RS-PH-N01-TR-1-EX
Soil pH Transmitter
(Type 485)
user's manual

content

1.product description

1.1product description

RS-PH-N01-TR-1 is a soil pH transmitter developed by our company. The transmitter has high precision, fast response and stable output, and is suitable for various soil types. It can be buried in the soil for a long time, resistant to long-term electrolysis, corrosion resistance, vacuum potting, and completely waterproof.

It can be widely used in soil pH detection, precision agriculture, forestry, geological exploration, plant cultivation, water conservancy, environmental protection and other fields of pH measurement.

1.2Features

1) The threshold is low, the steps are few, the measurement is fast, no reagents are required, and the number of tests is not limited.

2) High measurement accuracy, fast response speed and good interchangeability.

3) The electrode is made of alloy material with special treatment, which can withstand strong external impact and is not easy to be damaged.

4) Completely sealed, resistant to acid and alkali corrosion, and can be buried in soil for long-term dynamic testing.

5) The probe insertion design ensures accurate measurement and reliable performance.

1.3 technical parameter

| DC power supply (default)	DC 5-30V
Maximum power consumption	0.5W（24V DC powered by）
range	3—9 PH
Resolution	0.1
Accuracy	±1PH(Mesure the trend of PH value)
Operating temperature	-20℃~60℃
long term stability	≤5%/year
Response time	≤10S
stable schedule	≤5min
Protection class	IP68
Probe material	Anti-corrosion special electrode
Sealing material	Black flame retardant epoxy resin
Dimensions	45*15*123mm
output signal	RS485 (Modbus protocol)

1.4product model

RS-				company code
	PH-			Soil pH Transmitter
		N01-		RS485 (Modbus-RTU protocol)
			TR-1	Soil Detection Shell
			EX	Fixed code

2.Dimensions
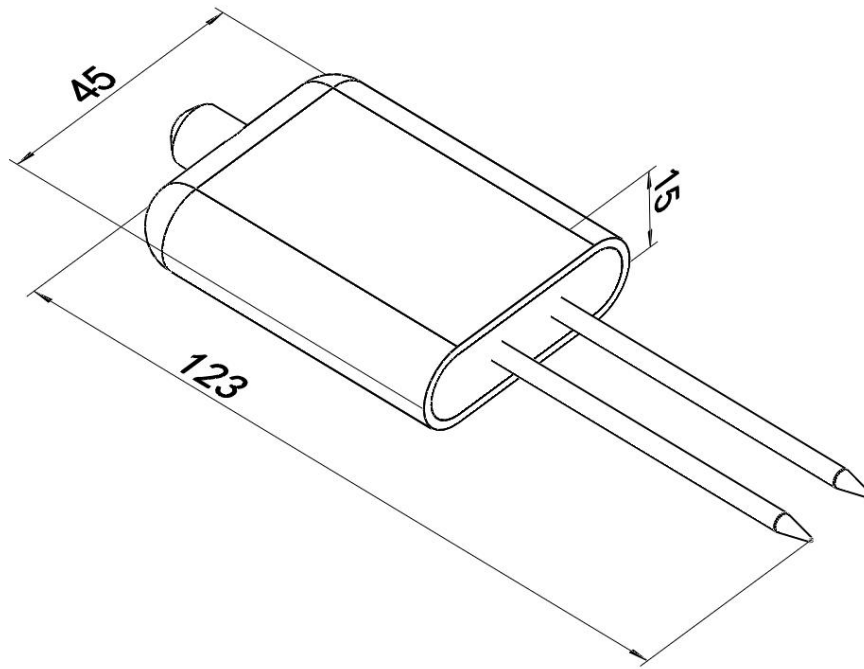
Equipment dimension drawing (unit: mm)

3. How to use

When using it for the first time, it is necessary to repeat plugging and unplugging in the soil several times to remove the oxide film on the surface of the probe.

3.1Measurement area

The measurement area is: the center of the two probes is

In the center, in a cylinder with a diameter of 5 cm, which is the same height as the probe. As shown below:

Measurement area:

Φ =5cm, a cylinder with the same height as the probe

3.2Quick test method

Select a suitable measurement location, avoid stones, ensure that the steel needle does not touch hard objects, discard the topsoil according to the required measurement depth, maintain the original tightness of the soil below, firmly hold the sensor and insert it into the soil vertically, insert It is not allowed to shake left and right. It is recommended to measure multiple times within a small range of a measuring point to obtain an average value.

3.3Buried Surveying

Dig a pit with a diameter > 20cm vertically, insert the sensor steel needle into the pit wall horizontally 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.

Filled land after excavation
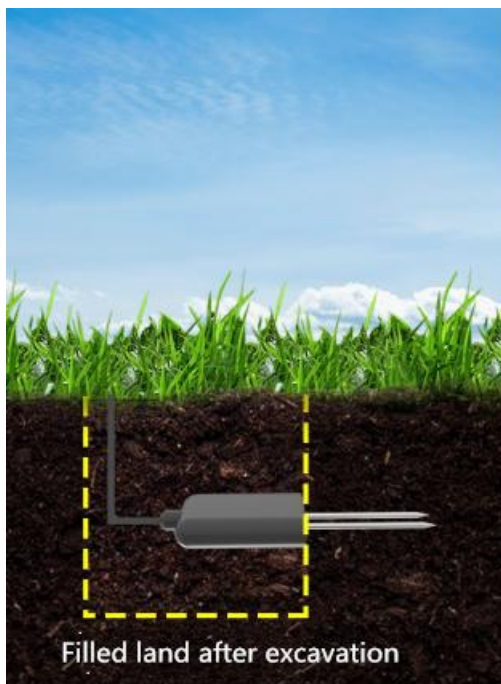
3.4Precautions

1. The probe must be fully inserted into the soil during measurement.

2. Pay attention to lightning protection when using in the field.

3. Do not bend the probe violently, do not pull the sensor lead wire forcibly, and do not drop or violently hit the sensor.

4. The sensor protection grade is IP68, and the sensor can be soaked in water.

5. Due to the existence of radio frequency electromagnetic radiation in the air, it is not suitable to be energized in the air for a long time.

6. It should be calibrated before each measurement. It is recommended to calibrate every 1 month for long-term use. The calibration frequency should be adjusted according to different application conditions (soil quality, moisture content, salt content, pH, etc. of the application)

4.Equipment Installation Instructions

4.1 Equipment pre-installation inspection

Equipment List:

1 sensor device

Certificate, Warranty Card

4.2 Interface Description

Wide voltage power input can be 5~30V. When wiring the 485 signal line, pay attention that the two lines A and B cannot be reversed, and the addresses of multiple devices on the bus cannot conflict.

4.3 Wiring Instructions

thread color	illustrate	Remark
brown	V+	5~30V DC
black	power ground	GND
yellow	485-A	485-A
blue	485-B	485-B
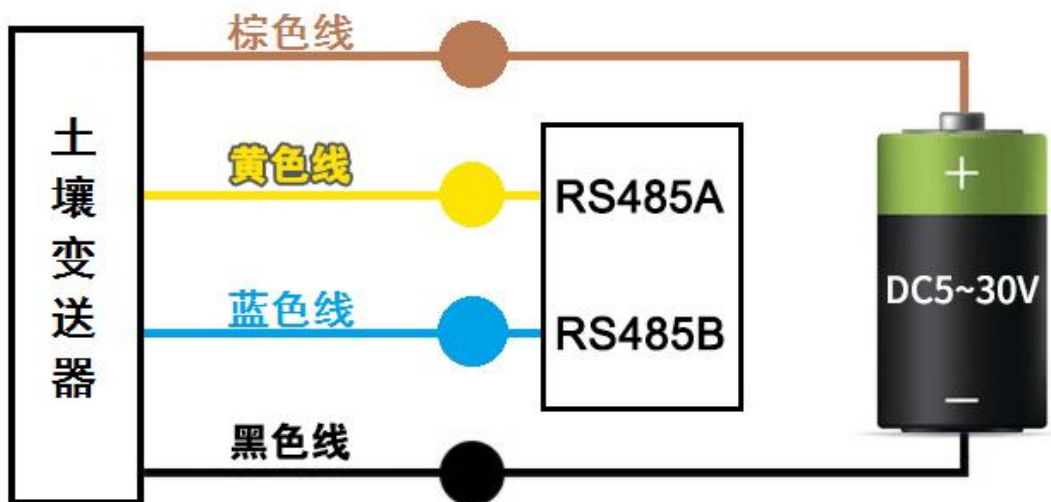
5.Configuration software installation and use

5.1 software selection

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


Software",turn up   Just open it.

5.2 parameter settings

1. Select the correct COM port (check the COM port in "My Computer - Properties - Device Manager - Port"), the following figure lists the driver names of several different 485 converters.

②. Only connect one device and power it on, 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, you can query the current functional status of the device.

④. If the test is unsuccessful, please re-check the wiring of the equipment and the installation of the 485 driver.
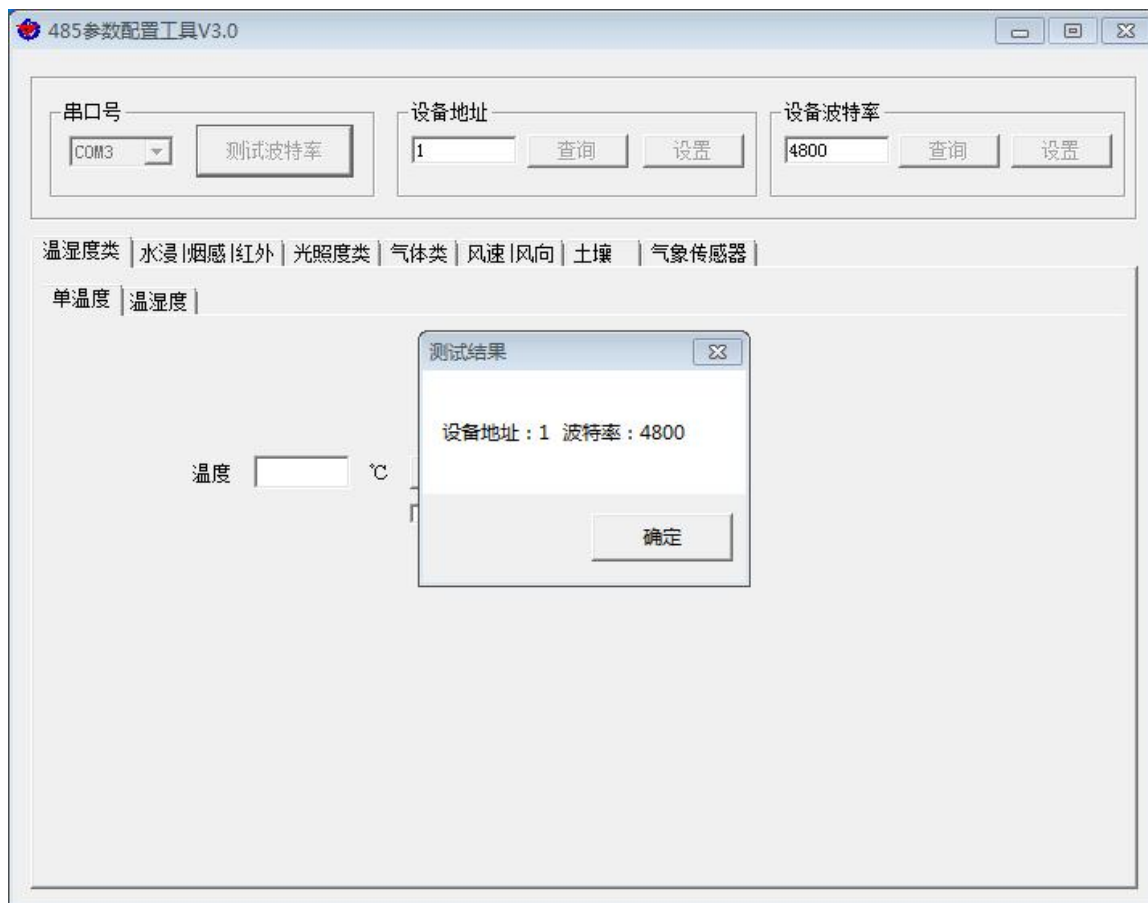
6.letter of agreement

6.1Communication basic parameters

coding	8 bit binary
data bits	8 bits
parity bit	none
stop bit	1 person
error checking	CRC (Redundant Cyclic Code)
baud rate	Can be set, the factory default is 4800bit/s

6.2 Data Frame Format Definition

Using 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

Time to end structure ≥ 4 bytes

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

Function code: the function instruction of the command sent by the host.

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

CRC code: two-byte check code.

Host query frame structure:

address code	function code	register start address	register length	Check code low byte	Check code high byte
1byte	1byte	2byte	2byte	1byte	1byte

Slave response frame structure:

address code	function code	number of valid bytes	data area	data 2 area	data n area	Check code low byte	Check code high byte
1byte	1byte	1byte	2byte	2byte	2byte	1byte	1byte

6.3 register address

register address	PLC or configuration address	content	operate	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 means 2400 1 for 4800 2 for 9600

6.4 Communication protocol example and explanation

Example: read the PH value of device address 0x01

query frame

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

acknowledgment frame

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

PH value calculation:

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

7. Common problems and solutions

7.1 The device cannot be connected to the PLC or computer

possible reason:

1) The computer has multiple COM ports, and the selected port is incorrect.

2) The device address is wrong, or there are devices with duplicate addresses (the factory default is all 0x01).

3) Baud rate, check mode, data bit, stop bit error.

4) The 485 bus is disconnected, or the A and B lines are reversed.

5) If the number of devices is too large or the wiring is too long, power supply should be provided nearby, add a 485 booster, and at the same time increase a 120Ω terminal resistance.

6) The USB to 485 driver is not installed or damaged.

7) The equipment is damaged.

8. Contact information

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