

Sludge concentration sensor

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Preface

Thank you for purchasing sludge concentration sensor. Please read this manual carefully before operating and using it correctly to avoid unnecessary losses caused by false operation.

Note

- Modification of this manual's contents will not be notified as a result of some factors, such as function upgrading.
- We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us.
- This product is forbidden to use in explosion-proof occasions.

Version

U-SUP-PSS-9011-EN1

Safety Precautions

In order to use this product safely, be sure to follow the safety precautions described.

About this manual

- Please submit this manual to the operator for reading.
- Please read the operation manual carefully before applying the instrument. On the precondition of full understanding.
- This manual only describes the functions of the product. The company does not guarantee that the product will be suitable for a particular use by the user.

Precautions for protection, safety and modification of this product

- To ensure safe use of this product and the systems it controls, Please read carefully the operation manual and understand the correct application methods before putting into operation, to avoid unnecessary losses due to operation mistakes. If the instrument is operated in other ways not described in the manual, the protections that the instrument give may be destroyed, and the failures and accidents incurred due to violation of precautions shall not be borne by our company.
- When installing lightning protection devices for this product and its control system, or designing and installing separate safety protection circuits for this product and its control system, it needs to be implemented by other devices.
- If you need to replace parts of the product, please use the model specifications specified by the company.
- This product is not intended for use in systems that are directly related to personal safety. Such as nuclear power equipment, equipment using radioactivity, railway systems, aviation equipment, marine equipment, aviation equipment and medical equipment. If applied, it is the responsibility of the user to use additional equipment or systems to ensure personal safety.

-
- Do not modify this product.
 - The following safety signs are used in this manual:



Hazard, if not taken with appropriate precautions, will result in serious personal injury, product damage or major property damage.



Warning: Pay special attention to the important information linked to product or particular part in the operation manual.



- Confirm if the supply voltage is in consistent with the rated voltage before operation.
- Don't use the instrument in a flammable and combustible or steam area.
- To prevent from electric shock, operation mistake, a good grounding protection must be made.
- Thunder prevention engineering facilities must be well managed: the shared grounding network shall be grounded at is-electric level, shielded, wires shall be located rationally, SPD surge protector shall be applied properly.
- Some inner parts may carry high voltage. Do not open the square panel in the front except our company personnel or maintenance personnel acknowledged by our company, to avoid electric shock.
- Cut off electric powers before making any checks, to avoid electric shock.
- Check the condition of the terminal screws regularly. If it is loose, please tighten it before use.
- It is not allowed to disassemble, process, modify or repair the product without authorization, otherwise it may cause abnormal operation, electric shock or fire accident.
- Wipe the product with a dry cotton cloth. Do not use alcohol, benzene or other organic solvents. Prevent all kinds of liquid from splashing on the product. If the product falls into the water, please cut off the power

immediately, otherwise there will be leakage, electric shock or even a fire accident.

- Please check the grounding protection status regularly. Do not operate if you think that the protection measures such as grounding protection and fuses are not perfect.
- Ventilation holes on the product housing must be kept clear to avoid malfunctions due to high temperatures, abnormal operation, shortened life and fire.
- Please strictly follow the instructions in this manual, otherwise the product's protective device may be damaged.



- Don't use the instrument if it is found damaged or deformed at opening of package.
- Prevent dust, wire end, iron fines or other objects from entering the instrument during installation, otherwise, it will cause abnormal movement or failure.
- During operation, to modify configuration, signal output, startup, stop, operation safety shall be fully considered. Operation mistakes may lead to failure and even destruction of the instrument and controlled equipment.
- Each part of the instrument has a certain lifetime, which must be maintained and repaired on a regular basis for long-time use.
- The product shall be scrapped as industrial wastes, to prevent environment pollution.
- When not using this product, be sure to turn off the power switch.
- If you find smoke from the product, smell odor, abnormal noise, etc., please turn off the power switch immediately and contact the company in time.

Disclaimer

- The company does not make any guarantees for the terms outside the scope of this product warranty.
- This company is not responsible for damage to the instrument or loss of parts or unpredictable damage caused directly or indirectly by improper operation of the user.

No.	Name	Quantity	Note
1	Sludge Concentration Sensor	1	
2	Manual	1	
3	Certificate	1	

After opening the box, please confirm the package contents before starting the operation. If you find that the model and quantity are incorrect or there is physical damage in appearance, please contact us.

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1. Specifications

Table 1

Specifications	Details
Measurement Range	0.01-20000 mg/L, 0.01-45000 mg/L, 0.01-120000 mg/L
Measurement Accuracy	Less than $\pm 5\%$ of the measured value (depending on sludge homogeneity)
Repeatability	$\pm 2\%$
Resolution Ratio	0.01~1 mg/L, it depends on different ranges
Pressure Range	$\leq 0.4\text{Mpa}$
Flow velocity	$\leq 2.5\text{m/s}$, 8.2ft/s
Material	Main Body: SUS316L (Ordinary version), Titanium alloy (Seawater version) Cable: PUR
Power Supply	9~36VDC
Communication Protocol	MODBUS RS485
Operating Temperature	0~45°C (not freeze)
Weight	1.65 KG
Level of Protection	IP68/NEMA6P
Cable Length	Standard 10-Meter Cable, Max Length: 100 Meters

Note: The specifications of the product are subject to change without prior notice.

2. Product Presentation

2.1. Product Information

Suspended solids/sludge concentration sensor is based on the method of combination of infrared absorption scattered light. Infrared light which the photo source sends out scattered by suspended particles in the sample. And finally converted to electrical signals by photoelectric detector and getting the suspended solids/sludge concentration of the sample after treatment by analog and digital signals.

The product is widely used in the on-line monitoring of suspended matter/sludge concentration in various processes of sewage treatment plants. Online monitoring of industrial process water and suspended solids/sludge concentration of waste water treatment process. The size of the suspended solids/sludge concentration sensor is shown in the following figures.

SUS316L/Titanium Alloy External Dimension:

No automatic cleaning device:

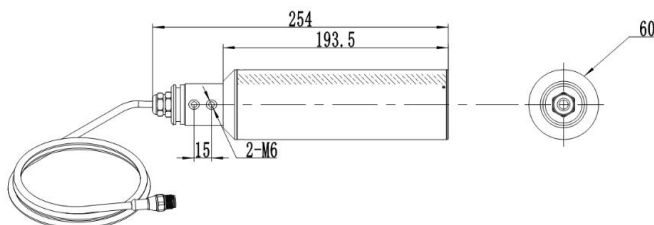


Fig. 1

With automatic cleaning device:

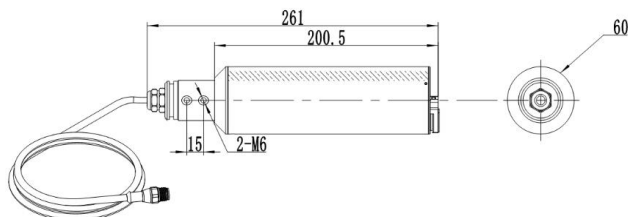


Fig. 2

POM External Dimension:

No automatic cleaning device:

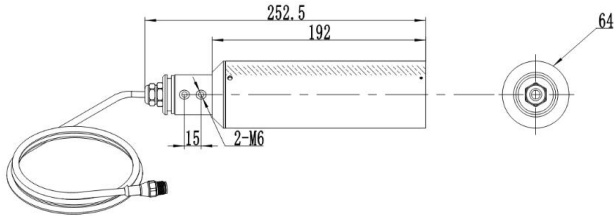


Fig. 3

With automatic cleaning device:

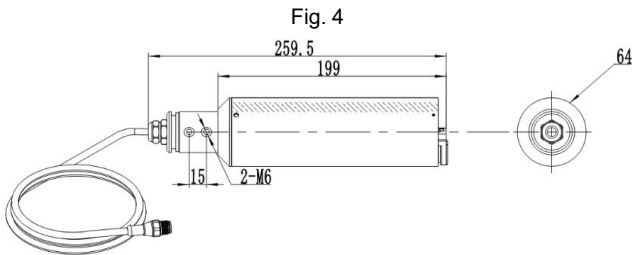


Fig. 4

2.2. Safety Information

Please read this manual completely before opening the package, installing or using. Otherwise it may cause personal injury to the operator, or cause damage to equipment.

Warning labels

Please read all labels and signs on the instrument, and comply with the security label instructions, otherwise it may cause personal injury or equipment damage.



When this symbol appears in the instrument, please refer to the operation or safety information in the reference manual.



While this symbol indicates an electric shock or risk of death from electric shock.

Please read this manual completely. Pay particular attention to some notes or warnings, etc. To ensure that the protective measures provided by the equipment are not destroyed.

3. Installation

3.1. Installation of Sensors

3.1.1. Quick Dismantling Pool Side Fixed Installation

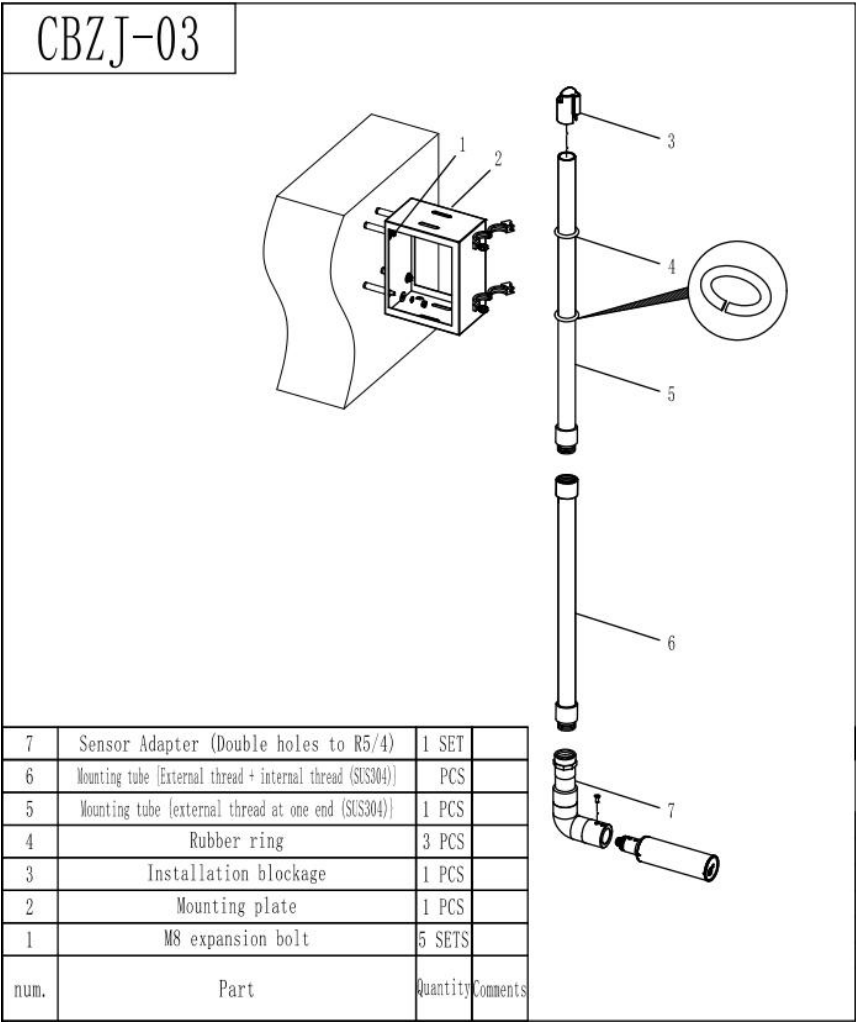


Fig. 5

CBZJ-03

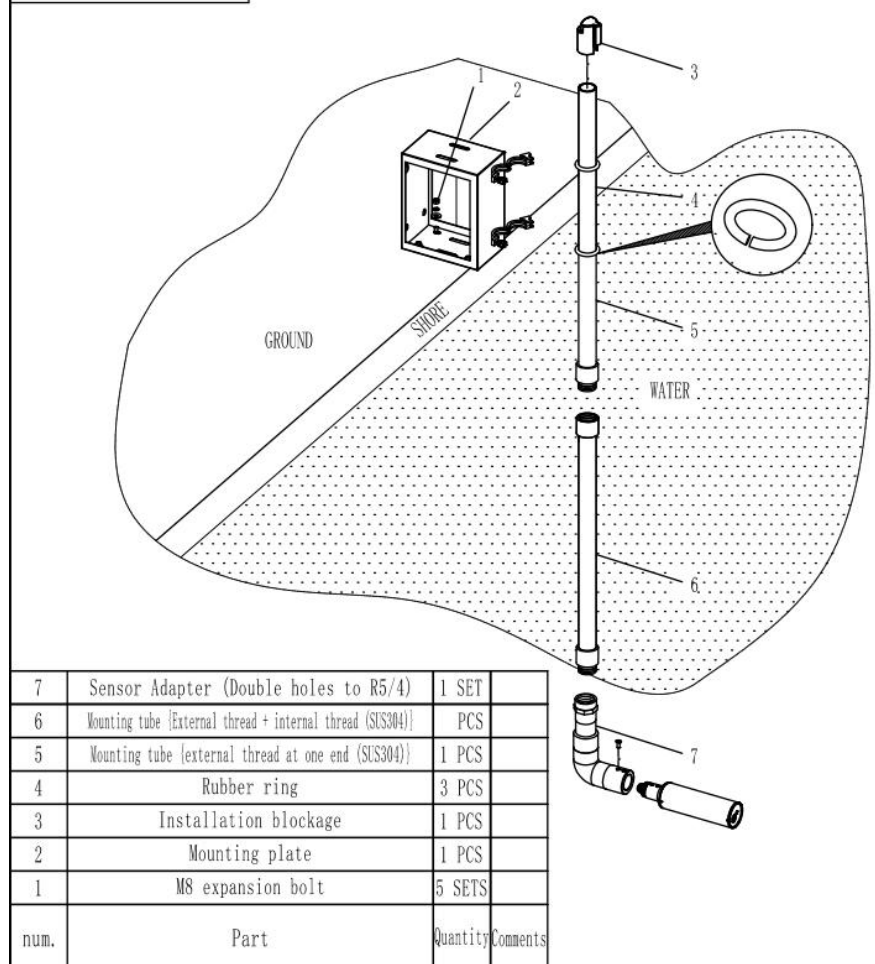


Fig. 6

3.1.2. Classic Pool Side Fixed Installation

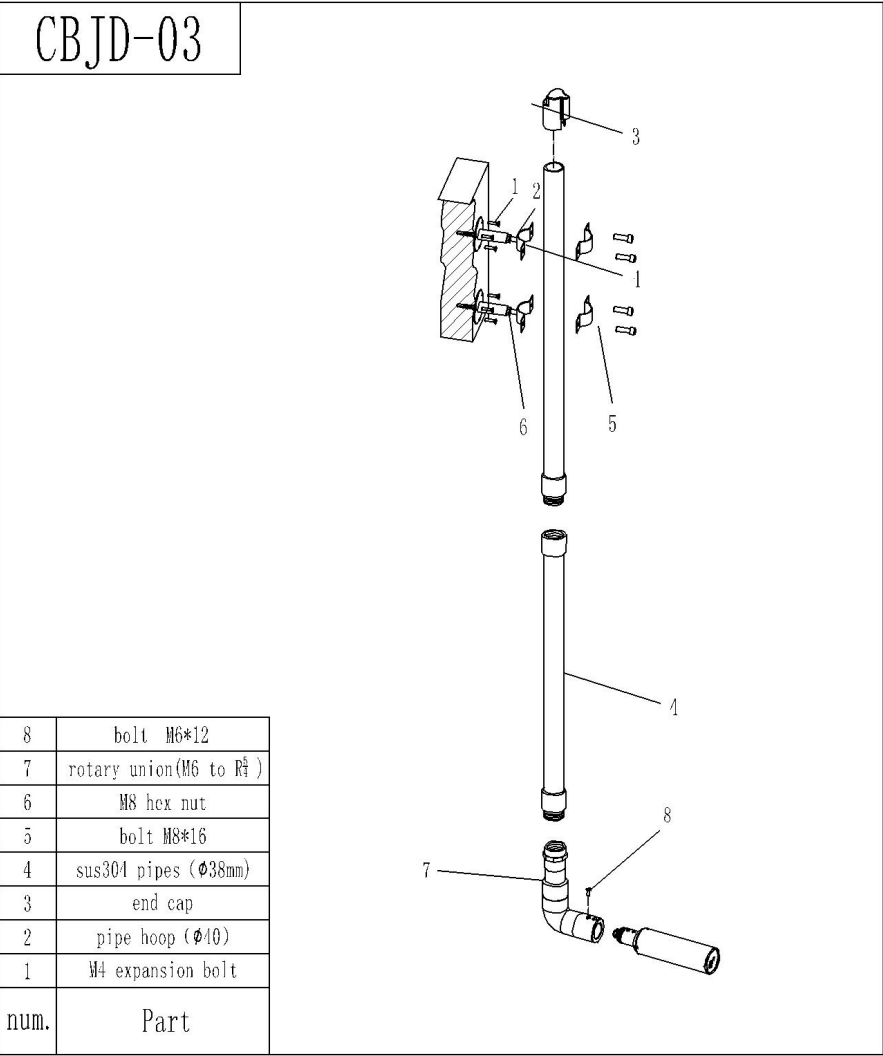


Fig. 7

3.1.3. Railing Fixed Installation

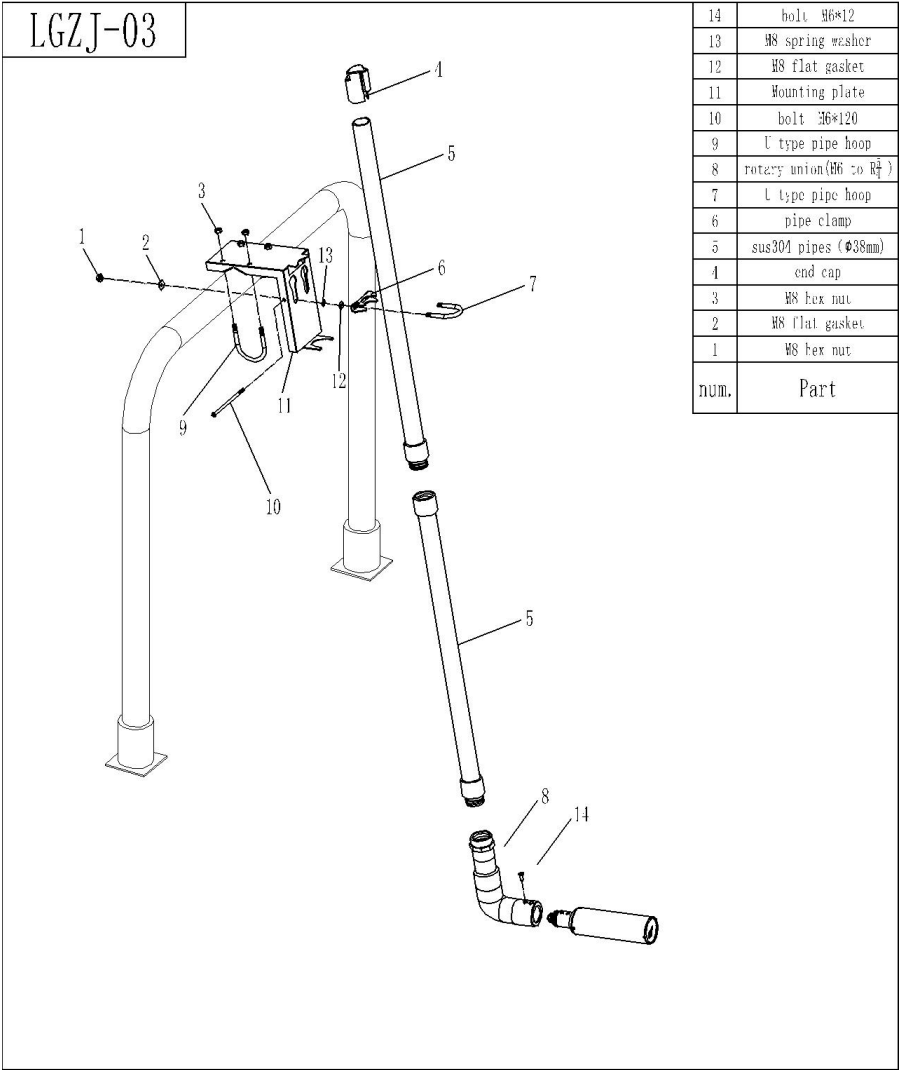


Fig. 8

3.2. Connection of Sensor

The sensor should be correctly connected by the following definition of wire core:

Table 2

Serial No.	1	2	3	4	5
Sensor Cable	Brown	Black	Blue	White	Yellow + Green
Signal	+12VDC	AGND	RS485 A	RS485 B	Ground lead/PE

4. Interface and Operation

4.1. User Interface

The sensor is connected to the computer using RS485 to USB, and then use Modbus Poll to connect.

Note: Modbus Poll software is a general software that can be downloaded online.

4.2. Parameter Setting

1、Click “Setup” on the menu bar, select “Read / Write Definition”, and then set the parameters (The slave address for the first time is the slave label), then enter “30” for Quantity in the dialog box, click “OK”.

Read/Write Definition

Slave ID: 1

Function: 03 Read Holding Registers (4x)

Address: 0 Protocol address. E.g. 40011 -> 10

Quantity: 30

Scan Rate: 1000 [ms]

Disable

☐ Read/Write Disabled

☐ Disable on error

View

Rows

☒ 10 ☐ 20 ☐ 50 ☐ 100 ☐ Fit to Quantity

☐ Hide Alias Columns ☐ PLC Addresses (Base 1)

☐ Address in Cell ☐ Enron/Daniel Mode

OK Cancel Apply Read/Write Once

Fig. 9

Note: After the slave address is changed, the new address will be used for communication and the slave address for the next time connection is also the most recently changed address.

2、Click “Connection” on the menu bar, select the first line in the drop-down menu “Connection setup” (The baud rate for the first time is the slave label) and click “OK”.

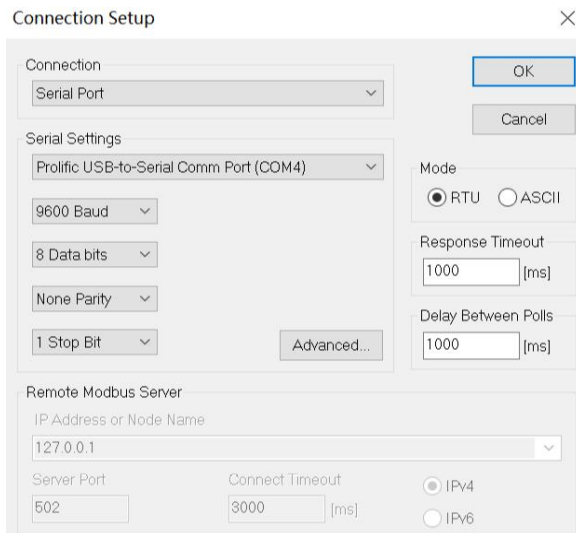


Fig. 10

Note: Port is set according to the Port number of the connection

Note: If the sensor has been connected as described, and “Timeout Error” appears on the software “Display status”, it means that the connection is failed; remove and replace the USB port or check the USB to RS485 converter, repeat the above procedure until the sensor connection is successful.

5. Calibration of Sensor

There are two kinds of calibration methods for the sensor, but only one type is valid. The calibration mode used depends on the actual needs of the site.

For the selection method, refer to the communication protocol. The specific calibration can be carried out according to the following steps.

Note: Curve calibration serves as the base calibration and coexists with the other two calibration modes

5.1. Factor Calibration

Calibration of suspended solids/sludge concentration requires the use of suspended solids standards solution. During the process of calibration, make sure the lens of probe is 15cm far from the bottom of calibration cup and no bubbles in front of the lens, meanwhile, it is recommended to keep the calibration cup away from the light. Specific steps are as follows

If there is a large deviation between the measured value and the standard value, the slope of calibration curve needs factor calibration.

1. Connect the sensor to the Modbus software;
2. Set the relevant parameters and wipe the sensor;
3. Select "06" in the menu bar to enter "27" for Address in the dialog box, "1" for Value, then click "Send", as shown below;

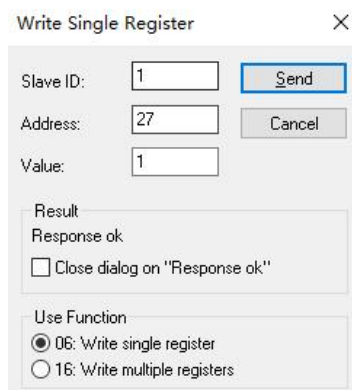


Fig. 11

4. Select “16” in the menu bar to enter “06” for Address in the dialog box, “2” for Quantity and change type into “Float CD AB”. Double-click the up on the right to enter “1” for the value. Click “OK”, then click “Send”, as shown below;

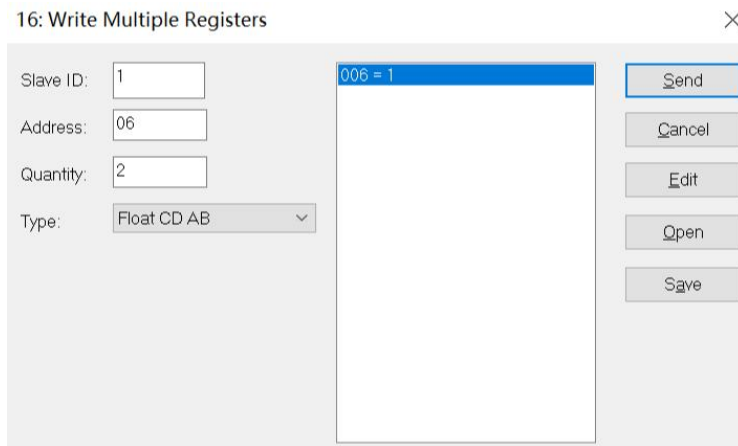


Fig. 12

5. Slowly immerse the sensor into the suspended solids standard solution;
6. Wait for the value to be stable and record the stable value;
7. Calculate the correction factor. The correction factor equals to the standard solution value divided by the value measured in the 6 step. (Factor = standard solution value / stable value);
8. Select “16” in the menu bar to enter “06” for Address in the dialog box, “2” for Quantity and change type into "Float CD AB". Double-click the up on the right to enter “Factor Value” for the value(The factor value is the calculated value in step 7). Click “OK”, then click “Send”.

Assume that the factor value calculated in step 7 is 0.93, as shown in the figure below:

16: Write Multiple Registers ✕

Slave ID:

Address:

Quantity:

Type:

006 = 0.93

Fig. 13

Tx = 6469; Err = 2204; ID = 1; F = 03; SR = 1000ms

	Alias	00000	Alias	00010	Alias	00020
0		0		0	Manual Brushing Order	0
1		--	Brushing Time	1	Automatic Brushing Order	0
2	Suspended solids value	5667.26	Response Time	1		0
3		--	Suspended solids	2		0
4		0	Probe Humidity	0		0
5		--		1		0
6	Suspended solids factor	0.93	Probe Baud Rate	1		0
7		--	Probe Slave Address	1		0
8		0	Serial No. 1	221		0
9		--	Serial No. 2	8329		0

Fig. 14

5.2. Four-point Calibration

Four-point calibration of suspended solids/sludge concentration requires the use of suspended solids standards solution. The specific steps are as follows:

1. Connect the sensor to the Modbus software;
2. Prepare the four suspension standards required for four-point calibration.
Generally, they are 0 point, 0.25 times or 0.5 times or full scales point of the range,wipe the sensor clean;

3. Refer to steps 3-4 of 5.1 section, set the calibration mode as factor, the factor has a value of 1, in this way, the measured values of each standard solution are measurement value.
4. Slowly immerse the sensor into the first suspension standard solution, record the first standard solution value (standard solution value is target value) and standard solution measurement value (standard solution measurement value is actual value), clean and wipe clean. Slowly immerse the sensor into the second suspension standard solution. record the second standard solution value and standard solution measurement value, clean and wipe clean. Slowly immerse the sensor into the third suspension standard solution, record the third standard solution value and standard solution measurement value, clean and wipe clean. Slowly immerse the sensor into the fourth suspension standard solution, record the fourth standard value and standard solution measurement value, clean and wipe clean; (Note: standard value divided by measurement value < 2)
5. Select "06" in the menu bar to enter "27" for Address and "3" for Value, and then click "Send", as shown below;

Write Single Register X

Slave ID: 1 Send

Address: 27 Cancel

Value: 3

Result
Response ok
☐ Close dialog on "Response ok"

Use Function
☒ 06: Write single register
☐ 16: Write multiple registers

Fig. 15

- 6 Select “06” in the menu bar to enter “28” for Address and “1” for Value in the dialog, and then click “Send”, as shown below;

Write Single Register

Slave ID: 1 Send

Address: 28 Cancel

Value: 1

Result

Response ok

☐ Close dialog on "Response ok"

Use Function

☒ 06: Write single register

☐ 16: Write multiple registers

Fig. 16

- 7 Select “16” in the menu bar to enter “20” for Address, “2” for Quantity, and “Float CD AB” for Type. Double-click the value that pops up on the right to enter Value as “first standard solution value”, click “OK”, then click “Send”, as shown below;

16: Write Multiple Registers

Slave ID: 1

Address: 20

Quantity: 2

Type: Float CD AB

020 = 2.17

Send

Cancel

Edit

Open

Save

Fig. 17

- 8 Select "16" in the menu bar to enter "22" for Address, "2" for Quantity, and "Float CD AB" for Type. Double-click the value that pops up on the right to enter Value as "first standard solution measurement value", click "OK", then click "Send", as shown below;

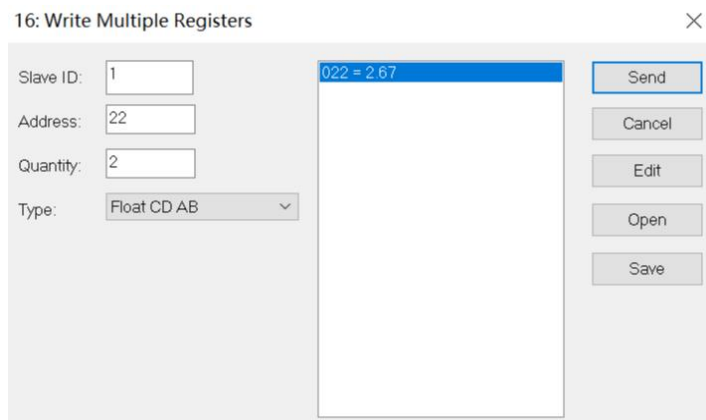


Fig. 18

- 9 Select "06" in the menu bar to enter "28" for Address and "2" for Value, and then click "Send", as shown below;

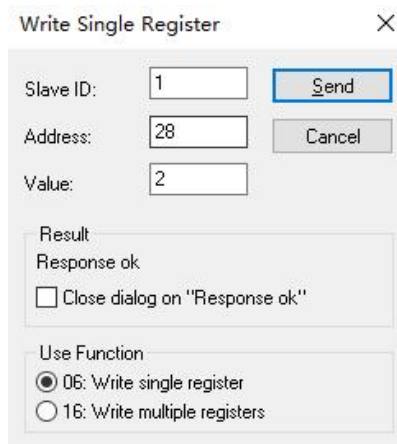


Fig. 19

- 10 Select “16” in the menu bar to enter “20” for Address in the dialog box, “2” for Quantity, and “Float CD AB” for Type. Double-click the value that pops up on the right to enter “second standard solution value”, click “OK”, then click “Send”, as shown below;

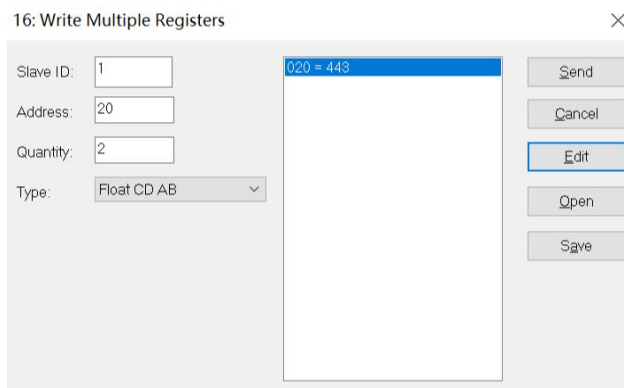


Fig. 20

- 11 Select “16” in the menu bar to enter “22” for Address, “2” for Quantity, and “Float CD AB” for Type. Double-click the value that pops up on the right to enter “second standard solution measurement value”, click “OK”, then click “Send”, as shown below;

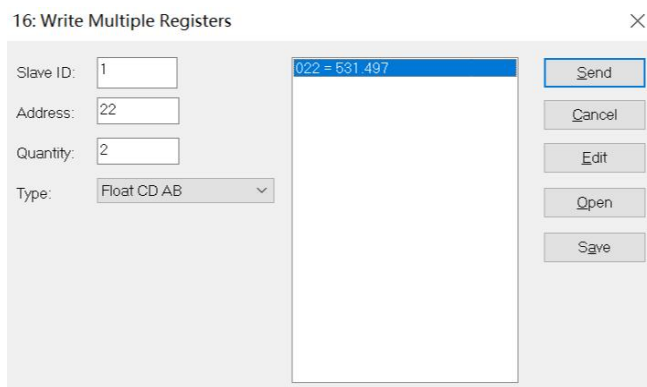
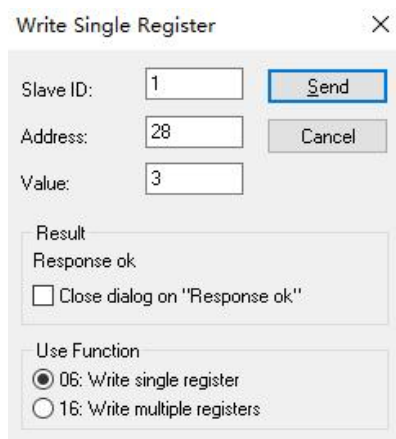


Fig. 21

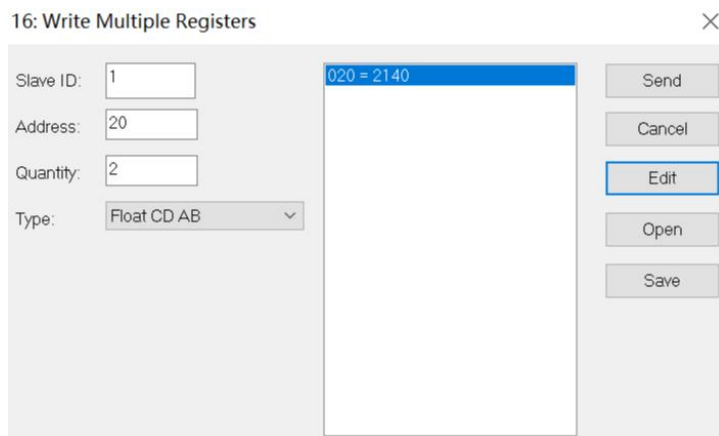
- 12 Select “06” in the menu bar to enter “28” for Address, “3” for Value, and then click “Send”, as shown below.



The dialog box is titled "Write Single Register" with a close button (X) in the top right corner. It contains three input fields: "Slave ID" with the value "1", "Address" with the value "28", and "Value" with the value "3". To the right of the "Slave ID" field is a "Send" button, and to the right of the "Address" field is a "Cancel" button. Below these fields is a "Result" section with the text "Response ok" and a checkbox labeled "Close dialog on 'Response ok'". At the bottom is a "Use Function" section with two radio buttons: "06: Write single register" (which is selected) and "16: Write multiple registers".

Fig. 22

- 13 Select “16” in the menu bar to enter “20” for Address, “2” for Quantity, and “Float CD AB” for Type. Double-click the value that pops up on the right to enter “third standard solution value”, click “OK”, then click “Send”, as shown below;



The dialog box is titled "16: Write Multiple Registers" with a close button (X) in the top right corner. It contains four input fields: "Slave ID" with the value "1", "Address" with the value "20", "Quantity" with the value "2", and "Type" with a dropdown menu showing "Float CD AB". To the right of these fields is a large list box containing the text "020 = 2140", which is highlighted with a blue selection bar. To the right of the list box are five buttons: "Send", "Cancel", "Edit" (which is highlighted with a blue border), "Open", and "Save".

Fig. 23

- 14 Select “16” in the menu bar to enter “22” for Address, “2” for Quantity, and “Float CD AB” for Type. Double-click the value that pops up on the right to enter “third standard solution measurement value”, click “OK”, then click “Send”, as shown below;

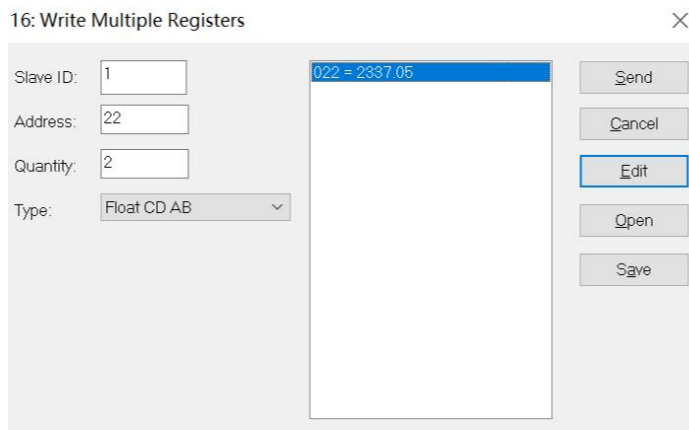


Fig. 24

- 15 Select “06” in the menu bar to enter “28” for Address, “4” for Value, and then click “Send”, as shown below.

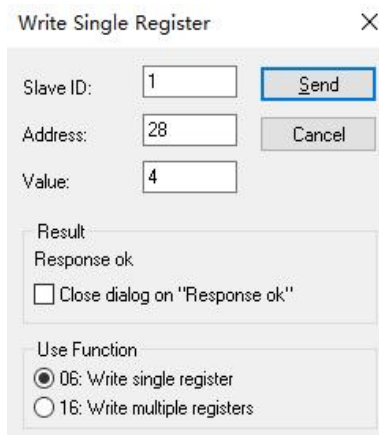


Fig. 25

16 Select “16” in the menu bar to enter “20” for Address, “2” for Quantity, and “Float CD AB” for Type. Double-click the value that pops up on the right to enter “fourth standard solution value”, click “OK”, then click “Send”, as shown below;

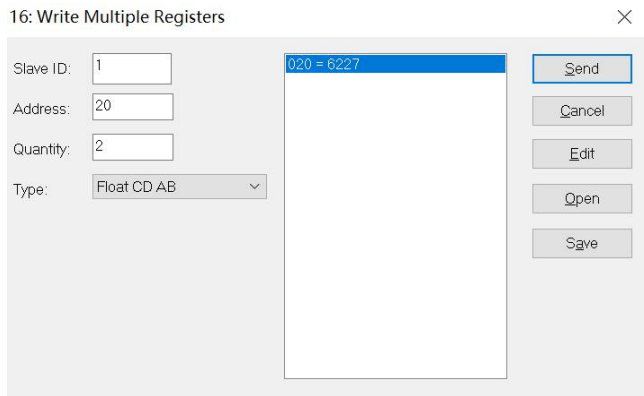


Fig. 26

17 Select “16” in the menu bar to enter “22” for Address, “2” for Quantity, and “Float CD AB” for Type. Double-click the value that pops up on the right to enter “fourth standard solution measurement value”, click “OK”, then click “Send”, as shown below;

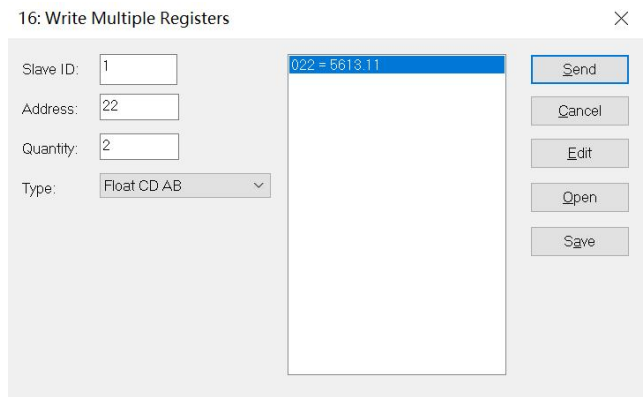


Fig. 27

18 After the calibration is complete, remove the sensor and clean it.

5.3. Curve Calibration

Suspension (sludge concentration) calibration requires the use of turbidity standards solution. The specific steps are as follows:

(If you enter the curve calibration, you must perform the calibration action until step 11, otherwise the sensor will be in the calibration mode all the time. If the normal measurement cannot be performed, you can choose to restart after power failure or perform step 12).

1. Connect the sensor to the Modbus software;
2. After setting the parameters according to Section 4.2, select the second column and right click and select "Format", click "Float CD AB" and wipe the sensor;
3. Select "16" in the menu bar to enter "06" for Address in the dialog box, "2" for Quantity, and change type into "Float CD AB". Double-click the up on the right to enter "1" for the value. Click "OK", then "Send" as shown below;

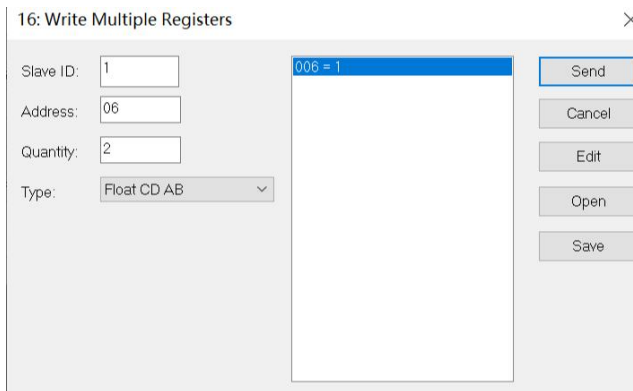


Fig. 28

4. Select "06" in the menu bar to enter "13" for Address in the dialog box, "1" for Value, click "Send". The probe type becomes turbidity, as shown below;

Write Single Register ✕

Slave ID: 1

Address: 13

Value: 1

Send

Cancel

Result

Response ok

☐ Close dialog on "Response ok"

Use Function

☒ 06: Write single register

☐ 16: Write multiple registers

Fig. 29

	Alias	00000	Alias	00010	Alias	00020
0	Turbidity Value	0.26847		0	Manual Brushing Order	0
1		--	Brushing Time	1		--
2		0	Response Time	1		0
3		--	Turbidity	1		--
4	Turbidity Factor	1	Probe Humidity	0		0
5		--		1		--
6		0	Probe Baud Rate	1		0
7		--	Probe Slave Address	1		--
8	Turbidity Deviation Value	0	Serial No. 1	221		0
9		--	Serial No. 2	8329		--

Fig. 30

5. Select “16” in the menu bar to enter “04” for Address in the dialog box, “2” for Quantity, and change type into “Float CD AB”. Double-click the up on the right to enter “1” for the value. Click “OK”, then “Send” to start calibration.

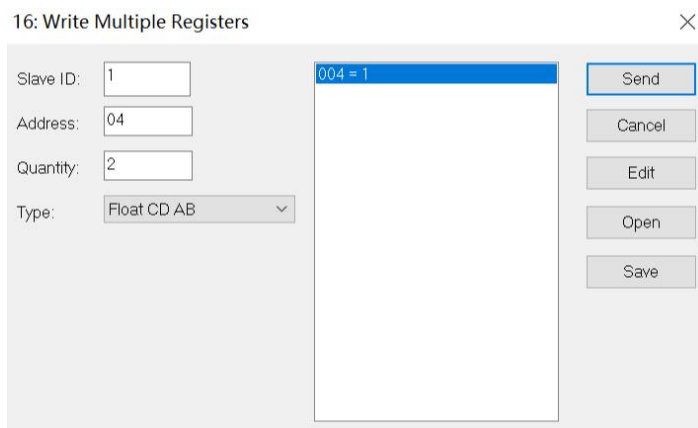


Fig. 31

6. Enter calibration mode, select "06" in the menu bar to enter "59" for Address in the dialog box, enter "66" for Value, and click "Send";

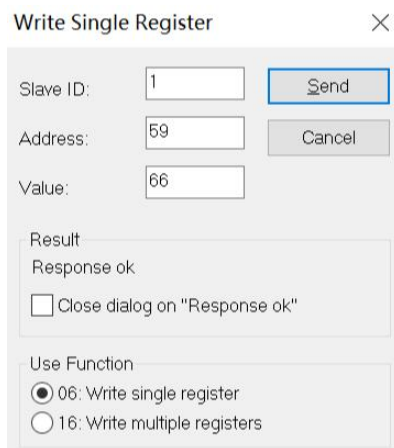


Fig. 32

7. Place the sensor in distilled water. After a while, select "16" in the menu bar to enter "59" for Address in the dialog box, enter "1" for Value;

8. Wait for the value in the box below the figure to be less than 17 and stabilize for a period of time in address “22”, select “06” in the menu bar to enter “59” for Address in the dialog box, enter “2” for Value click “Send”, close the dialog box;

Write Single Register X

Slave ID:

Address:

Value:

Result
N/A

☐ Close dialog on "Response ok"

Use Function

☒ 06: Write single register

☐ 16: Write multiple registers

Fig. 33

	Alias	00000	Alias	00010	Alias	00020
0	Turbidity Value	0		0	Manual Brushing Order	343.043
1		--	Brushing Time	1		--
2		0	Response Time	1		8.48925
3		--	Turbidity	1		--
4	Turbidity Factor	1	Probe Humidity	0		0
5		--		1		--
6		0	Probe Baud Rate	1		0
7		--	Probe Slave Address	1		--
8	Turbidity Deviation Value	0	Serial No. 1	221		0
9		--	Serial No. 2	8329		--

Fig. 34

9. Select “16” in the menu bar to enter “30” for Address , and “2” for Quantity. Change the Type to “Float CD AB” and double-click the value popped on the right to enter the value into the “known standard value (500-700NTU)”, click “OK”, then click “Send”;

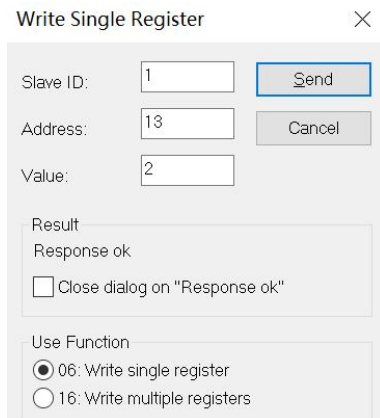
10. Put the sensor into the standard solution. After waiting for 10s, select "06" in the menu bar to enter "59" and "3" for value click "Send". After a period of time, wait until the value and input in the box below the value is close and stable, click "Send". Select "06" in the menu bar to enter "59" then change the Value to "4", click "Send", the calibration is completed;

Fig. 35

	Alias	00000	Alias	00010	Alias	00020
0	Turbidity Value	631.394		0	Manual Brushing Order	0
1		--	Brushing Time	1		--
2		0	Response Time	1		0
3		--	Turbidity	1		--
4	Turbidity Factor	1	Probe Humidity	0		0
5		--		1		--
6		0	Probe Baud Rate	1		0
7		--	Probe Slave Address	1		--
8	Turbidity Deviation Value	0	Serial No. 1	221		0
9		--	Serial No. 2	8329		--

Fig. 36

11. After the calibration is completed, select "06" in the menu bar to enter the "13" and "2" for value, and click "Send". The probe type becomes suspended solids/sludge concentration;



The image shows a software dialog box titled "Write Single Register" with a close button (X) in the top right corner. The dialog contains three input fields: "Slave ID:" with the value "1", "Address:" with the value "13", and "Value:" with the value "2". To the right of the "Slave ID" field is a "Send" button, and to the right of the "Address" field is a "Cancel" button. Below the input fields is a "Result" section containing the text "Response ok" and a checkbox labeled "Close dialog on 'Response ok'". At the bottom is a "Use Function" section with two radio button options: "06: Write single register" (which is selected) and "16: Write multiple registers".

Fig. 37

12. If the customer wants to quit the calibration during the calibration or for other reasons, select "06" in the menu bar to enter "59" and Value to enter "33".

Note: If the curve calibration is inaccurate, it is recommended to use factor calibration to calibrate again.

6. Communication Protocol

The sensor is equipped with MODBUS RS485 communication function, please refer to this manual section 3.2 to check the communication wiring. The specific MODBUS RTU table is shown in the following table.

Table 3

MODBUS-RTU	
Baud Rate	4800/9600/19200/38400
Data Bits	8 bit
Parity Check	no
Stop Bit	1bit

Table 4

Register Name	Address Location	Read /Write	Data Type	Register Number	Descriptions
Suspended solids/sludge concentration Value	2	OR	Float	2	0-Range
Suspended solids/sludge concentration Factor	6	RW	Float	2	0.1-10
Brushing Time	11	OR	Int	1	15/30/60/240/720 /1440/4320/10080min

Register Name	Address Location	Read /Write	Data Type	Register Number	Descriptions
Response Time	12	RW	Int	1	1-60s
Suspended solids/sludge concentration	13	RW	Int	2	It should be 2, otherwise, it should be changed to 2.
Probe Humidity	14	OR	Int	1	It is recommended to be less than 10 (Greater than 10 indicates that the sensor may have been flooded)
Probe Baud Rate	16	RW	Int	1	W R 0 stands for 4800 4800 1 stands for 9600 9600 2 stands for 19200 19200 3 stands for 38400 38400
Probe Slave Address	17	RW	Int	1	1-254
Serial No. 1	18	OR	Int	1	First 4 numbers of Serial No.
Serial No. 2	19	OR	Int	1	Last 4 numbers of Serial No.
Manual Brushing Order	20	W	Int	1	Send 66
Automatic Brushing Order	21	W	Int	1	Time between sending intervals:15/30/60/240/720/1440/4320/10080min
Calibration Mode					
Factor Calibration (use of suspended solids standards solution)					
Step 1	27	W	Int	1	Send 1 (1 stands for the sensor enable factor calibration mode)
Four-point Calibration (use of suspended solids standards solution)					

Register Name	Address Location	Read /Write	Data Type	Register Number	Descriptions
Step 1	27	W	Int	1	Send 3 (3 stands for the sensor enable four-point calibration mode)
the First Point Calibration					
Step 1	28	W	Int	1	Send 1 (1 stands for the First Point)
Step 2 Set Target Value	20	W	Float	2	Send Target Value
Step 3 Set Actual Value	22	W	Float	2	Send Actual Value
The Second Point Calibration					
Step 1	28	W	Int	1	Send 2 (2 stands for the Second Point)
Step 2 Set Target Value	20	W	Float	2	Send Target Value
Step 3 Set Actual Value	22	W	Float	2	Send Actual Value
the Third Point Calibration					
Step 1	28	W	Int	1	Send 3 (3 stands for the Third Point)
Step 2 Set Target Value	20	W	Float	2	Send Target Value
Step 3 Set Actual Value	22	W	Float	2	Send Actual Value
the Fourth Point Calibration					
Step 1	28	W	Int	1	Send 4 (4 stands for the Fourth Point)

Register Name	Address Location	Read /Write	Data Type	Register Number	Descriptions
Step 2 Set Target Value	20	W	Float	2	Send Target Value
Step 3 Set Actual Value	22	W	Float	2	Send Actual Value
Curve Calibration (use of turbidity standards solution)					
Step 1	13	W	Int	1	Send 1 (1 means switch to the turbidity sensor status, ready for calibration)
Step 2	59	W	Int	1	Send 66 (66 means enter calibration mode)
Step 3	59	W	Int	1	Send 1 (1 means ready to calibrate 0 points)
Step 4	59	W	Int	1	Send 2 (2 means calibration 0 point)
Step 5	30	W	Float	2	Write the 2nd point standard value (500-700NTU)
Step 6	59	W	Int	1	Send 3 (3 means ready to calibrate point 2)
Step 7	59	W	Int	1	Send 4 (4 means calibration point 2)
Step 8	13	W	Int	2	Send 2 (2 means switch to the suspended solids/sludge concentration sensor status, enter normal measurement)
In-process cancellation	59	W	Int	1	Send 33 (33 to exit calibration mode)

485 analysis:

1 Read the suspended solids/sludge concentration value

Table 5

Register Name	Address Location	Read/Write	Data Type	Register Number	Descriptions
Suspended solids/sludge concentration Value	2	OR	Float	2	0-Range

Send the command: 01 03 00 02 00 02 65 CB

The equipment return: 01 03 04 00 00 40 E0 CA 7B

Send command parsing:

01: device address 01

03: Function code 03 for reading register content

00 02: The starting register address read is 0002

00 02: Read 2 registers

65 CB: CRC16 check code

The device returns the analysis:

01: device address 01

03: Function code 03 for reading register content

04: The length of the returned data is 4 bytes

00 00 40 E0: The suspended solids/sludge concentration value read is 7.00

(analyze 40 E0 00 00 using IEEE 754) CA 7B: CRC16 check code

2 Read the brushing time

Table 6

Register Name	Address Location	Read/Write	Data Type	Register Number	Descriptions
Brushing Time	11	OR	Int	1	15/30/60/240/720/1440/4320/10080min

Send the command: 01 03 00 0B 00 01 F5 C8

The equipment return: 01 03 02 00 0A B8 44

Send command parsing:

01: device address 01

03: Function code 03 for reading register content

00 0B: The starting register address read is 0011

00 01: Read 1 registers

F5 C8: CRC16 check code

The device returns the analysis:

01: device address 01

03: Function code 03 for reading register content

02: The length of the returned data is 2 bytes

00 0A: The brushing time read is 10

B8 44: CRC16 check code

3 Set the manual brush

Table 7

Register Name	Address Location	Read/Write	Data Type	Register Number	Descriptions
Manual Brushing Order	20	W	Int	1	Send 66

Send the command: 01 06 00 14 00 42 49 FF

The equipment return: 01 06 00 14 00 42 49 FF

Send command parsing:

01: device address 01

06: Function code 06 for writing register content

00 14: The register address of write data is 00 20

00 42: Write data content of 66

49 FF: CRC16 check code

The device returns the analysis:

01: device address 01

06: Function code 06 for reading register content

00 14: The register address of the return write data is 20

00 42: Returns modified data content of 66

49 FF: CRC16 check code

4 Set the suspended solids/sludge concentration factor

Table 8

Register Name	Address Location	Read/Write	Data Type	Register Number	Descriptions
---------------	------------------	------------	-----------	-----------------	--------------

Suspended solids/sludge concentration Factor	6	RW	Float	2	0.1-10
--	---	----	-------	---	--------

Send the command: 01 10 00 06 00 02 04 00 00 3F 80 63 D5

The equipment return: 01 10 00 06 00 02 A1 C9

Send command parsing:

01: device address 01

10: Function code 16 for writing register content

00 06: The starting register address write is 00 06

00 02: Write 2 registers

04: The length data is 4 bytes

00 00 3F 80: The suspended solids/sludge concentration value write is 1.00
(analyze 3F 80 00 00 using IEEE 754)

63 D5: CRC16 check code

The device returns the analysis:

01: device address 01

10: Function code 16 for writing register content

00 06: The starting register address of the return write data is 00 06

00 02: Returns 2 registers

A1 C9: CRC16 check code

7. Maintenance

In order to obtain the best measurement results, it is very necessary to maintain the sensor regularly. Maintenance mainly includes cleaning, inspecting damage of the sensor. You can also view the sensor's status during maintenance and inspection.

7.1. Sensor Cleaning

Both the two lenses on the sensor need to be cleaned and maintained regularly to ensure the accuracy of the measurement on the basis of actual use. Wash with clean water, then wipe with a cleanser and rag to remove stubborn stains.

7.2. Inspection on the Damage of Sensor

Check the appearance of the sensor to see whether there is damage, if it's damaged, please contact to the after-sales service center in time for replacement to prevent malfunction of sensor caused by water due to the damage. Note: It is recommended to replace the sealing ring once a year.

7.3. Sensor Blade Replacement

It is recommended that the blade of the sensor should be replaced quarterly with a new rubber one, the specific steps are as follows:



Fig. 38 SUS316L/Titanium Alloy



Fig. 39 POM

1. The position of the blade is shown in the figure;
2. Remove the rubber sheet from the scraper;
3. Then apply lubricant to the bracket
4. Load new rubber sheet.

8. Special Description

The optional self-cleaning brush is motor-driven. In order to avoid the internal motor gear, please don't move the brush with hand. The warranty doesn't include the misfunction/damage caused by manually moving of the brush.

The default brush cycle is once every 1 hours. If the brush cycle becomes shorter, the maintenance cycle should be shortened: Shorter brush intervals will result in shorter brush life. Please carefully set the brush cycle.