User Manual

pH/ORP sensor

U-PRO/Hp-EN11

Preface

Thank you for purchasing pH sensor. 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-PRO/Hp-EN11

Disclaimer

Please confirm the product and information after unpacking. Please contact us if the product is wrong, or the quantity is incorrect or the appearance is damaged.

Package contents

S/N	Item Name	Qty
1	Industrial online pH/ORP sensor	1
2	Manual	1
3	Certificate of Compliance	1

Description of symbols

Symbol	Name	Meaning
	Danger	Serious personal injuries, instrument damage or major property losses and other accidents will be caused if proper preventive measures are not taken.
	Warning	Remind you to pay special attention to important information about products or special parts of this manual.

Contents

Chapter 1 Brief Introduction

The principle of pH/ORP sensor measurement is electrochemical method and galvanic battery principle.

The primary battery is a system whose function is to turn chemical energy into electrical energy. The voltage of this battery is called electromotive force (EMF) which is made up of 2 half-cells, of which one is called a measuring cell whose potential is related to specific ionic activity; the other is a reference half-cell, commonly known as a reference sensor, which is generally interlinked with the measuring solution and is connected to the measuring instrument.

The potential difference produced by the galvanic interaction inside the sensor is transmitted to the pH controller, and the corresponding algorithm is transmitted to display the pH value.

Chapter 2 Precautions

(1) The electrode leads are special shielded wires. Do not cut or splice them, as any consequences caused by unauthorized modification will not be covered.

(2) It shall avoid soaking in distilled water or protein solutions for a long time and prevent contact with silicone oil.

(3) For electrodes that have been in use for a long time, the gas membrane may become transparent or coated with deposits. In this case, rinse with dilute hydrochaloric acid, followed by through water rinsing.

(4) If the electrode cannot perform calibration or normal measurement after maintenance, it indicates that the electrode can no longer respond properly; please replace the with a new electrode.

(5) The pH sensor wire is not waterproof, so it shall be avoided to expose it to water.

Chapter 3 Maintenance

(1) An appropriate amount of 3.3 mol/LKCL solution is contained in the protective cover at the front part of the sensor, in which the sensor tip is immersed to maintain the activation of the sensitive membrane and the reference junction.

(2) Before use, remove the transparent protective front cap so that the glass bulb and reference junction are fully immersed in the solution during measurement.

(3) Before installation, make sure to use thread seal tape (at 3/4 threads) for waterproofing and sealing to shield from water, which may otherwise cause short circuit of the pH sensor cable.

(4) In measurement, the sensor should be rinsed out in distilled water (or deionized water) and dried with filter paper to prevent impurities from entering the measured liquid. The sensor sensitive membrane and the liquid junction shall be completely immersed in the measured liquid.

(5) Check whether the connecting terminal is dry. If there is contamination, please wipe it with anhydrous alcohol and blow dry it for use.

(6) It is recommended to regularly clean the glass bulb and reference junction at the front of the electrode, and periodically perform instrument calibration.

(7) When not in use, rinse the electrode and store it in the protective cap filled with saturated KCl solution.

(8) The electrode should be cleaned regularly. If the glass bulb or PTFE annular reference junction becomes contaminated, the following cleaning reagents may be used:

Buildup Type	Cleaning Agent
Calcium deposits or metal hydroxide coatings	1%~3% diluted hydrochloric acid
Lubricating grease or oils	Organic solvent (e.g., ethanol) or surfactant-containing solution (e.g., dishwashing detergent).
Proteins	Mixture of 0.5% dilute hydrochloric acid and gastric protease
Inorganic coatings containing sulfides	1%~3%diluted hydrochloric acidandthiourea（0.1mol/L）

Chapter 4 Installation

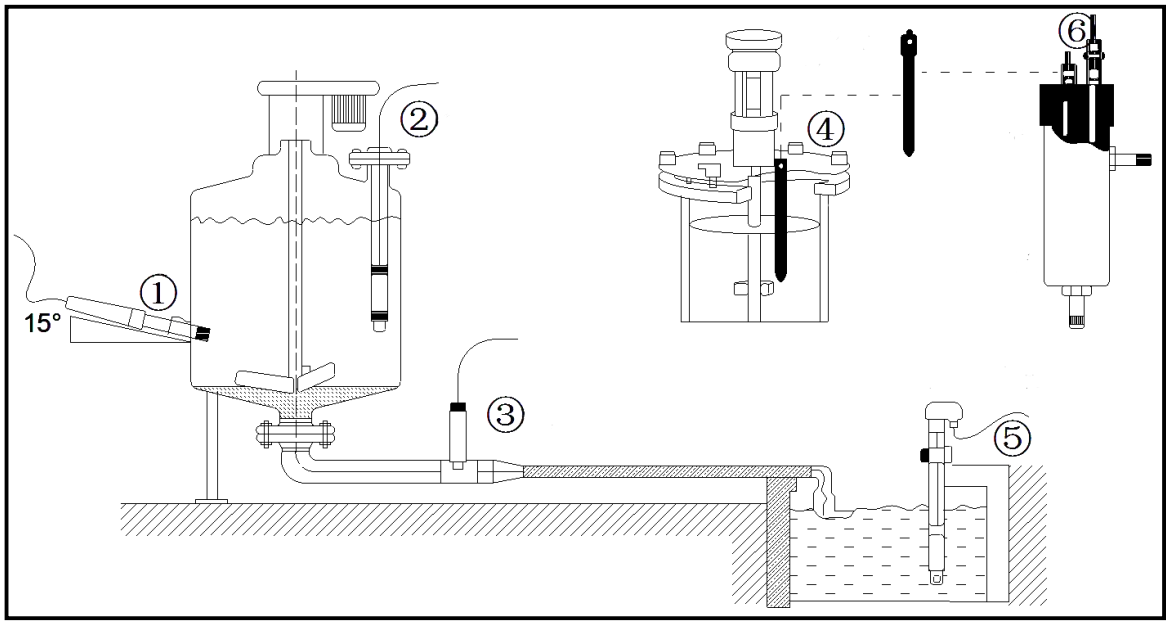

Fig. 1

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 sensor.We won’t be responsible for any results due to this.

Chapter 5 Calibration

(1) It is recommended to calibrate the sensor by three-point method. The pH 4.00 buffer solution is usually used for positioning first, then the pH 6.86 and pH 9.18 buffer solutions are used sequentially to determine the slope,calibration points are selectable in the meter.

(2) After the sensor is connected to the instrument, please connect the instrument to the power supply to preheat it for 30 minutes before performing the calibration.

(3) When performing the calibration of calibration sensor, it shall be noted that the sensor can not be placed flat, but shall be placed vertically (please put the sensor sensitive membrane downward) to prevent deviation of the sensor mV data.

(4) For sensors with temperature compensation, switch the controller to automatic temperature compensation.

Chapter 6 Signal Parameters

Sensor slope: The slope of the glass sensor is 59.16 mV at 25 ℃ theoretically, i.e. potential change of 59.16 mV for each pH change in the solution.

But in fact, neither glass sensor can reach the theoretical value 100%; in general, the sensor slope is more than 98% of the theoretical value (percentage slope). In addition, the mV difference corresponding to each unit pH value varies under different temperatures.
The conversion of temperature to electric potential difference is as follows:

$$\triangle E=59.16*[(273+T)/298]*\triangle pH$$

Chapter 7 Parameters

7.1. pH-5013A

Low-impedance glass sensitive film, wear-resistant, strong acid and alkali resistant, with protection ring in the the front to protect glass bulb and better precision and linearity.

Zero potential point: 7±0.25
Conversion coefficient: ≥95%
Membrane resistance: ＜500Ω
Practical response time: < 1 min
Measurement range: (0~14) pH
Temperature compensation: Pt100/Pt1000/NTC10K
NTC22K/NTC30K
Temperature: (0~80)℃
Reference: Ag/AgCl
Pressure resistance: 0.3MPa
Thread Connection: 3/4NPT
Salt bridge: Ring Teflon junction
Material: PTFE

Fig. 2

7.2. pH-5014

The pH-5014 sensor is made of pH sensitive glass film resistant to hydrofluoric acid.The application of this sensor is not only for the determination of pH value in water containing hydrofluoric acid, but also in the dilution control of hydrofluoric acid in semiconductor wafer manufacturing and chip production.It can also be used in the petrochemical industry, iron and steel waste water and other corrosive systems in the determination of pH value.

Sensor interface: VP,S8M,K2, etc.
Conversion coefficient: > 98%
Measurement range: (0~14) pH
Salt Bridge: Single Ceramic Junction
Temperature: (0~130)℃
Pressure resistance: 0.25MPa
Temperature compensation: Pt100/Pt1000/NTC10K/
NTC22K/NTC30K
Hydrofluoric acid concentration range: ≤4000ppm
Mounting thread: PG13.5
Shell material: Glass
Reference type: Ag/AgCl

Fig. 3

7.3. pH-5015

pH-5015 sensor has large sensitive areas and is resistant to mechanical shock; it is widely used in various chemical processes including microbial technology, pHarmaceuticals, food and beverages, sugar manufacturing, chlor-alkali, mining and smelting, paper pulp, textiles, petrochemical industry and semiconductor electronic industry as well as fields such as waste water treatment.

Connector: VP, S8M, K2, etc.
Zero potential point: 7 ±0.5 pH
Conversion coefficient: > 98%
Membrane resistance: general: <250MΩ
Practical response time: < 1 min
Measurement range: (0~14) pH
Salt bridge: single ceramic junction
Temperature compensation: Pt100/Pt1000/NTC10K/ NTC22K/NTC30K
Temperature: (0~130) ℃
Pressure resistance: 0.3MPa
Thread Connection: PG13.5
Reference type: Ag/AgCl
Shell material: glass

7.4. pH-5016

The electrode can resist strong acid and alkali erosion. It is widely used in wastewater treatment and fields including mining and smelting, papermaking, pulp, textiles, petrochemicals, semiconductor electronic industrial processes, and biotechnology downstream engineering.

Measuring range: (2~12) pH
Temperature range: (0~80)℃
Pressure resistance: 0.1MPa~0.3MPa
Zero potential point: 7±0.5pH
Conversion factor: > 98 %
Membrane resistance: < 250MΩ
Response time: < 1min
Salt Bridge: Annular PTFE or single-point ceramic diaphragm
Thread Connection: NPT 3/4
Shell material: PPS

Fig. 5

7.5. pH-5018

The pH-5018 sensor has large sensitive areas and strong mechanical shock resistance, which can be widely used in various chemical processes including microbial technology, pHarmaceuticals, food and beverages, sugar manufacturing, chlor-alkali, mining and smelting, paper-making, paper pulp, textiles, petrochemical industry and semiconductor electronic industry as well as fields such as waste water treatment.

Connector: VP, S8M, K2, etc.
Zero potential point: 7 ± 0.5 pH
Conversion coefficient: > 98%
Membrane resistance: general: <250MΩ
Practical response time: < 1 min
Measurement range: (0~14) pH
Salt bridge: Porous ceramic/porous Teflon
Temperature compensation: Pt100/Pt1000/NTC10K
NTC22K/NTC30K
Temperature: (0~100)℃
Pressure resistance: 0.3MPa
Thread Connection: PG13.5
Shell material: glass

Fig. 6

7.6. pH-5019

The pH-5019 sensor consists of a pH-sensitive membrane, double-junction reference GPT medium electrolyte, and a porous large-area Teflon salt bridge. The plastic case is made of modified PON, which can withstand high temperature up to 80°C and resist strong acid and strong alkali corrosion. It is widely used in waste water treatment and fields including mining and smelting, paper-making, paper pulp, textiles, petrochemical industry, process of semiconductor electronic industry and downstream engineering of biotechnology.

Temperature compensation: NTC10K, NTC22K, NTC30K, PT100, PT1000
Zero potential point: 7 ± 0.5 pH
Conversion coefficient: > 98%
Membrane resistance: <250MΩ
Practical response time: < 1 min
Measurement range: (2~12) pH
Salt bridge: single ceramic junction
Temperature: (0~80) ℃ for general cables
Pressure resistance: 0.2Mpa
Thread Connection: 3/4NPT

Fig.7

7.7. pH-5100

The pH-5100 sensor is composed of pressure- resistant hemispHerical pH sensitive film, intermediate dielectric composed of GMT mixed with glue, Ag/AgCL/KCL external reference system, and salt-free bridge open liquid interface.Widely used in pure water and high purity water and complex chemical processes.

Measurement range: (0~14) pH
Temperature: (0~130) ℃
Pressure: 0.3MPa
Reference: Ag/AgCl
Connector: VP,S8M,K2, etc.
Conversion coefficient: > 98%
Membrane resistance: <250MΩ
Practical response time: < 1 min
Salt bridge: OPEN junction
Temperature compensation: Pt100/Pt1000/NTC10K/ NTC22K/NTC30K

Fig. 8

7.8. pH-6001

The sensor can be directly used with a variety of domestic or imported pH meter.

Measurement range: (2~12) pH
Temperature: (0~80) ℃
Pressure range: 0.4MPa
Temperature compensation: NTC10K/PT1000
Thread Connection: 3/4NPT threaded
Application range: Environmental protection, water treatment, aquaculture, dosing equipment support
Installation: Submersible installation, pipe installation, thread installation, flange installation
Reference: Ag/AgCl
Salt bridge: Annular Teflon junction
Shell material: ABS
Wire: 5m (customizable)
sensor: Φ25*165mm

Fig. 9

7.9. pH-6002

The electrode can be used directly with various domestic or imported pH meters;

Fig. 10

Measuring range: (0~14) pH
Temperature range: (0~100)℃
Pressure resistance: 0.6MPa
Zero potential: Eo=7pH;
Electrode dimensions: φ12x120, 225 or other dimensions
Mounting thread: PG13.5
Electrode outer tube material: glass
Cable length: 5m(standard); Others can be Customized
Reference: Ag/AgCl
Salt bridge: Annular PTFE junction
Temperature compensation: Pt100, Pt1000, NTC10K, NTC22K
Application scope: General industrial occasions, general wastewater occasions such as environmental wastewater occasions.

7.10. pH-7001

7001 industrial planar pH sensor is made of ring-type polytetrafluoro-reference liquid interface, solid electrolyte and special glass sensitive film, so that the reaction speed and anti-pollution ability of the sensor are enhanced and its performance reaches the level of similar sensors in the world.

Measurement range: (2~12) pH
Temperature: (5~80)℃
Pressure resistance: 0.3MPa
Temperature compensation:
NTC10K/PT100/PT1000/NTC30K/NTC22K
Salt bridge: annular Teflon junction
Thread connection: 3/4NPT
Shell material: PPS
Reference type: Ag/AgCl
Slope: (PTS values) ≧95% (25℃)
Resistance: ≦ 250 mΩ

Fig. 11

7.11. pH-7002

The 7002 industrial pH sensor uses the ring-type polytetrafluoro-reference liquid interface, solid electrolyte and special glass sensitive film, which enhances the reaction speed and anti-pollution ability of the sensor, and reaches the level of similar sensors in the world.

Measurement range: (2~12) pH
Temperature: (5~80) ℃
Pressure resistance: 0.3MPa
Temperature compensation: NTC10K/PT100/PT1000
Thread Connection: 3/4NPT
Shell material: PPS
Reference type: Ag/AgCl
Slope: (PTS values) ≧95% (25℃)
Resistance: ≦ 250 mΩ
Salt bridge: annular Teflon junction

Fig. 12

7.12. pH-7003

The 7003 pure water pH sensor adopts ring type PTFE reference liquid boundary, solid electrolyte and special glass sensitive film, so that the reaction speed and anti-pollution ability of the sensor are enhanced and the performance is perfect, reaching the level of similar sensors in the world.Please follow the following instructions carefully to obtain the best test results and prolong the service life of the sensor.

Measurement range: (2~12) pH
Temperature: (5~80) ℃
Zero potential: 7±0.5pH (25℃)
Slope: (PTS) ≥95% (25℃)
Resistance: ≦ 250 m Ω
Pressure resistance: ≤ 0.3MPa
Temperature compensation: NTC10K, PT100, PT1000
Reference: Ag/AgCl
Salt bridge: Annular Teflon junction
Mounting thread: upper and lower 3/4NPT pipe thread
Shell material: PPS

Fig. 13

7.13. ASP2110

ASP2110 pH sensor adopts ring type PTFE reference liquid boundary, single liquid junction,solid electrolyte and special glass sensitive film, so that the reaction speed and anti-pollution ability of the sensor are enhanced and the performance is perfect, reaching the level of similar sensors in the world.

Measurement range:（2~12）pH
Temperature: （0～80）℃
Pressure resistance: 0.4MPa
Temperature compensation type: NTC10K
Reference: Ag/AgCl
Salt bridge: Annular Teflon junction
Thread Connection:3/4NPT
Shell material:Nylon 66 mixed with fiberglass

Fig. 14

7.14. ASP2210

ASP2210 pH sensor adopts ring type PTFE reference liquid boundary, double liquid junction,solid electrolyte and special glass sensitive film, so that the reaction speed and anti-pollution ability of the sensor are enhanced and the performance is perfect, reaching the level of similar sensors in the world.

Measurement range:（2~12）pH
Temperature: （0～80）℃
Pressure resistance: 0.4MPa
Temperature compensation type: NTC10K
Reference: Ag/AgCl
Salt bridge: Annular Teflon junction
Thread Connection:3/4NPT
Shell material:Nylon 66 mixed with fiberglass

Fig. 15

7.15. ASP5110

ASP2110 pH sensor adopts ring type PTFE reference liquid boundary, single liquid junction,solid electrolyte and special glass sensitive film, so that the reaction speed and anti-pollution ability of the sensor are enhanced and the performance is perfect, reaching the level of similar sensors in the world.

Measurement range:（2~12）pH
Temperature: （0～80）℃
Pressure resistance: 0.4MPa
Temperature compensation type: NTC10K
Reference: Ag/AgCl
Salt bridge: Annular Teflon junction
Thread Connection:3/4NPT
Shell material:Nylon 66 mixed with fiberglass

Fig. 14

7.16. ASP5210

ASP2210 pH sensor adopts ring type PTFE reference liquid boundary, double liquid junction,solid electrolyte and special glass sensitive film, so that the reaction speed and anti-pollution ability of the sensor are enhanced and the performance is perfect, reaching the level of similar sensors in the world.

Measurement range:（2~12）pH
Temperature: （0～80）℃
Pressure resistance: 0.4MPa
Temperature compensation type: NTC10K
Reference: Ag/AgCl
Salt bridge: Annular Teflon junction
Thread Connection:3/4NPT
Shell material:Nylon 66 mixed with fiberglass

Fig. 15

7.17. ORP 6042

The ORP 6042 sensor is composed of PT-Ag indicating electrode and AgCL reference electrode. It is used for the detection of REDOX potential in circuit board and chrome-containing sewage treatment.During the measurement of the sensor, the test part and the reference part must be immersed simultaneously.

Measurement range: (245~270) mV
Temperature: (5~70) ℃
Resistance: ≦ 10kΩ
Stability: ±8mv/24h
Storage in standard liquid solution: 48 hours

Fig. 17

7.18. ORP 6050

The industrial 6050 sensor USES the ring-type polytetrafluoroethylene reference liquid interface, solid electrolyte and ring-type platinum ring, which makes the reaction speed and anti-pollution ability of the sensor strengthened, and the performance is perfect, reaching the level of the international similar sensor.

Measurement range: -2000mV~2000mV
sensor unit: (245~270)mV (15~30℃,256mV calibration fluid)
Temperature compensation: NTC10K/PT100/PT1000
Pressure range: ≤0.3Mpa
sensor stability: ± 4mV /24h
Measurement range: 2~12pH
Temperature: (0~80)℃
Thread Connection: 3/4NPT
Shell material: PPS
Slope: (PTS values) ≧95% (25℃)
Resistance: ≦ 250 m Ω

Fig. 18

Chapter 8 Accessories

The shell of the glass electrode is relatively fragile. To prevent accidental damage, it is recommended to use a high temperature resistant sheath. (See the picture below for each optional accessory)

PTFE electrode case

SS316L electrode case

Flange

Mounting bracket

Flow cup

Flow cell

Electronic controlled box

Appendix: Correspondence between pH and mV

Corresponding relationship between pH value and mV at 25℃

Potentiometer (mV)	Nominal pH	Potentiometer (mV)	Nominal pH
414.12	0.00	-414.12	14.00
354.96	1.00	-354.96	13.00
295.80	2.00	-295.80	12.00
236.64	3.00	-236.64	11.00
177.48	4.00	-177.48	10.00
118.32	5.00	-118.32	9.00
59.16	6.00	-59.16	8.00
0.00	7.00	0.00	7.00