KPR-202 Online ORP Sensor User Manual

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User Notes

- Please read the instruction carefully before using and save it for reference.
- Please follow the instructions and precautions.
- When receiving the instrument, please open the packaging carefully, inspect equipment's damage level in case of transportation, if you found spoiled equipment, please immediately notify the manufacturer and distributor, and retain the packaging, in order to send back to processing.
- When the instrument is in trouble, please do not repair it by yourself, please directly contact the maintenance department of the manufacturer.

Catalog

1. Equipment Application Environment

It can meet the stringent requirements of on-line ORP measurement in most industrial applications in the process of acid / alkali / salt solution, chemical reaction and industrial production.

- Signal output: RS485 (Modbus / RTU digital signal).
- Easy to connect to PLC, DCS, industrial control computer, general controller, and paperless recording instrument or touch screen and other third party equipment.
- Dual high impedance differential amplifier, strong anti-interference, fast response.
- Patented ORP probe, the internal reference solution at a pressure of at least 100KPa (1Bar), very slowly from the porous salt bridge exudation, the positive osmosis for more than 20 months. Such a reference system is very stable, the electrode life than ordinary industrial electrodes multiply.
- Easy to install: 3/4-inch NPT thread (pipe thread), easy to install in the pipeline and tank. The probe and display section can be separated and connected by a cable.
- IP68 degree of protection.

2. Technical Parameters, Functions, Specifications

2.1. Technical Parameters

Model	KPR-202
Measurement Range	-1500～+1500mV
Resolution	1mV
Accuracy	±6mV
Operating temperature	0～65℃
Working pressure	＜0.1MPa
Power Supply	12VDC～24VDC ±10%
Output Mode	RS485 Modbus RTU)
Wetted material	PPR
Installation	3/4 "NPT thread, immersion mounting
Cable length	5m, other length can be customized
Calibration method	One point calibration
Power	＜0.5W
Degree of protection	IP68

2.2. Dimension Chart
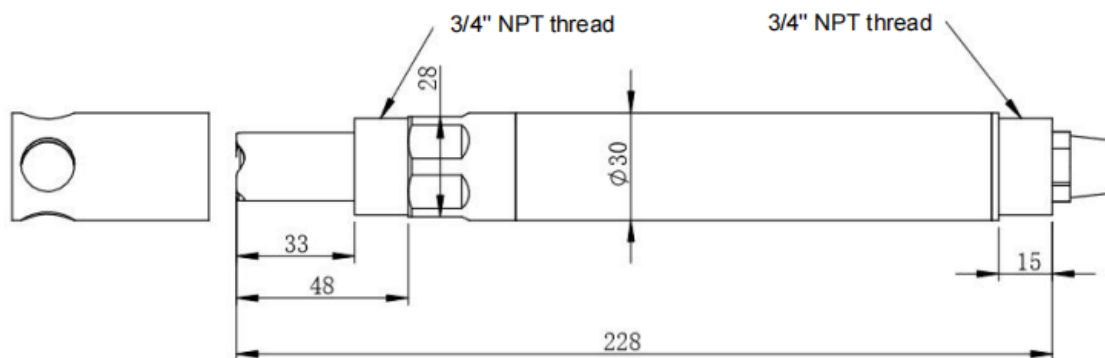
3. Installation and electrical connection

3.1. Installation
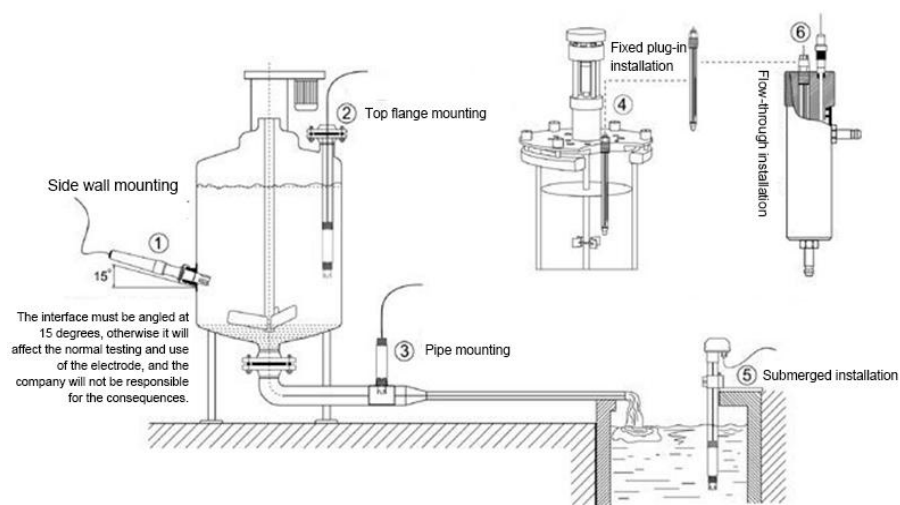
Note: the sensor cannot be installed or installed horizontally, at least tilt 15 degrees above the installation.

3.2. Electrical connection

- red line - power cord (12 ~ 24V)
- black line - ground wire (GND)
- blue line - 485A
- white line - 485B
- bare wire - shielded wire

Please check carefully after the completion of wiring, to avoid the wrong connection before powering.

Specification of cable: Considering that the cable is supposed in the water (including water) or exposed to air in a long time, it is request that cable has anticorrosion capacity. The cable outer diameter is 6 mm, all the interfaces are required to do waterproof processing.

4. Maintenance

4.1. Use and maintenance of ammonium ion electrode

When the ORP electrode start the measurement, you should first use D water (or DI water) to clean it, and dry with a filter paper to prevent impurities into the measured liquid, should insert 1/3 of the electrode into the measured solution.

The electrode should be cleaned when no using, and insert into the protective sleeve with 3.5mol / L potassium chloride solution, or insert the electrode into the container with 3.5mol / L potassium chloride solution.

Check whether the terminal is dry, if contaminated, please use anhydrous alcohol wipe, and make it dry before use. Avoid soaking in D water or protein solutions, and avoiding contacting with silicone grease. The electrode which have use for a long time, its glass film may become translucent or with sediment. At this time, can wash by dilute hydrochloric acid, and rinse with water. If the electrode which have use for a long time, there will be a measurement error. So the calibration must be calibrated.

If the electrode cannot be calibrated and measured by the above manner, the electrode has failed. Please replace the electrode.

4.2. Preparation method of ORP standard solution

a) **Preparation method of 256mV ORP standard solution**
   Weigh 2.1g quinhydrone. Add them into 200ml standard pH buffer solution with pH of 4 and mix.
b) **Preparation method of 86mV ORP standard solution**
   Weigh 2.1g quinhydrone. Add them into 200ml standard pH buffer solution with pH of 6.86 and mix.
c) **Preparation method of -40mV ORP standard solution**
   Weigh 2.1g quinhydrone. Add them into 200ml standard pH buffer solution with pH of 9.18 and mix.

Note: When preparing for PH, the preparation of pH is a total preparation of 250mL. Take 200mL for use.

Preparation method of PH standard solution:
Take 250ml D water, pour into the beaker, add a set of pH=6.86/4.00/9.18 calibration powder,

and stir with glass rods until the powder is completely dissolved. It will be prepared into pH=6.86/4.00/9.18 solution.

4.3. Calibration

Place the sensor into the prepared 86mV (or 256mV or -40mV) solution and waits for 3~5 minutes until the value is stable. See whether the displayed value is 86mV (or 256mV or -40mV), and if not, calibration is needed. Calibration instructions are shown in appendix.

5. Quality and service

5.1. Quality assurance

- The supplier quality inspection department has established standard procedures quality inspection, with advanced testing equipment and means, and in strict inspecting with the discipline inspection. The products have done the 72 hours ageing experiment and stability experiment. We promise not to let an unqualified product leaving the factory.
- If the unqualified rate reached 2% of the products batch, can directly return the products, and all the expenses will be borne by the supplier. Whether products is qualified or not is based on the standard reference of product description provided by supplier
- Ensure the supply of goods quantity and the delivery speed.

5.2. Parts and spare parts

This product includes:
- Sensor
- Specification
- certificate

5.3. After-sales service commitment

Company provides the after-sale service within one year from the date of the sales, but does not include the damage caused by improper using. If you need repair or adjustment, please send back, and the freight should be paid. When sending back, determine the good packaging to avoid transit damage, and the company will be free maintenance device damage.

Appendix   Data communication

1. Data format

Default data format: 9600,N, 8, 1 (baud rate 9600 bps, 1 start bit, 8 data bits, no parity, 1 stop bit).
The baud rate can be customized.

2. Message frame format

a) Data read instruction

06	03	xx xx	xx xx	xx xx
Device	Function code	Register address	Register count	CRC code (low byte first)

b) Data read response

06	03	xx	xx......xx	xx xx
Device	Function code	Data bytes count	Data bytes	CRC code (low byte first)

c) Data write instruction

06	06	xx xx	xx xx	xx xx
Device	Function code	Register address	Data to write	CRC code (low byte first)

d) Data write response(same with data write instruction)

06	06	xx xx	xx xx	xx xx
Device	Function code	Register address	Data to write	CRC code (low byte first)

3. Register address

Register address	Name	Instruction	Number of registers	Access method
40001 (0x0000)	ORP	2 double-byte integers, measured, measured decimal places.	2（4 bytes）	Read
44097 (0x1000)	Slope calibration	In the standard solution, calibration, write the actual value of the standard solution. (Users generally do not need calibration)	1（2 bytes）	Write
44103 (0x1006)	Zero calibration value	Returns the zero calibration value.	1（2 bytes）	Read
48195	Device address	Default address is 6, data	1（2 bytes）	Write/

(0x2002)		range is 1-64.		Read
48225 (0x2020)	factory reset	Restore calibration values to factory settings, write data to 0.	1（2 bytes）	Write

Note：
a) The register address is the register start address with register type defined by the Modbus protocol (The actual register start address represented by the 16 hexadecimal characters in parentheses).
b) When address of the device is changed, the response to the data write instruction would contain the new changed address.
c) The data definition of the read response value:

XX XX	XX XX	XX XX	XX XX
2 bytes test value	2 bytes decimal digits	2 bytes temp value	2 bytes decimal digits

The default data type is double-byte integer (high byte first), other data format such as floating point type is optional.

4. Command sample

a) set the device address
Function: setting the Modbus device address of the sensor meter;
Change the device address 06 to 01, and the example is as follows:
Request   frame：   06 06 20 02 00 01 E3 BD
ACK frame: 01 06 20 02 00 01 E2 0A
b) began to measure instructions
Function: Obtain the ORP value of the measuring probe. The ORP value is mV.
Request   frame：06 03 00 00 00 02 C5 BC
ACK frame: 06 03 04 00 78 00 00 B6 64

Reading sample:

ORP value
00 78 00 00

Such as:
0078 represents the ORP hex value, 0000 represents the ORP value, without a decimal point, and hasn't temperature value. The decimal value is converted to 120.
c) calibration instructions
The ORP sensor requires only one point of calibration. Before calibrating with another calibration solution, the probe must be cleaned using the latter calibration solution, which can cause large test errors.
In the configured 86mV or 256mV standard solution, enter the appropriate calibration instructions.

Standard solution is 86mV:

    Request frame：06 06 10 00 00 56 0C 83 ；

    ACK frame: 06 06 10 00 00 56 0C 83；

Standard solution is 256mV:

    Request frame：06 06 10 00 01 00 8D 2D ；

    ACK frame: 06 06 10 00 01 00 8D 2D。

Note: ORP value has a negative value, such as -40mV its calculation method is:

  - {FFFF-FFD7 software test value)} = - 28; decimal is -40mV.

5. Error response

If the sensor meter could not recognize the data received correctly, it will return the following information:

Definition	Address	Function code	CODE	CRC check
Data	ADDR	COM+80H	xx	CRC 16
Number of bytes	1	1	1	2

    a) CODE: 01 – Functional code error
                03 – Data error
    b) COM: Received function code