NBL-DDM-406-S Online Conductivity Sensor
User Manual

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User Notes

- Please read this manual carefully before use and save it for reference.
- Please follow the operating procedures and precautions in this manual.
- When receiving the instrument, please carefully open the package and check whether the instrument and accessories are damaged due to shipping. If any damage is found, please inform the manufacturer and distributor immediately, and keep the package for return.
- When the instrument fails, do not repair it yourself. Please contact the maintenance department of the manufacturer directly.

Content

I、Application Environment description

The CLI-206A integrated online chloride ion sensor uses an ion-selective electrode with a solid membrane for testing free chlorine ions in water, making it fast, simple, accurate and economical.In this manual, the technical parameters, communication protocol, operation and maintenance of the chloride ion sensor are introduced in detail.

- Signal output: RS-485 bus, Modbus/RTU protocol, easy to connect to PLC, DCS, industrial control computer, general controller, paperless recording instrument or touch screen and other third-party devices.
- The patented chloride ion electrode, with an internal reference fluid at a pressure of at least 100KPa (1Bar), slowly seeps out of the microporous salt bridge.The reference system is very stable and the electrode life is longer than that of ordinary industrial electrodes.
- Easy to install: 3/4-inch NPT threads for submerged installation or installation in piping and tanks.
- IP68 protection grade.

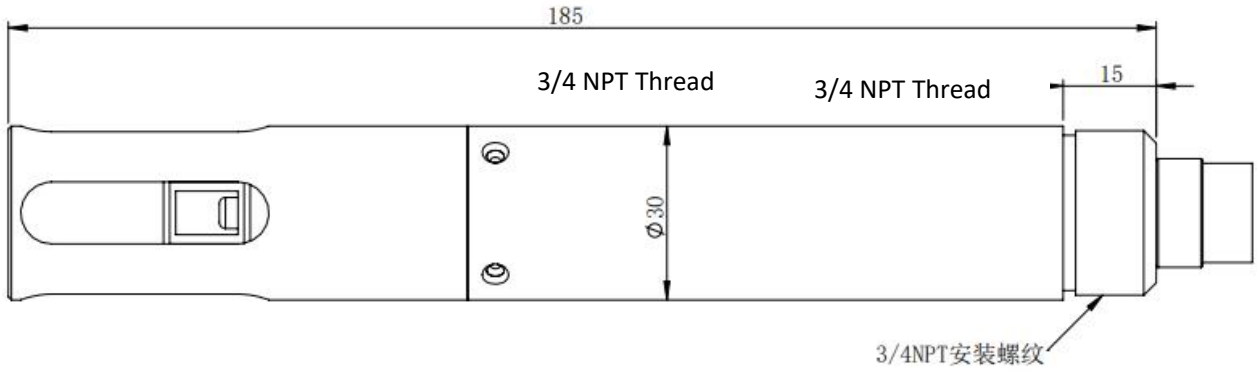
II、Technical performance and specifications

1. Technical Specifications

Model	NBL-DDM-406-S
Measuring range	0～5000μS/cm
Resolution	1μS/cm，0.1℃
Precision	±1.5%F.S.，±0.3℃
Working Temperature	0～65℃
Working Pressure	＜0.6MPa
Power supply	12～24VDC
Signal output	RS-485(Modbus/RTU)、4-20mA(Optional)
Wetted Material	ABS and POM and 316L stainless steel
Installation Method	Submersion Mount, 3/4NPT Pipe Thread
Cable length	5 meters, other lengths can be customized
Temperature compensation	Automatic temperature compensation (Pt1000)
Calibration	Two point calibration
Power consumption	0.2W@12V

Protection Grade	IP68

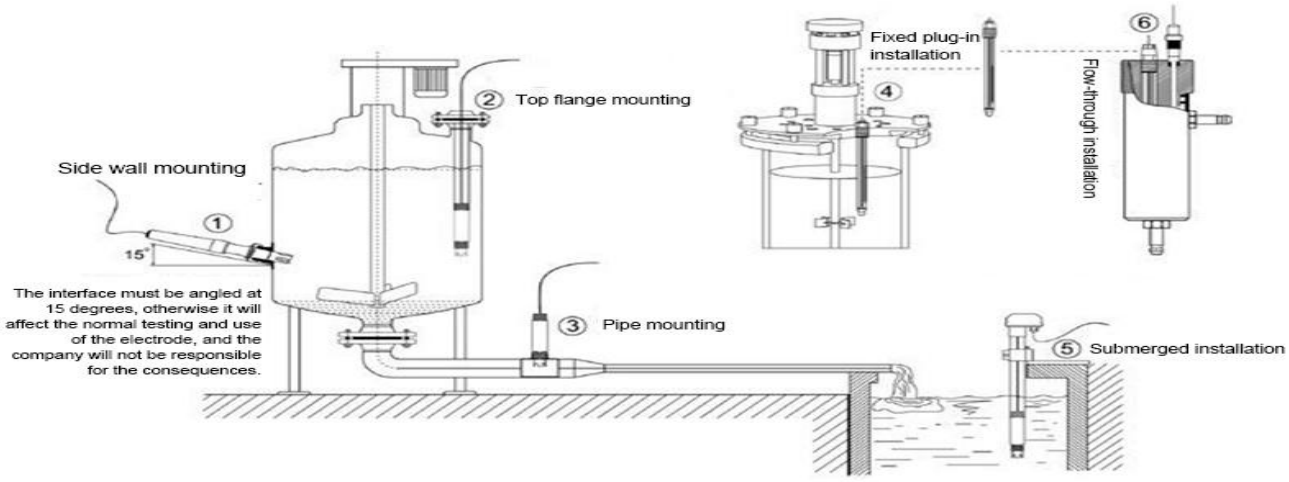
2. Dimensional drawing



Note：The connector of the sensor is M16-5 core waterproof connector

III、Installation and electrical connection

1. Installation



Note: Install and test at least 2cm from the bottom and side walls of the container.

2. Electrical connection

The cable is a 5-core twisted pair shielded wire, and the wire sequence definition:

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

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

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 maintenance

Conventional electrodes need to be cleaned and calibrated periodically, and the maintenance cycle is determined by customers according to their own working conditions. Conventional electrode cleaning method: use a soft brush to remove attachments (be careful to avoid scratching the surface of the electrode), then clean with distilled water, and then perform the calibration operation.

2. Calibration

a) Zero calibration

Rinse the sensor with distilled water and blot dry with filter paper. Connect the sensor to the power supply and place it vertically in the air for about 3 minutes. After the value is stable, perform zero calibration. See the appendix for calibration instructions.

b) Slope calibration

Place the sensor vertically in the standard solution (10% full scale - full scale), pay attention to the sensor at least 2cm from the bottom and side walls of the container, and perform slope calibration. See the appendix for calibration instructions.

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:：

- One sensor
- A copy of product manual
- One 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 of Modbus communication is: 9600, n, 8, 1 (baud rate 9600bps, 1 start bit, 8 data bits, no parity, 1 stop bit).

Parameters such as baud rate can be customized.

2. Information frame format (xx represents a byte)

a) Read data command frame:

01	03	xxxx	xx xx	xx xx
Address	Function code	Register address	Number of registers	CRC check code (low byte first)

b) Read data response frame:

01	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:

01	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 as write data command frame):

01	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	Description	Number of registers	Access Method
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	Calibration in air or 0-10% full scale standard solution, the written data is the actual value of the standard solution.	1 (2 bytes)	Write
44101 (0x1004)	Slope calibration	Calibrate in a known standard solution (10% full scale - full scale), and the written data is the actual value of the standard solution.	1 (2 bytes)	Write
44103 (0x1006)	Zero calibration value	The read data is zero offset.	1 (2 bytes)	Read
44105 (0x1008)	Slope calibration value	The read data is the slope value x 1000.	1 (2 bytes)	Read
44113 (0x1010)	temperature calibration	For calibration in solution, the written data is the actual temperature value ×	1 (2 bytes)	Write/read

		10; the read data is the temperature calibration offset × 10.		
48195 (0x2002)	Sensor address	The default is 1 and the write data range is 1- 255.	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: 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 conductivity and temperature measured by the sensor; the unit of temperature is ℃, and the unit of conductivity is mS/cm (or uS/cm);

Request frame: 01 03 00 00 00 04 44 09

Response frame: 01 03 08 01 02 00 01 00 B0 00 01 8A 3C

Reading example:

Conductivity value	Temperature value
01 02 00 01	00 B0 00 01

For example: the conductivity value 01 02 represents the hexadecimal reading conductivity value, 00 01 represents the conductivity value with 1 decimal point (the decimal point is related to the measuring range), and the converted decimal value is 25.8.

The temperature value 00 B0 represents the hexadecimal reading temperature value, 00 01 represents the temperature value with 1 decimal point, and the converted decimal value is 17.6.

b) Calibration instructions

Zero point calibration

Function: Set the conductivity zero-point calibration value of the sensor; here the zero-point calibration is performed in the air;

Request frame: 01 06 10 00 00 00 8D 0A

Response frame: 01 06 10 00 00 00 8D 0A

slope calibration

Function: Set the conductivity slope calibration value of the sensor; calibrate in 5000uS/cm standard solution, and write the data based on the actual standard solution value;

Request frame: 01 06 10 04 13 88 C1 9D

Response frame: 01 06 10 04 13 88 C1 9D

c)Set device ID address

Function: Set the Modbus device address of the sensor;

Change the sensor address 1 to 01, the example is as follows

Request frame: 01 06 20 02 00 01 E2 0A

Response frame: 01 06 20 02 00 01 E2 0A

5. Response Error

If the sensor cannot execute the command of the host computer correctly, 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 – The function code is wrong
03 – Data error

b) COM：received function code