OHTS1050 Multi-Element Weather Sensor

1 Product Overview

The OHTS1050 is an integrated multi-element meteorological monitoring device featuring a louvered radiation shield design. It integrates acoustic noise acquisition, particulate matter (PM2.5/PM10) detection, temperature and humidity sensing, atmospheric pressure measurement, and illuminance monitoring functions. The device provides RS485 interface output and supports the standard Modbus-RTU communication protocol, making it suitable for continuous monitoring and data acquisition of outdoor environmental parameters.

2 Application Scenarios

- Multi-element data acquisition for environmental monitoring stations
- Smart city ambient air quality monitoring
- Construction site dust and noise combined monitoring
- Agricultural meteorological environmental parameter monitoring
- Campus and community environmental quality monitoring

- Industrial park environmental safety monitoring
- Transportation hub environmental status monitoring
- Warehouse and logistics environment temperature and humidity monitoring
- Scientific research meteorological observation stations
- HVAC system environmental parameter acquisition

3 Product Features

- Integrated structural design incorporating six measurement elements: noise, particulate matter, temperature & humidity, barometric pressure, and illumination
- Louvered housing constructed from UV-resistant material, suitable for long-term outdoor deployment
- Temperature and humidity measurement unit utilizes capacitive sensing principle
- Particulate matter detection employs dual-frequency data acquisition and auto-calibration technology
- Wide voltage supply range: 10VDC~30VDC
- RS485 digital output supporting Modbus-RTU protocol with communication distance up to 2000m
- Device address and communication baud rate configurable via software

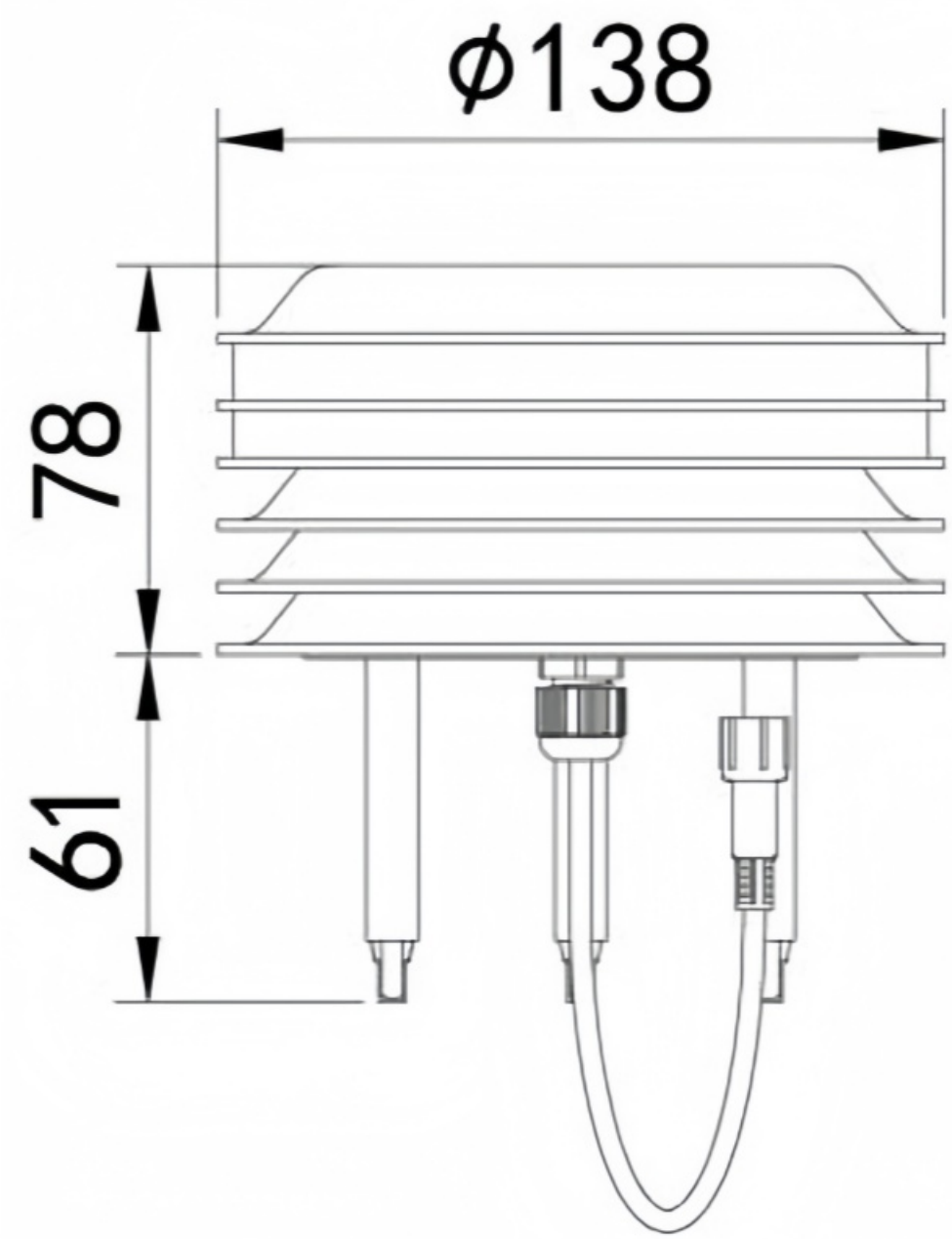
4 Technical Specifications

Parameter Category	Measurement Element	Specification
Power Supply	DC Power	10VDC~30VDC
Power Consumption	RS485 Output	≤0.8W
Accuracy	Temperature	±0.5℃ (@25℃)
	Humidity	±3%RH (@60%RH, 25℃)
	Illuminance	±7% (@25℃)
	Atmospheric Pressure	±0.15kPa (@25℃, 101kPa)
	Noise	±0.5dB (Reference 94dB@1kHz)
	PM2.5	Particle counting efficiency: 50%@0.3μm, 98%@≥0.5μm Accuracy: ±3%FS (@0~100μg/m³, 25℃, 50%RH)
Measuring Range	Temperature	-40℃~+120℃
	Humidity	0%RH~99%RH
	Illuminance	0~200000Lux
	Atmospheric Pressure	0kPa~120kPa
	Noise	30dB~130dB
	PM2.5/PM10	0~1000μg/m³
Long-term Stability	Temperature	≤0.1℃/y
	Humidity	≤1%/y
	Illuminance	≤5%/y
	Atmospheric Pressure	-0.1kPa/y
	Noise	≤3dB/y
	PM10/PM2.5	≤1%/y
Response Time (τ63)	Temperature	≤25s (1m/s air velocity at sensor interior)
	Humidity	≤8s (1m/s air velocity at sensor interior)
	Illuminance	≤2s
	Atmospheric Pressure	≤2s
	Noise	≤3s
	PM10/PM2.5	≤90s
Output	Communication Interface	RS485
	Communication Protocol	Modbus-RTU

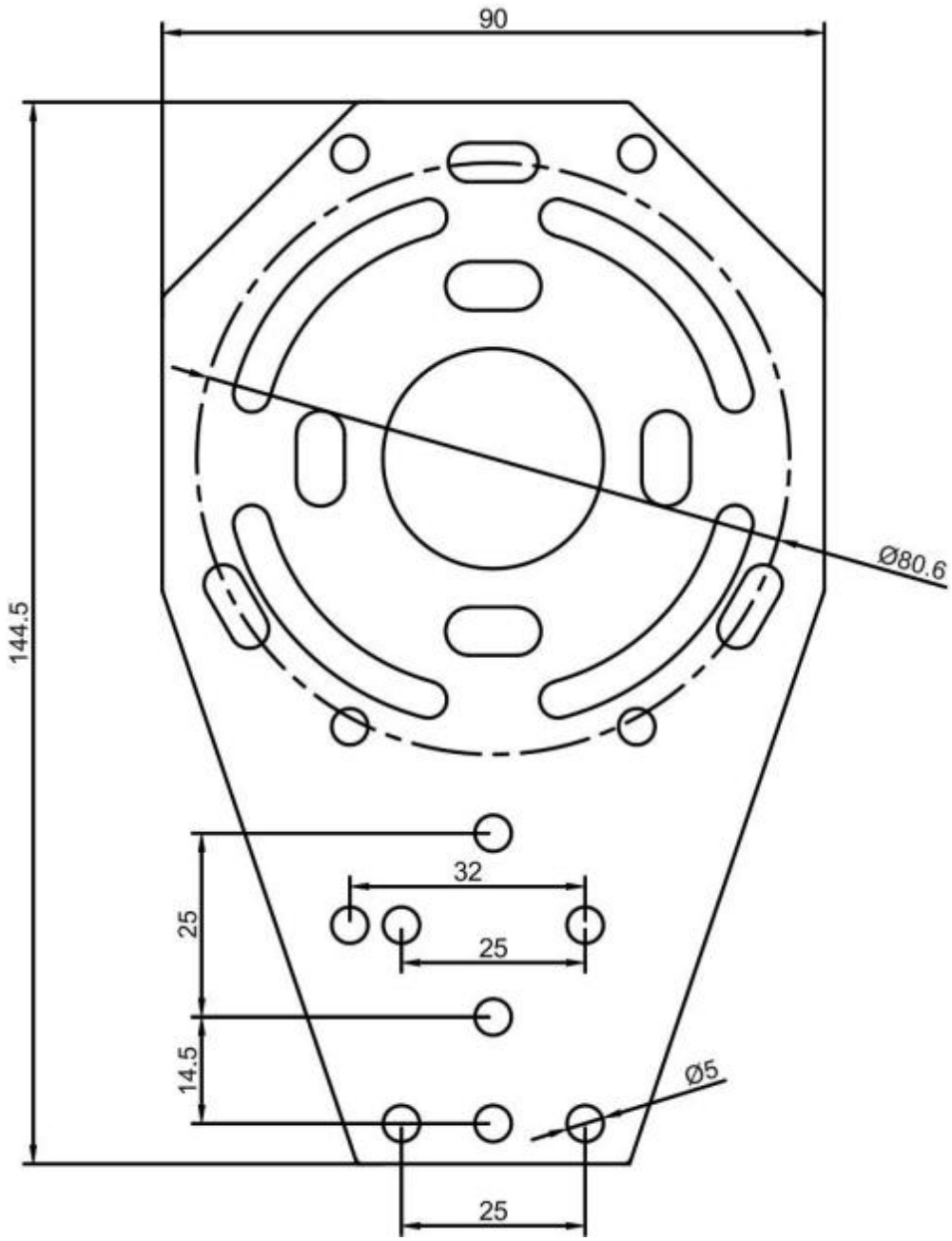
Note: Temperature and humidity response time test conditions specify 1m/s air velocity at the sensor's internal sensing material location, corresponding to test environment air velocity of 10^{-2}m/ms with wind direction perpendicular to the sensor acquisition port.

5 Physical Specifications

Parameter	Specification
Housing Material	UV-resistant Engineering Plastic
Protection Structure	Louvered Radiation Shield Design



Enclosure Dimension Drawing

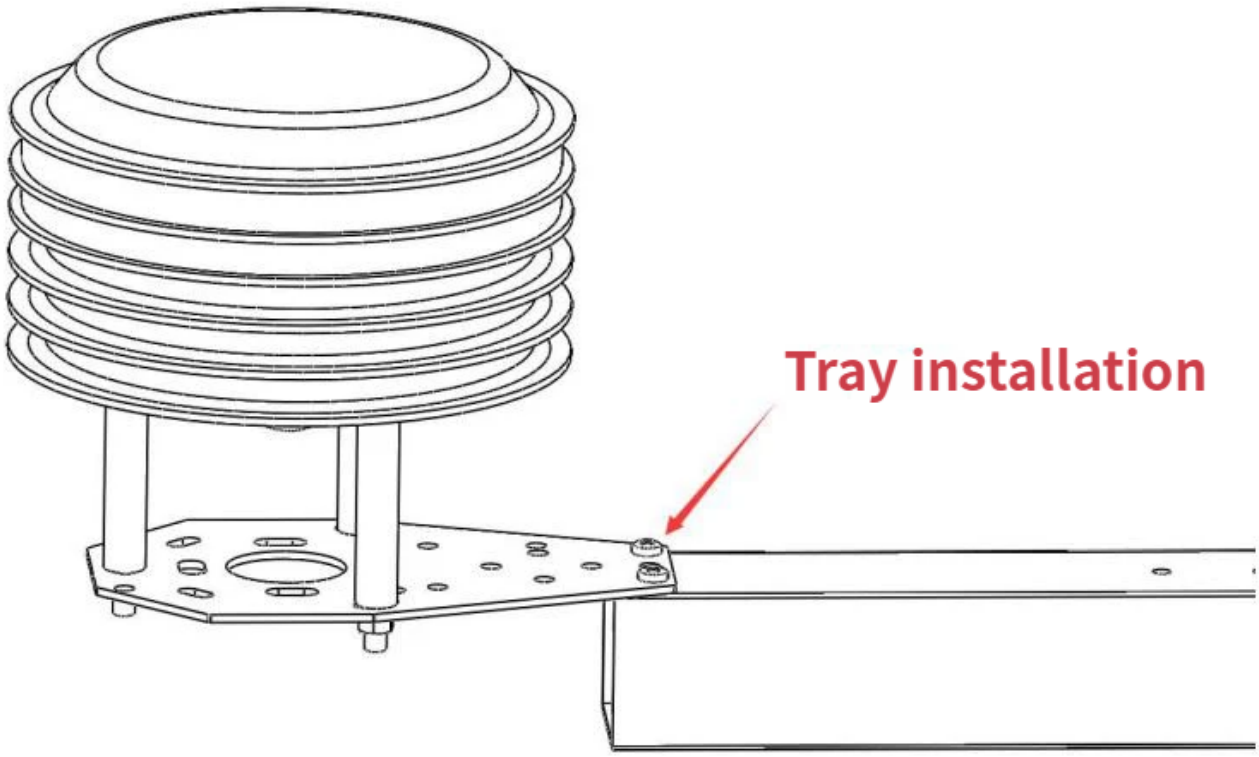


Mounting Plate Dimension Drawing (Unit: mm)

6 Installation Instructions

Before installation, verify the device package contents: 1 transmitter main unit, mounting plate and fasteners, USB-to-RS485 converter (optional), and technical documentation.

During installation, ensure the louvered housing air inlet remains unobstructed. Installation examples and mounting plate dimensions are shown below:



Louvered Housing Installation Schematic

For multi-device RS485 bus wiring, follow bus topology structure and avoid star connections. A 120Ω termination resistor is recommended at the bus end.

7 Wiring Definition

Function Category	Wire Color	Definition
Power	Brown	Power Positive (10VDC~30VDC)
	Black	Power Negative (GND)
Communication	Yellow	RS485-A
	Blue	RS485-B

Note: When connecting RS485 signal lines, do not reverse the A and B wires. Device addresses on the same bus must not conflict.

8 Communication Protocol and Data Conversion

8.1 Communication Basic Parameters

Parameter	Setting
Encoding	8-bit Binary
Data Bits	8 bits
Parity	None
Stop Bits	1 bit
Error Check	CRC-16 (Cyclic Redundancy Check)
Baud Rate	1200bit/s~115200bit/s configurable, factory default 4800bit/s

8.2 Data Frame Format

Utilizes Modbus-RTU communication specification:

Master Query Frame:

Address Code	Function Code	Register Starting Address	Register Quantity	CRC Low	CRC High
1 Byte	1 Byte	2 Bytes	2 Bytes	1 Byte	1 Byte

Slave Response Frame:

Address Code	Function Code	Byte Count	Data Area 1	Data Area 2	...	Data Area N	CRC
1 Byte	1 Byte	1 Byte	2 Bytes	2 Bytes	...	2 Bytes	2 Bytes

Note: For 16-bit data, high byte precedes low byte.

8.3 Measurement Data Registers

Supported Function Codes: 0x03, 0x04

Register Address (Decimal)	PLC/SCADA Address	Content	Data Conversion Formula
497	40498	Atmospheric Pressure (hPa)	$P_{hPa} = \frac{\text{Register Value}}{10}$
500	40501	Humidity Value	$RH = \frac{\text{Register Value}}{10}\ (\%RH)$
501	40502	Temperature Value	$T = \frac{\text{Register Value}}{10}\ (^\circ\text{C})$ *Note: Negative values in two's complement form*
502	40503	Noise Value	$L = \frac{\text{Register Value}}{10}\ (\text{dB})$
503	40504	PM2.5 Value	$C_{PM2.5} = \text{Register Value}\ (\mu\text{g/m}^3)$
504	40505	PM10 Value	$C_{PM10} = \text{Register Value}\ (\mu\text{g/m}^3)$
505	40506	Atmospheric Pressure (kPa)	$P_{kPa} = \frac{\text{Register Value}}{10}$
506	40507	Illuminance High 16-bit	$Lux = (\text{High 16-bit} \times 65536) + \text{Low 16-bit}$
507	40508	Illuminance Low 16-bit	

8.4 Configuration Registers

Supported Function Codes: 0x03, 0x04, 0x06, 0x10

Register Address (Decimal)	PLC/SCADA Address	Content	Description
2000	42001	Device Address	Range: 1~254, Factory Default: 1
2001	42002	Baud Rate	0:2400, 1:4800, 2:9600, 3:19200, 4:38400, 5:57600, 6:115200, 7:1200

8.5 Calibration Registers

Supported Function Codes: 0x03, 0x04, 0x06, 0x10

Register Address (Decimal)	PLC/SCADA Address	Content	Conversion Relationship
80	40081	Temperature Calibration Value	Actual Value × 10
81	40082	Humidity Calibration Value	Actual Value × 10
82	40083	Noise Calibration Value	Actual Value × 10
83	40084	PM2.5 Calibration Value	Actual Value
84	40085	PM10 Calibration Value	Actual Value
85	40086	Atmospheric Pressure Calibration Value (kPa)	Actual Value × 10 *Note: Simultaneously calibrates hPa register*
86	40087	Illuminance Calibration Value	Actual Value

8.6 Communication Example

Query Temperature and Humidity (Device Address 0x03):

Address Code	Function Code	Starting Address	Data Length	CRC Low	CRC High
0x03	0x03	0x01 0xF4	0x00 0x02	0x85	0xE7

Response Frame (Temperature -10.1℃, Humidity 65.8%RH):

Address Code	Function Code	Byte Count	Humidity Value	Temperature Value	CRC Low	CRC High
0x03	0x03	0x04	0x02 0x92	0xFF 0x9B	0x79	0xFD

Data Parsing:

- Humidity: $0x0292 = 658 \Rightarrow 65.8\%\mathrm{RH}$
- Temperature: $0xFF9B = -101 \Rightarrow -10.1^{\circ}\mathrm{C}$ (Two's complement representation)

9 Precautions

1. **Safety Restrictions**: This device is strictly prohibited from use as a safety device or emergency stop device, nor shall it be used for any other purpose where equipment failure may cause personal injury. Technical documentation must be consulted prior to installation, operation, or maintenance.
2. **Environmental Restrictions**: The humidity sensor operates on a capacitive principle and should be avoided in environments containing volatile organic compounds (VOCs).
3. **Address Configuration**: Device addresses on the same bus must not conflict; factory default address is 0x01.
4. **Electrical Connection**: RS485 signal lines A and B must not be reversed in polarity; bus wiring should avoid star topology and utilize bus-type wiring.
5. **Power Supply Requirements**: Use of a 10VDC~30VDC DC power supply is recommended to ensure adequate power capacity for device consumption.
6. **Maintenance Recommendations**: The PM sensor warranty period is 12 months; periodic calibration is recommended to ensure measurement accuracy.

10 Warranty and Support

Warranty Period: 24 months from the date of purchase (based on valid proof of purchase), with the PM sensor warranty period being 12 months.

Warranty Coverage: Under normal use and maintenance conditions, free repair and replacement of parts for failures due to material or manufacturing defects. Lifetime repair services are provided (fees apply after warranty expiration).

Non-Warranty Coverage:

- Damage caused by incorrect installation, use, or operation
- Disassembly, repair, modification, or replacement of internal components by unauthorized technicians
- Damage caused by water ingress, foreign object intrusion, or negligent use
- Failures resulting from natural disasters or accidents
- Damage caused by operation outside the parameters specified in the technical specifications

11 Manufacturer Information

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12 Revision History

Version	Revision Date	Revision Content
V1.0	-	Initial Release