TSS-408-S Online Suspended Matter Sensor User manual

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User Notes

- Please read the instruction carefully before using and save it for reference.

- Please follow the instructions and precautions.

- When receiving the instrument, please open the packaging carefully, inspect equipment's damage level in case of transportation, if you found spoiled equipment, please immediately notify the manufacturer and distributor, and retain the packaging, in order to send back to processing.

- When the instrument is in trouble, please don't repair it by yourself, please directly contact the maintenance department of the manufacturer.

Content

Ⅰ、 Operational principle

TSS-406-S integrated on-line suspended matter sensor is designed and manufactured by the principle of scattered light suspended matter measurement method. When a beam is shot into the water sample, the light is scattered by the suspended matter in the water sample. By measuring the intensity of the backscattered light and comparing it with the internal calibration value, the suspended matter in the water sample can be calculated, and the final value can be output after linearization.

- scattered light principle, internal temperature sensor
- support RS - 485, Modbus/RTU protocol, 4-20 ma current output
- fiber structure, external light interference ability
- the infrared LED light source, high stability
- IP68 protection, within the depth of 20 meters

Ⅱ、 Technical performance and specifications

1. Technical parameters

Model	TSS-408-S
Measuring principle	Scattered light method
Measuring range	0～2000mg/L
Resolution	0.1NTU，0.1℃
Precision	±5%(Depends on sludge homogeneity), ±0.3℃
Calibration method	Two-point calibration
Temperature compensation	Auto temperature compensation（Pt1000）
Output method	RS-485(Modbus/RTU)、4-20mA
Working conditions	0～50℃，<0.2MPa
storage temperature	-5～65℃
Wetted material	316L stainless steel
Installation method	Immersion mounting, 3/4 NPT thread
Cable length	5 meters, other lengths can be customized
Power consumption	0.2W@12V
Power supply	12～24VDC
Protection grade	IP68

2. Dimensional drawing
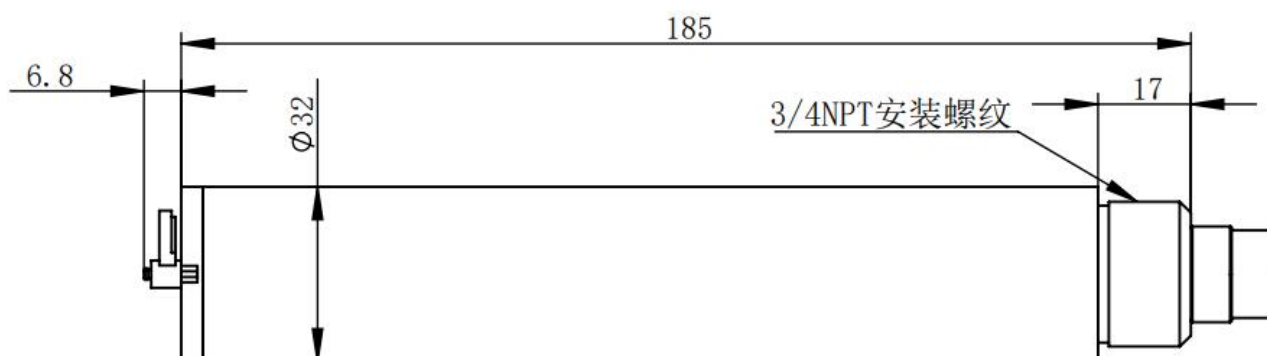
Ⅲ、Installation and electrical connection

1. Installation
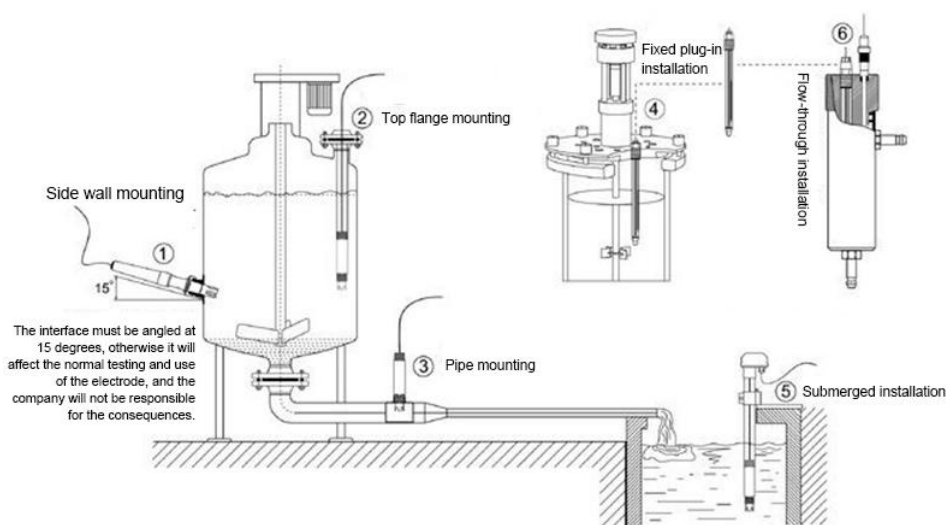
Installation distance requirements: keep more than 5cm with the side wall and 10cm or more with the bottom.

2. Electrical connection

a) Red line - power cord (12 ~ 24V)

b) Black line - ground (GND)

c) Blue line - 485A

d) white line - 485B

After wiring is completed, it should be carefully checked to avoid incorrect connections before powering up.

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 And Maintenance

1. Maintenance procedures and methods

1.1 Maintenance schedule

The cleanliness of the measurement window is very important to maintain accurate readings.

Maintenance task	Recommended maintenance frequency
Calibrate the sensor (if required by the competent authority)	According to the maintenance schedule required by the competent authority

1.2 Maintenance methods

● Sensor outer surface: Clean the outer surface of the sensor with tap water. If there is still debris left, wipe it with a soft, damp cloth. For some stubborn dirt, add some household washing liquid to the tap water to clean it.

● Check the cable of the sensor: the cable should not be tight when working normally, otherwise the cable inside the cable will be broken and the sensor will not work properly.

● Check the sensor's measurement window for dirt.

1.3 Notes

The probe contains sensitive optical and electronic components. Make sure the probe is not subject to severe mechanical shock. There are no parts inside the probe that require user maintenance.

2. Sensor calibration

a) Zero calibration: use a large amount of beaker to take a proper amount of zero suspension or a known concentration of suspension (0 ~ 200.0mg / L), the sensor is placed vertically in the solution, the front end of the sensor is at least 10cm from the bottom of the beaker, 1 minute Zero calibration is performed after the value is stable. The instructions refer to the appendix.

b) Slope calibration: Place the sensor probe in a suspension of known concentration (200.0~2000.0mg/L). The front end of the sensor is at least 10cm away from the bottom of the beaker. After 1 minute, the value is stabilized and the slope is calibrated. The instructions refer to the appendix.

Note: No bubbles can be generated at the front of the probe.

3. Frequently Asked Questions

Problem	Possible reason	Solution
The operation interface cannot be connected or the measurement result is not displayed.	Controller and cable connection error	Reconnect controller and cable
	Cable failure	Please contact us
The measured value is too high, too low or the value is continuously unstable.	The sensor window is attached by a foreign object	Cleaning the sensor window surface

Ⅴ、Quality and service

1. Quality assurance

● The quality inspection department has standardized inspection procedures, advanced and perfect testing equipment and means, and strictly in accordance with the regulations, to do 72-hour aging test and stability test on the product, and not to allow one unqualified product to leave the factory.

● The receiving party directly returns the product batch with a failure rate of 2%, and all the costs incurred are borne by the supplier. The reference standard refers to the product description provided by the supplier.

● Guarantee the quantity of goods and the speed of shipment.

2. Accessories and spare parts

This product includes:
● 1 sensor
● 1 copy of the instructions
● 1 certificate

3. After-sales service commitment

The company provides local after-sales service within one year from the date of sale, but does not include damage caused by improper use. If repair or adjustment is required, please return it, but the shipping cost must be conceited. Damaged on the way, the company will repair the damage of the instrument for free.

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 parity, 1 stop bit).

2. Information frame format

a) Read data instruction frame

06	03	xx xx	xx xx	xx xx
Address	Function code	Register address	Number of registers	CRC check code (low byte first)

b) Read data response frame

06	03	xx	xx......xx	xx xx
Address	Function code	Bytes	Answer data	CRC check code (low byte first)

c) Write data instruction frame

06	06	xx xx	xx xx	xx xx
Address	Function code	Register address	Write data	CRC check code(low byte first)

d) Write data response frame (same data command frame)

06	06	xx xx	xx xx	xx xx
Address	Function code	Register address	Write data	CRC check code (low byte first)

3. Register address

Register address	Name	Instruction	Number of registers	Access method
40001 (0x0000)	Measured value + temperature	Four double-byte integers are measured, measured decimal and temperature decimal places.	4 (8 bytes)	Read
44097 (0x1000)	Zero calibration	Calibrate in zero suspension, write data is 0;The read out data is the zero offset. (Calibration can also be carried out in the suspension of 0-200.0mg/L, and the	1 (2 bytes)	Write/Read

		calibration method refers to slope calibration).		
44101 (0x1004)	Slope calibration	In the known suspension (200.0mg/L-2000.0mg/L), the written data is the actual value of the standard solution × 10, and the readout data is the slope value × 1000.	1 (2 bytes)	Write/Read
44113 (0x1010)	Temperature calibration	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 suspended matter value and temperature of the measuring sensor; the unit of temperature is degrees Celsius and the unit of suspended substance is mg/L.

Request frame:06 03 00 00 00 04 45 BE

Answer frame:06 03 08 01 02 00 01 00 B0 00 0190 48

Example of reading:

Suspended material value	Temperature value
01 02 00 01	00 B0 00 01

For example: suspended matter value 01 02 represents the hexadecimal reading suspension value, 00 01 represents the suspended matter value with 1 decimal point, converted to a decimal value of 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 instruction

Zero calibration

Function:Set the zero calibration value of the suspended matter sensor;Zero point calibration is performed here in the zero suspension liquid;

Request frame:：06 06 10 00 00 00 8C BD

Answer frame:06 06 10 00 00 00 8C BD

Slope calibration

Function:Set the slope calibration value of the suspension sensor; here the slope value is based on the actual standard solution value x10, and take 1000mg/L as an example to refer to the calibration;

Request frame:06 06 10 04 27 10 D7 40

Answer frame:06 06 10 04 27 10 D7 40

c) Set the sensor   ID address:

Function: set the MODBUS device address of the electrode;

Change the sensor address 06 to 01, with the following example:"

Request frame:：06 06 20 02 00 01 E3 BD

Answer frame:06 06 20 02 00 01 E3 BD

5. Error response

If the sensor does not correctly execute the host command, it will return the following format information:

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

a) CODE: 01 –Function code error

03 – Data is wrong

b) COM: The received function code