LonHand 郎汉德®

Soil sensor instructions

Suitable model: LH-SL series

郎汉德
可信赖的物联网终端设备

Revised records:

Revised date	Revised records	version number
2023/04/03	First written	V1.0

catalogue

1. product presentation

Soil integrated sensor is a sensor integrating nitrogen, phosphorus and potassium, temperature and humidity, PH and conductivity. It is suitable for soil moisture monitoring, scientific experiment, water-saving irrigation, greenhouse, flowers and vegetables, grassland and pasture, soil quick testing, plant cultivation, sewage treatment, fine agriculture and other occasions. The input power supply, induction probe, signal output are completely isolated, safe and reliable, beautiful appearance, convenient installation, the probe is made of stainless steel, corrosion resistance, stable performance.

Product characteristics

- Multiple parameters are combined in one body
- High precision and stable signal
- The measurement range is wide, with good data linearity
- Corrosion-resistant, IP68 waterproof, safe and reliable
- Simple and easy installation, long transmission distance
- Low power consumption, suitable for outdoor low power consumption to use

2. Specification parameters

parameter	qualification
Model	LH-SL series sensor
Service voltage	DC 12V
Power consumption	10mA @12V
communicating protocol	RS485 Interface, Modbus-RTU
working temperature	-40～80℃
soil temperature	Range: -40~80℃
	Division rate: 0.1℃ (@25℃)
	Accuracy: ± 0.5℃

Soil moisture	Range: 0-100%
	Resolution: 0.1% (@25℃)
	Accuracy: ± 3%
Soil conductivity	Range 0-10000us / cm
	Resolution: 1us / cm (@25℃)
	accuracy ±10%
soil PH	Scale 3-9
	Resolution: 0.01 (@25℃)
	accuracy ±0.6PH
Soil nitrogen, phosphorus and potassium	Range: 0-1999mg / Kg
	Resolution: 1 mg/L (@25℃)
	accuracy:±2%
Measurement principle and measurement method	Soil conductivity AC bridge method, soil in situ insertion or immersion medium
	FDR method of soil water and integrated nutrient solution
levels of protection	IP68
sealing material	Black flame-retardant epoxy resin
way to install	Fully embedded or probe fully inserted into the measured medium
Default cable length	5 meters

3. product size
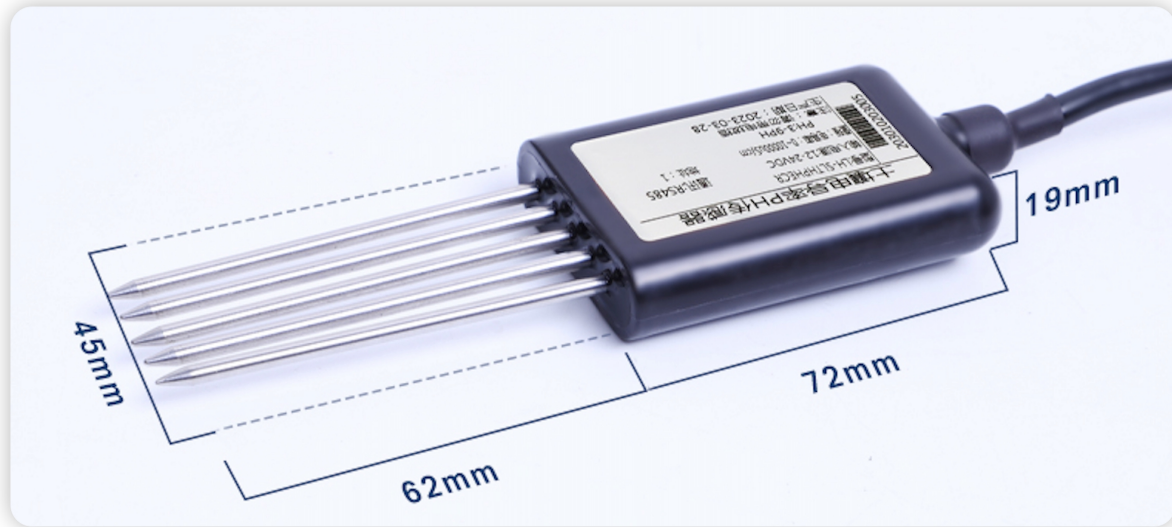
4. Installation method

Since the electrode directly determines the conductivity of soluble salt ions in the soil, the water content of the soil volume is higher than about 20% to correctly reflect the soluble soil conductivity at about 20%. In long-term observations, the measurements after irrigation or rainfall are closer to the true level. If a quick test is conducted, it can be watered at the soil measured after the water is fully infiltrated。

（1）Quick measurement method: select the appropriate measurement site, avoid stones, to ensure that the electrode does not encounter hard objects such as stones, dig the surface soil according to the required measurement depth, maintain the original tightness of the soil below, hold the sensor body vertically inserted into the soil, back and back can not shake before and forth, to ensure close contact with the soil. It is recommended to average the tests multiple times in a small range of a test point。

（2）Burment measurement method: According to the required depth, insert the sensor steel needle horizontally into the pit wall at the established depth and compaction the pit to ensure close contact between the electrode and the soil. After stabilization for a period, measurements and records can be made for consecutive days, months and longer。

If in hard surface measurement, drill first (hole diameter shall be less than

probe diameter), inserted into soil and soil compacted and measured; the sensor shall prevent severe vibration and shock and not hit with hard objects.Because the sensor is packaged in black, the sensor will heat up sharply (up to 50℃) under strong sunlight, to prevent excessive temperature measurement, pay attention to shading and protection when used in the field or in the field。

5. 485 Communication protocol and data format

5.1. Basic parameters of communication

parameter	content
data bit	8
parity check bit	not have
stop bit	1
error check	CRC (redundant cycle code)
Baud rate	9600 bps

5.2. Function code

Function code	explain
03H	Read the register
06H/10H	Write register

5.3. Register address (by model)

❖ Soil Temperature and Humidity [LH-SLTH]

Register address	parameter	data type	explain
00 00	temperature	Int16	And 1 decimal place after the decimal point
00 01	humidity	Int16	And 1 decimal place after the decimal point

❖ Soil temperature and humidity conductivity [LH-SLTHECR]

Register address	parameter	data type	explain
00 00	temperature	Int16	And 1 decimal place after the decimal point
00 01	humidity	Int16	And 1 decimal place after the decimal point
00 02	conductivity EC	Int16	integer

❖ Soil Temperature and Humidity PH [LH-SLTHPH]

Register address	parameter	data type	explain
00 00	temperature	Int16	And 1 decimal place after the decimal point
00 01	humidity	Int16	And 1 decimal place after the decimal point
00 02	PH	Int16	And 2 decimal places after the decimal point

❖ Soil nitrogen, phosphorus and potassium [H-SLNPK]

Register address	parameter	data type	explain
00 00	nitrogen	Int16	integer
00 01	Phosphate	Int16	integer
00 02	potassium	Int16	integer

❖ Soil temperature and humidity conductivity PH [LH-SLTHPHECR]

Register address	parameter	data type	explain
00 00	temperature	Int16	And 1 decimal place after the decimal point
00 01	humidity	Int16	And 1 decimal place after the decimal point
00 02	conductivity EC	Int16	integer
00 03	PH	Int16	And 2 decimal places after the decimal point

❖ Soil temperature, humidity, nitrogen, phosphorus and potassium [LH-SLTHNPK]

Register address	parameter	data type	explain
00 00	temperature	Int16	And 1 decimal place after the decimal point
00 01	humidity	Int16	And 1 decimal place after the decimal point
00 02	nitrogen	Int16	integer
00 03	Phosphate	Int16	integer
00 04	potassium	Int16	integer

❖ Soil PH [LH-SLPH]

Register address	parameter	data type	explain

| 00 00 | PH | Int16 | And 2 decimal places after the decimal point |

5.4.   Modify the device address

The default slave address of the sensor is 1, and the user can modify it as necessary. Change the device of address 1 to 2.

The host sends to the sensor: 01 06 00 07 00 02 B9 CA

Sensor returned: 01 03 02 00 02 39 85

Indicates a successful setting.

Note: The modifiable slave address is 1 byte and ranges from 1 to 255. 00 is the broadcast address.

5.5.   Read the register parameters

❖ When the equipment address is 1, [LH-SLTH] as an example

The host sends 01 03 00 00 00 02 C4 0B

01	03	00 00	00 02	C4 0B
device address	03 Function code	Register start address	register length	CRC check, left low and right high

The device is returned to 01 03 04 01 23 01 46 8A 67

01	03	04	01 23 01 46	8A 67
device address	03 Function code	Data length	01 23: temperature,29.1℃ 01 46: humidity, 32.6% RH	CRC check, left low and right high

6. Electrical connection

Line color	explain
red	Power supply positive (12V DC)
black	Power negative
yellow	485-A
blue	485-B

7. Common problems and solutions

Device cannot connect to PLC or computer, possible reason:

(1)   The equipment does not supply power normally, and the low voltage or unstable voltage will lead to abnormal data.

(2)   The computer has multiple COM ports, and the COM port selection error.

(3)   The communication parameters such as port rate, check mode and data bit are not selected correctly.

(4)   The device address is wrong, or devices with duplicate address (factory default is 1).

(5)   The host polling interval and waiting response time are too short, both need to be set above 300ms.

(6)   RS485 wiring is disconnected, or A, B wire is reversed.

(7)   If the equipment quantity is too much / the wiring is too long, supply power nearby, add 485 enhancer, and add 120 Ω terminal resistance.

(8)   USB to 485 driver is not installed or damaged.

(9)   Equipment damage.

8. after-sale service

8.1.   After-sales service commitment

We follow the sensor after-sale terms, for the sensor host circuit warranty for one year, gas probe warranty for a year, accessories (shell, plug, cable, etc.) three months warranty, but does not include the damage caused by improper use, if need maintenance or adjustment, please send back, but the freight to pay, send back to determine good packaging to avoid delivery damage.

8.2.   disclaimer

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8.3. contact way

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