OPERATION MANUAL

PORTABLE CO_2 METER



CE

Model:

- 7752
- 77532
- 7755
- 77535

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INTRODUCTION

Thank you for purchasing this portable CO_2 meter. The meter measures CO_2 level, air temp., dew point, wet bulb temp. and humidity(DP, WB, RH are for models 7755/77535) 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)

The portable CO_2 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.

Features:

- Triple displays of CO_2 level, temp. and humidity (7755/77535).
- Stable NDIR sensor for CO_2 detection.
- Statistics of weighted averages
  TWA (8 hours weighted average)
  STEL(15 minutes weighted average)
- Backlight for working in dark area.
- Audile CO_2 warning alarm.
- Battery and adaptor power supply.
- Easy manual calibration on CO_2 and humidity (RH for 7755/77535 only).
- PC connect via RS232 interface.

MATERIAL SUPPLIED

This package contains:

- ✓ Meter
- ✓ 4pcs AA batteries
- ✓ Operation manual
- ✓ Hard carrying case

Optional accessory:

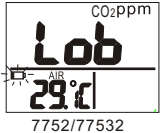
- ✓ 33% calibration salt (VZ0033AZ1)
- ✓ 75% calibration salt (VZ0075AZ1)
- ✓ 75% calibration salt (VZ0075AZ1)
- ✓ Adaptor (9V/100~240Vac)
- ✓ RS232 cable and software

POWER SUPPLY

The meter is powered by either 4 AA batteries or a DC adaptor(9V/1A output).

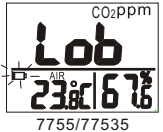
Install the batteries into the battery compartment on the rear and make sure they are in correct polarity and good contact. When an adaptor is used, it will cut off the power supply from batteries. The adaptor can't be used as a battery charger.

When battery voltage gets low, and "Lob" will appear on the LCD (Fig.1). And beeper sounds. The CO_2 sensor can't work under low voltage, so it beeps to indicate failed CO_2 measurement (press any key, except SET, to stop the beeps) and the readings won't be displayed. Please replace with fresh batteries or connect with an adaptor.



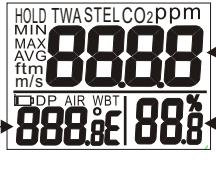
7752/77532

Fig.1



7755/77535

LCD DISPLAY



Symbols

TWA	Time weighted average(8 hours)
STEL	Short-term exposure limit (15 minutes weighted average)
HOLD	Readings are freezed unchanged
MIN/MAX	Minimum/Maximun readings
▭	Low battery indicator
DP	Dew point temp.(7755 , 77535)
AIR	Air temperature
WBT	Wet bulb temp.(7755 , 77535)
%	Unit of relative humidity
°E (C/F)	Celsius/Fahrenheit
AVG/ftm /m/s	Vain icons in these models

KEYPAD

(SET) Turns on and off the meter.
Enters setup mode.
Sets as non-sleep mode with (HOLD).

(CAL Esc) Exits setup page/mode.
Enters CO_2 calibration with (MODE).
Enters RH calibration with (DP/WBT).

(HOLD) Freezes the current readings.
Cancels data hold function.

(MODE) Activates or cancels the backlight.
Selects unit or increases value in setup.

(DP/WBT) Selects AIR, DP, WBT temps display.
(7755/77535 only)
Selects unit or decreases value in setup.

(M/AV) Activates MIN,MAX,STEL,TWA function.
Saves and finishes settings.

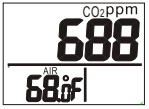
OPERATION

POWER ON/OFF

Press (SET) to turn the meter on and off. When power on, it emits a short beep and performs 30 sec countdown(Fig.2) for meter warm up, then enters normal mode with current CO_2, temp., and humidity(7755/77535) readings displayed (Fig.3).



Fig. 2



Model 7752/77532

Fig 3



Model 7755/77535

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_2 sensor and 30 minutes for RH.
NOTE: Do not hold the meter close to faces in case exhalation affects CO_2 levels.

AIR(all models),DP,WBT(7755/77535)

Press (DP/WBT) to switch temp. display. The lower left display will cycle from air temp., dew point temp. (Fig.4), and wet bulb temp.(Fig.5).

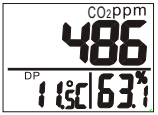


Fig.4



Fig.5

DATA HOLD

Press (HOLD) to freeze the readings, "HOLD" icon is displayed on the left top of LCD(Fig.6). All current readings are kept unchanged, except STEL and TWA. Press (HOLD) again to cancel the hold function.



Fig.6

BACKLIGHT

Hold down (MODE) for more than 1 sec to activate and cancel backlight function.

MIN,MAX,STEL,TWA

Under normal mode, press (M/AV) to see the minimum, maximum, and weighted average readings. Each press of (M/AV), it displays MIN, MAX, STEL, TWA in sequence and returns to normal mode.

In MIN and MAX modes, it shows the minimum and maximum readings of CO_2 on the upper LCD and of AIRor Dpor WB temp. and humidity(7755/77535) on the lower LCD. (Fig.7)

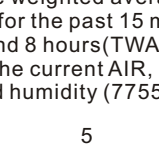


Fig.7

In STEL and TWA modes, the upper LCD shows the weighted average of CO_2 readings for the past 15 minutes (STEL) and 8 hours(TWA). The lower LCD are the current AIR, DP/WB temp. and humidity (7755/77535). (Fig.8)



Fig.8

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 TWA values appear before 8 hours.
2. It takes at least 5 minutes to calculate STEL and TWA. The LCD shows"----" (Fig.9) during the first 5 minutes from power on.



Fig. 9

3. While all readings are held unchanged, STEL and TWA will keep updating every 5 minutes.

ALARM

The meter features audible alarm to give warnings when CO_2 concentration exceeds the limit. (See **P1.0** in setup for setting the alarm threshold). It emits beeps (Abt.80dB) when CO_2 level goes over the set value and stops when any key (except SET) was pressed or readings fall below the set value. It beeps again when value goes over the limit. Restartthe meter if beeper can't be stopped.

AUTO POWER OFF

The meter turns off automatically after 20 minutes of inactivity. To override the function, hold down SET and HOLD for 2 sec to turn on the meter until "**n**" appears.

NOTE: Auto sleep function will be disabled during calibration mode.

SETUP

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

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

P1.0 CO_2 ALARM

When entering setup mode, **P1.0** and "AL" (Fig.10) are displayed on the LCD. Press (M/AV) to enter **P1.1** for setting CO_2 alarm threshold. The current set value will be blinking on the LCD(Fig11).

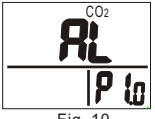


Fig. 10

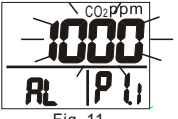


Fig. 11

Press (MODE) to increase the value or (DP/WB) to decrease. Each press tunes 100ppm and the alarm range is from 100 to 9900ppm. When the preferred alarm value is set, press (M/AV) to save the setting or (CAL Esc) without saving and return to **P1.0**.

P3.0 TEMPERATURE SCALE

Press (MODE) or (DP/WB) in **P1.0** to access **P3.0** for setting up temp. Scale(Fig.12). Press (M/AV) enter **P3.1** with blinking °C or °F current set (Fig.13) on the lower left LCD. To switch °C or °F, press (MODE) and (DP/WB). Then press (M/AV) to save the setting or (CAL Esc) without saving and return to **P3.0**.



Fig. 12



Fig. 13

CO_2 CALIBRATION

The meter is calibrated at standard 400ppm CO_2 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_2 concentration. Otherwise, it will be calibrated as 400ppm by default and leads to inaccurate measurements.

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

Place the meter in the calibration site. Turn on the meter and hold down (CAL Esc) and (MODE) simultaneously to enter CO_2 calibration mode (Fig.14). 400ppm and "CAL" are blinking on the LCD while performing calibration.



Fig. 14

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

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.

RH CALIBRATION (7755/77535)

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. Hold down CAL Esc and DP/WB under normal mode to enter 33% calibration (Fig.15). "CAL" 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" and humidity stop blinking. (Fig.16)



Fig. 15



Fig. 16

75% calibration

After 33% calibration, plug the sensor probe into 75% salt bottle, then press M/AV to enter 75% calibration (Fig.17).



Fig.17

"CAL" 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 CAL Esc and exit when 33% calibration is completed. To calibrate 75% only, press MODE or DP/WB within the 5 minutes while initializing 33% calibration.

TROUBLE SHOOTING

? Can't power on
Press SET for more than 0.3 sec and try again. Check whether batteries are in good contact and correct polarity, or the adaptor is well plugged.

? 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: 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 (DP, WB)
E07: Too low voltage to measure CO_2. Replace batteries or use an adaptor.
E11: Retry humidity calibration.
E17: Retry CO_2 calibration.
E31: Temperature sensor damaged.
E34: Humidity sensor damaged.

PC CONNECTION

The meter can do PC link 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 7752/77532

Cxxxxppm:Txxx.xC(F) LRC CRLF

Description: CO_2:Air LRC CRLF

Model 7755/77535

Cxxxxppm:Txxx.xC(F):Hxx.x%:
dxxx.xC(F):wxxx.xC(F) LRC CRLF

Description: CO_2:Air:RH:DP:WBT LRC CRLF

SPECIFICATION

Model	7752	77532	7755	77535
Measuring range				
CO_2	0~9999ppm (2001~9999 out of scale)	0~9999ppm (5001~9999 out of scale)	0~9999ppm (2001~9999 out of scale)	0~9999ppm (5001~9999 out of scale)
Temp.	-10~60°C(14~140°F)			
Humidity	NA		0.1%~99.9%RH	
Dew point	NA		-20.0~59.9°C	
Wet bulb	NA		-5.0~59.9°C	
Resolution	1ppm, 0.1°C/°F		1ppm, 0.1°C/°F, 0.1%RH	
Accuracy				
CO_2	±50ppm±5% (0~2000ppm)	±30ppm±5% (0~5000ppm)	±50ppm±5% (0~2000ppm)	±30ppm±5% (0~5000ppm)
Temp.	±0.6°C/±0.9°F			
Humidity	NA		±3%RH (at 25°C, 10~90%RH); ±5%RH (at 25°C, others)	
Warm-up time	30 seconds			
Response time				
CO_2	<30 seconds (90% step change)			
Tair	<2 mins (90% step change)			
RH	NA		<10 mins (90% step change)	
Relay	NO			
LCD size	26*44 mm, H*W			
Operating condition	0~50°C, 0~95% RH (avoid condensation)			
Storage condition	-20~50°C, 0~95% RH (avoid condensation)			
Power supply	AA *4 pcs			
Battery life	>24 hours (Alkaline battery)			
Meter size	205*70*56mm, L*W*H			
Weight	200g			
Standard package	Meter, manual, AA batteries, hard carry case			

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. 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.

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 7721 Wall mount Temp./CO_2 meter, general purpose.
b. Model 77231 Wall mount Temp./CO_2 meter, high performance.
c. Model 7722 Wall mount Temperature/RH/CO_2 meter, general purpose.
d. Model 77232 Wall mount Temperature/RH/CO_2 meter, high performance.

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
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Lux / Light Meter
Moisture Meter
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Temp./RH transmitter
Wireless Transmitter .....

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