



Water Turbidity Sensor Introduce



RD-TS-O-05



1. Product Introduce

The turbidity sensor is an online digital turbidity sensor newly developed and produced by our company. It adopts imported components and advanced production technology and surface mount technology. It has an IP68 waterproof rating and cables are protected against seawater. It can be directly put into water without protection. Tube to ensure the long-term stability, reliability and accuracy of the sensor.

The sensor probe adopts the scattered light turbidity measurement method. The turbidity in the water causes the light to scatter. By measuring the scattered light intensity perpendicular to the incident light and comparing it with the internal calibration value, the turbidity in the water sample is calculated degree, eliminate ambient light interference through infrared light and filter, output signal is stable after linearization processing, high precision.

2. Product Features

1. High integration, small size, low power consumption, easy to carry;
2. Realize low cost, low price and high performance;
3. Long life, convenience and high reliability;
4. Up to four isolations, able to resist complicated interference on site, waterproof grade IP68;
5. The electrode adopts high-quality low-noise cable, which can make the signal output length reach more than 20 meters.

3. Product advantages

Our circuit board and internal optical path have been upgraded to avoid light, which can be completely shielded from light and can be used directly in the sun without affecting the measurement of the actual turbidity value.

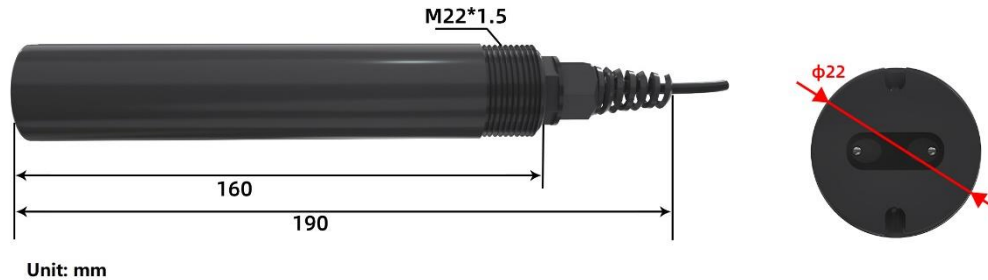
4. Product parameters

1. Measuring range: 0~1000.00NTU(Other measure range can be custom made)
2. Accuracy: $\pm 5\%$
3. Resolution: 0.01NTU
4. Stability: ≤ 1 NTU /24 hours
5. Output signal: RS485 (standard Modbus-RTU protocol, device default address: 01)
6. Power supply voltage: 12~24V DC(3V Power Supply, Optional)
7. Working environment: temperature 0~60°C;
8. Power consumption: ≤ 0.5 W

5. Scope of application

It can be widely used in chemical fertilizer, metallurgy, environmental protection water treatment engineering, pharmaceutical, biochemical, food, aquaculture and tap water and other solutions for continuous monitoring of turbidity.

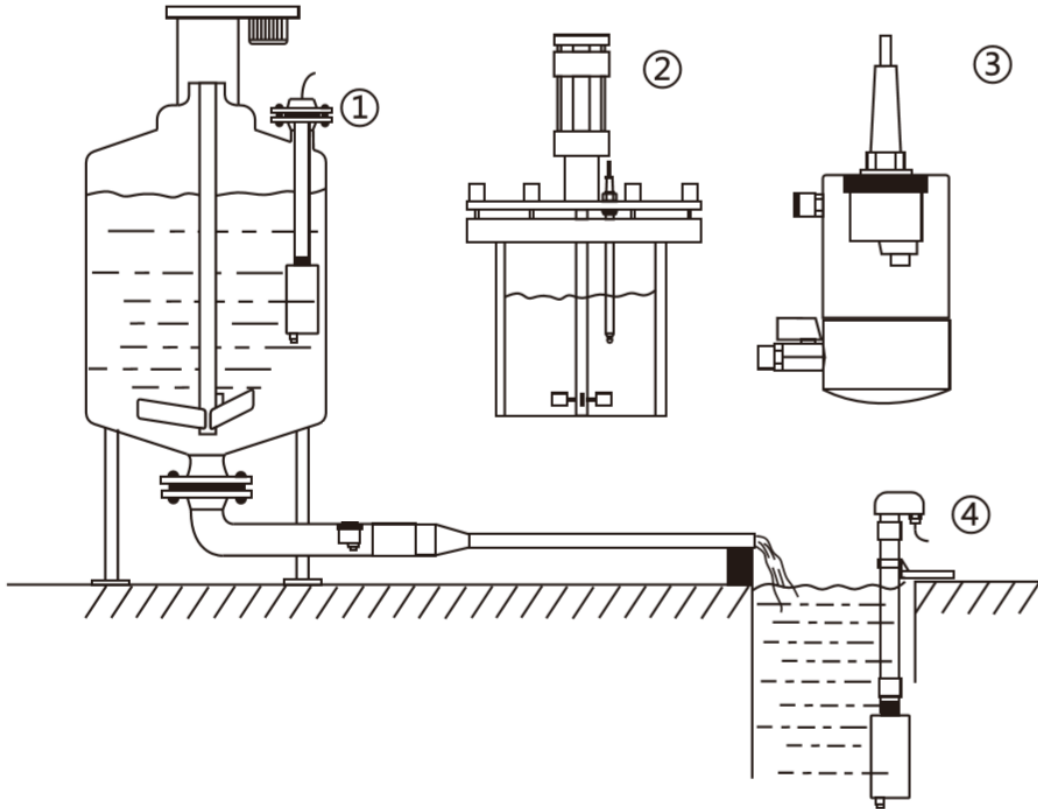
6. Product size



7. Working principle of electrode

The turbidity sensor is composed of a light source, a lens, and a photoelectric element. When the light passes through the liquid sample to be measured, the scattered light at a 90° direction with the incident light acts on the photoelectric element and generates an electrical signal that varies with turbidity. The reference signal is sent to the signal processor together. The signal processor uses the integrated circuit as the core to form a stable electronic circuit, which amplifies, filters, calculates, and compensates the signal to make it linearly related to the turbidity of the liquid sample to be measured throughout the measurement range.

8. Measurement methods



- ① Top flange mounting
- ② Top-plug installation
- ③ Flow-through installation
- ④ Submerged installation

★Note: The turbidity sensor needs to be more than 30cm away from the bottom and the wall

9. Wiring

Wire colour	Interface
Red	Power positive (12-24VDC)
Black	Power negative
Yellow	RS485A
Green	RS485B

10. RS485 Communication protocol

10.1 Standard Modbus-RTU protocol

Baud rate: 2400bps / 4800bps / 9600bps can be set, factory default is 9600bps;

Check digit: none;

Data bit: 8;

Stop bit: 1

10.2 Communication protocol examples and explanations



1. Modify the address, for example: change the address of the transmitter with address 1 to 2, host → slave

Original address	Function code	Reserved 1	Reserved 2	Reserved 3	New address	CRC16 low	CRC16 high
0X01	0X06	0X00	0X00	0X00	0X02	0X08	0X0B

Note: If you forget the original address of the sensor, you can use the broadcast address 0XFE instead. When using 0XFE, the host can only receive one slave, and the return address is still the original address, which can be used as a method of address query.

2. Read the Turbidity value at device address 0x01

(1) Inquiry frame

Address code	Function code	Register start address	Register length	Low check bit	Check code high
0X01	0X03	0X00 0X00	0X00 0X01	0X84	0X0A

(2) Response frame

Address code	Function code	Number of valid bytes	Turbidity content	Low check bit	High Check bit
0X01	0X03	0X02	0x1A 0x0A	0x33	0x23

Data representation method: convert data to decimal ÷ 100

The above data shows that the turbidity: 66.66NTU

3. Make the calibration

(1) Put the sensor in the standard water turbidity solution

For example, put it in the water turbidity = 100 NTU and read the AD value by the following instruction:

Address code	Function code	Register start address	Modify value	Low check bit	Check code high
0X01	0X03	0X00 0X02	0X00 0X01	0X25	0XCA

For example, it will feedback:

Address code	Function code	Number of valid bytes	AD Value	Low check bit	High Check bit
0X01	0X03	0X02	0x1A 0x0A	0x33	0x23

The AD value is : 1A 0A

(2) Write the AD value in the sensor by the following instruction



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Original address	Function code	Reserved 1	Reserved 2	AD value		CRC16 low	CRC16 high
0X01	0X06	0X00	0X5D	0X1A	0X0A	0X93	0X7F

If success, it will feedback: 01 06 00 5D 1A 0A 93 7F

Above is for the example for the 100 NTU, for the others , please check the following:

Standard solution	Send instruction (XX XX is the AD value in the correspond solution)
0 NTU	01 06 00 5A XX XX CRC16
20 NTU	01 06 00 5B XX XX CRC16
60 NTU	01 06 00 5C XX XX CRC16
100 NTU	01 06 00 5D XX XX CRC16
400 NTU	01 06 00 5E XX XX CRC16
800 NTU	01 06 00 5F XX XX CRC16

4. Make the offset of the Turbidity value at device address 0x01, add 1 NTU,

(1) Inquiry frame

Address code	Function code	Register start address	Modify value	Low check bit	Check code high
0X01	0X06	0X00 0X09	0X00 0X64	0X58	0X23

(2) Response frame

01 06 00 09 00 64 58 23

Data representation method: convert data to decimal ÷ 100

The above data shows that add the turbidity in 1 NTU.

Negative numbers are represented by complement