RK520-01 Soil Moisture&Temperature Sensor User Manual

Revision Time	Reviser	Current Version	Remarks
20250829	LI	V5.0	

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User Notice

Please read this manual carefully before use to ensure safe and optimal operation. Retain this manual for future reference.

Pre-Use Instructions

- Carefully review this manual and follow all operational and safety guidelines to prevent malfunctions and hazards.

Unpacking Inspection

- Upon receipt, carefully inspect the sensor device and accessories for any shipping damage.
- If damage is detected:
- Immediately notify the manufacturer and distributor.
- Retain all packaging materials for return or replacement processing.

Parts List

Item	Quantity	Remarks
Sensor	1	
Cable	1	The length depends on the order

1. Product Introduction

RK520-01 Soil Moisture & Temperature Sensor integrates the moisture and temperature measurement. The stainless steel probe is inserted into soil surface or soil profile to test soil moisture and temperature quickly. Moisture measurement part is designed on the basis of the principle of FDR, by measuring the dielectric constant of the soil in order to measure the volume of the soil moisture content, temperature part adopts precision platinum resistance element, the product built-in drift calibration and temperature compensation circuit, can adapt to most applications. The probe can be permanently embedded underground and be connected to a data logger for unlimited testing.

2. Product Features

- High precision
- Fast response
- Not affected by soil properties
- Directly buried in soil
- Widely used

3. Specification

Item	Technical Specification	
	Moisture	Temperature
Range	0-100%(m^3/m^3)	-30℃-+70℃
Accuracy	± 3%(0-50%)	±0.5℃
Output Signal	4-20mA,0-5V,0-2V, RS485 optional	
Response Time	<1s	
Supply	3.9-30VDC(0-2V, RS485),12-24VDC(4-20mA ,0-5V)	
Effective Measurement Area	With the center of the probe diameter is 70 mm, high 70 mm cylinder	
Housing	ABS	
Dimensions	45*15*145 mm(probe:3* Ø3*70mm)	
Operating Temperature	-40℃-+80℃	
Ingress Protection	IP68	
Storage	10-60℃ @20%-90%RH	
Probe Material	316L stainless steel	

4. Electrical Connections

Connector(Cable)	RS485	Voltage
Red	V+	V+
Black	V-	V-
Yellow	RS485A	
Green/White	RS485B	Humi
Brown		Temp

5. Output Types & Formulas

Voltage Type(0-2V)	F=V/2 × (Max Range - Min Range) + Min Range
Voltage Type(0-5V)	F=V/5× (Max Range - Min Range) + Min Range
Current Type (4-20mA):	F=(I - 4)/16 × (Max Range - Min Range) + Min Range

F:Current measurement parameters;

V: Transmitter output voltage in V

I: Transmitter output current in mA.

6. Product Dimensions

Unit：mm

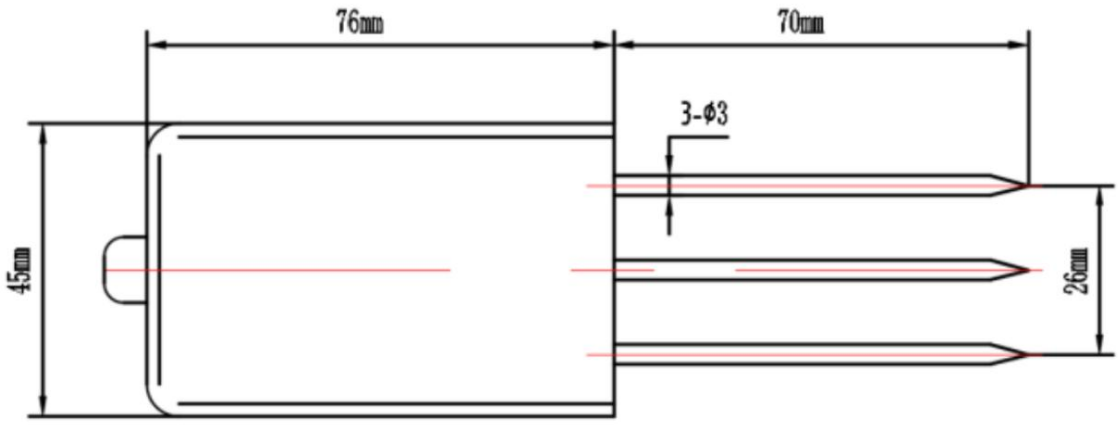

Figure 6.1
Dimensional Specifications

7. Communication Protocol（MODBUS-RTU）

Parameter	Value
Data Bits	8 bits
Check Bit	None
Stop Bit	1 bit
Baud Rate	9600 bps
Slave Address	0x01 (Factory Default)

7.1 Read Real-time Data

Client sends:

01 03 00 00 00 02 C40B

Return:

01 03 04 01 23 01 64 0A7E

7.1.1 Description of Return Data Format

No.	Conception	Byte Number	Description	Remarks
1	Address block	1	Address(0x01)	0x01
2	Function code	1	Only read(0x03)	0x03
3	Number of bytes	1	0X04	4bytes
4	Data block	2	Temperature value	0x0123(29.1℃)
5	Data block	2	Moisture value	0x0164(35.6%)
6	Check block	2		0x0A 0x7E

Note:If the data≧0x8000,for example:0xFF05,according to the following method to calculate:0xFF05-0xFFFF-0x01=(65285)D-(65535)D-(1)D=(-251)D,-251/10=-25.1(℃)

7.2 Modify Slave Address

Client sends:(Change slave address from 01H to 02H)

ID	Function code	Address_H	Address_L	Date_H	Date_L	CRC_L	CRC_H
0x01	0x06	0x02	0x00	0x00	0x02	0x09	0xB3

Response:

ID	Function code	Address_H	Address_L	Date_H	Date_L	CRC_L	CRC_H
0x01	0x06	0x02	0x00	0x00	0x02	0x09	0xB3

Note:If you forget the original address, you should use the broadcast address(FEH) (ensure that no other devices on the bus at this time).

8. Installation Guidelines

- Testing medium should be with uniform intensity.
- If surface soil water content measurement, the sensor should be insert into soil vertically. Do not shake the sensor when inserted, otherwise the probe will be blended;
- If multi-layer soil water content measurement, the sensor should be buried in the soil and parallel to the ground. Make sure the probe not be blended;
- When removing sensors from the soil, please hold the sensor housing shell and do not forcibly pull on the cable. Soil on probes should be brushed tightly.
- Please keep the sensor in dry & clean conditions.

8.1 Installation Method

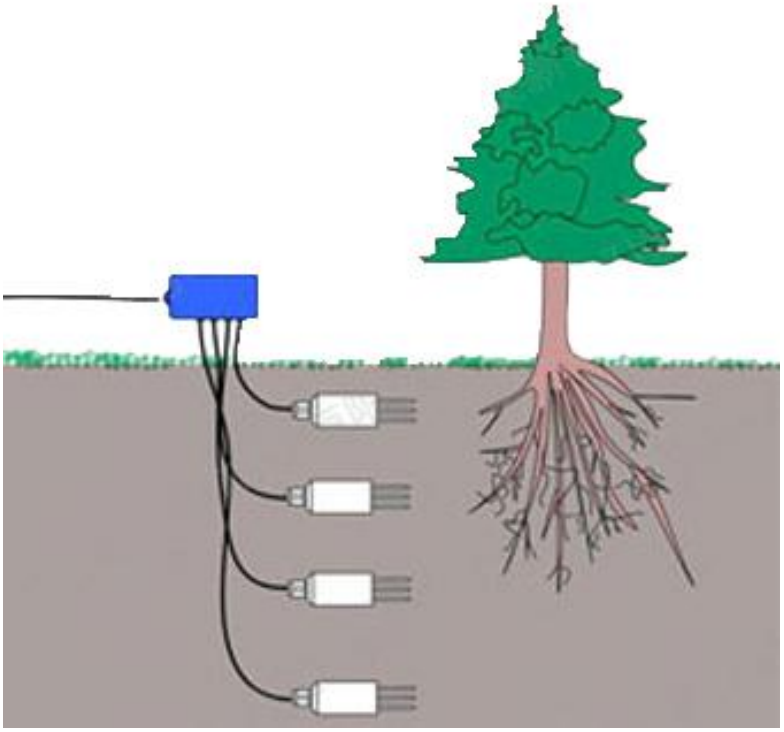

Figure 8.1.1 Installation Diagram

9. Precautions

Powered Wiring Prohibition

- Do not connect wires while powered. Only energize the sensor after confirming correct wiring.

Component Modification Restriction

- Do not alter factory-soldered components or pre-connected wires.

Precision Handling Requirement

The sensor is a precision device. Avoid:

- Unauthorized disassembly
- Do not touch internal components to prevent product damage

  Note: Unauthorized modifications void the warranty.

10. Troubleshooting

Incorrect Output Signals (Analog/RS232/RS485):

- Verify wiring correctness and secure connections.
- Check if the serial port is occupied or malfunctioning.
- Confirm serial port settings (baud rate, data/stop bits) match device requirements.

Persistent Issues:

- Contact the manufacturer if the above steps fail to resolve the problem.

11. Product Maintenance

Maintenance and Safety

- Regularly clean and inspect the sensor to maintain performance.
- Do not expose the sensor to extreme temperatures, moisture, or corrosive substances unless explicitly specified.
- Unauthorized disassembly, modification, or repairs may void the warranty and lead to malfunctions.

Troubleshooting Protocol

- In case of malfunction, refer to the troubleshooting section of this manual.
- Do not attempt unauthorized disassembly or repairs.
- Contact the manufacturer's after-sales department directly for technical support.

12. Warranty Terms

This product comes with a one-year warranty, starting from the date of delivery.Within twelve months, the Company shall be responsible for free repair or replacement of any failure caused by sensor quality issues(non-human damage). Fees will be charged for repairs or replacements after the warranty period expires.

CE Complies with applicable CE directives.

Manual subject to change without notice.

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