Agrinovo

AGRINOVO-TUR-110

Self-cleaning Turbidity Sensor

1. Overview

The AGRINOVO-TUR-110 is a self-cleaning digital turbidity sensor based on infrared scattered light technology. The infrared light emitted by the source scatters when passing through the sample, and the scattered light intensity is proportional to the turbidity level. A detector positioned at 90° receives the scattered light, and the sensor calculates the turbidity value by analyzing the signal strength.

Key Features

- Measurement range: 0.01–3000 NTU
- Resolution: 0.01 NTU / 0.1 NTU
- Accuracy: ±5% or ±0.5 NTU (whichever is greater)
- Repeatability: ±3%
- Self-cleaning wiper (optional)
- RS485 Modbus-RTU output
- IP68 / NEMA6P protection
- SUS316L stainless steel body

Applications

- Drinking water treatment inlet/outlet monitoring
- Sedimentation basin turbidity monitoring
- Wastewater treatment process control
- Industrial process water quality monitoring
- Environmental surface water monitoring

2. Specifications

Parameter	Specification
Range	0.01–3000 NTU (customizable)
Accuracy	±5% of reading or ±0.5 NTU, whichever is greater
Repeatability	±3%
Resolution	0.01 NTU or 0.1 NTU (depending on range)
Pressure Rating	≤0.2 MPa
Calibration	Standard solution / sample calibration
Materials	Body: SUS316L; End caps: PPS + glass fiber; Cable: PUR
Supply Voltage	9–36 VDC
Protocol	Modbus RS485
Storage Temp	–15 to 50°C
Operating Temp	0 to 45°C (non-freezing)
Dimensions	Without wiper: 49mm dia. × 222.5mm
	With wiper: 49mm dia. × 230.5mm
Weight	0.8 kg
Protection	IP68 / NEMA6P
Cable Length	10 m standard, extendable to 100 m

3. Wiring

Wire Color	Function	Description
Brown	V+	Power Supply (+12V DC)
Black	AGND	Analog Ground
Blue	RS485-A	Data+
White	RS485-B	Data–

4. Communication Settings

Parameter	Value
Protocol	Modbus-RTU
Baud Rate	9600 bps (configurable: 4800/9600/19200/38400)
Data Bits	8
Parity	None
Stop Bits	1
Default Address	0x01 (range 1–200)

5. Register Map

Measurement Registers (Function 0x03)

Address	Description	Type	Length	R/W	Notes
0x0000	Turbidity Value	Float	2	R	0–range NTU
0x0004	Turbidity Factor	Float	2	RW	0.1–9.99
0x0008	Turbidity Offset	Float	2	RW	±80% FS NTU

Configuration Registers (Function 0x03 read / 0x06 write)

Address	Description	Type	Length	R/W	Notes
0x000B	Wiper Time	Int	1	R	
0x000C	Response Time	Int	1	RW	3–60 seconds
0x000D	Parameter	Int	1	R	1 = turbidity, 2 = suspended solids
0x000E	Probe Humidity	Int	1	R	Recommended < 10
0x0010	Baud Rate	Int	1	RW	0=4800, 1=9600, 2=19200, 3=38400
0x0011	Slave Address	Int	1	RW	1–200
0x0012	Serial Number High	Int	1	R	First 4 digits
0x0013	Serial Number Low	Int	1	R	Last 4 digits
0x0014	Manual Wipe	Int	1	W	Send 66 to trigger
0x0015	Auto Wipe Interval	Int	1	W	Interval in minutes

Calibration Registers

Address	Description	Type	Length	R/W	Notes
0x003C	Factor 1	Float	2	RW	Calibration factor 1
0x003E	Factor 2	Float	2	RW	Calibration factor 2
0x0042	Standard Solution Value	Float	2	RW	Write standard value for 2-point cal

6. Reading Data

Read turbidity value (2 float registers from 0x0000):

```
Request:  01 03 00 00 00 02 [CRC]
Response: 01 03 04 XX XX XX XX [CRC]
```

Decoding:

Register	Bytes	Format	Result
0x0000–0x0001 Turbidity	4 bytes	IEEE-754 Float32	**NTU**

7. Address Configuration

Change Address (0x01 → 0x02)

```
01 06 00 11 00 02 [CRC]
```

Change Baud Rate (9600 → 19200)

```
01 06 00 10 00 02 [CRC]
```

Broadcast Discovery

Use address 0xFE with only one device connected.

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8. Calibration

The sensor is factory-calibrated. A two-point calibration using turbidity standard solutions is available for field recalibration.

Two-Point Calibration Procedure

1. Connect sensor to PC via RS485-to-USB adapter.
2. Set parameters (select address 66) and clean the sensor lens.
3. Immerse sensor slowly in the **first** standard solution (recommended: 50–100 NTU range).
4. Write the standard value to register 0x0042. When the displayed turbidity value matches the input value, the first point is calibrated.
5. Clean and dry the sensor, then immerse in the **second** standard solution (recommended: 2000–2500 NTU range).
6. Write the standard value to register 0x0042. When the displayed turbidity value matches the input value, the second point is calibrated.

Alternative: Direct Factor Adjustment

You can also directly write correction factors to registers 0x003C (Factor 1) and 0x003E (Factor 2) for fine-tuning the calibration curve.

Calibration Notes

- Keep probe lens at least 15 cm from the bottom of the calibration cup
- Ensure no air bubbles on the lens surface
- Shield the calibration cup from ambient light during calibration

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9. Installation Notes

Placement

- Three mounting options: quick-release poolside, classic poolside, or railing-mount (DN32 pipe)
- Submerge sensor fully in the measurement medium
- Avoid areas with excessive air bubbles or turbulence

Maintenance

- Clean the two optical lenses periodically
- Rinse with clean water, then wipe with detergent for stubborn deposits
- Inspect for damage; replace sealing rings annually
- Replace rubber wiper blade quarterly for sensors with self-cleaning
- Do NOT manually rotate the self-cleaning wiper — motor-driven only