

RS485 Temperature and Humidity Sensor

Manual

ST01

V1.2



Version Updating

Date	Version	Revise	Note
2020.04.14	V1.0	Create manual	
2020.11.02	V1.1	Revise parameter	
2021.07.15	V1.2	Revise baud rate	

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1. Product Overview

ST01 temperature and humidity transmitter adopts high-sensitivity probe with stable signal and high accuracy. With a wide measuring range, good linearity, good waterproof performance, easy to use, easy to install, long transmission distance and other characteristics. Suitable for indoor and outdoor are available, the shell IP65 full waterproof, can be applied to a variety of harsh environments. Widely used in agricultural greenhouses, flower cultivation and other occasions that need temperature and humidity monitoring.

T ST01 temperature and humidity transmitter in the input power, sensor probe, signal output three parts completely isolated. Safe and reliable, beautiful appearance, easy to install.

Adopts standard protocols and levels, supporting secondary development.

1.1 Features

- ◆ Adopt the latest Swiss Sensirion high-precision digital temperature and humidity sensor (SHT30), with high sensitivity, good stability and full-range automatic temperature compensation;
- ◆ MCU adopts ST's professional leading high quality low power consumption chip to ensure the processing capability and stability.;
- ◆ Standard RS485 output communication interface, strong stability, can realize long distance communication;
- ◆ Standard Modbus-RTU communication protocol, which is widely used in the industrial field;
- ◆ Internal DC/DC converter chip, to provide stable power supply for the module work, will not heat up, high conversion efficiency;
- ◆ Original imported high-density material shell, IP65 protection level;
- ◆ Wall-mounted design, compact appearance, simple installation to save space.

1.2 Parameter

Parameter

Power supply voltage	DC: 5V-24V 1A
Power	<0.4W
Humidity measurement accuracy	±3%
Temperature measurement accuracy	±0.5℃
Humidity measurement range	0~100%RH
Temperature measurement range	-40~80℃
Long-term stability Humidity	Humidity: <1%/y Temperature:<0.1 ℃/y
Communication mode	485 Modbus-RTU
Device address	Default address: 1; 1-252 can be set
Communication baud rate,	Default: 9600; 1200,2400,4800,9600,38400,57600, 115200 can be set; 8-bit data bit, 1-bit stop bit, no parity.
Dimension	110*85*44mm
Installation	Wall-mounted

1.3 Application

Applied in industrial field measurement, telecommunication base stations, production workshops, warehouses, agricultural greenhouses, hospitals, laboratories, hotels and guest houses, warehouse temperature and humidity monitoring, construction sites and other measurement occasions.

1.4 Installation

Wall-mounted structure design, easy to install.

2. Description

2.1 Size



2.2 Wiring

Red wire	Black wire	Yellow wire	White wire
Power positive	GND	485A	485B

Note: The actual product wire, subject to the label on the back of the product.

3. Communication Protocol

3.1 Communication Basic Parameter

Data bits	8 bits
Parity check bits	No
Stop bit	1
Error check	CRC (Redundant Cyclic Code)
Baud rate	1200bit/s, 2400bit/s, 4800bit/s, 9600 bit/s, 38400bit/s, 57600bit/s, 115200bit/s settable, factory default is 9600bit/s

3.2 RTU message frame format

Modbus-RTU communication protocol is used in the following format:

Initial structure \geq 4 bytes of time

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

End structure \geq 4 bytes of time

Address code: The address of the transmitter, which is unique in the communication network (factory default 0x01).

Function code: The function indication of the command sent by the host, this transmitter only uses the function code 0x03 (read register data).

Data area: data area is specific communication data, note that the high byte of 16bits data in front!

CRC code: two-byte check code.

Host interrogation frame format:

Address code	Function code	Start Address	Data length	Check digit low bit	Check digit high bit
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Slave answer frame format:

Address code	Function code	Number of valid bytes	First data area	Nth data area	Check digit low bit	Check digit high bit
1 byte	1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

3.3 Register Address Description

Register name	Operation	Function code	Register address (hexadecimal / decimal)	PLC/configuration address	Description
Wet bulb temperature	Read Only	03	0x01ff/511	0512	Rectify int16 10 times the actual value
Temperature	Read Only		0x0200/512	0513	Rectify int16 10 times the actual value
Humidity	Read Only		0x0201/513	0514	Rectify int16 10 times the actual value
Dew point temperature	Read Only		0x0202/514	0515	Rectify int16 10 times the actual value
Floating point temperature	Read Only		0x0203/515	0516	Float
			0x0204/516	0517	
Floating Point Humidity	Read Only		0x0205/517	0518	Float
			0x0206/518	0519	
Floating point	Read		0x0207/519	0520	Float

dew point temperature	Only				
			0x0208/520	0521	
Floating point wet bulb temperature	Read Only		0x0209/521	0522	Float
			0x020a/522	0523	
Slave address setting	Read /Write		0x0100/256	0257	Default 1
Baud rate setting	Read /Write		0x0101/257	0258	3:9600 by default. 0:1200,1:2400,2:4800, 3:9600,4:38400,5:57600, 6:115200
Humidity calibration	Read /Write	03/06/10	0x0102/258	0259	Signed number (with plus or minus), 10 times the offset value, e.g. if the current humidity value read out is 23.8 %, if we set this humidity offset value to -28, then the humidity value read out after setting is: $23.8 - 2.8 = 21.1\%$.
Temperature calibration	Read /Write		0x0103/259	0260	Signed number (with positive and negative), 10 times the offset value, for example, the current read temperature value is 23.8 degrees, if we set this temperature offset value to -28, then the read temperature value after setting is: $23.8 - 2.8 = 21.1^{\circ}\text{C}$
Parity setting	Read /Write		0x0104/260	0261	Default is 0: None. 0: None. 1: Even. 2: Odd.

(Note: PLC needs to add 1 to the address code, if the 03 function code to read the 1st register, you need to write 40002)

3.4 Host reads transmitter measured values and set parameters

Examples:

1. Read the temperature value.

Host send: 01 03 02 00 00 01 85 B2

Slave reply: 01 03 02 01 0D 78 11

Data parsing: 01 (address) 03 (function?) 02 (number of valid bytes) 01 0D (converted to decimal 269, actual temperature value: 26.9°C) 78 11 (CRC checksum)

2. Reading humidity value.

Host send: 01 03 02 01 00 01 D4 72

Slave reply: 01 03 02 02 58 B8 DE

Data parsing: 01 (address) 03 (function?) 02 (number of valid bytes) 02 58 (converted to decimal 600, actual humidity value: 60%) B8 DE (CRC checksum)

3. Read temperature and humidity measurement values (read temperature, humidity and dew point temperature).

Host send: 01 03 02 00 00 03 04 73

Slave reply: 01 03 06 01 0B 01 31 00 50 D5 6A

4. Set the parameters of the transmitter (change the device address) cautiously modify

Host send: 01 06 01 00 00 02 09 F7

Slave reply: 01 06 01 00 00 02 09 F7

Suggestion: modify the address of the sensor with caution, and be sure to remember the modified address of the device.

5. Set the parameters of the transmitter (change the device address and baud rate).

Host send: 01 10 01 00 00 02 04 00 02 00 03 1F FE

Slave reply: 01 10 01 00 00 02 40 34

Convert the returned hexadecimal data to decimal and divide by 10 to get the corresponding temperature and humidity values. As the above example returns the temperature and humidity values as follows

$$\text{Temperature} = 0x010B = 267 / 10 = 26.7^{\circ}\text{C}.$$

$$\text{Humidity} = 0x0131 = 305 / 10 = 30.5\%\text{RH}.$$

$$\text{Dew point temperature} = 0x0050 = 80 / 10 = 8^{\circ}\text{C}$$

When the read temperature is lower than 0°C , the temperature register is the complement of the current temperature value. If the value in the temperature register is $0xFF9D$, then the current temperature is $\text{temperature} = 0xFF9D = -99 / 10 = -9.9^{\circ}\text{C}$.

4. FAQ and Solutions

If the computer cannot communicate with the device during the test, the possible causes are as follows.

- ◆ Whether the device power is correctly connected, the device light will flash after correct connection
- ◆ The device address is wrong, or there is a duplicate address of the device (factory default is all 1).
- ◆ The baud rate, parity, data bits, and stop bits are incorrect.
- ◆ The host polling interval and waiting time are too short, both need to be set above 200ms.
- ◆ The 485 bus is disconnected, or the A and B lines are reversed.
- ◆ The number of devices is too many or the wiring is too long, so power should be supplied nearby, add a 485 booster, and increase the 120Ω terminal resistor.
- ◆ USB to 485 driver is not installed or damaged.
- ◆ The computer has more than one COM port, and the selected port is not correct.
- ◆ The device is damaged.

5. After-sale Service Commitment

OneFex provides after-sales service of the device within one year from the date of sale. But for damage caused by improper use, you need to send it back and take the freight for repair or adjust. Make sure that the package is in good condition to avoid damage during transportation. Repair the damage of device instrument is free.

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