AGRINOVO-PH-S100

Soil pH Sensor



PG13.5

1. Overview

The AGRINOVO-PH-S100 is a spear-tip pH sensor that measures pH directly in soil, growing media and other semi-solid materials. A hardened piercing tip protects the glass electrode while the probe is pushed into the ground, and the transmitter is built into the probe, so it delivers a ready-to-use digital or 4 to 20 mA signal with temperature compensation and no separate pH meter.

Features

- Direct in-soil measurement
- Piercing spear tip, 13 mm shaft
- pH range: 0 to 14.00
- Built-in temperature compensation
- RS485 Modbus-RTU or 4 to 20 mA
- Isolated power and output
- 3-point calibration
- Waterproof, PG13.5 mounting thread

Applications

Open-field and orchard soil
Greenhouse beds and substrates
Nurseries and potting media
Compost and organic amendments
Soil research and trial plots

2. Specifications

Parameter	Specification
Measurement Range	0.00 to 14.00 pH
Resolution	0.01 pH
Accuracy	±0.1 pH
Temperature Range	0 to 60°C
Temperature Resolution	0.1°C
Temperature Accuracy	±0.5°C
Temperature Compensation	Automatic or manual
Calibration	Up to 3 points (4.01 / 6.86 / 9.18 or 4.00 / 7.00 / 10.01)
Output	RS485 Modbus-RTU or 4 to 20 mA, selected when ordering
Isolation	2500 Vrms, power and output
Power Consumption	About 0.6 W

3. Physical Dimensions

Parameter	Dimension
Total Length	240 mm
Insertion Shaft Diameter	13 mm
Head Diameter	23 mm
Mounting Thread	PG13.5
Tip	Piercing spear tip with protected glass electrode

4. Electrical Characteristics

Each probe is built with one output type, selected when it is ordered.

Output Type	Supply Voltage	Signal
RS485	9 to 27 VDC	Modbus-RTU, pH, electrode mV and temperature
4 to 20 mA	24 VDC	4.00 to 20.00 mA, resolution 0.01 mA, accuracy ±0.02 mA

Current to pH

Output	Formula
4 to 20 mA	pH = (mA - 4) × 0.875

5. Wiring (RS485)

Wire Color	Function	Description
Red	V+	Power Supply (9 to 27 VDC)
Black	GND	Power Ground
Green	RS485-A	Data+
White	RS485-B	Data-

6. Communication Settings

Parameter	Value
Protocol	Modbus-RTU
Baud Rate	9600 bps (1200 to 19200 selectable)
Data Bits	8
Parity	None
Stop Bits	1
Default Address	0x01

7. Register Map

Measurement Registers, Integer (Function 0x04)

Address	Description	Scaling
0x0000	pH Value	Value ÷ 100
0x0001	pH decimals and unit code	High byte decimals, low byte unit
0x0002	Electrode Signal (mV)	Direct, -1000 to 1000
0x0003	Signal decimals and unit code	High byte decimals, low byte unit
0x0008	Temperature	Value ÷ 10
0x0009	Temperature decimals and unit code	High byte decimals, low byte unit

A value of 0x7FFF means over range and 0x8000 means under range.

Measurement Registers, Float (Function 0x03)

Address	Description	Format
0x0000 to 0x0001	pH Value	IEEE-754 float32, low word first
0x0002 to 0x0003	Electrode Signal (mV)	IEEE-754 float32, low word first
0x0008 to 0x0009	Temperature (°C)	IEEE-754 float32, low word first

Configuration Registers (Read 0x03, Write 0x06)

Address	Description	Notes
0x0019	Calibration Status	Read only. Bit 1 low point, bit 2 mid point, bit 3 high point
0x001C	Acid Slope	Read only. Value ÷ 10, in %
0x001D	Alkaline Slope	Read only. Value ÷ 10, in %
0x001E	Slave Address	1 to 247
0x001F	Baud Rate	0 = 1200, 1 = 2400, 2 = 4800, 3 = 9600, 4 = 19200
0x0020	Temperature Compensation	0 = manual, 1 = automatic
0x0021	Temperature Setting	Value × 10. Offset in automatic mode, fixed temperature in manual mode
0x0024	Buffer Set	0 = 4.01 / 6.86 / 9.18, 1 = 4.00 / 7.00 / 10.01
0x0043	Calibration Command and Result	See Calibration

8. Reading Data

Read 10 registers from 0x0000 with function 0x04:

```
Request:  01 04 00 00 00 0A 70 0D
Response: 01 04 14 02 BC 02 0A 00 00 00 00 00 00 00 00 00 00 00 00 FA 01 0B 7E 94
```

Decoding:

Register	Hex	Decimal	Scaling	Result
pH	0x02BC	700	÷100	7.00 pH
Electrode Signal	0x0000	0	Direct	0 mV
Temperature	0x00FA	250	÷10	25.0°C

9. Calibration

Calibrate in buffer solutions before first use and at regular intervals. Always calibrate the mid point first; calibrating the mid point clears the earlier calibration.

Step	Buffer	Command
1. Mid point	6.86 or 7.00 pH	`01 06 00 43 00 04 79 DD`
2. Low point	4.00 or 4.01 pH	`01 06 00 43 00 02 F9 DF`
3. High point	9.18 or 10.01 pH	`01 06 00 43 00 08 79 D8`

Calibration Procedure

1. Rinse the tip with distilled water and place it in the buffer
2. Send the command for that buffer
3. Read the result until it is no longer 1

```
Request:  01 03 00 43 00 01 75 DE
Response: 01 03 02 00 00 B8 44
```

Result	Meaning
0	Calibration saved
1	Calibration in progress
2	Buffer not recognised within 180 s
3	Signal not stable within 180 s
4	Electrode slope or offset out of limits

10. Address Configuration

Change Address (0x01 → 0x02)

```
01 06 00 1E 00 02 68 0D
```

Restore Default Settings

Send both commands in order. Calibration is cleared and the sensor restarts.

```
01 06 00 40 00 50 88 22
01 06 00 41 7F FF B9 AE
```

11. Installation Notes

Measuring in Soil

- Measure in moist soil; wet dry soil with distilled water first
- Push the probe in straight, without twisting
- Loosen hard or stony ground before inserting
- Press the soil around the shaft for full contact

Sensor Care

- Rinse the tip with clean water after use
- Keep the tip moist in storage, never dry
- Do not strike or lever on the tip
- Do not hot-plug

12. Ordering Information

Part number	Description
`AGRINOVO-PH-S100`	Soil pH Sensor

13. Revision History

Rev	Date	Changes
1.0	November 2026	Initial release

Modular IoT sensors and controllers for agriculture and aquaculture.
Specifications subject to change without notice.