Zts-3000-tr-ws-*
Soil temperature and humidity sensor
Product Manual

1	Overview
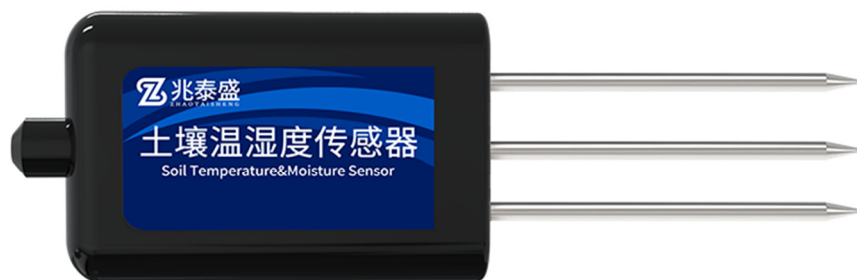
Soil temperature and humidity sensor is the integration of soil moisture and soil temperature sensor, with easy to carry, sealed, high precision and other advantages, is an ideal choice for soil moisture, soil temperature measurement.

Soil moisture is based on the principle of frequency domain reflection, using high-frequency electronic technology manufacturing high-precision, high-sensitivity sensors. By measuring the dielectric constant of soil, it can directly and stably reflect the real moisture content (volumetric moisture content) of all kinds of soil, which is the most popular method of soil moisture measurement in the world.

The sensor is composed of power module, temperature sensing module, transmission module, temperature compensation module and data processing module, etc. .

2	Features

(1) compact design of the sensor.

(2) high measurement precision, fast response and good interchangeability.

(3) good sealing, waterproof grade IP68, can be directly buried in soil use, and not subject to corrosion.

(4) the soil quality has little influence and is widely used.

(5) accurate measurement, reliable performance, ensure normal work, high data transmission efficiency.

3	Scope of application

Suitable for water-saving agriculture irrigation, meteorological monitoring, environmental monitoring, greenhouse, flowers and vegetables, grassland pastures, soil rapid measurement, plant culture, scientific experiments and other need to measure soil temperature and humidity fields.

4	Product information

4.1 technical parameters

Measurement parameters: soil volumetric moisture content; soil temperature

Unit of measurement:% (m 3/M 3) ; ° C

Moisture Range: 0-100% (optional 30% , 50% isorange or custom-made arbitrary range)

Temperature range:-40-80 ° C (other arbitrary range can be customized)

The measurement accuracy was ± 2% (m 3/M 3) and ± 0.2 ° C in the range of 0-50% (m 3/M 3)

Working Range: 一30 ° C 一70 ° C

Output Signal: A: voltage signal (0-2v, 0-5v, 0-10V)

B: 4-20mA (current loop)

C: RS485(standard Modbus-RTU protocol, device default address: 01)

Supply voltage: 4.5-30V DC

Stabilization Time: < 1 second

Response time: < 1 second

4.2 physical parameters

Probe size: 55mm, φ3mm

Probe material: 316L stainless steel

Sealing materials: ABS Engineering Plastics, epoxy resin, waterproof grade IP68

Cable specifications: Standard 2M (other cable length can be customized, up to 1200m)
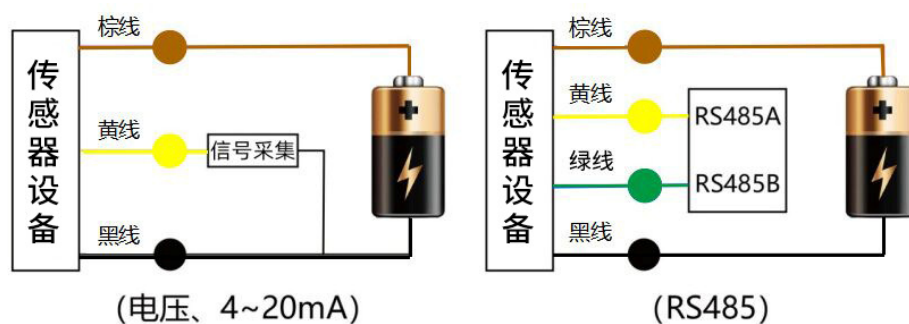
Load capacity: voltage output: output resistance ≤250 ω; current output: ≤600 ω

5	Shape specification
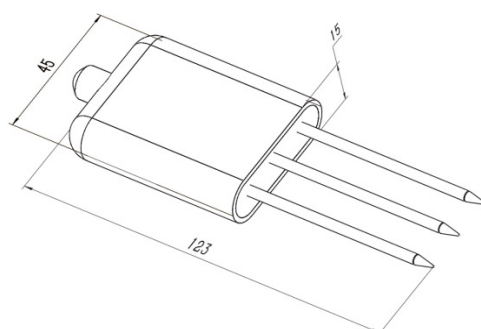
6   Use methods

Soil temperature and humidity sensors can be connected to a variety of differential input data acquisition device, data acquisition card, remote data acquisition module and other equipment, wiring description as follows:

7   Data conversion method

The soil temperature and humidity sensor has good linear characteristics in the range of soil saturated moisture. The following is a typical calibration formula, users can use for reference.

Θ V: soil water content; T: soil temperature;

V: voltage value collected by collector, in units: V;

A: the current collected by the collector, unit: Ma;

Output signal	Water conversion method	Temperature conversion (- 30-70 ° C)
0-2v DC	Θ V = 50 * v	T = 50 * v-30
0-5 V DC	Θ V = 20 * v	T = 20 * v-30

0-10 V DC	Θ V = 10 * v	T = 10 * v-30
4-20 Ma	Θ V = 6.25 * a-25	T = 6.25 * A-55

RS485 signal (default address 01) :

Standard Modbus-RTU protocol, baud rate: 4800; parity bit: none; data bit: 8; stop bit: 1

7.1 change of address

For example, change the address of a sensor with address 1 to 2, host to slave

Original address	Function codes	Start register high	Start register low	The starting address is high	Low start address	CRC16 is low	CRC16 is high
0X01	0X06	0X07	0XD0	0X00	0X02	0X08	0X86

If the sensor receives correctly, the data is returned in the same way.

Note: If you forget the original address of the sensor, you can use the broadcast address 0XFF instead, using 0XFF host can only receive a slave, and the return address is still the original address, can be used as an address query method.

7.2 enquire data

Query sensor (address 1-RRB- data (soil temperature, soil moisture) , host → slave

Address	Function codes	Start register address is high	Low start register address	Register length is high	Low register length	CRC16 is low	CRC16 is high
0X01	0X03	0X00	0X00	0X00	0X02	0XC4	0X0B

If the sensor receives correctly, return the following data, from machine to host

Address	Function	Data	Register	Register 0	Register 1	Register 1	CRC16	CRC16

	codes	Length	0 data is high	data low	data is high	data low	is low	is high
0X01	0X03	0X04	0x04	0XDD	0X01	0X64	0X5A	0X66
			Soil Temperature: ~ 3.5 ℃		Soil moisture: 35.6% (m 3/M 3)			

8 Usage notes

Warning

Failure to connect in sequence may cause damage to the device and the equipment connected to it.

When the input power supply exceeds the maximum access power supply of the device, the device will be damaged.

Note

Please read this manual before use.

Do not attempt to insert the probe into stone or hard soil to avoid damaging the probe.

When removing the sensor from the soil, do not pull the cable directly.

When the sensor probe is inserted into soil/matrix, it should be sufficient to reduce the operation error and improve the measurement precision.

9 Product warranty

This product has a one-year warranty. From the date of shipment, 12 months, due to sensor quality problems (non-human damage) caused by failure, the company is responsible for free maintenance or replacement, after the warranty period only cost.