

Digital Conductivity & Salinity Sensor



1. Overview

The AGRINOVO-EC-110 is a high-range digital conductivity and salinity sensor for industrial water, brine, and marine environments. A single PTFE-housed probe with a K=10.0 two-graphite electrode measures conductivity up to 200 mS/cm and salinity up to 100 ppt, with simultaneous TDS and temperature output, all delivered over RS485 Modbus-RTU.

Key Features

- Conductivity: 0 to 200 mS/cm
- Salinity: 0 to 100 ppt
- TDS in ppm
- Accuracy: $\pm 1.5\%$ FS
- K=10.0 graphite electrode
- PTFE housing
- RS485 Modbus-RTU output
- Low power: ≤ 0.5 W

Applications

- Industrial brine and salt processing
 - Aquaculture, marine, and seawater
 - Desalination plants
 - Wastewater and environmental monitoring
 - Food processing, fermentation, dye, plating
 - Chemical and process water
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2. Specifications

Parameter	Specification
Conductivity Range	0 to 200,000 $\mu\text{S/cm}$ (0 to 200 mS/cm)
Salinity Range	0 to 100 ppt
TDS Output	ppm (composition dependent)
Accuracy	$\pm 1.5\%$ FS
Temperature Range	0 to 60°C
Temperature Compensation	Automatic
Operating Humidity	$\leq 85\%$ RH
Power Consumption	≤ 0.5 W
Electrode Constant	K = 10.0
Electrode Material	Two-graphite
Housing Material	PTFE
Output	RS485 Modbus-RTU
Supply Voltage	12-24 VDC

3. Wiring

Wire Color	Function	Description
Red	V+	Power Supply
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	Range
0x0000	Conductivity	Value $\times 10 \rightarrow \mu\text{S}/\text{cm}$	0 to 200,000 $\mu\text{S}/\text{cm}$
0x0001	Temperature	Value $\div 10 \rightarrow ^\circ\text{C}$	0 to 60 $^\circ\text{C}$
0x0002	TDS	Value $\times 10 \rightarrow \text{ppm}$	composition dependent
0x0003	Salinity	Value $\div 10 \rightarrow \text{ppt}$	0 to 100 ppt

The salinity-to-TDS ratio depends on water composition. For NaCl-dominant water (seawater, marine aquaculture, industrial brine), the ratio is typically 1.5 to 2.0.

Configuration Registers (Function 0x06)

Address	Description	Range / Notes
0x0000	Slave Address	0x01 to 0xFE
0x0004	Slope	Value $\times 1000$ (default: 1000)

6. Reading Data

Read 4 registers from 0x0000:

Request: 01 03 00 00 00 04 [CRC]
Response: 01 03 08 00 1A 00 BF 00 0D 00 02 [CRC]

Decoding (tap water example):

Register	Hex	Decimal	Scaling	Result
Conductivity	0x001A	26	× 10	260 µS/cm
Temperature	0x00BF	191	÷ 10	19.1°C
TDS	0x000D	13	× 10	130 ppm
Salinity	0x0002	2	÷ 10	0.2 ppt

7. Address Configuration

Change Address (0x01 to 0x02)

Write to register 0x0000:

01 06 00 00 00 02 [CRC]

Broadcast Discovery

Use address 0xFE with only one device on the bus.

8. Calibration

Slope Adjustment

The slope register at 0x0004 trims the sensor against a known reference standard. Slope is stored as $\text{value} \times 1000$. To set a slope of 1.200, write 1200 (0x04B0):

01 06 00 04 04 B0 [CRC]

Default slope is 1.000 (raw value 1000).

9. Installation Notes

Sensor Placement

- Electrode faces flow direction
- Fully submerged in water
- Avoid dead space and air pockets
- Use bypass mounting for stable flow

Cable and Maintenance

- Keep electrode surface clean
- Avoid bare hand contact and oils
- Route signal cable separate from power lines
- Do not extend the factory cable

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