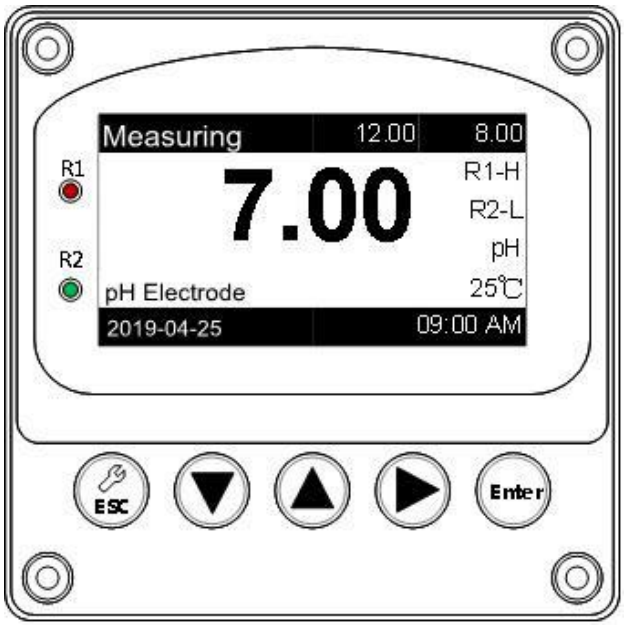
Industrial on-line pH/ORP controller

Operating manual



Initial password：0000

Note: please read the manual carefully before use.

Thank you for purchasing our products. In order to continuously improve the quality of the controller and improve its functions, our company reserves the right to modify the content and icon display at any time. The actual display may be different from the operation manual, so the actual situation shall be subject to the machine.When using the controller, please follow the function and installation method described in the operation manual. Our company will not be responsible for any indirect or indirect loss or damage caused by improper use of the product by any person or entity. If you have any problems or find any omissions or errors in the operation manual, please contact our sales.

Safety and matters needing attention

1. Please read this manual carefully before installation to avoid safety problems and instrument damage caused by wrong records.
2. Please avoid high temperature, high humidity and corrosive environment to install the controller, and avoid direct sunlight exposure.
3. Special wires shall be used for the transmission line of electrode signal. It is suggested to use the wires provided by our company instead of general wires.
4. When using the power supply, it should avoid interference from the power supply, especially when using the three-phase power supply, the ground wire should be used correctly (if there is a power surge phenomenon occurs, the controller's power supply and control devices such as: dosing machine, mixer, etc. can be separated, that is, the transmitter uses a separate power supply.)
5. The controller output contacts carry alarm and control functions. For safety and protection reasons, please be sure to connect external relays with sufficient current value to protect the safety of the instrument.

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Ⅰ Overview

This type of pH/ORP controller is a new controller. This meter has a high degree of intelligence and flexibility. It can measure pH/ORP value and temperature at the same time. It is widely used in urban sewage treatment plants, water supply and other industries and can continuously measured the pH/ORP value of solution.

Basic function

1.Language diversity. Factory standard is Chinese interface and can switch to English interface.
2.Temperature compensation diversity. PT1000， NTC10K and manual temperature compensation are available in three temperature compensation modes.
3.Two 4-20MA outputs, corresponding to PH/ORP value and temperature, using isolation technology, strong anti-interference ability
4.The high and low points of the two sets of relays can be switched freely, and the hysteresis can be adjusted freely to avoid relays on and off frequently.
5.Password management function is to prevent the wrong operation by non-professional personnel.
6.Menu prompt function, greatly facilitates the user's operation.

Instrument technical parameters

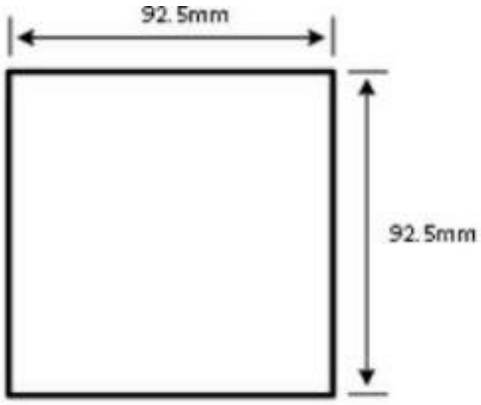
Measuring range: PH（0–14PH，0.0-14.0PH，0.00-14.00PH）ORP(-1999 - +1999 MV)
Accuracy：+ 0.01 pH; + 1 mV
Resolution：0.01pH; 1mV
Temperature compensation：0–100 ℃Manual / Auto(PT1000/NTC10K)
Signal output： 4-20mA isolation protection output，independent corresponding PH/ORP or temperature, maximum load is 500Ω.
Alarm output: two groups can randomly correspond to high and low point alarm (3A/250 V AC), normally open contact relay.
Power supply：AC100-240V or DC 12-24V.
Power consumption：≤5W
Environmental condition： （1）temperature0～ 60 ℃ （2）humidity≤85%RH
Dimensions：96×96×132mm（H×W×D）
Hole size：92.5×92.5mm（H×W）

Ⅱ Combination and installation

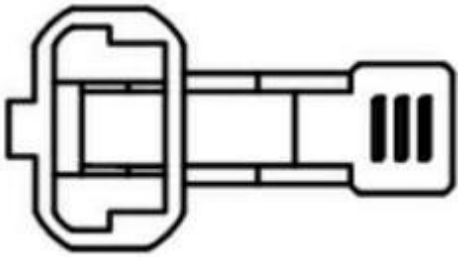
2.1 Main engine fixed（panel mounting）

Note：For panel installation, please reserve a square hole of 92.5mm×92.5mm on the panel of the power distribution box. The transmitter is directly inserted from the panel of the power distribution box. The fixator attached to the transmitter is sletted in from the rear and stuck into the fixing slot.

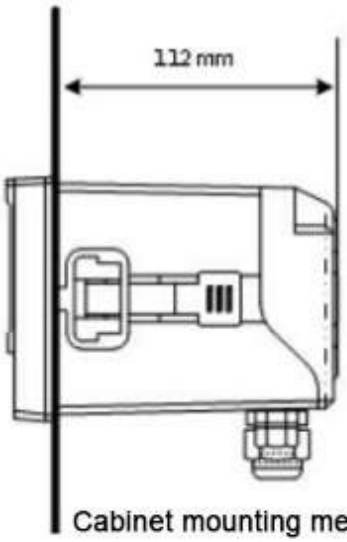
2.2 Panel mounting **reference drawing**



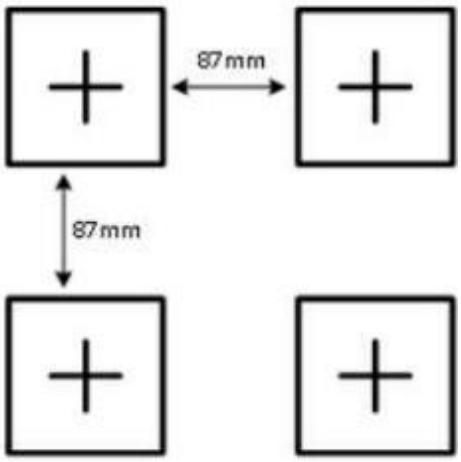
Digging size



Fixator



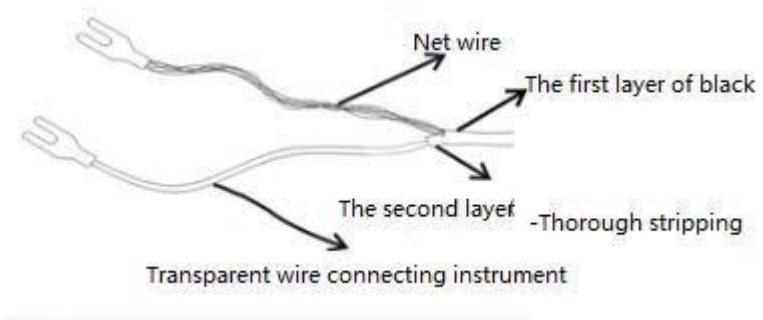
Cabinet mounting method.
Fixed with a dish holder.



Distribution box square hole spacing

2.3 Sensor and sensor protection tube combination

2.3.1 Sensor cable line and wiring method



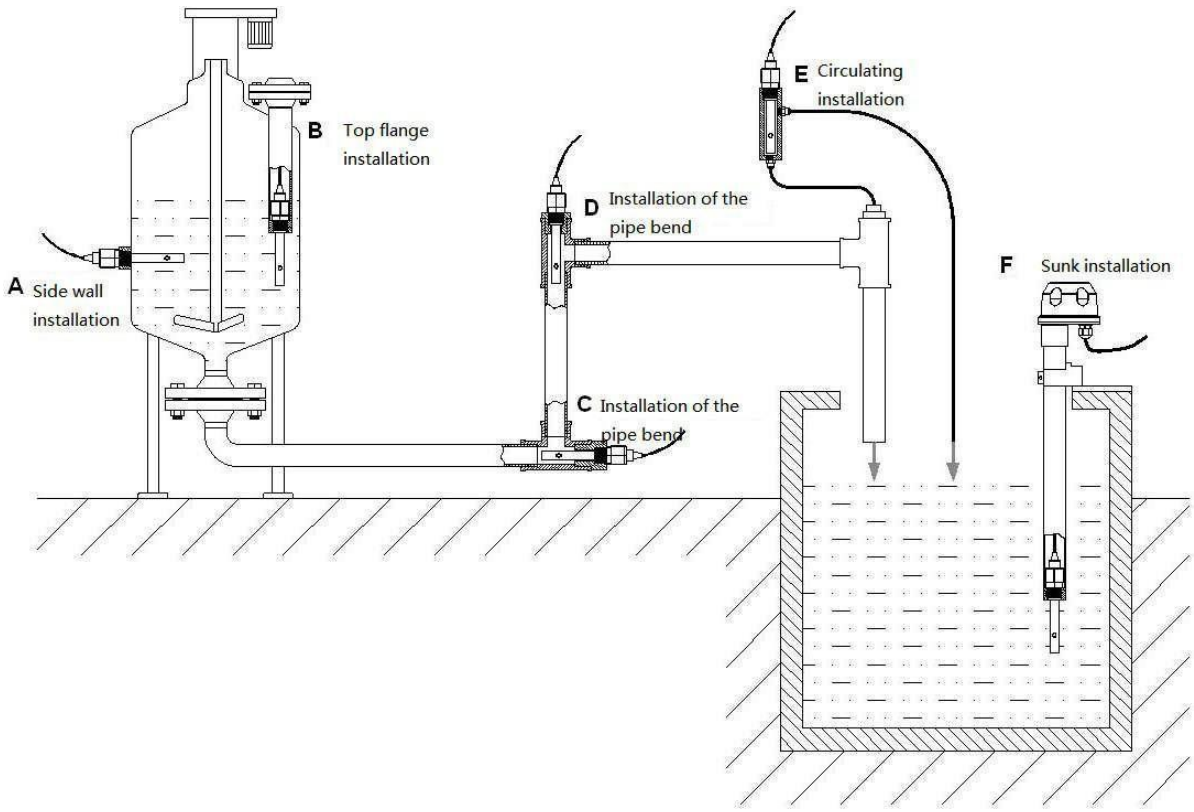
Configuration of coaxial cable：

Center line: + sensor wire line: - sensor reference line

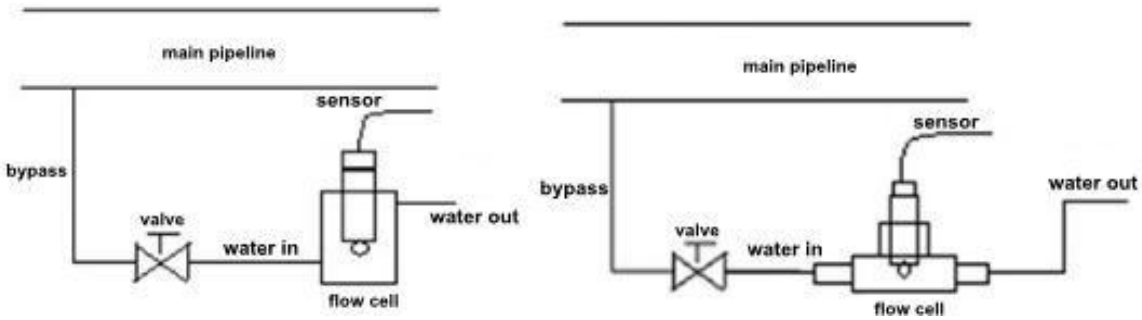
The correct configuration diagram like up, the outer peel of the black rubber mandrel guide be stripped off. Conductive rubber or aluminum foil sensor signal line of the central axis and the cable must be stripped off. The cable extends to the middle of the host, can't have any contact, directly to the central axis of the cable to the GLASS contact is connected to the back of the host, the cable connected to the Ref contact.

Note: if the standard cable can't meet the requirements, shall not extend t he cable, please contact the supplier to provide a dedicated cable, otherwise the instrument produces adverse consequences to bear. Recommended site not more than 30m to extend the cable, or need to increase the signal amplifier.

Installation form



Pipeline Installation Considerations

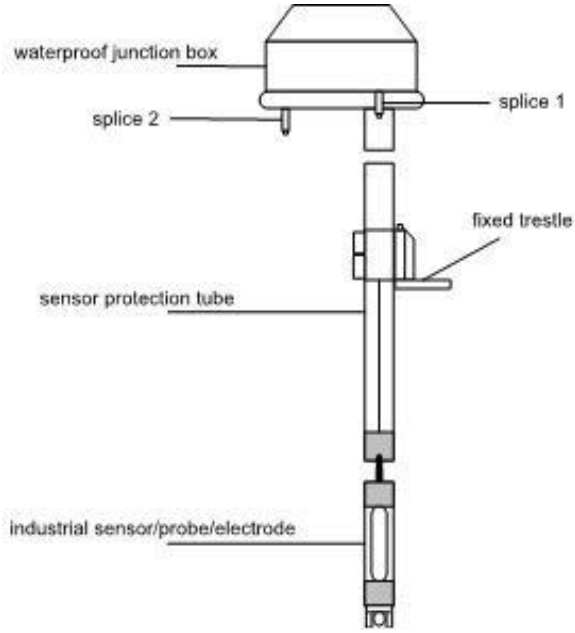


Note：（1）The sensor should be installed in the bypass of the main pipeline, the front end should install the valve, control the flow rate, the flow rate should be as small as possible, generally as long as the outlet has a stable aqueous solution dripping out can be. The sensor should be installed vertically and penetrate into the active water body, and the outlet should be higher than the inlet to ensure that the electrode is completely immersed in the solution.

（2） The sensor should be calibrated before installation.

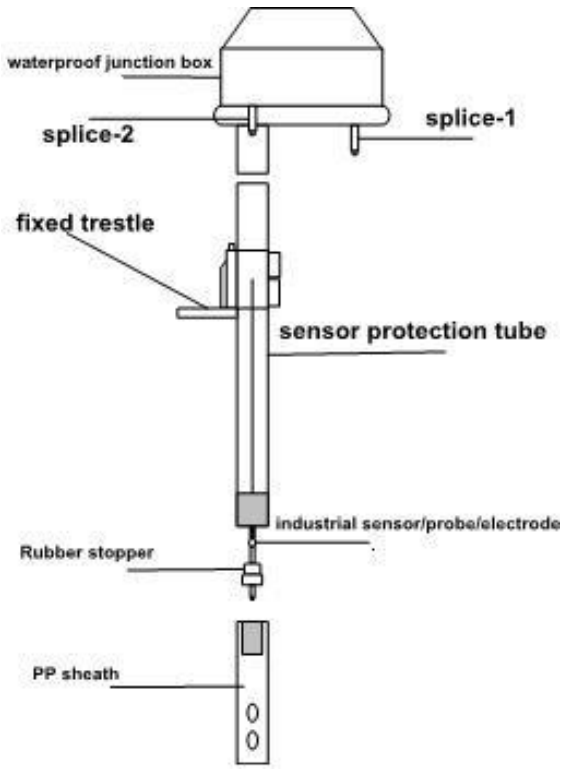
（3） The measuring signal is a weak electrical signal, its acquisition cable should be independent wiring, and the power line, control line connected to the same set of cable connectors or terminal panels, so as not to interfere with or penetrate the measuring unit.

Plastic shell sensor sink type installation



1. Sensor back-end threads wrapped with appropriate raw material tape (to prevent leakage).
2. Pass the sensor cable through the sensor protection tube, and tighten the thread of the sensor back-end to the thread of the inner shell. 15 cm cable is reserved at the tail of the protective tube. The cable passes through the splice-1. Lock it with the PG9 joint, and peel the cable with the reference sensor stripping method.
3. After the sensor extension line is stripped, it passes through the splice-2 and locks, and extends to the main machine.
4. For reserved wires, the REF to the REF, the GLASS to the Glass, fixed on the M4 screws, and then fixed the bracket to the pool, fixed well to complete the assembly.

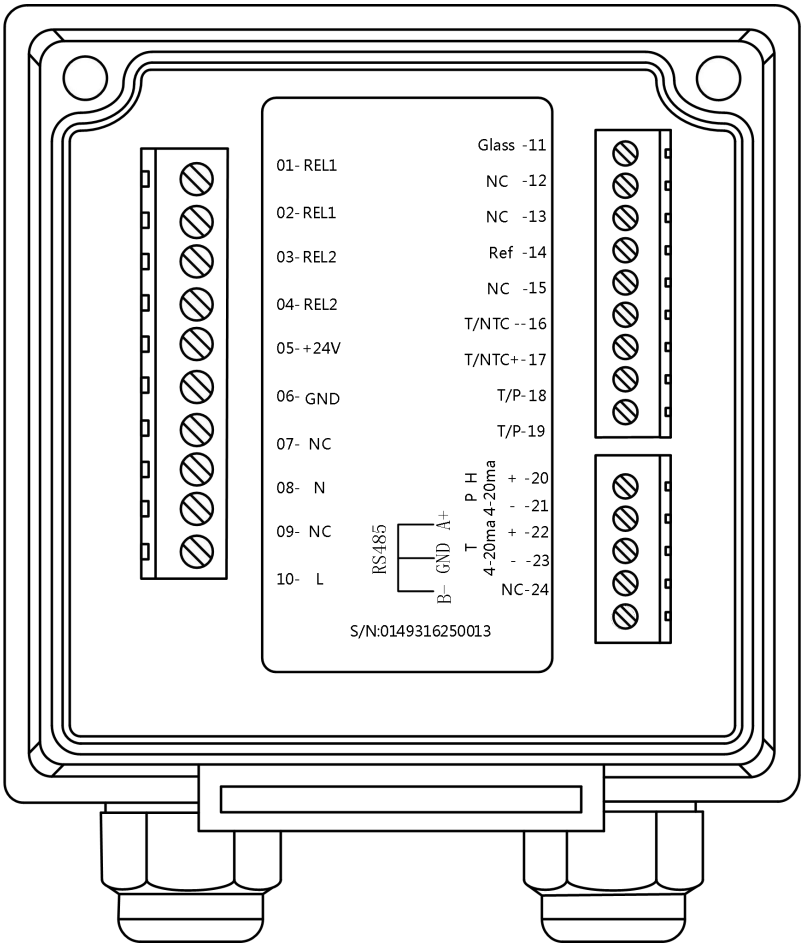
Glass shell sensor sink type installation



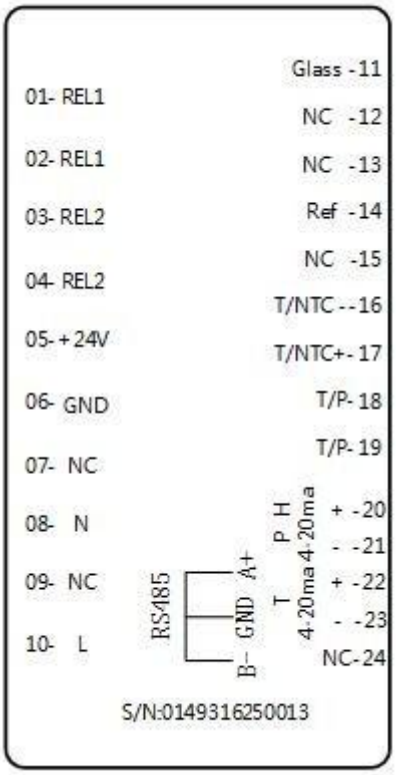
1. Wet the sensor and insert it into the rubber stopper.
2. Put the sensor cable through the protection tube, insert the rubber stopper into one end of the thread outside the tube, and fix the sensor with the PP sheath. The thread must be tightened, otherwise water will leak. Reserve about 15CM cable in the tube. The cable passes through the bundle head 2 and is locked with the PG9 joint. Strip the cable with reference to the sensor stripping method.
3. The sensor extension wire is stripped, threaded through the splice-1 and locked, and extended to the main machine.
4. For reserved wires, the REF to the REF, the GL ASS to the Glass, fixed on the M4 screws, and the n fixed the bracket to the pool, fixed well to compl ete the assembly.

Ⅲ Electrode and electrical wiring

3.1 Back wiring diagram



3.2 Back contact function diagram



01 REL1: First alarm control, external relay
02 REL1: First alarm control, external relay
03 REL2: Second alarm control, external relay
04 REL3: Second alarm control, external relay
05 DC:DC+24V output
06 DC:DC-24V output
07 NC:NC
08 AC:AC power supply 100-240V(L)
09 NC:NC
10 AC:AC power supply 100-240V(N)
11 Glass: pH/ORP +
12 NC: NC
13 NC:NC
14 Ref: pH/ORP -
15 NC: NC
16 T/NTC:NTC10K temperature resistance interface1
17 T/NTC: NTC10K temperature resistance interface 2
18 T/P: PT1000 temperature resistance interface1
19 T/P: PT1000 temperature resistance interface2
20 pH-ma(+): pH/ORP current output positive end
21 pH-ma(-): pH/ORP current output negative end
22 T-ma(+):Temperature current output positive end/RS485 A connector
23 T-ma(-):Temperature current output negative end
24 NC:NC /RS485 B connector

Note: This instrument supports two groups of 4-20MA or one group of 4-20ma and one group of RS485.
AC: 100~240VAC + 10% 50/60hz;
DC: 12-24V;
Power: 5W;
Relay: withstand voltage 240VAC, maximum current 0.5A
Output current: 500 Ω maximum resistance.

Electrical wiring

08-N
10-L
AC100-240V input

05-+24V
06-GND
DC24V output

01—REL1
02—REL1
AC220V power supply
Alarm device

Control alarm wiring

GLASS-11 Clear wire
REF-14 Black wire
T/P-18 Yellow wire
T/P-19 Red wire

(GRT1010W)
Sensor(electrode) wiring

20
21
pH current output

22
23
Temperature current output

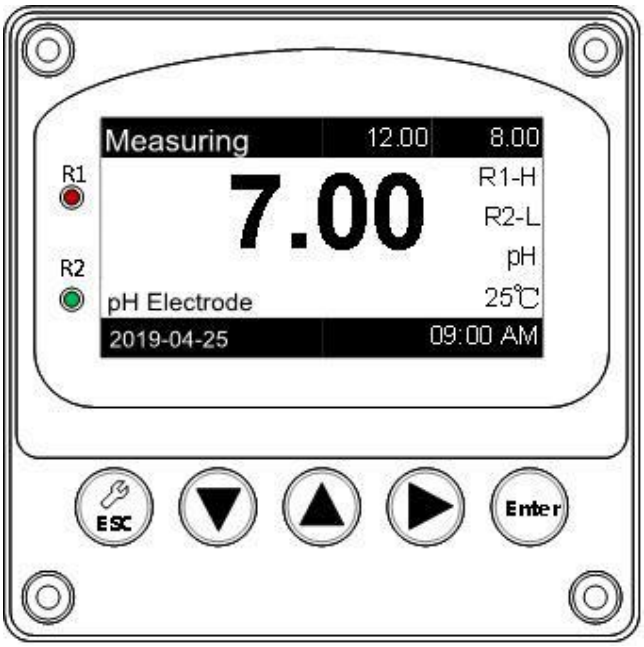
Current output wiring

22—A+
23—GND
24—B-
RS485 output

RS485 wiring

Ⅳ Panel introduction

4.1 Panel introduction



4.2 Key description

To prevent improper operation by non-users, enable password protection when entering parameter settings and corrections. Each function description is as foll ows:

ESC ： Trigger the setting interface in the measurement mode, return to the previous menu under the setting interface.

▼： Switching and numerical adjustment of menus under the setting interface.

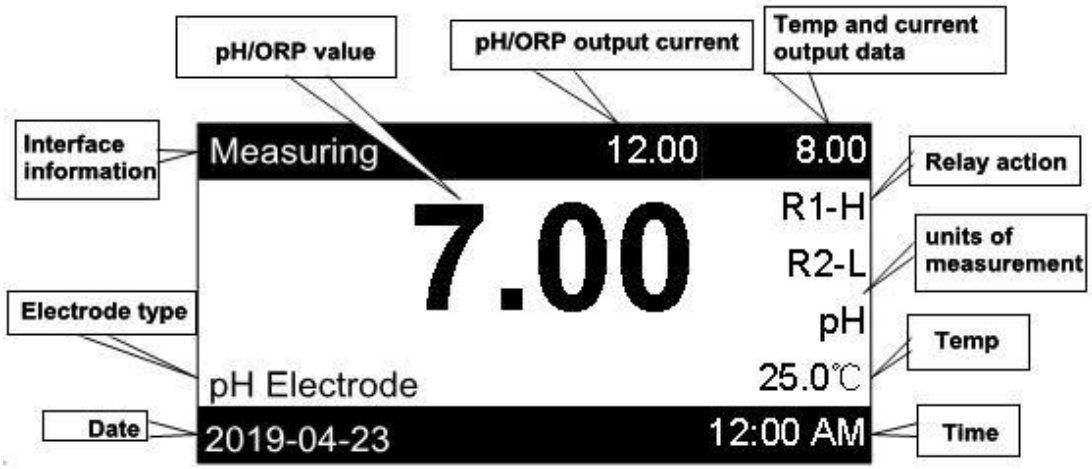
▲： Switching and numerical adjustment of menus under the setting interface.

▶： View historical alarm information in measurement mode, enter the next level menu under the setting interface, and the shortcut key of the alarm information interface.

Enter: View the basic parameters in measurement mode, and the setting interface is used to enter the next level menu, the shortcut key of the system information interface.

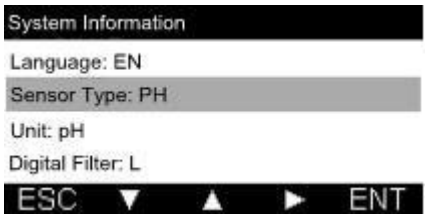
4.3 Display description

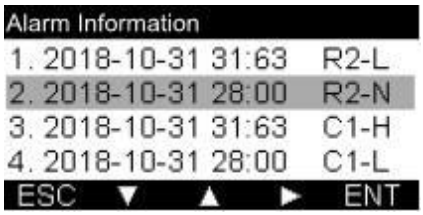
In the display mode of system measurement, it will be shown as follows:



Indicator light description:

R1:Action indicator of relay 1,the high displays the red light, the low displays the green light.
R2:Action indicator of relay 2,the high displays the red light, the low displays the green light.





The figure above shows the display interface of system information and alarm information respectively.

System information：All setting parameters of the meter are displayed in the system information. Press Enter to enter the system information interface.

Alarm information：Up to 60 relay alarm messages can be stored. Press the button ▶to enter the alarm information interface.

Ⅴ Menu introduction

The instrument is divided into four first-level menus according to the function, and each level menu includes two or even two sub-menus. Each menu is numbered for easy viewing and setting of meter parameters.Moreover, the secondary menu will display the setting parameters of the lower menu instrument according to the function at the upper right of the screen, and the user can know the instrument parameters without entering the lower menu.

The main menu includes four first-level menus:

1. System setting

The system setting parameters of the instrument include language, password, date, backlight, etc.

2. Sensor setting

Includes display mode, calibration, digital filtering, temperature mode, temperature regulation, and compensation.

3. Output setting

Including relay 1, relay 2 and two 4-20ma parameter settings.

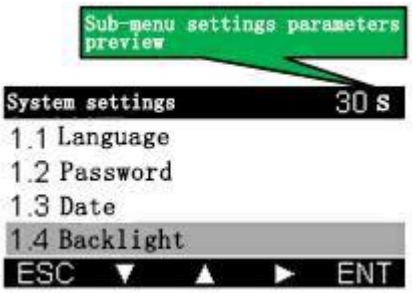
4. Factory reset

Including setting recovery and alarm information recovery.

Menu prompt function:

Enter the secondary menu and the parameter settings for the next menu will be displayed at the top right of the screen.

For example, enter the backlight of the system setup menu, the backlight parameter is set to 30 seconds.



5.1 System setting

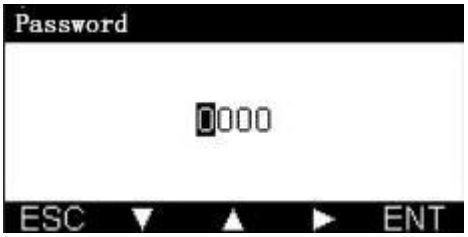
Menu 1.1 Language

This instrument supports Chinese and English two languages, two languages can switch freely.

For example: select simplified Chinese and press Enter key to confirm, the whole display interface of the instrument will be changed into simplified Chinese.

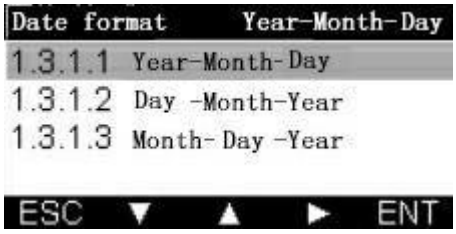
Note：In order to prevent the user from wrong operation, after the customer selects the parameter and presses the Enter key, there will be four prompts "ESC", "OK", "NO" and "ENT" at the bottom of the screen, corresponding to the four buttons of the meter. The user needs to reconfirm whether the parameter is correctly selected. If yes, press the button ▼that is "OK", otherwise press ▲is"NO".

Menu 1.2 Password



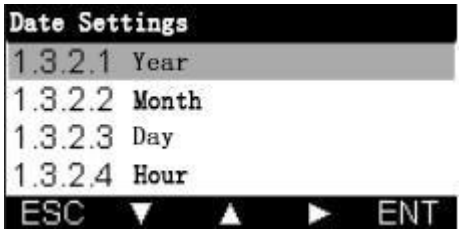
The default password of this instrument is 0000. You can change the password according to your own needs. After changing the password, the user will enter the new password after entering the setup menu next time.

Menu 1.3.1 Date format



The meter supports the selection of three date formats, and you can select the appropriate date format according to your needs.

Menu 1.3.2 Date setting



Enter the date setting menu to set the year, month day, hour, minute, and so on. After successful setting, the system time of the meter will automatically change to the set time.

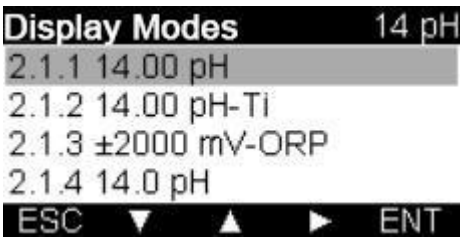
Menu 1.4 Backlight

This instrument supports four kinds of backlight time, the user can set the corresponding backlight time according to the demand. The screen will darken when the meter reaches backlight time.

5.2 Sensor setting

Menu 2.1 Display mode

This instrument supports 7 display modes, each display mode represents different measurement accuracy and measurement unit selection



Remarks:

14.00PH : need to use pH sensor, the measuring range is 0.00-14.00PH.
14.00pH-Ti: need to use pH sensor(TI), the measuring range is 0.00-14.00pH.
±2000mV-ORP: need to use ORP sensor, the measuring range is -2000~+2000mv.
14.0pH: need to use PH sensor, the measure range is 0.0 – 14.0pH.
14.0pH-Ti: need to use pH sensor(TI), the measuring range is 0.0 – 14.0pH.
14pH : need to use PH sensor, the measuring range is 0 – 14pH.
14pH-Ti: need to use pH sensor(TI), the measuring range is 0 – 14pH.

Menu 2.2 Coefficient settings

This menu has two types:

2.2.1 Calibration 2-point
2.2.2 Calibration 3-point

Because the principle of two-point calibration is the same as that of three-point calibration, here we take two-point calibration as an example.

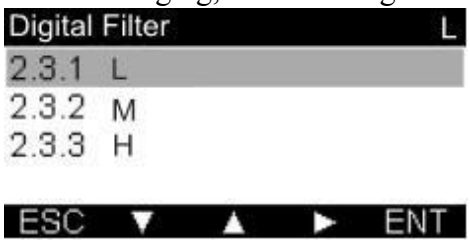
2.2.1 Cal. 2 Point

Two-point correction includes low-point correction and high-point correction：
The default setting of low-point calibration is 4.00pH. First, clean the probe with clean water and dry it. Insert the probe into the calibration solution of PH 4.00, observe the mV value in the calibration page, wait for the mV value to stabilize at 177.0mV (deviation less than 50MV) and press **Enter** to determine. After successful calibration, return to the two-point calibration interface. If the calibration is unsuccessful, it will stay at the low-point calibration interface.

Note: Three-point calibration refers to two-point calibration. The calibration point of this instrument can be set freely, but the value of the calibration fluid and the calibration point should be consistent. Calibration should wait for the mV value to stabilize before pressing Enter key to determine.

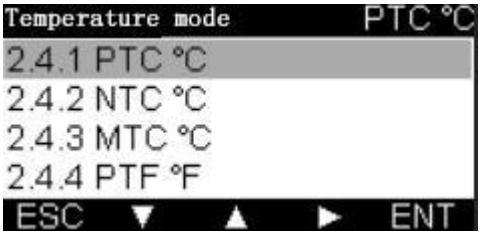
Menu 2.3 Digital filtering

The measured value of the meter is filtered by means of averaging, and three digital filtering methods are supported.



Low point: average every 5 seconds
Midpoint: average every 10 seconds
High point: average every 20 seconds
Note: The rate of change of the low point is higher than the rate of change of the high point.

Menu 2.4 Temperature mode



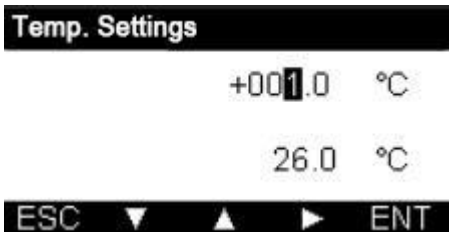
The meter supports two types of temperature compensation, PT1000 and NTC10K. It can freely set two temperature display modes: Celsius and Fahrenheit.

Note 2.4.1 PTC℃：PT1000 temperature probe, Celsius display mode.
2.4.2 NTC℃：NTC10K temperature probe, Celsius display mode.
2.4.3 MTC℃：manual mode，Celsius display mode.
2.4.4 PTF℉：PT1000 temperature probe，Fahrenheit display mode.
2.4.5 PTF℉：NTC10K temperature probe，Fahrenheit display mode.

2.4.6 MTF℉： manual mode，Fahrenheit display mode.

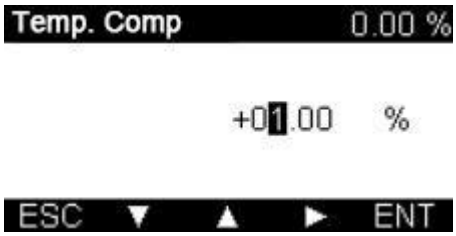
Menu 2.5 Temperature Settings

The temperature adjustment is divided into two parts, the upper part is the temperature adjustment value, and the lower part is the adjusted temperature display value. Press Enter key, the temperature display of the meter will be the adjusted value.



Menu 2.6 Compensation

Users can set the temperature compensation parameters freely according to the actual situation. After confirming by press **Enter** the measured values will change accordingly according to the temperature compensation parameters.



Note:The temperature compensation reference temperature of the instrument is fixed at 25 °C, and the calculation formula is:

$$Ct = C25\{1+\alpha(T-25)\}$$

C25 is PH/ORP value at 25 ° C. **α is temperature compensation coefficient**

T is temperature of the solution to be tested

Ct is temperature of T ℃

5.3 Output setting

The output settings mainly include relay 1, relay 2 and two 4-20ma settings, of which two 4-20ma correspond to the measured values of temperature. The following takes the relay 1 and 4-20 mA of dissolved oxygen as an example.

Menu 3.1 Relay 1

Relay 1 contains 3 sub-menus.

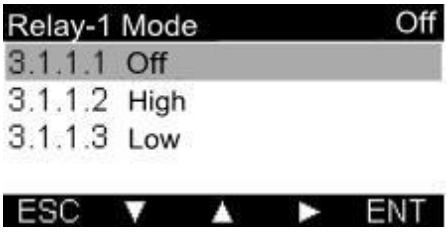
3.1.1 Relay 1 mode

3.1.2 Relay 1 trigger value

3.1.3 Relay 1 hysteresis value

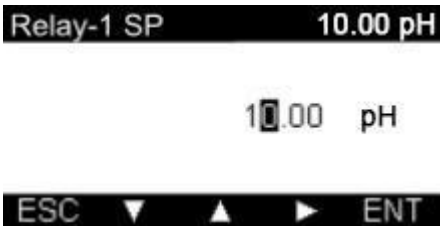
Menu 3.1.1 Relay 1 mode

The relay is divided into three modes: off, high and low. Users can set the corresponding relay mode according to their needs, press Enter to confirm.



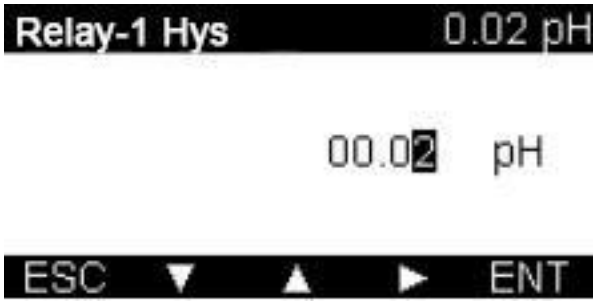
Menu 3.1.2 Relay 1 trigger value

The user can freely set the trigger value within the range allowed by the meter and press Enter to confirm.



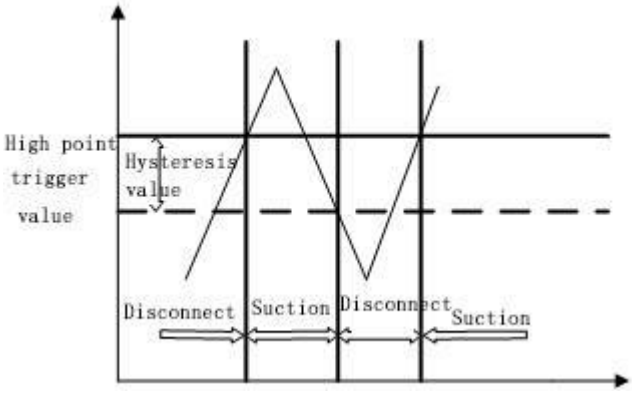
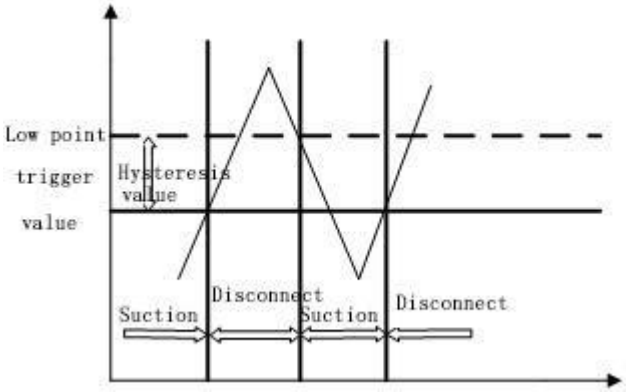
Menu 3.1.3 Relay 1 hysteresis value

The user can freely set the hysteresis value within the range allowed by the meter and press Enter to confirm.



Note:
Greater than (or less than) the alarm trigger value is pulled in. Below (or greater than) the hysteresis value is released.

The relay action diagram is as follows:

	**High point trigger:** **Relay 1 mode= high point** **Relay 1 trigger=5.00** **Relay 1 hysteresis=1.00** **At this time, the working state is: When the display value is higher than 5.00, the relay sucks in, and when the display value is lower than 4.00, the relay is disconnected.** **In high point mode, disconnection value = trigger value - hysteresis value**
	**Low point trigger:** **Relay 1 mode= low point** **Relay 1 trigger=2.00** **Relay 1 hysteresis=1.00** **At this time, the working state is: When the display value is less than 2.00, the relay will suck in, and when the display value is higher than 3.00, the relay will be disconnected.** **In low-point mode, disconnection value = trigger value + hysteresis value**

Menu 3.2 Relay 2
The setting of relay 2 is the same as the setting principle of relay 1, please refer to the setting of relay 1.

Menu 3.3 Electric current

This menu is divided into four sub-menus：

3.3.1 Electric current 1-4mA setting
3.3.2 Electric current 1-20mA setting
3.3.3 Electric current 1-4mA correction
3.3.4 Electric current 1-20mA correction

Since the setting and principle of correction of 4mA and 20mA of current are same, so 4mA setting and correction are taken as an example here.

Menu 3.3.1 Electric current 1-4mA setting

The user can freely set the current 1-4mA setting value. After pressing Enter, the system will automatically save the settings.

Menu 3.3.2 Electric current 1-20mA setting

The user can freely set the current 1-20mA setting value. After pressing Enter, the system will automatically save the settings.

Note：The dissolved oxygen value and current value set in 4-20mA correspond to each other, and the calculation formula is：

outMa =（20.00-4.00）/（endMa - startMa）*（hold- startMa）+ 4.00

outMa is the value of output current

startMa: **pH/ORP value set by 4mA**

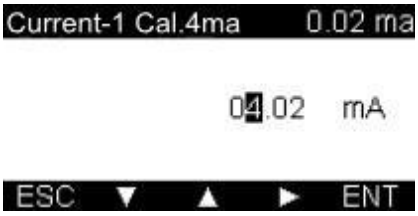
endMa：**pH/ORP value set by 20mA**

Hold is present measured value

For example, 4mA is set to 0.00pH, 20mA is set to 14.00pH, and when the pH value is 7.00 PPM, the current output is 12.00mA.

Menu 3.3.3 Electric current 1-4ma correction

After entering the calibration interface, the current output value will be displayed on the screen. The ammeter will measure the output current value of the current 1 and adjust the current value on the screen to be the same as the current value measured by the ammeter.



Menu 3.3.3 Electric current 1-20mA correction

The setting principle of 20mA is the same as that of 4mA. Please refer to 4mA for correction.

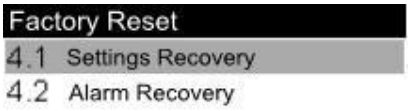
Menu 3.4 Electric current2

The setting principle of current 2 is the same as that of current 1. Please refer to current 1.

5.4 Factory reset

Menu 4.1 Setting recovery

Press Enter to confirm, all the parameter settings of the meter will be restored to the default value.



Menu 4.2 Alarm recovery

After pressing Enter key, the alarm information of the meter will be cleared.

Ⅵ Default factory setting

Menu	Range setting	Factory default
Sensor type	PH/ORP/Ti	PH
Digital filtering	Low/middle/high point	Low point
Calibration	2-point/3-point	2-point
Temperature compensation	Auto/manual	manual
Manual temperature compensation	0.0 ~ 100.0 ℃	25.0 ℃
High alert trigger value	pH: 0.00 ~ 14.00 pH	pH: 12.00 pH
	ORP：- 1999 ~ + 1999 mV	ORP：+ 900 mV
High alert hysteresis value	pH:0.00～14.00 pH	pH: 1.00 pH
	ORP：0～+1999 mV	ORP：100 mV
Low alert trigger value	pH: 0..00 ~ 14.00 pH	pH: 2.00 pH
	ORP：-1999～ +1999 mV	ORP：- 900 mV
Low alert hysteresis value	pH: 0.00～ 14.00 pH	pH: 1.00 pH
	ORP： 0～ +1999 mV	ORP：100 mV
4mA corresponding value	pH: 0.00 ~ 14.00 pH	pH: 0.00 pH
	ORP：- 1999 ~ + 1999 mV	ORP：- 1999 mV
20mA corresponding value	pH: 0.00～ 14.00 pH	pH: 14.00 pH
	ORP： - 1999 ~ + 1999 mV	ORP：+ 1999 mV
User password	0 ~ 9999	0000 (general password:6666)
Backlight	30S~Always	30S
Alarm sound	open/closed	open

Maintenance

Our controller does not need any maintenance under normal conditi ons, but the sensor needs regular cleaning and calibration to ensure accurate and stable measurements and to maintain the normal oper ation of the system.

The cleaning cycle of the sensor depends on the degree of contami nation of the tested water sample. Generally speaking, it is better t o have regular cleaning and maintenance once a week. The followi ng table is an introduction to the cleaning fluids needed for differe nt types of pollution. It provides operators with a reference for clea ning and maintenance.

Types of pollution	Cleaning method
Contamination of sensor diaphragm caused by protein in test solution	The sensor was immersed in Pepsin/HC L solution for several hours.
Sulfide contamination (black of sensor diaphragm)	The sensor was immersed in Thiourea/H CL solution until the diaphragm became white.
Pollution of grease or organic matter	The sensor was briefly cleaned with acetone or ethanol for several seconds.
General pollution	Clean the sensor with 0.1M NaOH or 0.1M HCL for several minutes.
When using the above method to clean the sensor, please rinse them thoroughly with clean water, and put the electrodes into 3M OL KCL solution for about 15 minutes, then do the sensor calibration again.	
During the sensor cleaning process, do not rub the sensor sensing glass head, or mechanical cleaning electrode, otherwise it will produce electrostatic interference, affecting the reaction.	

Platinum sensor can be cleaned with fine cloth stained with water to wipe the platinum ring lightly.

Note: The sensor cleaning cycle must depend on the degree of contamination of the water quality, it is generally recommended to clean and correct at least once a week, or according to the sensor operating instructions and the original recommended cleaning sensor(probe).