

Evolution

Carbon Dioxide Controller

INSTRUCTION MANUAL



Carbon dioxide (CO₂) is a colorless, odorless gas that occurs naturally in our environment. It is normally present in the atmosphere at an average concentration of approximately 0.036% or 360 PPM.

Many growers fail to recognize the importance of Carbon Dioxide in their growroom.

Most plants grow faster and larger with enhanced CO₂ levels because of more efficient photosynthesis and a reduction in water loss. There are also many other benefits for plants, among them greater resistance to temperature extremes and other forms of stress, better growth at low light intensities, improved root/top ratios & less injury from air pollutants.

Photosynthesis is the term used to describe the process by which plants combine CO₂ molecules with water molecules to form complex sugars, there is a resultant spare oxygen atom which is released back into the air, the sugars being further processed by the plant to form natural polymers for growth. The ambient level of CO₂ in air is 300-400 PPM, fast growing plants in your growroom or glasshouse can use all the available CO₂ in less than an hour slowing photosynthesis and therefore growth to a virtual halt.

Your new Evolution controller utilizes the latest microprocessor and infrared technology to monitor & control the levels of carbon dioxide in your growing area.

The controller can operate with or without the optional Evolution Solid State NDIR Co₂ sensor, this controller can also be used with either bottled co₂ gas or with a propane or natural gas burning co₂ generator, in addition to this the Evolution controller can be interfaced to most external thermo / hygrometers for improved environmental control

It can be seen that the rate at which plants are able to grow is relative to the availability of photosynthesized complex sugars. Raising the ambient CO₂ level in your growroom causes more sugars to be produced allowing the plant to grow bigger and faster. The optimum level of CO₂ for plant growth is dependant upon many different factors such as Light levels , Temperature , Humidity and Nutrient availability. Plants grown with enhanced CO₂ can grow up to 40% faster thus shortening crop times and increasing yields. This is of course assuming no other limiting factors such as lack of available light etc.

It should be noted that there is generally no advantage to increasing CO₂ levels beyond 3000 PPM for most greenhouse plant species. It should also be noted that there is generally no advantage to raising CO₂ levels during dark hours.

Controller & Accessory's

The Evolution Co2 Controller

Your new Evolution controller utilizes the latest microprocessor and infrared technology to monitor & control the levels of carbon dioxide in your growing area. The controller can operate with or without the optional Co2 sensor, this controller can also be used with either bottled co2 gas or with a gas burning co2 generator, in addition to this the Evolution controller can be interfaced to most external thermo / hygrometers for improved environmental control



The Evolution NDIR Co2 Sensor

We designed this High Accuracy Low Cost Compact Infrared NDIR Carbon Dioxide Sensor for use with the Evolution Range of controllers, this is the way to near perfect control and better gas usage and efficiency. This Sensor can be purchased separately from the Evolution controller

Ask your retailer for further details of this product.



The Ecotechnics Carbon Dioxide Regulator

This is the perfect Bottled gas regulator for use with the Evolution Co2 Controller, we have this regulator produced for us in the UK from top quality components it has a fixed flow rate of 0.17 Liters per Min and is our standard horticultural regulator.

Ask your retailer for further details of this product.



The Evolution Temperature Controller

This is the perfect thermostat system to use with the Evolution Co2 Controller, it can control your extraction system via the Stat input of the Co2 controller and can also switch up to 3Kw of Heater load for those cold winter nights

Ask your retailer for further details of this product.



Controller Configuration Options

Basic Closed loop configuration with Co2 Analyzer

This is the second way to connect your controller; it requires a Power connection, a connection to the Co2 release system, a connection to the Evolution NDIR Co2 Analyzer and a connection to your Extraction system.

In this mode the controllers internal cycle timer will periodically turn the extraction system on and off for the programmed amounts of time, Primary dosing will occur when the extraction system is turned off & secondary or Top up dosing will occur after the programmed Dispersal time.

For further information on setup parameters please refer to the settings section of this user guide.

Open loop configuration with External Thermo/Hygro-Stat & No Co2 Analyzer

This is the Third way to connect your controller; it requires a Power connection, a connection to the Co2 release system, a connection to the Evolution NDIR Co2 Analyzer and a connection to your Extraction system.

In this mode the controllers internal cycle timer will periodically turn the extraction system on and off for the programmed amounts of time unless your external Thermo/Hygro-Stat initiates an extraction first, Primary dosing will occur when the extraction system is turned off & secondary or Top up dosing will occur as programmed.

For further information on setup parameters please refer to the settings section of this user guide.

Closed loop configuration with External Thermo/Hygro-Stat & Co2 Analyzer

This is the Third way to connect your controller; it requires a Power connection, a connection to the Co2 release system, a connection to the Evolution NDIR Co2 Analyzer and a connection to your Extraction system.

In this mode the controllers internal cycle timer will periodically turn the extraction system on and off for the programmed amounts of time unless your external Thermo/Hygro-Stat initiates an extraction first, Primary dosing will occur when the extraction system is turned off & secondary or Top up dosing will occur as programmed.

For further information on setup parameters please refer to the settings section of this user guide.

Basic Open loop configuration with No Co2 Analyzer

This is the simplest way to connect your controller; it requires only a Power connection, a connection to the Co2 release system and a connection to your Extraction system.

In this mode the controllers internal cycle timer will periodically turn the extraction system on and off for the programmed amounts of time, Primary dosing will occur when the extraction system is turned off & secondary or Top up dosing will occur as programmed.

For further information on setup parameters please refer to the settings section of this user guide.

Controller Settings

Use the SET Button to scroll through the menu Items & the UP / DOWN Buttons to alter the setting



Set the volume of your growing area in cubic meters this can be calculated by multiplying the height by the width and then by the length the controller needs to know the room volume in order to calculate the dosing times for your required co2 level.



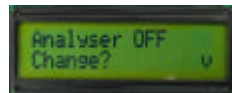
Set the level of Co2 that you require in your growing area in PPM , please note that the maximum level of co2 that a plant can process will be dependant on temperature , humidity and available light levels it should also be noted that the length of time that a co2 cylinder will last for is dependant on the target level of co2 that you set.



This controller can calculate the required dose times for bottled co2 or for a propane co2 generator , for bottled co2 gas you must set the flow rate of your gas regulator in Litres per minute and for na propane gas burner you should set the burner capacity in Kw/Hrs in order for the controller to calculate the correct dosing times



This controller can calculate the required dose times for bottled co2 or for a propane co2 generator , for bottled co2 gas you must set the flow rate of your gas regulator in Litres per minute and for na propane gas burner you should set the burner capacity in Kw/Hrs in order for the controller to calculate the correct dosing times



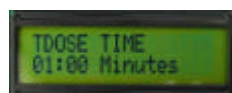
This controller can be used in conjunction with the Ecotechnics Evolution co2 analyser, use this setting to turn on or off the analyser.

Please note that it is important to have this set to off if you do not have the Evolution analyser plugged in.



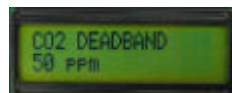
This setting is for the top up dose, the controller assumes that after it doses co2 into the growing area the level will gradually fall due to a number of reasons IE: co2 usage by plants , gas leakage like under doorways or through gaps etc , after the extractor fan turns off the controller makes a primary dose in order to achieve the level of co2 enrichment required by the user it will then wait for a period as specified by the user and make a small top up dose to allow for seepage / usage of gas this will be a percentage of the primary dose as per this setting. Top up dosing can be disabled by setting this option to zero %.

Please note this setting is only available if the controller does Not have the Evolution Analyzer connected



This setting specifies the amount of time after the primary dose that the small percentage Top up dose occurs.
Top up dosing can be disabled by setting this option to zero.

Please note this setting is only available if the controller does Not have the Evolution Analyzer connected



The controller will make a Co2 dose to the target level but will not re-dose until the level has fallen buy at least this amount , by reducing this setting you get better control and by increasing it you get better gas economy.

Please note this setting is only available if the controller Does have the Evolution Analyzer connected



This setting allows a period of time for the co2 gas to mix properly in the growing area and for the Co2 Sensor reading to stabilize. The setting should be increased for larger growing areas and decreased for smaller growing areas.

Please note this setting is only available if the controller Does have the Evolution Analyzer connected



This setting is for the internal fan cycle timer and it controls the amount of time between extraction cycles when using the internal fan cycle timer. If an external Thermostat / Hygrostat is connected then in the event of an externally induced extraction cycle the internal cycle timer will be reset.



This setting is for the duration of the Extraction cycle
IE: if the FAN CYCLE TIME IS SET TO 30 Min & the FAN DURATION IS SET TO 5 Min Then the fan will turn on for 5 Min's then off for 30 Min's repeatedly unless an externally induced extraction cycle is detected.



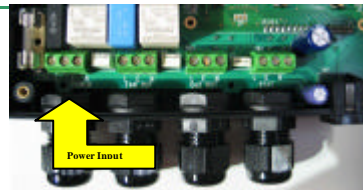
This setting will restore all controller settings to default parameters.
The list of default settings can be found in the specification sheet.

Note selecting yes will result in permanent loss of all user settings.

Controller Power Connections

Power Input

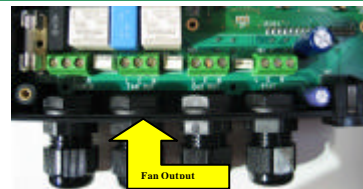
This is the main power connection for the controller



220/240 Volts AC
20 Watts Max

Fan Out

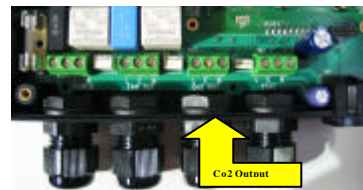
This is where your extractor system is connected, please note that if you run multiple fans then wire a suitable extension socket to this output then plug your fans into the extension.



220/240 Volts AC
2000 Watts Max

Co2 Out

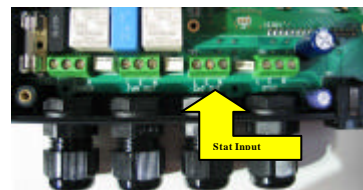
This is where you connect your co2 regulator or solenoid controlled gas burner
Please note this is a 220/240 v AC output
Please check solenoid coil voltage before connecting.



220/240 Volts AC
2000 Watts Max

Stat Input

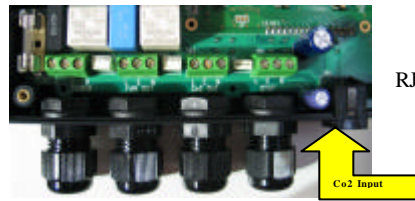
This input is for use with an external thermostat, connect the output of your thermostat to this input instead of to your fans then connect your fans to the fan out of the evolution Co2 controller.



220/240 Volts AC
2 Watts Max

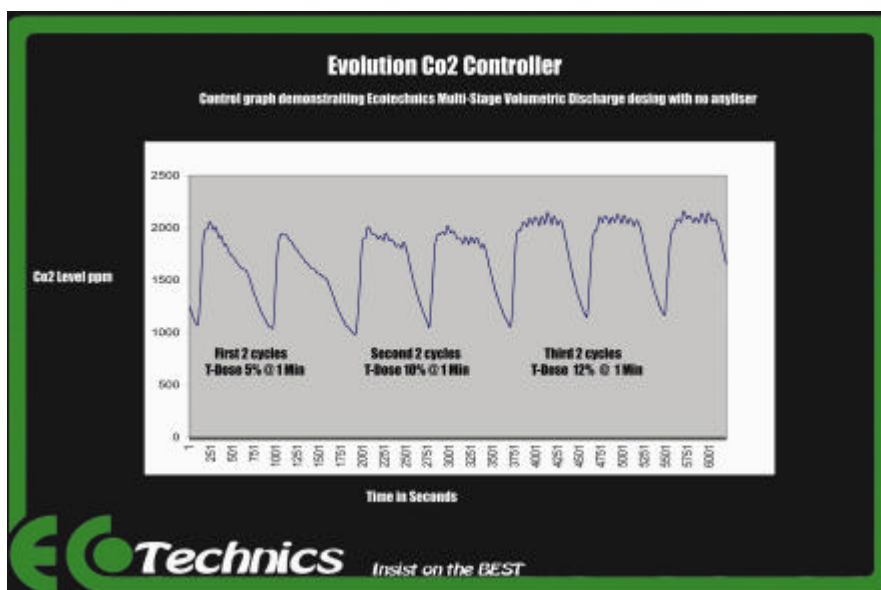
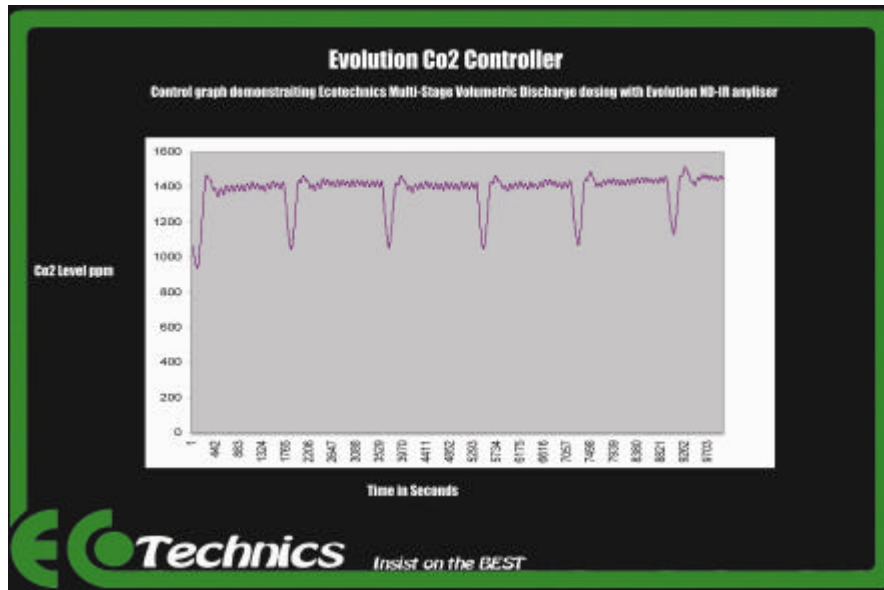
Co2 Input

This RJ 11 Socket is to plug the Evolution NDIR Carbon dioxide Sensor. Please note this controller can only be used with the Evolution NDIR Carbon dioxide Sensor.



12 Volts AC
RJ 11 Connector socket

Typical Performance Graphs



Specifications

<i>Settings</i>		
Controller Setting	Default Setting	Range
Room Vol	37 M3	1 - 999
Co2 Level ppm	1600ppm	600 - 3000ppm
Co2 Source	Co2 Cylinder	Co2 / Gas
Gas Flow Rate	0.17Lpm	0.01Lpm - 99Lpm
Burner Size	1.8 Kwh	0.01Kwh - 10Kwh
Anyliser on / off	Off	On / Off
T - Dose %	10%	0% - 25%
T - Dose Time	1 Min	10 Sec - 30 Min
Deadband ppm	50ppm	10 – 250ppm
Dispersal Time	1.00 Min	10 Sec – 30 Min
Fan Cycle Time	15 Min	5 Min - 60 Min
Fan Duration	3 Min	1 Min - 30 Min
Stat Ignore Time	0 Min	0 Min - 15 Min
Day Set Point	50%	10% - 90%
Reset to Default	Yes / No	Yes / No
Specifications		
Power supply	220 -240 Vac Single Phase	
Power Consumption	20 Watts Max	
Maximum Total Fan Load	3.0 Kw	
Maximum Total co2 output Load	3.0 Kw	
Maximum Total Combined output Load	3.0 Kw	
Co2 Measurement Range	10 – 4000ppm	
Co2 Measurement Accuracy	+/- 50ppm	
Co2 Measurement Resolution	10ppm	