

# OPERATION MANUAL

## PORTABLE IAQ METER



**CO2+RH+TEMP.  
IAQ METER/LOGGER**

## **INTRODUCTION**

Thank you for purchasing this portable IAQ meter. The meter measures CO<sub>2</sub> level, air temp., dew point, wet bulb temp. and humidity and is an ideal instrument for indoor air quality (IAQ) diagnosis.

Poor indoor air quality is considered unhealthy because it causes tiredness, loss of ability to concentrate, and even illness(ex. Sick Building Syndrome). IAQ monitoring and survey, especially on CO<sub>2</sub> level and air ventilation become widely applied in public areas such as offices, classrooms, factories, hospitals and hotels. It is also suggested in regulations of industrial hygiene in some countries. (Appendix)

The portable CO<sub>2</sub> meter uses NDIR (non-dispersive infrared) technology to ensure the reliability and long term stability. It's useful in verifying HVAC system performance and air ventilation control.

## **MATERIAL SUPPLIED**

This package contains:

- ✓ Meter
- ✓ 4pcs AA batteries
- ✓ Operation manual
- ✓ Mini USB cable and software CD
- ✓ Soft carrying case

## FEATURES

- Big LCD display with blue backlight to use in dark area
- One touch to display CO<sub>2</sub> /Dew point temperature/Wet bulb temperature/ Air temperature/Humidity in turns.
- Designed with NDIR (non-dispersive infrared) Waveguide technology CO<sub>2</sub> sensor
- Programmable warning CO<sub>2</sub> level
- Long time drift compensation on CO<sub>2</sub> sensor
- Audible alarm (~80db)threshold setting
- Max ,Min, average functions included
- Mini USB output every 2 seconds to pc for analysis
- 99 points manually recording
- 30000 points automatic recording
- Review 99 points manual record
- Hold function freezes current readings
- Housing design surrounds with rails to help air ventilation for quick & accurate response
- Easy to manually calibrate at fresh air around 380-420ppm

## POWER SUPPLY

The meter is powered by either 4 AA batteries or a DC adaptor(5V/1A output).

Install the batteries into the battery compartment on the bottom and make sure they are in correct polarity and good contact. When an adaptor is used, it will cut off the power supply from batteries. The adaptor can't be used as a battery charger.

When battery voltage gets low,  will appear on the LCD (Fig.1).

The CO<sub>2</sub> sensor can't work normally under low voltage, please replace with fresh batteries or connect with an adaptor.

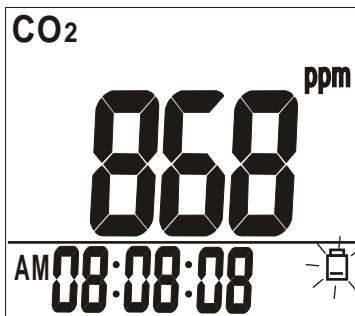
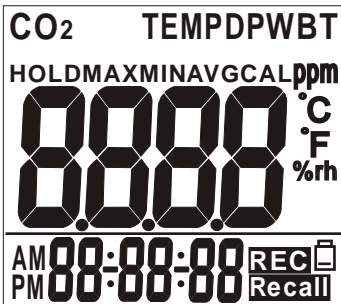



Fig.1

## LCD DISPLAY




### Symbols

UpperLCD	CO <sub>2</sub> /Temp/RH....reading
LowerLCD	Real time display
CO <sub>2</sub>	Carbon dioxide reading
HOLD	Readings are freezed unchanged
MIN/MAX	Minimum/Maximum readings
AVG	Average reading
	Low battery indicator
DP	Dew point temperature
TEMP	Air temperature
WBT	Wet bulb temperature
%rh	Unit of relative humidity
°C/°F	Celsius/Fahrenheit of temp.
CAL	In calibration status
REC	In manual/automatic logging
RECALL	In manual records recall mode

## KEYPAD



Turns on and off the meter.  
Enters setup mode while meter is off.  
Turn on with  to become non-sleep mode



Exits setup/recall page.  
Start automatic logging.



Press to switch displayed mode.  
Long press to enter memory recall mode.



Freezes the current readings.  
Selects unit or increases value in setup.  
Cancels data hold function.



Press to manually record the reading.  
Selects unit or decreases value in setup.



Activates MIN, MAX, AVG function.  
Saves and finishes settings.

## OPERATION

### POWER ON/OFF



Press  to turn the meter on and off. At power up, it emits a short beep and performs 30 seconds countdown (Fig.2) for meter warm up, then enters normal mode with current CO<sub>2</sub> and real time displayed (Fig.3). The real time display date and time in turns.



Fig.2




Fig.3

Suggest to wait for 30 seconds warm up time. For quick start, you may press  for 2 seconds to end the warm up and entering normal display.

### TAKING MEASUREMENT

The meter starts measurement when power on and update readings every second. In the condition of operating environment change (ex. from high to low temp.), it takes 30 sec to respond for CO<sub>2</sub> sensor and 30 minutes for RH.  
**NOTE:** Do not hold the meter close to faces in case exhalation affects CO<sub>2</sub> levels.

## CO2 (Carbon Dioxide)

Press  to switch the mode to CO2. User can get the CO2 reading in ppm unit on main display.(Fig.4). The lower display shows the real time clock.

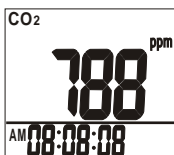


Fig.4

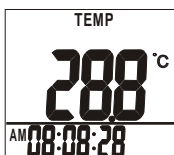


Fig.5

## AIR,DP,WBT


Press  to switch to temperatures display(Fig.5,6,7).The lower display shows the real time clock.



Fig.6



Fig.7

## Humidity




Press  to switch to humidity display. (Fig.8).The lower display shows the real time clock.



Fig.8

## DATA HOLD

In normal display mode, press  to freeze the readings, "HOLD" icon is flashed on the left top of LCD(Fig.9). All current readings are kept unchanged. Press  again to cancel the hold function.

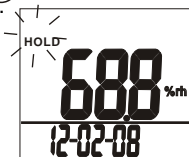


Fig.9

### NOTE:

THE HOLD FUNCTION IS DISABLE IN MIN/MAX/AVG MODE.

## BACKLIGHT

The backlight will be activated for 10 seconds by pressing any key.

## MIN,MAX,AVG,CURRENT REVIEW





This meter allows you to check the minimum, maximum, average, current value from the moment you press the  key. Under normal mode, press  to see the minimum, maximum, average and current value in turns. Each press of , it displays MIN, MAX, AVG, current value in sequence. (Fig.10~12). To return to normal mode, press  key to escape(Fig.13)



Fig.10

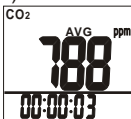


Fig.11



Fig.12




Fig.13



In this max/min/avg/current modes, it shows the corresponding readings on main display and the **accumulated time** of how long you are in this mode. (Fig10 ~12). The maximum time interval for this function is 18 hours.

In this mode, press  to switch the displayed parameters. Fig 14.

The displayed sequence in this mode is min→max→avg→ current→min→max..... Press  key can immediately leave this mode and return to normal display.

Distinguishing the normal display and current review by checking the time display format. In normal display, the date & time displayed in turns. In current review, the display is the **accumulated time** of how long you are in max/min mode.




Fig.14

**NOTE:**  
“HOLD” & “MANUALLY RECORD” & “RECALL”  
FUNCTION ARE DISABLE IN MIN/MAX/AVG MODE.

### **MANUALLY RECORDING**

The meter features 99 point memories.


In normal or hold mode, Press  key to record, **REC** icon and main display flash for about 3 seconds. The main display shows the memory serial number, at most 99 points. (Fig. 15)

Each memory contains all parameters (CO2, TA, %rh, DP, WBT), not only the

parameter you choose to see on main display.




Fig.15

If the reading changes quickly, you can press  to freeze the reading before manually recording the data.

The manually recording function is disabled in min/max mode.

### 99 MEMORIES RECALL

The meter features 99 point memories review function.

In normal or hold mode, press  key for more than 2 seconds until the **Recall** icon flashes.



Press  or  to scroll the memories. The memory serial number displays on main LCD first and reading comes after. (Fig .16&17)



Fig.16

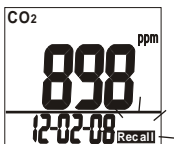


Fig.17



Press  key to switch the display parameter. (Fig.18)



Fig.18

The time displayed in memory recall mode is the recording time of this memory.

To escape the memory recall mode, press  key to leave and return to normal display.

## ALARM

The meter features audible alarm to give warnings when CO<sub>2</sub> concentration exceeds the limit. (See P20 in setup for setting alarm threshold). It emits beeps (Abt. 80dB) when CO<sub>2</sub> level goes over the set value and stops only when the readings fall below the set value. It beeps again when value goes over the limit.

## DATA LOGGING

The meter can automatically record readings of CO<sub>2</sub>/TEMP./RH for long time environment monitoring. The memory capacity is 10000 points for each parameter. Users can set up sampling rate from 1 second to 4 hours 59 minutes and 59 seconds (See SETUP P40).



After sampling rate is selected, press  for 2 seconds under normal mode to start logging. The **REC** icon flashes to indicate the logging status and LCD main display shows the real time CO<sub>2</sub> value. Lower displays are the real time clock. (Fig.19)





Fig.19

To terminate data logging, press  for 2 seconds, **REC** icon stops flashing

While press  to start the logging again, the previous logging records are overwrite.

Press  key to switch to the mode you want to see. Except the mode switch function, min/max, manual record, hold and recall functions are all disabled during logging.

## AUTO POWER OFF

The meter turns off automatically after 20 minutes of inactivity. To override the function, hold down  and  for 2 seconds to turn on the meter until “n” appears.(Fig.20)

### **NOTE:**

**AUTO SLEEP FUNCTION WILL BE DISABLED DURING CALIBRATION MODE.**

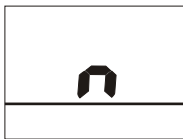




Fig.20




Fig.21

## SETUP

When the meter is off, hold down  for more than 1 sec to enter setup mode. To exit setup, press  in P10 ~ P60 and it returns to normal mode. (Fig.21)

## P10: 99 MEMORIES CLEAR

When entering setup mode, P10 and “CLr” (Fig.21) are displayed on the LCD. Press  to go into P11 and decide to clear or keep all the manual records. The current set will be blinking on LCD (Fig.22).

Press  or  to choose NO or YES and press  to confirm.



Fig.22

Press  to escape and return to P10.

## P20: CO2 ALARM






When entering setup mode, P20 and “ALAr” (Fig.23) are displayed on LCD. Press  to go into P21 for setting CO2 alarm threshold. The current set value will be blinking on LCD (Fig.24). Press  to increase the value or  to decrease. The selectable alarm limits are 100~9900ppm, each press tunes 100ppm. When the preferred alarm value is set, press  to save the setting or  without saving and return to P20.




Fig.23



Fig.24

## P30 TEMPERATURE UNIT

When entering setup mode, P30 and "unit" (Fig.25) are displayed on the LCD. Press  to go into P31 and decide the temperature unit.

The current set will display on LCD (Fig.26).

Press  or  to choose °C or °F and press  to confirm.

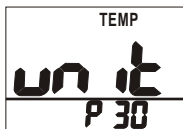


Fig.25

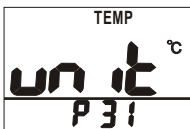


Fig.26

Press  to escape and return to P30.

## P40: LOGGING SAMPLING RATE

Go into P40 for setting sampling rate of data logging (Fig.27). The range is from 1 second to 4 hours 59 minutes and 59 seconds.








Press  and it goes into setting with blinking Hour digits on the lower display. To change the digit, press  to increase and  to decrease. Press  to confirm and enter Minute setting. Press  again to confirm and enter Second setting (Fig.28). Press  to confirm the rate setting or  without saving and return to P40.




Fig.27



Fig.28

## P50 PRESSURE COMPENSATION

When entering setup mode, P50 and "PrES" (Fig.29) are displayed on the LCD. Press  to set pressure compensation value for CO2 measurement.

The current set will flash on LCD (Fig.30). The barometric pressure unit is kpa.

Press  or  to adjust the pressure value and press  to confirm.

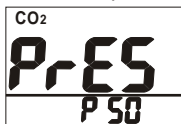


Fig.29

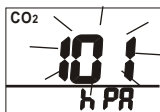









Fig.30

Press  to escape and return to P50.

## P60:REAL TIME CLOCK

Go into P60 for setting the real time clock of this meter.

Press  and it goes into P61 to set the time format as 12hour or 24 hour. The current set will flash on LCD. Press  or  to change the format and press  to confirm and entering real time clock setting.(Fig.31)

The blinking Year digits on the lower display. To change the digit, press  or  to adjust. Press  to confirm and enter Month setting. Repeat above steps to complete the month/date/hour/minute/second setting.(Fig.32)

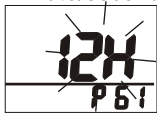


Fig.31



Fig.32

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

The meter is calibrated at standard 400ppm CO<sub>2</sub> concentration in factory. It's suggested to do manual calibration regularly to maintain good accuracy.




### **Note:**



When the accuracy becomes a concern after a long time usage, return to dealers for standard calibration.

### **CAUTION:**

Do not calibrate the meter in the air with unknown CO<sub>2</sub> concentration. Otherwise, it will be calibrated as 400ppm by default and leads to inaccurate measurements.

The manual calibration is suggested to be done in fresh outdoor air that is well ventilated and in sunny weather.

Place the meter in the calibration site. Press  ,  ,  simultaneously for 3 seconds to turn on the meter and enter calibration mode (Fig.33). Two calibration menu is available: Humidity /CO<sub>2</sub>.

Press  key to select the CO<sub>2</sub> calibration. 400ppm and "CAL" icon are blinking on the LCD. Press  to start calibration. (Fig.34)

Wait about 10 minutes until the blinking stops and the calibration is completed automatically. To abort the calibration, turn off the meter at any time.

### **NOTE:**

Ensure the batteries are with full voltage during the calibration to prevent from interruption or failed calibration.





Fig.33

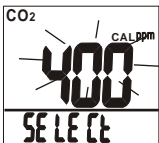


Fig.34





## RH CALIBRATION

The meter defaults to be calibrated the humidity with 33% and 75% salt solution. The ambient condition is recommended to be at 25°C and stable humidity (better to be close to the calibrating value). To abort calibration, just turn off the meter.

### **CAUTION:**



Do not calibrate the humidity without the default calibration salt. Otherwise, it will cause permanent damage. Contact the dealer for calibration salt or services.

### **33% calibration**

Plug the sensor probe into 33% salt bottle. Press , ,  simultaneously for 3 seconds to turn on the meter and enter calibration mode (Fig. 33.). Hold down  to enter 33% calibration. "iCALi" and calibrating value (32.8% if at 25°C) are blinking on the LCD.

Meter is now calibrating, and will finish in about 60 minutes when "iCALi" and humidity stop blinking. To abort the calibration, turn off the meter at any time.

### **75% calibration**

Plug sensor probe into 75% salt bottle and entering calibration mode. In calibration mode, press  to select 75% calibration (Fig.35), press  to start.

“CAL” and calibrating value (75.3% if at 25°C) are blinking on the LCD.


Meter is now calibrating, and will finish in about 60 minutes when “CAL” and humidity stop blinking. To abort the calibration, turn off the meter at any time.



Fig.35

## TROUBLESHOOTING

### ? Can't power on

Press  for more than 0.3 seconds and try again. Check whether batteries are in good contact and correct polarity, or the adaptor is well plugged. You may also remove the batteries for > 10 mins and then install the batteries again.

### ? Fixed readings

Check whether data hold function was activated. (HOLD icon at the left top)

### ? Slow response

Check whether the air flow channels on the rear were blocked.

### ? Error messages

E01/E33: CO<sub>2</sub> sensor is out of order.

Retry CO<sub>2</sub> calibration.

E02: The value is under range.

E03: The value is over range.

E04: The original data error results in this error (DP, WB)

E11: Retry humidity calibration.

E31: Temperature sensor or AD damaged.

E32: Memory IC damaged.

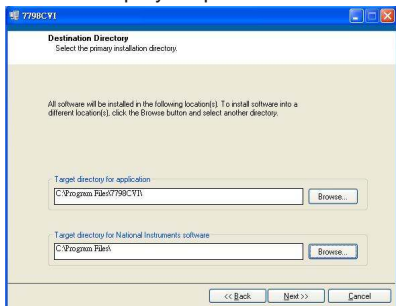
E33: Humidity sensor or circuit damaged.

## PC CONNECTION

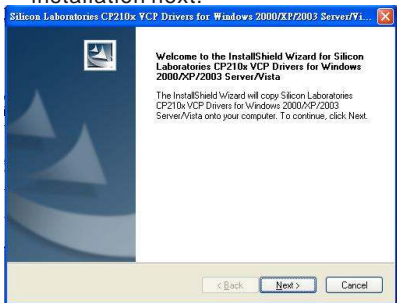
Connect the logger to PC, users can do logging setting and data transmission with the included software.

Plug the USB cable into the socket at the right side of the meter and the other port to PC. Then install the software in your PC with the following procedure.

1. Insert the CD Rom and run installation. Select a preferred directory and click “Next” step by step and finish it.



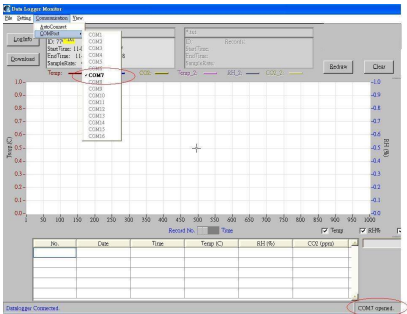
2. After the software installation is completed, it will run USB driver installation next.



## Software Operation

### **AutoConnect**

Start the software and it will detect logger connection automatically and indicate the COM Port information at the bottom of the main screen as well as the COMPort setting column.



### **Logger Settings**

To set up logging plan, click “Setting” icon and select “Logger”. The setting page is opened.

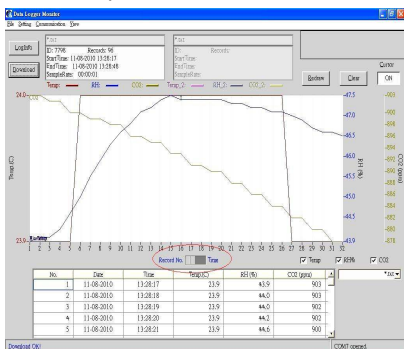


Users can set up the logger identifier number. Click OK for setting and Exit the screen to confirm the settings.

## Data Transmission

To transmit auto recorded data from the meter, click “Download” icon on the left top side of the main screen. All auto-recorded data in the logger will be transmitted. The raw data with time stamp will display at the lower part of the screen and the graph in the middle.

In the Graph display, the Y-axis indicates Temp, RH, DP, WBT, Co2 level in different line colors. And the X-axis can be switched to show Time or Recorded No. Stamp.



## Data Review Function

The following functions help to view the GRAPH data in more detailed way.

Under **View** function, there are 4 tools to enlarge the Graph data for detailed data review.

**Zoom in:** Hold down “Ctrl” key on the PC keyboard and click any target point on the graph. It enlarges the point in each click.

**Zoom window:** Hold down “Ctrl” key and drag click the left button of the mouse to select an area on the Graph and the selected area will be enlarged .

**Zoom Xaxis:** Hold down “Ctrl” key and drag click the left button of the mouse to select an area on the Graph and the X-axis of the selected area will be enlarged.

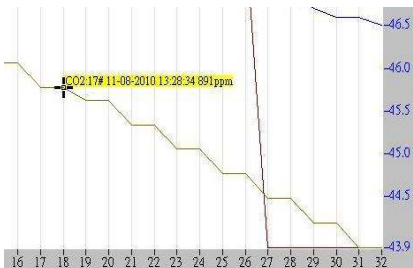
**Zoom Yaxis:** Hold down “Ctrl” key and drag click the left button of the mouse to select an area on the Graph and the Y-axis of the selected area will be enlarged.

Three icons on the right top side of the main screen:

**Redraw:** After any review and zooming on the Graph, click “Redraw” to reset it to original format.

**Clear:** Click “Clear” to delete all data and Graph on the window. A warning box shows up for confirmation. Press “Yes” and all data will be cleared.

**Cursor:** Switch Cursor **ON** and it shows the raw data with the cursor. In any click on the graph, the digital data displayed. Switch **OFF** to disable the function.



## Data Processing

The downloaded data can be **Saved** or **Printed** via “**File**” processing functions.

**Load:** To retrieve saved files, just click “**Load**” and select a desired file and it will be loaded in the main screen with the file details at the left top side.

LogInfo	77597V1.0
Download	StartTime: 08-11-2011 18:08:11
	EndTime: 08-11-2011 18:10:23
	SampleRate: 00:00:06

## SPECIFICATION

### ROTRONIC CP11

#### Measuring range

CO2 0~9999 ppm,  
(5001~9999 ppm out of scale range)

Temperature -20~60°C (-5~140°F)

Relative Humidity 0.1%~99.9%RH

DP(Dew point temp.) -20.0~59.9°C

WB(Wet bulb temp.) -5.0~59.9°C

Resolution 1ppm , 0.1°C/°F, 0.1%RH

#### Accuracy

CO2 ±30ppm±5% of reading( 0~5000ppm)  
Other ranges are not specified

Temperature ±0.3°C/±0.6°F at 5~40°C

Relative Humidity ±3%RH (at 25°C, 10~90%RH); ±5%RH (at 25°C, other range)

CO2 Warm-up time 30 seconds

#### Response time

CO2 <30 seconds(90% step change)

Tair <2 mins (90% step change)

RH <10 minutes ( 90% step change)

LCD / Meter size (mm) 40(H)x45(L), 173(L)x77(W)x42(H)

Operating condition -20 to 50 °C (CO2 sensor)

(avoid condensation) -20 to 60 °C (for the rest parameters)

Storage condition -20~ 60°C, 10~90%RH(avoid condensation)

Power supply AA x 4pcs or 5V adaptor

Battery life > 24 hours (Alkaline battery)

Weight 200g

Standard package Meter, manual ,AA bat.

## **CO<sub>2</sub> LEVELS AND GUIDELINES**

### **Non-Enforced Reference levels**

#### **NIOSH recommendations**

**250-350 ppm:** normal outdoor ambient concentrations

**600 ppm:** minimal air quality complaints

**600-1000 ppm:** less clearly interpreted

**1000 ppm:** indicates inadequate ventilation; complaints such as headaches, fatigue, and eye/throat irritation will be more widespread. 1000 ppm 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 CO<sub>2</sub> 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 CO<sub>2</sub> level is 600ppm.

### **Regulatory exposure limit**

#### **ASHRAE Standard 62-1989: 1000ppm**

CO<sub>2</sub> concentration in occupied building should not exceed 1000ppm.

#### **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.

#### **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.