USER GUIDE FOR CDT-70B NPK SENSOR

This document is applied for the following products

SKU	CDT	HW Ver.	1.0	FW Ver.	1.0
Item Code	CDT-70B	NPK Sensor, RS485 Output, ABS&SUS316, 0-20mS/cm 0-1999mg/kg			

1. Introductions

CDT-70B 7 in 1 soil sensors can generally measure soil temperature, humidity, conductivity, pH value, nitrogen, phosphorus and potassium content and other parameters at the same time. In this way, soil conditions can be comprehensively understood, and rich data support can be provided for agricultural production, soil scientific research, and environmental monitoring.
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2. Specification

Item	Technical Specification				
	Moisture	Temperature	EC	PH	NPK
Range	0-100%（m³/m³）	-30℃-+70℃	0-10mS/cm 0-20mS/cm	3-10	0-1999mg/kg
Accuracy	±2%(0-50%) ±3%(51-100%)	±0.5℃	±3%FS	±0.5	±3%FS
Output Signal	RS485				
Response Time	<1s				
Supply	5VDC, 12-24VDC				
Effective measurement area	With the center of the probe diameter is 70mm, high 70mm cylinder				
Housing	ABS				
Dimensions	45*15*145mm(probe:3* Ø3*70mm)				
Operating Temperature	-40℃-+80℃				
Ingress Protection	IP68				
Storage	10-60℃@20%-90%RH				
Probe material	316L stainless steel				

3.Working Process

FDR soil moisture sensors use the reflection properties of electromagnetic waves in the soil to measure soil moisture. The sensor emits electromagnetic waves of a certain frequency, which travel through the soil and are reflected back.
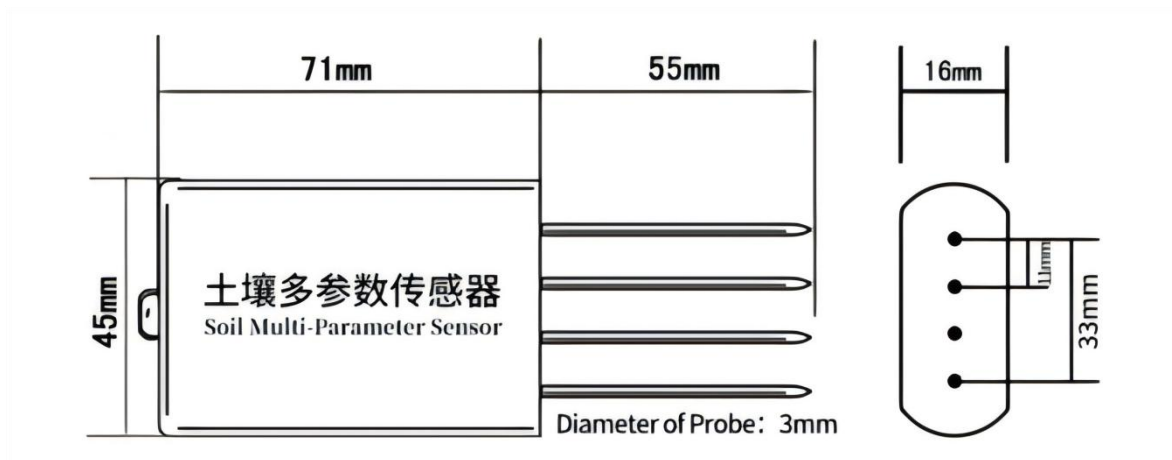
Soil moisture will affect the reflection coefficient of electromagnetic wave. By measuring the change of reflection coefficient, soil moisture can be determined.

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4. Electrical Connections

Connector（cable）	RS485
Brown	V+
Black	V-
Yellow	RS485A
Green	RS485B

5. Dimensions

71mm 55mm 16mm

45mm

土壤多参数传感器
Soil Multi-Parameter Sensor

Diameter of Probe: 3mm

11mm 33mm

6. Installation

Soil Surface measure method

1. Select a representative soil environment to clean up surface debris and vegetation

2. Insert the sensor vertically and completely into the soil

3. If there is a hard object, the measurement location should be replaced and re-measured

4. For accurate data, it is recommended to measure multiple times and take the average

Buried measure method

1. Make a soil profile in the vertical direction, slightly deeper than the installation depth of the bottommost sensor, between 20cm and 50cm in diameter.

2. Insert the sensor horizontally into the soil profile

3. After the installation is completed, the excavated soil is back filled in order, layered and compacted, and horizontal installation is guaranteed.

4. If you have the conditions, you can put the removed soil in a bag and number it to keep the soil moisture unchanged, and backfill it in reverse order.

7. Communication Protocol（MODBUS）

Transmission mode: MODBUS-RTU,**Baud rate:** 9600bps,**Data bits:**8,**Stop bit:**1,**Check bit:**no

Slave address:the factory default is 01H (set according to the need,00H to FFH)

7.1 The 03H Function Code Example:

Read temperature and humidity
Host Scan Order(slave address:0x01)
01 03 00 00 00 02 C40B

Slave Response
01 03 04 03 E8 01 29 BA0D

Temperature: (0129)H=(297)D,297/10=29.7℃
Moisture:(03E8)H=(1000)D,1000/10=100%

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(℃)

Read the value of sensor EC
Host Scan Order(slave address:0x01)
01 03 00 02 00 01 25CA

Slave Response
01 03 02 05 DC BA8D
EC: (05DC)H=(1500)D, 1500/1000=1.5(mS/cm)

Read the value of sensor PH

Host Scan Order(slave address:0x01)
01 03 00 03 00 01 740A

Slave Response
01 03 02 01 34 B803
PH: (0134)H=(308)D,308/100=3.08(PH)

Read The NPK Value
Host Scan Order(slave address:0x01)
01 03 00 04 00 03 440A

Slave Response
01 03 06 00 20 00 25 00 30 B16D
N: (0020)H=(32)D,32mg/kg
P:(0025)H=(37)D,37 mg/kg
K:(0030)H=(48)D=48 mg/kg

7.2 The 06H Function Code Example: Modify the slave address
Host Scan Order (Changed the 01H to 02H):

01 06 00 30 00 02 00804

Slave Response:
01 06 00 30 00 02 00804

Note:
1. All underlined is fixed bit;

2. The last two bytes is CRC check command.

Note: This product has been tested and complies with European CE requirements for EMC directive.

8. Troubleshooting

If some error occurs, such as no output or unreliable. Please disconnect the sensor first, then check if the sensor installation and connection is correct with the instruction manual.

If still not successful, please contact our company.

9. Support contacts: