# OHTS1060 Multi-Parameter Environmental Sensor ($CO_2$/Temperature/Humidity/Noise/Pressure/Light)

## 1 Product Overview

The OHTS1060 is an integrated multi-parameter environmental monitoring sensor featuring a louvered radiation shield structure. It integrates six-parameter measurement capabilities: carbon dioxide ($CO_2$) concentration, ambient temperature, relative humidity, atmospheric pressure, ambient noise, and illuminance. The device utilizes an RS485 physical interface with standard ModBus-RTU communication protocol, suitable for distributed environmental monitoring systems. The enclosure adopts UV-resistant engineering-grade materials, with internal sensors utilizing industrial-grade components, making it suitable for long-term continuous monitoring in both outdoor and indoor applications.

## 2 Applications

- Environmental Air Quality Monitoring Stations
- Smart Agriculture Greenhouse Environmental Monitoring
- Industrial Facility Environmental Quality Monitoring
- Smart City Street Light Pole Environmental Sensing Nodes
- Building Automation Environmental Control Systems
- Meteorological Observation Site Data Acquisition
- Warehousing and Logistics Environmental Monitoring
- Laboratory Environmental Parameter Recording
- Transportation Hub Environmental Monitoring
- Data Center Machine Room Environmental Management

## 3 Features

- Six-Parameter Integrated Measurement: Integrates detection of $CO_2$, temperature, humidity, atmospheric pressure, noise, and illuminance
- Standard Communication Protocol: RS485 interface supporting ModBus-RTU protocol, with configurable baud rate from 1200~115200 bit/s
- Wide Voltage Power Supply: Supports 10~30VDC power input, with maximum power consumption of 0.8W
- Environmental Adaptability: Protective housing constructed from UV-resistant materials, suitable for long-term outdoor deployment
- High-Precision Measurement: Temperature and humidity measurement units utilize Swiss-imported sensors, with temperature accuracy of ±0.5°C (at 25°C) and humidity accuracy of ±3%RH (at 60%RH, 25°C)
- Configurable Parameters: Supports software configuration of device address (1~254), baud rate, and measurement calibration parameters

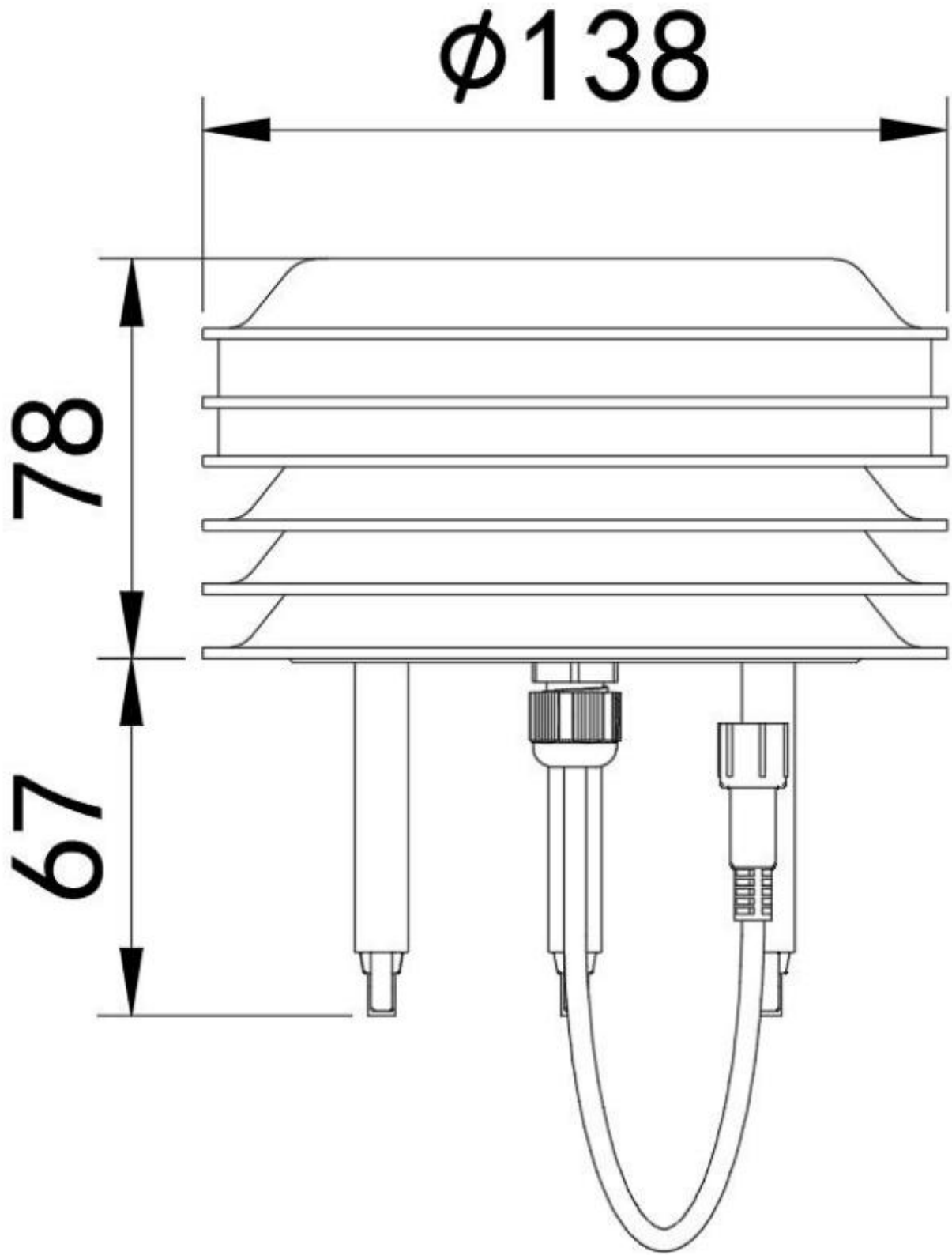
## 4 Technical Specifications

| Parameter Category | Parameter Item | Specification |
|---|---|---|
| **Power Supply** | DC Supply Range | 10~30VDC |
| | Maximum Power Consumption | 0.8W |
| **Temperature Measurement** | Range | -40℃~+120℃ |
| | Accuracy | ±0.5℃ (at 25℃) |
| | Long-term Stability | ≤0.1℃/y |
| | Response Time (τ63) | ≤25s (at 1m/s air velocity) |
| **Humidity Measurement** | Range | 0%RH~99%RH |
| | Accuracy | ±3%RH (at 60%RH, 25℃) |
| | Long-term Stability | ≤1%/y |
| | Response Time (τ63) | ≤8s (at 1m/s air velocity) |
| **$CO_2$ Measurement** | Range | 0~5000ppm |
| | Accuracy | ±(50ppm+3%F·S) (at 25℃) |
| | Resolution | 1ppm |
| | Long-term Stability | ≤1%/y |
| | Response Time (90% step) | <180s |
| **Atmospheric Pressure Measurement** | Range | 0~120kPa |
| | Accuracy | ±0.15kPa @25℃ 101kPa |
| | Long-term Stability | -0.1kPa/y |
| | Response Time | ≤2s |
| **Noise Measurement** | Range | 30dB~130dB |
| | Accuracy | ±0.5dB (reference tone 94dB@1kHz) |
| | Long-term Stability | ≤3dB/y |
| | Response Time | ≤3s |
| **Illuminance Measurement** | Range | 0~200000Lux |
| | Accuracy | ±7% (at 25℃) |
| | Long-term Stability | ≤5%/y |
| | Response Time | ≤2s |
| **Communication Interface** | Output Signal | RS485 (ModBus-RTU) |
| | Default Baud Rate | 4800bit/s |
| | Data Bits | 8 bits |
| | Stop Bits | 1 bit |
| | Parity | None |
| | Error Check | CRC-16 |
| **Operating Environment** | Suitable Operating Temperature | -10℃~+50℃ |

*Note: Temperature and humidity response time test conditions specify an air velocity of 1m/s at the sensor's internal sensing element, corresponding to approximately* $10^{-2}\mathrm{m/s}$ *in the test environment, with airflow direction perpendicular to the sensor sampling port.*

# 5 Physical Specifications

| Parameter Item | Specification |
|---|---|
| Housing Material | UV-resistant Engineering Plastic |
| Protection Structure | Louvered Radiation Shield Design |
| Mounting Method | Wall-mounted/Pole-mounted (with mounting bracket) |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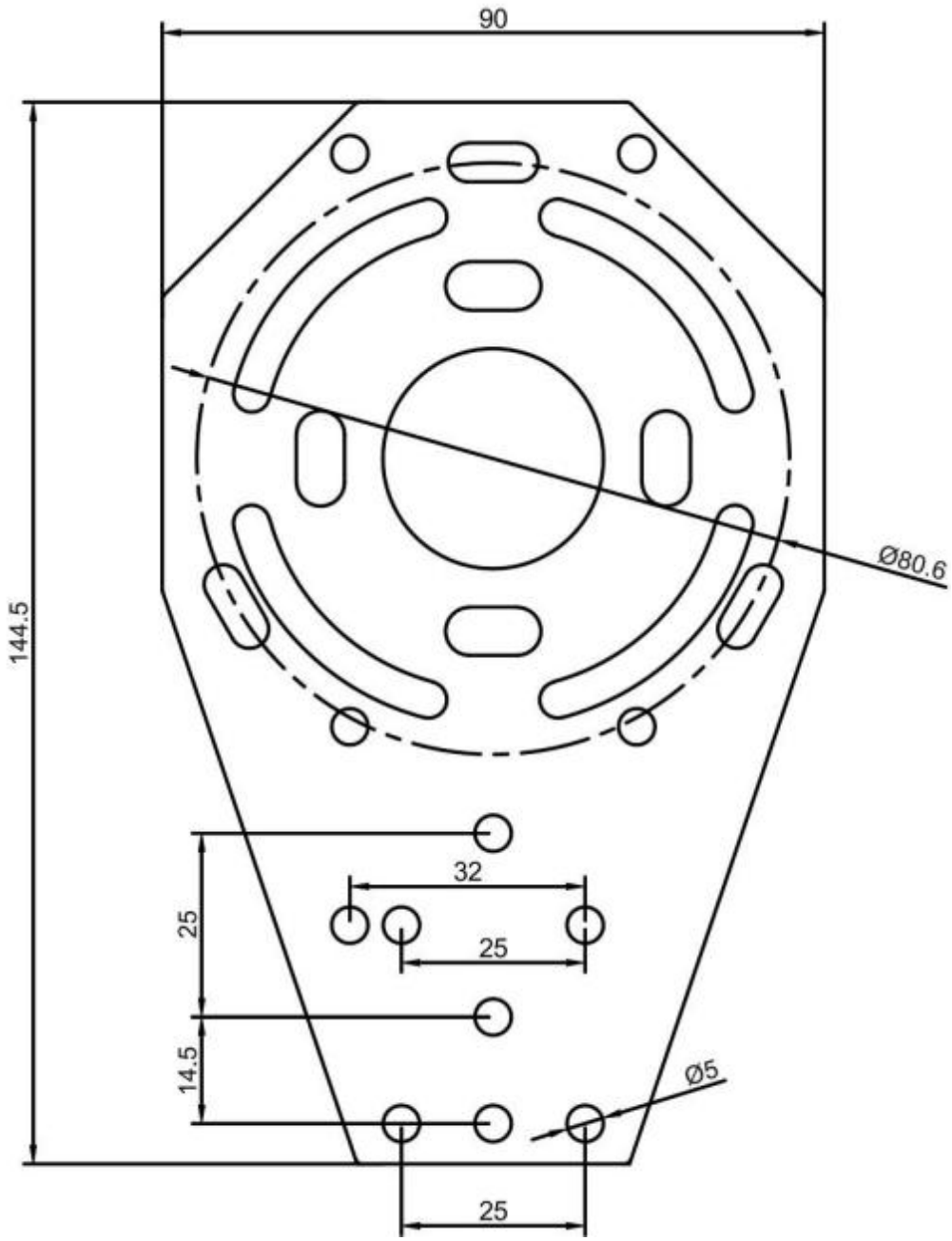



# 6 Installation

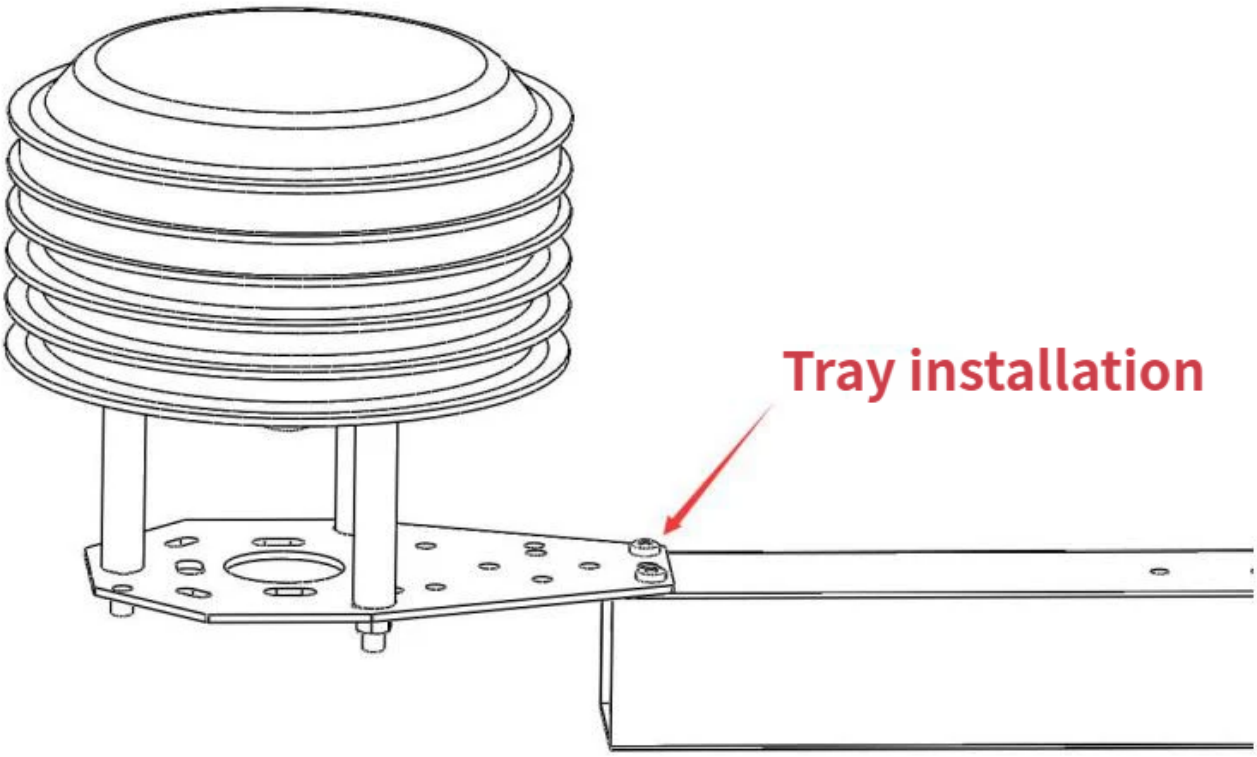
## 6.1 Pre-Installation Inspection

Packing List:

- OHTS1060 Multi-Parameter Sensor: 1 unit
- USB-to-RS485 Converter Module (optional)
- Warranty Card, Certificate of Conformity

## 6.2 Installation Steps

1. Select an installation location ensuring good ventilation around the sensor, avoiding direct sunlight and heat source interference
2. Secure the mounting bracket to the wall or support structure using the provided hardware, ensuring the device is installed horizontally
3. Recommended installation height is 1.5m~2m above ground (standard meteorological monitoring height)




# 7 Wiring Definition

| Wire Color | Definition | Description |
|---|---|---|
| Brown | VCC | Power Positive (10~30VDC) |
| Black | GND | Power Negative |
| Yellow | 485-A | RS485 Data Line A |
| Blue | 485-B | RS485 Data Line B |

**Wiring Precautions:**

- RS485 bus shall utilize shielded twisted pair cable; A and B lines must not be reversed
- Device addresses on the same bus must not conflict
- When bus length exceeds 2000m or excessive devices are connected, local power supply and 120Ω termination resistors are required

# 8 Communication Protocol and Data Conversion

## 8.1 Communication Basic Parameters

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

## 8.2 Data Frame Format

Utilizing ModBus-RTU communication protocol:

**Master Query Frame:**
| Address Code (1 byte) | Function Code (1 byte) | Register Start Address (2 bytes) | Register Length (2 bytes) | CRC Low (1 byte) | CRC High (1 byte) |

**Slave Response Frame:**
| Address Code (1 byte) | Function Code (1 byte) | Valid Byte Count (1 byte) | Data Field 1 (2 bytes) | ... | Data Field N (2 bytes) | CRC (2 bytes) |

## 8.3 Register Address Definition

**Measurement Data Registers** (Support function codes 03/04):

| Register Address (Decimal) | PLC Address | Content | Data Conversion Formula |
|---|---|---|---|
| 497 | 40498 | Atmospheric Pressure (hPa, actual value ×10) | $P_{hPa} = \frac{RegisterValue}{10}$ |
| 500 | 40501 | Humidity Value (actual value ×10) | $RH = \frac{RegisterValue}{10}$ $\%RH$ |
| 501 | 40502 | Temperature Value (actual value ×10) | $T = \frac{RegisterValue}{10}$ ℃ *(Negative values use two's complement representation)* |
| 502 | 40503 | Noise Value (actual value ×10) | $Noise = \frac{RegisterValue}{10}$ dB |
| 503 | 40504 | $CO_2$ Concentration (actual value) | $CO2 = RegisterValue$ ppm |
| 505 | 40506 | Atmospheric Pressure (kPa, actual value ×10) | $P_{kPa} = \frac{RegisterValue}{10}$ |
| 506 | 40507 | Illuminance Value High 16-bit | $Lux = (High_{16bit} \times 65536) + Low_{16bit}$ |
| 507 | 40508 | Illuminance Value Low 16-bit | |

**Configuration Registers** (Support function codes 03/04/06/10):

| Register Address (Decimal) | PLC Address | Content | Range/Description |
|---|---|---|---|
| 2000 | 42001 | Device Address | 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 |

**Calibration Registers** (Support function codes 03/04/06/10):

| Register Address (Decimal) | PLC Address | Content | Unit/Remarks |
|---|---|---|---|
| 80 | 40081 | Temperature Calibration Value | Actual value ×10 |
| 81 | 40082 | Humidity Calibration Value | Actual value ×10 |
| 82 | 40083 | Noise Calibration Value | Actual value ×10 |
| 85 | 40086 | Atmospheric Pressure Calibration Value | kPa, actual value ×10, synchronously calibrates hPa register |
| 86 | 40087 | Illuminance Calibration Value | Actual value |
| 87 | 40088 | $CO_2$ Calibration Value | Actual value |

## 8.4 Communication Example

**Query Temperature and Humidity Values (Device Address 0x03):**

Query Frame:

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

Data Parsing:

- Temperature: $0xFF9B = -101 \Rightarrow T = -10.1\ ^{\circ}\mathrm{C}$ (two's complement representation)
- Humidity: $0x0292 = 658 \Rightarrow RH = 65.8\ \%RH$

# 9 Precautions

1. **Personal Safety Protection**: This device is strictly prohibited from use as a safety device or emergency stop device, and shall not be used in applications where equipment failure may cause personal injury. Failure to follow the technical manual for installation, operation, or maintenance may result in serious injury.
2. **Operating Environment Limitations**: The suitable operating temperature range is -10℃~+50℃. Operation outside this range may result in decreased measurement accuracy or equipment damage.
3. **Chemical Environment Limitations**: The humidity sensor utilizes capacitive sensing principles and should be protected from use in environments containing volatile organic compounds (VOCs), as such environments may cause sensor drift or damage.
4. **Electrical Safety**: Ensure power is disconnected before wiring to avoid energized operation. Supply voltage must not exceed 30VDC, otherwise permanent equipment damage may occur.
5. **Bus Wiring**: RS485 bus shall utilize shielded twisted pair cable; A and B lines must not be reversed. When bus length exceeds 2000m or excessive devices are connected, local power supply and 120Ω termination resistors are required.
6. **Address Configuration**: Each device address on the same bus must be unique; factory default address is 0x01. Address conflicts will result in communication anomalies.
7. **Maintenance Requirements**: Annual calibration verification is recommended; $CO_2$ sensors should undergo baseline calibration annually.

# 10 After-Sales Guarantee & Support

**Warranty Policy:**

- Standard Warranty Period: 24 months from date of purchase (valid proof of purchase required)
- $CO_2$ Sensor Warranty Period: 12 months
- Lifetime paid repair services provided beyond warranty period

**Non-Warranty Scope:**

- Equipment damage caused by improper installation, use, or operation
- Disassembly, repair, modification, or replacement of internal components by non-authorized technical personnel
- Damage caused by water ingress, chemical infiltration, or other negligent use
- Failures caused by natural disasters or accidents
- Damage caused by operation beyond parameters specified in the product technical specifications

**Technical Support:**

- Technical documentation and software updates available on the official website
- Configuration tool usage inquiries may be directed to the technical support email

# 11 Manufacturer Information

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# 12 Revision History

| Version Number | Revision Date | Revision Content |
|---|---|---|
| V1.0 | - | Initial release |