# Multi-Parameter Air Quality Online Monitor

User Manual

## The instrument is used for：

The instrument is designed for detecting PM2.5 particle concentration in indoor environments and public open areas. Additionally, it is capable of monitoring various environmental parameters such as temperature, humidity, air pressure, VOCs (Volatile Organic Compounds), CO2 (Carbon Dioxide), O2 (Oxygen), formaldehyde, and carbon monoxide, making it a highly versatile device.

## Main Operating Parameters：

| | |
|---|---|
| Operating Temperature Range | -10 ~ 50℃ |
| Operating Humidity Range | 0 ~ 95%RH |
| Storage Temperature Range | -20 ~ 60℃ |
| Power Input | DC 12~24 |
| Current Consumption | An average of 350mA, with a peak of 600mA |
| Signal Output | Modbus RS485, 9600bps, 1 start bit, 8 data bits, 1 stop bit, no parity bit (Optional WiFi, ZigBee, TCP/IP) |
| Dimensions | 450g/133mm×133mm×39mm |

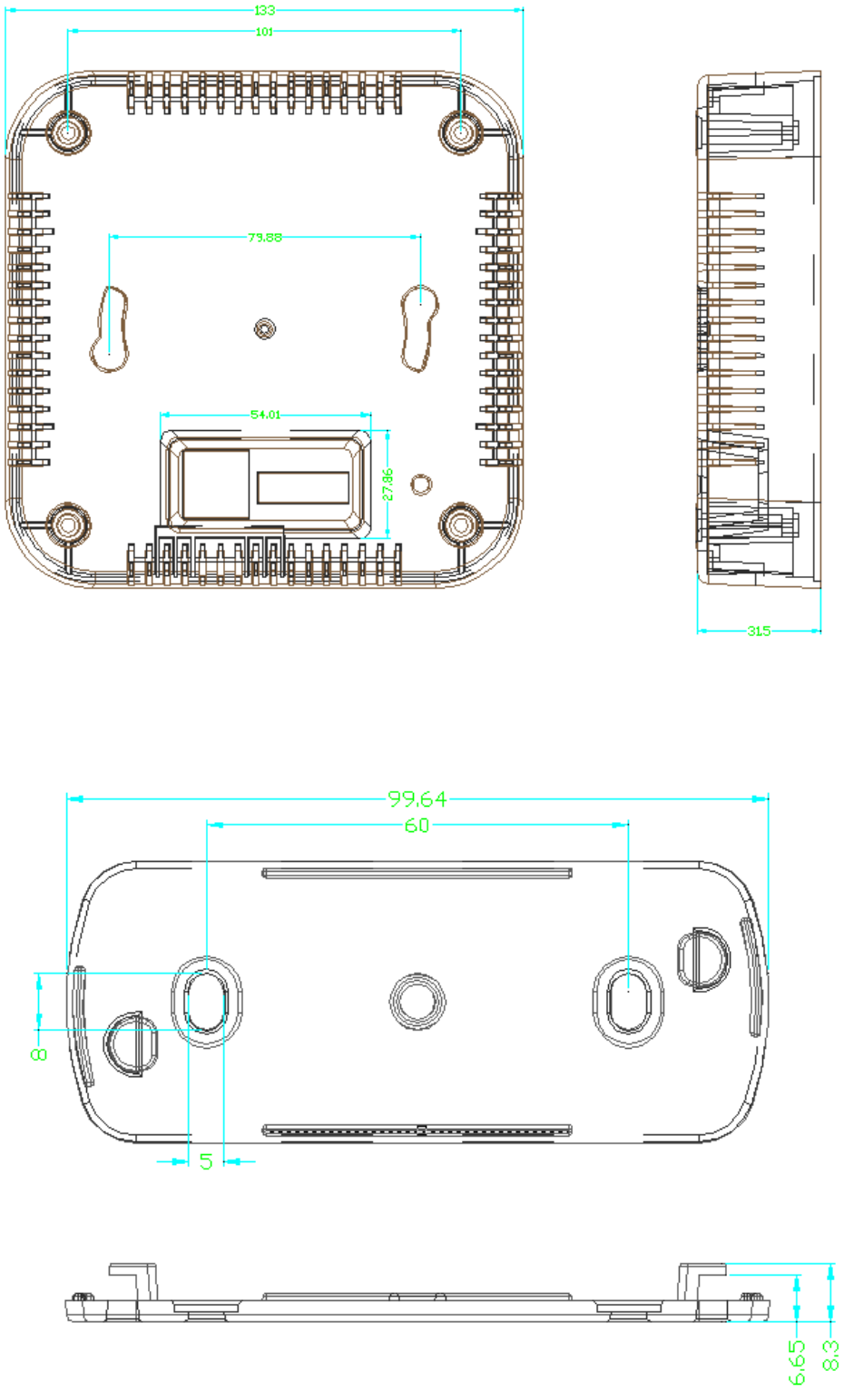
## Comprehensive Air Quality Monitor's Detection Capabilities and Range (Customers can select different parameter combinations based on their usage requirements):

| **Main Detection Parameters** | **Detection Range** | **Detection Accuracy** | **Detection Method** |
|---|---|---|---|
| PM2.5 Particle Concentration Measurement | 0~1000μg/m³ | <±15μg/m³ + 10% of reading | Optical scattering method |
| Formaldehyde Gas | 0~5.00ppm | <±5% FS (Full Scale) | Electrochemical |
| CO Gas | 0~500ppm | <±5% FS | Electrochemical |
| Volatile Odor Detection (VOC Gas) | 0~10mg/m³ | <±8% FS | Semiconductor |
| Smoke | 0~2000ppm | [Accuracy not specified] | Semiconductor |
| Oxygen Concentration Monitoring | 0~25.0% VOL | <2% FS | Electrochemical, 2-year lifespan |
| CO2 Detection | 0~5000ppm | ±50ppm + 5% of reading | Non-dispersive Infrared Detection |
| Temperature Measurement | -20 ~ 85℃ | ±0.5℃ | |
| Humidity Measurement | 0 ~ 100% RH | ±3% RH | |
| Atmospheric Pressure | 200~1200hPa | ±0.1% | |
| Noise | 30-130dB | ±1.5dB | Electret microphone |
| Illuminance | 0-65535 LUX | ±5% | Photoelectric principle |
| Expandable (NO/O3/NO2/NO/SO2/H2S/NH3/VOC/PH3/CL2/HCL/HCN/HF, etc.) Electrochemical principle sensors, up to 4 can be selected, parameters are determined by the selected sensors. | | | |

## Installation and Wiring

- Do not connect the transmitter to a voltage higher than 24V DC.
- Refer to Figure 1 for the product's exterior and dimensions diagram when installing the equipment.
- Install the transmitter at the desired detection location, away from heat sources or steam outlets, and protect it from direct sunlight.
- When wiring the electrical circuit, connect the wires to the terminal blocks, ensuring that the connections are correct and secure.

Figure 1: Installation DiagramFigure



## Wiring Instructions :

Starting from the right to the left, the terminals are numbered sequentially as 1-7, with the following definitions: 1. +12V; 2. GND; 3. RS485A; 4. RS485B; 5. I1/V1; 6. I2/V2; 7. TCP/IP

## Communication Protocol :

The device utilizes the MODBUS RTU protocol for communication. In RTU mode, messages are initiated with a minimum 3.5-character time interval. Devices decode the address field upon reception to identify messages directed at them. A message concludes with a stop interval of at least 3.5 character times. Messages are transmitted in a continuous stream; if interrupted by a pause exceeding 3.5 character times, the receiver aborts the incomplete message and treats the subsequent byte as the address field of a new message.

1. The hardware uses RS485 for master-slave, half-duplex communication, where the master initiates communication by calling the slave's address, and the slave responds accordingly.
2. Data frame format: 1 start bit, 8 data bits, 1 stop bit, no parity bit.
3. Baud rate: 9600bps.
4. Message frame includes: address field, function code field, data field, and CRC16 check field.
5. This device supports hexadecimal function codes 03H and 06H (decimal 3 and 6). Code 03H is for reading the device's register, while 06H is for writing to the device's register.

## Device Response Stack Planning：

| Register Address | Corresponding Parameter | Decimal Point | Unit | Data Description |
|---|---|---|---|---|
| 40001 | CO2 | 0 | ppm | |
| 40002 | PM2.5 | 0 | ug/m3 | |
| 40003 | O2 | 1 | VOL% | |
| 40004 | VOC | 2 | mg/m3 | |
| 40005 | SMOKE | 0 | ppm | |
| 40006 | TEMPERATURE | 1 | ℃ | |
| 40007 | HUMIDITY | 1 | % | |
| 40008 | ATMOSPHERIC PRESSURE | 1 | hPa （hectopascals） | |
| 40009 | FORMALDEHYDE | 2 | ppm | |
| 40010 | CARBON MONOXIDE | 0 | ppm | |
| 40011 | ILLUMINATION | 0 | lux | |
| 40012 | CH4 | 0 | ppm | |
| 40013 | NOISE | 1 | db | |
| 40014 | PM10 | 0 | ug/m3 | |
| 40015 | | | | |
| 40016 | DEVICE ADDRESS | 0 | | Default is 1 |
| 40017 | BAUD RATE | 0 | | Default is 9600 |