

LW103 LoRaWAN

Integral ORP

Transmitter

User Manual



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1. Overview

The LoRa water quality ORP sensor is a device used to measure the redox potential of a solution. The ORP composite electrode is made of high-purity platinum, which has strong acid and alkali resistance and antioxidant ability, high measurement accuracy, fast response, and good stability. The electrode can automatically compensate based on temperature. This product is suitable for online monitoring of redox potential in wastewater containing cyanide and chromium. Supports LoRa TDMA ad hoc networks and standard LoRaWAN protocols.

2. Technical Parameters

Power Supply	DC12/24V
Weight	150g
Working Conditions	0~60℃
Measuring Range	-1999~1999mV
Measurement Error	≤±5mV(25 ℃, 222mv standard solution)
Resolution Ratio	1mV
Temperature measurement range	0~60℃,Resolution Ratio:0.1℃
Electrode usage cycle	12 months
Pressurization	0.6Mpa
ORP Transmitter Line length	Default 5m (other lengths can be customized)
Frequency	CN470/IN865/EU868/RU864/US915/AU915/ KR920/AS923-1&2&3&4
Mode	OTAA Class A/C
Reporting cycle	5min(Default)
Communication Protocol	LoRaWAN,LoRa TDMA Networking

Equipment information (Reference)	AppEUI: 0000000000000001 DevEUI: aaaa202404150001 AppKey: 00001111222233334444555566667777 MAC Version: LoRaWAN 1.0.3
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2.2 Product List

- LW103 LoRaWAN Terminal 1 piece
- TYPE-C data cable 1 piece
- ORP Transmitter 1piece(individual packing)

3. Configuration and Installation

3.1 LW103 Interface Description



1. **DC Power Interface:**DC5.5 * 2.1 female socket, power supply interface, DC10-28V.
2. **TYPE-C Interface:**Used for device serial port configuration.
3. **Transmitter Interface:**Used for connecting integrated DO Transmitters
1.RD: VCC **2.BK:** GND **3.YL:** RS485A **4.GN:** RS485B

3.2 LW103 Parameter Configuration Instructions

Configuration preparation:

- ◆ USB Type-C data cable
- ◆ Computer (Windows system)
- ◆ Configuration Tool Toolbox

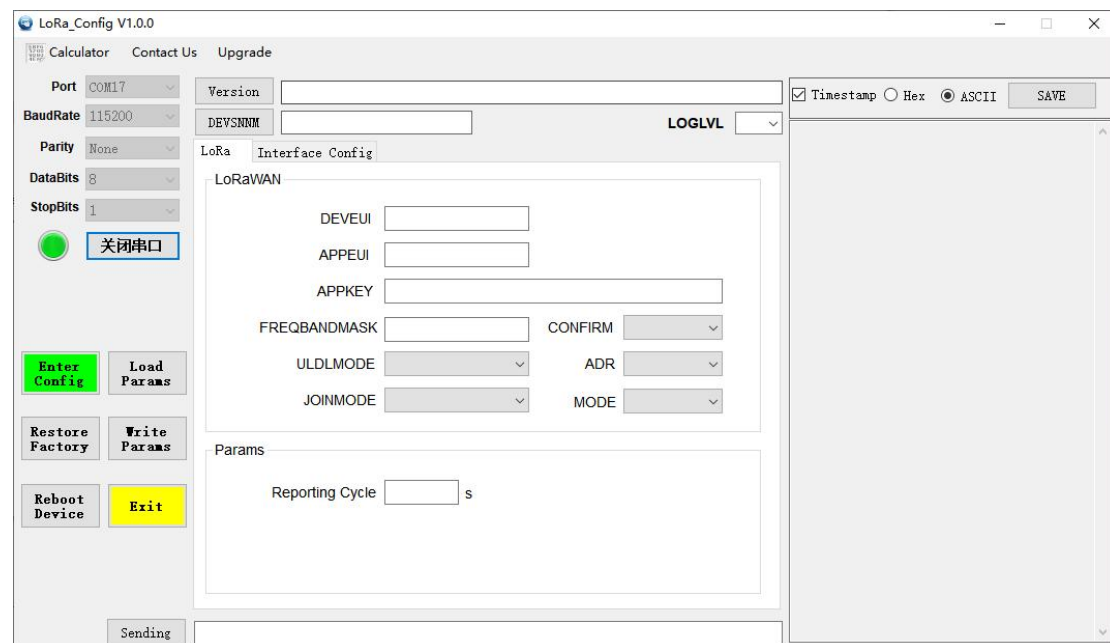
Download: <http://www.zonewu.com/en/Configuration-Tools.html>

1. Install serial port driver program.CH340 USB to serial port .
2. Connect the LW101 to the PC using a USB cable and check if there is a COM port. If not, please recheck the equipment wiring and driver installation.
3. Open the configuration tool LoRa_config  LoRa_config V1.0.0 .open the corresponding COM port .

Port default parameters:

BaudRate	115200bit/s
Parity	None
DataBits	8
StopBits	1

As follows:



4. 1.Enter Config → 2.Load Params → 3.LoRaWAN → 4.Write Params
→ 5.Reboot Device

LoRa_Config V1.0.0

Calculator Contact Us Upgrade

Port COM17 BaudRate 115200 Parity None DataBits 8 StopBits 1

Version DEVSNNM LOGLV

Timestamp Hex ASCII SAVE

LoRa Interface Config

LoRaWAN

DEVEUI APPEUI APPKEY

FREQBANDMASK CONFIRM

ULDLMODE ADR

JOINMODE MODE

Params

Reporting Cycle s

Enter Config Load Params

Restore Factory Write Params

Reboot Device Exit

Sending

LoRa Interface Config

LoRaWAN

DEVEUI BF01240726D00001

APPEUI 331341E186891989

APPKEY 5572404c696e6b4c6f52613230313823

FREQBANDMASK 0002 CONFIRM Close ACK

ULDLMODE Abnormal Freq Mo ADR Close

MODE ClassC

Params

Reporting Cycle 600 s

LoRaWAN Interface:

Item	Describe	Notes
DevEUI	Node's globally unique identifier code	64bit
AppEUI	Node's application identifier code	64bit
AppKey	Assigned to the terminal by the application owner.	128bit

FREQBANDMASK	Set frequency group mask	
ULDLMODE	Set up uplink and downlink same frequency but different frequency	
CONFIRM	Set uplink transmission type	
ADR	Set adaptive speed	
MODE	Set device working mode	

The device will be configured with ternary parameters by default when it leaves the factory:

DevEUI: BF01240726D00001

AppEUI: 331341E186891989

AppKey: 5572404c696e6b4c6f52613230313823

NOTE: All sensors are shipped with AppEUI and AppKey default to 331341E186891989 and 5572404c696e6b4c6f52613230313823.

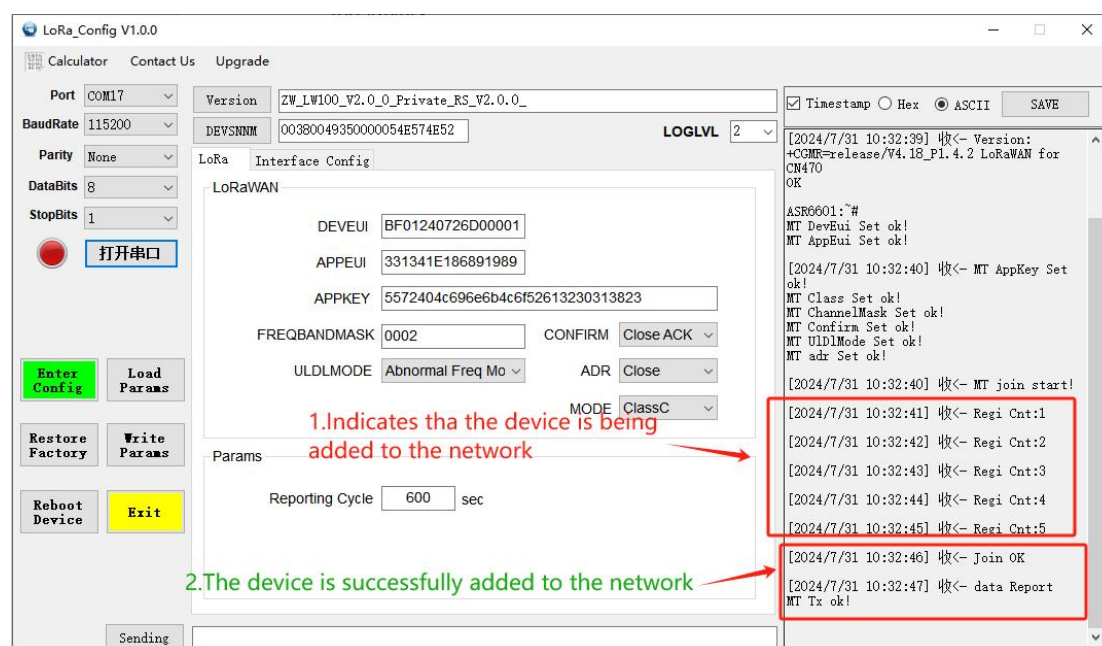
Users can customize according to their own applications

FREQBANDMASK: The frequency group mask for LoRaWAN operation, with 16 bits corresponding to 16 frequency groups. Default is 0001. Users need to configure it according to the actual application region.

Params Interface:

Item	Describe	Notes
Reporting cycle	adjustable range 1-65535, default is 300s (5min)	

Printing logs of device startup and network connection:



1. Indicates that the device is being added to the network

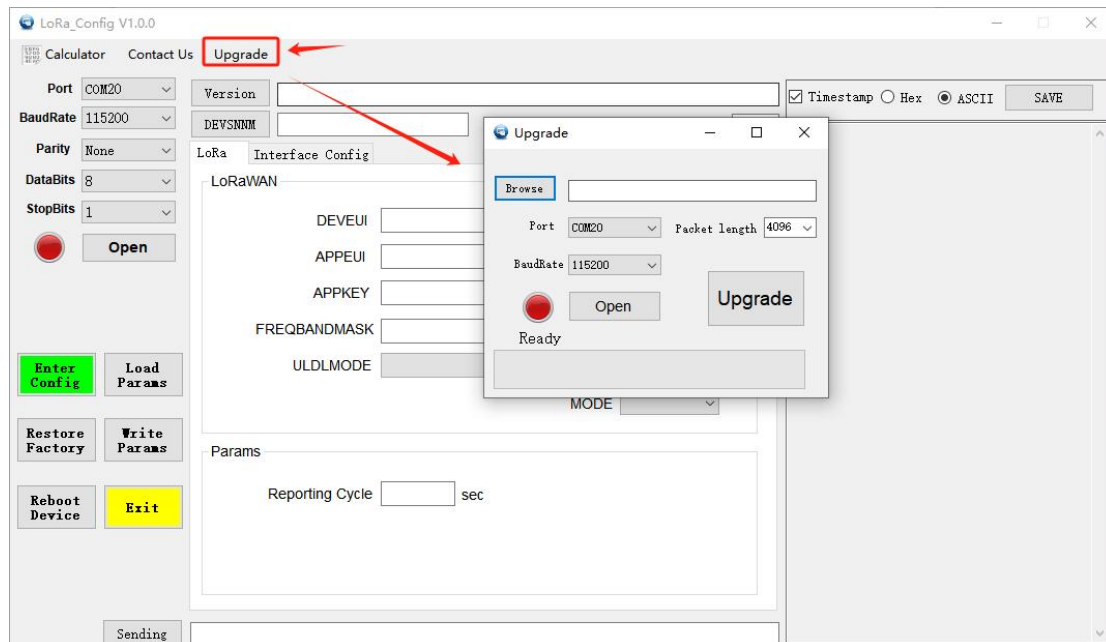
2. The device is successfully added to the network

The device is equipped with a built-in LED indicator light, which is located next

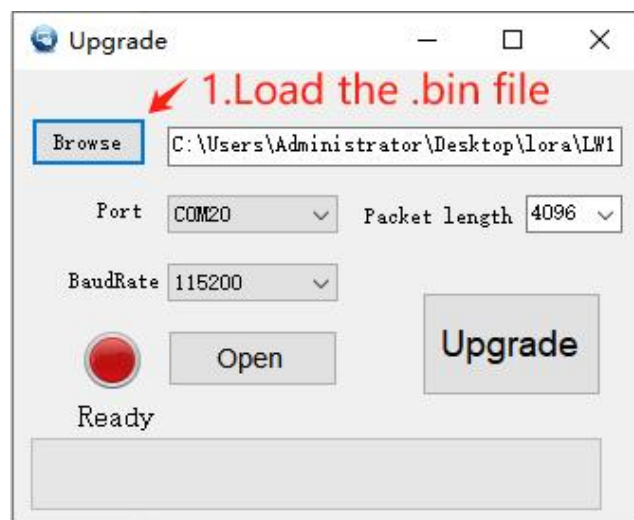
to the antenna interface and can be seen as a green light through the casing.

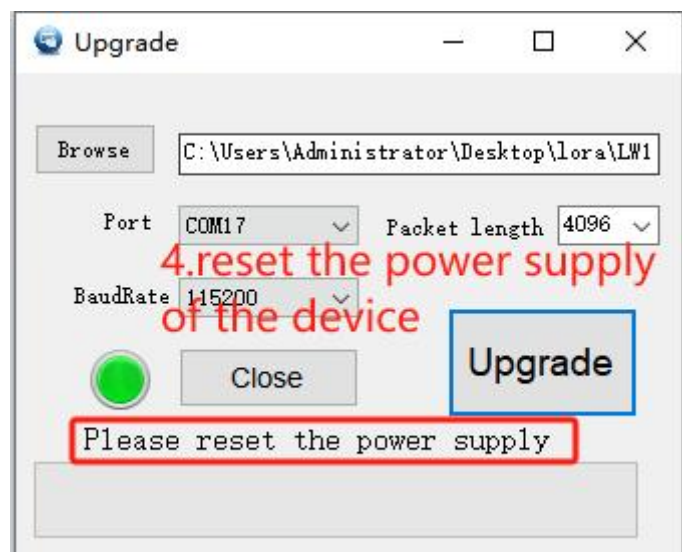
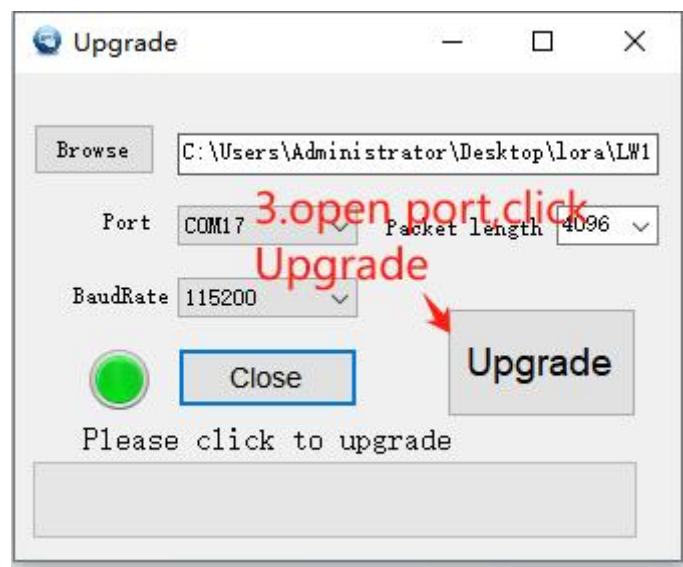
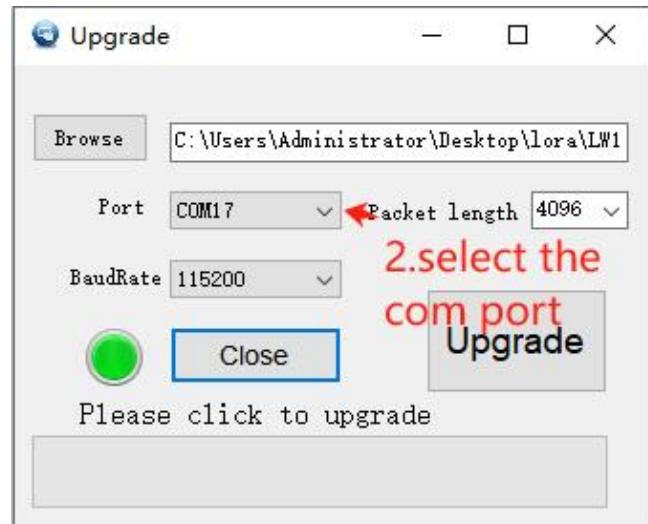
LED	Status	Describe
Green indicator light	Light	Wake up
	Extinguish	Enter sleep mode

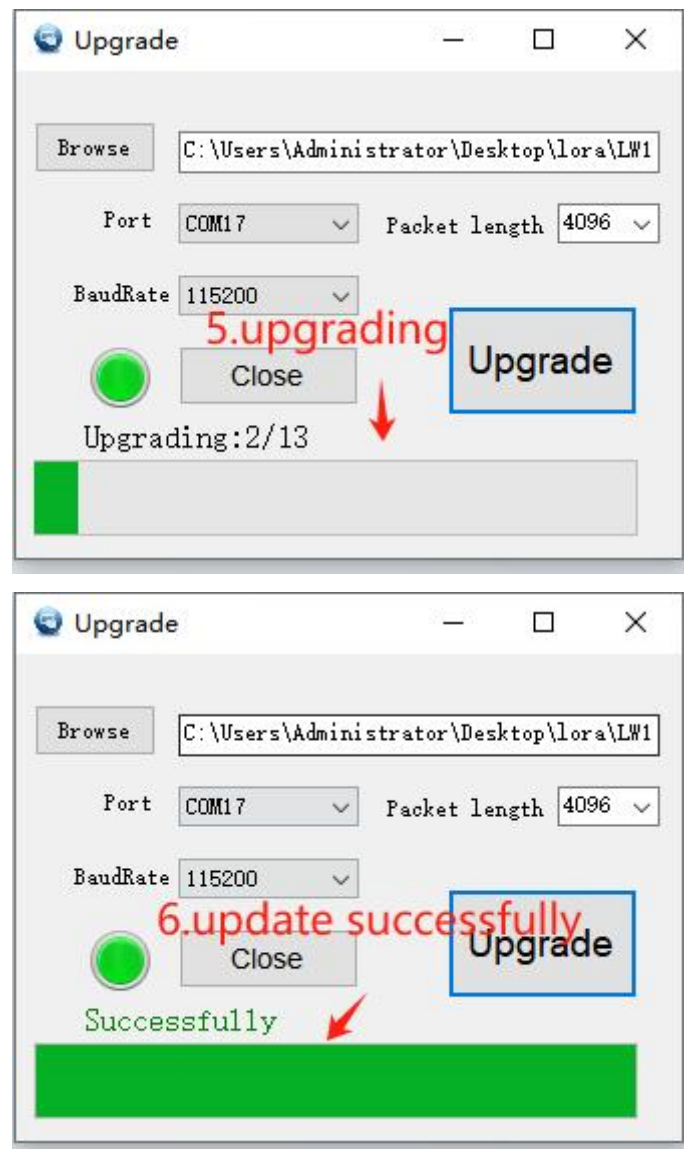
Firmware upgrade:



Click to upgrade → Pop up upgrade window





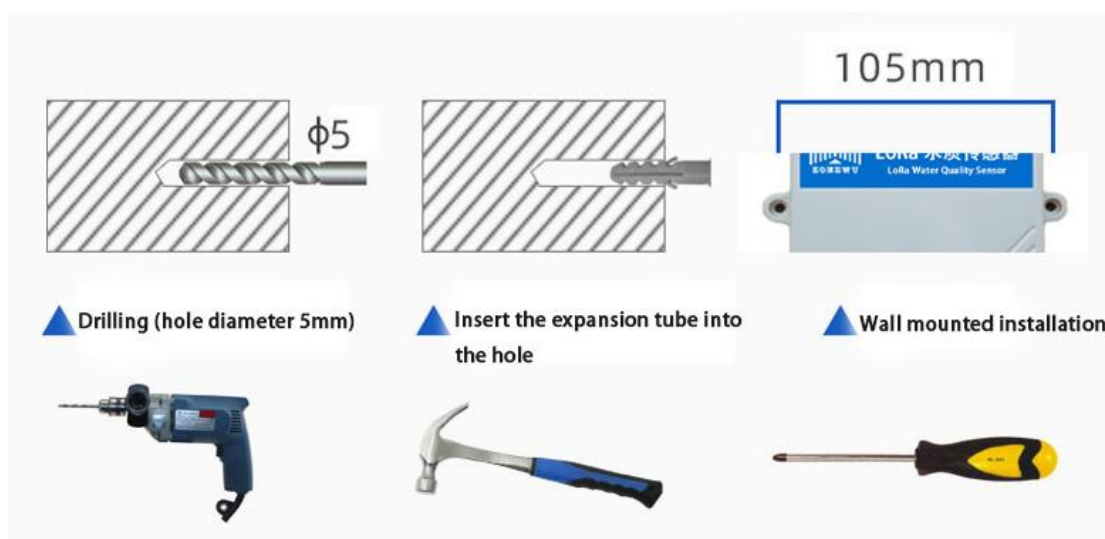


If there is an upgrade error during the upgrade process, you can close and reopen the upgrade window and follow the instructions to upgrade again.

3.3 LW103 Size and Installation



Product size



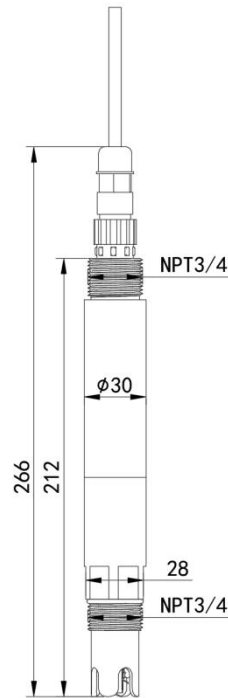
Installation instructions

3.4 ORP Transmitter Size and Installation



Integrated ORP Transmitter Description

3.4.1 ORP Transmitter Size

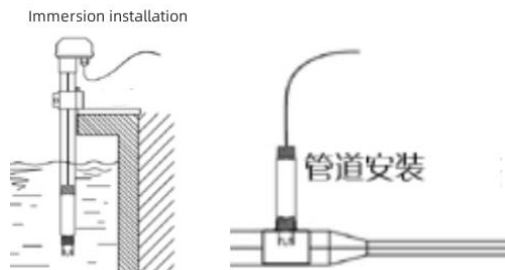


3.4.2 Installation

The sensor should be immersed below the liquid level for fixed installation. During installation and use, avoid collision or scratching of the surface of the fluorescent film head. The fluorescent film head should be avoided from being attached by sediment at the bottom of the water. The rubber protective cover should be removed during use.

Submerged installation:

Equipped with NPT3/4 thread, it can be used in conjunction with our waterproof pipes. The cable is threaded out of the pipe and the device is screwed into the waterproof pipe thread.



4. Protocol Description

4.1 Data Format

The up/down data of the device is based on hexadecimal format. High position in front, low position in back.

address	code	length	data		
1 byte	1 byte	1 byte	2 byte	2 byte	2 byte

4.2 Upward Data

The device information is reported once during network access or restart.

01030601350101				
Sensor address	Instruction type	Data Length	DATA	
			ORP	Temp
1	3	4	135	101
1	3	4	309	26.5℃

Note: If the received data is FFFF FFFF, it indicates that the sensor is not connected or the sensor is abnormal.

4.2.1 Register Address Description

Register address	0001H	0002H
Parameter	ORP	Temperature
Unit	-	℃
Range	-1999~1999mV	0~40
Data Type	int16	int16
Sample Value	-	/10
Operate	Read	Read

4.3 Downward data

Support configuring devices through downstream commands. When the downlink command is in confirmation packet mode, the device will immediately

send a reply packet after executing the command.

4.3.1 Restart the device

Starting byte (1byte)	Instruction type (1byte)	Trail byte (1byte)
0xFE	01	0xEF

Response:

Starting byte (1byte)	Instruction type (1byte)	Trail byte (1byte)
0xEF	01	0xFE

4.3.2 Set Reporting cycle

Starting byte (1byte)	Instruction type (1byte)	Reporting cycle (2byte)	Trail byte (1byte)
0xFE	02	X	0xEF

Response:

Starting byte (1byte)	Instruction type (1byte)	Reporting cycle (2byte)	Trail byte (1byte)
0xEF	02	X	0xFE

4.3.3 Register calibration electrode

If sensor calibration is required, parameters can be written to the 0x0120 and 0x0121 registers through the 0x10 function code for calibration.

This sensor adopts two-point calibration and requires the preparation of two known ORP standard solutions. When calibrating the first point, write 0x0001 to the 0x0120 register and write the standard ORP value of the first point to the 0x0121 register; When calibrating the second point, write 0x0002 to the 0x0120 register and write the standard ORP value of the second point to the 0x0121 register. Calibration completed.

Example:

Select 86mV ORP standard solution and calibrate the first point.

Send: 86 converted to hexadecimal as 0x056

Slave Address	Function Code	Register Address	Register Length	byte length	Register content	CRC Low	CRC Hi
0x01	0x10	0x01 0x20	0x00 0x02	0x04	0x00 0x01 0x00 0x56	0x2d	0xd9

Response:

Slave Address	Function Code	Register Address	Register Length	CRC Low	CRC Hi
0x01	0x10	0x01 0x20	0x00 0x02	0x41	0xfe

Select another 256mV ORP standard solution and calibrate the second point.

Send: 256 converted to hexadecimal 0x100

Slave Address	Function Code	Register Address	Register Length	byte length	Register content	CRC Low	CRC Hi
0x01	0x10	0x01 0x20	0x00 0x02	0x04	0x00 0x02 0x01 0x00	0x5c	0x77

Response:

Slave Address	Function Code	Register Address	Register Length	CRC Low	CRC Hi
0x01	0x10	0x01 0x20	0x00 0x02	0x41	0xfe

Default port configuration:

BaudRate	4800bit/s
Parity	None
DataBits	8
StopBits	1

Wiring instructions:

1.RD: VCC **2.BK:** GND **3.YL:** RS485A **4.BU:** RS485B
VCC:10-24VDC

4.4 Precautions and Maintenance

◆The equipment itself generally does not require daily maintenance. In case of obvious malfunctions, please do not open it for self repair and contact us as soon as possible!

◆There is an appropriate amount of soaking solution in the protective bottle at the front end of the electrode, and the electrode tip is soaked in it to maintain the activation of the glass bulb and liquid interface. When measuring, loosen the bottle cap, remove the electrode, and rinse with pure water before use.

◆ Preparation of electrode soaking solution: Take a packet of ORP4.00 buffer and dissolve it in 250ml of pure water. Add 56g of analytical grade potassium chloride, heat it appropriately in an electric furnace, and stir until completely dissolved. Alternatively, a 3.3M potassium chloride solution can be used for soaking, prepared as follows: Dissolve

25 grams of analytical grade potassium chloride in 100 milliliters of pure water.

◆The glass bulb at the front end of the electrode should not come into contact with hard objects, as any damage or scratching will cause the electrode to fail.

◆Before measurement, the bubbles inside the electrode glass bubble should be thrown away, otherwise it will affect the measurement. During measurement, the electrode should be stirred in the measured solution and placed still to accelerate the response.

◆Clean the electrodes with deionized water before and after measurement to ensure accuracy.

◆ORP electrodes will become passivated after long-term use, resulting in a decrease in sensitivity gradient, slow response, and inaccurate readings. For non-metallic electrodes, the bottom bulb of the electrode can be soaked in 0.1M dilute hydrochloric acid for 24 hours (0.1M dilute hydrochloric acid preparation: 9 milliliters of hydrochloric acid are diluted to 1000 milliliters with distilled water), and then soaked in 3.3M potassium chloride solution for 24 hours. If the ORP electrode passivation is severe and soaking in 0.1M hydrochloric acid is ineffective, the end of the ORP electrode bulb can be soaked in 4% HF (hydrofluoric acid) for 3-5 seconds, washed with pure water, and then soaked in 3.3M potassium chloride solution for 24 hours to restore its performance. For antimony electrodes: Fine sandpaper can be used to polish the metal head until a metallic luster appears, restoring its performance.

◆ Glass bulb contamination or liquid interface blockage can also cause electrode passivation. In this case, appropriate solution cleaning should be carried out according to the properties of the pollutant, as shown in the table below (for reference)

Pollutant	Detergent
Inorganic metal oxides	Less than 1M dilute acid
Organic oils and fats	Dilute detergent (weakly alkaline)
Resin polymer material	Alcohol, acetone, ether
Protein erythrocyte sediment	Acidic enzyme solution
Pigment substances	Dilute bleach, hydrogen peroxide

◆The electrode has a service life of 6-12 months, and should be replaced with a new electrode in a timely manner after aging.

◆The equipment should be calibrated before each use, and it is recommended to calibrate it every 3 months for long-term use. The calibration frequency should be adjusted appropriately according to different application conditions (such as the degree of dirt and chemical deposition in the application site).