LW109 LoRaWAN Integral Chlorophyll Transmitter User Manual

Contents

1. Overview

LoRaWAN water quality chlorophyll sensor is a device for measuring chlorophyll concentration in water bodies; The design method of using fluorescence principle and optical fiber to conduct the optical path; Internally added filtering algorithm, with strong resistance to external light interference. Built in temperature transmitter, capable of automatic temperature compensation. The device outputs relative fluorescence units, which facilitates the analysis of the relationship between fluorescence intensity and chlorophyll concentration based on actual conditions.Supports LoRa TDMA networking and standard LoRaWAN protocol.

2. Technical Parameters

Power Supply	DC12/24V
Weight	150g
Measuring Range	0-10mg/L, resolution 0.01mg/L 0-100mg/L, resolution 0.01mg/L (default) 0-1000mg/L, resolution 0.1mg/L
Temperature Measurement Range	-20-80℃
Resolution	Temperature：0.1℃
PH Measurement Range	0-14PH,±0.15PH
Pressure Resistance	0.6Mpa
Electrode Usage Cycle	6-12 months
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：331341E186891989 DevEUI：aaaa202404150001 AppKey：5572404c696e6b4c6f526132330313823 MAC Version: LoRaWAN 1.0.3

2.2 Product List

- LW109 LoRaWAN Terminal　1 piece
- TYPE-C data cable　1 piece
- Blue Green Algae Transmitter　1piece(individual packing)

3. Configuration and Installation

3.1 LW109 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 LW109 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 .

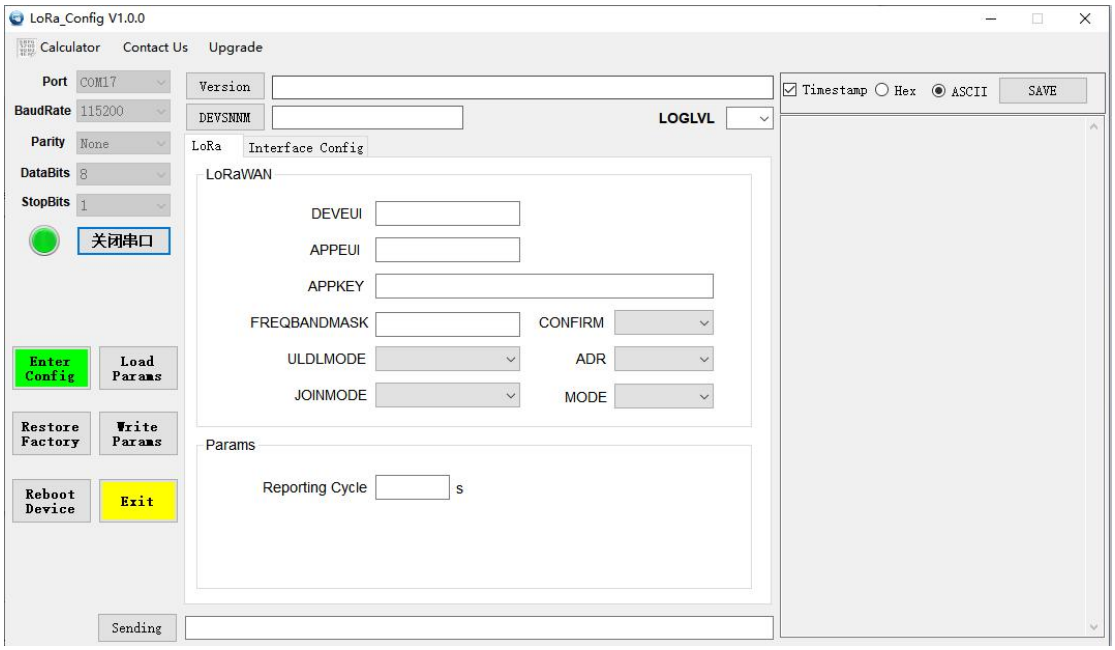
2. Connect the LW101 to the PC using a USB cable and check if there is a COM port. If not, please recheck the equipment wiring and driver installation.

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

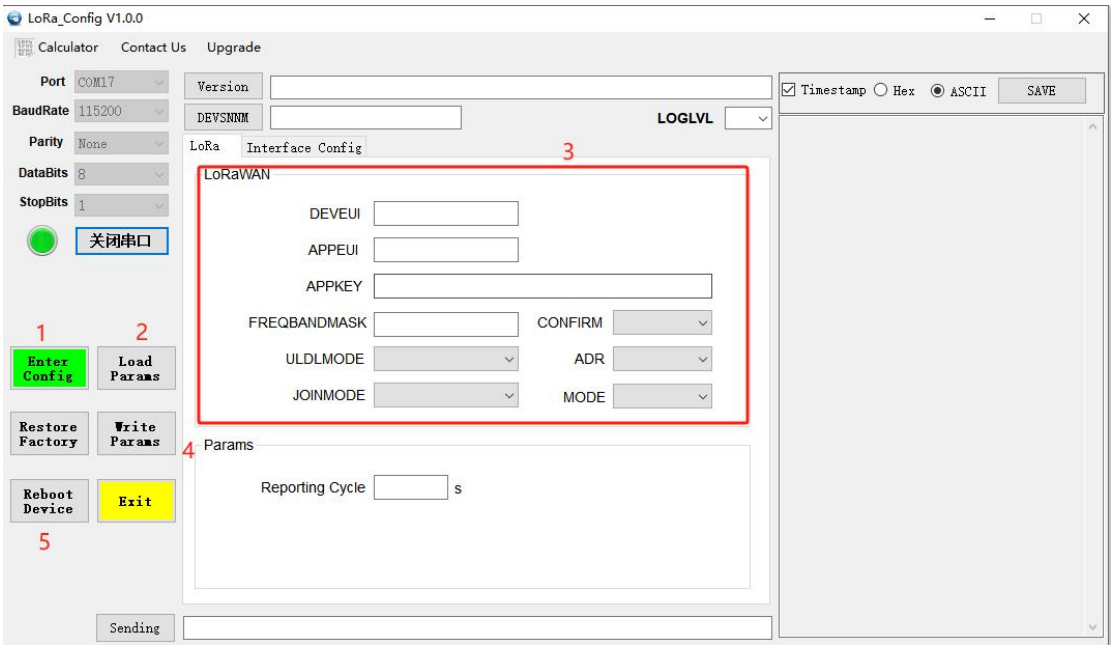
Port default parameters:

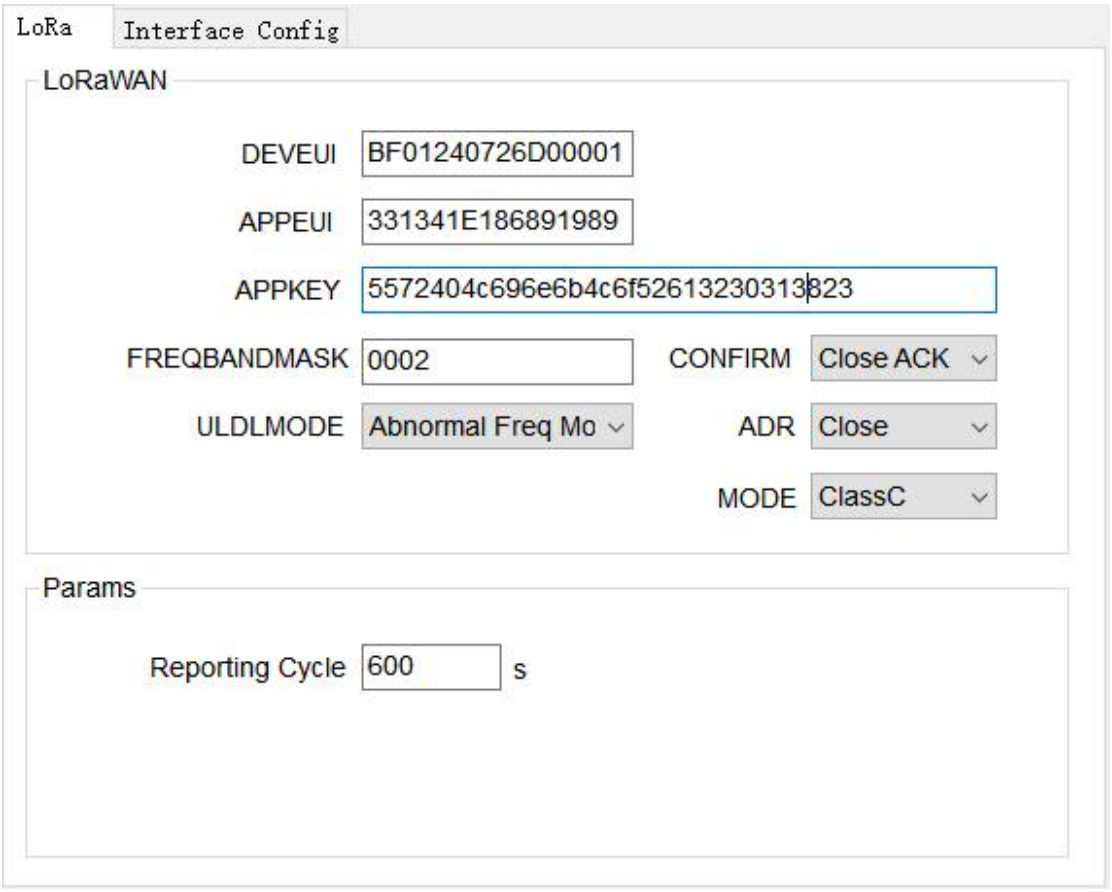
BaudRate	115200bit/s
Parity	None
DataBits	8
StopBits	1

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

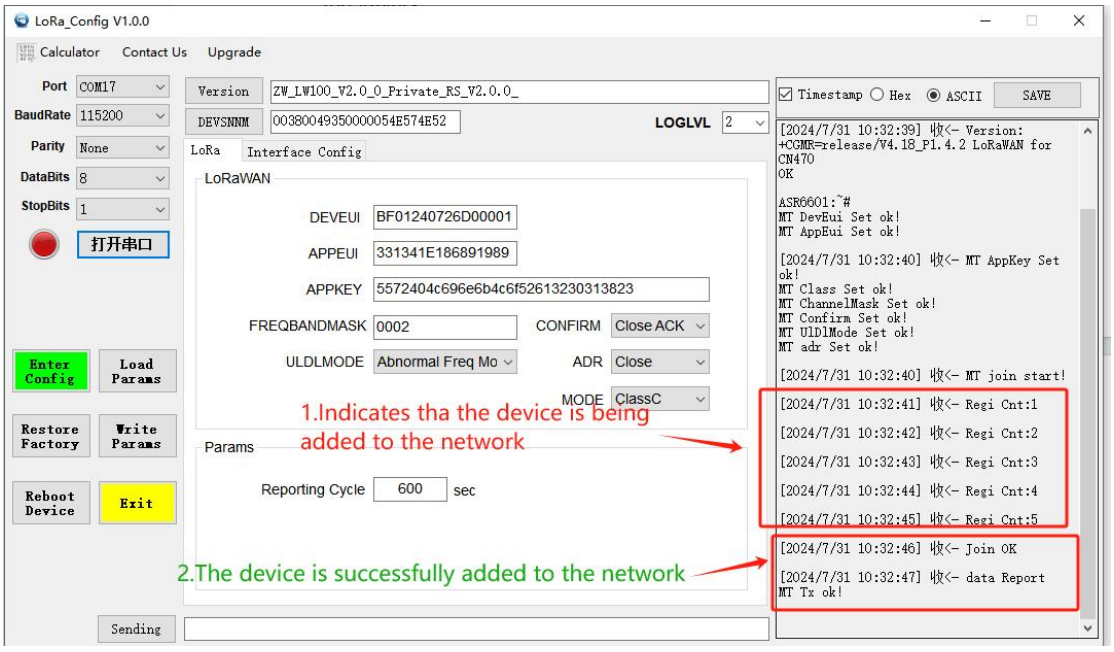
FREQBANDMASK	Set frequency group mask	
ULDLMODE	Set up uplink and downlink same frequency but different frequency	
CONFIRM	Set uplink transmission type	
ADR	Set adaptive speed	
MODE	Set device working mode	

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：

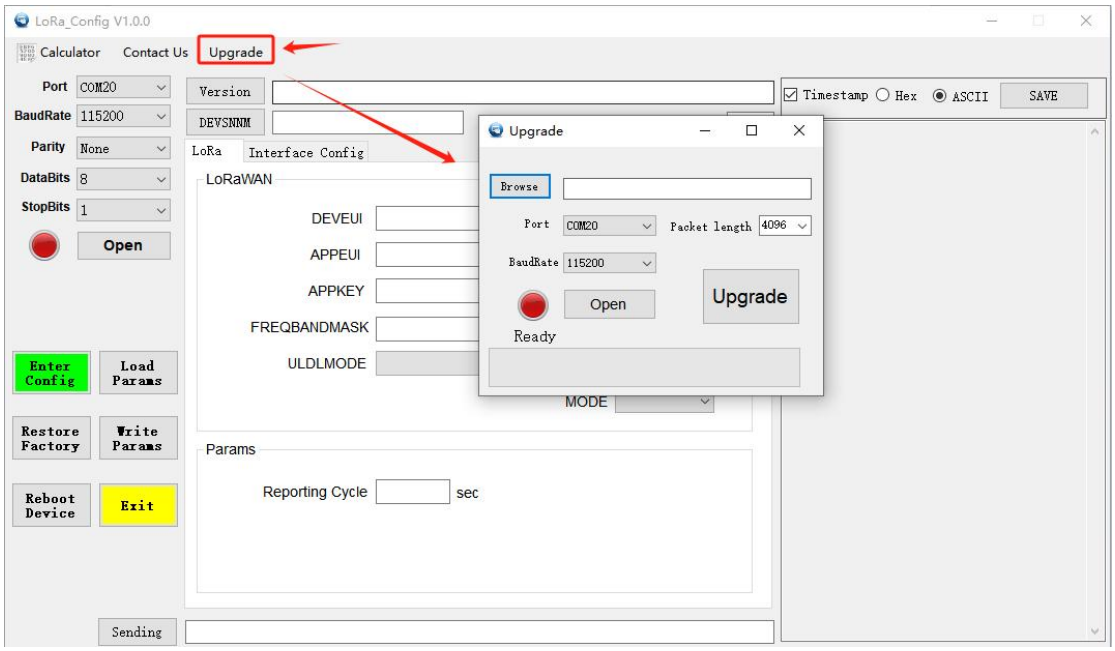


The device is equipped with a built-in LED indicator light, which is located next

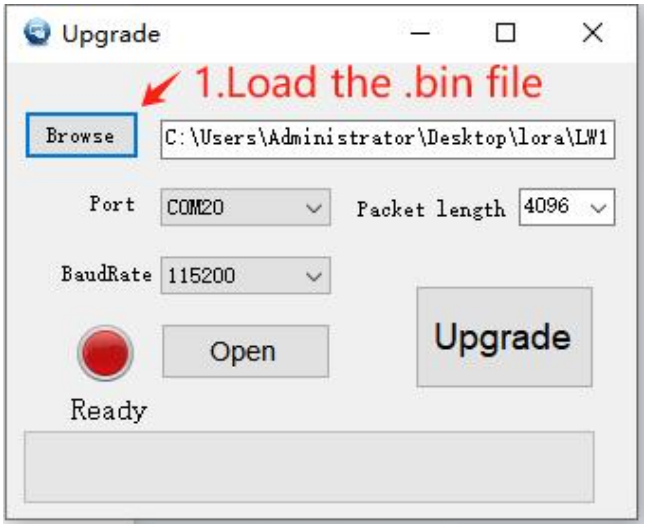
to the antenna interface and can be seen as a green light through the casing.

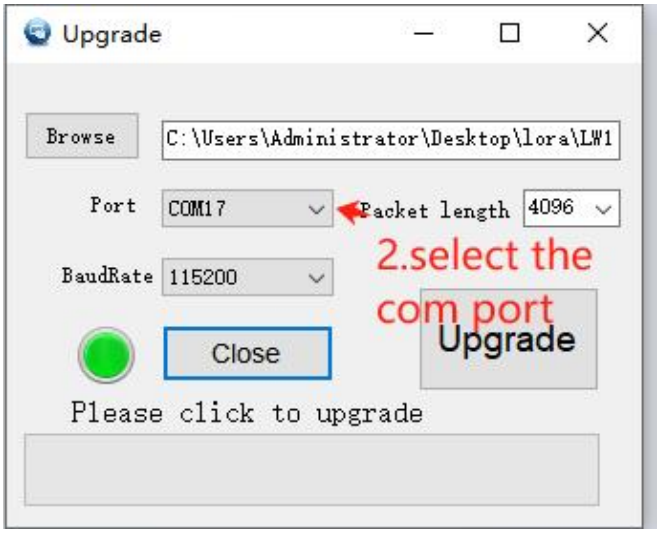
LED	Status	Describe
Green indicator light	Flicker	Add to the network
	Light	Successfully added to the network

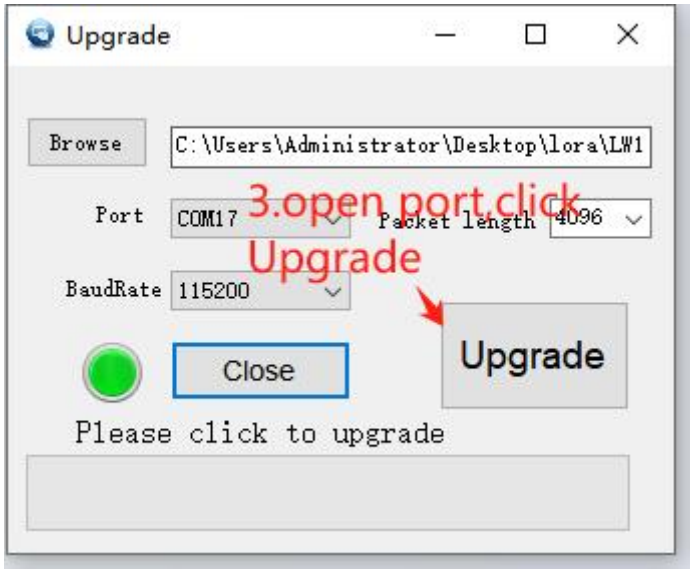
Firmware upgrade:

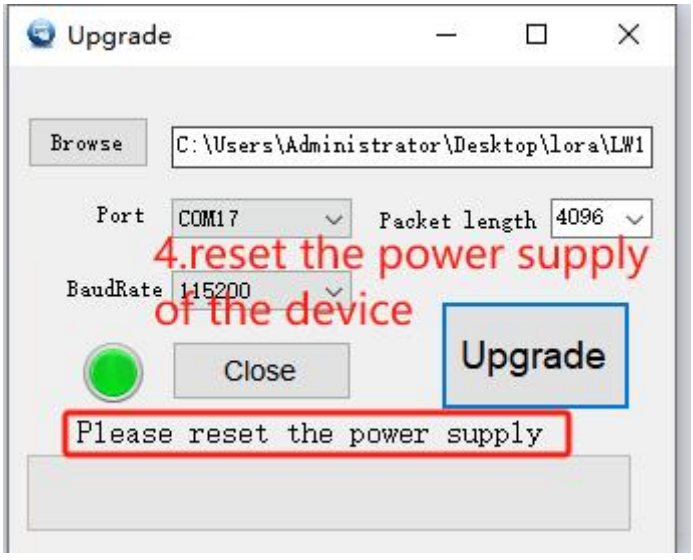


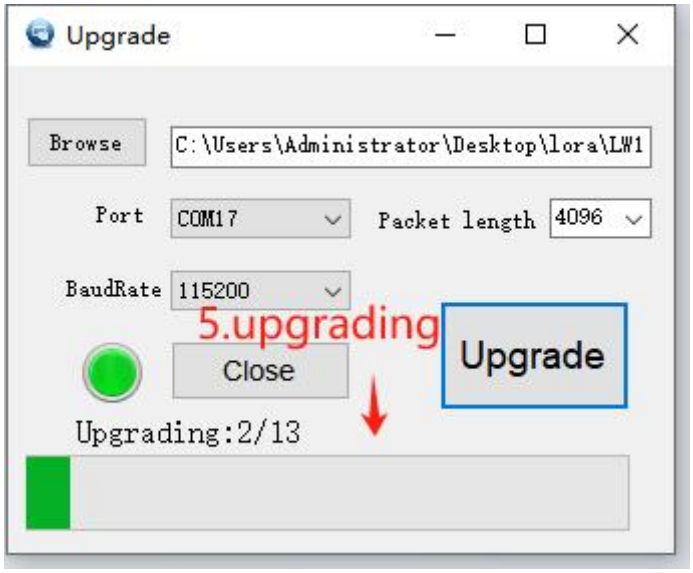
Click to upgrade → Pop up upgrade window

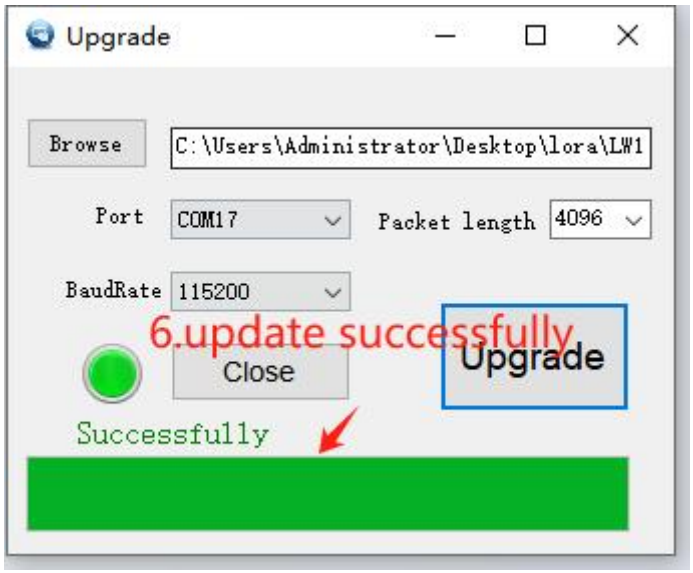



Upgrade
Browse
C:\Users\Administrator\Desktop\lora\LW1
Port
COM17
Packet length
4096
2.select the com port
BaudRate
115200
Close
Upgrade
Please click to upgrade


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

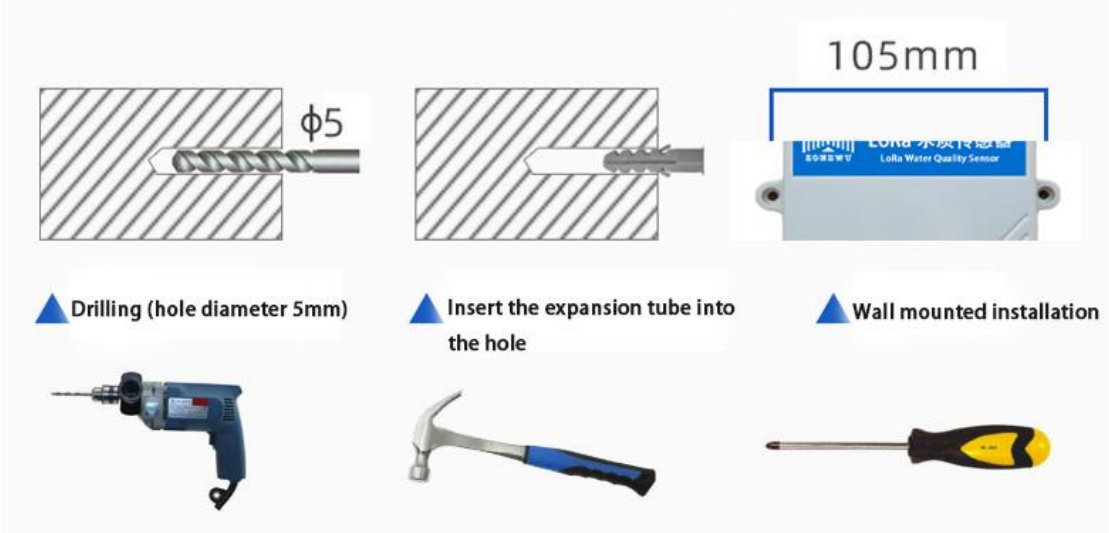




If there is an upgrade error during the upgrade process, you can close and reopen the upgrade window and follow the instructions to upgrade again.

3.3 LW109 Size and Installation

Product size

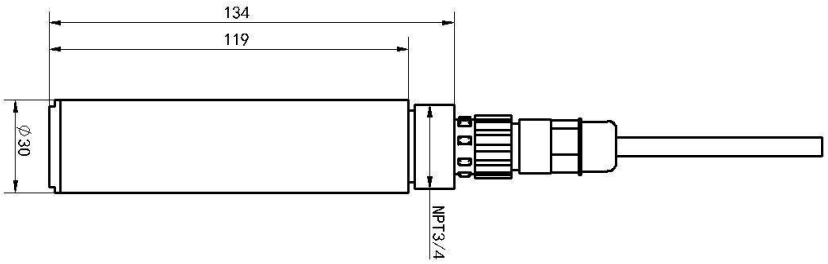


Installation instructions

3.4 Blue Green Algae Transmitter Size and Installation

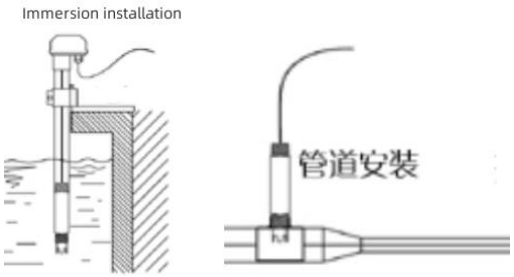
Integrated Blue Green Algae Transmitter Description

3.4.1 Blue Green Algae 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.

0103060CF502BA00E6					
Sensor address	**Instruction type**	**Data Length**	DATA		
			Ammonia Nitrogen	**PH**	**Temp**
1	9	6	0CF5	02BA	00E6
1	9	6	33.17	6.98	23

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**	**0003H**
Parameter	Ammonia Nitrogen	PH	Temp
Unit	mg/L	-	℃
Range	0-100mg/L	0-14PH	-20-80℃
Data Type	uint16	uint16	int16
Sample Value	/100	/100	/10
Operate	Read	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 Sensor calibrate

This equipment uses two-point calibration for ammonia nitrogen, and two known ammonia nitrogen standard solutions need to be prepared.

Before calibrating each calibration point, the equipment should be cleaned thoroughly, excess water should be removed, and the response should be accelerated by shaking it thoroughly in the standard solution before standing still. Wait for more than 15 minutes until the value stabilizes before performing the calibration operation. When calibrating the first point, write 0x0001 to the 0x1200 register and write 100 times the concentration of ammonia nitrogen in the standard solution of the first point to the 0x1201 register (10 times for devices with a range of 1000); When calibrating the second point, write 0x0002 to the 0x1200 register and write 100 times the ammonia nitrogen concentration of the

standard solution for the second point to the 0x1201 register (10 times for devices with a range of 1000), and the calibration is complete. (It is recommended to calibrate once every 2-3 weeks)

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

Issued frame: 10 * 100=1000 converted to hexadecimal as 0x03E8

Starting byte（1byte）	Instruction type（1byte）	Register 0x1200（2byte）	Register 0x1201（2byte）	Trail byte（1byte）
0xFE	03	0x0001	0x03E8	0xEF

Response：

Starting byte（1byte）	Instruction type（1byte）	Register 0x0120（2byte）	Register 0x0121（2byte）	Trail byte（1byte）
0xEF	03	0x0001	0x03E8	0xFE

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

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

Starting byte（1byte）	Instruction type（1byte）	Register 0x1200（2byte）	Register 0x1201（2byte）	Trail byte（1byte）
0xFE	03	0x0002	0x2710	0xEF

Response：

Starting byte（1byte）	Instruction type（1byte）	Register 0x0120（2byte）	Register 0x0121（2byte）	Trail byte（1byte）
0xEF	03	0x0002	0x2710	0xFE

This device adopts two-point calibration for pH, and two known pH standard solutions need to be prepared. When calibrating the first point, write 0x0003 to the 0x1100 register and write 100 times the standard pH value of the first point to the 0x1101 register; When calibrating the second point, write 0x0004 to the 0x1100 register and write 100 times the standard pH value of the second point to the 0x1101 register. Calibration completed.

Example: Select a pH standard solution of 4.01 and calibrate the first point.

Issued frame: 4.01 * 100=401 converted to hexadecimal as 0x0191

Starting byte（1byte）	Instruction type（1byte）	Register 0x1100（2byte）	Register 0x1101（2byte）	Trail byte（1byte）
0xFE	04	0x0001	0x0191	0xEF

Response：

Starting byte（1byte）	Instruction type（1byte）	Register 0x0120（2byte）	Register 0x0121（2byte）	Trail byte（1byte）
0xEF	04	0x0001	0x0191	0xFE

Select a pH standard solution of 9.18 and calibrate the second point.

Issued frame: 9.18 * 100=918 converted to hexadecimal 0x0396

Starting byte （1byte）	Instruction type （1byte）	Register 0x1100 （2byte）	Register 0x1101 （2byte）	Trail byte （1byte）
0xFE	04	0x0002	0x0396	0xEF

Response：

Starting byte （1byte）	Instruction type （1byte）	Register 0x0120 （2byte）	Register 0x0121 （2byte）	Trail byte （1byte）
0xEF	04	0x0002	0x0396	0xFE

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!

◆After use, please clean the electrode head with clean water and cover it with a protective cover.

◆ If dirt and mineral components are attached to the electrode membrane, the sensitivity may decrease, making it difficult to perform sufficient measurements. Please ensure that the platinum ring is clean.

◆A good Ammonia Nitrogen electrode should always keep its platinum sensing ring clean and bright. If the platinum ring of the electrode becomes rough or covered with pollutants after measurement, please clean it according to the following method: (for reference)

Inorganic contamination: Immerse the electrode in 0.1mol/L dilute hydrochloric acid for 15 minutes, gently wipe the platinum ring of the Ammonia Nitrogen electrode with a cotton swab, and then clean with tap water.

Organic or oil pollution: Immerse the electrode in tap water with a small amount of detergent, such as dishwashing detergent, to thoroughly clean the sensing surface of the electrode sensor. Gently wipe the platinum ring of the electrode with a cotton swab, then rinse with tap water and clean it. If the platinum ring of the electrode has formed an oxide film, please polish the sensing surface moderately with toothpaste or 1000 grit sandpaper, and then clean it with tap water. The platinum ring is connected to the glass, please handle it carefully when polishing.

◆ The electrode has a service life of about one year, and should be replaced with a new electrode in a timely manner after aging.