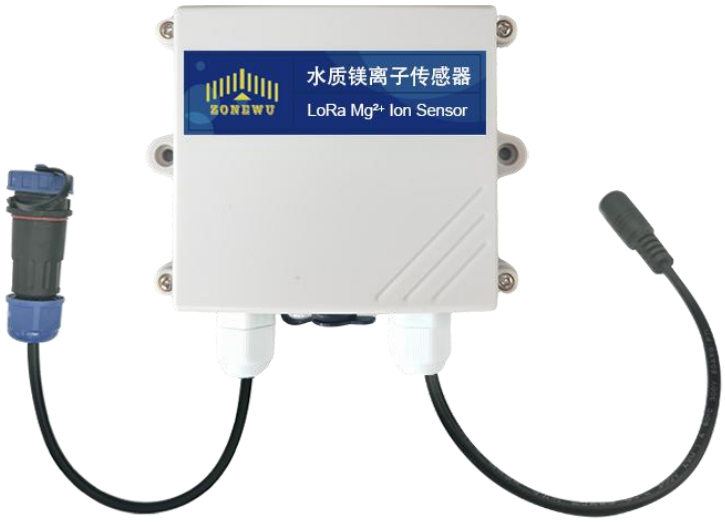
LW110 LoRaWAN Integral Mg^{2+} Transmitter User Manual



Contents

1. Overview

LoRaWAN water quality magnesium ion sensor is a wireless sensor that measures the concentration of magnesium ions in water bodies. It has automatic temperature compensation, is less affected by the environment, and has higher measurement accuracy. Connect with LoRaWAN collector through aviation connector to achieve wireless communication. Widely used for ion online automatic continuous analysis and detection in industrial wastewater, surface water, drinking water, seawater, and industrial production process control.

2. Technical Parameters

Power Supply	DC12/24V
Weight	150g
Measuring Range	0-100mg/L, 0-1000mg/L(default) Ionic sensors are more susceptible to interference from other ions in the water and can easily cause membrane head failure. Please purchase with caution !
Temperature Measurement Range	0~50℃,Resolution Ratio:0.1℃ (When manually compensating for temperature, it is set to 25 ℃ by default.)
Measurement Error	±5%FS（25℃）
Resolution Ratio	0-100mg/L: 0.01mg/L 0-1000 mg/L :0.1mg/L
Pressure Resistance	0.2Mpa
Electrode Usage Cycle	Normal use for 2 years
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

2.2 Product List

- LW110 LoRaWAN Terminal 1 piece
- TYPE-C data cable 1 piece
- Mg^{2+} Transmitter 1piece(individual packing)

3. Configuration and Installation

3.1 LW110 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 LW110 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 .

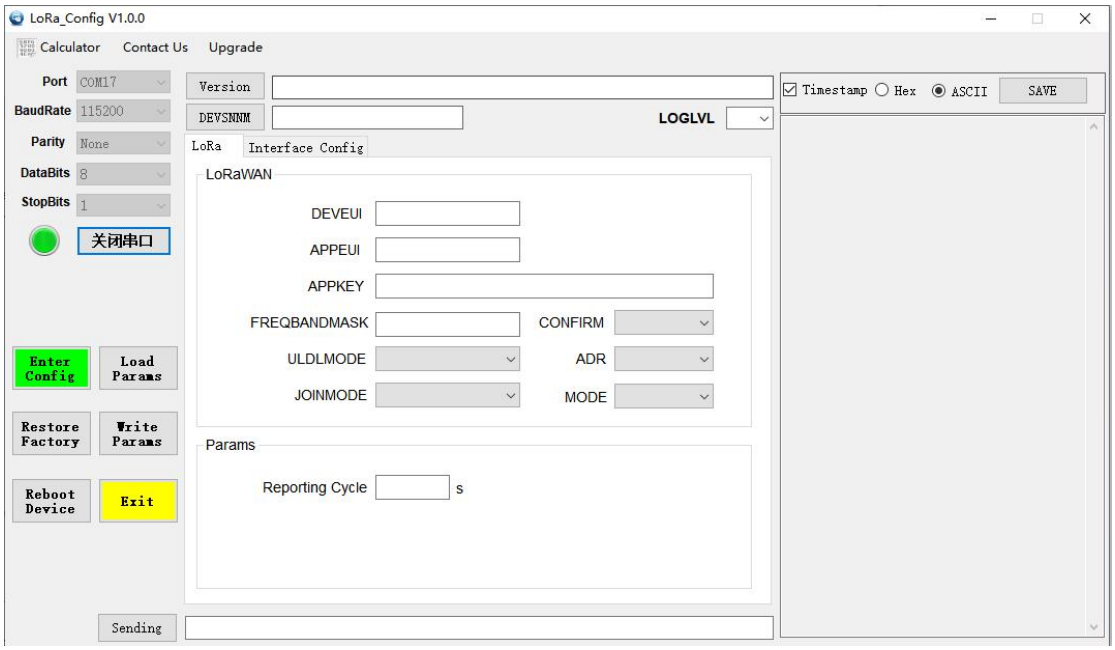
2. Connect the LW101 to the PC using a USB cable and check if there is a COM port. If not, please recheck the equipment wiring and driver installation.

3. Open the configuration tool LoRa_config LoRa_config V1.0.0 .open the corresponding COM port .

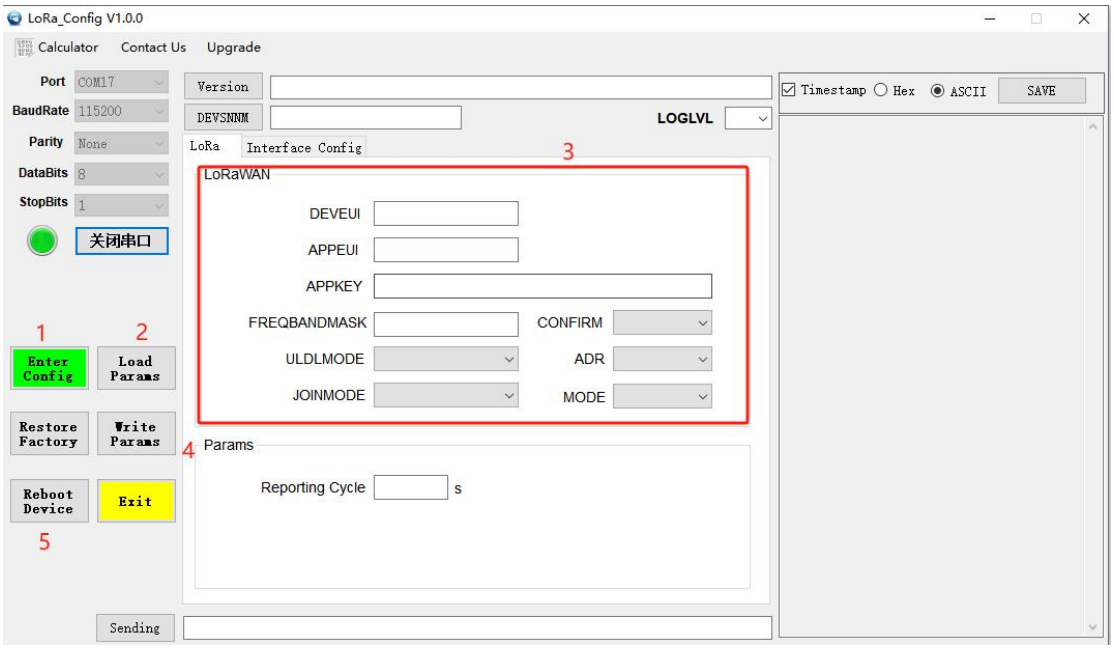
Port default parameters:

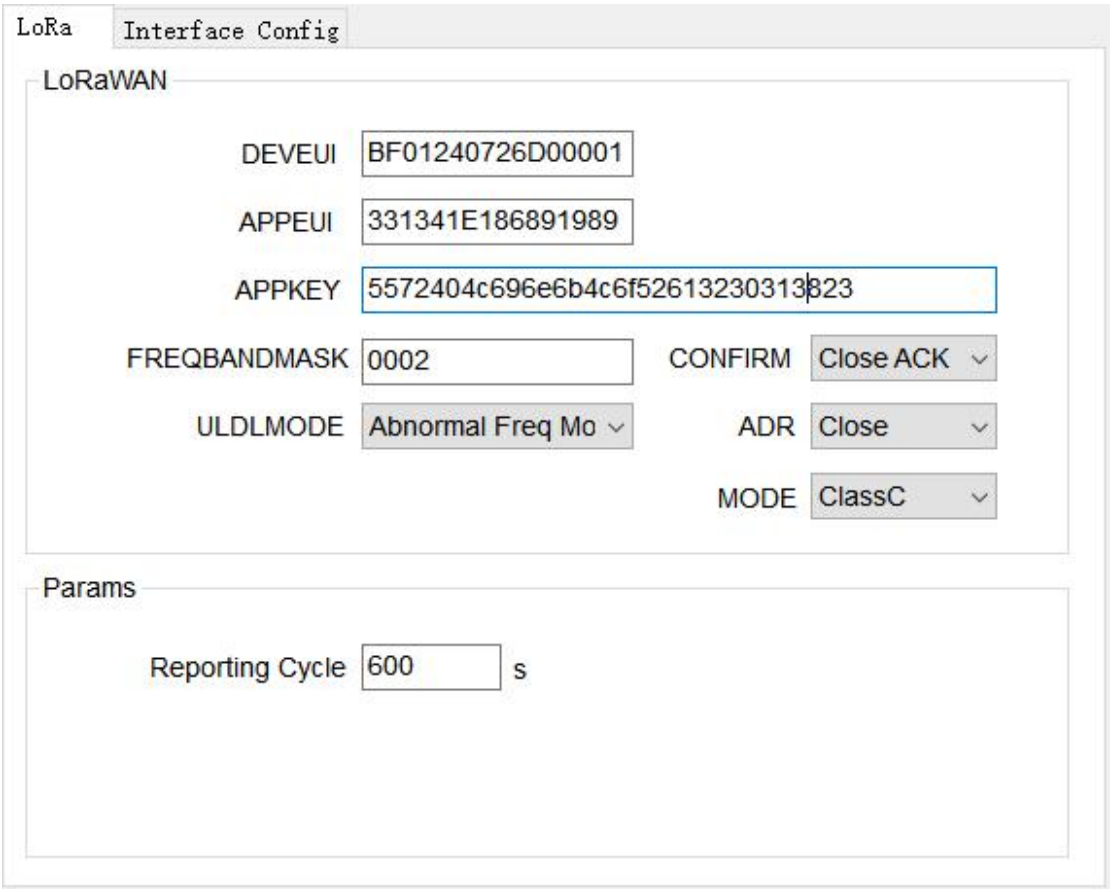
BaudRate	115200bit/s
Parity	None
DataBits	8
StopBits	1

As follows:



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





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

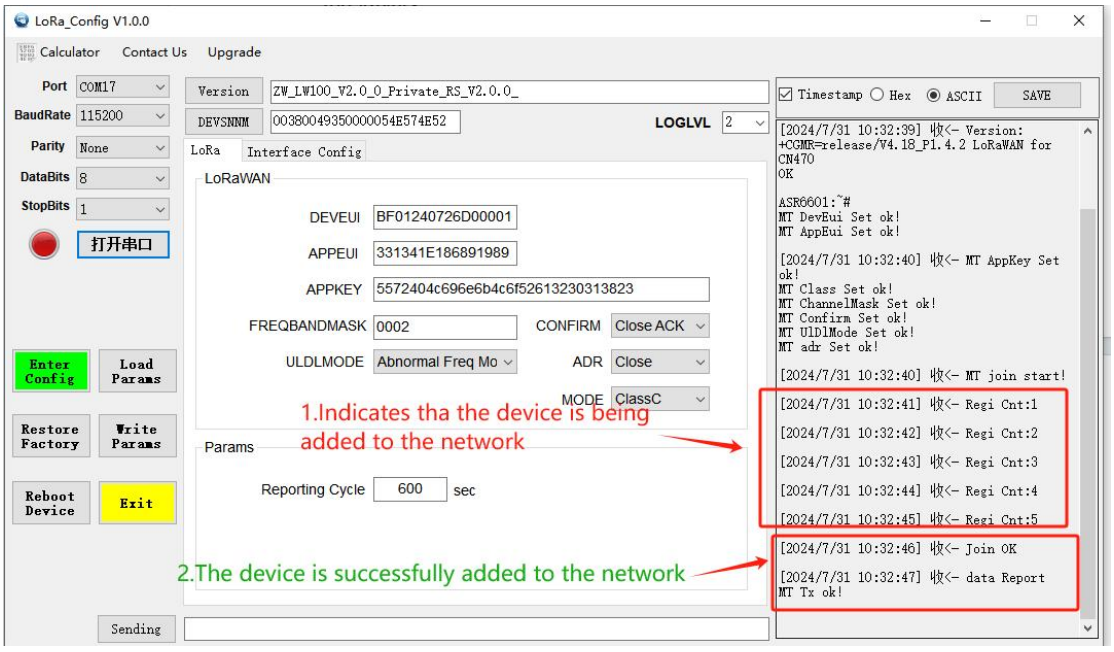
FREQBANDMASK	Set frequency group mask	
ULDLMODE	Set up uplink and downlink same frequency but different frequency	
CONFIRM	Set uplink transmission type	
ADR	Set adaptive speed	
MODE	Set device working mode	

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 **5572404c696e6b4c6f526132330313823**.
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 600s (10min)	

Printing logs of device startup and network connection：

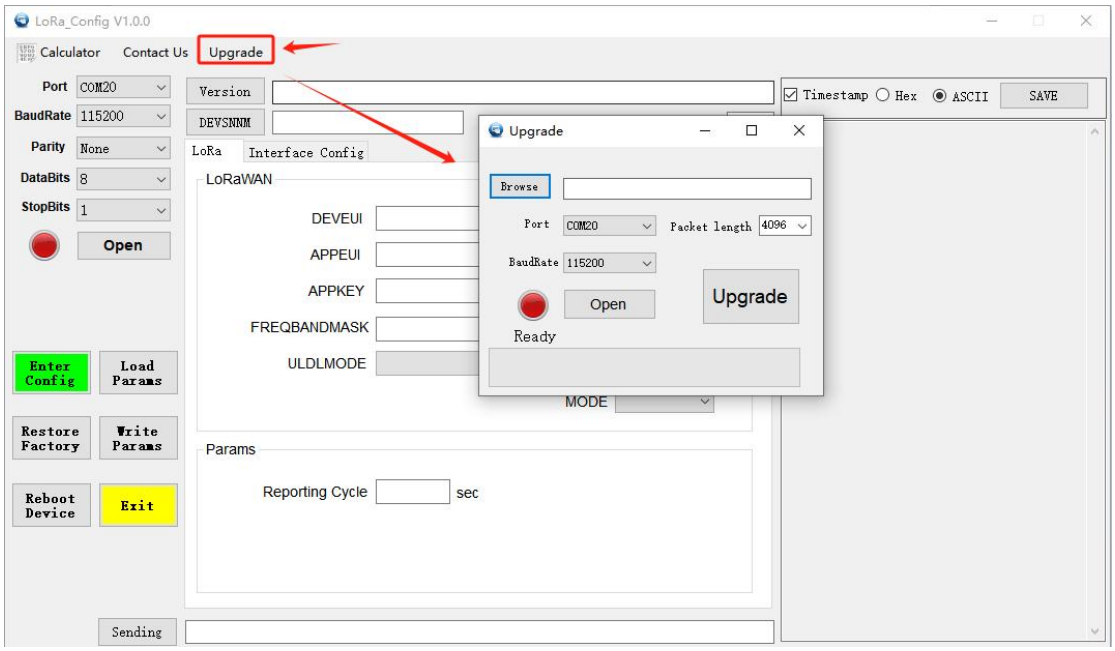


The device is equipped with a built-in LED indicator light, which is located next

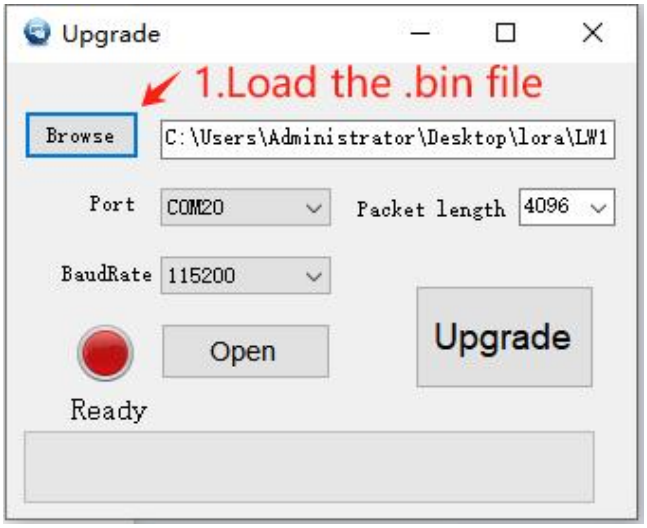
to the antenna interface and can be seen as a green light through the casing.

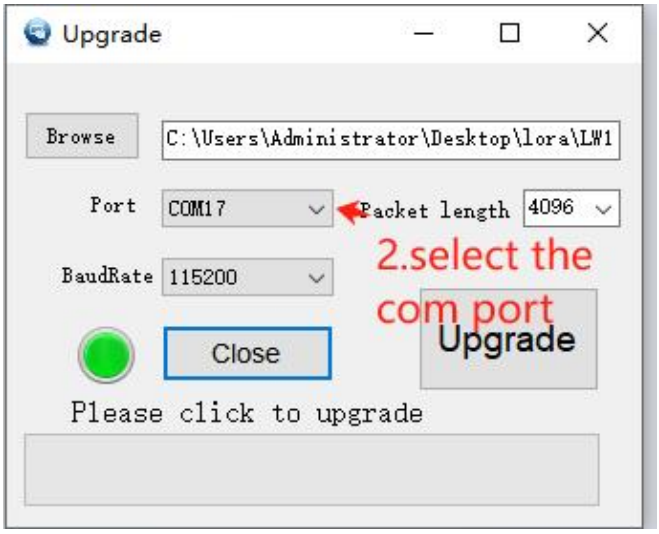
LED	Status	Describe
Green indicator light	Flicker	Add to the network
	Light	Successfully added to the network

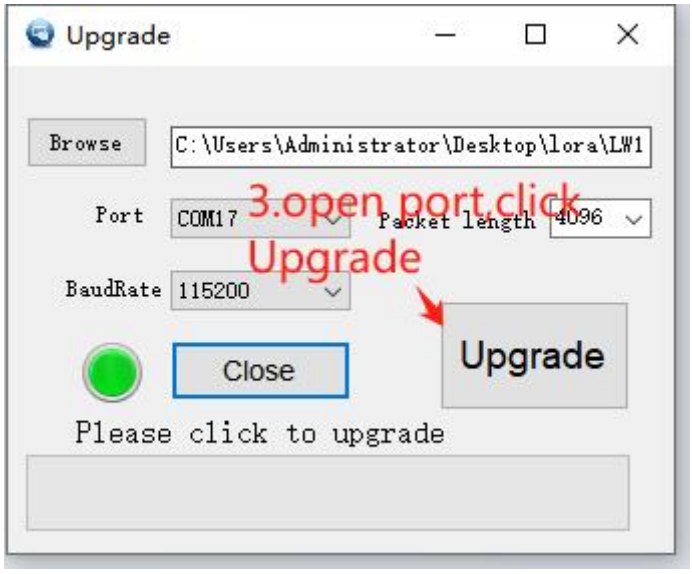
Firmware upgrade:

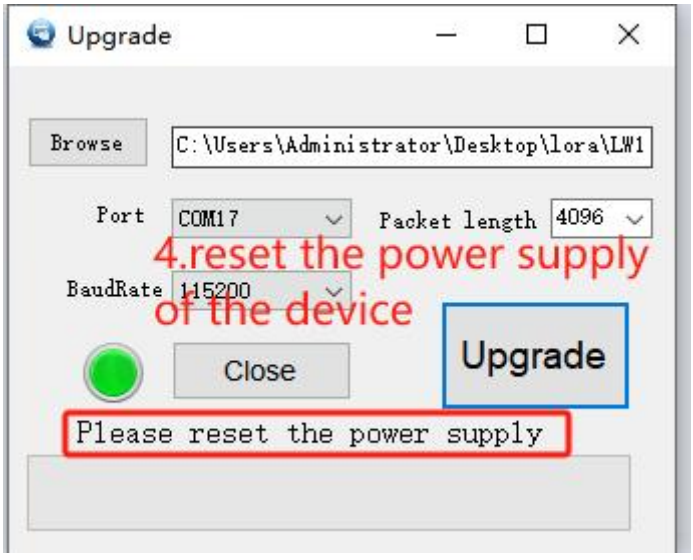


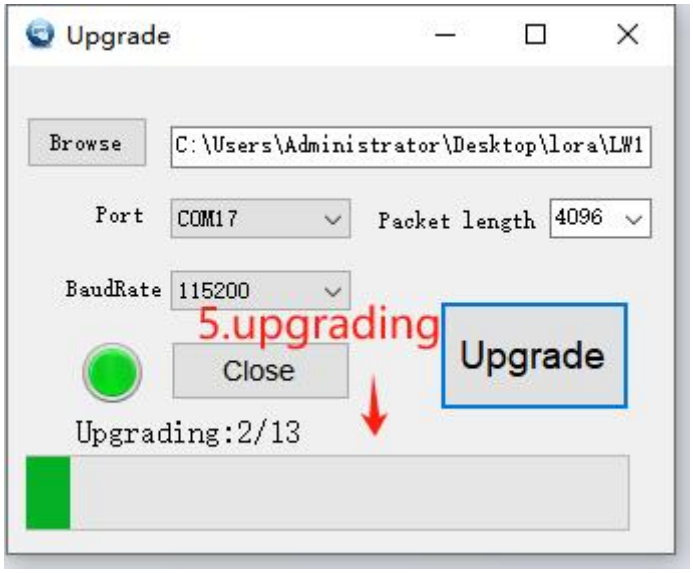
Click to upgrade → Pop up upgrade window

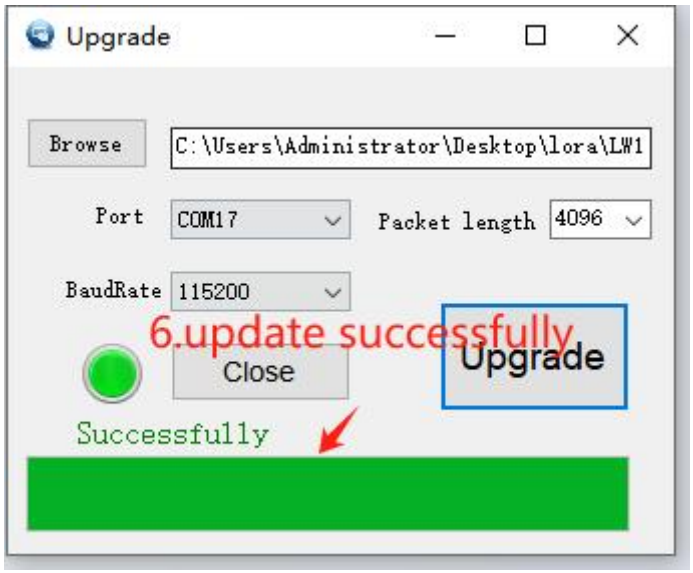



Upgrade
Browse
C:\Users\Administrator\Desktop\lora\LW1
Port
COM17
Packet length
4096
2.select the com port
BaudRate
115200
Close
Upgrade
Please click to upgrade


Upgrade
Browse
C:\Users\Administrator\Desktop\lora\LW1
3.open port,click Upgrade
Port
COM17
Packet length
4096
BaudRate
115200
Close
Upgrade
Please click to upgrade


Upgrade
Browse
C:\Users\Administrator\Desktop\lora\LW1
Port
COM17
Packet length
4096
4.reset the power supply of the device
BaudRate
115200
Close
Upgrade
Please reset the power supply

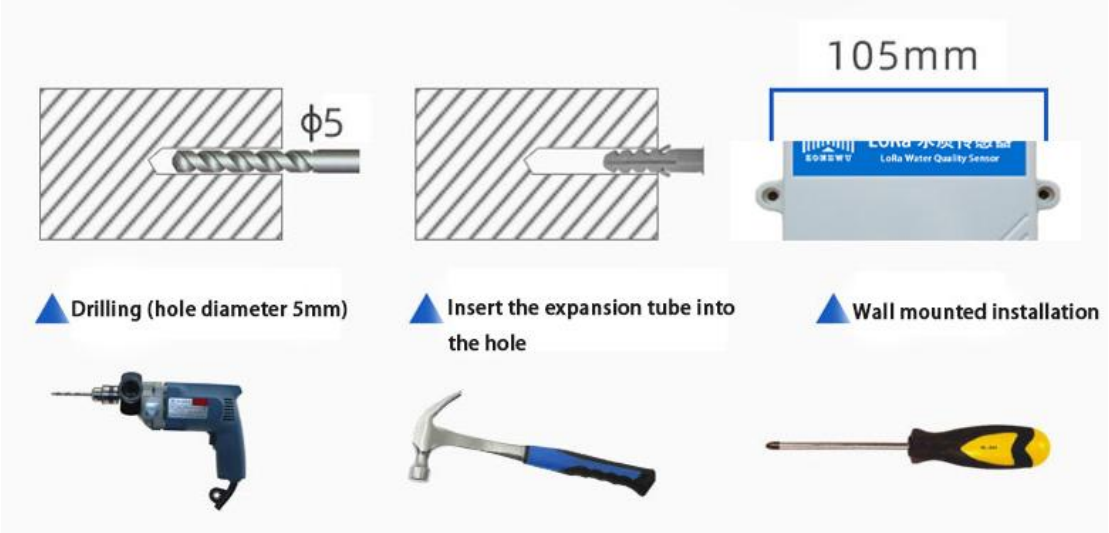




If there is an upgrade error during the upgrade process, you can close and reopen the upgrade window and follow the instructions to upgrade again.

3.3 LW110 Size and Installation

Product size

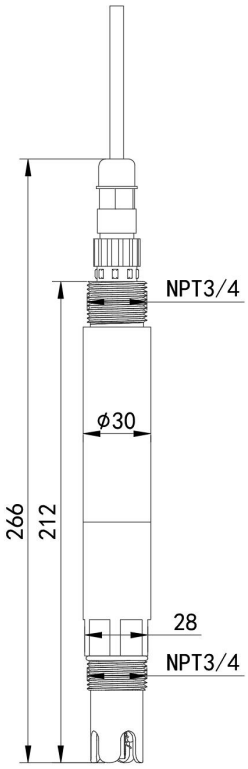


Installation instructions

3.4 Mg^{2+} Ion Transmitter Size and Installation

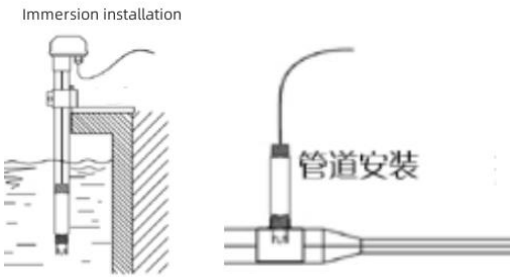
Integrated Mg^{2+} Transmitter Description

3.4.1 Mg^{2+} Ion 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

4.2 Upward Data

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

010A0203160014				
Sensor	**Instruction**	**Data**	DATA	
address	**type**	**Length**	**Mg2+**	**Temp**
01	0A	04	0316	0014
1	10	04	7.9	20

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	Mg^{2+}	Temp
Unit	ppm	℃
Range	0-1000mg/L	0~50℃
Data Type	uint16	int16
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

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 Calibration Electrode

To use two-point calibration, two known ion standard solutions need to be prepared.

1. When calibrating the first point, write 0x0003 to the 0x1100 register and write the quantifier corresponding to the standard ion concentration value of the first point to the 0x1101 register;
2. When calibrating the second point, write 0x0004 to the 0x1100 register and write the quantifier corresponding to the standard ion concentration value of the second point to the 0x1101 register. Calibration completed.

(It is recommended to choose a standard solution with a concentration of 10mg/L for devices with a range of 0-100mg/L, and 100mg/L for devices with

ranges of 0-1000mg/L and 0-3500mg/L. It is also recommended to choose a standard solution with a concentration of 100mg/L for devices with a range of 0-100mg/L, and 1000mg/L for devices with ranges of 0-1000mg/L and 0-3500mg/L.)

For example, for a device with a range of 100mg/L, select a 10mg/L ion standard solution and calibrate the first point.

Issued frame: 10 * 100=1000 converted to hexadecimal 0x3e8

(If it is a device with chloride ions and a range of 1000, it will be amplified by 10 times and converted to hexadecimal as 0x64.)

Starting byte（1byte）	Instruction type（1byte）	Register 0x1100（2byte）	Register 0x1101（2byte）	Trail byte（1byte）
0xFE	03	0x0003	0x03E8	0xEF

Response：

Starting byte（1byte）	Instruction type（1byte）	Register 0x1100（2byte）	Register 0x1101（2byte）	Trail byte（1byte）
0xEF	03	0x0003	0x03E8	0xFE

Select 100mg/L of ion standard solution and calibrate the second point.

Issued frame: 100 * 100=10000 converted to hexadecimal 0x2710

(If it is a device with chloride ions and a range of 1000, it will be amplified by 10 times and converted to hexadecimal as 0x3e8.)

Starting byte（1byte）	Instruction type（1byte）	Register 0x1100（2byte）	Register 0x1101（2byte）	Trail byte（1byte）
0xFE	04	0x0004	0x2710	0xEF

Response：

Starting byte（1byte）	Instruction type（1byte）	Register 0x1100（2byte）	Register 0x1101（2byte）	Trail byte（1byte）
0xEF	04	0x0004	0x2710	0xFE

4.3.4 Correction of ion concentration deviation value

Perform numerical correction on the deviation value of the current ion value setting

Issue frame: (If the current sensor output ion value is 7.90, the value needs to be corrected to 8.00. The difference is 8.00-7.90=0.10, which is 0.1=>3DCCCCCD (floating point number). Write 3DCCCCCD to the register content)

Starting byte（1byte）	Instruction type（1byte）	Data Length（1byte）	Register Content（2byte）	Trail byte（1byte）
0xFE	05	0x04	0x3dc 0xcc 0xcc 0xcd	0xEF

Response：

Starting byte（1byte）	Instruction type（1byte）	Data Length（1byte）	Register Content（2byte）	Trail byte（1byte）
0xEF	05	0x04	0x3dc 0xcc 0xcc 0xcd	0xFE

4.4 Precautions and Maintenance

- In case of obvious malfunction, please do not open it for self repair and contact us as soon as possible!
- Before measurement, the transparent sheath at the front end of the electrode should be removed.
- Before using the device, it is necessary to check whether there are bubbles at the front end of the ion transmitter. If there are no bubbles, it can be used normally. If there are bubbles, the device needs to be shaken downwards to remove them.
- Unused equipment should be stored in diluted standard solutions for each ion.
- Ion transmitters that have not been used for a long time need to be soaked and activated before measurement. (First, perform low concentration activation and soak in 10mg/L standard solution for at least 12 hours. After high concentration soaking, take 1000mg/L solution and immerse the equipment in it for 1-2 hours.). Before testing after activation, it is necessary to thoroughly clean the equipment by immersing the front end of the equipment in deionized water for 5 minutes and stirring the aqueous solution. To achieve a more thorough cleaning, please replace the deionized water with clean water multiple times and clean it again to prevent measurement errors.
- Ion transmitters that have not been used for a short period of time should be soaked in deionized water before measurement to prevent measurement errors.
- Before each use, the equipment should be calibrated. For long-term use in water bodies, it is recommended to calibrate once every 2-3 weeks to ensure equipment accuracy. 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).
- After using the device, please rinse the transmitter head with clean water.
- Do not use this equipment in highly corrosive liquid environments to avoid equipment damage.

- Do not touch the membrane head at the front end of the ion device with sharp objects to avoid damage to the device.
- Do not use the device in an environment that exceeds its applicable temperature to avoid damage to the device.
- If the on-site usage environment has complex components, the chemical composition it contains may cause the ion membrane to fail.
- Do not use in water containing organic solvents.
- Due to the excessive variety and high concentration of interfering ions in seawater, it is not recommended to use this device in seawater.
- The service life of electrode film tips is about 3-6 months, and they should be replaced with new ones in a timely manner after aging.