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Residual Chlorine Sensor
User Manual

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Application Environment

For applications requiring continuous monitoring of residual chlorine levels in aqueous solutions, such as drinking water treatment plants, bottling plants, drinking water distribution networks, swimming pools, cooling water circulation systems, and water quality treatment projects.

Technical Performance and Specifications

Housing Material	POM and ABS	POM 和 316L
Measuring Principle	Constant Voltage Method	
Range and Resolution	0~2 mg/L (HClO)	0.001
	0~20 mg/L (HClO)	0.01
Accuracy	0~2 mg/L (HClO)	±5% of reading; ±0.3° C
	0~20 mg/L (HClO)	±0.05 of reading; ± 0.3° C
Response Time (T90)	＜90s	
Minimum Detection Limit	0.05mg/L	
Calibration Method	Two-point calibration	
Cleaning Method	/	
Temperature Compensation	Automatic temperature compensation (Pt1000)	
Output Method	RS-485 (Modbus RTU), 4-20mA (optional)	
Storage Temperature	-5 to 65° C	
Operating Conditions	5～50℃, ≤0.2MPa, pH: 4～9	
Mounting Method	Flow-through cell installation, 3/4NPT	
Power Consumption	0.2W@12V	
Power Supply	12～24VDC	
Protection Rating	IP68	
Cable Length	5 meters, other lengths customizable	

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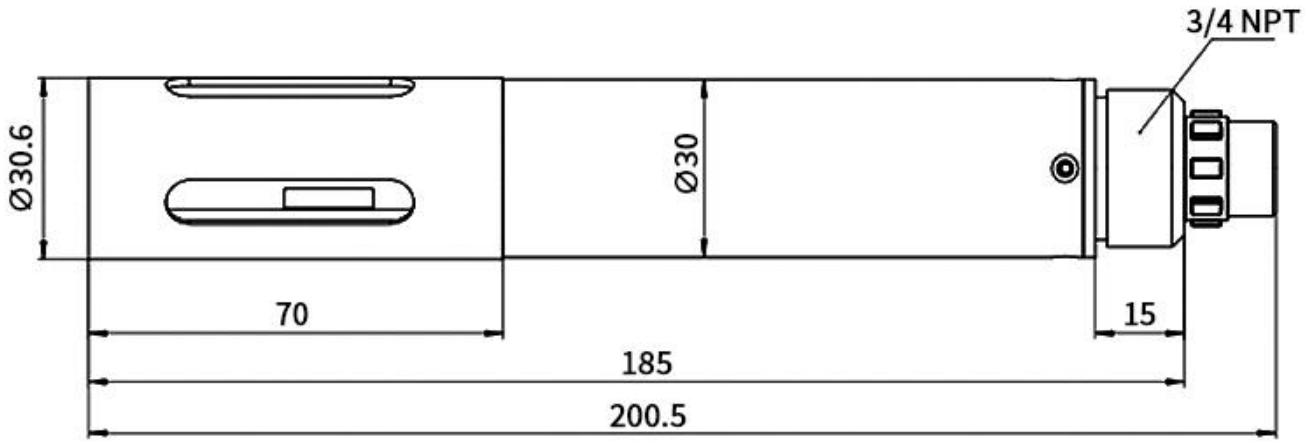
1. Dimension



Note: The sensor connector is an M16-5-pin waterproof connector (male).

1. Electrical Connection

Installation

Install using the matching flow cell. Ensure the sensor is securely mounted within the flow cell, positioning the measuring section near the inlet area. Avoid direct alignment with the outlet to maintain steady flow velocity. Recommended flow rate: 30-60 L/h to ensure testing accuracy.

Connection

The cable is a 5-core twisted pair shielded cable with the following wire sequence definition:

- Red wire — Power supply (12–24VDC)
- Black wire — Ground (GND)
- Blue wire — 485A
- Green wire — 485B
- Yellow wire—Current output (optional; leave floating if unused)

Before powering on, carefully verify the wiring sequence to prevent unnecessary damage from incorrect connections.

Wiring Notes: Considering the cable may be submerged in water (including seawater) or exposed to air for extended periods, all connections require waterproofing. User cables should possess adequate corrosion resistance.

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Maintenance and Care

1. Sensor Inspection and Maintenance

New electrodes and electrodes that have been stored for extended periods require activation before use. Place the sensor in tap water and let it sit for 24 hours. If the readings are inaccurate upon return, perform the following steps:

Calibrate the sensor for zero point and slope.

2. Sensor Calibration

a) Zero Calibration: Place the sensor in chlorine-free water and perform zero calibration once the reading stabilizes.
b) Slope Calibration: Place the sensor in a flow cell with circulating residual chlorine standard solution and perform slope calibration once the reading stabilizes. For low ranges, use 1 – 2 mg/L HClO standard solution; for high ranges, use 10 – 20 mg/L HClO standard solution. For standard solution preparation and measurement procedures, refer to the national standard for residual chlorine determination.
Note: Sensors are factory-calibrated prior to shipment. As standard solution preparation requires specialized expertise, non-professionals may not be qualified to perform this task. User calibration is recommended only when measurement inaccuracies are confirmed.

Accessories and Spare Parts

- This product includes:
- Residual chlorine sensor*1
- flow cell*1
- instruction manual*1
- certificate of conformity*1
- cable (5 meters) *1

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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 parity, 1 stop bit). Parameters such as baud rate can be customized.

2. Information Frame Format

a) Read data instruction frame

Address	Function code	Register address	Number of registers	CRC checksum (low byte first)
0A	03	xx xx	xx xx	xx xx

b) Read Data Acknowledgment Frame

Address	Function code	Number of bytes	Response data	CRC checksum (low byte first)
0A	03	xx	xx……xx	xx xx

c) Write data command frame

Address	Function code	Register address	Write data	CRC checksum (low byte first)
0A	06	xx xx	xx xx	xx xx

d) Write data response frame (same as writing data command frame)

Address	Function code	Register address	Write data	CRC checksum (low byte first)
0A	06	xx xx	xx xx	xx xx

3. Register Address

Register address	Name	Instruction	Number of registers	Access Method
40001 (0x0000)	Measurement Value + Temperature	Four double-byte integers representing the measured value, measured value decimal places, temperature value, and temperature value decimal places.	4 (8 bytes)	Read
44097 (0x1000)	Zero Calibration	Calibrate in chlorine-free water after values stabilize. Write data as 0; readout data represents zero offset.	1 (2 bytes)	Write/Read
44101 (0x1004)	Slope Calibration	For 0-2mg/L range residual chlorine sensors, calibrate in a flow cell with a known concentration HClO (1-2mg/L) solution. Write data as actual concentration value x1000; readout data represents slope value x1000. For 0-20mg/L range residual chlorine sensors, calibrate in a flow cell with a known concentration of HClO solution (10-20mg/L). Write data as actual concentration value ×100; read data as slope value ×1000.	1 (2 bytes)	Write/Read
44113 (0x1010)	Temperature Calibration	Calibrate in solution. Write data as actual temperature value ×10; read data as temperature calibration offset ×10.	1 (2 bytes)	Write/Read
48195 (0x2002)	Sensor Address	Default is 10. Write data range: 1 – 255.	1 (2 bytes)	Write/Read
48196 (0x2003)	Baud Rate	Default is 9600. 0 – 9600,	1 (2 bytes)	Write/Read

4. Command Examples

a) Read data instruction

Function: Retrieve residual chlorine and temperature values measured by the sensor; temperature is in ℃, residual chlorine is in 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	Temp value
01 67 00 03	01 6F 00 01

For example: Residual chlorine value 01 67 indicates the hexadecimal reading for residual chlorine, while 00 03 denotes the residual chlorine value with three decimal places, converting to the decimal value 0.359;

Temperature value 01 6F indicates the hexadecimal temperature reading, while 00 01 denotes the temperature value with one decimal place. Converted to decimal, this equals 36.7.

b) Calibration Commands

Zero Calibration
Function: Sets the sensor's residual chlorine zero calibration value;
Request Frame: 0A 06 10 00 00 00 8C 71
Response Frame: 0A 06 10 00 00 00 8C 71

Slope Calibration
Function: Sets the residual chlorine slope calibration value for the sensor; this slope calibration is performed in a residual chlorine solution of known concentration. (e.g., 2mg/L, write value converted to hexadecimal: 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: Sets the sensor's Modbus device address;
Change device address from 10 to 01. Example:
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 fails to execute the host computer command correctly, it will return the following format of 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 error
b) COM: Function code received