OHTS1023 Soil pH Sensor

1 Product Overview

The OHTS1023 is a soil acidity detection sensor based on electrochemical principles. It utilizes a zinc-aluminum alloy probe to convert hydrogen ion activity in soil into analog voltage, current loop, or digital signal outputs. The sensor features a fully sealed structural design, enabling direct burial into soil for long-term in-situ monitoring across various soil types. With high measurement accuracy, fast response time, and excellent interchangeability, this sensor is suitable for dynamic soil pH detection in agriculture, forestry, environmental monitoring, and related fields.

2 Applications

- Greenhouse soil environment monitoring and regulation
- Substrate pH detection for floriculture and vegetable cultivation
- Soil quality assessment for grasslands and pastures
- Soil surveys in forestry ecological research
- On-site soil testing for geological exploration
- Substrate monitoring in plant cultivation scientific experiments
- Water quality monitoring in irrigation systems
- Soil assessment at contaminated environmental sites
- Soil nutrient management in precision agriculture
- Nutrient solution monitoring in soilless horticultural cultivation

3 Features

- Compact structural design with small footprint, facilitating field deployment and system integration
- High measurement accuracy, fast response speed, and good interchangeability between probes
- Fully sealed protective structure resistant to acid and alkali corrosion, supporting long-term burial for dynamic monitoring
- Wide adaptability to soil types with minimal influence from soil composition, suitable for broad geographical applications
- Multiple signal output interfaces supported: Analog voltage (0–2V/0–5V/0–10V), current loop (4–20mA), and RS485 digital bus (Modbus-RTU protocol)

4 Technical Specifications

4.1 Measurement Parameters

Parameter	Range	Accuracy	Resolution	Stability
pH Value	3–10	±1	0.01	≤0.02/24h

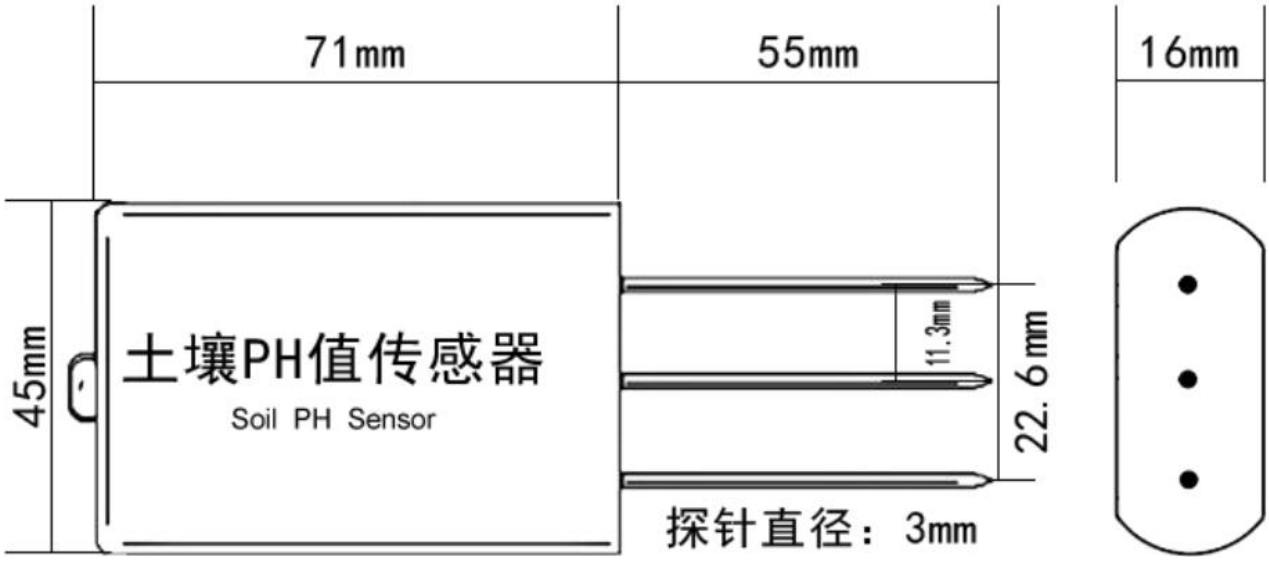
4.2 Electrical Characteristics

Parameter	Specification
Supply Voltage	7–24V DC (for 0–2V voltage output or RS485 output) 12–24V DC (for 0–5V/0–10V voltage output or 4–20mA current output) Customizable 3.3–5V DC
Power Consumption	≤0.5W
Output Signal	Voltage output: 0–2V DC, 0–5V DC, 0–10V DC (select one) Current output: 4–20mA Digital output: RS485 (Standard Modbus-RTU protocol, default address 0x01)
Operating Environment	Temperature: -30–70°C; Humidity: ≤100%RH

4.3 Current Signal Load Capacity

Supply Voltage	9V DC	12V DC	20V DC	24V DC
Maximum Impedance	125Ω	250Ω	500Ω	>500Ω

5 Physical Specifications



Note: Please refer to the diagram above for specific structural dimensions. The sensor employs a zinc-aluminum alloy probe and sealed housing structure, supporting long-term burial in soil.

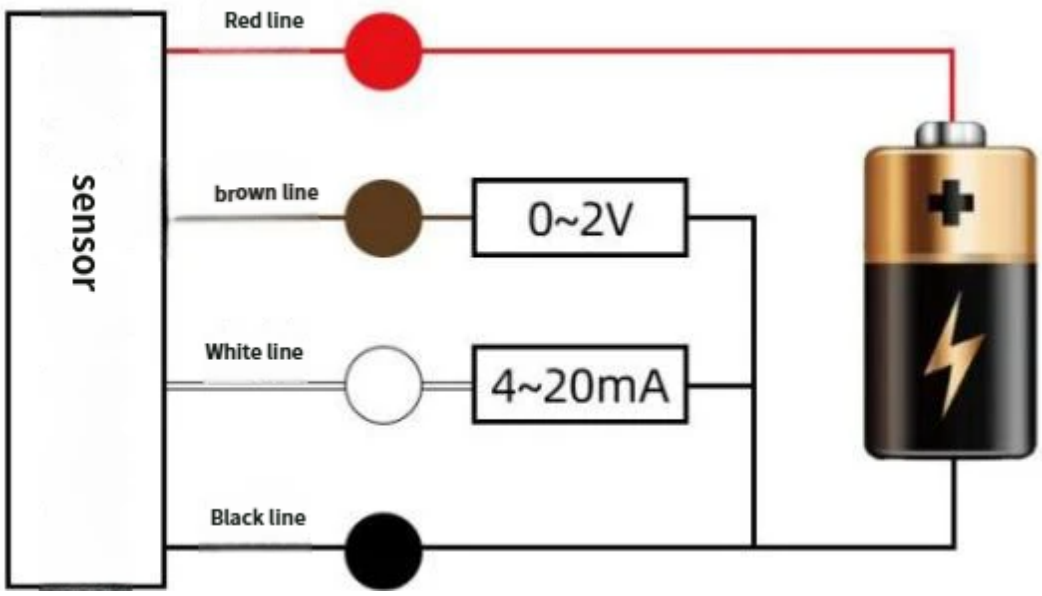
6 Installation

1. **Pre-installation Preparation**: Please read this technical documentation completely before use to confirm compatibility between supply voltage and output signal type.
2. **Soil Insertion**: Insert the sensor probe vertically into the target soil or substrate. The insertion depth should be sufficient to ensure tight contact between the probe and soil, reducing operational errors and improving measurement accuracy.
3. **Avoid Hard Objects**: Do not attempt to insert the probe into stones or hard soil clumps during installation to prevent probe damage.

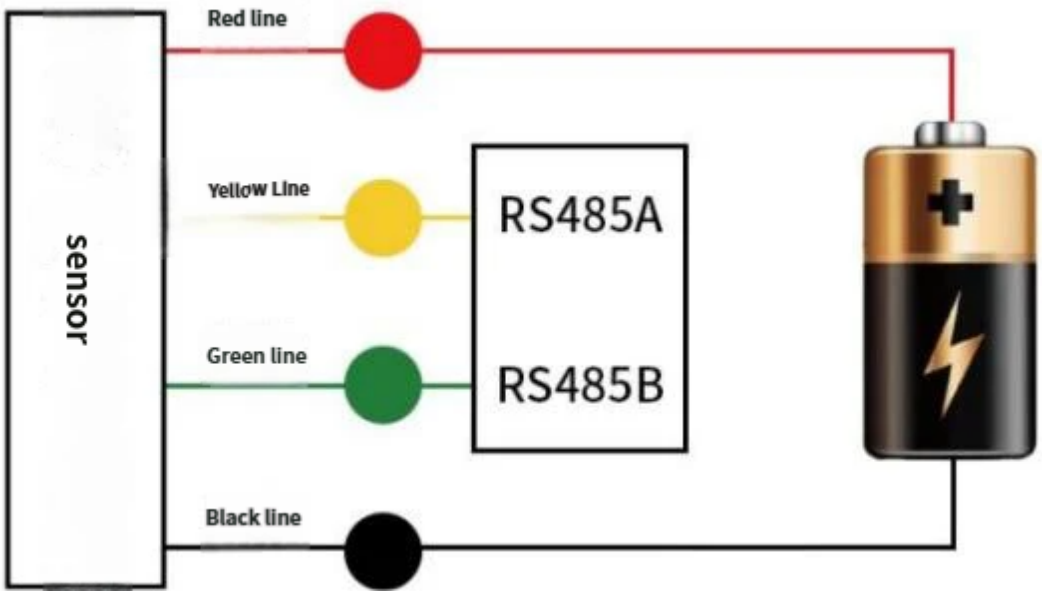
4. **Cable Protection**: When removing the sensor from soil, do not pull directly on the cable. Grasp the sensor housing and pull out slowly.
5. **Device Connection**: Can be connected to various data loggers, data acquisition cards, or remote data acquisition modules with differential inputs.

7 Wiring Definition

7.1 Voltage and Current Output Wiring



7.2 RS485 Digital Output Wiring



Note: Please strictly follow the wire sequence when connecting. Incorrect wiring may result in damage to the sensor and connected equipment.

8 Communication Protocol and Data Conversion

8.1 Analog Signal Data Conversion

The sensor output has a linear relationship with pH value. The conversion formulas are as follows:

0–2V DC Output:

$$pH = 3.5 \times V + 3$$

0–5V DC Output:

$$pH = 1.4 \times V + 3$$

0–10V DC Output:

$$pH = 0.7 \times V + 3$$

4–20mA Output:

$$pH = 0.4375 \times A + 1.25$$

Where V is the acquired voltage (Unit: V), and A is the acquired current (Unit: mA).

8.2 RS485 Communication Protocol (Modbus-RTU)

Communication Parameters:

- Baud Rate: 9600 bps
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Default Slave Address: 0x01

Register Definitions:

- pH Value Data Register Address: 0x0000
- Device Address Modification Register: 0x0030

Command Examples:

Query pH Value Data (Address 0x01):

Address	Function Code	Starting Register High	Starting Register Low	Register Quantity High	Register Quantity Low	CRC16 Low	CRC16 High
0x01	0x03	0x00	0x00	0x00	0x01	0x84	0x0A

Correct Response Example (pH=6.86):

Address	Function Code	Byte Count	Data High Byte	Data Low Byte	CRC16 Low	CRC16 High
0x01	0x03	0x02	0x02	0xAE	0x38	0x98

Modify Device Address (from 0x01 to 0x02):

Original Address	Function Code	Register Address High	Register Address Low	New Address High	New Address Low	CRC16 Low	CRC16 High
0x01	0x06	0x00	0x30	0x00	0x02	0x08	0x04

Note: If the original sensor address is forgotten, broadcast address 0xFE can be used for address inquiry. In this case, only one slave device can be connected to the bus, and the address code in the returned data indicates the current device address.

9 Precautions

9.1 Warnings

- Incorrect wiring sequence may cause damage to the sensor and connected instruments
- Input power exceeding the sensor's maximum rated supply voltage will cause permanent damage to the equipment

9.2 Cautions

- Please read this technical documentation completely before use
- Do not insert the probe into stones or hard soil clumps during installation to prevent probe damage
- When removing the sensor from soil, do not pull directly on the cable; operate by holding the housing
- Ensure full contact between the sensor probe and soil or substrate during insertion to reduce operational errors and improve measurement accuracy

10 After-Sales Guarantee & Support

This product carries a twelve-month warranty period calculated from the date of shipment. During the warranty period, failures caused by sensor quality issues (non-human damage) will be repaired or replaced free of charge by our company. After the warranty period expires, our company provides paid repair services, charging only cost fees.

11 Manufacturer Information

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12 Revision History

Version	Date	Description
V1.0	-	Initial Release