ZS-206A Online Turbidity Sensor
User Manual

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User Notes

- Please read this manual carefully before use and save it for reference
- Please follow the operating procedures and precautions in this manual.
- When receiving the instrument, please carefully open the package to check whether the instrument and accessories are damaged due to shipping. If any damage is found, please inform the manufacturer and distributor immediately, and keep the package for return.
- When the instrument fails, don’t repair it yourself. Please contact the after-sales department of the manufacturer directly.

Content

Ⅰ、Working principle

ZS-206A integrated online turbidity sensor is designed and manufactured using the principle of scattered light turbidity measurement. When a beam of light is incident on a water sample, the light is scattered by the turbidity substance in the water sample, and the intensity of the scattered light in the direction perpendicular to the incident light is measured and compared with the internal calibration value to calculate the turbidity in the water sample. Degree, linearized to output the final value.。

- 90° angle scattered light principle, built-in temperature sensor
- Support RS-485, Modbus/RTU protocol
- Optical fiber structure, strong resistance to external light interference
- Infrared LED light source with high stability
- IP68 protection, water depth within 20 meters
- Convenient, fast, stable and easy to maintain

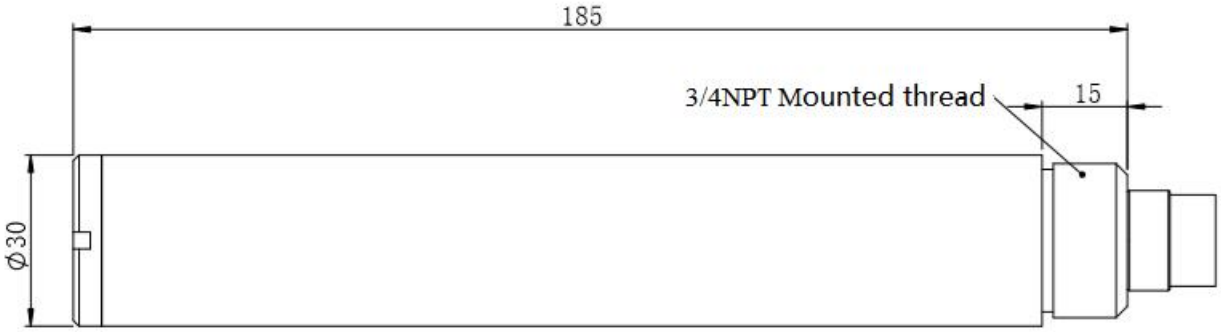
Ⅱ、Technical performance and specifications

1. Technical parameters

Model	ZS-206A	
Measuring principle	Scattering light method	
Measuring range/Resolution	0～20.00NTU	0.01NTU/0.1℃
	0～100.0NTU	0.1NTU/0.1℃
	0～3000.0NTU	0.1NTU/0.1℃
Accuracy	±5% or ±3NTU(0～1000NTU) ±3% or ±2NTU(0～100NTU) ±3% or±1.5NTU(0～20NTU) ±0.3℃	
Calibration mode	Two-point calibration	
temperature compensation	Automatic temperature compensation(Pt1000)	
Output mode	RS-485(Modbus /RTU)	
Working conditions	0～50℃，<0.2MPa	
Storage temperature	-5～65℃	
Wetted material	POM、ABS	
Installation mode	Immersive installation, 3/4NPT thread	
Cable length	5 meters, other lengths, customizable	
power dissipation	＜0.3W@12V	
source	12～24VDC ±10%	

levels of protection	IP68

2. Dimensional drawing



Note:The sensor connector is m16-5 core waterproof connector male.

Ⅲ、Installation and electrical connection

1. Install

Installation distance requirements: keep above 5cm with side wall and above 10cm with bottom.

2. Electrical connection

a) Red wire-power cord（12～24V）
b) Black wire-ground wire（GND）
c) Blue Line-485A
d) White Line-485B

After the wiring is completed, it should be carefully checked to avoid the wrong connection before the power is turned on.

Cable specification: Considering that the cable is immersed in water (including sea water) for a long time or exposed to the air, all the wiring points are required to do waterproof treatment, the user cable should has certain corrosion resistance.

Ⅳ、Maintenance

1. Maintenance procedures and methods

1.1 Maintenance schedule

The cleanliness of the measuring window is very important for maintaining accurate readings.

Maintenance task	Recommended maintenance frequency
Calibrate sensors (If required by the competent authority)	According to the maintenance schedule required by the competent department

1.2 Maintenance method

- Sensor outer surface: clean the outer surface of the sensor with tap water, if there is still debris residue, wipe with wet soft cloth, for some stubborn dirt, you can add some household washing liquid to tap water to clean.
- Check the cable of the sensor: the cable should not be tightened when it is working properly, otherwise it is easy to break the wire inside the cable and make the sensor unable to work properly.
- Check the sensor measurement window if there is any dirt, cleaning brush is normal.

1.3 Note:

The probe contains sensitive optical and electronic components. Make sure the probe is not subjected to severe mechanical impact. There are no components inside the probe that need to be maintained by the user。

2. Calibration of sensors

a) Zero calibration: take proper amount of zero turbidity solution with large beaker, put the sensor vertically in the solution, the front end of the sensor is at least 10 cm from the bottom of the beaker, and the zero calibration will be carried out after the value is stabilized for 3-5 minutes. The instructions refer to the appendix.

b) Slope calibration: the sensor probe is placed in the standard solution, the front end of the sensor is at least 10 cm from the bottom of the beaker, and the slope calibration is carried out after 3 -5 minutes of numerical stability. The instructions refer to the appendix.

3. Frequently asked questions

Wrong	Probable cause	Resolvent
The operating interface cannot connect or does not display the measurement results	The measured value is too high, too low, or the numerical value remains unstable.	Reconnect the controller and cable.
	Cable failure	Please contact us.
The measured value is too high, too low, or the numerical value remains unstable.	The sensor window is attached to the external object.	Clean the window surface of the sensor.

Ⅴ、Quality and service

1. Quality assurance

- The quality inspection department has a standard inspection procedure, with advanced and complete detection equipment and means, and according to the procedure inspection, the product is subjected to 72-hour aging experiment and stability experiment, so that a non-conforming product is not allowed to leave the factory.
- The consignee shall refund directly the product batches with a failure rate of 2%, and all expenses incurred shall be borne by the supplier. Consider the standard reference to the product description provided by the supplier.
- Ensure the quantity of goods and the speed of shipment.

2. Spare parts

This product includes:

- Transmitter *1
- One copy of explanation*1
- One certificate of quality*1

3. After-sales service commitment

The Company has provided the local after-sales service within one year from the date of sales, but does not include the damage caused by improper use. If it is necessary to repair or adjust it, please return it, but the freight is required to be self-contained. When it is returned, it shall be confirmed that the package is good to avoid damage during transportation. The Company will repair the damage of the instrument free of charge.

Appendix data communication

1. Data format

The default data format for Modbus communication is: 9600, n, 8, 1 (baud rate 9600bps, 1 start bit, 8 data bits, no check, 1 stop bit)。

2. Information frame format (xx for one byte)

a) Read data instruction frame

06	03	xx xx	xx xx	xx xx
Address	FC	Register start address	Number of registers	CRC check code (low bytes in front)

b) Read data response frame

06	03	xx	xx……xx	xx xx
Address	FC	Bytes	Response data	CRC check code(low bytes in front)

c) Write data instruction frame

06	06	xx xx	xx xx	xx xx
Address	FC	Register address	read-in data	CRC check code(low bytes in front)

d) Write data response frame (co-write data instruction frame)

06	06	xx xx	xx xx	xx xx
Address	FC	Register address	read-in data	CRC check code(low bytes before）

3. Register address

Register address	Designation	Explain	Number of registers	Access mode
40001 (0x0000)	Measured temperature	4 double-byte integers, which are the measured values, the number of decimal places, the temperature value, and the number of decimal places of the temperature value, respectively.	4 (8 bytes)）	Read
44097 (0x1000)	Zero calibration	The 0-20NTU measurement range is calibrated in the 0-10NTU turbidity solution, and the written data is the actual value of the standard solution ×100;The 0-100NTU	1(2 bytes)	Write/ Read

		measurement range is calibrated in the 0-20NTU turbidity solution, and the written data is the actual value of the standard solution ×10;The measuring range of 0 ~ 1000NTU is calibrated in the turbidity solution of 0 ~ 200NTU, and the written data is the actual value of the standard solution ×10；Readout value is zero offset.		
44101 (0x1004)	Slope calibration	The 0-20NTU range is calibrated in a turbidity solution of 10-100NTU, and the written data is the actual value of the standard solution ×100;The measuring range of 0 ~ 100NTU is calibrated in the turbidity solution of 20 ~ 200NTU, and the written data is the actual value of the standard solution ×10;The measuring range of 0 ~ 1000NTU is calibrated in the turbidity solution of 200 ~ 1000NTU, and the written data is the actual value of the standard solution ×10; the readout value is slope value ×10.	1（2 bytes）	Write/ Read
44113 (0x1010)	temperature correction	Calibrate in the solution, the written data is the actual temperature value × 10, and the readout data is the temperature calibration offset × 10.	1（2 bytes）	Write/ Read

48195 (0x2002)	Sensor address	The default is 6, and the write data range is 1-127.	1(2 bytes)）	Write/ Read
48225 (0x2020)	Reset sensor	The calibration value is restored to the default value and the write data is 0. Note that the sensor needs to be re-calibrated after it has been reset before it can be used.	1（2 bytes）	Write

4. Command example

a) Start measurement instructions
Function: Obtain the turbidity value and temperature of the measuring sensor; the unit of temperature is Celsius, and the unit of turbidity is NTU.
Request frame: 06 03 00 00 00 04 45 BE
Response frame: 06 03 08 01 02 00 01 00 B0 00 01 90 48
Example of reading:

Turbidity value	Temperature scale
01 02 00 01	00 B0 00 01

For example: turbidity value 01 02 means hexadecimal reading turbidity value, 00 01 means turbidity value with 1 decimal point, converted to decimal value 25.8.
The temperature value 00 B0 represents the hexadecimal reading temperature value, and 00 01 represents the temperature value with a decimal point converted to a decimal value of 17.6.

b) Calibration instructions
Zero calibration
Function: Set the zero calibration value of the turbidity of the sensor; here the zero calibration is performed in zero turbidity water;
Request frame: 06 06 10 00 00 00 8C BD
Response frame: 06 06 10 00 00 00 8C BD
Slope calibration
Function:Set the calibration value of the sensor slope.

- For 0 ~ 1000NTU and 0 ~ 100NTU range products, the slope calibration example is as follows (calibrated in 1000NTU standard fluid, write a value of 1000x10, i.e. 0x2710) :
  Request frame: 06 06 10 04 27 10 D7 40
  Response frame: 06 06 10 04 27 10 D7 40
- For a 0-20NTU range product, the slope calibration example is as follows (calibrated in a 20NTU standard liquid, write the value 20x100, i.e. 0x07D0) :
  Request frame: 06 06 10 04 07 D0 CE D0
  Response frame: 06 06 10 04 07 D0 CE D0

c) Set the device ID address:

Role: set the MODBUS device address of the sensor;

Change the device address 06 to 01. The example is as follows

Request frame: 06 06 20 02 00 01 E3 BD

Response frame: 06 06 20 02 00 01 E3 BD

5. Error response

If the sensor does not execute the upper computer command correctly, the following format information is returned:

Definition	Address	Function code	Code	CRC check
Data	ADDR	COM+80H	xx	CRC 16
Number of bytes	1	1	1	2

a) CODE：01 – Functional code error
03 – Data error

b) COM：Received function code