LW100 LoRaWAN Integral EC Transmitter User Manual

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1. Overview

LoRa water quality EC, temperature, salinity sensor is a water conductivity sensor used to measure the conductivity of solutions. It has an automatic temperature compensation function, which can compensate the conductivity of the current temperature to the specified temperature. It can be widely used for continuous monitoring of the conductivity value of aqueous solutions in fields such as water quality, aquaculture, sewage treatment, environmental protection, pharmaceuticals, food, and tap water. Supports LoRa TDMA self-organizing network and standard LoRaWAN protocol.

2. Technical Parameters

Power Supply	DC12V/24V	
Operating emperature	-20~+80°C	
Sensor parameters	Temperature	-5~+80°C
	EC	Electrode constant K=1:1~2000us/cm Electrode constant K=10:10~20000us/cm
	Salinity	Electrode constant K=1:0~1000mg/L Electrode constant K=10:0~11476mg/L
	TDS	Electrode constant K=1：0~1100mg/L Electrode constant K=10：0~13400mg/L
Typical Accuracy	Temperature	±0.1℃
	EC	Electrode constant K=1:0.1 μ s/cm; Electrode constant K=10:1 us/cm;
	Salinity	-
Temperature Compensation Range	-5~+80℃ (default compensation temperature is 25℃)	

Temperature Compensation Coefficient	Default 0.02
EC Equipment Working Conditions	-20~+80℃
Pressure Resistance	0.6MPa
EC 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

2.1 Common knowledge of conductivity EC

- The conductivity of water quality is the ability of a solution to conduct electrical current, which is usually used to indicate the purity of water.
- The conductivity of pure water is very low. When the water contains inorganic acids, bases, salts, or organic charged colloids, the conductivity increases. Conductivity is commonly used to indirectly infer the total concentration of charged substances in water. The conductivity of an aqueous solution depends on the properties and concentration of the charged substance, as well as the temperature and viscosity of the solution.
- The conductivity changes with temperature, and for every 1C increase in

temperature, the conductivity increases by about 2%. It is usually specified that 25 ° C is the standard temperature for measuring conductivity.

- The conductivity of newly distilled water is 0.5-2uS/cm. After being stored for a period of time, the conductivity can increase to 2-4uS/cm due to the dissolution of carbon dioxide or ammonia in the air
- The conductivity of drinking water is between 50-1500us/cm; The conductivity of seawater is approximately 30000 us/cm; The conductivity of clean river water is 100 uS/cm.

2.2 Product List

- LW100 LoRaWAN Terminal 1 piece
- TYPE-C data cable 1 piece
- Conductivity Transmitter 1 piece (individual packing)

3. Configuration and Installation

3.1 LW100 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 LW100 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 .

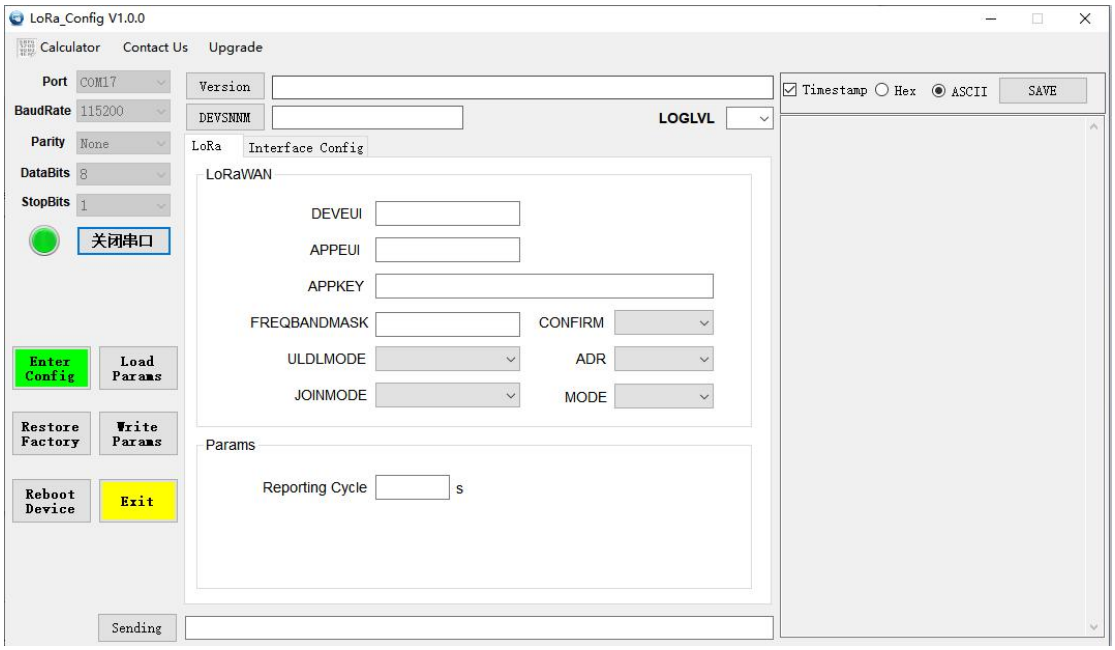
2. Connect the LW100 to the PC using a USB cable and check if there is a COM port. If not, please recheck the equipment wiring and driver installation.

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

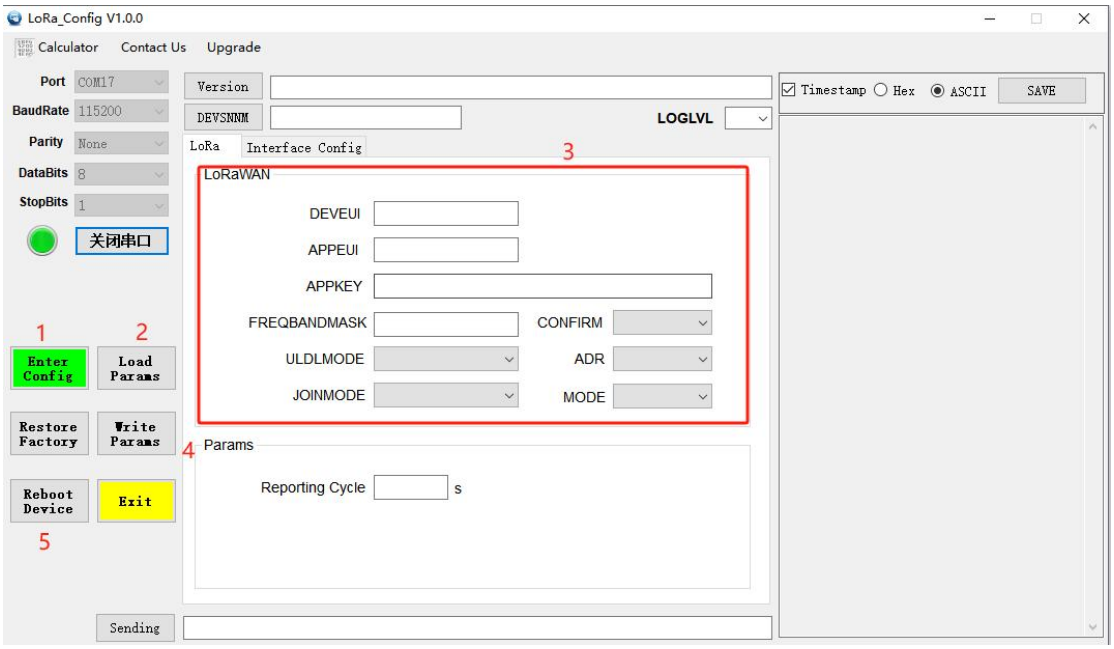
Port default parameters:

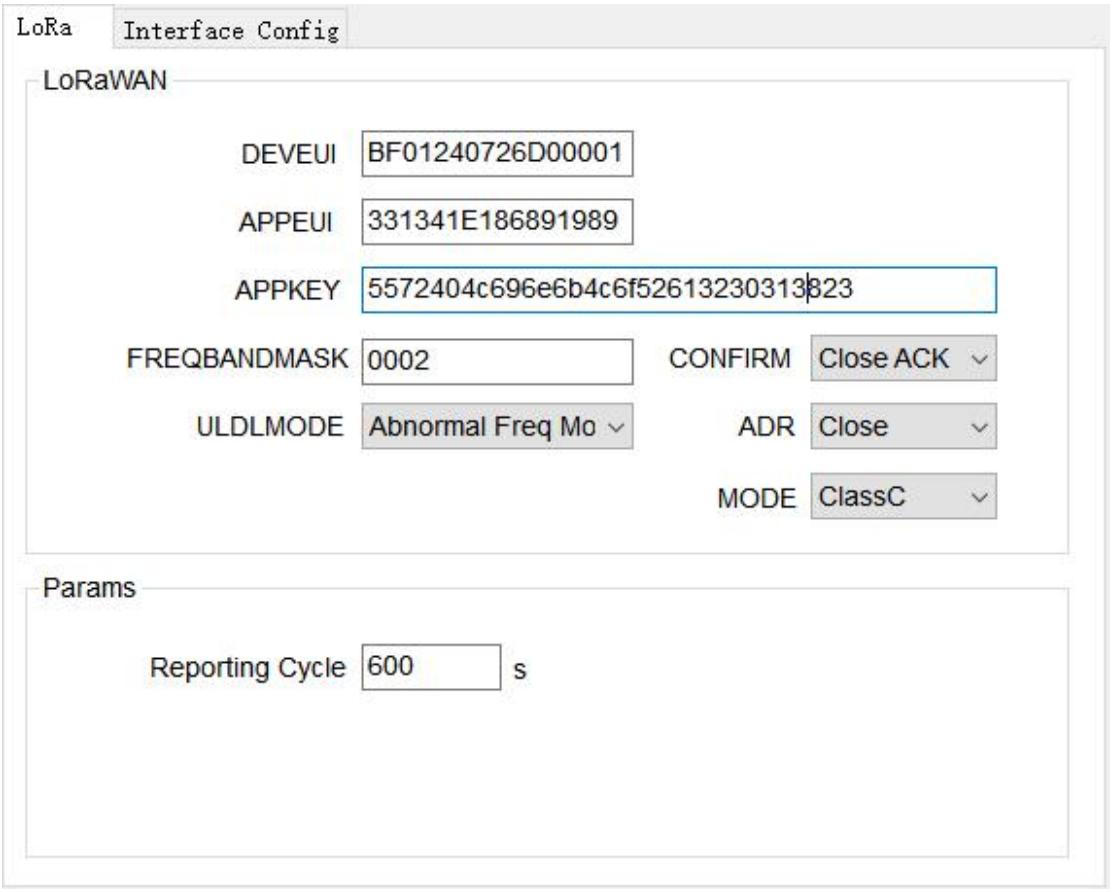
BaudRate	115200bit/s
Parity	None
DataBits	8
StopBits	1

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

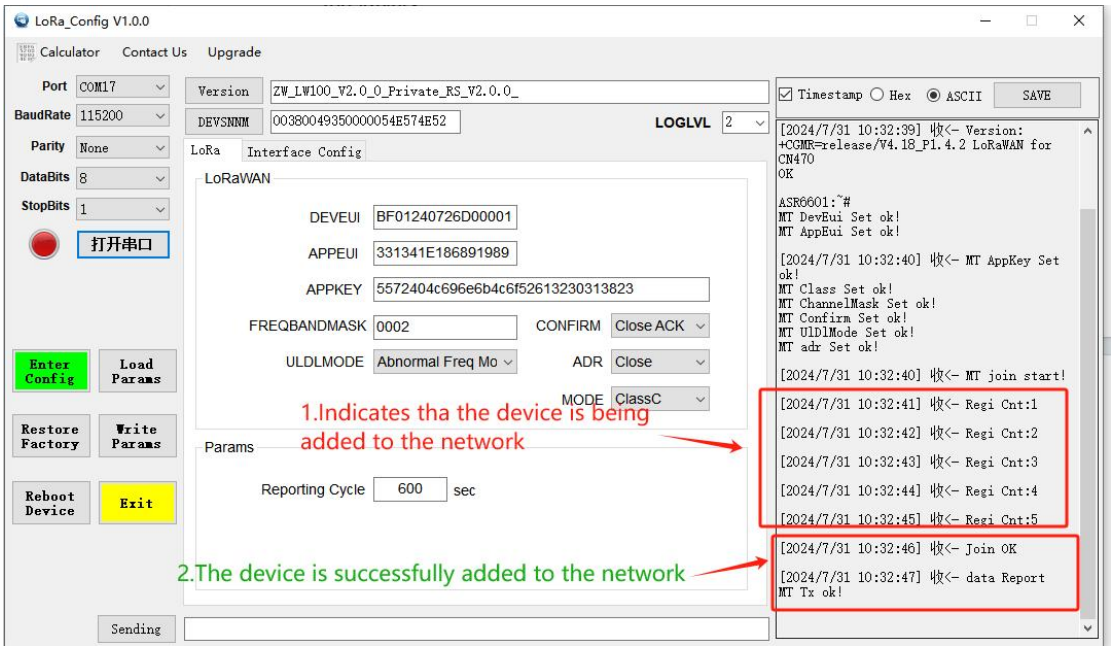
FREQBANDMASK	Set frequency group mask	
ULDLMODE	Set up uplink and downlink same frequency but different frequency	
CONFIRM	Set uplink transmission type	
ADR	Set adaptive speed	
MODE	Set device working mode	

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 300s (5min)	

Printing logs of device startup and network connection：

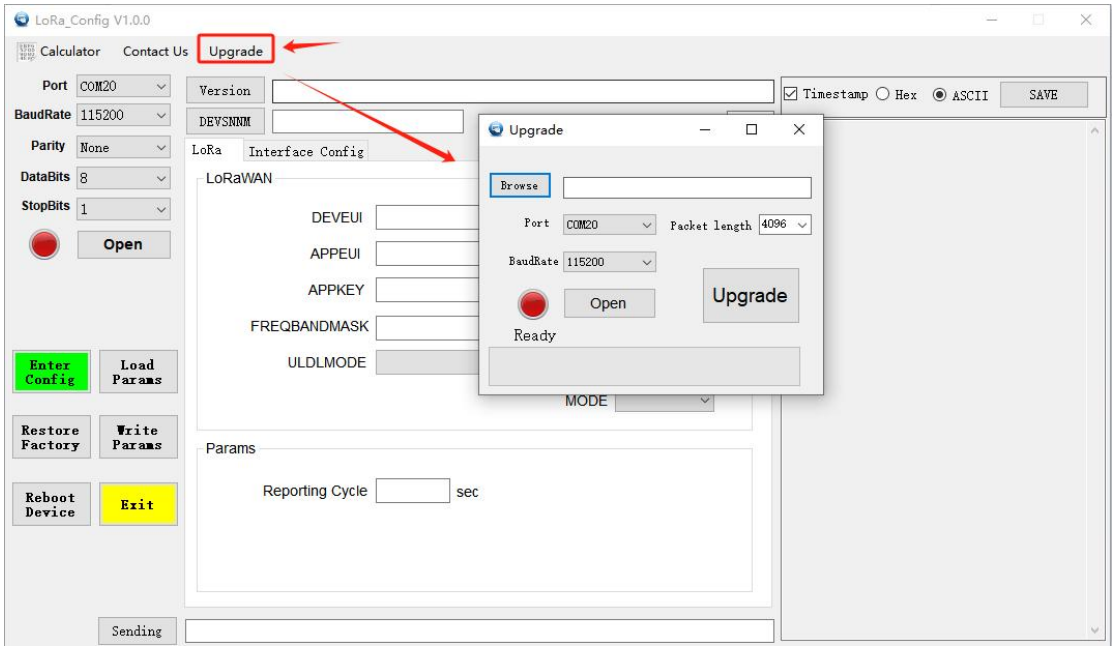


The device is equipped with a built-in LED indicator light, which is located next

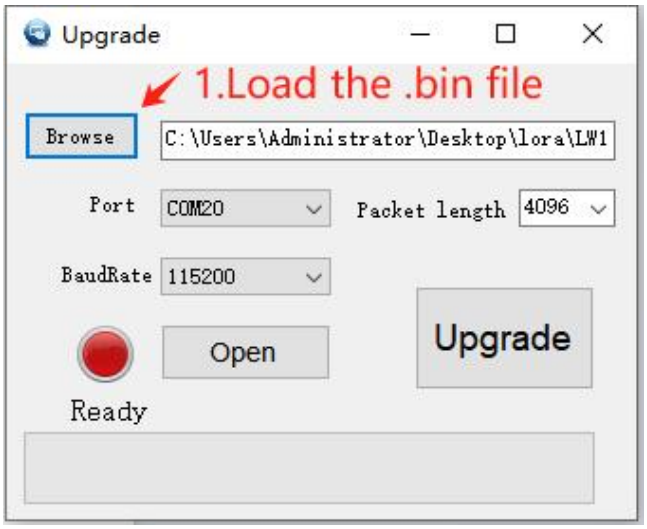
to the antenna interface and can be seen as a green light through the casing.

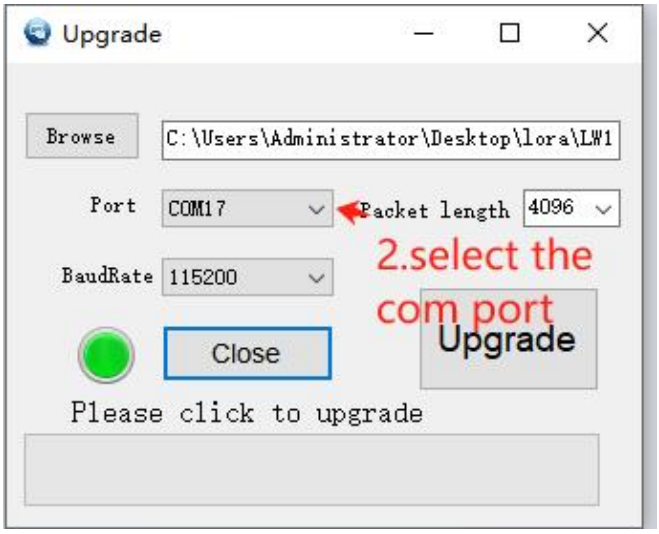
LED	Status	Describe
Green indicator light	Flicker	Add to the network
	Light	Successfully added to the network

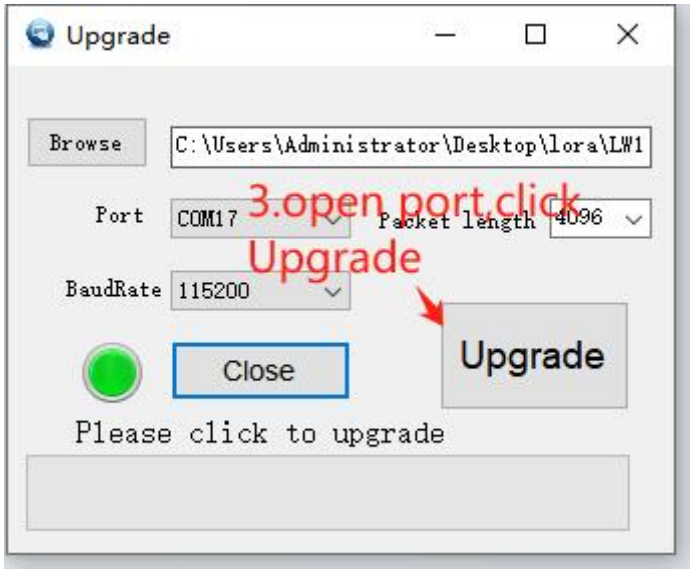
Firmware upgrade:

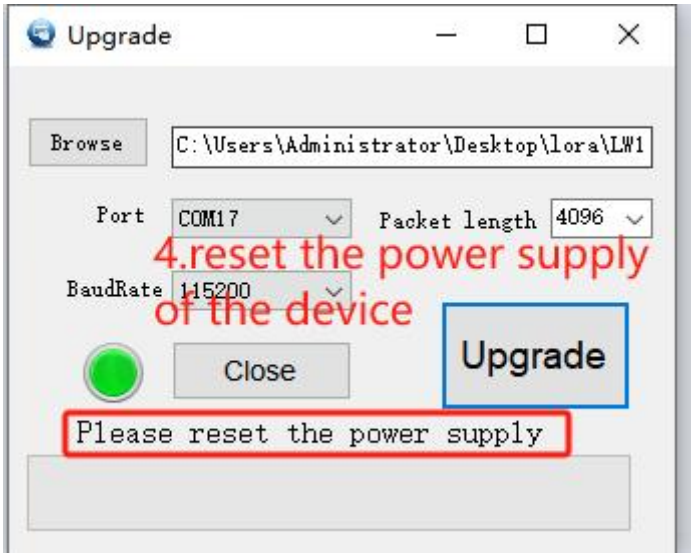


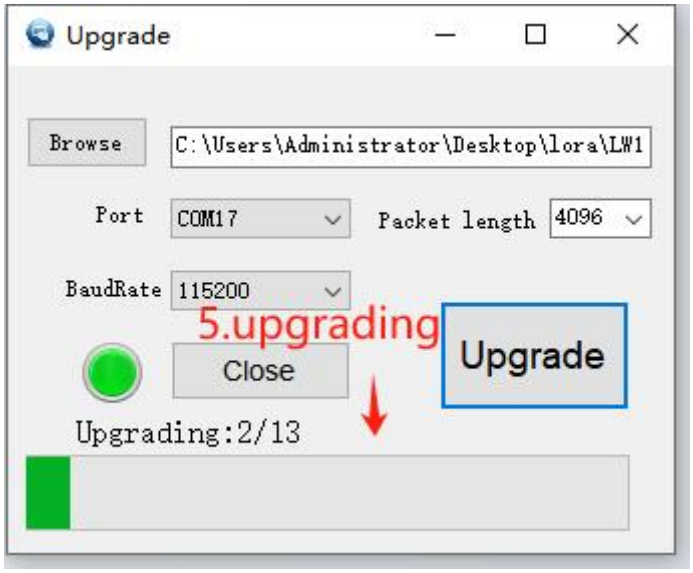
Click to upgrade → Pop up upgrade window

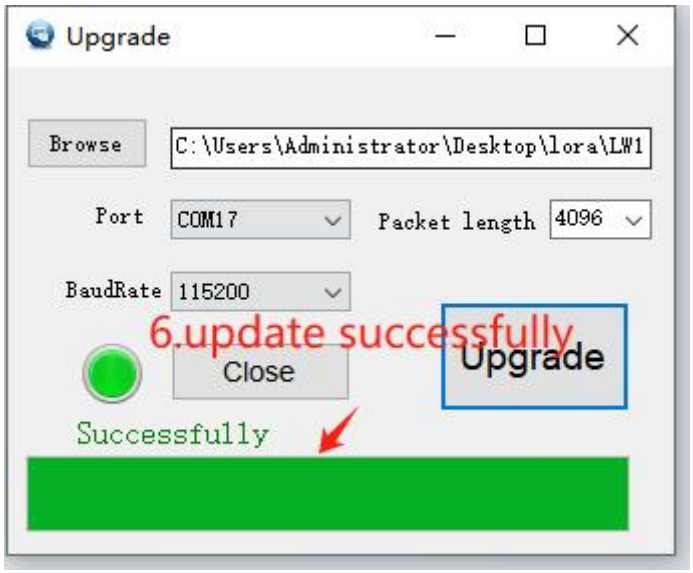



Upgrade
Browse
C:\Users\Administrator\Desktop\lora\LW1
Port
COM17
Packet length
4096
2.select the com port
BaudRate
115200
Close
Upgrade
Please click to upgrade


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

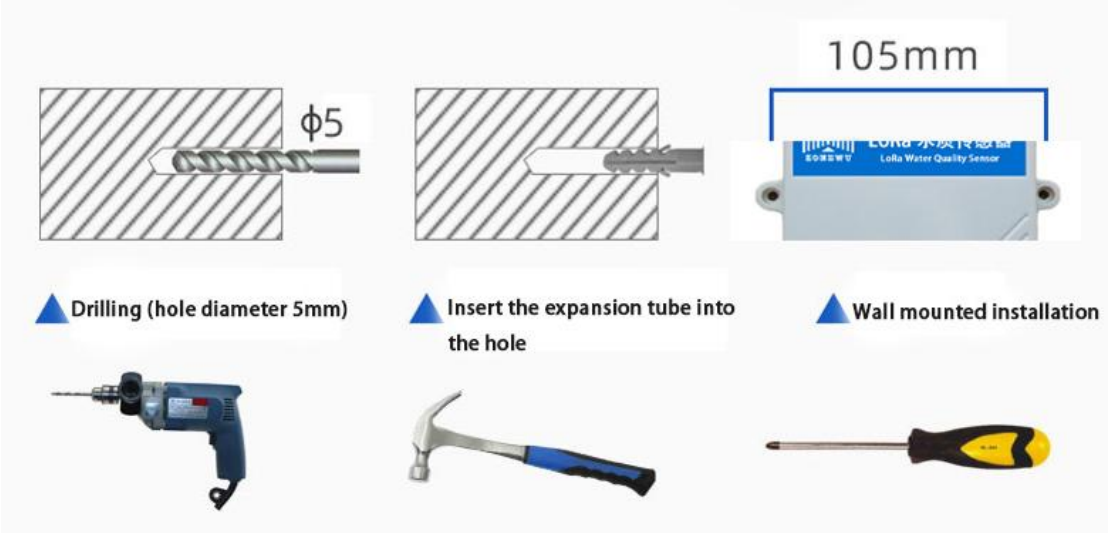




If there is an upgrade error during the upgrade process, you can close and reopen the upgrade window and follow the instructions to upgrade again.

3.3 LW100 Size and Installation

Product size

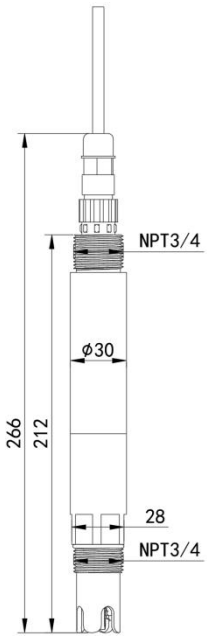


Installation instructions

3.4 EC Transmitter Size and Installation

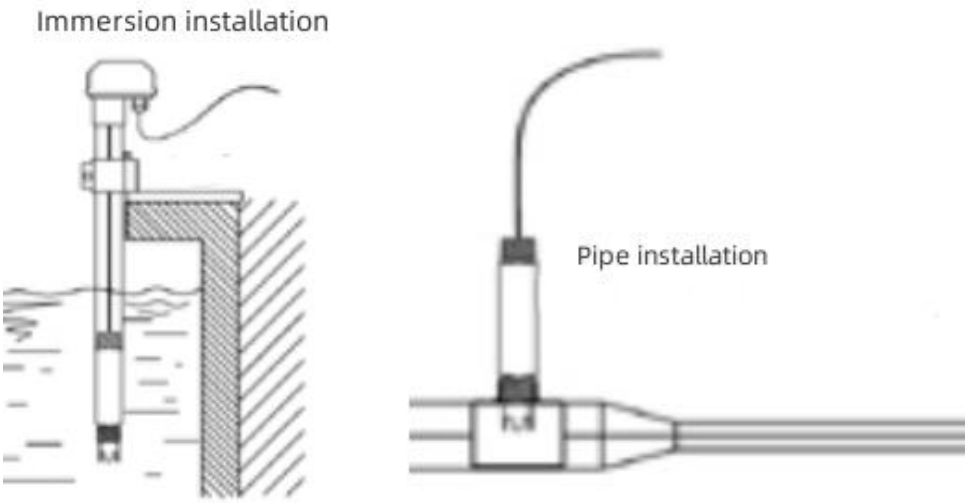
Integrated EC Transmitter Description

3.4.1 EC Transmitter Size



3.4.2 Installation

1. Submerged installation: The lead wire of the equipment is passed through the waterproof pipe, and the 3/4 thread on the top of the equipment is connected with the 3/4 thread of the waterproof pipe with raw material tape. Make sure that the top of the equipment and the equipment lines are free of water.
2. Pipe Installation: Connect to the pipe through the 3/4 thread of the device.



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	2 byte

4.2 Upward Data

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

010008FFFFFFFFFFFFFFFF						
Sensor address	**Instruction type**	**Data**	**Data**			
		Length	**EC**	**Temp**	**Salinity**	**TDS**
01	00	08	FF FF	FF FF	FF FF	FF FF

Note: If the received data is 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**	**0004H**
Parameter	EC	Temperature	Salinity	TDS
Unit	uS/cm	℃	mg/L	mg/L
Range (K=10)	10~20000	-5~+80	0~11476	0~13400
Sample Value	/1	/10	/1	/1
Operate	Read	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 Calibration of EC transmitter standard solution

Starting byte（1byte）	Instruction type（1byte）	Standard value（2byte）	Trail byte（1byte）
0xFE	03	X	0xEF

Response：

Starting byte（1byte）	Instruction type（1byte）	Standard value（2byte）	Trail byte（1byte）
0xEF	03	X	0xFE

Example:

Calibration of EC transmitters with a range of 10-20000 using 1413 μS/cm standard solution.1413 to convert hexadecimal to 0x585.

(If K=1 , the standard value needs to be multiplied by 10)

Item	Starting byte	Instruction type	Standard value	Trail byte
Send	FE	03	0585	EF
Receive	EF	03	0585	FE

Note: After reporting the response, there will be another data report.

The calibration process takes about 15 seconds, please do not turn off

the power during the calibration process. Do not remove the EC transmitter from the calibration solution.

4.4 Precautions for use

- In principle, 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 according to different application conditions (such as the degree of dirt in the application, deposition of chemical substances, etc.).
- If the electrode is not used for a long time, it can generally be stored in a dry place, but it must be placed (stored) in distilled water for several hours before use to activate the electrode. Electrodes that are frequently used can be placed (stored) in distilled water.
- Organic contamination on the electrode can be cleaned with warm water containing detergent, or with alcohol.
- It is best to use 10% citric acid for calcium and magnesium precipitates.
- Cleaning electrode plates or poles can only be done by chemical methods or by shaking them in water. Be careful not to wipe the electrode plates or poles, otherwise it will damage the plating layer (platinum black) on the electrode surface.

4.5 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!
- If the electrode is not used for a long time, it can generally be stored in a dry place, but it must be placed (stored) in distilled water for several hours before use to activate the electrode. Electrodes that are frequently used can be placed (stored) in distilled water.
- Cleaning of conductive electrodes:
- Organic contamination on the electrode can be cleaned with warm water containing detergent, or with alcohol.
- It is best to use 10% citric acid for calcium and magnesium precipitates.
- Only chemical methods or shaking in water can be used to clean electrode plates or columns. Wiping the electrode pads will damage the plating layer (platinum black) on the electrode surface.
- 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).