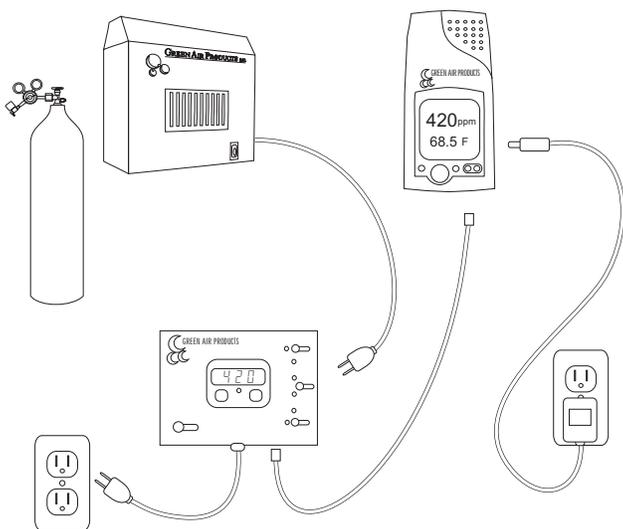
- The calibration procedure will last approximately 5 minutes. First remove the battery cover to provide access to the CO2 calibration activation switch. Connect the supplied AC adapter to the back of the sensor. If you do not have the AC adapter, new batteries should be used.
- Power up the sensor and wait for the Warm-up to end.
- Next, verify the Elevation correction has been set. Refer to Elevation Correction for procedure.
- Press the Mode button twice. The Calibration mode will begin blinking. Press Enter.
- Use the Up/Down Rocker button to adjust the lower reading on the display to the current ambient conditions. Pressing the button once will change the readings in increments of 10 ppm.
- Next, on the backside of the unit locate the push button switch (under the battery cover, in the small round hole to the right of the connector jack), use a small pointed object to depress and hold the switch for 5 seconds. The Calibration light will begin to blink. Press Enter.
- Calibration In Progress will blink. The unit will program itself based on the CO2 value that was input in Step 6. The calibration process will take about 5 minutes. When Calibration is complete, the display will return to the steady Calibration mode. Press Enter to return to normal operation mode.

Temperature Calibration

- Use this procedure to adjust the temperature output when, for example, you wish to have the temperature output match a reference sensor. The accuracy of a field adjustment is dependent upon the stability of the environment in which the procedure is performed, and upon the accuracy of the reference sensor.

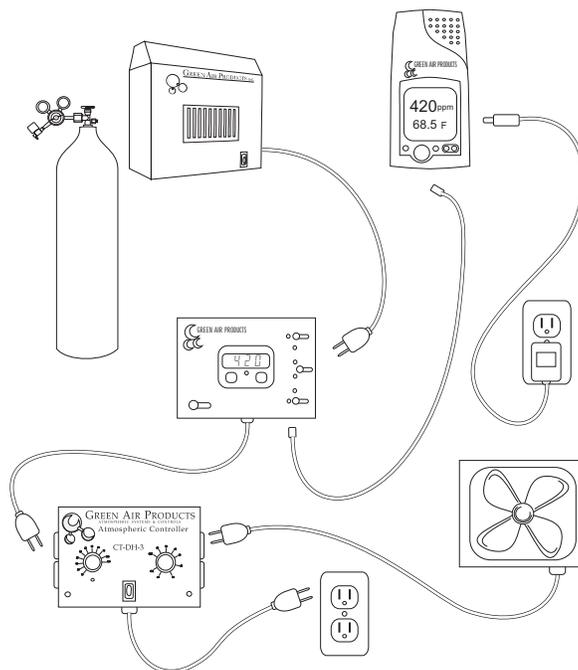
 - Before performing the temperature adjustment, connect the supplied AC adapter to the back of the sensor. If you do not have the AC adapter, new batteries should be used.
 - Power up the sensor and, using the kickstand, place it on a flat surface in a stable environment relatively free of drafts or temperature changes. Wait 30 minutes for the unit to fully equilibrate with the environment. Do not hold the unit in your hand during this period.
 - Press the Mode button three times. The word "TEMPERATURE" at the bottom of the display will begin blinking.
 - Press Enter. Both the word "TEMPERATURE" and the numeric temperature display will begin blinking in unison.
 - Use the Up/Down Rocker button to adjust the temperature reading to match the reference.
 - Press Enter. The temperature offset is immediately adjusted, the blinking stops, and the unit is now in normal operation mode.

Basic Hook Up Procedure



- Plug the CDDDS-2 sequencers power cord into a 120 volt outlet.
- Plug the CO2 monitors transformer into a 120 volt outlet.
- Insert the transformer plug into the monitors power input jack.
- Connect the patch cord between the monitor and the sequencer.
- Turn the model 7001 monitor and the CDDDS-2 sequencer "on". Allow both units a 2 to 3 minute warm up period.
- Plug CO2 producing equipment into the outlet located on the underside of the CDDDS-2 sequencer. The system is now ready to operate.
- Set monitor and controller according to programming instructions.

Exhaust Synchronized Operation



The CDMC-7 system can be combined with the Green Air Products CT-DH-3 temperature and humidity controller to defeat CO2 production during exhaust functions. Plug power cord from CDDDS-2 sequencer into the left hand equipment outlet on the CT-DH-3 and power to the sequencer will be interrupted when ever temperature or humidity conditions constitute an exhaust function. CO2 production will resume immediately after exhaust cycle is completed.