

Digital ORP Sensor



1. Overview

The AGRINOVO-ORP-100 is a digital Oxidation-Reduction Potential (ORP) sensor for continuous water quality monitoring. It provides high-accuracy ORP measurements through RS485 Modbus-RTU interface with single-point calibration capability.

Key Features

- ORP range: -1999–+1999 mV
- Resolution: 1 mV
- Accuracy: ± 3 mV
- Stability: ≤ 2 mV/24h
- IP68 waterproof
- RS485 Modbus-RTU
- Low power: ≤ 0.5 W
- 7–24 VDC supply

Applications

- Agricultural irrigation
 - Hydroponics and greenhouses
 - Water quality testing
 - Aquaculture
 - Wastewater treatment
 - Chemical and pharmaceutical processing
-

2. Specifications

Parameter	Specification
Measurement Range	-1999~+1999 mV
Resolution	1 mV
Accuracy	±3 mV
Stability	≤2 mV / 24 hours
Power Consumption	≤0.5W
Supply Voltage	7~24 VDC
Operating Temp	0~60°C
Protection	IP68

3. Wiring

Wire Color	Function	Description
Red	V+	Power Supply (7~24V DC)
Black	GND	Power Ground
Yellow	RS485-A	Data+
Green	RS485-B	Data-

4. Communication Settings

Parameter	Value
Protocol	Modbus-RTU
Baud Rate	9600 bps
Data Bits	8
Parity	None
Stop Bits	1
Default Address	0x01

5. Register Map

Measurement Registers (Function 0x03)

Address	Description	Scaling
0x0000	ORP Value (mV)	Direct (signed 16-bit)

Configuration Registers (Function 0x06)

Address	Description	Notes
0x000A	Calibration Offset	Signed offset in mV
0x0050	Slave Address	0x01–0xFE

6. Reading ORP Value

Read 1 register from 0x0000:

```
Request: 01 03 00 00 00 01 84 0A  
Response: 01 03 02 02 AE 38 98
```

Decoding:

Hex	Decimal	Result
0x02AE	686	686 mV

Negative values use two's complement. For example, 0xFF9C = **-100 mV**.

7. Single-Point Calibration

ORP uses single-point offset calibration via register 0x000A.

Procedure

1. Prepare an ORP standard solution (e.g. +220 mV)
2. Clean the electrode with distilled water
3. Immerse in the standard solution and wait for stabilization
4. Read the current sensor value
5. Calculate the offset: $\text{offset} = \text{standard} - \text{reading}$
6. Write the offset to register 0x000A

Example

If the standard is +220 mV and the sensor reads +200 mV, the offset is +20:

```
01 06 00 0A 00 14 [CRC]
```

If the sensor reads +240 mV, the offset is -20 (0xFFEC in two's complement):

```
01 06 00 0A FF EC [CRC]
```

8. Address Configuration

Change Address (0x01 → 0x02)

```
01 06 00 50 00 02 [CRC]
```

Broadcast Discovery

Use address 0xFE with only one device connected.

9. Installation Notes

Safety

- Do not hot-plug
- Verify wiring before power
- Avoid air bubbles in measurement area

Sensor Care

- Clean with distilled water regularly
- Rinse with sample before measuring
- Do not touch electrode with bare hands