ATO

ATO-RK300-02 Air Quality Sensor User Manual

User Notice

Please read this manual carefully before use to ensure safe and optimal operation. Retain this manual for future reference.

Pre-Use Instructions

- Carefully review this manual and follow all operational and safety guidelines to prevent malfunctions and hazards.

Unpacking Inspection

- Upon receipt, carefully inspect the sensor device and accessories for any shipping damage.
- If damage is detected:
- Immediately notify the manufacturer and distributor.
- Retain all packaging materials for return or replacement processing.

Parts List

Item	Quantity	Remarks
Sensor	1	
Cable	1	The length depends on the order
Radiation Shield(Outdoor sensor)	1	Set
Installation Screws(Indoor sensor)	1	Set

1. Product Introduction

ATO-RK300-02 Air Quality Sensor operates on the laser scattering principle to detect concentration of dust particles in the air, with a minimum detection size of 1.0μm. It has a good consistency and stability. Depending on the application environment, both indoor and outdoor models are available.

2. Product Features

- High sensitivity
- Fast response
- Low power consumption
- Excellent stability
- Long service life

3. Specifications

Item	Technical Specification
Sampling Object	PM1.0,PM2.5,PM10
Range	0-1000μg/m^3
Accuracy	±10%FS@25℃
Supply	5VDC, 12-24VDC
Output	4-20mA ,0-5V,0-10V, RS485
Power Consumption	<50mA@24V(4-20mA)
Warm Up Time	3min
Response Time	<1s
Temperature Drift	≤ 0.2%FS/℃
Stability	<±2%FS
Repeatability	<±1%FS
Operating Temperature	-10-+60℃@5-80%RH(No condensation)
Storage	-30-80℃@0%-95%RH(No condensation)
Shell Material	ABS

4. Electrical Connections

Connector(Cable)	Current/Voltage	Current/Voltage	RS485
Red	V+	V+	V+
Black	V-	V-	V-
Yellow	PM1.0	PM2.5	RS485A
Green	PM2.5	PM10	RS485B
Brown	PM10		

5. Output Types & Formula

Voltage Type	F=V/full scale voltage*(Max Range-Min Range)
Current Type	F=(I-4)/16*(Max Range-Min Range)

F: Current measurement parameters;

V: Transmitter output voltage in V;

I: Transmitter output voltage in mA;

6. Product Dimensions

Unit:mm

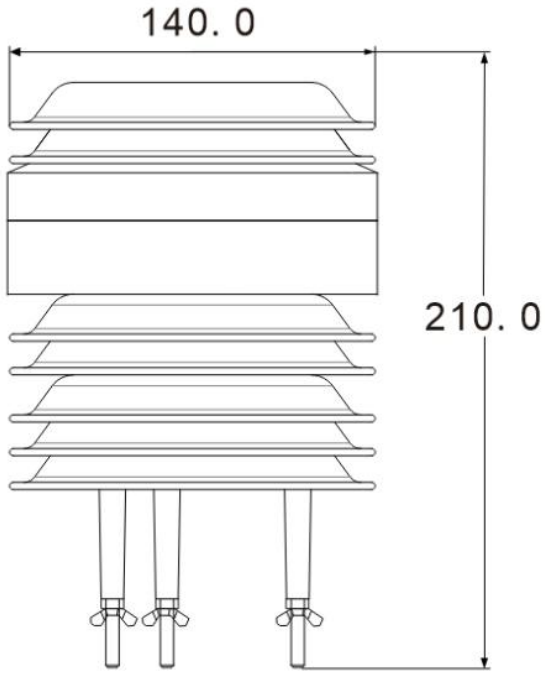

Figure 6.1 Outdoor Model Dimension Diagram

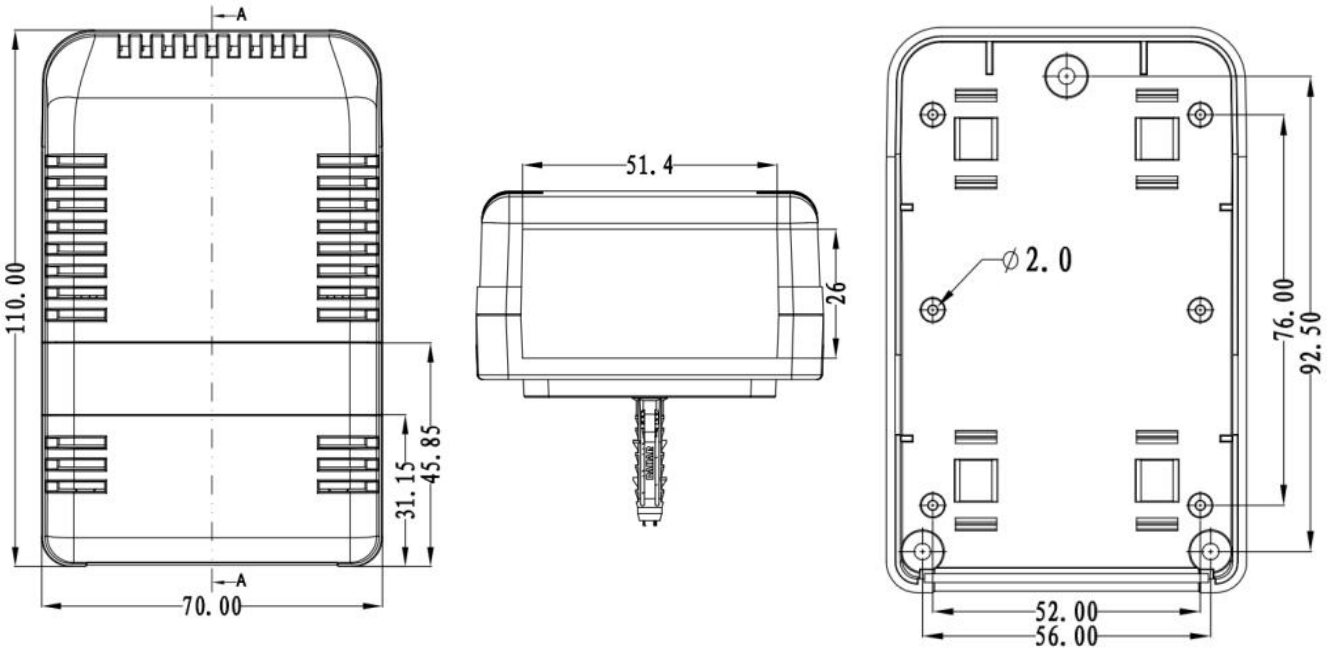

Figure 6.2 Indoor Model Dimension Diagram
(Wall-mounted installation)

7. Communication Protocol(MODBUS-RTU)

Parameter	Value
Data Bits	8 bits
Check Bit	None
Stop Bit	1 bit
Baud Rate	9600 bps
Slave Address	0x01 (Factory Default)

7.1 Read Real-Time Data(PM2.5)

Client sends:

01 03 00 00 00 01 840A

Return:

01 03 02 01 64 B8 3F

7.1.1 Description of Return Data Format

No.	Conception	Byte Number	Description	Remarks
1	Address block	1	Address(0x01)	0x01
2	Function code	1	Only read(0x03)	0x03
3	Number of bytes	1	0X02	2bytes
4	Data block	2	PM2.5	0x0164(356μg/m^3)
5	Check block	2		0xB8 0x3F

7.2 Read Real-Time Data(PM10)

Client sends:

01 03 00 00 00 01 840A

Return:

01 03 02 01 84 B9 B7

7.2.1 Description of Return Data Format

No.	Conception	Byte Number	Description	Remarks
1	Address block	1	Address(0x01)	0x01
2	Function code	1	Only read(0x03)	0x03
3	Number of bytes	1	0X02	2bytes
4	Data block	2	PM10	0x0184(388μg/m^3)
5	Check block	2		0xB9 0xB7

7.3 Read Real-Time Data(PM2.5&PM10)

Client sends:

01 03 00 00 00 02 C40B

Return:

01 03 04 00 3A 00 68 DB D0

7.3.1 Description of Return Data Format

No.	Conception	Byte Number	Description	Remarks
1	Address block	1	Address(0x01)	0x01
2	Function code	1	Only read(0x03)	0x03
3	Number of bytes	1	0X04	4bytes
4	Data block	2	PM2.5	0x003A(58μg/m^3)
5	Data block	2	PM10	0x0068(104μg/m^3)
6	Check block	2		0xDB 0xD0

7.4 Read Real-Time Data(Three in one)

Client sends:

01 03 00 00 00 03 05CB

Return:

01 03 06 00 30 00 3A 00 68 40 92

7.4.1 Description of Return Data Format

No.	Conception	Byte Number	Description	Remarks
1	Address block	1	Address(0x01)	0x01
2	Function code	1	Only read(0x03)	0x03
3	Number of bytes	1	0X06	6bytes
4	Data block	2	PM1.0	0x0030(48μg/m^3)
5	Data block	2	PM2.5	0x003A(58μg/m^3)
6	Data block	2	PM10	0x0068(104μg/m^3)
7	Check block	2		0x40 0x92

7.5 Modify Slave Address(Address setting range: 00H to FFH)

Client sends:(Changed to 02H.)

Slave id	Function code	Address_H	Address_L	New id_H	New id_L	CRC_L	CRC_H
0x01	0x06	0x00	0x30	0x00	0x02	0x08	0x04

Response:

Slave id	Function code	Address_H	Address_L	New id_H	New id_L	CRC_L	CRC_H
0x01	0x06	0x00	0x30	0x00	0x02	0x08	0x04

Note: If you forget the original address, you should use the broadcast address(FEH) (ensure that no other devices on the bus at this time).

8. Installation Method

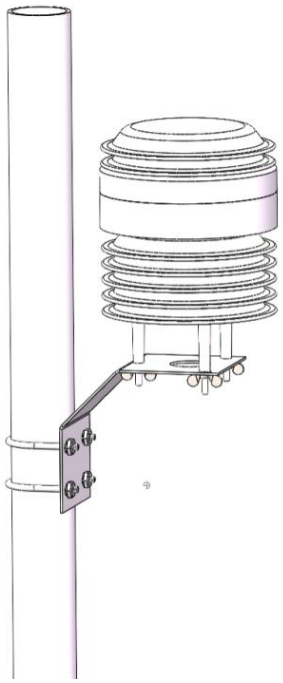

Figure 8.1 Installation Diagram(Outdoor)

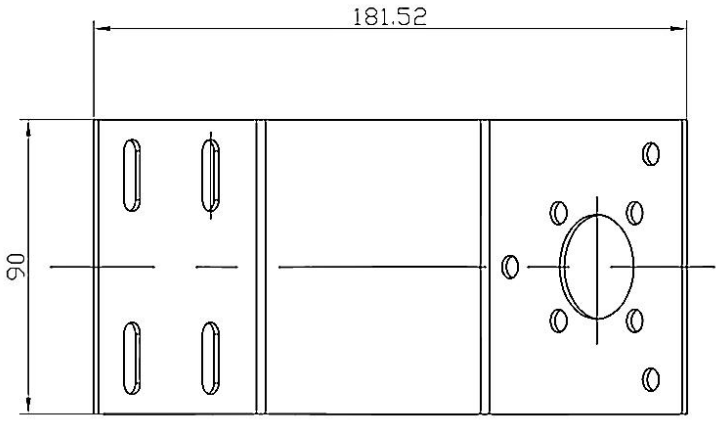

Figure 8.2 Bracket Size Diagram(Unit:mm)

9. Precautions

Powered Wiring Prohibition

- Do not connect wires while powered. Only energize the sensor after confirming correct wiring.

Component Modification Restriction

- Do not alter factory-soldered components or pre-connected wires.

Clearly Identify the Object of Detection

- Do not detect gases outside of their design range, as this may result in no response or false alarms.

Precision Handling Requirement

The sensor is a precision device. Avoid:

- Unauthorized disassembly
- Do not touch internal components to prevent product damage

  Note: Unauthorized modifications void the warranty.

10. Troubleshooting

Incorrect Output Signals (Analog/RS232/RS485):

- Verify wiring correctness and secure connections.
- Check if the serial port is occupied or malfunctioning.
- Confirm serial port settings (baud rate, data/stop bits) match device requirements.

Persistent Issues:

- Contact the manufacturer if the above steps fail to resolve the problem.

11. Product Maintenance

Maintenance and Safety

- Regularly clean and inspect the sensor to maintain performance.
- Do not expose the sensor to extreme temperatures, moisture, or corrosive substances unless explicitly specified.
- Unauthorized disassembly, modification, or repairs may void the warranty and lead to malfunctions.

Troubleshooting Protocol

- In case of malfunction, refer to the troubleshooting section of this manual.
- Do not attempt unauthorized disassembly or repairs.
- Contact the manufacturer's after-sales department directly for technical support.

12. Warranty Terms

This product comes with a one-year warranty, starting from the date of delivery. Within twelve months, the Company shall be responsible for free repair or replacement of any failure caused by sensor quality issues (non-human damage). Fees will be charged for repairs or replacements after the warranty period expires.