NBL-WQ-MLSS-408-S Online Sludge Concentration Sensor User Manual

Changsha Zoko Link Technology Co., Ltd.

Tel:+8615367865107

E-mail：sales@niubol.com

Website：www.niubol.com

Address: Room 102, District D, Houhu Industrial Park, Yuelu District, Changsha City, Hunan Province, China

User Notes

- Please read the instructions 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、working principle

MLSS-406-S integrated online sludge concentration sensor is designed and manufactured by the principle of scattered light measurement method. When a beam of light enters the water sample, the light is scattered by the suspended particles in the water sample. By measuring the intensity of the backscattered light and comparing it with the internal calibration value, the sludge concentration in the water sample can be calculated. The final value is output after linearization.

- 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, high stability
- IP68 protection, water depth up to 20 meters
- Convenient, fast, stable and easy to maintain

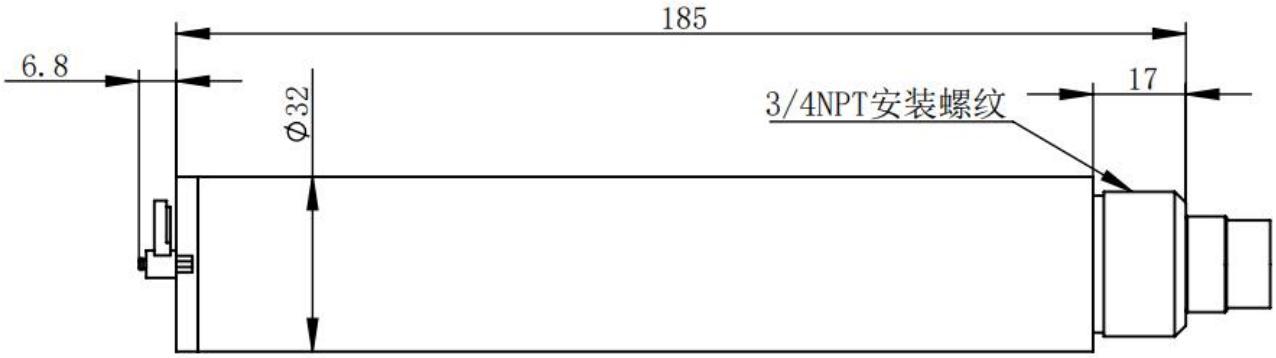
II、Technical performance and specifications

1. Technical parameters

Model	NBL-WQ-MLSS-408-S
working principle	scattered light method
Measuring range	0～20.000g/L
resolution	0.001g/L，0.1℃
Accuracy	±5% (depending on sludge homogeneity)
Calibration	Two point calibration
Signal output	Automatic temperature compensation (Pt1000)
Signal output	RS-485(Modbus/RTU)、4-20mA(Optional)
Working temperature	0～50℃，<0.2MPa
storage temperature	-5～65℃
Installation	Submersion Mount, 3/4NPT Pipe Thread
Cable length	5 meters, other lengths can be customized
Calibration	<0.3W@12V

Power supply	12～24VDC
Protection grade	IP68

2. Dimensional drawing



Note: The sensor connector is M16-5 core waterproof connector male

III、Installation and electrical connection

1. Installation

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

2 Electrical connection

The cable is a 4-core twisted pair shielded wire, and the wire sequence definition:：

- Red wire—power wire (12～24VDC)
- Black wire - ground wire (GND)
- Blue wire - 485A
- White wire - 485B

The wiring sequence should be carefully checked before power-on to avoid unnecessary losses caused by wrong wiring.

Wiring instructions: Considering that the cables are immersed in water (including seawater) or exposed to air for a long time, all wiring points are required to be waterproofed, and the user cables should have certain anti-corrosion capabilities.

IV、 Maintenance

1. Use and maintenanceMaintenance Schedule

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

maintenance tasks	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 method

- Sensor outer surface: Use tap water to clean the outer surface of the sensor. If there is still debris, wipe it with a damp soft cloth. For some stubborn dirt, you can add some household detergent to the tap water to clean.
- Check the cable of the sensor: The cable should not be taut during normal operation, otherwise the inner wire of the cable will be easily broken and the sensor will not work normally.
- Check whether the measuring window of the sensor is dirty.

1.3 Precautions

The sensor contains sensitive optical components and electronic components, and the use environment should be careful to avoid external light interference. Make sure that the sensor is not subjected to severe mechanical shock. There are no user-maintainable parts inside the sensor.

2 sensor calibration

a) Zero point calibration: place the sensor in the 2.000g/L sludge concentration standard solution, place the sensor vertically in the solution, with the front end of the sensor at least 10cm from the bottom of the beaker, and perform zero point calibration after the value is stable for 1 minute. Instructions refer to the appendix.

b) Slope calibration: place the sensor in a 20.000g/L sludge concentration standard solution, place the sensor vertically in the solution, and keep the front end of the sensor at least 10cm from the bottom of the beaker, and perform slope calibration after the value is stable for 1 minute. Instructions refer to the appendix.

Note: The sensor is calibrated in the standard solution configured with diatomite before leaving the factory. The customer can calibrate it according to the concentration value at the measurement site. When calibrating, pay attention to increase the magnetic stirring to prevent the sedimentation of suspended particles. When measuring, pay attention to the front end of the probe not to generate air bubbles

3 Frequently questions

Wrong	Probable cause	Solution
The operating interface cannot connect or does not display the measurement results	Measured value is too high, too low or the value is persistently unstable	Reconnect the controller and cables
	cable failure	Please contact us.
The measured value is too high, too low, or the numerical value remains unstable.	The sensor window is attached by foreign objects	Cleaning the sensor window surface

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 and spare parts

This product includes:

- 1 sensor
- 1 copy of the manual
- 1 certificate

3. After-sales service commitment

The company provides after-sales service for this machine within one year from the date of sale, but does not include the damage caused by improper use. If you need to repair or adjust, please send it back, but the freight must be borne by yourself, and it is necessary to make sure that the packing is good to avoid damage in transit. We will repair the damage of the instrument free of charge.

Appendix Data Communication

1. Data format

The default data format of 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 command frame

40	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

40	03	xx	xxxx	xx xx
address	function code	number of bytes	response data	CRC check code (low byte first)

c) Write data command frame

40	06	xx xx	xx xx	xx xx
addres	function code	register address	data input	CRC check code (low byte first)

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

40	06	xx xx	xx xx	xx xx
address	function code	register address	data input	CRC check code (low byte first)

3.Register address

register address	name	explanation	Number of registers	access mode
40001 (0x0000)	Measured value + temperature	4 double-byte integers, which are the measured value, the number of decimal places of the measured value, the temperature value, and the number of decimal places of the temperature value.	4 (8 bytes)	read
44097 (0x1000)	Zero calibration	It is calibrated in the sludge concentration standard solution of 0-2.000g/L, and the written data is the actual value of the standard solution × 1000; the read data is zero offset.	1 (2 bytes)	write/read
44101 (0x1004)	Slope calibration	Calibration in the standard solution of sludge concentration	1 (2 bytes)	write/read

		from 2.000g/L to 20.000g/L, the written data is the actual value of the standard solution × 1000; the read data is the slope value × 1000。		
44113 (0x1010)	temperature calibration	For calibration in solution, the written data is the actual temperature value × 10; the read data is the temperature calibration offset × 10.	1 (2 bytes)	write/read
48195 (0x2002)	Sensor address	The default is 64, and the write data range is 1 to 255.	1 (2 bytes)	write/read
44865 （0x1300）	Automatic cleaning interval setting	The default is 30 minutes, and the data range is 6 to 6000 minutes.	1 (2 bytes)	write/read
44866 （0x1301）	Automatic cleaning lap setting	The default is 3 circles, and the data range is 0~6 circles.	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 after the sensor is reset, it needs to be calibrated again before it can be used.	1 (2 bytes)	write

4.Command example

a) Measurement instructions

Function: Get the sludge concentration and temperature measured by the sensor; the unit of sludge concentration is g/L, and the unit of temperature is ℃.

Request frame: 40 03 00 00 00 04 4B 18

Response frame: 40 03 08 27 FB 00 03 00 B0 00 01 49 FC

Reading example:

Sludge concentration value	Temperature value
27 FB 00 03	00 B0 00 01

For example: the sludge concentration value 27 FB represents the hexadecimal reading of the sludge concentration value, 00 03 represents the sludge concentration value with 3 decimal points, and the converted decimal value is 10.235.

The temperature value 00 B0 represents the hexadecimal reading temperature value, and 00 01

represents the temperature value with 1 decimal point converted into a decimal value of 17.6.

b) Calibration instructions

Zero point calibration

Function: Set the zero point calibration value of the sensor;

An example of zero point calibration is as follows (assuming calibration in 2g/L standard solution, the written value is 2x1000, which is 0x07D0):

Request frame: 40 06 10 00 07 D0 81 B7

Response frame: 40 06 10 00 07 D0 81 B7

slope calibration

Function: Set the slope calibration value of the sensor;

An example of slope calibration is as follows (assuming calibration in 20g/L standard solution, the written value is 20x1000, which is 0x4E20):

Request frame: 40 06 10 04 4E 20 F7 A2

Response frame: 40 06 10 04 4E 20 F7 A2

c) Set device ID address:

Function: Set the MODBUS device address of the sensor;

Change the sensor address 40 to 01, the example is as follows

Request frame: 40 06 20 02 00 01 ED 1B

Response frame: 40 06 20 02 00 01 ED 1B

5.Error response

If the sensor cannot execute the command of the host computer correctly, it will return the following format information:：

Definition	Address	Function	CODE	CRC Check
data	ADDR	COM+80H	xx	CRC 16
number of bytes	1	1	1	2

a) CODE：01 – The function code is wrong
03 – data error

b) COM：Received function code