

Online Conductivity/TDS Meter

Operation Manual

Instrument initial password: 0000

Instrument power supply: 220VAC

Wuxi Wohuan Instrument Technology Co., Ltd.

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1. Overview

The industrial online conductivity meter (hereinafter referred to as the meter) is an online water quality monitoring instrument with a microprocessor. The meter is equipped with conductivity electrodes of different types and constants, which are used to continuously monitor and control the conductivity value and temperature value of the aqueous solution. Widely used in power plants, petrochemicals, metallurgy, paper industry, environmental protection water treatment, light industry electronics and other fields. Such as power plant cooling water, make-up water, saturated water, condensate water and boiler water, ion exchange, reverse osmosis EDL, seawater distillation and other water production equipment raw water and water quality monitoring and control.

The instrument adopts LCD liquid crystal display; intelligent Chinese menu operation; with current or voltage output, free setting of measurement range, high and low over-limit alarm prompt and two sets of relay control switches, adjustable hysteresis range; automatic or manual temperature compensation;

According to user needs, we can provide conductivity electrodes with various installation processes such as [flow type] [pipe type] [submerged type] [flange type].

2. Structural features and working principle

2.1 Structural features:

The whole set of measurement system is mainly composed of two parts: meter (secondary meter) and conductivity electrode (primary meter).

2.2 Working principle:

Measurement principle: In order to avoid electrode polarization, the meter generates a high-stability sine wave signal and applies it to the electrode. The current flowing through the electrode is proportional to the conductivity of the solution to be measured. The meter converts the current from a high-impedance operational amplifier into a voltage signal. Then, the potential signal reflecting the conductivity is obtained after the program-controlled signal amplification, phase-sensitive detection and filtering; the microprocessor alternately samples the temperature signal and the conductivity signal by switching the switch, and after calculation and temperature compensation, the measured solution is obtained. Conductivity value at 25°C and temperature value at that time.

Principle of temperature compensation: The conductivity of the electrolyte solution is affected by temperature changes, and temperature compensation is required. The temperature coefficient of a weak aqueous solution is 2.00% °C, and the higher the concentration, the smaller the temperature coefficient. The temperature coefficient of the solution with lower concentration ($1\mu\text{S}\cdot\text{cm}^{-1}$) is not 2.00%°C, but is set by the user, and the range is 0.00~9.99%.

3. Technical parameter

(1) Measuring range (range can be freely set):

Conductivity : $0\sim 20\mu\text{S}\cdot\text{cm}^{-1}$ (K=0.01); $20\sim 200\mu\text{S}\cdot\text{cm}^{-1}$ (K=0.1);
 $200\mu\text{S}\cdot\text{cm}^{-1}\sim 4\text{mS}\cdot\text{cm}^{-1}$ (K=1.0); $4\sim 20.0\text{mS}\cdot\text{cm}^{-1}$; (K=10.0)
 $20\sim 100.0\text{mS}\cdot\text{cm}^{-1}$; (K=30.0)

Temperature: $-5\sim 110^\circ\text{C}$;

(2) Resolution: Conductivity: $0.01\mu\text{S}\cdot\text{cm}^{-1}$; $0.01\text{mS}\cdot\text{cm}^{-1}$; Temperature: 0.1°C ;

(3) Meter Basic Error: Conductivity: $\pm 1.0\%\text{F}\cdot\text{S}\pm 1$ byte, Temperature: $\pm 0.5^\circ\text{C}$;

(4) Electronic unit automatic or manual temperature compensation range: $0\sim 110^\circ\text{C}$ (reference temperature 25°C);

(5) Electronic unit automatic temperature compensation error: $\pm 0.5\%\text{F}\cdot\text{S}$;

(6) Electronic unit stability: $\pm 0.2\%\text{F}\cdot\text{S}\pm 1$ byte /24h;

(7) Repeatability error of electronic unit: $\leq 0.2\%\text{F}\cdot\text{S}\pm 1$ byte;

(8) Electronic unit alarm error: $\pm 1\%\text{F}\cdot\text{S}$;

(9) Electronic unit output current error: $\pm 1\%\text{F}\cdot\text{S}$;

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- (10) Output Signal: 0~10mA(Load Resistance<1.5K Ω); 4~20mA(Load Resistance<750 Ω);
0~5V,0~10V optional (Reservation required);
- (11) Two sets of relay control contacts: 3A 240VAC, 6A 28VDC or 120VAC;
- (12) Power supply: 230VAC \pm 10%,60 \pm 1Hz, Power \leq 3W;
24VDC, Power \leq 1W (Reservation required); 12VDC, Power \leq 1W (Reservation required);
- (13) Dimensions: 96 \times 96 \times 130mm;
- (14) Installation method: plate mounting (embedded); opening size:91 \times 91mm;
- (15) Wall-mounted: Waterproof wall-mounted box Dimensions: 300 (height) \times 200 (width) \times 167 (depth) mm;
- (16) Meter weight: 0.6kg;
- (17) Working environment:
- 1) Ambient temperature: -10~60 $^{\circ}$ C;
 - 2) Relative humidity: not more than 90%;
 - 3) Except for the earth's magnetic field, there is no strong magnetic field interference around.

4. Features

- ※Intelligence: use a single-chip microprocessor to complete conductivity value measurement, temperature measurement and compensation;
- ※ Man-machine dialogue: menu operation structure, users can operate according to the prompts on the screen;
- ※ Multi-parameter display on the same screen: Simultaneous display of conductivity value, temperature value and working status;
- ※ Software setting output mode: software selects 0~10mA or 4~20mA output;
- ※ The measurement range and the upper and lower alarm limits can be freely set; the upper and lower limit overrun alarm prompts;
- ※ Two sets of relay control, the hysteresis control range is adjustable;
- ※ Self-set password and service guide: Users can set or modify their own passwords to prevent unrelated personnel from entering and causing misoperation; provide users with technical support and after-sales service contact methods.

5. Installation and electrical connection

The instrument should be installed in a clean, dry, well-ventilated and vibration-free place. There should be a certain space around the instrument to facilitate the operation and maintenance of the instrument, and the instrument should be as close to the sampling point as possible to facilitate electrical connection. The distance between the meter and the sensor should not be too far to facilitate the calibration operation.

5.1 Instrument installation: The instrument is suitable for embedded installation on the panel. The size of the opening is shown in Diagram 1, and the size of the opening is 93 \times 93mm. Insert the meter into the square hole and fix it with the provided bracket.

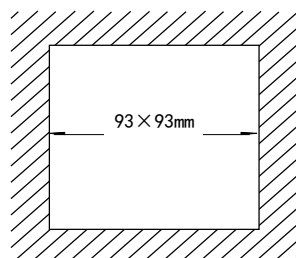
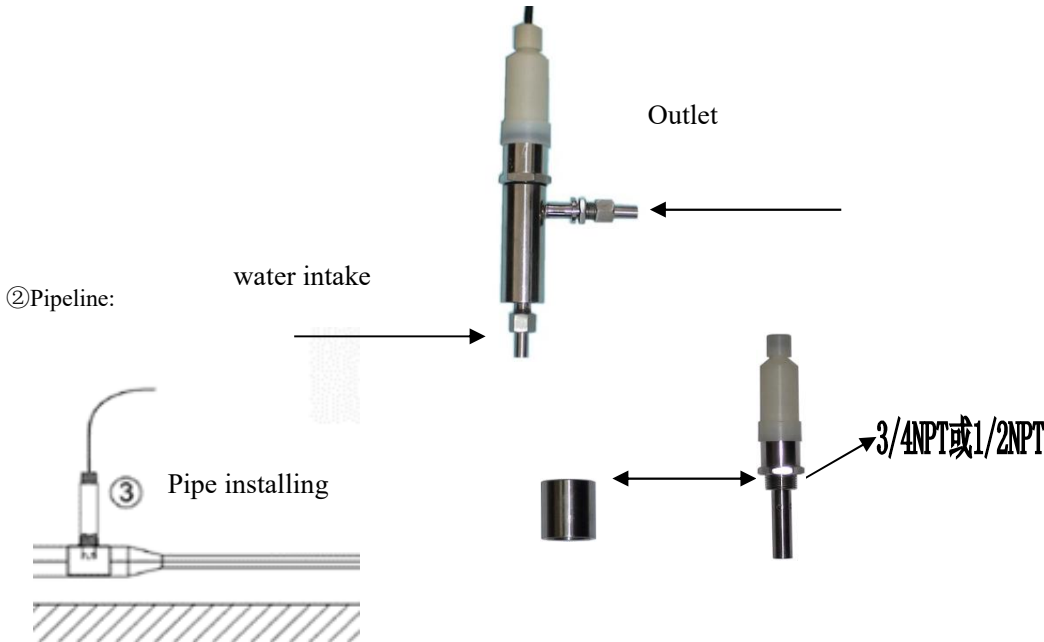


Diagram 1: Dimensions of the opening for instrument installation

5.2 Electrode installation:

①Flow-through (connected with a hose or hard pipe):



Wiring Instructions:

Mounting the base Applicable electrode type diagram

- ③ Flange type: Flange installation can be customized according to user needs.
- ④ Input type: Put the electrode directly into the pool, water tank, water tower, waterproof the electrode cable or install it with a sheath.
- ⑤ Other methods: If no suitable installation method can be found above, please contact the manufacturer to order a special installation method.

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5.3 Terminal wiring for the meter:

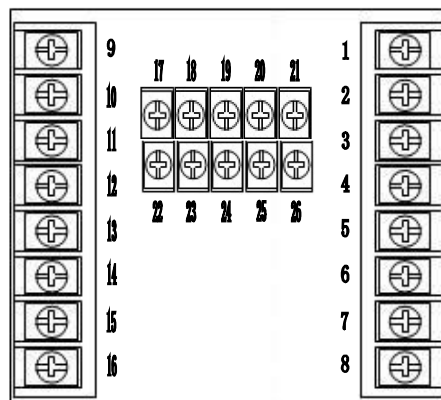


Figure 2 Wiring diagram behind the instrument

9	Electrode terminal (white)	1	AHNC Relay high alarm turns off
10	Electrode Terminal (Black)	2	AHNO Relay high alarm turns on
11	Electrode Terminal (Temperature T)	3	COM Relay common connection
12	Electrode Terminal (Temperature T)	4	ALNC Relay low alarm turns off
13	null	5	ALNO Relay low alarm turns on
14	Current output 1+	6	FG Power ground wire
15	Current output common terminal—	7	Power L AC - Fire Wire L/or DC +
16	Current output 2+ (optional)	8	Power N AC - Neutral N/or DC -
25	Communication A+ (optional)	26	Communication B - (optional)

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5.4 Electrical connection: the connection between the meter and the sensor electrode: the power supply, output signal, relay alarm contact and the connection between the sensor electrode and the meter are all at the rear of the meter, and the wiring is as shown in Figure 2. The lead length of the electrode fixed cable is usually 5-10 meters, and the terminal has a labelled insert, which can be inserted into the terminal with the same number and symbol at the rear of the instrument and tightened.

If the installation distance between the electronic unit and the sensor electrode is far, the user can notify the manufacturer in advance, and the repeater can be extended up to 100 meters or longer.

6. Function key description

There are 6 touch buttons on the panel: \leftarrow (left), \rightarrow (right), \uparrow (up), \downarrow (down), exit and confirm, see cover.

\leftarrow : Move the cursor to the left when entering data, or move the menu to the left;

\rightarrow : Move the cursor to the right when entering data, or move the menu to the right;

\uparrow : Move up the menu or increase the value;

\downarrow : Move down the menu or decrease the value;

Exit: switch between the measurement screen and the menu screen or return to the previous menu, status or cancel the entered data in the menu screen;

Confirmation: The selection or confirmation of a menu item ends the input of data or confirmation of certain states. (left), (right), (up), (down)

7. Detailed operating instructions

7.1 Power on: Check all the pipeline connections and electrical connections before use. The meter will enter the main measurement display after a few seconds of power on.

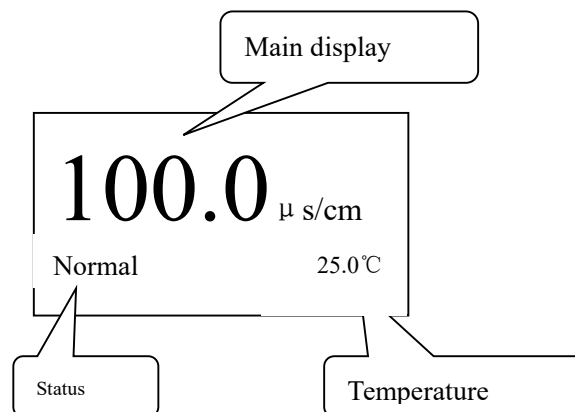
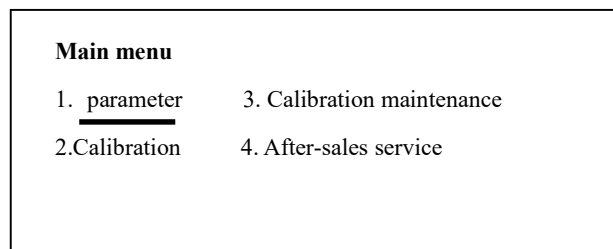


Diagram 3 The instrument is turned on and the main display of the instrument screen

The conductivity value is the main display, and the temperature and status are the secondary display. The status prompt line displays the following information: 1. Normal 2. High limit alarm 3. Low limit alarm.

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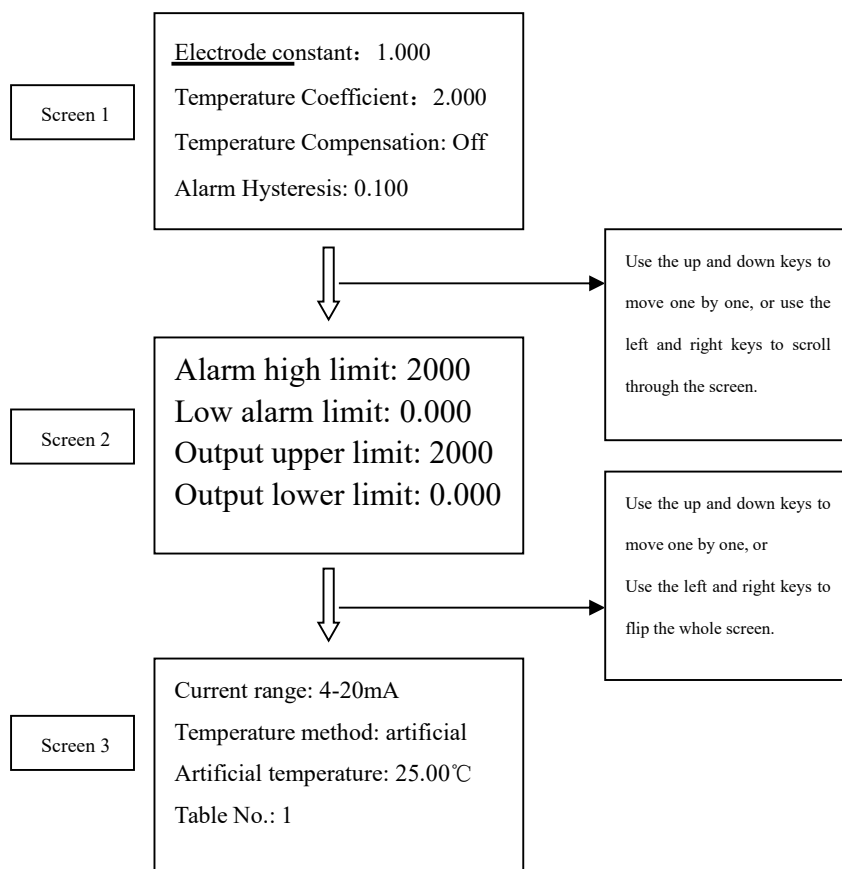
7.2 Main menu: After pressing the "Exit" key in the main display state, enter the main menu:



7.3 Submenu: Before the measurement, the "parameters" should be set or modified according to the actual situation, otherwise, it should be carried out according to the existing set value in the instrument. When the cursor is under the "parameter" menu, press the "confirm" key to enter the password and then press "confirm" to enter the multiple sub-menu. Before entering this menu, you need to enter the correct password (the initial password is 0000). After entering this menu, a flashing cursor will appear to indicate the current parameter item. After moving the cursor up and down according to the selected parameter, press the "Enter" key to enter the parameter item for setting or modification.

Important note: When entering a password or modifying numerical parameters, use the up and down keys to move and transform the numbers "0-9", "minus" and "dot", and the left and right keys to move the transformed position.

Backlight adjustment method: When the meter displays on the right side of Figure 4, long press the "Up" key, and the font square background will appear. At this time, release the "Up" key and then press the "Up" or "Down" key to adjust the brightness of the meter as required. Backlight, adjust to the right.



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7.4 Parameter Description:

- 1) **Electrode constant : K(J)** Indicates the actual cell constant of the current conductivity electrode. Before use, according to the measurement range determined at the time of ordering, the cell constant (setting) marked on the electrode must be input into the instrument parameters (eg: 0.01, 0.1, 1.0, 10.0, 30.0).
- 2) **Temperature coefficient and automatic compensation:** The "Automatic compensation" item is used to select whether to enable the automatic temperature compensation function. If "On" is selected, it means that the meter will compensate according to the automatic temperature compensation algorithm, and the setting of the "Temperature Coefficient" item will not work; The coefficient set by the "Coefficient" item is used for temperature compensation. For ultra-pure water, "Automatic Mode: On" should be selected, and the "Temperature Coefficient" item does not work at this time, and the "Temperature Coefficient" item only works when "Automatic Mode: Off".
- 3) **"Alarm High Limit", "Alarm Low Limit" and "Alarm Hysteresis":** These three items are used to set the high and low alarm limits, the high alarm limit > the low alarm limit; this function is used to control metering pumps, valves and other equipment .
- 4) **"Output upper limit" and "Output lower limit":** These two items are used to set the range of conductivity measurement corresponding to current output, output upper limit > output lower limit.
- 5) **"Output current":** This menu item is used to set the mode of the instrument's current output, which can be selected from "0-10mA" and "4-20mA". Correspondence between output current and measured conductivity value:

0~10mA Output method: $I = \{(D-DL)/(DH-DL)\} \times 10mA$;

4~20mA Output method: $I = 4mA + \{(D-DL)/(DH-DL)\} \times 16mA$ 。

Among them: I- output current value, D- current measured conductivity value, DH- user-set "output upper limit"; DL- user-set "output lower limit".

- 6) **"Temperature mode" and "Artificial temperature":** "Temperature mode" is divided into "measured" and "artificial", "measured" means that the temperature is actually measured by the temperature sensor; "artificial" means that the temperature is artificially set, which is different from the actual The solution temperature is irrelevant. This function is mainly used to reduce a resistance box during analog debugging (for example, when the measurement is not affected by the temperature, the temperature can be set manually).

7.5 Calibration instructions:

No calibration required for routine use. Conditional users can use "standard solution calibration" or "standard electrode calibration" for higher measurement accuracy.

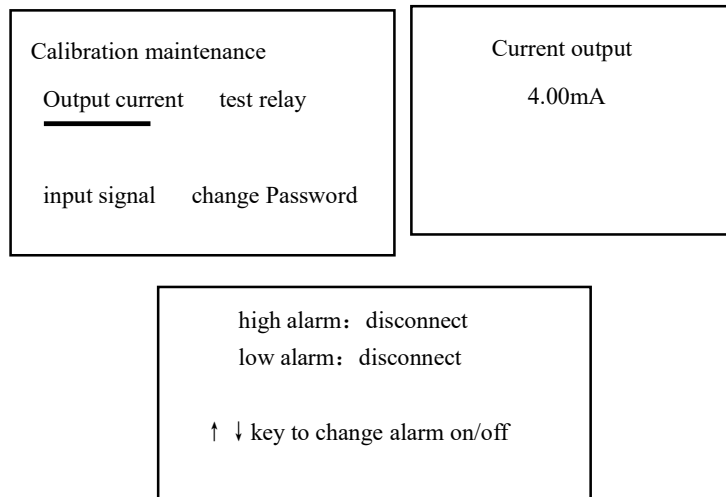
8. Check Maintenance Menu

8.1 Output current check: This function is mainly used for the analog verification of the output current, allowing the user to check the accuracy of the output current of the meter within the full output range. Second, when it is connected to the collector or PLC, it can check whether the collector and PLC sampling are correct, so as to find Fault. When entering this submenu, a warning will appear, prompting you to ensure that the random change of the output current will not cause any harm before using this function. Press the "OK" key to continue, and enter the current output setting screen as shown in the figure below. The value displayed on the screen is the current output

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current. Use the up and down or left and right keys to change the current output current, and press the "OK" key to stop the change, or press the "OK" key to jump out of a box, and use the "UP, DOWN" button directly in the box. , Left, Right" key to input the current value to be calibrated. At this time, use an ammeter or a multimeter to measure the output current, which should be the same as the displayed value or within the error range.

Special reminder: When using this function, since the output current is arbitrarily set by the user, it may change in the full range. It is necessary to confirm that the adjustment controller or microcomputer connected to the output circuit will not produce control output with adverse consequences.

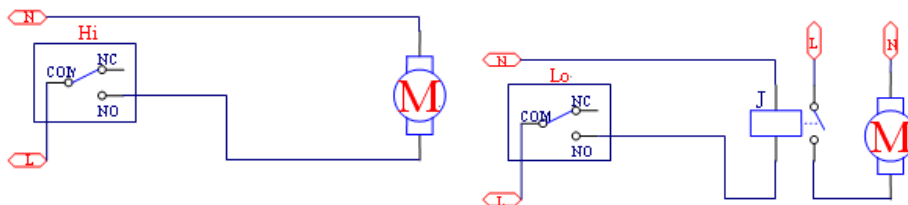


8.2 Test Relay Calibration:

Entering this sub-menu displays as shown on the above page. This function is used to test the quality of the output of the alarm control relay. Press the up key to high alarm: disconnect or connect; press the down key to low alarm: disconnect or connect.

When the rated current of the control load is less than the current of the relay, it can be connected to the left of the figure below (the power supply cannot exceed 220V);

When the rated current of the control load is greater than that of the relay, an AC contactor needs to be added, which can be connected to the right of the figure below.



8.3 Change Password:

After entering this submenu, first enter the "original password" (the initial password is 0000), then enter the "new password" and press "Confirm" to complete the modification of the user password. Up to five passwords can be set, please remember the password you set!

8.4 Output signal check: This function is used when the manufacturer conducts simulation debugging.

8.5 After-sales service: This menu displays the contact information of the seller.

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8.6 Calibration of the electronic unit:

Users generally do not adjust the meter (electronic unit) by themselves. If there is any error or failure, please contact our company and make adjustments under the guidance of technicians. If the user has any doubts about the meter, he can remove the connecting wire between the meter and the conductivity electrode, and connect the resistance box to the 11-pin and 12-pin at both ends of the corresponding thermistor (Temp) and the 9-pin and 10-pin at both ends of the electrode. Simulation verification judgment. First set the temperature coefficient of the meter to 0.00%, and convert the exact value of the conductivity as follows:

$$S=10^6 \times K/R$$

$$S_ \text{Conductivity value, Unit: } \mu\text{S} \cdot \text{cm}^{-1}$$

$$K_ \text{Electrode constant, Unit: cm}^{-1}$$

$$R_ \text{Resistance box value, Unit: } \Omega$$

For example: input a 10K Ω resistance with a resistance box, and set the electrode constant of the meter to 0.1cm⁻¹, then the theoretical conductance value $S=10^6 \times 0.1/10000=10\mu\text{S} \cdot \text{cm}^{-1}$, the difference between the indicated value of the meter and 10 $\mu\text{S} \cdot \text{cm}^{-1}$ should be Less than or equal to the fundamental error. This instrument uses NTC_temperature coefficient thermistor, and adopts two-wire system for temperature measurement and compensation.

The following table is the corresponding table of resistance and conductivity (set the meter "parameter" - "temperature coefficient" to 0.00%, "automatic mode" to "off" state, "electrode constant" corresponds to K in the table)

K=0.01		K=0.1		K=1	
Resistance value	Conductivity	Resistance value	Conductivity	Resistance value	Conductivity
50K	0.200	50K	2.000	50K	20.00
40K	0.250	40K	2.500	40K	25.00
30K	0.333	30K	3.333	30K	33.33
20K	0.500	20K	5.000	20K	50.00
10K	1.000	10K	10.00	10K	100.0
5K	2.000	5K	20.00	5K	200.0
2K	5.000	2K	50.00	2K	500.0
1K	10.00	1K	100.0	1K	1000
500	20.00	500	200.0	500	2000

Correspondence table of temperature and resistance:

Resistance box resistance	Temperature value (°C)	Resistance box resistance	Temperature value (°C)
7352.90	0.0	1814.51	30.0
4481.09	10.0	1199.72	40.0
2813.11	20.0	811.42	50.0
2252.00	25.0	560.34	60.0

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9. Daily Maintenance

It is best to calibrate the instrument once a year. If the user has no conditions, they can send it to our company for help in the calibration. Conductivity electrodes can determine the maintenance cycle of cleaning electrodes according to the cleanliness of the water sample. It should be ensured that there are no contamination deposits on the inner and outer surfaces of the electrodes. For stainless steel conductivity electrodes and platinum conductivity electrodes, if they are found to be stained, they should be cleaned in time. Use 50% warm detergent (or household soap powder) and nylon brush to wash, and then rinse the inside of the electrode with distilled water to ensure the surface of the inner and outer electrodes. No grease deposits. Do not touch the conductivity electrode with your fingers; the deposits with strong adhesion can be cleaned with 2% dilute hydrochloric acid solution, and then rinsed with water; **For the platinum black conductivity electrode, if it is found to be stained, it should be cleaned in time, and do not use a brush or To brush the electrode head with other substances, just rinse the electrode head with clean water;** keep the cables and plugs dry to ensure reliable contact.

10. Completeness

Name	Qty
1) Electronic unit	1pc
2) Conductivity electrode and connecting cable	1pc
3) Meter Mounting Bracket	2pc
4) Sensor mounting accessories (optional accessories)	1set
5) Operation Manual	1pc

Note: Please check the completeness of the purchased instrument before use.

For other series of analytical instruments of our company, please log in to our website to inquire.

Tips for using the instrument:

1. How to retrieve the forgotten password?

A: Enter the after-sales service menu, when you see the manufacturer's contact information, press the "left" and "right" keys at the same time, then you need to enter the password "12345", after entering, move the cursor to the bottom row of "password" to view the current Meter password.

2. How to correct the temperature error value (this method is only used for small errors, if the actual value differs greatly, it is necessary to check whether the instrument and electrode are working properly)?

A: Enter the after-sales service menu, when you see the manufacturer's contact information, press the "left" and "right" keys at the same time, then you need to enter the password "12345", after entering, move the cursor to "temperature calibration", the temperature value is too small Then input the error value directly, if the temperature value is too large, first input the negative sign and then input the error value.

3. How to correct the conductivity error value (this method is only used for small errors, if the actual value differs greatly, it is necessary to check whether the meter and electrode are working properly)?

A: Enter the after-sales service menu, when you see the manufacturer's contact information, press the "left" and "right" keys at the same time, then you need to enter the password "12345", after entering, move the cursor to "calibration", the conductivity value is too small Then input the error value directly, if the conductivity value is too large, first input the negative sign and then input the error value.