NiuBoL

teaching and other related work.

Features

➢ With multi-depth moisture and temperature change measurement capabilities, standard nodes: 10cm, 20cm, 30cm, 40cm depth, real-time monitoring, fast and convenient;

➢ Products with different depths and configurations can be customized according to different applications;

➢ The special custom-made PVC plastic pipe is used for anti-aging and more resistant to the corrosion of acid, alkali and salt in the soil;

➢ Using epoxy resin as the sealing material, it can be soaked in water for a long time without leakage;

➢ High measurement accuracy, reliable performance, less affected by soil properties, suitable for various soil properties;

➢ It has multi-directional anti-misconnection protection for power lines, ground wires, and signal lines;

➢ Support RS485 digital output;

➢ DC12-24V DC power supply;

➢ Free on-site setting and calibration design, on-site installation and use at any time;

➢ Using shock-resistant packaging, transportation and storage are safer;

Product Introduction

The tube-type moisture monitor adopts the FDR principle to measure the humidity of each soil layer according to the frequency change of the electromagnetic wave emitted by the monitor in materials with different dielectric coefficients, and uses a high-precision digital temperature sensor to measure the temperature of each soil layer. By default, the temperature and humidity of 10cm, 20cm, 30cm, and 40cm soil layers are simultaneously measured, which is suitable for long-term uninterrupted monitoring of representative soils.

The soil temperature and humidity monitor has many advantages such as light weight, easy installation, convenient use, and accurate measurement. The instrument uses precision sensors and smart chips, and is composed of soil moisture sensors and soil temperature sensors.

At present, the products are widely used in the monitoring and collection of environmental information in agriculture, forestry, environmental protection, water conservancy, meteorology and other industries. Precision agriculture, etc., to meet the needs of scientific research, production,

Technical Parameters

1) Soil moisture (volume water content) measurement range: dry soil to water-saturated soil, laboratory measurement accuracy: ±3%, field measurement accuracy: ±5%, humidity resolution: 0.1%;

2) Temperature measurement range: -40℃～80℃, measurement accuracy ±0.5℃, temperature resolution: 0.1℃;

3) Power supply mode: DC12~24V wide voltage power supply

4) Communication method: RS485 communication, MODBUS communication

protocol, (baud rate 9600 can be set, address 0-255 can be set);

5) Wiring method: RS485 output 4-wire system, power supply positive, power supply negative, 485+, 485-;

6) Response time: respond within 3s after power on;

7) Stabilization time: About 10s after power on, it enters the stabilization process;

8) Dimensions: ϕ63mm, the length varies with the measurement depth of the sensor, the standard length is about 1000mm;

9) Sensor measurement principle: FDR frequency domain reflection method;

10) Power consumption: The power consumption is less than 10mA when static, and the power consumption when sampling is 70 mA;

11) Working environment: -40℃～80℃; 0-100%RH;

12) Mean time between failures: ≥25000h;

13) Sensing range: 99% are read from the range within 10cm outside the tube;

14) Shell protection level: use epoxy resin as the sealing material, the ground part: IP67; below the ground: IP68;
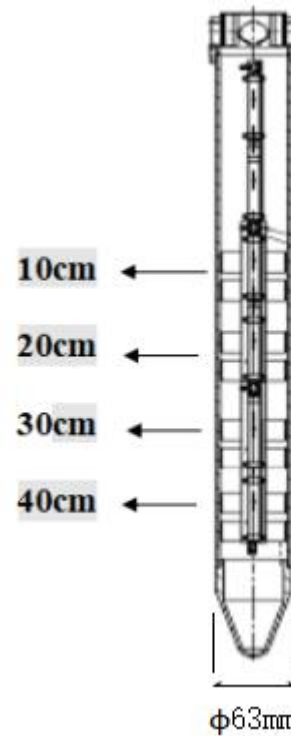
Wiring method

Line color	Definition
Red	+
Black	-
Yellow	RS485+
Blue	RS485-

Structural diagram

10cm
20cm
30cm
40cm

ϕ63mm

Installation Location

Moisture monitoring stations (points) should be representative, able to represent the main crops and the typical soil in the area, and the indicators collected can reflect the actual local conditions.

The layout of moisture monitoring stations (points) should be comprehensively determined according to the local soil type, planting structure and topographical conditions.

Therefore, in principle, the representative plot with the largest representative area of crops and soil types in the region should be selected. In areas where the soil and topographical conditions change greatly, topographical conditions and signal requirements for information transmission should also be considered, and representative land with flat topography should be selected as much as possible.

Monitoring facilities need to be set up on one side of representative plots to reduce the impact on farming. The sensor needs to be set in the soil layer

of the farming area, and corresponding ground marks or simple protective railings should be set up around it to prevent collision and damage during farming. However, walls or physical fences cannot be set up, so as to avoid the loss of representativeness due to the isolation of the land where the instrument is buried from the surrounding land.

The selection and construction of moisture monitoring stations should focus on rain-fed and dry-farming agricultural areas, and avoid the establishment of stations in paddy field irrigation areas.

The station site should be as far away as possible from woods, tall buildings, roads (railways), rivers, reservoirs and large channels to avoid signal blocking and the influence of water sources.

Notice

(1) The punching should be vertically downward;
(2) The depth of the hole is increased by 5cm on the basis of the installation depth to ensure that there is enough space for compressed air at the bottom of the installation;
(3) Appropriate depth for drilling;
(4) It is strictly forbidden to hit the moisture meter with heavy objects;
(5) Confirm that the switch button of the moisture meter is turned on and the instrument is working;

Installation Procedure

1. Use the soil drill to drill holes, hold the handle tightly with both hands and turn it clockwise;

双手紧握手把并顺时针下压转动

2. Pull out and clean the soil auger after it is fully drilled, and repeat this process until the depth is met;

钻满土钻后拔出并清理土钻

3. Put the sensor into the hole that has been punched, and it should be smooth to put in and take out. If it is not smooth, please use the soil drill to expand the hole in the unsmooth place;

4. Prepare the mud. The mud should not be too thin or too thick. Pour the mud into the hole, about halfway up the hole.

5. Insert the sensor into the hole and rotate the sensor left and right to distribute the mud evenly around the sensor.

If there is resistance when the sensor is inserted downward during this process, it indicates that there is air in the mud. At this time, the sensor should be moved up and down slowly and rotated counterclockwise to discharge the air.

When the sensor is installed to a suitable depth (the ground plane and the 0cm point of the sensor are on the same level), some overflowing mud will accumulate around the installation hole, and the installation is complete.

The purpose of grouting: to make the installed integrated moisture meter and the soil more closely and seamlessly, so as to ensure more accurate measurement data. Because the water content of the grouting mud is higher than the actual soil water content, the automatic measurement data can only be used after the grouting is basically solidified after one to two days.

MODBUS-RTU Communication Protocol

1. Serial port format

Data bits: 8 bits
Stop bit: 1 or 2 bits
Check digit: none
Baud rate: 9600, the interval between two communications is more than 1000ms.

2. Communication format

【1】 Read device address
Send: 00 20 CRC (4 bytes)
Return: 00 20 Address CRC (5 bytes)
Description: Address is 1 byte, the range is 0-255
Example: send 00 20 00 68
return 00 20 01 A9 C0

【2】 Write device address
Send: 00 10 Address CRC (5 bytes)
Return: 00 10 CRC (4 bytes)
Note: 1. The address bit of the read/write address command must be 00.
2. Address is 1 byte, ranging from 0-255.
Example: send 00 10 01 BD C0
return 00 10 00 7C

【3】 Read real-time data
Send: Address 03 00 00 CRC
Description: As shown in the figure below:

Code	Functional definition	Remark
Address	Station number (address)	
03	Function code	
00 00	Start address	
CRC	CRC check code, low in front and high in back	

Return：Address 03 00 10 TS TS TW TW TS TS TW TW TS TS TW TW TS TS TW TW CRC CRC

Description:

Code	Functional definition	Remark
Address	Station number (address)	
03	Function code	
00 10	Read Points	
TS TS	Soil moisture data (first high and then low)	Hex
TW TW	Soil temperature data (high at the beginning	Hex

	and low at the end)	
XX XX	CRC check code	

Steps to calculate CRC code:

1. The preset 16-bit register is hexadecimal FFFF (that is, all 1). Call this register the CRC register;

2. XOR the first 8-bit data with the low bit of the 16-bit CRC register, and put the result in the CRC register;

3. Shift the content of the register to the right by one bit (towards the lower bit), fill the highest bit with 0, and check the lowest bit;

4. If the lowest bit is 0: repeat step 3 (shift again)
    If the lowest 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 8 times, so that the entire 8-bit data has been 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 putting the CRC result into the information frame, exchange the high and low bits, with the low bits first.

Precautions

1. Please check whether the packaging is in good condition, and check whether the product model is consistent with the selected model;

2. Do not connect live wires, and power on after the wiring is completed and checked;

3. The length of the sensor wire will affect the output signal of the product. When using it, do not change the components or wires that have been welded when the product leaves the factory. If you need to change it, please contact the manufacturer;

4. The sensor is a precision device. When using it, please do not disassemble it by yourself, or touch the surface of the sensor with sharp objects or corrosive liquids, so as not to damage the product;

4、5. Please keep the verification certificate and qualification certificate, and return it with the product when repairing.

Contact Us

Contact: +8615367865107/+8618073152920

Zip code: 421000

Email: sales@niubol.com

Website: http://www.niubol.com

Address: Room 103, Area D, Houhu Industrial Park, Yuelu District, Changsha City, Hunan Province,China