Five-pin soil multi-parameter sensor

Product Manual

1 Overview

The five-pin soil multi-parameter sensor has stable performance, high sensitivity, fast response, stable output, and is suitable for all kinds of soil. It is an important tool for observing and studying the occurrence, evolution, improvement, and water-salt dynamics of saline soil. By measuring the dielectric constant of the soil, it can directly and stably reflect the true moisture content of various soils. It can measure the volume percentage of soil moisture, which is a soil moisture measurement method that meets the current international standards. It can be buried in the soil for a long time, is resistant to long-term electrolysis, corrosion, vacuum potting, and is completely waterproof.

2 Features

（1）This sensor is designed with compact size.

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

（3）It has good sealing performance and can be directly buried in the soil for use without being corroded.4) It has little impact on soil quality and is widely used in a wide area.

(5) Accurate measurement, reliable performance, ensuring normal operation and high data transmission efficiency.

3 Scope of application

It is suitable for temperature, humidity, conductivity and pH value testing in soil moisture monitoring, scientific experiments, water-saving irrigation, greenhouses, flowers and vegetables, grasslands, rapid soil testing, plant cultivation, sewage treatment, precision agriculture and other occasions.

4 Product Information

4.1Technical Parameters

Measurement parameters: Soil conductivity (ECvalue), temperature, moisture,PHValue, nitrogen, phosphorus and potassium (measured by national standard instruments and input)

Measuring range: 0~20000μS/cm, -40~80°C, 0-100%,3~9PH, 0-2999 mg/kg (mg/L) Measurement accuracy:0-10000us/cmThe range is ±3%FS;10000-20000us/cmThe range is ± 5%FS, @(brown soil, 60%RH, 25°C), ±0.5°C,0-50%Internal2%,@(brown soil,30%,25°C） 50-100%Internal3%,@(brown soil,60%,25°C）、±0.3PH、typical accuracy≤5%(Subject to the actual measuring instrument)

Resolution: 1μS/cm, 0.1°C, 0.1%, 0.1, 1 mg/kg (mg/L)

Output signal:RS485（ModBus-RTUProtocol)

Supply voltage:4.5~30V DC Scope of work: -30°C～

70°C Stabilization time:≤5min

Response time: <1Second

Note: The performance data stated above was obtained under the test conditions using our test system and software. In order to continuously improve our products, our company reserves the right to change the design functions and specifications.

rights without prior notice.

4.2Physical parameters

Pin length:68mm,ϕ3mm Pin

Material:316LStainless steel

Seal Material:ABSEngineering plastics, epoxy resin, waterproof gradeIP68 Cable specification:

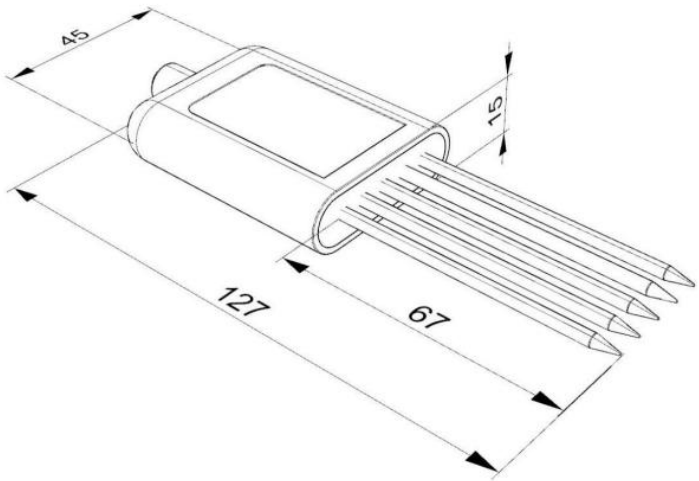
Standard2Meters (other cable lengths can be customized, up to1200m) Load capacity: Voltage

output: Output resistance ≤250Ω; Current output: ≤600Ω

4.3Product Selection

					Company Code
					Soil testing enclosure
			THNPKPH-		Temperature, moisture, nitrogen, phosphorus, potassiumPH
			ECTHNPKPH-		Conductivity Temperature Moisture Nitrogen Phosphorus PotassiumPH
			THPH-		Temperature and moisturePH
			ECTHPH-		Conductivity Temperature MoisturePH
				N01	RS485（Modbus-RTUprotocol)

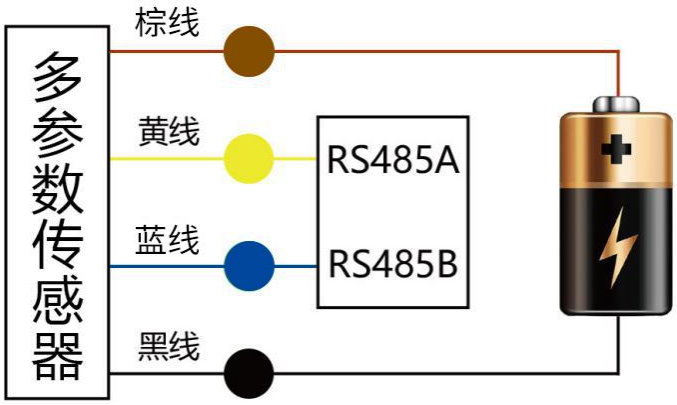
5 Form Factor



设备尺寸图（单位：mm）

6 How to use

The device can be connected to various data acquisition devices with differential input, data acquisition cards, remote data acquisition modules and other devices. The wiring instructions are as follows:



7 Data conversion methods

RS485Signal (default address01):

standardModbus-RTUProtocol, baud rate:4800; Check digit: None; Data digit:8; Stop bits:1

7.1Modify address

For example: Change the address to1The sensor address is changed to2, host→Slave

Original address	Function code	Initial mail Memory High	Initial mail Memory Low	Starting address high	Starting address Low	CRC16 Low	CRC16 high
0X01	0X06	0X07	0XD0	0X00	0X02	0X08	0X86

If the sensor receives the data correctly, the data is returned along the original route.

Note: If you forget the original address of the sensor, you can use the broadcast address0XFFInstead, use0XFFThe host can only connect to one slave, and the returned address is still the original address, which can be used as a method of address query.

7.2Query data

Register Address

Register Address	PLCOr configure the address	content	operate	Definition
0000 H	40001 (Decimal)	Moisture content	Read-only	Real-time value of moisture content (expanded10times)
0001 H	40002 (Decimal)	Temperature value	Read-only	Temperature real-time value (expanded10times)
0002 H	40003 (Decimal)	Conductivity	Read-only	Conductivity real-time value
0003 H	40004 (Decimal)	PHvalue	Read-only	PHReal-time value (expanded tenfold)
0004H	40005(Decimal)	Nitrogen content temporary value	Read and Write	The nitrogen content value or test value to be written1
0005H	40006(Decimal)	Phosphorus content temporary value	Read and Write	Phosphorus content value or test value to be written2
0006H	40007(Decimal)	Potassium content temporary value	Read and Write	Potassium content value or test value to be written3
0007 H	40008(Decimal)	salinity	Read-only	Salinity real-time value (for reference only)
0008 H	40009 (Decimal)	Total dissolved solids TDS	Read-only	TDSReal-time value (for reference only)
0022 H	40035 (Decimal)	Temperature coefficient of conductivity	Read and Write	0-100correspond0.0%-10.0% default0.0%
0023 H	40036 (Decimal)	Salinity coefficient	Read and Write	0-100correspond0.00-1.00 default55（0.55）
0024 H	40037 (Decimal)	TDScoefficient	Read and Write	0-100correspond0.00-1.00 default50（0.5）
0050 H	40081 (Decimal)	Temperature calibration value	Read and Write	Integer (expanded10times)
0051 H	40082 (Decimal)	Moisture content calibration value	Read and Write	Integer (expanded10times)
0052 H	40083 (Decimal)	Conductivity calibration value	Read and Write	Integer
0053 H	40083 (Decimal)	PHCalibration value	Read and Write	Integer
04E8H	41001 (Decimal)	Nitrogen content temporary value Coefficient high sixteen digits	Read and Write	Floating point numbers (IEEE754Standard floating point type)
04E9H	41002 (Decimal)	Nitrogen content temporary value Coefficient lower sixteen digits	Read and Write	
04EA	41003 (Decimal)	Nitrogen content temporary value Deviation value	Read and Write	Integer
04F2H	41011 (Decimal)	Phosphorus content temporary value Coefficient high sixteen digits	Read and Write	Floating point numbers (IEEE754Standard floating point type)
04F3H	41012 (Decimal)	Phosphorus content temporary value Coefficient lower sixteen digits	Read and Write	
04F4H	41013 (Decimal)	Phosphorus content temporary value Deviation value	Read and Write	Integer
04FCH	41021 (Decimal)	Potassium content temporary value Coefficient high sixteen digits	Read and Write	Floating point numbers (IEEE754Standard floating point type)
04FD H	41022 (Decimal)	Potassium content temporary value Coefficient lower sixteen digits	Read and Write	
04FEH	41023 (Decimal)	Potassium content temporary value	Read and Write	Integer

		Deviation value		
07D0 H	42001 (Decimal)	Device Address	Read and Write	1~254(factory default1)
07D1 H	42002 (Decimal)	Device baud rate	Read and Write	0represent2400 1represent4800 2represent9600

1:0004HWhen the register is not written, the value in the register isf1(Conductivity measurement value),0004HAfter a write operation is performed on a register, the register stores the written value. 2: 0005HWhen the register is not written, the value in the register isf2(Conductivity measurement value),0005HAfter a write operation is performed on a register, the register stores the written value. 3: 0006HWhen the register is not written, the value in the register isf3(Conductivity measurement value),0006HAfter a write operation is performed on a register, the register stores the written value.

Query conductivity, temperature and moisturePHValue sensor (address is1) data, host→Slave

address	Function code	Initial mail Memory Location Address height	Initial mail Memory Location Low address	register Length High	register Low length	CRC16 Low	CRC16 high
0X01	0X03	0X00	0X00	0X00	0X04	0X44	0X09

If the sensor receives correctly, it returns the following data, slave → host

address code	Function code	Return valid Number of bytes	Moisture value	Temperature value	Conductivity value	pH value	Check code Low Byte	Check code High Byte
0x01	0x03	0x08	0x02 0x92	0xFF 0x9B	0x03 0xE8	0x00 0x38	0x57	0xB6

Temperature calculation:

When the temperature is below 0°C, the temperature data is uploaded in the form of

complement. Temperature: FF9B H (hexadecimal) = -101 => Temperature = -10.1°C Moisture

calculation:

Water content: 292 H (hexadecimal) = 658 => humidity = 65.8%, that is, the volumetric water content of the soil is 65.8%.

Conductivity calculation:

Conductivity: 3E8 H (hexadecimal) = 1000 Conductivity = 1000 us/cm Calculation

of pH value:

PH value: 38H (hexadecimal) = 56 => PH value = 5.6

8 Precautions for use

police tell

⃠ Failure to follow the wiring sequence may cause damage to the device and the instruments connected to it. If

⃠ the input power exceeds the maximum input power of the device, it will cause damage to the device.

Note meaning

⚠ Please read this instruction manual completely before use.

⚠ Do not attempt to insert the probe into stones or hard soil to avoid damaging the probe. When

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

⚠ The sensor probe should be fully inserted into the soil/matrix to reduce operational errors and improve measurement accuracy. Calibration should

⚠ be performed before each measurement. For long-term use, it is recommended to calibrate once a month. The calibration frequency should be adjusted according to different application conditions (soil quality, moisture content, salt content, pH value, etc.).