

# **NBL-WQ-ECS-4 Online Salinity 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.

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## I .Application environment

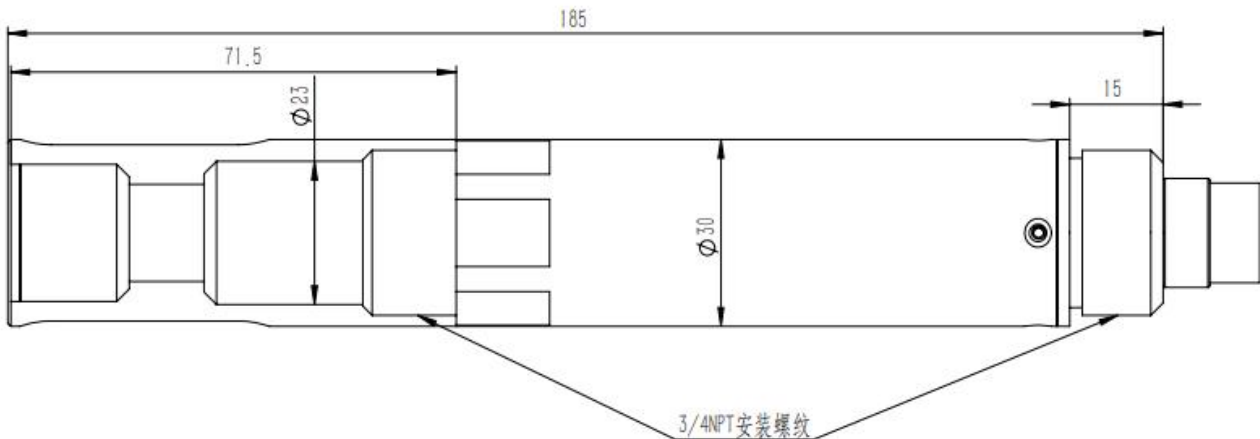
- Sea water / heavy salt water / various water supply / industrial water treatment.
- Signal output: RS-485 (Modbus/RTU protocol).
- Convenient connection to third-party equipment such as PLC, DCS, industrial control computer, general controller, paperless recording instrument or touch screen.
- Immersion installation with 3/4 NPT pipe thread for easy submersible installation or installation in pipes and tanks.
- IP68 protection grade.

## II .Technical performance and specifications

### 1. Technical parameters

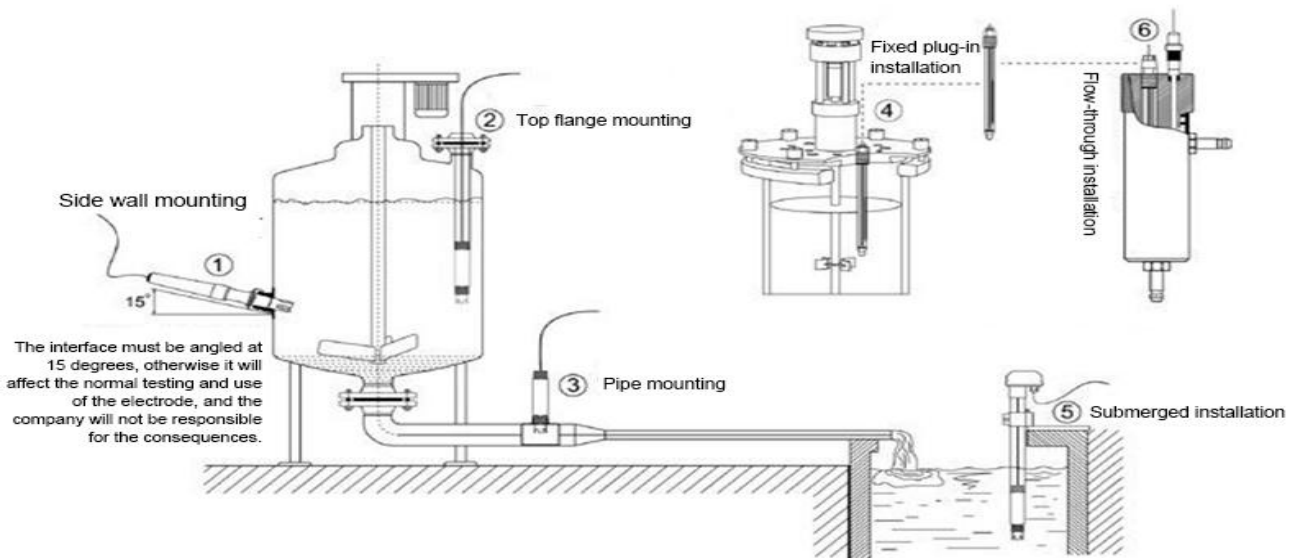
<b>Model</b>	NBL-DDM-406S-T
<b>Measuring range</b>	0~70.0PSU
<b>Resolution</b>	0.1PSU
<b>Precision</b>	±1.5%F.S., ±0.5°C
<b>Working temperature</b>	0~65°C
<b>Working pressure</b>	<0.6MPa
<b>Power supply</b>	12~24VDC
<b>Signal output</b>	RS-485(Modbus/RTU)
<b>Wetted material</b>	ABS(Default) / POM
<b>Mounting method</b>	Immersion mounting, 3/4 NPT thread
<b>Cable length</b>	5 meters, other lengths can be customized
<b>Temperature compensation</b>	Auto temperature compensation (Pt1000)
<b>Calibration</b>	Two-point calibration
<b>Power consumption</b>	0.2W@12V
<b>Protection grade</b>	IP68

## 2. Dimensional drawing



## III. Installation and electrical connection

### 1. Installation



Note: At least 2 cm from the bottom and side walls of the container during installing and testing.

### 2. Electrical connection

- a) Red line - power cord (12 ~ 24V)
- b) Black line - ground (GND)
- c) Blue line - 485A

d) white line - 485B

E) Yellow wire—current output (if not used, it can be left floating)

After wiring is completed, it should be carefully checked to avoid incorrect connections before powering up.

Cable specification: Considering that the cable is immersed in water (including sea water) for a long time or exposed to the air, the cable has certain corrosion resistance. The outer diameter of the cable is  $\Phi 6$  mm and all interfaces are waterproof.

## IV. Maintenance

### 1. Use and maintenance

Conventional electrodes require periodic cleaning and calibration, and the maintenance cycle is determined by the customer based on his or her own working conditions. Conventional electrode cleaning method: use a soft brush to remove attachments (be careful to avoid scratching the electrode surface), then clean with distilled water, and then perform calibration operations.

### 2. Calibration

a) Zero point calibration

Rinse the sensor with distilled water and blot the liquid with filter paper. Turn on the power supply and place the sensor vertically in the air for about 3 minutes. After the value is stable, perform zero point calibration. Calibration instructions are detailed in the appendix.

b) Slope calibration

Place the sensor vertically in the standard solution (10% full scale - full scale). Note that the sensor is at least 2cm away from the bottom and side walls of the container, and perform slope calibration. Calibration instructions are detailed in the appendix.

## 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

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This product includes:

- 1 sensor
- 1 copy of the instruction manual
- 1 certificate
- Calibration solution (optional)

### **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 concealed. 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 for 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

a) Read data instruction frame

```

08          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

```

08          03          xx          xx.....xx          xx  xx
Address  Function code  Bytes  Answer data          CRC check code (low byte first)
  
```

c) Write data instruction frame

```

08          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 data command frame)

```

08          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	Instruction	Number of registers	Access method
40001 (0x0000)	Measured value + temperature	4 double-byte integers, which are the measured value, the measured number of decimal places, the temperature value, and the decimal value of the temperature value.	4 (8 bytes)	Read
44097 (0x1000)	Zero calibration	Calibrate in the air, the read data is 0.	1 (2 bytes)	Write

44101 (0x1004)	Slope calibration	Calibrated in a known standard solution (20% full scale - full scale), the read value is actual value of standard solution *10	1 (2 bytes)	Write
44103 (0x1006)	Zero calibration value	The data is read out as a 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 value	Calibrated in solution, the written data is the actual temperature value x 10; the read data is the temperature calibration offset x 10 .	1 (2 bytes)	Write/Read
48195 (0x2002)	Device address	The default is 8, writing data range 1-255.	1 (2 bytes)	Write/Read
48225 (0x2020)	factory reset	The calibration value is restored to the default value and the write data is 0. Note: The sensor needs to be calibrated again after resetting.	1 (2 bytes)	Write

#### 4. Command example

a) Start measurement instructions

Function: Get the conductivity and temperature measured by the sensor; the unit of temperature is °C, and the unit of conductivity is mS/cm (or uS/cm);

Request frame: 08 03 00 00 00 04 44 90

Response frame: 08 03 08 01 02 00 01 00 B0 00 01 A4 A0

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: 08 06 10 00 00 00 8D 93

Response frame: 08 06 10 00 00 00 8D 93

slope calibration

Function: Set the conductivity slope calibration value of the sensor; calibrate in 35PSU standard solution, and write the data based on the actual standard solution value;

Request frame: 08 06 10 04 01 5E 4C 3A

Response frame: 08 06 10 04 13 88 C1 04

c) Set device ID address

Function: Set the Modbus device address of the sensor;

Change the sensor address 08 to 01, the example is as follows

Request frame: 08 06 20 02 00 01 E2 93

Response frame: 08 06 20 02 00 01 E2 93

## 5. Error response

If the sensor does not correctly execute the host command, 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 –Function code error

03 – Data is wrong

b) COM: The received function code