

Digital Conductivity Sensor



1. Overview

The AGRINOVO-EC-100 is a digital water conductivity sensor capable of measuring Electrical Conductivity (EC), Total Dissolved Solids (TDS), and temperature. It integrates internal signal conditioning, linearization, temperature compensation, and digital communication.

Key Features

- EC measurement ($\mu\text{S}/\text{cm}$)
- TDS derived ($\text{EC} \div 2$)
- Temperature compensation
- Accuracy: $\pm 1.0\%$ FS
- Multiple electrode constants
- Slope/intercept calibration
- RS485 Modbus-RTU
- Low power: $\leq 0.5\text{W}$

Applications

- Agricultural irrigation
- Hydroponics
- Aquaculture
- Water quality monitoring

EC–TDS Conversion

- $\text{EC} = 2 \times \text{TDS}$
- $\text{TDS} = \text{EC} \div 2$

2. Specifications

Parameter	Specification
Accuracy	$\pm 1.0\%$ FS
Temp Compensation	0–60°C (automatic)
Power Consumption	$\leq 0.5\text{W}$
Supply Voltage	12–24 VDC
Operating Humidity	$\leq 85\%$ RH

Electrode Constants and Ranges

K Value	EC Range	TDS Range	Resolution
0.1 cm ⁻¹	0.2–200 µS/cm	0.1–100 ppm	0.01
1.0 cm ⁻¹	2–10,000 µS/cm	1–5,000 ppm	1
10.0 cm ⁻¹	20–100,000 µS/cm	10–50,000 ppm	1

3. Wiring

Wire Color	Function	Description
Red	V+	Power Supply (12-24V 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	Electrical Conductivity	Direct (μS/cm)
0x0001	Temperature	Value ÷ 10 (°C)

Configuration Registers (Function 0x06)

Address	Description	Range/Notes
0x0004	Slope (Gain)	Value × 1000 (default: 1000)
0x000B	Intercept (Offset)	μS/cm (default: 0)
0x0050	Slave Address	0x01–0xFE

6. Reading Data

Read 2 registers from 0x0000:

Request: 01 03 00 00 00 02 C4 0B
Response: 01 03 04 02 AE 01 64 5C 91

Decoding:

Register	Hex	Decimal	Scaling	Result
EC	0x02AE	686	Direct	686 μS/cm
Temperature	0x0164	356	÷10	35.6°C

TDS Calculation: $\text{TDS} = 686 \div 2 = 343 \text{ ppm}$

7. Address Configuration

Change Address (0x01 → 0x02)

Request: 01 06 00 50 00 02 08 1A
Response: 01 06 00 50 00 02 08 1A

Broadcast Discovery

Use address 0xFE with only one device connected.

8. Calibration

Set Slope (1.200)

Slope = 1200 (1.200×1000) = 0x04B0

01 06 00 04 04 B0 CB 7F

Set Intercept (10 μ S/cm)

01 06 00 0B 00 0A 78 0F

9. Installation Notes

Sensor Placement

- Stable water flow, no bubbles
- Fully submerged tip
- Correct flow orientation

Electrical

- Separate RS485 from power lines
- Shielded twisted pair cable
- Proper bus termination

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