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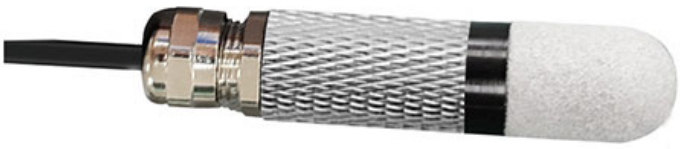
Waterproof Temperature Humidity Sensor Probe

（RS485 type）



SN-3000-WS-N01

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Product Overview

This temperature and humidity transmitter features a compact design, incorporating an imported industrial-grade microprocessor chip and an internal high-precision temperature sensor to ensure outstanding reliability and accuracy. The device operates in non-condensing environments from 0 to 99.9% RH. It employs the ModBus-RTU communication protocol via a 485 interface, with configurable communication address and baud rate, supporting distances up to 2000 meters. The product incorporates reverse polarity protection, preventing damage to the device if connections are reversed.

Features

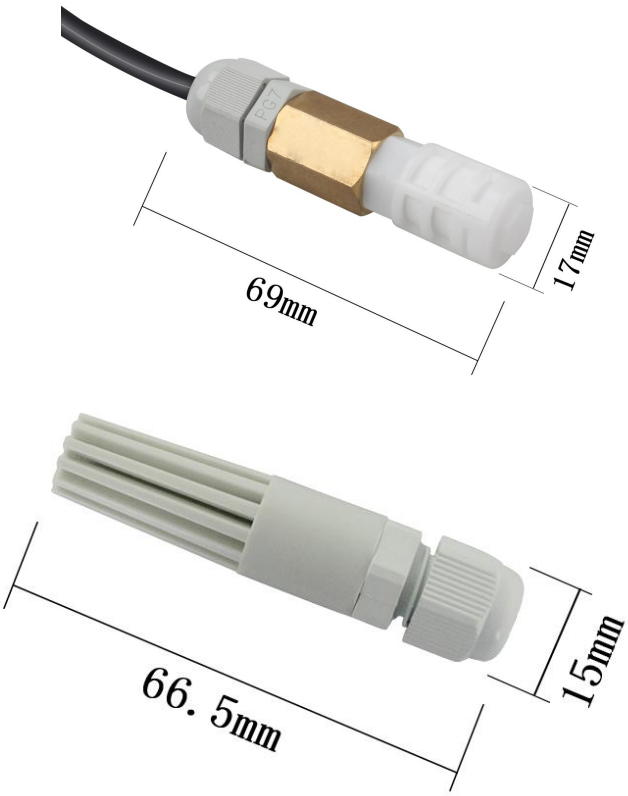
- RS485 communication interface, standard Modbus-RTU protocol, configurable communication address and baud rate, with a maximum communication cable length of 2000 meters.
- Temperature accuracy ±0.3°C, humidity accuracy ±3% RH, high precision, low drift.
- Features dedicated EMC interference suppression components, ensuring robust performance against intense electromagnetic interference in field environments. Equipped with industrial-grade processing chips for broad operational applicability.
- Supports a wide voltage range of 5–28V, ensuring reliable operation even with centralized power supply over long distances.

Main Spec

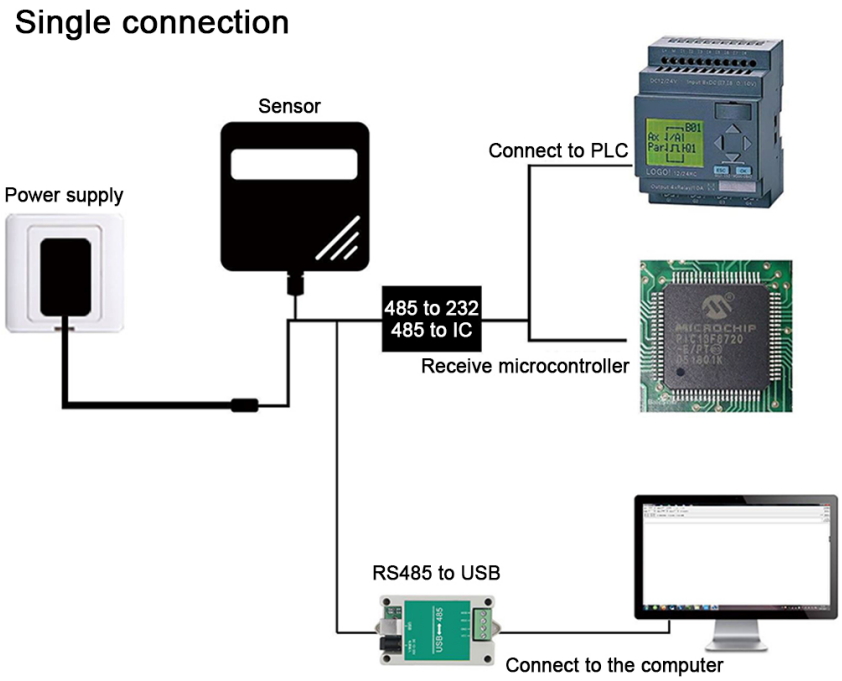
DC Power Supply (Default)	5-28V DC	
Max Power Consumption	≤0.05W	
Accuracy	Humidity	±3%RH（60%RH，25℃）
	Temperature	±0.3℃（25℃）
Transmitter Circuit Operating Tempe	Standard model：-40℃~+85℃ High-temperature model：-40℃~+120℃	
Rang	-40℃~+120℃，0%RH~100%RH	
Communication Protocol	ModBus-RTU communications protocol	
Output Signal	485 signal	
Temperature Display Resolution	0.1℃	
Humidity Display Resolution	0.1%RH	
Tempe & Humidity Refresh Time	≥20ms	
Long-term Stability	Temperature	≤0.1℃/y
	Humidity	≤1%RH/y
Response Time	Temperature	≤25s（1m/s）
	Humidity	≤8s（1m/s ）
Parameter Settings	Software settings	

Set the response time to τ63 via software configuration. Wind speed refers to the velocity at the sensor's internal sensitive material. When the test environment wind speed is 10-2 m/s, with wind direction perpendicular to the sensor's intake port, the wind speed at the sensor's internal sensitive material is approximately 1 m/s.

Housing Dimensions

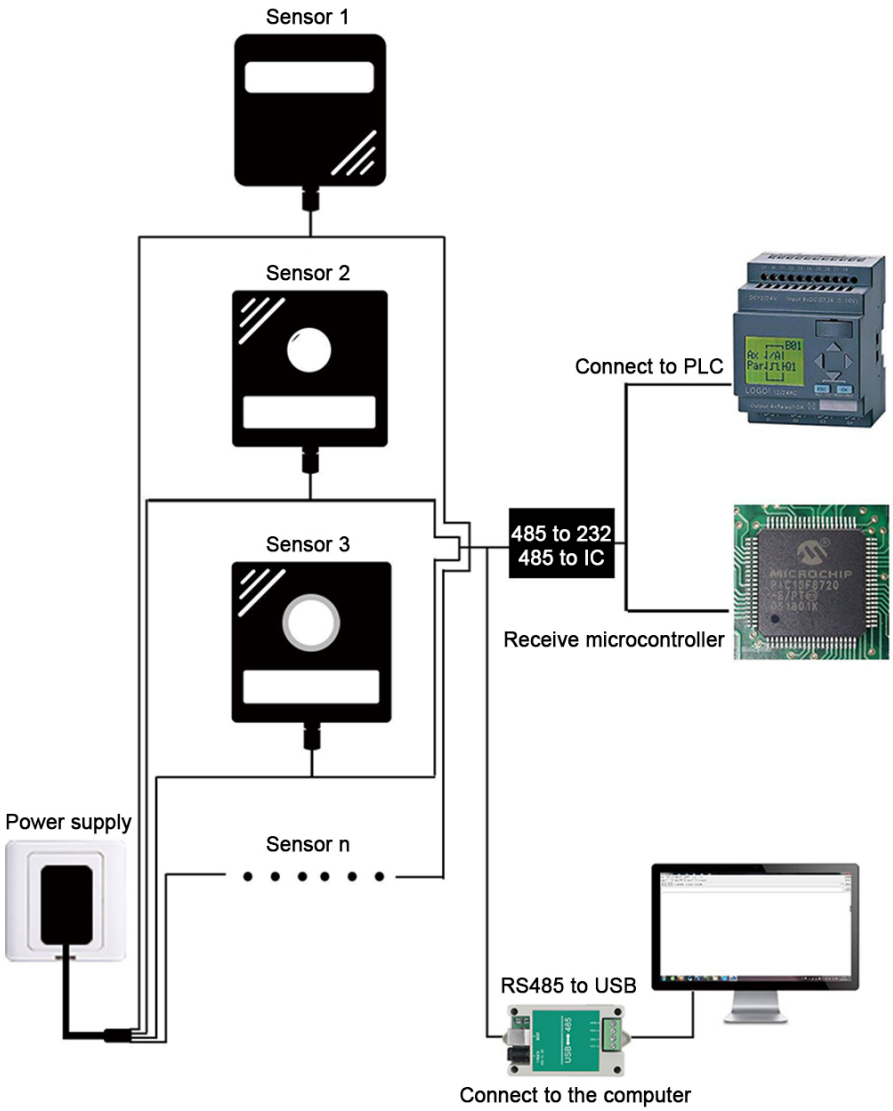


System Framework



This product can also be used with multiple sensors combined on a single 485 bus. Theoretically, one bus can support up to 254 485 sensors. Connect the other end to a PLC with a 485 interface, link to a microcontroller via a 485 interface chip, or use a USB-to-485 converter to connect to a computer. Configure and test using the sensor configuration tool provided by our company (only one device can be connected at a time when using this configuration software).

More connections



Interface Specification

The power supply interface supports wide-range input from 5V to 28V. When connecting the RS-485 signal lines, ensure that the A and B lines are not reversed. Address conflicts must be avoided among multiple devices on the bus.

Sensor Wiring

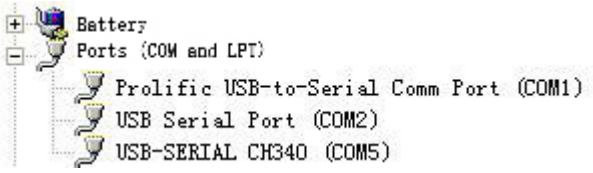
Line Color	Instruction
Brown	Power supply positive (5–28 V DC)
Black	Power supply negative
Yellow	485-A
Blue	485-B

Configuration Software Installation and Usage

Our company provides the accompanying "485 Parameter Configuration Software," which allows convenient reading of sensor parameters via computer and flexible modification of the sensor's device ID and address. Note that when using the software's automatic retrieval feature, ensure only one sensor is present on the 485 bus.

Connect the sensor to the computer

After correctly connecting the sensor to the computer via USB to RS-485 and providing power, the correct COM port will be visible in the computer (check the COM port under "My Computer > Properties > Device Manager > Ports").

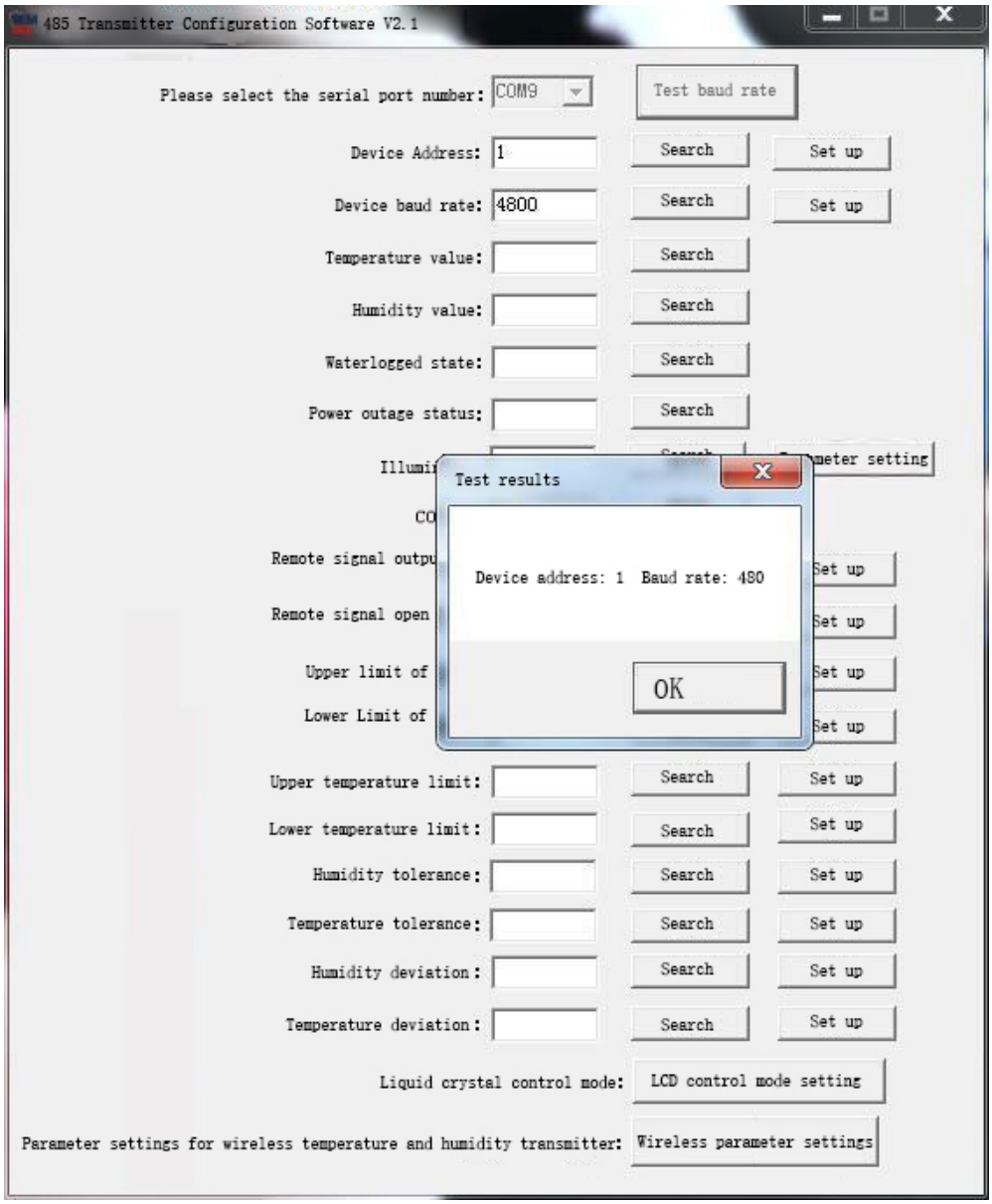


Open the data package, select "Debugging Software" → "485 Parameter Configuration Software," locate the "485 Parameter Configuration Software" and open it.

If no COM port is found in Device Manager, it indicates that you have not installed the USB-to-485 driver (included in the documentation package) or that the driver was not installed correctly. Please contact technical support for assistance.

Using the Sensor Monitoring Software

1. The configuration interface is shown in the figure. First, obtain the serial port number using the method described in Section 3.1 and select the correct serial port.
2. Click the software's test baud rate button. The software will test the current device's baud rate and address. The default baud rate is 4800 bit/s, and the default address is 0x01.
3. Modify the address and baud rate as needed, while simultaneously checking the device's current functional status.
4. If testing fails, recheck the device wiring and the installation status of the 485 driver.



Basic Communication Parameters

Code	8-bit binary
Data Bit	8-bit
Parity Bit	Non
Stop Bit	1-bit
Error Check	CRC (Cyclic Redundancy Check)
Baud Rate	1200bit/s、2400bit/s、4800bit/s、9600bit/s、19200bit/s、38400bit/s、5 7600bit/s、115200bit/s canbeset,factorydefaultis4800bit/s。

Data Frame Format Definition

Using the ModBus-RTU communication protocol, the format is as follows:
Initial structure ≥4 bytes of time
Address code = 1 byte
Function code = 1 byte
Data area = N bytes
Error check = 16-bit CRC code
End structure ≥4 bytes of time
Address code: Represents the transmitter's address, which is unique within the communication network (factory default 0x01).
Function Code: Indicates the command function sent by the host. This transmitter only uses function code 0x03 (read register data).
Data Area: Contains the specific communication data. Note: For 16-bit data, the high byte comes first!
CRC Code: A two-byte check code.

Host Inquiry Frame Structure:

Address code	Function code	Register start address	Register length	Checksum low byte	Checksum high byte
1 byte	1 byte	2 byte	2 byte	1 byte	1 byte

From-machine response frame structure:

Address code	Function code	N0. of valid bytes	Data Zone 1	Data Zone 2	Data Zone n	Checksum
1 byte	1 byte	1 byte	2 byte	2 byte	2 byte	2 byte

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Register Address

Register address (hexadecimal)	PLC/configuration address	Content	Supported function codes
0000 H	40001	Humidity (Actual value*10)	0x03
0001 H	40002	Tempe (Actual value*10)	0x03
07D0H	42001	Address	0x03、0x06
07D1H	42002	0 stands 2400, 1 stands 4800 2 stands 9600, 3 stands 19200 4 stands 38400, 5 stands 57600 6 stands 115200, 7 stands 1200	0x03、0x06
0050 H	40081	Tempe calibration value (actual value *10)	0x03、0x06
0051 H	40082	Humidity calibration value (actual value *10)	0x03、0x06

Communication Protocol Examples and Explanations

Example of reading temperature and humidity values from device address 0x01:

Reading temperature and humidity values from device address 0x01

Interrogation frame (hexadecimal):

Address code	Function code	Start address	Data length	Checksum low byte	Checksum high byte
0x01	0x03	0x00 0x00	0x00 0x02	0xC4	0x0B

Response Frame (Hexadecimal): (e.g., temperature read as -9.7°C, humidity as 48.6%RH)

Address code	Function code	Return valid bytes count	Humidity value	Temperature value	Checksum low byte	Checksum high byte
0x01	0x03	0x04	0x01 0xE6	0xFF 0x9F	0x1B	0xA0

Temperature Calculation:

When temperature is below 0°C, temperature data is uploaded in two's complement format.

Temperature: FF9F H (hexadecimal) = -97 => Temperature = -9.7°C

Humidity Calculation:

Humidity: 1E6 H (hexadecimal) = 486 => Humidity = 48.6%RH

Read the temperature calibration value from device address 0x01

Interrogation Frame (Hexadecimal):

Address code	Function code	Start address	Data length	Checksum low byte	Checksum high byte
0x01	0x03	0x00 0x50	0x00 0x01	0x84	0x1B

Response Frame (Hexadecimal): (e.g., temperature calibration value read as -1.0°C)

Address code	Function code	Return valid bytes count	Tempe calibrate value	Checksum low byte	Checksum high byte
0x01	0x03	0x02	0xFF 0xF6	0x79	0xF2

Temperature Calibration Value Calculation:

When the temperature calibration value is less than 0, the data is uploaded in two's complement format.

Temperature Calibration Value: FF F6 H (hexadecimal) = -10 => Temperature Calibration Value = -1.0°C

Set the temperature calibration value for device address 0x01

Transmit temperature calibration value -1.0°es When the temperature calibration value is less than 0, transmit the data in two's complement format.

pemperature calibration value: FF F6 H (hexadecimal) = -10 =o Temperature calibration value = -1.0°e

Request frame (hexadecimal):

Address code	Function code	Register address	Tempe calibrate value content	Checksum low byte	Checksum high byte
0x01	0x06	0x00 0x50	0xFF 0xF6	0x48	0x6D

Response Frame (Hexadecimal):

Address code	Function code	Register address	Tempe calibrate value content	Checksum low byte	Checksum high byte
0x01	0x06	0x00 0x50	0xFF 0xF6	0x48	0x6D

The humidity calibration value operation is similar to the temperature calibration value operation.

Change the device with address 01 to a 02 request frame (hexadecimal):

Address code	Function code	Register address	Tempe calibrate value content	Checksum low byte	Checksum high byte
0x01	0x06	0x07 0xD0	0x00 0x02	0x08	0x86

Response Frame (Hexadecimal)：

Address code	Function code	Register address	Tempe calibrate value content	Checksum low byte	Checksum high byte
0x01	0x06	0x07 0xD0	0x00 0x02	0x08	0x86

Set the baud rate of device address 0x01 to 4800

Change the baud rate of device 01 to 4800

Request frame (hexadecimal):

Address code	Function code	Register address	Baud rate value content	Checksum low byte	Checksum high byte
0x01	0x06	0x07 0xD1	0x00 0x01	0x19	0x47

Response Frame (Hexadecimal):

Address code	Function code	Register address	Baud rate value content	Checksum low byte	Checksum high byte
0x01	0x06	0x07 0xD1	0x00 0x01	0x19	0x47

Read Device Address

Interrogation Frame (Hexadecimal):

Address code	Function code	Start address	Data length	Checksum low byte	Checksum high byte
0xFF	0x03	0x07 0xD0	0x00 0x01	0x91	0x59

Response Frame (Hexadecimal): (e.g., read at address 1)

Address code	Function code	Return valid bytes count	Present address	Checksum low byte	Checksum high byte
0x01	0x03	0x02	0x00 0x01	0x79	0x84

Read Device Baud Rate

Interrogation Frame (Hexadecimal):

Address code	Function code	Start address	Data length	Checksum low byte	Checksum high byte
0x01	0x03	0x07 0xD1	0x00 0x01	0xD5	0x47

Response Frame (Hexadecimal): For example, reading at a baud rate of 4800

Address code	Function code	Return valid bytes count	Present address	Checksum low byte	Checksum high byte
0x01	0x03	0x02	0x00 0x01	0x79	0x84

Frequently Asked Questions and Solutions

No output or output error

Possible causes:

The computer has a COM port, but the selected port is incorrect.
The baud rate is incorrect.
The 485 bus is disconnected, or the A and B lines are reversed.
Too many devices or excessive cable length; power locally, add a 485 repeater, and install a 120Ω terminating resistor.
The USB-to-485 driver is not installed or is damaged.
The device is damaged.