

# LW109 LoRaWAN Integral Chlorophyll Transmitter User Manual



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### 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.

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	<b>-20-80</b> ℃
Resolution	Temperature: 0.1 °C
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 )

## 2. Technical Parameters

Website: <u>http://www.zonewu.com</u> E-mail: <u>qui@zonewu.com</u>



Communication Protocol	LoRaWAN,LoRa TDMA Networking
	AppEUI: 331341E186891989
Equipment information	DevEUI: aaaa202404150001
(Reference)	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.
- 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 SLoRa\_config V1.0.0 .open the corresponding COM port .

Port default parameters:

BaudRate	115200bit/s
Parity	None
DataBits	8
StopBits	1

As follows:

LoRa_Config V	V1.0.0										×
Calculator	Contact L	Js Upgrade									
Port COM17	7 ~	Version					🗹 Timestamp (	) Hex 💿 ASC	п	SAVE	
BaudRate 11520	v 00	DEVSNNM				LOGLVL	~				
Parity None	~	LoRa In	terface Config								
DataBits 8	~	LoRaWA	N								
StopBits 1	×		DEVEUI								
Ki	利串口		APPEUI								
			APPKEY								
		FF	REQBANDMASK		CONFIRM	~					
Enter Config F	Load Parans		ULDLMODE	~	ADR	~					
			JOINMODE	~	MODE	~					
Restore Factory F	Write Params	Params									
Reboot De <del>v</del> ice	Exit		Reporting Cycle	S							
s	Sending					2					

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



LoRa_Confi	ig V1.0.0							1944		×
Calculato	r Contact	Us <mark>Upg</mark> r	ade							
Port CO	M17 ~	Versio	n				Timestamp () Hex	() ASCIT	SAVE	
BaudRate 11	5200 ~	DEVSNN	IM			LOGLVL		0		
Parity No	ne v	LoRa	Interface Config		3		-			Ŷ
DataBits 8	~	LoRa	WAN							
StopBits 1	~		DEVEUI							
	关闭串口		APPEUI							
			APPKEY							
_1	2		FREQBANDMASK		CONFIRM	~				
Enter Config	Load Parans		ULDLMODE	~	ADR	~				
			JOINMODE	~	MODE	~				
Restore Factory	Vrite Parans	4 Parar	ns							
Reboot Device	Exit		Reporting Cycle	S						
5										
	Sending									Ų

LoR	aWAN				
	DEVEUI	BF01240726D00001			
	APPEUI	331341E186891989			
	APPKEY	5572404c696e6b4c6f52613230313823		823	
	FREQBANDMASK	0002	CONFIRM	Close ACK	~
	ULDLMODE	Abnormal Freq Mo ~	ADR	Close	~
			MODE	ClassC	~
Para	ams				
	Reporting Cycle	600 s			

#### LoRaWAN Interface:

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



FREQBANDMASK	Set frequency group mask	
	Set up uplink and downlink same frequency but	
ULDLMODE	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:

CoRa_0	Config V1.0.0							-		×
The Calcul	ator Conta	ct Us Upgrade	•							
Port	COM17	Version	ZW_LW100_W2.0_0_Pri	ivate_RS_V2.0.0_			🗹 Timestamp 🔿 Hex 🛛	• ASCII	SAVE	
BaudRate	115200	DEVSNNM	00380049350000054E5	574E52	LOGLV	L 2 ~	[2024/7/31 10+32+39]	- المار Werei	on:	
Parity	None	- LoRa In	nterface Config				+CGMR=release/V4.18_F CN470	21.4.2 LoRa	WAN for	
<b>DataBits</b>	8	LoRaWA	AN				ok			
StopBits			DEVEUI BF01	1240726D00001			ASR6601:~# MT DevEui Set ok! MT AppEui Set ok!			
	шлњц	-	APPEUI 3313 APPKEY 5572	341E186891989 2404c696e6b4c6f52613;	230313823		[2024/7/31 10:32:40] ok! MT Class Set ok! MT ChannelWask Set ok	Чұ<- МТ Ар	pKey Set	
Entor	Load	F	REQBANDMASK 0002	2 CON	ADR Close		MT Confirm Set ok! MT UlDlMode Set ok! MT adr Set ok!			
Config	Parans		1.Indicates	s tha the device	MODE ClassC		[2024/7/31 10:32:40] [2024/7/31 10:32:41]	收<- MT jo 收<- Regi	in start Cnt:1	
Factor	e Viite y Params	Params	added to t	he network		-	[2024/7/31 10:32:42] [2024/7/31 10:32:43]	収<- Regi 収<- Regi	Cnt:2 Cnt:3	
Reboot Device	Exit		Reporting Cycle 6	00 sec			[2024/7/31 10:32:44] [2024/7/31 10:32:45]	收<- Regi 收<- Regi	Cnt:4 Cnt:5	
		2 Tho d		fully added to	the network		[2024/7/31 10:32:46]	收<- Join	OK	ר
		z.me di	evice is success	sing added to		[2024/7/31 10:32:47] MT Tx ok!	4∑<- data	Report		
	Sending	:								~

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
Croop indicator light	Flicker	Add to the network
Green indicator light	Light	Successfully added to the network

#### Firmware upgrade:

FUIL	COM20 ~	Version	Timestamp 🔿 Hex 💿 ASCII SAVE
udRate	115200 ~	DEVSNNM	Upgrade – 🗆 X
Parity	None $\vee$	LoRa Interface Config	
ataBits	8 ~	LoRaWAN	Browse
topBits	1 ~	DEVEUI	Part 2000
	Open	APPEUI	BaudRate 115200 V
		APPKEY	Open Upgrade
Enter Config	Load Parans	ULDLMODE	MODE
estore actory	e Vrite 7 Params	Params	
leboot levice	Exit	Reporting Cycle	sec

Click to upgrade  $\rightarrow$  Pop up upgrade window





opgrade		_3		×
Browse C:\Vsers\Adm	inistrator	·\Desk	top\lor:	a\LW1
Port COM17	🗸 🛹 acke	t ler	gth 409	6 🗸
BaudRate 115200	✓ 2.1	sele	ect th	ie
Close		υ	port	ə
Please click to	ungrade	5		- 20
		22		
Upgrade	1	_8		X
			1000	
100 100	1.1.5	r\Des	ktop\lom	a\LW1
Browse C:\Users\Adm	inistrato			
Browse C:\Users\Adm	inistrato	ort	click	
Browse C:\Users\Adm Port COM17 3.01	onistrato	o <mark>rt</mark>		96 🗸
Port COM17 3.01	ven per	<mark>qrt</mark>		96 🗸
Browse C:\Vsers\Adm Port COM17 3.01 BaudRate 115200	grade	orit,	<mark>click</mark>	96 🗸
Browse C:\Users\Adm Port COM17 3.01 BaudRate 115200	oen p grade	orit,	<u>çlick</u>	96 ~
Browse C:\Vsers\Adm Port COM17 3.01 BaudRate 115200 Close			pgrad	96 ~
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Browse C:\Users\Adm Port COM17 3.01 BaudRate 115200 Close Please click to			<mark>çlick</mark> pgrad	96 ~
Browse C:\Users\Adm Port COM17 3.01 BaudRate 115200 Close Please click to	upgrade		ograd	96 ~

_	T			
Browse	C:\Users\Administ	rator\Des	ktop\lor	∙a\LW
Port	4.reset the	Packet ler	ngth 409 r sup	96 Ida
BaudRat	of the devic	ce 🗖		
	Close	U	ograd	е
	se reset the po	wer sup	ply	





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



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	da	ata
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	Instruction	Data	Data DATA			
address	type	Length	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	РН	Temp
Unit	mg/L	-	°C
Range	0-100mg/L	0-14PH	<b>-20-80</b> ℃
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	Instruction type	Trail byte
(1byte)	(1byte)	(1byte)
0xFE	01	0xEF

Response:

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

#### 4.3.2 Set Reporting cycle

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

Response:

Starting byte	Instruction	Reporting	Trail byte
(1byte)	type(1byte)	cycle(2byte)	(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 concentration of the first point.

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.

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

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

Starting byte (1byte)	Instruction type	Register 0x0120 ( <b>2byte</b> )	Register 0x0121 (2bvte)	Trail byte
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	Instruction type	Register 0x1200	Register 0x1201	Trail byte	
	(1byte)	(1byte)	(2byte)	(2byte)	(1byte)	
	0xFE	03	0x0002	0x2710	0xEF	
Response:						
	Starting byte	Instruction type	Register 0x0120	Register 0x0121	Trail byte	

Starting byte	Instruction type	Register 0x0120	Register 0x0121	Trail byte
(1byte)	(1byte)	(2byte)	(2byte)	(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 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		
R	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



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