

Soil PH transmitter (Type 485)

Chapter 1 Product Introduction

1.1 Product overview

The transmitter is widely used in occasions requiring pH monitoring such as soil pH detection. The input power supply in the sensor, the sensor probe, and the signal output are completely isolated. It is safe and reliable, beautiful in appearance and easy to install.

1.2 Features

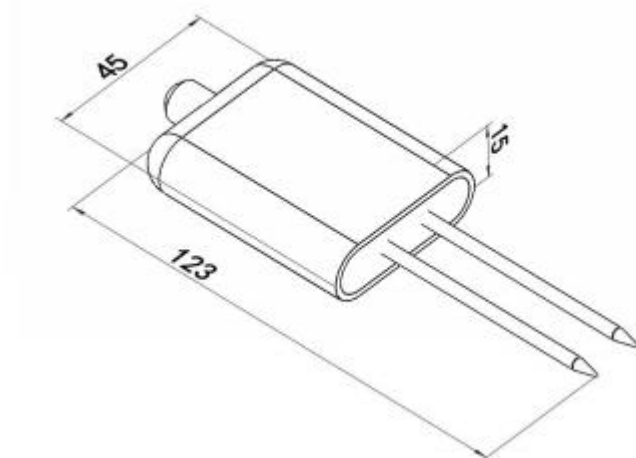
The probe of this product adopts PH electrode, the signal is stable, and the precision is high. It has the characteristics of wide measurement range, good linearity, good waterproof performance, convenient use, easy installation, and long transmission distance.

1.3 Main parameters

DC power supply (default)	DC 5-30V
Maximum power consumption	0.5W (24V DC power supply)
Range	3—9 PH
Resolution	0.1
Precision	±0.3PH

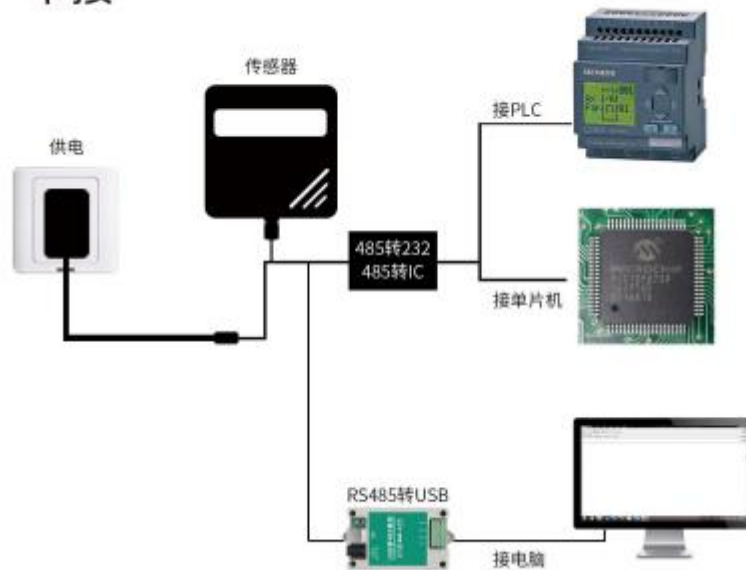
Operating temperature	-20℃~60℃
Long-term stability	≤5%/year
Response time	≤10S
Protection level	IP68
Probe material	Anti-corrosion special electrode
Sealing material	Black flame-retardant epoxy resin
Dimensions	45*15*123mm
output signal	RS485 (Modbus protocol)

Dimensions



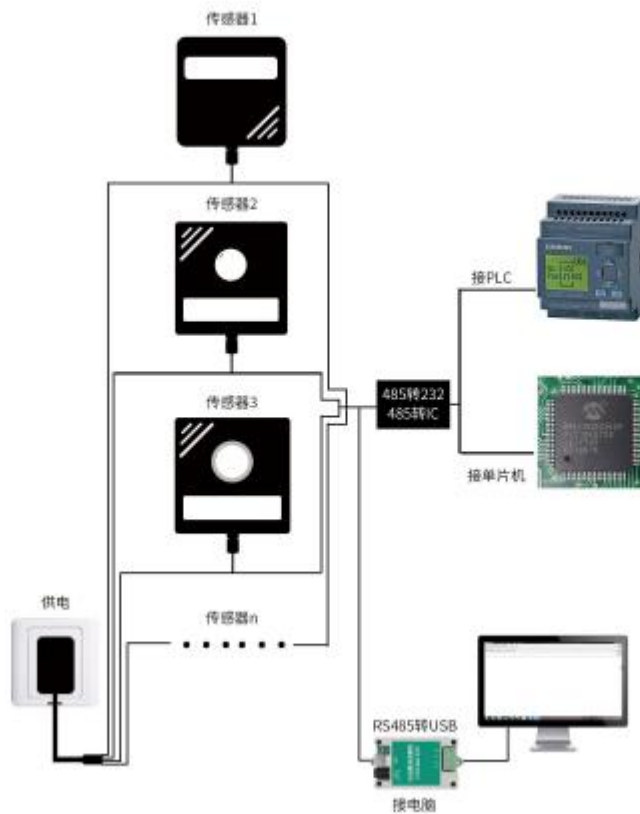
1.4 System framework diagram

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This product can also be used in combination with multiple sensors on a 485 bus. In theory, one bus can be used for 254 485 sensors, and the other end is connected to a PLC with a 485 interface. Computer connection, use the sensor configuration tool provided by our company to configure and test (only one device can be connected when using the configuration software).

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2.2 Interface description

The power interface is a wide-voltage power input that can be 5-30V.

When wiring the 485 signal wire, pay attention to the two wires A and B that cannot be reversed, and the addresses of multiple devices on the bus cannot be conflicted.

2.2.1 Sensor wiring



Brown: Positive power supply 5~30V DC

Black: power ground GND

Yellow: 485-A

Blue: 485-B

Chapter 3 How to Use

3.1 Measuring area

The measurement area is: a cylinder with a diameter of 5 cm and the same height as the probe centered on the center of the two probes. As shown below:

测量区域:

$\Phi=5\text{cm}$, 与探针等高的圆柱体



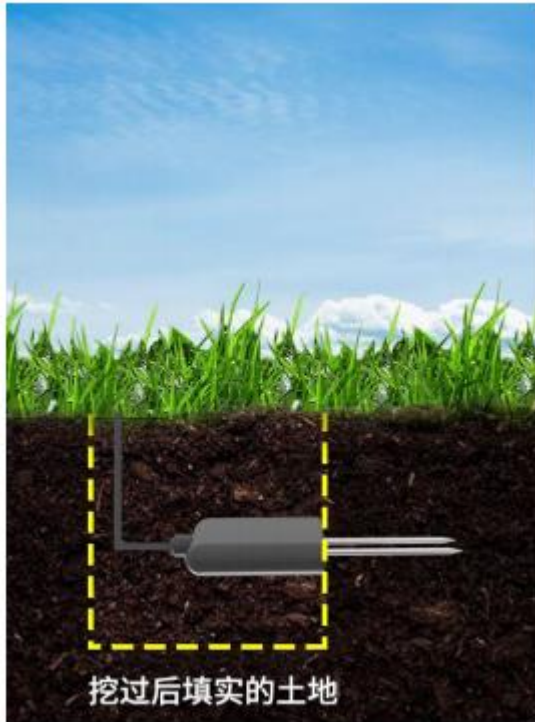
3.2 Quick test method

Select a suitable measurement location, avoid rocks, ensure that the steel needle does not touch hard objects, throw away the surface soil according to the required measurement depth, maintain the original tightness of the soil below, hold the sensor vertically and insert it into the soil. Do not shake left and right. It is recommended to measure multiple times to find the average value within a small range of a measuring point.



3.3 Buried measurement method

Dig a pit with a diameter $>20\text{cm}$ vertically, insert the sensor needle horizontally into the pit wall at a predetermined depth, and fill the pit tightly. After a period of stability, measurement and recording can be carried out for several days, months or even longer.



3.4 Matters needing attention

1. All probes must be inserted into the soil during measurement.
2. Pay attention to lightning protection when used in the field.
3. Do not bend the probe violently, pull the lead wire of the sensor forcefully, and do not hit or hit the sensor violently.
4. The sensor protection grade is IP68, and the sensor can be completely immersed in water.
5. Due to the presence of radio frequency electromagnetic radiation in the air, it is not suitable to stay energized in the air for a long time.

Chapter 4 Configuration Software Installation and Use

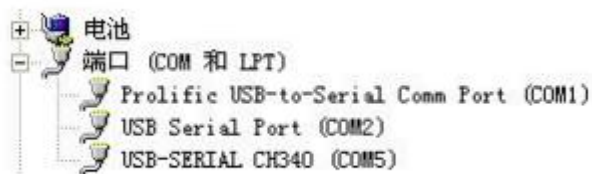
Our company provides the supporting "485 parameter configuration

software", which can easily use the computer to read the parameters of the sensor, and at the same time flexibly modify the device ID and address of the sensor.

Note that you need to ensure that there is only one sensor on the 485 bus when using the software to obtain it automatically.

4.1 Connect the sensor to the computer

After the sensor is correctly connected to the computer via USB to 485 and supplied with power, you can see the correct COM port in the computer (check the COM port in "My Computer—Properties—Device Manager—Port").



Open the data package, select "Debugging Software" --- "485 Parameter

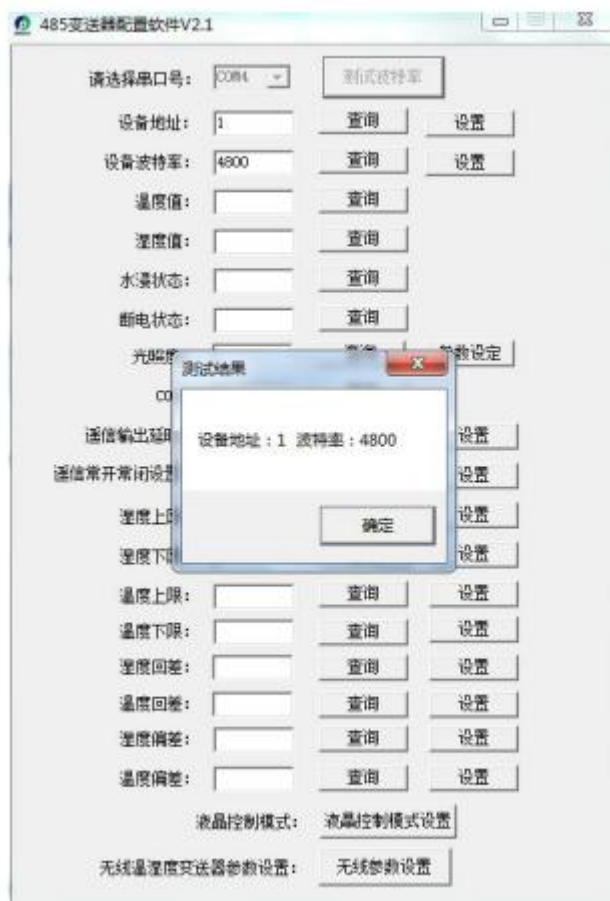
Configuration Software", find and open it.



If the COM port is not found in the device manager, it means that you have not installed the USB to 485 driver (included in the data package) or the driver has not been installed correctly, please contact a technician for help.

4.2 Use of sensor monitoring software

- ①. The configuration interface is shown in the figure. First, obtain the serial port number according to the method in chapter 3.1 and select the correct serial port.
- ②. Click the test baud rate of the software, the software will test the baud rate and address of the current device, the default baud rate is 4800bit/s, and the default address is 0x01.
- ③. Modify the address and baud rate according to the needs of use, and at the same time query the current function status of the device.
- ④. If the test is unsuccessful, please recheck the equipment wiring and 485 driver installation.



Chapter 5 Communication Protocol

51 Communication basic parameters

Code	8-bit binary
Data bit	8-bit
Parity bit	No
Stop bit	1 person
Error checking	CRC (Redundant Cyclic Code)

Baud rate	2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 4800bit/s
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5.2 Data frame format definition

Using Modbus-RTU communication protocol, the format is as follows:

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

Time to end structure \geq 4 bytes

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

Function code: the command function instruction issued by the host, this transmitter only uses the function code 0x03 (read register data).

Data area: The data area is the specific communication data, pay attention to the high byte of 16bits data first!

CRC code: two-byte check code.

Host query frame structure:

address	function	Register	Register	Check	High bit
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code	code	start address	length	code low bit	of check code
1 byte	1 byte	2 byte	2 byte	1 byte	1 byte

Slave machine response frame structure:

address code	function code	Number of valid bytes	Data area	Second data area	Data area N	Check code
1 byte	1 byte	1 byte	2 byte	2 byte	2 byte	2 byte

5.3 Register address

Register address	PLC or configuration address	content	operating	Definition description
0000 H	40001 (decimal)	PH value	Read only	PH real-time value (expanded 10 times)
07D0 H	42001 (decimal)	Device address	Read and write	1~254 (factory default 1)
07D1 H	42002 (decimal)	Device baud rate	Read and write	0 is 2400 1 is 4800 2 is 9600

5.4 Communication protocol example and explanation

Example: Read the PH value of the device address 0x01

Interrogation frame

address code	function code	initial address	Data length	Check code low byte	Check code high byte
0x01	0x03	0x00 0x00	0x00 0x01	0x84	0x0A

Reply frame

address code	function code	Returns the number of valid bytes	PH value	Check code high byte	Check code high byte
0x01	0x03	0x02	0x00 0x42	0x38	0x75

PH value calculation:

PH value: 0042 H (hexadecimal) = 66 => PH = 6.6

Chapter 6 Common Problems and Solutions

No output or output error

possible reason:

- ①. The computer has a COM port, and the selected port is incorrect.
- ② The baud rate is wrong.
- ③ The 485 bus is disconnected, or the A and B wires are connected reversely.
- ④. If the number of equipment is too much or the wiring is too long, power supply should be nearby, add 485 booster, and add 120Ω terminal resistance at the same time.
- ⑤ The USB to 485 driver is not installed or damaged.
- ⑥ The equipment is damaged.