MPS-400 Online Multi-parameter Self-cleaning Sensor User Manual

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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、Overview

The online multi-parameter self-cleaning digital sensor is integrated and designed to be reliable and easy to use. Up to 8 parameters can be measured simultaneously. The sensor types can be selected such as dissolved oxygen, COD,pH, ORP, conductivity/salinity, ammonia nitrogen, turbidity, etc. Using RS-485 bus (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 suit the water quality of different cleaning levels. 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 quick-release waterproof connector for easy assembly and disassembly.

The sensor cover at the front end is used to protect the internal sensor from damage. The cover is covered with a slot to prevent large suspended particles and biological damage to the sensor probe without affecting the accuracy of the measurement.

Features

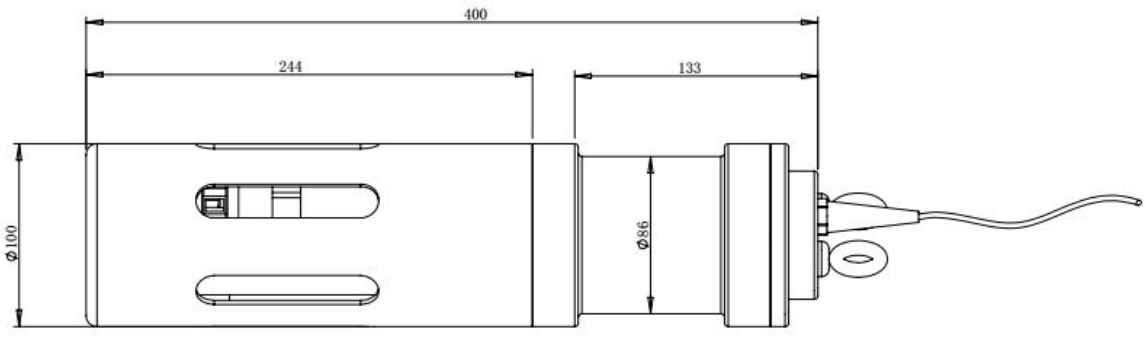
- Digital sensor, RS-485 bus (Modbus/RTU) communication protocol.
- Equipped with automatic cleaning device, it can effectively clean the sensor surface to prevent microbial adhesion, more accurate measurement and lower maintenance cost.
- Optional digital sensors such as dissolved oxygen, COD,conductivity/saltitude, turbidity, ammonia nitrogen, pH, ORP, etc., suitable for long-term online monitoring.
- Integrated design, can measure 8 parameters (including temperature) at the same time.

Ⅱ、The main parameters of optional sensors

Dissolved oxygen sensor		
Measuring range	0～20mg/L	
Accuracy	±0.4mg/L	
Resolution	0.01mg/L	
Turbidity sensor		
Measuring range and Accuracy	0～100NTU	±3%or±2NTU
	0～1000NTU	±5%or±3NTU
Resolution	0.1NTU	
Conductivity / salinity sensor		
Measuring range and Resolution	0～5000uS/cm	1uS/cm
	0～200mS/cm	0.1mS/cm
	0～70PSU	0.1PSU
Accuracy	±1.5% F.S.	

COD sensor		
Measuring range	COD	Turbidity
	0～200mg/L equiv. KHP	0～100NTU
	0～500mg/L equiv. KHP	0～200NTU
COD accuracy	±5%F.S.	
COD resolution	0.1mg/L	
Turbidity accuracy	±5%F.S.	
Turbidity resolution	0.1NTU	
pH sensor		
Measuring range	0～14pH	
Accuracy	±0.1pH	
Resolution	0.01pH	
ORP sensor		
Measuring range	-1500mV～+1500mV	
Accuracy	±6mV	
Resolution	1mV	
Ammonia nitrogen sensor		
Measuring range	0～100mg/L or 0～1000mg/L	
Accuracy	±10% or ±2mg/L	
Resolution	0.1mg/L	
Temperature		
Measuring range	0～50℃	
Accuracy	±0.5℃	
Resolution	0.1℃	
Other Information of Multi-parameter sensor		
Output	RS-485(Modbus/RTU)	
Cleaning method	Automatic cleaning	
Power consumption	5W@12V	
power supply	12VDC±5%	
Cable length	5 meters, other length can be customized	

Ⅲ、Structure diagram



Note: The sensor measurement is installed with a lifting ring or 4NPT pipe thread to avoid direct cable stress.The sensor connector is m16-5 core waterproof connector male.

Ⅳ、Electrical connection

The cable is 4-core twisted-pair shielded wire, and the definition of line sequence:

a) Red line - power line (12VDC)
b) Black line - ground line (GND)
c) Blue line - 485A
d) white line - 485B

Check wiring sequence carefully before power-on to avoid unnecessary losses caused by wiring errors.

Wiring instructions: considering that the cables have been immersed in water (including sea water) or exposed to air for a long time, all wiring points are required to be waterproofed, and the user's cables should have certain corrosion resistance.

Ⅴ、Maintenance management

1. Maintenance schedule

The MPS-400 online multi-parameter self-cleaning water sensor is equipped with a cleaning brush to extend the maintenance cycle. Due to the diversity of the environment, it is recommended to check, clean and calibrate the sensor regularly.

Maintenance task	Maintenance frequency
Cleaning sensor	Depending on the Operating environment
Calibrate the sensor (if needed)	Calibrate the sensor regularly

2. Maintenance method

a) Check: Check the sensor head for dirt and microbial adhesion, whether the outer casing and sensor surface are damaged, whether the cable is normal, whether the test data is normal, and whether the consumables are damaged.
b) Cleaning: Clean the outer surface of the sensor with tap water. If there is still debris left, wipe it with a soft, damp cloth. For some stubborn dirt, add some household washing liquid to the tap water to clean it.
c) Calibration: Perform a single or two point calibration on the sensor. Select the appropriate standard solution based on the corresponding sensor. Refer to the respective sensor manual for

the calibration method.

3. Frequently asked questions

Error	Possible cause	Solution
No communication information return	Error in integrated circuit	Please contact us
	Cable fault	Please contact us
The measured value is too high, too low or the value is continuously unstable	Dirt and microbes attached to the sensor	Cleaning the sensor surface
	For details, refer to the frequently asked questions in the corresponding sensor manuals.	

Ⅵ、Quality And Service

1. Warranty cycle

Dissolved oxygen sensor	One year
Turbidity sensor	One year
Conductivity / salinity sensor	One year
Ph Sensor	One year
Ammonia nitrogen sensor	Six month
COD sensor	One year
Online multi-parameter probe matrix	Three year
Other consumables	Three month

2. Quality assurance

- The quality inspection department has standardized inspection procedures, advanced and perfect testing equipment and means, and strictly in accordance with the regulations, 72-hour aging test and stability test on the product, and not let a substandard product leave the factory.
- The receiving party will return the product batch with the failure rate of 2% directly, and all the costs incurred will be 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.

3. Accessories and spare parts

This product includes:

- 1 sensor
- 1 copy of the manual
- 1 certificate
- Standard liquid depends on adaptive sensor

4. After-sales service spare parts

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 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

06	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

06	03	xx	xx.....xx	xx xx
Address	Function code	Bytes	Answer data	CRC check code (low byte first)

c) Write data instruction frame

06	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)

06	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 (bytes)	Access method (function code)
0x0000	Temperature value	2 double-byte integers, Separately Temperature value and the number of decimal places for the temperature	2 (4 bytes)	Read (0x03)

		value.		
0x0002	COD value	2 double-byte integers, respectively COD value and COD value decimal number.	2（4 bytes）	Read(0x03)
0x0004	COD built-in turbidity measurement	2 double - byte integers, the turbidity value and the number of decimal digits of the turbidity value, respectively.	2（4 bytes）	Read(0x03)
0x0006	Conductivity / salinity value	2 double-byte integers, respectively conductivity / salinity value and the number of decimal places for the conductivity / salinity value.	2 (4 bytes)	Read (0x03)
0x0008	pH value	2 double-byte integers, respectively pH value and the number of decimal places for the pH value.	2 (4 bytes)	Read (0x03)
0x000A	ORP value	2 double-byte integers, respectively ORP value and the number of decimal places for the ORP value.	2 (4 bytes)	Read (0x03)
0x000C	DO value	2 double-byte integers, respectively DO value and the number of decimal places for the DO value.	2 (4 bytes)	Read (0x03)
0x000E	NH_4^+ value	2 double-byte integers, respectively NH_4^+ value and the number of decimal places for the NH_4^+ value.	2 (4 bytes)	Read (0x03)

0x0010	Turbidity value	2 double-byte integers, respectively turbidity value and the number of decimal places for the turbidity value.	2 (4 bytes)	Read (0x03)
0x1000	Temperature calibration	Temperature calibration: The write data is the actual temperature value x10; the read data is the temperature calibration offset x10.	1 (2 bytes)	Write (0x06) (0x03) Read (0x03)
0x1002	COD zero calibration	Calibrated in deionized water.The calibration value data written during calibration is 0;The data read out is the original signal of COD zero point.（the measuring range of 0-200mg/L can be calibrated in 0-20mg/L COD standard solutions, the writing value during calibration is the using standard solutionsx10； the measuring range of 0-500mg/L can be calibrated in 0-50mg/L COD standard solutions, the writing value during calibration is the using standard solutionsx10；）	1（2bytes）	Write (0x06) (0x03) Read (0x03)
0x1003	COD slope calibration	the measuring range of 0-200mg/L can be calibrated in 20-200mg/L standard solutions, the writing value during calibration is the using standard solutionsx10, the read out value is COD slope original signal; the measuring range of 0-500mg/L can be calibrated in 50-500mg/L	1（2bytes）	Write (0x06) (0x03) Read (0x03)

		standard solutions, the writing value during calibration is the using standard solutionsx10, the read out value is COD slope original signal.		
0x1004	COD built-in zero turbidity calibration	Calibrated in deionized water, the written data is 0;The read data is a zero offset.	1（2bytes）	Write (0x06) (0x03) Read (0x03)
0x1005	COD built-in turbidity slope calibration	Calibrated in 20.0 ~ 200.0NTU turbidity standard solution, the written data is the turbidity value of the standard solution ×10; The readout is the slope value ×1000.	1（2bytes）	Write (0x06) (0x03) Read (0x03)
0x1006	Zero calibration of conductivity / salinity	Calibrated in air, the write data is 0; the read data is zero offset.	1 (2 bytes)	Write (0x06)/ Read (0x03)
0x1007	Slope calibration of conductivity / salinity	Calibration in the standard solution, the full scale is 0 ~ 5000μS / cm write data is the actual value of the standard solution; full scale is 0 ~ 200mS / cm write data is the standard solution actual value × 10; full scale is 0 ~ 70PSU write The data is the actual value of the standard solution x 10. The read data is the slope value x1000.	1 (2 bytes)	Write (0x06)/ Read (0x03)
0x1008	Zero calibration of pH	Calibrated in a standard solution with pH of 6.86, the write data is 0; the read data is zero offset.	1 (2 bytes)	Write (0x06)/ (0x03)

0x1009	Slope calibration of pH (4pH/9pH)	Calibrated in a standard solution with pH of 4.00, the write data was 0; Calibrated in a standard solution with pH of 9.18, and the write data was 1; the readout data was a slope value of x1000.	1 (2 bytes)	Write (0x06)/Read (0x03)
0x100A	Zero calibration of ORP	Calibrated in the standard solution, the write data is the actual value; the read data is zero offset.	1 (2 bytes)	Write (0x06)/ Read (0x03)
0x100B	Slope calibration of ORP	Calibrate in the standard liquid and write the data as the standard hydraulic conductivity value;The read data is the slope value ×1000.	1（2bytes）	Write (0x06)/ Read (0x03)
0x100C	Zero calibration of DO	Calibrated in oxygen-free water, the write data is 0; the read data is zero offset.	1 (2 bytes)	Write (0x06)/ Read (0x03)
0x100D	Slope calibration of DO	Calibrated in water vapor saturated air, the write data is 0; the read data is the slope value x1000.	1 (2 bytes)	Write (0x06)/ Read (0x03)
0x100E	Zero calibration of NH_4^+	It can be calibrated in 1ppm or 10ppm solution, and the calibration data written during calibration is the value of the standard solution concentration ×10. The data read out is the mV value ×100 corresponding to the zero calibration value.	1 (2 bytes)	Write (0x06)/ Read (0x03)
0x100F	Slope calibration of NH_4^+	Calibration can be performed in 10 ppm or 100 ppm solution. The calibration value data written during calibration is the	1 (2 bytes)	Write (0x06)/

		value of the standard solution concentration x10 used; the read data is the mV value x100 corresponding to the slope calibration value. Note that the concentration of the slope standard should be 10 times the concentration of the standard solution.		Read (0x03)
0x1010	Zero-calibration of turbidity	Calibration in deionized water or 0 ~ 20.0NTU standard solution, the written data is the turbidity value of standard solution ×10; Readout data is a zero offset.	1（2 bytes）	Write (0x06)/ Read (0x03
0x1011	Slope calibration of turbidity	Calibrated in the standard solution, the data written is the turbidity value x10 of the standard solution; the readout data is the slope value x1000.	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 laps and the data range is 0 to 10 laps.	1 (2 bytes)	Write (0x06)/ Read (0x03)
0x2000	The address of the sub-sensor corresponding to the temperature data	The default data is 4, which can be 1, 4, 8, 32, 64, 65, and so on.	1（2 bytes）	Write (0x06)/ Read (0x03
0x2002	Sensor address	The default is 6, the data range is 1-127.	1 (2 bytes)	Write (0x06)/ Read (0x03)

0x2020	Reset	The written data is 0. Automatic cleaning interval time and automatic cleaning cycle number and other data to restore factory Settings.	1 (2 bytes)	Write (0x06)