

Online Free Chlorine Analyzer

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## Preface

- Thank you for purchasing our product.
- This manual is an instruction manual about various functions, wiring methods, setting methods, operation methods, and troubleshooting methods of the product.
- Please read this manual carefully before operation, use this product correctly to avoid unnecessary losses due to incorrect operation.
- After you finish reading, please keep it in a place where it can be easily accessed at any time for reference during operation.

## Note

- The contents of this manual are subject to change without notice due to functional upgrades.
- We strive to be correct in the contents of this manual. If you find any errors, please contact us.
- The contents of this manual are strictly prohibited to be reproduced or copied.
- This product is forbidden to be used in explosion-proof occasions.

## Version

U-SUP-TRC400/ERC400-EN1

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## **Safety Precautions**

In order to use this product safely, be sure to follow the safety precautions described.

### **About this manual**

- Please submit this manual to the operator for reading.
- Please read the operation manual carefully before applying the instrument. On the precondition of full understanding.
- This manual only describes the functions of the product. The company does not guarantee that the product will be suitable for a particular use by the user.

### **Precautions for protection, safety and modification of this product**

- To ensure safe use of this product and the systems it controls, Please read carefully the operation manual and understand the correct application methods before putting into operation, to avoid unnecessary losses due to operation mistakes. If the instrument is operated in other ways not described in the manual, the protections that the instrument give may be destroyed, and the failures and accidents incurred due to violation of precautions shall not be borne by our company.
- When installing lightning protection devices for this product and its control system, or designing and installing separate safety protection circuits for this product and its control system, it needs to be implemented by other devices.
- If you need to replace parts of the product, please use the model specifications specified by the company.
- This product is not intended for use in systems that are directly related to personal safety. Such as nuclear power equipment, equipment using radioactivity, railway systems, aviation equipment, marine equipment, aviation equipment and medical equipment. If applied, it is the responsibility of the user to use additional equipment or systems to ensure personal safety.

- 
- Do not modify this product.
  - The following safety signs are used in this manual:



Hazard, if not taken with appropriate precautions, will result in serious personal injury, product damage or major property damage.



Warning: Pay special attention to the important information linked to product or particular part in the operation manual.



- Confirm if the supply voltage is consistent with the rated voltage before operation.
- Don't use the instrument in a flammable and combustible or steam area.
- To prevent from electric shock, operation mistake, a good grounding protection must be made.
- Thunder prevention engineering facilities must be well managed: the shared grounding network shall be grounded at is-electric level, shielded, wires shall be located rationally, SPD surge protector shall be applied properly.
- Some inner parts may carry high voltage. Do not open the square panel in the front except our company personnel or maintenance personnel acknowledged by our company, to avoid electric shock.
- Cut off electric powers before making any checks, to avoid electric shock.
- Check the condition of the terminal screws regularly. If it is loose, please tighten it before use.
- It is not allowed to disassemble, process, modify or repair the product without authorization, otherwise it may cause abnormal operation, electric shock or fire accident.
- Wipe the product with a dry cotton cloth. Do not use alcohol, benzene or other organic solvents. Prevent all kinds of liquid from splashing on the

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product. If the product falls into the water, please cut off the power immediately, otherwise there will be leakage, electric shock or even a fire accident.

- Please check the grounding protection status regularly. Do not operate if you think that the protection measures such as grounding protection and fuses are not perfect.
- Ventilation holes on the product housing must be kept clear to avoid malfunctions due to high temperatures, abnormal operation, shortened life and fire.
- Please strictly follow the instructions in this manual, otherwise the product's protective device may be damaged.



- Don't use the instrument if it is found damaged or deformed at opening of package.
- Prevent dust, wire end, iron fines or other objects from entering the instrument during installation, otherwise, it will cause abnormal movement or failure.
- During operation, to modify configuration, signal output, startup, stop, operation safety shall be fully considered. Operation mistakes may lead to failure and even destruction of the instrument and controlled equipment.
- Each part of the instrument has a certain lifetime, which must be maintained and repaired on a regular basis for long-time use.
- The product shall be scrapped as industrial wastes, to prevent environment pollution.
- When not using this product, be sure to turn off the power switch.
- If you find smoke from the product, smell odor, abnormal noise, etc., please turn off the power switch immediately and contact the company in time.

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## Disclaimer

- The company does not make any guarantees for the terms outside the scope of this product warranty.
- This company is not responsible for damage to the instrument or loss of parts or unpredictable damage caused directly or indirectly by improper operation of the user.

## Package contents

No.	Name	Quantity	Note
1	Online Free Chlorine Analyzer	1	
2	Manual	1	
3	Certificate	1	

After opening the box, please confirm the package contents before starting the operation. If you find that the model and quantity are incorrect or there is physical damage in appearance, please contact us.

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## Chapter 1 Introduction

The built-in chlorine sensor has the characteristics of high measurement accuracy, fast response time and low maintenance cost. The analyzer outputs one (4~20)mA standard signal and one RS485 signal, which can be connected with various regulators, such as two regulators, time-proportional regulators, nonlinear regulators and classical PID regulators according to customer requirements, to combine all kinds of residual chlorine control systems.

This product is widely used in the industry of continuous monitoring of residual chlorine content in water solution in drinking water and waterworks.

### 1.1. Electrode usage requirements

The analyzer uses imported sensors to measure the residual chlorine value in water. The following conditions are the basic guarantee for obtaining accurate measurement values.

- Before power on, you must ensure that the electrodes are placed in the water. Ignoring this can lead to electrode damage.
- Electrodes were placed and hydrated in running tap water for 12 hours without power on, before their first use or reuse after air drying. Otherwise, there will be a short period of instability, and even reduce the performance of the sensor.
- When measuring, the measured current flowing through the electrode has a recommended flow of (12~30)L/h. If the electrified electrode is used in a sometimes absent water, its service life will be shortened.
- To ensure the accuracy of the measurement value, it is recommended that only a single disinfectant be placed for disinfection. Free chlorine electrodes can be cross-sensitive to chlorine dioxide, ozone, and hydrogen peroxide. The use of hydrogen peroxide significantly reduces the life of the sensor.
- The range of the electrode is (0~5)mg/L, and the service life of the electrode will be shortened if the over-range is used.

- The pH values of the tested fluid ranged from 5 to 9. pH below 5 or greater than 9 may damage the electrodes.
- The electrode was rinsed with purified water for at least 60 seconds to completely remove free chlorine on the electrode surface. After rinsing, the electrode was placed in a cool place to dry until the sensor was completely dry before storage.

### **1.2. Display**

The analyzer adopts 7" touch screen display, in the measurement mode, the free chlorine measurement value is displayed in the prominent position of the main screen, unit mg/L, the temperature value of the measured solution is displayed in the lower right row, unit °C, the current value of the equipment output is displayed in the lower left row, unit mA, date and time are displayed in the upper right row.

### **1.3. Output signal**

The analyzer is equipped with a (4~20)mA analog output and a 485 output. The output signal corresponds to the measured free chlorine value and can be connected to various regulators to form the free chlorine control system.

## Chapter 2 Technical parameters

Table 1 TRC400 analyzer technical parameters

Display	7" Touch screen
Protective box dimensions	Dimensions : 400mm×300mm×180mm Visual size : 155mm×87mm
Measuring range	Free chlorine: (0~5) mg/L Temperature: (0.1~40.0) °C
Output signal	(4~20)mA and RS485
Load resistance	≤750Ω
Ambient humidity	≤95% No condensed water
Power supply	220VAC
Ingress protection	IP43

Table 2 ERC400 electrode technical parameters

Measurement content	HClO、ClO <sub>2</sub>
Measurement system	Microelectronic MEMS technology, special membrane structure
Accuracy	When (0~0.1)mg/L, absolute error ±0.01mg/L; When (0.1~2)mg/L, ±5% or ±0.03mg/L of measured value(Whichever is greater); When (2~5)mg/L, ±5% of ±0.25mg/L of measured value(Whichever is greater);
Resolution ratio	0.01
Polarization time	When it is used for the first time, chlorine containing water is first supplied with water for 2 hours and then supplied with electricity for half an hour.
Response time	<30s
Conductivity	> 100μS/cm

Working temperature	(0.1~40) °C (No condensed water)
Temperature compensation	Pt1000, built in integrated automatic compensation
Max.working pressure	4bar
Recommended flow rate	≥0.03m/s, in flow cell
pH range	(5~9 )pH
Maximum chlorine concentration	≥5ppm
Supply voltage	Standard ( 24 ± 2V ) DC Optional ( 12V ± 2)V DC
Power consumption	1.56W
Communication	MODBUS RS485
Cable length	3m (standard), others can be customized
Probe weight	210g
Thread size	NPT 3/4
Connection type	5-core waterproof aviation plug
Moisture proof material	PVC and VitonO-ring seal
Dimensions (Unit: mm)	<p>Technical drawing of the probe showing dimensions: total length 156mm, diameter Ø32mm, a 20mm section, a 50mm section with diameter Ø21.5mm, and a 15mm section with NPT3/4 thread.</p>

## Chapter 3 Installation

### 3.1. Installation location

The installation position of the analyzer shall meet the following conditions:

- Indoor installation is recommended ;
- Clean, dry ;
- There is no high-power motor operation equipment nearby ;
- Ambient temperature range is 0~40°C.

### 3.2. Installation of protective box

The protective box integrates touch screen, power supply and electrode, which has the characteristics of easy installation and superior protective performance.

The dimensions of the protective box are shown in Fig.1. During installation, install M6-M8 expansion screws on the wall according to the spacing between the mounting feet, and then fix the box. Connect the water inlet and outlet respectively with 2 PE pipes. If there is no leakage, the water test can be carried out and the next operation can be carried out.

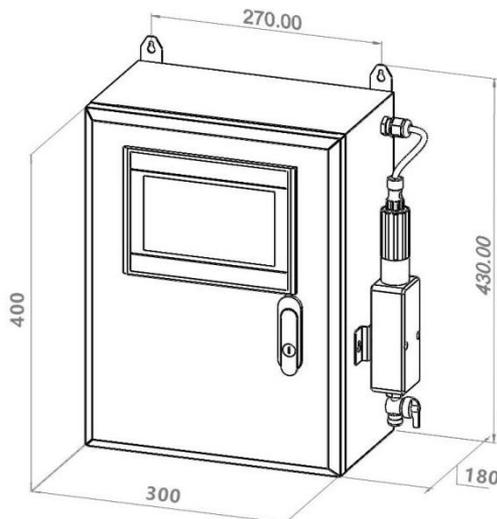


Fig.1 Protective box dimensions

### 3.3. Choose of sampling points

When choose the sampling point, consider the following factors:

- The chlorine stays in the water for a period of time (i. e., after the residual chlorine content in the tested water sample is relatively stable).
- The sampling point should be close to the measuring unit, and the residual chlorine concentration at the sampling point should be the same as in the water sample entering the measuring unit.
- Stay away from high-power mechanical and electrical equipment, such as working pump, frequency conversion cabinet, etc.
- With the electromagnetic flowmeter and other instruments, keep the spacing is not less than 3m.
- The height of the water intake point should be the same as the installation height of the circulation pool. When the temporary water cut off on site causes backflow, it can ensure a certain amount of water in the circulation pool to avoid electrode damage caused by long-term dry burning without water.

### 3.4. Installation of sensor flow cell

The specific installation steps are as follows:

- (1) Fix the flow cell on the wall or panel with screws;
- (2) Screw the residual chlorine sensor into the flow tank;
- (3) 8mm water pipe is used to connect to the water inlet and outlet of the circulation tank.
- (4) Refer to Fig. 2 for dimension drawing of flow cell

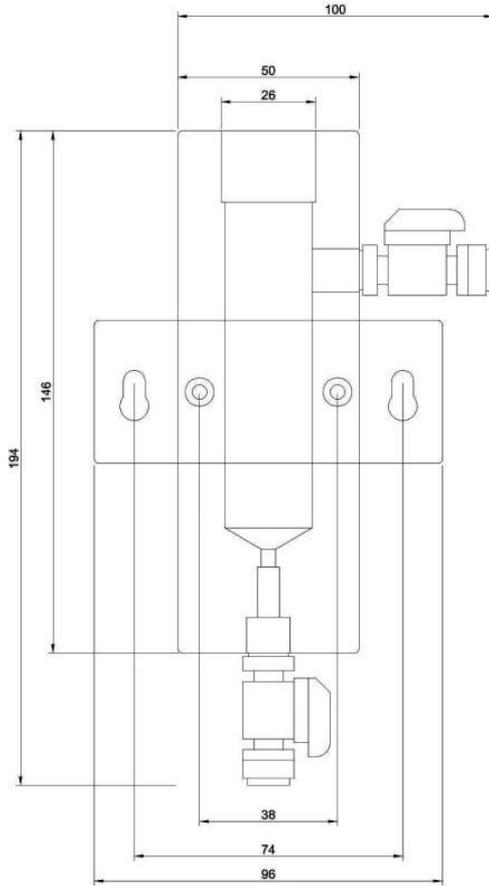


Fig.2 Flow cell dimensions

## Chapter 4 Electrical connection

### 4.1. Analyzer power supply wiring

The analyzer can use 220V AC power supply. Connect cables strictly according to the related instructions. Three power plugs have been connected before delivery, which can be used directly.

### 4.2. Analyzer output signal wiring

Fig.3 shows the preview of analyzer output wiring and wiring definition. The user can correctly connect according to the connection information.

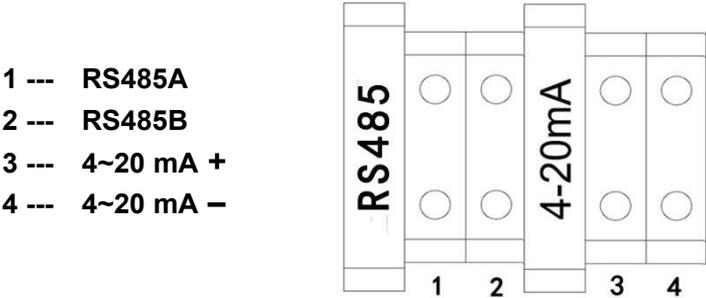


Fig.3 Analyzer wiring

## Chapter 5 Operation

### 5.1. Analyzer interface

After the sensor is hydrated, the analyzer is powered on. After the sensor is powered on, the display interface is shown in Fig.4. Users can operate the instrument through the menu on the right of the touch screen, including “Menu”, “para query”, “Calibration” .

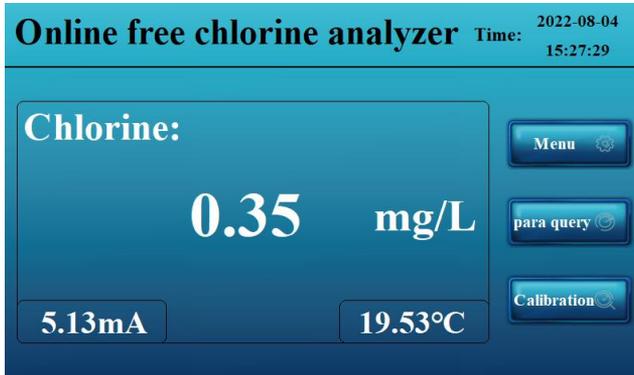


Fig.4 Display

If no, check whether the power supply is correctly connected. If a yellow warning mark appears, please check whether the sensor is correctly connected, as shown in Fig.5:

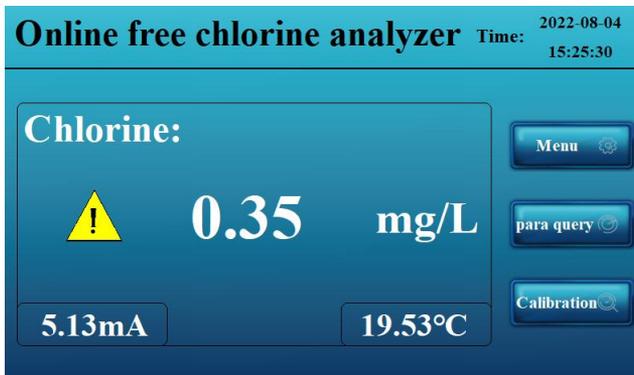


Fig.5 The sensor is not connected

Menu includes : “Para set” 、 “Calibration Set” 、 “Maintenance” 、 “Historical data” , and “Service” . Fig.6 shows the Menu interface.



Fig.6 Menu Interface

“Para query” : You can directly view sensor parameters.

“Calibration” : You can directly enter the sensor calibration interface.

## 5.2. Operation instructions

The analyzer has been accurately calibrated when leaving the factory. Please modify the parameters when you confirm that you need to modify them (such as: calibration after long time use, etc.)!

Before powering on, you must carefully check to confirm that the electrode is immersed in water before powering on, otherwise it will shorten the service life of the electrode, or even damage the electrode! If water is cut off on site, please turn off the power supply of the product to avoid damage.

The response time of the electrode after the first hydration polarization is longer, please read the free chlorine value after 30 minutes of energizing.

## 5.3. Menu introduction

In the normal display state, press “Menu”and enter the correct password (default password 123) to access the Menu interface, which includes “Para set”, “Calibration”, “Maintenance”, “Historical data”and “Service”.

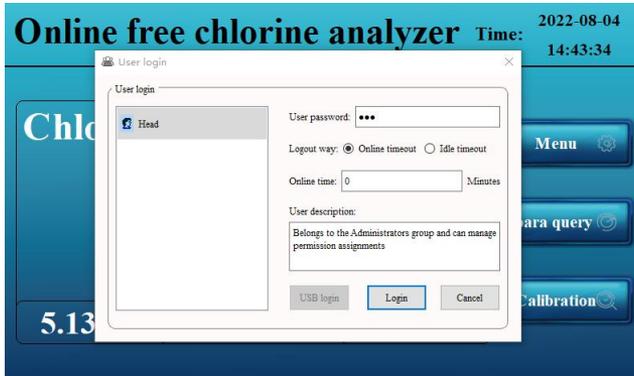


Fig.7 User Login interface

### 5.3.1 Parameter settings

“Para set” include “Info query” and “Para Modify”.

“**Para set**”: Click the “ Info query ” on the Menu interface to enter the parameter query screen. “ Info query ” can view the basic parameters of the electrode, including “Zero point”、 “Slope”、 “Measuring”、 “Voltage”、 “pH value”、 “CL offset”、 “Temp offset”、 “Filter” , “hardware ver” and “software ver”, as shown in Fig.8.

Info query				Exit
Zero point	601.00	pH value	7.50	
Slope	321.00	CL offset	0.00	
Measuring	0.51	Temp offset	0.00	
Voltage	682.10	hardware Ver	4	
Temp	23.14	software Ver	14	

Fig.8 Info query interface

“**Para Modify**” : Click the “ Para Modify ” on the Menu interface to enter the parameter modification page. The parameters that can be modified are “pH value” , “CL offset” and “Filter” . “pH value” : The analyzer needs to perform

pH compensation on the chlorine value, which needs to be manually input for compensation calculation. “CL offset” : used to correct the error between chlorine value and DPD value. The default value is 0.00. “Filter” : The filter level of the signal, which can stabilize the field interference. The default value is 4. Grade 3 is the highest, grade 2 and 4 are medium, and grade 1 is the lowest.



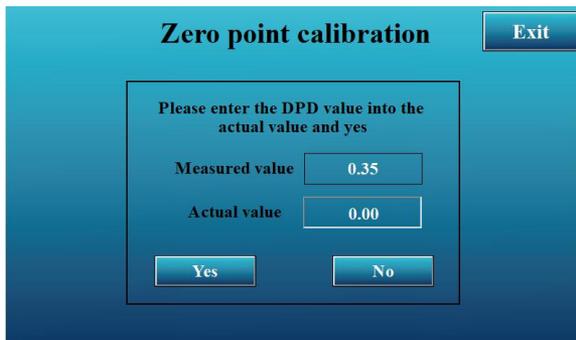
Para Modify		Exit
pH value	7.00	
Yes	No	
CL offset	0.00	
Yes	No	
Filter	4	
Yes	No	

Fig.9 Para Modify interface

### 5.3.2 Calibration setting

Calibration Setting include Zero point calibration, Slope calibration, Quick calibration and temperature calibration.

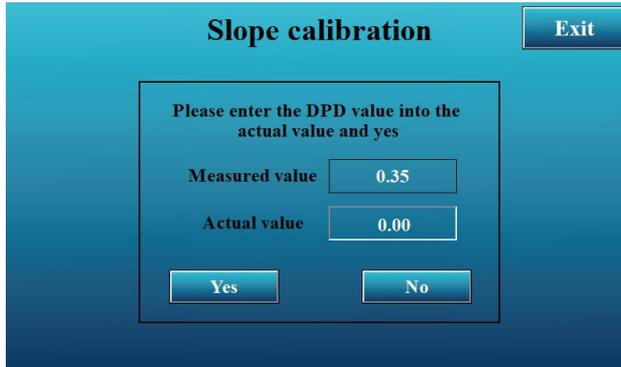
**Zero point calibration** : Click " Zero point " button on the Menu interface to enter the " Zero point calibration" interface. When the actual measured value is lower than 0.1 mg/L, "Zero point calibration" is used. Click " Zero point ", input “Actual value”, and click “Yes” to complete "Zero point calibration", as shown in Fig.10.



Zero point calibration		Exit
Please enter the DPD value into the actual value and yes		
Measured value	0.35	
Actual value	0.00	
Yes	No	

Fig.10 Zero point calibration interface

**Slope calibration:** Click the "Slope Calibration" button on the Menu interface to enter the slope calibration interface. "Slope calibration" is used when the measured value shows a linear development deviation from the actual value. Click "slope calibration", input the "Actual value", and click Yes to complete the slope calibration, as shown in Fig.11 .



**Slope calibration** Exit

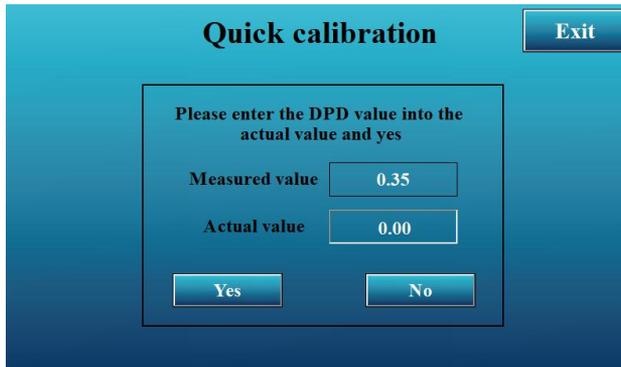
Please enter the DPD value into the actual value and yes

Measured value

Actual value

Fig.11 Slope calibration interface

**Quick calibration:** Click the "Quick Calibration" button on the Menu interface to enter the Quick Calibration interface. If there is a deviation between the Actual value and the Measured value of the instrument, the measurement accuracy can be improved by comparing the calibration with the DPD value or the value of the laboratory instrument. Click "Quick Calibration" , input Actual value, and click "Yes" to complete slope calibration, as shown in Fig.12.



**Quick calibration** Exit

Please enter the DPD value into the actual value and yes

Measured value

Actual value

Fig.12 Quick Calibration interface

**Temperature calibration:** Click the "temperature calibration" button on the Menu interface to enter the "Temperature calibration" interface. Temperature calibration Calibrates the temperature by modifying the temperature bias. Temperature offset: increases or decreases the temperature value.

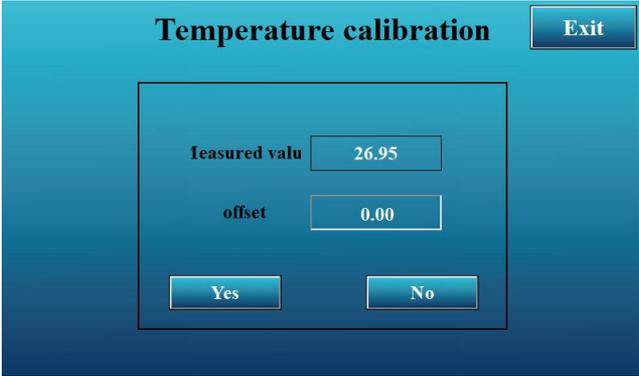


Fig.13 Temperature calibration interface

**5.3.3 Maintenance settings**

Maintenance Setting include Signal input, System Setup, Factory restoration, Communication Setting, Current Setting and Alarm Setting.

**Signal input:** Click the "Signal Input" button on the Menu interface to enter the "signal input " interface. You can view the measured value and input signal value. As shown in Fig.14 .

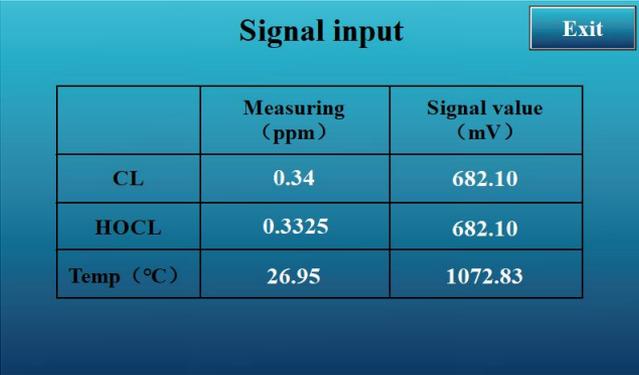


Fig.14 Signal input interface

**System Setup:** Click the "System Setup" button on the Menu interface to enter the system Settings interface. "System Setup" include "language", "User admin", and "Password". As shown in Fig.15. The "language": you can choose Chinese or English, as shown in Fig.16. "User admin":you can allocate and manage user rights. "Password": you can set and change the password. The factory default password is 123.



Fig.15 System Setup interface

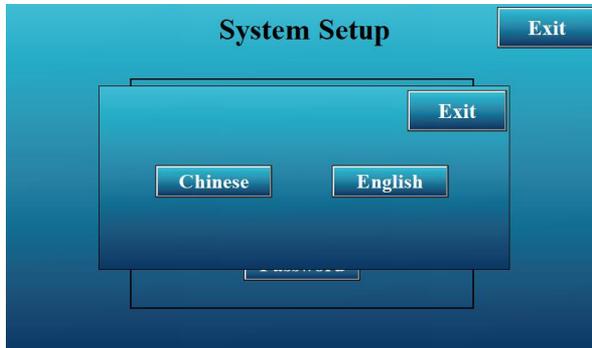


Fig.16 Language interface

**Factory reset:** Click the "Factory reset" button on the Menu interface to enter the "factory reset" interface. "Factory reset" includes "Slope", "Zero point", and "Other options", as shown in Fig.17.

"Slope": The slope of the electrode can be recovered

"Zero point": Zero point of electrode can be recovered

" Other options ": Electrode parameters can be recovered, including pH compensation coefficient, chlorine bias, and temperature bias.

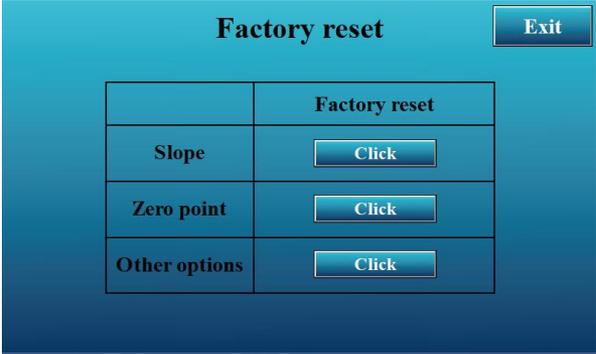


Fig.17 Factory reset interface

**“Comm set”**: Click the "Comm Set" button on the Menu interface to enter the "Comm Set" interface. The communication protocol is MODBUS(RTU) protocol, and the communication content and address can be changed according to customers' needs. The default configuration is shown in Fig.18. Users can also set and change by themselves. Click the "Data set" button at the bottom of the page to enter the “comm set ”interface. You can modify the address, baud rate and check bit. The baud rate can be 4800. 9600; 19200; Check bit 0 is no check, check bit 1 is even check, and check bit 2 is odd check, as shown in Fig.19.



Fig.18 Comm set interface

Fig.19 Data set interface

(1) Description of the Modbus protocol:

**Function code 0x03:** This function enables the host to obtain the real-time measurement value of the slave machine. The value is specified as a single-precision floating point (that is, it occupies two consecutive registers with the lower byte in the address before the higher byte, and the resolution order is 1234), and the corresponding parameters are marked with different register addresses.

**Modbus address:**

40000-40001	Free chlorine value
40002-40003	Temperature value
40004-40005	Free chlorine Voltage value
40006-40007	Temperature Voltage value

(2) Examples of communication:

**For example, command with function code 03:**

Modbus address=1, Free chlorine value=0.20, Temperature value=16.62,

Free chlorine Voltage value=682.10mV, Temperature Voltage value=832.4mV,

The master station sends the communication command :01 03 00 00 00 08 44 0C

Slave station communication reply:01 03 10 3E 51 EB 85 41 84 B8 52 44 2A 86 66 44 50 19 99 DD 26

**Notes :**

<b>【01】</b>	Indicates the communication address of the instrument
<b>【03】</b>	Indicates function code 03
<b>【10】</b>	Indicates 10H (16) bytes of data
<b>【 3E 51 EB 85 】</b> =0.20;	Free chlorine value
<b>【 41 84 B8 52 】</b> =16.62;	Temperature value
<b>【 44 2A 86 66 】</b> =682.10;	Free chlorine Voltage value
<b>【 44 50 19 99 】</b> =832.4;	Temperature Voltage value
<b>【DD 26】</b>	Represents CRC16 check code.

**Current set:** Click the "Current Set" button on the Menu interface to enter the "current set" interface. "Current set" includes "4-20mA set" and "4-20mA CAL", as shown in Fig.20. (This item is set with 4~20mA output)



Fig.20 Current set interface

Tip: By default, 4mA corresponds to the lowest value in the range, and 20mA corresponds to the highest value in the range.

**4~20mA CAL:** If the display and output are different, recalibrate the 4~20mA output, as shown in Fig.21.

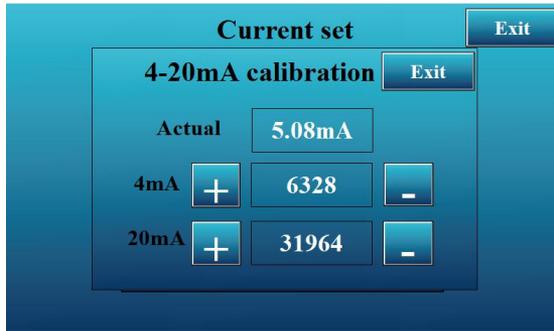


Fig.21 4~20MA CAL interface

“4~20 mA CAL” steps are as follows:

- 1) for a 4mA, place both ends of the multimeter at both ends of the current ring terminal, adjust the AD value corresponding to 4mA, and use the + and - keys to adjust the AD value so that the multimeter displays 4mA.
- 2) for a 20mA, place both ends of the multimeter at both ends of the current ring terminal, adjust the AD value of 20mA, and use the + and - keys to adjust the AD value so that the multimeter displays 20mA.

(Note: 4mA corresponds to an AD value of about 6400 and 20mA corresponds to an AD value of about 32000).

**Alarm set:** Click "Alarm Setting" button on the Menu interface to enter the “Alarm set” interface. The High and lower alarm values and the return difference of the sensor can be set. As shown in Fig.22. (This item is set with alarm function)

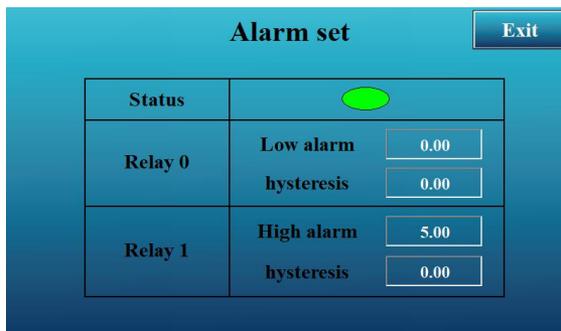


Fig.22 Alarm set interface

**“High alarm”**: When the value of free chlorine rises to the “ high alarm” value, the relay is activated and the alarm action is started.

**“High value hysteresis”**: When the value of free chlorine drops to a reasonable value, the alarm is released and the relay is disconnected.

For example, if the set high value alarm is 2 and the high value hysteresis is 0.3, the alarm will be released when the measured value is less than 1.7.

**“Low alarm”** : When the free chlorine value drops to the “low alarm” value, the relay will be activated and the alarm will be activated.

**“Low value hysteresis”** : When the free chlorine value rises back to a reasonable value, the alarm is lifted and the relay is disconnected.

For example, if the set low value alarm is 0.5 and the low value hysteresis is 0.2, the alarm will be released when the measured value is greater than 0.7.

When the alarm is triggered, the value displayed on the home page turns red, and "L" flashes on the screen when the alarm is low, and "H" flashes on the screen when the alarm is high, as shown in Fig.23.

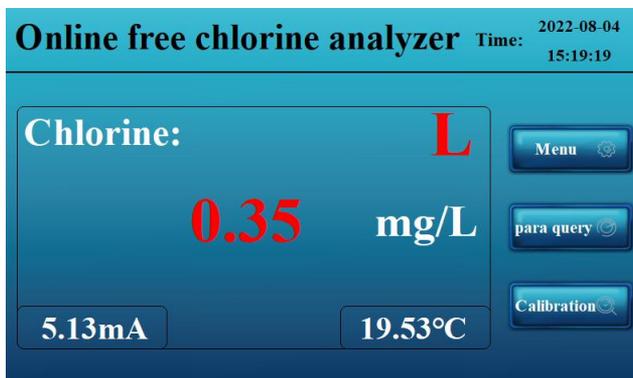


Fig.23 Alarm status interface

### 5.3.4 Historical data

“Historical data” including “History”、 “GrapHics” and ” Data export”.

**History**: Click the "History" button on the Menu interface to enter the “history” interface. The default record interval is 5 minutes, and the record interval can be modified by the button on the right. As shown in Fig.24.

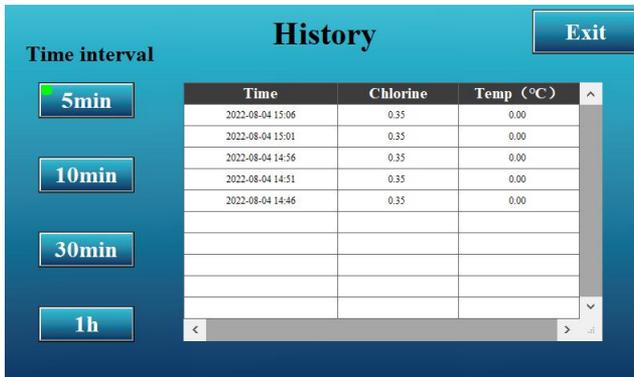


Fig.24 History interface

**GraphHics** : Click the "GraphHics" button on the Menu interface to enter the "GraphHics" interface. The GraphHics can be used to observe the data trend, and different types of graphHs can be selected from the two options at the bottom of the screen. As shown in Fig.25 and Fig.26.

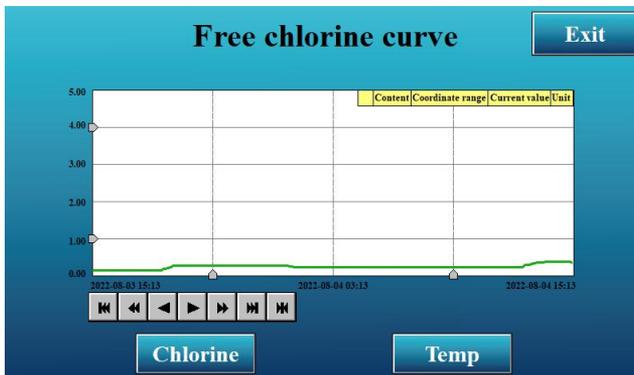


Fig.25 Free chlorine curve

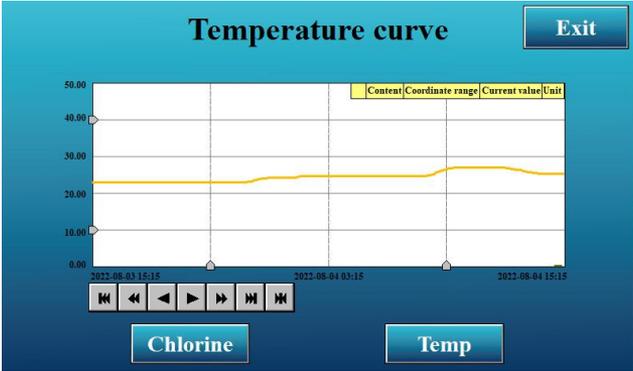


Fig.26 Temperature curve

**Data Export:** Click the "Data Export" button on the Menu interface to enter the "Data Export" interface. You can export the history records, enter the start time and end time, and the number of exported items will be automatically popped up, click "Yes" to export the data. As shown in Fig.27.



Fig.27 Data Export

**5.3.5 Service**

**Service:** Click the "information" button on the Menu interface to enter the "Service" interface. After-sales service provides the contact information and version information of the current supplier. As shown in Fig.28.



Fig.28 Service

#### 5.4. Quick calibration

The analyzer has been calibrated before leaving the factory, and usually there is no need to do on-site calibration. If the measured value deviates from the actual value due to interference and other factors, you can follow the following method to do quick calibration, and the bias should be set to 0.00 for quick calibration. Click "Quick Calibration" on the home page to jump directly to the calibration interface, enter the field measurement DPD value, and click Confirm to complete the calibration, as shown in Fig.29.

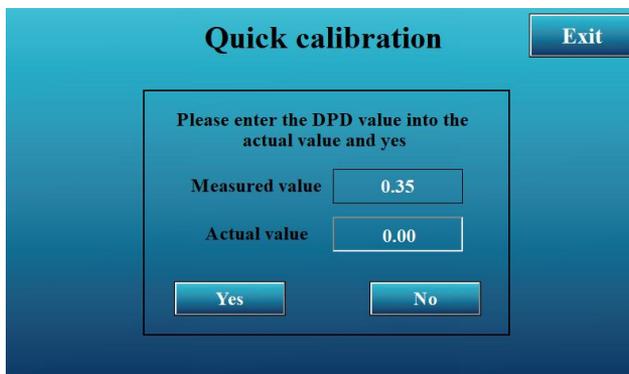


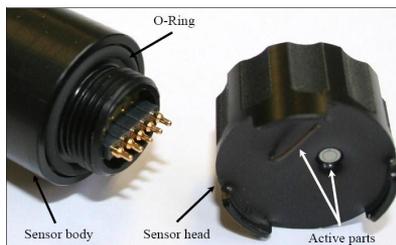
Fig.29 Quick calibration

## Chapter 6 Equipment maintenance

### 6.1. Free chlorine electrode

The service life of the electrode largely depends on the maintenance and maintenance in the process of use. In the long-term use of this product, please ensure the normal flow of water and clean water quality. If the electrode probe part has scaling phenomenon, please disconnect the electrode power supply, and soak in the hypochlorous acid concentration of 2~4mg/L running water for 12 hours. Do not wipe the probe or use other chemical cleaning. The operation should be carried out in accordance with the electrode use requirements in 1.1. Free chlorine electrode is a split free chlorine electrode, the probe at the front of the electrode can be replaced. If you need to replace the probe, strictly follow the following requirements:

- Disconnect sensor power.
- Take the sensor out of the flow line.
- When drying the sensor, do not touch the active part of the sensor.
- It is important to dry the sensor properly and have dry hands as no water should enter in the sensing head.
- Unscrew the head.
- Make sure the O-ring is still in place and properly installed.
- Take a new sensor head.
- Screw it on the sensor body.
- Make sure you have screw the head to the maximum to assure water tightness.
- Do not touch the active part of the sensor during the replacement process, and do not allow the needle of the probe head to touch water.



## 6.2. Analyzer

The analyzer is an electronic device, and improper use environment may cause damage to the controller. It is necessary to check the working status of the instrument regularly.

## 6.3. Flow cell

It is necessary to regularly check whether there is dirt at the entrance and exit of the circulation pool, so as to clean up in time to prevent blockage.

For sites with poor water quality, it is recommended to add a front-end filter before the inlet of the circulation basin. To reduce the impact of sediment on the sensor and extend the service life of the sensor.

## 6.4. Common faults and causes

Table 3

Fault	Cause	Corrective action
Display and output signal value is 0	(1) No connection between PLC and LCD	(1) Check the connection network cable between PLC and LCD screen
RS485 cannot communicate	(1) Signal cable is not connected (2) The sensor is damaged	(1) Reconnect the signal line after power off (2) Please contact the distributor or our company
The reading is zero, and the value does not change with free chlorine	(1) The contact between the sensor head and the sensor body is not firm (2) Sensor failure	(1) Retighten the sensor head (2) Please contact the distributor or our company
Excessive residual chlorine value (Exclude the problem of excessive disinfectant)	(1) Membrane breakage (2) Excessive flow (3) Sensor failure	(1) Change the sensor head (2) Reduce the flow (3) Please contact the distributor or our company

Fault	Cause	Corrective action
The free chlorine value is too low	(1) Sensor head is contaminated (2) Hydration time is too short (3) Air bubbles in the front of the sensor head Sensor failure	(1) Cleaning the sensor head and hydrating the sensor (2) Extended sensor hydration time (3) Eliminate air bubbles (4) Please contact the distributor or our company
Temperature exceeds the limit value	(1) Pt1000 failure	(1) Please contact the distributor or our company

**6.5. Recovery calibration value**

If you cannot confirm whether the output value is correct, please return the controller to our company, we will re-calibrate for you, do not change by yourself!

**6.6. Special notice**

- (1) Before powering on, you must carefully check to make sure that the electrode is immersed in water before powering on, otherwise the sensor will be damaged! If water is cut off at the site, Please turn off the power supply of this product to avoid damage.
- (2) Check electrodes regularly for dirt and sediment.
- (3) Make sure there are no bubbles near the probe.
- (4) Other devices connected to the grid must be electrically isolated when connected to the electrodes.
- (5) The distance between the installation and other instruments should not be less than 3m, in which the electromagnetic flowmeter will seriously interfere with the electrode work.
- (6) After the electrodes are powered on and running for about half an hour, the transmitter can output a stable value.
- (7) The use of hydrogen peroxide will considerably reduce the lifetime of the sensor.

(8) The free chlorine analyzer is not suited for salt water electrolysis systems.

(9) Sensor test completed.

Rinse the electrode with chlorine-free water for not less than 60 seconds to completely remove the chlorine remaining on the electrode surface. After rinsing, place the electrode in a cool place to dry until the sensor is completely dry before storing.

## **Chapter 7 Warranty and After-sale Service**

We promise to the customer that the hardware accessories provided during the supply of the instrument have no defects in material and manufacturing process.

From the date of the purchase, if the user's notice of such defects is received during the warranty period, the company will unconditionally maintain or replace the defective products without charge, and all non customized products are guaranteed to be returned and replaced within 7 days.

Disclaimers:

- During the warranty period, product faults caused by the following reasons are not in the scope of Three Guarantees service
- Product faults caused by improper use by customers.
- Product faults caused by disassembling, repairing and refitting the product.

After-sales service commitment:

- We promise to deal with the customer's technical questions within 2 hours.
- For the instruments returned to the factory for maintenance, we promise to issue the test results within 3 working days and the maintenance results within 7 working days after receiving them.

## Chapter 8 Electrode communication

The instrument is provided with standard RS485 series communication interface, in accordance with international universal standard MODBUS-RTU communication protocol.

Table 4

MODBUS-RTU	
Device ID	Default ID is 1
Baud rate	19200
Data bit	8
Check bit	No check
Stop bit	1

Table 5

Data type	
Float	Big Endian (ABCD)
Unsigned char [...]	Big Endian (AB)

Table 6

Command type	
Command	Function
0x03	Read register
0x10	Write multiple registers

**Data description:**

Table 7

Communication settings						
Register address	Access method	Data type	Para.	Range	Default	
0x0016	R/W	Unsigned char [...]	ID	1-254	1	
0x0017	R/W	Unsigned char [...]	Baud rate	3	9600	4
				4	19200	

Table 8

Measurement data					
Register address	Access method	Data type	Para.		
0x0000	R/O	Float	Chlorine concentration/ppm H		
0x0001			Chlorine concentration/ppm L		
0x0002	R/O	Float	Hypochloric acid concentration/ppm H		
0x0003			Hypochloric acid concentration/ppm L		
0x0004	R/O	Float	Temperature H		
0x0005			Temperature L		
Calibration parameters					
Register address	Access method	Data type	Para.	Range	Default
0x000A	R/W	Float	pH compensation value H	5~9	7.0
0x000B			pH compensation value L		

0x000C	R/W	Float	Chlorine bias /ppm H	-5~5	0
0x000D			Chlorine bias /ppm L		
0x000E	R/W	Float	Temperature offset H	-5~5	0
0x000F			Temperature offset L		
0x0010	R/W	Float	Chlorine zero voltage H		
0X0011			Chlorine zero voltage L		
0x0012	R/W	Float	Chlorine slope H		
0x0013			Chlorine slope L		
0x0031	R/W	Float	Single point calibration H		0
0x0032			Single point calibration L		