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Soil moisture transmitter (485

# **RS-WS-N01-TR**

## **Soil moisture temperature operation instruction**

### **(Type 485)**

Document version: V1.1



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## 1. Product Introduction

### 1.1 Product summary

It is suitable for measuring soil temperature and water content. It is calibrated by comparison with Germany original high precision sensor and soil drying weighing method. It has high precision, quick response and stable output. By the soil salt content of small, suitable for all kinds of soil. Long-term buried in the soil, resistant to long-term electrolysis, corrosion resistance, vacuum potting, completely waterproof.

### 1.2 Scope of application

Widely used in scientific experiments, water-saving irrigation, greenhouses, flowers and vegetables, grassland ranch, soil speed measurement, plant culture, sewage treatment, grain storage and a variety of particulate matter moisture and temperature measurement.

### 1.3 Main technology parameter

Supply power: 10~30V DC

Power consumption: 0.4W

Moisture measurement range : 0~100% RH

Temperature measurement range: -40°C~80°C(personal)

Moisture accuracy:  $\pm 3\%$ RH(default)

Temperature accuracy:  $\pm 0.5^\circ\text{C}$ (default)

Work environment: -20°C~60°C,0~80%RH

Output signal: RS485

Parameter configuration: software

(Measured frozen ice layer, the water value will be low is not accurate, the need for user compensation)

### 1.4 Physical parameters

Probe length: 70 mm

Probe diameter: 3 mm

Probe material: 304 stainless steel

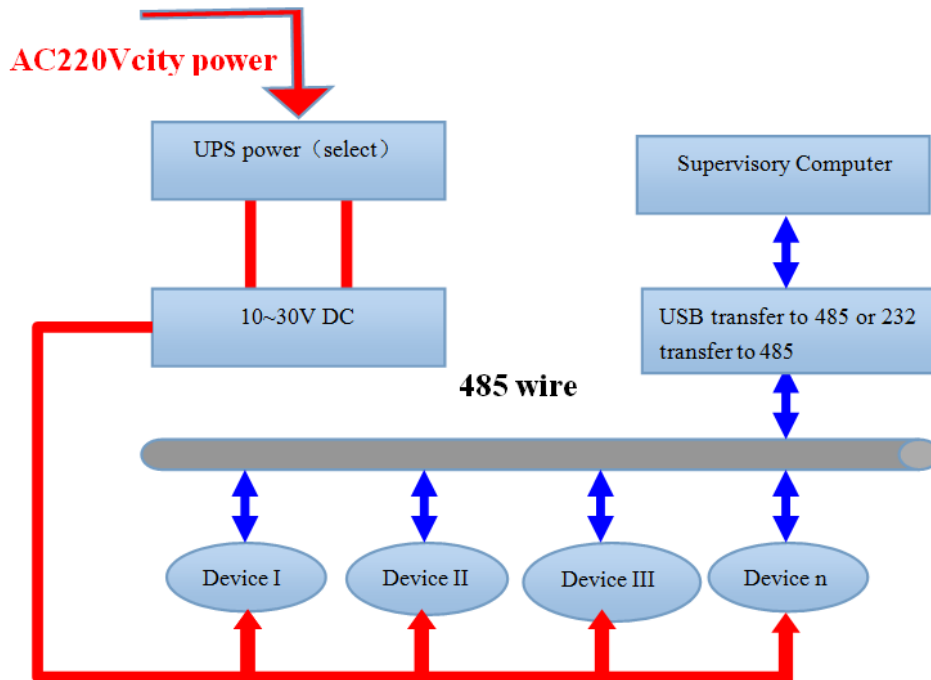
Sealing material: Epoxy resin (black flame retardant)

Cable length: standard two meters (RVV 4 \* 0.3)

Protection class: IP68

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## 1.5 System frame diagram



## 2. How to use

### 2.1 speed measurement method:

Select the appropriate measurement location, to avoid the stones, to ensure that the needle does not touch a hard object, according to the required depth of measurement to put aside the topsoil, to maintain the original soil below the tightness of the sensor vertically insert the soil, insert Can not be left and right shaking, a small measuring point within the recommended average of several measurements.

### 2.2 Buried measurement method:

Vertical digging diameter > 20cm pits, the depth of the probe will be the level of the probe inserted into the pit wall, the pit filled with strict, stable for some time, you can for several days, months and even longer measurement and recording.

### 2.3 Note:

- 1, the measurement must be fully inserted into the soil needle.
- 2, to avoid direct sunlight to the strong sunlight caused by the sensor temperature is too high. Note the use of wild lightning.
- 3, do not violent bending steel needle, do not pull the sensor pull lead wire, do not beat or violent impact sensor.
- 4, the sensor protection class IP68, the sensor can be soaked in water.



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5, due to the presence of radio frequency electromagnetic radiation in the air, not a long time in the air in the power state.

### 3. Device Installation Instruction

#### 3.1 Check before the device installation

Device list:

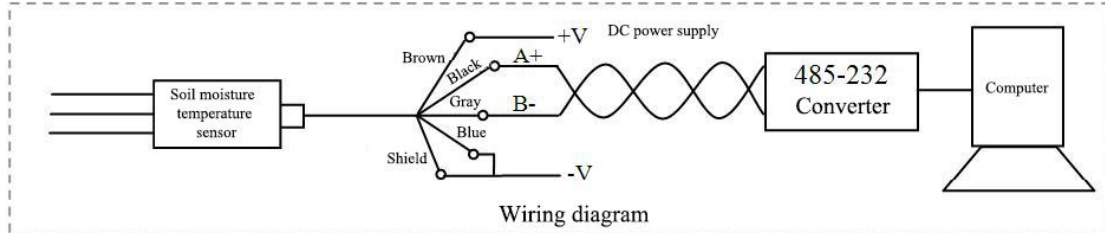
- One transmitter equipment
- Certificate, warranty card, and after sales service card and so on
- one 12V/2A waterproof power (select)
- USB transfer to 485 (select)
- 485 terminal resistance (select)

#### 3.2 Joggle instruction

##### 3.2.1 Power and 485 signals

Range 5V-24V of wide voltage is available in power input, the A wire and B wire can not be connected contrary when connecting to 485 signal, and the address among several devices on the total wire can not be conflicted.

#### 3.3 specific model wiring



Line color	Description	Remark
Brown	Power supply	5 ~ 24V DC
Blue	power ground	GND
Black	485-A	485-A
Gray	485-B	485-B
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	

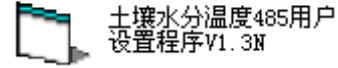


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## 4. Configuration Software Installation and Application

First copy the software to your computer, double-click the icon to run the program.

1, select the computer's serial communication port, the model in the default "set mode."



2, in the set parameters, the sensor's SET (shield) to power +, otherwise the sensor can not write internal parameters.

At this point the sensor internal address automatically becomes 255, communication parameters automatically become 9600, N, 8,2.

3, click Start, start the data acquisition and display, modify the required parameters, click Write,

Then click Read to confirm that the write was successful.

4, click the stop, the SET side (shield) connected to the power -, click mode to switch to the "acquisition mode"

The software will automatically copy the sensor communication parameters to the computer serial port parameters,

5, click to start, check the data communication is normal.

## 5. Communication Agreement

### 5.1 Communication basic parameter

Code	8 bit binary system
Data Bit	8 bit
Odd-even Revi-sion Bit	None
Stop Bit	1bit
Incorrect R evis-ion	CRC (Redundant cyclic codes)
Baud Rate	2400bit/s, 4800bit/s, 9600 bit/s options, the factory default 4800bit/s

### 5.2 The concept of data frame format

Apply Modbus-RTU communication rules, the format below:

Initial structure  $\geq 4$  byte time

Address code = 1 byte

Function code = 1 byte

Data area = N byte

Incorrect revision = 16 byte CRC code

Ending structure  $\geq 4$  byte time



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Address code: the address of the transmitter, and will be the only (factory default 0x01) in the communication net..

Function code: the order function orders from host computer, this transmitter only uses function code 0x03(reading register date).

Data area: data area is the specific communication data, attention16bits data high byte in front!

CRC code: two byte revision code.

Main computer enquires frame structure

Address Code	Function Code	Register Origin Address	Register Length	Revision Code in Low Position	Revision Code in High Position
1byte	1byte	2bytes	2bytes	1byte	1byte

Accessorial computer replying frame structure:

Address Code	Function Code	Effective Byte NO.	Data Area One	Data Area Two	Data Area N	Revision Code
1byte	1byte	1byte	2bytes	2bytes	2bytes	2bytes

### 5.3 Register address

Register Address	PLC or Configuration Address	Content	Operation
0000 H	40001	Temperature	Read only
0001 H	40002	humidity	Read only

### 5.4 Communication agreement example and explaining

#### 5.4.1For example: reading price of temperature and humidity in device address 0x01

enquiry frame:

Address Code	Function Code	Origin Address	Data Length	Revision Code in Low Position	Revision Code in High Position
0x01	0x03	0x00 0x00	0x00 0x02	0xC4	0x0B

Replication frame: (when reading temperature is -10.1℃, humidity is 65.8%RH)



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Address Code	Function Code	Return Byte Number	Humidity Number	Temperature Number	Revision Code in Low Position	Revision Code in High Position
0x01	0x03	0x04	0x02 0x92	0xFF 0 x9B	0x5A	0x3D

Temperature calculation :

When temperature is under 0 °C, the temperature date will be updated in complement code.

Temperature: FF9B H(hexadecimal)= -101 => temperature = -10.1 °C

Humidity calculation:

Humidity: 292 H (hexadecimal)= 658 => humidity = 65.8%RH

## 6. Common Problem and Solution

### 6.1 Device can not be connected with PLC or computer

Reasons possible:

- 1) Several COM ports in the computer, the port be chosen is incorrect.
- 2) The device address is wrong, or some device addresses are repeat.(all factory defaults are 1).
- 3) Baud rate, revision mode, data position and stop position are wrong.
- 4) The main computer and polling interval is too small and time waiting for replying is too short, and all need to set over 200ms.
- 5) The 485 general wire is broken or the A wire and B wire are connected in the wrong side.
- 6) Too many devices or too long wires, the power need to be chosen nearby, add 485 intensifier, and add 120Ω terminal electric resistance.
- 7) The driver of USB transfer to 485is not installed or damaged.
- 8) The device is broken.

## 7. Contact Information

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## 8. Document History

V1.0 Document building.





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- V1.1 Add a variety of card rail shell.
- V1.2 Increase wiring rules and solutions to common problems.

## 9. Shell Size

Overall dimensions:

