

Operating and Installation Instructions

Carbon Dioxide Monitor Controller System

CDMC-6



includes set-up, resetting and calibration procedures for

CDDDS-2

Carbon Dioxide Digital Sequencer
&

CDM-6000

Carbon Dioxide Microprocessor
(Infrared CO2 Sensor)

Bringing You the Elements for Success for Over 20 Years

CDMC-6 (CDDDS-2 & CDM-6000)

PLEASE READ THIS MESSAGE FIRST

The CDMC-6 system is designed to sample the air and learn the characteristics of your space, then make adjustments as necessary to ensure a constant level of CO2. Therefore after installation or resetting, **PLEASE ALLOW 24 HOURS** for the system to adjust to the parameters of the space in which the CO2 concentration will be controlled.

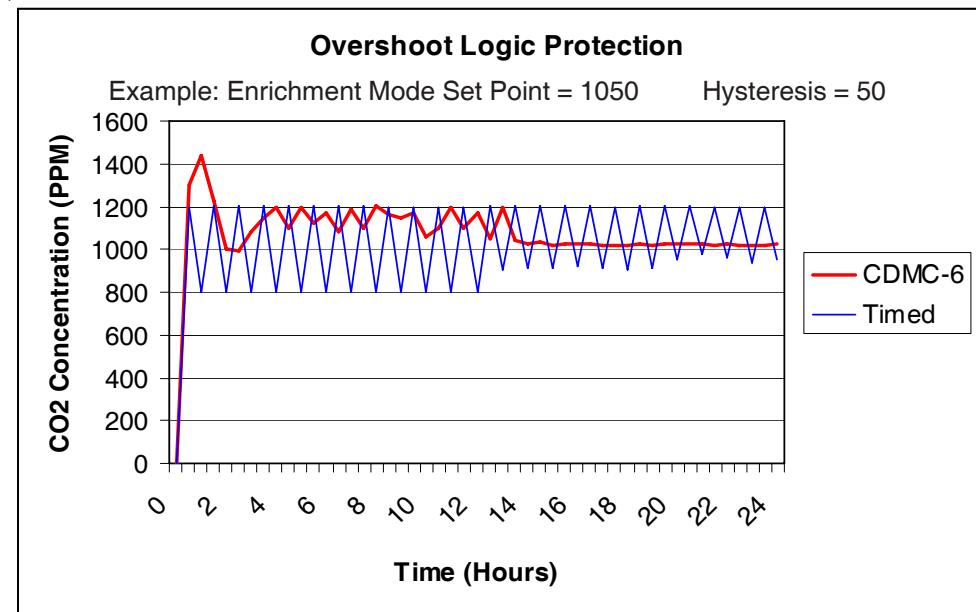
HOW THE CDMC-6 SYSTEM WORKS

The CDM-6000 samples the air, then sends the sample data to the CDDDS-2. The CDDDS-2 then activates or deactivates your CO2 enrichment or CO2 venting (exhaust) equipment as necessary to maintain the desired CO2 PPM. For best results, turn off all exhaust functions and close all doors and windows during the initial 24-hour adjustment period. You must allow this 24-hour adjustment period, every time you relocate the system to a new space. After 24 hours, you can restart your exhaust functions and continue as normal.

OVERSHOOT PROTECTION LOGIC

In enrichment mode, the CDDDS-2 employs a sophisticated adaptive algorithm "Overshoot Protection Logic" which learns the dynamics of the space being controlled. This allows the system to avoid dramatic overshoots inherent to set point controllers or timed CO2 enrichment. These learned parameters are stored in memory, even when the 'POWER' is off, until you reset the CDDDS-2 (see page 6 for CDDDS-2 RESETTING INSTRUCTIONS).

The graph below demonstrates the average variance in CO2 concentrations when using the CDMC-6 system with "Overshoot Logic Protections" verses timed CO2 enrichment.



USE IN AN INDOOR GARDEN SPACE

The light emitted from the LCD and LED indicator lights is not enough nor is it in the appropriate spectrum to affect plant growth. You do **not** need to cover these light sources.

CDMC-6 DIAGRAM

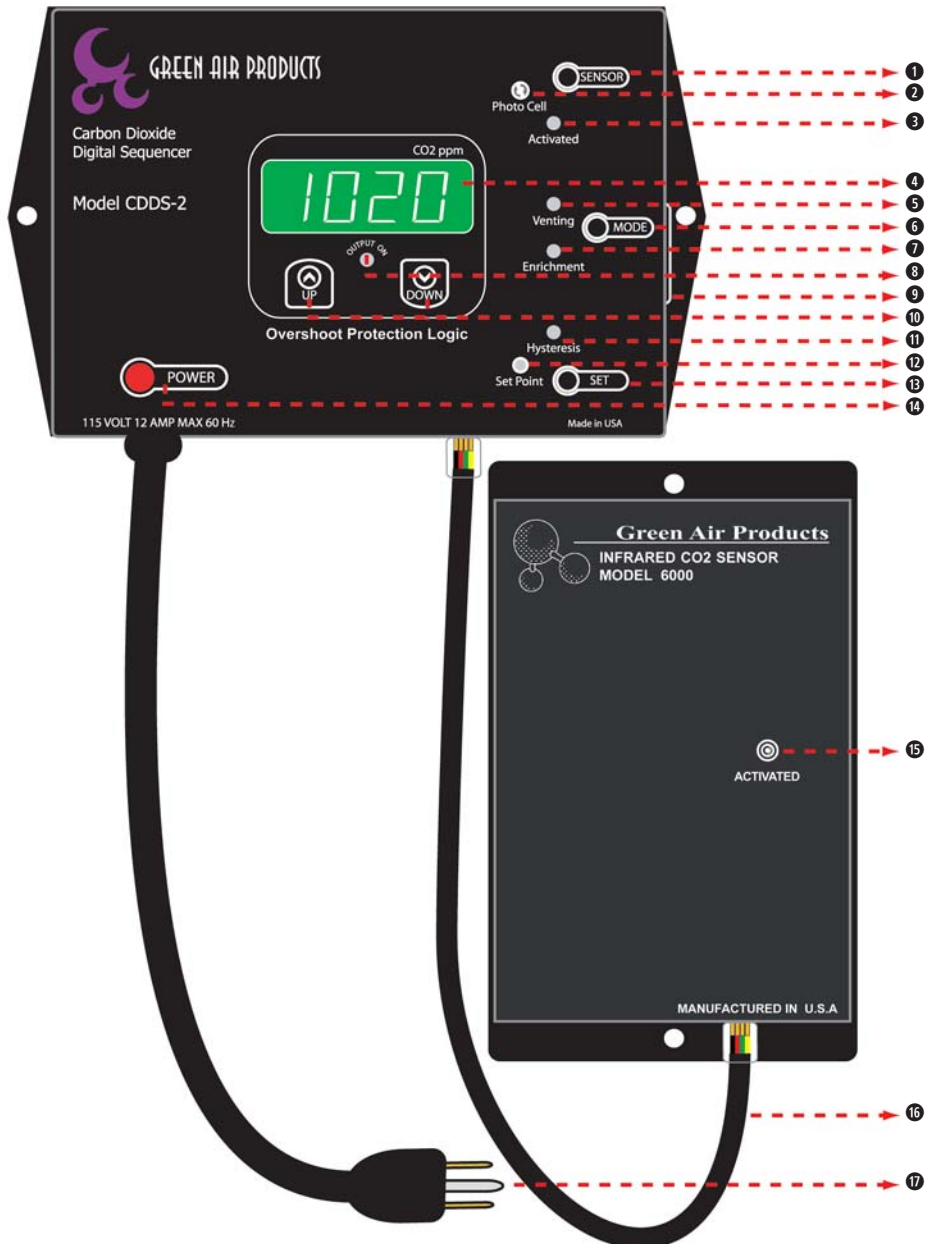


DIAGRAM IDENTIFICATIONS & DEFINITIONS

- ❶ **'SENSOR' Button** - Use this button to activate and deactivate the photo cell sensor ❷.
- ❷ **'Photo Cell'** - When activated, the photo cell sensor deactivates the CDMC-6 system and CO₂ production during periods of darkness. Do not allow any object to cast a shadow on the photo cell as this will impede its function.
- ❸ **'Activated' Indicator Light** - When lit, the photo cell sensor ❷ is active and the system will not operate during periods of darkness.
- ❹ **Liquid Crystal Display (LCD)** - Indicates the PPM concentration of CO₂ in your controlled space.
- ❺ **'Venting' Mode Indicator Light** - When lit, the system is in 'Venting' mode.
DEFINITION: 'Venting' mode is used to **decrease** the concentration of CO₂ in your space (example: mushroom cultivation, meeting and class rooms). When CO₂ concentration rises above 'Set Point' value, the system will activate exhaust equipment plugged into right side outlet ❹. **Do not attempt to run CO₂ enrichment equipment when the CDDS-2 is in the 'Venting' mode.**
- ❻ **'MODE' Button** - Use this button to switch between 'Venting' and 'Enrichment' mode.
- ❼ **'Enrichment' Mode Indicator Light** - When lit, the system is in 'Enrichment' mode.
DEFINITION: 'Enrichment' mode is used to **increase** the concentration of CO₂ in your space. When CO₂ concentration falls below 'Set Point' value, the system will activate CO₂ enrichment equipment plugged into right side outlet ❹. **Do not attempt to run exhaust equipment when the CDDS-2 is in the 'Enrichment' mode.**
- ❽ **'OUTPUT ON'** - When lit, the system is active and equipment has been activated.
- ❾ **Equipment Outlet** - Plug CO₂ enrichment equipment or exhaust fan into this outlet.
- ❿ **'UP' and 'DOWN' Buttons** - These two buttons are used to adjust the 'Set Point' and 'Hysteresis' values and the elevation.
- ⓫ **'Hysteresis' Indicator Light** - When lit, CDDS-2 is ready to accept a new 'Hysteresis'.
DEFINITION: The **'Hysteresis'** is the value that determines the amount the CDDS-2 is allowed to **overshoot** (in enrichment) or **undershoot** (in venting) the 'Set Point'.
Example settings: 'Set Point' = 1000 PPM, 'Hysteresis' = 50 PPM
Venting: At these settings, CO₂ levels will be maintained between 950-1000 PPM.
Enrichment: At these settings, CO₂ will be maintained between 1000-1050 PPM.
- ⓬ **'Set Point' Indicator Light** - When lit, CDDS-2 is ready to accept a new 'Set Point'.
DEFINITION: The **'Set Point'** is the PPM concentration of CO₂ you want to maintain.
- ⓭ **'SET' Button** - Press this button once to display current 'Set Point' value and press twice to display current 'Hysteresis' value.
- ⓮ **'POWER' Button** - Use this button to turn the system "ON" and "OFF".
- ⓯ **'ACTIVATED' Indicator Light** - This green LED light on the CDM-6000 should blink continuously when power is applied, indicating that the unit is functioning properly. If LED stops blinking or shuts off completely, follow the 'CDM-6000 Calibration Procedures' on page 7.
- ⓰ **Patch Cord** - Use this 20-ft patch cord to connect the CDDS-2 to the CDM-6000.
- ⓱ **Power Cord and Plug** - To power the system, plug this cord into a surge protector that is plugged into a wall outlet, or plug into an atmospheric controller.

LOCATING YOUR CDMC-6 SYSTEM

- For best results, mount the CDMC-6 system in the **middle** of your space or room, or on a wall or support structure **opposite** CO₂ enrichment equipment. Do not locate system in the immediate vicinity of CO₂ equipment.
- Protect system from foliar sprays and irrigation moisture. Corrosion resulting from these activities may void warranty.
- Ensure proper air circulation throughout the space.

SET-UP INSTRUCTIONS

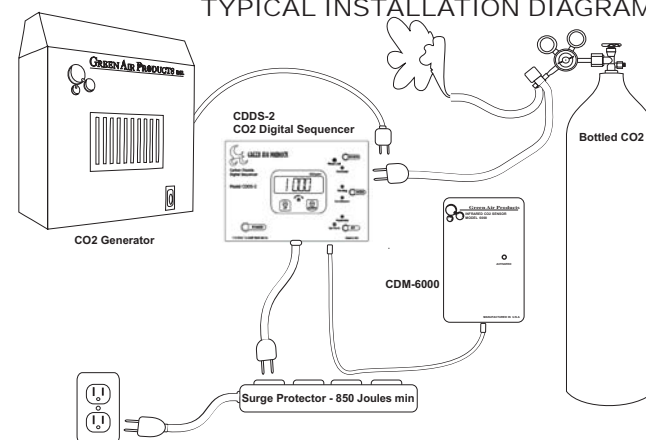
1. Plug the CDDS-2 into a surge protector (850 joules min) and plug the surge protector into a wall socket.
(OR, plug the CDDS-2 into an atmospheric controller with CO₂ override. The atmospheric controller should be plugged into a surge protector and the surge protector plugged into the wall).
2. Turn the unit on (push red 'POWER' button).
3. Press the 'SET' button once to select the 'Set Point' mode ('Set Point' indicator light should now be lit).
4. Using the 'UP' and 'DOWN' buttons, set desired 'Set Point' (CO₂ PPM you want to maintain in your space).
5. Press the 'SET' button again to select the 'Hysteresis' mode ('Hysteresis indicator light should now be lit).
6. Using the 'UP' and 'DOWN' buttons, set desired 'Hysteresis' (50-200 recommended).
7. Press and hold the 'SET' and 'SENSOR' buttons for 5 seconds until all of yellow indicator lights blink and the current elevation flashes on the LED display.
8. Using the 'UP' and 'DOWN' buttons, set the 'Elevation' of your town or region.
9. Using the patch cord provided, connect the CDM-6000 to the CDDS-2.
10. Choose your mode of operation ('Venting' or 'Enrichment') by pressing and holding down the 'MODE' button on the CDDS-2 until the indicator light for that mode is lit.
11. Plug CO₂ or exhaust equipment into the right side of the CDDS-2.
12. Allow 12-24 hours for the system to adjust to conditions and size of the environment. Shut off or minimize ventilation during adjustment period. Return ventilation to normal after the 24-hour period.

YOU MUST ALLOW YOUR CDMC-6 SYSTEM A MINIMUM OF 12 HOURS (24 IS BEST) TO LEARN THE SPACE AND ENSURE PEAK PERFORMANCE

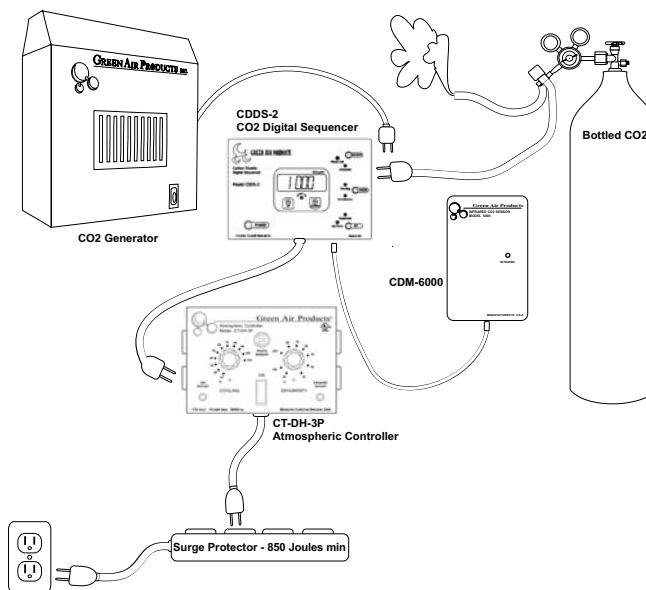
SAFETY INSTRUCTIONS

- Mount the systems on a wall or support structure.
- Do not operate system when wet and keep out of direct sprays from foliar applications and irrigation moisture. Do not allow the CDM-6000 sensor to get wet.
- System is not intended for outdoor use.
- If using an extension power cable (extension cord), do not exceed 25 feet in length, and ensure that the total amperage rating of the equipment plugged in to the extension cable does not exceed the amperage rating of the cable or controller.
- Follow all set-up and re-setting instructions and calibration procedures explicitly to avoid safety hazards and protect you and your equipment.
- Do not insert objects into the vents on the sides of the CDM-6000. Doing so could short out the interior components and create a safety hazard. This will void the warranty.

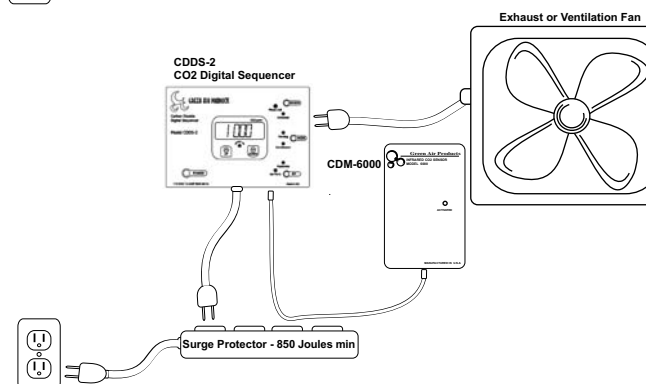
TYPICAL INSTALLATION DIAGRAMS



CDMC-6 in Enrichment Mode
Use with a CO₂ generator
or bottled CO₂



CDMC-6 in Enrichment Mode
Use with a CO₂ generator
and an Atmospheric Controller with
CO₂ override



CDMC-6 in Ventilation Mode
Use with an exhaust
or ventilation fan

WHEN SHOULD YOU RESET YOUR CDDS-2?

- ☞ When you move the unit into a different environment or room
- ☞ When you experience a power failure or power surge problems
- ☞ When you suspect that the readings are incorrect
- ☞ When you suspect that the unit is out of calibration
- ☞ When you think that the unit is just not working correctly

CDDS-2 RESETTING INSTRUCTIONS

1. Press the 'SET' button once to select the 'Set Point' mode ('Set Point' indicator light should now be lit).
2. Using the 'DOWN' button, lower the 'Set Point' to lowest setting (300).
3. Press the 'SET' button twice to select the 'Hysteresis' mode ('Hysteresis indicator light should now be lit).
4. Using the 'DOWN' button, lower the 'Hysteresis' to lowest setting (10).
5. Press and hold the 'SET' and 'SENSOR' buttons for 5 seconds until all of yellow indicator lights blink and the current elevation flashes on the LED display.
6. Using the 'DOWN' button, lower the 'Elevation' to lowest setting (0).
7. Turn the CDDS-2 off (push red 'POWER' button).
8. Unplug the unit, wait 10 seconds ... then plug it back into the surge protector and turn it back on.
(OR, plug the CDDS-2 into an atmospheric controller with CO₂ override. The atmospheric controller should be plugged into a surge protector and the surge protector plugged into the wall).
9. Set your 'Set Point', 'Hysteresis' and 'Elevation' as directed in 3-8 above, except now use the 'UP' button to program desired settings.
10. Using the patch cord provided, connect the CDM-6000 to the CDDS-2.
11. Choose your mode of operation ('Venting' or 'Enrichment') by pressing and holding down the 'MODE' button on the CDDS-2 until the indicator light for that mode is lit.
12. Plug your CO₂ or exhaust equipment into the right side of the CDDS-2.
13. Allow 12-24 hours (one Day Night cycle) for the system to adjust to conditions and size of the environment.

Except as directed above, do not attempt to service the CDDS-2 yourself. Do not break the housing seal on the CDDS-2. Doing so will void the warranty.



CDM-6000 CALIBRATION PROCEDURE

A quick calibration verification can be done by supplying the CDM-6000 with outside air and letting the reading stabilize. CO₂ concentrations in outside air are typically between 350 and 450 PPM. To adjust the calibration, follow the procedure below. **Avoid breathing on the sensor during calibration.**

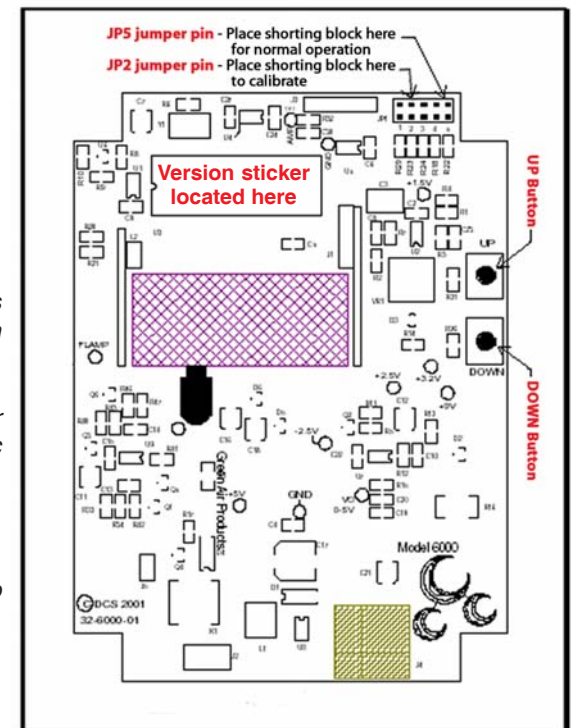
1. Unplug the patch cord (RJ-14 phone cord) from the bottom of the CDM-6000.
2. Remove the front cover of the unit. Locate the black adjustment buttons and the JP jumper pins (see diagram below). The jumper-shortening block should be parked on the two JP5 pins.
3. Plug the CDM-6000 back into the CDDS-2 using the patch cord; allow two minutes for the reading to stabilize.
4. Pull the shorting block from the JP5 pins and move it to the two JP2 pins.
5. Locate the version sticker on the chip in the upper left hand corner of the board.
If the sticker displays "V600AL", the "ACTIVATED" LED light on the CDM-6000 should be **solid** green (Please contact Green Air Products if the light is not lit at all).
If the version sticker displays "V001L", the "ACTIVATED" LED should be **blinking** in calibration mode (Please contact Green Air Products if the light is not lit at all).
6. Now check the reading on the CDDS-2 LED screen. The reading should be between 350-450. If not, use the 'UP' and 'DOWN' buttons (see diagram below) to adjust the reading. **Do not hold down the 'UP' or 'DOWN' buttons.** Press either button, then allow it to scale before pressing again as there is a slight delay (scale moves about 10 PPM with each press).
7. When the proper value is set, remove the shorting block from the JP2 pins, and place it back on the two JP5 pins.
The green 'ACTIVATED' light on the CDM-6000 will now blink.
This process will save the new PPM value and reset the unit.
8. Wait 2-5 minutes to ensure adjustments are within 350-450 range before re-installing the cover.

A more accurate calibration requires the use of calibration gas of known concentration.

Calibration kits are available at your local indoor gardening or hydroponic retail store.

OR

Contact Green Air Products to arrange a factory calibration.



Parts List

1 CDDS-2 and/or
 1 CDM-6000
 Wall Mount Kit (2 #6x1" Pan Phillips-head Tapping Screws and 2 E-Z Anchor Dry-wall Mounts)
 1 20-foot patch cord
 1 Operating and Installation Instructions

Specifications

<u>CDMC-6</u>	
Shipping Weight	5 Lbs (2.3 Kg)
<u>CDDS-2</u>	
Warm-up/Adjustment Time	24 Hours
Response Time	1 Minute (after initial warm-up)
Operating Voltage	100-130 VAC
Operating Frequency	50-60 Hz
Switching Capacity	12 Amps Max
CO2 Control Range	300-5000 PPM
CO2 Reading Range	0-5000 PPM
Accuracy	±5% or ±75 PPM
Repeatability	±20 PPM
Typical Drift per Year	±75 PPM
Calibration Interval	1 year
CO2 Enrichment Algorithm	Adaptive fuzzy logic
CO2 Venting Algorithm	Set point w/adjustable hysteresis
Operating Temperature	10 to 120°F (0 to 50°C)
Operating Humidity	0 to 90% RH (non-condensing environment)
Storage Temperature	0 to 120°F (-18 to 50°C)
Digital Display	4 Digit, 2¼"W x 13/16"H, LCD
Mode/Operation Indicator Lights	Green LED
Housing Material	Black ABS plastic
Housing Flammability	UL94 /V0
Housing Dimensions (WxHxD)	7" x 5" x 2-11/16"
Weight	2 Lbs (1 Kg)
<u>CDM-6000</u>	
Warm-up/Adjustment Time	24 Hours
Sensor Response Time	Less than 1 Minute (after initial warm-up)
Gas Sampling Method	Diffusion
Operating Principle	Non-dispersive infrared (NDIR)
Measurement Range	0-5000 PPM CO2
Typical Drift per Year	±75 PPM
Accuracy	±5% or ±75 PPM
Repeatability	±20 PPM
Operating Temperature	10 to 120°F (0 to 50°C)
Operating Humidity	0 to 90% RH (non-condensing environment)
Storage Temperature	0 to 120°F (-18 to 50°C)
Voltage Output	0-5 Volts DC (1 mV=1PPM)
Power Requirements	18 to 30 VDC
Power Consumption	2 Watts @ 24 VAC
Calibration Verification Time	10 Minutes
Housing Material	Black, anodized aluminum
Housing Dimensions (WxHxD)	4" x 5-7/8" x 2¼"
Weight	1 Lbs (0.5Kg)

One Year Limited Warranty

Green Air Products, Inc. guarantees that this equipment will perform as implied for the purpose it is intended. Green Air Products warrants the original purchaser of this equipment against defects in mechanical parts and workmanship for one (1) year and electrical parts for 90 days. At our option we will repair or replace defective equipment. Warranty service is only performed at the factory or authorized service center. Any usage contrary to specified application or alterations of original construction will void warranty obligations. For further warranty information contact your dealer or Green Air Products service department.