Evolution
Carbon Dioxide Controller

December 2012
Added new section - Page 16
New section - page 30

Fan

Dose

Day

Power

SET FLOW RATE
17 1pm

DOWN SET UP Evolution

ECOTechnics Horticultural Carbon Dioxide Controller

ECOTechnics

CO_2
Accurate Sensing

Fan

ABC
Multi-Language Support

Timer

Thank you for purchasing the **Ecotechnics Evolution Carbon Dioxide Controller**. In order to take full advantage of your new controller, please read this manual carefully and use the product as directed.

Carbon dioxide (CO_2) is a colourless, odourless gas that occurs naturally in our environment. It is normally present in the atmosphere at an average concentration of approximately 0.00036% or 360 PPM.

Many growers fail to recognise the importance of Carbon Dioxide in their growroom. Most plants grow faster and larger with enhanced CO_2 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 CO_2 molecules with water molecules to form complex sugars. There is a resultant spare oxygen atom which is released back into the air. The sugars are then further processed by the plant to form natural polymers for growth. The ambient level of CO_2 in air is 300-400 PPM, which fast growing plants in your growroom or glasshouse can use all the available CO_2 in less than an hour, slowing photosynthesis and bringing 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 CO_2 sensor and can also be used with either bottled CO_2 gas or with a propane or natural gas burning CO_2 generator. In addition to this the Evolution controller can be interfaced to most external thermo / hygrostats 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 CO_2 level in your growroom causes more sugars to be produced allowing the plant to grow bigger and faster. The optimum level of CO_2 for plant growth is dependant upon many different factors such as light levels , temperature, humidity and nutrient availability. Plants grown with enhanced CO_2 can grow up to 40% faster thus shortening crop times and increasing yields. This is of course assuming there are no other limiting factors such as lack of available light etc.

It should be noted that there is generally no advantage to increasing CO_2 levels beyond 3000 PPM for most greenhouse plant species. It should also be noted that there is generally no advantage to raising CO_2 levels during dark hours.

Controller & Accessories

The Evolution CO_2 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 Evolution Solid State NDIR CO_2 sensor and can also be used with either bottled CO_2 gas or with a propane or natural gas burning CO_2 generator.

In addition to this the Evolution controller can be interfaced to most external thermo / hygrostats for improved environmental control.

The Evolution NDIR CO2 Sensor

The new solid state evolution CO_2 sensor from Ecotechnics represents the latest state of the art sensor technology utilizing advanced solid state LED's and detectors with precision engineered, gold plated optics to provide high accuracy fast response real time CO_2 sensing from 0-10,000ppm

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 CO_2 Controller. We have this regulator produced for us in the UK from top quality components it has a fixed flow rate of 17 Litres per min. and is our standard horticultural regulator.

Ask your retailer for further details of this product.

The Evolution digital fan speed Controller

This is the perfect thermostat system to use with the Evolution CO_2 Controller. It can control your extraction system and interface to the stat input of the CO_2 controller ,it can also switch up to 3Kw of heater load for those cold winter nights.

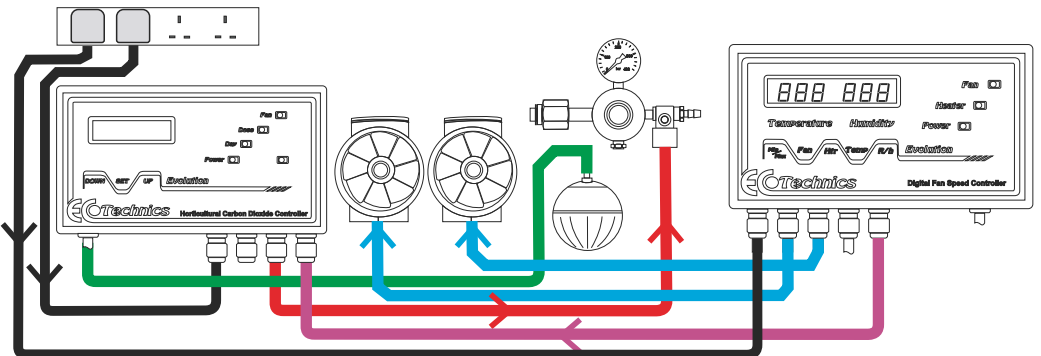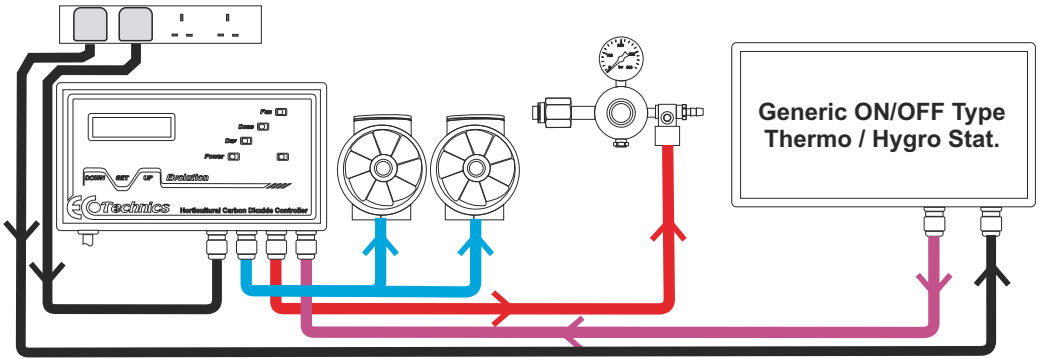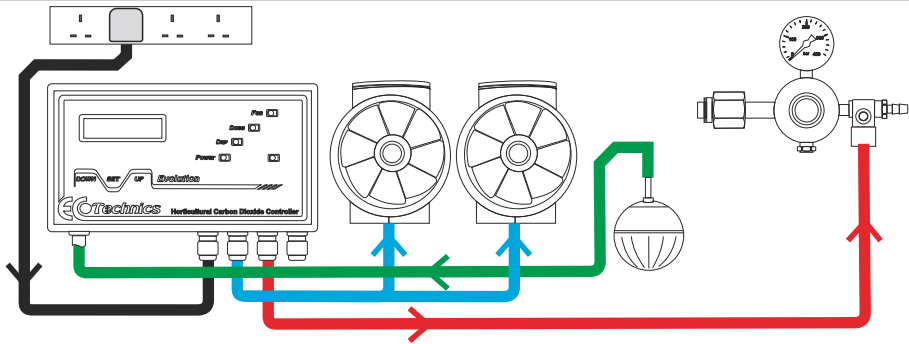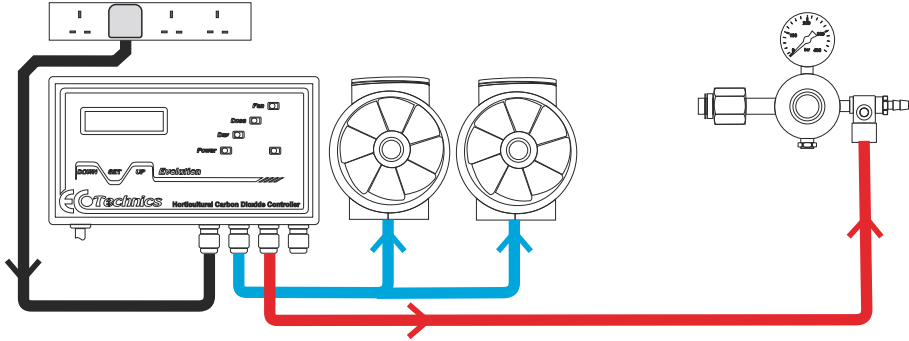Ask your retailer for further details of this product.

Propane CO_2 Generator

There are many different propane burners available on the market and the evolution controller can work with most of them.
Burner sizes of 0.01Kwh to 9.99Kwh are supported and the switching output is 230Vac.

Controller Configuration Options

Generic ON/OFF Type
Thermo / Hygro Stat.

3

Controller Configuration Options

Basic Open loop configuration with No CO2 Analyser

This is the simplest way to connect your controller; it only requires a power connection, a connection to the CO_2 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.

Basic Closed loop configuration with CO2 Analyser

This is the second way to connect your controller; it requires a power connection, a connection to the CO_2 release system, a connection to the Evolution NDIR CO_2 Analyser 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 peak level minus the CO_2 deadband setting is achieved.
For further information on setup parameters please refer to the settings section of this user guide.
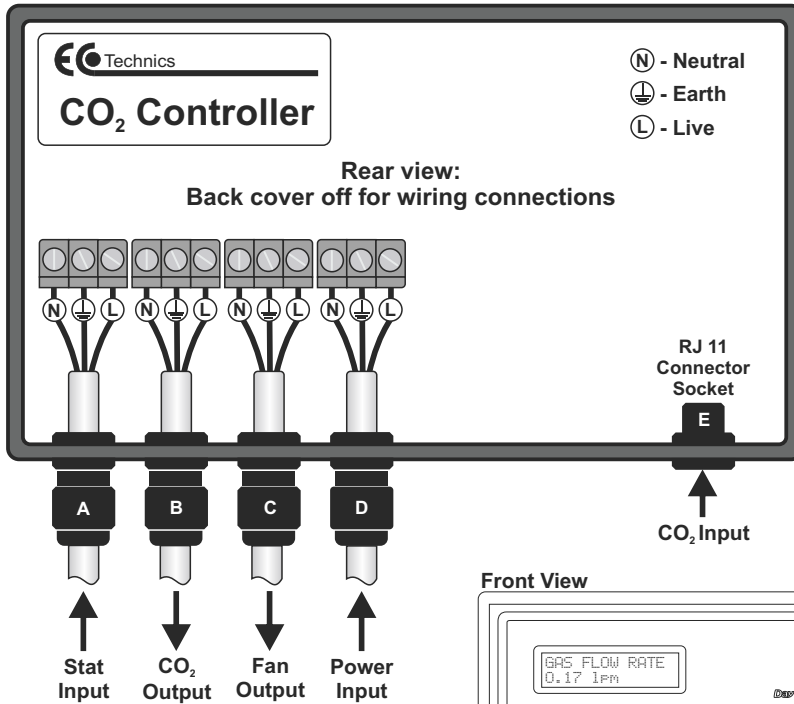
Configuration with an external basic ON / OFF Type Thermo / Hygro-Stat

The Evolution CO_2 Controller is equipped with an interface input so that it can work in conjunction with an external Thermostat or Thermo/Hygro-Stat. The AC Power output of the Thermostat that normally would connect to the extractor fan should be connected to the STAT INPUT of the CO_2 Controller.
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.
Please note, this input is an on & off type input and is not suitable for use with fan controllers that vary fan speed, except the Evolution Digital Fan Speed Controller that has a dedicated interface output.
For further information on setup parameters please refer to the settings section of this user guide.
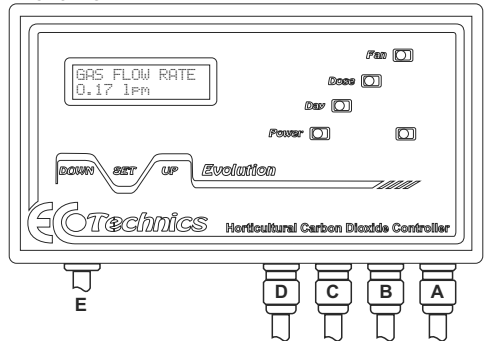
Configuration with an Evolution Digital Fan Speed Controller.

The Evolution CO_2 controller is equipped with an interface input so that it can work in conjunction with an external Thermostat or Thermo Hygrostat.
When used with the Evolution Digital Fan Speed Controller the STAT OUTPUT from the fan controller should be connected to the STAT INPUT of the CO2 controller & the intake / exhaust fans should be connected to the FAN 1 & FAN 2 outputs of the fan controller.
In this mode the fan controller will control the speed of the fans and will only allow the CO_2 controller to dose when the fans are running at the minimum or Idle speed.

Please note this can be set to zero if desired.
For further information on setup parameters please refer to the settings section of this user guide.

€€ Technics

CO₂ Controller

Ⓝ **- Neutral**
⏚ **- Earth**
Ⓛ **- Live**

Rear view:
Back cover off for wiring connections

Ⓝ ⏚ Ⓛ   Ⓝ ⏚ Ⓛ   Ⓝ ⏚ Ⓛ   Ⓝ ⏚ Ⓛ

RJ 11
Connector
Socket

E

A   **B**   **C**   **D**

CO₂ Input

Stat Input   **CO₂ Output**   **Fan Output**   **Power Input**

Front View

GAS FLOW RATE
0.17 lpm

Fan ▢
Dose ▢
Day ▢
Power ▢   ▢

DOWN SET UP *Evolution*

€€Technics **Horticultural Carbon Dioxide Controller**

E   D C B A

A - Stat Input

This input is an interface to external fan controllers and thermostats & can be used to implement a full environmental control system when combined with a suitable temperature / humidity controller such as the Evolution digital fan speed controller. **Wire: 0.5mm - 0.75mm**

B - CO2 Out

This is where you connect your CO₂ regulator or solenoid controlled gas burner. Please note this is a 220/240v AC output. Please check solenoid coil voltage before connecting. **Wire: 0.5mm**

C - 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. **Wire: 0.75mm**

D - Power Input

This is the main power connection for the controller.
Wire: 1.25mm -1.5mm

E - 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 **Wire: 0.5mm**.

Dark Street II

DS60	$0.5m^3$
DS90	$1.29m^3$
DS120	$2.59m^3$
DS150	$4.56m^3$

Dark Room II

DR60	$0.57m^3$
DR90	$1.46m^3$
DR120	$2.88m^3$
DR150	$4.5m^3$
DR240	$11.52m^3$
DR300	$18m^3$
DR240w	$5.76m^3$
DR300w	$9m^3$

Dark Room Twin

DR60T	$1.25m^3$
DR120T	$2.16m^3$

INTense

INT120	$6.19m^3$
INT240	$12.38m^3$
INT480	$24.76m^3$
INT150	$9.67m^3$
INT300	$19.34m^3$
INT600	$38.6m^3$

How to set up your Controller

A

If your set up includes:
Evolution CO_2 Controller + the Regulator
use **Section A** which starts on the next page (page 8)

B

If your set up includes:
Evolution CO_2 Controller + the Regulator + CO_2 Analyser
use **Section B** which starts on page 12

C

If your set up includes:
Evolution CO_2 Controller + the Regulator + CO_2 Analyser
+ the Evolution Digital Fan Speed Controller
use **Section C** which starts on page 16

User Guide:
Evolution CO_2 Controller
(NO Analyser Sensor)

Controller Settings

Use the **SET** Button to scroll through the menu items & the **UP** / **DOWN** buttons to alter the setting

1
```
SELECT LANGUAGE
ENGLISH >
```

Language selection screen for English, French, German, Italian and Spanish.

2
```
ROOM VOLUME
37 m3
```

Set the volume of your growing area in cubic meters.
note: your grow room volume must be entered when using the analyser or without the analyser.

When using the Evolution CO_2 Controller without the analyser it will dose your room similar to our UNIS carbon dioxide controller..

If you have the Analyser it will take into account both the size of your room plus the current ppm levels of CO_2 in your grow room and dose the optimum amount of carbon dioxide for your plants.
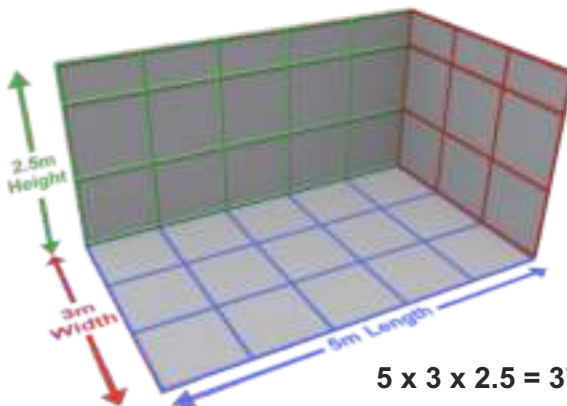
Grow Room Volume:
Before you set up your Evolution CO_2 controller you will need to find out the cubic volume of your growing area. Once calculated and set this will enable the Evolution CO_2 Controller to introduce the optimum amount of CO_2 for your plants.

length x width x height = internal cubic volume of the room

Example Room Volume Calculation

The illustration below shows a typical example of a room, in this case the room measures **5M** in **length, 3M** in **width** and **2.5M** in **height**.

Note:
If you have a Secret Jardin grow tent we have provided a chart for their Volumes for you on page 6

$$5 \times 3 \times 2.5 = 37.5 \ M^3$$

1 To calculate your grow room volume, measure your room in length width and height in metres, then multiply the length width and height measurements to obtain the cubic volume of your room.
Example: 5 x 3 x 2.5 = 37.5 M³

2 Dial in the required setting on the **Evolution CO_2 Controller.**

Controller Settings

DOWN   SET   UP   *Evolution*

3

```
CO2 LEVEL
1600 ppm
```

Set the level of CO_2 that you require in your growing area in PPM. Please note that the maximum level of CO_2 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 CO_2 that you set.

Default setting is 1600ppm,
The baseline for CO_2 levels in fresh air at sea level is between 300ppm and 400ppm.
Depending on which plants you are growing, the grow room temperature, humidity and at what growing phase your plants are at (cuttings, veg and flowering) their CO_2 needs can vary from no CO_2 [night cycle where plants take up no CO_2] up to 1800ppm.

4

```
GAS Source
Cylinder
```

Gas source

```
GAS Source
Propane
```

5

```
GAS FLOW RATE
17 LPM
```

Bottled CO_2 or Propane

```
Burner size
0.18 kWh
```

This controller can calculate the required dose times for bottled CO_2 . For bottled CO_2 gas you must set the flow rate of your gas regulator in litres per minute in order for the controller to calculate the correct dosing times. (our regulator is preset to use 17 ltrs per min)

This controller can calculate the required dose times for a propane CO_2 generator. For a propane gas burner you should set the burner capacity in Kw/Hrs in order for the controller to calculate the correct dosing times.

6

```
TDOSE %
10 %
```

This setting is for the top up dose. The controller assumes that after it doses CO_2 into the growing area the level will gradually fall due to a number of reasons ie: CO_2 usage by plants, gas leakage 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 CO_2 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 0%.

7

```
TDOSE TIME
01:00 Minutes
```

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.

Controller Settings

8

```
FAN CYCLE TIME
15 Minutes
```

This setting is for the internal fan cycle timer. 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.

9

```
FAN DURATION
3 Minutes
```

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. **Please note, fan duration should be set to ZERO in a sealed room with air conditioning.**

10

```
FAN RUNDOWN TIME
0.10 minutes
```

This setting allows the controller to wait for the programmed time period from the fan output being turned off so that the fans stop spinning before the CO_2 is injected.
Please note that the time required will vary from one fan to another and can be set to suit your particular fan.

11

```
Stat ignore time
0 Minutes
```

This setting is for the Stat input & allows the controller to ignore the stat input for the set period of time. This is useful if your thermostat has a very sensitive deadband and effectively will allow the fan to come on for the first time the stat asks for it but will not allow another extraction to be triggered by the stat until the ignore time has passed.

12

```
DAY SETPOINT
50 %
```

This setting is for the level of light at which the controller decides to disable the CO_2 output. The light sensor is located in the front panel of the controller.
Make this setting lower to increase sensitivity.

13

```
RESTORE DEFAULTS
No              Yes
```

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 defined settings.

Wire connection diagram for angled plug on Regulator

Brown: Live
Blue: Neutral
Green/Yellow: Earth

User Guide:
Evolution CO_2 Controller
+ Analyser Sensor.

Controller Settings - Controller + CO$_2$ Analyser Sensor Ball

DOWN SET UP **Evolution**

Use the **SET** Button to scroll through the menu items & the **UP** / **DOWN** buttons to alter the setting

1

SELECT LANGUAGE
ENGLISH >

Language selection screen for English, French, German, Italian and Spanish.

2

ROOM VOLUME
37 m3

Set the volume of your growing area in cubic meters.
note: your grow room volume must be entered when using the analyser or without the analyser.

When using the Evolution CO$_2$ Controller without the analyser it will dose your room similar to our UNIS carbon dioxide controller..

If you have the Analyser it will take into account both the size of your room plus the current ppm levels of CO$_2$ in your grow room and dose the optimum amount of carbon dioxide for your plants.
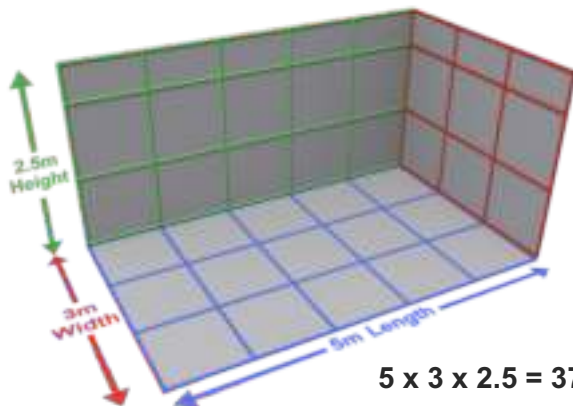
Grow Room Volume:
Before you set up your Evolution CO$_2$ controller you will need to find out the cubic volume of your growing area. Once calculated and set this will enable the Evolution CO$_2$ Controller to introduce the optimum amount of CO$_2$ for your plants.

length x width x height = internal cubic volume of the room

Example Room Volume Calculation

The illustration below shows a typical example of a room, in this case the room measures **5M** in **length, 3M** in **width** and **2.5M** in **height**.

Note:
If you have a Secret Jardin grow tent we have provided a chart for their Volumes for you on page 5

2.5m Height

3m Width

5m Length

5 x 3 x 2.5 = 37.5 M^3

1 To calculate your grow room volume, measure your room in length width and height in metres, then multiply the length width and height measurements to obtain the cubic volume of your room.
Example: 5 x 3 x 2.5 = 37.5 M^3

2 Dial in the required setting on the **Evolution CO$_2$ Controller.**

Controller Settings - Controller + CO$_2$ Analyser Sensor Ball

Use the **SET** Button to scroll through the menu items & the **UP** / **DOWN** buttons to alter the setting

3

```
CO2 LEVEL
1600 ppm
```

Set the level of CO$_2$ that you require in your growing area in PPM. Please note that the maximum level of CO$_2$ 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 CO$_2$ that you set.

Default setting is 1600ppm,

The baseline for CO$_2$ levels in fresh air at sea level is between 300ppm and 400ppm.

Depending on which plants you are growing, the grow room temperature, humidity and at what growing phase your plants are at (cuttings, veg and flowering) their CO$_2$ needs can vary from no CO$_2$ [night cycle where plants take up no CO$_2$] up to 1800ppm.

4

```
GAS Source
Cylinder
```

Gas source

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GAS Source
Propane
```

5

```
GAS FLOW RATE
17 LPM
```

Bottled CO$_2$ or Propane

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Burner size
0.18 kWh
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This controller can calculate the required dose times for bottled CO$_2$. For bottled CO$_2$ gas you must set the flow rate of your gas regulator in litres per minute in order for the controller to calculate the correct dosing times. (our regulator is preset to use 17 ltrs per min)

This controller can calculate the required dose times for a propane CO$_2$ generator. For a propane gas burner you should set the burner capacity in Kw/Hrs in order for the controller to calculate the correct dosing times.

6

```
CO2 DEADBAND
50 ppm
```

This is the number of PPM that the CO$_2$ must drop below the CO$_2$ level before CO$_2$ injection is resumed.

The controller will make a CO$_2$ dose to the target level but will not re-dose until the level has fallen buy at least the set deadband amount. By reducing this setting you get better control and by increasing it you get better gas economy.

7

```
FAN CYCLE TIME
15 Minutes
```

This setting is for the internal fan cycle timer. 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.

8

```
FAN DURATION
3 Minutes
```

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. **Please note, fan duration should be set to ZERO in a sealed room with air conditioning.**

Controller Settings - Controller + CO₂ Analyser Sensor Ball

9

```
FAN RUNDOWN TIME
0.10 minutes
```

This setting allows the controller to wait for the programmed time period from the fan output being turned off so that the fans stop spinning before the CO_2 is injected.
Please note that the time required will vary from one fan to another and can be set to suit your particular fan.

10

```
Stat ignore time
0 Minutes
```

This setting is for the Stat input & allows the controller to ignore the stat input for the set period of time. This is useful if your thermostat has a very sensitive deadband and effectively will allow the fan to come on for the first time the stat asks for it but will not allow another extraction to be triggered by the stat until the ignore time has passed.

11

```
DAY SETPOINT
50 %
```

This setting is for the level of light at which the controller decides to disable the CO_2 output. The light sensor is located in the front panel of the controller.
Make this setting lower to increase sensitivity.

12

```
RESTORE DEFAULTS
No          Yes
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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 defined settings.

Wire connection diagram for angled plug on Regulator
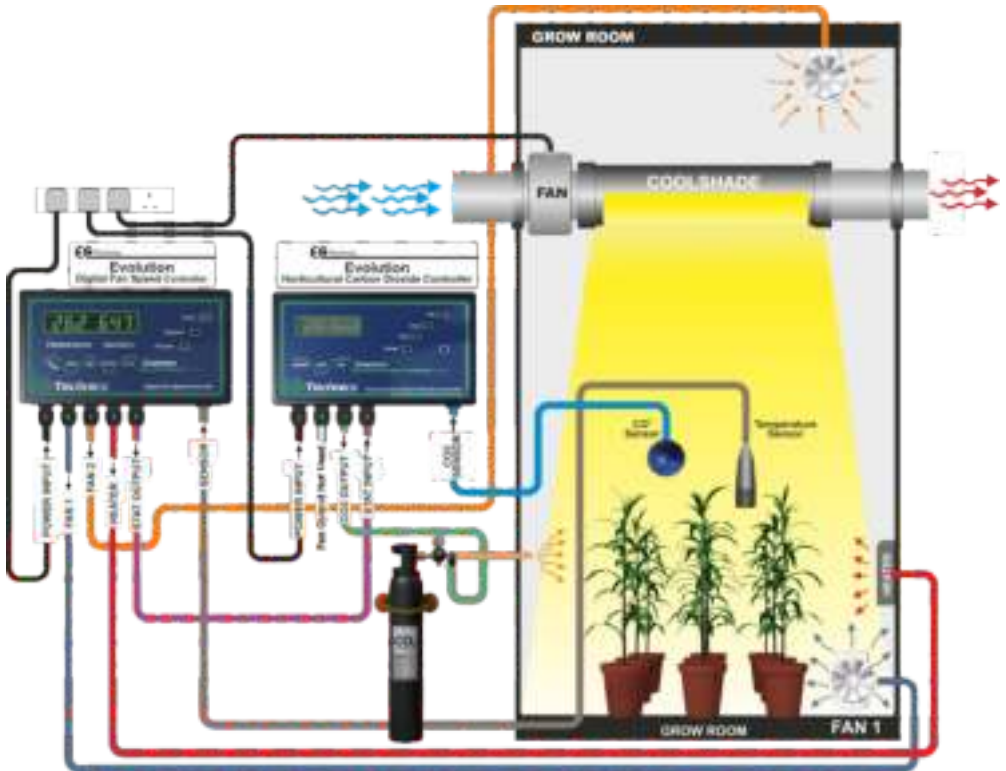
Brown: Live
Blue: Neutral
Green/Yellow: Earth

User Guide:
Evolution CO$_2$ Controller
+ Analyser Sensor
Plus Evolution Digital Fan Speed
Controller.

When the 2 Evolution controllers are connected together the fans should be connected to the Evolution Digital Fan Speed Controller as shown in the diagram above.

Evolution Fan Speed Controller:

Enabling CON mode for fans:
Some users like to use the fan controller in CON mode when used with the Evolution Carbon Dioxide Controller to save gas usage.
see page 18 on how to set your fan speed controller over from PHA to CON.

Evolution Carbon Dioxide Controller:

Disabling fan control on the Evolution Carbon Dioxide Controller:
Set the fan cycle timer to **1 minutes**. (page 20 - step 7)
Set the Fan duration to **0 minutes** to disable the timer. (page 20 - step 8)
Set the Fan Run Down Time to **0:00 minutes** (page 21 - step 9)
These settings will disable Fan Control on the Evolution Carbon Dioxide Controller and transfer control over to the Evolution Digital Fan Speed Controller.

Evolution Digital Fan Speed

**How to set the Fan Speed Controller into CON mode
(contactor mode) when using it with the Evolution Carbon Dioxide Controller**

Advanced Settings & Calibration modes

FAN OUTPUT Mode

Some users like to use the fan controller in **CON** mode when used with the Evolution Carbon Dioxide Controller to save gas usage.

Default is 'PHA' mode (PHAse angle control).

Phase angle mode the controller will control the speed of the fans and you can set a % speed for them in min and max.

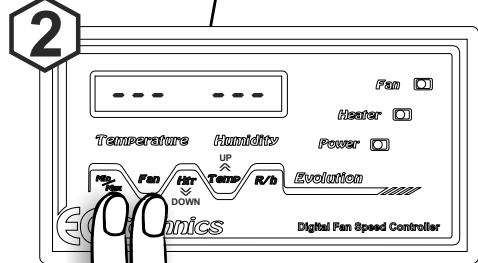**Contactor mode** the fans will just switch either on or off (0% and 100%).

1. Press and hold **FAN** and **Min/Max** button down during power up.

2. Once powered up and displaying
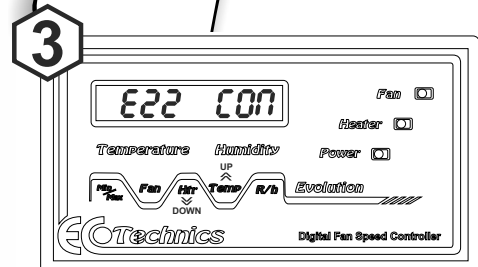- - - - - - release the buttons.

3. The display will flash up E22 in the left and the current setting of either **CON** or **PHA** in the right LED window before reverting to live readings.
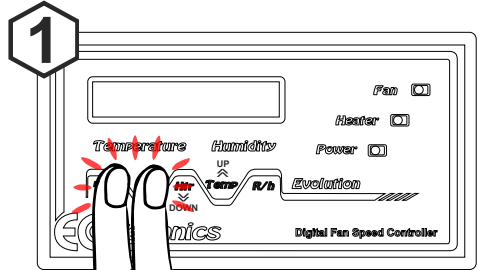
hold down before power on

release once the display shows - - - - - -

current PHA/CON mode flashes up before settling down for normal temp and humidity live display.

Controller Settings - Controller + CO_2 Analyser Sensor Ball

DOWN SET UP *Evolution*

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1
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Language selection screen for English, French, German, Italian and Spanish.

2
ROOM VOLUME
37 m3

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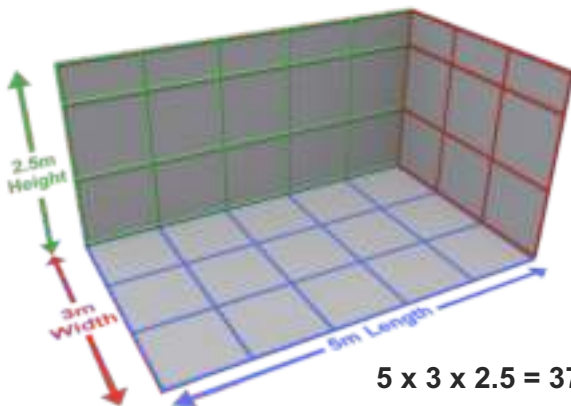
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Example Room Volume Calculation

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Note:
If you have a Secret Jardin grow tent we have provided a chart for their Volumes for you on page 5

2.5m Height
3m Width
5m Length

$$5 \times 3 \times 2.5 = 37.5 \ M^3$$

1 To calculate your grow room volume, measure your room in length width and height in metres, then multiply the length width and height measurements to obtain the cubic volume of your room.
Example: 5 x 3 x 2.5 = 37.5 M^3

2 Dial in the required setting on the **Evolution CO_2 Controller.**

Controller Settings - Controller + CO$_2$ Analyser Sensor Ball

DOWN   **SET**   **UP**   *Evolution*

3

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CO2 LEVEL
1600 ppm
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```
GAS Source
Cylinder
```

Gas source

```
GAS Source
Propane
```

5

```
GAS FLOW RATE
17 LPM
```

Bottled CO$_2$ or Propane

```
Burner size
0.18 kWh
```

This controller can calculate the required dose times for bottled CO$_2$. For bottled CO$_2$ gas you must set the flow rate of your gas regulator in litres per minute in order for the controller to calculate the correct dosing times. (our regulator is preset to use 17 ltrs per min)

This controller can calculate the required dose times for a propane CO$_2$ generator. For a propane gas burner you should set the burner capacity in Kw/Hrs in order for the controller to calculate the correct dosing times.

6

```
CO2 DEADBAND
50 ppm
```

This is the number of PPM that the CO$_2$ must drop below the CO$_2$ level before CO$_2$ injection is resumed.

The controller will make a CO$_2$ dose to the target level but will not re-dose until the level has fallen buy at least the set deadband amount. By reducing this setting you get better control and by increasing it you get better gas economy.

7

```
FAN CYCLE TIME
1 Minutes
```

SET to 1 when using Evolution Fan Speed Controller.
This setting is for the internal fan cycle timer. 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.

8

```
FAN DURATION
0 Minutes
```

SET to 0 when using Evolution Fan Speed Controller.
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. **Please note, fan duration should be set to ZERO in a sealed room with air conditioning.**

Controller Settings - Controller + CO$_2$ Analyser Sensor Ball

9

```
FAN RUNDOWN TIME
0.00 minutes
```

Set this to 0.00 minutes when using the Evolution Digital Fan Speed Controller.
This setting allows the controller to wait for the programmed time period from the fan output being turned off so that the fans stop spinning before the CO$_2$ is injected.
Please note that the time required will vary from one fan to another and can be set to suit your particular fan.

10

```
Stat ignore time
0 Minutes
```

This setting is for the Stat input & allows the controller to ignore the stat input for the set period of time. This is useful if your thermostat has a very sensitive deadband and effectively will allow the fan to come on for the first time the stat asks for it but will not allow another extraction to be triggered by the stat until the ignore time has passed.

11

```
DAY SETPOINT
50 %
```

This setting is for the level of light at which the controller decides to disable the CO$_2$ output. The light sensor is located in the front panel of the controller.
Make this setting lower to increase sensitivity.

12

```
RESTORE DEFAULTS
No            Yes
```

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 defined settings.

Wire connection diagram for angled plug on Regulator

Brown: Live
Blue: Neutral
Green/Yellow: Earth

ADVANCED
User Guide Section

Advanced Menus & Calibration Section

Advanced Settings

Information Menu

Depress and hold the **up** button when in normal operating mode to display……
Peak CO$_2$, Average CO$_2$, Dose Error %, CO$_2$ Required, Gas Generation Rate, Dose Time & Time to Next Fan cycle.

Internal Counter Zero

Pressing the **down** button in normal operating mode will **reset the internal counter to zero**, this function can be used to skip a fan cycle, fan rundown or CO$_2$ dose.

Dose Calibration

1.Power turned off
2.Depress and hold the **Up** Button,
3.Turn the power on, with the **UP** button held down to enter the Dose Calibration mode.
4 Adjust the Cal factor by using the **Up** & **Down** buttons, once an adjustment has been made
5.Leave the unit alone and it will automatically store the new setting.
6.Alternatively you can store by simply pressing the **Set** button, this will store the offset and enter into normal operating mode.
Note:
All green houses, grow rooms etc have a leakage rate which is dependant on many factors such as gaps under doors gaps in glass panels etc. This setting can be used to calibrate the dose factor to overdose a bit in order to compensate for losses. This can also be done by just increasing the room size setting or decreasing the flow rate setting.

How to Detect which Evolution CO$_2$ Sensor you are using

1.**Power off**
2.Depress and hold down the **Set** Button
3.Switch **power on** you will enter **Test & Sensor Calibration mode**
4.Now release the **SET** key
5.Depressing the **Down** & **Up** buttons Simultaneously will enter the "CO$_2$ Calibration mode" the screen will **blank** and when the buttons released you will be in "cal mode"
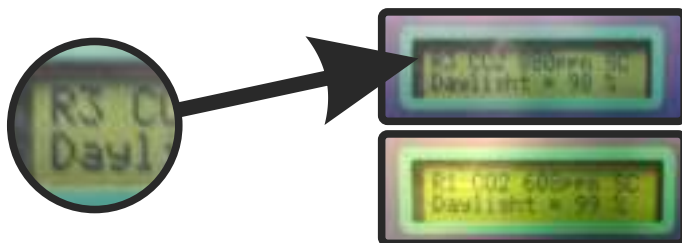
On this display screen in the top Left of the display is the revision number of the Sensor you are using.
R1 = Mk1 Sensor
R2 = Mk2 Sensor
R3 = Mk3 Sensor
In the examples below you can see R3 [Mk 3 sensor] has been detected and in the second photograph you can see that the R1 [Mk 1 sensor] has been detected.

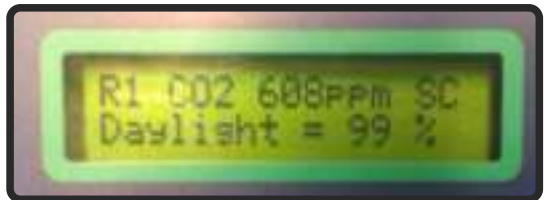# Test and Calibration mode Evolution CO_2 Sensor

Test and Sensor Calibration Mode for mk1 and mk2 Sensors (R1 and R2)
Please note the Evolution CO_2 Sensor needs at least 15 min's to warm up and stabilize before calibration can be started.

1. **Power off**
2. Depress and hold down the **Set** Button
3. Switch **power on** you will enter **Test & Sensor Calibration mode** now release the **SET** key
4. Depressing the **Down** button will test the CO_2 Output>> the CO_2 LED will illuminate.
5. Depressing the **Set** button will test the Fan Output>>the Fan LED will illuminate.
6. Depressing the **Down** & **Up** buttons Simultaneously will enter the "CO_2 Calibration mode" the screen will **blank** and when the buttons released you will be in "cal mode"
7. CO_2 Cal mode: use the **down** & **up** buttons to calibrate the Mk1 and Mk2 CO_2 sensor
8. Once the correct level is programmed depress the **Set** button to **store** the new calibration setting the display will read press **SET** to exit [storing your setting]

Note: ambient CO_2 levels are usually 450ppm
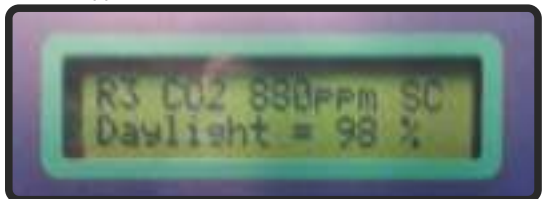
R1 (Mk 1) sensor detected

Test and Sensor Calibration Mode for Mk3 Sensor (R3)
Please note the Evolution CO_2 Sensor needs at least 15 min's to warm up and stabilize before calibration can be started.

1. **Power off**
2. Depress and hold down the **Set** Button
3. Switch **power on** you will enter **Test & Sensor Calibration mode** now release the **SET** key
4. Depressing the **Down** button will test the CO_2 Output>> the CO_2 LED will illuminate.
5. Depressing the **Set** button will test the Fan Output>>the Fan LED will illuminate.
6. Depressing the **Down** & **Up** buttons Simultaneously will enter the "CO_2 Calibration mode" the screen will **blank** and when the buttons released you will be in "cal mode"
7. **Mk 3 CO_2 sensor air calibration**
   The sensor must be positioned in outside air until stable then press the **up** button to calibrate. This assumes ambient CO_2 levels to be 450ppm.

Once you have entered Air Cal mode the sensor will count down from 3mins on the display to allow the sensor to settle on the ambient Co2 level which it assumes is 450ppm it then stores this automatically as the new calibration setting.

R3 (Mk 3) sensor detected

Light Level Sensor
The correct operation of the Light level sensor can also be tested in this mode and the level is reported in the display by covering the sensor window the function can be tested.

Stat Input Test
The operation of the Stat input can also be tested by connecting your thermostats output to the Stat input and triggering it, the state will be displayed in the top right hand corner of the display on will show as **SC** and off will show as **SO.**

Specifications

Specifications

Settings

Controller Setting	Default Setting	Range
Language	English	N/A
Room volume	37 m3	1 - 999
CO_2 level ppm	1600 ppm	600 - 3000 ppm
CO_2 source	CO_2 Cylinder	CO_2 / Gas
Gas Flow Rate	17 Lpm	1 Lpm - 99 Lpm
Burner size	1.8 kwh	0.01 Kwh - 9.99 Kwh
Fan run down	30 seconds	30 Sec's - 5:00 Min's
T - Dose %	10%	0% - 25%
T - dose Time	1 Min	10 Sec - 30 Min
Deadband ppm	50 ppm	10 - 250 ppm
Fan Cycle time	15 Min	5 Min -60 Min
Fan Duration	3 Min	0 Min - 30 Min
Stat Ignore Time	0 Min	0 Min - 15 Min
Day Set Point	10%	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	1.5 Kw
Maximum Total CO_2 output Load	0.5 Kw
Maximum Total combined output Load	1.5 Kw
CO_2 Measurement Range	0 - 10,000 ppm
CO_2 Measurement Accuracy	+ / - 50 ppm
CO_2 Measurement Resolution	1 ppm

Light Sensor

The **Ecotechnics Evolution Carbon Dioxide Controller** has a light sensor as hi-lighted in the graphic on the left. This light sensor can automatically be set to turn **off** the CO_2 controller when it senses night time when light falls and also turn the CO_2 **on** when light rises back to a daytime state.
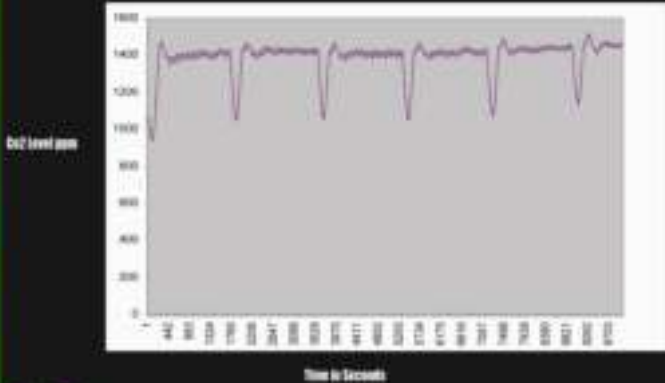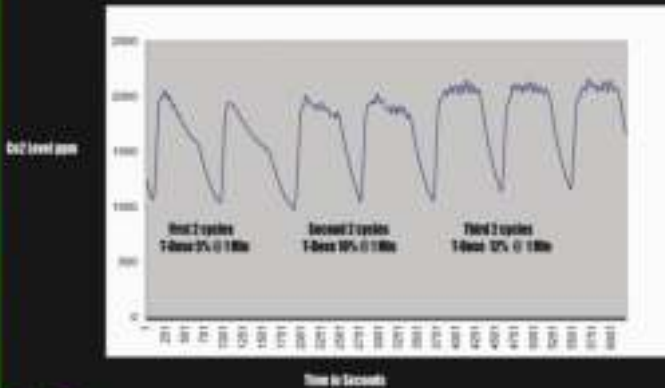
Gas Regulator Safety Advice
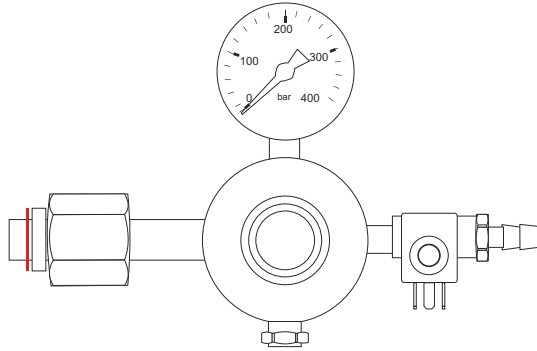
Only experienced and properly trained persons should handle compressed gases, they should be conversant with relative safely instructions including the current British compressed Gases Association code of practice CP7 and the gas safety instructions from the gas supplier.

Markings
The regulator is marked with the following:-
• Maximum inlet pressure (pressure service)
• Rated outlet pressure
• Gas (only use for gas shown)

Fitting to the cylinder
Before fitting the regulator, ensure both the cylinder outlet valve and the regulator inlet are clean and free from contaminants including dirt, oil and water. If fitted, fully release the regulator adjusting knob by winding anticlockwise prior to fitting to the cylinder. Right hand thread is employed for oxygen and permanent gases and left hand thread is used for fuel gases. Use only the correct size spanner and finally tighten by applying 2 blows to the end of the spanner with the heel of the hand.

Operating
After fitting of the downstream equipment, open the cylinder valve slowly, this is a critical operation and must be done slowly to be safe. If fitted, adjust the regulator knob to the required outlet pressure and purge hoses, make the final adjustment when gasses are flowing. It is vital to ensure that any audiable vibration or freezing of the regulator is avoided during operation. Check for leaks at all joints with a leak detection spray. On completion of use, close the cylinder valve and exhaust gas from lines.
If fitted, fully release regulator pressure adjusting knob.

Safety points
Carefully inspect the regulator for oil, grease and damaged or dirty parts. Oxygen vigorously supports combustion, never use the regulator if oil, grease or damaged parts are detected.

Never:
Never use a regulator showing any signs of damage
Never allow cylinders to become heated
Never use pressure gauges that are damaged, not smooth in operation or not zeroing
Never remove or change any component parts of a regulator.

Always:
Always check the whole system for damage and leaks at frequent intervals
Always work to BCGA codes of practice (to purchase copies, telephone 01491 825533)
Always fit a flashback arrestor to the outlet of an oxygen or fuel gas cylinder.

---- ALWAYS OBSERVE THE FOLLOWING ----

● When connecting / disconnecting all cables, grasp the connector itself—never pull on the cable. This way you will avoid causing shorts, or damage to the cable's internal elements.

● Do not excessively twist or bend the power cord, or place heavy objects on it. Doing so can damage the cord, producing severed elements and short circuits. Damaged cords are fire and shock hazards!

● In households with small children, an adult should provide supervision which is essential for the safe operation of any electrical appliances in the home.
All cords and cables should be placed so they are out of the reach of children.

● Try to prevent cords and cables from becoming entangled.

● Before moving the unit, disconnect the power cable from the mains supply and any cords coming from external devices.

● Never handle an AC adaptor or electrical plugs with wet hands when plugging into, or unplugging from, an outlet or this unit.

● Before cleaning the unit, turn off the power and unplug the AC adaptor from the outlet.

● Do not force the unit's power-supply cord to share an outlet with an unreasonable number of other devices.

● Be especially careful when using extension cords—the total power used by all devices you have connected to the extension cord's outlet must never exceed the power rating (watts/amperes) for the extension cord. Excessive loads can cause the insulation on the cord to heat up and eventually melt through.

● Protect the unit from strong impact.(Do not drop it!)

● Before using the unit in a foreign country, consult with your retailer or an authorized distributor.

● Whenever you suspect the possibility of lightning in your area, disconnect the unit from the power outlet.

● Do not attempt to repair the unit, or replace parts within it. Refer all servicing to your retailer or an authorized distributor.

● When moved from one location to another where the temperature and/or humidity is very different, water droplets (condensation) may form inside the unit. Damage or malfunction may result if you attempt to use the unit in this condition. Therefore, before using the unit, you must allow it to stand for several hours, until the condensation has completely evaporated.

Please note you will find the latest revision of any of our
User Guides on the Ecotechnics website located in the
downloads area below:
http://www.ecotechnics.co.uk/downloads.htm

Understanding the Evolution CO2 Controller:

Let's take a closer look at understanding how the Evolution Carbon Dioxide Controller operates in delivering Carbon Dioxide into your Grow room.

Example Grow Tent:
For this example we'll choose a Secret Jardin DR240 as the Grow Tent we wish to use Our Evolution Carbon Dioxide controller in.

Grow Tent size?
DR240 has a cubic capacity of $15m^3$. (see the chart on page 7)
Set the controller accordingly.

How much CO_2 is used?
The Gas regulator has a preset Gas delivery rate of 17ltrs per minute.
Therefore with a 6 second dose, that's 1 tenth of a minute.
So the amount of CO_2 released per dose is 1.7ltrs of CO_2 Gas into your grow tent.

Things to take into account:

- **The optimum time to dose is after an air extraction event during the day cycle.**
- **How air tight is the grow tent?**
- **Please Note: A leaky tent or open zips will allow the CO_2 to exit the tent**
- **How many plants are in your grow tent?**
- **1 plant will use a small amount of CO_2 but 40 plants will require much more CO_2**
- **What stage of development are your plants?**
- **How are you distributing the gas from the regulator (perforated hose for example)**
- **Do you have a small fan (not extraction) to stir the air in the grow tent to mix the CO_2 evenly**
- **What height do you release the CO_2 in the tent?**
- **CO_2 is heavier than Air: so will tend to sink to the lower part of the grow tent in "still air" conditions.**
- **Having an extraction event shortly a dose: CO2 will drop when air is exchanged.**
- **No need to dose during the night cycle of the plants.**
- **Plants do not take up CO_2 in the night cycle**
- **Using Air-cooled lighting reduces the amount of Cooling Fans in the grow room.**

What the Evolution Carbon Dioxide Controller Does!
- **Constantly measures/controls the level of carbon dioxide. (with analyser)**
- **If you wish to monitor and control the levels of CO_2 use our Evolution CO_2 Controller**

SAFETY CONSIDERATIONS

- Always make sure the unit is unplugged before attempting to connect the fan and/or heater to the unit.

- Always check that all cables are correctly and securely connected and that the cover is securely screwed on before plugging the unit in and turning the power on.

- Always Remember that Electricity and Water is an Extremely Dangerous Combination. Electricity can be fatal especially in the presence of water.

- It is strongly recommended that any electrical equipment used in the growing environment is mounted above ground level, on a shelf or if possible wall mounted so that in the event of water spillage or flooding the two remain separate.

  This appliance must be installed by an approved electrician and must be connected via an approved RCD safety breaker.

POWER CONSUMPTION   15 WATTS MAX
SUPPLY VOLTAGE   230-240V AC
TOTAL LOAD NOT TO EXCEED 1.5kw

ECOTECHNICS PRODUCT GUARANTEE

Thank you for choosing an Ecotechnics product for use in your growroom. As leading manufacturers of horticultural equipment and accessories we are committed to providing a range of innovative products to enhance your garden. Our commitment to quality is second to none, however if you do experience any problem all our products are covered with a full 1 year parts & labor guarantee and should be returned to the retailer along with the original purchase receipt .

Ecotechnics UK Ltd is not liable for labor costs involved in the installation or removal of the product, lost profits, incidental or consequential loss, injury to property or persons or any other consequential loss however caused.

Shop / Dealer

Purchase Date

| D | D | M | M | Y | Y |

Serial Number   E   C   •   •