OPERATION MANUAL

DESKTOP
CARBON DIOXIDE (CO_2)
LOGGER



CE

Model: 7798

INTRODUCTION

Thank you for purchasing this desktop CO_2 monitor & datalogger. It measures CO_2 level, air temperature, humidity and also do datalogging, which is an ideal instrument for indoor air quality (IAQ) diagnosis and HVAC system performance verification.

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_2 level and air ventilation become widely applied in public areas such as offices, classrooms, factories, hospitals, day care centers and hotels. It is also suggested in regulations of industrial hygiene in some countries. (See appendix)

Features:

- Super large display of CO_2 level, temp., humidity, date and time.
- 15 degree tilt angle. Easy to see and read..
- Indoor air quality level indication. (Good, Normal, Poor) .
- Stable NDIR sensor for CO_2 detection
- Visible and audile CO_2 warning alarm
- ABC(Automatic Baseline Calibration) and manual CO_2 calibration.
- Max. & Min. CO_2 value recall function
- Data logging up to 15999 points.
- Sampling rate from 1 second to 4:59:59.

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MATERIAL SUPPLIED

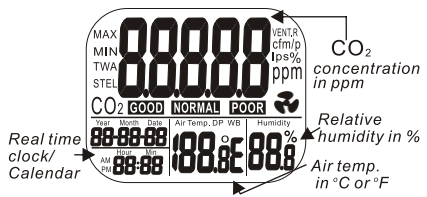
This package contains:

- ✓ Meter
- ✓ Universal adaptor (5V±10%, >=0.5A)
- ✓ USB cable
- ✓ Download software CD
- ✓ Operation manual
- ✓ Plain white box

POWER SUPPLY

The meter is powered by an AC adaptor (5V/0.5A output).

LCD DISPLAY



Symbols

ppm	The scale of the CO_2 value
GOOD	CO_2 is in good level
NORMAL	CO_2 is in normal level
POOR	CO_2 is in poor level
Air Temp.	Air temperature
Humidity %	Unit of air relative humidity
^{O}E (C/F)	Celsius/Fahrenheit of temp.
MAX/MIN	Maximun/Minimum readings
	Icon of CO_2 alarm

NOTE: TWA/STEL/VENT.R/cfm/p/lps% are vain icons in this model.

KEYPAD

SET -Enter setup mode.
-Save and finish settings.

ESC -Exit setup page / mode.
-Terminate calibration / datalogging

RESET -Press to clear the MAX/MIN records.

LOG/▲ -Select mode or increase value in setup
-Start data logging

MIN/MAX▼ -Activate MAX, MIN function.
-Select mode or decrease value in setup.

▲ + **SET** + **MIN/MAX▼** -Enter CO_2 calibration.

OPERATION

POWER ON/OFF

Plug the adaptor and the meter turns on automatically with a short beep. The LED lit to indicate full power.
If the voltage is too high or low, " bAt " will display on LCD and LED will flash. Please see page14 for trouble shooting.

The LCD will display current CO_2, temp., humidity, date and time. The air quality level is displayed as well (Fig.1).

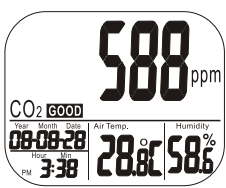


Fig. 1

TAKING MEASUREMENT

The meter starts taking measurement after turned on and updates readings every second. In case of operating environment changed (ex. From high to low temp.), it takes 2 mins to get the response of CO_2 /temp. change and 10 minutes for RH change.

NOTE: Do not hold the meter close to faces in case that exhalation affects CO_2 levels.

MAX,MIN

Under normal mode, press " MIN/MAX▼ " to see the minimum, maximum of each parameter. Each press of " MIN/MAX▼ ", it displays MIN, MAX in sequence and returns to normal mode.

In MIN and MAX modes, it shows the minimum and maximum readings of CO_2 on main display and air temp. and humidity on the lower displays. (Fig.2)

In MIN/MAX or normal operation modes, press and hold "RESET " key more than 1 second to clear the minimum and maximum value and then re-start.

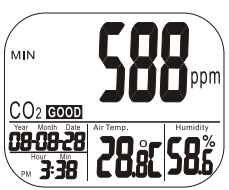


Fig.2

DATA LOGGING

The meter can record readings of CO_2 , temperature and humidity for long time environment monitoring. The memory capacity is 15999 points. Users can set up sampling rate from 1 second to 4 hours 59 minutes and 59 seconds (See SETUP P5.0).

After sampling rate is selected, press " LOG/▲" for 2 seconds under normal mode to start logging. The green LED light blinks to indicate the logging status and LCD main display shows the real time CO_2 value and "rEC" in turn. Lower displays are the real time temperature, humidity and clock.

To terminate data logging, press "ESC" for 2 seconds, LED light stops blinking and main display shows "End" and CO_2 reading interchangeably. Hold down "ESC" for 2 seconds again, and it goes back to normal measurement mode.

Minimum and Maximum recall is still working during logging.

ALARM

The meter features audible alarm to give warnings when CO_2 concentration exceeds the limits. Users can set up 2 limits: An limit for alarm threshold that requires ventilation (See P1.3 in setup for setting alarm limits) and a lower limit to stop the ventilation system (See P1.2 in setup CO_2 normal limit).

It emits beeps(Abt.80dB) with fan icon on LCD when CO_2 level goes over the upper limit. Beeps can be stopped by pressing any key or automatically stops when CO_2 reading falls under lower limit.

If the beep is temporarily shut, it will sound again when readings fall under lower limit and then go over the upper limit again, or users can press "**RESET**" for more than 1 second to re-activate it.

The fan icon keeps flashing when beeps are manually shut. It stops only when readings fall under the lower limit (Fig.3)



Fig.3

SETUP

Hold down "**SET**" under normal mode more than 3 sec to enter setup mode. To exit setup, press "**ESC**" in P1.0, P2.0,P3.0, P4.0, and P5.0 and it returns to normal mode.

P1.1 CO_2 GOOD LEVEL

When entering setup mode, P1.0 and "CO_2" (Fig.4) are displayed on the LCD. Press "**SET**" again to go into P1.1 for setting CO_2 upper limit of GOOD level. The current set value will be blinking on LCD(Fig.5).

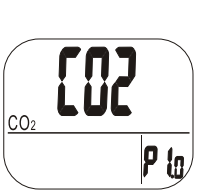


Fig.4

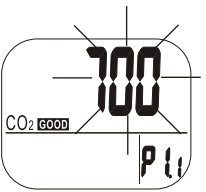


Fig.5

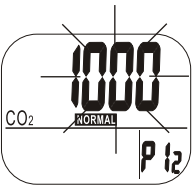


Fig.6

Press " **LOG/▲** " to increase or " **MIN/MAX▼** " to decrease the value. Each press tunes 100 ppm and the alarm range is from 0 to 700ppm.

When the preferred value is set, press " **SET** " to go into P1.2 (Fig.6) for upper limit setting of NORMAL level and confirm P1.2 or press "**ESC** " without saving and return to P1.0.

P1.2 CO_2 NORMAL LEVEL

P1.2 is used to set CO_2 upper limit of NORMAL level. The current set value will be blinking on LCD(Fig.6).

Press " **LOG/▲** " to increase or " **MIN/MAX▼** " to decrease the value. Each press tunes 100 ppm and the alarm range is from 700 to 1000ppm.

When the preferred value is set, press " **SET** " to confirm P1.2 and go into P1.3 (Fig.7) for alarm threshold setting. Or, press " **ESC** " without saving and return to P1.0.

P1.3 CO_2 BEEP ALARM

P1.3 is used to set CO_2 alarm threshold. The current set value will be blinking on LCD(Fig.7) when entering P1.3 page.

Press "LOG/▲" to increase or "MIN/MAX▼" to decrease the value. Each press tunes 100 ppm and the alarm range is from 1000 to 5000ppm.

When the preferred value is set, press " SET " to confirm P1.3 and go into P1.4 (Fig.8). Or, press " ESC " without saving and return to P1.0.

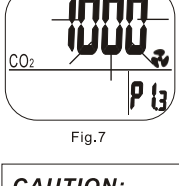


Fig.7

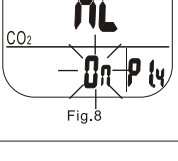


Fig.8

CAUTION:
It's suggested to set up alarm value within specification range that accuracy is ensured. Out of spec readings are only for reference and not suitable to be used as alarm limits.

P2.0 TEMPERATURE SCALE

Press " LOG/▲ " in P1.0 to access P2.0 for setting up temperature scale(Fig.9). Press " SET " and it goes into P2.1 with blinking °C or °F current set(Fig. 10) on the lower middle display. To switch °C or °F, press " LOG/▲" or " MIN/MAX▼ ". Then press " SET " to save the setting or press " ESC " without saving and return to P2.0



Fig.9

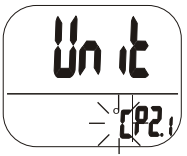


Fig.10

P3.0 REAL TIME CLOCK

24 hour and 12 hour time displays are both available in this meter.

Press " **LOG/▲** " in P1.0 twice to access P3.0 for setting up real time clock (Fig. 11). Press " **SET** " and it goes into P3.1 with blinking year set (Fig.12) on the lower left display. To change the year, press "**LOG/▲** " or " **MIN/MAX▼** ". Then press "**SET**" to save the setting and then enter P3.2 or press "**ESC**" without saving and return to P3.0

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

Repeat above to finish the setting of P3.3 (Date),then press " **SET** " to save the setting and then enter P3.4 or press "**ESC** " without saving and return to P3.0

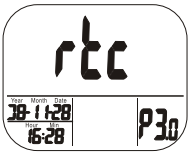


Fig.11

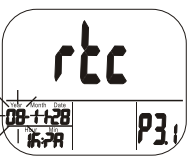


Fig.12

While in P3.4, the current time setting (12 hour or 24 hour) will blink.(Fig.13) To change the setting, press " **LOG/▲** "

or "MIN/MAX▼". Then press "SET" to save the setting and then enter P3.5 or press "ESC" without saving and return to P3.0

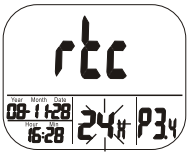


Fig. 13

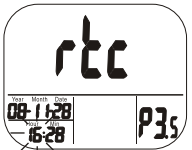


Fig.14

While in P3.5, the current hour setting will blink(Fig.14). To change the setting, press"LOG/▲" or "MIN/MAX▼". Then press "SET" to save the setting and then enter P3.6 or press "ESC" without saving and return to P3.0.

Repeat above step to finish the minute setting in P3.6.

P4.0 RESET

Press "LOG/▲" in P1.0 three times to access P4.0 to revert the meter to defaut status(Fig.15). Press "SET" and it goes into P4.1 with blinking " No" default (Fig.16) on the lower middle display. To switch the status, press "LOG/▲" or "MIN/MAX▼". Then press "SET" to save the setting or press "ESC" without saving and return to P4.0

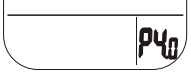


Fig. 15



Fig.16

Choose "Yes", the meter is reset to the following defaults:

Parameter	Default
P1.1	700ppm
P1.2	1000ppm
P1.3	1000ppm
P2.1	°C
P4.1	No
P5.0	

P5.0 SAMPLING RATE

Go into P5.0 for setting sampling rate of data logging(Fig.17). The range is from 1 second to 4 hours 59 minutes and 59 seconds. Press " **SET** " and it goes into P5.1 with blinking Hour digits on the lower left display. To change the digit, press "**LOG/▲** " to increase and "**MIN/MAX▼**" to decrease. Press " **SET** " to enter P5.2 for Minute setting and P5.3 for Second setting (Fig.18). Press " **SET**" to confirm the rate setting or " **ESC** " without saving and return to P5.0.

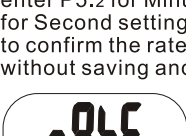


Fig . 17

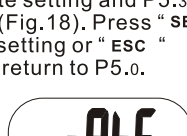


Fig.18

CO_2 CALIBRATION

The meter is calibrated at standard 400ppm CO_2 concentration in factory. It's suggested to do either ABC or manual calibration regularly to maintain good accuracy.

Note:

When the accuracy becomes a concern after a long time usage or other special conditions, return to dealers for standard

calibration.

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

ABC (Automatic Baseline Calibration)

ABC (Automatic Baseline Calibration) is to implement baseline calibration to eliminate the zero drift of the infrared sensor. The ABC function is always "ON" when turning on the meter.

ABC is to calibrate the meter at the minimum CO_2 reading detected during 7.5 days continuous monitoring (power on). It is supposed that the ventilating area exists fresh air with CO_2 level around 400ppm during a period of time. **it's not suitable to use desktop CO_2 in close area with higher CO_2 level always such as: 24 hours' field / places with windows shut.**

Manual Calibration

The manual calibration is suggested to be done outdoor with good ventilation, fresh air and sunny day where CO_2 level is around 400 ppm. Do not calibrate in rainy day because high humidity will affect the CO_2 level in air.

Do not calibrate in places crowded with people or close to where exist high CO_2 concentration such as ventilating outlets or fireplaces.

Place the meter in the calibration site. Turn on the meter and hold down " **SET** " ," **LOG/▲**" and " **MIN/MAX▼** " simultaneously more than 1 second to enter CO_2 calibration mode (Fig.19). 400ppm and "CO_2" are blinking on the LCD while performing calibration.

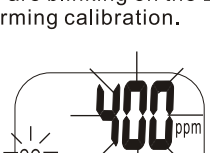


Fig.19

Wait about 5 minutes until the blinking stops and the calibration is completed automatically and return to normal mode.

To abort the calibration, press " **RESET** " for more than 1 second.

Note:

Keep away from any animal, human or plant which might affect the CO_2 concentration during the calibration.

RH CALIBRATION

This humidity accuracy of this desktop CO_2 meter can be re-calibrated.

Please contact the distributor where you buy this meter from to purchase the calibration tooling and request operation manual.

Note:

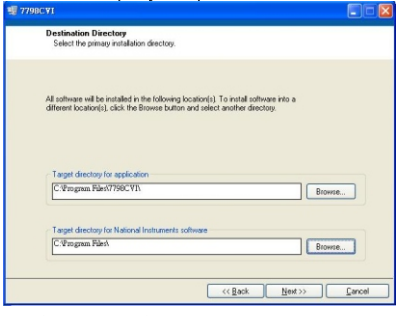
It is suggested to operate humidity calibration by well-trained technician.

PC CONNECTION

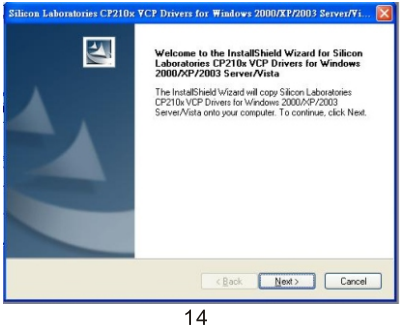
Connect the logger to PC, users can do logging setting and data transmission with the included software.

Plug the USB cable into the socket at the rear side of the logger 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.



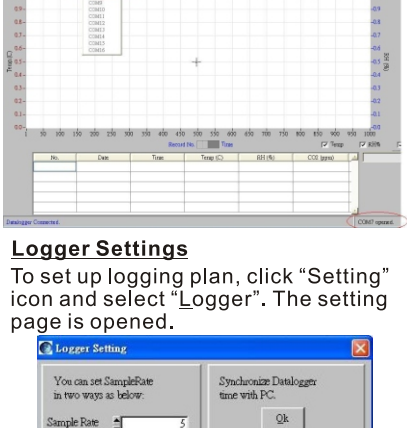
2. After the software installation is completed, it will run USB driver installation next.



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

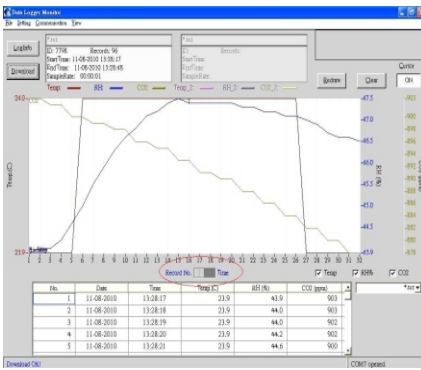
To set up logging plan, click “Setting” icon and select “Logger”. The setting page is opened.

Users can set up the sample rate in 2 ways of either “total seconds” or “hour: minute: second” format. The other two settings are for logger identifier and to synchronize the time in logger and PC. Click OK for each setting and Exit the screen to confirm the settings.

Data Transmission

To transmit recorded data from the logger, click "Download" icon on the left top side of the main screen. All 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 and CO_2 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.

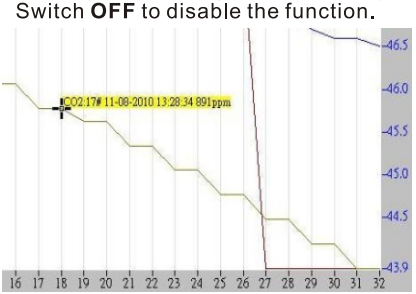
Zoom Yaxis: Hold down “Ctrl” key and drag click the left button of the mouse to select an area on the Graph and the Y-axis of the selected area will be enlarged.

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.

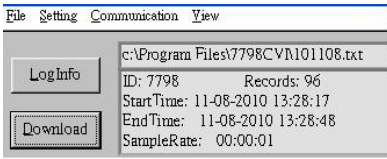
Cursor: Switch Cursor **ON** and it shows the raw data with the cursor. In any click on the graph, the digital data displayed. Switch **OFF** to disable the function.



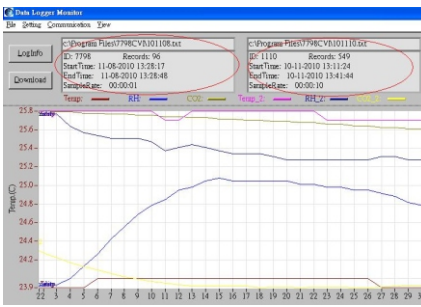
Data Processing

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.



Compare: The function enables cross comparison of two recorded data. Load one file in the main screen first, and then click "Compare". The 2nd file will be loaded in the Graph section for cross comparison. There will be 6 color lines for data indication.



TROUBLESHOOTING

? Can't power on

1. Check whether the adaptor is well plugged.
2. Use a needle or toothpick to stab the RESET hole at the meter bottom.

? Reading no change

Check whether the meter is in maximum or minimum mode.

? "BAt" and green LED keep flashing

The adaptor output voltage is too high or too low. Please use the adaptor with correct 5V(±10%), >=0.5A.

? Error Code



Fig.A



Fig.B



Fig.C

Error Code	Problem	Solution
CO2 Reading (See example of Fig. A)		
E01	CO2 sensor is damaged	Send back for repair
E02	CO2 reading is under the lower limit	Re-calibrate the CO2，if it still appear, send back for repair
E03	CO2 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 are failed, send back for repair
E17	ABC mode of CO2 senor is failed and might cause wrong CO2 readings	Send back for repair

Error Code	Problem	Solution
Air Temp. Reading (See example of Fig. B)		
E02	Air temp. measurement is under the lower limit	Put the meter in regular room temperature for 30 minutes, if it still appear, send back for repair
E03	Air temp. measurement is over the upper limit	Put the meter in regular room temperature for 30 minutes, if it still appear, send back for repair
E31	Temp. sensor or measuring circuit is damaged	Send back for repair
Air Humidity Reading (See example of Fig. C)		
E04	Air temp. measurement has error code	Refer to above temperature error code for problem solving
E11	The RH calibration is failed	Please re-calibrate the RH, if it still appear, send back for repair
E34	RH sensor or measuring circuit is failed	Send back for repair

SPECIFICATION

Measuring Range	CO2 : 0 ~ 9999 ppm Air Temp. : -10°C ~ 60°C (14°F ~ 140°F) Air RH% : 5.0%RH ~ 95.0%RH
Resolution	CO2 : 1ppm Air temp. : 0.1°C / 0.1°F Air RH% : 0.1%RH
Accuracy	CO2 : 50ppm ±5% of reading Air temp. : ±0.6°C, ±1.0°F; Air RH% : ±3%RH (at 25°C, 10 ~ 90% RH) ±5%RH (at 25°C, <10% & >90% RH)
Response	CO2 : <2 mins（90% step change） Air temp.: <2 mins（90% step change） Air RH% : <10 mins (90% step change）
Max/Min function	Included
Air quality level （**CO2 concentration**）	Good: <700ppm (Programmable by user) Normal: 700~1000ppm (Programmable by user) Poor: > "Normal".
Alarm	Alarm: >1000ppm (Programmable by user)
Sampling rate	1sec ~ 04:59:59
Memory points	15999 points
Operating Condition	-10~50°C, 5~80%RH (Be sure to avoid condense)
Storage Condition	-20~60°C, 5~90%RH (be sure to avoid condense)
Display	LCD & green LED
Power Supply	DC5V (+/-10%),>=500mA.

WARRANTY

The meter is warranted to be free from defects in material and workmanship for a period of one year from the date of purchase. This warranty covers normal operation and does not cover misuse, abuse, alteration, neglect, improper maintenance, or damage resulting from leaking batteries. Proof of purchase is required for warranty repairs. Warranty is void if the meter has been opened.

RETURN AUTHORIZATION

Authorization must be obtained from the supplier before returning items for any reason. When requiring a RA (Return Authorization), please include data regarding the defective reason, the meters are to be returned along with good packing to prevent any damage in delivery and insured against possible damage or loss.

OTHER RELATED PRODUCTS

Other related CO_2 products:

a. Model 7752 portable Temp./CO_2 meter, general performance.
b. Model 77532 portable Temp./CO_2 meter, high performance.
c. Model 7755 portable Temp./RH/CO_2 meter, general performance.
d. Model 77535 portable Temp./RH/CO_2 meter, high performance.

Appendix

CO_2 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_2 concentration of 8 hours avarge is 1000ppm.

Type 2 indoor areas with special requirements of good air quality such as schools, hospitals, day care centers, the suggested CO_2 level is 600ppm.

Regulatory exposure limit

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 CO_2 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.

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pH Meter
Conductivity Meter
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