

pHG-2091

Online pH / ORP Meter

User manual



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Foreword

- Thank you very much for your company to buy my company's pH / redox online analyzer. This manual describes the functions, wiring methods, setting methods, operation methods and fault handling methods that can be realized by the instrument in detail. Before the instrument is put into operation, it is necessary to read this manual in detail, to understand the use of the method and then to carry out specific operations, to avoid unnecessary damage caused by the wrong operation, if the manual described in the method other than the operation, and sometimes damage the instrument Provide protection, if it is due to breach of these precautions arising from the failure and the accident, our company is not responsible.
- Please read this manual carefully before using the instrument. Under the premise of full understanding, must be on the scene of the relevant electrical professionals in order to install the instrument, operation and maintenance. Incorrect installation or operation can result in damage to the instrument or personal injury
- The company promises to the user, the instrument should be provided when the supply of hardware, accessories in the material and manufacturing processes are not any flaws. From the date of purchase of the instrument from the date of calculation, in the warranty period, if the user received a notice on such defects, the company is indeed defective products for unconditional free maintenance or free replacement. The company for all products will guarantee life-long maintenance.
- In order to comply with the principles of sustainable development, the Company reserves the right to modify the performance parameters described in this manual without prior notice. Reserves the right to revise or revoke this manual without prior notice. When the instrument changes certain performance parameters may lead to serious accidents, the company must inform the user in advance. For the improved instrument, the company will have a new version of the instructions or improved instructions. If there is a deviation from the description in this manual, please prevail in kind.
- No modification of the instrument! Due to unauthorized transformation of the product caused by the accident, the company is not responsible.

Instructions used in this manual

Remark	Name	Note
	Danger	Failure to take appropriate precautions can result in serious personal injury, damage to the instrument, or loss of significant property.
	Warning	Remind you of the important information about the product or the special part of this manual.
	Caveat	Be careful to do this, and execution errors can cause significant problems.
	Note	Please read this note carefully, it is very helpful to operate the instrument correctly.



Danger

- Do not use the instrument in flammable and explosive atmospheres or where there is steam.
- The instrument can work normally in general. If the fault of the instrument may cause serious accident or damage other equipment, need to set the emergency stop circuit and protection circuit.
- Make sure that the supply voltage is consistent with the rated voltage before running.
- In order to prevent electric shock, misuse, display is not normal or measurement of a larger error, be sure to carry out a good grounding protection.
- Must be mine construction facilities: common grounding grid equipotential grounding, shielding, reasonable wiring, the appropriate use of SPD surge protector and so on.
- Some internal parts with high pressure, non-company or non-I recognized the maintenance staff, do not open the front panel, in order to avoid electric shock.
- Make sure that the power is turned off before performing any inspection to avoid electric shock.
- Check the terminal screws and mounting screws regularly. If they are found loose, please use them before tightening.
- Never allow unauthorized removal, processing, alteration or repair of the instrument, otherwise it may cause abnormal action, electric shock or fire accident.

- Please use a dry cotton cloth to wipe the instrument, can not use alcohol, gasoline or other organic solvents. Beware of a variety of liquid splashed on the instrument, if the instrument fell into the water, please immediately cut off the power, or leakage, electric shock and even fire accidents.
- Check the grounding protection and fuse status regularly. Do not run if you think that the protective measures such as earthing protection and fuses are not perfect.
- Ventilation holes in the instrument housing must be kept smooth so as to avoid high temperature failure, abnormal action, shortened life and fire.
- Please follow the instructions in this manual, otherwise it may damage the instrument protection device.

**Warning**

- If you find out if the instrument is damaged or deformed, please do not use it.
- Install to avoid dust, thread, iron or other substances into the instrument, otherwise it will occur abnormal action or failure.
- During operation, if you want to modify the configuration, signal output, start, stop and other operations, should take full account of operational safety, error operation may lead to instrumentation and equipment failure or even damage.
- Parts of the instrument have a certain period of life, in order to ensure long-term use, be sure to carry out regular maintenance and maintenance.
- Scrap the product, according to industrial waste disposal, to avoid pollution of the environment.

User Notice

Please observe the operating instructions and precautions in this manual.

⚠ The instrument can be operated normally. If the malfunction of the instrument may result in a major accident or damage to other equipment, the emergency stop circuit and the protection circuit shall be provided. Otherwise, the Company will not be responsible for any consequences.

- The instrument has only one electrode input. When selecting the PH mode, the PH electrode should be installed. The OPR electrode should be installed in the ORP mode.
- In order to make the measurement more accurate, the glass electrode shelf life of one year, the factory a year later, regardless of whether the use of its performance will be affected, should be replaced.
- The first use of the PH electrode or long-term no use of the PH electrode, must be sink into 3mol/ L of KCL for 24 hours.
- Preheat the instrument for about half an hour before performing calibration work.
- When measuring, should be washed in distilled water (or deionized water), and filter the paper to absorb moisture, to prevent impurities into the measured liquid.
- In the course of the use of the instrument if the work is abnormal or damaged, please contact the manufacturer, do not repair themselves.

Chapter 1 Production introduction

PHG-2091 Online pH / ORP Analyzer is one of the intelligent online chemical analysis instruments, is a widely used in thermal power, chemical fertilizer, metallurgy, environmental protection, pharmaceutical, biochemical, food and tap water solution PH value or OPR Value and temperature of the continuous monitoring.

Continuous monitoring data through the transmission output connection recorder to achieve remote monitoring and recording, you can also connect the RS485 interface through the MODBUS-RTU protocol can be easily connected to the computer to achieve monitoring and recording.

1.1 Features

Board modular design, assembly configuration more convenient.

- Using 2.4-inch 12864 dot matrix screen
- Use isolated output, less interference
- Isolated RS485 communication
- Can be PH / ORP measurement, temperature measurement, high and lower limit control, transmission output, RS485 communication
- Configurable temperature manual, automatic compensation function
- Can set high and low alarm function, and hysteresis
- Can be set buzzer, LCD backlight switch function
- Increase the universal password function
- Industrial control watchdog to ensure that the instrument does not crash

1.2 Technical indexes

- Isolated 4-20 mA current output, the maximum load 750 Ω , 0.1% FS
- Measuring range: PH (0-14 pH); ORP (-2000- + 2000 mV)
- Accuracy: ± 0.03 pH; ± 2 mV
- Resolution: ± 0.01 pH; ± 1 mV
- Stability: ≤ 0.02 pH / 24H; ≤ 3 mV / 24H

- Input impedance: $\geq 10^4 \Omega$
- Temperature type: NTC10K
- Temperature measurement range: 0-99.9 °C, accuracy: ± 0.5 °C
- Temperature compensation: 0-99.9 °C manual / automatic
- RS485 function, compatible with standard MODBUS-RTU communication protocol
- Power supply: AC220V $\pm 10\%$, 50 / 60Hz
- Alarm relay AC250V, 3A

Chapter 2 Installation

2.1 Meter installation

⚠ Please describe the installation method and installation method of this instrument. Be sure to read this section when installing.

Installation Precautions

⚠ The instrument is equipped with relay switch output, generally used for alarm prompts, if the user will use this function to participate in loop control, if the instrumentation, the instrument is used to control the instrument, The failure may lead to major accidents or damage to other equipment, the need to set the emergency stop circuit and protection circuit complement, otherwise the consequences, the company is not responsible.

This instrument is disk mounted.

Please install indoors, avoid wind and rain and direct sunlight.

In order to prevent the internal temperature rise of the instrument, please install in a well ventilated place.

When installing this instrument, please do not tilt left and right, as far as possible (can be tilted $< 30^\circ$).

Avoid the following places during installation

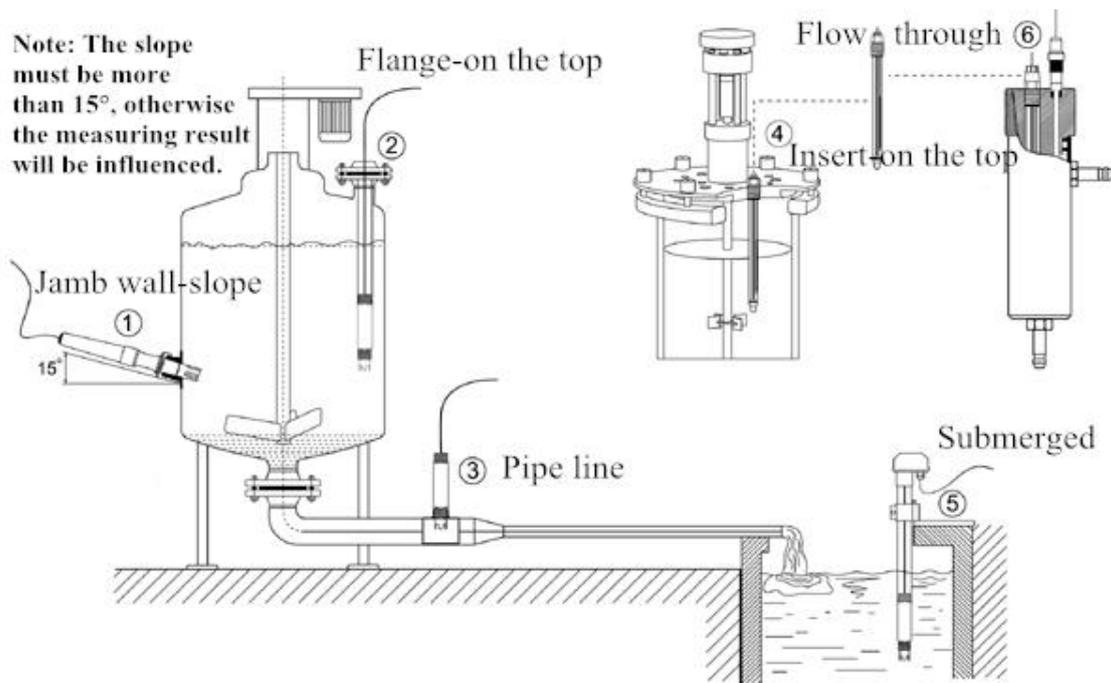
- The area where the sunlight is directly irradiated and the vicinity of the heat instrument.
- Work where the ambient temperature exceeds 60 ° C.
- Work where the ambient humidity exceeds 85%.
- Near the electromagnetic source.

- Mechanical vibration strong place.
- The temperature change is easy to condensation place.
- Fumes, steam, moisture, dust and corrosive gases.

Installation method

Open a 92.5 * 92.5 mounting hole on the instrument cabinet or mounting panel to insert the instrument into the mounting hole fixing screw.

2.2 Electrode Installation



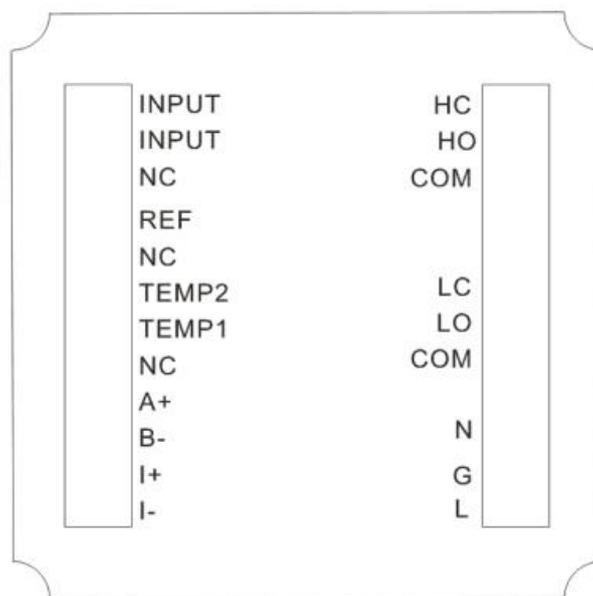
Common installation diagram

2.3 Meter wiring

Terminal definition

- INPUT: Electrode measurement terminal
- REF: Sensor reference
- NC: None
- TEMP2: Temperature compensation 2
- TEMP1: Temperature compensation 1
- RS485(A+): RS485 Communication protocol A+
- RS485(B-): RS485 Communication protocol B-
- 4-20mA(I+): 4-20mA Output +

- 4-20mA(I-): 4-20mA Output -
- AC220V(L): AC220V Zero wire
- AC220V(N): AC220V Fire wire
- HC: High limit normally close
- HO: High limit normally open
- LC: Low limit normally close
- LO: Low limit normally open
- COM: Relay common port



Notice:

To prevent electric shock, make sure that the meter is not energized before connecting the signal cable.

To prevent fire, use a double insulated wire.

Do not place the live product near the signal terminals, which may cause malfunction.

Chapter 3 Button operation



Button description

Remark	Name	Function description
	Menu	“Monitoring interface” enter into main menu “Main menu” to exit
	Exit	“Monitoring interface” to check alarm status “Main menu” to exit to the last page “Calibration” jump over the calibration process
	Right shift	Cycle select the number of parameters
	Next	“Main menu” to select relevant menu Set the state to modify the relevant value
	Enter	“Main menu” enter into sub-menu or confirm the modify

Chapter 4 Meter display and operation

Monitoring interface

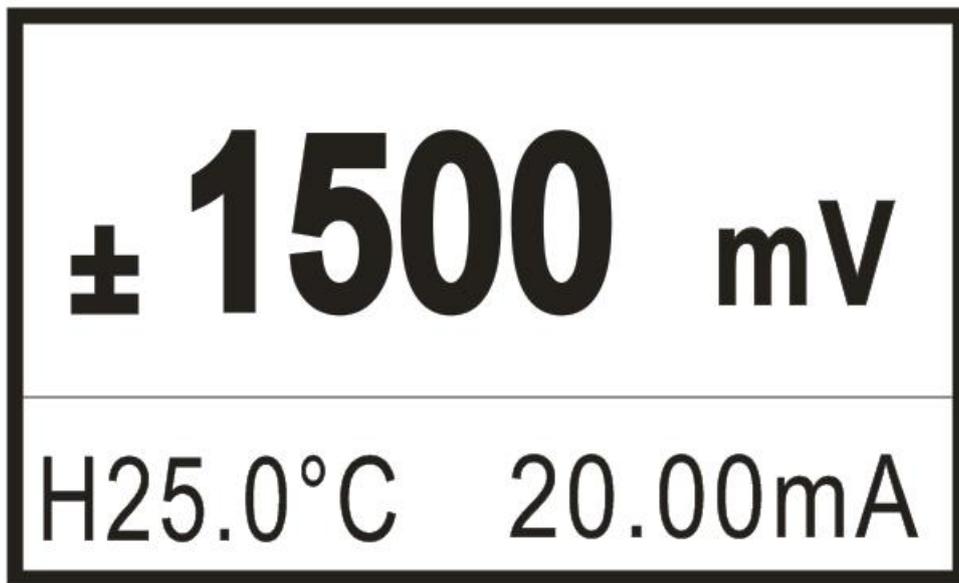
The instrument is equipped with monochrome dot matrix LCD display with a resolution of 128 * 64.

Use the **【Menu】** to enter the password verification screen, input the password and enter into the main menu screen.

Use **【ESC】** to enter the alarm query screen, query the current alarm settings information.



Monitoring interface of pH value



Monitoring interface of ORP value

Password verification screen

After entering the password, use [ENT] to enter the main menu screen.

Initial password is 0000, you can use the password modification function to change the password.

If you forget your password, please contact us.

----Password----

0000

Main menu

----Main menu----

1. System Setting
2. Signal Setting
3. Online Calibration
4. Remote Setting
5. Alarm Setting
6. Information inquiry

System Setting: buzzer and backlight settings, password changes and factory settings.

Signal Setting: switching of the electrode type and automatic switching of the warm-up hand.

Online Calibration: Calibration and correction of PH and ORP signals.

Remote Setting: RS485 and current transmission output parameter settings.

Alarm Settings: high alarm and low alarm parameter settings.

Information Inquiry: current version number.

Chapter 5 Settings

5.1 System setting

----System setting----

1. Language
2. Buzzer
3. Backlight
4. Password Modify
5. Factory Setting

Language: Chinese and English switch

Buzzer: Sets the buzzer switch when the alarm is set.

Backlight Setting: set the LCD backlight switch.

Password Modify: change the password and use the new password login.

Factory Setting: return to factory settings.

5.2 Signal setting

----Signal setting----

1. Electrode Type
2. Temp compensation

Electrode Type: set the electrode type, PH electrode and ORP electrode two types.

Temperature compensation: set the automatic temperature compensation or manual temperature compensation, the temperature range of 0-99.9 °C.

5.3 Online Calibration

----Online Calibration----

1. pH Calibration
2. pH Modification
3. ORP Calibration
4. ORP Modification

PH Calibration: enter into PH calibration screen, put the PH electrode into 4.00PH standard solution firstly, standing for a moment, after the value stable, press the ENT; Then put the PH electrode into 6.86PH standard solution, standing for a moment, after the value stable, press the ENT; Finally, put the PH electrode into 9.18PH standard solution, standing for a moment, after the test is stable, press the ENT, indicating that the calibration is successful , The PH calibration process finished.

PH correction: The measured PH value can be corrected between 2 PH values.

ORP Calibration: enter into ORP calibration screen, put the ORP electrode into the 86mV standard solution firstly, standing for a moment, after the value stable, press the ENT; then put the ORP electrode into 256mV standard solution, Moment, after the value stable, press the ENT, display calibration is successful, ORP calibration process is finished.

ORP Correction: The measured ORP value can be corrected between 300mV.

5.4 Remote Setting

---Remote Setting---

1. RS485
2. 4-20mA setting

RS485: Set the address and baud rate of 485 communication.

4-20mA Setting: set 4-20mA output 4mA corresponds to the value and 20mA corresponding value.

5.5 Alarm Setting

---Alarm Setting---

1. pH High Alarm
2. pH Low Alarm
3. ORP High Alarm
4. ORP Low Alarm

pH High Alarm: when the measured value is higher than the high value set, the high alarm relay pull, when the measured value is lower than the high value set, the high alarm relay disconnect.

pH Low Alarm: when the measured value is higher than the low value set, the lower alarm relay pull, when the measured value is lower than the low value set, the low alarm relay off.

ORP High Alarm: when the measured value is higher than the high value set, the high alarm relay pull, when the measured value is lower than the high value set, the high reported relay disconnect.

ORP Low Alarm: When the measured value is lower than the low value set, the low alarm relay pull, when the measured value is higher than the low value set, the low alarm relay off.

5.6 Information Inquiry

---Information Inquiry---

1. Ver Information

Version information: query the current hardware and software version, strong traceability.

Chapter 6 Communication protocol

The instrument provides standard RS485 serial communication interface, using the international standard MODBUS-RTU communication protocol, support 03 read to keep the register command.

Register address

The communication data and the register address are as follows:

Address	Data type	Function code	Description	Access permission
0x0000	unsigned short	0x03	PH value (Default two decimal places)	Read only
0x0001	unsigned short	0x03	Temp value (Default one decimal places)	Read only
0x0002	short	0x03	ORP value (Signed integer)	Read only

Communication sample:

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

PH / ORP meter returns: 00 03 02 02 AE 05 58

Return command comment: 00 is 485 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 (hexadecimal high byte);

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

05 58 is the CRC check value;

Chapter 7 Product maintenance

1. pH glass electrode storage, short-term: stored in the pH 4 buffer solution; long-term: stored in the pH7 buffer solution.

2. 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 for 24 hours and then continue use. When the pollution is serious, can be use 5% HF

solution for 10 to 20 minutes, immediately rinse with water, and then immersed in 0.1N HCl solution for 24 hours and then continue use.

3. Glass electrode aging treatment: the aging of the glass electrode and the gradual change in the structure of the glue layer. Old electrode response is slow, film resistance is high, slope is low.

Exfoliation of the outer layer with HF 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.

4. The storage of the reference electrode Silver - silver chloride electrode, the best storage solution is in 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 also applies to the storage of composite electrodes.

5. The reference electrode regeneration reference electrode problems caused by the vast majority of liquid junction caused by blockage, the following methods can be resolved:

(1) 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.

(2) 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.

(3) 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.

(4) 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.

(5) When the above methods are invalid, you can use sandpaper grinding mechanical method to remove the blockage. This method may cause the sand under the grinding into the liquid interface. Causing permanent clogging.

Chapter 8 Trouble analysis and recovery methods

1. The controller no display?

A: Check whether the power wiring is connected, the power supply is on.

2. Measurement value is bouncing?

A: Check around the frequency converter and other interference equipment, pay attention to stay away from these interference equipment or do shielding measures.

3. PH instrument can not be calibrated?

A: The standard solution is not properly formulated or the electrode is damaged.

4. After calibrated by standard solution PH4.00, PH6.86, PH9.18, the test is not test?

A: The standard solution may polluted, replace the standard liquid and re-calibration.

5. The measurement value is slow response?

A: The electrode bulb is covered with dirt, the reaction will slow down, according to the type of pollutants according to the corresponding cleaning method, it's normal phenomenon in winter.