

# User's Guide

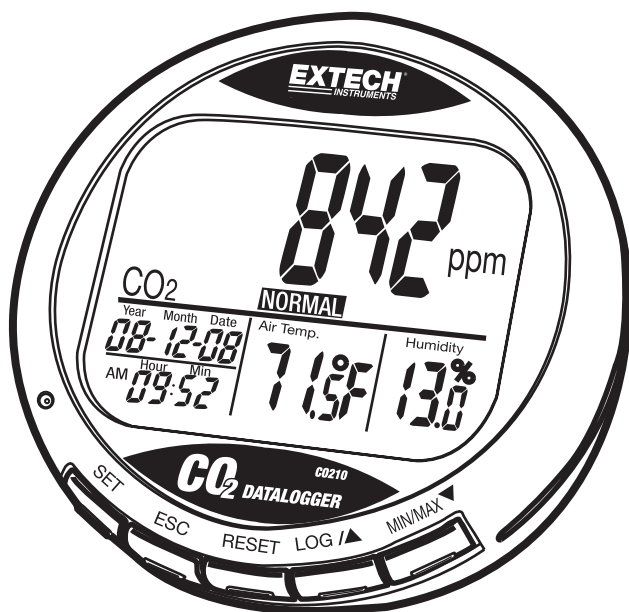
# **EXTECH**<sup>®</sup>

**INSTRUMENTS**

A FLIR COMPANY

## CO<sub>2</sub> Monitor and Datalogger

### Model CO210



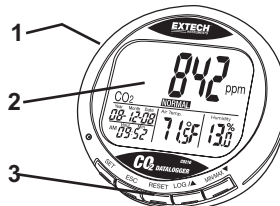
## Introduction

Congratulations on your purchase of this Model CO210 Carbon Dioxide Meter. This meter measures and datalogs CO<sub>2</sub> level, air temperature, humidity, date and time. With visible and audible alarms, this is an ideal instrument for indoor air quality (IAQ) diagnosis. This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

## Meter Description

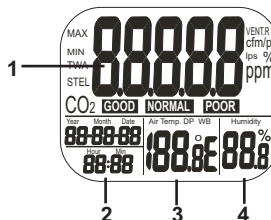
### Meter

1. CO<sub>2</sub>, Temp and RH sensors (rear)
2. LCD display
3. Controls



### LCD Display

1. CO<sub>2</sub> concentration in ppm
2. Date and Time
3. Air Temperature
4. % Relative Humidity



### Symbols

|            |                                     |
|------------|-------------------------------------|
| ppm        | CO <sub>2</sub> value               |
| GOOD       | CO <sub>2</sub> air quality level   |
| NORMAL     | CO <sub>2</sub> I air quality level |
| POOR       | CO <sub>2</sub> air quality level   |
| Air Temp   | Air Temperature                     |
| Humidity % | Relative Humidity                   |
| °C or °F   | Celsius or Fahrenheit               |
| MAX/MIN    | Maximum or Minimum reading          |

### Controls

|           |   |
|-----------|---|
| SET       | Enters setup mode.<br>Saves and finishes settings.  |
| ESC       | Exits setup page/mode.<br>Terminates calibration / Datalogging                                  |
| RESET     | Press to clear the MAX/MIN. -<br>Terminates during RH calibration.                              |
| LOG ▲     | Selects mode or increases value in setup<br>Start Datalogging                                   |
| MIN/MAX ▼ | Activates MAX, MIN function.<br>Enters CO <sub>2</sub> calibration with <b>SET</b> and <b>▲</b> |

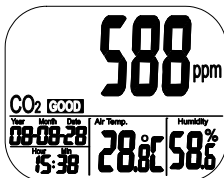
## Operation

---

### POWER ON

Plug in the adaptor and the meter turns on automatically with a short beep. If the voltage is too high or low, "bAt" will display on the LCD and an LED will flash.

The LCD will display current CO<sub>2</sub>, temp., humidity, date and time. The air quality level is displayed as well



### TAKING MEASUREMENT

The meter starts measurements when powered on and updates readings every second. If the operating environment changes (ex. from high to low temp.), it takes 2 minutes for the CO<sub>2</sub> sensor to respond and 10 minutes for RH change.

NOTE: Do not hold the meter close to your mouth or any other source of CO<sub>2</sub>.

### MAX/MIN

In the normal mode, press the MIN/MAX button to see the minimum and maximum of CO<sub>2</sub>, Temperature and Humidity. Each press of MIN/MAX button will sequence through the MIN, MAX display and then returns to normal mode.

Press and hold the RESET button for more than 1 second to clear the minimum and maximum value from memory.

### DATA LOGGING

The meter can record readings of CO<sub>2</sub>, , temperature and humidity for long time environment monitoring. The memory capacity is 15999 points (5,333 RH, Temperature and CO<sub>2</sub> records) . The sample rate is adjustable from 1 second to 4 hours 59 minutes and 59 seconds.

After the sampling rate is selected, press the **LOG** button for 2 seconds in the normal mode to start logging. The green LED light blinks to indicate the logging status and the LCD main display will alternate between real time CO<sub>2</sub> value and "rEC". The lower displays are the real time temperature, humidity and clock.

To terminate data logging, press the **ESC** button" for 2 seconds. The LED will stops blinking and the LCD main display will alternate between real time CO<sub>2</sub> value and "End". Hold down the ESC button for 2 seconds again and it the meter returns to normal measurement mode.

Minimum and Maximum recall continues working during logging.

The memory is cleared whenever a new logging session is activated.

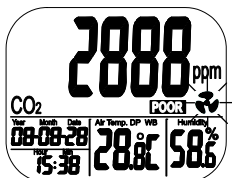
## ALARM

The meter features an audible alarm which will give warnings when the CO<sub>2</sub> concentration exceeds the set limit. There are two settable limits, an upper limit that initiates the alarm and a lower limit to stop the alarm.

The meter emits beeps and displays the fan icon on the display when the CO<sub>2</sub> level goes over the upper limit. The audible alarm can be stopped by pressing any key or it automatically stops when CO<sub>2</sub> reading falls below the lower limit.

If the beeper is temporarily shut down, it will sound again when readings fall below lower limit and then go over the upper limit again or if the user presses the RESET button for more than 1 second to activate it.

The fan icon keeps flashing when beeps are manually shut down. It stops only when readings fall under the lower limit

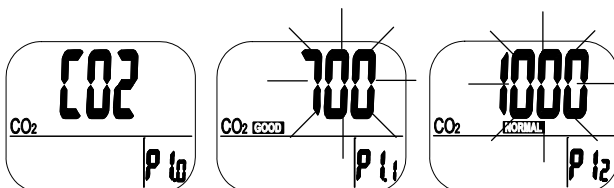


## SETUP (Alarm level, Temperature scale, Real Time clock)

Hold the SET button, in the normal mode, for more than 1 second to enter the setup mode.

### P1.1 CO<sub>2</sub> ALARM: GOOD LEVEL

When entering the setup mode, P1.0 and "CO<sub>2</sub>" are displayed on the LCD. Press the SET button again to go into P1.1 for setting the CO<sub>2</sub> upper limit for the GOOD level. The current set value will be blinking on the display.



Press the LOG/▲ or MIN/MAX▼ button to increase or decrease the value. Each press adjusts in 100ppm increments. The alarm range is 0 to 700ppm.

When the value has been set, press the SET button to confirm the GOOD limit and to proceed to P1.2 for setting the upper NORMAL limit. Press the ESC button to exit without saving the setting.

### P1.2 CO<sub>2</sub> ALARM: NORMAL LEVEL

P1.2 is used for setting the CO<sub>2</sub> upper limit for the NORMAL level. The current set value will be blinking on the display.

Press the LOG/▲ or MIN/MAX▼ button to increase or decrease the value. Each press adjusts in 100ppm increments. The alarm range is 700 to 1000ppm.

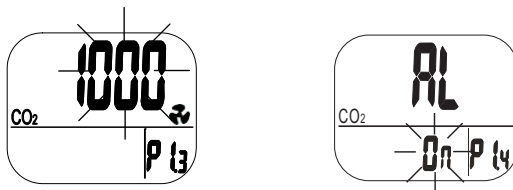
When the value has been set, press the SET button to confirm the NORMAL limit and to proceed to P1.3 for setting the upper POOR limit. Press the ESC button to exit without saving the setting.

### P1.3 CO2 ALARM: BEEP ALARM

P1.3 is used for setting the CO<sub>2</sub> upper limit for the BEEPER ALARM level. The current set value will be blinking on the display.

Press the **LOG/▲** or **MIN/MAX▼** button to increase or decrease the value. Each press adjusts in 100ppm increments. The alarm range is 1000 to 5000ppm.

When the value has been set, press the **SET** button to confirm the limit and to proceed to P1.4 or press the **ESC** button to return to P1.0.

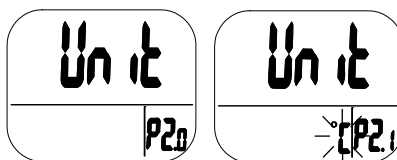


### P2.0 TEMPERATURE SCALE

Press the **LOG/▲** button in P1.0 mode to access P2.0 for setting the temperature scale.

Press the **SET** button to go into the P2.1 setting mode. The °C or °F will blink.

Press the **LOG/▲** button to change the units. Press the **SET** button to confirm the setting or press the **ESC** button to exit without saving and return to P2.0.

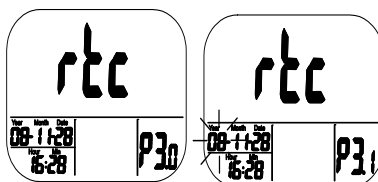


### P3.0 REAL TIME CLOCK

Press the **LOG/▲** button in P1.0 twice to access P3.0 for setting up real time clock. Press the **SET** button and the meter goes into P3.1 with blinking year in the lower left display. To change the year, press the **LOG/▲** button or the **MIN/MAX▼** button. Press the **SET** button to save the setting and then enter P3.2 or press the **ESC** button return to P3.0 without saving the setting.

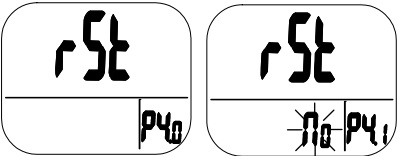
Press the **LOG/▲** button P3.1 to access P3.2. The current month setting will blink. To change the month, press the **LOG/▲** button or the **MIN/MAX▼** button. Press the **SET** button to save the setting and then enter P3.3 or press the **ESC** button return to P3.0 without saving the setting.

Repeat as above to finish the setting of P3.3 (Date), P3.4 (Hour) and P3.5 (Minute)



**P4.0 RESET**

Press the **LOG/▲** button in P1.0 three times to access P4.0 to reset the meter to default settings. Press the **SET** button and the meter will go to P4.1 with a blinking “No”. Press the **LOG/▲** to switch the status then press either the **SET** button to save the settings or the **ESC** button to exit without saving the settings.

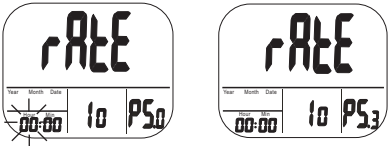


If “Yes” is selected the meter defaults to the following settings:

| Parameter | Default |
|-----------|---------|
| P1.1      | 700ppm  |
| P1.2      | 1000ppm |
| P1.3      | 1000ppm |
| P2.1      | °C      |
| P4.1      | No      |

**P5.0 SAMPLING RATE**

Press the **LOG/▲** button in P1.0 three times to access P5.0 to set the logging sample rate. The available range is 1 second to 4 hours 59 minutes. Press the **SET** button and the meter will go to P5.1 with blinking hour digits. To change the hour, press the **LOG/▲** button or the **MIN/MAX▼** button. Press the **SET** button to save the setting and then repeat the procedure for P5.2 minutes and P5.3 seconds. Press the **ESC** button return to P5.0 without saving the setting.



## Calibration

---

### CO<sub>2</sub> CALIBRATION

The meter is calibrated to a standard 400ppm CO<sub>2</sub> concentration at the factory

**NOTE:** When the accuracy becomes a concern or after a year of use, return the meter to Extech for calibration.

**CAUTION:** Do not calibrate the meter in an atmosphere of unknown CO<sub>2</sub> concentration.

### ABC (Automatic Baseline Calibration)

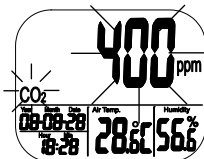
ABC (Automatic Baseline Calibration) establishes a baseline calibration to eliminate the zero drift of the infrared sensor. The ABC function is always “ON” when the meter is turned on. ABC is designed to calibrate the meter at the minimum CO<sub>2</sub> reading detected during 7.5 days continuous monitoring (power on). It assumes that the area being tested receives fresh air with a CO<sub>2</sub> level of approximately 400ppm at some period of time during the seven days. **It is not suitable to use desktop CO<sub>2</sub> in closed areas with consistently high CO<sub>2</sub> levels 24 hours a day.**

### Manual Calibration

Manual calibration is suggested to be done outdoors on a sunny day with good ventilation and fresh air where the CO<sub>2</sub> level is approximately 400 ppm. Do not calibrate on a rainy day because high humidity will affect the CO<sub>2</sub> level in air.

Do not calibrate in places crowded with people or close to where high CO<sub>2</sub> concentrations may exist such as ventilating outlets or fireplaces.

Place the meter in the calibration site. Turn on the meter and hold down the **SET**, **▲** and **MIN/MAX ▼** buttons simultaneously for more than 1 second to enter CO<sub>2</sub> calibration mode. “400ppm” and “CO<sub>2</sub>” will blink while the calibration is in process.



The calibration will take about 30 minutes. When the calibration is complete, the blinking stops and the meter returns to normal operation. To abort the calibration, press the RESET button for more than 1 second.

**Note:** Keep away from any animal, human or plant which might affect the CO<sub>2</sub> concentration during the calibration.

## Software

---

The Windows based pc software provided is used to set-up the datalogger, download data and to view the data in graphical or text format. After installing the software, view the HELP file for operational information.

# Maintenance

## CLEANING AND STORAGE

1. The meter should be cleaned with a damp cloth and mild detergent when necessary. Do not use solvents or abrasives.
2. Store the meter in an area with moderate temperature and humidity.

# Specifications

| Function    | Range                      | Resolution | Accuracy                              |
|-------------|----------------------------|------------|---------------------------------------|
| CO2         | 0 to 9999ppm               | 1ppm       | ±(5%rdg +50ppm)                       |
| Temperature | -10 to 60°C<br>14 to 140°F | 0.1°       | ±0.6°C/0.9°F                          |
| Humidity    | 0.1 to 99.9%               | 0.1%       | ±3%(10 to 90%)<br>±5%(< 10% or > 90%) |


|                      |  |
|----------------------|--|
| Display              | LCD  |
| Sensor Type          | CO2: NDIR (non-dispersive infrared) technology<br>Humidity: Capacitance sensor;<br>Temperature (air): Thermistor |
| Response             | CO2: <2min for 90% step change<br>Temp: <2min for 90% step change<br>%RH: <10min for 90% step change             |
| Datalogging          | Up to 15999 points   |
| Sample rate          | 1 second to 4 hours-59 minutes-59 seconds  |
| Operating Conditions | -10 to 60°C (14 to 140°F); < 90% RH non-condensing   |
| Storage Conditions   | -20 to 60°C (-4 to 140°F); <99% RH non-condensing  |
| Power Supply         | 5VDC (±10%), ≥ 500mA (AC adaptor supplied)   |
| Dimensions / Weight  | 117x102x102mm (4.6x4x4"); 204g (7.2 oz.)   |





## TROUBLESHOOTING

|                                    |  |
|------------------------------------|--|
| Can't power on:                    | Check whether the adaptor is properly plugged in.  |
| Slow response:                     | Check whether the air flow channels on the rear of the meter are blocked.                      |
| "BAT" and green LED keep flashing: | The adaptor output voltage is too high or too low. Please use the adaptor with correct output. |

### Error Codes:

| CO <sub>2</sub> Display |            |   |
|-------------------------|---|---|
| E01                     | CO <sub>2</sub> sensor is damaged   | Send back for repair  |
| E02                     | CO <sub>2</sub> reading is under the lower limit  | Re-calibrate the meter, if it still appears, return for repair  |
| E03                     | CO <sub>2</sub> reading is above the upper limit  | Put the meter in fresh air and wait for 5minutes, if it still appear, re-calibrate the meter. If above two methods faile, return for repair |
| E17                     | ABC mode of CO <sub>2</sub> senor has failed and might cause wrong CO <sub>2</sub> readings | Send back for repair  |

| Temp Display |  |  |
|--------------|---|--|
| E02          | Air temp. measurement is under the lower limit                                    | Put the meter in regular room temperature for 30 minutes, if it still appears, return for repair |
| E03          | Air temp. measurement is over the upper limit                                     | Put the meter in regular room temperature for 30 minutes, if it still appears, return for repair |
| E31          | Temp. sensor or measuring circuit is damaged                                      | Return for repair  |

| Humidity Display |  |   |
|------------------|---|---|
| E04              | Air temp. measurement has error code  | Refer to temperature error code for problem solving |
| E11              | The RH calibration has failed   | Please return for repair                            |
| E34              | RH sensor or measuring circuit has failed   | Return for repair                                   |

## ***CO<sub>2</sub> Levels and Guidelines***

---

### Non-Enforced Reference levels:

- 250 - 350 ppm – background (normal) outdoor air level
- 350- 1,000 ppm - typical level found in occupied spaces with good air exchange.
- 1,000 – 2,000 ppm - level associated with complaints of drowsiness and poor air.
- 2,000 – 5,000 ppm – level associated with headaches, sleepiness, and stagnant, stale, stuffy air. Poor concentration, loss of attention, increased heart rate and slight nausea may also be present.
- >5,000 ppm – Exposure may lead to serious oxygen deprivation resulting in permanent brain damage, coma and even death.

### Regulatory exposure limits:

ASHRAE Standard 62-1989: 1000ppm: CO<sub>2</sub> concentration in occupied building should not exceed 1000ppm.

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

Building bulletin 101 (Bb101): 1500ppm. UK standards for schools say that CO<sub>2</sub> at averaged over the whole day (i.e. 9am to 3.30 pm) should not exceed 1500ppm.

Germany, Japan, Australia, UK: 5000ppm, 8 hours weighted average occupational exposure limit is 5000ppm.

**Copyright © 2011 Extech Instruments Corporation (a FLIR company)**

All rights reserved including the right of reproduction in whole or in part in any form.

[www.extech.com](http://www.extech.com)