Multifunctional Air Detector

User Manual

Be sure to carefully read this user manual regarding use and keep it for future reference.

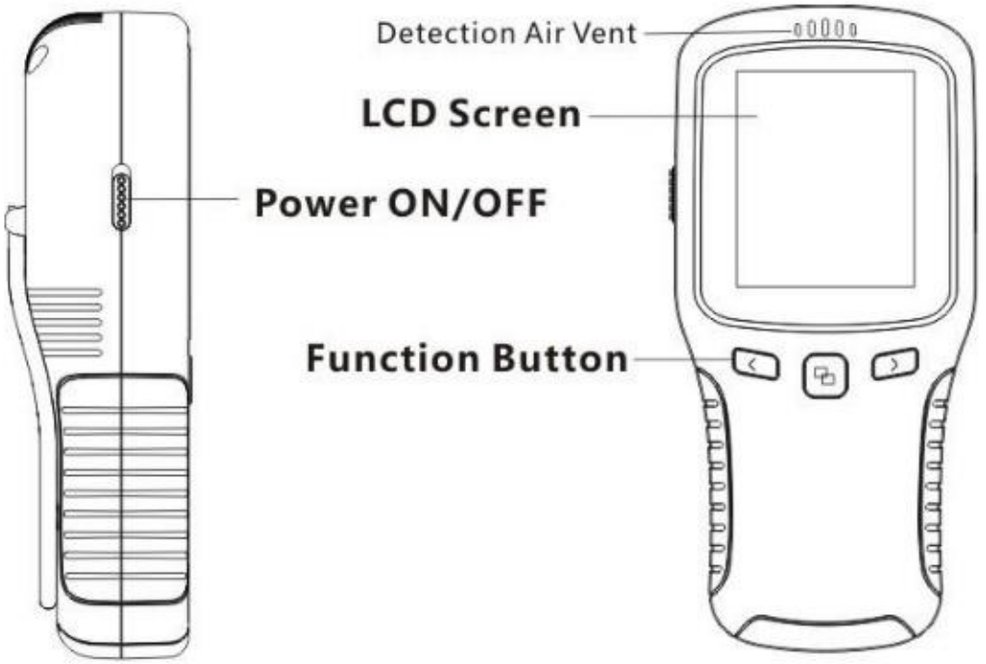
I. Introduction

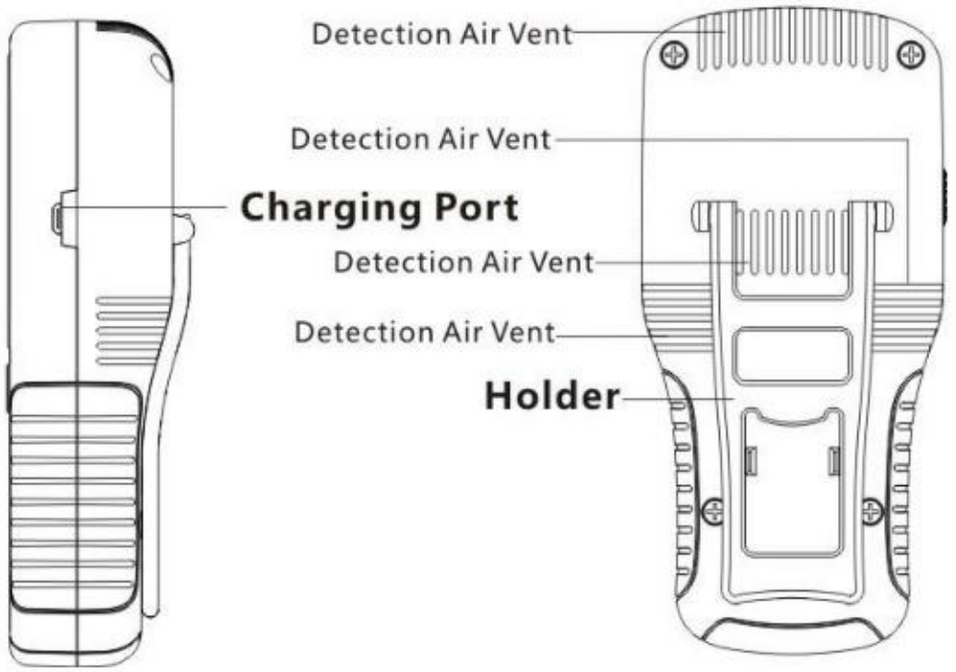
This product is a multifunctional air detector that detects Formaldehyde (HCHO), Total Volatile Organic Compounds (TVOC), and Particulate Matter ≤2.5 micron-sized particles (PM2.5) with clock and air quality record chart. As a professional and scientific air detection device, it combines advanced sensor technology with a built-in fan to allow real-time monitoring of formaldehyde (HCHO), total volatile organic compounds (TVOC), and PM2.5 on its digital LCD display.

Features:

- 2.8" color liquid crystal display (LCD)
- User adjustable alarm threshold to alert of hazardous conditions
- Green/yellow/red indicator corresponding to three air quality levels: Fresh, Unqualified (i.e. borderline fresh but not qualified as fresh), and Polluted.
- Large 2200 mAh capacity Lithium battery
- 5V 800mA Micro USB charging
- Low battery warning

Ⅱ. How to Use


Detection Air Vent
LCD Screen
Power ON/OFF
Function Button


Detection Air Vent
Detection Air Vent
Charging Port
Detection Air Vent
Detection Air Vent
Holder

Why measure TVOC and Formaldehyde? TVOCs are carbon-containing compounds produced by synthetic processes, materials, and organisms. Formaldehyde has suspected links to nasal cancer and lung cancer and emitted from many household materials. Most known carcinogens are synthetic organic compounds as they can interact with DNA to cause mutations/cancer. A combined measure can give a picture of relative indoor pollution levels and synthetic gas accumulation.

DIRECTIONS TO MEASURE AIR QUALITY

1. Charge device on receipt until battery level is at least half full before initial use. Power on device to determine battery level. Place device in a well ventilated area for 20-60 minutes.
2. Power on device. Detector will begin initiation process for 3 minutes allowing sensors to preheat and fan to draw in fresh ambient air. This is necessary for accurate results. LED screen will display the countdown number from 180 to 0 seconds.
3. To measure air quality, place device in any location for at least 5 minutes for most accurate and stable readings of formaldehyde (HCHO), TVOC, and PM2.5.
4. After detection, turn device off and store in a cool, dry area.

5. If item is newly purchased or has not been used for long periods, it may accumulate gases from packaging that can affect detection results. In this case, place the device before use in fresh well-ventilated air for at least 20 minutes, leaving it unused during this period. Should results appear inaccurate despite ventilation, consider calibration by referring to CALIBRATION procedure.

CALIBRATION

Like all scientific instruments, you can calibrate it initially or after long storage for greatest reproducibility and accuracy of results.

Calibration procedure is for formaldehyde and TVOC sensor. PM2.5 particular matter sensor does not require calibration. This procedure is best done OUTDOORS where formaldehyde and TVOC levels are generally negligible.

Video of procedure for calibration:

https://www.youtube.com/watch?v=Y9ZdjQy2qAg

1. Turn on unit by sliding left sided button upwards.

2. Allow device to fully start up by allowing TVOC counter to count to 0.

3. Place device in a CLEAN OUTDOOR AIR environment for 5+ minutes where there is no formaldehyde or TVOC. Putting the device outside for at least 5 minutes allows full circulation of outside air into the device. Putting the device outside longer may be even better. Place the device outside before proceeding further.

***Generally outdoors is a clean environment with negligible formaldehyde and TVOC. Do this procedure away from traffic or combustion sources.**

4. Push center button once to enter Menu and 2 additional times to highlight "Sensor Calibration" in red.

5. Push the left < button to select "OK"

6. Push the left < button to select "Calibrate"

7. Push the left < button twice to select "OK" and confirm while outside.

8. Push the right > button twice to select "Back" and exit to the main screen. You will see that device has set the HCHO and TVOC readings as 0.000 mg/m^3.

You can confirm device has been calibrated after exiting to the main screen and seeing device <u>reads 0.000 mg/m^3 for HCHO and TVOC.</u> Calibration means device has set <u>0.000 mg/m^3</u> as corresponding to clean outdoor air which generally has <u>negligible or near zero</u> HCHO and TVOC. One can think of calibration as zeroing a weight scale. HCHO and TVOC are most commonly emitted by synthetic materials and accumulate indoors and degrade outdoors. DO NOT CALIBRATE unless you have access to clean air free from formaldehyde and TVOC (organic compounds). Avoid calibrating indoors where HCHO and TVOC are usually higher. If you try calibrating your device indoors (NOT recommended), you will notice that the device will read 0.000 mg/m^3 indoors and will show low and inaccurate numbers.

Why are there significant differences in HCHO and TVOC readings at different times?

There can be large variations in formaldehyde (HCHO) and TVOC readings within a house on different days and in different rooms.

The total volatile organic compound (TVOC) readings can vary by magnitude of 10 or more on different days. Anything from cooking to perfume to body odor near the device can cause large variations in the TVOC readings. Think of the device as a very sensitive electronic nose.

Remember to calibrate ESPECIALLY if you are getting inaccurate readings or after storage as most product boxes are made from a large amount of synthetic materials that emit HCHO and TVOC's and can cause inaccurate readings.

Why is the TVOC reading 9.999 mg/m^3?

Make sure there are no fragrances, body odors, perfumes, smoke, aromas, detergent or cooking smells near the device as these all are benign sources of total volatile organic compounds (TVOCs). They will lead to higher TVOC concentrations and an elevated or 9.999 mg/m^3 reading as the device is sensitive and the human nose is often exposed to TVOC concentrations far greater than 10 mg/m^3. Do not be alarmed if TVOCs are elevated as TVOCs include any organic or biologic odors dispersed in the air, the majority benign. If you take the device outside, the TVOC reading should be near 0.000; if not, please be sure to calibrate the device.

AIR LEVEL QUALITY AND GRADE

1. When formaldehyde (HCHO) concentration is less than *0.080 mg/m^3* and PM2.5 is less than *55*, LCD screen displays Level as Fresh in green and air quality is fresh.
2. When formaldehyde (HCHO) concentration is between *0.080 to 0.300 mg/m^3* or PM2.5 is between *55 to 250 mcg/m^3,* LCD screen displays Level as Unqualified in yellow, meaning air is in a *borderline* condition not *qualified* as Fresh but not meeting criteria for hazardous pollution.
3. When formaldehyde (HCHO) density is greater than *0.300 mg/m^3* or PM2.5 is greater than *250 mcg/m^3*, LCD screen displays the Level as Polluted or Hazardous in red, meaning air quality is considered polluted and not safe for prolonged exposure. Corrective action including ventilation of the area should be taken.

Formaldehyde Level Interpretation

The World Health Organization guideline for indoor air formaldehyde concentration is 0.10 mg/m^3 (0.08 ppm). The California Air Resources

Board recommends an "action level" of 0.1228 mg/m^3 (0.1 ppm) and a "target level" of 0.0614 mg/m^3 (0.05 ppm) or lower for homes.

PM2.5 Level Interpretation

According to the EPA, here are levels of PM2.5 or dust particulate matter measuring 2.5 micrometers or less considered healthy/unhealthy:

- GOOD: 0.0-12.0 µg/m3
- MODERATE: 12.1-35.4
- UNHEALTHY FOR SENSITIVE GROUPS: 35.5-55.4
- UNHEALTHY: 55.5-150.4
- VERY UNHEALTHY: 150.5-250.4
- HAZARDOUS: 250.5-500.4

Total Volatile Organic Compound Level Interpretation

Measuring *total volatile organic compounds* (TVOC), sometimes chemical pollutants, are helpful but also more difficult to interpret

when determining air quality grade. This is because hazard levels with TVOC are specific to the actual organic compound(s) in the air; some synthetic organic compounds are hazardous whereas many natural organic compounds are harmless.

The U.S. Green Building Council's recommended healthy building level is 0.500 mg/m^3. However, data from hundreds of homes measured by homeowners show the median value is 1.200 mg/m^3, more than twice the recommended level. No absolute numbers can be attributed to certain hazard as they vary with each organic compound. Even one's breath can cause a spike in TVOC levels but is not considered harmful. However, relative TVOC levels can be useful to measure if you are aware of the type of organic compounds present such paint fumes or benzene/aromatic compound fumes. A house with high mold concentration or building material off gassing is associated with high TVOC levels. *Treating high humidity conditions with a dehumidifier or opening windows for venting is usually the most effective strategy to reduce TVOC and formaldehyde levels.*

Many harmful or carcinogenic compounds are synthetic organic compounds that are easily inhaled into the body as they are “volatile” or easily evaporated at room temperature.

Can you inform me how to convert mg/m^3 to ppm for formaldehyde?

For formaldehyde,

At 760 mmHg and 20 °C, 1 ppm = 1.249 mg/m3 and **1 mg/m^3 = 0.801 ppm**;

At 25 °C, 1 ppm = 1.228 mg/m3 and **1 mg/m^3 = 0.814 ppm.**

Conversion factor from mg/m^3 to ppm for TVOC varies with each specific organic compound since molecular weights of individual organic compounds are different. Identification of specific organic compound is needed.

III. TYPES OF INTERFACE (MENU)

With the default Overall Interface, the time, battery level, air quality level, formaldehyde (HCHO) concentration, Total Volatile Organic Compound (TVOC), and PM2.5/10 concentrations are displayed.

To access the Menu Interface, press the center button labelled . Pressing the center button again allows downward selection within the menu in RED. The Left < button and Right > button select options on the screen such as “OK” or “Back.”

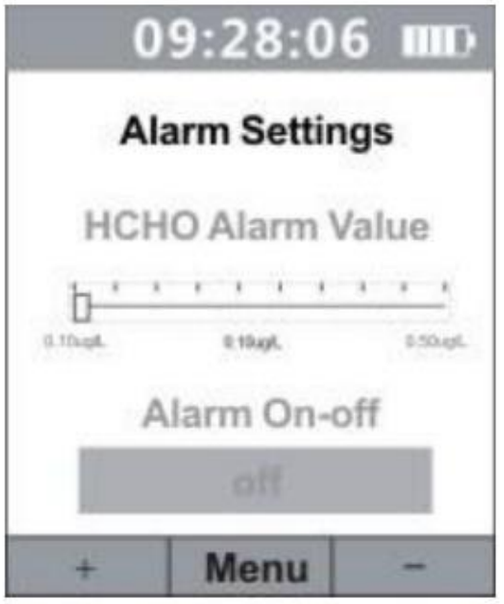
Overall Interface

Menu Interface

- System Setting

You can set [OFF time] for time period before self-shutoff, [Version] for interface style, [Factory Settings] to reset device, and [Time Setting] to set the time and date.

System Setting Interface



Alarm Settings Interface

- Alarm Settings

Default alarm threshold when alarm sounds is 0.10 mg/m^3. However, the user can set a different HCHO alarm threshold by pressing the left button to (+)

or right button to (-) alarm threshold. Alarm will ring when HCHO level is exceeded.

To turn off alarm entirely, press center button within Alarm Interface to highlight ON/OFF selection Blue. Press left button to turn alarm ON/Open and right button turn alarm OFF/Close. Press center button to exit to Menu Interface and "Back" to Overall Monitoring Interface.

- HCHO/TVOC/PM2.5 Records

You can view HCHO/TVOC/PM2.5 current record chart. ` is for minutes and " is for seconds elapsed.

IV. HOW TO CHARGE

This product comes with built-in lithium battery charged by 5V micro USB. Suggested charging time is 4 hours. When charging, battery status displays  icon. When full charged, battery status displays  icon.

- When battery status turns to  , battery level is low; please charge device immediately to prevent shut off.

- When LCD screen displays "Lowest power, please charge", device will turn off automatically after 3 seconds.

Continuous air quality monitoring can be achieved by charging device with micro USB cable while monitoring and setting [OFF time] for time period of *2 days* found under System Settings within Menu interface.

Caution

Do not disassemble, impact, or put it into any fire. If there is severe bulging, please do NOT continue to use. Do not put it in high-temperature environment.

V. TECHNICAL PARAMETERS

- Display Mode: High-definition liquid crystal display (LCD) with 240 x 320 resolution
- Product Dimension: 150 x 70.8 x 43.6 mm
- Product Weight: 188 g
- Battery Capacity: 2200mAh
- Lithium Battery Input: 5.0V, 800mA
- Charging Temperature: -10°C - 45°C

Operation Environment

- Atmospheric Pressure: 86Kpa - 106Kpa
- Humidity Range: 20% - 85%
- Working Temperature: -10°C - 45°C
- Storage Temperature: -20°C - 50°C

Formaldehyde or HCHO

- Test Item: atmospheric HCHO
- Test Range: 0.000-1.999 mg/m^3
- Sampling Method: Diffusion Type
- Concentration Unit: mg/m^3

- Sensor type: electrochemical semiconductor sensor

Total Volatile Organic Compounds or TVOC

- Test Item: TVOC in the air including potentially carcinogenic aromatic compounds and benzene
- Test Range: 0.000 - 9.999 mg/m^3
- Sampling Method: Diffusion Type
- Concentration Unit: mg/m^3
- Sensor type: electrochemical semiconductor sensor

PM2.5/PM10

- Tested particle diameter: PM2.5 or <2.5 micrometer particle concentration (PM10 via calculation from PM2.5)
- Sampling Time: 3 seconds
- Sensor type: Laser Detection Sensor
- Detection range: 0-999 mcg/m^3

Produced for and Manual written/edited by EG AIR