JXCT®

JXBS-3001-TR

Soil Temperature Moisture Sensor User Manual

Analog Output
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www.jxct-iot.com

I. BRIEF INTRODUCTION

1.1 Product Overview

The soil moisture temperature sensor is suitable for soil temperature and moisture measurement. Compared with the German original high-precision sensor and the actual soil drying and weighing method, the soil moisture temperature sensor has high accuracy, fast response and stable output. Less affected by soil salt content, suitable for all kinds of soil. Can be buried in soil for a long time, resistant to long-term electrolysis, corrosion resistance, vacuum potting, completely waterproof.

1.2 Primary Parameters

TABLE 1imary Parameters

PARAMETERS	TECHNICAL SPECIFICATIONS
POWER SUPPLY	12-24V DC
MOISTURE MEASUREMENT RANGE	0-100%
STORAGE ENVIRONMENT	-45℃-115℃
MOISTURE ACCURACY	±3% in the 0-53% range; ±5% in the range of 53-100%
RESPONSE TIME	<1s
TEMPERATURE MEASUREMENT RANGE	-40℃-80℃
TEMPERATURE ACCURACY	±0.5℃
INSTALLATION METHOD	All buried or inserted into the measured medium
PROTECTION LEVEL	IP68
POWER CONSUMPTION	<1.15W
CURRENT OUTPUT TYPE	4-20mA
CURRENT OUTPUT LOAD	≤600 Ω

VOLTAGE OUTPUT TYPE	0-5V/0-10V
VOLTAGE OUTPUT LOAD	≤250 Ω
WORKING PRESSURE RANGE	0.9-1.1atm

1.3 System frame Diagram

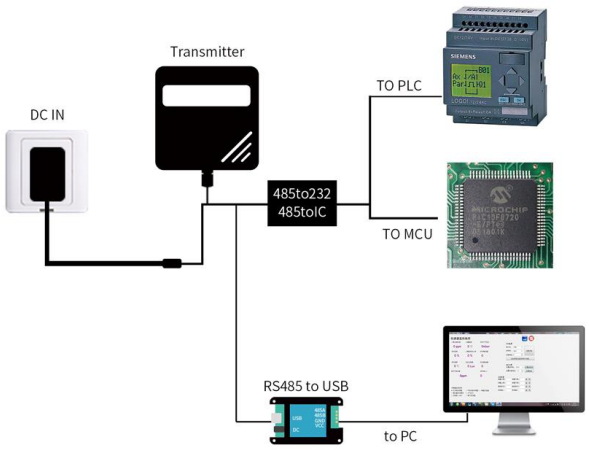


FIGURE 1 SINGLE-ENDED

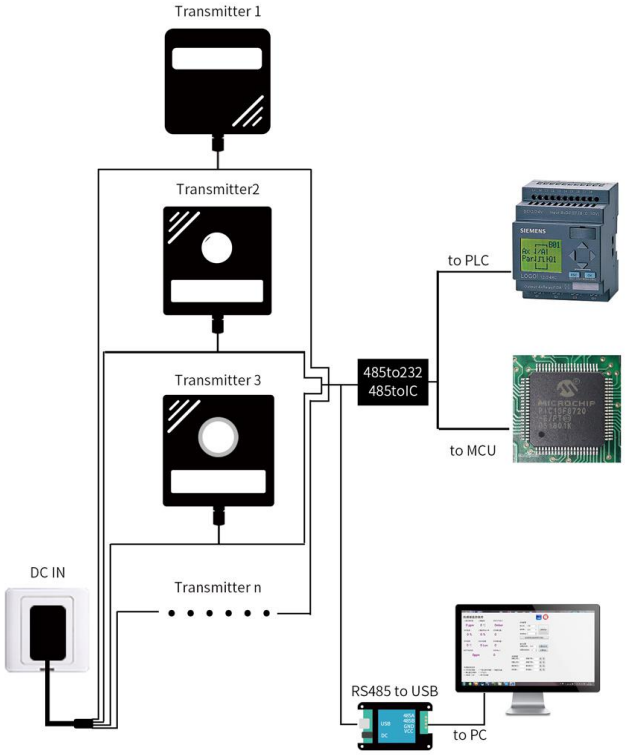


FIGURE 2 MUTIPLE-ENDED

II. HARDWARE CONNECTIONS

2.1 CHECKING BEFORE INSTALLATION

Check the list of devices before installation:

TABLE 2 List of Devices

Name	Number
THE SENSOR DEVICE	1
12V POWER ADAPTER (Optional)	1
WARRANTY CARD / CERTIFICATE	1

2.2 Interface Description

The power interface is wide-voltage power input 12-24V. Analog products should pay attention to the positive and negative signal lines. Do not reverse the positive or negative of the current/voltage signal lines.

FIGURE 3 PHYSICAL PICTURE

TABLE 3 Wiring Sequence

	Line Color	Description
Power	Brown	Power supply Positive (12-24V DC)
	Black	Power supply Negative
Communication	White Humidity	Voltage/current output Positive
	Gray Temperature	Voltage/current output Positive
	Blue	NC
	Yellow	NC

We provide default cable length of 1.5meters, you can extend the cable yourself according to your needs.

2.3 Speed measurement method

Select the appropriate measurement site, avoid the stones, ensure that the steel needle does not hit a hard object, throw the topsoil at the required depth of measurement, keep the underlying soil tightness, grip the sensor vertically into the soil, insert It is not possible to shake left and right. It is recommended to measure multiple times within a small area of a measurement point to obtain the average value.

2.4 Buried method

Dig a pit with a diameter of >20cm vertically and insert the sensor steel needle horizontally into the wall of the pit at a predetermined depth. After the pit is buried tightly and stable for a period of time, it can be measured and recorded for several days, months, or even longer.

2.5 Precautions

1, steel needle must be fully inserted into the soil.

2. Avoid direct sunlight on the sensor and cause excessive temperature. Use caution in the field against lightning strikes.

3, do not violently bend the steel needle, do not force pull the sensor leads, do not beat or violently hit the sensor.

4, sensor protection grade IP68, the sensor can be soaked in water.

5, due to the presence of radio frequency electromagnetic radiation in the air, it should not be in a state of power in the air for a long time.

III. WIRING INSTRUCTIONS

3.1 Typical four-wire wiring

Analog sensor wiring is simple, just connect the wire to the designated port of the device. The device supports 3-wire wiring.

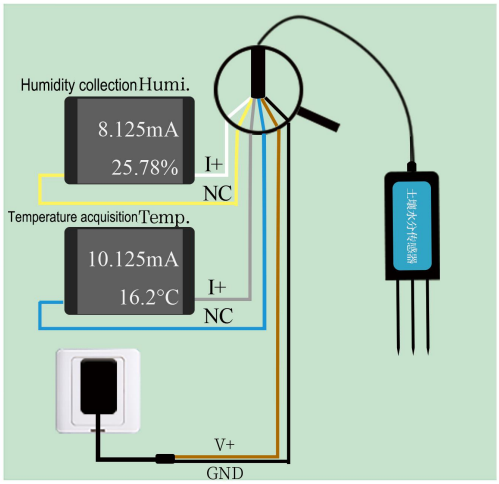
The following figure shows the voltage sensor connection mode. The power line (brown line and black line) of the sensor is connected to the power supply; the yellow (gray) color line of the sensor is the signal that is connected to the acquisition device. Positive, yellow (gray) The voltage of the line is the output voltage; the blue line of the sensor is the signal that the signal is being connected to the voltage acquisition device, and the voltage of the blue line is the reference voltage, which is consistent with the voltage of the black line being 0V.

3.1 Typical Three-wire Connection Mode

For the typical three-wire connection, the blue line and the yellow line are omitted. In the sensor, the blue line, the yellow line, and the black line are short-circuited, so the blue line and the yellow line can be omitted.

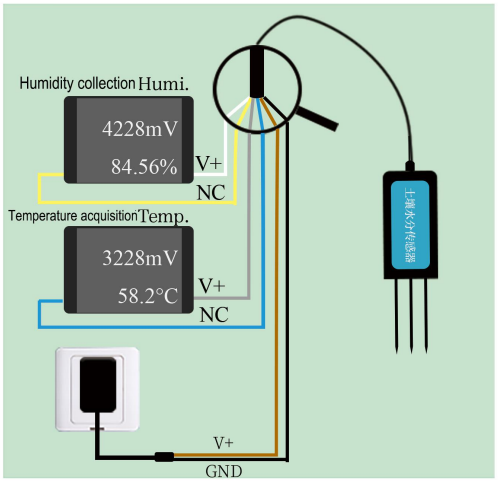
For the three-wire current connection method, after the power cables (brown wires and black wires) of the sensors are connected to the power supply, the white and gray wires of the sensors need only to be connected to signals of the current acquisition equipment.

Current output type(4-20mA)
first step
Connect the sensor with a
12V-24V power adapter
Second step
Correctly select multimeter range
or connect analog signal collector
third step
Calculate the formula
$P_{温度}=(I_{(电流)}-4mA)*10-45℃$
$P_{湿度}=(I_{(电流)}-4mA)*6.25\%$

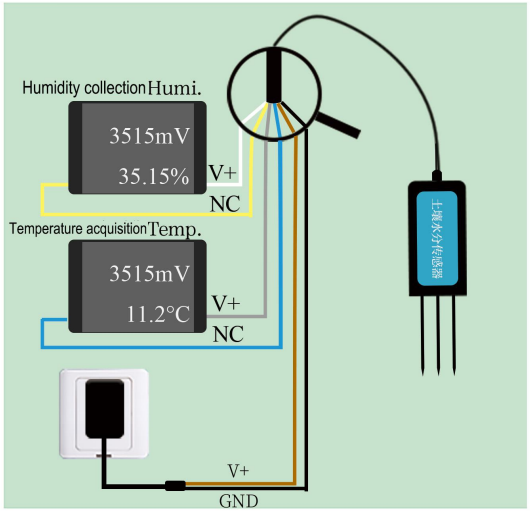


For the three-wire voltage connection method, after the power cables (brown wires and black wires) of the sensors are connected to the power supply, it is only necessary to connect the white and gray wires of the sensors to the signal of the voltage acquisition equipment.

Voltage output type(0-5V)
first step
Connect the sensor with a
12V-24V power adapter
Second step
Correctly select multimeter range
or connect analog signal collector
third step
Calculate the formula
$P_{温度}=V_{(电压)}*0.032-45℃$
$P_{湿度}=V_{(电压)}/50\%$



Voltage output type(0-10V)
first step
Connect the sensor with a
12V-24V power adapter
Second step
Correctly select multimeter range
or connect analog signal collector
third step
Calculate the formula
$P_{温度}=V_{(电压)}*0.016-45℃$
$P_{湿度}=V_{(电压)}/100\%$



IV. ANALOG PARAMETERS AND CONVERSION

4.1 Analog 4-20mA Current Loop

Current Value	Temperature	Humidity
4mA	-45℃	0%
20mA	115℃	100%

The formula is P temperature = (I $_{(current)}$ -4mA) *10-45 °C

The formula is P Humidity=(I$_{(Current)}$-4mA)*6.25%

Where I is in mA.

For example, the data humidity Iout+ collected in the current situation is 8.125 mA, and the calculated humidity value is 25.78%. The temperature Iout+ is 10.125 mA, and the calculated temperature value is 16.2°C.

4.2 Analogue 0-10V Voltage Output

Voltage Value	Temperature	Humidity
0V	-45℃	0%
10V	115℃	100%

The formula is P temperature = V $_{(voltage)}$ * 0.016-45 °C

The formula is P humidity=V$_{(voltage)}$/100%

Where V is in mV.

For example, the data humidity Vout+ collected in the current situation is 3515 mV, and the calculated humidity value is 35.15%. The data temperature Vout+ collected was 3515 mV, and the calculated temperature was 11.2°C.

4.3 Analogue 0-5V voltage output

Voltage Value	Temperature	Humidity
0V	-45℃	0%
10V	115℃	100%

The formula is P $_{temperature}$=V$_{(voltage)}$*0.032-45°C

The formula is P $_{humidity}$=V$_{(voltage)}$/50%

Where V is in mV.

For example, in the current situation, the data humidity Vout+ collected is 4228 mV, and the calculated humidity value is 84.56%. The data temperature Vout+ collected was 3228 mV, and the calculated temperature was 58.2°C.