

Digital Soil Oxygen Sensor



1. Overview

The AGRINOVO-O2-100 is a digital oxygen sensor for monitoring oxygen concentration in the soil root zone and growing environment. An electrochemical sensing cell with built-in temperature compensation measures oxygen as a volume percentage (%VOL) and reports it over an RS485 Modbus-RTU interface.

Key Features

- Oxygen range: 0-25 %VOL
- Resolution: 0.1 %VOL
- Accuracy: $\pm 2\%$ FS (at 25°C)
- Electrochemical sensing cell
- Built-in temperature compensation
- Response time under 15 seconds
- RS485 Modbus-RTU output
- Low power: ≤ 15 mA average

Applications

- Soil root-zone oxygen monitoring
 - Soil aeration and drainage assessment
 - Greenhouse and substrate growing systems
 - Compost and organic matter monitoring
-

2. Specifications

Parameter	Specification
Measured Parameter	Oxygen concentration
Range	0-25 %VOL
Resolution	0.1 %VOL
Accuracy	±2% FS (at 25°C)
Repeatability	≤1% FS
Temperature Drift	0.2% FS per °C
Response Time	Under 15 seconds
Sensing Method	Electrochemical cell with temperature compensation

3. Electrical Characteristics

Parameter	Specification
Supply Voltage	7-24 VDC
Average Current	≤15 mA
Operating Temperature	-20°C to 50°C
Operating Humidity	15-80% RH (non-condensing)
Dimensions	97 mm length, 30 mm diameter

Caution: Connect the sensor with correct polarity and within the rated supply voltage. Reverse polarity or overvoltage will permanently damage the sensing cell.

4. Wiring

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

5. Communication Settings

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

6. Register Map

Measurement Register (Function 0x03)

Address	Description	Scaling
0x0000	Oxygen Concentration	Value ÷ 10 = %VOL

Address Configuration (Function 0x06)

Address	Description	Range
0x0000	Slave Address	0x01-0xFE

The oxygen value is read from register 0x0000 with function 0x03. The slave address is changed by writing the new address to register 0x0000 with function 0x06.

7. Reading Data

Read 1 register from 0x0000 (function 0x03):

```
Request: 01 03 00 00 00 01 84 0A
Response: 01 03 02 00 D1 78 18
```

Decoding:

Register	Hex	Decimal	Scaling	Result
0x0000 Oxygen	0x00D1	209	÷ 10	20.9 %VOL

8. Address Configuration

Change Address (0x01 to 0x02)

Write the new address to register 0x0000 with function 0x06:

```
Request: 01 06 00 00 00 02 08 0B
```

Power cycle the sensor after changing the address.

Broadcast Discovery

Use address 0xFE with only one device connected to query an unknown address.

9. Installation Notes

Placement

- Install the probe in the active root zone at the depth of interest
- Ensure firm soil contact around the sensing end
- Keep the sensing membrane clear of standing water
- Install at multiple depths to build an oxygen profile

Environment & Maintenance

- Operating range: -20°C to 50°C
- Avoid condensation and water saturation at the membrane
- Keep the sensing cell free of sticky particles and debris
- Do not open the housing or touch the membrane

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