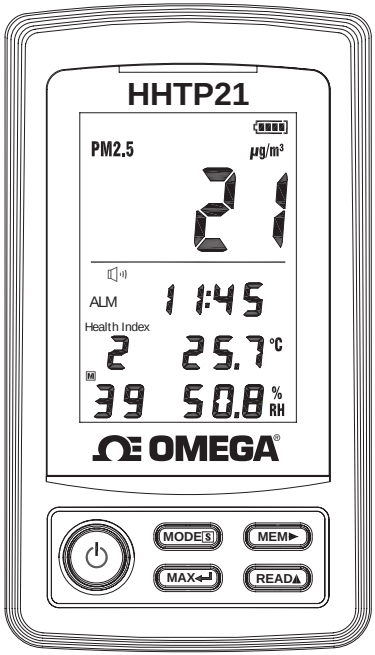
1 YEAR
WARRANTY

OMEGA®

User's Guide



HHTP21
Air Quality Monitor

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WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence. The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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1. SAFETY INFORMATION

- ❑ Read and keep the instruction manual.
- ❑ Follow all warnings and instructions.
- ❑ Avoid any adhesive particle like oil, etc. from gettng onto the meter.
- ❑ Do not install or operate the meter close to noise generator, such as electric dust collector, fluorescent lighting, etc.
- ❑ Avoid use on mechanical vibration.
- ❑ Avoid use in moisture.
- ❑ Do not use the meter near water, such as a sink, wash basin, or bathtub.
- ❑ Do not spill any liquids onto or into the meter.
- ❑ Do not push any objects into the openings of the meter.
- ❑ Do not use any liquid or spray cleaners on the meter. Clean only with dry cloth.
- ❑ Do not install or operate near any source of heat.
- ❑ Do not use the meter in direct sunlight or other bright light source.
- ❑ Air sampling port shall not be covered when in use.
- ❑ Place the meter in a flat and safe surface to prevent it from dropping.

Health Disclaimer

While the meter can detect levels of airborne particulates it cannot determine the health impact for any given individual.
Respiratory ailments and allergic symptoms are caused by a variety of factor. The meter is not meant to be used in the treatment or mitigation of any medical condition.

2. INTRODUCTION

Particle pollution comes from many different type of sources. Fine particle (2.5 micrometers in diameter and smaller) include power plants, industrial processes, vehicle tailpipes, wood stoves, and wildfires. Coarse particles (between 2.5 and 10 micrometers) come from crushing and grinding operations, road dust, and some agricultural operations.

Particle pollution is linked a number of health problems, including coughing, wheezing, reduced lung function, asthma attacks, heart attacks and strokes. It also is linked to early death.

Some people may be at greater risk from particle pollution. They include:

- ❑ People with cardiovascular disease (diseases of the heart and blood vessels).
- ❑ People with lung disease, including asthma and COPD.
- ❑ Children and teenagers.
- ❑ Older adults.
- ❑ Research indicates that obesity or diabetes may increase risk.
- ❑ New or expectant mothers may want to take precaution to protect the health of their babies.

The meter is a real-time air quality monitor instrument used to monitor the concentration of PM2.5, humidity and temperature in the indoor environment. The meter convert the concentration of PM2.5 in the air into visual data, and evaluate the air quality comprehensively. Visual and audio alarm will be actived when the air quality reached a critical or alarm limit values.

2-1 Features:

- ❑ **Fine particulate matter (PM2.5) measurement.**
- ❑ **Temperature and Humidity measurements.**
- ❑ **Health index (0 ~ 9) detection and alarm.**
- ❑ **PM2.5 time weighted average reading.**
- ❑ **Data hold and MAX/MIN with time stamp function.**
- ❑ **Six-color LED indication Air Quality Index Category.**
- ❑ **Preset warning point of buzzer alarm, LED and alarm output.**
- ❑ **Manual data memory and read function.**

2-2 Applications:

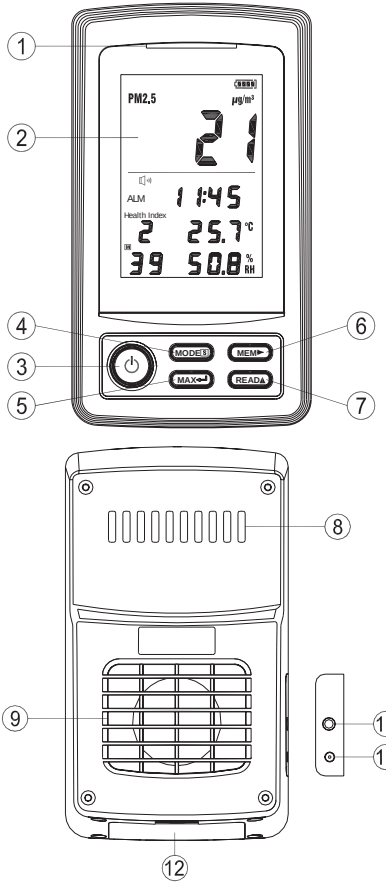
- ❑ Sensitive individuals can monitor their personal space at home and work.
- ❑ Evaluate effectiveness and placement of air filtration devices.
- ❑ Investigate the effectiveness of different strategies to reduce particulates.
- ❑ Correlate health related issues to changes in particulate levels.
- ❑ Indoor air quality investigations.
- ❑ Evaluate effectiveness of air filtration.
- ❑ Continuous monitoring of building conditions (continuous commissioning)
- ❑ Troubleshooting/optimization of filtration methods.
- ❑ Sales tool for understanding filtration needs.

3. SPECIFICATIONS

- **Measurement Range**:
  PM2.5: 0 to 500μg/m^3
  Humidity: 1% to 99%R.H.
  Temperature: -20°C to +60°C (-4°F to +140°F)
- **Resolution**: 1μg/m^3, 0.1% R.H., 0.1°C, 0.1°F
- **Accuracy**:
  PM2.5: ±10% of reading±10μg
  Temperature: ±0.8°C, ±1.5°F
  Humidity: ±3%RH (at 25°C, 30 to 80% RH).
  ±5%RH (at 25°C, 0 to 20% RH and 80 to 100% RH).
- **Sensor type**:
  PM2.5: Optical sensing with an IRLED and a photodiode sensor.
  Humidity: Precision capacitance sensor
  Temperature: Thermistor sensor
- **Response time**:
  PM2.5: ≤1min
  Humidity: 45%R.H. to 95% R.H. ≤1min
  95%R.H. to 45%R.H. ≤3min
  Temperature : 10°C/2 sec.
- **Flow rate**: 0.115m^3/min (4.135 CFM)
- **Sampling rate**: 1 sample/second.
- **Data Memory Capacity**: 39 sets. (Direct reading from LCD display)
- **Alarm Output**: Open-collect output. Input impedance: 490Ω
  Maximum applied Voltage: 24V DC
  Maximum drive current: 50mA DC
- **Operating temperature and humidity**: 0°C to 60°C, below 95% R.H.
- **Storage temperature and humidity**: -10°C to 60°C, below 70% R.H.
- **Power supply**: Four 1.5V LR-6/AA size batteries, AC adapter
- **Battery life**: Approx. 8 hour
- **Dimensions**: 165mm(L)×93mm(W)×75mm(T), (6.5"L×3.7"W×3"T)
- **Weight**: Approx. 380g (13.4oz)
- **Accessories**: Instruction manual, Battery, AC adaptor DC6V 1000mA.

4. PARTS & CONTROLS

4-1 Description of Parts & Control keys:



1. PM2.5 LED Air quality indicator

LED Color	Air Quality Index	Who Needs to Be Concerned ?	PM2.5 (μg/m^3) 24-hour average
Green	Good (0 – 50)	No one. Air quality is good for everyone.	0.0 – 12.0
Yellow	Moderate (51 – 100)	Some people may be unusually sensitive to particle pollution and may need to take precautions.	12.1 – 35.4
Orange	Unhealthy for Sensitive Groups (101 – 150)	Sensitive groups include people with heart or lung disease, older adults, children and teenagers.	35.5 – 55.4
Red	Unhealthy (151~200)	Everyone can be affected.	55.5 – 150.4
Purple	Very Unhealthy (201 – 300)	Everyone	150.5 – 250.4
Maroon	Hazardous (301 – 500)	Everyone	250.5 – 500

2. LCD display.

3. ⏻ Power and Backlight control key:

① Press this key to turn on the meter.
② Press this key again to turn on or off the LCD backlight.
③ Press this key for 3 seconds to turn off the meter.

4. MODE S key:

① **MODE** key: Press this key to cycle the Measurement, PM2.5 TWA (Time-Weighted Average) and Current Date reading.

② S key: Press this key for 3 seconds to enter the Setting Mode.
Press ↵ key to exit this mode.
SET **dAtE**: Real-time setting mode.
SET **bEEP**: Alarm sound on/off setting mode.
SET **UNit**: Temperature unit °C/°F setting mode.
SET **PM2.5 TWA**: PM2.5 TWA average time setting mode.
SET **cA**: User calibration setting mode.
SET **ALM**: Alarm limit values setting mode.

5. MAX ↵ key:

① ↵ key: In the setting mode, press this key to store the setting data and exit.
② **MAX** key: Press this key to enter the MAX (maximum) / MIN (minimum) Recording Mode.

Press this key to circulate the MAX and MIN reading.
Press this key for 3 seconds to exit this mode and store one set recorded datas to memory.

6. MEM ▶ key:

① ▶ key: In the setting mode, press this key to move cursor to the desired position.

② **MEM key**:

a). **Memory function**: Press this key one time to store a measuring data.

b). **Clear the stored data**: Press and hold this key, then turn on the meter again. There shows "**rEC CLr no**" mark on LCD. Press ▲ key to select "**YES**" or "**no**" to erase the memory data.

7. READ ▲ key:

① **▲ key**: In the setting mode, press this key to increase the parameter.

② **READ key**: Press this key to enter the READ mode, then press this key again to select the desired stored number of data to read.
Press ↵ key to exit.

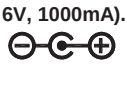
8. Air sampling inlet port.

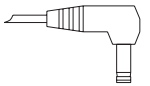
9. Air sampling outlet port.

10. Alarm output jack: Alarm signal is available this jack.

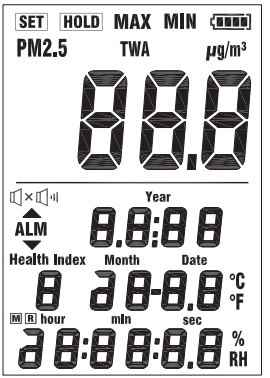
11. AC adaptor power jack (DC 6V, 1000mA).

12. Battery compartment.





4-2 Description of Display:



SET : Setting mode indication.

HOLD : In the user calibration setting mode, the measuring data hold indication for calibration.

MAX: In the MAX/MIN recording mode, maximum value indication.

MIN: In the MAX/MIN recording mode, minimum value indication.

MAX MIN: In the MAX/MIN recording mode, current value indication.

: Battery capacity indication.

: Low battery indication.

PM2.5: Fine particulate matter (PM2.5) measurement value indication.

PM2.5 TWA: Fine particulate matter (PM2.5) measurement TWA value indication.

μg/m^3: PM2.5 measurement unit.

888 : PM2.5 measurement value.

: Disable alarm sound indication.

: Enable alarm sound indication.

ALM: Enable the alarm function indication.

ALM ▲: Measurement value upper to the high limit value or setting the high limit value indication.

ALM ▼: Measurement value below to the low limit value or setting the low limit value indication.

88:88: Current time (hour:minute) indication.

Health Index

8 : PM2.5 air particle pollution is based on a scale from 0 – 9 indication.
0: Very good, 1: Good, 2 – 4: Moderate, 5 – 8: Poor, 9: Very poor.

188.8 °C °F : Temperature measurement value.

M : Store one set of data into memory.

M 39: Manual memory address number indication.

R : Read mode indication.

R 39: Recall manual memory address number indication.

Hour 24: PM2.5 TWA average time indication or setting.

88.8 % RH : Relative humidity measurement value.

Year Month Date hour min sec: Real-time or MAX/MIN recorded stamp time indication.

5. BEFORE OPERATION

5-1 Power Supply:

The meter can be powered by two ways: Four AA-size alkaline batteries or the AC adaptor.

5-2 Install the Batteries:

Insert four AA-size batteries as indicated by the diagram located on the inside of the battery compartment.

The meter is disigned to operate only with alkaline batteries.

When the battery voltage drop below the operating voltage, the " " mark will be blink displayed, it indicates the batteries need to be changed.

5-3 AC Adaptor:

The AC adaptor allows you to power the meter from a wall outlet. When using the AC adaptor, the batteries (if installed) will be by passed. The AC adaptor is not a battery charger.

5-4 Air Sampling Port:

Always ensures that the meter air sampling inlet and outlet port are not blocked and open to the atmosphere.

6. OPERATING INSTRACTIONS

6-1 Selecting Temperature Unit °C or °F:

1. Press ⏻ key to turn on the meter.
2. Press S key for 3 seconds to enter the setting mode, the "**SET**" and "**dAtE**" marks are displayed.
3. Press S key 2 times to enter the temperature unit °C/°F setting mode, the "**Unit**" mark is displayed.
4. Press ▶ key to select "°C" or "°F" unit now blink on the display.
5. Press ↵ key to store the desired measure unit.

6-2 Taking Measurements:

1. Press ⏻ key to turn on the meter.
2. The display will shows the PM2.5 concentration reading (PM2.5 μg/m^3), Temperature reading (°C or °F), Humidity reading (%RH), Real-time hour:minute (88:88), and PM2.5 air particle pollution (Health Index 0 – 9). The Health Index 5 – 9 will be blink display for warning.
3. The PM2.5 LED air quality indicator in a color format, the Red, Purple and Maroon colors will be blink.

4. Press **MODE** key to cycle the Measurement, PM2.5 TWA and Real-time display. If the measurement time arrive ahead of the TWA average setting time, the "**hour - -:**" will be displayed.
5. Press ⏻ key again to turn on or off the LCD backlight.
6. Press ⏻ key for 3 seconds to turn off the meter.

6-3 Setting the TWA Average Time:

1. Press ⏻ key to turn on the meter.
2. Press S key for 3 seconds to enter the setting mode, the "**SET**" mark is displayed.
3. Press S key 3 times to enter the PM2.5 TWA average time setting mode, the "**SET PM2.5 TWA hour**" mark is displayed.
4. Press ▲ key to select the desired average time from 1 to 24 hours.
5. Press ↵ key to store the setting value and exit this mode.

6-4 Setting the Real-Time:

The meter internal clock is used in the display and for time-stampling recorded measurements.

1. Press ⏻ key to turn on the meter.
2. Press S key for 3 seconds to enter the real-time setting mode, the "**SET dAtE**" mark is displayed.
3. Using ▶ key to position the cursor on the date or time element to adjust.
4. Press ▲ key to change the selected date or time element value.
5. Press ↵ key to complete the action.

6-5 Taking Maximum (MAX) and Minimum (MIN) Recorder Measurements:

1. Press ⏻ key to turn on the meter.
2. Press **MAX** key to enter the read previous recorded data mode, the "**rEAd OLd dAtA**" mark is displayed.
3. If you wish to read previously recorded data, press **READ** key to cycle display the recorded data, then press **MAX** key for 3 seconds to exit this mode. Otherwise press **MAX** key again to enter the recorder mode and auto clear the previous recorded data.
4. Press **MAX** key to cycle through the
   ① Current measurement reading, the "**MAX MIN**" mark is displayed.
   ② **MAX.** reading for PM2.5, temperature and humidity, the "**MAX**" mark is displayed.
   ③ **MAX.** reading for PM2.5 TWA, temperature and humidity, the "**MAX TWA**" mark is displayed.

④ **MIN.** reading for PM2.5, temperature and humidity, the "**MIN**" mark is displayed.

⑤ **MIN.** reading for PM2.5 TWA, temperature and humidity, the "**MIN TWA**" mark is displayed.

⑥ **MAX.** PM2.5 reading with its temperature and humidity reading, the "**PM2.5**" mark is blinks.

⑦ **MIN.** PM2.5 reading with its temperature and humidity reading, the "**PM2.5**" mark is blinks.

⑧ **MAX**. temperature reading with its PM2.5 and humidity reading, the "°C or °F" mark is blink.

⑨ **MIN.** temperature reading with its PM2.5 and humidity reading, the "°C or °F" mark is blink.

⑩ **MAX.** humidity reading with its PM2.5 and temperature reading, the "**%RH**" mark is blink.

⑪ **MIN.** humidity reading with its PM2.5 and temperature reading, the "**%RH**" mark is blink.

Under ⑥ to ⑪ steps, users also can get the occurred time by press **MODE** key to display the occurred time, press **MODE** key again to exit time display.

Under ② to ⑪ steps, the "R" mark is displayed.

5. Press **MAX** key for 3 seconds to exit this mode and store the recorded data to memory.

6-6 Taking Alarm Operation:

1. Quantity for alarm operation

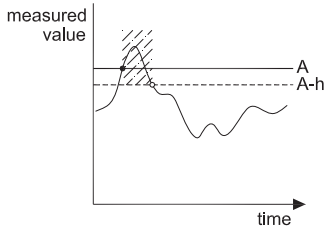
Alarm setpoints:

A alarm monitors the quantity chosen for the alarm operation. When the measured value is in between the "**high**" and "**low**" limit values, the alarm is OFF. When choosing low value as "**high**" value and higher value as "**low**" value, the alarm is OFF when the measured value is not between the setpoints. You can also set only one setpoint.

The figure for illustrative examples of the different measurement-based alarm operation modes.

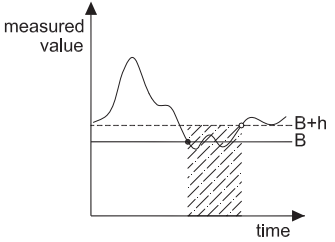
Hysteresis function is to prevent the alarm operation back and forth when the measured value is near to the setpoint values. Hysteresis value should be smaller than the difference of the setpoints.

Mode 1: Only “high” setpoint set.



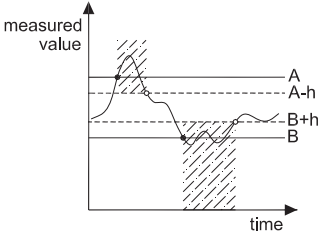
Alarm is ON when value is above the setpoint.

MODE 2: Only “low” setpoint set.



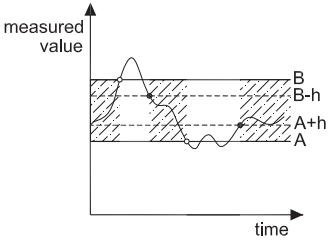
Alarm is ON when value is below the setpoint.

Mode 3: Both setpoints set “high” > “low”.



Alarm is ON when value is outside the setpoints.

Mode 4: Both setpoints set “high” < “low”.



Alarm is OFF when value is outside the setpoints.

Legend	
A: “high” setpoint value	▩ Alarm is ON
B: “low” setpoint value	Alarm is ON
h: Hysteresis value	◦ Alarm is OFF

2. Setting the alarm limit values

① Press ⏻ key to turn on the meter.

② Press S key for 3 seconds to enter the setting mode, the "SET" mark is displayed.

③ Press S key 5 times to enter the PM2.5 alarm mode select, the "**PM2.5 ALM**" and "**no-x**" marks are displayed.

④ Press ▲ key to select the desired PM2.5 alarm mode from 1 to 4, then press ↵ key to select and to enter the alarm limit values setting mode.

⑤ The "**ALM▼**" mark indication setting the low limit value,
the "**▲ALM**" mark indication setting the high limit value, and
the "**▲ALM▼**" mark indication setting the hysteresis value.
Press ▲ key to set the desired value, the ▲ key can be held down to increase the speed.

Press ↵ key to move the next setting value or to enter the temperature alarm mode select, the "°C or °F **ALM**" and "**no-x**" marks are displayed.

⑥ Repeat step ④ and ⑤ above to complete the temperature limit value setting, and to enter the humidity alarm mode select, the "**%RH, ALM**" and "**no-x**"marks are displayed.

⑦ Repeat step ④ and ⑤ above to complete the humidity limit value setting, and exit the alarm limit values setting mode.

3. Setting the alarm sound ON/OFF

① Press ⏻ key to turn on the meter.

② Press S key for 3 seconds to enter the setting mode, the "SET" mark is displayed.

③ Press S key 1 times to enter this mode, the "**bEEP**" and "🔇× 🔊" marks are displayed.

④ Press ▲ key to select "🔇×" for disable the alarm sound or select "🔊" for enable the alarm sound.

⑤ Press ↵ key to exit this mode.

4. To turn-on and turn-off alarm function.

① Press **READ** key for 3 seconds to turn on the alarm function, the "**ALM** 🔊" or "**ALM** 🔇×" mark is displayed.

② Press **READ** key one time to turn off the alarm function, the "**ALM** 🔊" or "**ALM** 🔇×" mark is disappeared.

6-7 Manual data Memory and Read Mode:

1. To clear the manual memorized data

① Press ⏻ key to turn off the meter.

② Press and hold down **MEM** key then press ⏻ key to turn on the meter, LCD show "**rEC CLr no**" mark.

③ Press ▲ key to select "**YES**" or "**no**", then press ↵ key to exit.
If you select "YES" the memorized data will be cleared.

2. To memorized the reading

① Press **MEM** key each time will store one set of the measured value into the memory. At this moment, LCD will show the memory address number and the "M" mark will be disappear one time. Total memory size is 39 sets.

② When the memory is full, LCD will show "**rEC FULL**" mark.

3. To recall the memorized data.

❑ Press **READ** key to enter the READ mode, the LCD will show "R" mark and the memory address number.

❑ Press **READ** key to select the desired memory address number data for display.

❑ Press **MODE** key to display the stored date and time, press **MODE** key again to exit the date and time display.

❑ Press ↵ key to exit.

6-8 User Friendly Calibration Procedure:

6-8-1 Use standard PM2.5 meter for 2-point calibration, use standard temperature meter for 1-point calibration, and use standard humidity meter for 1-point calibration.

1. Press ⏻ key to turn on the meter.
2. Press S key for 3 seconds to enter the setting mode, the "**SET**" mark is displayed.
3. Press S key 4 times to enter the calibration mode, "**CA 1**" mark is displayed.
4. Wait about 10 minutes, until the meter and the standard meters all readings are stable, then press ↵ key to hold the meter measured values, the "**HOLD**" mark is displayed and the "**PM2.5 1**" mark is blinking.
5. Press and hold down the ▲ key to increase the PM2.5 first point value or press and hold down the ▶ key to decrease the value, until the PM2.5 value is same as the PM2.5 standard meter.

6. Press ↵ key, the "°C or °F" mark is displayed, press ▲ or ▶ key until the temperature value is same as the standard temperature meter.
7. Press ↵ key, the "**%RH**" mark is displayed, press ▲ or ▶ key until the humidity value is same as the standard humidity meter.
8. Press ↵ key to enter the PM2.5 second point calibration mode, the "**CA 2**" mark is displayed.
9. Wait about 10 minutes, until the meter and PM2.5 standard meter reading are stable, then press ↵ key to hold the meter measured value, the "**HOLD**" mark is displayed and the "**PM2.5 2**" mark is blink.
10. Press ▲ or ▶ key until the PM2.5 second point value is same as the PM2.5 standard meter.
11. Press ↵ key to complete the calibration procedure and exit this mode.

6-8-2 Reset to factory calibration

1. Press ⏻ key to turn off the meter.
2. Press and hold down S key then press ⏻ key to turn on the meter, the "**CA Fact no**" mark is displayed.
3. Press key to select "**YES**" or "**no**". If you select "**YES**" will reset to factory calibration.

7. MAINTENANCE

7-1 Cleaning

Periodically wipe the case with a dry or damp cloth and mild detergent. Do not use abrasives or solvents to clean this instrument.

7-2 Battery Replacement

When the battery power is not sufficient, LCD will show " ▭ " mark is blink, the four 1.5V "**AA**" alkaline batteries must be replaced.

1. Turn the meter off.
2. Remove the meter's battery cover.
3. Replace the batteries observing polarity.
4. Affix the battery cover.

8. AIR POLLUTION REGULATION

		WHO				European Union	USA		Canada
		IT-1	IT-2	IT-3	AQG		United States	California	
PM2.5 μg/m^3	Yearly average	35	25	15	10	25	12	12	-
	Daily average (24-hour)	75	50	37.5	25	-	35	-	30

		Australia	Japan	South Korea	Hong Kong	China		Thailand	Taiwan
						Class1	Class2		
PM2.5 μg/m^3	Yearly average	8	15	-	35	15	35	25	15
	Daily average (24-hour)	25	35	-	75	35	75	50	35

NOTES:

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