

LW102D LoRaWAN Integral PH Transmitter User Manual



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1. Overview

The LoRa water quality pH sensor is an industrial liquid pH sensor used to measure the pH value of a solution. It has automatic temperature compensation function. Automatic temperature compensation and manual temperature compensation can be switched freely. Suitable for industrial wastewater, domestic wastewater, agriculture, aquaculture and other scenarios in non corrosive weak acid and weak alkali environments. Supports LoRa TDMA ad hoc networks and standard LoRaWAN protocols.

2. Technical Parameters

Power Supply	DC12/24V
Weight	150g
Measuring Principle	Glass Electrode Method
Operating Temperature	0~50℃, ≤0.2MPa
Measuring Range	0~14.00PH
Accuracy	±0.1, ±0.3℃
Resolution Ratio	0.01PH, 0.1℃
Temperature Compensation	Automatic temperature compensation (Pt1000)
Electrode usage cycle	6-12 months
pH 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	10min(Default reporting cycle)
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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2.1 Product List

- LW102D LoRaWAN Sensor Data Collector 1 piece
- TYPE-C data cable 1 piece
- pH Transmitter 1piece(individual packing)

3. Configuration and Installation

3.1 LW102D 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 LW102D Parameter Configuration Instructions

Configuration preparation:

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

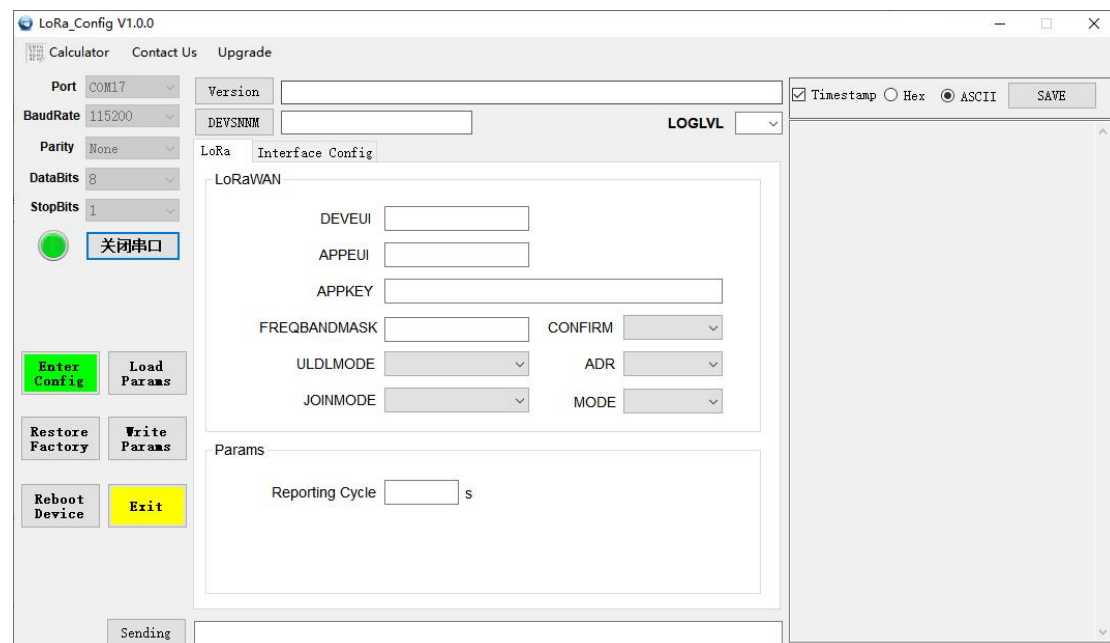
Download: <http://www.zonewu.com/en/Configuration-Tools.html>

1. Install serial port driver program.CH340 USB to serial port .
2. Connect the LW10xD 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	
UPLDMODE	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: BF01022407D00001

AppEUI: 331341E186891989

AppKey: 5572404c696e6b4c6f52613230313823

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

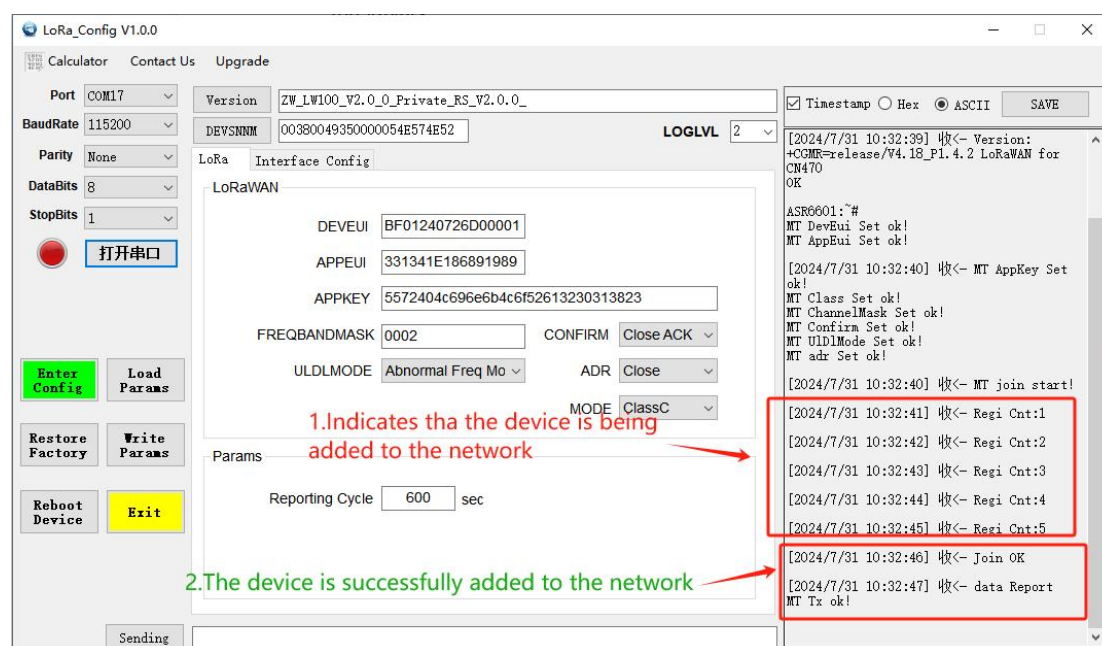
Users can customize according to their own applications

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:

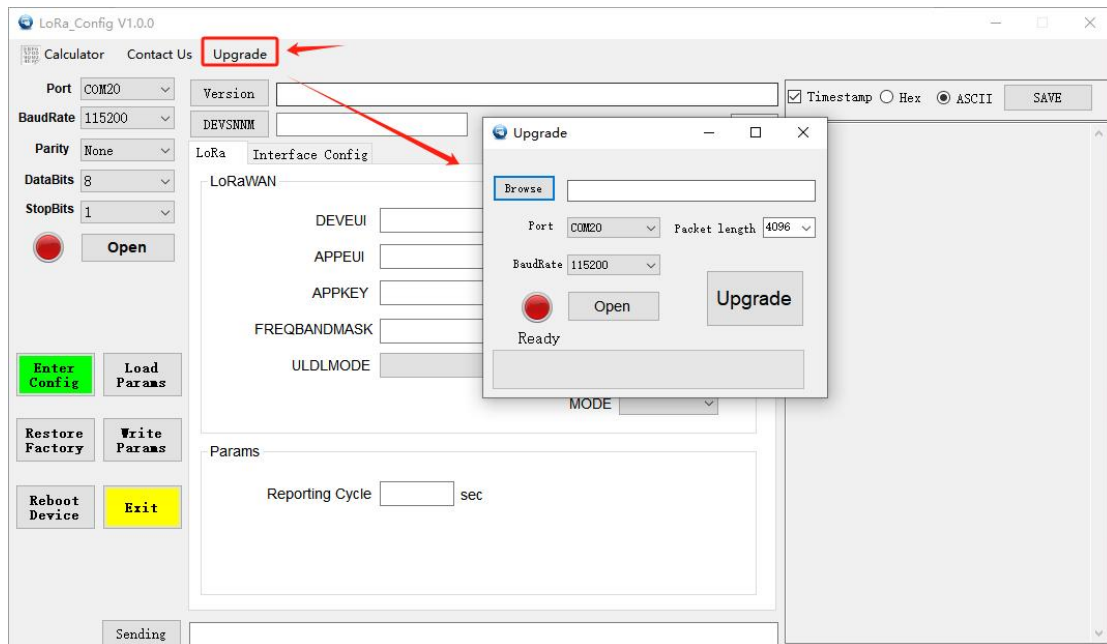


The device is equipped with a built-in LED indicator light, which is located next

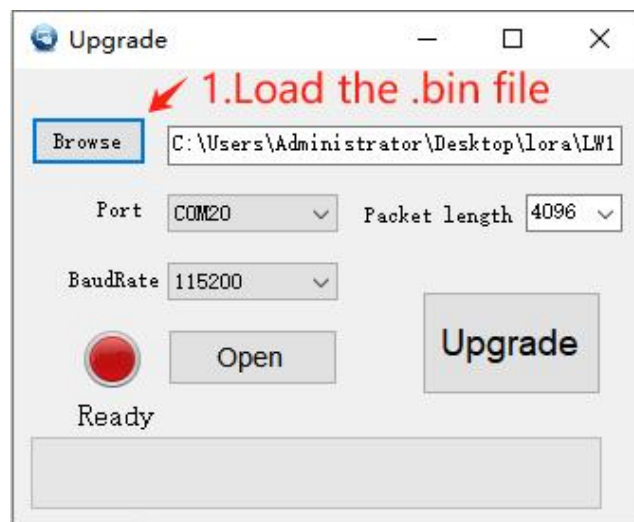
to the antenna interface and can be seen as a green light through the casing.

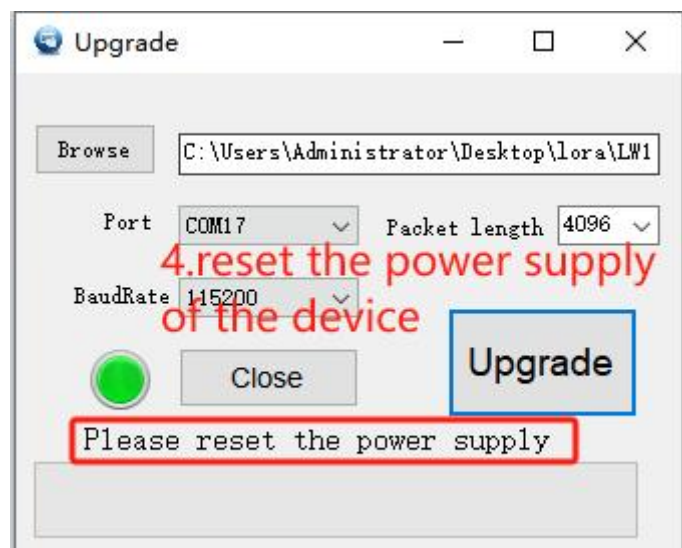
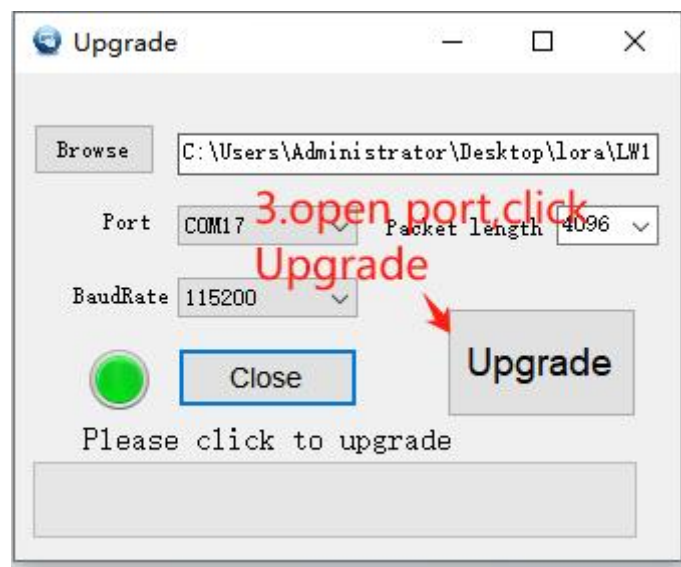
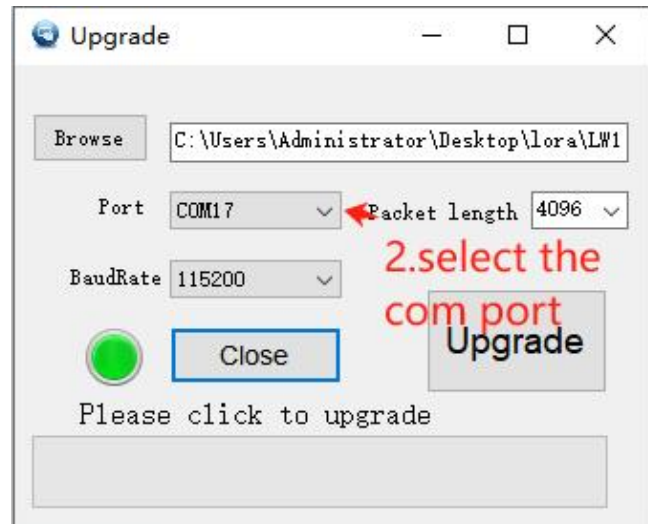
LED	Status	Describe
Green indicator light	Flicker	Add to the network
	Light	Successfully added to the network

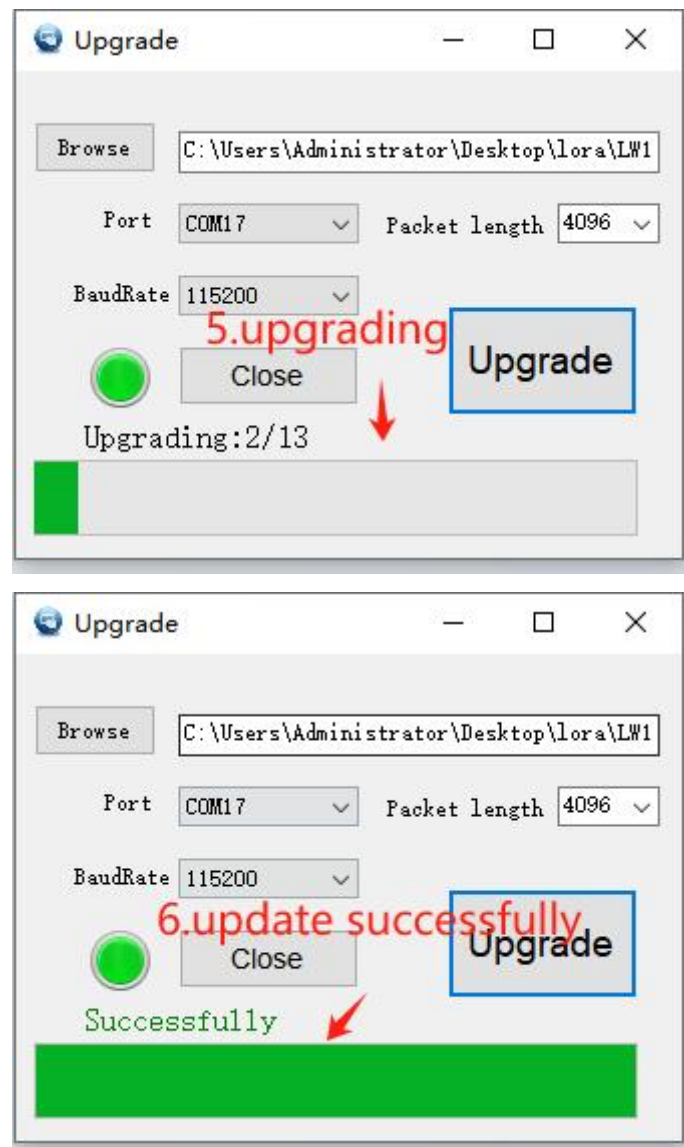
Firmware upgrade:



Click to upgrade → Pop up upgrade window





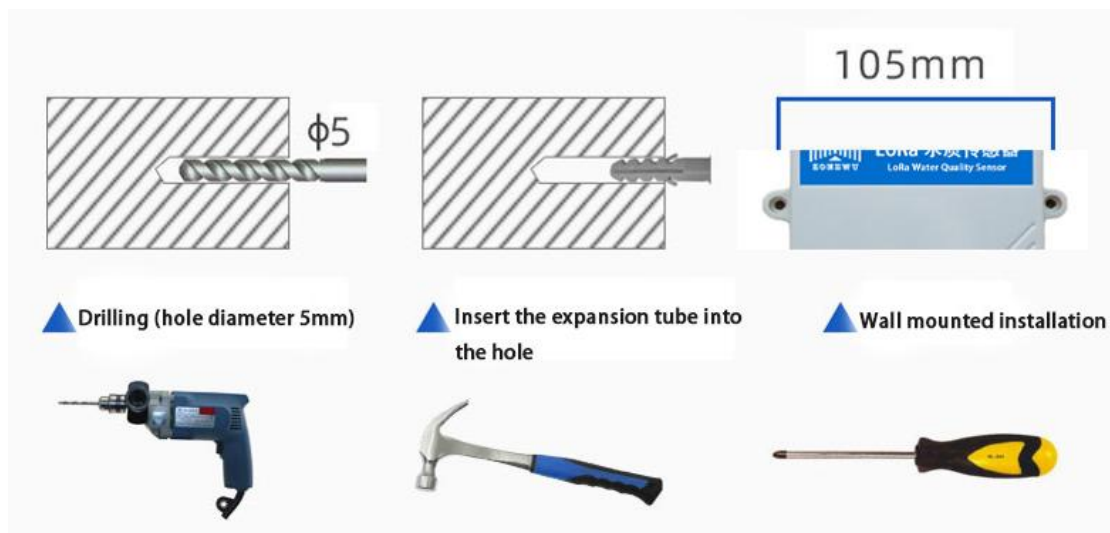


If there is an upgrade error during the upgrade process, you can close and reopen the upgrade window and follow the instructions to upgrade again.

3.3 LW102D Size and Installation



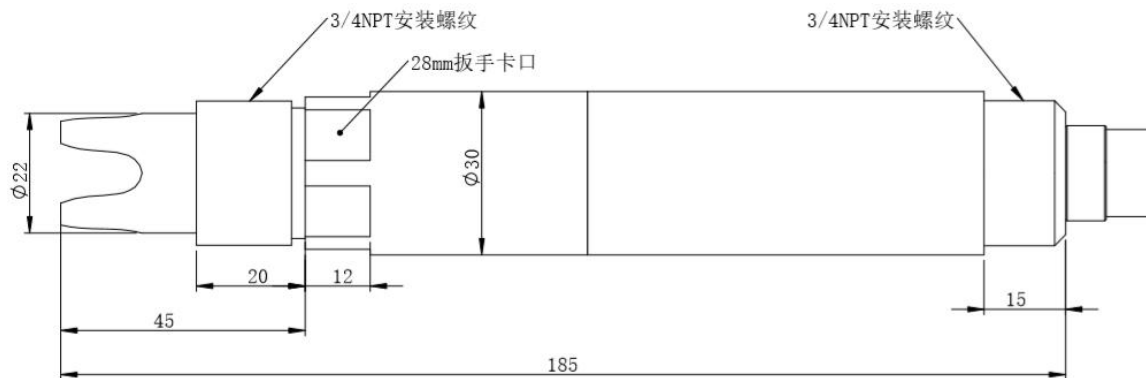
Product size



Installation instructions

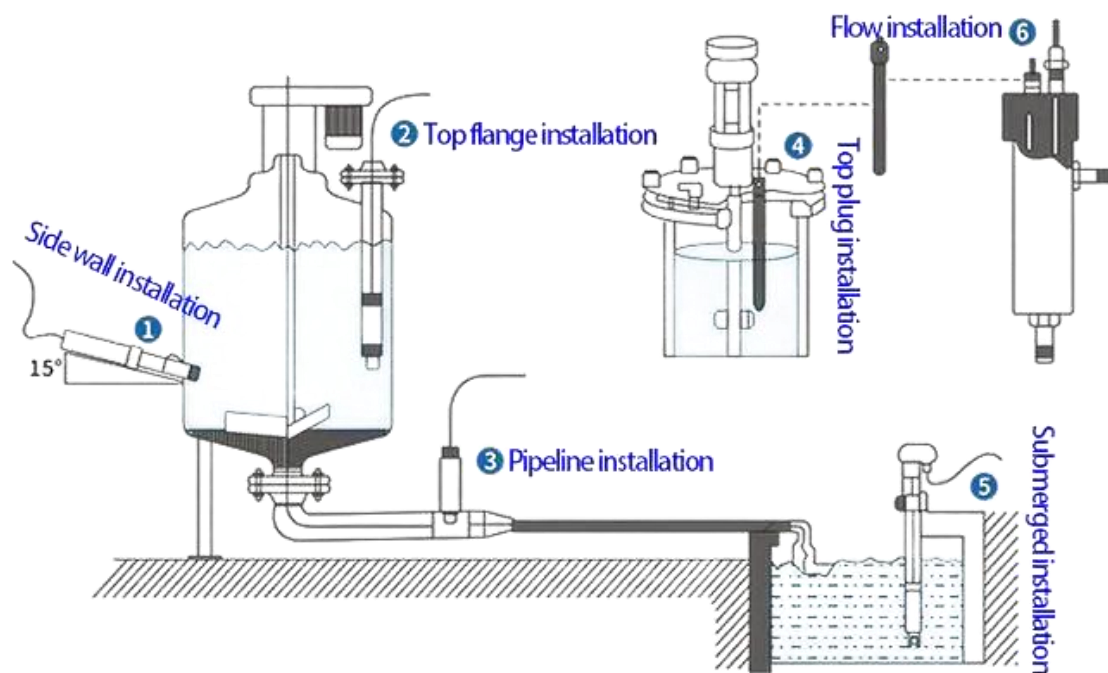
3.4 PH Transmitter Size and Installation

3.4.1 PH Transmitter Size



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

3.4.2 Installation



Note: The sensor should not be installed upside down or horizontally, and should be installed at least 15 degrees of inclination.

3.4.3 Calibration

Notes: The sensor has been calibrated before leaving the factory.

Unless exceeding measurement error limits, do not perform arbitrary recalibration.

1.Zero Point Calibration: Use a graduated cylinder to measure 250mL distilled water and pour it into a beaker. Add one packet of calibration powder with pH=6.86, stir thoroughly with a glass rod until completely dissolved to prepare a solution with pH=6.86. Place the sensor in the solution and wait 3-5 minutes. After the reading stabilizes, check if the displayed value matches 6.86. If not, perform zero point calibration according to the instructions in the appendix.

2.Slope Calibration: For acidic solutions: Use a graduated cylinder to measure 250mL distilled water and pour it into a beaker. Add one packet of calibration powder with pH=4.00, stir thoroughly until completely dissolved to prepare a solution with pH=4.00. Place the sensor in the solution and wait 3-5 minutes. After the reading stabilizes, check if the displayed value matches 4.00. If not, perform slope calibration according to the instructions in the appendix.

3.For alkaline solutions: Use a graduated cylinder to measure 250mL distilled water and pour it into a beaker. Add one packet of calibration powder with pH=9.18, stir thoroughly until completely dissolved to prepare a solution with pH=9.18. Place the sensor in the solution and wait 3-5 minutes. After the reading stabilizes, check if the displayed value matches 9.18. If not, perform slope calibration according to the instructions in the appendix.

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

4.2 Upward Data

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

Sensor address	Instruction type	Data Length	DATA	
			PH	Temp
01	02	04	0316	0109
1	2	4	790	265

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

PH calculation: 316H (hexadecimal)=790=>PH=7.90

Temperature calculation: 109H (hexadecimal)=265=>Temperature=26.5 °C

4.2.1 Register Address Description

Register address	0001H	0002H
Parameter	PH	Temperature
Unit	-	°C
Range	0~14	0~40
Data Type	uint16	uint16
Sample Value	/100	/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

Example: The platform sets the reporting cycle to 200s, 200 => 0x00C8(hex)

Starting byte (1byte)	Instruction type (1byte)	Reporting cycle (2byte)	Trail byte (1byte)
0xFE	02	00 C8	0xEF

Message: FE0200C8EF

Response:

Starting byte (1byte)	Instruction type (1byte)	Reporting cycle (2byte)	Trail byte (1byte)
0xEF	02	00 C8	0xFE

Message: EF0200C8FE

4.3.3 Calibration Electrode

This device adopts two-point calibration and requires the preparation of two known pH standard solutions.

Zero point calibration

Function: Set the pH zero point calibration value of the sensor, and the zero point value is calibrated with 6.86pH standard solution as the calibration standard.

The example is as follows:

Send:

Starting byte (1byte)	Instruction type (1byte)	Calibration value (2byte)	Trail byte (1byte)
0xFE	03	0x0000	0xEF

Response:

Starting byte (1byte)	Instruction type (1byte)	Calibration value (2byte)	Trail byte (1byte)
0xEF	03	0x0000	0xFE

Slope Calibration Function

Set the pH slope calibration value for the sensor. The calibration is divided into high-point and low-point calibration. For alkaline solutions, perform high-point calibration; for acidic solutions, perform low-point calibration. Here, the high-point calibration reference is set at 9.18pH of the standard solution, and the low-point calibration reference is set at 4.00pH of the standard solution. The example is as follows:

Example:

Low limit reference solution 4.00pH Calibration:

Send:

Starting byte (1byte)	Instruction type (1byte)	Calibration value (2byte)	Trail byte (1byte)
0xFE	04	0x0000	0xEF

Response:

Starting byte (1byte)	Instruction type (1byte)	Calibration value (2byte)	Trail byte (1byte)
0xEF	04	0x0000	0xFE

High point standard solution 9.18pH calibration:

Send:

Starting byte (1byte)	Instruction type (1byte)	Calibration value (1byte)	Trail byte (1byte)
0xFE	05	0x0000	0xEF

Response:

Starting byte (1byte)	Instruction type (1byte)	Calibration value (2byte)	Trail byte (1byte)
0xEF	05	0x0000	0xFE

4.4 Use and maintenance

Maintenance Guidelines for pH Sensors:

Before use, clean the sensor thoroughly with distilled or deionized water and dry it with filter paper to prevent contamination. Insert one-third of the sensor into the solution.

When not in use, clean the sensor and either insert it into a protective sleeve containing 3mol/L potassium chloride solution or place it in a container with the same solution.

Check terminal connections for dryness; if contaminated, wipe with anhydrous alcohol and dry before use. Avoid prolonged immersion in distilled water or protein solutions and

contact with silicone grease. For long-term sensors, the glass membrane may become semi-transparent or develop deposits – clean with dilute hydrochloric acid followed by rinsing with water. If measurement errors occur after extended use, calibrate using a standard instrument.

If calibration and measurement remain impossible despite these maintenance steps, the sensor is faulty and requires replacement.

Standard buffer pH Value reference table

Temp(°C)	4.00	4.01	6.86	7.00	9.18	10.01
0	4.00	4.00	6.98	7.12	9.46	10.32
5	4.00	4.00	6.95	7.09	9.39	10.25
10	4.00	4.00	6.92	7.06	9.33	10.18
15	4.00	4.00	6.90	7.04	9.28	10.12
20	4.00	4.00	6.88	7.02	9.23	10.06
25	4.00	4.01	6.86	7.00	9.18	10.01
30	4.01	4.02	6.85	6.99	9.14	9.97
35	4.02	4.02	6.84	6.98	9.10	9.93
40	4.03	4.04	6.84	6.97	9.07	9.89
45	4.04	4.05	6.83	6.97	9.04	9.86
50	4.06	4.06	6.83	6.97	9.02	9.83