



## LWL01 – LoRaWAN Water Leak User Manual

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## 1. Introduction

### 1.1 What is LWL01 LoRaWAN Water Leak Sensor

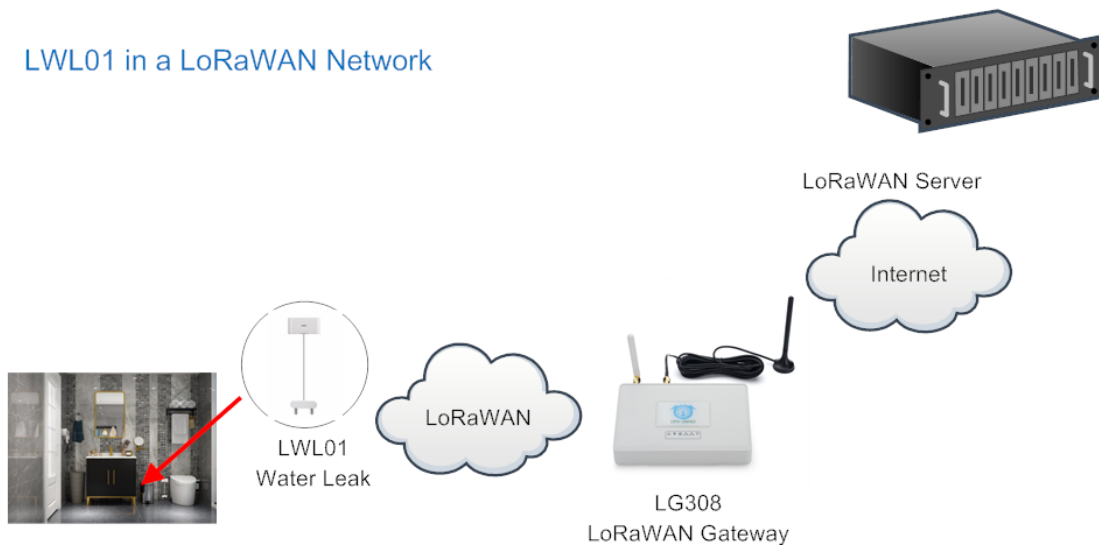
The Dragino LWL01 is a LoRaWAN Water Leak Sensor. It detects the water leak status and send it to LoRaWAN network. The LWL01 is small sensor, the dimension is as small as 64 x 30 x 14 mm.

LWL01 is powered by a CR2032 coin battery, in a good LoRaWAN Network Coverage case, it can transmit as many as 12,000 uplink packets (base on SF7, 14dB). in poor LoRaWAN network coverage, it can transmit ~ 1,300 uplink packets (base on SF10, 18dB). The design goal for one battery is up to 2 years. User can easily change the CR2032 battery for reuse.

The LWL01 will send periodically data every day as well as for water leak event. It also count the water leak event times and also calculate last water leak duration.

Each LWL01 is pre-loaded with a set of unique keys for LoRaWAN registrations, register these keys to local LoRaWAN server and it will auto connect after power on.

#### LWL01 in a LoRaWAN Network



## 1.2 Features

- ✓ LoRaWAN Class A v1.0.3
- ✓ Frequency Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915/IN865/RU864
- ✓ SX1262 LoRa Core
- ✓ Water Leak detect
- ✓ CR2032 battery powered
- ✓ AT Commands to change parameters
- ✓ Remote configure parameters via LoRa Downlink
- ✓ Firmware upgradable via program port

## 1.3 Applications

- ✓ Smart Buildings & Home Automation
- ✓ Logistics and Supply Chain Management
- ✓ Smart Metering
- ✓ Smart Agriculture
- ✓ Smart Cities
- ✓ Smart Factory

## 1.4 Dimension



## 1.5 Firmware Change log

[LWL01 Image files – Download link](#)

### Image v1.0

- Release

## 2. Power ON LWL01

When receive the LWL01, please open the enclosure and remove the isolated paper and PRESS RESET so the coin battery can power on the device and device runs in low power mode. The [LED](#) will blink when devices is powered.

### 3. Operation Mode

#### 3.1 How it works?

The LWL01 is configured as LoRaWAN OTAA Class A mode. It has OTAA keys to join network. To connect a local LoRaWAN network, user just need to input the OTAA keys in the network server and [power on](#) the LWL01. It will auto join the network via OTAA.

In case user can't set the OTAA keys in the network server and has to use the existing keys from server. User can [use AT Command](#) to set the keys in the devices.

#### 3.2 Example to join LoRaWAN network

Here shows an example for how to join the TTN Network. Below is the network structure, we use our LG308 as LoRaWAN gateway here.



The LWL01 is installed on the door edge to detect the open / close event. And send the status to LoRaWAN server. The LWL01 will uplink two type of messages to the server.

- ✓ A keep-alive message which send once per day.
- ✓ An emergency event message when detect a water leak.
- ✓ A periodically update at every 5 minutes when in water leak.
- ✓ A message when switch from water leak to none water leak.

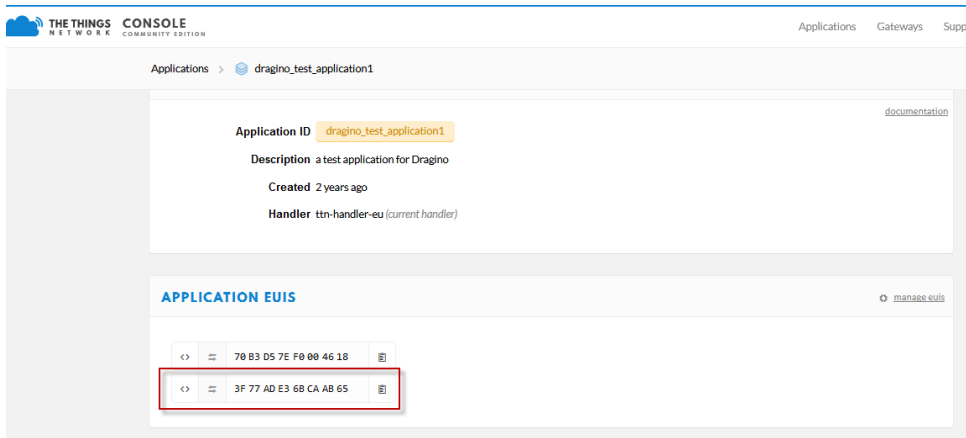
The LG308 is already set to connect to [TTN network](#). So what we need to now is only configure the TTN:

**Step 1:** Create a device in TTN with the OTAA keys from LWL01.

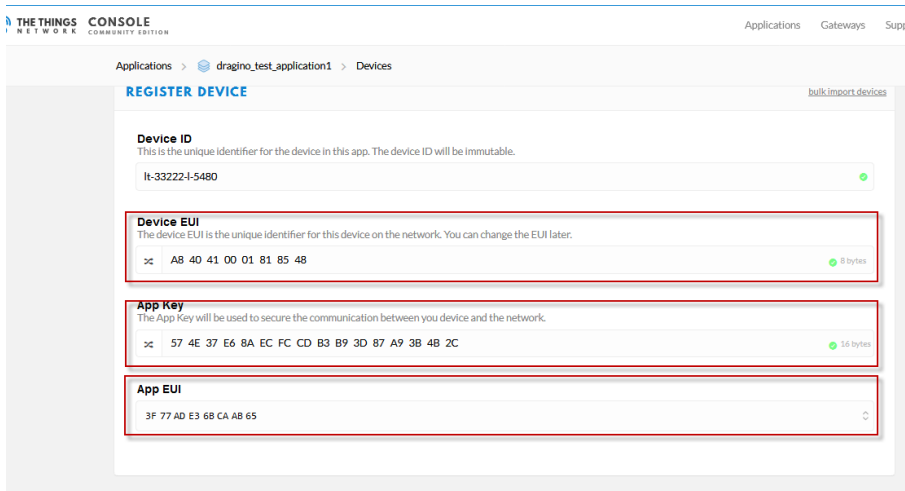
Each LWL01 is shipped with a sticker with unique device EUI:



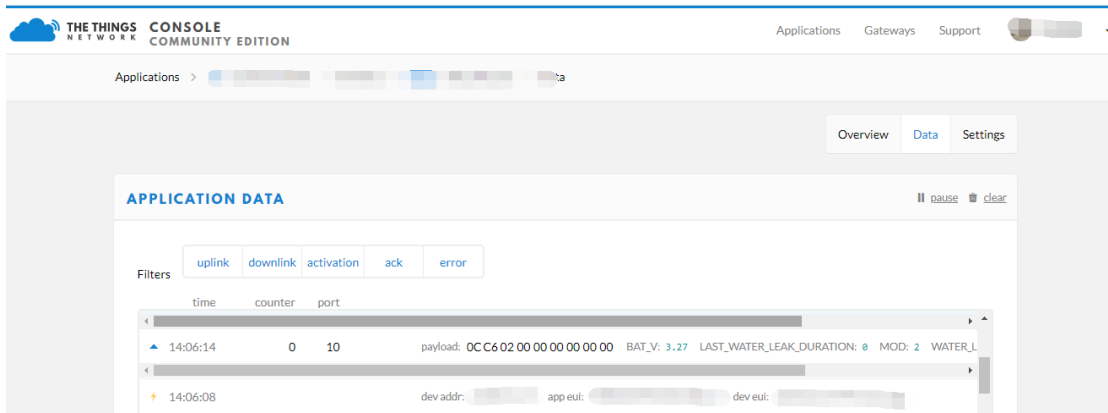
User can enter this key in their LoRaWAN Server portal. Below is TTN screen shot:  
Add APP EUI in the application.



Add APP KEY and DEV EUI



**Step 2:** [Power on](#) LWL01 and it will auto join to the TTN network. After join success, it will start to upload message to TTN and user can see in the panel.



### 3.3 Uplink Payload

Total 9 bytes.

Size(bytes)	3	1	3	3
value	Status&BAT	MOD Always:0x02	Total water leak events	Last water leak duration (unit: min)

Example:

```
payload: 4B E2 02 00 00 08 00 00 01 BAT_V: 3.042 LAST_WATER_LEAK_DURATION: 1 MOD: 2 WATER_LEAK_STATUS: 1 WATER_LEAK_TIMES: 8
```

Example Payload Decoder in TTN:

[http://www.dragino.com/downloads/index.php?dir=LoRa\\_End\\_Node/LDS01/Payload/](http://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/LDS01/Payload/)

### 3.4 Downlink Payload

Downlink Control Type	Type Code	Downlink payload size(bytes)
TDC (Transmit Time Interval—Keep Alive Interval)	0x01	4
RESET	0x04	2
Clear Counting	0xA6	2

Example Downlink payload setting in TTN:

**DOWNLINK**

**Scheduling**

replace first last

**FPort**

2

Confirmed

**Payload**

bytes fields 01 00 00 3C 4 bytes

#### Type Code 0x01

If the payload=0100003C, means to control the LWL01's Keep Alive interval to 0x00003C=60(S)

#### Type Code 0x04

If payload = 0x04FF, it will reset the LWL01.

#### Type Code 0xA6

Example: 0xA601: Clear Counting

For LWL01: reset count number.

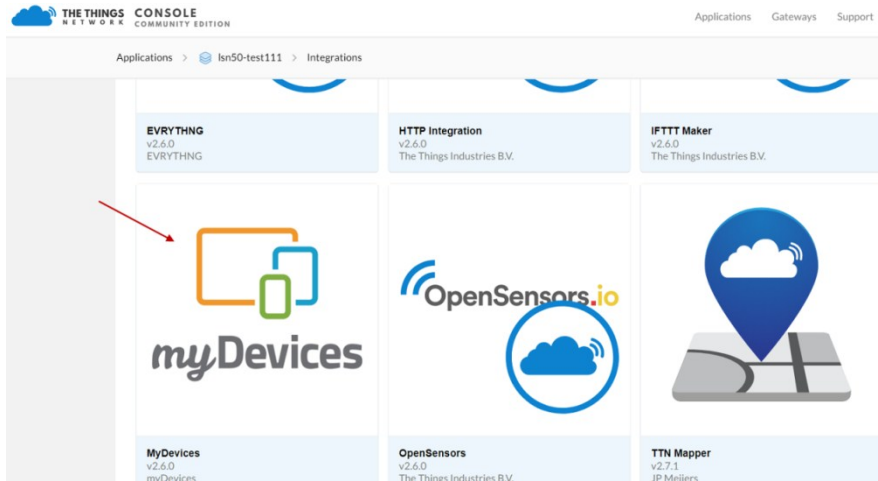
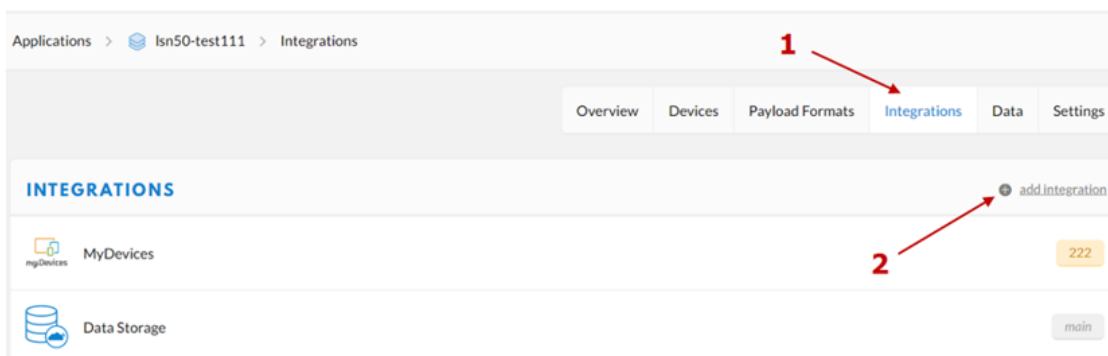


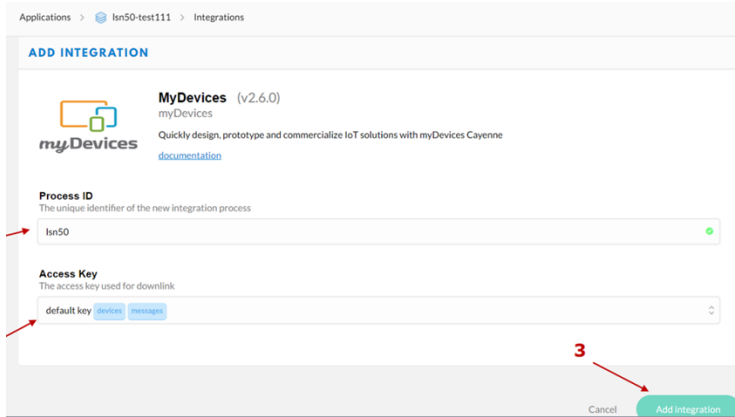
### 3.5 Integrate with Mydevice

Mydevices provides a human friendly interface to show the sensor data, once we have data in TTN, we can use Mydevices to connect to TTN and see the data in Mydevices. Below are the steps:

Step 1: Be sure that your device is programmed and properly connected to the network at this time.

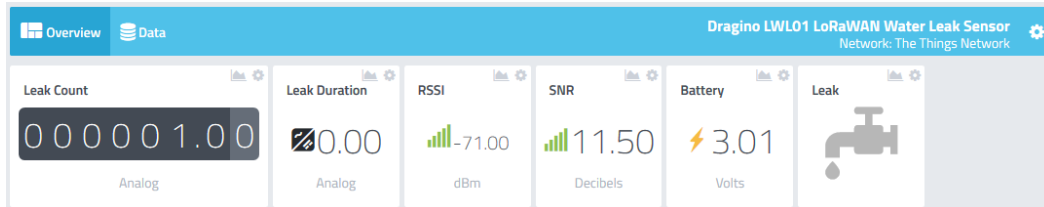
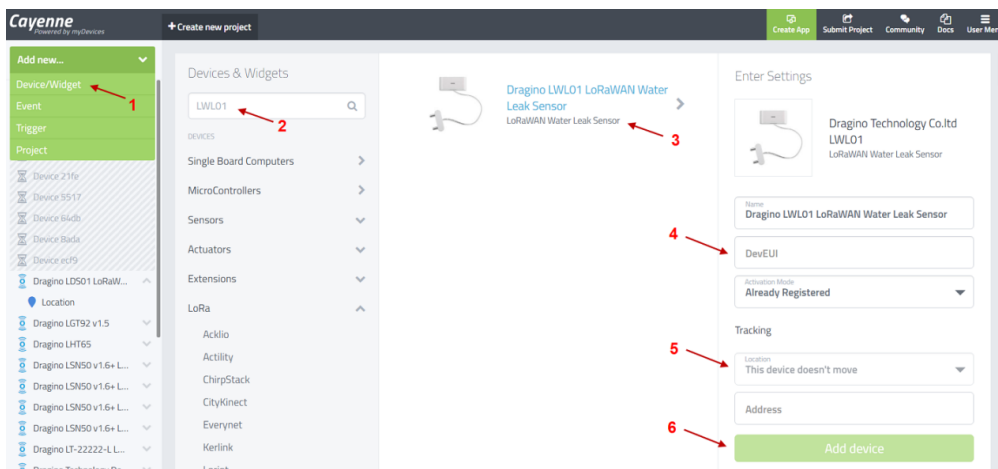
Step 2: To configure the Application to forward data to Mydevices you will need to add integration. To add the Mydevices integration, perform the following steps:





Step 3: Create an account or log in Mydevices.

Step 4: Search LWL01 and add DevEUI.



### 3.6 LEDs

Action	LED behavior
Power On	<b>GREEN on 1s, RED on 1s, BLUE on 1s</b>
Joined successful	<b>GREEN LED on 5s</b>
Send an uplink message	<b>GREEN LED</b> blinks once
Got a downlink message	<b>BLUE LED</b> blinks once

### 3.7 Battery

LWL01 is powered by a CR2032 coin battery, when running in deep sleep mode, the device power consumption is ~5uA.

The main power consumption is transmitting an uplink message. Depends on LoRaWAN network signal strength, the device can send different number of uplink messages.

1. In poor network coverage and US915 band. The device will transmit at SF10 at max power. in this case, it can uplink about ~1,300 messages.
2. In good network coverage and EU868 band, the device will transmit at SF7, and can uplink as many as 12,000 messages.

When battery voltage is below 2.75v, the LWL01 can't send uplink message.

**Note: It is recommended to change battery when it reaches 2.8v. After change the battery, make sure to **PRESS RESET** button to active the low power mode.**

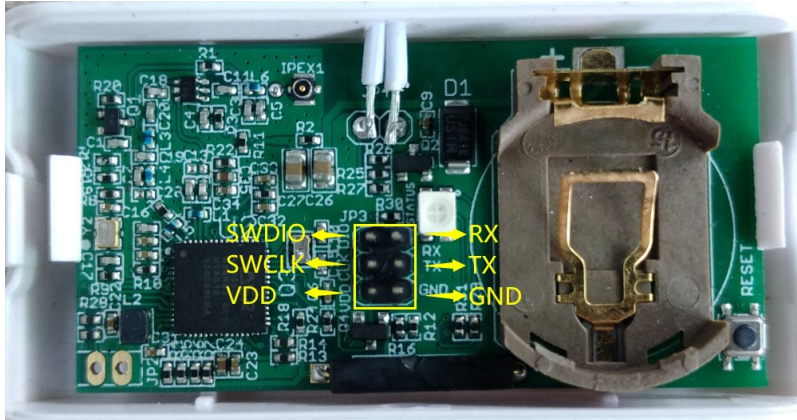
Below shows the battery placement:



## 4. Use AT Command

### 4.1 Access AT Command

LWL01 supports AT Command set. User can use a USB to TTL adapter to configure LWL01 via use AT command, as below.



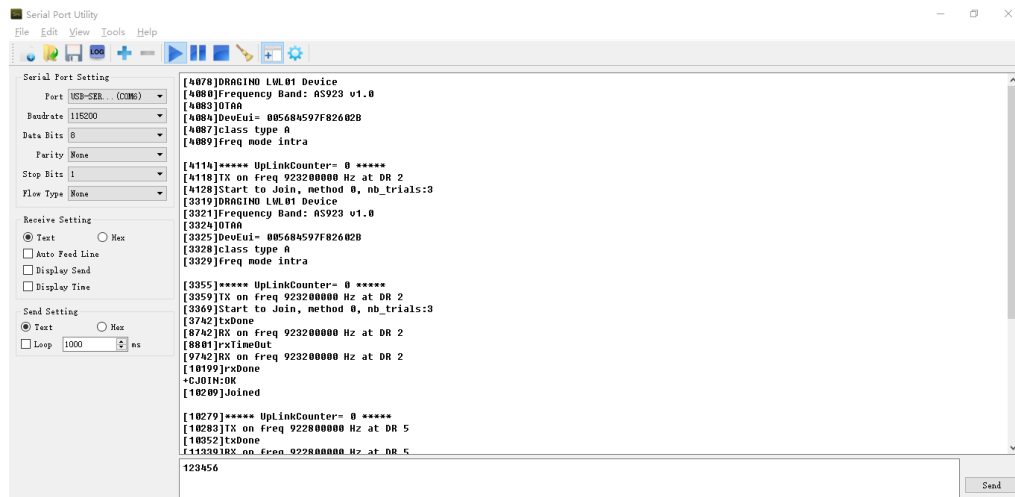
USB to TTL <- -> LWL01

RX <- -> TX

TX <- -> RX

GND <- -> GND

In PC, User needs to set **serial tool**(such as [putty](#), SecureCRT) baud rate to **115200** to access to access serial console of LWL01. The AT Access password is **123456**. Below is the output for reference:



Each AT Command need to **add an ENTER** at the end before send.

When entering the first command, the **RED LED** will on and user can now input AT Commands. After input all needed AT Commands, Please input AT+CLPM=1 to set the device to work in Low Power mode and **RED LED** will be off.

More detail AT Command manual can be found at [AT Command Manual](#)

## 5. FAQ

### 5.1 How to upgrade the image?

User can upgrade the firmware of LWL01 for bug fix, new features, or change working region. The upgrade instruction are here:

[http://wiki.dragino.com/index.php?title=Firmware\\_Upgrade\\_Instruction](http://wiki.dragino.com/index.php?title=Firmware_Upgrade_Instruction)

### 5.2 How to change the LoRa Frequency Bands/Region?

User can follow the introduction for [how to upgrade image](#). When download the images, choose the required image file for download.

## 6. Order Info

**Part Number: LWL01-XXX**

**XXX:**

- **EU433:** frequency bands EU433
- **EU868:** frequency bands EU868
- **KR920:** frequency bands KR920
- **CN470:** frequency bands CN470
- **AS923:** frequency bands AS923
- **AU915:** frequency bands AU915
- **US915:** frequency bands US915
- **IN865:** frequency bands IN865
- **CN779:** frequency bands CN779

## 7. Packing Info

**Package Includes:**

- ✓ LWL01 x 1

**Dimension and weight:**

- ✓ Device Size: 64 x 30 x 14 mm

## 8. Support

- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to

[support@dragino.com](mailto:support@dragino.com)