NBL-WQ-CL-4S Residual Chlorine Sensor
User Manual

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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.Application environment description

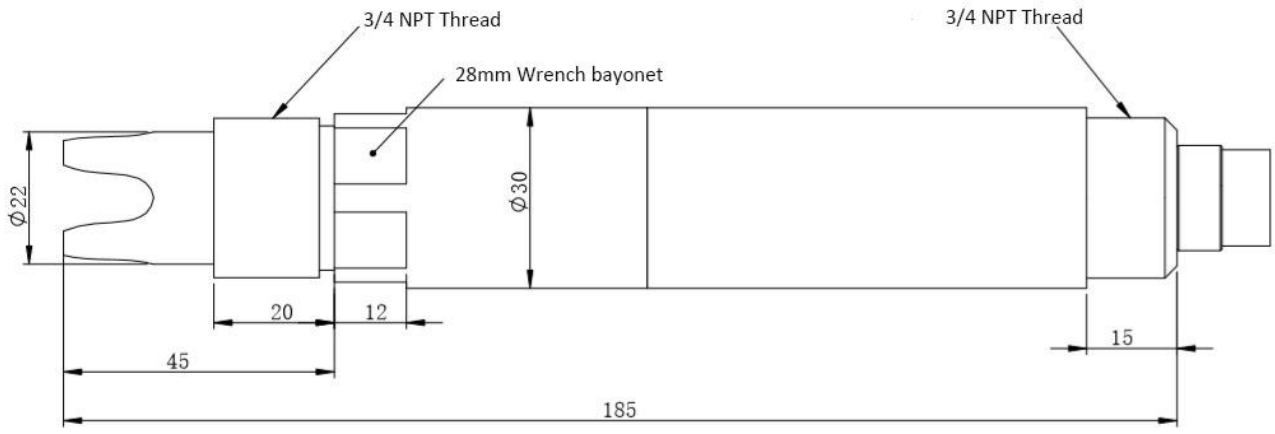
It is used for continuous monitoring of residual chlorine content in aqueous solution in drinking water treatment plants, canning plants, drinking water distribution networks, swimming pools, cooling circulating water, water quality treatment engineering and so on.

II.Technical performance and specifications

1. Technical parameter

Model	NBL-WQ-CL-4S	
Measuring principle	Constant voltage method	
Range and resolution	0~2.000 mg/L(HClO)	0.001
	0~20.00 mg/L(HClO)	0.01
precision	0~2.000 mg/L(HClO)	±5%； ±0.3℃
	0~20.00 mg/L(HClO)	±0.05； ±0.3℃
Response time (T90)	＜90s	
Minimum detection limit	0.05mg/L	
Calibration mode	Two-point calibration	
Cleaning method	/	
Temperature compensation	Automatic Temperature Compensation (Pt1000)	
Output mode	RS-485(ModbusRTU).4-20mA(Optional)	
Storage temperature	-5～65℃	
Working condition	0～60℃，≤0.2MPa，pH：4～9	
Shell material	316L	
Installation mode	Flow tank installation, 3/4NPT	
Power dissipation	0.2W@12V	
Power supply	12～24VDC	
Class of protection	IP68	

2. Dimensional drawing



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

III.Electrical connection

1.Installation

Using the matching circulation pool installation, the electrode and the circulation pool are installed closely to ensure that the electrode measurement part is placed in the area near the inlet of the circulation pool, and the flow rate should not be aligned to the outlet as far as possible to ensure the steady flow rate. It is suggested that the flow rate should be controlled at 30 ≤ 60L / h to ensure the accuracy of the test.

2.Electrical connection

Cable for the 4-core twisted pair shielded wire, wire sequence definition:

- Red cord—power cord（12V～24VDC）
- Black cord —ground cord（GND）
- Blue cord—485A
- Green cord—485B
- Yellow cord—Current output (if unused, suspended)

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

Wiring instructions: considering the cable long-term Immersion in water (including sea water) or exposure to air, all wiring are required to do waterproof treatment, the user cable should have a certain degree of corrosion resistance.

IV.Maintenance

1. Detection and maintenance of sensors

The new electrode and the long-standing electrode need to be activated before use, the sensor will be placed in tap water for 24 hours. If the return value is inaccurate, the following action is required:

- Zero and slope calibration of the sensor
- Return to factory for inspection

2.Sensor calibration

a) Zero calibration: the sensor probe is placed in chlorine-free water for zero calibration after numerical stability.
b) Slope calibration: the sensor probe is placed in the flow pool of residual chlorine standard liquid, and the slope calibration is carried out after the value is stable. It is recommended to use HClO standard liquid of 1~2mg/L. The preparation and determination of standard liquid can be referred to the determination of national standard residual chlorine.
Note: The sensor has been calibrated before leaving the factory, because the preparation of its standard liquid requires high personnel requirements, non-professionals may not be able to do this work, only if the value is not correct, users are advised to calibrate themselves.

V.Quality and service

1. Quality assurance

- The quality inspection department has standardized inspection rules, advanced and perfect testing equipment and means, and strictly according to the rules of inspection, 72 hours aging test, stability test, do not let a unqualified product 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 circulation pool
- 1 copy of the instruction manual
- 1 certificate
- 1 Cable (5 m)

3. After-sales service commitment

The company provides one year from the date of sale of this machine after-sale guarantee, electrodes belong to consumable products warranty for half a year. However, it does not include damage caused by improper use. If repair or adjustment is required, 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 for Modbus communication is 9600, n,8,1 (baud rate 9600 bps,1 start bit,8 data bits, no check,1 stop bit). The baud rate and other parameters can be customized.

2. Information frame format

a) Read data instruction frame

0A	03	xx xx	xx xx	xx xx
Address	FC	register address	Number of registers	CRC check code (low bytes in front)

b) read data response frame

0A	03	xx	xx……xx	xx xx
Address	FC	Number of bytes	Response data	CRC check code (low bytes in front)

c) Write data instruction frame

0A	06	xx xx	xx xx	xx xx
Address	FC	register address	read-in data	CRC check code (low bytes in front)

d) Write data reply frame (same as data instruction frame)

0A	06	xx xx	xx xx	xx xx
Address	FC	register address	read-in data	CRC check code (low bytes in front)

3. Registers address

Register address	Name	Explain	Number of registers	Access mode

40001 (0x0000)	Measured temperature	Four double-byte integers are measured, measured decimal and temperature decimal places.	4（8byte）	Read
44097 (0x1000)	Zero calibration	When the value is stable in chlorine-free water, the written data is 0 and the readout data is zero offset.	1（2byte）	Write / read
44101 (0x1004)	Slope calibration	Calibrated in a flow cell with a known concentration of HCIO (1~2mg/L) solution, the written data is the actual concentration value x 1000, and the read data is the slope value x 1000.	1（2byte）	Write / read
44113 (0x1010)	temperature correction	In the solution, the written data is the actual temperature value x10, and the readout data is the temperature calibration offset x10.	1（2byte)	Write / read
48195 (0x2002)	Sensor address	The default is 10, and the write data range is 1- 255.	1（2byte）	Write / read
48225 (0x2020)	Reset sensor	The calibration value is restored to the default value and the write data is 0. 5%. Note that the sensor needs to be re-calibrated after it has been reset before it can be used.	1（2byte）	Write

4. Command example

a) Read data command
Function: Get the residual chlorine value and temperature value measured by the sensor; the unit of temperature is ℃ and the unit of residual chlorine is mg/L.
Request frame: 0A 03 00 00 00 04 45 72
Response frame: 0A 03 08 01 67 00 03 01 6F 00 01 D3 D8

Reading example:

Residual chlorine value	Temperature value
01 67 00 03	01 6F 00 01

For example: the residual chlorine value 01 67 represents the hexadecimal reading of the residual chlorine value, 00 03 represents the residual chlorine value with 3 decimal points, and the converted decimal value is 0.359;
The temperature value 01 6F represents the hexadecimal reading temperature value, 00 01 represents the temperature value with 1 decimal point, and the converted decimal value is 36.7.
b) Calibration instructions
Zero point calibration
Function: Set the residual chlorine zero point calibration value of the sensor;
Request frame: 0A 06 10 00 00 00 8C 71
Response frame: 0A 06 10 00 00 00 8C 71
slope calibration
Function: Set the sensor's residual chlorine slope calibration value; here the slope value calibration is performed in a known concentration of residual chlorine solution. (For example, 2mg/L, the written value is converted into hexadecimal as 7D0)
Request frame: 0A 06 10 04 07 D0 CE 1C
Response frame: 0A 06 10 04 07 D0 CE 1C
c)Change device address
Function: Set the Modbus device address of the sensor;
Change the device address 10 to 01, the example is as follows
Request frame: 0A 06 20 02 00 01 E3 71
Response frame: 0A 06 20 02 00 01 E3 71

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 verification
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