NBL-WQ-OIL-408-S Online Water Oil Sensor

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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. Working principle

The oil sensor in water uses the characteristic that soluble oil has absorption peaks and emission peaks in the spectrum. The spectral absorption peak of soluble oil emits monochromatic light and irradiates it into the water. The soluble oil absorbs the energy of the monochromatic light and releases another wavelength. Emitting peak monochromatic light, the intensity of light emitted by soluble oil is proportional to the content of soluble oil in water. The sensor is simple to install and easy to use.

- UV LED light source, high stability, long service life, small drift
- AC drive, effectively filtering natural light interference
- Support RS-485, Modbus/RTU protocol
- Convenient, fast, stable and easy to maintain

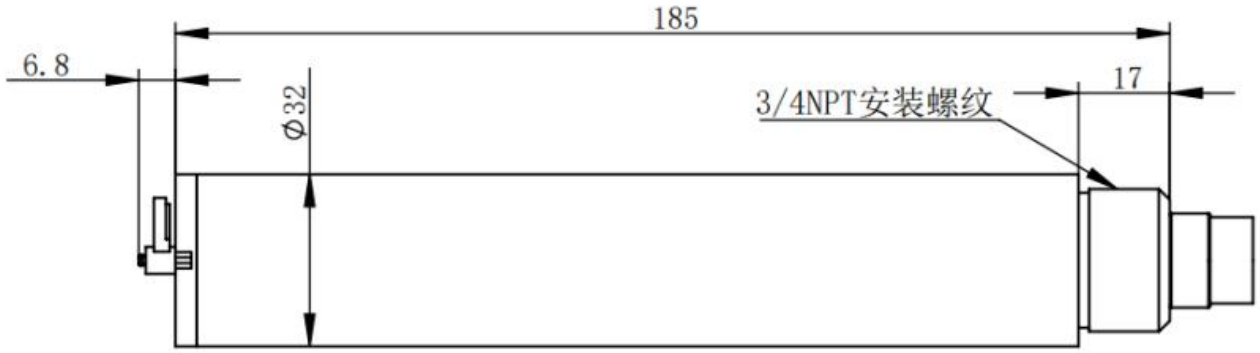
II. Technical performance and specifications

1. Technical parameters

model	**NBL-WQ-OIL-408-S**	
Measurement principle	Fluorescence method	
Range and resolution	0～40.00 mg/L	0.01 mg/L
Accuracy	±3% of reading, ±0.3℃	
Response time (T90)	<30s	
lowest detection limit	0.4mg/L	
Calibration method	Two point calibration	
Cleaning method	Comes with cleaning brush	
Temperature compensation	Automatic temperature compensation (Pt1000)	
output method	RS-485 (Modbus RTU), 4-20 mA (optional)	
storage temperature	-5～65℃	
working conditions	0～50℃, <0.2 MPa	
shell material	316L	
Installation method	Submersible installation, 3/4NPT	

Power consumption	0.2W@12V
powered by	12~24V DC
Protection level	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 2cm from the side wall and more than 10cm from the bottom.

2. Electrical connection

The cable is a 5-core shielded wire, and the wire sequence is defined as:

- Red wire—power cord (12~24VDC)
- Black wire—ground wire (GND)
- Blue wire—485A
- Green line—485B
- Yellow wire—current output (if not used, it can be left floating)

The wiring sequence should be carefully checked before powering on to avoid unnecessary losses caused by wiring errors.

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

IV. Maintenance and maintenance

1. Maintenance procedures and methods

1.1 Maintenance schedule

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

Maintenance tasks	Recommended maintenance frequency
Calibrate the sensor (if required by the competent authority)	Carry out according to the maintenance schedule required by the competent authority

1.2 Maintenance methods

- Outer surface of the sensor: Clean the outer surface of the sensor with tap water. If there are still debris remaining, wipe it with a damp soft cloth. For some stubborn dirt, you can add some household detergent to the tap water to clean it.
- Check the sensor cable: The cable should not be tightened during normal operation, otherwise the internal wires of the cable may easily break, causing the sensor to not work properly.
- Check whether the measurement window of the sensor is dirty.

1.3 Things to note

The sensor contains sensitive optical and electronic components. Make sure the sensor is not subject to severe mechanical impact. There are no user-serviceable parts inside the sensor.

2. Calibration of sensors

a) Zero point calibration: Use a large bucket to take an appropriate amount of distilled water, place the sensor vertically in the solution, with the front end of the sensor at least 10cm away from the bottom of the bucket, and wait for 3 to 5 minutes for the value to stabilize before performing zero point calibration. See the appendix for instructions.

b) Slope calibration: Place the sensor in the standard solution, with the front end of the sensor at least 10cm away from the bottom of the beaker, and wait for 3 to 5 minutes for the value to stabilize before performing slope calibration. See the appendix for instructions.

3. FAQ

question	possible reason	Solution
The operation interface cannot connect or does not display the measurement results.	The measured value is too high, too low or the value continues to be unstable	Reconnect the controller and cables
	Cable failure	Please contact us

The measured value is too high, too low or the value continues to be unstable	The sensor window is attached to a foreign object	Clean 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. Accessories and spare parts

This product includes:

- 1 sensor
- 1 copy of instruction manual
- 1 certificate of conformity
- 1 cable (5 meters)

3. After-sales service commitment

Our company provides after-sales service for this machine within one year from the date of sale, but does not include damage caused by improper use. If repair or adjustment is required, please send it back, but the freight will be borne by you. When sending it back, make sure it is well packaged to avoid shipping. If the instrument is damaged during the journey, our company will repair the damage to 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 (xx represents one byte)

a) Read data command frame

0F	03	xx xx	xx xx	xx xx
address	function code	Register starting address	Number of registers	CRC check code (low byte first)

b) Read data response frame

0F	03	xx	xx……xx	xx xx
address	function code	Number of bytes	response data	CRC check code (low byte first)

c) Write data command frame

0F	06	xx xx	xx xx	xx xx
address	function code	Register address	data input	CRC check code (low byte first)

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

0F	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	Illustrate	Number of registers	Interview method
40001 (0x0000)	Measurements	2 double-byte integers, respectively the measurement value and the number of decimal places in the measurement value.	2（4 bytes ）	read
44097 (0x1000)	Zero point calibration	Calibrated in distilled water, the written data is 0; the read data is the zero offset. (Calibration can also be performed in a standard solution of 0 to 10 mg/L. For the calibration method, refer to slope calibration)	1（2 bytes ）	write/read
44101 (0x1004)	slope calibration	Calibrate in a known standard solution (10 mg/L ~ 40 mg/L). The	1（2 bytes ）	write/read

		written data is the actual value of the standard solution × 100; the read data is the slope value × 1000.		
48195 (0x2002)	sensor address	The default is 15, and the writing data range is 1~255.	1（2 bytes ）	write/read
48225 (0x2020)	Reset sensor	The calibration value returns to the default value, and the written data is 0. Note that the sensor needs to be calibrated again after resetting before it can be used.	1（2 bytes ）	Write

4. Command examples

a) Start measurement command

Function: Get the oil value in the water measured by the sensor; the unit of oil in the water is mg/L.

Request frame: 0F 03 00 00 00 02 C5 25

Response frame: 0F 03 04 01 02 00 02 34 0E

Reading example:

Oil value in water
01 02 00 02

For example: the value of oil in water 01 02 represents the value of oil in water in hexadecimal reading, 00 02 represents the value of oil in water with 2 decimal points, and the converted decimal value is 2.58.

b) Calibration instructions

Zero point calibration

Function: Set the zero point calibration value of the oil in the sensor water; here the zero point calibration is performed in distilled water;

Request frame: 0F 06 10 00 00 00 8C 24

Response frame: 0F 06 10 00 00 00 8C 24

slope calibration

Function: Set the slope calibration value of the sensor's oil in water; the slope value here is based on the actual standard solution value x100. Take 30 mg/L as an example to refer to the calibration;

Request frame: 0F 06 10 04 0B B8 CA A7

Response frame: 0F 06 10 04 0B B8 CA A7

c) Set device ID address:

Function: Set the Modbus device address of the sensor;

Change the sensor address 0F to 01, the example is as follows

Request frame: 0F 06 20 02 00 01 E3 24

Response frame: 0F 06 20 02 00 01 E3 24

5. Error response

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

Definition	Address	Function code	CODE	CRC check
data	ADDR	COM+80H	xx	CRC16
Number of bytes	1	1	1	2

a) CODE：01 – Wrong function code
03 – Data error

b) COM：function code received