

User's Manual

pH/ORP Controller

U-S261HP-EN2



Preface

Thank you for purchasing pH/ORP controller. Please read this manual carefully before operating and using it correctly to avoid unnecessary losses caused by false operation.

Note

- Modification of this manual's contents will not be notified as a result of some factors, such as function upgrading.
- We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us.
- This product is forbidden to use in explosion-proof occasions.

Version

U-S261HP-EN2

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.

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- 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 in 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, benzine or other organic solvents. Prevent all kinds of liquid from splashing on the 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 immediately and contact the company in time.

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

Number	Name	Quantity	Remarks
1	pH/ORP Controller	1	
2	Manual	1	
3	Certificate	1	

Package contents

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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Chapter1 Introduction

This product is an instrument developed by our company for online monitoring of pH / ORP value. The data can be transmitted to the monitoring room through RS485 or 4-20mA.

The pH / ORP controller is widely used in thermal power, chemical fertilizer, metallurgy, environmental protection, pharmaceutical, biochemical, food, tap water and other industries, and it continuously monitors the pH or ORP value and temperature in the solution.

Continuous monitoring data is connected to the recorder through the transmission output to achieve remote monitoring and recording.

1.1. Characteristics

- Modular design
- Isolated transmission output, less interference
- Measure pH / ORP and temperature
- Manually/ automatically temperature compensation
- High and low alarm
- Alarm switch
- Timeout return function
- isolated RS485 communication
- Large-size LCD screen

1.2. Parameters

Screen size	3.2 inch monochrome LCD (liquid crystal display)
Dimension	Overall dimension: 96mm×96mm×113mm
	Cutout dimension: 92mm×92mm
Weight	0.6kg
variables	pH/ORP
Measure range	pH: 0.00~14.00pH
	ORP: -1000mV~+1000mV -1999mV~+1999mV (optional)
Accuracy	pH: ±0.02pH; ORP: ±1mV
Input resistance	≥10 ¹² Ω
Temperature compensation	NTC10K: -10℃~60℃ Accuracy ±0.3℃ 60℃~130℃ Accuracy ±2℃
	Range: -10℃~130℃ Manual/Auto
Current output	Isolated, 4mA ~ 20mA can be set corresponding to pH / ORP measurement range, maximum loop is 750Ω,±0.2%FS
Alarm	2 channels, Pickup/Breakaway AC250V/3A, normally open
Relative humidity	10%RH ~85%RH (no condensation)

Working temperature	0~60℃
Power supply	AC: 220V±10%, 50Hz;
	DC: 24V
Power consumption	≤5W
Storage	Temperature: -10℃~60℃ Relative humidity: 5%~85% (no condensation) Altitude: <2000m

Chapter2 Installation

2.1. Instrument installation

The installation location and installation method of this product are explained. Please be sure to read this section when installing.

Installation precautions

- The instrument is panel mounted.
- Please install it at the place with good ventilation in order to prevent the internal temperature of the instrument from rising.
- Horizontal installation shall be realized as possible

The following places shall be avoided during the installation

- Do not expose direct to sunlight and near heaters.
- The location where the environment temperature exceeds 60°C during the work.
- The location where the environment humidity exceeds 85% during the work.
- The vicinity of the electromagnetic occurring sources.
- The sites with strong mechanical vibration.
- The site where the temperature is changed a lot and the moisture condensation is easily formed.
- Places with lots of lampblack, steam, moisture, dust and corrosive gas.

Installation method:

Open a 92mm × 92mm mounting hole in the product cabinet or mounting panel, the thickness of the mounting panel is 1.5mm~13mm

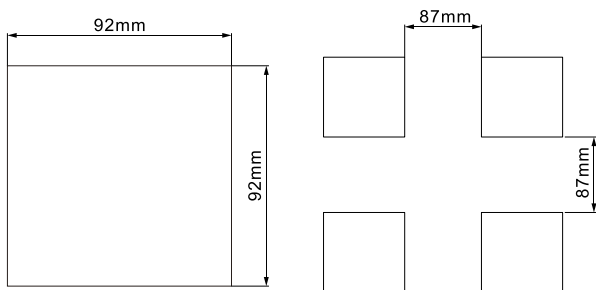


Figure 1 Mounting hole dimension drawing

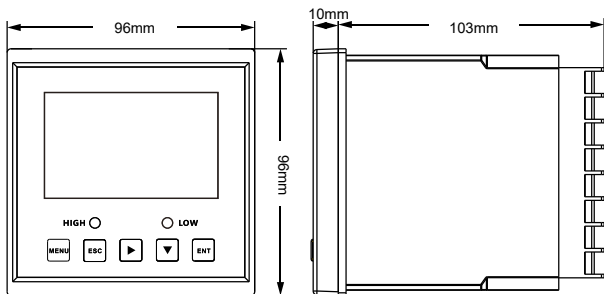


Figure 2 Dimension

Insert the product into the mounting hole fixing screw, as shown in Figure 3:

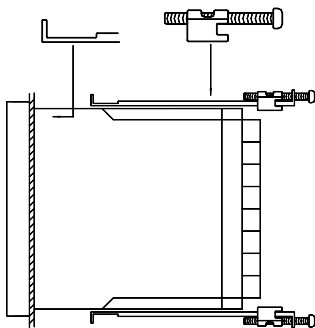


Figure 3 Installation

2.2. Electrode installation

- Schematic diagram of common installation methods

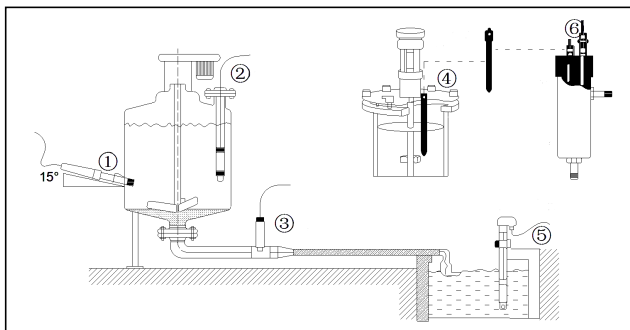


Figure 4 common installation methods

- ① Side wall installation
- ② Flange mounted at the top
- ③ Pipe installation
- ④ Top installation
- ⑤ Submersible installation
- ⑥ Flow-through installation

The interface must be in 15 oblique angle, or it will affect the normal test and use of the electrode. We won't be responsible for any results due to this.

2.3. Wiring

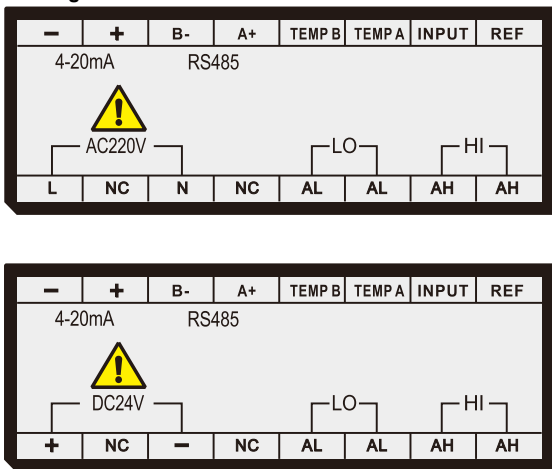


Figure 5

Identification of terminal

- REF: Reference terminal of the electrode
- INPUT: Measuring terminal of the electrode
- TEMP A: Temperature compensation A
- TEMP B: Temperature compensation B
- RS485 A+: RS485 communication interface A+
- RS485 B-: RS485 communication interface B-
- NC: Unidentified
- 4~20mA+: 4~20mA output +

- 4~20mA-: 4~20mA output -
- AC220V(L): AC220V live wire
- AC220V(N): AC220V neutral wire
- LO(AL): Low alarm relay
- HI(AH): High alarm relay
- DC24V+: DC24V +
- DC24V-: DC24V -

Chapter3 Navigation keys

Button display

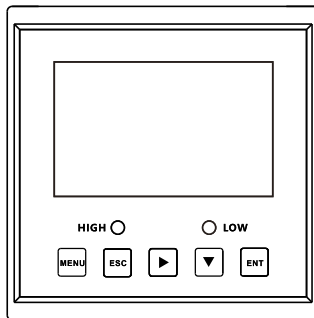





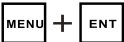
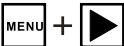



Figure 6

Definition

Sign	Button name	Key function
	Menu	Under "Monitoring page" - Enter the MENU Under "Menu page" - Exit the MENU
	Escape	Under "Monitoring page" - Alarm view Under "Menu page" - Return to the previous page Under "Calibration page" - Skip this item
	MOVE RIGHT	Make a recurrent selection of digit of parameters modify the original indication value

	MOVE DOWN	Under "menu page" - Select the related menu Modify the values in the configuration state
	ENTER	Under "Menu page" - Enter the sub-menu or confirm modification
	Combination	Press and hold the key to enter "Temperature compensation"
	Combination	Press and hold the key to enter "Calibration"
	Combination	Press and hold the key to enter "Alarm setting"

Chapter4 System menu & operating

4.1. Interface Introduction

● Typical screen display

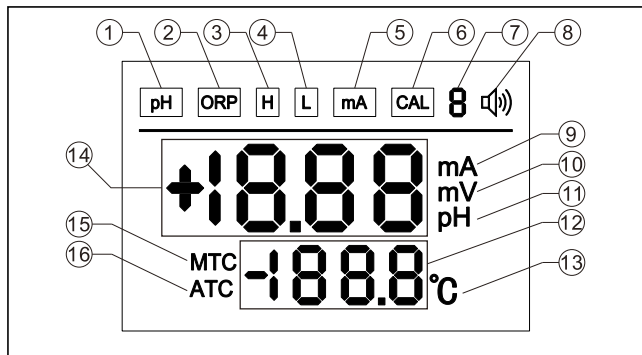


Figure 7

- | | |
|---------------------------|--------------------------------------|
| ① Measure parameter pH | ⑩ ORP unit |
| ② Measure parameter ORP | ⑪ pH unit |
| ③ High Alarm sign | ⑫ Temperature display |
| ④ Low alarm sign | ⑬ Temperature sign |
| ⑤ 4~20mA setting sign | ⑭ Main display area |
| ⑥ Online calibration sign | ⑮ Manual temperature compensation |
| ⑦ Setting sing | ⑯ Automatic temperature compensation |
| ⑧ Alarm sign | |
| ⑨ Current unit | |

- Main monitor display

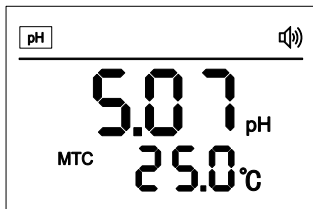


Figure 8 pH monitoring

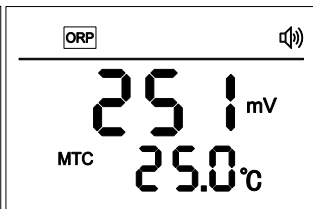


Figure 9 ORP monitoring

Use the [RIGHT] to switch the current display interface, query the current transmission output information, and press it again to return to the main monitoring interface. If there is no key operation, it will automatically return to the main monitoring interface after 3 minutes.

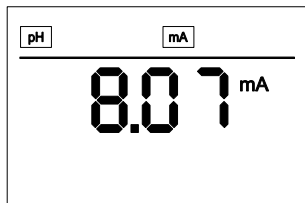


Figure 10 pH current display

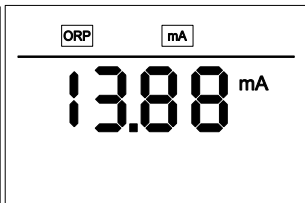


Figure 11 ORP current display

The setting state, the main display area displays "SUC" when the setting is successful, and the main display area displays "ERR" when the setting data exceeds the limit or fails.

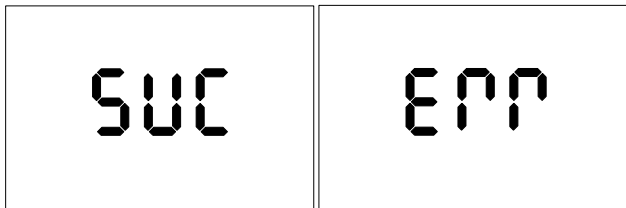


Figure 12

Chapter5 Setting

5.1. Password verification menu

Press and hold **【Menu】** to enter the password verification interface, the password is the fixed password "001", enter the password to enter the main menu interface.

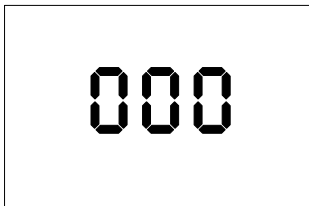


Figure 13 Password verification interface

5.2. Measure parameter

After successful password verification, enter the main menu interface, the "pH" mark enters the flashing state, then press [ENTER] to enter the electrode selection interface, press [RIGHT] to cycle through the configurations.

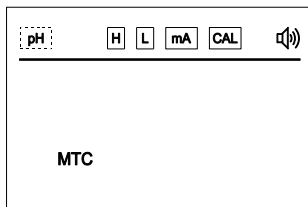


Figure 14 Measurement parameter selection interface

Enter the electrode selection interface, you can select the electrode through press [RIGHT], the mark of the selected electrode will flash, then press [ENTER] to set successfully, and return to the main monitoring interface by [menu].

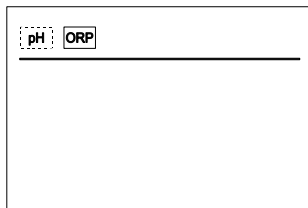


Figure 15 Electrode selection interface

5.3. High alarm setting

Select the high alarm sign to enter the high alarm setting interface. This interface automatically enters different high alarm settings according to the previously set electrode parameters, pH high alarm or ORP high alarm.

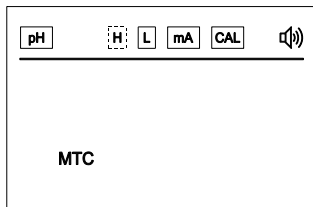


Figure16 High alarm setting interface

The "H" mark flashes, press [ENTER] to enter the setting of the high alarm value, select the number of digits by [RIGHT], and change the value by [DOWN]. The "1" in the upper right corner indicates the setting of the high alarm pull-in value, and the "2" in the upper right corner indicates the high alarm break away value. pH high alarm: when the measured value is greater than the high alarm pull-in value, the high alarm relay pulls in, when the measured value is less than the high alarm break value, the high alarm relay is turned off. ORP high alarm: when the measured value is greater than the high alarm pull-in value, the high alarm relay pulls in, when the measured value is less than the high alarm break-away value, the high alarm relay is turned off.

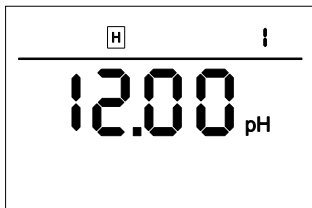


Figure17 pH high alarm pick-up value

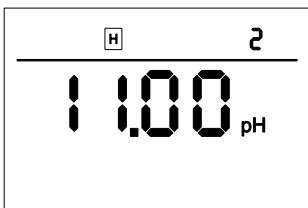


Figure18 pH high alarm break away value

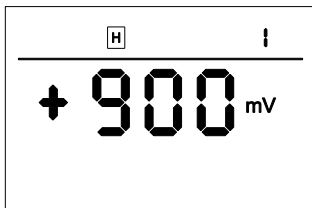


Figure19 ORP high alarm pick-up value

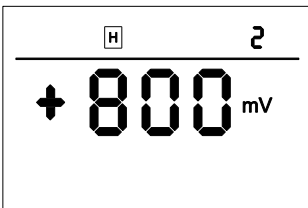


Figure20 ORP high alarm break away value

5.4. Low alarm setting

Select the low alarm sign to enter the high alarm setting interface. This interface automatically enters different low alarm settings according to the previously set electrode parameters, pH low alarm or ORP low alarm.

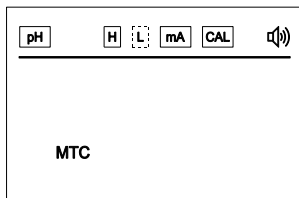


Figure 21 Low alarm setting interface

The "L" mark flashes, press [ENTER] to enter the setting of the low alarm value, select the number of digits by [RIGHT], and change the value by [DOWN]. The "1" in the upper right corner indicates the setting of the low alarm pull-in value, and the "2" in the upper right corner indicates the low alarm break away value. pH low alarm: when the measured value is less than the low alarm pull-in value, the low alarm relay pulls in, when the measured value is greater than the low alarm break value, the low alarm relay is turned off. ORP low alarm: when the measured value is less than the low alarm pull-in value, the low alarm relay pulls in, when the measured value is greater than the low alarm break-away value, the low alarm relay is turned off.

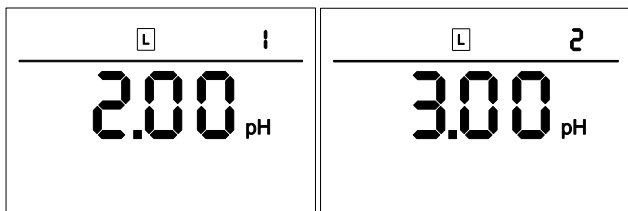


Figure22 pH low alarm pick-up value

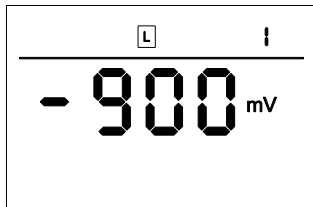


Figure 23 pH low alarm break away value

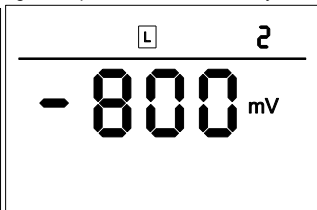


Figure24 ORP low alarm pull-in value

Figure25 ORP low alarm break away value

5.5. Output transmitting setting

Select the mA sign and enter the 4 ~ 20mA corresponding value setting interface. This interface automatically enters different transmission settings, pH transmission settings or ORP transmission settings according to the previously setted electrode parameters.

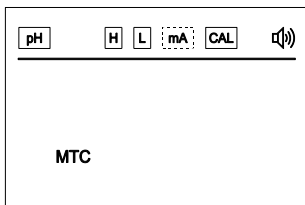


Figure 26 Transmission output setting interface

The "mA" sign flashes, press [ENTER] to enter the corresponding value setting of 4mA, select the number of digits through [RIGHT], and change the size of the value by [DOWN]. "1" in the upper right corner indicates the setting of the corresponding value of 4mA, and "2" in the upper right corner indicates the setting of the corresponding value of 20mA.

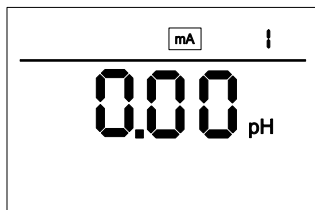


Figure 27 pH 4mA corresponding value

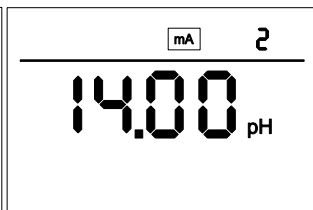


Figure 28 pH 20mA corresponding value

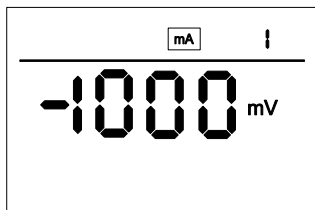


Figure 29 ORP 4mA corresponding value

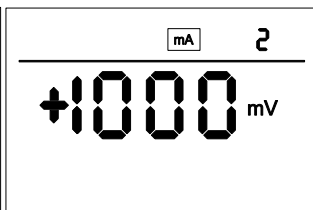


Figure 30 ORP 20mA corresponding value

5.6. Online calibration

Select the "CAL" sign to enter the online calibration interface, or enter the online calibration interface by pressing the [ENTER] + [RIGHT] on the main monitoring interface. This interface automatically enters different online calibration interfaces according to the previously set electrode parameters, pH Online calibration or ORP online calibration.

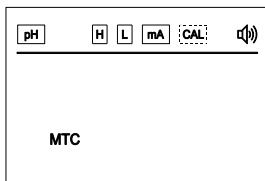


Figure 31 Select the online calibration interface

When the "CAL" sign is blinking, press [ENTER] to enter the pH calibration interface, the "1" in the upper right corner indicates the first point of calibration, first put the pH electrode in the 4.00pH standard solution, let it sit for a while, wait until the displayed value is stable, press [ENTER]. If the data exceeds the limit interface, it will prompt "ERR" and return to the first point calibration. If the calibration is successful, enter the second point of pH calibration. At this time, "2" in the upper right corner indicates the second point of calibration, after cleaning the electrode with distilled water, wipe off the water stains, and then put the pH electrode back into the 6.86pH standard solution, let it sit for a while, after the displayed value is stable, press [ENTER]. If the

data exceeds the limit interface, it will prompt "ERR" and return to the second point calibration. If the calibration is successful, enter the third point of pH calibration. At this time, the "3" in the upper right corner indicates the third point of calibration, after cleaning the electrode with distilled water, wipe off the water stain and finally put the pH electrode in the 9.18pH standard solution and let it sit for a while. After the displayed value is stable, press the [ENTER] button. If the data exceeds the limit interface, it will prompt "ERR" to return to the third point calibration. If the calibration is successful, it will be displayed Calibration successful, pH calibration process is finished.

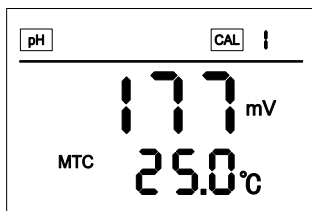


Figure32 First pH calibration point

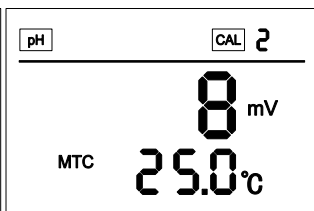


Figure33 Second pH calibration point

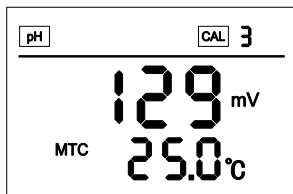


Figure34 Third pH calibration point

When the "CAL" sign is blinking, press [ENTER] to enter the ORP calibration interface, the "1" in the upper right corner indicates the first point of calibration, first put the ORP electrode into the 86mV standard solution, let it sit for a while, after the value is stable, press [ENTER]. If the data exceeds the limit, it will prompt "ERR" to return to the first point calibration. If the calibration is successful, enter the second point of ORP calibration. At this time, "2" in the upper right corner indicates calibration the second point, after cleaning the electrode with distilled water, wipe off the water stains, and then put the ORP electrode into the 256mV standard solution, let it sit for a while, after the displayed value is stable, press the [ENTER] button. If the data exceeds the limitation, it will prompt "ERR" to return to the second point calibration again. If the calibration is successful, it shows that the calibration is successful, and the ORP calibration process ends.

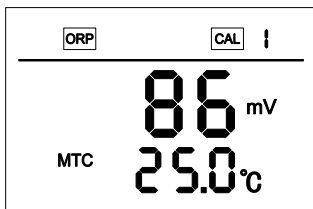


Figure 35 First ORP calibration point

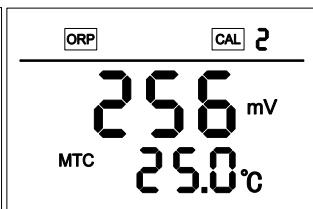


Figure 36 Second ORP calibration point

5.7. Buzzer

Select the buzzer to enter the buzzer switch setting interface.

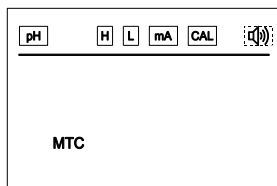


Figure 37 Select the buzzer interface

When the buzzer is blinking, press [ENTER] to enter the buzzer setting interface. At this time, the buzzer stops flashing. Use the [DOWN] to switch buzzers on or off and press the [ENTER] button again to set successfully.



Figure38 Buzzer on

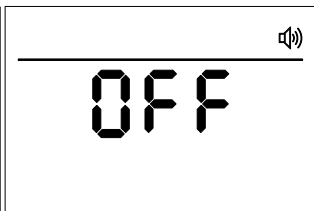


Figure 39 Buzzer off

5.8. Temperature compensation setting

Select the "MTC" to enter the temperature compensation selection interface, you can choose manually temperature compensation or automatically temperature compensation. By default, it is manually temperature compensation.

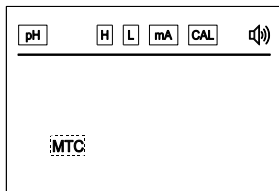


Figure 40 Temperature compensation selection interface

When "MTC" is flashing, press [ENTER] to enter the manual temperature compensation and automatic temperature compensation selection interface, press [DOWN] to choose "MTC" and "ATC", and when "ATC" is flashing press [ENTER] The automatic temperature compensation setting is selected successfully. When "MTC" is flashing, press [RIGHT] to select the number of digits. When the manual temperature compensation value set to negative, you can use the [Right] to move to the right four times, in this time no characters flash. Press [DOWN] to choose negative or positive symbols. When it is not displayed, the temperature value is positive. Press [ENTER] to confirm the manual temperature compensation.

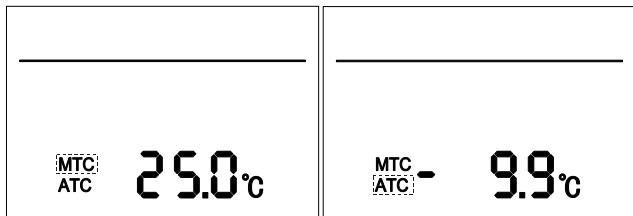


Figure 41 Manual temperature compensation setting

Figure 42 Automatic temperature compensation setting

5.9. Measurement value correction

Through the combination button [menu] + [DOWN], quickly enter the measurement value correction interface, this interface will automatically enter different measurement value correction interface, pH correction interface or ORP correction interface according to the previous electrode parameter settings. The pH correction can correct the measured pH with a correction range of $\pm 2\text{pH}$, and the ORP correction can correct the measured ORP with a correction range of $\pm 300\text{mV}$.

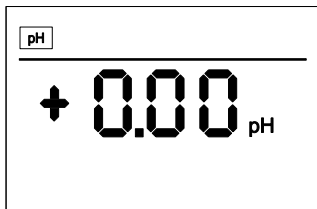


Figure 43 pH correction interface

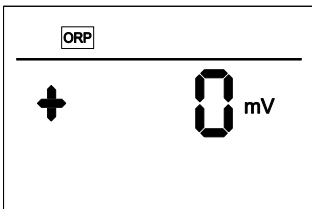


Figure 44 ORP correction interface

5.10. Factory settings

Enter the factory setting interface by pressing the combination button [menu] + [ENTER], and press the [ENTER] to confirm.



Figure 45 Factory setting interface

Chapter6 Maintenance

- The storage of pH glass electrode, short-term:
stored in the pH = 4 buffer solution;
long-term: stored in the pH = 7 buffer solution.
- pH glass electrode cleaning
pH glass electrode cleaning glass electrode bulb contamination may make the electrode response time longer. CCl₄ or soap can be used to wipe the dirt, and then immersed in distilled water a day and night to continue to use. When the pollution is serious, can be 5% HF solution for 10 to 20 minutes, immediately rinse with water, and then immersed in 0.1N HCl solution for a day and night to continue to use.
- Glass electrode aging treatment
The aging of the glass electrode and the gradual change in the structure of the glue layer. Previous electrode response slowly, film resistance is high, slope is low. Exfoliation of the outer layer with hydrofluoric acid can often improve electrode performance. If this method can be used to regularly remove the inner and outer layers, the electrode life is almost unlimited.
- The storage of the reference electrode
Silver - silver chloride electrode The best storage solution is saturated potassium chloride solution, high concentration of potassium chloride solution can prevent the silver chloride in the liquid junction precipitation, and maintain the liquid junction in the work status. This method is also applied to the storage of composite electrodes.

- The reference electrode regeneration reference electrode problems caused by the vast majority of liquid junction caused by blockage, the following methods can be resolved:
 - Soaking fluid interface: 10% saturated potassium chloride solution and 90% distilled water mixture, heated to 60 ~ 70 °C, the electrode immersed in about 5cm, soak for 20 minutes to 1 hour. This method dissolves the crystallization of the electrode tip.
 - Ammonia Soaking: When the liquid interface is blocked by silver chloride can be leaching with concentrated ammonia. The specific method is to clean the electrode, the liquid vent after immersion in ammonia 10 to 20 minutes, but do not let ammonia into the electrode inside. Remove the electrode with distilled water to wash, re-add the internal liquid and continue to use.
 - Vacuum method: the hose to match the reference electrode fluid interface, the use of water suction pump, suction part of the liquid through the fluid interface, remove the mechanical blockage.
 - Boiling fluid junction: silver - silver chloride reference electrode liquid interface immersed in boiling water for 10 to 20 seconds. Note that the next time you boil, the electrode should be cooled to room temperature.
 - When the above methods are invalid, sandpaper grinding can be used to remove the mechanical method of grinding. This method may cause the sand under the grinding into the liquid interface. Causing permanent clogging.

Chapter7 Troubleshooting

The users must read this manual carefully before installation and using. The instrument should be operated correctly in accordance with the contents of this manual to confirm whether the installation and use environment meets the requirements. The following table is the possible faults encountered by the pH / ORP controller. The user can eliminate the problems according to the troubles.

Problems	Solutions
The signal data is displayed incorrectly or displays "---"	Wiring error: please check whether the input signal cable is connected correctly
	Range exceeded: the measured value exceeds the range
No display on LCD	Please make sure that the power supply wiring is correct and the power supply can supply power normally
The values jumps up and down	Check whether there are interference devices such as inverters around, pay attention to stay away from these interference devices or do shielding measures
The controller cannot be calibrated	The standard solution is incorrectly prepared or the electrode is damaged

<p>The instrument can not measure accurately after calibration with a standard solution of pH4.00、pH6.86、pH9.18</p>	<p>The standard solution may be contaminated, please replace the standard solution to re-calibrate</p>
<p>Value response slowly</p>	<p>The electrode bulb may be covered by dirt, and the reaction will be slow. Please clean it according to the type of pollutant. The slow reaction rate in winter is a normal phenomenon</p>

Chapter8 Communication

The instrument is provided with standard RS485 series communication interface, in accordance with international universal standard MODBUS-RTU communication protocol, supporting No.03 register reading and holding command.

Communication data and register address.

Address	Data type	Function code	Description	Access authority
0x0000	unsigned short	0x03	pH value (default two decimal places)	Read only
0x0001	short	0x03	Temperature (default 1 decimal)	Read only
0x0002	short	0x03	ORP value (signed integer)	Read only

Communication case:

The computer sends: 00 03 00 00 00 01 85 DB

pH / ORP Table Returns: 00 03 02 02 AE 05 58

Return command comment:

00 is RS485 communication address;

03 is the function code;

02 is the data length of the return pH value: 2 bytes;

02 for the return of the pH value of 686 (hex

high byte);

AE for the return of the pH value of 686 (hex
low byte);

05 58 is the CRC check value;

Chapter9 Warranty & After-sales 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.