

pH/ORP sensor

# Supmea

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## 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-SUP-pH/ORP-EN11

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## 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.

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## 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 hydrochloric 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:

<b>Buildup Type</b>	<b>Cleaning Agent</b>
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 acid and thiourea (0.1mol/L)

## Chapter 4 Installation

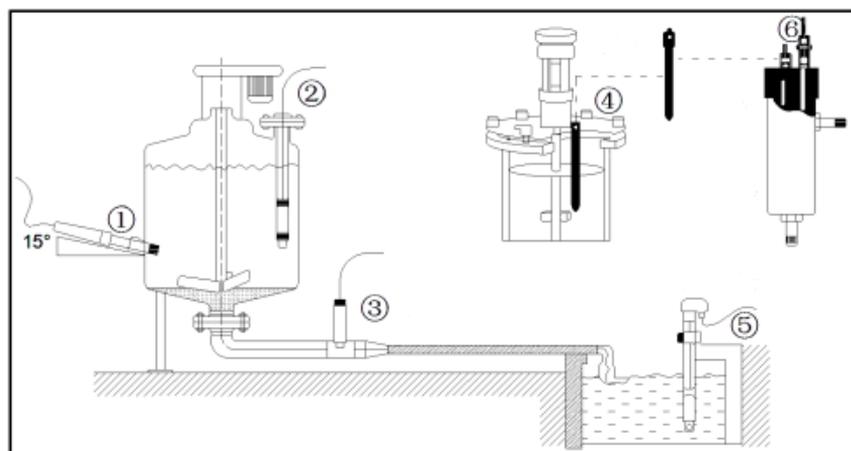


Fig. 1

- |                             |                             |
|-----------------------------|-----------------------------|
| ① Side wall installation    | ④ Top installation          |
| ② Flange mounted at the top | ⑤ Submersible installation  |
| ③ Pipe 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 °C 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:

$$\Delta E = 59.16 \cdot [(273 + T) / 298] \cdot \Delta \text{pH}$$

## 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:  $7\pm 0.25$

Conversion coefficient:  $\geq 95\%$

Membrane resistance:  $< 5000\Omega$

Practical response time:  $< 1$  min

Measurement range: (0~14) pH

Temperature compensation: Pt100/Pt1000/NTC10K  
NTC22K/NTC30K

Temperature: (0~80) $^{\circ}\text{C}$

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)°C

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:  $7 \pm 0.5$  pH

Conversion coefficient: > 98%

Membrane resistance: general: <250M $\Omega$

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)  $^{\circ}\text{C}$

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)°C

Pressure resistance: 0.1MPa~0.3MPa

Zero potential point:  $7 \pm 0.5$ pH

Conversion factor: > 98 %

Membrane resistance: < 250M  $\Omega$

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:  $7 \pm 0.5$  pH

Conversion coefficient:  $> 98\%$

Membrane resistance: general:  $< 250\text{M}\Omega$

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) $^{\circ}\text{C}$

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:  $7 \pm 0.5$  pH

Conversion coefficient: > 98%

Membrane resistance: <250M $\Omega$

Practical response time: < 1 min

Measurement range: (2~12) pH

Salt bridge: single ceramic junction

Temperature: (0~80) °C 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) °C

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) °C

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:  $\Phi 25 \times 165$ mm



Fig. 9

### 7.9. pH-6002

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

Measuring range: (0~14) pH

Temperature range: (0~100)°C

Pressure resistance: 0.6MPa

Zero potential:  $E_0=7\text{pH}$ ;

Electrode dimensions:  $\phi 12 \times 120, 225$  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.



Fig. 10

### 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)°C

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)  $\cong 95\%$  (25°C)

Resistance:  $\cong 250\text{ m}\Omega$



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) °C

Pressure resistance: 0.3MPa

Temperature compensation: NTC10K/PT100/PT1000

Thread Connection: 3/4NPT

Shell material: PPS

Reference type: Ag/AgCl

Slope: (PTS values)  $\cong 95\%$  (25°C)

Resistance:  $\cong 250\text{ m}\Omega$

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) °C

Zero potential:  $7 \pm 0.5$  pH (25°C)

Slope: (PTS)  $\geq 95\%$  (25°C)

Resistance:  $\leq 250$  m  $\Omega$

Pressure resistance:  $\leq 0.3$  MPa

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) °C

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) °C

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) °C

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) °C

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

## 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°C

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