CPL01 LoRaWAN Outdoor Pulse/Contact Sensor

last modified by Xiaoling

on 2022/07/01 18:01

Table of Contents

1. Introduction 4
1.1 What is CPL01 LoRaWAN Pulse/Contact Sensor 4
1.2 Features 4
1.3 Installation 5
1.4 Storage & Operation Temperature 5
1.5 Applications 6
1.6 Mechanical 6
1.7 Pin Definitions and Switch 7
1.7.1 Pin Definition 7
1.7.2 Jumper JP2(Power ON/OFF) 7
1.7.3 BOOT MODE / SW1 7
1.7.4 Reset Button 7
1.7.5 LED 7
2. Operation Mode 8
2.1 How it works? 8
2.2 Example to use for LoRaWAN network 8
2.3 Uplink Payload 12
2.3.1 Device Status, FPORT=5 12
2.3.2 Sensor Configuration, FPORT=4 13
2.3.3 Real-Time Open/Close Status, Uplink FPORT=2 15
2.3.4 Historical Door Open/Close Event, FPORT=3 16
2.4 Datalog Feature 17
2.4.1 Unix TimeStamp 17
2.4.2 Set Device Time 18
2.4.3 Poll sensor value 18
2.4.4 Decoder in TTN V3 19
2.5 Show data on Datacake 19
3. Configure CPL01 via AT Command or LoRaWAN Downlink 24
3.1 Set Transmit Interval Time 25
3.2 Set Password 25
3.3 Quit AT Command 26
3.4 Enable / Disable Alarm 26
3.5 Alarm Base on Timeout 26
3.6 Clear Flash Record 27
3.7 Set the sensor mode 27
3.8 Set trigger mode 28
3.9 Set the calculate flag 28
3.10 Set count number 28
4. Battery & how to replace 29
4.1 Battery Info 29
4.1.1 Battery Note 29
4.2 Replace Battery 29
4.3 Battery Life Analyze 30
5. FAQ 30
5.1 How to use AT Command to configure CPL01 30
5.2 How to upgrade the firmware? 31
5.3 How to change the LoRa Frequency Bands/Region? 31
6. Trouble Shooting 32
6.1 AT Commands input doesn't work 32
7. Order Info 32
8. Packing Info 32
9. Support 32

Table of Contents:

- 1. Introduction
  - 1.1 What is CPL01 LoRaWAN Pulse/Contact Sensor
  - 1.2 Features
  - 1.3 Installation
  - 1.4 Storage & Operation Temperature
  - 1.5 Applications
  - 1.6 Mechanical
  - 1.7 Pin Definitions and Switch
    - 1.7.1 Pin Definition
    - 1.7.2 Jumper JP2(Power ON/OFF)
    - 1.7.3 BOOT MODE / SW1
    - 1.7.4 Reset Button
    - 1.7.5 LED
- 2. Operation Mode
  - 2.1 How it works?
  - 2.2 Example to use for LoRaWAN network
  - 2.3 Uplink Payload
    - 2.3.1 Device Status, FPORT=5
    - 2.3.2 Sensor Configuration, FPORT=4
    - 2.3.3 Real-Time Open/Close Status, Uplink FPORT=2
    - 2.3.4 Historical Door Open/Close Event, FPORT=3
  - 2.4 Datalog Feature
    - 2.4.1 Unix TimeStamp
    - 2.4.2 Set Device Time
    - 2.4.3 Poll sensor value
    - 2.4.4 Decoder in TTN V3
- 2.5 Show data on Datacake
- 3. Configure CPL01 via AT Command or LoRaWAN Downlink
  - 3.1 Set Transmit Interval Time
  - 3.2 Set Password
  - 3.3 Quit AT Command
  - 3.4 Enable / Disable Alarm
  - 3.5 Alarm Base on Timeout
  - 3.6 Clear Flash Record
  - 3.7 Set the sensor mode
  - 3.8 Set trigger mode
  - 3.9 Set the calculate flag
  - 3.10 Set count number

- 4. Battery & how to replace
  - 4.1 Battery Info
    - 4.1.1 Battery Note
  - 4.2 Replace Battery
  - 4.3 Battery Life Analyze
- 5. FAQ
  - 5.1 How to use AT Command to configure CPL01
  - 5.2 How to upgrade the firmware?
  - 5.3 How to change the LoRa Frequency Bands/Region?
- 6. Trouble Shooting
  - 6.1 AT Commands input doesn't work
- 7. Order Info
- 8. Packing Info
- 9. Support

1. Introduction

1.1 What is CPL01 LoRaWAN Pulse/Contact Sensor

The Dragino CPL01 is a **LoRaWAN Contact Sensor**. It detects open/close status and uplink to IoT server via LoRaWAN network. user can see the dry contact status, open time, open counts in the IoT Server.

CPL01 is powered by **8500mAh Li-SOCl2 battery**, It is designed for long term use up to 10 years. (Actually Battery life depends on the use environment, update period.)

The CPL01 will send periodically data every day as well as for each dry contact action. It also counts the contact open times and calculate last open duration. User can also disable the uplink for each open/close event, instead, device can count each open event and uplink periodically.

CPL01 has the open alarm feature, user can set this feature so device will send Alarm if the contact has been open for a certain time.

CPL01 is designed for outdoor use. It has a weatherproof enclosure and industrial level battery to work in low to high temperatures.

Each CPL01 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.

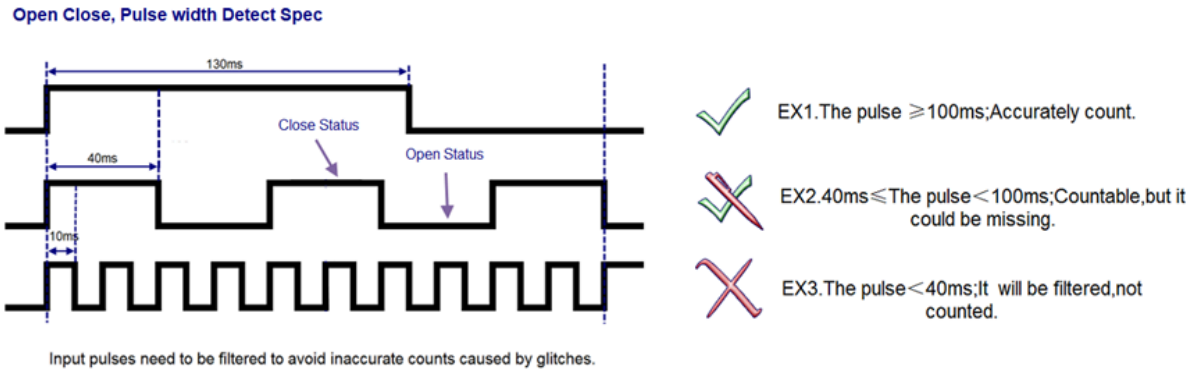
*Battery life depends on how often to send data, please see battery analyzer.

1.2 Features

- LoRaWAN v1.0.3 Class A protocol.
- Frequency Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915/IN865/RU864
- Open/Close detect
- Open/Close statistics
- 8500mAh industrial battery(none-rechargeable)
- AT Commands to change parameters
- Uplink on periodically and open/close event
- Datalog feature
- Remote configure parameters via LoRa Downlink
- Firmware upgradable via program port
- Wall Mountable
- Outdoor Use

1.3 Installation

Connect CPL01 to an Open Close sensor like below. So it can detect the open/close event.



Input pulses need to be filtered to avoid inaccurate counts caused by glitches.

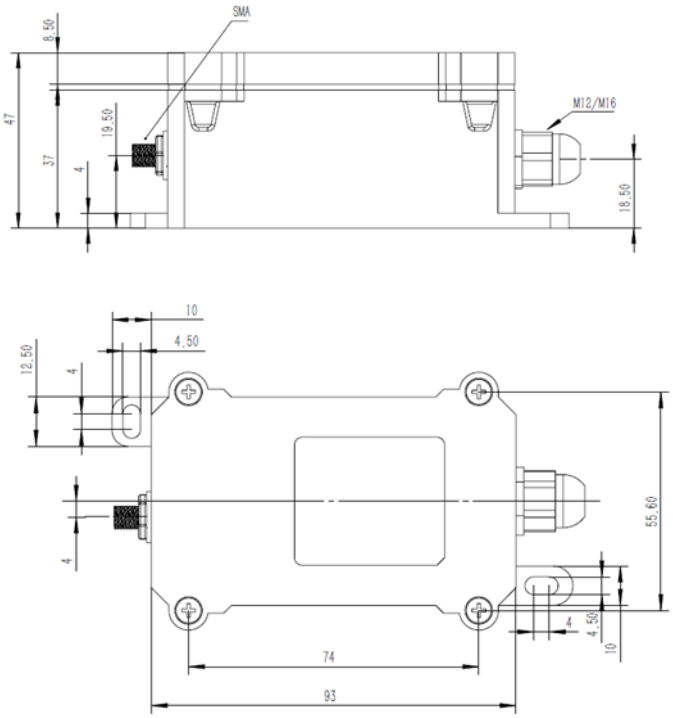
1.4 Storage & Operation Temperature

-40°C to +85°C

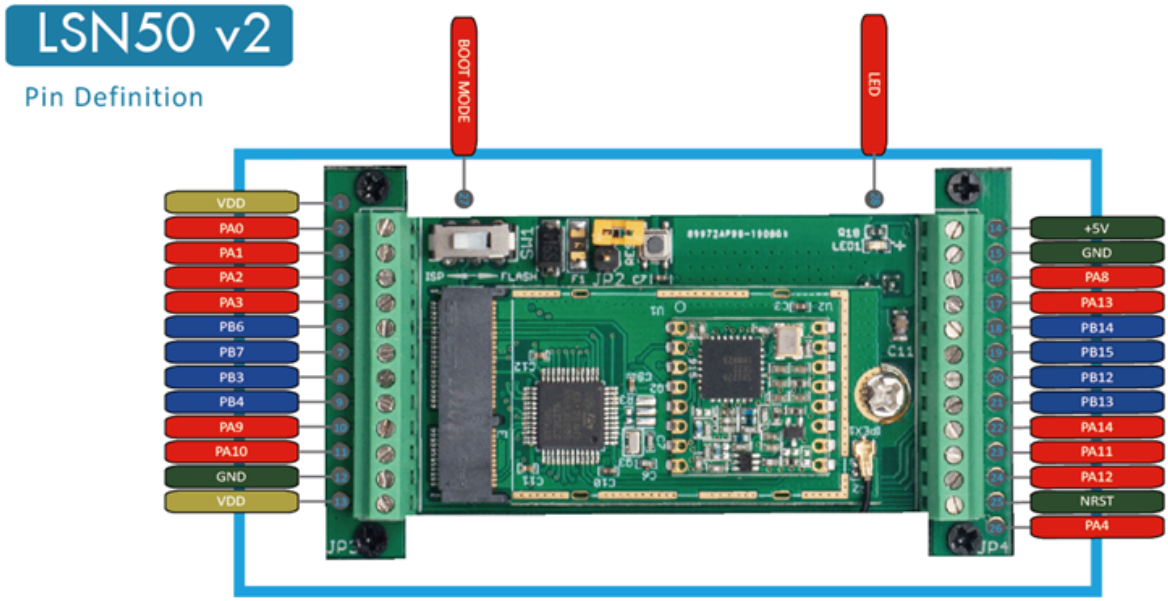
1.5 Applications

- Open/Close Detection
- Pulse meter application
- Dry Contact Detection

1.6 Mechanical



1.7 Pin Definitions and Switch



1.7.1 Pin Definition

CPL01 is pre-configured to connect to two external wires. The other pins are not used. If user wants to know more about other pins, please refer to the user manual of LSN50v2 at: http://www.dragino.com/downloads/index.php?dir=LSN50-LoRaST/

1.7.2 Jumper JP2(Power ON/OFF)

Power on Device when putting this jumper.

1.7.3 BOOT MODE / SW1

1) ISP: upgrade mode, device won't have any signal in this mode. but ready for upgrade firmware. LED won't work. Firmware won't run.

2) Flash: work mode, the device starts to work and send out console output for further debug

1.7.4 Reset Button

Press to reboot the device.

1.7.5 LED

It will flash:

1. Boot the device in flash mode
2. Send an uplink packet

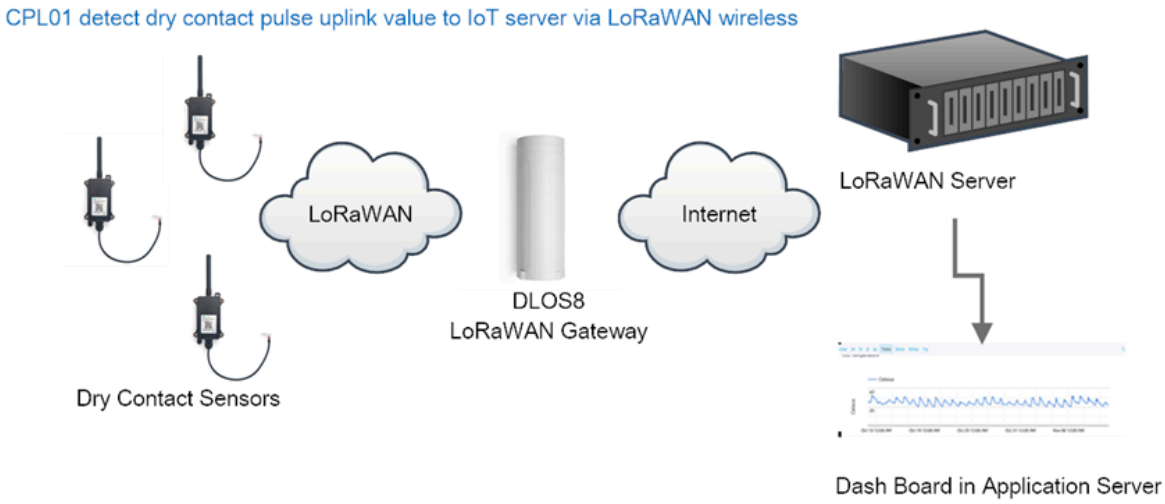
2. Operation Mode

2.1 How it works?

Each CPL01 is shipped with a worldwide unique set of OTAA keys. To use CPL01 in a LoRaWAN network, user needs to input the OTAA keys in the LoRaWAN network server. So CPL01 can join the LoRaWAN network and start to transmit sensor data.

2.2 Example to use for LoRaWAN network

This section shows an example of how to join the TTN V3 LoRaWAN IoT server. Usages with other LoRaWAN IoT servers are similar.



- In this use case, the CPL01 is connect to a dry contact sensor to detect the open/close event and send the status to the LoRaWAN server. The CPL01 will uplink different types of messages to the LoRaWAN server. See Uplink payload for detail.

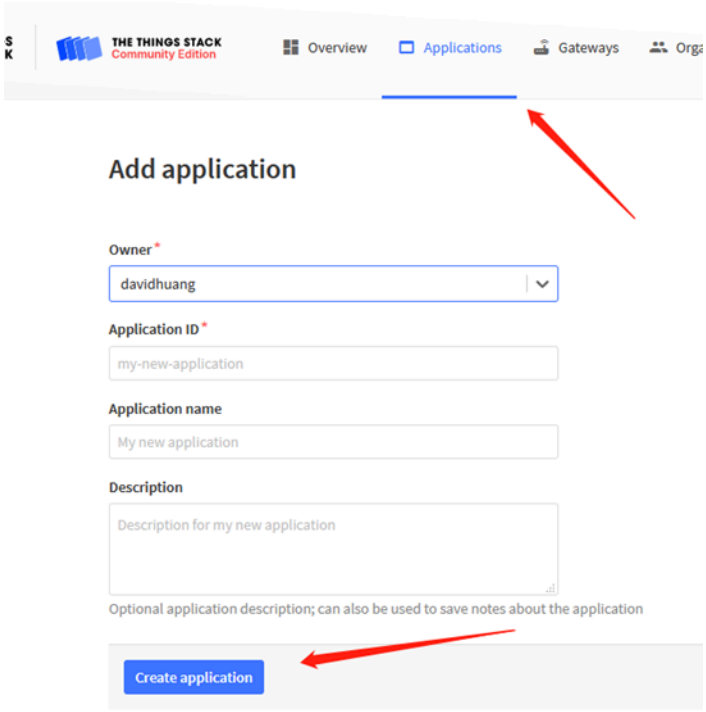
Assume the DLOS8 is already set to connect to the TTN V3 network . We need to add the CPL01 device in TTN V3:

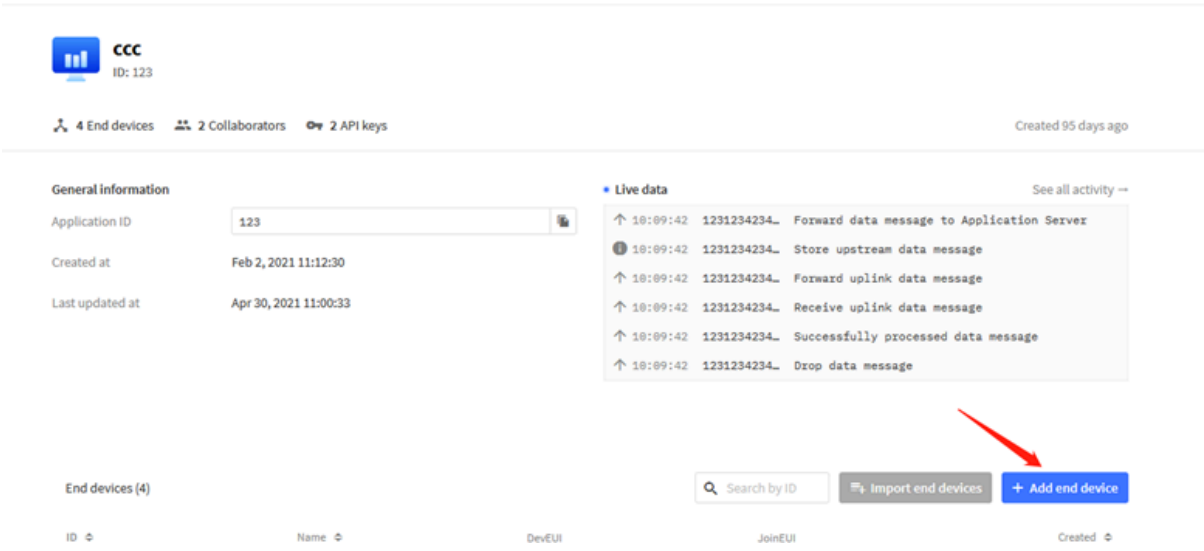
Step 1: Create a device in TTN V3 with the OTAA keys from CPL01.

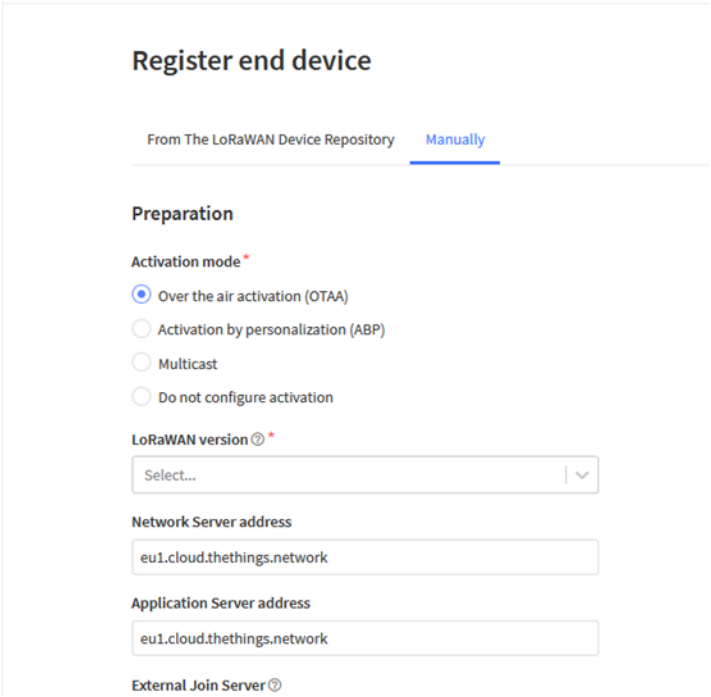
Each CPL01 is shipped with a sticker with the default device EUI as below:

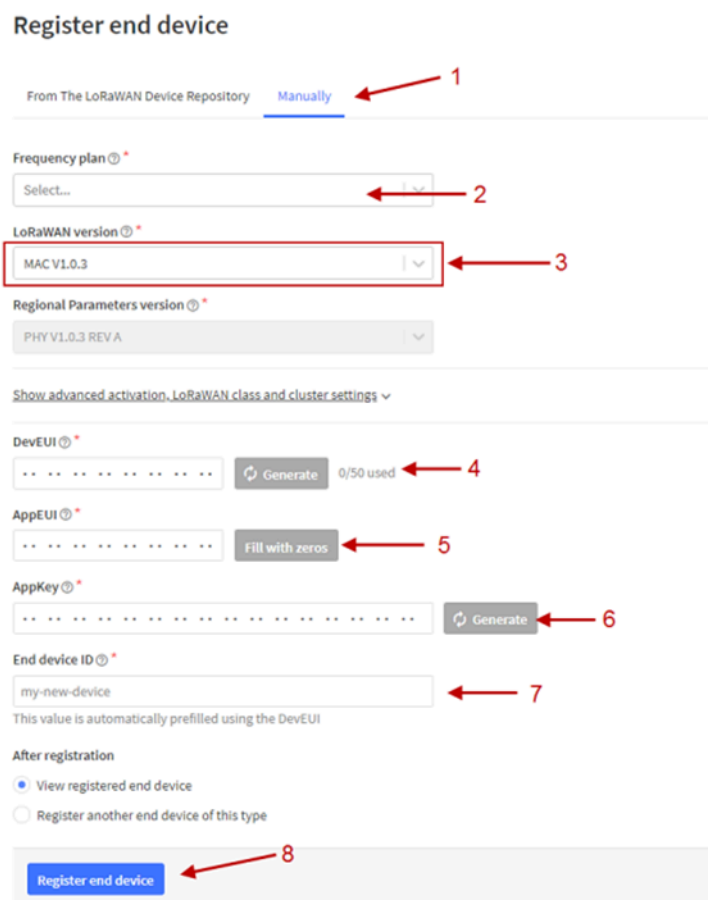
Users can enter these keys in the LoRaWAN Server portal. Below is the TTN V3 screenshot:

Add APP EUI in the application.



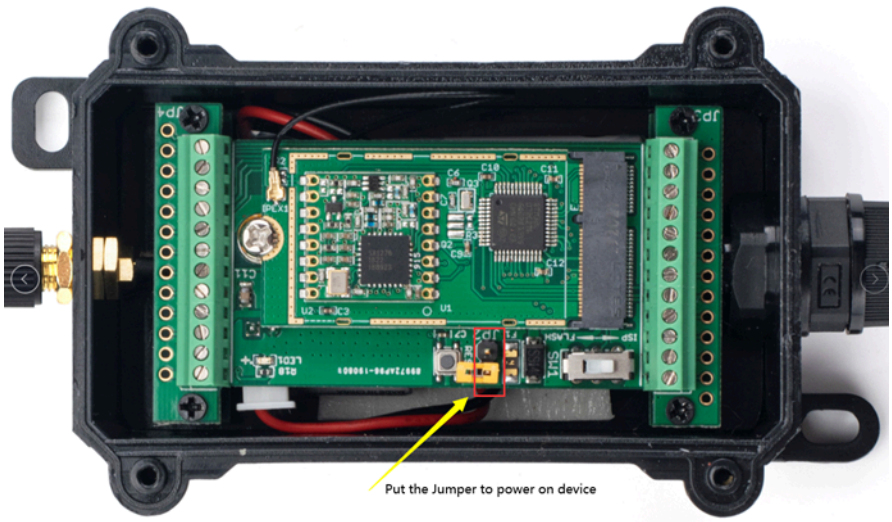

ccc
ID: 123
4 End devices
2 Collaborators
2 API keys
Created 95 days ago
General information
Application ID
123
Created at
Feb 2, 2021 11:12:30
Last updated at
Apr 30, 2021 11:00:33
Live data
See all activity
10:09:42 1231234234… Forward data message to Application Server
10:09:42 1231234234… Store upstream 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
Preparation
Activation mode *
Over the air activation (OTAA)
Activation by personalization (ABP)
Multicast
Do not configure activation
LoRaWAN version *
Select...
Network Server address
eu1.cloud.thethings.network
Application Server address
eu1.cloud.thethings.network
External Join Server

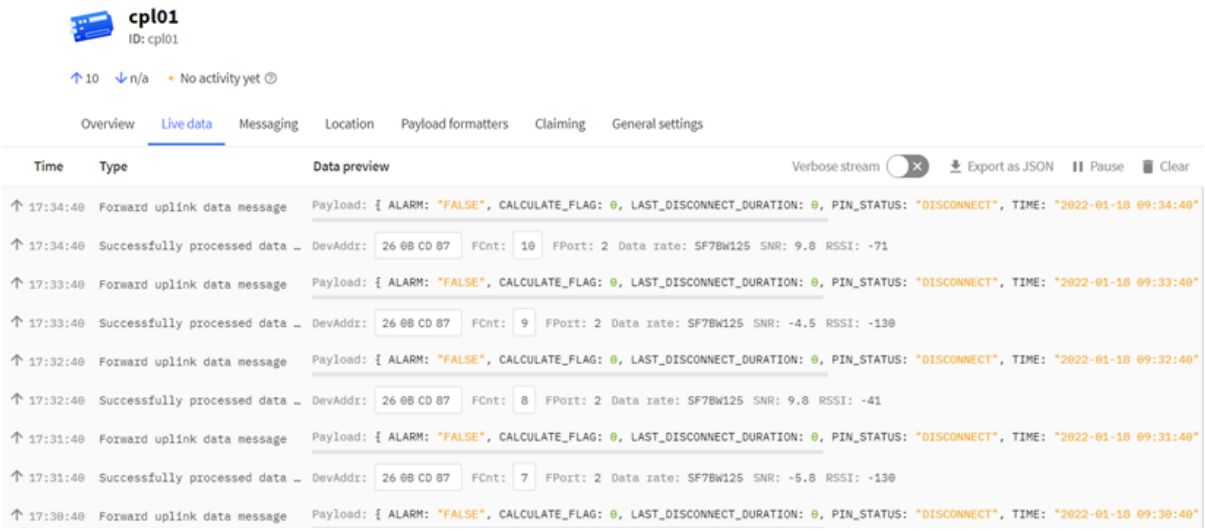


Add APP KEY and DEV EUI

Step 2: Power on CPL01



Put the jumper to power on CPL01 and it will auto-join to the TTN V3 network. After join success, it will start to upload sensor data to TTN V3 and the user can see it in the panel.



2.3 Uplink Payload

Uplink payloads have two types:

- Open/Close Status: Use FPORT=2
- Other control commands: Use other FPORT fields.

The application server should parse the correct value based on FPORT settings.

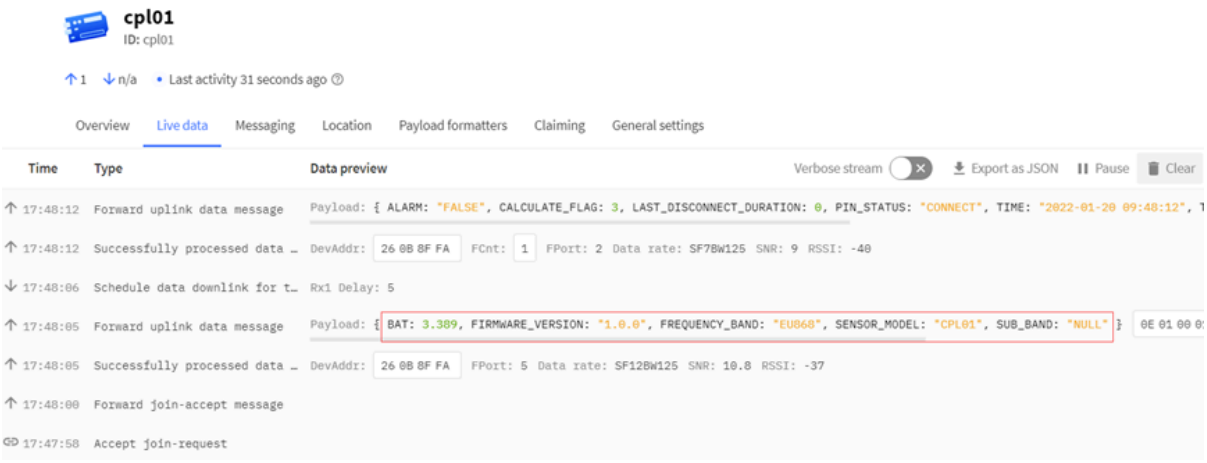
2.3.1 Device Status, FPORT=5

Include device configure status. Once CPL01 Joined the network, it will uplink this message to the server. After that, CPL01 will uplink Device Status every 12 hours.

Users can also use the downlink command(0x26 01) to ask CPL01 to resend this uplink. This uplink payload also includes the DeviceTimeReq to get time.

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

Example parse in TTNv3



- **Sensor Model**: For CPL01, this value is 0x0E
- **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: 0x0B45 = 2885mV

Ex2: 0x0B49 = 2889mV

2.3.2 Sensor Configuration, FPORT=4

CPL01 will only send this command after getting the downlink command (0x26 02) from the server.

Sensor Configuration FPORT=4					
Size (bytes)	3	1	1	2	1
Value	TDC (unit: sec)	Disalarm	Keep status	Keep time (unit: sec)	Trigger mode

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

Uplink interval for the total pulse count, default value is 0x001C20 which is 7200 seconds = 2 hours.

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

If Disalarm = 1, CPL01 will only send uplink at every TDC periodically. This is normally use for pulse meter application, in this application, there are many disconnect/connect event, and platform only care about the total number of pulse.

If Disalarm = 0, CPL01 will send uplink at every TDC periodically.

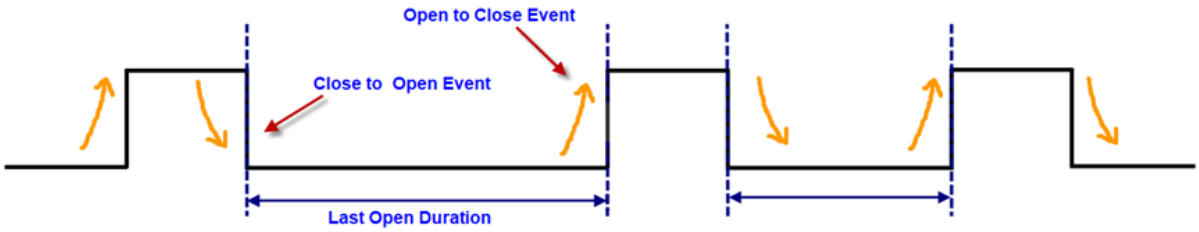
- **Keep Status & Keep Time**

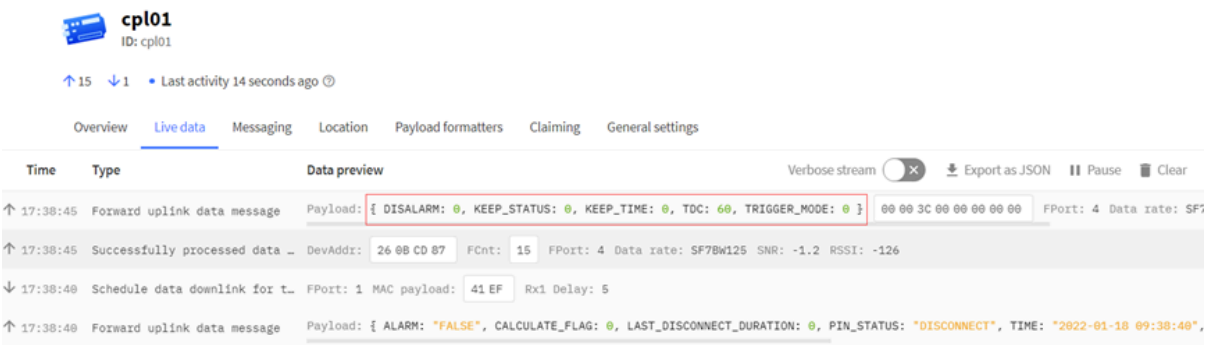
Shows the configure value of Alarm Base on Timeout Feature

- **Trigger mode (default: 0)**

If Trigger mode = 0, count close to open event.

If Trigger mode = 1, count open to close event.





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

CPL01 will send this uplink **after** Device Status once join the LoRaWAN network successfully. And CPL01 will:

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

Uplink Payload totals 11 bytes.

Real-Time Open/Close Status, FPORT=2				
Size (bytes)	**1**	**3**	**3**	**4**
Value	Status & Alarm	Total pulse	The last open duration (unit: min)	Unix TimeStamp

Status & Alarm field			
Size (bit)	**6**	**1**	**1**
Value	Calculate Flag	Alarm: 0: No Alarm; 1: Alarm	Contact Status: 0: Open, 1: Close

- **Calculate Flag**

The calculate flag is a user define field, IoT server can use this filed to handle different meter with different pulse factor. For example, if there are 100 water meters, meter 1 ~50 are 1 liter/pulse and meter 51 ~ 100 has 1.5 liter/pulse.

User can set calculate flag to 1 for meter 1~50 and 2 for meter 51 ~ 100, So IoT Server can use this field for calculation.

Default value: 0.

Range (6 bits): (b)000000 ~ (b) 111111

Refer: Set Calculate Flag

- **Alarm**

See Alarm Base on Timeout

- **Contact Status**

0: Open

1: Close

- **Total pulse**

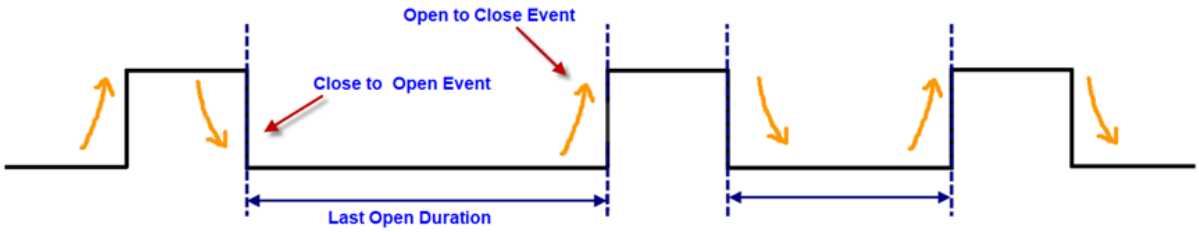
Total pulse/counting base on dry contact trigger event

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

- **The last open duration**

Dry Contact last open duration.

Unit: min.



2.3.4 Historical Door Open/Close Event, FPORT=3

CPL01 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 open/close status.

- Each data entry is 11 bytes and has the same structure as Real-Time open/close status, to save airtime and battery, CPL01 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:

a) DR0: max is 11 bytes so one entry of data

b) DR1: max is 53 bytes so devices will upload 4 entries of data (total 44 bytes)

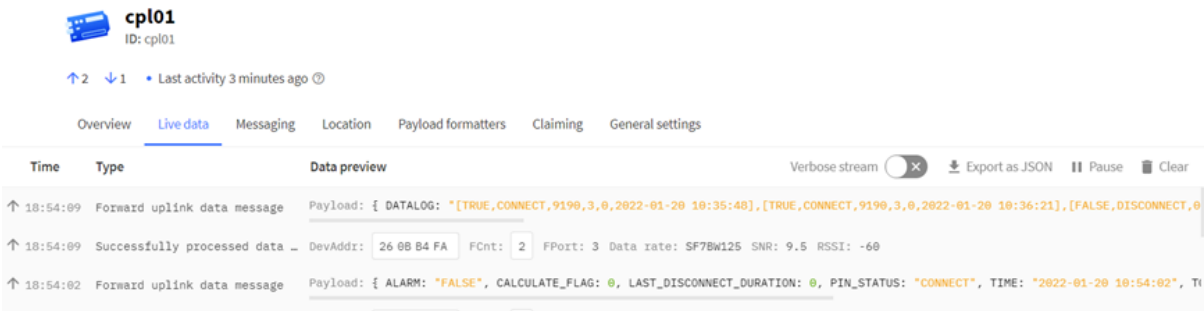
c) DR2: total payload includes 11 entries of data

d) DR3: total payload includes 22 entries of data.

If CPL01 doesn't have any data in the polling time. It will uplink 11 bytes of 0

Downlink:

0x31 61 E9 3A D4 61 E9 3D E0 05



Uplink:

0E 00 23 E6 00 00 00 61 E9 3B 04 0E 00 23 E6 00 00 00 61 E9 3B 25 0D 00 00 00 00 00 00 61 E9 3B C8 0E 00 00 02 00 00 00 61 E9 3B D4 0E 00 00 06 00 00 00 61 E9 3B DB 01 00 00 00 00 00 00 61 E9 3C 91 01 00 00 00 00 00 00 61 E9 3C A1 0D 00 00 00 00 00 00 61 E9 3C BC 0E 00 00 07 00 00 00 61 E9 3C D6 00 00 00 00 00 00 00 61 E9 3D A6

Parsed Value:

[ALARM, PIN_STATUS, TOTAL_PULSE, CALCULATE_FLAG, LAST_OPEN_DURATION, TIME]

[TRUE, CLOSE, 9190, 3, 0, 2022-01-20 10:35:48],

[TRUE, CLOSE, 9190, 3, 0, 2022-01-20 10:36:21],

[FALSE, OPEN, 0, 3, 0, 2022-01-20 10:39:04],

[TRUE, CLOSE, 2, 3, 0, 2022-01-20 10:39:16],

[TRUE, CLOSE, 6, 3, 0, 2022-01-20 10:39:23],

[FALSE, OPEN, 0, 0, 0, 2022-01-20 10:42:25],

[FALSE, OPEN, 0, 0, 0, 2022-01-20 10:42:41],

[FALSE, OPEN, 0, 3, 0, 2022-01-20 10:43:08],

[TRUE, CLOSE, 7, 3, 0, 2022-01-20 10:43:34],

[FALSE, CLOSE, 0, 0, 0, 2022-01-20 10:47:02],

```
AT+PLDTA=10
Stop Tx events when read sensor data
1 22/1/20 10:35:48 bat:3378 status:connect total_pulse:9190 uint:3 last_duration:0 alarm:true
2 22/1/20 10:36:21 bat:3380 status:connect total_pulse:9190 uint:3 last_duration:0 alarm:true
3 22/1/20 10:39:04 bat:3382 status:disconnect total_pulse:0 uint:3 last_duration:0 alarm:false
4 22/1/20 10:39:16 bat:3382 status:connect total_pulse:2 uint:3 last_duration:0 alarm:true
5 22/1/20 10:39:23 bat:3382 status:connect total_pulse:6 uint:3 last_duration:0 alarm:true
6 22/1/20 10:42:25 bat:3380 status:disconnect total_pulse:0 uint:0 last_duration:0 alarm:false
7 22/1/20 10:42:41 bat:3378 status:disconnect total_pulse:0 uint:0 last_duration:0 alarm:false
8 22/1/20 10:43:08 bat:3382 status:disconnect total_pulse:0 uint:3 last_duration:0 alarm:false
9 22/1/20 10:43:34 bat:3382 status:connect total_pulse:7 uint:3 last_duration:0 alarm:true
10 22/1/20 10:47:02 bat:3380 status:connect total_pulse:0 uint:0 last_duration:0 alarm:false

Start Tx events

OK
```

2.4 Datalog Feature

When a user wants to retrieve sensor value, he can send a poll command from the IoT platform to ask the sensor to send value in the required time slot.

2.4.1 Unix TimeStamp

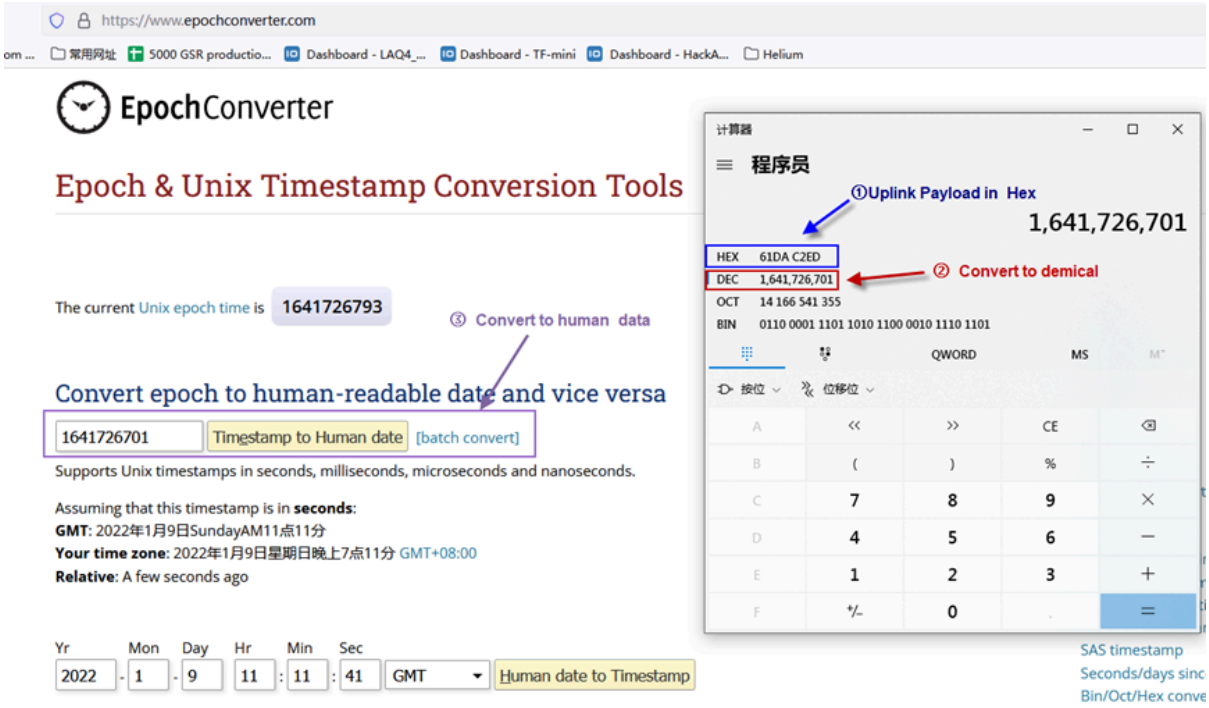
CPL01 uses Unix TimeStamp format based on

Size (bytes)	4	1
DeviceTimeAns Payload	32-bit unsigned integer : Seconds since epoch*	8bits unsigned integer: fractional-second in ½^8 second steps

Figure 10 : DeviceTimeAns payload format

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

Below is the converter example



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 CPL01 Joined the LoRaWAN network, it will send the MAC command (DeviceTimeReq) and the server will reply with (DeviceTimeAns) to send the current time to CPL01. If CPL01 fails to get the time from the server, CPL01 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.

2.4.3 Poll sensor value

Users can poll sensor values based on timestamps. Below is the downlink command.

Downlink Command to poll Open/Close status (0x31)			
1byte	4bytes	4bytes	1byte

31	Timestamp start	Timestamp end	Uplink Interval

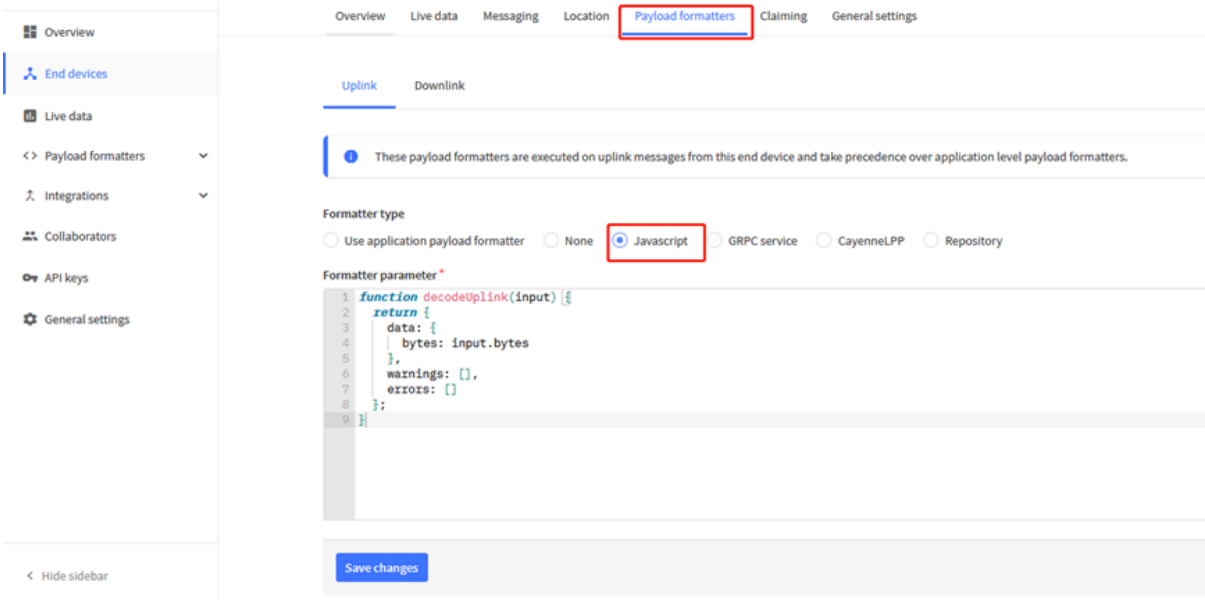
Timestamp start and Timestamp end-use Unix TimeStamp format as mentioned above. Devices will reply with all data logs during this period, using the uplink interval.

For example, downlink command 31 618E5740 618E8170 05

Is to check 2021/11/12 12:00:00 to 2021/11/12 15:00:00's data

Uplink Internal =5s, means CPL01 will send one packet every 5s. range 5~255s.

2.4.4 Decoder in TTN V3



Please check the decoder from this link:

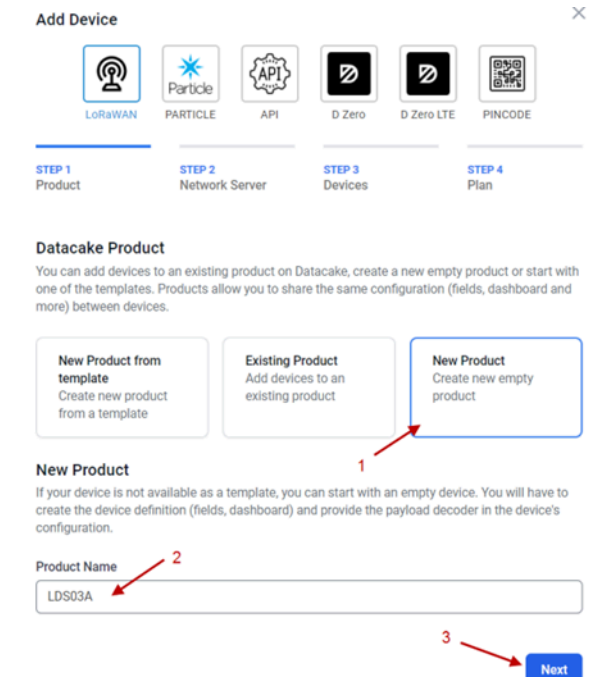
https://docs.google.com/document/d/1LFTp2IupfM3O4rQ1gJgZHJNP49BZFnm2xThiErnJYPQ/edit?usp=sharing

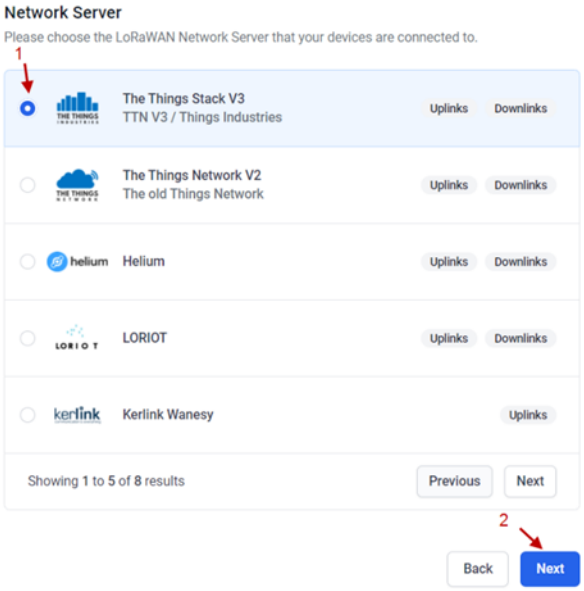
2.5 Show data on Datacake

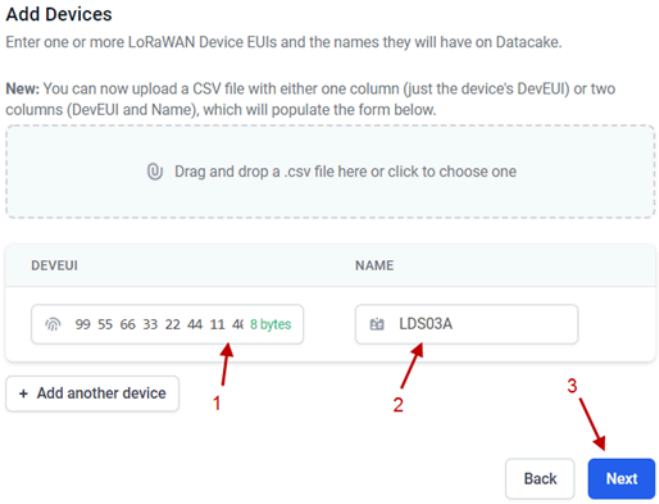
Datacake IoT platform provides a human-friendly interface to show the sensor data, once we have sensor data in TTN V3, we can use Datacake to connect to TTN V3 and see the data in Datacake. Below are the steps:

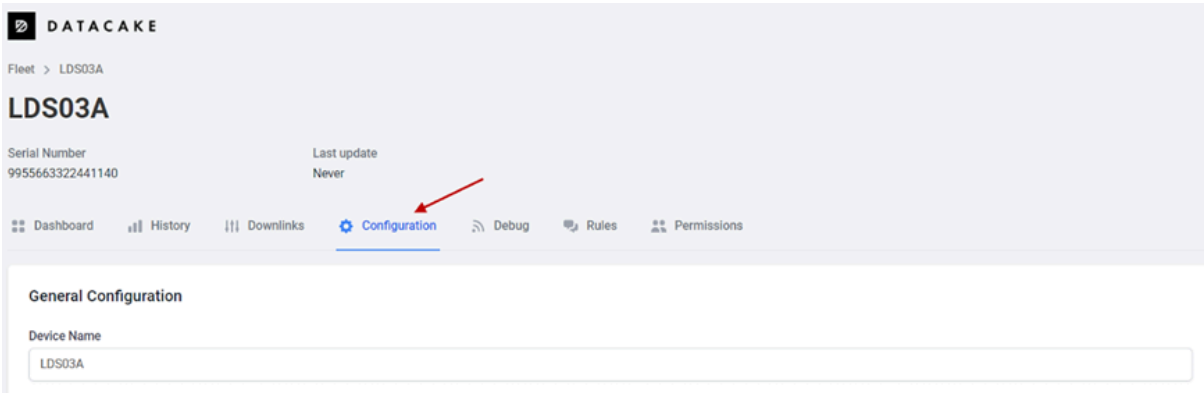
Step 1: Link TTNv3 to Datacake https://docs.datacake.de/lorawan/lns/thethingsindustries#create-integration-on-tti

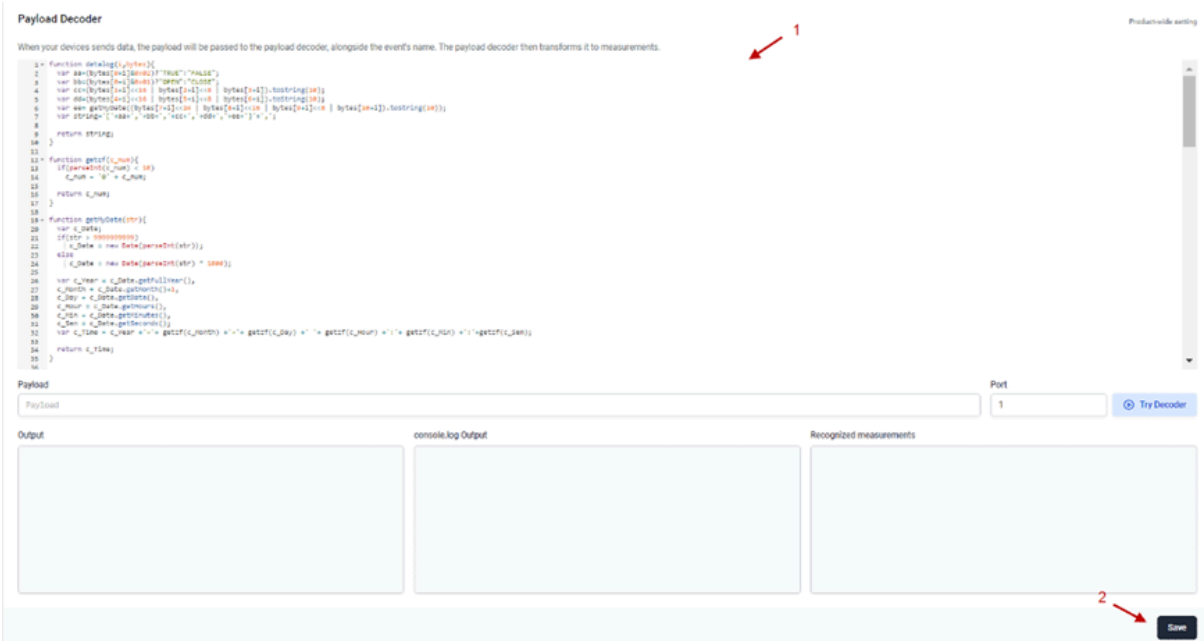
Step 2: Configure CPL01 in Datacake

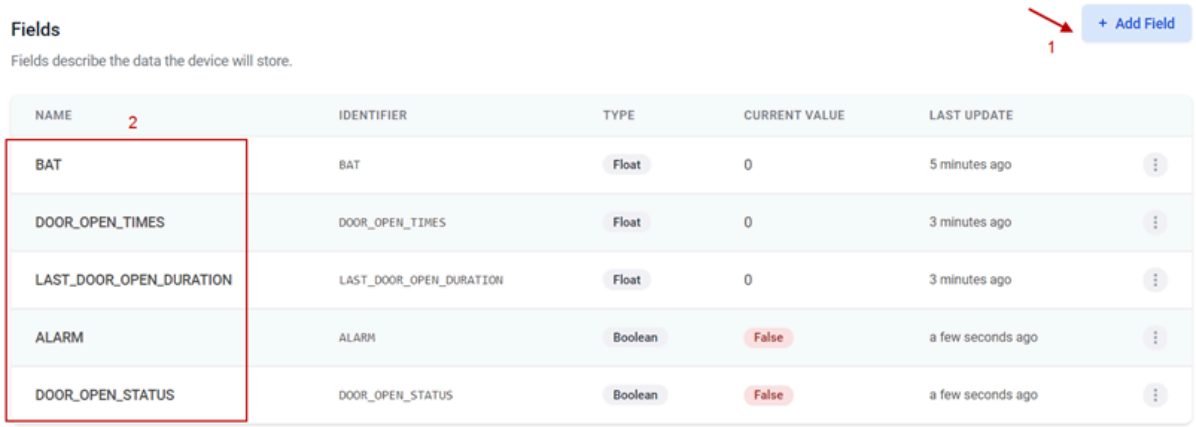

Add Device
LoRaWAN
PARTICLE
API
D Zero
D Zero LTE
PINCODE
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Datacake Product
You can add devices to an existing product on Datacake, create a new empty product or start with one of the templates. Products allow you to share the same configuration (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
1
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
2
LDS03A
3
Next

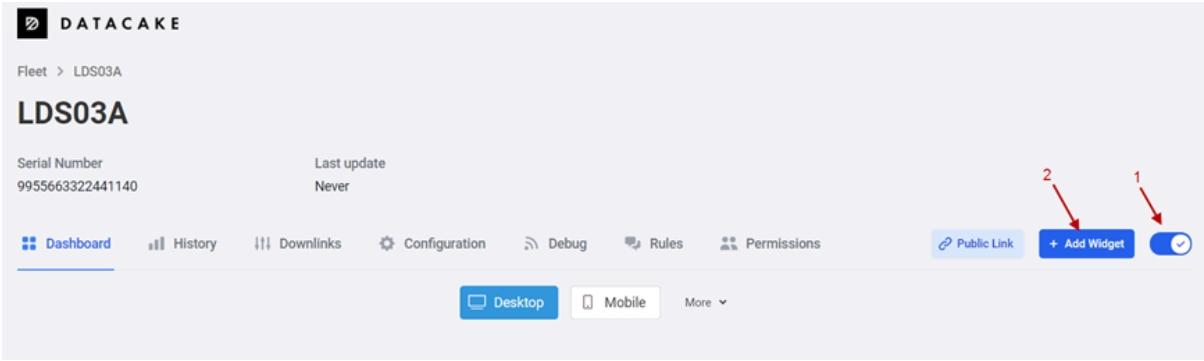

Network Server
Please choose the LoRaWAN Network Server that your devices are connected to.
1
The Things Stack V3
TTN V3 / Things Industries
Uplinks
Downlinks
The Things Network V2
The old Things Network
Uplinks
Downlinks
helium
Helium
Uplinks
Downlinks
LORIOT
Uplinks
Downlinks
kerlink
Kerlink Wanesy
Uplinks
Showing 1 to 5 of 8 results
Previous
Next
2
Back
Next

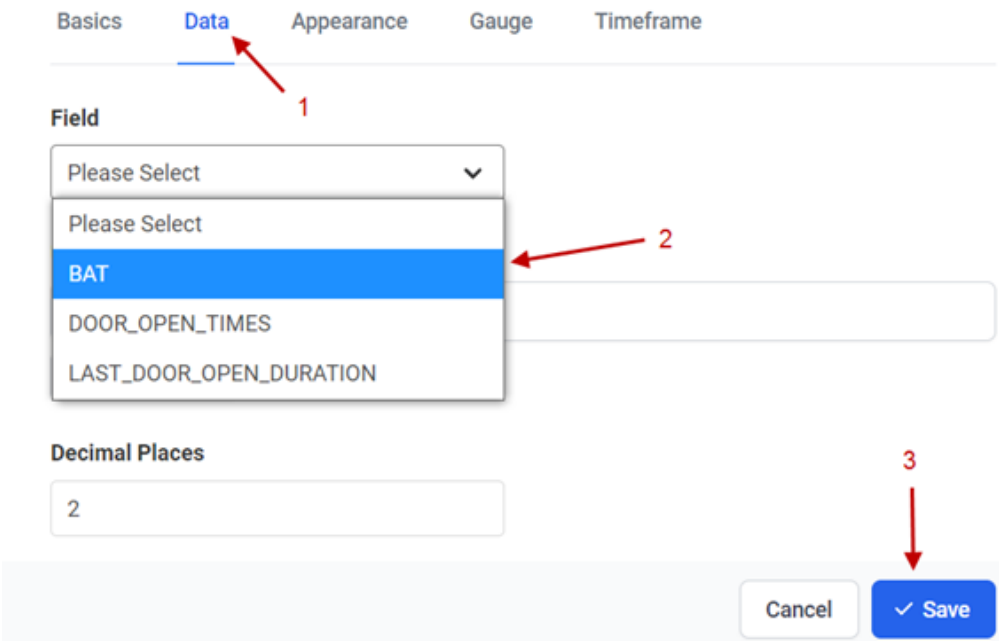

Add Devices
Enter one or more LoRaWAN Device EUIs and the names they will have on Datacake.
New: You can now upload a CSV file with either one column (just the device's DevEUI) or two columns (DevEUI and Name), which will populate the form below.
Drag and drop a .csv file here or click to choose one
DEVEUI
NAME
99 55 66 33 22 44 11 4(8 bytes
LDS03A
+ Add another device
1
2
3
Back
Next

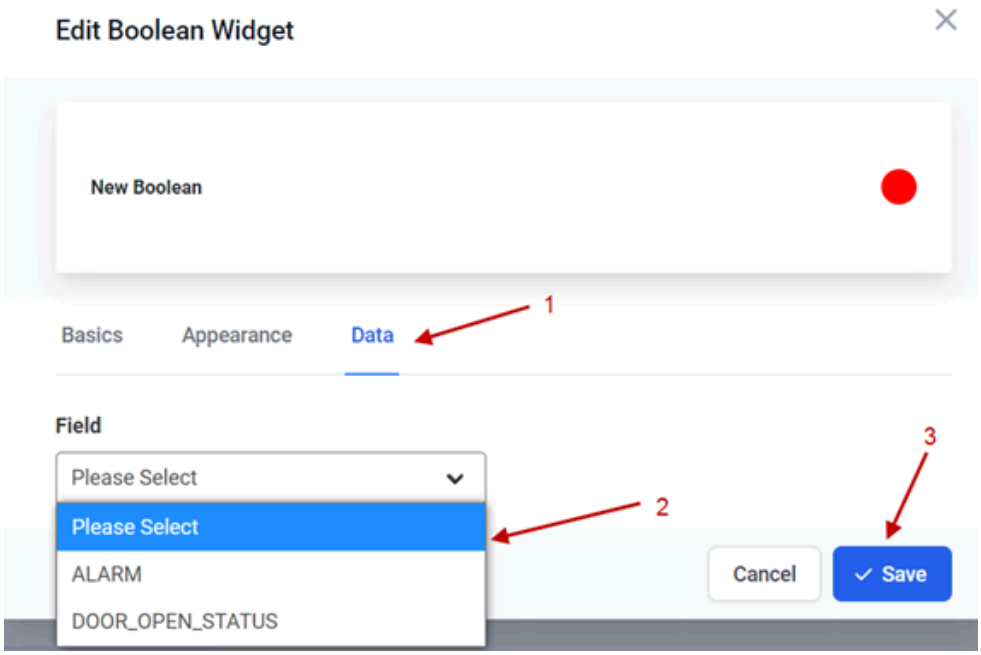

DATACAKE
Fleet > LDS03A
LDS03A
Serial Number
9955663322441140
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
General Configuration
Device Name
LDS03A

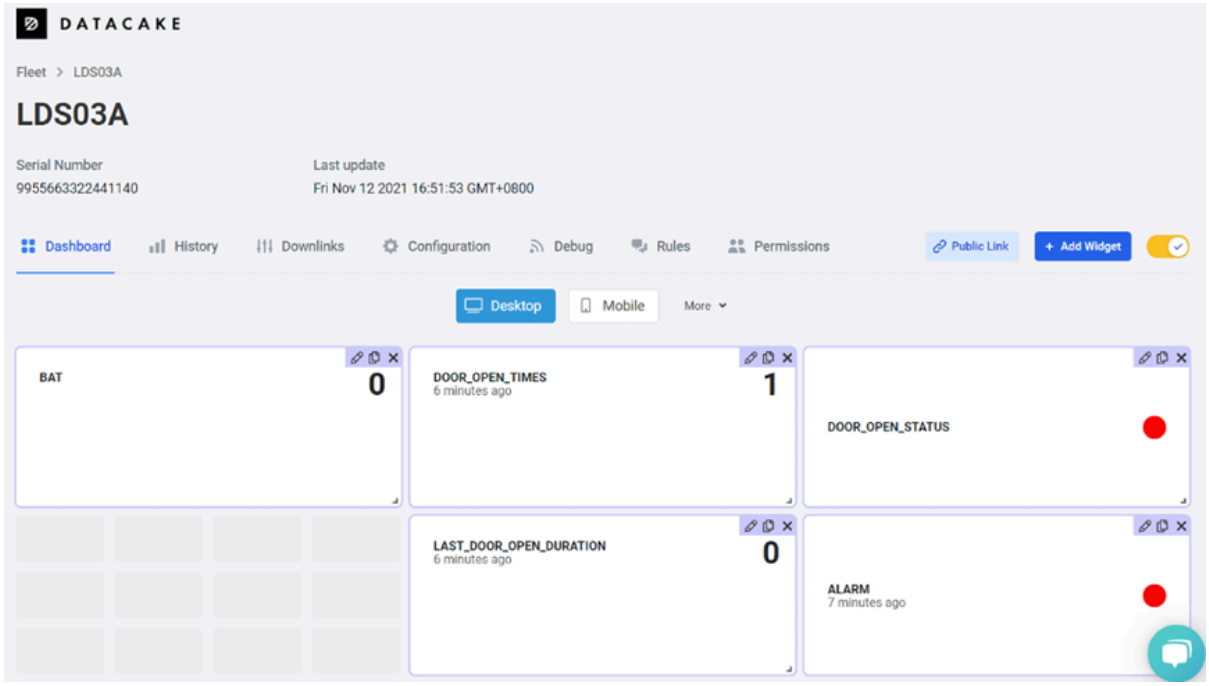

Payload Decoder
When your devices sends data, the payload will be passed to the payload decoder, alongside the event's name. The payload decoder then transforms it to measurements.
1
Payload
Port
Try Decoder
Output
console.log Output
Recognized measurements
2
Save


Fields
Fields describe the data the device will store.
+ Add Field
1
2
NAME
IDENTIFIER
TYPE
CURRENT VALUE
LAST UPDATE
BAT
BAT
Float
0
5 minutes ago
DOOR_OPEN_TIMES
DOOR_OPEN_TIMES
Float
0
3 minutes ago
LAST_DOOR_OPEN_DURATION
LAST_DOOR_OPEN_DURATION
Float
0
3 minutes ago
ALARM
ALARM
Boolean
False
a few seconds ago
DOOR_OPEN_STATUS
DOOR_OPEN_STATUS
Boolean
False
a few seconds ago


DATACAKE
Fleet > LDS03A
LDS03A
Serial Number
995566322441140
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
Public Link
+ Add Widget
Desktop
Mobile
More
2
1


Basics
Data
Appearance
Gauge
Timeframe
1
Field
Please Select
Please Select
BAT
DOOR_OPEN_TIMES
LAST_DOOR_OPEN_DURATION
2
Decimal Places
2
3
Cancel
Save





3. Configure CPL01 via AT Command or LoRaWAN Downlink

Use can configure CPL01 via AT Command or LoRaWAN Downlink.

- AT Command Connection: See FAQ.

- LoRaWAN Downlink instruction for different platforms: IoT LoRaWAN Server

There are two kinds of commands to configure CPL01, they are:

- **General Commands**.

These commands are to configure:

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

They are the same for all Dragino Devices which support DLWS-005 LoRaWAN Stack(Note**). These commands can be found on the wiki: End Device AT Commands and Downlink Command

- **Commands special design for CPL01**

These commands are only valid for CPL01, as below:

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	30000 OK the interval is 30000ms = 30s
AT+TDC=60000	Set Transmit Interval	OK Set transmit interval to 60000ms = 60 seconds

Downlink Command: 0x01

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

If the downlink payload=0100003C, it means set the END Node's Transmit Interval to 0x00003C=60(S), while type code is 01.

- Example 1: Downlink Payload: 0100001E // Set Transmit Interval (TDC) = 30 seconds
- Example 2: Downlink Payload: 0100003C // Set Transmit Interval (TDC) = 60 seconds

3.2 Set Password

Feature: Set device password, max 9 digits

AT Command: AT+PWORD

Command Example	Function	Response
AT+PWORD=?	Show password	123456

		OK
AT+PWORD=999999	Set password	OK

Downlink Command:

No downlink command for this feature.

3.3 Quit AT Command

Feature: Quit AT Command mode, so user needs to input the password again before using AT Commands.

AT Command: AT+DISAT

Command Example	Function	Response
AT+DISAT	Quit AT Commands mode	OK

Downlink Command:

No downlink command for this feature.

3.4 Enable / Disable Alarm

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

AT Command:

Command Example	Function	Response
AT+DISALARM=1	End node will only send packets in TDC time.	OK
AT+DISALARM=0	End node will send packets in TDC time or status change for dry contact status	OK

Downlink Command:

0xA7 01 //Same As AT+DISALARM=1

0xA7 00 // Same As AT+DISALARM=0

3.5 Alarm Base on Timeout

CPL01 can monitor the timeout for a status change, this feature can be used to monitor some events such as door opening too long etc. Related Parameters are:

1. Keep Status: Status to be monitor

Keep Status = 1: Monitor Close to Open event

Keep Status = 0: Monitor Open to Close event

2. Keep Time: Timeout to send an Alarm

Range 0 ~ 65535(0xFFFF) seconds.

If keep time = 0, Disable Alarm Base on Timeout feature.

If keep time > 0, device will monitor the keep status event and send an alarm when status doesn't change after timeout.

AT Command to configure:

AT+TTRIG=1,30 --> When the **Keep Status** change from connect to disconnect, and device remains in disconnect status for more than 30 seconds. CPL01 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+TTIG=0,0 --> Default Value, disable timeout Alarm.

Downlink Command to configure:

Command: 0xA9 aa bb cc

A9: Command Type Code

aa: status to be monitored

bb cc: timeout.

If user send 0xA9 01 00 1E: equal to AT+TTRIG=1,30

Or

0xA9 00 00 00: Equal to AT+TTRIG=0,0. Disable timeout Alarm.

3.6 Clear Flash Record

Feature: Clear flash storage for data log feature.

AT Command: AT+CLRDTA

Command Example	Function	Response
AT+CLRDTA	Clear flash storage for data log feature.	Clear all stored sensor data... OK

Downlink Command:

- **Example**: 0xA301 //Same as AT+CLRDTA

3.7 Set the sensor mode

Feature: LDS03A and CPL01 use the same firmware. User is possible to switch between this two models.

AT Command: AT+MOD

Command Example	Function	Response
AT+MOD =1	Set the sensor to LDS03A.	OK
AT+MOD=2	Set the sensor to CPL01.	OK

Downlink Command:

- **Example**: 0x0A02 //Same as AT+MOD=2

3.8 Set trigger mode

Feature: Set the trigger interrupt mode.

AT Command: AT+TTRMOD

Command Example	Function	Response
AT+TTRMOD =1	Count and trigger from open to close (rising edge)	OK
AT+TTRMOD =0	Count and trigger from close to open (falling edge)	OK

Downlink Command:

- **Example**: 0xA401 //Same as AT+ TTRMOD =1

3.9 Set the calculate flag

Feature: Set the calculate flag

AT Command: AT+CALCFLAG

Command Example	Function	Response
AT+CALCFLAG =1	Set the calculate flag to 1.	OK
AT+CALCFLAG =2	Set the calculate flag to 2.	OK

Downlink Command:

- **Example**: 0XA501 //Same as AT+CALCFLAG =1

3.10 Set count number

Feature: Manually set the count number

AT Command: AT+SETCNT

Command Example	Function	Response
AT+ SETCNT =0	Set the count number to 0.	OK
AT+ SETCNT =100	Set the count number to 100.	OK

Downlink Command:

1. **Example**: 0xA6000001 //Same as AT+ SETCNT =1;
2. **Example**: 0xA6000064 //Same as AT+ SETCNT =100

4. Battery & how to replace

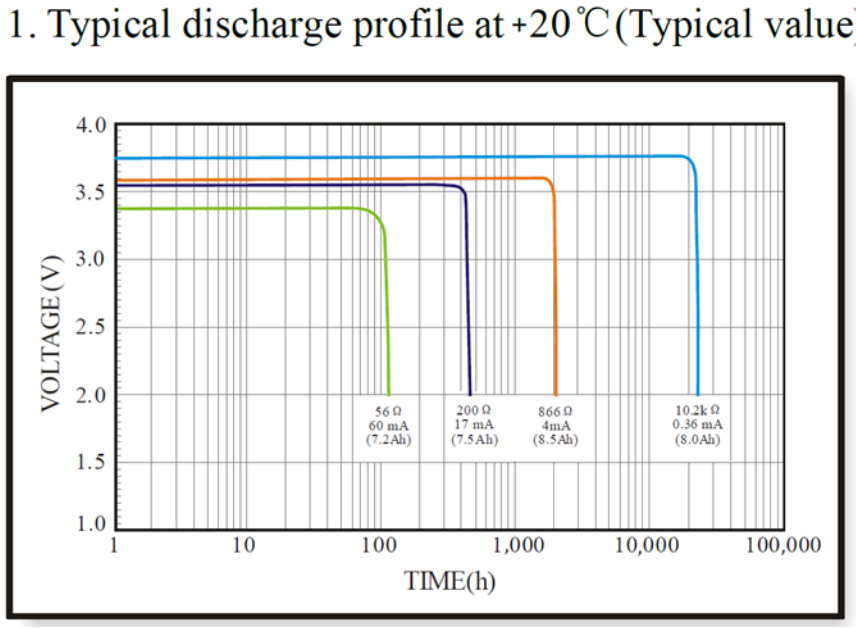
4.1 Battery Info

CPL01 is equipped with a 8500mAH ER18505 Li-SOCI2 battery. The battery is an un-rechargeable battery with a low discharge rate targeting 8~10 years of use. This type of battery is commonly used in IoT targets for long-term running, such as water meters.

The battery-related documents are as below:

- Battery Dimension,
- Lithium-Thionyl Chloride Battery datasheet,
- Lithium-ion Battery-Capacitor datasheet, Tech Spec

The discharge curve is not linear so can't simply use percentage to show the battery level. Below is the battery performance.



Minimum Working Voltage for the CPL01:

CPL01: 2.45v ~ 3.6v

4.1.1 Battery Note

The Li-SICO battery is designed for small current / long period applications. It is not good to use a high current, short period transmit method. The recommended minimum period for use of this battery is 5 minutes. If you use a shorter period to transmit LoRa, then the battery life may be decreased.

4.2 Replace Battery

Any battery with a range of 2.45 ~ 3.6v can be a replacement. We recommend using Li-SOCl2 Battery.

And make sure the positive and negative pins match.

4.3 Battery Life 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:

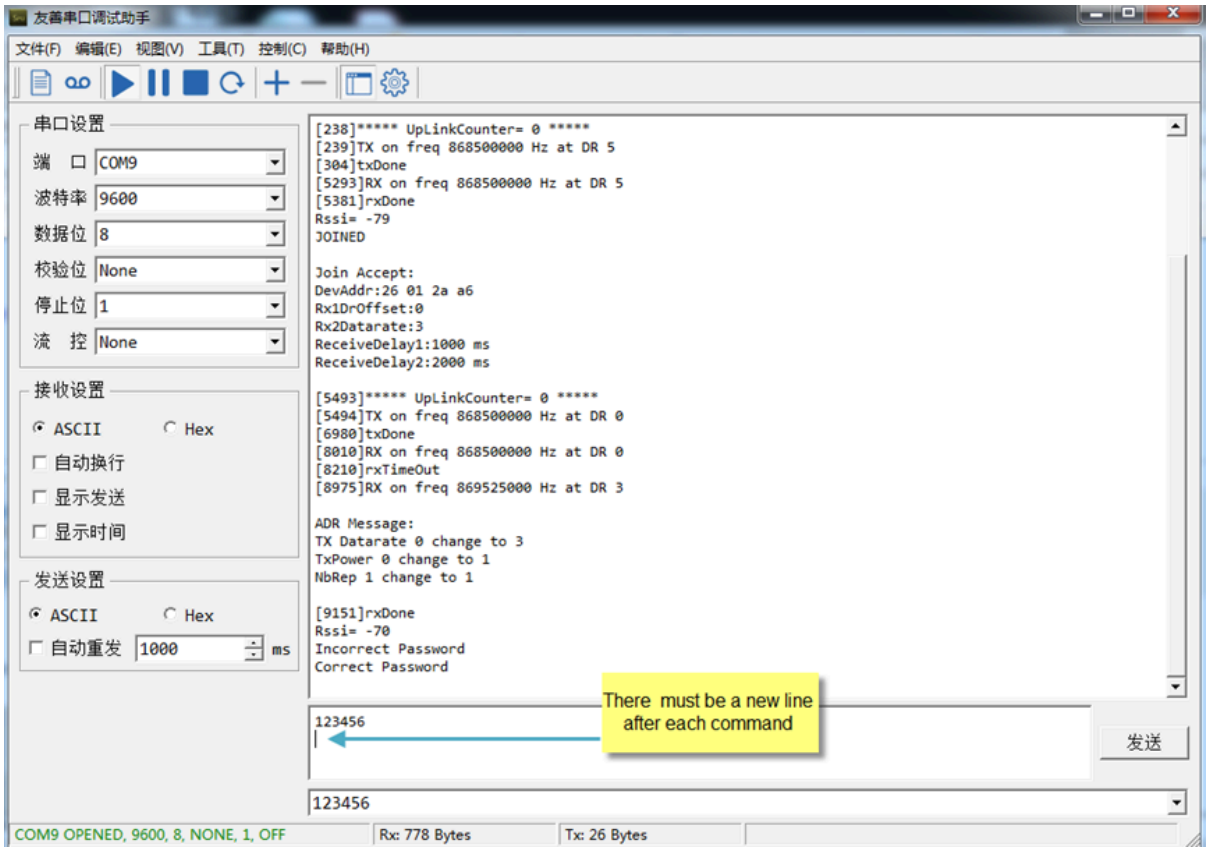
https://www.dragino.com/downloads/downloads/LoRa_End_Node/Battery_Analyze/DRAGINO_Battery_Life_Guide.pdf

5. FAQ

5.1 How to use AT Command to configure CPL01

CPL01 UART connection photo

In the PC, you need to set the serial baud rate to **9600** to access the serial console for LSN50. LSN50 will output system info once power on as below:



5.2 How to upgrade the firmware?

A new firmware might be available for:

- Support new features
- For bug fix
- Change LoRaWAN bands.

Instruction for how to upgrade: Firmware Upgrade Instruction

Firmware location: (same firmware as LDS03A)https://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/CPL01/Firmware/

5.3 How to change the LoRa Frequency Bands/Region?

Users can follow the introduction for how to upgrade image. When downloading the images, choose the required image file for download.

6. Trouble Shooting

6.1 AT Commands input doesn't work

In the case if user can see the console output but can't type input to the device. Please check if you already include the **ENTER** while sending out the command. Some serial tool doesn't send **ENTER** while press the send key, user need to add ENTER in their string.

7. Order Info

Part Number: **CPL01-XX**

XX: The default frequency band

- **AS923 :** LoRaWAN AS923 band
- **AU915 :** LoRaWAN AU915 band
- **EU433 :** LoRaWAN EU433 band
- **EU868 :** LoRaWAN EU868 band
- **KR920 :** LoRaWAN KR920 band
- **US915 :** LoRaWAN US915 band
- **IN865 :** LoRaWAN IN865 band
- **CN470 :** LoRaWAN CN470 band

8. Packing Info

Package Includes:

- CPL01 Open/Close Sensor x 1

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 inquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to support@dragino.com.