User Guide

Product Introduction

The sensor, with its stable performance and high sensitivity, is an important tool for observing and studying the occurrence, evolution and improvement of saline soils and water-salt dynamics. Measurement of the dielectric constant of the soil provides a direct and stable reflection of the true water content of various soils, as well as a measurement of the volume percentage of soil moisture.

Use Case Scenarios

The sensor is suitable for soil moisture monitoring, scientific experiments, water-saving irrigation, greenhouses, flowers and vegetables, meadows and pastures, rapid soil measurement, plant cultivation, wastewater treatment, fine agriculture and other occasions.

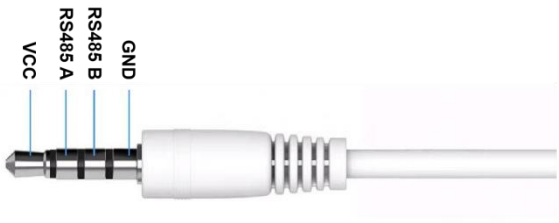
Features

1. Soil water content, conductivity and temperature in one.
2. Completely sealed, acid and alkali corrosion resistant, can be buried in the soil or directly into the water for long-term dynamic detection.
3. High precision, fast response, good interchangeability, sensor insertion design ensures accurate measurement and reliable performance.

Product Specifications

Specifications	
Model	UB-SEC-N1
Power Supply	DC 4.5 ~ 30V
Max Current	110mA (@5V)
Measuring Range	EC: 0 ~ 20000μS/cm Temperature: -40 ~ 80℃ Humidity: 0 ~ 100%
Accuracy	EC: ±3%FS (0~10000μS/cm), ±5%FS (10000~20000μS/cm) Temperature: ±0.5℃ Humidity: ±2% (@0 ~ 50%, palm soil +30% + 25℃) ; ±3% (@50 ~ 100%, palm soil +60% + 25℃)
Resolution	EC: 1μS/cm Temperature: 0.1℃ Humidity: 0.1%
Protection Level	IP68
Connector	Audio
Cable Length	3m
Communication Protocol	RS485 Modbus RTU Protocol
RS485 Address	0xD6
Baud Rate	1200 bit/s, 2400 bit/s, 4800 bit/s (default), 9600 bit/s, 19200 bit/s

Wiring Instruction



Measurement Area

Measurement area: Inside a 5cm diameter cylinder of equal height to the sensors, centred on the centre of the two sensors.

Quick Test Method

Select a suitable measurement site, avoid rocks and ensure that the steel needle does not touch hard objects. Throw away the top layer of soil according to the required measuring depth, keep the original tightness of the soil underneath, and insert the sensor vertically into the soil by holding it tightly. Do not shake the sensor from side to side when inserting it. It is recommended to take several measurements within a small area of one measurement point to find the average value.

Ground Penetration Method

Vertically dig a pit with a diameter of > 20cm. Insert the sensor pin horizontally into the pit wall at the established depth and fill the pit tightly. After a period of stabilisation, measurements and recordings can be made over a period of days, months or even longer.

Communication Protocols

1. Communication Basic Parameters

Communication Basic Parameter	
Coding System	8-bit binary
Data Bit	8 bits
Parity Checking Bit	none
Stop Bit	1 bit
Error Checking	CRC Check
Baud Rate	1200 bit/s, 2400 bit/s, 4800 bit/s (default), 9600 bit/s, 19200 bit/s

2. Data Frame Format

The Modbus-RTU communication protocol is used in the following format:

- Initial structure ≥ 4 bytes in time.
- Address code: 1 byte, default 0xE1.
- Function code: 1 byte, support function code 0x03 (read only) and 0x06 (read / write).
- Data area: N bytes, 16-bit data, high byte comes first.
- Error check: 16-bit CRC code.
- End structure ≥ 4 bytes of time.

Request					
Slave Address	Function Code	Register Address	No. of Registers	CRC LSB	CRC MSB
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Response							
Slave Address	Function Code	No. of Bytes	Content 1	Content 1	...	Content n	CRC
1 byte	1 byte	1 byte	2 bytes	2 bytes	...	2 bytes	2 bytes

3. Register Address

Register Address				
Address	Content	Register Length	Function Code	Description of Definitions
0x0000	Humidity	1	03	Unsigned integer data, divided by 10
0x0001	Temperature	1	03	Signed integer data, divided by 10
0x0002	EC	1	03	Integer
0x07D0	Address	1	03/06	1 ~ 255
0x07D1	Baud Rate	1	03/06	0:2400, 1:4800, 2:9600

NOTE

1. The sensor must be fully inserted into the soil when measuring.
2. Pay attention to the lightning protection when using in the field.
3. Do not violently bend the sensor, do not pull the sensor lead wire, do not drop or hit the sensor violently.