LWL04 -- LoRaWAN Water Leak Sensor User Manual

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on 2024/10/28 10:38

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1. Introduction

1.1 What is LWL04 LoRaWAN Water Leak Sensor

The Dragino LWL04 is a **LoRaWAN Water Leak Sensor**. When there is water between the bottom 3 metal posts, the LWL04 indicates a **water leak event** and uplink to IoT server via LoRaWAN network.

The Dragino LWL04 does not need to be fixed, only placed on the ground. The bottom three metal columns can adjust the height. Only when there is water between the three metal columns, it will cause a short circuit alarm.

LWL04 can be activated from the bottom of the housing with a magnet, and the light will indicate when the magnet is close. Its main unit has a sealing ring, which can achieve **IP65 waterproof**.

LWL04 is powered by **CR123A non-rechargeable battery** and target for long time use, these batteries can provide about 16,000 ~ 70,000 uplink packets, which result in 2 ~ 10 years battery life. After battery running out, user can easily open the enclosure and replace with CR123A batteries.

The LWL04 will send periodically data every day as well as for each water leak event. It also **counts the water leak times and calculate last water leak duration**. User can also disable the uplink for each water leak event, instead, device can count each event and uplink periodically.

Each LWL04 is pre-load with a set of unique keys for LoRaWAN registration, register these keys to LoRaWAN server and it will auto connect after power on.

1.2 Features

- LoRaWAN Class A v1.0.3
- Frequency Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915/IN865/RU864
- Water Leak detect
- Support wireless OTA update firmware
- Downlink to change configure
- Uplink on periodically and water leak event
- **CR123A** 1500mAh Battery
- IP65 waterproof

1.3 Storage & Operation Temperature

Support operating temperature -40℃~+85℃, but the extreme temperature will have a certain impact on the battery discharge life.

Note: Storage and operation temperature depends on the battery type, this manual LWL04 shipped original battery as an example, see CR123A RAMWAY BATTERY.

1.4 Applications

- Smart Factory
- Smart Buildings & Home Automation

1.5 Sleep mode and working mode

Deep Sleep Mode: Sensor doesn't have any LoRaWAN activate. This mode is used for storage and shipping to save battery life.

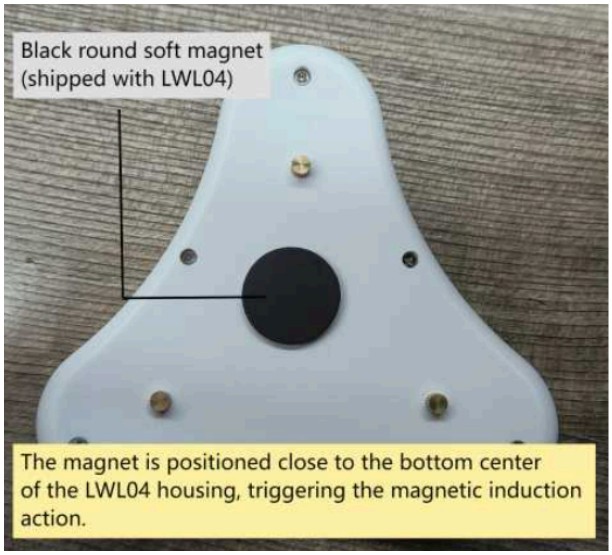
Working Mode: In this mode, Sensor will work as LoRaWAN Sensor to Join LoRaWAN network and send out sensor data to server. Between each sampling/tx/rx periodically, sensor will be in IDLE mode), in IDLE mode, sensor has the same power consumption as Deep Sleep mode.

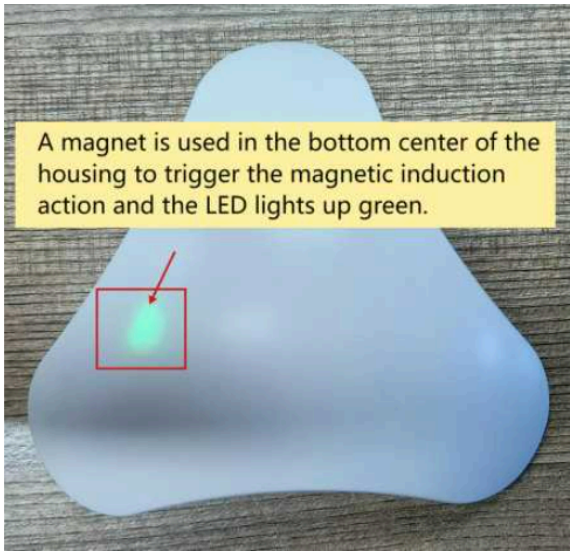
1.6. Power ON LWL04

The LWL04 is shipped in a battery-mounted condition and the user can activate the LWL04 by simply placing the magnet at the bottom center of the LWL04 for more than 3 seconds.

When the user uses the magnet to get close to the bottom center of the LWL04, the green light is on to indicate successful sensing. Keeping the magnet position still for 3 seconds, the green light is always on for 3 seconds, then the green light blinks rapidly for 5 times, the node activation is successful. Please refer to Magnet action & LEDs for specific LED indication status.

Example diagram of LWL04 activation operation (Soft magnet operation on the bottom of the node & LED status on the front of the node):



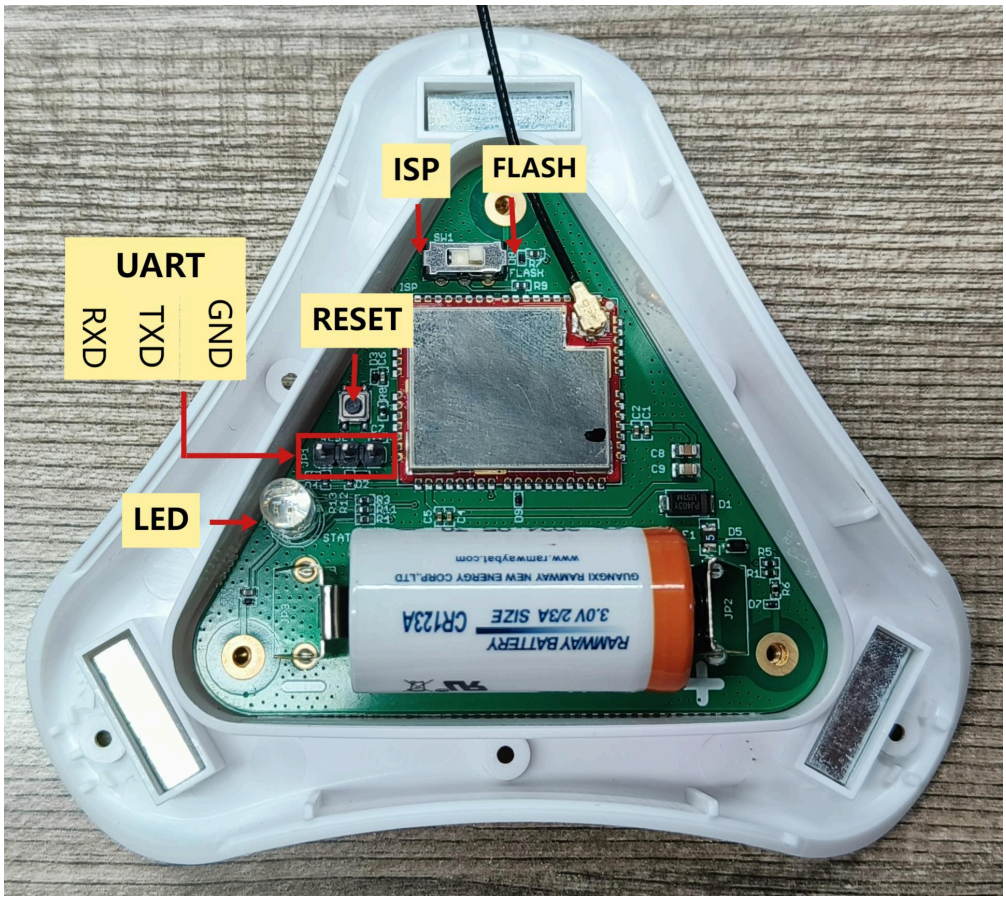


1.7 Magnet action & LEDs

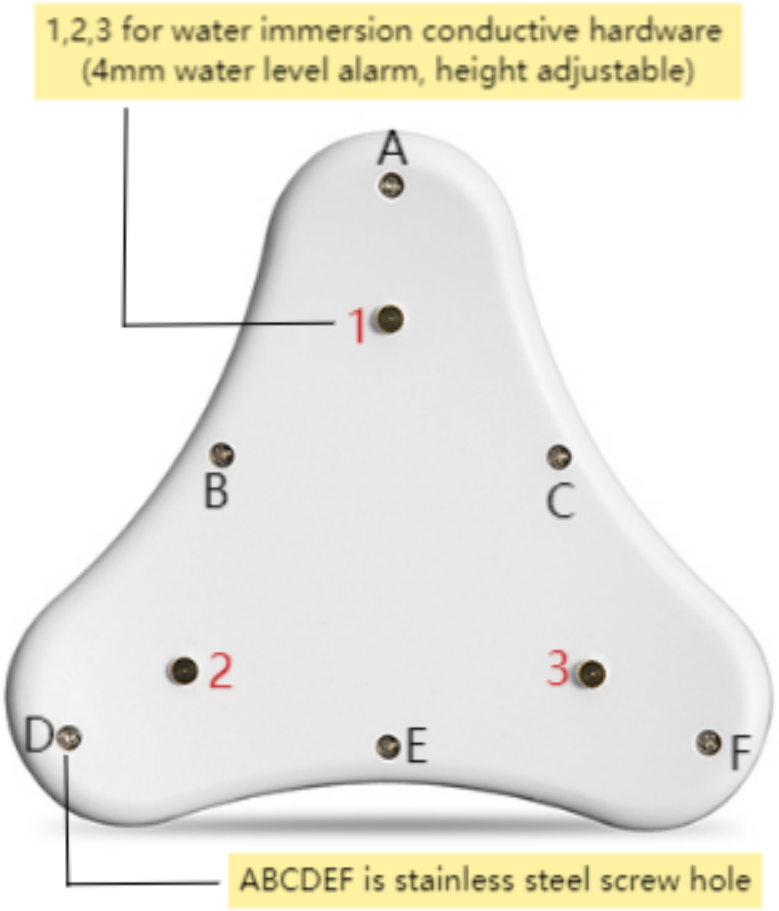
When the magnet is near the bottom center position of LWL04, the green light indicates that the magnet is successfully induced.

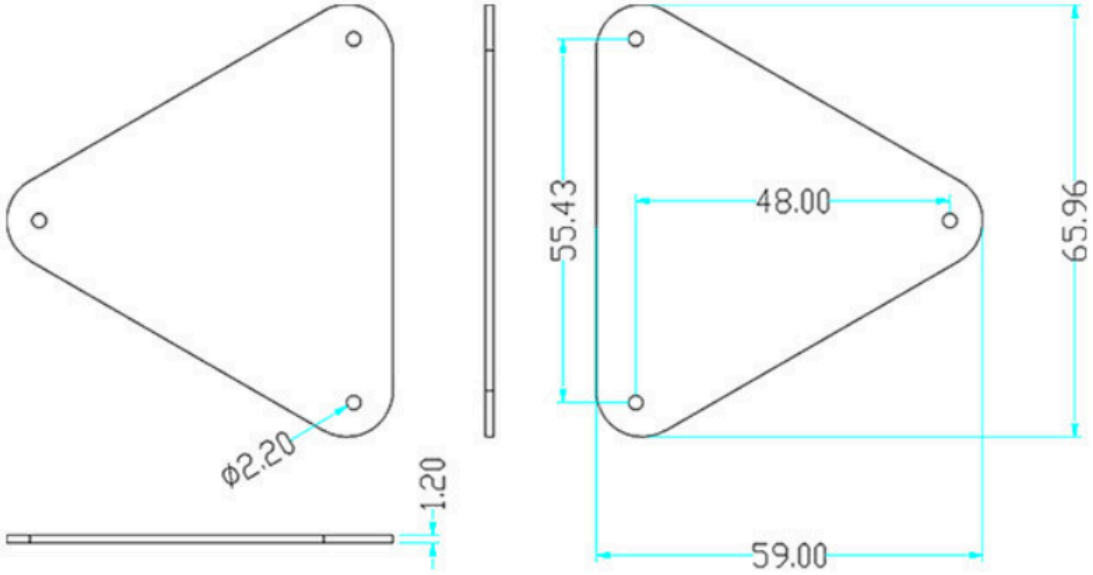
Magnet action	Function	Action
Hold magnet induction between 1s < time < 3s	Send an uplink	If sensor is already Joined to LoRaWAN network, sensor will send an uplink packet, **blue led** will blink once.
Hold magnet induction for more than 3s	Active Device	**Green led** will fast blink 5 times, device will enter **OTA mode** for 3 seconds. And then start to JOIN LoRaWAN network. **Green led** will solidly turn on for 5 seconds after joined in network.
Quickly activate magnet induction 5 times	Deactivate Device	**Red led** will solid on for 5 seconds. Means device is in Deep Sleep Mode.

1.8 Pin Definitions



1.9 Mechanical


1,2,3 for water immersion conductive hardware
(4mm water level alarm, height adjustable)
A
1
B
C
2
3
D
E
F
ABCDEF is stainless steel screw hole



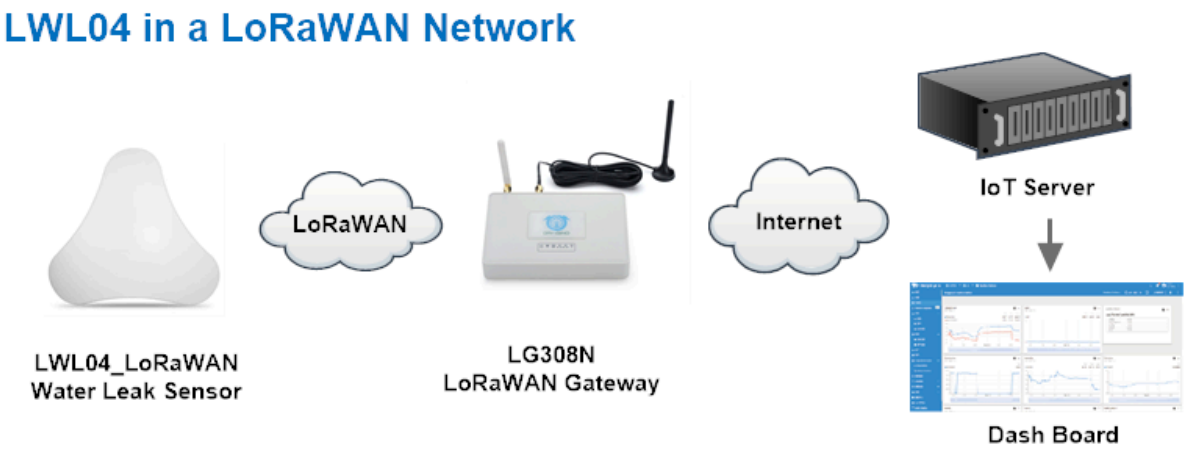
2. Configure LWL04 to connect to LoRaWAN network

2.1 How it works?

The LWL04 is configured as **LoRaWAN OTAA Class A** mode by default. It has OTAA keys to join LoRaWAN network. To connect a local LoRaWAN network, you need to input the OTAA keys in the LoRaWAN IoT server and press the button to activate the LWL04. It will automatically join the network via OTAA and start to send the sensor value. The default uplink interval is 2 hours.

2.2 Quick guide to connect to LoRaWAN server (OTAA)

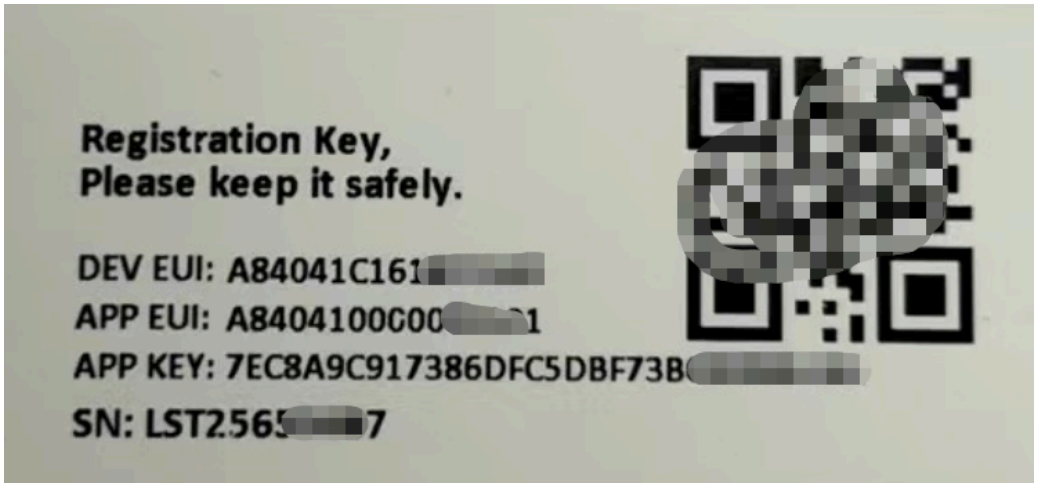
Here shows an example for how to join the TTN V3 Network. Below is the network structure, we use LG308N as LoRaWAN gateway here.



The LG308 is already set to connect to TTN V3 network . What we need to now is only configure the TTN V3:

Step 1: Create a device in TTN V3 with the OTAA keys from LWL04.

Each LWL04 is shipped with a sticker with unique device EUI:



User can enter this key in their LoRaWAN Server portal. Below is TTN V3 screen shot:

Create the application.

Add devices to the created Application.

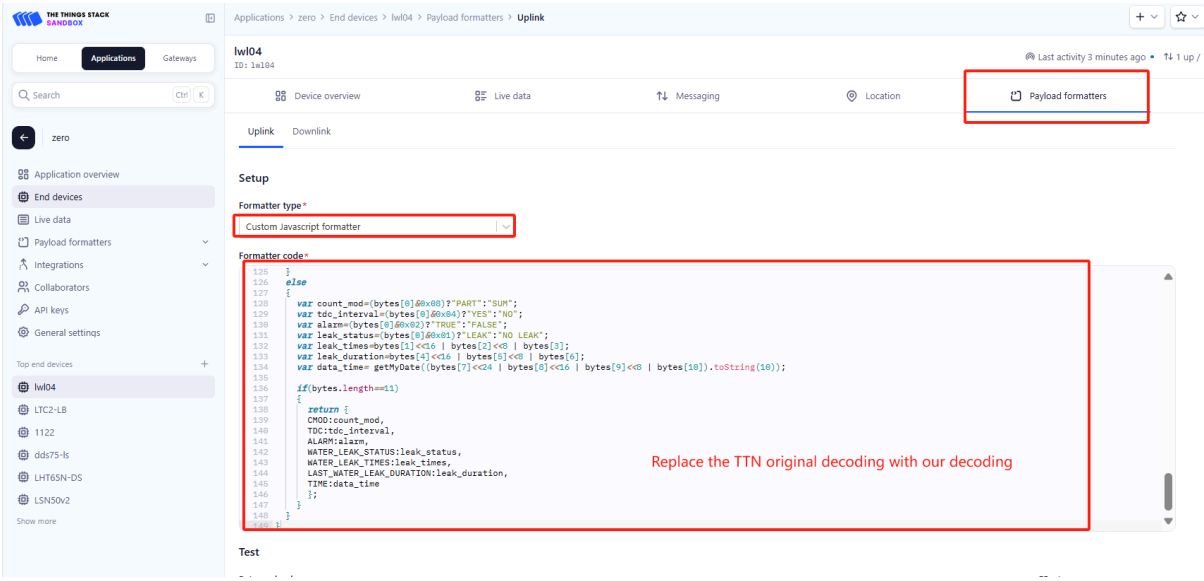
Enter end device specifics manually.

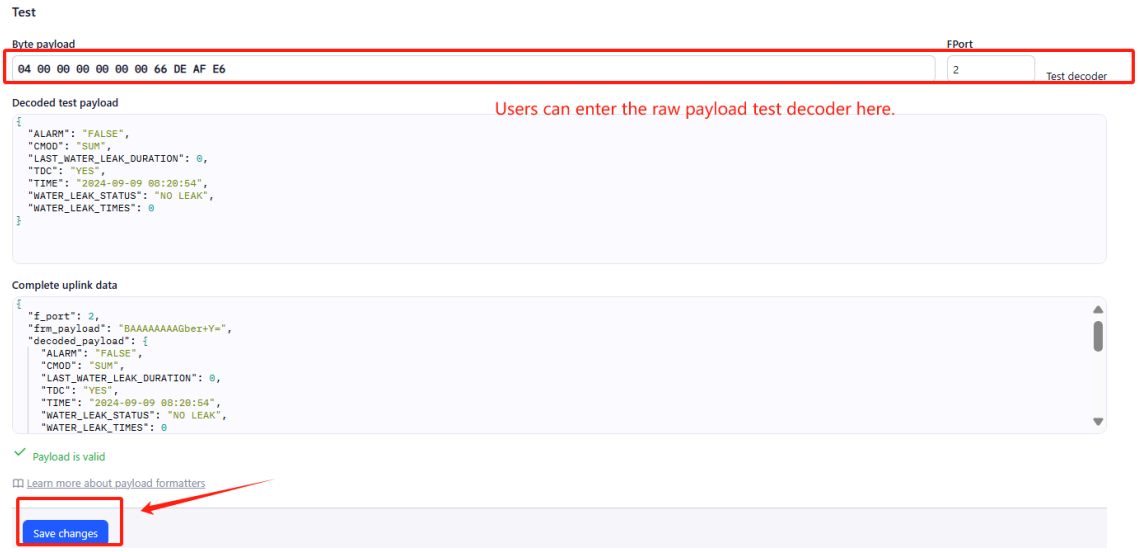
Step 2: Add decoder

In TTN, user can add a custom payload so it shows friendly reading.

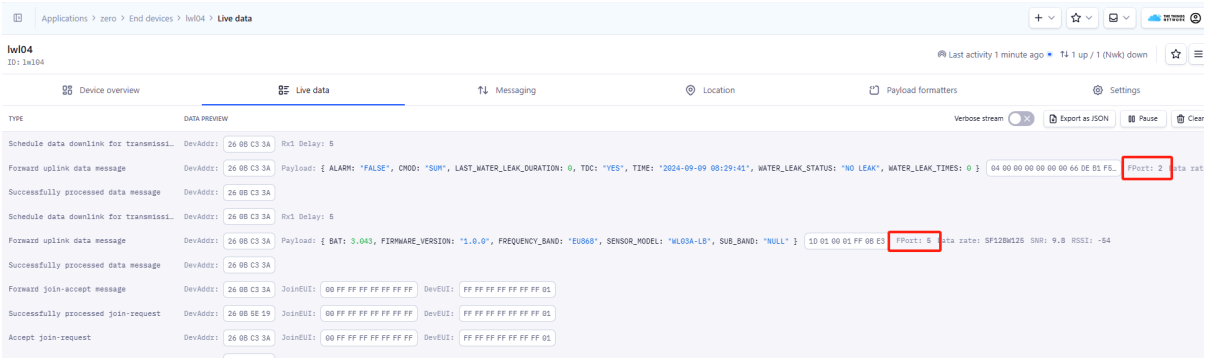
Click this link to get the decoder: LWL04 decoder.

Below is TTN screen shot:





Step 3: **Power on** LWL04 and it will auto join to the TTN V3 network. After join success, it will start to upload message to TTN V3 and user can see in the panel.



2.3 Uplink Payload

2.3.1 Device Status, FPORT=5

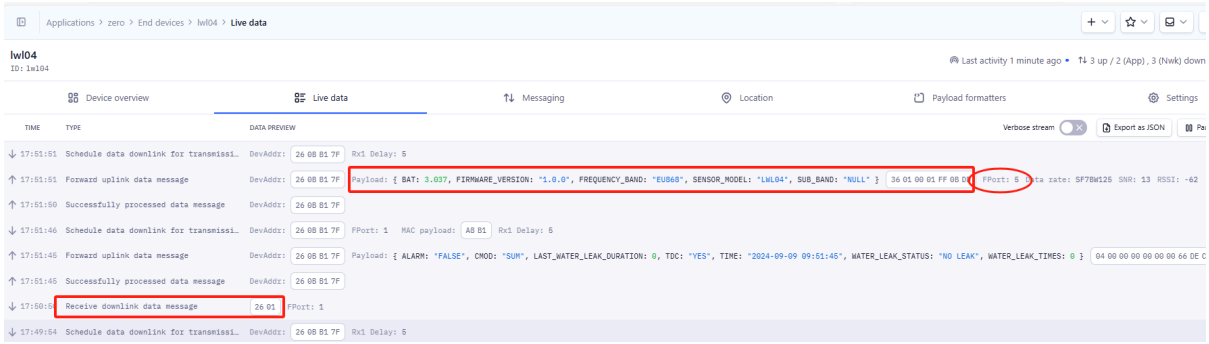
Include device configure status. Once LWL04 Joined the network, it will uplink this message to the server. After that, LWL04 will uplink Device Status every 12 hours.

Users can also use the downlink command**(0x26 01)** to ask LWL04 to resend this uplink. This uplink payload also includes the DeviceTimeReq to get time.

The Payload format is as below.

Device Status (FPORT=5)					
Size (bytes)	**1**	**2**	**1**	**1**	**2**
Value	Sensor Model	Firmware Version	Frequency Band	Sub-band	BAT

Example parse in TTN:



Sensor Model: For LWL04, this value is 0x36

Firmware Version: 0x0100, Means: v1.0.0 version

Frequency Band:

0x01: EU868

0x02: US915

0x03: IN865

0x04: AU915

0x05: KZ865

0x06: RU864

0x07: AS923

0x08: AS923-1

0x09: AS923-2

0x0a: AS923-3

0x0b: CN470

0x0c: EU433

0x0d: KR920

0x0e: MA869

Sub-Band:

AU915 and US915:value 0x00 ~ 0x08

CN470: value 0x0B ~ 0x0C

Other Bands: Always 0x00

Battery Info:

Check the battery voltage.

Ex1: 0x0BE3 = 3043mV

Ex2: 0x0B49 = 2889mV

2.3.2 Sensor Configuration, FPORT=4

LWL04 will only send this command after getting the downlink command **(0x26 02)** from the server.

Size(bytes)	3	1	1	2	1
Value	TDC (unit: sec)	Disalarm	Keep status	Keep time (unit: sec)	Leak alarm time

Example parse in TTNv3

- **TDC: (default: 0x001C20)**

Uplink interval for the Leak/No leak Event, default value is 0x001C20 which is 7200 seconds = 2 hours.

- **Disalarm: (default: 0)**

If Disalarm = 1, LWL04 will only send uplink at every TDC periodically. This is normally use for pulse meter application, in this application, there are many Leak/No leak event, and platform only care about the total number of pulse.

If Disalarm = 0, LWL04 will send uplink at every TDC periodically and send data on each Leak/No leak event. This is useful for the application user need to monitor the Leak/No leak event in real-time.

Note: When Disalarm=0, a high frequently Leak/No leak event will cause lots of uplink and drain battery very fast.

- **Keep Status & Keep Time**

Shows the configure value of Alarm Base on Timeout Feature

- **Leak alarm time**

Regularly update a confirm uplink when water leaks, default value is 0x0A which is 10 minutes.

2.3.3 Real-Time Open/Close Status, Uplink FPORT=2

LWL04 will send this uplink **after** Device Status once join the LoRaWAN network successfully. And LWL04 will:

1. periodically send this uplink every 2 hours, this interval can be changed.

2. There is an Leak/No leak event.

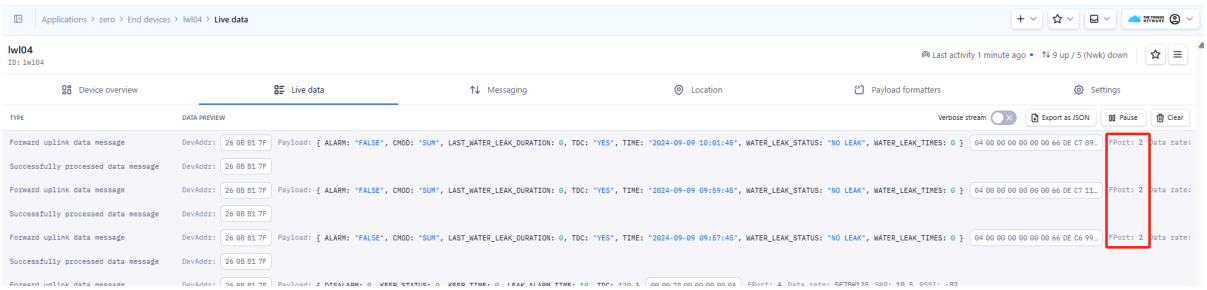
Uplink Payload totals 11 bytes.

Real-Time Open/Close Status, FPORT=2				
Size(bytes)	**1**	**3**	**3**	**4**
Value	Status & Alarm	Total leak events	Last leak duration (unit: sec)	Unix TimeStamp

Status & Alarm:

Size(bit)	[bit5:bit4]	bit3	bit2	bit1	bit0
Value	Reserve	Count mod	TDC flag 0:No;1:Yes	Alarm 0: No Alarm;1: Alarm	Status 0: No leak, 1: leak

Example parse in TTNv3



- **Count mod:Default=0**

0 : Uplink total leak times since factory

1: Uplink total leak times since last FPORT=2 uplink.

- **TDC flag**

When the flag is 1, it means sending packets at normal time intervals.

Otherwise, it is a packet sent at non-TDC time.

- **Alarm**

See Alarm Base on Timeout

- **Status**

This bit is 1 when the leak sensor is leak and 0 when it is no leak.

- **Total leak events**

Total pulse/counting base on leak.

Range (3 Bytes) : 0x000000 ~ 0xFFFFFF . Max: 16777215

- **Last leak duration**

Leak sensor last leak duration.

Unit: sec.

2.3.4 Historical Water Leak/No leak Event, FPORT=3

LWL04 stores sensor values and users can retrieve these history values via the downlink command.

The historical payload includes one or multiplies entries and every entry has the same payload as Real-Time leak/no leak status.

Real-Time Open/Close Status, FPORT=3				
Size(bytes)	**1**	**3**	**3**	**4**
Value	Status & Alarm	Total leak events	Last leak duration (unit: sec)	Unix TimeStamp

Status & Alarm:

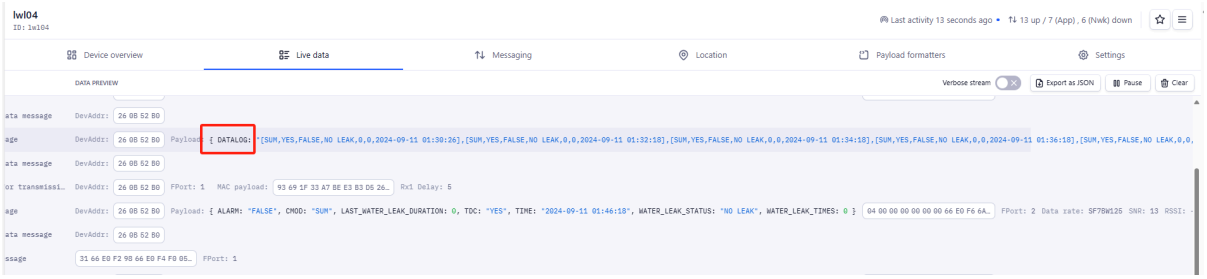
Size(bit)	bit7	bit6	[bit5:bit4]	bit3	bit2	bit1	bit0
Value	Reserve	Poll Message Flag	Reserve	Count mod	TDC flag 0:No;1:Yes	Alarm 0: No Alarm;1: Alarm	Status 0: No leak, 1: leak

- Each data entry is 11 bytes and has the same structure as Real-Time open/close status, to save airtime and battery, LWL04 will send max bytes according to the current DR and Frequency bands.

For example, in the US915 band, the max payload for different DR is:

1. **DR0**: max is 11 bytes so one entry of data
2. **DR1**: max is 53 bytes so devices will upload 4 entries of data (total 44 bytes)
3. **DR2**: total payload includes 11 entries of data
4. **DR3**: total payload includes 22 entries of data.

LWL04 doesn't have any data in the polling time. It will uplink 11 bytes of 0



Access via serial port:

```
Stop Tx events when read sensor data
0001 2024/9/11 01:42:18 bat:2977 mod:0 status:no_leak leak_times:0 last_leak_duration:0 alarm:false tdc:yes

0002 2024/9/11 01:44:18 bat:2977 mod:0 status:no_leak leak_times:0 last_leak_duration:0 alarm:false tdc:yes

0003 2024/9/11 01:46:18 bat:2978 mod:0 status:no_leak leak_times:0 last_leak_duration:0 alarm:false tdc:yes

0004 2024/9/11 01:48:18 bat:2978 mod:0 status:no_leak leak_times:0 last_leak_duration:0 alarm:false tdc:yes

0005 2024/9/11 01:50:18 bat:2978 mod:0 status:no_leak leak_times:0 last_leak_duration:0 alarm:false tdc:yes

Start Tx events

OK
```

Downlink: 0x31+Start time +End time +Uplink interval(Unit: seconds)

0x31 66 E0 F2 98 66 E0 F4 F0 05

Uplink:

44 00 00 00 00 00 00 66 E0 F2 B2 44 00 00 00 00 00 00 66 E0 F3 22 44 00 00 00 00 00 00 66 E0 F3 9A 44 00 00 00 00 00 00 66 E0 F4 12 44 00 00 00 00 00 00 66 E0 F4 8A

Parsed Value:

[COUNTMOD,TDC_FLAG,ALARM, WATER_LEAK_STATUS, WATER_LEAK_TIMES, LAST_WATER_LEAK_DURATION, TIME]

[SUM,YES,FALSE,NO LEAK,0,0,2024-09-11 01:30:26],

[SUM,YES,FALSE,NO LEAK,0,0,2024-09-11 01:32:18],

[SUM,YES,FALSE,NO LEAK,0,0,2024-09-11 01:34:18],

[SUM,YES,FALSE,NO LEAK,0,0,2024-09-11 01:36:18],

[SUM,YES,FALSE,NO LEAK,0,0,2024-09-11 01:38:18],

2.4 Datalog Feature

Datalog Feature is to ensure IoT Server can get all sampling data from Sensor even if the LoRaWAN network is down. For each sampling, LWL04 will store the reading for future retrieving purposes.

Note:After the device is reset, in cumulative counting mode, the last stored leak count value will be read as the initial value.

2.4.1 Unix TimeStamp

LWL04 use Unix TimeStamp format based on

Users can get this time from the link: https://www.epochconverter.com/ :

Below is the converter example

So, we can use **AT+TIMESTAMP=1726018200** or downlink 3066E0F29800 to set the current time 2021 – Jan --29 Friday 03:03:25 2024 - September --11 Wednesday 01:30:00

2.4.2 Set Device Time

There are two ways to set the device's time:

1. Through LoRaWAN MAC Command (Default settings)

Users need to set **SYNCMOD=1** to enable sync time via the MAC command.

Once LWL04 Joined the LoRaWAN network, it will send the MAC command (DeviceTimeReq) and the server will reply with (DeviceTimeAns) to send the current time to LWL04. If LWL04 fails to get the time from the server, LWL04 will use the internal time and wait for the next time request [via Device Status (FPORT=5)].

Note: LoRaWAN Server needs to support LoRaWAN v1.0.3(MAC v1.0.3) or higher to support this MAC command feature.

2. Manually Set Time

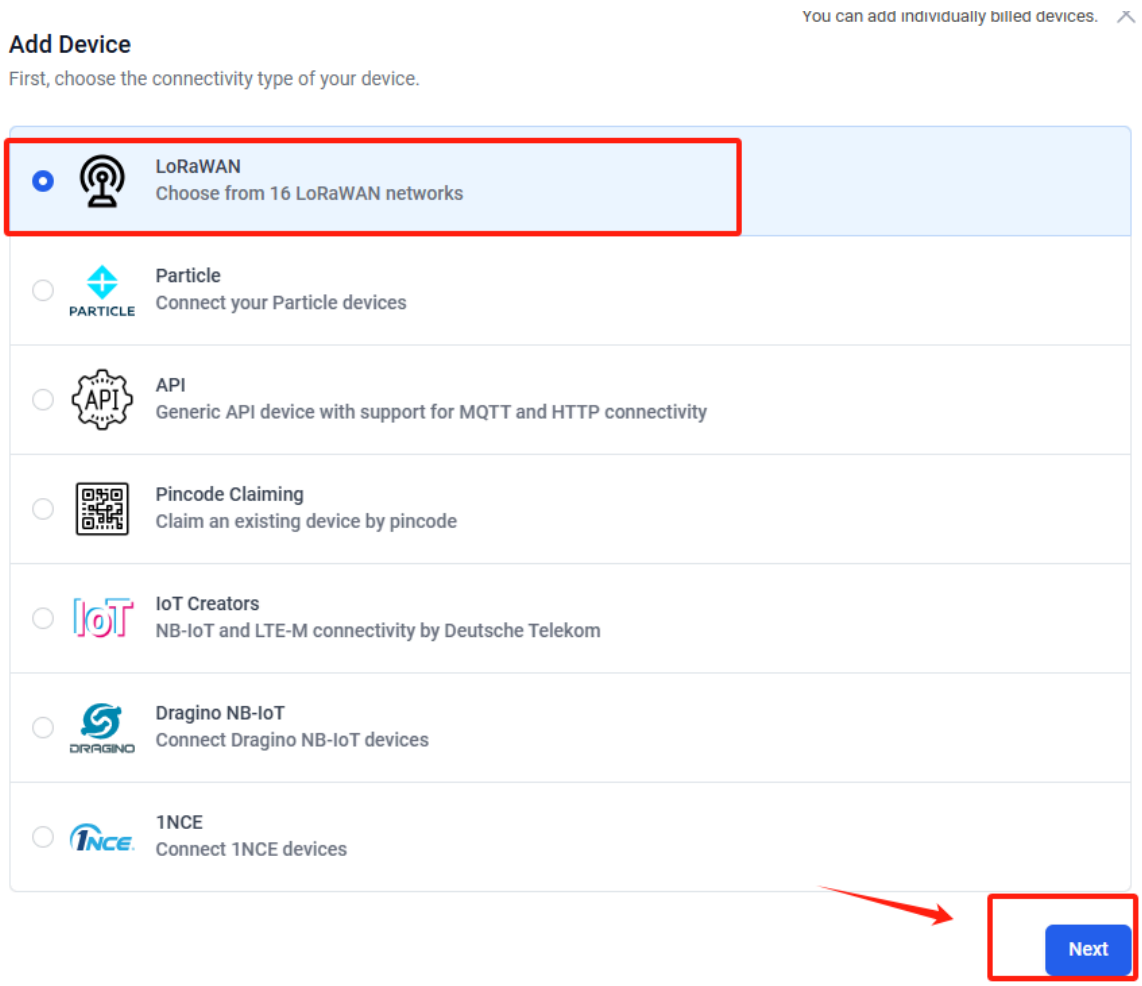
Users need to set **SYNCMOD=0** to manual time, otherwise, the user set time will be overwritten by the time set by the server.

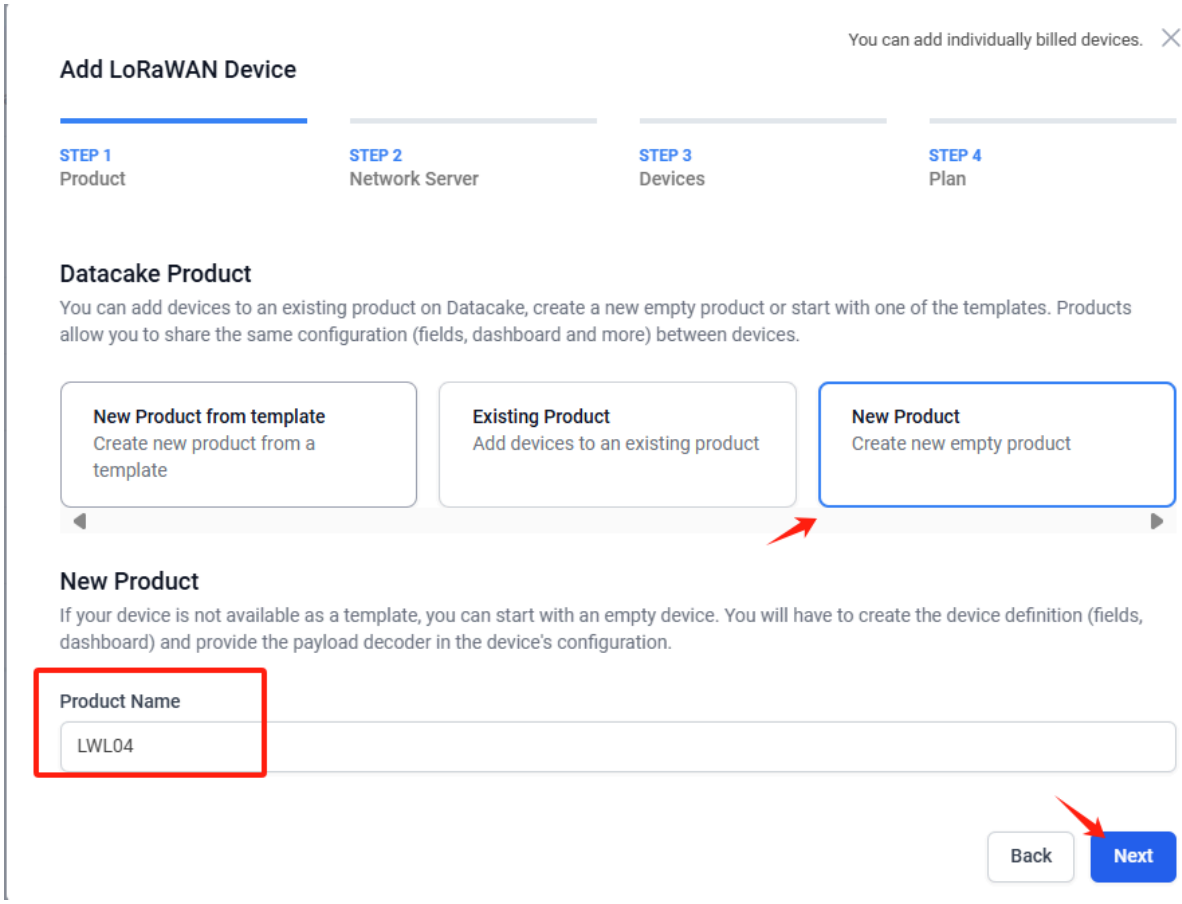
2.5 Show Data in DataCake IoT Server

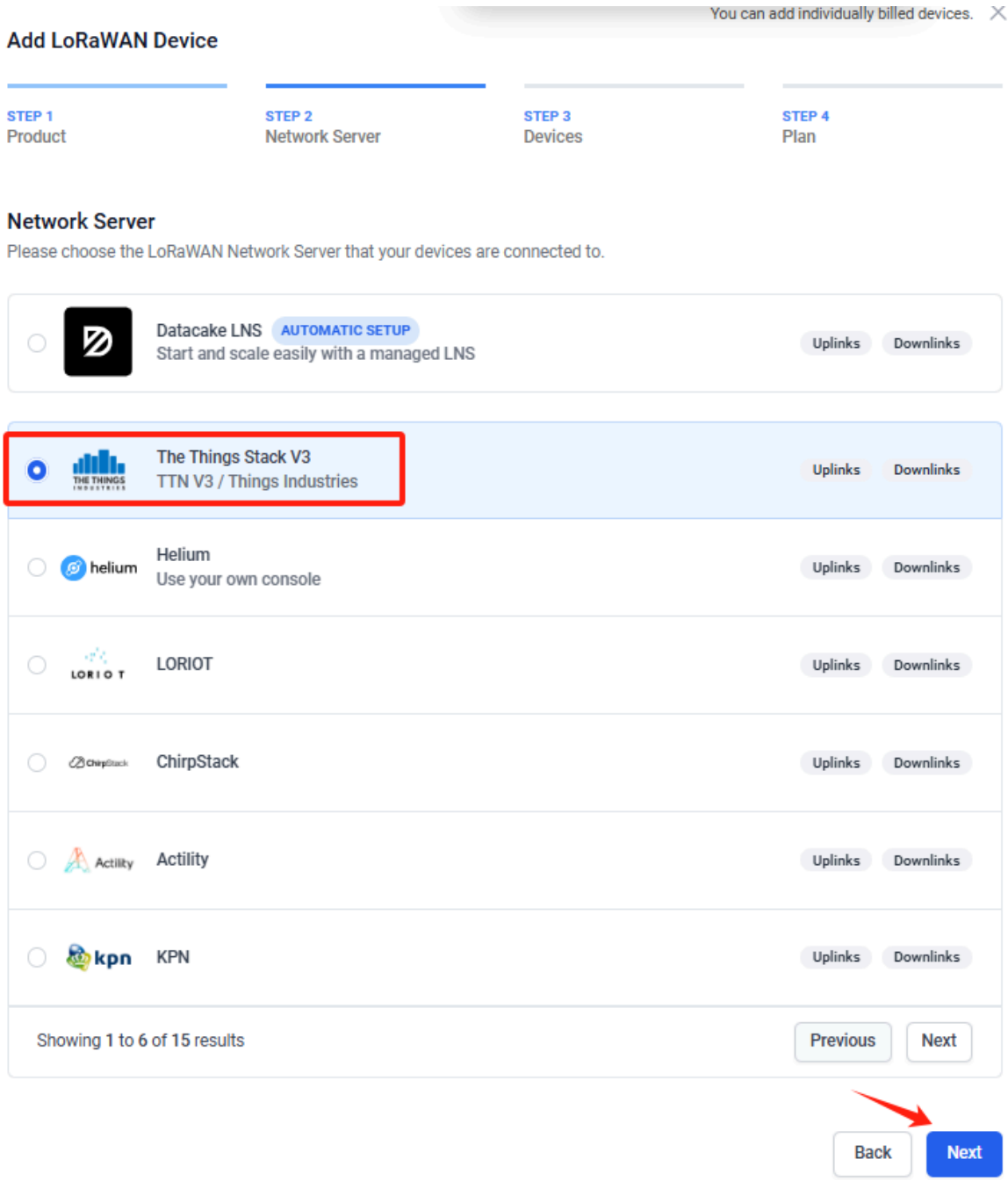
Datacake IoT platform provides a human-friendly interface to show the sensor data, once we have sensor data in TTN V3, we can use Datacake to connect to TTN V3 and see the data in Datacake. Below are the steps:

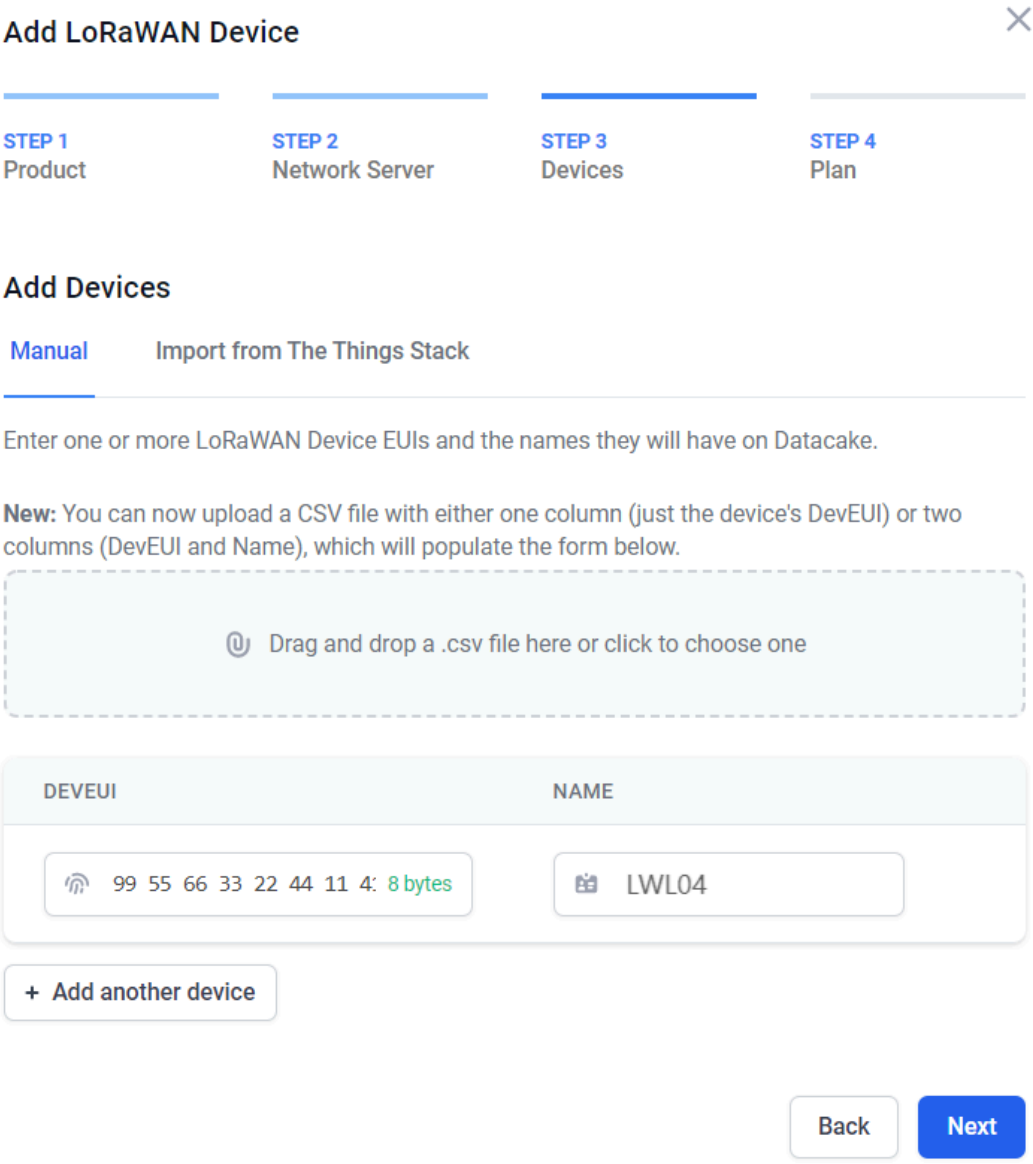
Step 1: Link TTNv3 to Datacake.https://docs.datacake.de/lorawan/lns/thethingsindustries#create-integration-on-tti

Step 2: Add LWL04 to Datacake.

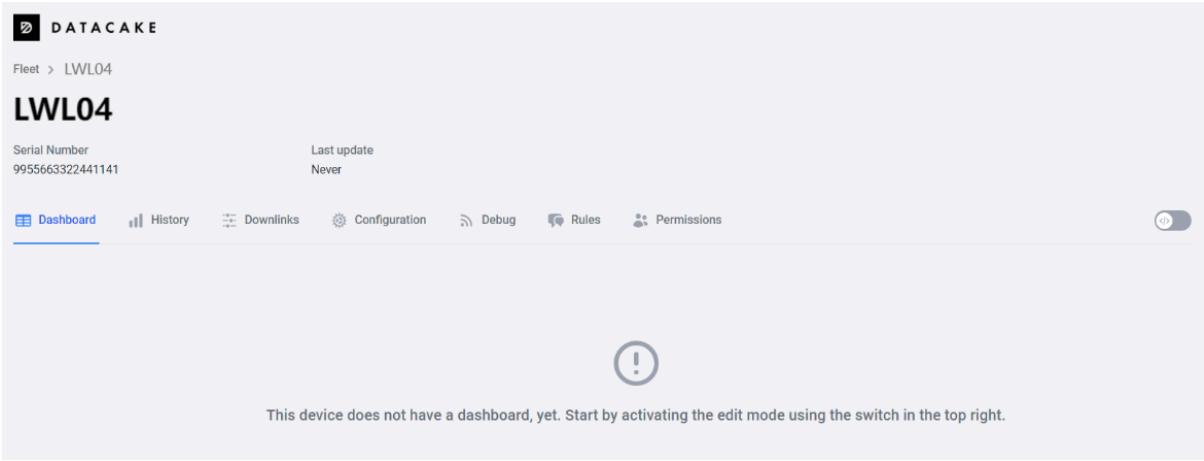

You can add individually billed devices.
Add Device
First, choose the connectivity type of your device.
LoRaWAN
Choose from 16 LoRaWAN networks
Particle
Connect your Particle devices
API
Generic API device with support for MQTT and HTTP connectivity
Pincode Claiming
Claim an existing device by pincode
IoT Creators
NB-IoT and LTE-M connectivity by Deutsche Telekom
Dragino NB-IoT
Connect Dragino NB-IoT devices
1NCE
Connect 1NCE devices
Next

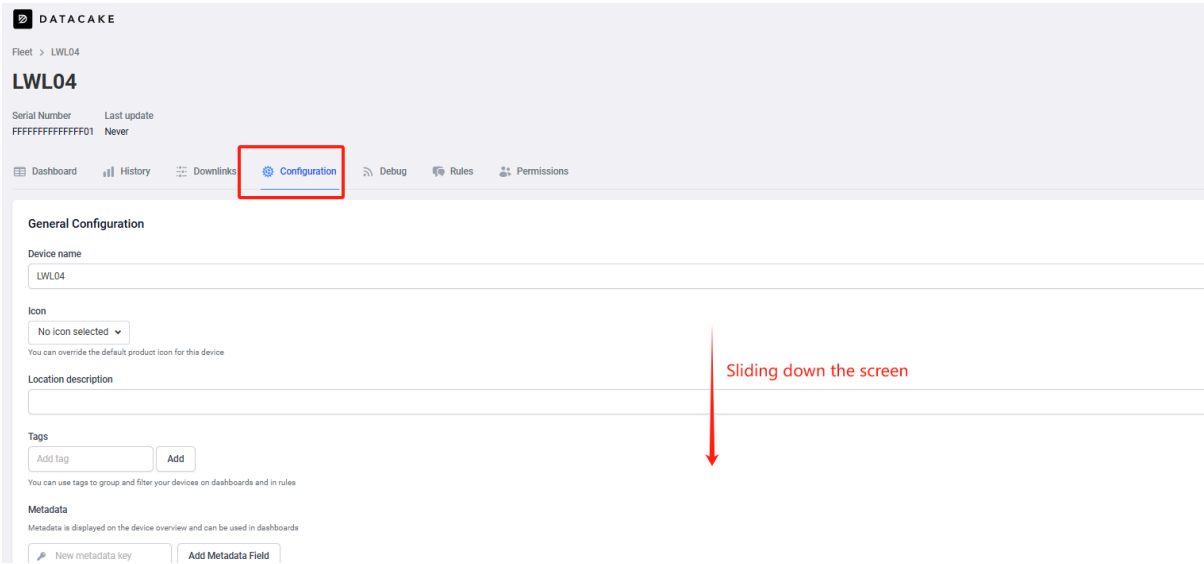

You can add individually billed devices.
Add LoRaWAN Device
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Datacake Product
You can add devices to an existing product on Datacake, create a new empty product or start with one of the templates. Products allow you to share the same configuration (fields, dashboard and more) between devices.
New Product from template
Create new product from a template
Existing Product
Add devices to an existing product
New Product
Create new empty product
New Product
If your device is not available as a template, you can start with an empty device. You will have to create the device definition (fields, dashboard) and provide the payload decoder in the device's configuration.
Product Name
LWL04
Back
Next

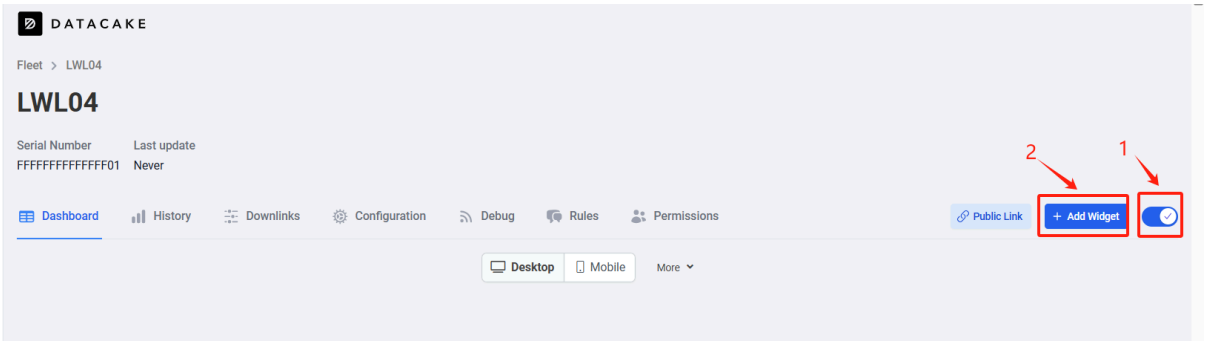

You can add individually billed devices.
Add LoRaWAN Device
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Network Server
Please choose the LoRaWAN Network Server that your devices are connected to.
Datacake LNS
AUTOMATIC SETUP
Start and scale easily with a managed LNS
Uplinks
Downlinks
The Things Stack V3
TTN V3 / Things Industries
Uplinks
Downlinks
Helium
Use your own console
Uplinks
Downlinks
LORIOT
Uplinks
Downlinks
ChirpStack
Uplinks
Downlinks
Actility
Uplinks
Downlinks
KPN
Uplinks
Downlinks
Showing 1 to 6 of 15 results
Previous
Next
Back
Next

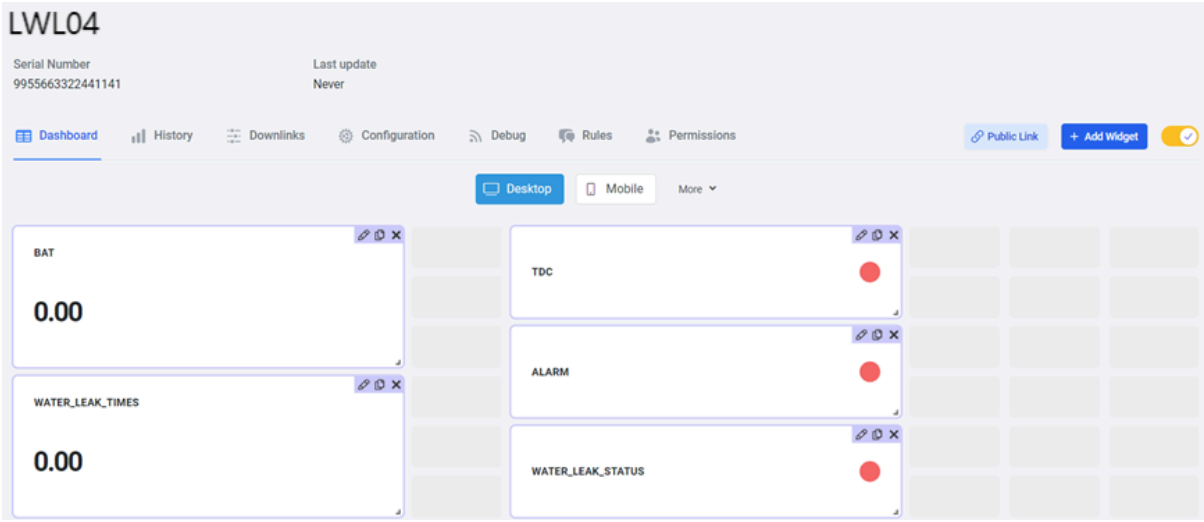


Step 3: Configure LWL04 in Datacake.


DATACAKE
Fleet > LWL04
LWL04
Serial Number
9955663322441141
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
This device does not have a dashboard, yet. Start by activating the edit mode using the switch in the top right.


DATACAKE
Fleet > LWL04
LWL04
Serial Number
FFFFFFFFFFFFF01
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
General Configuration
Device name
LWL04
Icon
No icon selected
You can override the default product icon for this device
Location description
Tags
Add tag
Add
You can use tags to group and filter your devices on dashboards and in rules
Metadata
Metadata is displayed on the device overview and can be used in dashboards
New metadata key
Add Metadata Field
Sliding down the screen


DATACAKE
Fleet > LWL04
LWL04
Serial Number
FFFFFFFFFFFFF01
Last update
Never
2
1
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
Public Link
+ Add Widget
Desktop
Mobile
More



2.6 Frequency Plans

The LWL04 uses OTAA mode and below frequency plans by default. Each frequency band use different firmware, user update the firmware to the corresponding band for their country.

End Device Frequency Band

3. Configure LWL04

3.1 Configure Methods

LWL04 supports below configure method:

- AT Command via UART Connection : See UART Connection.
- LoRaWAN Downlink. Instruction for different platforms: See IoT LoRaWAN Server section.

3.2 General Commands

These commands are to configure:

- General system settings like: uplink interval.
- LoRaWAN protocol & radio related command.

They are same for all Dragino Devices which support DLWS-005 LoRaWAN Stack. These commands can be found on the wiki:

End Device AT Commands and Downlink Command

3.3 Commands special design for LWL04

These commands only valid for LWL04, as below:

3.3.1 Set Transmit Interval Time

Feature: Change LoRaWAN End Node Transmit Interval.

AT Command: AT+TDC

Command Example	Function	Response
AT+TDC=?	Show current transmit Interval	7200000 OK the interval is 7200000ms = 7200s
AT+TDC=1200000	Set Transmit Interval	OK Set transmit interval to 1200000ms = 1200s

Downlink Command: 0x01

Format: Command Code (0x01) followed by 3 bytes time value.

If the downlink payload=01001C20, it means set the END Node's Transmit Interval to 0x001C20(H)=7200(D) seconds, while type code is 01.

- Example 1: Downlink Payload: 01001C20 // Set Transmit Interval (TDC) = 7200 seconds
- Example 2: Downlink Payload: 010004B0 // Set Transmit Interval (TDC) = 1200 seconds

3.3.2 Set Power Output Duration

Control the output duration 5V . Before each sampling, device will

1. first enable the power output to external sensor,

2. keep it on as per duration, read sensor value and construct uplink payload

3. final, close the power output.

AT Command: AT+5VT

Command Example	Function	Response
AT+5VT=?	Show 5V open time.	0 (default) OK
AT+5VT=1000	Close after a delay of 1000 milliseconds.	OK

Downlink Command: 0x07

Format: Command Code (0x07) followed by 2 bytes.

The two bytes following the function code 0x07 set the opening time of 5V.

- Example 1: Downlink Payload: 070000 **--->** AT+5VT=0
- Example 2: Downlink Payload: 0701F4 **--->** AT+5VT=500

3.3.3 Enable / Disable Alarm

Feature: Enable/Disable Alarm for open/close event. Default value 0.

AT Command: AT+DISALARM

Command Example	Function	Response
AT+DISALARM=1	End node will only send packet in TDC time.	OK

AT+DISALARM=0	End node will send packet in TDC time or status change for water leak sensor	OK

Downlink Command: 0xA7

- Downlink payload: 0xA7 01 // Same as AT+DISALARM=1
- Downlink payload: 0xA7 00 // Same as AT+DISALARM=0

3.3.4 Set system time

Feature: Set system time, Unix format. See here for format detail.

AT Command: AT+TIMESTAMP

Command Example	Function	Response
AT+TIMESTAMP=1725957832	Set System time to 2024-09-10 08:43:52	OK

Downlink Command: 0x30

0x3066E006C800 // Set timestamp to 0x(66E006C800),Same as AT+TIMESTAMP=1725957832

3.3.5 Set Time Sync Mode

Feature: Enable/Disable Sync system time via LoRaWAN MAC Command (DeviceTimeReq), LoRaWAN server must support v1.0.3 protocol to reply to this command.

SYNCMOD is set to 1 by default. If user wants to set a different time from the LoRaWAN server, the user needs to set this to 0.

AT Command: AT+SYNCMOD

Command Example	Function	Response
AT+SYNCMOD=1	Enable Sync system time via LoRaWAN MAC Command (DeviceTimeReq) The default is zero time zone.	OK
AT+SYNCMOD=1,8	Enable Sync system time via LoRaWAN MAC Command (DeviceTimeReq) Set to East eight time zone.	OK
AT+SYNCMOD=1,-12	Enable Sync system time via LoRaWAN MAC Command (DeviceTimeReq) Set to West Twelve Time Zone.	OK

Downlink Command: 0X28

0x28 01 // Same as AT+SYNCMOD=1

0x28 01 08 // Same as AT+SYNCMOD=1,8

0x28 01 F4 // Same as AT+SYNCMOD=1,-12

0x28 00 // Same as AT+SYNCMOD=0

3.3.6 Alarm Base on Timeout

LWL04 can monitor the timeout for a status change, this feature can be used to monitor some events such as door opening too long etc.

User configure this feature by using:

AT Command: AT+TTRIG=AA,BB

AA: When AA=0, the monitoring state: changes from leakage to no leakage.

When AA=1, the monitoring state: changes from no leakage to leakage.

BB: Holding time after state change.

Example:

AT+TTRIG=1,30 --> When status change from no leak to leak, and device keep in leak status for more than 30 seconds. LWL04 will send an uplink packet, the Alarm bit (the second bit of 1st byte of payload) on this uplink packet is set to 1.

AT+TTRIG=0,30 --> When status change from leak to no leak, and device keep in no leak status for more than 30 seconds. LWL04 will send an uplink packet, the Alarm bit (the second bit of 1st byte of payload) on this uplink packet is set to

AT+TTRIG=0,0 --> Default Value, disable timeout Alarm.

Downlink Command: 0xA9 aa bb cc

A9: Command Type Code

aa: status to be monitored

bb cc: timeout

Example:

- Downlink payload: 0xA9 01 00 1E --> Equal to AT+TTRIG=1,30
- Downlink payload: 0xA9 00 00 00 --> Equal to AT+TTRIG=0,0 //Disable timeout Alarm.

3.3.7 The working mode of the total water leakage event

AT Command: AT+COUNTMOD

- **AT+COUNTMOD=0** //Default Value, Total leak events since factory.
- **AT+COUNTMOD=1** //Total leak events since last TDC uplink.

Downlink Command: 0x0B

- Downlink payload: **0x0B00** // Same as AT+COUNTMOD=0
- Downlink payload: **0x0B01** // Same as AT+COUNTMOD=1

3.3.8 Regularly update a confirm uplink when water leaks

AT Command: AT+LEAKALARM

- **AT+LEAKALARM=10 -->** Default Value, A periodically update at every 10 minutes when in water leak.
- **AT+LEAKALARM=0 -->** Disable a periodically update when in water leak.

Downlink Command: 0x0C

Format: Command Code (0x0C) followed by 1 byte.

- Downlink payload: 0xAC 0A // Same as AT+LEAKALARM=10
- Downlink payload: 0xAC 00 // Same as AT+LEAKALARM=0

3.3.9 Delay time for state changes to take effectEdit

AT Command: AT+DETEDELAY

AT+DETEDELAY=50 --> Default Value, Set state change, valid signal is 50ms.

AT+DETEDELAY=0 --> Disable valid signal detection..

Downlink Command: 0x0D aa bb

0D: Command Type Code

aa bb: timeout

Example:

- Downlink payload: 0x0D 00 32 // Same as AT+DETEDELAY=50
- Downlink payload: 0x0D 00 00 // Same as AT+DETEDELAY=0

3.3.10 Clear the leak count and the duration of the last leak

AT Command: AT+CLRC

Command Example	Function	Response
AT+CLRC	clear the leak count and the duration of the last leak.	OK

Downlink Payload: 0xA601

The sensor will clear the leak count and the duration of the last leak.

3.3.11 Set the count value of the number of leaks

AT Command: AT+SETCNT

Command Example	Function	Response
AT+SETCNT=100	Set the leak count value to 100	OK

Downlink Payload: 0xA5

Format: Command Code (0xA5) followed by 3 bytes.

- 0xA5 00 00 64 //Same as AT+SETCNT=100

4. Battery & How to replace

4.1 Battery Type and replace

LWL04 is equipped with 1 x CR123A battery. If the batterys running low(see 2.3~2.5v in the platform). User can buy generic CR123A battery and replace it.

Note: Make sure the direction is correct when install the CR123A battery.

Important Notice: Make sure use new CR123A battery and the battery doesn't have broken surface.

Example of CR123A battery:

4.2 Power Consumption Analyze

Dragino battery powered products are all run in Low Power mode. User can check the guideline from this link to calculate the estimate battery life:

Battery Info & Power Consumption Analyze .

5. OTA Firmware update

User can change firmware LWL04 to:

- Change Frequency band/ region.
- Update with new features.
- Fix bugs.

Firmware and changelog can be downloaded from : Firmware download link

Methods to Update Firmware:

- (Recommanded way) OTA firmware update via wireless: **http://wiki.dragino.com/xwiki/bin/view/Main/Firmware%20OTA%20Update%20for%20Sensors/**
- Update through UART TTL interface: **Instruction**.

6. FAQ

7. Order Info

Part Number: LWL04-XXX

XXX:

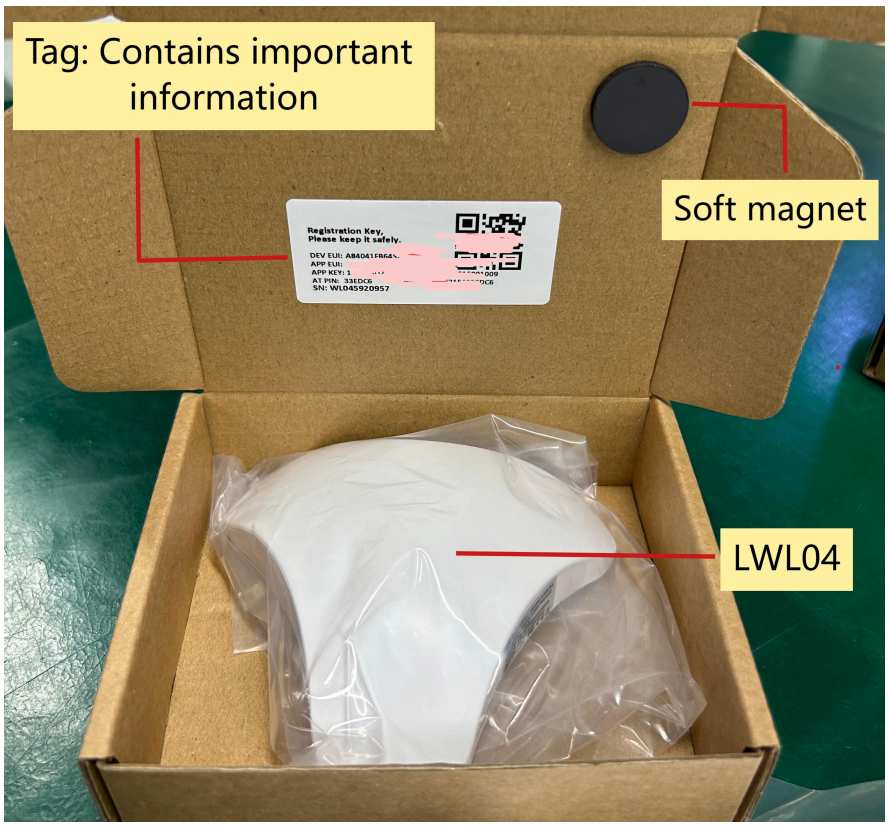
- **EU433**: frequency bands EU433
- **EU868**: frequency bands EU868
- **KR920**: frequency bands KR920

- **CN470**: frequency bands CN470
- **AS923**: frequency bands AS923
- **AU915**: frequency bands AU915
- **US915**: frequency bands US915
- **IN865**: frequency bands IN865
- **CN779**: frequency bands CN779

8. Packing Info

Package Includes:

- LWL04 x 1

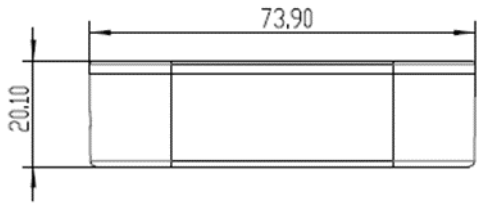


Dimension and weight:

- Device Size: cm
- Device Weight: g
- Package Size / pcs : cm
- Weight / pcs : g

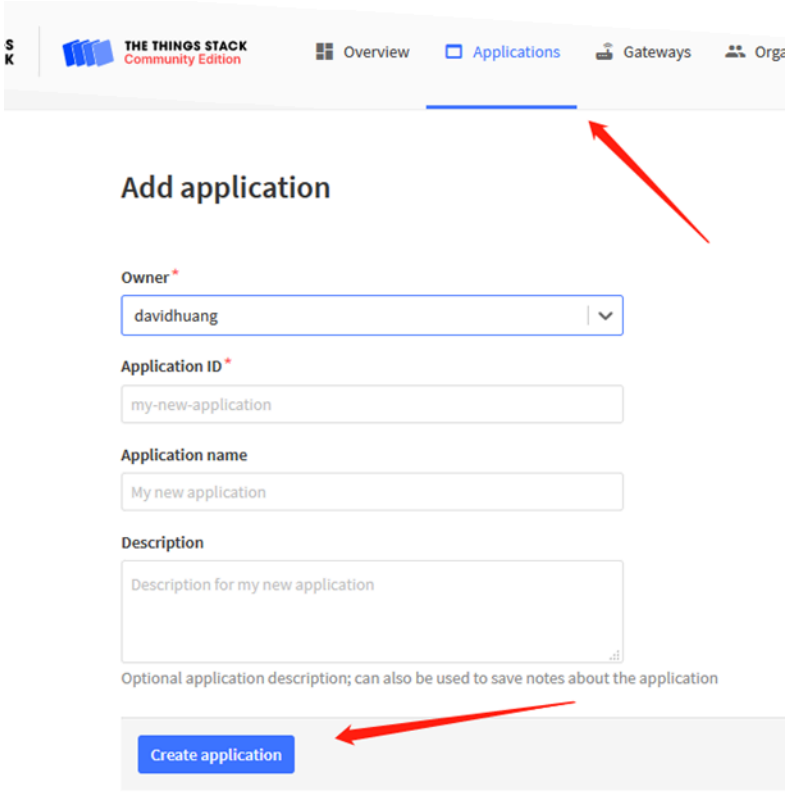
9. Support

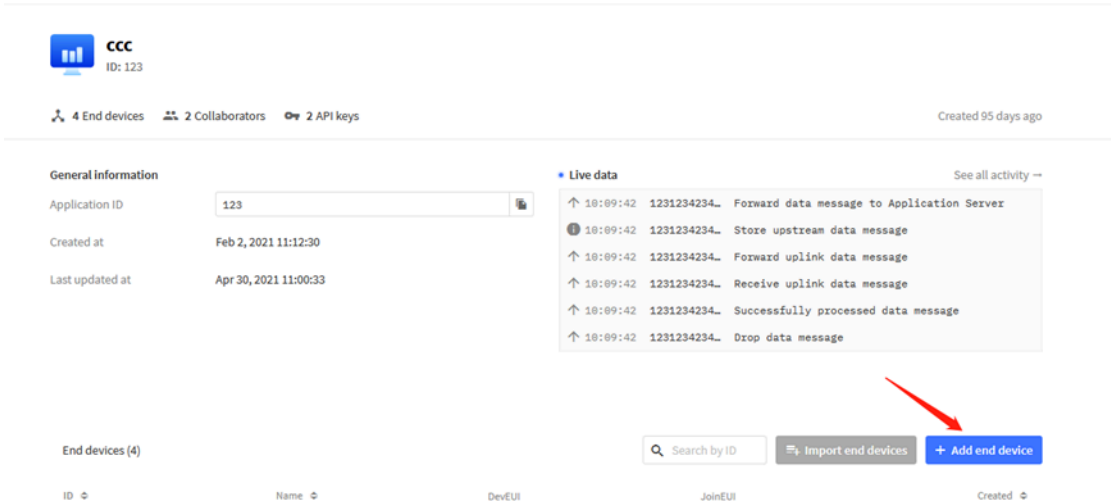
- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models,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

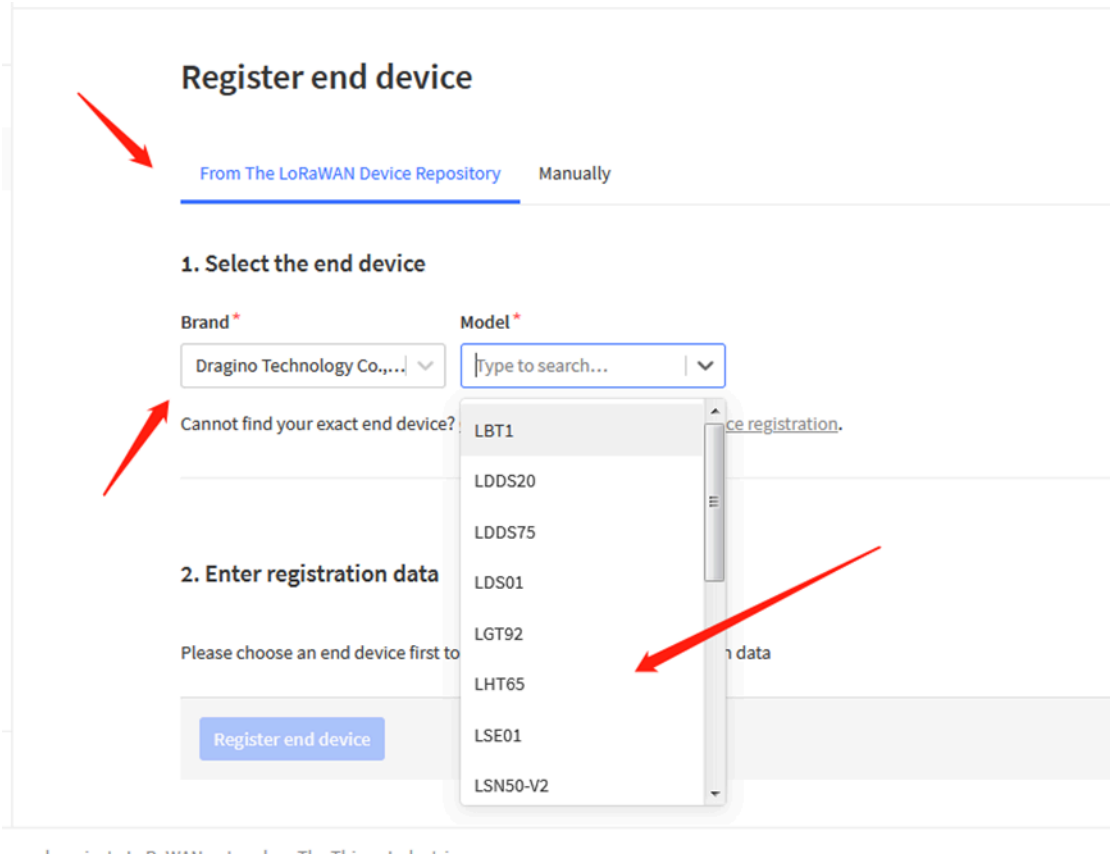

73.90
20.10

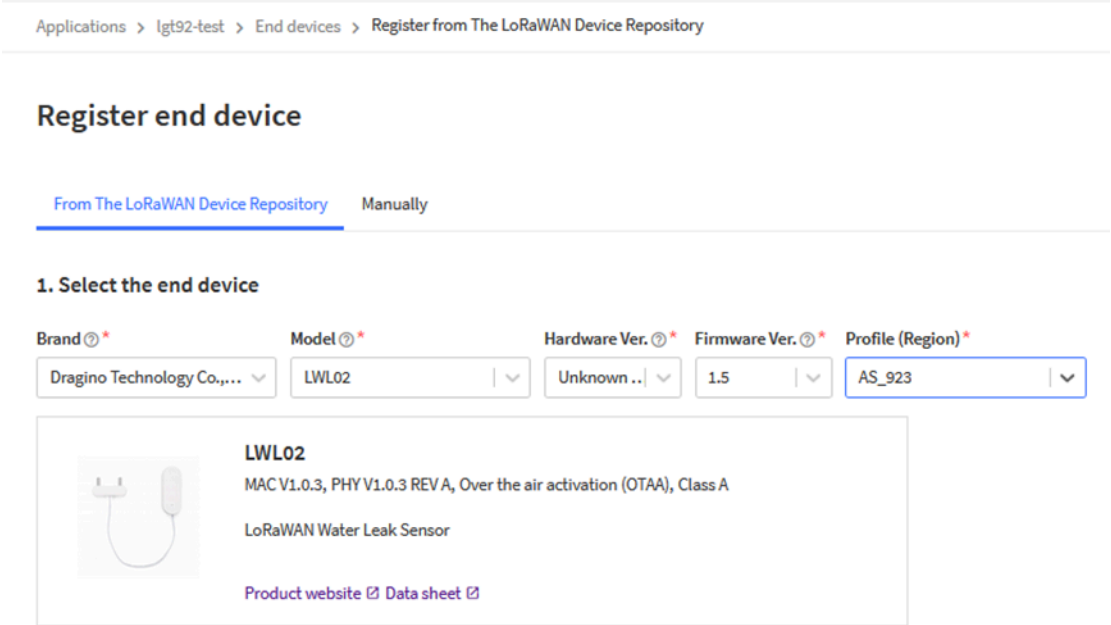

LWL02
Water Leak
Sensor
LoRaWAN
LG308
LoRaWAN Gateway
Internet
THE THINGS
NETWORK
TTN LoRaWAN server

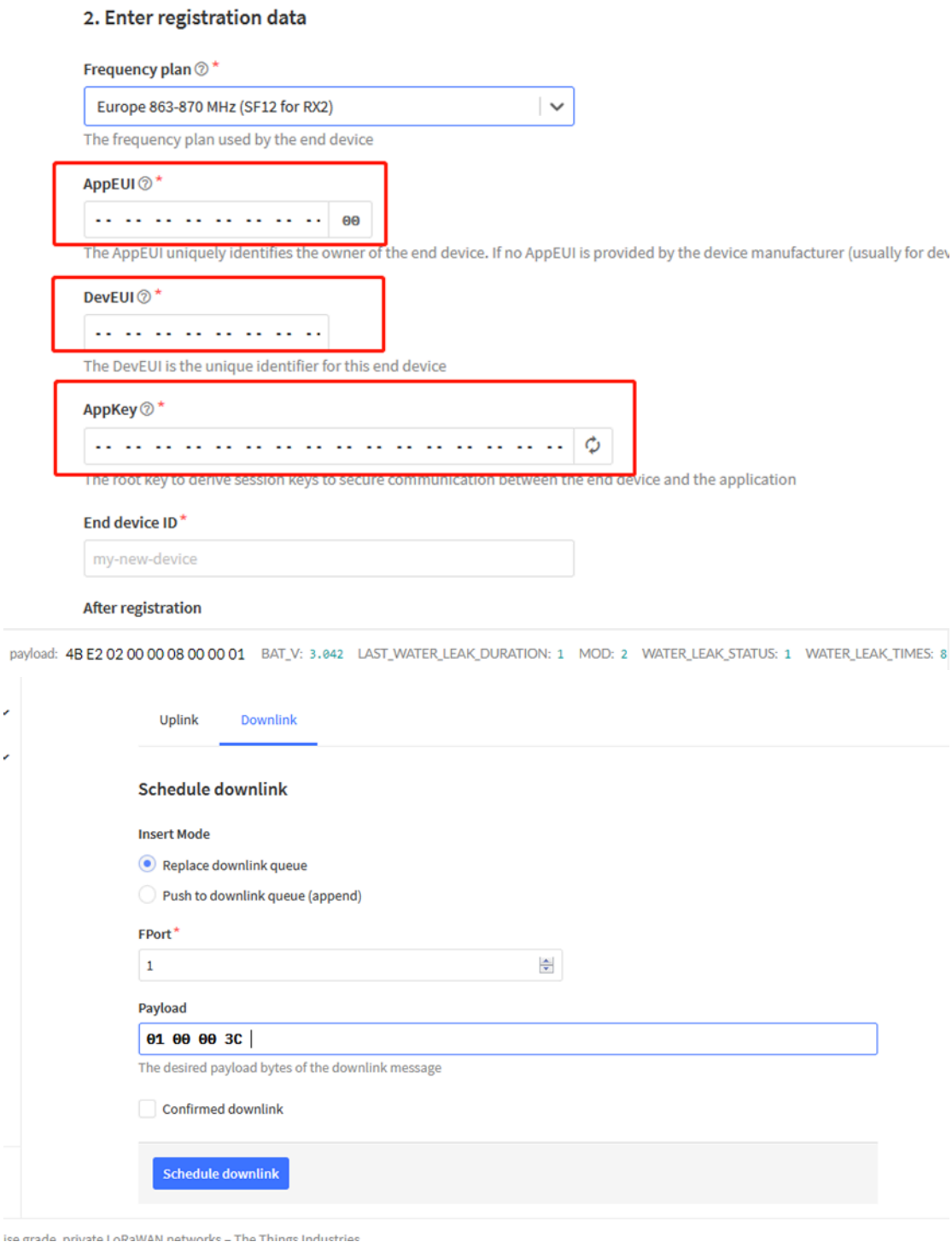

DRAGINO
DEV ADDR: 01818548
DEV EUI: A840410001818548
APP EUI: 3F77ADE36BCAAB65
APP KEY: 574E37E68AECFCCDB3B93D87A93B4B2C
APPSKEY: C948A56F21258524BE2ED27FA8BCC8C9
NETSKEY: FFA2F546BFFF65DD62FB26685A9B94F3
SN:LST25265480

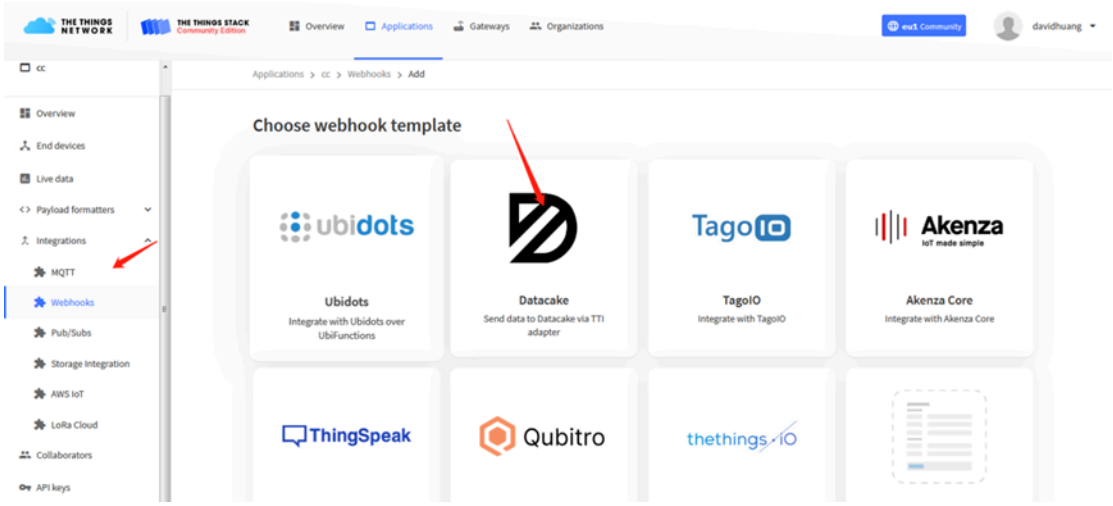

THE THINGS STACK
Community Edition
Overview
Applications
Gateways
Add application
Owner *
davidhuang
Application ID *
my-new-application
Application name
My new application
Description
Description for my new application
Optional application description; can also be used to save notes about the application
Create application

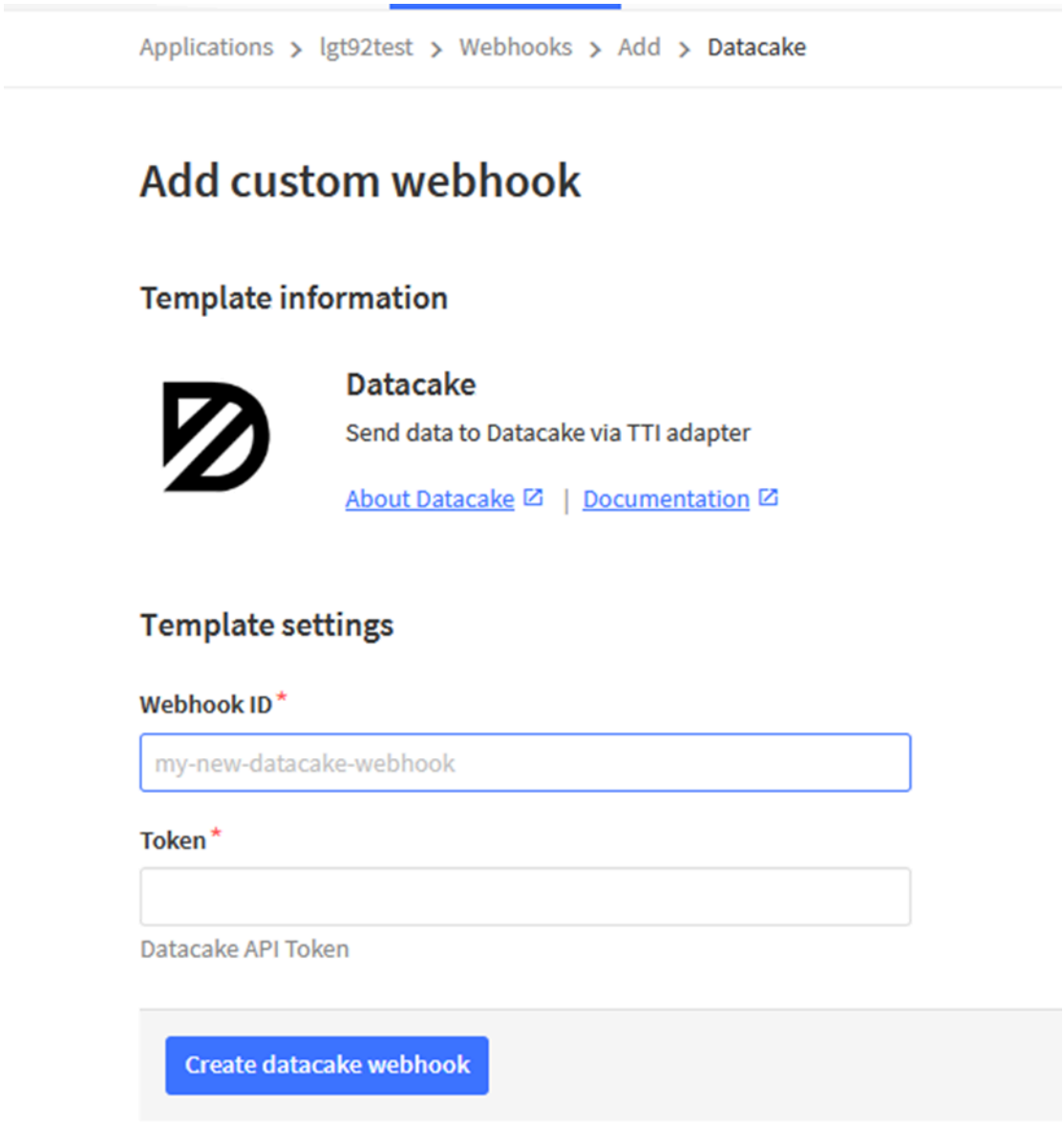

ccc
ID: 123
4 End devices
2 Collaborators
2 API keys
Created 95 days ago
General information
Application ID
123
Created at
Feb 2, 2021 11:12:30
Last updated at
Apr 30, 2021 11:00:33
Live data
See all activity
10:09:42 1231234234… Forward data message to Application Server
10:09:42 1231234234… Store upstream data message
10:09:42 1231234234… Forward uplink data message
10:09:42 1231234234… Receive uplink data message
10:09:42 1231234234… Successfully processed data message
10:09:42 1231234234… Drop data message
End devices (4)
Search by ID
Import end devices
Add end device
ID
Name
DevEUI
JoinEUI
Created

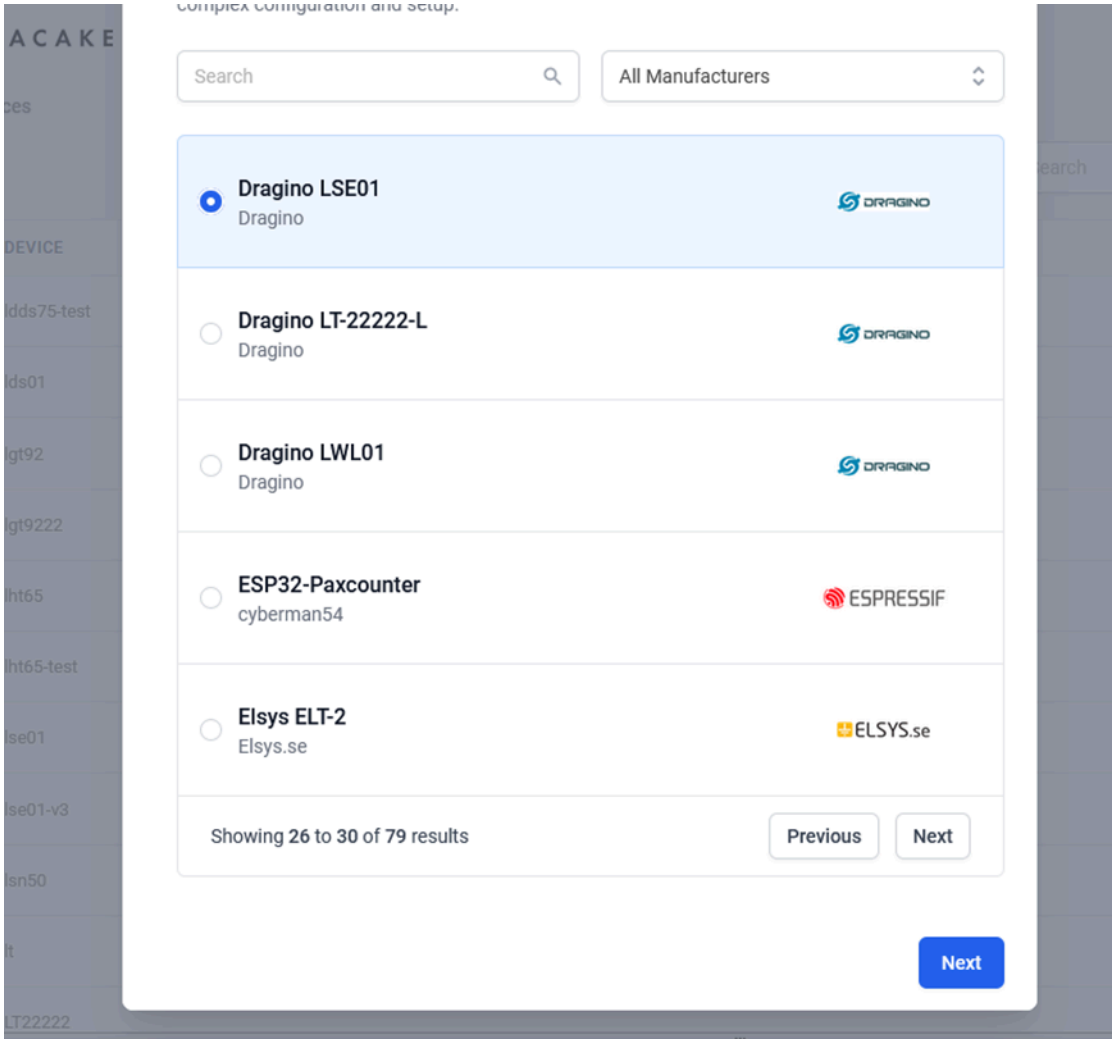

Register end device
From The LoRaWAN Device Repository
Manually
1. Select the end device
Brand *
Model *
Dragino Technology Co.,...
Type to search...
Cannot find your exact end device?
ce registration.
LBT1
LDDS20
LDDS75
LDS01
LGT92
LHT65
LSE01
LSN50-V2
2. Enter registration data
Please choose an end device first to
data
Register end device

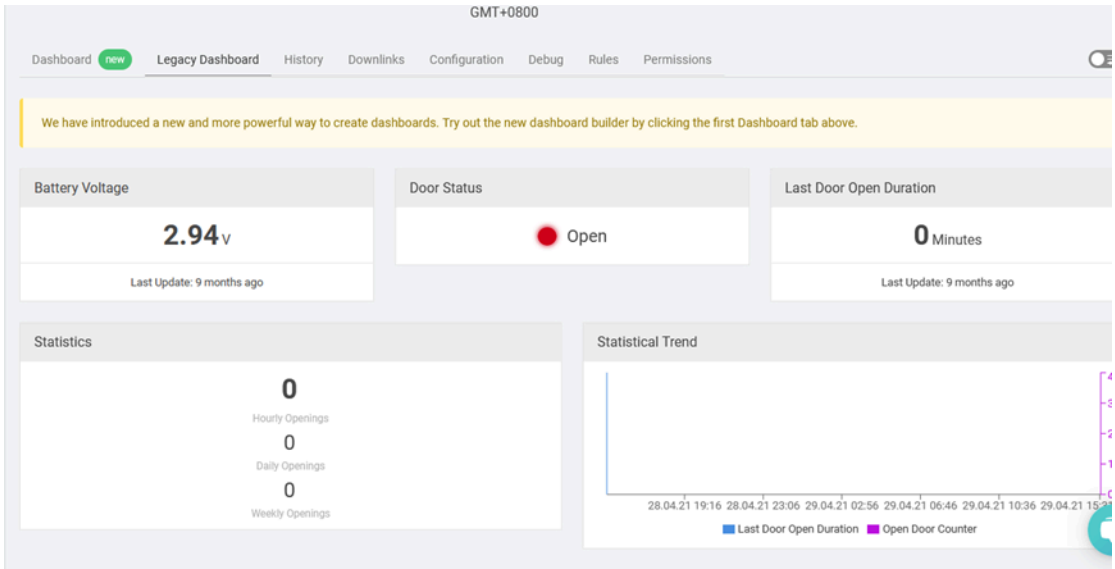

Applications > lgt92-test > End devices > Register from The LoRaWAN Device Repository
Register end device
From The LoRaWAN Device Repository
Manually
1. Select the end device
Brand *
Model *
Hardware Ver. *
Firmware Ver. *
Profile (Region) *
Dragino Technology Co.,...
LWL02
Unknown ..
1.5
AS_923
LWL02
MAC V1.0.3, PHY V1.0.3 REV A, Over the air activation (OTAA), Class A
LoRaWAN Water Leak Sensor
Product website
Data sheet


2. Enter registration data
Frequency plan *
Europe 863-870 MHz (SF12 for RX2)
The frequency plan used by the end device
AppEUI *
-- -- -- -- -- -- -- -- 00
The AppEUI uniquely identifies the owner of the end device. If no AppEUI is provided by the device manufacturer (usually for dev
DevEUI *
-- -- -- -- -- -- -- --
The DevEUI is the unique identifier for this end device
AppKey *
-- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
The root key to derive session keys to secure communication between the end device and the application
End device ID *
my-new-device
After registration
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
Uplink
Downlink
Schedule downlink
Insert Mode
Replace downlink queue
Push to downlink queue (append)
FPort *
1
Payload
01 00 00 3C
The desired payload bytes of the downlink message
Confirmed downlink
Schedule downlink

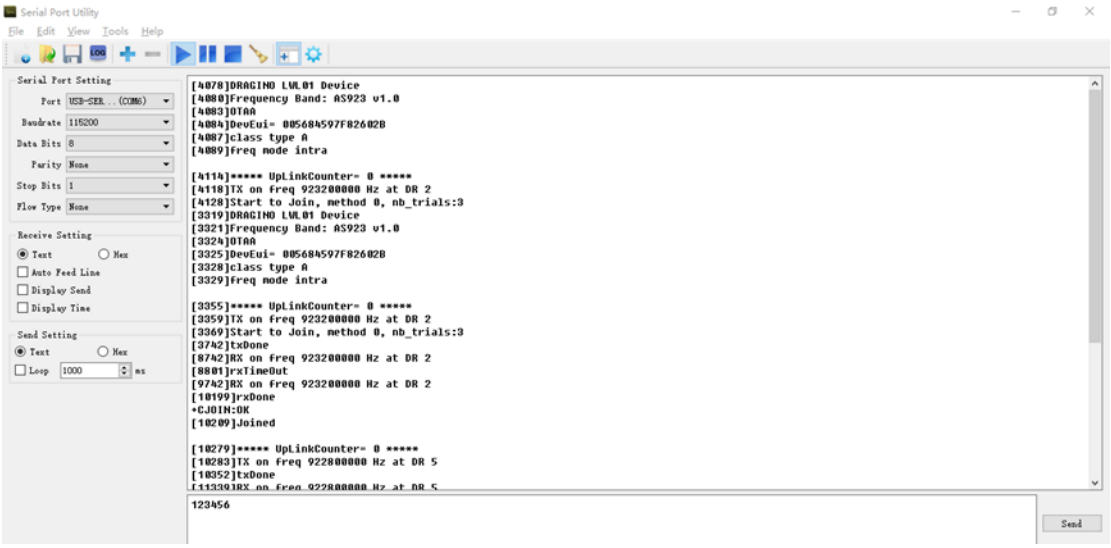

THE THINGS NETWORK
THE THINGS STACK
Community Edition
Overview
Applications
Gateways
Organizations
davidhuang
cc
Applications > cc > Webhooks > Add
Overview
End devices
Live data
Payload formatters
Integrations
MQTT
Webhooks
Pub/Subs
Storage Integration
AWS IoT
LoRa Cloud
Collaborators
API keys
Choose webhook template
ubidots
Ubidots
Integrate with Ubidots over UbiFunctions
Datacake
Send data to Datacake via TTI adapter
TagoIO
Integrate with TagoIO
Akenza
IoT made simple
Akenza Core
Integrate with Akenza Core
ThingSpeak
Qubitro
thethings.iO


Applications > lgt92test > Webhooks > Add > Datacake
Add custom webhook
Template information
Datacake
Send data to Datacake via TTI adapter
About Datacake | Documentation
Template settings
Webhook ID *
my-new-datacake-webhook
Token *
Datacake API Token
Create datacake webhook


Search
All Manufacturers
Dragino LSE01
Dragino
Dragino LT-22222-L
Dragino
Dragino LWL01
Dragino
ESP32-Paxcounter
cyberman54
Elsys ELT-2
Elsys.se
Showing 26 to 30 of 79 results
Previous
Next
Next

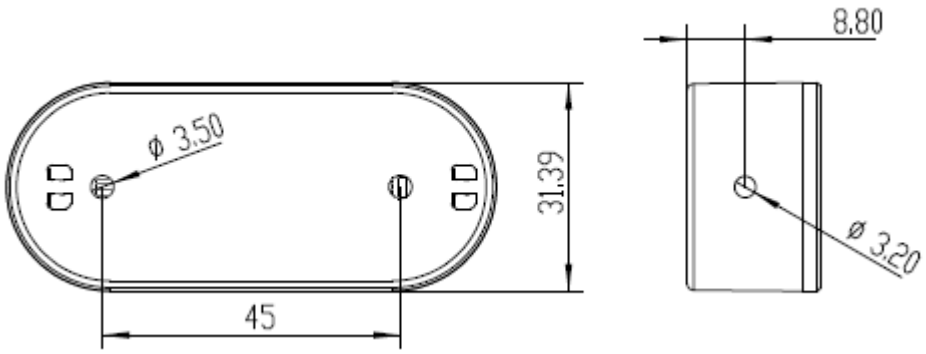

GMT+0800
Dashboard
new
Legacy Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
We have introduced a new and more powerful way to create dashboards. Try out the new dashboard builder by clicking the first Dashboard tab above.
Battery Voltage
2.94 v
Last Update: 9 months ago
Door Status
Open
Last Door Open Duration
0 Minutes
Last Update: 9 months ago
Statistics
0
Hourly Openings
0
Daily Openings
0
Weekly Openings
Statistical Trend
28.04.21 19:16
28.04.21 23:06
29.04.21 02:56
29.04.21 06:46
29.04.21 10:36
Last Door Open Duration
Open Door Counter

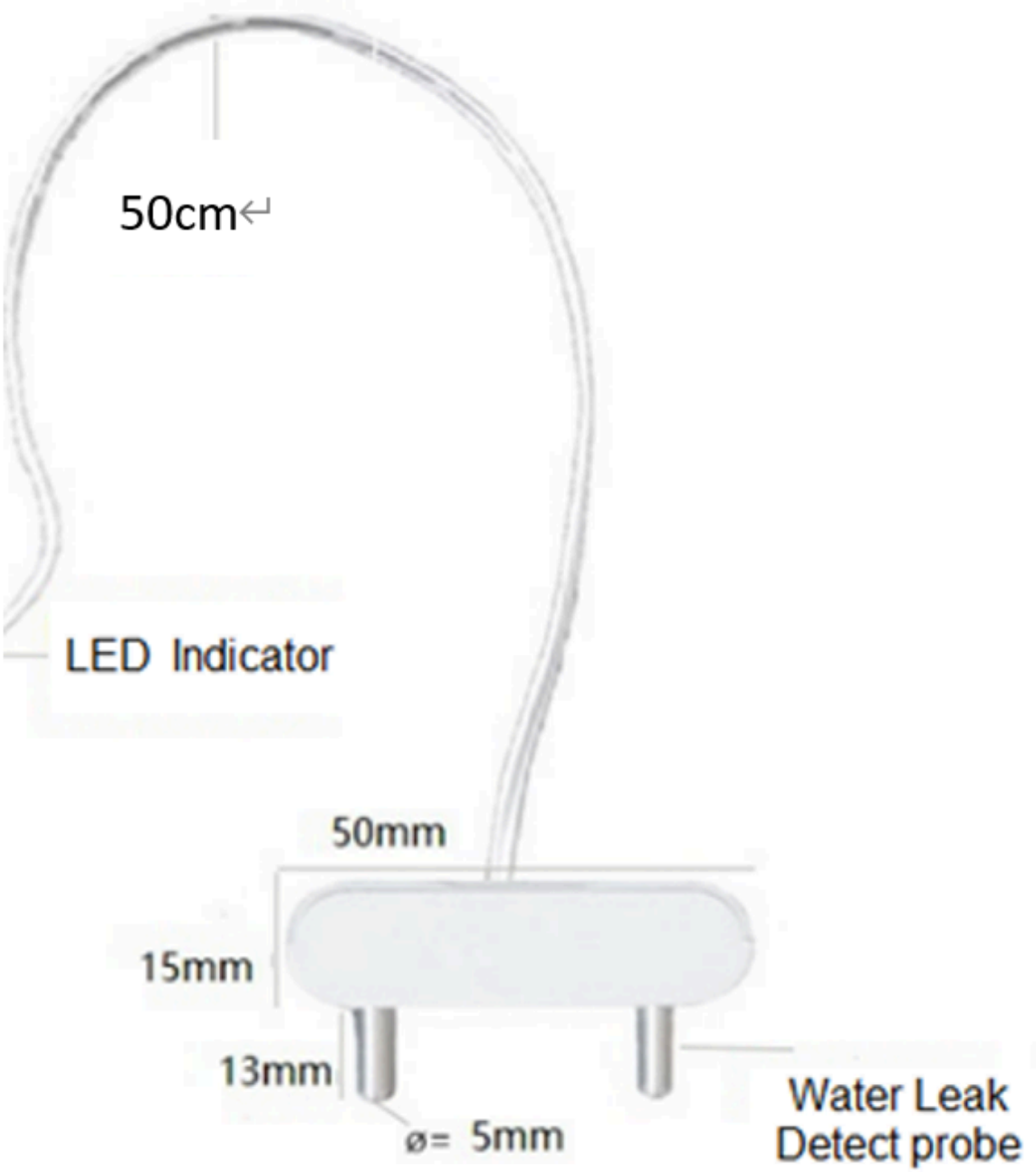

7号AAA
44.5mm
10.4mm

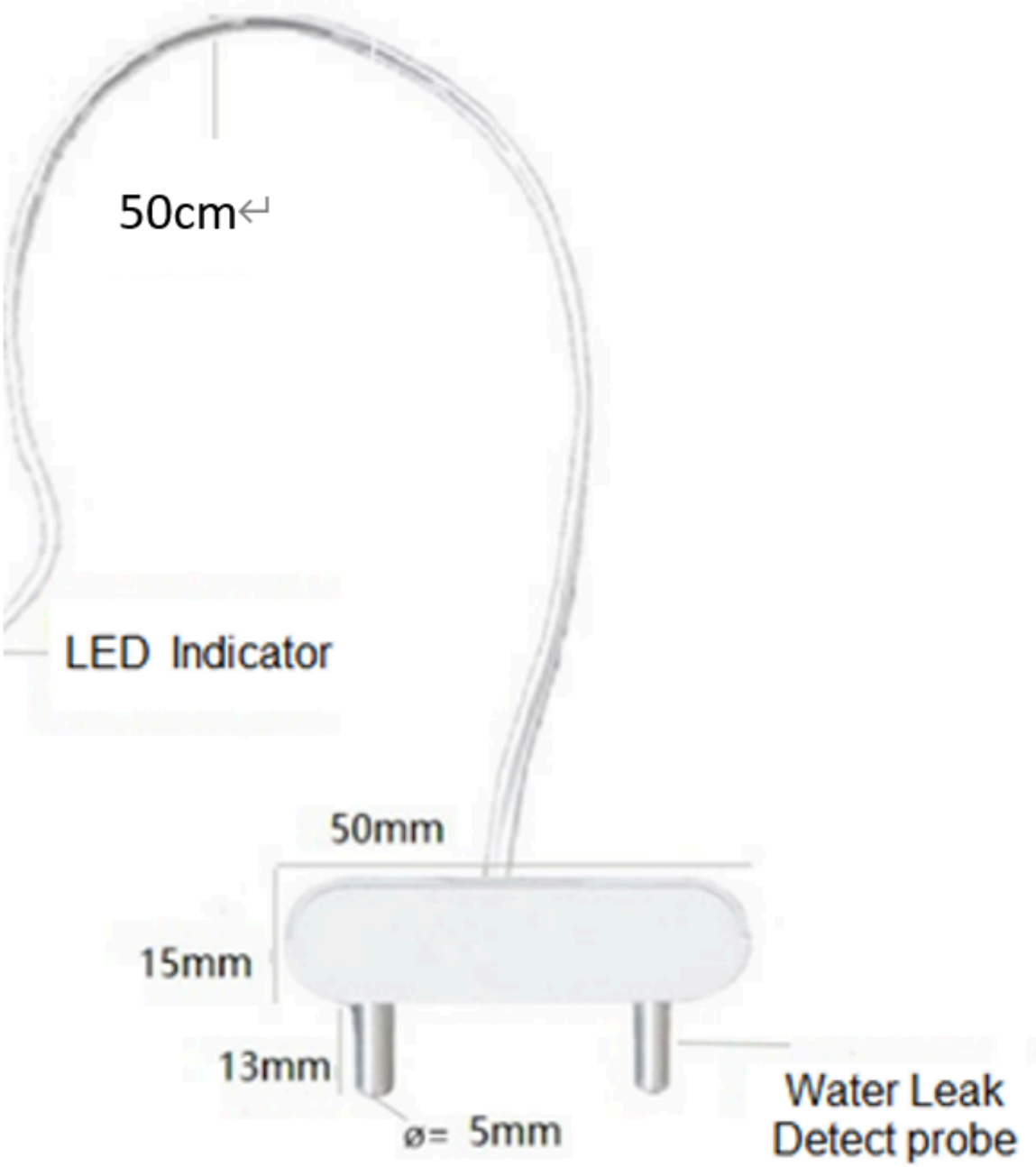

Serial Port Utility
File Edit View Tools Help
Serial Port Setting
Port USB-SER...(COM6)
Baudrate 115200
Data Bits 8
Parity None
Stop Bits 1
Flow Type None
Receive Setting
Text Hex
Auto Feed Line
Display Send
Display Time
Send Setting
Text Hex
Loop 1000 ms
[4078]DRAGINO LWL01 Device
[4080]Frequency Band: AS923 v1.0
[4083]OTAA
[4084]DevEui= 00568A597F82602B
[4087]class type A
[4089]freq mode intra
[4114]***** UpLinkCounter= 0 *****
[4118]TX on freq 923200000 Hz at DR 2
[4128]Start to Join, method 0, nb_trials:3
[3319]DRAGINO LWL01 Device
[3321]Frequency Band: AS923 v1.0
[3324]OTAA
[3325]DevEui= 00568A597F82602B
[3328]class type A
[3329]freq mode intra
[3355]***** UpLinkCounter= 0 *****
[3359]TX on freq 923200000 Hz at DR 2
[3369]Start to Join, method 0, nb_trials:3
[3742]txDone
[8742]RX on freq 923200000 Hz at DR 2
[8801]rxTimeOut
[9742]RX on freq 923200000 Hz at DR 2
[10199]rxDone
+CJOIN:OK
[10209]Joined
[10279]***** UpLinkCounter= 0 *****
[10283]TX on freq 922800000 Hz at DR 5
[10352]txDone
123456
Send


10:35:52 Forward data message to Applic… DevAddr: 26 0B 0C 33 MAC payload: 1A DD 0E 16 02 BB 2D 45 E9 85 FPort: 10 SNR: -6.5 RSSI: -128 Bandwidth: 125000
10:35:52 Store upstream data message DevAddr: 26 0B 0C 33
10:35:51 Successfully scheduled data do… DevAddr: 26 0B 0C 33
10:35:51 Schedule data downlink for tra… DevAddr: 26 0B 0C 33 Rx1 Delay: 5
10:35:51 Forward uplink data message ER_LEAK_DURATION: 0, MOD: 2, WATER_LEAK_STATUS: 1, WATER_LEAK_TIMES: 60] 48 EE 02 00 00 3C 00 00 00 00 FPort: 10 SNR: -6.5 RSSI: -128
10:35:51 Receive uplink data message DevAddr: 26 0B 0C 33
10:35:51 Successfully processed data me… DevAddr: 26 0B 0C 33 FCnt: 480 FPort: 10 MAC payload: 1A DD 0E 16 02 BB 2D 45 E9 85 Bandwidth: 125000 SNR: -6.5 RSSI: -128
10:35:51 Drop data message Uplink is a duplicate
10:35:51 Drop data message Uplink is a duplicate

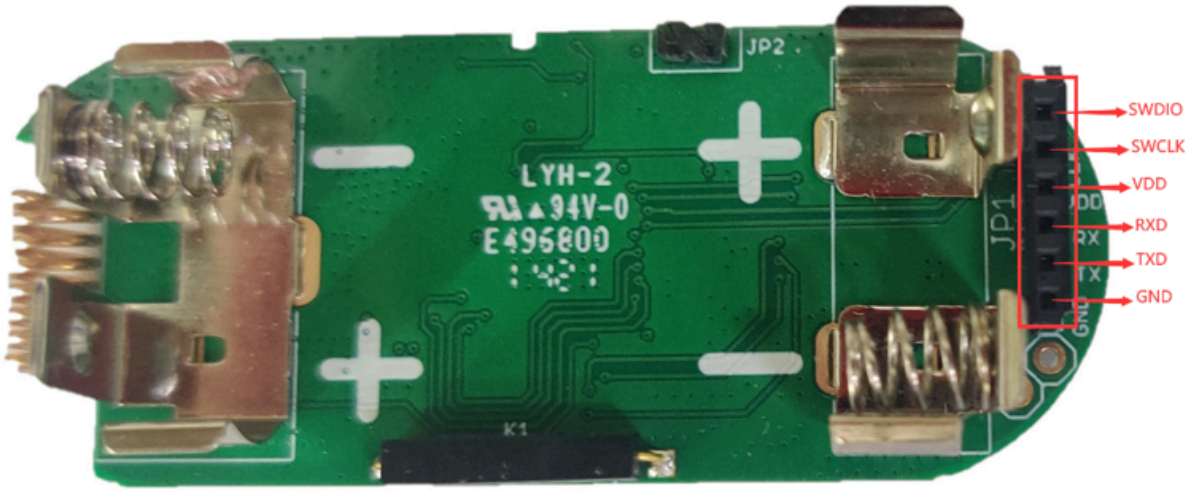

LWL02 in a LoRaWAN Network
LoRaWAN Server
Internet
LWL02
Water Leak
LoRaWAN
LG308
LoRaWAN Gateway


ϕ 3.50
31.39
45
8.80
ϕ 3.20


50cm
LED Indicator
50mm
15mm
13mm
ø= 5mm
Water Leak
Detect probe

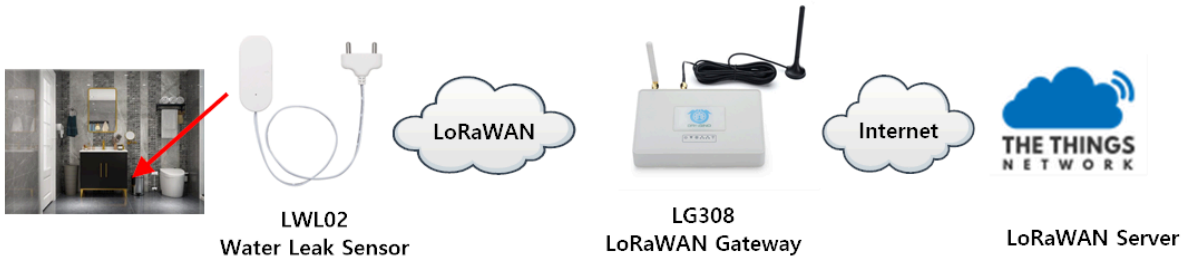


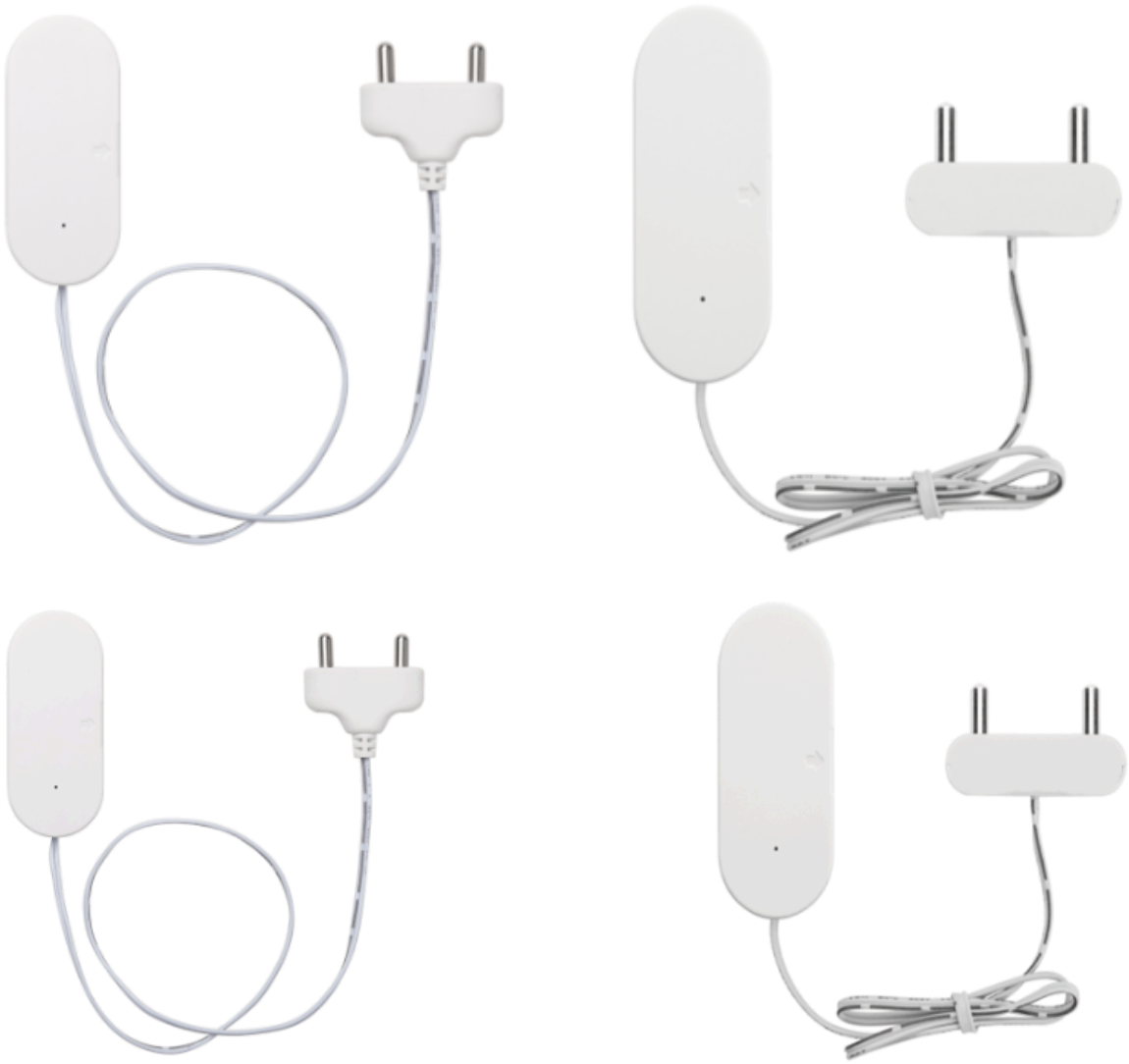
Size(bytes)	2	1	3	3
value	Status&BAT	MOD Always:0x02	Total water leak events	Last water leak duration (unit: min)

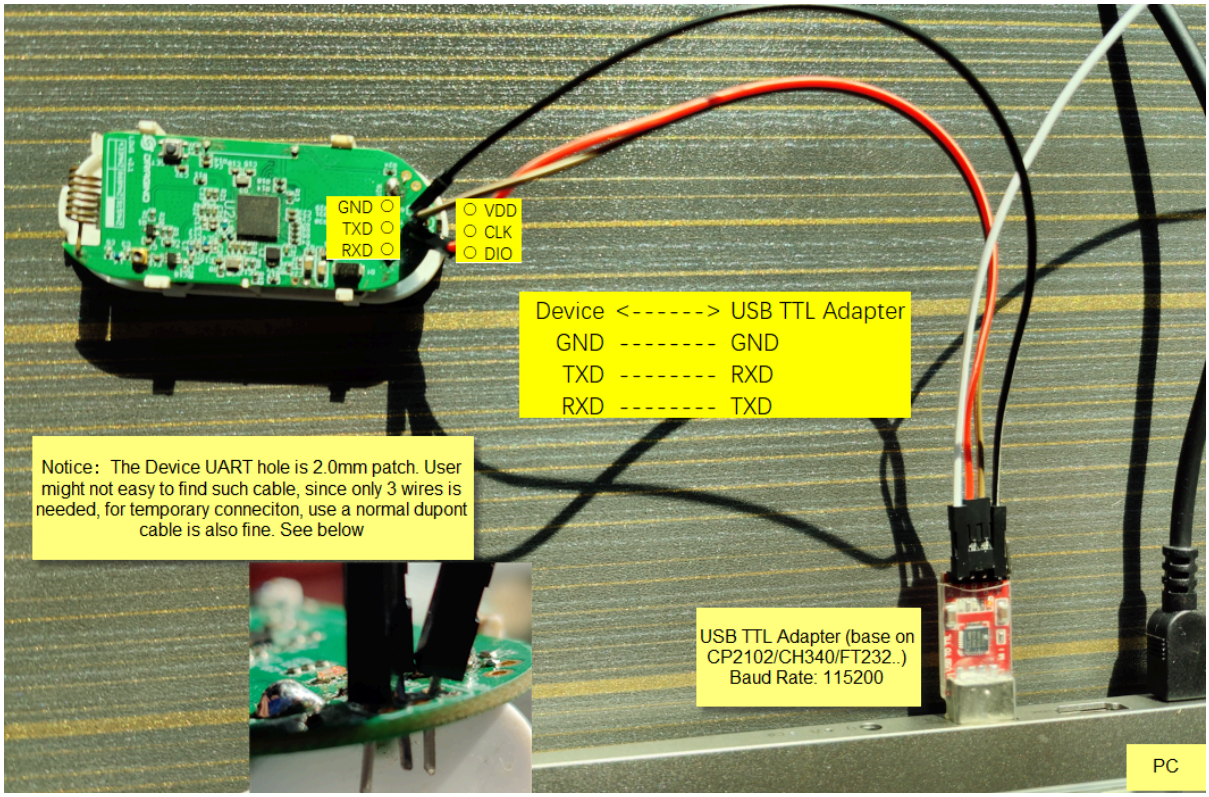

JP2
LYH-2
94V-0
E496800
K1
JP1
SWDIO
SWCLK
VDD
RXD
TXD
GND

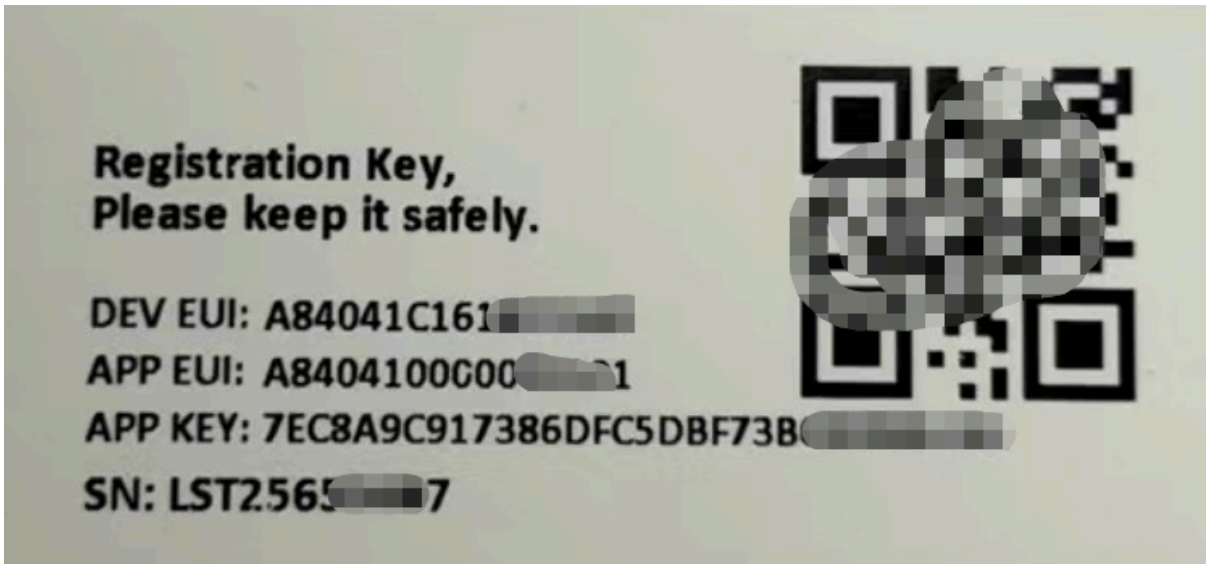
LWL02 in a LoRaWAN Network

LWL02 in a LoRaWAN Network





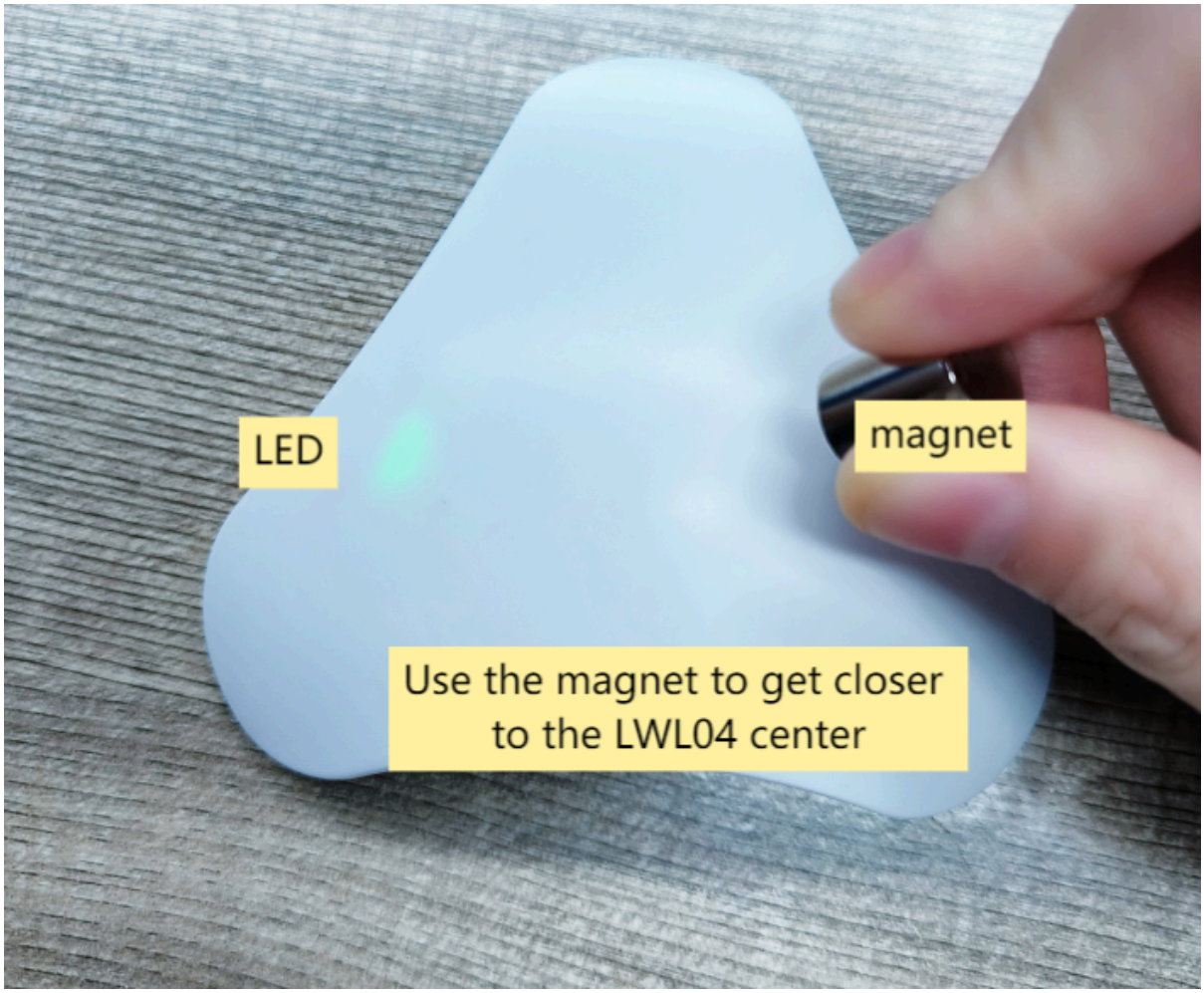

GND
TXD
RXD
VDD
CLK
DIO
Device <------> USB TTL Adapter
GND -------- GND
TXD -------- RXD
RXD -------- TXD
Notice: The Device UART hole is 2.0mm patch. User might not easy to find such cable, since only 3 wires is needed, for temporary conneciton, use a normal dupont cable is also fine. See below
USB TTL Adapter (base on CP2102/CH340/FT232..)
Baud Rate: 115200
PC

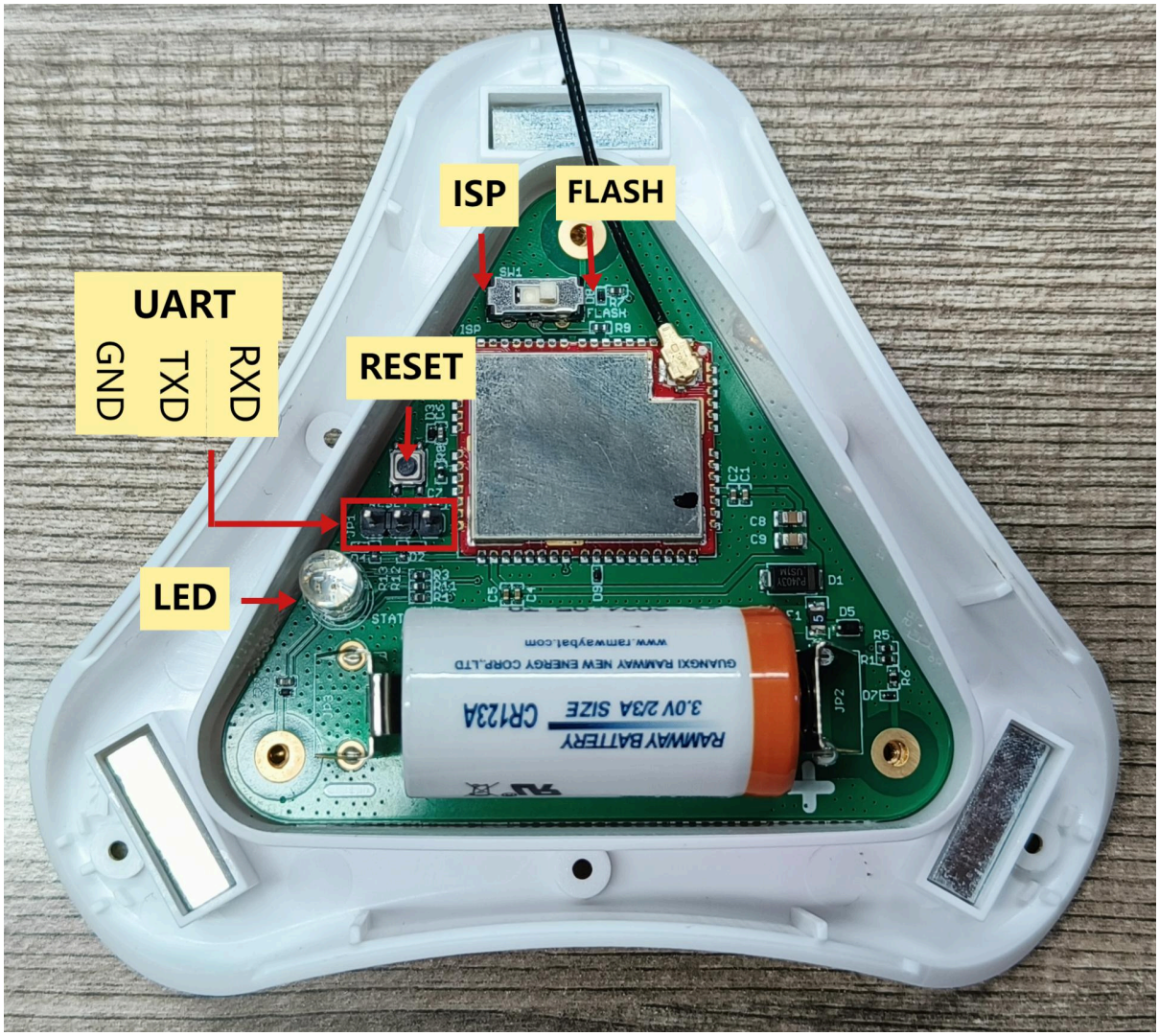

Registration Key,
Please keep it safely.
DEV EUI: A84041C161
APP EUI: A8404100C00
APP KEY: 7EC8A9C917386DFC5DBF73B
SN: LST2565

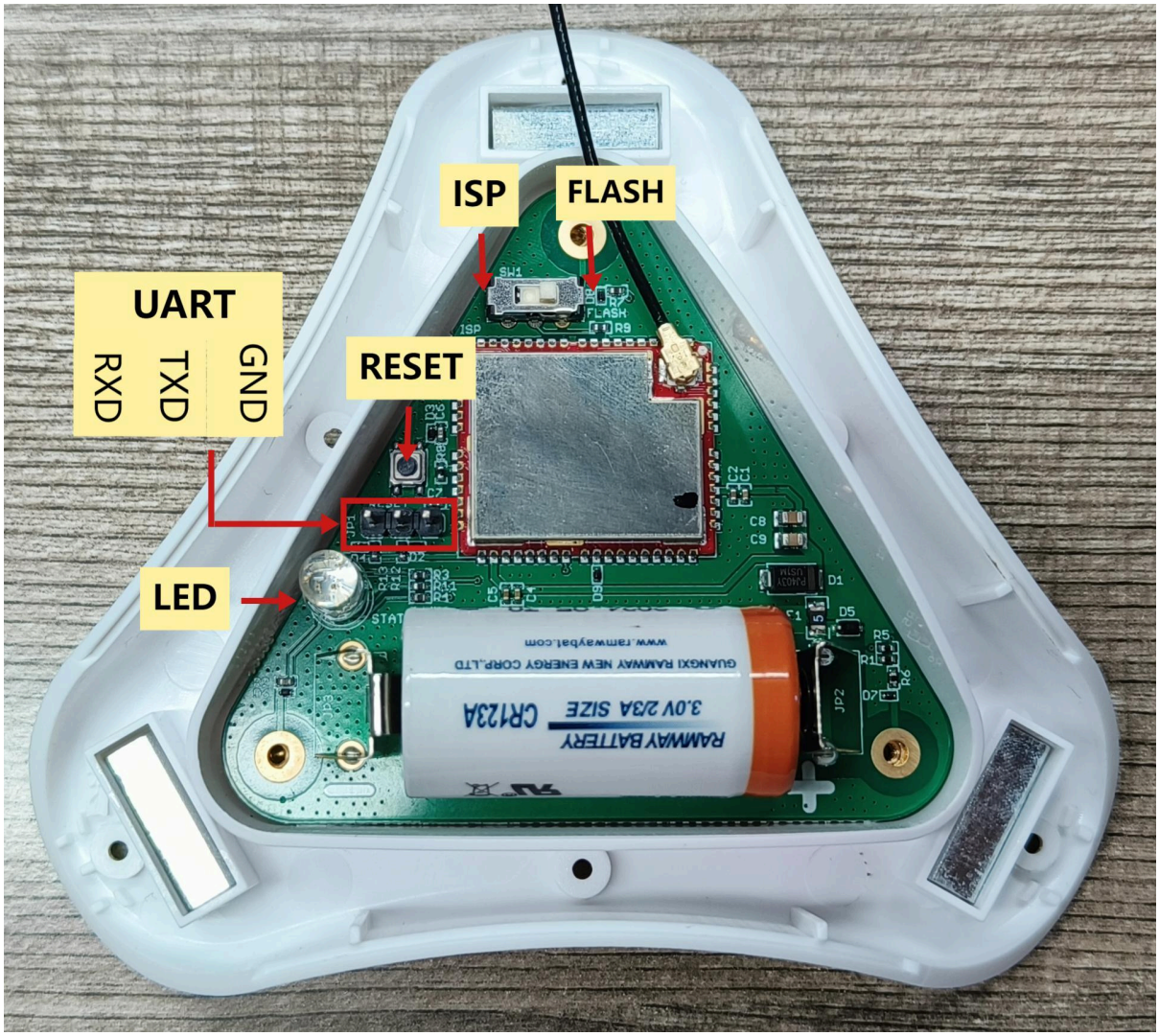

Method one: Fix with screws

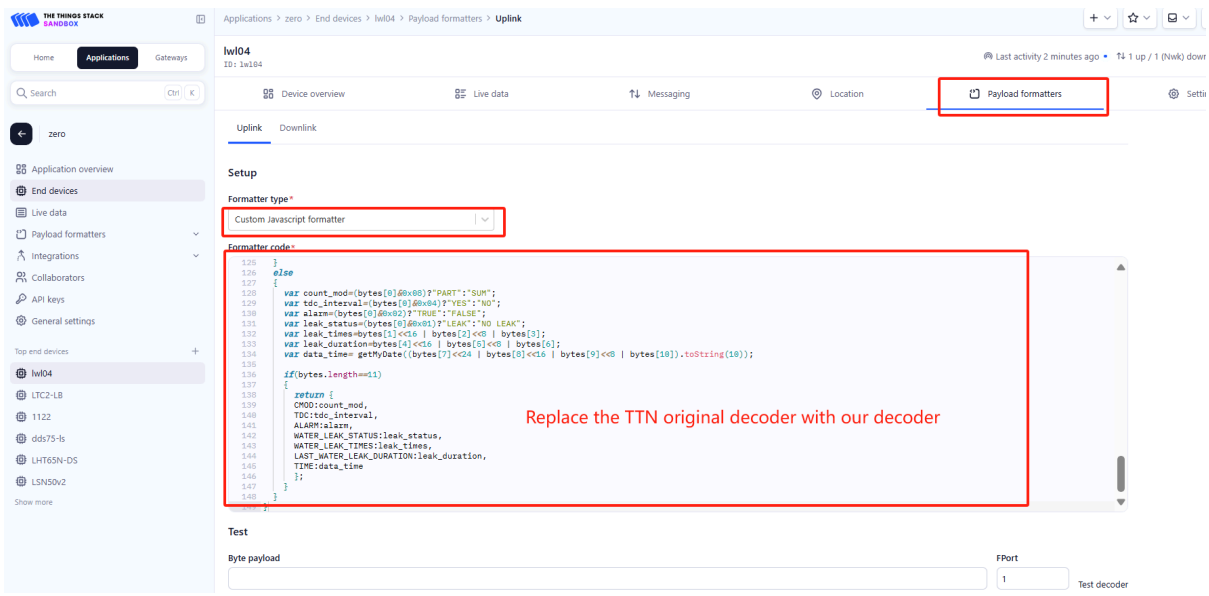

Method two: Fix with double-sided tape
9448A

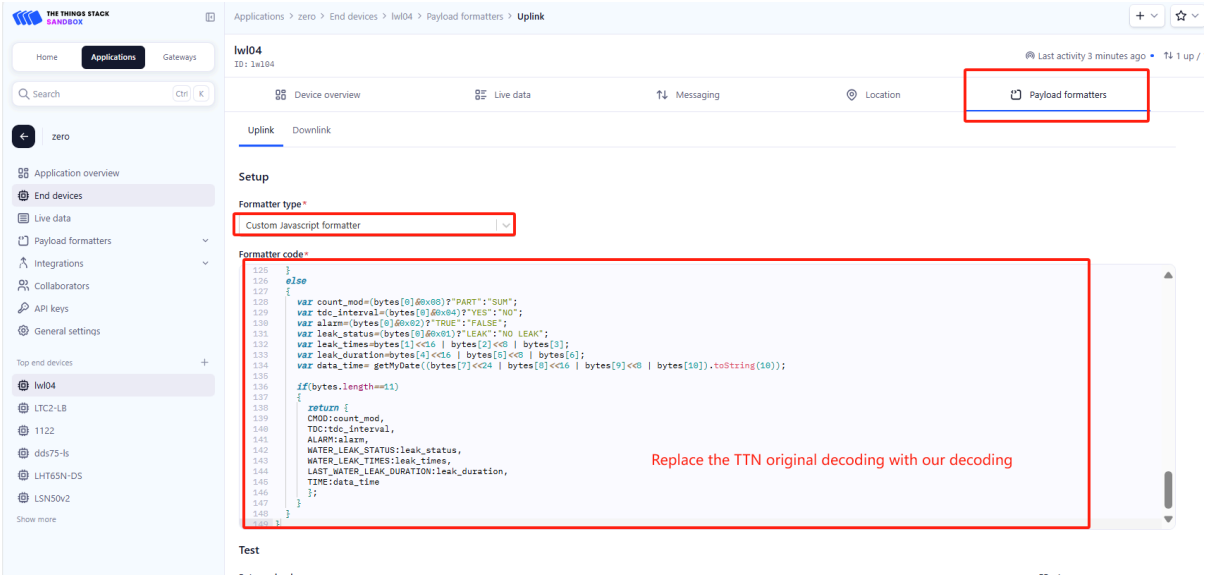
LWL04 in a LoRaWAN Network

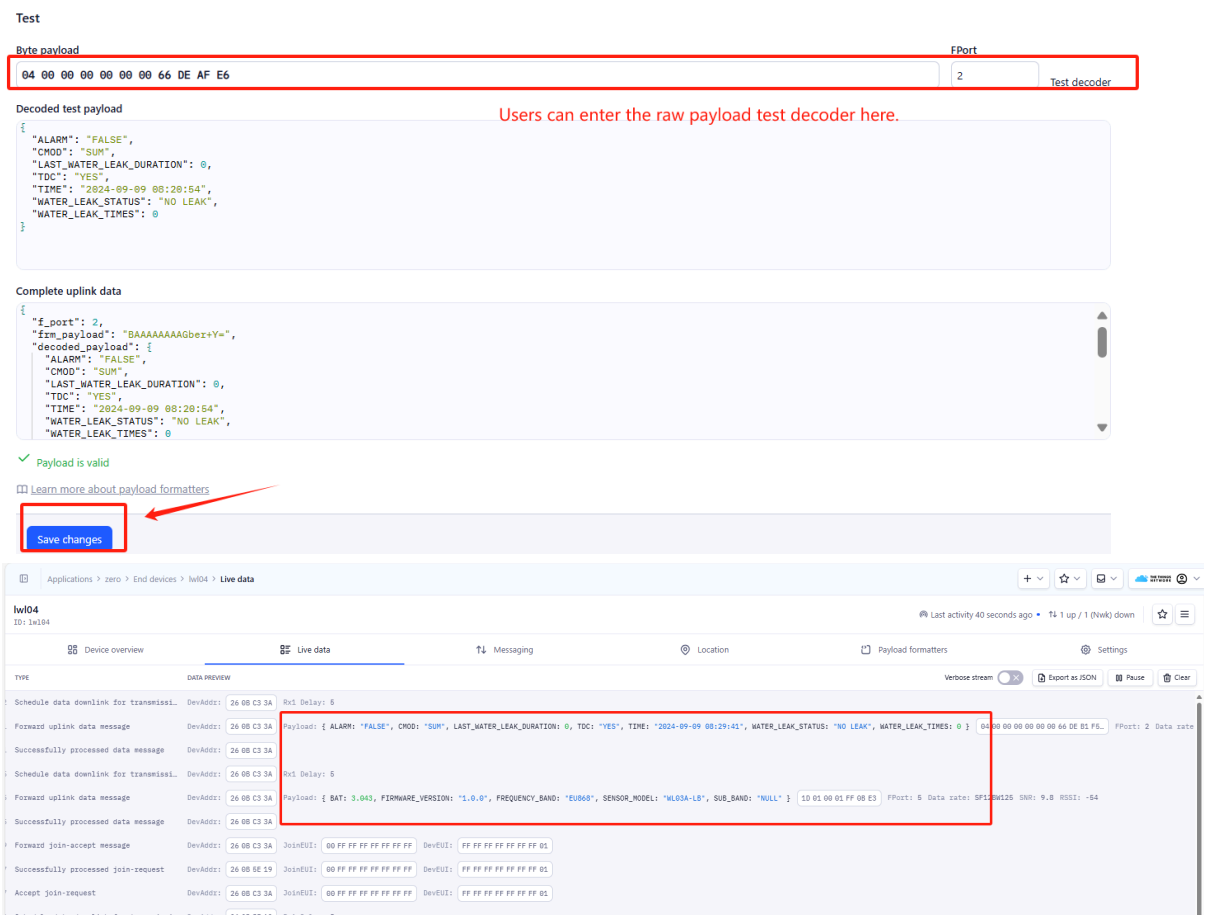

LED
magnet
Use the magnet to get closer
to the LWL04 center


ISP
FLASH
UART
GND
TXD
RXD
RESET
LED

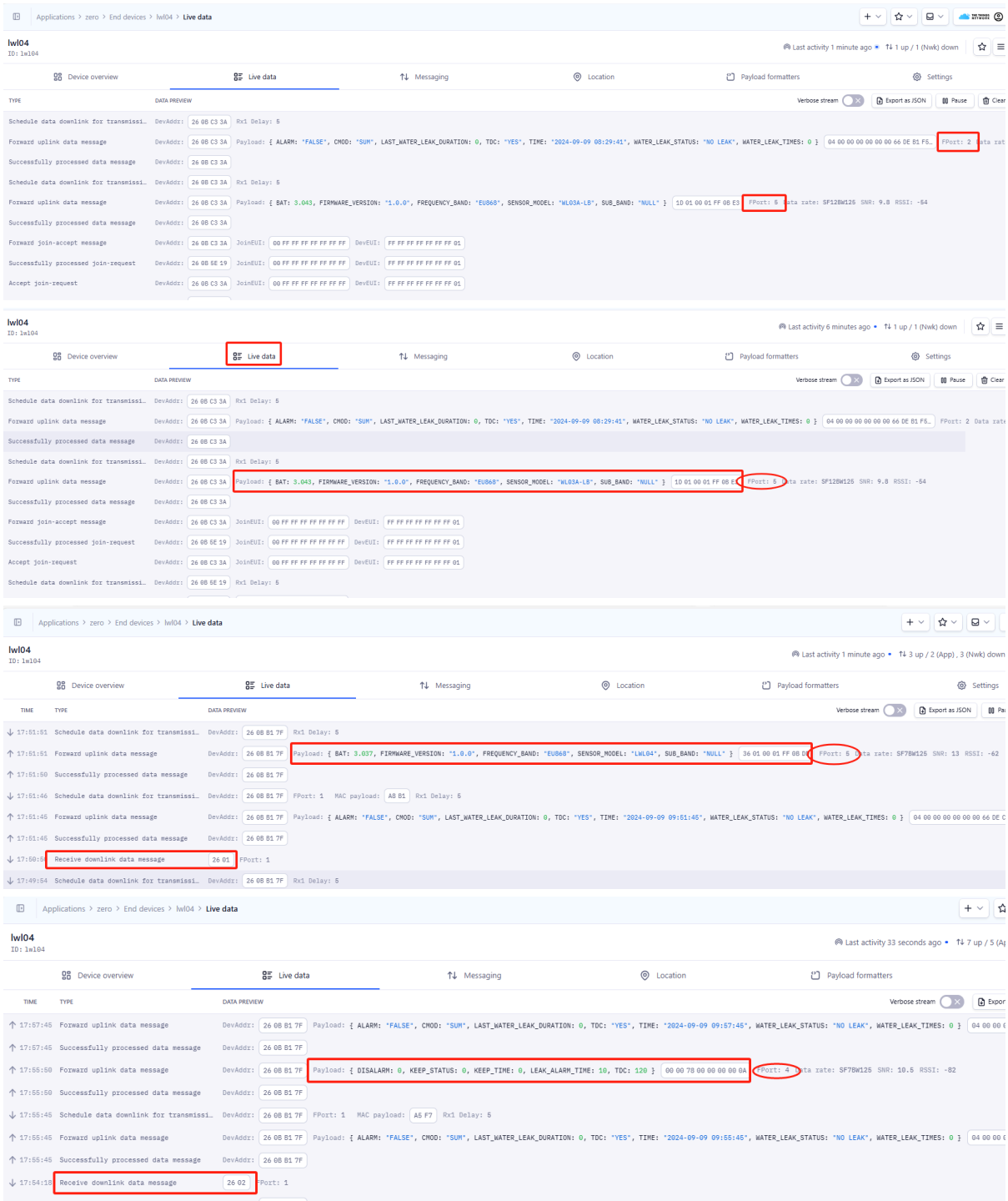

ISP
FLASH
UART
RXD
TXD
GND
RESET
LED

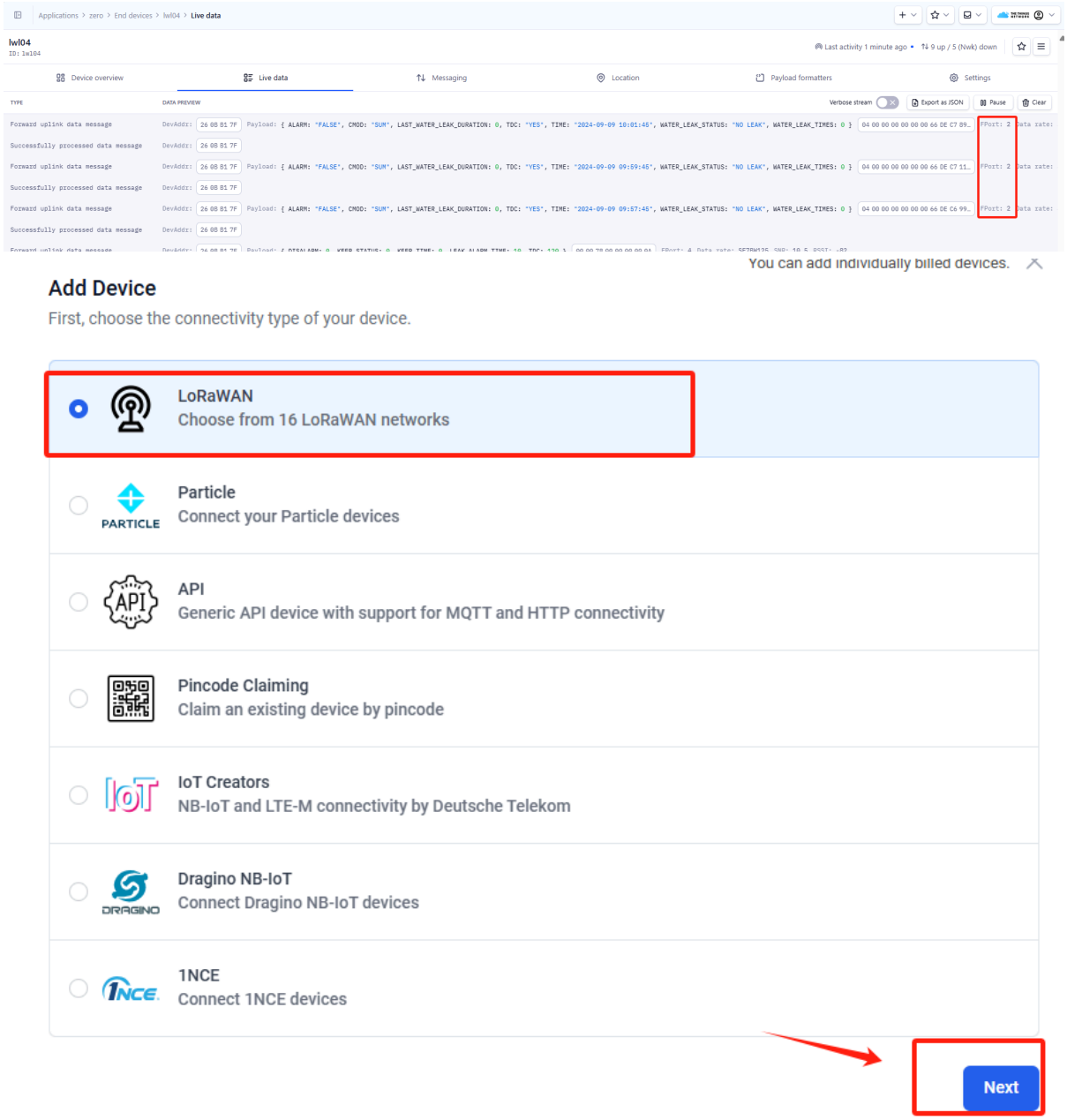

Applications > zero > End devices > lwl04 > Payload formatters > Uplink
lwl04
Device overview
Live data
Messaging
Location
Payload formatters
Uplink
Downlink
Setup
Formatter type
Custom Javascript formatter
Formatter code
Replace the TTN original decoder with our decoder
Test
Byte payload
FPort
Test decoder

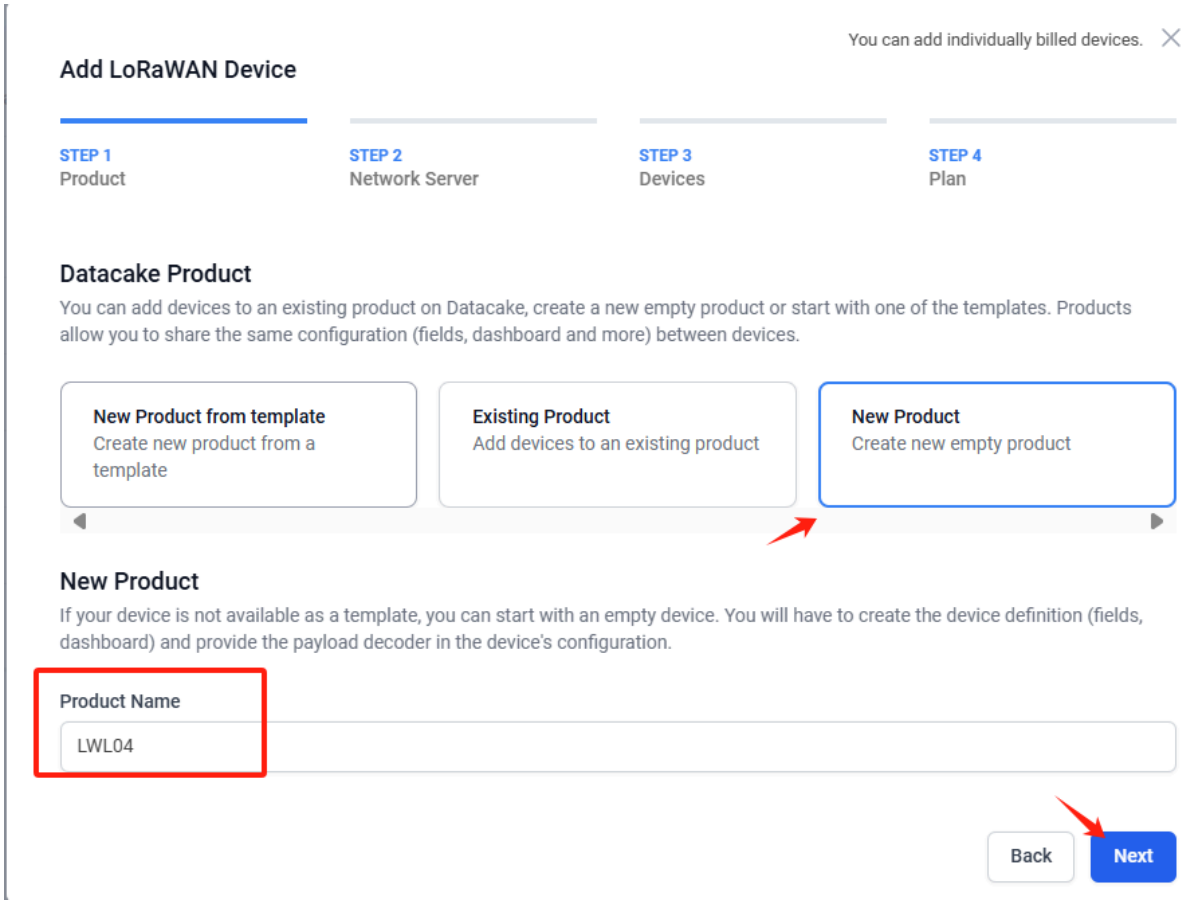

THE THINGS STACK SANDBOX
Applications > zero > End devices > lwl04 > Payload formatters > Uplink
lwl04
ID: lwl04
Device overview
Live data
Messaging
Location
Payload formatters
Uplink
Downlink
Setup
Formatter type *
Custom Javascript formatter
Formatter code *
Replace the TTN original decoding with our decoding
Test

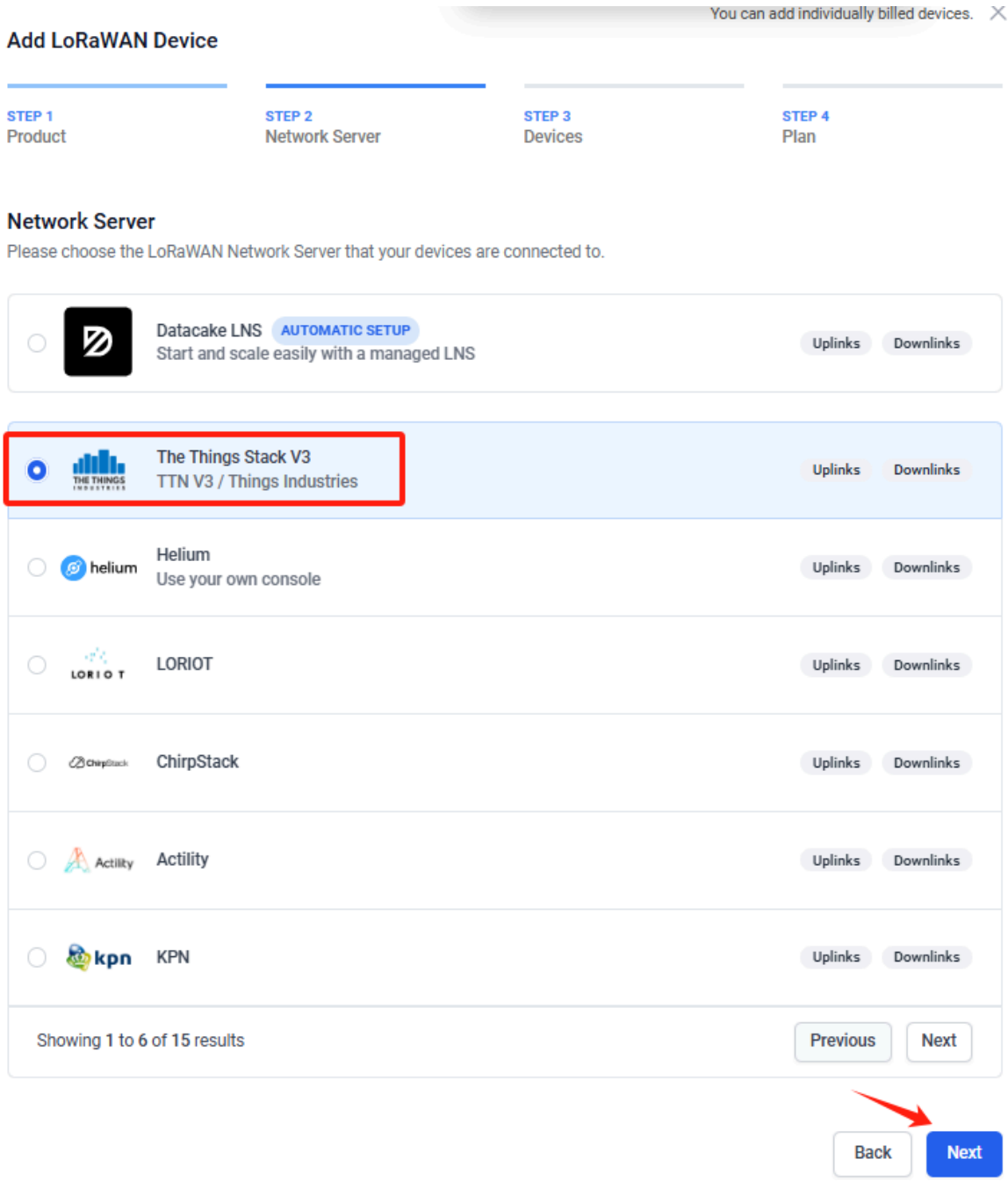

Test
Byte payload
04 00 00 00 00 00 00 66 DE AF E6
FPort
2
Test decoder
Decoded test payload
Users can enter the raw payload test decoder here.
{
"ALARM": "FALSE",
"CMOD": "SUM",
"LAST_WATER_LEAK_DURATION": 0,
"TDC": "YES",
"TIME": "2024-09-09 08:20:54",
"WATER_LEAK_STATUS": "NO LEAK",
"WATER_LEAK_TIMES": 0
}
Complete uplink data
"f_port": 2,
"frm_payload": "BAAAAAAAAGbez+Y=",
"decoded_payload": {
"ALARM": "FALSE",
"CMOD": "SUM",
"LAST_WATER_LEAK_DURATION": 0,
"TDC": "YES",
"TIME": "2024-09-09 08:20:54",
"WATER_LEAK_STATUS": "NO LEAK",
"WATER_LEAK_TIMES": 0
Payload is valid
Learn more about payload formatters
Save changes

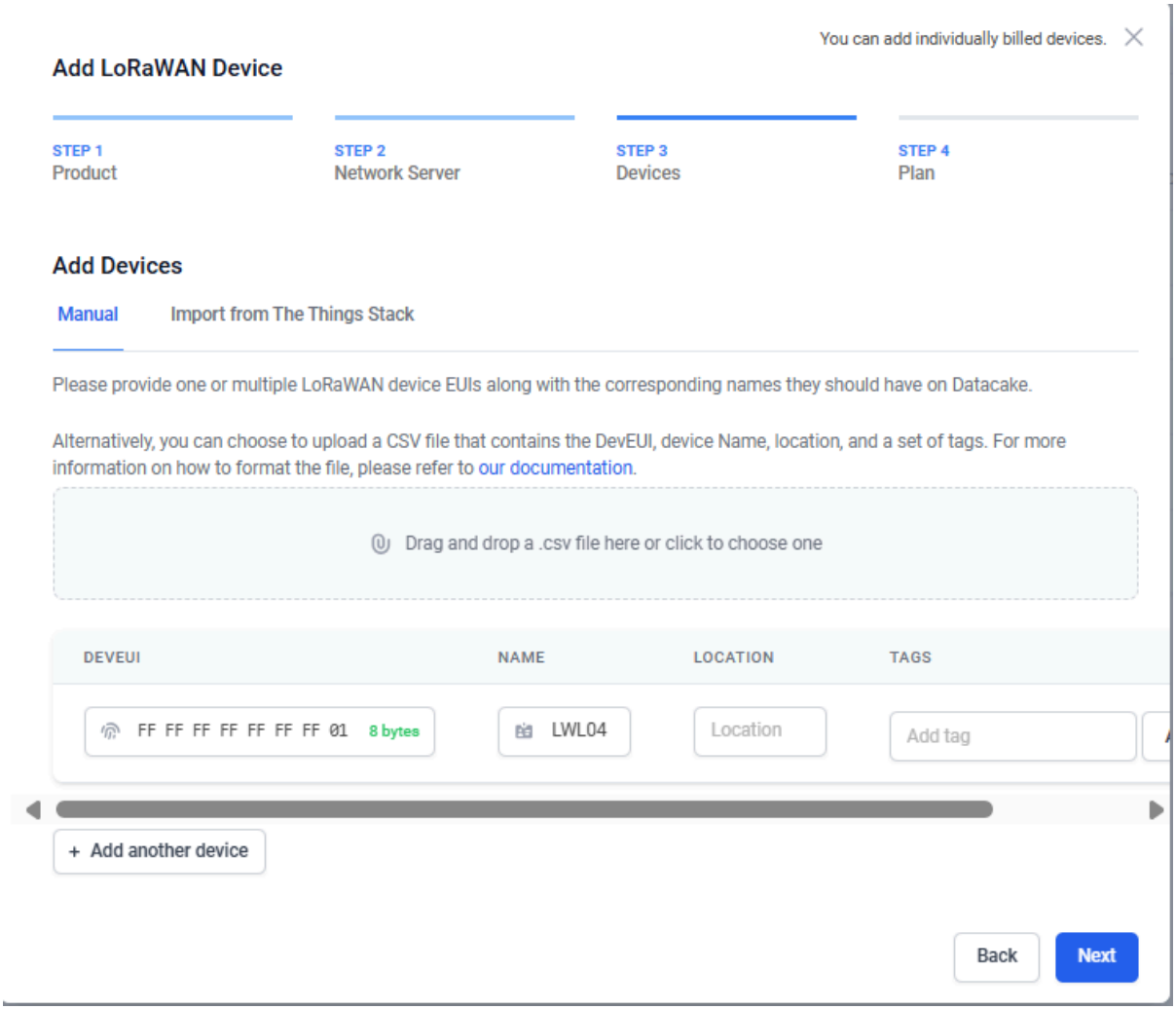
Applications > zero > End devices > lwl04 > Live data
lwl04
ID: lwl04
Device overview
Live data
Messaging
Location
Payload formatters
Settings
TYPE
DATA PREVIEW

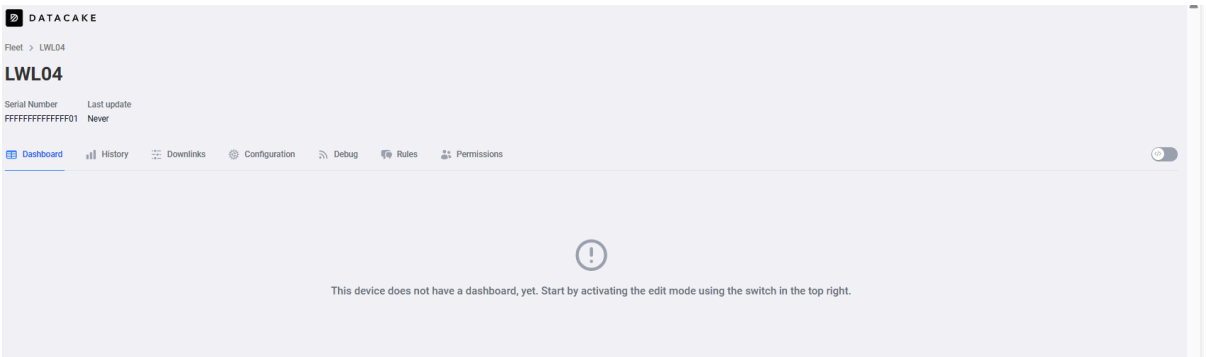

Applications > zero > End devices > lwl04 > Live data
lwl04
ID: lw104
Device overview
Live data
Messaging
Location
Payload formatters
Settings
Schedule data downlink for transmissi…
Forward uplink data message
Successfully processed data message
Forward join-accept message
Successfully processed join-request
Accept join-request
Receive downlink data message
FPort: 2
FPort: 5
FPort: 1
FPort: 4

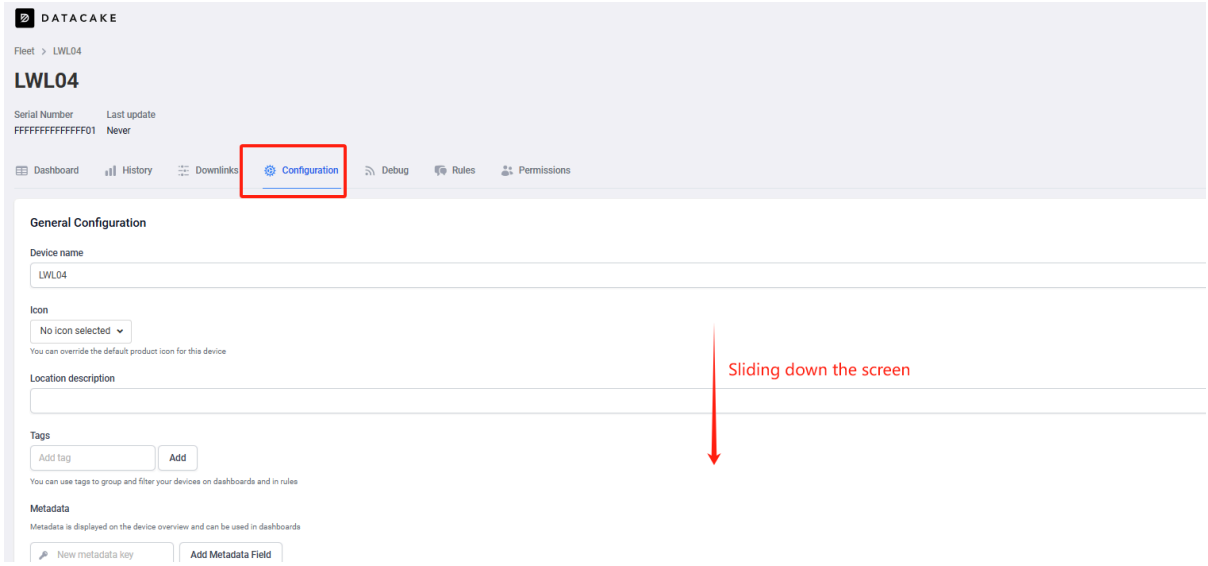

Applications > zero > End devices > lwl04 > Live data
lwl04
ID: lwl04
Last activity 1 minute ago
9 up / 5 (Nwk) down
Device overview
Live data
Messaging
Location
Payload formatters
Settings
TYPE
DATA PREVIEW
Verbose stream
Export as JSON
Pause
Clear
Forward uplink data message
Successfully processed data message
Forward uplink data message
Successfully processed data message
Forward uplink data message
Successfully processed data message
You can add individually billed devices.
Add Device
First, choose the connectivity type of your device.
LoRaWAN
Choose from 16 LoRaWAN networks
Particle
Connect your Particle devices
API
Generic API device with support for MQTT and HTTP connectivity
Pincode Claiming
Claim an existing device by pincode
IoT Creators
NB-IoT and LTE-M connectivity by Deutsche Telekom
Dragino NB-IoT
Connect Dragino NB-IoT devices
1NCE
Connect 1NCE devices
Next

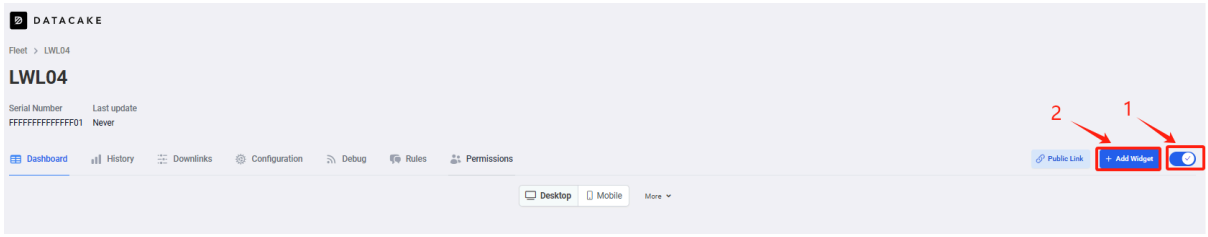

You can add individually billed devices.
Add LoRaWAN Device
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Datacake Product
You can add devices to an existing product on Datacake, create a new empty product or start with one of the templates. Products allow you to share the same configuration (fields, dashboard and more) between devices.
New Product from template
Create new product from a template
Existing Product
Add devices to an existing product
New Product
Create new empty product
New Product
If your device is not available as a template, you can start with an empty device. You will have to create the device definition (fields, dashboard) and provide the payload decoder in the device's configuration.
Product Name
LWL04
Back
Next

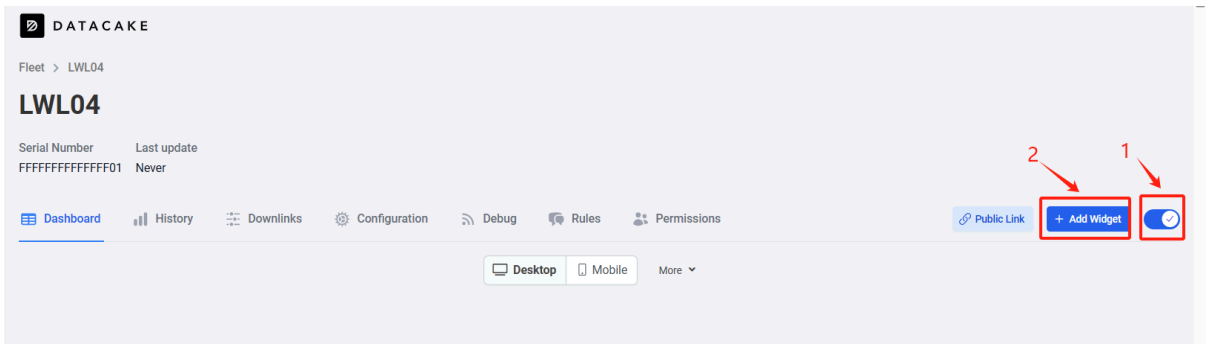

You can add individually billed devices.
Add LoRaWAN Device
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Network Server
Please choose the LoRaWAN Network Server that your devices are connected to.
Datacake LNS
AUTOMATIC SETUP
Start and scale easily with a managed LNS
Uplinks
Downlinks
The Things Stack V3
TTN V3 / Things Industries
Uplinks
Downlinks
Helium
Use your own console
Uplinks
Downlinks
LORIOT
Uplinks
Downlinks
ChirpStack
Uplinks
Downlinks
Actility
Uplinks
Downlinks
KPN
Uplinks
Downlinks
Showing 1 to 6 of 15 results
Previous
Next
Back
Next

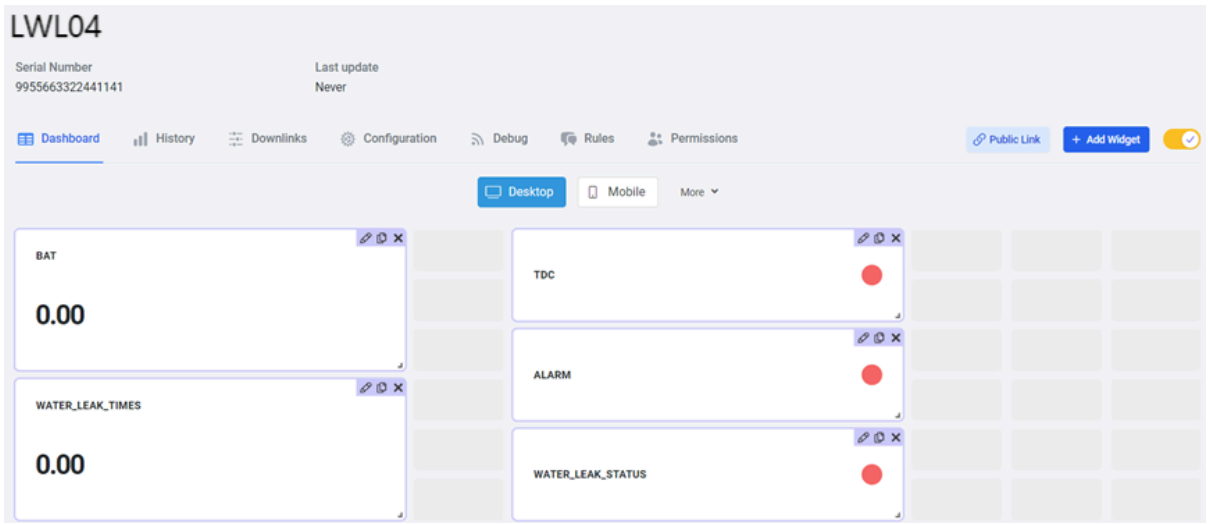

You can add individually billed devices.
Add LoRaWAN Device
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Add Devices
Manual
Import from The Things Stack
Please provide one or multiple LoRaWAN device EUIs along with the corresponding names they should have on Datacake.
Alternatively, you can choose to upload a CSV file that contains the DevEUI, device Name, location, and a set of tags. For more information on how to format the file, please refer to our documentation.
Drag and drop a .csv file here or click to choose one
DEVEUI
NAME
LOCATION
TAGS
FF FF FF FF FF FF FF 01
8 bytes
LWL04
Location
Add tag
+ Add another device
Back
Next

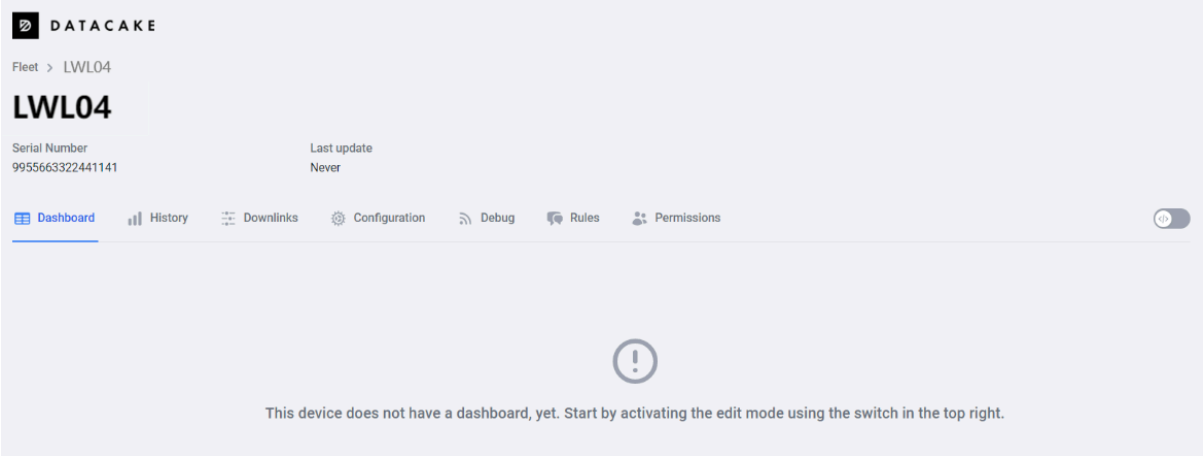

DATACAKE
Fleet > LWL04
LWL04
Serial Number
FFFFFFFFFFFFF01
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
This device does not have a dashboard, yet. Start by activating the edit mode using the switch in the top right.

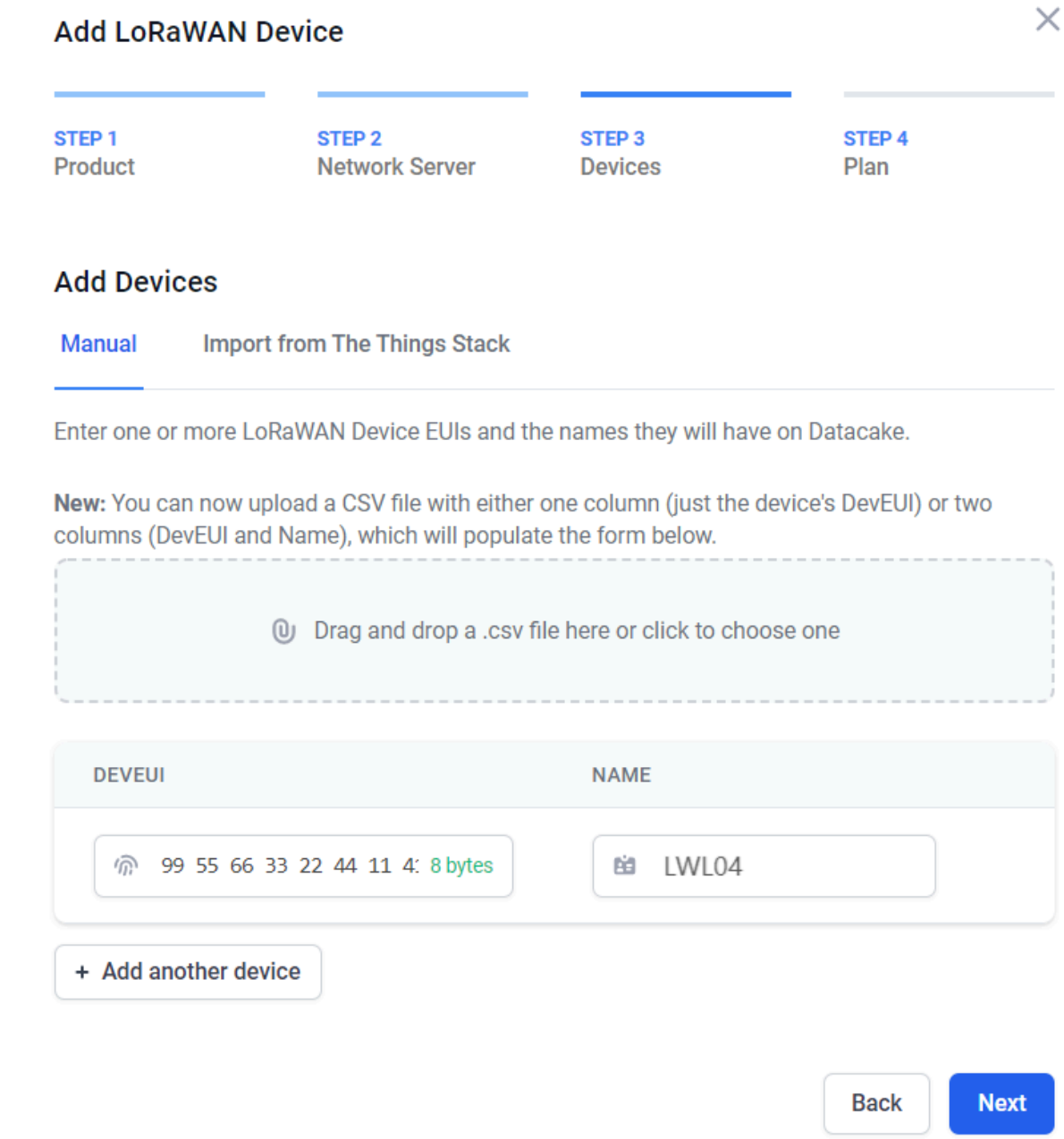

DATACAKE
Fleet > LWL04
LWL04
Serial Number
FFFFFFFFFFFFF01
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
General Configuration
Device name
LWL04
Icon
No icon selected
You can override the default product icon for this device
Location description
Tags
Add tag
Add
You can use tags to group and filter your devices on dashboards and in rules
Metadata
Metadata is displayed on the device overview and can be used in dashboards
New metadata key
Add Metadata Field
Sliding down the screen


DATACAKE
Fleet > LWL04
LWL04
Serial Number
FFFFFFFFFFFFF01
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
Public Link
Add Widget
Desktop
Mobile
More
2
1

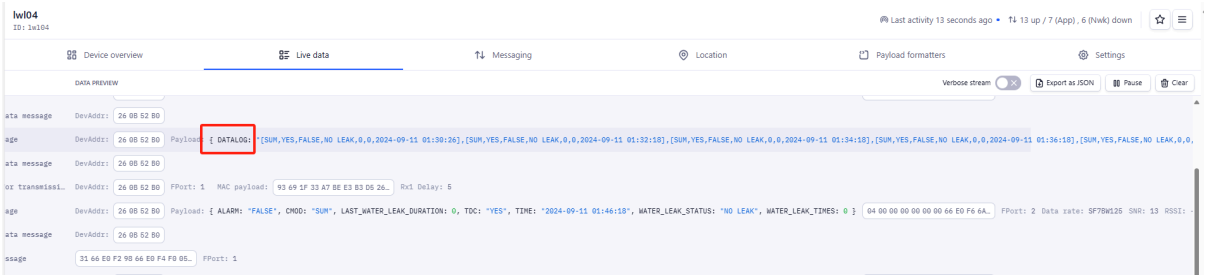

DATACAKE
Fleet > LWL04
LWL04
Serial Number
FFFFFFFFFFFFF01
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
Public Link
Add Widget
Desktop
Mobile
More
2
1


LWL04
Serial Number
9955663322441141
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
Public Link
Add Widget
Desktop
Mobile
More
BAT
0.00
TDC
ALARM
WATER_LEAK_TIMES
0.00
WATER_LEAK_STATUS

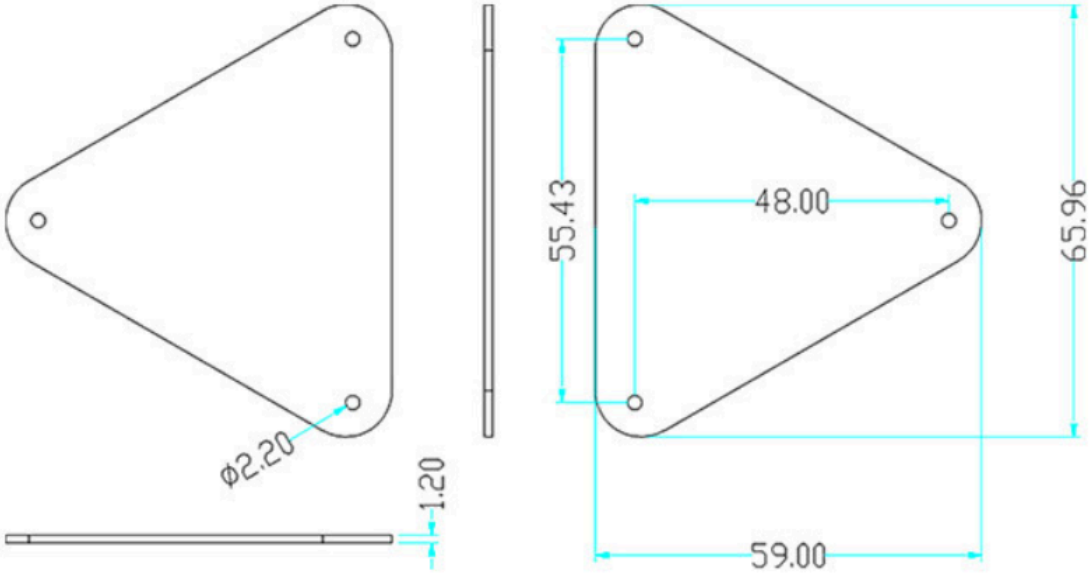

DATACAKE
Fleet > LWL04
LWL04
Serial Number
9955663322441141
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
This device does not have a dashboard, yet. Start by activating the edit mode using the switch in the top right.

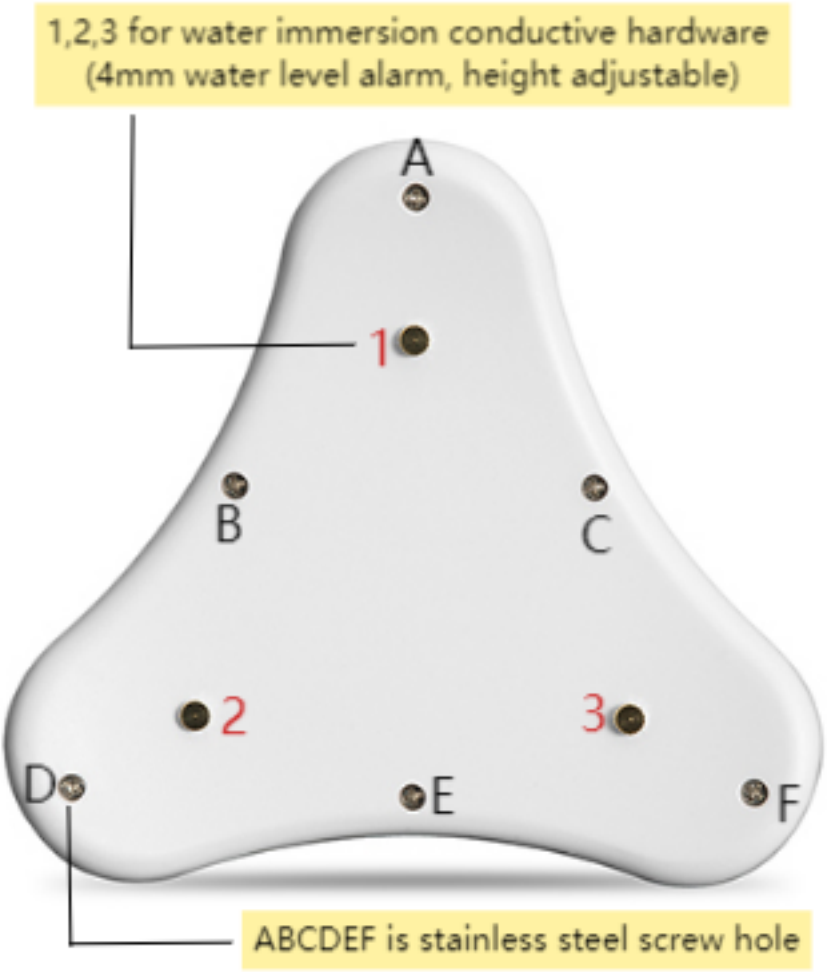


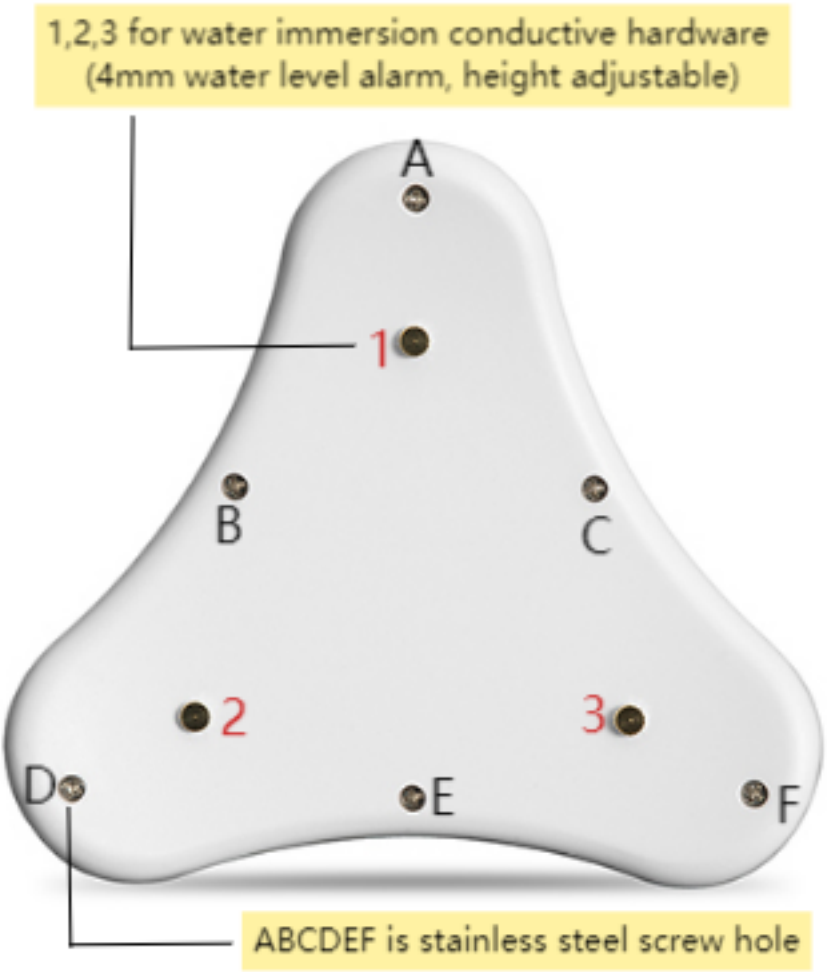

```
Stop Tx events when read sensor data
0001 2024/9/11 01:42:18 bat:2977 mod:0 status:no_leak leak_times:0 last_leak_duration:0 alarm:false tdc:yes

0002 2024/9/11 01:44:18 bat:2977 mod:0 status:no_leak leak_times:0 last_leak_duration:0 alarm:false tdc:yes

0003 2024/9/11 01:46:18 bat:2978 mod:0 status:no_leak leak_times:0 last_leak_duration:0 alarm:false tdc:yes

0004 2024/9/11 01:48:18 bat:2978 mod:0 status:no_leak leak_times:0 last_leak_duration:0 alarm:false tdc:yes

0005 2024/9/11 01:50:18 bat:2978 mod:0 status:no_leak leak_times:0 last_leak_duration:0 alarm:false tdc:yes

Start Tx events

OK
```

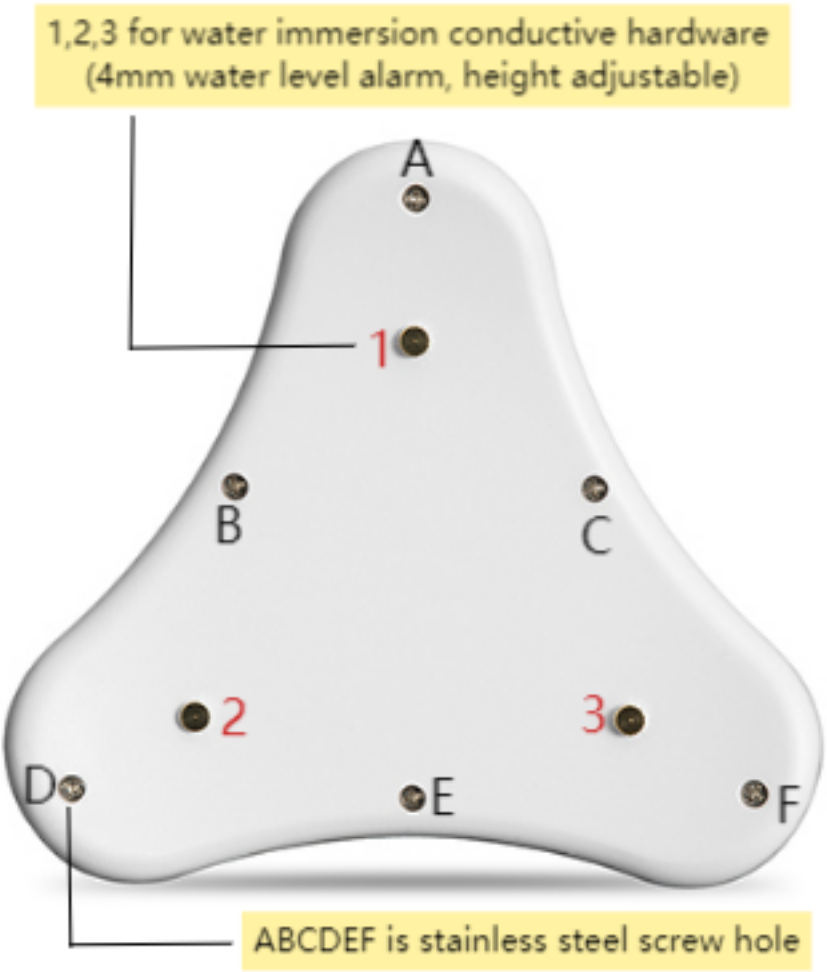

lwl04
ID: lwl04
Last activity 13 seconds ago
13 up / 7 (App) , 6 (Nwk) down
Device overview
Live data
Messaging
Location
Payload formatters
Settings
DATA PREVIEW
Verbose stream
Export as JSON
Pause
Clear
DevAddr: 26 0B 52 B0
Payload: { DATALOG: "[SUM,YES,FALSE,NO LEAK,0,0,2024-09-11 01:30:26],[SUM,YES,FALSE,NO LEAK,0,0,2024-09-11 01:32:18],[SUM,YES,FALSE,NO LEAK,0,0,2024-09-11 01:34:18],[SUM,YES,FALSE,NO LEAK,0,0,2024-09-11 01:36:18],[SUM,YES,FALSE,NO LEAK,0,0,
FPort: 1
MAC payload: 93 69 1F 33 A7 BE E3 B3 D5 26…
Rx1 Delay: 5
Payload: { ALARM: "FALSE", CMOD: "SUM", LAST_WATER_LEAK_DURATION: 0, TDC: "YES", TIME: "2024-09-11 01:46:18", WATER_LEAK_STATUS: "NO LEAK", WATER_LEAK_TIMES: 0 }
04 00 00 00 00 00 00 66 E0 F6 6A…
FPort: 2 Data rate: SF7BW125 SNR: 13 RSSI:
31 66 E0 F2 98 66 E0 F4 F0 05…
FPort: 1

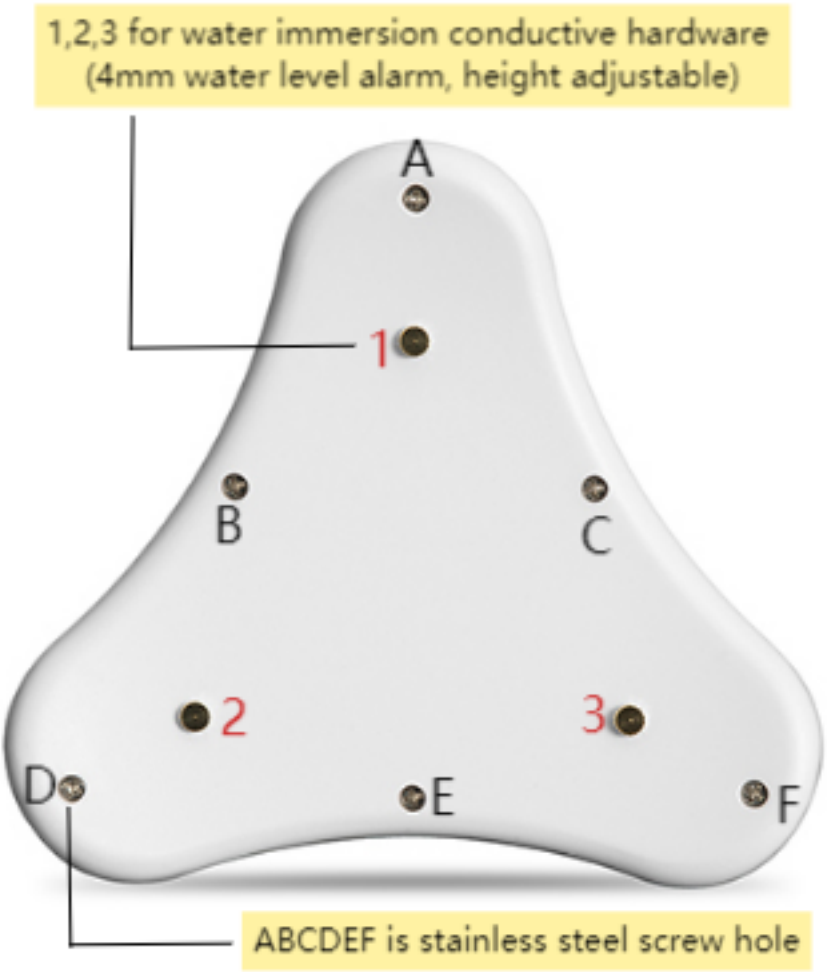

17.0mm
34.5mm
CR123A
LITHIUM BATTERY 2/3A SIZE

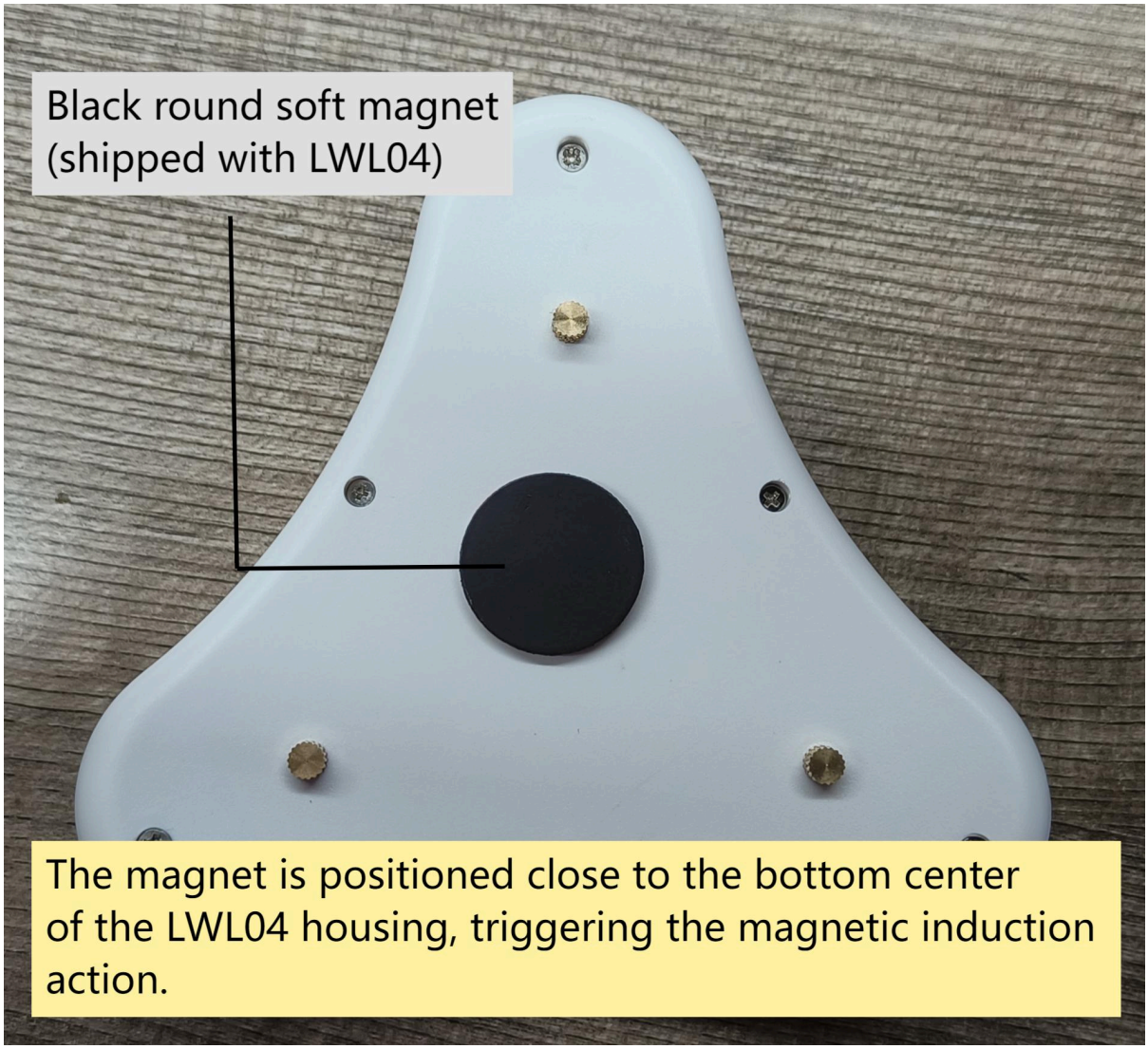

ø2.20
1.20
55.43
48.00
65.96
59.00

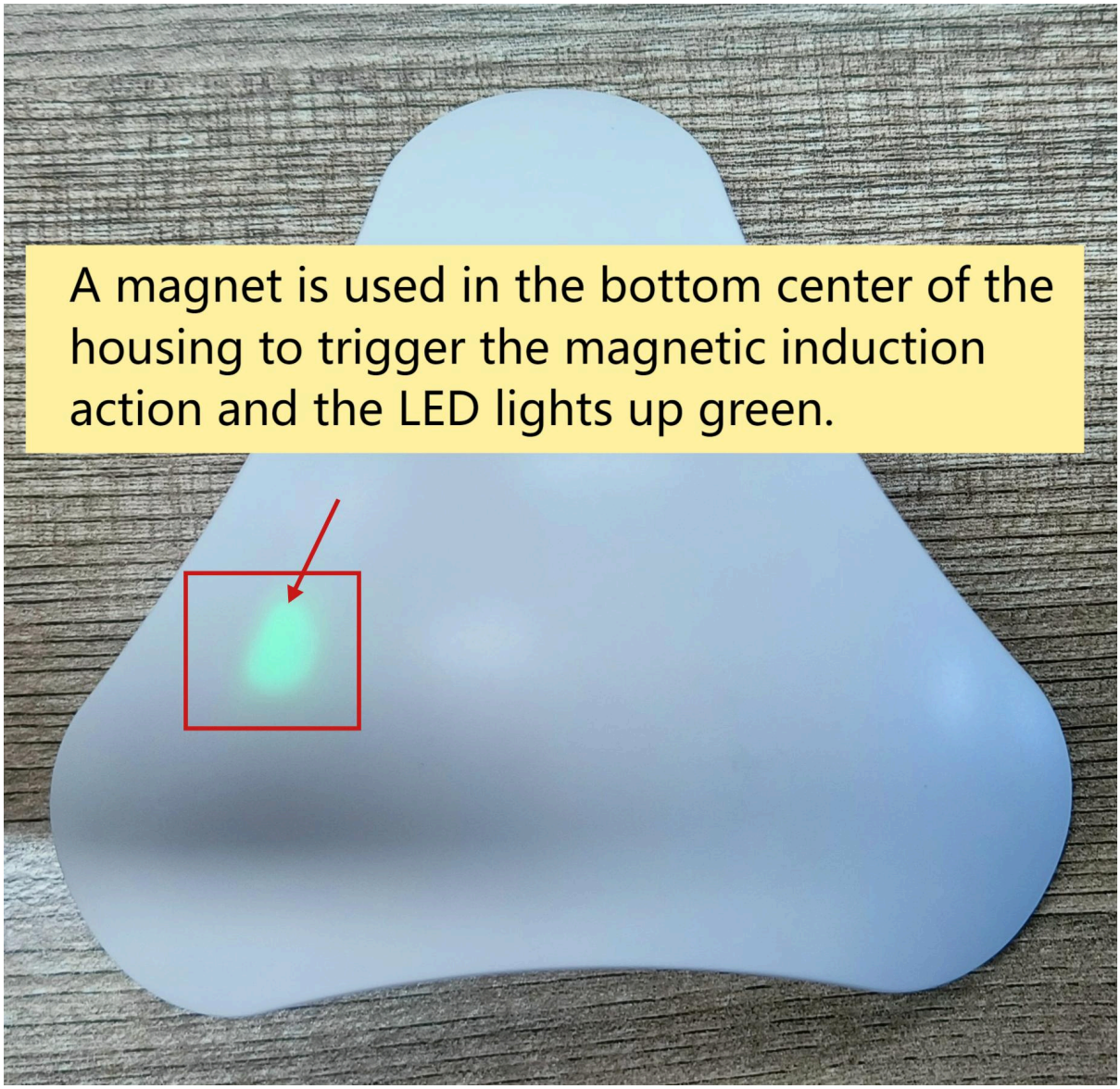

1,2,3 for water immersion conductive hardware
(4mm water level alarm, height adjustable)
A
1
B
C
2
3
D
E
F
ABCDEF is stainless steel screw hole

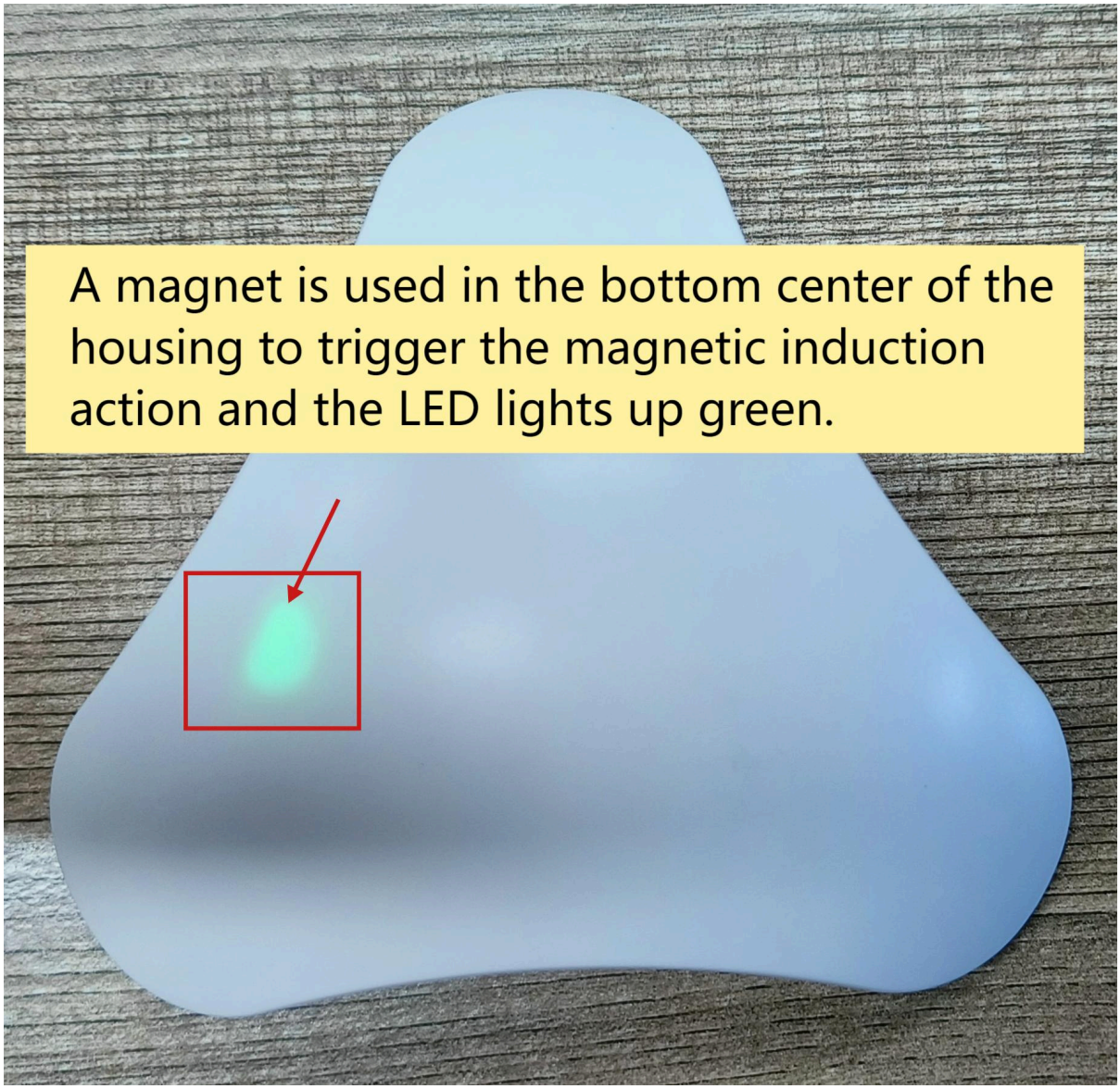

1,2,3 for water immersion conductive hardware
(4mm water level alarm, height adjustable)
A
1
B
C
2
3
D
E
F
ABCDEF is stainless steel screw hole

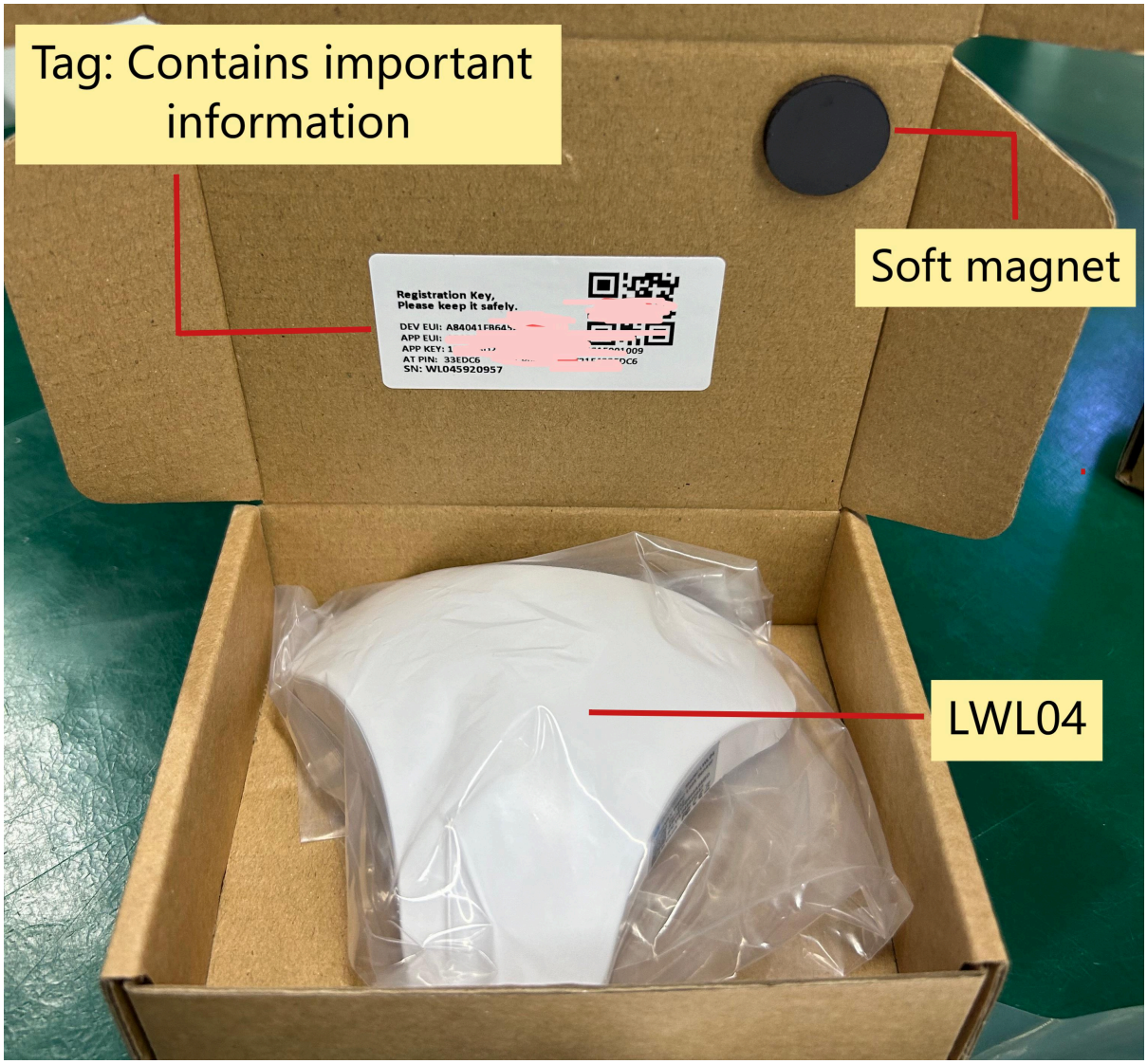

1,2,3 for water immersion conductive hardware
(4mm water level alarm, height adjustable)
A
1
B
C
2
3
D
E
F
ABCDEF is stainless steel screw hole

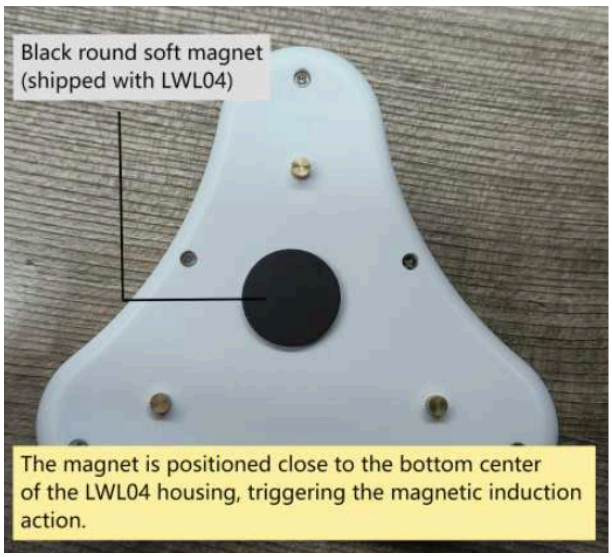

1,2,3 for water immersion conductive hardware
(4mm water level alarm, height adjustable)
A
1
B
C
2
3
D
E
F
ABCDEF is stainless steel screw hole

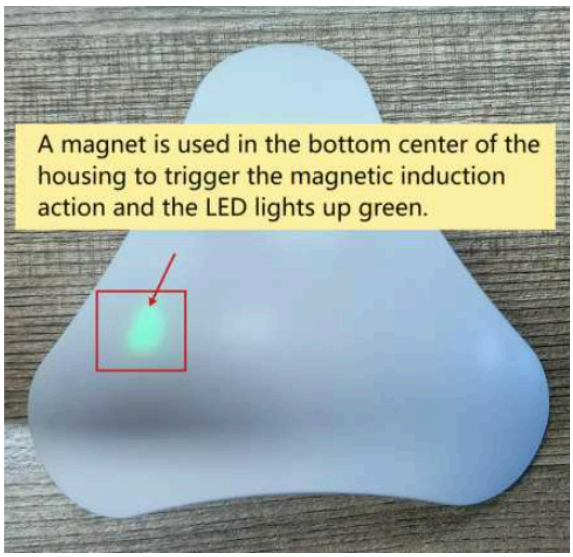

Black round soft magnet
(shipped with LWL04)
The magnet is positioned close to the bottom center of the LWL04 housing, triggering the magnetic induction action.


A magnet is used in the bottom center of the housing to trigger the magnetic induction action and the LED lights up green.


A magnet is used in the bottom center of the housing to trigger the magnetic induction action and the LED lights up green.


Tag: Contains important information
Soft magnet
Registration Key,
Please keep it safely.
LWL04


Black round soft magnet (shipped with LWL04)
The magnet is positioned close to the bottom center of the LWL04 housing, triggering the magnetic induction action.


A magnet is used in the bottom center of the housing to trigger the magnetic induction action and the LED lights up green.