CO_2 controller

range: O-9999PPM

for greenhouse

CO_2 monitor & controller
with rh/temp. Display



VDL

4 different sockets to control external device

- USA(piggy back)
- EU France
- EU Schuko
- UK

OPERATION MANUAL

verdetop

Gracias por confiar en Verdetop

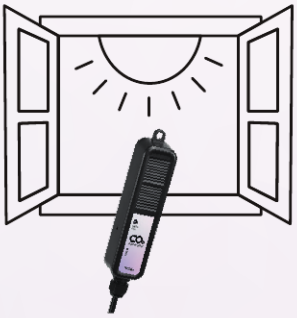
Más información, fichas y asesoramiento en verdetop.com

www.verdetop.com

QUICK GUIDE

1. Device power on

Plug power cable to the supplied mains.



2. Accuracy & Relay Test

Check functions after transportation.

Power on the meter and leave the probe next to open window in sunny day for at least 5 minutes.

The qualified CO_2 range is 350-450ppm. If not, please calibrate (see page x)

Also check if the " ⚡ " icon flash on display to indicate the relay controlling function is normal.

3. Device installation

Install the probe to monitor the CO_2 concentration. Connect the CO_2 generator to relay control socket. Away from water spray to avoid damage and risk.



INTRODUCTION

Thank you for purchasing this wall mount CO_2 controller. An external sensing probe is included to help you measure CO_2, humidity and temperature value in a closed space. Among above 3 measurement, CO_2 is the quick response parameter often used to monitor the environment.

To ensure safety, please read this manual carefully before installation and follow up the instructions. Store this manual in a secure place for future reference.

Features:

- Accurate and long life time NDIR CO_2 measuring
- External CO_2/RH/T sensor to be used in a closed space
- Display real time CO_2, humidity and temperature value
- 4 socket options to choose from while ordering: US (piggyback), EU france, EU Schuko and UK
- Display CO_2 chart with variable time zoom levels (week/day/hour/min)
- Color LED display for dim place and vivid from far
- Max. /Min. recall function
- Programmable CO_2 zone value & CO_2 center value to control relay output power on/off
- Audible alarm warns CO_2 concentration
- Target zone indicator
- Built-in Day/Night auto detection to override CO_2 control
- Shutter design on probe housing to reduce water risk
- Easy replaceable fuse to extend product life time
- Monitoring& Controlling CO_2 value in Green house, residential and commercial building

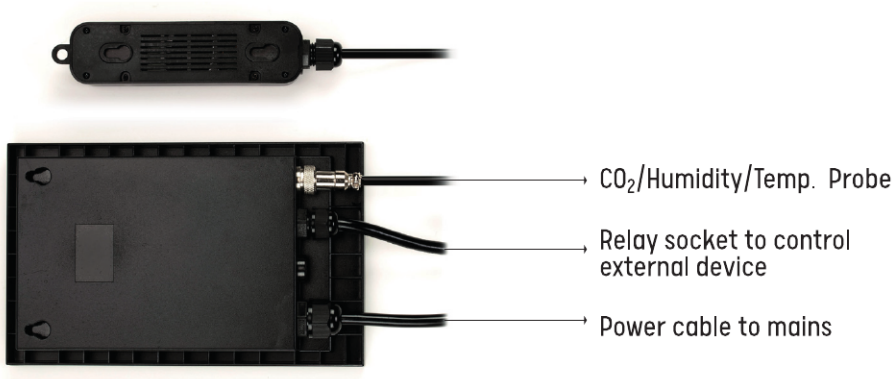
verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

MATERIAL SUPPLIED

This package contains:

- Meter (controller+sensing probe)
- Operation manual
- Paper box
- Screws and tape

MATERIAL SUPPLIED



The meter is powered by AC100-240 VAC directly. Different plug options available while you order. They are US/EU/UK.

Relay socket is where you connect with external device and control on/off of it. Different plug options are available while you order. They are US/EU/UK.

For US type, mains plug and relay socket are integrated as one cable only, called piggyback socket.

PLACEMENT

The probe cable length is 4.5 meter long to extend your measure spot 4.5 meter away from display. Though the shutter design of in the front side of probe can reduce the water spray risk but having probe and meter **away from water spray** can extend the life time.

verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

Screws are provided in package. First using the provided wall sticker to locate the spot where you want to hang the controlling meter on, drill to fix screw and hang devices.



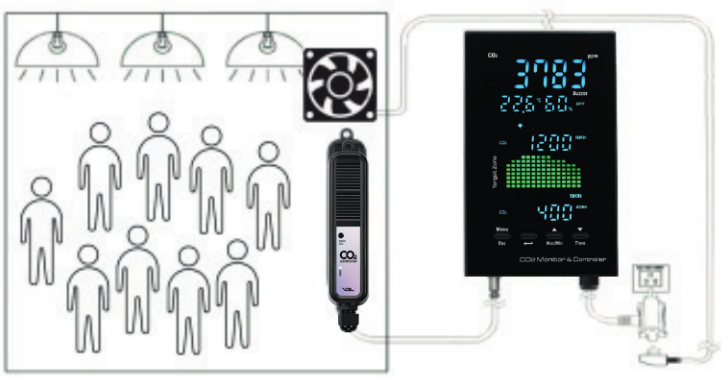
There is a photo cell built in sensing probe, don't cover it since it will terminate relay function all the time.

This controller is default for indoor gardening use. For indoor air quality controlling users, please adjust the setting to human mode before using (see page x)

In plant mode (Default), designed to turn ON CO_2 generator while measured is too low.



In human mode, designe to turn ON fan while measured CO2 is too high.



verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

SAFETY FUSE

The meter is powered by AC100-240VAC directly and provide power through piggyback socket or other types of socket to drive CO_2 generator or ventilation. To avoid the damage by power overload, a 250V@10A fuse is installed in meter. It is easy replaceable and can be purchased from local stores.



Push and rotate to pull out the fuse carriage.

Purchase new fuse locally. It is 250V@10A with Dia. 5, length 20mm

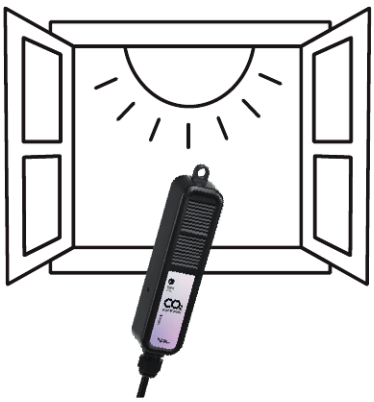
PRE-CHECK

Check accuracy and relay functions after transportation, before installation.

Power on the meter and leave the probe next to open window in sunny day for 5 minutes.

The qualified CO_2 range is 350-450ppm. If not, please calibrate (see page 11)

Also check if the "⚡" icon flash on display to indicate the relay controlling function is normal.

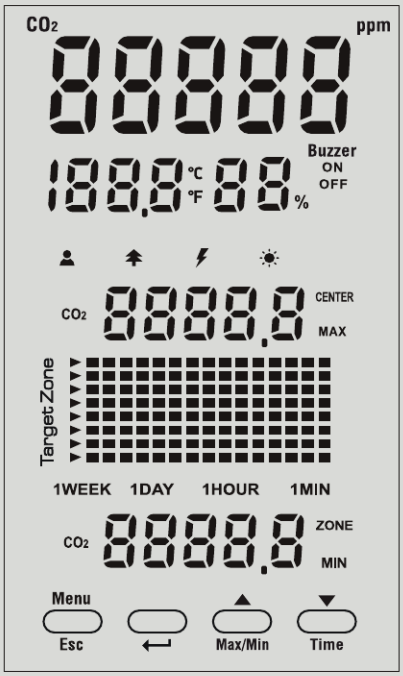


verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

DISPLAY/KEYPAD

CO_2 ppm	Current CO_2 value
°C °F	Current temp and unit
%	Current air humidity
Buzzer ON or OFF	Beeper alarm on/off indicator
	Human or plant mode
	Flashing when relay is ON
	ON when detected light is >60 lux for 10 sec
Center	Center value for relay control
Max	Max. CO_2 of displayed chart
Min	Min. CO_2 of displayed chart
Zone	Zone value for relay control
CO_2 Chart	CO_2 trend in graphic
Time scale	Chart time scale. Includes week, day, hour & minute.

Menu	Enter setup mode.
↵	Save and finish settings.
▲	Select mode or increase value in setup.
▼	Select mode or decrease value in setup.
Time	Press to select preferred time scale of CO_2 chart.
Esc	Quit setup mode.
Max/Min	Press to switch between zone/center or max/min.



verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

OPERATION

POWER ON

Plug the power plug into the mains socket to turn the controller on. The device will start with a short beep and performs 10 sec. countdown to warm up the sensor.

Besides, the green color power LED on sensing probe will turn on as well to indicate the probe is working.

Unplug the power plug to turn off the meter. While power on the meter again, the meter will retain the same setting from last operation, except the chart time will stay as 1 day while re-powered.

TAKING MEASUREMENT

The meter starts taking measurement after power on and updates readings every second. If your application is for green house CO_2 control, no initial setup is needed.

In the condition of operating environment change (ex. from high to low temp.), it takes 30 sec to respond for CO_2 change. Do not hold the sensing probe close to face in case that exhalation affects CO_2.

The device constantly displays current ambient CO_2, humidity, temperature, set center value and set zone value.



Trend Chart Zone

Below is a table that shows the available time scale and the duration of each division for corresponding scale:

Time Span	Time per division
1min	5sec/div
1hour	5 min/div
1day	2 hour/div
1week	0.5 day/div

Using **Time** to toggle the available time scale.

verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

MAX/MIN of displayed chart

At the upper and lower side of the displayed chart, there are two CO_2 value indicators: Max and Min.

Simply press (Max/Min) to switch from zone/center to Max and Min.

While you press time key to change the chart time scale, these value update as well.

Colorful LED Display

Big colorful LED display provides you good viewing distance from far, even in dim places. The brightness is also adjustable. See page 10

Auto Detect Day/Night

In greenhouse application, CO_2 control is not necessary while light is weak. The built-in Photo-Cell sensor in CO_2 sensing probe can automatically detect whether it is Day (above 60 Lux) or Night (less than 20Lux). It can override the CO_2 control and shut off the CO_2 generator by turning off the output power during the night. Conversely, if the Photo-Cell detects light (>60Lux) and the CO_2 level is consistently low for 30 seconds, the device will start the CO_2 generator by turning on output power.

Above auto detect Day/Night function is ignored while users pick up " Human" mode in advanced setting. With auto detection is ignored, the relay output control is only decided by CO_2 value, Day or Night has no influence in human mode.

Relay Output Control

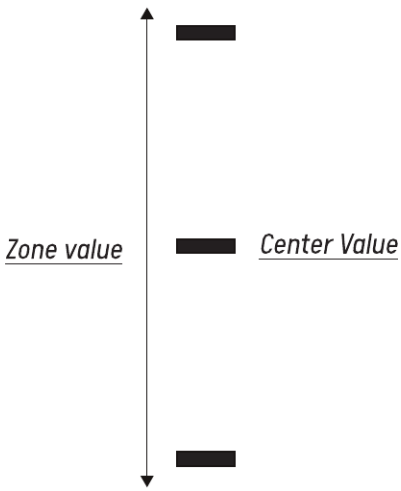
Output power is turned ON when CO_2 value is lower than set Center-(1/2) set Zone. When CO_2 concentration is above set Center+(½) set Zone, the output power is cut OFF.

For example, if the Set Center is 1200ppm, and the Set zone is 400ppm, the output power is ON when CO_2 is below 1000ppm *1200-(½)*(400)=1000ppm.*

And the output power will shut off when CO2 over 1400ppm. *1200+(½)*(400)=1400ppm.*

Above output control pattern is opposite while users pick up " Human" mode. In Human mode, if the Set Center is 1200ppm, and the Set zone is 400ppm, the output power will turn on when CO2 is above 1400ppm *1200+(1/2)*(400)=1400ppm.*

And shut off when CO2 is below *1000ppm.1200-(½)*(400)=1000ppm.*



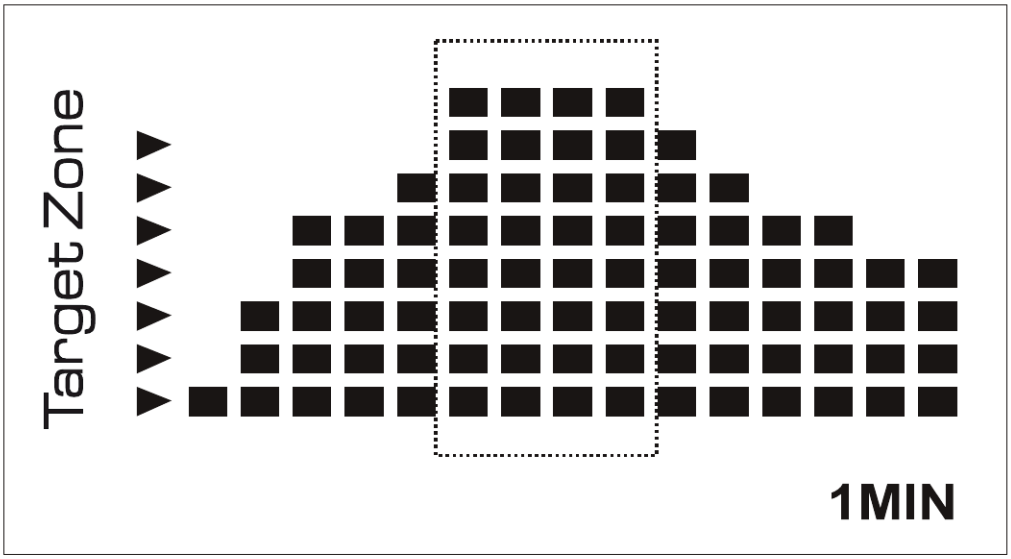
verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

Target Zone indicator:

From displayed chart, users can easily know whether the history CO_2 reading is inside the controlling target zone or not by checking the chart.

Target zone is indicated by triangle icons.

For example, below picture shows in the past 75 seconds that most time CO_2 is in target zone, only 20 seconds are over the target zone.



Buzzer Alarm

Buzzer alarm default as OFF, you may go for setup mode to turn on the buzzer alarm function (see page 10).

While the buzzer is on, it beeps when CO_2 value is overSet Center+Set zone, and off when CO_2 concentration is below Set Center+Set zone.

For example, if the Set Center is 1200ppm, and the Set zone is 400ppm, the beep will start when CO_2 is over 1600ppm.

1200+400=1600ppm

And buzzer off when CO2 drop to below 1600ppm.

This high alarm buzzer feature acts the same on both Plant & Human mode.

verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

SETUP

This device provides varieties setting so you can choose the one best for your application.

Press **Menu** under normal mode to enter setup mode.

Press UP ▲ or DOWN ▼ to choose the needed setup function and then press ↵ to enter.

To exit setup, press ESC **Esc** few times till it returns to normal mode. If none of the keys are pressed within 1 min, the device will automatically return to normal status.

The selectable features and adjustable range are shown below:

Feature	P No.	Default	Adjustable range
Center	P1	1200ppm	400-3000ppm, 50ppm/step
Zone	P2	400ppm	50-990ppm 10ppm/step
Calibration	P3	400ppm	Long press Enter to execute or press ESC to quit .
Advanced	P4		
Buzzer ON/OFF	P4 .1	OFF	ON or OFF
Temp Unit	P4 .2	°C	°C °or F
Brightness	P4 .3	4	1 to 4. 4 is most bright
Restore	P4 .4	N/A	Long press Enter to execute or press ESC to quit .
Mode	P4 .5	Plant	Plant or Human
Altitude	P4 .6	0 meter	0 to 5000 meters high 50 meters/step

Mode

To select Plant mode, your relay output will be activated while CO_2 value is lower than threshold.

To select Human mode, your relay output will be activated while CO_2 value is higher than threshold.

Altitude

For users in higher altitude area, this feature provides meter a factor to compensate the displayed CO_2 value.

Restore

To restore to factory default, press **ENTER** for 3 seconds till an audible beep. Now, all Center/Zone/Chart time/Calibrate/Altitude will all restore to 1200 ppm/400-ppm/1Day and 0M. This restore function won't revert the CO_2 probe to factory calibration if you already calibrate it by your own.

verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

CO_2 CALIBRATION

The meter is calibrated at standard 400ppm CO_2 concentration in factory already. You just need to check the performance (see page 4) before the first time use. Often re-calibration is not required.

While the accuracy of this device is a concern, you may use this function to calibrate by using outdoor fresh atmospheric air which is around 400ppm on theory.

Do not calibrate the meter in the air with unknown CO_2 level. Otherwise, it will be taken as 400ppm and leads to inaccurate measurements.

It is suggested to do calibration in sunny day to ensure the fresh air is closed to 400ppm.

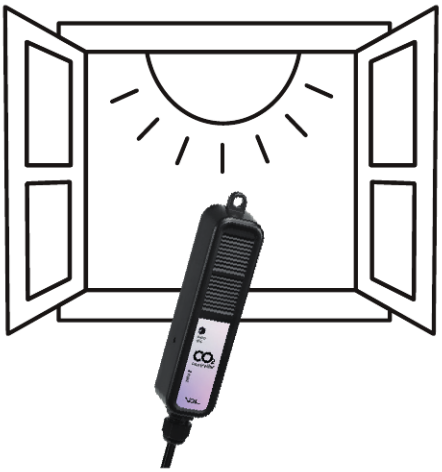
First leave the sensor in outdoor fresh air for 5 mins before you pressing key to execute calibration.

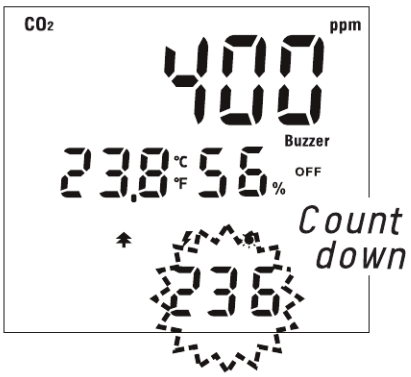
See page 10 to enter the CO_2 calibration mode (P3). While in calibration mode, press ENTER (↵) longer than 3 seconds to till hearing beep sound and meter start to execute calibration. You shall see a 250 seconds count down in the middle of display.

After count down, it will show " save" to indicate the calibration is successful or show " fail" to indicate error. See page 13 for error code.

To quit, press ESC to quit. Before count down is completed, you can also press ESC to escape without saving the result.

Make sure the device is far away from CO_2 source, not in direct sunlight, and not exposed to water.





verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

TROUBLE SHOOTING

Can't power on	Check whether the power is well plugged. Check whether the fuse is damaged
Slow response	Check whether the air flow channels on the sensing probe is blocked.
CO2 reading is "E01"	E01 means probe is damaged or connection fail. Please re-connect CO2 probe. If not work, contact after sales service.
CO2 reading is "E03"	E03 means the measured value is higher than 9999ppm. Move the sensor to fresh air for 5 mins to revert it to normal display. If not work, contact after sales service.
CO2 calibration shows "Fail"	If meter is calibrated in a place with unknown CO2 condition and that condition is really too high for calibration, " Fail" will show up as reminder. Please find a suitable location with outdoor fresh air for calibration purpose.
Error messages	E2 in RH or Temp. means the measured humidity is below 5% or temperature is below 0oC. Please move the probe to room temperature with good ventilation to get it back to normal. If not work, probe might be damaged due to the condensation. Contact after sales service. E3 in RH or Temp. means the measured humidity is above 95% or temperature is above 50oC. Please move the probe to room temperature with good ventilation to get it back to normal. If not work, probe might be damaged due to the condensation. Contact after sales service.

verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

SPECIFICATION

Measuring range	
CO2/RH/T	0-9999 ppm, 5-95% RH,0.0-50.0oC (32-122oF)
Resolution	1ppm (0-1000); 5ppm (1000-2000); 10ppm (>2000) 1% RH,0.1oC
Accuracy	
CO2 below 2000ppm	±50ppm±5% of reading
CO2 above 2000ppm	<±10% of reading
Temperature	+0.6oC/+0.9oF
Humidity	+5%RH (at 25oC, 10-90%RH) ; +7%RH (at 25oC , other range)
Warm-up time	30 seconds
Response time	
CO2	<30 seconds (63% step change)
Tair	<2 mins (90% step change)
Humidity	<20 minutes (90% step change)
Display size	133 x 88 mm
Meter size	188 x 115 x 50 mm
Sensor size	124 x 33 x 26 mm ; Cable length: 4.5 meters
Operating condition	0-50oC , 5-95% RH (avoid condensation)
Storage condition	-20- 60oC,5-95%RH(avoid condensation)
Power supply	AC100-240VAC
Socket load / Fuse	5A@250VAC;10A@120VAC / Fuse:250V/10A 5x20mm
Weight	1044g
Standard package	Sensor unit, monitor& controller unit, manual, screws

verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com

CO_2 LEVELS AND GUIDELINES

Plant

This CO_2 is default as 1200ppm for center of target zone and 1200ppm is suitable for most application. However, you still can adjust center and zone value to customize a best controlling output for your plant!

Human

NIOSH recommendations

250-350ppm: normal outdoor ambient concentrations

600ppm: minimal air quality complaints

600-1000ppm: less clearly interpreted

1000ppm: indicates inadequate ventilation; complaints such as headaches, fatigue and eye/throat irritation will be more widespread. 1000ppm should be used as an upper limit for indoor levels.

EPA Taiwan: 600ppm and 1000ppm

Type 1 indoor areas such as department stores, theaters, restaurants, libraries, the acceptable CO2 concentration of 8 hours average is 1000ppm.

Type 2 indoor areas with special requirements of good air quality such as schools, hospitals, day care centers, the suggested CO2 level is 600ppm.

ASHRAE Standard 62-1989: 1000ppm

CO_2 concentration in occupied building should not exceed 1000ppm.

Building bulletin 101 (BB101): 1500ppm

UK standards for schools say that CO2 at averaged over the whole day(i.e. 9am to 3.30 pm) should not exceed 1500ppm.

OSHA: 5000ppm

Time weighted average over five 8-hour work days should not exceed 5000ppm.

Germany, Japan, Australia, UK...: 5000ppm

8 hours weighted average in occupational exposure limit is 5000ppm.

verdetop
Gracias por confiar en Verdetop
Más información, fichas y asesoramiento en verdetop.com
www.verdetop.com