Portable Hydrogen Conductivity Meter

HC-200 Series

User Manual

CAS TECHNOLOGY
中科特肯

Declaration

The functions described in this manual are for the entire HC-200 series portable hydrogen conductivity meters. The specific available functions and parameters depend on the specific configuration of the model you purchased.

We have carefully compiled this manual, but cannot guarantee the complete accuracy of the content. We shall not be liable for any losses caused to users by this manual. At the same time, our products are constantly being improved, including this manual. Therefore, we reserve the right to modify this manual at any time without notice.

Warning

This instrument cannot be used in flammable and explosive environments.

Notes

The equipment operating environment shall comply with the requirements of GB/T 12145 standard, and the host working environment is 0℃-45℃.

- When not in use for a long time, block the water inlets and outlets with plugs and turn off the equipment power.
- Use only the special charger for charging, avoid charging on the same line with high-power equipment; to avoid circuit overload, equipment component damage or abnormal charging, the charger must be connected for charging after the equipment is completely shut down. Charging in the power-on state is strictly prohibited; if abnormal heating of the equipment, smoke or peculiar smell at the charger interface is found during charging, the power supply must be disconnected immediately and use stopped. Contact professional personnel for maintenance, do not disassemble it by yourself.
- The working environment shall be free from severe vibration and strong

electromagnetic interference.

Equipment Usage Precautions

The operating mobile phone equipped with the equipment is only for the use of this equipment and shall not be used for other purposes, otherwise the user shall bear the responsibility!

- Special color-changing resin particles provided by the manufacturer shall be used, otherwise the equipment electrode sensor may be damaged.
- Pay close attention when connecting the water inlets and outlets, and strictly prohibit any foreign matter from entering the through holes of the water inlets and outlets.
- Before starting up, connect the sample to be tested with the water inlets and outlets first to flush out the air bubbles in the equipment.
- There is a preheating time of about 60 seconds after the power is turned on.
- Contact the manufacturer when the ion column discolors and fails with inaccurate values.
- Keep the equipment clean. Turn off the power and cover the host with a dust cloth when not in use for testing.

Special Attention for Use

It is strictly forbidden for customers to disassemble or modify the equipment without permission, otherwise all guarantees will be invalid.

- Customers must operate in strict accordance with the requirements in the manual. The user shall bear the responsibility for any equipment damage

caused by failure to operate in accordance with the usage requirements or regulations, and the manufacturer shall not bear any responsibility!

Contents

1 Equipment Overview

1.1 Equipment Application

This equipment is designed and manufactured in accordance with the relevant provisions of the national standard technical requirements of GB/T 12145, meeting the needs of portable inspection and testing for power plant users and special equipment inspection institutions. Compared with the current detection methods, it is the first in China, saving user usage costs, reducing enterprise safety hazards, and contributing to carbon neutrality. It is the best choice for on-site measurement of main parameters such as hydrogen conductivity, conductivity, and pH value of power plant water and steam quality.

This equipment can be equipped with various electrodes according to user needs to meet the user's testing needs for different water samples. It can not only measure the hydrogen conductivity and conductivity of high-purity water and steam, but also measure the conductivity of tap water, groundwater, and various production wastewater at the same time, with an extremely wide range of measurement range.

1.2 Equipment Features

- The equipment is equipped with styrene-divinylbenzene hydrogen type gel strong acid cation ion column, pH meter, dissolved oxygen sensor, temperature sensor, and flow meter;

- The standard flow cell of the electrode completely isolates the air to avoid the influence of air on high-purity water vapor samples such as pure water and steam;
- Complies with GB12145 *Water and Steam Quality for Thermal Power Generating Units and Steam Power Equipment*, DLT502.29 *Method for Water and Steam Analysis in Thermal Power Plants - Part 29: Determination of Hydrogen Conductivity*, DL/T912 *Water and Steam Quality Standard for Supercritical Thermal Power Generating Units*;
- The hydrogen conductivity test mode can test the liquid hydrogen conductivity, and can automatically adjust the instrument test accuracy according to the water quality, and automatically switch the ion exchange column as needed;
- The equipment adopts a two-inlet and two-outlet water structure, which can test the dissolved oxygen and hydrogen conductivity values of two water samples respectively;
- Professional software support, the software interface is simple and clear, easy to operate, and the detection process is flexible and configurable. Fully automatic operation, one-key detection, can test sample temperature, flow rate, conductivity, hydrogen conductivity, pH value, dissolved oxygen value;
- Can draw real-time change curves of hydrogen conductivity, conductivity, and pH value according to real-time data;
- Can save more than 100,000 test data, and provide a convenient test data

query function;

- Can use Type-C interface to share data with computer or update equipment software.

1.3 Technical Specifications

Item		**HC-201**	**HC-202**	**HC-203**	**HC-204**
Hydrogen Conductivity	Measurement Range	0~20μs/cm			
	Resolution	0.001μs/cm			
	Accuracy	±1.0%F.S			
pH	Measurement Range	1~14			
	Resolution	0.01			
	Accuracy	±0.1			
	Measurement Range	-	-	0~500μs/cm	
	Resolution	-	-	0.001μs/cm	

Item		**HC-201**	**HC-202**	**HC-203**	**HC-204**
Conductivity	Accuracy	-	-	±1.0%F.S	
Dissolved Oxygen	Measurement Range	-	-	-	0.00μg/L~ 50.00mg/ L
	Minimum Detection Limit	-	-	-	< 0.01μg/L
	Repeatability	-	-	-	±0.1μg/L
Basic Configuration	Temperature Compensation	Automatic			
	Working Temperature	0~45℃			
	Calibration Point	Available			
	Recording	Manual、Automatic			

Item		HC-201	HC-202	HC-203	HC-204
	Data Storage	100000 groups			
	Sample Flow Rate	300~700ml/min			
	Equipment Volume	41cm×33cm×18cm			

2 Equipment Appearance

2.1 Equipment Appearance Diagram

Equipment Appearance Diagram (Figure 1)

2.2 Functions of Each Component

(1) Portable Main Chassis

Function: Measure hydrogen conductivity, conductivity, pH value, dissolved oxygen of high-purity water and steam water, and can also measure conductivity of tap

water, groundwater, and various production wastewater at the same time, with an extremely wide range of measurement range. Open flame is strictly prohibited to avoid accidents! The portable hydrogen conductivity meter cannot measure harmful liquids such as toxic and strongly corrosive liquids, otherwise the user shall bear the consequences!

(2) Mini Accessory Box

Function: Store various accessories, including: host charger, clamp, water inlet and outlet connecting pipe, etc.

3 Equipment Installation

3.1 Equipment Working Environment

When the equipment is working, the space shall be free from strong electromagnetic radiation interference.

Operators can only perform test operations on the equipment after reading the manual thoroughly and mastering the basic operation essentials of the equipment; it is strictly prohibited to perform tentative operations without understanding the equipment.

3.2 Equipment Installation

(1) Unpacking

Carefully open the outer packaging of the instrument, check the equipment list,

manual and accessories, and carefully check whether the received goods are consistent with the contents listed in the packing list. If there is any abnormal phenomenon, please contact the manufacturer in time.

Properly keep the packing box and accessory box for transportation during factory maintenance.

(2) Waterway Connection

Before turning on the equipment power, connect the water inlet and outlet pipelines first. Insert the Φ8mm polyurethane tube (transparent) provided in the accessory box into the water inlets and outlets, then connect the sampling port of the sample to be tested with the Φ8mm polyurethane tube (transparent) with a latex tube (yellow), start flushing the host and discharge air bubbles. When testing the dissolved oxygen value, insert the Φ8mm polyurethane tube (transparent) into the dissolved oxygen inlets and outlets according to the previous steps.

Power Button and Water Inlet/Outlet Schematic Diagram (Figure 2)

(3) Turn on the Host

After discharging the air bubbles from the host, press the power button, turn on the operating mobile phone, wait for 60 seconds, find and open the "Hydrogen Conductivity Meter-APP", the software will automatically connect to the host.

4 Software Interface and Functions

4.1 Operation Interface and Functions

Main interface of the operation software, as shown in Figure 3

(1) Setting Function: Bluetooth connection between the operating equipment and the control mobile phone.

(2) Equipment Status: Display whether the operating mobile phone is connected to the host and the host battery level.

(3) Dissolved Oxygen Test: Connect the dissolved oxygen water inlet pipeline, the equipment detects the dissolved oxygen value in real time. When testing dissolved oxygen, the hydrogen conductivity, pH and other values of other water samples can be tested at the same time. If there is no need to detect the dissolved oxygen value, please operate directly according to the relevant instructions.

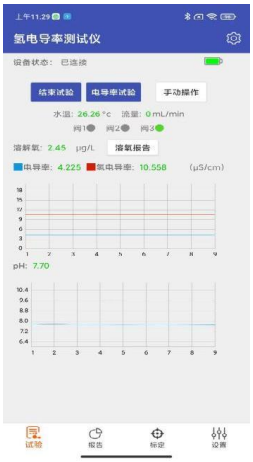
(4) Hydrogen Conductivity Test: Used to test the hydrogen conductivity, conductivity and pH value of water samples. Click to "End Test", the hydrogen conductivity and pH value curves are read in real time, and the conductivity, hydrogen conductivity and pH value are read in real time (Figure 4). Click "End Test" to pop up the test PDF format report setting interface. The report displays the conductivity, hydrogen conductivity, pH value, test time, and can add unit name, sampling location, experimenter, remarks. "Save" can save the test report to the mobile phone (Figure 5).

(5) Conductivity Test: Used to test the conductivity and pH value of water samples.

Click to "End Test", the conductivity value, curve graph and pH value, curve graph are read in real time (Figure 6). Click "End Test" to pop up the test PDF format report setting interface. The report displays the conductivity, pH value, test time, and can add unit name, sampling location, experimenter, remarks. "Save" can save the test report to the mobile phone (Figure 7).

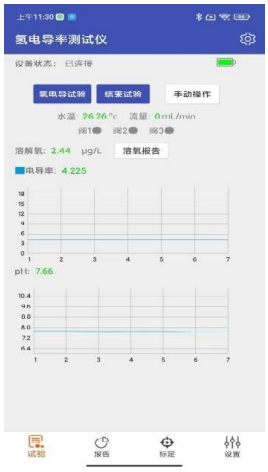
(6) Manual Operation: 3 valves in the host can be operated manually on this page, and the values of 5 sensors can be read in real time (Figure 8).

(Figure 3)



(Figure 4)

(Figure 5)



(Figure 6)

(Figure 7)

(Figure 8)

4.2 Report Interface and Functions

Search Function: Test reports can be searched according to unit name, sampling location, and experimenter respectively on this page, and experimental reports in PDF format can be exported (Figure 9).

(Figure 9)

4.3 Calibration Interface and Functions

(1) pH Calibration

The pH value is displayed in real time on this page, and calibration can be performed with 4.00, 6.86 and 9.18 calibration standard buffer solutions. The specific operation steps are as follows:

① Take out the pH meter and flow cell from the fixator;

② Separate the pH meter from the flow cell with the special wrench in the accessory box;

③ First rinse the pH meter electrode with carbon dioxide-free distilled water, dry it

with filter paper, put it into 6.86 standard buffer solution for rinsing, then insert it into 6.86 standard buffer solution, stand vertically until the value is stable, click 6.86 calibration, the value changes with temperature (Figure 10);

④ Take out the electrode, rinse the pH meter electrode with carbon dioxide-free distilled water, dry it with filter paper, put it into 9.18 standard buffer solution for rinsing, then insert it into 9.18 standard buffer solution, stand vertically until the value is stable, click 9.18 calibration, the value changes with temperature;

⑤ Take out the electrode, rinse the pH meter electrode with carbon dioxide-free distilled water, dry it with filter paper, then put it into 6.86 standard buffer solution. The unchanged value also indicates that the value is accurate.

(2) Conductivity Calibration

High point calibration, low point calibration and temperature calibration can be performed on 3 conductivity sensors respectively on this page.

(3) Dissolved Oxygen Calibration

Zero point calibration, air calibration and pressure setting can be performed on the dissolved oxygen sensor (Figure 11).

① Air Calibration: Based on the oxygen content in the local ambient air, air calibration is required when the instrument is used for the first time and after long-term continuous/intermittent use. The saturation can be checked to see if it deviates from 100% (if the saturation is near 100%, no calibration is needed). The steps are: 1) Check the membrane at the front end of the probe. If there are air bubbles in the membrane, flick the front end of the probe downwards or shake the

probe downwards a few times (to make no air bubbles in the membrane). Then place the probe in air with near-saturated humidity (such as on the surface of a wet towel), check that there are no water droplets at the probe membrane (blot dry with clean paper if any); 2) Run the instrument for more than 20 minutes (display oxygen concentration and temperature are stable and unchanged), click the air calibration button to complete the air calibration, and check the oxygen concentration and saturation in real time.

② Zero Point Calibration: Severe zero point offset will not occur during normal use and maintenance of the equipment. It is recommended to configure oxygen-free water regularly for zero point verification, only observe the data change without calibration. Calibration method: 1) Turn on the instrument, perform air calibration according to the above steps first; 2) Configure a sodium sulfite (Na2SO3) solution with a concentration of ≥5% using pure water or drinking water, and stir; 3) Screw the probe into the calibration cap and put it into the oxygen-free water solution, confirm that there are no air bubbles on the surface of the oxygen membrane; if there are, flick the probe to break the air bubbles, and start timing at the same time; 4) Observe the response speed (should be less than 10 μg/L within 5 minutes normally). After more than 30 minutes, when the equipment measurement value is extremely low and tends to be stable, if calibration is needed, click zero point calibration to complete the zero point calibration.

Note: Zero point is an important parameter, incorrect zero point calibration will lead to unreliable measurement results; each zero point calibration will overwrite

the previous calibration value.

③ Pressure Setting: The pressure value needs to be set manually before use (only need to set once when used in this area, no need to set again in future use). If used in low altitude areas, the pressure value can be kept at the default value (101.3KPa, i.e. standard atmospheric pressure) without setting.

pH Value of Standard Buffer Solutions at Different Temperatures

Temperature (℃)	**Potassium Hydrogen Phthalate (0.05M)**	**Mixed Phosphate (0.025M)**	**Borax (0.01M)**
5	4.00	6.95	9.39
10	4.00	6.02	9.33
15	4.00	6.90	9.28
20	4.00	6.88	9.23
25	4.00	6.86	9.18
30	4.01	6.85	9.14
35	4.02	6.84	9.11

Figure 10: pH Standard Buffer Solution Values at Different Temperatures

(Figure 11)

4.4 Setting Interface and Functions

(1) Test Parameters

High conductivity alarm value, resin failure alarm value, K0.01 conductivity maximum value, inlet stabilization time, outlet stabilization time can be set on this page (Figure 12).

(Figure 12)

(2) Common Test Units

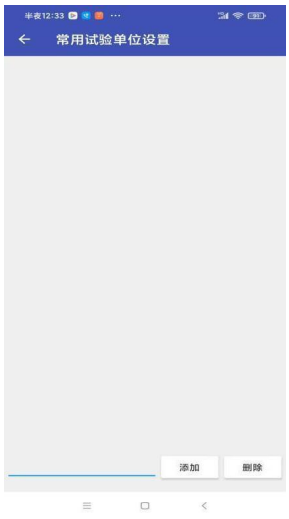
Common test units can be added and deleted on this page (Figure 13), which can be quickly added by clicking on the save test report page.

(3) Common Sampling Location Setting

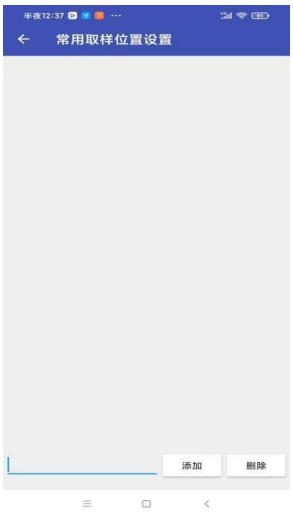
Common sampling locations can be added and deleted on this page (Figure 14), which can be quickly added by clicking on the save test report page.

(4) Common Experimenter Setting

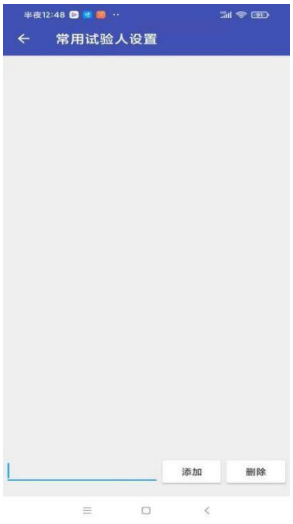
Common experimenters can be added and deleted on this page (Figure 15), which can be quickly added by clicking on the save test report page.



(Figure 13)



(Figure 14)



(Figure 15)

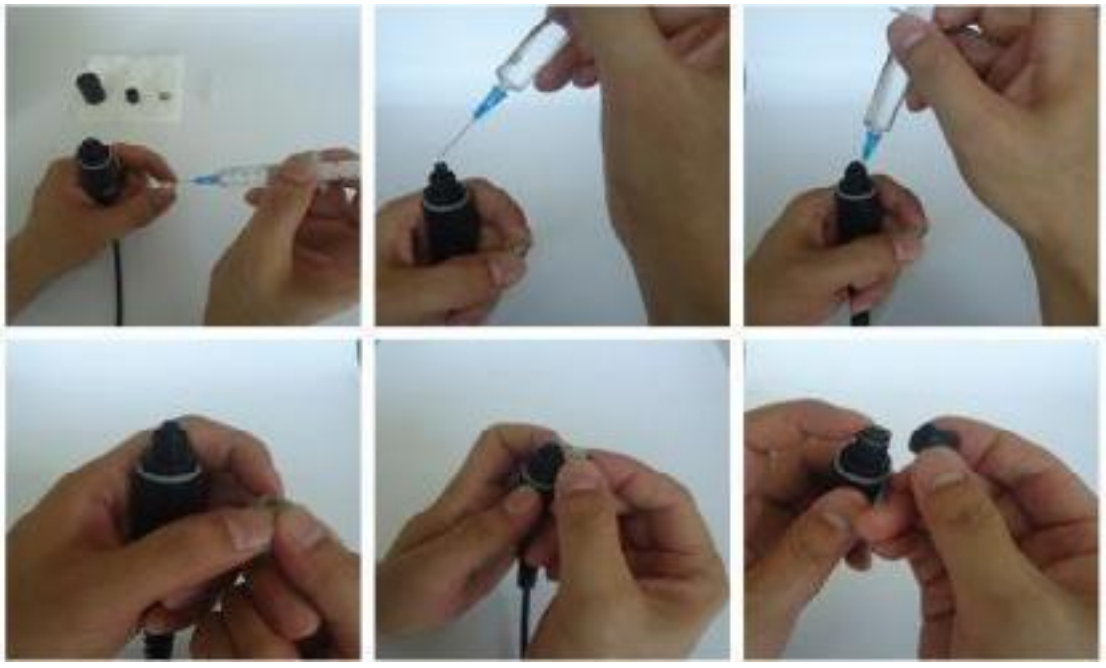
5 Maintenance of Dissolved Oxygen Electrode

5.1 Membrane and Electrolyte Replacement

Note: Protect the front end of the electrode, avoid contact with any hard objects.

The electrode can be maintained in both shutdown and power-on states.


1. Prepare a new membrane and extract about 5.0mL of electrolyte (the needle can be removed first for extraction);
2. Unscrew the electrode pressure cap and membrane in turn;
3. Shake out the electrolyte in the electrode like shaking a thermometer;



4. Hold the probe and new membrane with the left hand, fill the membrane with electrolyte with a syringe with the right hand;
5. Add two or three drops of electrolyte to the electrode head;
6. Insert the syringe vertically to the bottom of the electrode cavity, inject

electrolyte slowly until it overflows; (This process needs to be slow, otherwise air bubbles are easily generated, the electrolyte injection volume is about 4mL);

7. Hold the membrane with the right hand and close to the probe, fasten the membrane on the electrode head quickly, and tighten the pressure cap;
8. Wipe off water stains with a clean paper towel, visually check that there are no obvious air bubbles inside the probe, flick a few times if there are;
9. If the O-ring is found to be damaged, please replace it in time. Screw on the protective cap and polarize for several hours after startup. It is recommended to configure oxygen-free water for zero point test to detect the membrane replacement effect.

5.2 Electrode Maintenance

The electrode needs to be inspected and maintained when the following situations occur during equipment use:

- Equipment zero point offset (large test data in oxygen-free water);
- Decreased test response speed;
- Shortened equipment service cycle after membrane replacement.

Solutions:

- The electrode is not immersed in electrolyte, at this time flick the probe downwards to make the electrolyte flow. If flicking the probe cannot solve the problem, the membrane may move, perforate or rupture, and the

membrane needs to be replaced;

- After long-term use of the electrode, microorganisms will be adsorbed on the electrode surface. After step (3) of the membrane replacement process, the electrode can be deeply cleaned. The cleaning methods are (choose any one):

① Gently wipe the electrode head (platinum electrode) with alcohol cotton sheets, and inject electrolyte after cleaning;

② Inject electrolyte into the electrode cavity, then shake it out, then inject it again, and cycle this process more than twice;

③ After removing the membrane from the electrode, screw it into the calibration cap, insert it into a beaker filled with ultrapure water (or analytical grade alcohol) for cleaning three times, and then perform operation ②.

5.3 Phenomena and Treatment

Phenomenon Description	**Cause Analysis**	**Solutions**
High data in oxygen-free water test	1. Expired or invalid oxygen-free water 2. Air bubble interference at electrode head 3. Electrode needs maintenance	1. Configure oxygen-free water as required 2. Stir to eliminate air bubbles 3. Replace membrane and electrolyte

Phenomenon Description	Cause Analysis	Solutions
High data in on-site test with flow cell	1. Sensor linear offset 2. Insufficient tightness of sampling system 3. Air bubbles in sampling tube 4. Membrane damage or membrane not attached to cathode	1. Maintain electrode and calibrate 2. Check system and eliminate leakage 3. Eliminate air bubbles 4. Replace membrane and electrolyte
Unstable data in air and during measurement	1. Air bubbles in membrane 2. Membrane not attached to electrode 3. Membrane damage	1. Flick the front end of the probe downwards 2. Replace membrane and electrolyte 3. Replace membrane and electrolyte
Very small value in air	1. A large number of air bubbles in membrane 2. Broken probe wire	1. Flick the front end of the probe downwards 2. Replace probe

5.4 Electrode Maintenance Checklist

Maintenance Items (In Laboratory)	Recommended Cycle

Maintenance Items (In Laboratory)	**Recommended Cycle**
1. Startup polarization 2. Check oxygen content and temperature value in air 3. Rinse electrode with pure water	Once every 7-10 days
Configure zero oxygen water and check electrode zero point value	Once every 15-30 days, or irregularly
Electrode maintenance (membrane and electrolyte replacement)	Once every 4-8 months, or according to test result requirements
Replace O-ring	Once every 4-8 months, or according to wear condition
Host charging	Once every 4-12 months when used infrequently or temporarily not in use, or according to screen prompts

6 Shutdown

After the test is completed, the final test results will be displayed in the corresponding test report, see 4.1 for details. Turn off the power button, pull out

the pipeline by pressing the inlet and outlet connection, block with pipe plugs, arrange the polyurethane tube and latex tube into the accessory box. Wipe the equipment and store it with a dust cloth covered.

7 Charging

The operating mobile phone displays the host battery level. Please charge the host in time with the special host charger when the battery level display bar turns red. The first charge takes 4-6 hours.

To avoid circuit overload, equipment component damage or abnormal charging, the charger must be connected for charging after the equipment is completely shut down. Charging in the power-on state is strictly prohibited.

If abnormal heating of the equipment, smoke or peculiar smell at the charger interface is found during charging, the power supply must be disconnected immediately and use stopped. Contact professional personnel for maintenance, do not disassemble it by yourself.

8 Query

View historical data through the software.

For the specific operation instructions of viewing software historical data, see the software operation instructions part.

9 Troubleshooting

Due to the patents involved in the equipment, please contact the manufacturer or call the after-sales personnel for any faults.

Company Introduction

Zhongke Tk (Shandong) Intelligent Technology Co., Ltd. was founded in 2015, with its headquarters located in Jinan, Shandong. It is a high-tech enterprise focusing on the R&D, production, sales and service of water quality analysis equipment.

The company has a professional R&D team. With profound professional knowledge and rich practical experience, team members continue to promote the innovation and progress of water quality analysis technology to ensure that products are always in the leading level of the industry.

Our products cover a variety of water quality analysis equipment, including hydrogen conductivity meter, dissolved oxygen meter, pH meter, conductivity meter, multi-parameter water quality analyzer, etc. At the same time, the company also provides customized solutions for customers, tailoring suitable water quality analysis equipment and monitoring schemes according to their specific needs.

Zhongke Tk always adheres to the business philosophy of "Technological Innovation, Quality First, Service Supreme", continuously improves product quality and service level, provides customers with suitable water quality analysis equipment and solutions, and makes greater contributions to promoting the

development of the water quality analysis industry.

After-sale Service

- One-year warranty for instruments, free software upgrade service, lifetime free technical support;
- Instrument "trade-in" policy, provide backup instruments for use when instruments fail;
- Equipped with a testing center to provide customers with sample testing and sample data comparison services.

Contact Information

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