TR05-N01

Soil moisture sensor type 485

user's Guide



SIBO.X INDUSTRIAL CO.,LTD.
Add: No. Building 1, No. 1, Jingshi Road, Cicheng Town Industrial Park, Jiangbei District, Ningbo City, Zhejiang, China
https://www.sbxsun.com
Email: info@sbxsun.com
Tel: +86-15958288207

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1. product description

1.1 product description

The TR05-N01 soil moisture sensor is a high-precision, high-sensitivity sensor for measuring soil moisture. By measuring the dielectric constant of the soil, the volume percentage of soil moisture can be measured, and the soil moisture measurement method conforming to the current international standard can directly and stably reflect the true moisture content of various soils.

1.2 Scope of application

Applicable to soil moisture monitoring, scientific experiments, water-saving irrigation, greenhouses, grassland pastures, soil speed measurement, plant cultivation, greenhouse control, precision agriculture, etc., while measuring the water content of water, meteorology and various particulate matter.

1.3 Measurement parameters and hardware parameters

Power supply: 4.5~30V DC

Maximum power consumption: 30mA*24V DC DC

Moisture measurement range: 0~100%

Moisture accuracy: ±2% in the range of 0-50%; ±3% in the range of 50-100%

Storage environment: -40 ° C ~ 60 ° C

Response time: <1s

Output signal: 485 signal (Modbus-RTU)

Soil moisture measurement area: a cylinder with a radius of 7 cm centered on the center probe

1.4 Physical parameters

Probe length: 70mm

Probe diameter: 3mm

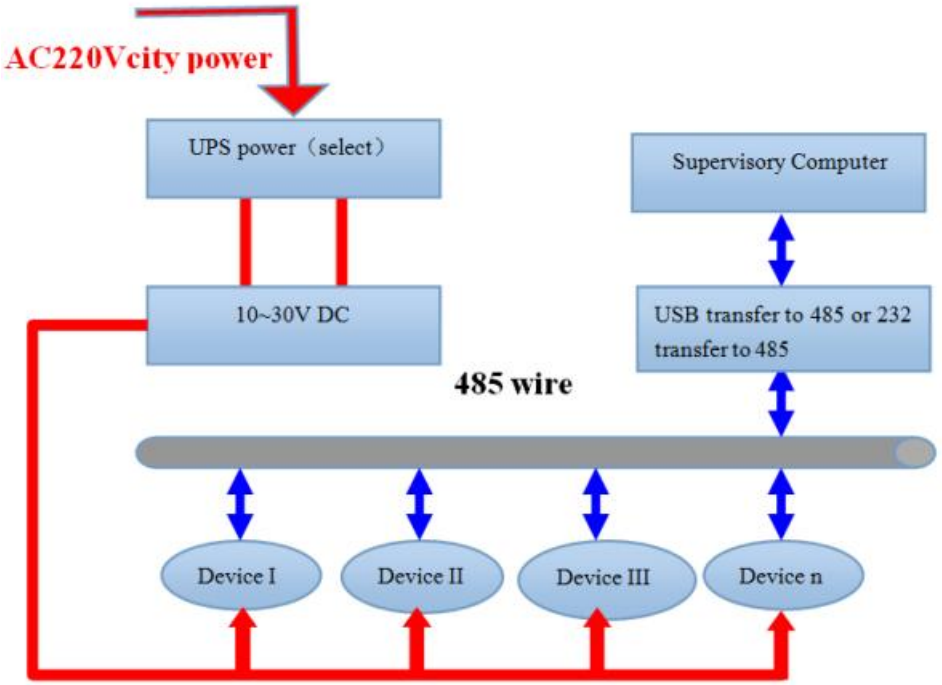
Probe material: 304 stainless steel

Sealing material: epoxy resin (black flame retardant)

Cable length: standard two meters

Protection level: IP68

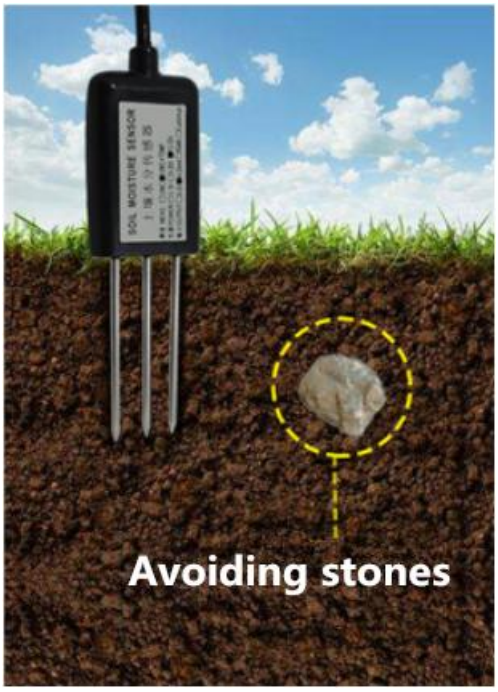
1.5 system framework diagram



2. Instructions

2.1 Quick test method：

Select the appropriate measurement location, avoid the stone, ensure that the steel needle will not touch the hard object, throw off the topsoil according to the required measurement depth, keep the original soil tightness under the ground, hold the sensor vertically into the soil, insert It is not allowed to sway from side to side. It is recommended to measure the average for multiple measurements within a small range of one measurement point.



2.2 Buried measurement：

Vertically dig pits with a diameter of >20cm, insert the sensor steel needle horizontally into

the pit wall at a given depth, fill the pits tightly, and stabilize for a period of time, then measure and record for several days, months or even longer.



2.3 Note:

1. The steel needle must be inserted into the soil during the measurement.
2. Avoid strong sunlight directly on the sensor and cause the temperature to be too high. Use in the field to prevent lightning strikes.
3, do not violently bend the steel needle, do not pull the sensor lead wire, do not beat or violently hit the sensor.
4. The sensor protection class IP68 can soak the sensor in the water.
5. Due to the presence of radio frequency electromagnetic radiation in the air, it is not suitable to be energized in the air for a long time.

3. Equipment installation instructions

3.1 Equipment inspection before installation

Equipment List:

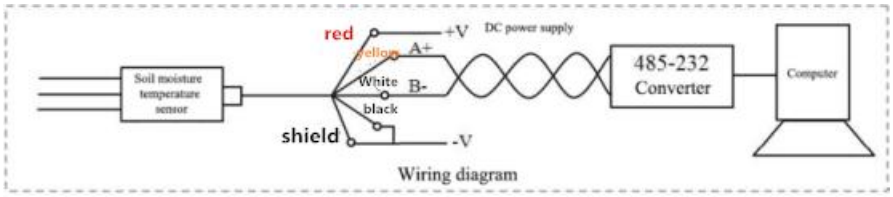
■Soil moisture temperature sensor device 1

■Certificate, warranty card, etc.

3.2 Interface Description

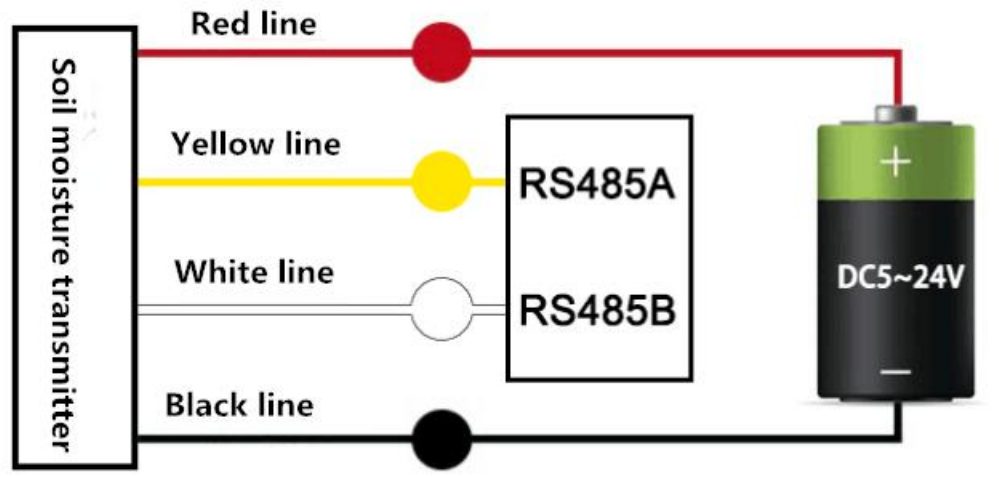
Wide voltage power input can be 5~24V. When wiring the 485 signal line, note that the A/B lines cannot be connected in reverse, and the addresses between multiple devices on the bus cannot conflict.

3.3 Wiring instructions



（Mark:if configuration via our software, the shield wire need to connect red wire +V）

Line color	Description	Remarks
red	Power supply	5~24V DC
black	Power ground	GND
yellow	485-A	485-A
white	485-B	485-B
Green (shield)	Connect the negative pole of the power supply to the acquisition mode, and connect the positive pole of the power supply to the setting mode.	



Note: The shielded cable (green line) is connected to the power supply for the acquisition mode, and the power supply is in the setup mode.

4. Configuration software installation and use

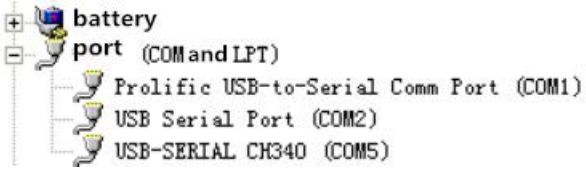
4.1Software selection

Open the package and select "Configuration Software"---"ECTH-N01-A Configuration Software", open it after installation.



4.2 parameter settings

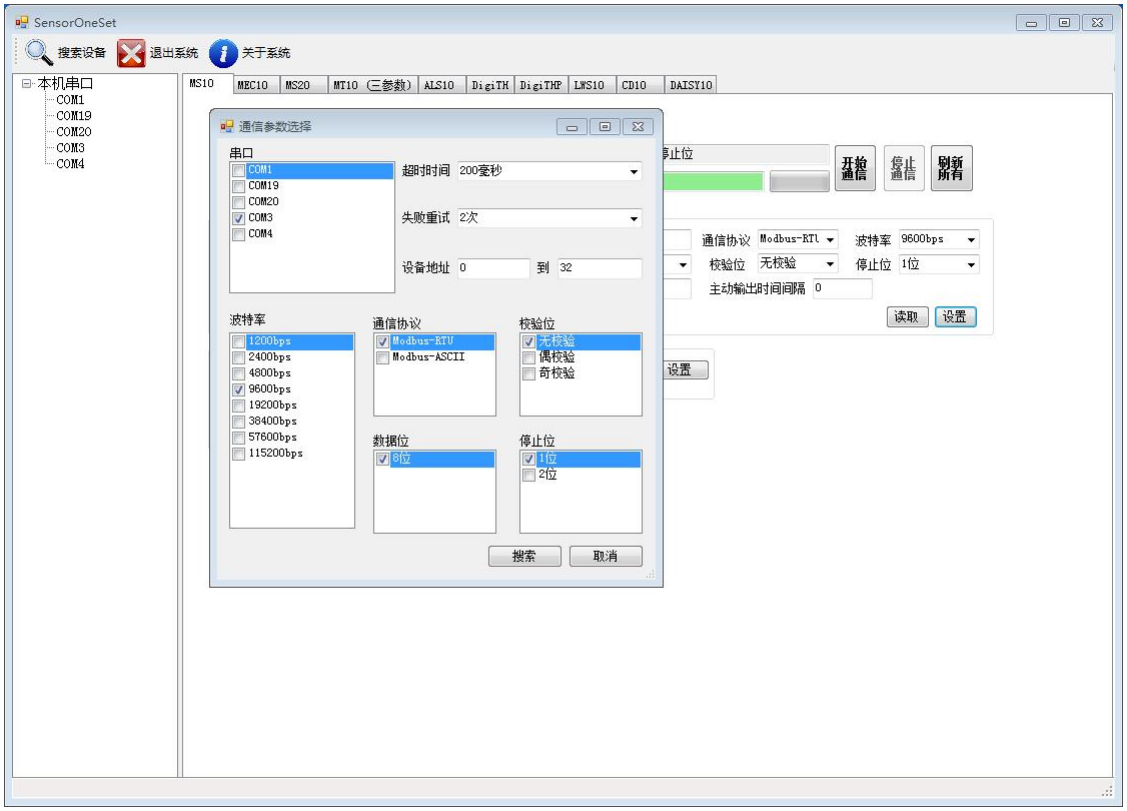
1、 Select the correct COM port ("My Computer - Properties - Device Manager - Port" to view the COM port), the following figure lists the drive names of several different 485 converters.



2. Connect a separate device and power it on. The set end (shield layer) of the sensor is connected to the power supply. Click the software search device, double-click the searched device, click Start Communication, the software will test the current device baud rate and address, the default baud rate is 9600bit / s, the default address is 0x01.

3. Modify the address and baud rate according to the needs of use, and query the current functional status of the device.

4. If the test is not successful, please re-check the equipment wiring and 485 driver installation.



5. letter of agreement

5.1 Basic communication parameters

Code	8-bit binary
Data bit	8 digits
Parity bit	no

Stop bit	1 person
Error check	CRC (redundant cyclic code)
Baud rate	2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 9600bit/s

5.2 Data frame format definition

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

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

Data area: The data area is the specific communication data. Note that the 16-bit data high byte is in front!

CRC code: Two-byte check code.

Host inquiry frame structure：

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

Slave response frame structure

address code	function code	Effective number of bytes	Data area	Second data area	Nth data area	Check code
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes

5.3 Register address

Register address	PLC or configuration address	content	operating	Definition
0001 H	40002	Moisture	Read only	Upload data is 100 times the

		content		actual value

5.4 Communication protocol example and explanation

5.4.1 Read the moisture value of device address 0x01

Inquiry frame

address code	function code	initial address	Data length	Check code low	Check code high
0x01	0x03	0x00 0x01	0x00 0x01	0xD5	0xCA

Response frame (for example, the read moisture value is 38.85%)

address code	function code	Number of bytes	Moisture value	Check code low	Check code high
0x01	0x03	0x02	0x0F 0x2D	0x7D	0xA9

Moisture value:

F2D (hex) = 3885 => moisture value = 38.85 %

6. Common problems and solutions

6.1 Device cannot connect to PLC or computer

possible reason:

1) The computer has multiple COM ports, and the selected port is incorrect.
2) The device address is incorrect, or there is a device with a duplicate address.
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 power should be supplied nearby, add 485 repeater, and increase the resistance of 120Ω terminal.
6) The USB to 485 driver is not installed or damaged.
7) Equipment damage.

7.Dimensions

