OPERATION MANUAL

WALL-MOUNT CO_2 MONITOR



CE

Model:

- 7721
- 77231
- 7722
- 77232

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INTRODUCTION

Thank you for purchasing this wall mount CO_2 monitor. It could measure the CO_2 level, air temp., dew point, wet bulb temp. and humidity (DP, WB, RH are for models 7722/77232) 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_2 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)

With NDIR (non-dispersive infrared) sensor used, this CO_2 monitor is stable in long term monitoring. And the built-in alarm output is especially helpful in ventilation control and HVAC system performance verification.

Features:

- Triple displays of CO_2 level, temp. and humidity (7722/77232)
- Stable NDIR sensor for CO_2 detection
- Statistics of weighted averages
  TWA (8 hours weighted average)
  STEL(15 minutes weighted average)
- Visible and audile CO_2 warning alarm
- Alarm output for ventilation control
- ABC(Automatic Baseline Calibration) and manual CO_2 calibration
- PC connect via RS232 interface

MATERIAL SUPPLIED

This package contains:

- ✓ Meter
- ✓ Adaptor
- ✓ Operation manual
- ✓ Plain white box

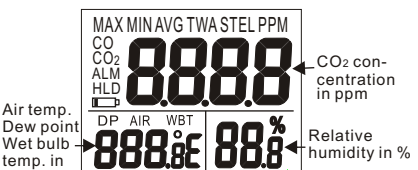
Optional accessory:

- ✓ 33% calibration salt (VZ0033AZ1)
- ✓ 75% calibration salt (VZ0075AZ1)
- ✓ RS232 cable and software

POWER SUPPLY

The meter is powered by an AC adaptor (12V/1A output).

LCD DISPLY



Symbols

MAX/MIN	Maximun/Minimum readings
TWA	Time weighted average(8 hours)
STEL	Short-term exposure limit (15 minutes weighted average)
DP	Dew point temp. (7722,77232)
AIR	Air temp.
WBT	Wet bulb temp. (7722,77232)
%	Unit of relative humidity
°E (C/F)	Celsius/Fahrenheit
AVG/CO/ ALM/HLD/	Vain icons in these models

KEYPAD

SET — Enter setup mode.
Save and finish settings.

CAL/ESC — Enter CO_2 calibration with ▲.
Enter RH calibration with ▼.
Exit setup page/mode.

RESET — Reset the meter and clear MAX/MIN.
Terminate during calibration.

▲ UNITS — Select AIR, DP, WBT temp. display. (7722/77232 only)
or
▲ — Select mode or increase value in calibration and setup.

▼ MM/MN — Activate MAX, MIN, STEL,TWA function. Select mode or decrease value in calibration and setup.

OPERATION

POWER ON/OFF

Plug in the adaptor and the meter turns on automatically with a short beep. It performs 30 sec. countdown(Fig.1) for meter warm up, then enters normal mode with current CO_2, temp.and humidity(7722/77232) readings displayed (Fig.2).



Fig. 1

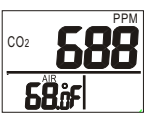
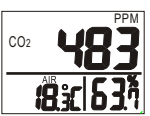


Fig. 2

Model 7721/77231



Model 7722/77232

TAKING MEASUREMENT

The meter starts taking measurement after power on and updates readings every second. In the condition of opera -ting environment change (ex. from high to low temp.), it takes 30 sec to respond for CO_2 sensor and 30 minutes for RH.

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

AIR(all models),DP,WBT(7722/77232)

Press UNIT to switch temp. display. The lower left LCD will cycle through air temp., Dew point temp. (Fig.3), and wet bulb temp.(Fig.4).

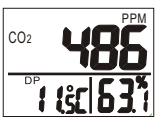


Fig.3

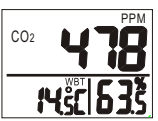


Fig.4

MAX,MIN, STEL,TWA

Under normal mode, press MAX/MIN key to see the minimum, maximum, and weighted average readings. Press MAX/MIN key, it displays MIN, MAX, STEL, TWA in sequence and returns to normal mode.

In MIN and MAX modes, it shows the minimum and maximum reading of CO_2 on the upper LCD. The reading of AIR or DP or WB temp. and humidity (7722/77232) shows on the lower LCD. (Fig.5)



Fig.5

In **STEL** and **TWA** modes, the upper LCD shows the weighted average of CO_2 reading for the past 15 minutes (STEL) and 8 hours(TWA). The lower LCD shows the current AIR, DP/WB temp. and humidity (7722/77232). (Fig.6)

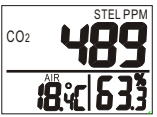


Fig.6

NOTE:

1. If the meter is turned on for shorter than 15 minutes, the STEL value will be the weighted average of readings taken since power on. Same for the TWA value.
2. It takes at least 5 minutes to calculate the STEL and TWA value. The LCD shows "----" (Fig.7) during the first 5 minutes from power on.

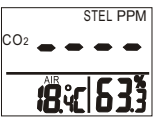


Fig.7

ALARM & OUTPUT

ALARM

The meter features visible and audible alarm to give warnings when CO_2 concentration exceeds the limit. Users can set up 2 limits:

1. Upper limit: the alarm threshold requires air conditioning
2. Lower limit: to stop the alarm.

(See page 7 **P1.0** to set the alarm limits).

It emits beeps (Abt.80dB) with blinking LED when CO_2 level goes over the upper limit. Beeps can be stopped by pressing any key or automatically stop when CO_2 reading falls below the lower limit.

If the beeper is temporarily shut, it will sound again when readings fall below the lower limit and then go over the upper limit again, or users press key for more than 1 sec to activate it.

LED alarm keeps blinking when beeps are manually shut. It stops only when readings fall below the lower limit.

ALARM OUTPUT



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

When CO_2 readings go over the upper limit and cause to alarm. The relay picks up automatically and send output.
It can be connected to a ventilation system or activator for conditioning the air quality. The relay will drop out when CO_2 readings fall below the lower limit.

SETUP

Hold SET key under normal mode for more than 1 sec to enter setup mode. To exit setup, press CAL key in **P1.0**, **P3.0**, or **P4.0** and it returns to normal mode.

Note:
P2.0 is not applicable in these models but for future model with CO and CO_2 measurements.

P1.0 CO_2 ALARM: UPPER&LOWER LIMITS

When entering setup mode, **P1.0** and "AL" (Fig.8) are displayed on the LCD. Press SET key again to enter **P1.1** to set the CO_2 upper limit. The current setting value will be blinking on the LCD(Fig.9).

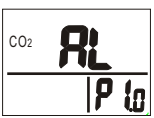


Fig. 8

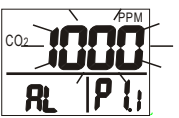


Fig. 9

Press UP or key to increase the value or DOWN key to decrease. Each press tunes 100ppm and the alarm range is from 100 to 9900ppm.

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

When the preferred value is set, press key to enter **P1.2** (Fig. 10) to set the lower limit. After both settings are done, press key to save or key without saving and return to **P1.0**.

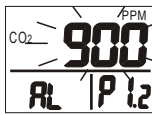


Fig. 10

P3.0 TEMPERATURE SCALE

Press key in **P1.0** to access **P3.0** to set up the temperature scale(Fig.11). Press key to enter **P3.1,** current setting of °C or °F would blinking on the lower LCD (Fig.12). Press or key to switch °C or °F. Then press key to save the setting or key without saving and return to **P3.0**.



Fig. 11



Fig. 12

P4.0 ABC SELECTION

ABC (Automatic Baseline Calibration) is to implement baseline calibration to eliminate the zero drift of the infrared sensor. The ABC function default is on when turning on the meter. Users can disable it by following the procedure. Press in **P3.0** or in **P1.0** to access **P4.0** to select the ABC function.(Fig.13).

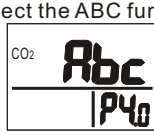


Fig.13

Press SET key enter **P4.1** with blinking "en" icon (Fig.14) on the lower LCD. To disable the ABC function, press ▲ or ▼ and "dis" blinks for choice (Fig.15). After the preferred selection is done, press SET key to save the setting or ESC without saving and return to **P4.0**.

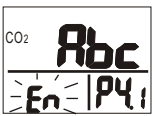


Fig. 14

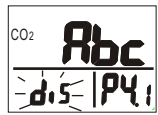


Fig. 15

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 the 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:
1. 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.
2. When operating the meter in the closed indoor areas that are not ventilating, such as hospitals or offices with windows shut, be sure to disable the ABC function to prevent incorrect calibration.

ABC (Automatic Baseline Calibration)

ABC is to calibrate the meter at the minimum CO_2 reading detected during 7 days continuous monitoring (power on). It is supposed that the ventilating area can have fresh air with CO_2 level around 400ppm during a period of time. It's not suitable to implement ABC in the closed area with higher CO_2 level.
The ABC default is on. To disable the function, please refer to **P4.0**. (See p.8)

Manual Calibration

The manual calibration is suggested to be done in outdoor area with ventilating fresh air where CO_2 level is around 400 ppm. Do not calibrate in the places crowded with people or closed area with high CO_2 concentration such as ventilating outlets or fireplaces.

Place the meter in the calibration site. Turn on the meter and hold and keys simultaneously to enter CO_2 calibration mode (Fig.16). 400ppm and " CAL" are blinking on the LCD while performing calibration.

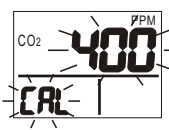


Fig. 16

Wait about 5 minutes until the blinking stops and the calibration is completed automatically and return to normal mode.
To abort the calibration, press key for more than 1 sec.

RH CALIBRATION (7722/77232)

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 stop calibration, hold MODE key for more than 1 sec at any time.

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

33% calibration

Plug the sensor probe into 33% salt bottle. Hold MODE and ▼ keys under normal mode to enter 33% calibration (Fig.17). " CAL" icon and calibrating value (32.7% if at 25°C) are blinking on the LCD with current temp. at the left.

Meter is now calibrating, and will finish in about 60 minutes when " CAL" icon and humidity value stop blinking. (Fig.18)



Fig. 17



Fig. 18

75% calibration

After 33% calibration, plug the sensor probe into 75% salt bottle, then press MODE key to enter 75% calibration (Fig.19).



Fig.19

" CAL" icon and calibrating value (75.2% if at 25°C) are blinking on the LCD with current temp. at the left. Meter is now calibrating. Wait about 60 minutes until blinking stops, then calibration is completed and it returns to normal mode.

NOTE:
Users can also calibrate either point. To calibrate 33% only, press MODE key to exit when 33% calibration is completed. To calibrate 75% only, press ▲ or ▼ key within 5 minutes while initializing 33% calibration. And it skips 33% and enters 75% calibration mode.

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.

? Error messages
E01: CO_2 sensor damaged.
E02: The value is under range.
E03: The value is over range.
E04: The original data error results in this error (RH, DP, WB)
E07: Too low voltage to measure CO_2. Check if the adaptor output is 12V.
E11: Retry humidity calibration.
E17: Retry CO_2 calibration.
E31: Temperature sensor damaged.
E34: Humidity sensor damaged.

PC CONNECTION

The meter can link to PC for on-line logging and data analysis via RS232 interface and software.
The protocol is as follows.

A. 9600 bps, 8 data bits, no parity.

B. Format (ASCII)

Model 7721/77231

Cxxxxppm:Txxx.xC(F) LRC CRLF
Description: CO_2:Air LRC CRLF

Model 7722/77232

Cxxxxppm:Txxx.xC(F):Hxx.x%:
dxxx.xC(F):wxxx.xC(F) LRC CRLF
Description: CO_2:Air:RH:DP:WBT LRC CRLF

SPECIFICATION

	7721	7722	77231	77232
CO_2				
Range	0~2000ppm		0~5000ppm	
	2001~9999(out of scale)		5001~9999(out of scale)	
Resolution	1 ppm		1 ppm	
Accuracy	±50ppm±5%rdg(0~2000) Not specified for out of scale		±30ppm±5%rdg(0~5000) Not specified for out of scale	
Pressure Dependence	+1.6% reading per kPa deviation from normal pressure, 100kPa			
Temp.				
Range	-10.0~60.0℃ (14~140℉)			
Resolution	0.1℃/0.1℉			
Accuracy	±0.6℃/ ±0.9℉			
Humidity				
Range	N/A	0.0~99.9%	N/A	0.0~99.9%
Resolution	N/A	0.1%	N/A	0.1%
Accuracy	N/A	±3%(10~90%) ±5%(others)	N/A	±3%(10~90%) ±5%(others)
Warm up	30 seconds			
Operating	0~50℃, 0~95%RH (avoid condensation)			
Storage	-20~60℃, 0~99%RH (avoid condensation)			
Power	12V adaptor			

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

Appendix

CO_2 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. 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 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.

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
D.O. Meter
Saccharimeter
Manometer
Tacho Meter
Lux / Light Meter
Moisture Meter
Data logger
Temp./RH transmitter
Wireless Transmitter .....

More products available !

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