4-IN-1 SOIL NUTRIENT SENSING / DATA SHEET

SS204-04

4-in-1 Soil Nutrient Sensor

Four-parameter soil sensor for moisture, temperature, electrical conductivity and pH monitoring, with RS485 / Modbus-RTU output.

Overview

- Measures soil volumetric moisture, soil temperature, electrical conductivity and pH.
- The fully sealed probe is designed for long-term burial or direct immersion in water.
- Low-power wake/sleep operation supports battery, adapter or solar-powered field deployment.

Moisture Range	EC Range	pH Range	Protection Level
0–100%	0–20,000 μS/cm	3–9	IP68

Key Advantages

- Four-parameter measurement combines moisture, temperature, EC and pH.
- Dielectric-constant measurement reflects volumetric soil-water content.
- Specially treated alloy electrodes resist external impact and corrosion.
- No reagents are required; the source states there is no limit on detection count.
- Low-power design supports wake, sample, upload and sleep workflows.

Application Scenarios

- Soil moisture monitoring.
- Scientific experiments.
- Water-saving irrigation.
- Greenhouses, flowers and vegetables.
- Grassland and pasture.
- Soil rapid testing and plant cultivation.
- Wastewater treatment and precision agriculture.

SENSING PRINCIPLE

Measurement Principle

DIELECTRIC-CONSTANT AND MULTI-PARAMETER SENSING

The source describes soil-moisture measurement by measuring the soil dielectric constant, which directly reflects volumetric water content. The insertion probe simultaneously supports soil temperature, electrical conductivity and pH measurement. The source provides no detailed sensing equation; this section presents only the stated measurement path.

4-in-1 soil nutrient measurement path

Measurement characteristics

Principle reconstructed from the supplied source description; no additional sensing equation is inferred.

SYSTEM DATA

Technical Specifications

Item	Specification
Moisture Measurement Range	0–100% volumetric moisture
Moisture Resolution	0.1%
Moisture Accuracy	±2% from 0–50% (@30% moisture, 25 °C); ±3% from 50–100% (@60% moisture, 25 °C)
Electrical Conductivity Range	0–20,000 µ S/cm
Electrical Conductivity Resolution	1 µ S/cm
Electrical Conductivity Accuracy	±3% FS from 0–10,000 µ S/cm; ±5% FS from 10,000–20,000 µ S/cm (brown soil, 60% RH, 25 °C)
Soil Temperature Range	−40 to +80 °C
Soil Temperature Resolution	0.1 °C
Soil Temperature Accuracy	±0.5 °C (@25 °C)
Soil pH Range	3–9 pH
Soil pH Resolution	0.1
Operating Temperature	−20 to +60 °C
Core Chip Temperature Rating	85 °C
Power Supply	DC 4.5–30 V (standard); DC 3.6–30 V (low-power)
Standard Power Consumption	0.5 W (@24 V DC)
Low-power Consumption	Sleep: 31 µ A; operating: 20 mA; average: 127 µ A
Response Time	≤1 s (standard); ≤5 s (low-power)
Stabilization Time	≤5 min
Protection Level	IP68

Item	Specification
Probe Material	Special corrosion-resistant electrodes
Sealing Material	Black flame-retardant epoxy resin
Default Cable Length	2 m; customizable as required
Dimensions	45 × 15 × 127 mm
Output Signal	RS485 (Modbus protocol)

Output and Communication

The detailed source configuration is RS485 using Modbus-RTU. The standard version accepts DC 4.5–30 V; the low-power version is listed as DC 3.6–30 V, with source wiring examples showing both 3.6–5 V battery power and a 3.6–30 V wide-range supply.

Output	Description	Power Supply
RS485	Modbus-RTU protocol	DC 4.5–30 V (standard)
Low-power RS485	Modbus-RTU protocol	DC 3.6–30 V; 3.6–5 V battery example

MECHANICAL DATA

Mechanical Dimensions & Structure

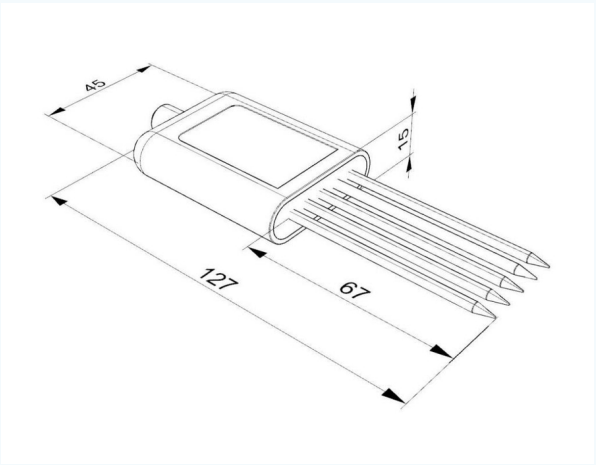
The supplied mechanical drawing shows the transmitter housing and five special-alloy insertion electrodes. Dimension figures 45, 15, 127 and 67 mm are reproduced from the source drawing; the technical specification table gives the overall size as 45 × 15 × 127 mm.

Product view

4-in-1 soil sensor with five insertion electrodes and a sealed transmitter housing.

Supplied product appearance retained; no third-party branding is used in the product view.

Mechanical dimensions



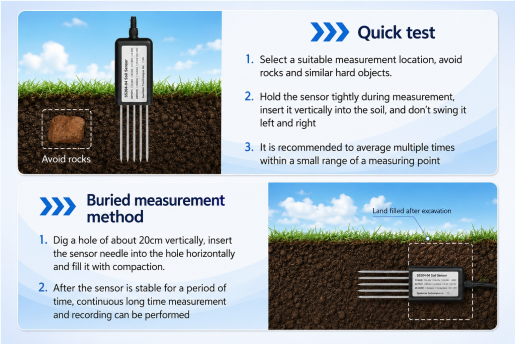
Source dimension drawing retained; dimension figures are listed below.

Source dimension figures: 45, 15, 127 and 67 mm, as shown in the supplied drawing.

INSTALLATION & OPERATION

Installation Notes

- Insert the five alloy electrodes into the soil for measurement; the sealed sensor may also be placed directly in water as described in the source.
- Select the standard or low-power supply and RS485 wiring that match the ordered configuration.
- For low-power field use, wake the sensor for acquisition and upload, then return it to sleep mode as required by the application.
- Keep RS485 A/B polarity correct and ensure that device addresses on the same bus do not conflict.



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Measurement & Configuration Summary

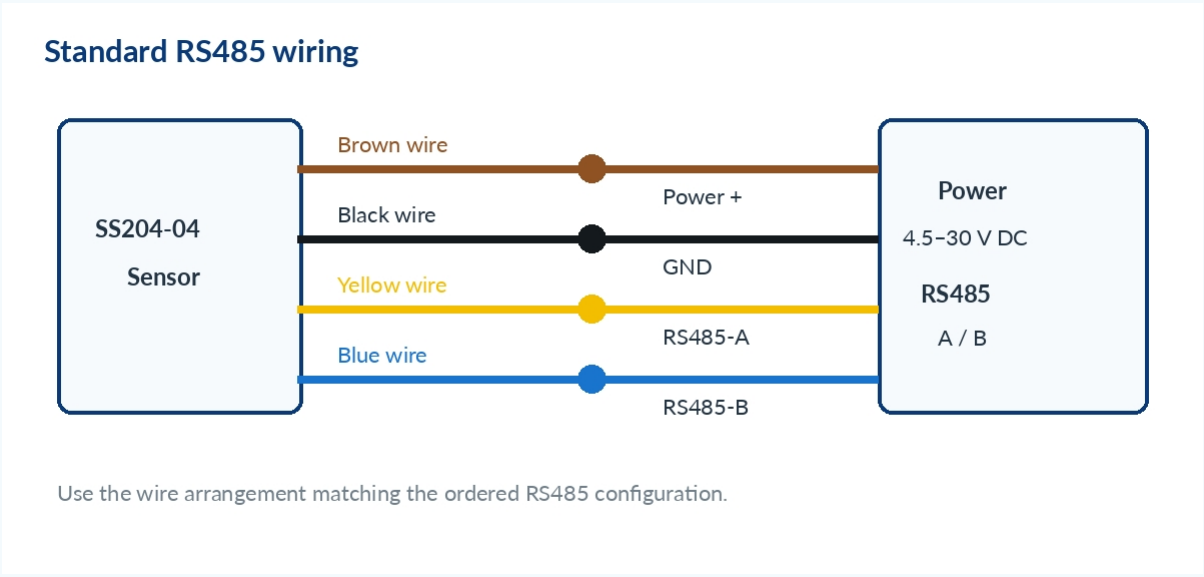
- Four-parameter measurement combines soil moisture, temperature, electrical conductivity and pH.
- The source overview also mentions soil salinity collection; the detailed table specifies the four-parameter configuration.
- Low-power operation supports battery-powered field deployment, with 3.6 V battery use described in the source.
- RS485 with Modbus-RTU is the detailed output configuration listed in the source.

ELECTRICAL CONNECTION

Wiring Instructions

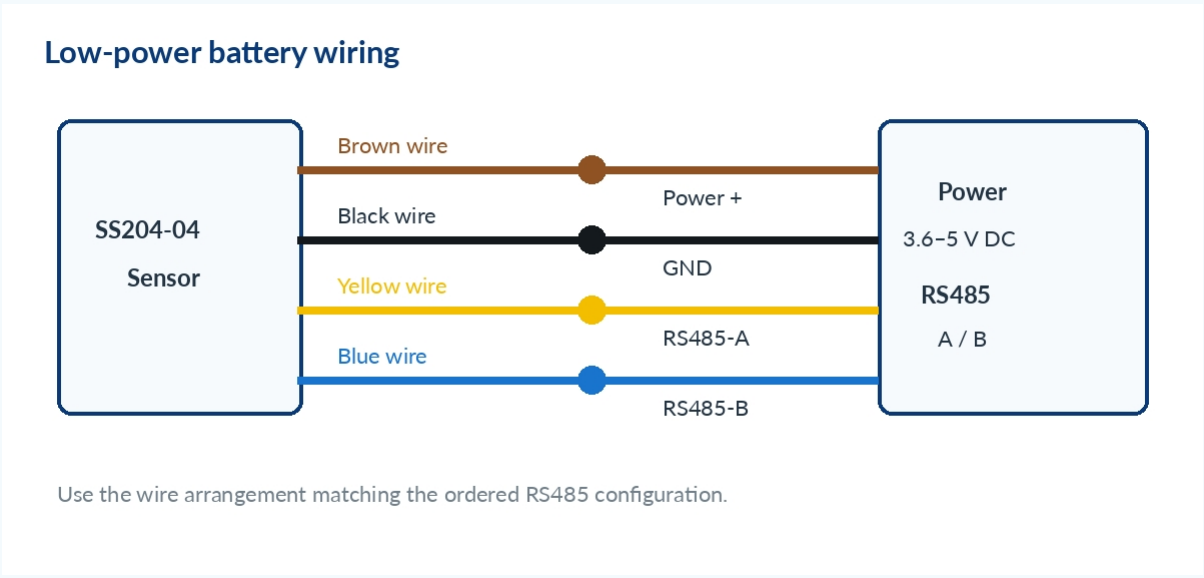
The source provides standard and low-power RS485 wiring examples. Brown is power positive, black is power negative, yellow is RS485-A and blue is RS485-B. Low-power examples show 3.6–5 V battery wiring and a 3.6–30 V wide-range supply; use the arrangement matching the ordered configuration.

Standard RS485 wiring example

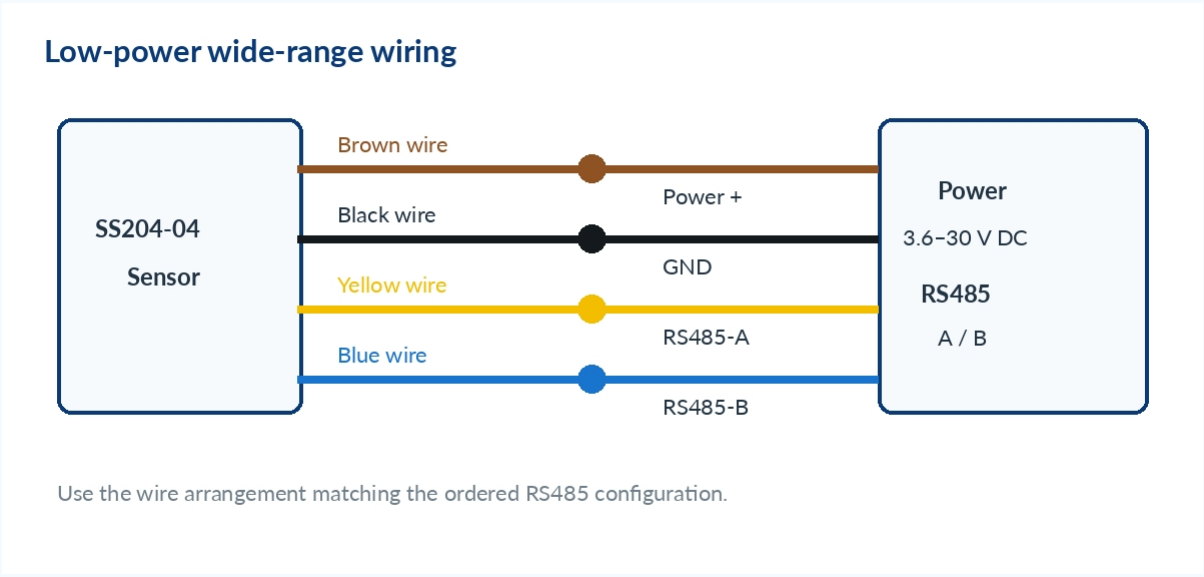


Use the wire arrangement matching the ordered RS485 configuration.

Low-power battery wiring example



Low-power wide-range wiring example



RS485 Wiring

Signal / Power	Wire Color	Definition
Power positive	Brown	4.5–30 V DC standard; 3.6–30 V DC low-power
Power negative	Black	GND
RS485 A	Yellow	485-A
RS485 B	Blue	485-B

WIRING NOTE
Do not reverse the RS485 A/B lines or duplicate device addresses on the bus. For low-power operation, follow the power range and wiring arrangement of the ordered version.

ORDERING INFORMATION

Product Selection

Code	Description
SS204-04	Model
ECTHPH-	Four-in-one EC, temperature, moisture and pH transmitter
N01-	RS485 (Modbus-RTU protocol)
TR-1	Soil measurement enclosure
TR-1L	Low-power soil version

SELECTION NOTE

Configuration code elements are transcribed from the supplied source. Confirm the final code and power version before ordering.

CONTACT / SUPPORT

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