NBL-MPS-400B online multi-parameter self-cleaning digital 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. Overview

The online multi-parameter self-cleaning digital sensor launched by our company adopts an integrated design, making the product reliable and easy to use. Up to 6 parameters can be measured simultaneously, and the sensor types available include dissolved oxygen, pH, ORP, conductivity/salinity, turbidity, etc. Using RS-485 bus and Modbus/RTU communication protocol, data can be directly transmitted to the acquisition platform.

The online multi-parameter water quality sensor is equipped with an automatic cleaning device, which can set the automatic cleaning interval and the number of automatic cleaning cycles to adapt to water quality with different degrees of cleanliness. The automatic cleaning device can effectively clean the sensor surface to prevent microbial adhesion and greatly reduce maintenance costs. Each sensor is equipped with a professional marine connector, which has better waterproof effect and is easy to disassemble and assemble.

The front-end sensor protective cover is used to protect the internal sensor from damage. There are slots around the protective cover, which can effectively prevent large suspended particles and organisms from damaging the sensor probe without affecting the accuracy of the measurement. Made of copper-containing metal, it can effectively drive away microorganisms, and with an automatic cleaning device, it can better prevent microorganisms from adhering.

Features:

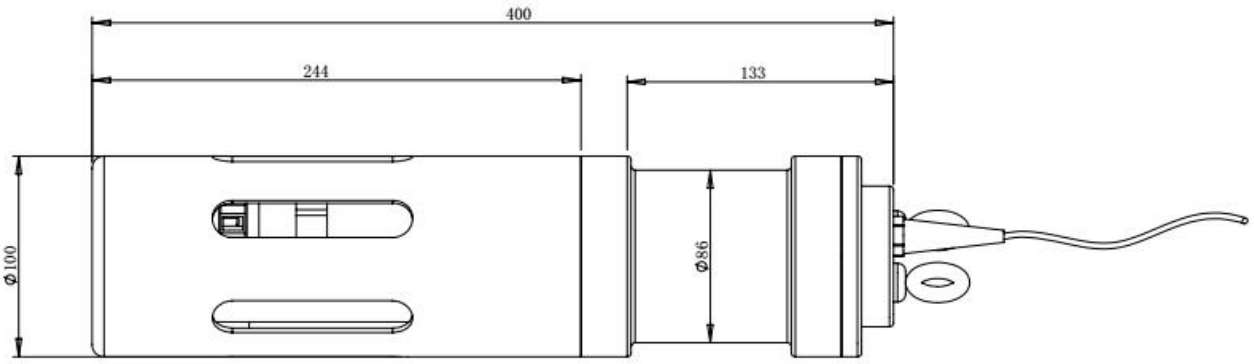
- Digital sensor, RS-485 bus, Modbus RTU communication protocol.
- Equipped with an automatic cleaning device, which can effectively clean the sensor surface to prevent microbial adhesion, making measurement more accurate and lowering maintenance costs.
- Optional digital sensors such as dissolved oxygen, conductivity/salinity, turbidity, pH, ORP, etc., suitable for long-term online monitoring.
- Integrated design, can measure 6 parameters (including temperature) at the same time.

Ⅱ. Main parameters of optional sensors

Dissolved oxygen sensor		
Range and resolution	0～20.00 mg/L	0.01
Accuracy	±2%	
Turbidity sensor		
Range and resolution	0～20.00 NTU	0.01
	0～200.0 NTU	0.1
	0～1000.0 NTU	0.1
Accuracy	0~20.00 NTU	±3% or ±1.5 NTU, whichever is greater
	0～200.0 NTU	±3% or ±2 NTU, whichever is greater
	0～1000.0 NTU	±5% or ±3 NTU, whichever is greater

Conductivity/Salinity Sensor		
Range and resolution	0～200.0 mS/cm	0.1
	0～70.0 PSU	0.1
Accuracy	±1.5%	
pH sensor		
Range and resolution	0～14.00	0.01
Accuracy	±0.1	
ORP sensor		
Range and resolution	-1500～+1500 mV	1
Accuracy	±6 mV	
Temperature		
Range and resolution	0～50.0℃	0.1
Accuracy	±0.3℃	
Other information about multi-parameter sensors		
output method	RS-485(Modbus RTU)	
Cleaning method	Comes with cleaning brush	
storage temperature	-5～65℃	
working conditions	0～50℃，≤0.2MPa	
shell material	POM and 316L	
Installation method	Input installation	
Power consumption	2W@12V	
powered by	12VDC	
Protection level	IP68	

Ⅲ. Structure diagram



Note: When installing the sensor for measurement, use lifting rings to fix it or install it with three M8 threads on the top cover to avoid direct stress on the cable. The sensor connector is a male marine connector.

Ⅳ. Electrical connection

The cable is a 4-core twisted pair shielded wire, and the line sequence is defined as follows:

- Red wire—power cord (12VDC)
- Black wire—ground wire (GND)
- Blue wire—485A
- Brown wire—485B

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.

Ⅴ. Maintenance and maintenance

1. Maintenance schedule

The MPS-400 online multi-parameter self-cleaning water quality sensor is equipped with a cleaning brush, which can extend the maintenance cycle. Because of the diversity of environments, it is recommended that sensors be inspected, cleaned and calibrated regularly.

Maintenance tasks	Recommended maintenance frequency
Clean sensor	Depends on usage environment
Calibrate sensors (if needed)	Calibrate sensors regularly

2. Maintenance methods

a) **Inspection:** Check whether there is dirt and microbial adhesion on the sensor head, whether the shell and sensor surface are damaged, whether the cable is normal, whether the test data is normal, and whether the consumables are damaged.

b) **Cleaning:** Use tap water to clean the outer surface of the sensor. 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.

c) **Calibration:** Perform single-point or two-point calibration of the sensor. Select the appropriate standard solution according to the corresponding sensor. For details on the calibration method, please refer to the instructions of each corresponding sensor.

3. FAQ

Mistake	Possible Reason	Solution
No communication returned	Error in circuit integration part	Please contact us

	Cable failure	Please contact us
The measured value is too high, too low or the value continues to be unstable	Dirt and microorganisms adhere to the sensor	Clean sensor surface
	For details, please refer to the frequently asked questions in the manual of each corresponding sensor.	

Ⅵ. Quality and service

1. Warranty period

Dissolved oxygen sensor	one year
Turbidity sensor	one year
Conductivity/Salinity Sensor	one year
pH sensor	one year
Online multi-parameter probe matrix	three years
Other consumables	three months

2. Quality Assurance

- The quality inspection department has standardized inspection procedures, advanced and complete testing equipment and means, and strictly follows the inspection procedures. It conducts 72-hour aging tests and stability tests on the products, and does not allow any unqualified products to leave the factory.
- The consignee will directly return batches of products with a defective rate of 2%, and all costs incurred will be borne by the supplier. For consideration criteria, refer to the product description provided by the supplier.
- Ensure supply quantity and shipping speed.

3. Accessories and spare parts

This product includes:

- 1 sensor
- 1 copy of instruction manual
- 1 certificate of conformity
- 1 cable (5 meters)
- The standard liquid depends on the adapted sensor.

4. 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 needed, 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 Communications

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

a) Read data instruction frame

14	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

14	03	xx	xx……xx	xx xx
Address	Function code	Bytes	Answer data	CRC check code(low byte first)

c) Write data command frame

14	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)

14	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	Illustrate	Number of registers	interview method
0x0000	**Temperature measurement**	2 double-byte integers, respectively the temperature value and the number of decimal places of the temperature value.	2 (4 bytes)	Read (0x03)
0x0006	**Conductivity/salinity measurements**	2 double-byte integers, respectively the conductivity/salinity value and the number of decimal places for conductivity/salinity.	2 (4 bytes)	Read(0x03)
0x0008	**pH measurement**	2 double-byte integers, respectively the pH value and the number of decimal places in the pH value.	2 (4 bytes)	Read(0x03)

0x000A	**ORP measurements**	2 double-byte integers, respectively the ORP value and the number of decimal places in the ORP value.	2 (4 bytes)	Read (0x03)
0x000C	**Dissolved oxygen measurements**	2 double-byte integers, respectively the DO value and the number of decimal places of the DO value.	2 (4 bytes)	Read (0x03)
0x0010	**Turbidity measurement**	2 double-byte integers, respectively the turbidity value and the number of decimal places of the turbidity value.	2 (4 bytes)	Read (0x03)
0x1000	**temperature calibration**	Temperature calibration: The written data is the actual temperature value × 10; the read data is the temperature calibration offset × 10.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x1006	**Conductivity/Salinity Zero Point Calibration**	Calibrated in air, the written data is 0; the read data is the zero offset.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x1007	**Conductivity/Salinity Slope Calibration**	Calibrated in the standard solution, the full scale range is 0~5000 μS/cm and the written data is the actual value of the standard solution; the full scale range is 0~200mS/cm and the written data is the actual value of the standard solution × 10; the full scale range is 0~70PSU. The data is the actual value of the standard solution × 10. The readout data is the slope value × 1000.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x1008	**pH zero point calibration**	Calibrated in a standard solution with a pH of 6.86, the written data is 0; the read data is the zero offset.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x1009	**pH slope calibration (4pH/9pH)**	When calibrated in a standard solution with a pH of 4.00, the written data is 0; when calibrated in a standard solution with a pH of 9.18, the written data is 1;	1 (2 bytes)	Write(0x06)/Read(0x03)

		the read data is the slope value × 1000.		
0x100A	**ORP zero point calibration**	Calibrated in standard solution, the written data is the actual value; the read data is the zero offset.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x100B	**ORP slope calibration**	Calibrate in the standard solution, the written data is the conductivity value of the standard solution; the read data is the slope value × 1000.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x100C	**Dissolved oxygen zero point calibration**	Calibrated in oxygen-free water, the written data is 0; the read data is the zero offset.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x100D	**Dissolved Oxygen Slope Calibration**	Calibrated in air-saturated water or water-saturated air, the written data is 0; the read data is the slope value × 1000.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x1010	**Turbidity zero point calibration**	Calibrate in deionized water or 0~20.0NTU standard solution. The written data is the turbidity value of the standard solution × 10; the read data is the zero offset.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x1011	**Turbidity Slope Calibration**	Calibrate in 200.0~1000.0NTU standard solution. The written data is the turbidity value of the standard solution × 10; the read data is the slope value × 1000.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x1300	**Automatic cleaning interval setting**	The default is 30 minutes, and the data range is 6 to 6000 minutes.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x1301	**Automatic cleaning lap setting**	The default is 3 circles, and the data range is 0~10 circles.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x2000	**The address of the sub-sensor**	The default data is 4, which can be 1, 4, 8, 32, 64, 65, etc.	1 (2 bytes)	Write(0x06)/Read(0x0

	corresponding to the temperature data			3)
0x2002	**sensor address**	The default is 6, the data range is 1~127.	1 (2 bytes)	Write(0x06)/Read(0x03)
0x2020	**Reset cleaning brush**	The written data is 0. Data such as the automatic cleaning interval and the number of automatic cleaning cycles can be restored to factory settings.	1 (2 bytes)	write(0x06)