KH.TSQ Soil Moisture Sensor
Introduction& Communication Protocol

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The KH.TSQ Probe Soil Sensor can simultaneously measure four key soil parameters: moisture content, temperature, conductivity, and total salinity, with data output via RS485 communication.

It features an all-in-one design with a compact appearance, easy installation, and no maintenance required. The sensor adopts advanced sensing technology for real-time and highly accurate measurement, offering excellent stability, low power consumption, and strong resistance to external interference. It supports all-weather, long-term continuous online monitoring, even under harsh environmental conditions.

I Technical Indicators

· Power supply: DC12V

· Power consumption: <0.1W

· Working temperature: -30~70℃

· Communication interface: RS485

Working current: 8mA@DC12V

· Minimum data interval: 60S

II Parameters

Parameter	Measuring Range	Accuracy	Resolution	Unit
Soil Temperature	-30~ 70℃	± 0.3 (-10~ 50℃)	0.01	℃
Soil Moisture Content	0~100 per cent	±3% (loamy soil) High organic matter soils (soil organic carbon content >12%) High clay content soils (clay content >45%) Due to their dielectric relaxation properties, calibration may be required for specific soil types	0.01 per cent	---
Soil Conductivity	0~20000	±3 (15℃ 0~10000us/cm) ±5% (full scale)	1	us/cm
Soil Salinity	0~12800	± 3%	1	mg/L

III Initial Configuration

Sensor address: 33 (hexadecimal: 0x21)

Baud rate: 9600

Data bits: 8

Stop position: 1

Check digit: None

CRC16: The low byte is in front and the high byte is behind

IV Communication Example

Instruction 03

Read temperature value:

To: 21 03 00 00 00 01 83 6A

Response: 21 03 02 08 DC 3F DA

Data analysis: 0x08*256+0xDC =2268, temperature = 2268/100 = 22.68℃

Instruction 06

Change the sensor baud rate to 115200

To: 21 06 00 05 00 04 9F 68

Receiving: 21 06 00 05 00 04 9F 68

Note: After sending the modification command, you need to power off and restart the sensor to use the new baud rate

Change the sensor address to 120 (default address hex 21)

To: 21 06 00 04 00 78 CF 49

Receiving: 21 06 00 04 00 78 CF 49

V Modbus Register Description

Register address (hexadecimal)	Parameter	Attribute	Data Format	Remarks
0x00	Soil Temperature	Readable	Unit16	Read value / 100
0x01	Soil Moisture Content	Readable	Uint16	Read value / 100
0x02	Soil Conductivity	Readable	Uint16	Read value / 1
0x03	Soil Salt Content	Readable	Uint16	Read value / 1
0x04	Address	Readable and Writable	Uint16	Address range: 0X01-0XFF Default address: 0x21 (decimal: 33)
0x05	Baud rate	Readable and Writable	Uint16	Bottleneck rate write 0x01: 4800 0x02: 9600 0x03:56000 0x04: 115200

VI Precautions

1) The sensor installation should be carried out in strict accordance with the installation and use manual.
2) Multiple sensors must be spaced more than 3 meters apart when working at the same time.
3) Due to the limitation of sensor measurement principle, there

should be no electromagnetic cable and strong magnetic radiation interference within the central radius of 3 meters for sensor measurement, so as to avoid huge error and damage caused by sensor measurement.

4) The installation environment of the sensor should be in line with the measurement range of the sensor to avoid non-standard behaviors such as overrange.

5) Sensor installation should avoid strong acid, strong alkali, heavy oil pollution and heavy metal environment.

6) The sensor is a soil measurement sensor and is prohibited from being used for other purposes.

7) The sensor installation environment should not have strong vibration.

8) Sensors should not be subjected to excessive external forces.

9) Do not disassemble, private disassembly will not provide any services.

10) The sensor probe is relatively sharp, so you should pay attention to wearing protective equipment when using it.

11) The default calibration soil of the sensor is loam (soil dry density 1.36). If the soil dry density of the measured soil (sand, clay) differs greatly from that of the calibrated soil, it needs to be calculated by yourself.

12) The use and maintenance of the equipment shall be carried out in strict accordance with the above matters needing attention. If there is any violation of the use, the company will not assume the relevant responsibility.

Contact Us

Should you have any questions or require technical support, please do not hesitate to contact us.

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