RS-PH-N01-TR-1

Soil PH transmitter (Type 485) user's Guide

Document version：V1.0

Table of Contents

1.product description

1.1product description

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

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

1.2Features

1) The threshold is low, the steps are few, the measurement is fast, no reagents are required, and the number of detections is unlimited.

2) High measurement accuracy, up to ± 0.3PH accuracy, fast response speed, and good interchangeability.

3) The electrode adopts specially treated alloy materials, which can withstand strong external impact and is not easy to damage.

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

5) Probe insertion design ensures accurate measurement and reliable performance.

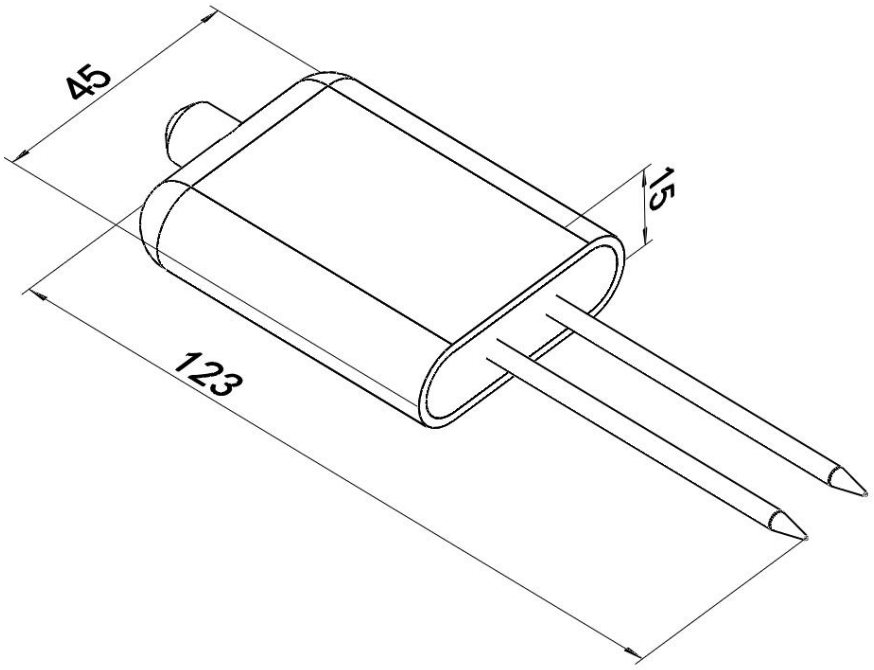
1.3 Technical Parameters

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

1.4product model

RS-				Company code
	PH-			Soil PH transmitter
		N01-		RS485（Modbus-RTU protocol）
			TR-1	Soil testing enclosure

2.Dimensions



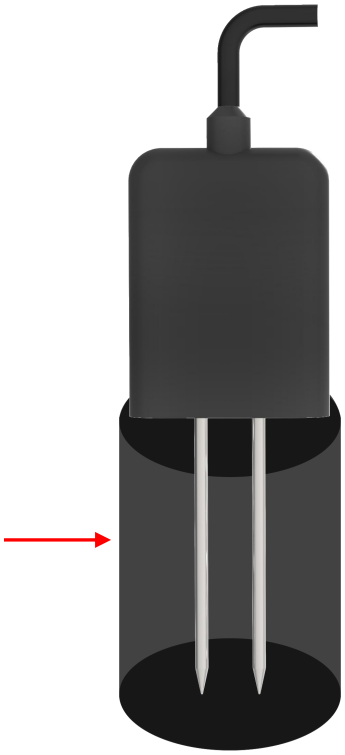
Equipment size drawing (unit: mm)

3.Instructions

3.1Measuring area

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

Measuring area:
ϕ = 5cm, cylinder with the same height as the probe



3.2Quick Test Method

Choose a suitable measurement location, avoid stones, 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 is not allowed to sway from side to side. It is recommended to measure multiple times to get the average value within a small range of a measuring point.

3.3Buried survey

Dig a pit> 20cm in diameter vertically, insert the steel needle of the sensor horizontally into the pit wall at a predetermined depth, and fill the pit tightly. After a period of stability, it can be measured and recorded for several days, months or longer.

3.4Precautions

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

2. Pay attention to lightning protection in field use.

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

4. The protection grade of the sensor is IP68, which can soak the sensor in the water.

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

4.Equipment installation instructions

4.1Check before installation

Equipment List:

1. One sensor device

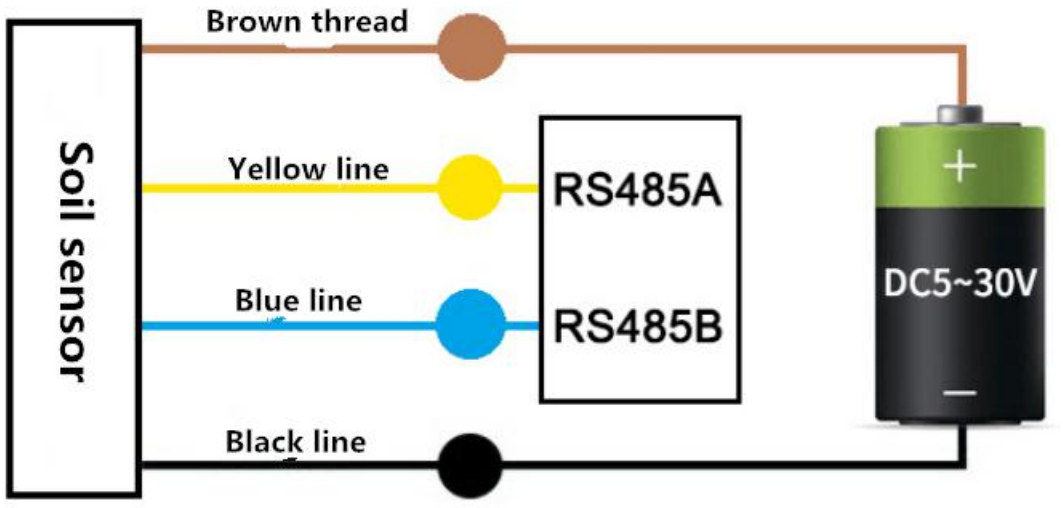
2. Qualification certificate, warranty card

4.2 Interface Description

The wide voltage power input can be 5 ~ 30V. When connecting the 485 signal line, please note that the two lines A and B cannot be reversed, and the addresses of multiple devices on the bus must not conflict.

4.3 Wiring instructions

Thread color	Explanation	Remarks
brown	Power is positive	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

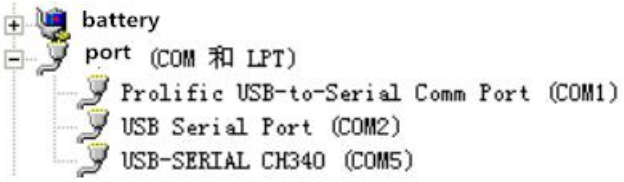
Open the data package, select "Debug software" --- "485 parameter configuration software",

find 

Just open。

5.2 Parameter setting

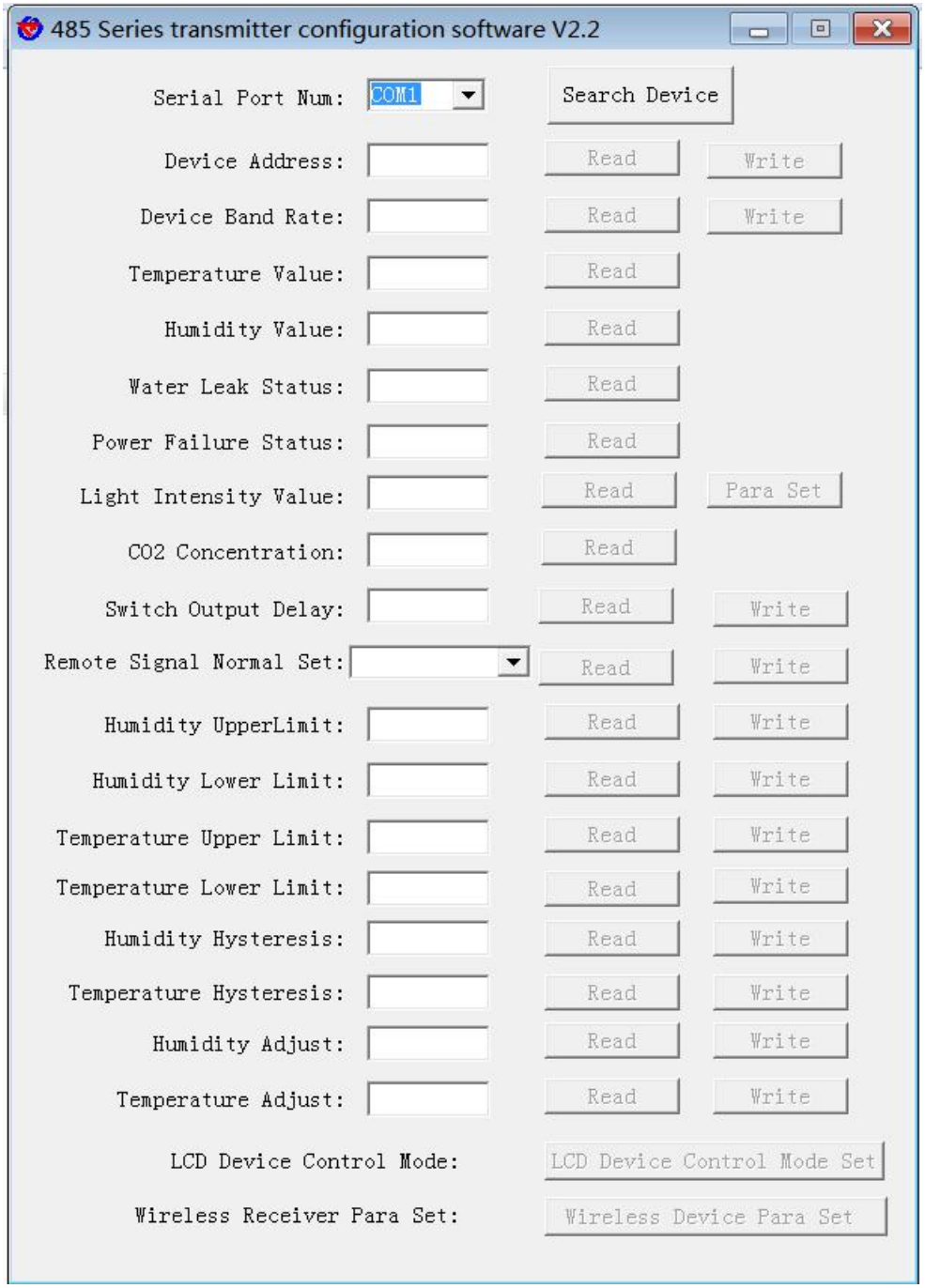
①, select the correct COM port ("COM"-"Properties-Device Manager-Port" to view the COM port), the following figure lists the driver names of several different 485 converters.



②, only connect one device and power 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, 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 recheck the device wiring and 485 driver installation.



6.letter of agreement

6.1Communication basic parameters

Coding	8-bit binary
Data bit	8 bit
Parity bit	no
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:

Time for initial structure ≥ 4 bytes

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

Function code: instruction function instruction issued by the host.

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

CRC code: two-byte check code.

Host inquiry frame structure

address code	function code	Register start address	Register length	Checksum low byte	Check code high byte
1byte	1byte	2byte	2byte	1byte	1byte

Slave response frame structure:

address code	function code	Effective bytes	Data area	Data area two	Data N area	Checksum 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	operating	Definition description
0000 H	40001 (Decimal)	PH value	Read only	PH real-time value (expand 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 for 2400 1 for 4800

				2 for 9600

6.4 Communication protocol example and explanation

Example: Read the PH value of device address 0x01

Inquiry frame

address code	function code	starting address	Data length	Checksum 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	Checksum low byte	Check code high byte
0x01	0x03	0x02	0x00 0x42	0x38	0x75

PH value calculation:

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

7.Common problems and solutions

7.1 The device cannot be connected to a 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, the nearest power supply should be provided. A 485 booster should be added and a 120Ω terminal resistance should be added.

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

7) The equipment is damaged.

8.contact details

Shandong Renke Control Technology Co., Ltd.
Address: 2nd Floor, East Building, Building 8, Shuntai Plaza, High-tech Zone, Jinan City, Shandong Province
Postcode: 250101
Phone: 400-085-5807
Fax: (86) 0531-67805165
Website: www.renkeer.com
Cloud platform address: www.0531yun.cn

山东仁科测控技术有限公司 官网

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9.Document history

V1.0 document creation