OHTS1124 Negative Oxygen Ion Detector

1 Product Overview

The OHTS1124 is a negative oxygen ion concentration monitoring instrument based on the capacitive aspiration principle, designed for ambient air quality monitoring and assessment. The device integrates a high-sensitivity negative ion detection unit, featuring local LCD data display and remote digital communication capabilities. It supports data exchange with host computer systems or PLCs via the RS485 interface using the ModBus-RTU protocol, with a maximum communication distance of up to 2000m. The device supports wide-voltage DC power supply and is applicable for forestry, meteorological, environmental protection, and indoor air quality monitoring scenarios, capable of long-term stable operation in outdoor environments.

2 Applications

- Forestry ecological monitoring and forest environmental quality assessment
- Urban ambient air quality monitoring networks
- Atmospheric ion concentration monitoring at meteorological observatories
- Real-time air quality monitoring in tourist attractions
- Ecological environment monitoring in nature reserves
- Indoor air quality detection and assessment
- Environmental scientific research and data acquisition
- Smart agriculture greenhouse environment monitoring

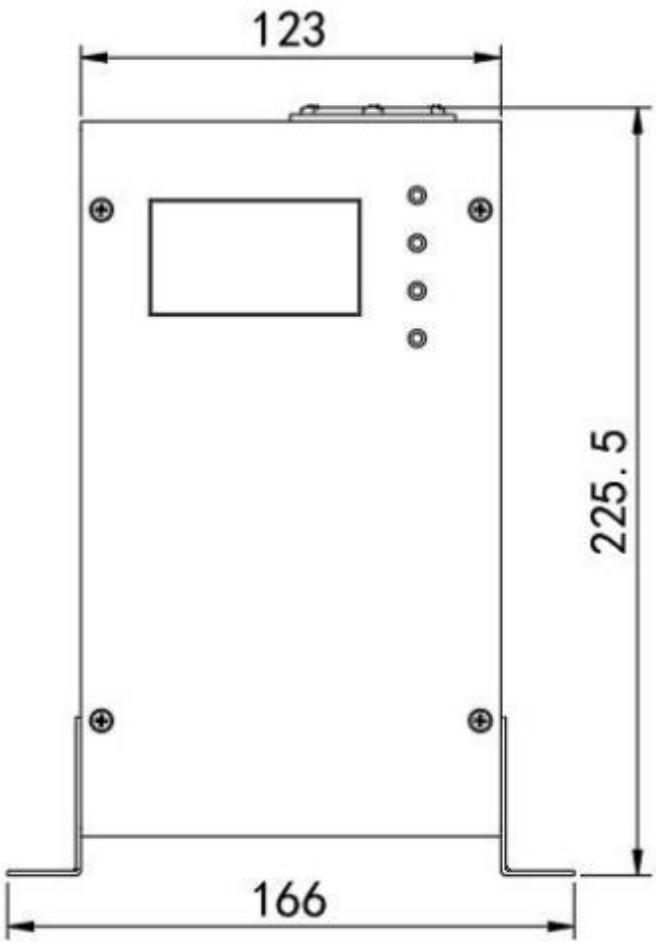
3 Features

- Utilizes high-precision negative oxygen ion measurement unit with excellent long-term stability and favorable time-drift characteristics
- Measurement range 0-5,000,000 ions/cm³, resolution 10 ions/cm³, typical accuracy ±15%
- Equipped with large-size LCD display, supporting local real-time data reading and parameter viewing
- Standard RS485 digital interface with ModBus-RTU communication protocol, supporting software configuration of address and baud rate
- Wide-voltage power supply design, supporting DC 10-30V input range
- Front panel configured with buttons, supporting local parameter setting and calibration operations
- Ion mobility 0.4 cm²/(V·s), mobility error ±5%
- Industrial-grade temperature and humidity adaptability, operating temperature range -40℃~+70℃

4 Technical Specifications

Parameter	Specification
Supply Voltage	DC 10-30V
Maximum Power Consumption	2W (under DC 12V supply condition)
Measurement Range	0-5,000,000 ions/cm³
Resolution	10 ions/cm³
Measurement Accuracy	±15%
Data Update Rate	1Hz
Ion Mobility	0.4 cm²/(V·s)
Ion Mobility Error	±5%
Communication Interface	RS485
Communication Protocol	ModBus-RTU
Default Baud Rate	4800 bit/s (optional 2400/9600 bit/s)
Default Device Address	0x01 (range 1-255)
Maximum Communication Distance	2000m
Operating Temperature	-40℃~+70℃
Operating Humidity	0%RH~95%RH (non-condensing)

5 Physical Specifications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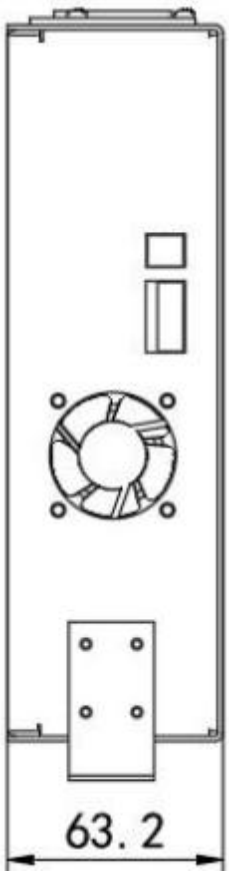
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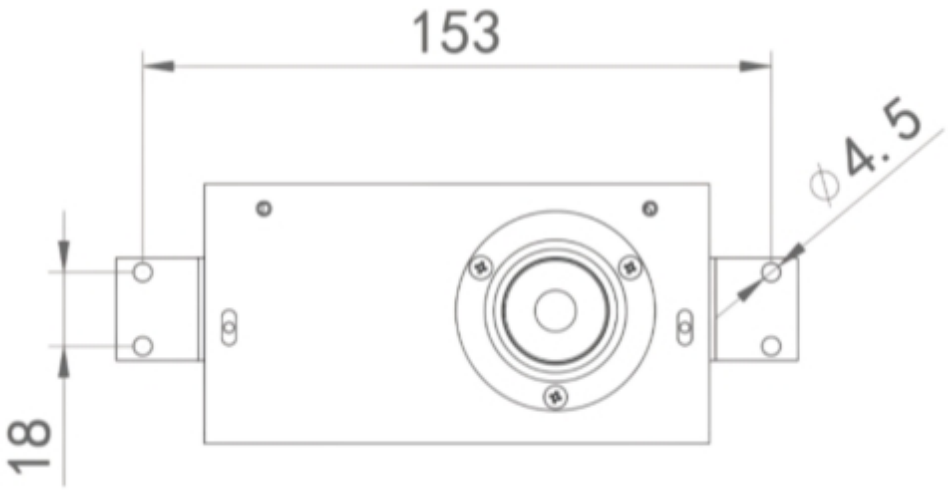

Parameter	Specification
Mounting Method	Wall-mounted screw fixation
Mounting Orientation	Must be placed vertically
Recommended Mounting Height	1.5m (geometric center of device from ground)
Grounding Requirement	Enclosure must be properly grounded, grounding resistance <4Ω

6 Installation Instructions

1. **Mechanical Installation**: Secure the device using screws through the mounting holes; mounting hole dimensions are detailed in the Physical Specifications section. The device must be maintained in a vertical position; tilted installation will affect measurement accuracy.
2. **Installation Height**: The device center should be positioned 1.5m above ground level.
3. **Grounding Protection**: The collector enclosure and external casing should be properly grounded, with grounding resistance less than 4Ω.
4. **Lightning Protection**: The installation site should be equipped with lightning protection facilities.
5. **Protective Fence** (Optional): If a protective fence is required, the fence height should not exceed 1.2m, and the distance between the instrument and the fence should preferably be greater than 2.0m.

7 Wiring Definition

Wire Color	Definition	Description
Brown	VCC+	Positive Power Supply (DC 10-30V)
Black	GND	Negative Power Supply
Yellow/Green	RS485-A	Differential Signal Line A
Blue	RS485-B	Differential Signal Line B

Wiring Precautions:

- When wiring the RS485 bus, lines A and B must not be reversed
- Multiple devices on the same bus must not have conflicting addresses
- Multi-device bus wiring should follow RS485 network topology specifications; terminal resistors should be added when necessary

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 Checking	CRC-16 (Cyclic Redundancy Check)
Baud Rate	2400/4800/9600 bit/s configurable, factory default 4800 bit/s

8.2 Data Frame Format

Adopting the ModBus-RTU communication protocol, the frame structure is as follows:

Master Query Frame:

Address Code	Function Code	Register Start Address	Register Length	CRC Low Byte	CRC High Byte
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Slave Response Frame:

Address Code	Function Code	Valid Byte Count	Data Area 1	Data Area 2	...	CRC Check
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes

8.3 Register Address Definition

Register Address (HEX)	Register Address (DEC)	PLC Address	Content	Operation Code
0000H	0	40001	Negative Ion Count (32-bit unsigned high 16 bits)	03
0001H	1	40002	Negative Ion Count (32-bit unsigned low 16 bits)	03
0007H	7	40008	LCD Backlight Time (s)	03
0009H	9	40009	Version Number	03
0053H	83	40084	Floating-point Coefficient A High 16 bits	03/10
0054H	84	40085	Floating-point Coefficient A Low 16 bits	03/10
0055H	85	40086	Floating-point Coefficient B High 16 bits	03/10
0056H	86	40087	Floating-point Coefficient B Low 16 bits	03/10
07D0H	2000	42001	ModBus Device Address	03/06/10
07D1H	2001	42002	ModBus Baud Rate (0:2400, 1:4800, 2:9600)	03/06/10

8.4 Data Conversion Formulas

Negative Oxygen Ion Concentration Calculation:

$$C = (D_{high} \times 65536) + D_{low}$$

Where:

- C: Negative oxygen ion concentration, unit: ions/cm³

- D_{high}: Value read from register 0000H (high 16 bits)
- D_{low}: Value read from register 0001H (low 16 bits)

Calibration Formula (Linear Compensation):

$$Y = A \times X + B$$

Where:

- Y: Calibrated value
- X: Original measured value
- A: Coefficient A (IEEE 754 single-precision floating-point number, stored in registers 0053H-0054H)
- B: Coefficient B (IEEE 754 single-precision floating-point number, stored in registers 0055H-0056H)

8.5 Communication Examples

Query Current Negative Oxygen Ion Value:

- Query Frame: `01 03 00 00 00 02 C4 0B`
- Response Frame (example value 200,000 ions/cm³): `01 03 04 00 03 0D 40 0F 53`
- Data Parsing: 00030D40H = 200,000 ions/cm³

9 Precautions

- The device must be installed strictly vertically; any tilt will affect the accuracy of measurement data
- When using configuration software to modify device parameters, only a single device should be connected to the RS485 bus
- The collector, air intake/outlet ports, and fan should be cleaned and maintained monthly
- Specialized inspection and cleaning of the collector, circuitry, and air path should be performed quarterly
- Before the lightning-prone season, the lightning protection grounding system and enclosure grounding should be inspected and maintained
- Device zeroing operations must be performed under the guidance of professional technical personnel (requires turning off the fan and blocking the ventilation port)
- Avoid using or storing the device in environments exceeding the specified temperature and humidity ranges

10 After-Sales Guarantee & Support

Warranty Policy:

- Warranty Period: 12 months from the date of purchase (valid purchase proof required)
- Warranty Coverage: Free repair and component replacement services for failures caused by material or workmanship defects under normal use and maintenance conditions
- Beyond Warranty Period: Lifetime paid repair services provided

Non-Warranty Coverage:

- Equipment damage caused by incorrect installation, use, or operation
- Disassembly, repair, modification, or replacement of internal components by technical personnel not authorized by the company
- Damage caused by water ingress or penetration of other substances
- Failures or damage caused by accidents or natural disasters
- Failures caused by operation beyond the working parameters listed in the product technical specifications

11 Manufacturer Information

Item	Content
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12 Revision History

Version	Date	Description
V1.0	-	Initial Release