

KWS-550 Online ORP Sensor



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1.Introduction

KWS-550 can be used for environmental water quality monitoring, acid/alkali/salt solution, chemical reaction process, industrial production process, and can meet the requirements of online ORP measurement for most industrial applications.

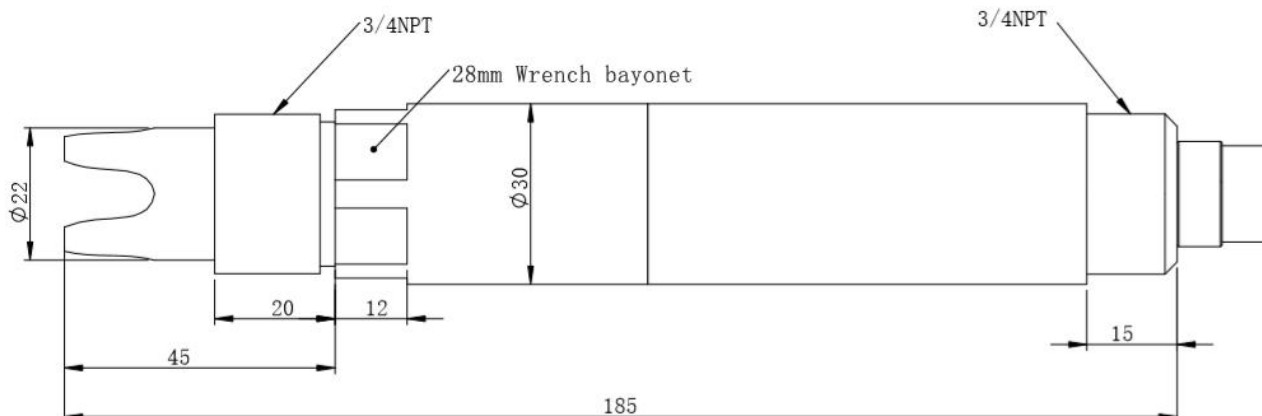
2.Feature

- Signal output: RS-485 (Modbus/RTU protocol).
- Conveniently connect to third-party equipment such as PLC, DCS, industrial control computer, general controller, paperless recording instrument or touch screen.
- Double high impedance differential amplifier, strong anti-interference and fast response speed.
- Durable ORP electrode, the internal reference fluid seeps out from the microporous salt bridge very slowly under a pressure of at least 100KPa (1Bar), and its positive seepage lasts for more than 20 months. Such a reference system is very stable, and the electrode life is doubled compared to ordinary industrial electrodes.
- Easy to install: 3/4NPT pipe thread is convenient for sinking installation or installation in pipelines and tanks.
- IP68 protection level.

3.Technical Specifications

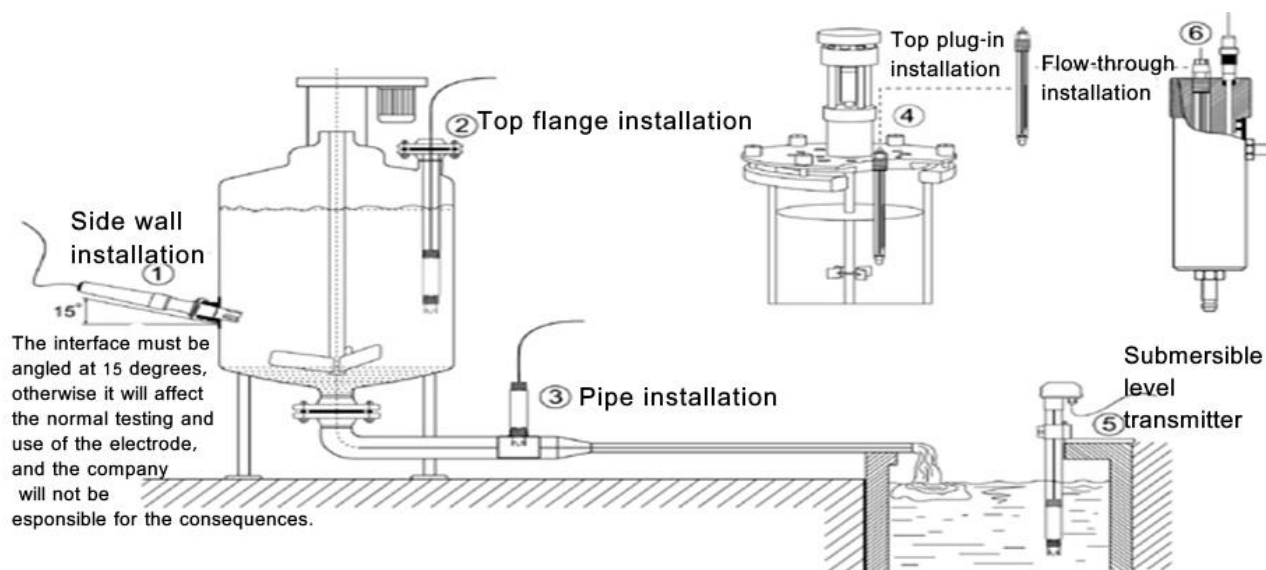
Model	KWS-550
Measuring Range	-1500~+1500mV
Accuracy	±6mV
Resolution	1mV
Temperature Range	0 ~ 65℃
Work Pressure	<0.1MPa
Output	RS-485, MODBUS protocol
Power Supply	12~24VDC ±10%
Wetted Part Material	POM
Installation	Immersion mounting, 3/4 NPT thread
Cable Length	5 m, customizable
Calibration Method	One-point calibration
Power Consumption	<0.3W@12V
Ip Grade	IP68

4.Dimension



5.Installation and Electrical Connection

5.1 Install



Note: The sensor should not be installed upside down or horizontally when installed, at least at an angle of 15 degrees or more.

5.2 Wiring

- a) Red line - power cord (12 ~ 24V)
- b) Black line - ground (GND)
- c) Blue line - 485A
- d) White line - 485B

After wiring is completed, it should be carefully checked to avoid incorrect connections before powering up.

5.3 Wiring instructions

Considering that the cables have been immersed in water (including seawater) or exposed to air for a long time, all wiring positions are required to be waterproof, and the cables should have certain corrosion resistance.

6.Maintenance

1. Use and maintenance

When measuring the ORP electrode, it should be cleaned in distilled water (or deionized water) first, and the water should be absorbed with filter paper to prevent impurities from being brought into the test solution. 1/3 of the electrode should be inserted into the test solution.

The electrode should be cleaned when not in use, and inserted into a protective cover with 3.5mol/L potassium chloride solution, or inserted into a container with 3.5mol/L potassium chloride solution.

Check whether the terminal is dry, if it is stained, wipe it with absolute alcohol and blow it dry before use. Avoid long-term immersion in distilled water or protein solution, and prevent contact with silicone grease. For electrodes that have been used for a long time, its glass membrane may become translucent or attached with sediment. In this case, it can be washed with dilute hydrochloric acid and rinsed with water. The electrode has been used for a long time, and when there is a measurement error, it must be calibrated and corrected with the meter.

When the electrode is still unable to be calibrated and measured when the electrode is maintained and maintained by the above method, it means that the electrode has failed. Please replace the electrode.

2. ORP standard solution preparation method

a) Preparation method of ORP standard solution 256mV

Weigh 2.1 g of quinhydroquinone and add it to 200 mL of a standard pH buffer solution with a pH of 4.00, and mix well.

b) Preparation method of ORP standard solution 86mV

Weigh 2.1 g of quinhydroquinone and add it to 200 mL of a standard pH buffer solution with a pH of 6.86, and mix well.

c) Preparation method of ORP standard solution-40mV

Weigh 2.1 g of quinhydroquinone and add it to 200 mL of a standard pH buffer solution with a pH of 9.18, and mix well.

Please note that when preparing the pH, a total of 250 mL is prepared, and 200 mL is measured for use.

Method of preparing corresponding standard solution for pH:

Measure 250mL of distilled water with a graduated cylinder, pour it into a beaker, add a package of calibration powder with pH=6.86/4.00/9.18, stir with a glass rod until the powder is completely dissolved, and prepare a solution with pH=6.86/4.00/9.18.

3. Calibration

Put the sensor into the prepared 86mV (or 256mV or -40mV) solution and wait for 3 to 5 minutes. After the

value is stable, check whether the displayed value is 86mV (or 256mV or -40mV). If not, you need to calibrate it. See the appendix for calibration instructions.

7. Quality and service

7.1 Quality assurance

- Quality inspection departments have standardized inspection procedures, with advanced detection equipment and instruments, and in strict accordance with the test procedures for products that do 72 hours aging test, stability test, not asubstandard products factory.
- The receiving party directly returns the product batch with a failure rate of 2%, and all the costs incurred are borne by the supplier. The reference standard refers to the product description provided by the supplier.
- Guarantee the quantity of goods and the speed of shipment.

7.2 Service commitment

The company provides local after-sales service within one year from the date of sale, but does not include damage caused by improper use. If repair or adjustment is required, please return it, but the shipping cost must be conceited. Damaged on the way, the company will repair the damage of the instrument for free.

8. Appendix data communication

8.1 Data Format

The default data format for Modbus communication is: 9600, n, 8, 1 (baud rate 9600bps, 1 start bit, 8 data bits, no parity, 1 stop bit).

8.2 Modbus Frame Format (xx represents a byte)

a) Read data instruction frame

06	03	xx xx	xx xx	xx xx
Address	FC	Register start address	Number of registers	CRC check code (low bytes in front)

b) Read data response frame

06	03	xx	xx xx	xx xx
Address	FC	Number of bytes	Response data	CRC check code (low bytes in front)

c) Write data instruction frame

06	06	xx xx	xx xx	xx xx
Address	FC	Register address	Read-in data	CRC check code (low bytes in front)

d) Data response frame

06	06	xx xx	xx xx	xx xx
Address	FC	Register address	Read-in data	CRC check code (low bytes in front)

8.3 Register Address

Register Address	Name	Instruction	Number of Registers	Access Method
40001 (0x0000)	Measured value	Two double-byte integers are the measured value and the number of decimal places of the measured value.	2 (4 bytes)	Read
44097 (0x1000)	Zero calibration	Calibrate in the standard solution, the written data is the actual value of the standard solution.	1 (2 bytes)	Write
44103 (0x1006)	Zero calibration value	The read data is the zero offset.	1 (2 bytes)	Read
48195 (0x2002)	Sensor address	The default is 6, and the write data range is 1-127.	1 (2 bytes)	Write/Read
48225 (0x2020)	Reset sensor	The calibration value is restored to the default value, and the write data is 0. Note that the sensor needs to be calibrated again after reset before it can be used.	1 (2 bytes)	Write

Note:

a) The register address is the starting address of the register with register type defined according to the Modbus protocol (the actual starting address of the register represented by the hexadecimal system in parentheses).

b) When changing the sensor address, the sensor address in the return instruction is the new address after the change.

c) The data definition of the measured value returned when reading the data:

xx xx

xx xx

2-byte measurement value

2-byte measurement value decimal places

The default data type is: double-byte integer, high byte first; other types such as floating-point numbers are optional.

8.4 Command example

a) Start measurement command

Function: Obtain the ORP measured by the sensor, the unit of ORP is mV.

Request frame: 06 03 00 00 00 02 C5 BC

Response frame: 06 03 04 00 78 00 00 0C EA

Examples of readings:

ORP value
00 78 00 00

For example, ORP value: 00 78 represents the hexadecimal reading ORP value, 00 00 represents the ORP value without a decimal point and no temperature value, converted to a decimal value of 120.

b) Calibration instruction:

The ORP sensor only needs one point calibration. Before calibrating with another calibration solution, the electrode must be cleaned with the latter calibration solution, otherwise it will cause a larger test error.

In the prepared 86mV or 256mV standard solution, enter the corresponding calibration instructions.

The standard solution is 86mV:

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

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

The standard solution is 256mV:

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

Response frame: 06 06 10 00 01 00 8D 2D.

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

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

c) Set the device ID address:

Function: set the MODBUS device address of the electrode;

Change the device address 06 to 01, with the following example

Request frame: 06 06 20 02 00 01 E3 BD

Response frame: 06 06 20 02 00 01 E3 BD

8.5 Error response

If the sensor does not execute the upper computer command correctly, the following format information is returned:

definition	address	FC	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