

AQ

PM2.5+VOC+Temperature and Humidity sensors
Manual



Description

High-precision sensor to ensure long-term stability and reliability of the instrument
 Circuit designed to measure accurately the full scale
 Short stabilization time
 Structural Design of aerodynamic theory, automatic real-time sampling
 Structural design is simple, easy to maintain

Applications

Production Line , Warehouse , Public Places , Intelligent Building
 Smart Home , Building Automation

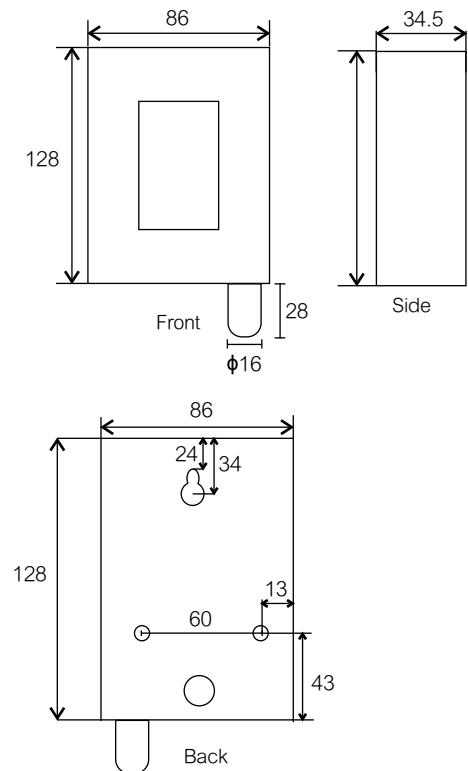
Technical Specification

PM2.5	
Sensor Type	Laser Type PM2.5 Sensor
Measuring Range	0~500 $\mu\text{g}/\text{m}^3$
Relative Error	$\leq \pm 5\%$
Warm Up Time	3 Minutes
Resolution	1 $\mu\text{g} / \text{m}^3$
Response Time	<30 Sec
VOC	
Sensor Type	Semiconductor gas sensor
Gas type	Ammonia, Formaldehyde, Alcohol, Organic volatile gases ; Smoke of cigarettes, wood, paper burning
Measuring Range	0~100ppm
Resolution	0.1ppm
Relative Error	$\leq \pm 5\%$
Sensitivity Attenuation	$\leq 1\%$ year
Satbility	< 2%
Operating Life	$\geq 7-10$ year
Temp. & Humi.	
Sensor Type	Digital capacitance sensing element
Temp. Range	-20~80 $^{\circ}\text{C}$
Resolution	0.01 $^{\circ}\text{C}$
Relative Error	$\leq \pm 0.35^{\circ}\text{C}$
Humi. Range	0~100%RH
Resolution	0.01%RH
Relative Error	$\leq \pm 2\%$
Satbility	<1%RH/year <0.1 $^{\circ}\text{C}$ /year
System	
Power Supply	12-24 Vdc $\pm 10\%$
Power Consumption	1.8W / Average
Communication	Modbus RTU (RS485) ; Baud Rate: 9600 (Default) , 14400 , 19200 , 28800 , 38400 bps
Operating Temp. & Humi.	0~50 $^{\circ}\text{C}$ (32~122 $^{\circ}\text{F}$) ; 20~95%RH
Material	PC
IP Enclosure	IP20
Storage Temp.	-40~70 $^{\circ}\text{C}$ (-40~158 $^{\circ}\text{F}$)
Weight / Dimensions	200g / 128X86x34.5mm

Installation

Wall Mounting

Dimensions



■ Function & Operating Key

Display

Display range: -9999~99999
Refresh rate: 4 times/sec

Analog Output

Range: 4~20mA
Error: $\pm 1\%$ FS
Nonlinearity: $\pm 1\%$ FS
Temperature drift: $\pm 1\%$ FS

Operating Key

Enter login page

In the measurement page, press ● 3 seconds into the login page
Press ◀ and ▶ to select, press ● to enter
In the preview page, press ● 3 seconds back to measurement page

Login password

Press ◀ and ▶ to select, press ● to enter. Default : 8888

Parameters setting

Press ● to select, press ◀ and ▶ to modify parameters
Press ● 3 second back to measurement page

Parameters

Main page

Device ID
Baud Rate
Alarm Select
Sensor Span
Alarm Value
Alarm Hysteresis
Next Page (press ▶ into next page)
Factory Settings

Next page

Auto Backlight
Keypad Tone
Alarm Mode
Return (press ◀ back to main page)

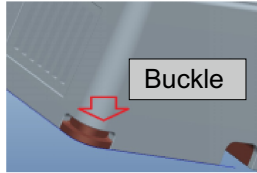
Alarm Setting

Into parameter setting page, goto "Alarm Select" and setting alarm address. Single parameter default : 40001
Goto "Alarm Value" for value setting
Goto "Alarm Hysteresis" for hysteresis value setting
Goto "Next Page" then press ▶ into next page, goto "Alarm Mode" and setting "SPEC ON" to enable single alarm function. At meantime, yellow alert line will show on measurement page

Alarm release: Press and hold ▶ to release alarm in measurement page

Installation & Demolition

Description



Remove front cover from the buckle



Rear panel and wiring installed

Installation

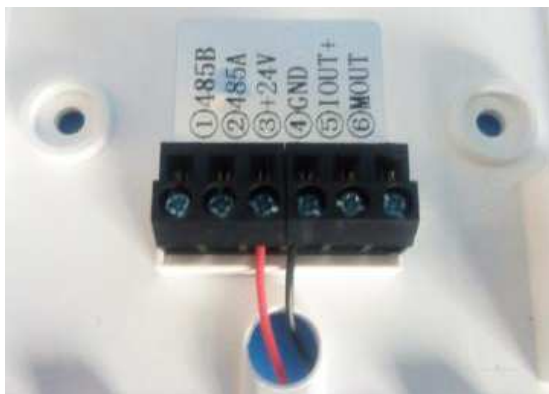


Make sure the terminal and pin are aligned and closed the front cover

Demolition or Maintenance

Hold tightly front cover then pulled out slowly then remove wiring

Wiring Interface



- | | | |
|---|---|-------|
| ⊗ | 1 | 485B |
| ⊗ | 2 | 485A |
| ⊗ | 3 | +24V |
| ⊗ | 4 | GND |
| ⊗ | 5 | IOUT+ |
| ⊗ | 6 | N/A |

RS485 Communication

RS485 Port

Device address: 1
 Baud rate: 9600
 Data width: 8
 Stop bit: 1
 Parity: None

RS485 Communication table

Modbus protocol , Function code : 03,06,16

40001	Sensor data
40002	Sensor data
....
40010	Sensor data
40018	Write-protect
40019	baud rate
40020	device addr

Example

Sensor value reading:40001

Send command {0x01, 0x03, 0x00, 0x00, 0x01, 0x84, 0x0A}

Modify device address to 2

First write 24(18h) to address 40018 for disable write protect as below:

Send command{0x01, 0x06, 0x00, 0x11, 0x00, 0x18, 0xD9, 0xC5}

Then write 2 to address 40020 for modify device address as below:

Send command{0x01, 0x06, 0x00, 0x13, 0x00, 0x02, 0xF9, 0xCE}

If communication fail, try to exchange A,B wiring

Data format definition

Modbus-RTU Communication protocol

Initial structure ≥4 byte time

Address code = 1 byte

Function code =1 byte

Data = N byte

Error Correction = 16 bit CRC

End structure ≥4 byte time

Address code: Default 0x01

Function code: Modbus function code

Data: Front byte is high byte of word

CRC: 2 byte

Command send frames

Address	Function	Start	Lenth	CRC low byte	CRC high byte
1byte	1byte	2byte	2byte	1byte	1byte

Reply data frames

Address	Function	Data lenth	First data	Second data	N data	CRC
1byte	1byte	1byte	2byte	2byte	2byte	2byte

Communication Table (Signal parameter)

Address	Modbus address	Content	Operating
0000H	40001	PM2.5/VOC	Read only

Communication Table (PM2.5+VOC+Temp./Humidity)

Scratchpad address	Modbus address	Content	Operating
0000H	40001	PM2.5	Read only
0001H	40002	PM2.5(avg/hr)	Read only
0002H	40003	VOC	Read only
0003H	40004	VOC(avg/hr)	Read only
0004H	40005	Temperature	Read only
0005H	40006	Humidity	Read only

Example and Explanation of Communication

Example: Reading PM2.5 and VOC from device address 0x01

Command frames

Address	Function	Start	Lenth	CRC low byte	CRC high byte
0x01	0x03	0x00 0x00	0x00 0x02	0xC4	0x0B

Reply frame: (EX: PM2.5 is 357, VOC is 2)

Address	Function	Data lenth	PM2.5	VOC	CRC low byte	CRC high byte
0x01	0x03	0x04	0x01 0x65	0x00 0x02	0x5A	0x3D

Calculate PM2.5

PM2.5: 165H=357=>PM2.5=357ug/m³

Calculate VOC

VOC: 002H=2 => VOC=2/100=0.02ppm

Problems and Troubleshooting

The device can not connect to PLC or computer

1. Wrong comport
2. Wrong device address or address duplication (Default:1)
3. Wrong Baud rate, parity, data bits, stop bit setting
4. Wire break or reverse
5. Too many devices or cable too long, try to install repeater and 120Ω terminal resistor in end of device
6. USB to 485 converter driver is not installed or damaged