OHTS1123 Type C Integrated Weather Station

1 Product Overview

The OHTS1123 is an industrial-grade meteorological monitoring device featuring integrated multi-parameter measurement. Utilizing an all-in-one structural design, it simultaneously acquires environmental parameters including wind speed, wind direction, temperature and humidity, noise, particulate matter (PM2.5/PM10), carbon dioxide concentration, and atmospheric pressure. The device employs an RS485 interface and supports the standard ModBus-RTU communication protocol, ensuring compatibility with PLC configuration systems and host computer monitoring platforms. The housing utilizes UV-resistant engineering materials with a protection rating suitable for long-term outdoor deployment. Internal sensors employ high-sensitivity probes to ensure measurement stability across wide temperature and humidity ranges. Bluetooth wireless parameter configuration is supported to facilitate on-site commissioning and maintenance.

2 Applicable Scenarios

- Grid-based deployment of environmental monitoring stations
- Smart city air quality monitoring
- Boundary noise and gas monitoring for industrial parks
- Construction site dust monitoring systems
- Agricultural greenhouse environmental control systems
- Meteorological data collection at transportation hubs
- Photovoltaic power station environmental monitoring
- Warehouse logistics environmental monitoring
- Meteorological observation for universities and research institutions
- Ecological environment monitoring for scenic areas

3 Product Features

- Multi-parameter integrated design reduces on-site wiring complexity
- Wind speed and direction measurement mechanism utilizes low moment of inertia design with response time ≤3.5s
- Noise measurement range 30dB~130dB, compliant with industrial environmental acoustic monitoring requirements
- Particulate matter detection employs laser scattering principle with counting efficiency of 50%@0.3μm, 98%@≥0.5μm
- Carbon dioxide detection range 0-5000ppm with effective range 400-5000ppm, suitable for outdoor high-humidity environments
- Atmospheric pressure measurement range 0-120kPa, adaptable to altitude variation scenarios
- Wide voltage power supply design (DC10~30V), compatible with solar power systems
- Bluetooth BLE parameter configuration function, supporting real-time data reading and parameter modification via Android mobile terminals
- Standard ModBus-RTU protocol with configurable baud rate 1200~115200bit/s

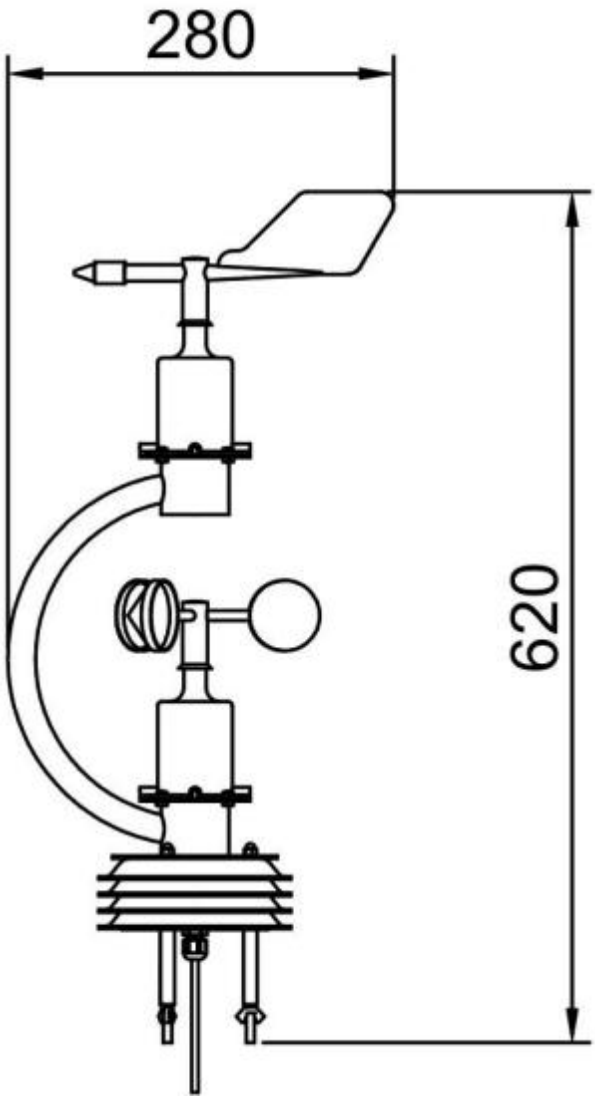
4 Technical Specifications

Parameter Category	Parameter Item	Specification Value
Power Supply	DC Supply Voltage	DC10~30V
	Maximum Power Consumption (RS485 Output)	0.8W
Measurement Accuracy	Wind Speed	±(0.2+0.03V)m/s (V=wind speed value, 60%RH, 25℃)
	Temperature	±0.5℃ (25℃)
	Humidity	±3%RH (60%RH, 25℃)
	Atmospheric Pressure	±0.15kPa@25℃ 101kPa
	Noise	±0.5dB (reference tone 94dB@1kHz)
	PM2.5	Particle counting efficiency: 50%@0.3μm, 98%@≥0.5μm Accuracy: ±3%FS (@0~100μg/m³, 25℃, 50%RH)
	CO_2	±(50ppm+3%F·S) (25℃)
Measurement Range	Wind Speed	0~70m/s
	Wind Direction	8-direction indication (0-7 levels) / 0-360°
	Temperature	-40℃~+80℃
	Humidity	0%RH~99%RH
	Atmospheric Pressure	0-120kPa
	Noise	30dB~130dB
	PM2.5/PM10	0-1000μg/m³
	CO_2	0-5000ppm (Effective range: 400-5000ppm)
Long-term Stability	Temperature Drift	≤0.1℃/y
	Humidity Drift	≤1%/y
	Atmospheric Pressure Drift	-0.1kPa/y
	Noise Drift	≤3dB/y
	Particulate Matter Drift	≤1%/y
	CO_2 Drift	≤1%/y
Response Time	Wind Speed/Wind Direction	≤3.5s
	Atmospheric Pressure	≤2s
	Noise	≤3s
	PM2.5/PM10	≤90s
	CO_2	Generally <180s for 90% step change
	Temperature (τ_{63})	≤25s (1m/s wind speed)
	Humidity (τ_{63})	≤8s (1m/s wind speed)
Resolution	PM2.5/PM10	1μg/m³
	CO_2	1ppm
Communication Interface	Output Signal	RS485 (Standard ModBus-RTU Protocol)
	Baud Rate	1200~115200bit/s configurable, factory default 4800bit/s
	Data Format	8 data bits, no parity, 1 stop bit
	Maximum Communication Distance	2000m

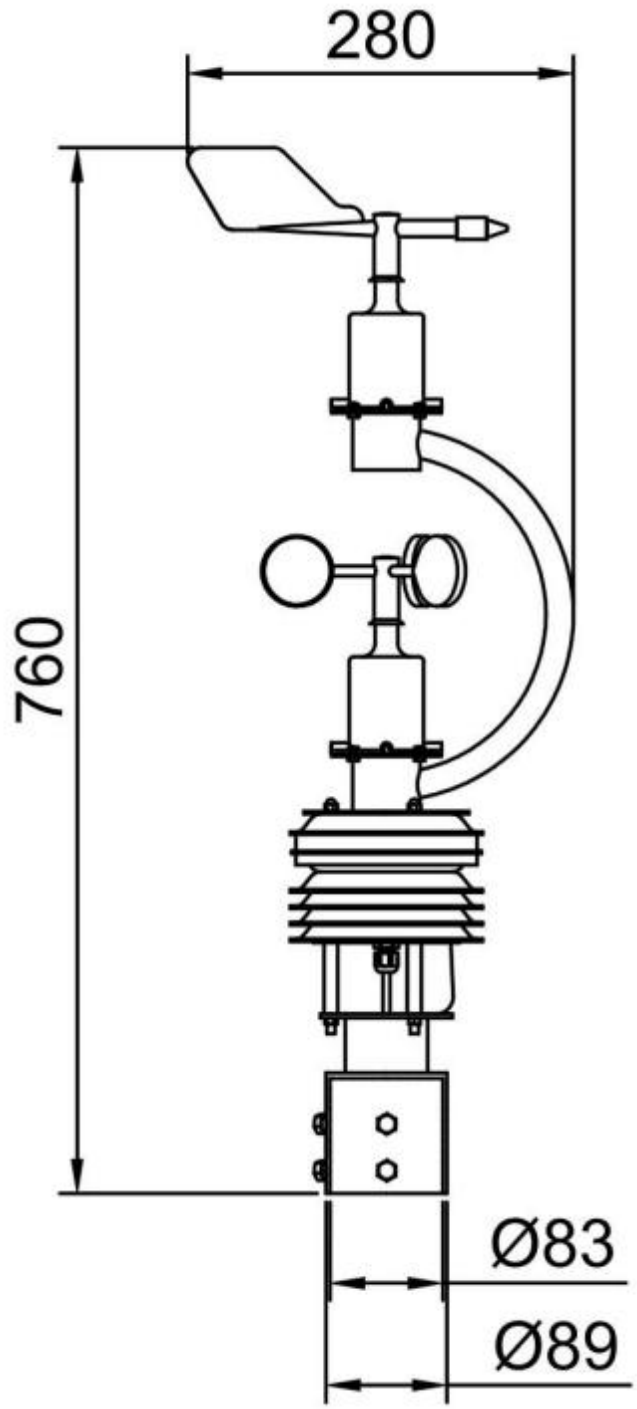
5 Physical Specifications

Parameter Item	Specification Value
Housing Material	UV-resistant Engineering Plastic
Protection Rating	Outdoor suitable
Mounting Interface	Standard sleeve mounting (optional 2-meter pole)

Device Dimensional Drawing:



Device Dimensional Drawing with Sleeve:



6 Installation Instructions

6.1 Pre-installation Inspection

Equipment List:

- OHTS1123 Type C Integrated Weather Station main unit: 1 pc
- Installation screw kit: 1 set
- 2-meter pole and sleeve (optional)
- Warranty card, Certificate of Conformity

6.2 Interface Definition

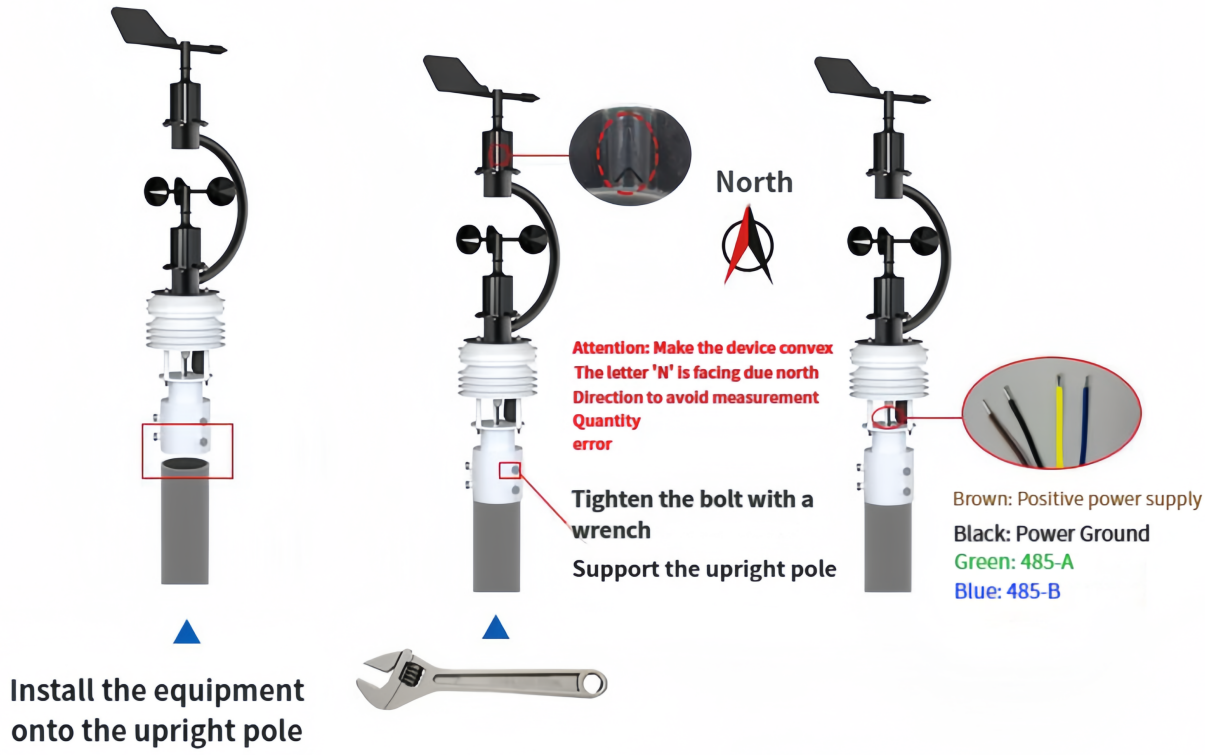
Wide voltage power input range 10~30VDC. When connecting 485 signal wires, ensure correct A and B polarity; avoid reverse connection. Multiple devices on the bus must have unique addresses and consistent baud rates.

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

6.3 Field Wiring Instructions

When multiple 485 devices connect to the same bus, follow 485 bus topology specifications. Refer to the "485 Device Field Wiring Manual" for detailed wiring requirements. It is recommended to install a 120Ω termination resistor at the bus end. For long-distance transmission, use shielded twisted pair cable and provide local power supply.

6.4 Installation Method



7 Wiring Definition

Wire Color	Identifier	Function Description	Electrical Characteristics
Brown	VCC	Power Positive	DC10~30V
Black	GND	Power Negative/Ground	0V
Yellow/Green	485-A	RS485 Data Positive	Differential+
Blue	485-B	RS485 Data Negative	Differential-

8 Communication Protocol and Data Conversion

8.1 Basic Communication Parameters

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

8.2 Data Frame Format

Utilizes ModBus-RTU communication protocol with the following frame structure:

Initial Structure: ≥4 bytes silent interval
Address Code: 1 byte (factory default 0x01)
Function Code: 1 byte (0x03/0x04/0x06/0x10)
Data Area: N bytes (16-bit data, high byte first)
CRC Check: 2 bytes (low byte first)
End Structure: ≥4 bytes silent interval

Host Query Frame Structure:

Address Code	Function Code	Register Start Address	Register Length	CRC Low Byte	CRC High Byte
1 byte	1 byte	2 bytes (MSB first)	2 bytes	1 byte	1 byte

Slave Response Frame Structure:

Address Code	Function Code	Valid Byte Count	Data Area 1	Data Area 2	...	Data Area N	CRC Low Byte	CRC High Byte
1 byte	1 byte	1 byte	2 bytes	2 bytes	...	2 bytes	1 byte	1 byte

8.3 Register Address Mapping

Supported function codes: 0x03 (Read Holding Registers), 0x04 (Read Input Registers), 0x06 (Write Single Register), 0x10 (Write Multiple Registers)

Register Address (Decimal)	PLC/Configuration Address	Content Description	Supported Function Codes	Data Conversion Rules
497	40498	Atmospheric Pressure (hPa)	0x03/0x04	$P = \frac{\text{Register Value}}{10}$
500	40501	Wind Speed Value	0x03/0x04	$V = \frac{\text{Register Value}}{10}\,\text{m/s}$
501	40502	Wind Force Level	0x03/0x04	Actual value (current wind speed corresponding to Beaufort scale)
502	40503	Wind Direction (0-7 levels)	0x03/0x04	Actual value (North=0, increasing clockwise, East=2)
503	40504	Wind Direction (0-360°)	0x03/0x04	Actual angle (North=0°, increasing clockwise, East=90°)
504	40505	Humidity Value	0x03/0x04	$RH = \frac{\text{Register Value}}{10}\%$
505	40506	Temperature Value	0x03/0x04	$T = \frac{\text{Register Value}}{10}\,^\circ\text{C}$ (Negative values represented in two's complement)
506	40507	Noise Value	0x03/0x04	$L = \frac{\text{Register Value}}{10}\,\text{dB}$
507	40508	PM2.5 Value[1]	0x03/0x04	Actual value (μg/m³)
508	40509	PM10 Value[1]	0x03/0x04	Actual value (μg/m³)
509	40510	Atmospheric Pressure (kPa)	0x03/0x04	$P = \frac{\text{Register Value}}{10}\,\text{kPa}$
2000	42001	Device Address	0x03/0x04/0x06/0x10	Range 1~254, factory default 1
2001	42002	Baud Rate	0x03/0x04/0x06/0x10	0=2400, 1=4800, 2=9600, 3=19200, 4=38400, 5=57600, 6=115200, 7=1200

[1]Note: PM2.5 and CO_2 elements are mutually exclusive. If CO_2 is selected, register 507 indicates CO_2 concentration value (actual value, ppm), and register 508 is invalid.

8.4 Communication Examples

Example 1: Read Real-time Wind Speed (Address 0x01)

Query Frame:

Address Code	Function Code	Start Address	Data Length	CRC Low	CRC High
0x01	0x03	0x01 0xF4	0x00 0x01	0xC4	0x04

Response Frame (Wind Speed 12.5m/s):

Address Code	Function Code	Valid Bytes	Wind Speed Value	CRC Low	CRC High
0x01	0x03	0x02	0x00 0x7D	0x78	0x65

Data Conversion:

$$V = \frac{0 \times 256 + 125}{10} = 12.5\,\text{m/s}$$

Example 2: Read Wind Direction (Address 0x01)

Query Frame:

Address Code	Function Code	Start Address	Data Length	CRC Low	CRC High
0x01	0x03	0x01 0xF6	0x00 0x01	0x65	0xC4

Response Frame (East Wind, 2):

Address Code	Function Code	Valid Bytes	Wind Direction Value	CRC Low	CRC High
0x01	0x03	0x02	0x00 0x02	0x39	0x85

Example 3: Read Temperature and Humidity (Address 0x01)

Query Frame:

Address Code	Function Code	Start Address	Data Length	CRC Low	CRC High
0x01	0x03	0x01 0xF8	0x00 0x02	0x44	0x06

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

Address Code	Function Code	Valid Bytes	Humidity Value	Temperature Value	CRC Low	CRC High
0x01	0x03	0x04	0x02 0x92	0xFF 0x9B	0x5A	0x3D

Data Conversion:
Temperature (Two's complement conversion):

$$T = \frac{-101}{10} = -10.1\,^{\circ}\mathrm{C}$$

Humidity:

$$RH = \frac{658}{10} = 65.8\,\%$$

9 Precautions

1. **Safety Warning**: This device is strictly prohibited from use as a safety protection device or emergency stop device. It must not be used in critical control applications where equipment failure could result in personal injury. Thoroughly read the technical manual before installation, operation, or maintenance.
2. **Environmental Limitations**: The humidity sensor operates on capacitive principles and should avoid long-term use in environments containing Volatile Organic Compounds (VOCs) to prevent sensor drift or damage.
3. **Electrical Safety**: The device power supply range is DC10~30V; strict prohibition of exceeding this range. RS485 bus wiring must ensure correct A and B polarity to avoid communication failures caused by reverse connection.
4. **Maintenance Requirements**: Regularly inspect sensor air inlets to ensure no dust blockage. Wind speed and direction sensor rotating components must be kept clean to prevent foreign object jamming.

10 After-sales Support

Warranty Policy:
The warranty period is 12 months from the date of purchase (subject to valid purchase documentation). During the warranty period, under normal use and maintenance conditions, failures caused by mechanical materials and workmanship issues are eligible for free repair and parts replacement services by the company. Beyond the warranty period, lifetime paid maintenance services are provided.

Exclusions from Warranty:

- Equipment damage caused by incorrect installation or operation
- Disassembly, repair, modification, or replacement of internal components by unauthorized technicians
- Damage caused by liquid infiltration, foreign object entry, or negligent use

- Failures resulting from natural disasters or accidents
- Damage caused by use beyond product operating parameter ranges

Technical Support:

RS485 parameter configuration software and Bluetooth configuration APP technical support provided, including ModBus protocol secondary development consultation.

11 Manufacturer Information

Item	Information
Company Name	Shanghai OrangeHorse Electronic Technology Co., Ltd.
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12 Revision History

Version	Revision Date	Revision Content
V1.0	-	Initial Release