

KIS-100 Online Calcium Ion Sensor

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1.Introduction

KIS-100 integrated online calcium ion sensor is made of calcium ion selective electrode based on PVC membrane, which is used to test the calcium ion content in water, with temperature compensation, ensuring that the test is fast, simple, accurate and economical. This user manual details the technical parameters, use and maintenance, and communication protocols of the calcium ion sensor.

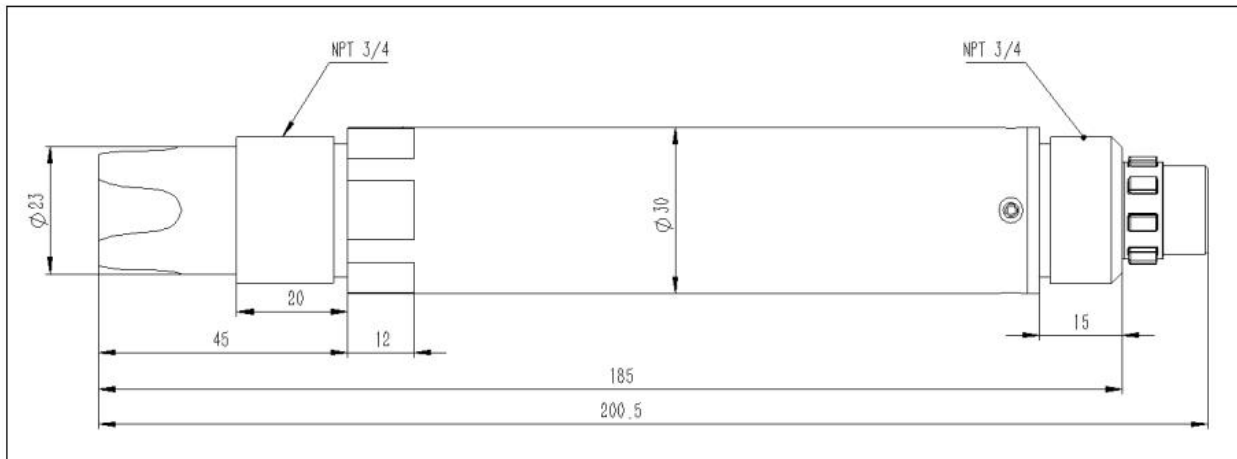
2.Features

- Signal output: RS-485 bus, Modbus/RTU protocol, convenient for connection to third-party devices such as PLC, DCS, industrial control computers, general controllers, paperless recording instruments or touch screens.
- Patented calcium ion electrode, the internal reference solution seeps out of the microporous salt bridge extremely slowly at a pressure of at least 100KPa (1Bar). Such a reference system is very stable, and the electrode life is longer than that of ordinary industrial electrodes.
- Easy to install: 3/4NPT pipe thread, easy to install in submerged or in pipes and tanks.
- IP68 protection grade.

3.Technical Specifications

Model	KIS-100	
Range and resolution	0~100.00mg/L	0.01mg/L
	0~1000.0mg/L	0.1mg/L
Accuracy	<60s	
Response time (T90)	0.09(0-100mg/L)	
Minimum detection limit	0.9(0-1000mg/L)	
Storage temperature	-5~40℃	
Working conditions	0~40℃, <0.1MPa	
pH range of medium	4~10pH	
Temperature compensation	Automatic temperature compensation (Pt1000)	
Power supply	12~24VDC	
Signal output	RS-485 (Modbus/RTU), 4-20mA (optional)	
Casing material	POM and 316L stainless steel	
Mounting method	3/4NPT pipe thread, immersion installation	
Cable length	5 meters, other lengths can be customized	
Calibration method	Two-point calibration	
Power consumption	0.2W@12V	
Protection level	IP68	

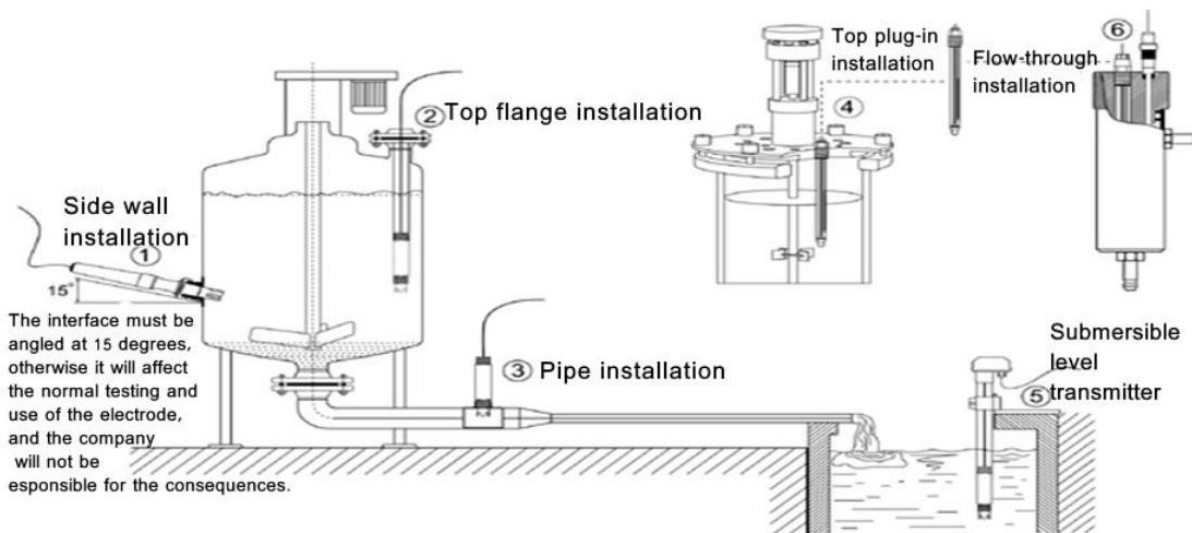
4.Dimension



Note: The sensor connector is a male M16-5-core waterproof connector.

5.Installation and electrical connections

5.1 Installation



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

The cable is a 5-core twisted pair shielded cable, and the line sequence is defined as follows:

- Red line - power line (12~24VDC)
- Black line - ground line (GND)
- Blue line - 485A
- Green line - 485B
- Yellow line - current output (if not used, it can be left floating)

Before powering on, the wiring sequence should be carefully checked to avoid unnecessary losses due to wiring errors.

Wiring instructions: Considering that the cable is immersed in water (including seawater) or exposed to the air for a long time, all wiring points are required to be waterproofed, and the user cable should have a certain degree of corrosion resistance.

6. Maintenance

6.1 Use and maintenance

Before testing, the electrode should be soaked in tap water for 24 hours. After activation, it should be cleaned in deionized water. If the electrode is not used for a long time (more than two weeks), it should be stored dry, and the sensing element of the electrode should be put into the protective cap.

Check whether the terminal is dry. If it is contaminated, wipe it with anhydrous alcohol and use it after drying. Avoid long-term immersion in distilled water or protein solution, and prevent contact with silicone grease. The PVC film of the electrode that has been used for a long time may become translucent or have sediment. At this time, it can be rinsed with distilled water (or deionized water). If the electrode has been used for a long time and measurement errors occur, it must be calibrated.

If the above method is used to maintain and service the electrode, it still cannot be calibrated and measured, which means that the electrode has failed. Please replace the electrode.

6.2 Calibration

Note: The sensor has been calibrated before leaving the factory. It is not advisable to calibrate it at will unless it exceeds the measurement error.

a) Zero point calibration

Put the sensor in the zero point standard solution, wait for 10 minutes, and wait for the value to stabilize to see if the displayed value is within the error range. If not, zero point calibration is required. Calibration command reference data communication

b) Slope calibration

Put the sensor in the slope standard solution, wait for 10 minutes, and wait for the value to stabilize to see if the displayed value is within the error range. If not, slope calibration is required. Calibration command reference data communication

7. Quality and service

7.1 Quality assurance

- The quality inspection department has standardized inspection procedures, advanced and complete testing equipment and means, and strictly inspects according to the procedures, conducts 72-hour aging tests and stability tests on products, and does not allow any unqualified products to leave the factory.
- The consignee directly returns the product batches with an unqualified rate of 2%, and all the costs incurred are borne by the supplier. The inspection standards refer to the product description provided by the supplier.
- Guarantee the quantity of supply and delivery speed.

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.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).

Parameters such as baud rate can be customized.

8.2 Information frame format

a) Read data command frame

2E	03	xx xx	xx xx	xx xx
Address	Function code	Register address	Number of registers	CRC check code (low byte first)

b) Read data response

2E	03	xx	xx.....xx	xx xx
Address	Function code	Number of bytes	Response data	CRC check code (low byte first)

c) Write data command frame

2E	06	xx xx	xx xx	xx xx
Address	Function code	Register address	Write data	CRC check code (low byte first)

d) Write data response frame (same as write data command frame)

2E	06	xx xx	xx xx	xx xx
Address	Function code	Register address	Write data	CRC check code (low byte first)

8.3 Register Address

Register address	Name	Description	Registers Number	Access mode
40001 (0x0000)	Calcium ion measurement + temperature	4 double-byte integers, namely calcium ion measurement value, measurement value decimal places, temperature value, and temperature value decimal places.	4 (8 bytes)	Read
44097 (0x1000)	Zero calibration	When calibrated in 10mg/L or 100mg/L standard solution, the data written in 0~100mg/L is the value of the standard solution concentration x100; the data written in 0~1000mg/L is the value of the standard solution concentration x10. The data read out is the mV value x100 corresponding to the zero calibration value.	1 (2 bytes)	Write/ Read
44101 (0x1004)	Slope calibration	When calibrated in 100mg/L or 1000mg/L standard solution, the data written in 0~100mg/L is the value of the standard solution concentration x100; the data written in 0~1000mg/L is the value of the standard solution concentration x10. The data read out is the mV value x100 corresponding to the slope calibration value.	1 (2 bytes)	Write/ Read
44113 (0x1010)	Temperature calibration	When calibrated in solution, the data written is the actual temperature value x10; the data read out is the temperature calibration offset x10.	1 (2 bytes)	Write/ Read
48195 (0x2002)	Sensor address	The default is 46, and the write data range is 1~255.	1 (2 bytes)	Write/ Read
48225 (0x2020)	Reset sensor	The calibration value is restored to the default value, and the written data is 0. Note that the sensor needs to be calibrated again after being reset before it can be used.	1 (2 bytes)	Write

8.4 Command examples

a) Read data command:

Function: Get the calcium ion and temperature measured by the sensor; the unit of calcium ion is mg/L; the unit of temperature is °C.

Request frame: 2E 03 00 00 00 04 43 96

Response frame: 2E 03 08 00 55 00 02 01 18 00 01 32 FD

Reading example:

Calcium ion value	Temperature value
00 55 00 02	01 18 00 01

For example: Calcium ion value: 00 55 represents the hexadecimal reading of the calcium ion value, 00 02 represents the calcium ion value with two decimal places, and the decimal value is 0.85.

Temperature value: 01 18 represents the hexadecimal reading of the temperature value, 00 01 represents the temperature value with one decimal place, and the decimal value is 28.0.

b) Calibration command:

Zero point calibration

Function: Set the sensor's calcium ion zero point calibration value. Calibrate in a 100mg/L standard solution, as follows:

Request frame: 2E 06 10 00 03 E8 8A 2B

Response frame: 2E 06 10 00 03 E8 8A 2B

Slope calibration

Function: Set the sensor's calcium ion slope calibration value. Calibrate in 1000mg/L standard solution, the example is as follows:

Request frame: 2E 06 10 04 27 10 D1 68

Response frame: 2E 06 10 04 27 10 D1 68

c) Set device ID address

Function: Set the Modbus device address of the sensor.

Change the sensor address 46 to 01, the example is as follows

Request frame: 2E 06 20 02 00 01 E5 95

Response frame: 2E 06 20 02 00 01 E5 95

8.5 Error response

If the sensor cannot correctly execute the host computer command, it will return the following format information:

Definition	Address	Function code	CODE	CRC Check
Data	ADDR	COM+80H	xx	CRC 16
Bytes	1	1	1	2

a)CODE: 01 – Function code error

03 – Data error

b)COM: Received function code