Product introduction

NBL-S-THR soil temperature and moisture sensor is a high-precision, high-sensitivity soil moisture measuring instrument. The electromagnetic wave pulse emitted by the sensor is transmitted to the probe through the coaxial cable, and then enters the soil medium to measure the apparent dielectric constant of the soil, thereby obtaining the real water content of the soil. The influence of metal ions, etc. This instrument can be widely used in soil moisture monitoring, water-saving irrigation, greenhouses, grassland pastures, soil speed measurement and other fields.

Technical Parameters

Measuring range: soil moisture 0~100%, soil temperature -50~100℃

Power supply mode: DC 12-24V

Resolution: soil moisture 0.1%, temperature 0.1℃

Accuracy: soil moisture ±3%, temperature ±0.5℃

Output form: RS485 or 4～20mA (RL≤250Ω),Voltage 0-5V (RL≥1KΩ)

Product power consumption: about 0.3W

Operating environment: -40℃～80℃

Protection class: IP68

Method of Calculation

Current type (3-wire 4～20mA output) calculation:

Soil moisture R=(I-4)/16 × 100%

Soil temperature T = (I-4) / 16 × 150 -50

Voltage type (0～5V output) calculation:

Soil moisture R=V/ 5 × 100%

Soil temperature T=V/ 5 × 150-50

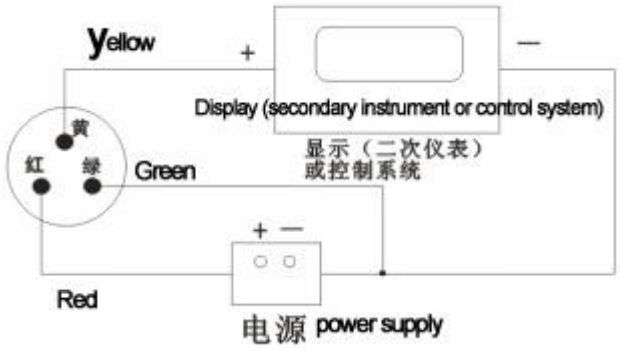
Connection method

(1) If equipped with the collector produced by our company, directly connect the sensor to the corresponding interface on the collector.

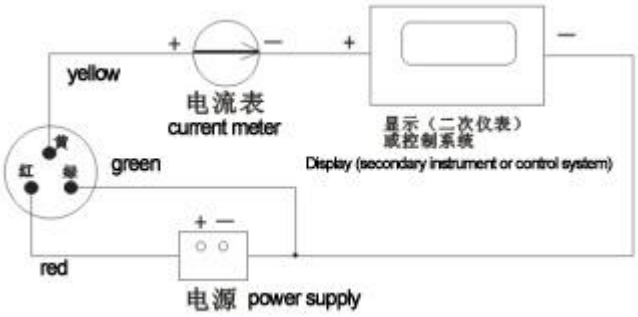
(2) If the sensor is purchased separately, the supporting line sequences are:

Line Color	output signal		
	voltage	current	communication
Red	+	+	+
Black（Green）	-	-	-
Yellow	soil temperature signal	soil temperature signal	A
Blue	Soil Moisture Signal	Soil Moisture Signal	B

(3) There are two output wiring methods for sensor voltage and current:

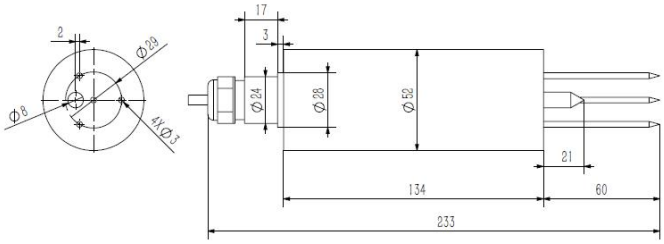


(Wiring diagram of voltage output mode)



(Wiring diagram of current output mode)

Structural Dimensions



MODBUS-RTU Communication protocol

1. Serial format

Data bits: 8 bits

Stop bits: 1 or 2 bits

Check Digit: None

The baud rate is 9600bps, and the interval between two communications is more than 1000ms.

2. Communication format

[1] Write the device address

Send: 00 10 Address CRC (5 bytes)

Return: 00 10 CRC (4 bytes)

Instructions: 1. The address bit of the read/write address command must be 00.

2. Address is 1 byte, the range is 0-255.

For example: send 00 10 01 BD C0

return 00 10 00 7C

[2] Read the device address

Send: 00 20 CRC (4 bytes)

Returns: 00 20 Address CRC (5 bytes)

Description: Address is 1 byte, the range is 0-255

For example: send 00 20 00 68

Return 00 20 01 A9 C0

[3] Read real-time data

Send: Address 03 00 00 00 02 CRC

Description: As shown in the figure below:

code	Feature Definition	Description
Address	Address	Device Unique Address
03	Function Code	Fixed value 0x03
00 00	Start Address	The first register number read
00 02	Reading points	2 parameters
CRC	CRC Check code, low	low front and

	front and high back	high back

Return: Address 03 04 XX XX XX XX YY YY

Description:

No.	implication	byte count	Description
1	Address field	1	Address
2	Opcodes	1	Read only(0x03)
3	Data Length Field	1	Data length
4	Data field	2	Soil temperature: 0x7FFF table invalid/missed
		2	Soil Moisture: 0x7FFF table invalid/missed
5	Check Field	2	low front high back

Note: After the data is parsed, it needs to be divided by 10 with one decimal point.
For example: send 01 03 00 00 00 02 C4 0B
Return 01 03 04 00 B4 01 10 BA 49
Note: 00 B4 converted to hexadecimal is 180. After data analysis, it needs to be divided by 10 with a decimal point. The actual soil temperature is 18.0℃, and 01 10 converted to hexadecimal is 272. After data analysis, it has a decimal point. Need to divide by ten, the actual soil moisture is 27.2%

Attachment:

The steps to calculate the CRC code:

1. The preset 16-bit register is hexadecimal FFFF (that is, all 1s). Call this register the CRC register;
2. XOR the first 8-bit data with the lower bits of the 16-bit CRC register, and place the result in the CRC register;
3. Shift the contents of the register one bit to the right (toward the lower bit), fill the highest bit with 0, and check the shifted out bit after the right shift;
4. If the shift out bit is 0: repeat step 3 (shift right one bit again)
   If the shift-out bit is 1: XOR the CRC register with the polynomial A001 (1010 0000 0000 0001);
5. Repeat steps 3 and 4 until the right shift is performed 8 times, so that the entire 8-bit data is processed;
6. Repeat steps 2 to 5 to process the next 8-bit data;
7. The final CRC register is the CRC code;
8. When the CRC result is put into the information frame, the high and low bits are exchanged, and the low bits are first.

Instruction manual

Wire the sensor according to the instructions in the wiring method, then insert the probe pin of the sensor into the soil where the moisture is to be measured, turn on the power supply and the switch of the collector, and then the soil temperature and moisture at the measurement point can be obtained.

Notice

1. Please check whether the packaging is in good condition, and check whether the product model is consistent with the selection;
2. Do not connect with live power. After the

wiring is completed and checked, the power can be turned on;

3. Do not arbitrarily change the components or wires that have been soldered when the product leaves the factory;
4. The sensor is a precision device, please do not disassemble it by yourself, or touch the surface of the sensor with sharp objects or corrosive liquid, so as not to damage the product;
5. Please keep the verification certificate and certificate of conformity, and return it together with the product during maintenance.

Trouble Removal

1. During analog output, the indicator indicates that the value is 0 or not within the range. The collector may not be able to obtain information correctly due to wiring problems. Please check whether the wiring is correct and firm;
2. If it is not for the above reasons, please contact the manufacturer.

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