

OPERATION MANUAL

DESKTOP CO₂ MONITOR



Model: 7788 Green Day
 7787 Green Life

INTRODUCTION

Thank you for purchasing this desktop CO₂ monitor. It could measure the CO₂ level, air temp., humidity and 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 CO₂ 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. (See appendix)

Features:

- Super large display of CO₂ 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 CO₂ detection
- Visible and audile CO₂ warning alarm.
- Relay output for ventilation control (model:7788).
- ABC(Automatic Baseline Calibration) and manual CO₂ calibration.
- Max. & Min. CO₂ value recall function.

MATERIAL SUPPLIED

This package contains:

- ✓ Meter
- ✓ Adaptor (5V±10%, ≥ 0.5A)
- ✓ Operation manual
- ✓ Plain white box

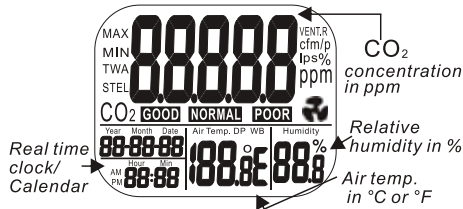
POWER SUPPLY

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


RELAY OUTPUT(7788 Only)

The meter is designed with a relay output on the rear side of the meter (next to the power jack).

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
°E (C/F)	Celsius/Fahrenheit of temp.
MAX/MIN	Maximum/Minimum readings
	The relay is activated (7788) & Icon of CO ₂ alarm(7788/87)

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

KEYPAD

- SET** -Enter setup mode.
-Save and finish settings.
- ESC** -Exit setup page/mode.
-Terminate during CO₂ calibration.
- RESET** -Press to clear the MAX/MIN records.
- ▲** -Select mode or increase value in setup.
- MIN/MAX▼** -Activate MAX, MIN function.
-Select mode or decrease value in setup.
- ▲** +
SET + -Enter CO₂ calibration.
- MIN/MAX▼**

OPERATION

POWER ON/OFF

Plug the adaptor and the meter turns on automatically with a short beep. The LED would light up to indicate the full power. If the voltage is too high or low, "bAt" icon will display on the LCD and LED will flash. (See page14 for trouble shooting.)

The LCD will display the current CO₂, temp., humidity, date and time. The air quality level is displayed as well (Fig.1).

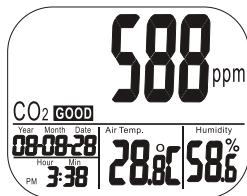


Fig. 1

TAKING MEASUREMENT

The meter starts taking measurement after power on and updates readings every second. In case of operating environment changed (ex. From high to low temp.), it takes 2 minutes to get the response of CO₂ /temp. change and 10 minutes for RH change.

NOTE: Do not hold the meter close to faces in case that exhalation affects CO₂ levels.

MIN/MAX

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

In MIN and MAX mode, it displays the minimum and maximum readings of CO₂ on the upper LCD. The air temp. and humidity show on the lower LCD (Fig.2)

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

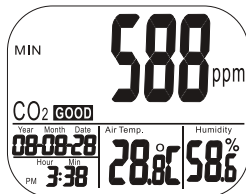


Fig.2

ALARM & OUTPUT

ALARM

The meter features audible alarm to give warnings when CO₂ 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 CO₂ normal limit).

It emits beeps (Abt.80dB) with fan icon on LCD when CO₂ level goes over the upper limit. Beeps can be stopped by pressing any key or automatically stops when CO₂ reading falls below the lower limit.

If the beep is temporarily shut, it will sound again when readings fall below the lower limit and then go over the upper limit again, or users can press "RESET" key for more than 1 sec 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)

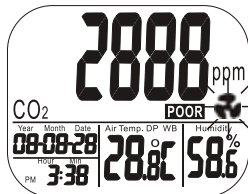
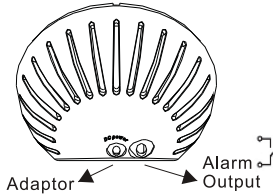



Fig.3

RELAY OUTPUT-model 7788 only



The meter is designed with a relay  to send output for further connection.

When CO₂ readings go over the upper limit and cause alarming. The relay picks up automatically and sends output signal. It can be connected to a ventilation system or activator for conditioning the air quality. The relay will drop out when CO₂ readings fall below the lower limit.

User can use 2.5mm mono phone jack plug to connect with relay output port. The relay is : 1A 30VDC/0.5A 125VAC

SETUP

Hold "SET" key under normal mode more than 3 sec to enter setup mode.

To exit setup, press "ESC" key in **P1.0**, **P2.0**, **P3.0**, or **P4.0** and it returns to normal mode.

P1.1 CO₂ GOOD LEVEL

When entering setup mode, **P1.0** and "CO₂" icons (Fig.4) are displayed on the LCD. Press "SET" key again to go into **P1.1** for setting CO₂ upper limit of GOOD level. The current set value will be blinking on the LCD(Fig.5).



Fig.4

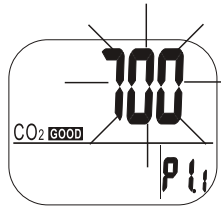


Fig.5

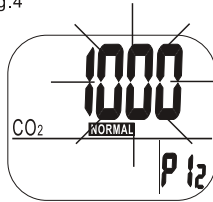


Fig.6

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

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

P1.2 CO₂ NORMAL LEVEL

P1.2 is used to set the CO₂ upper limit of NORMAL level. The current set value will be blinking on the LCD(Fig.6).

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

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

P1.3 CO₂ BEEP ALARM

P1.3 is used to set CO₂ alarm threshold. The current set value will be blinking on LCD(Fig.7).

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

When the preferred value is set, press "**SET**" key to confirm **P1.3** and enter **P1.4** (Fig.8). Or, press "**Esc**" key without saving and return to **P1.0**.

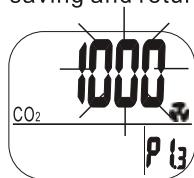


Fig.7

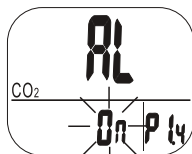


Fig.8

P1.4 ALARM ON/OFF (Model 7787 only)

P1.4 is used to set alarm on and off. When entering **P1.4**, the "On" icon will be blinking on the LCD(Fig.8).

Press "**▲**" or "**MIN/MAX▼**" key to switch to "off".(There are no P1.4 Alarm ON/OFF Function in 7788 meter.)

When the preferred setting is done, press "**SET**" key to confirm **P1.4** and return to **P1.0** (Fig.4). Or, press "**Esc**" key without saving and return to **P1.0**.

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 "**▲**" key in **P1.0** to enter **P2.0** for setting up temp. scale(Fig.9).

Press "**SET**" key to enter **P2.1** with blinking °C or °F current set (Fig. 10) on the lower middle LCD. To switch °C or °F, press "**▲**" or "**MIN/MAX▼**" key. Then press "**SET**" key to save the setting or press "**ESC**" key without saving and return to **P2.0**.



Fig.9



Fig.10

P3.0 REAL TIME CLOCK

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

Press "**▲**" key in **P1.0** twice to enter **P3.0** for setting up real time clock (Fig.11).

Press "**SET**" key enter **P3.1** with blinking year set (Fig.12) on the lower left LCD. To change theyear, press "**▲**" or "**MIN/MAX▼**" key. Then press "**SET**" key to save the setting and then enter **P3.2** or press "**ESC**" key without saving and return to **P3.0**.

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

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

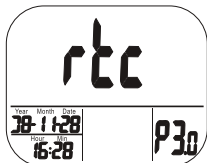


Fig. 11

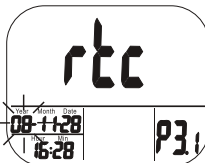


Fig.12

While in **P3.4**, the current time setting (12 hour or 24 hour) will blink. (Fig.13) To change the setting, press "▲" or "MIN/MAX▼" key. Then press "SET" key to save the setting and then enter **P3.5** or press "ESC" key without saving and return to **P3.0**.

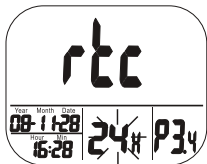


Fig. 13

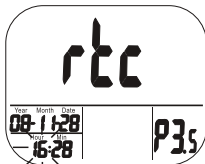


Fig.14

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

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

P4.0 RESET

Press "▲" key in **P1.0** three times to enter **P4.0** to revert the meter to default status (Fig.15). Press "SET" key to enter **P4.1** with blinking "No" icon (Fig.16) on the lower middle LCD.

To switch the status, press "▲" or "MIN/MAX▼" key. Then press "SET" key to save the setting or press "ESC" key without saving and return to P4.0.

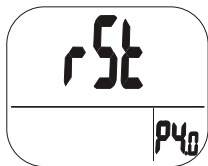


Fig. 15

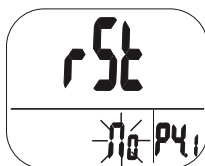


Fig.16

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

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

CO₂ CALIBRATION

The meter is calibrated at standard 400ppm CO₂ 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 CO₂ 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 CO₂ reading detected during 7.5 days continuous monitoring (power on). It is supposed that the ventilating area exists fresh air with CO₂ level around 400ppm during a period of time. **it's not suitable to use desktop CO₂ in close area with higher CO₂ 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 CO₂ level is around 400ppm. Do not calibrate in rainy day because high humidity will affect the CO₂ level in air.

Do not calibrate in places crowded with people or close to where exist high CO₂ concentration such as ventilating outlets or fireplaces.

Place the meter in the calibration site. Turn on the meter and hold down "SET" "▲" and "MIN/MAX▼" key simultaneously more than 1 second to enter CO₂ calibration mode (Fig.17). 400ppm and "CO₂" are blinking on the LCD while performing calibration.

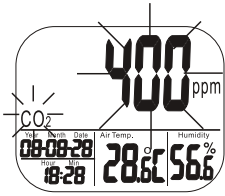


Fig.17

Wait about 30 minutes until the blinking stops and the calibration is completed automatically and return to normal mode.

To abort the calibration, press "RESET" key for more than 1 sec.

Note:

Keep away from any animal, human or plant which might affect the CO₂ concentration during the calibration.

RH CALIBRATION (7788)

This humidity accuracy of this desktop CO₂ 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.

TROUBLE SHOOTING

? **Can't power on**

Check whether the adaptor is well plugged.

? **Slow response**

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

? **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 $5V \pm 10\%$, $\geq 0.5A$.

? **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 sensor 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% : 0.1%RH ~ 99.9%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, ±0.9 °F; Air RH% : 7788 : ±3%RH (at 25 °C, 10 ~ 90% RH) ±5%RH (at 25 °C, <10% & >90% RH) 7787 : ±5%RH (at 25 °C, 10 ~ 90% RH) ±7%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)
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.
Relay	7788 : Included 7787 : Not included

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 CO₂ products:

- a. Model 7752 portable Temp./CO₂ meter, general performance.
- b. Model 77532 portable Temp./CO₂ meter, high performance.
- c. Model 7755 portable Temp./RH/CO₂ meter, general performance.
- d. Model 77535 portable Temp./RH/CO₂ meter, high performance.

Appendix

CO₂ LEVELS AND GUIDELINES

Non-Enforced Reference levels

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. 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 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.

Regulatory exposure limit

ASHRAE Standard 62-1989: 1000ppm

CO₂ 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.

**Accuracy, the Zenith of
Measuring / Testing Instruments !**

Hygrometer/Psychrometer
Thermometer
Anemometer
Sound Level Meter
Air Flow meter
Infrared Thermometer
K type Thermometer
K.J.T. type Thermometer
K.J.T.R.S.E. type Thermometer
pH Meter
Conductivity Meter
T.D.S. Meter
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Data logger
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