SW3L LoRaWAN Outdoor Flow Sensor

last modified by Xiaoling

on 2022/06/29 17:10

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1. Introduction

1.1 What is SW3L LoRaWAN Flow Sensor

The Dragino SW3L is a **LoRaWAN Flow Sensor**. It detects water flow volume and uplink to IoT server via LoRaWAN network. User can use this to **monitor the water usage for buildings.**

SW3L is powered by **8500mAh Li-SOCI2 battery**, It is designed for long term use up to 10 years. (Actually Battery life depends on the use environment, update period.)

The SW3L will send water flow volume every 20 minutes. It can also **detect the water flow status** and **send Alarm**, to avoid the waste for water usage such as broken toilet case.

SW3L is designed for both indoor and outdoor use. It has a weatherproof enclosure and industrial level battery to work in low to high temperatures.

Each SW3L 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
- Upload water flow volume
- Monitor water waste
- 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

Each SW3L package is shipped with a flow sensor. Install the flow sensor into water pipe with correct flow direction to start monitoring.

1.4 Storage & Operation Temperature

-40°C to +85°C

1.5 Applications

- Flow Sensor application
- Water Control
- Toilet Flow Sensor
- Monitor Waste water

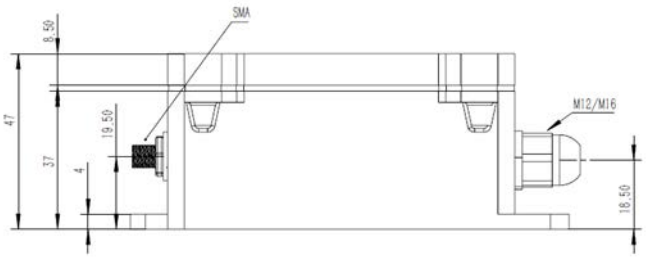
1.6 Flow Sensor Spec

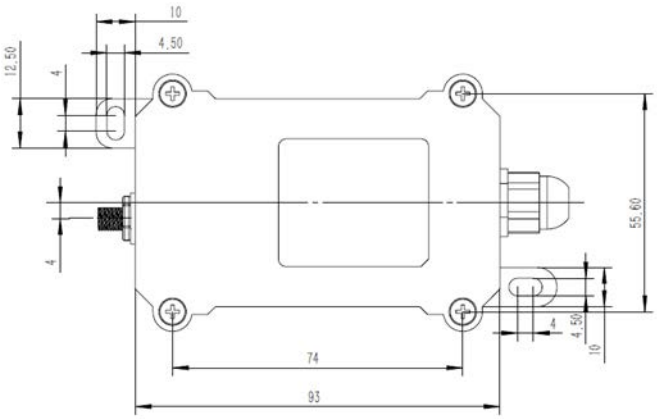
SW3L-004: DW-004 Flow Sensor: diameter: G1/2" / DN15. 450 pulse = 1 L

SW3L-006: DW-006 Flow Sensor: diameter: G3/4" / DN20. 360 pulse = 1 L

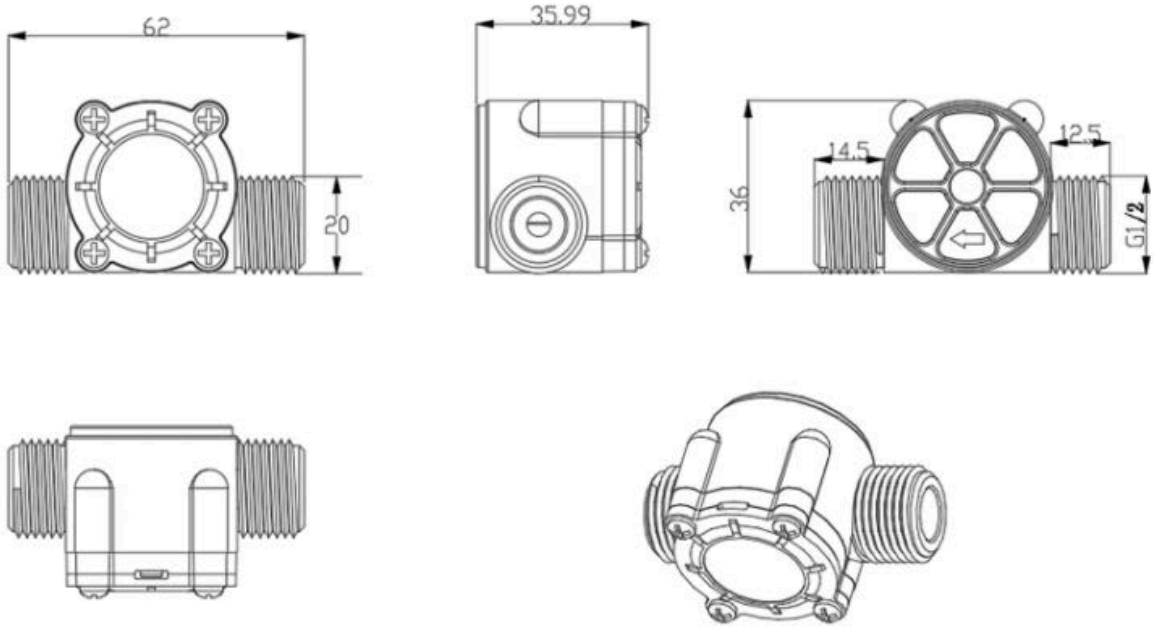
SW3L-010: DW-010 Flow Sensor: diameter: G 1" / DN25. 60 pulse = 1 L

1.7 Mechanical

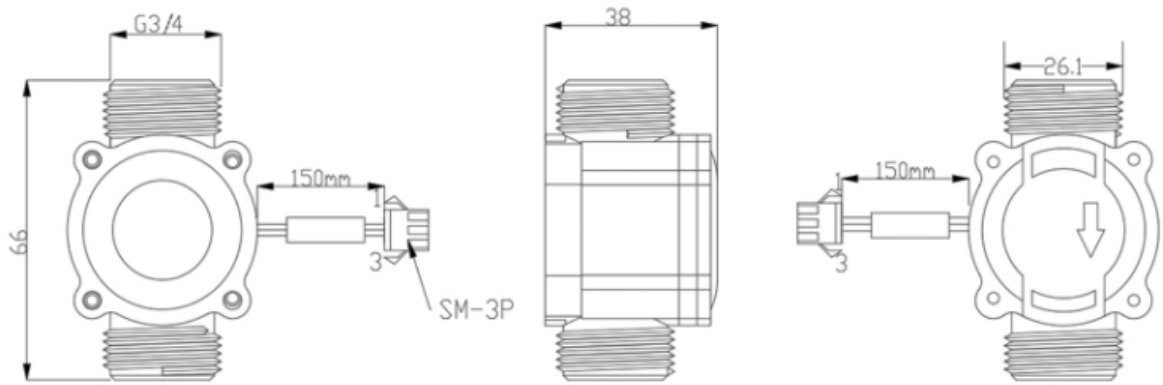




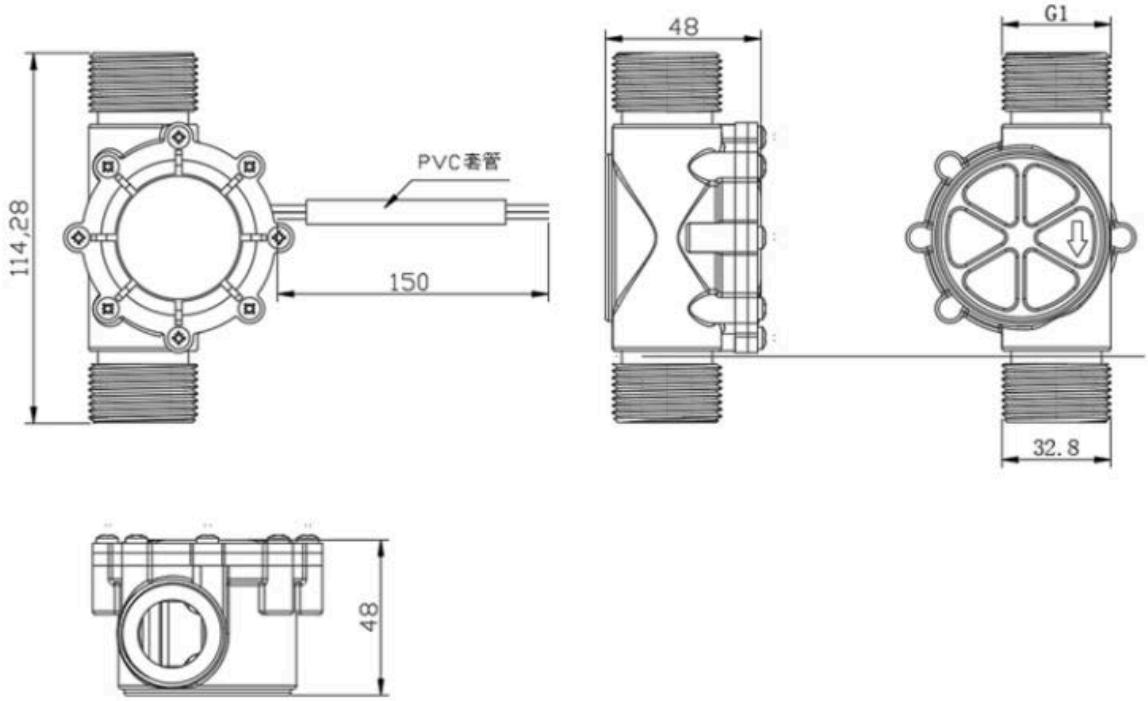
DW-004 Flow Sensor: diameter: G1/2" / DN15. 450 pulse = 1 L



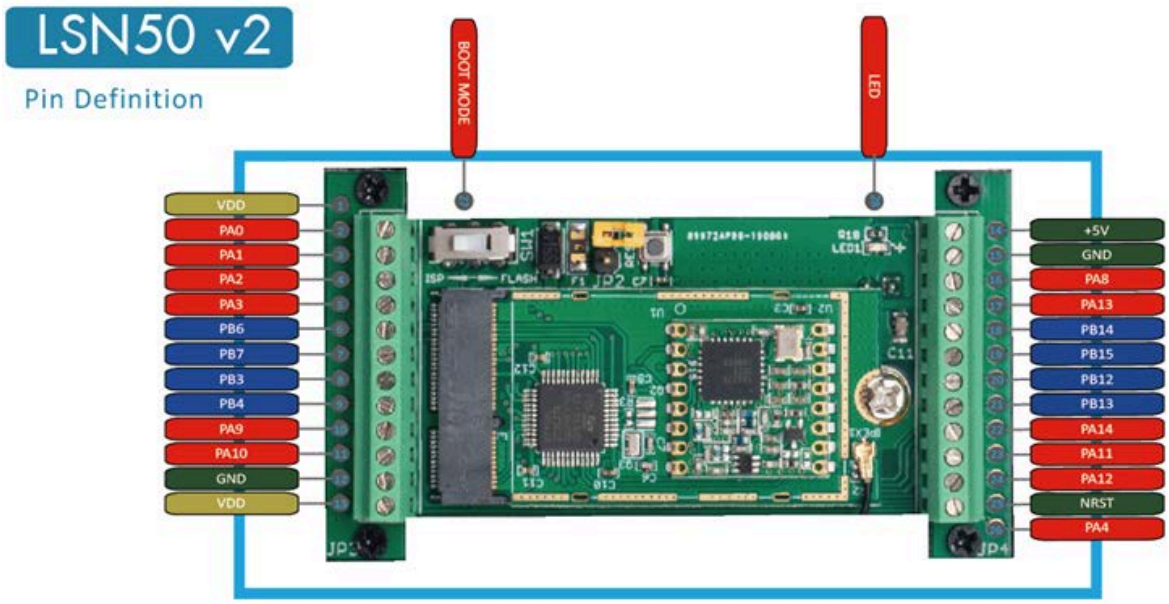
006: DW-006 Flow Sensor: diameter: G3/4" / DN20. 360 pulse = 1 L



010: DW-010 Flow Sensor: diameter: G 1" / DN25. 60 pulse = 1 L



1.8 Pin Definitions and Switch



1.8.1 Pin Definition

SW3L 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/

1.8.2 Jumper JP2(Power ON/OFF)

Power on Device when putting this jumper.

1.8.3 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

1.8.4 Reset Button

Press to reboot the device.

1.8.5 LED

It will flash:
1) Boot the device in flash mode
2) Send an uplink packe

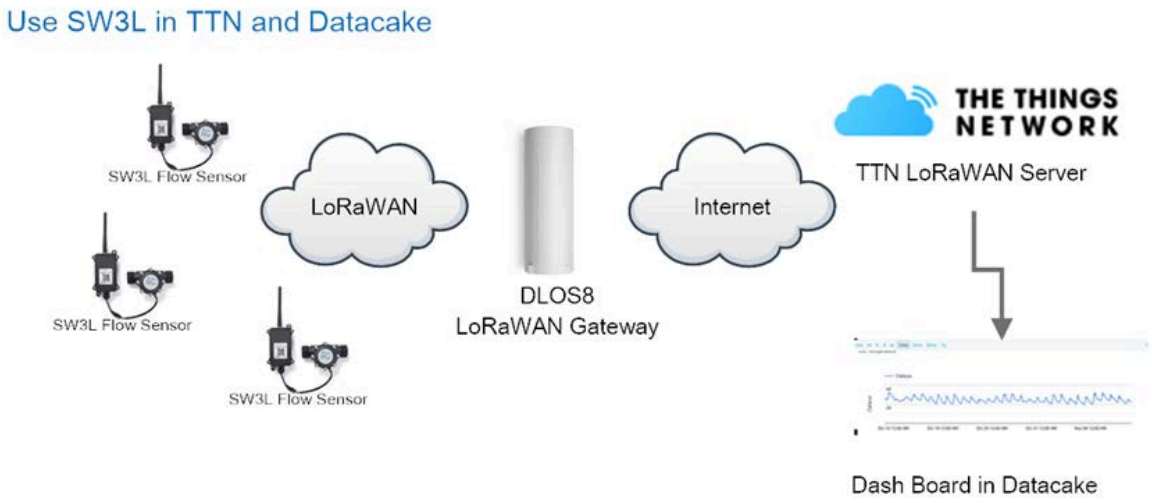
2. Operation Mode

2.1 How it works?

Each SW3L is shipped with a worldwide unique set of OTAA keys. To use SW3L in a LoRaWAN network, user needs to input the OTAA keys in the LoRaWAN network server. So SW3L 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 SW3L is connected into water line to measure water flow and send the status to the LoRaWAN server. The SW3L will uplink different types of messages to the LoRaWAN server. See Uplink payload for detail.

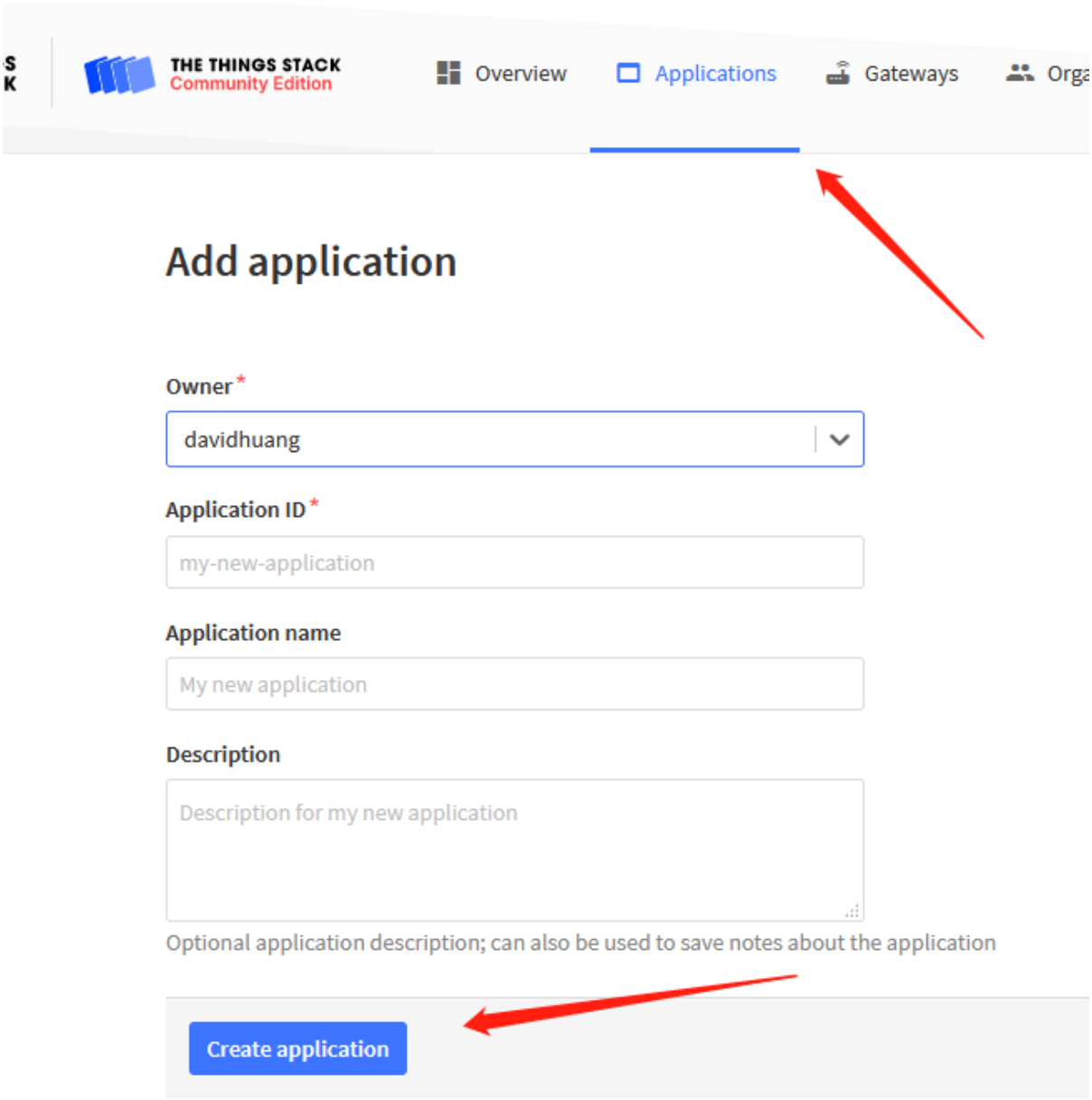
Assume the DLOS8 is already set to connect to the TTN V3 network . We need to add the SW3L device in TTN V3:

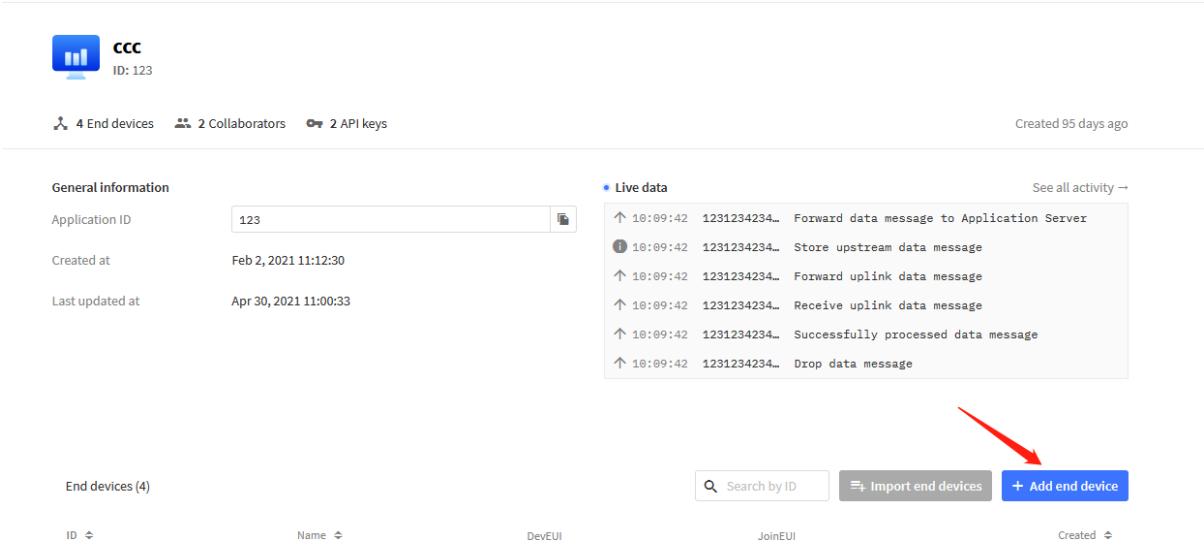
Step 1: Create a device in TTN V3 with the OTAA keys from SW3L.

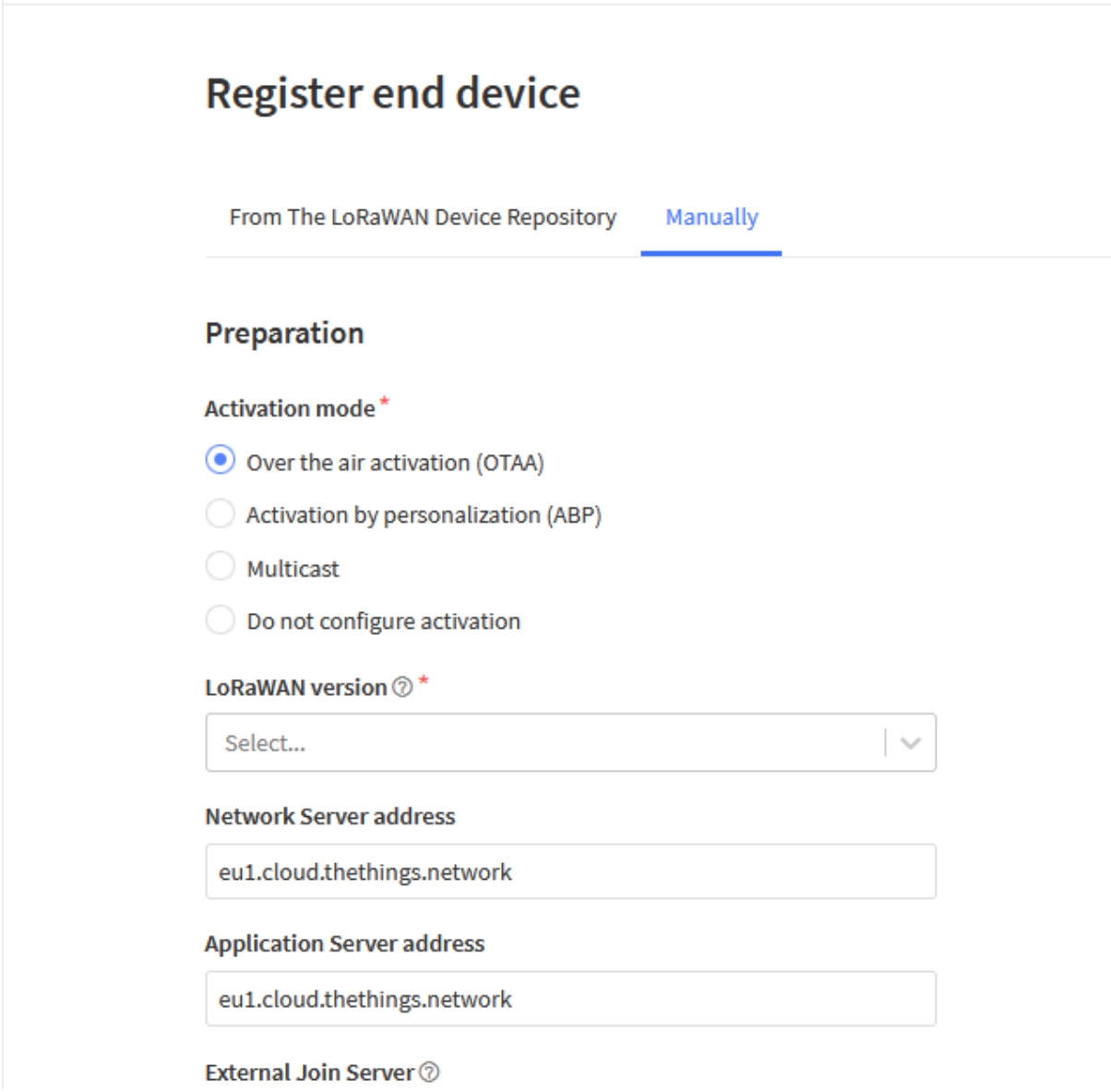
Each SW3L is shipped with a sticker with the default device EUI as below:

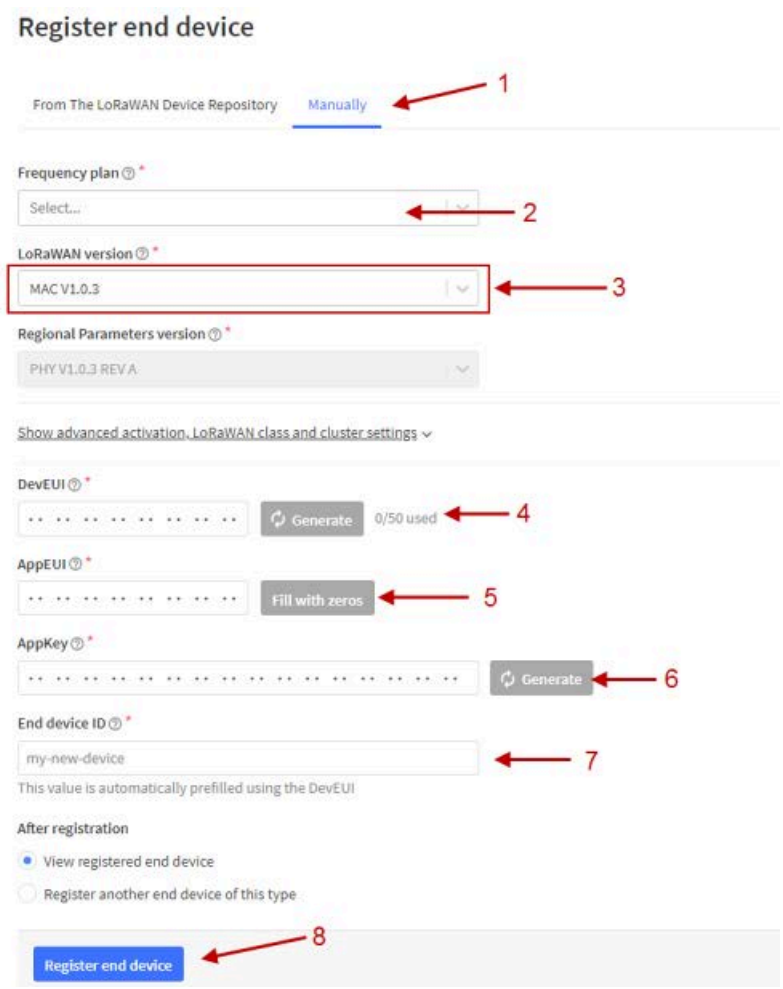
Users can enter these keys in the LoRaWAN Server portal. Below is the TTN V3 screenshot:

Add APP EUI in the application.



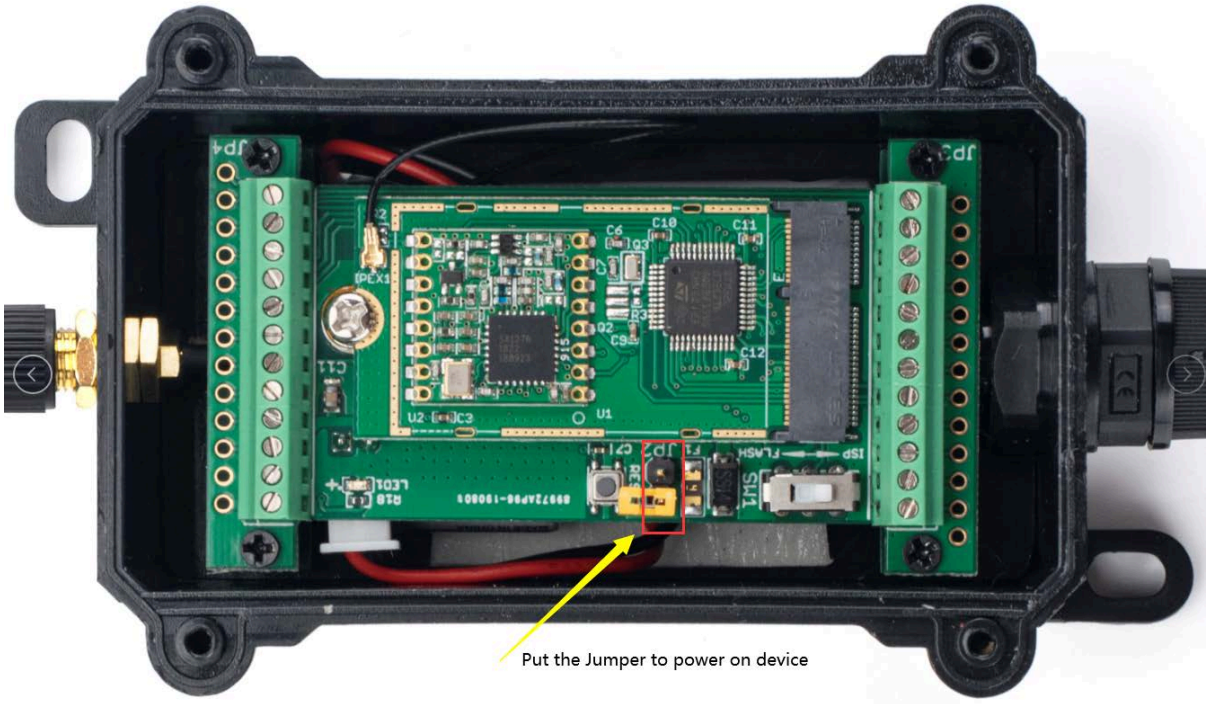

ccc
ID: 123
4 End devices
2 Collaborators
2 API keys
Created 95 days ago
General information
Application ID
123
Created at
Feb 2, 2021 11:12:30
Last updated at
Apr 30, 2021 11:00:33
Live data
See all activity →
10:09:42 1231234234… Forward data message to Application Server
10:09:42 1231234234… Store 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

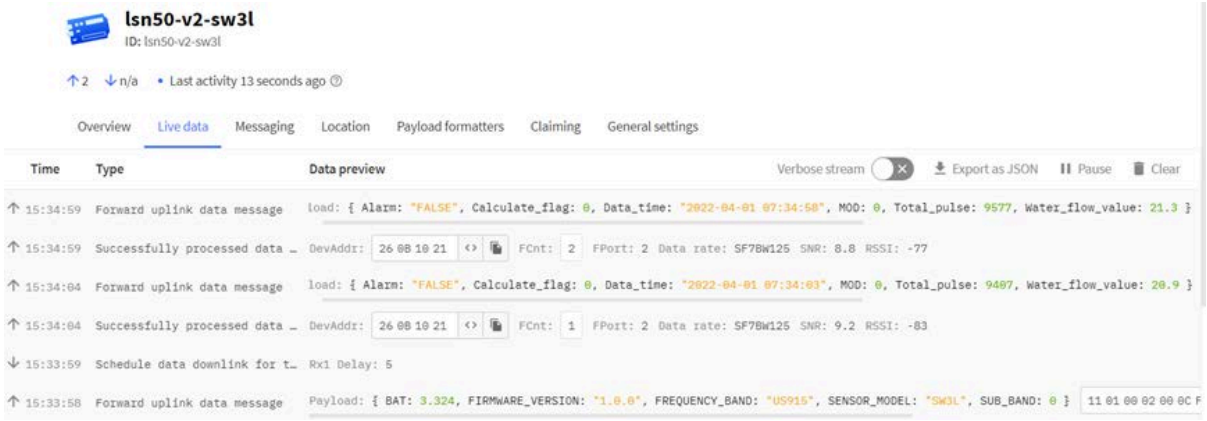


Add APP KEY and DEV EUI

Step 2: Power on SW3L



Put the jumper to power on SW3L 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 SW3L Joined the network, it will uplink this message to the server. After that, SW3L will uplink Device Status every 12 hours.

Users can also use the downlink command(0x26 01) to ask SW3L 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 SW3L, this value is 0x11
- **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

SW3L 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)	N/A	Stop Timer	Alarm Timer	Reserve

- **TDC: (default: 0x0004B0)**

Uplink interval for the total pulse count, default value is 0x0004B0 which is 1200 seconds = 20 minutes.

- **STOP Duration & Alarm Timer**

Shows the configure value of Alarm for continuously water flow

2.3.3 Water Flow Value, Uplink FPORT=2

SW3L will send this uplink **after** Device Status once join the LoRaWAN network successfully. And SW3L will:

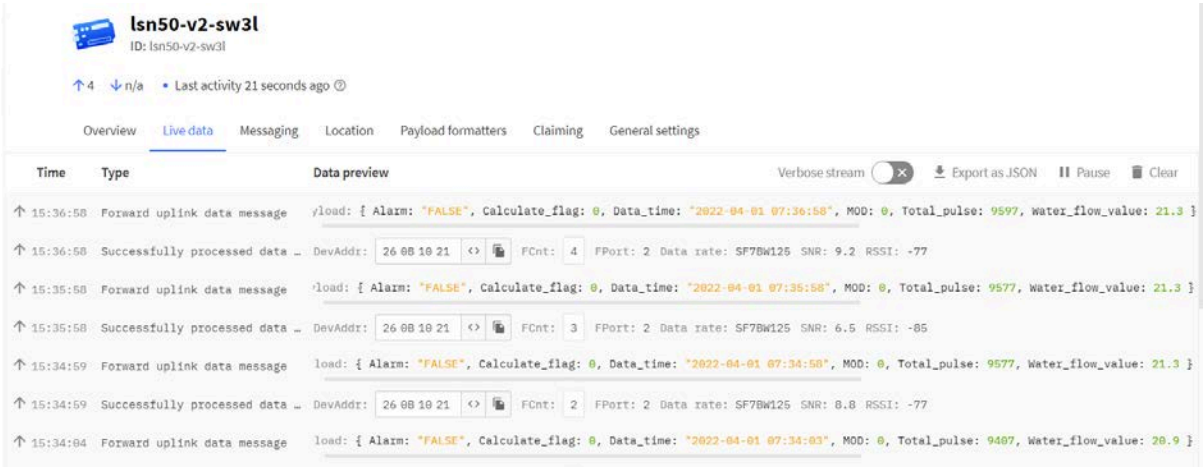
periodically send this uplink every 20 minutes, this interval can be changed.

Uplink Payload totals 11 bytes.

Water Flow Value, FPORT=2					
Size (bytes)	1	4	1	1	4
Value	Calculate Flag & Alarm	Total pulse Or Last Pulse	MOD	Reserve(0x01)	Unix TimeStamp

Status & Alarm field

Size (bit)	**6**	**1**	**1**
Value	Calculate Flag	Alarm: 0: No Alarm; 1: Alarm	N/A



- **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 Flow Sensors, meter 1 ~50 are 1 liter/pulse and meter 51 ~ 100 has 1.5 liter/ pulse.

Example: in the default payload:

- calculate flag=0: for SW3L-004 Flow Sensor: 450 pulse = 1 L
- calculate flag=1: for SW3L-006 Flow Sensor: 360 pulse = 1 L
- calculate flag=2: for SW3L-010 Flow Sensor: 60 pulse = 1 L

Default value: 0.

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

NOTE: User need to set Calculate Flag to proper value before use Flow Sensor. Downlink or AT Command see: Refer: Set Calculate Flag

- **Alarm**

See Alarm Base on Timeout

- **Total pulse**

Total pulse/counting since factory

Range (4 Bytes) : 0x00000000~ 0xFFFFFFFF .

- **Last Pulse**

Total pulse since last FPORT=2 uplink. (Default 20 minutes)

Range (4 Bytes) : 0x00000000~ 0xFFFFFFFF .

- **MOD: Default =0**

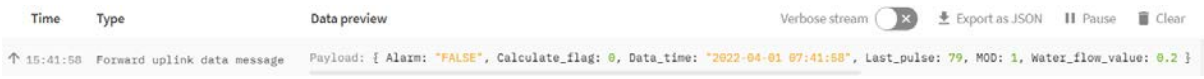
MOD=0 --> Uplink Total Pulse since factory

MOD=1 --> Uplink total pulse since last FPORT=2 uplink.

- **Water Flow Value**

Total Water Flow Volume = (Calculate Flag) x (Total Pulse)=9597/450=21.3L

Total Water Flow for TDC timer = (Calculate Flag) x (Last Pulse)=79/450=0.2L



2.3.4 Historical Water Flow Status, FPORT=3

SW3L 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 water flow status.

- Each data entry is 11 bytes and has the same structure as real time water flow status, to save airtime and battery, SW3L 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 SW3L doesn't have any data in the polling time. It will uplink 11 bytes of 0

Downlink:

0x31 62 46 B1 F0 62 46 B3 94 07

Uplink:

00 00 01 00 00 00 00 62 46 B2 26 00 00 01 00 00 00 00 62 46 B2 5D 00 00 01 00 00 00 00 62 46 B2 99 00 00 01 00 00 00 00 62 46 B2 D5 00 00 01 00 00 01 15 62 46 B3 11 00 00 01 00 00 01 1F 62 46 B3 7E

Parsed Value:

[Alarm, Calculate Flag, MOD, Total pulse or Last Pulse, Water Flow Value, TIME]

[FALSE,0,0,0,0.0,2022-04-01 08:04:54],

[FALSE,0,0,0,0.0,2022-04-01 08:05:49],

[FALSE,0,0,0,0.0,2022-04-01 08:06:49],

[FALSE,0,0,0,0.0,2022-04-01 08:07:49],

[FALSE,0,0,277,0.6,2022-04-01 08:08:49],

[FALSE,0,0,287,0.6,2022-04-01 08:10:38],

```
AT+PDTA=1,1
Stop Tx events when read sensor data
8016000 22/4/1 08:04:54 bat:3313 mode:0 total_pulse:0 cal_flag:0 water_sum:0.0 alarm:false
8016010 22/4/1 08:05:49 bat:3313 mode:0 total_pulse:0 cal_flag:0 water_sum:0.0 alarm:false
8016020 22/4/1 08:06:49 bat:3316 mode:0 total_pulse:0 cal_flag:0 water_sum:0.0 alarm:false
8016030 22/4/1 08:07:49 bat:3316 mode:0 total_pulse:0 cal_flag:0 water_sum:0.0 alarm:false
8016040 22/4/1 08:08:49 bat:3313 mode:0 total_pulse:277 cal_flag:0 water_sum:0.6 alarm:false
8016050 22/4/1 08:10:38 bat:3313 mode:0 total_pulse:287 cal_flag:0 water_sum:0.6 alarm:false
8016060
8016070

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

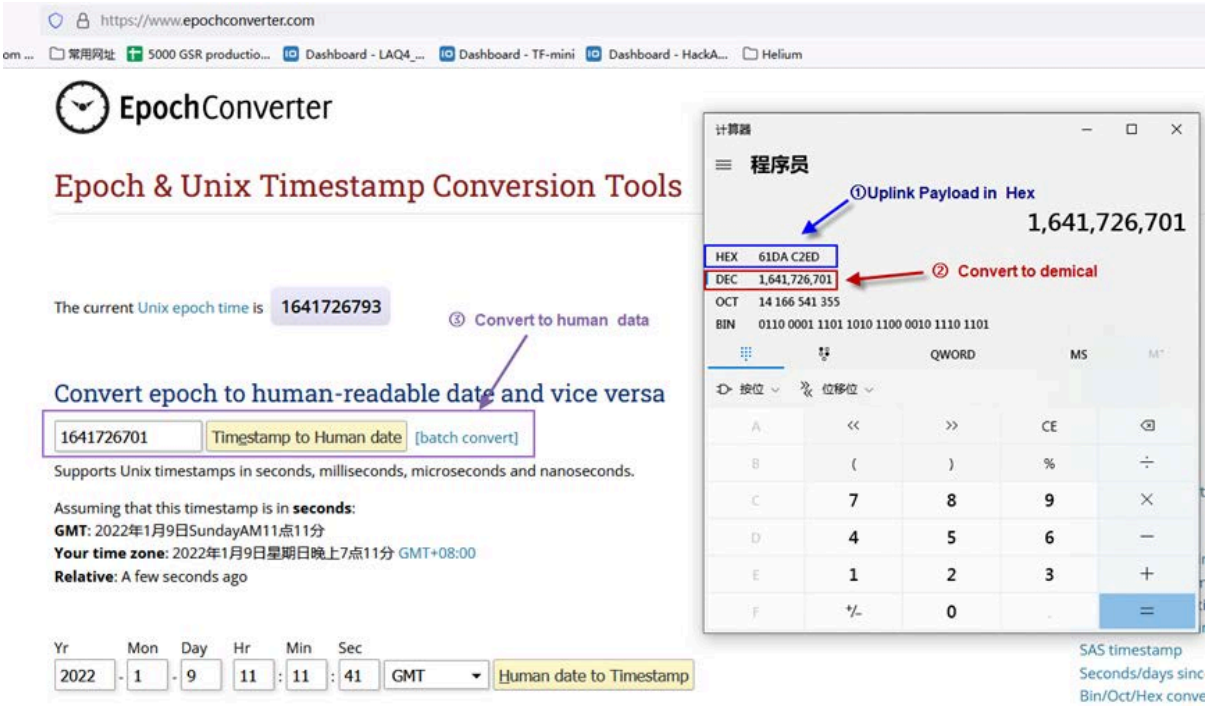
SW3L uses Unix TimeStamp format based on

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

Through LoRaWAN MAC Command

Once SW3L Joined the LoRaWAN network, it will send the MAC command (DeviceTimeReq) and the server will reply with (DeviceTimeAns) to send the current time to SW3L. If SW3L fails to get the time from the server, SW3L 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.

2.4.3 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

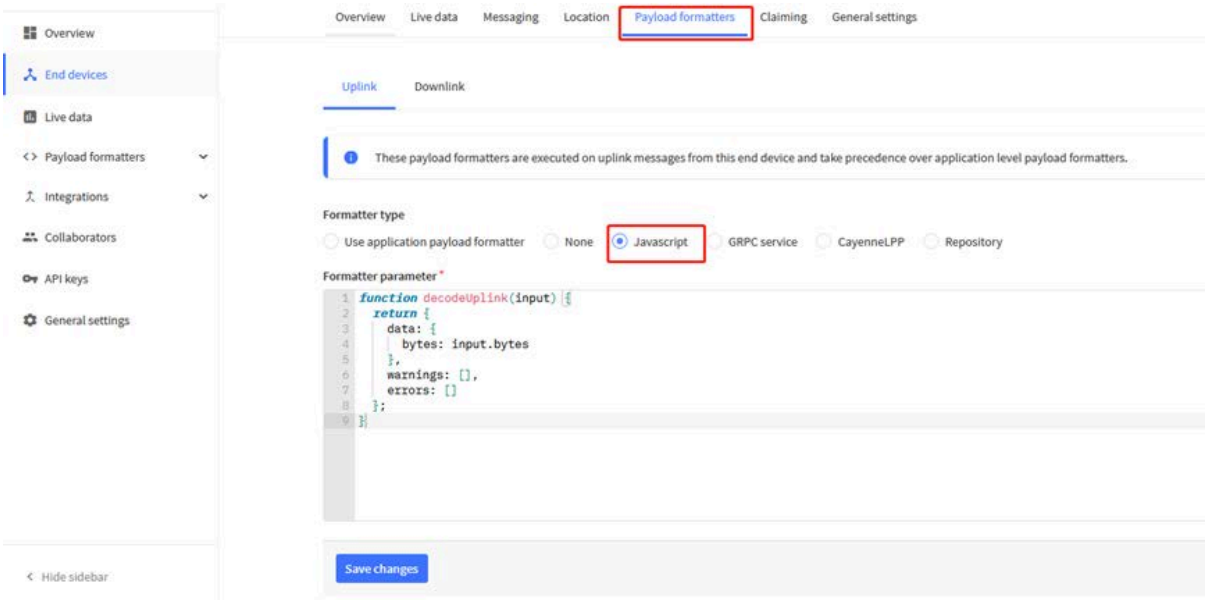
Timestamp start and Timestamp end-use Unix TimeStamp format as mentioned above. Devices will reply with all data logs during this period, using the uplink interval.

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:

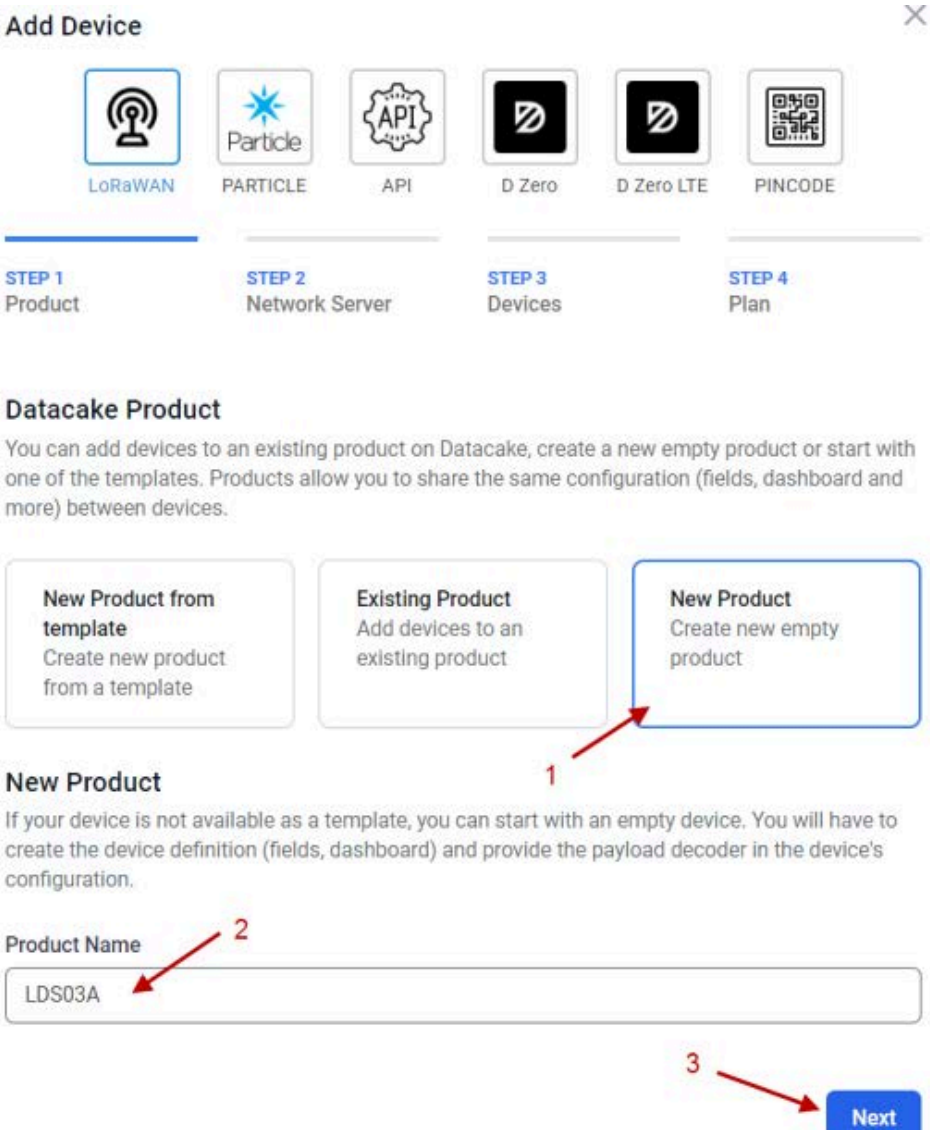
https://docs.google.com/document/d/1LFTp2lupfM3O4rQ1gJgZHJNP49BZFnm2xThiErnJYPQ/edit?usp=sharing

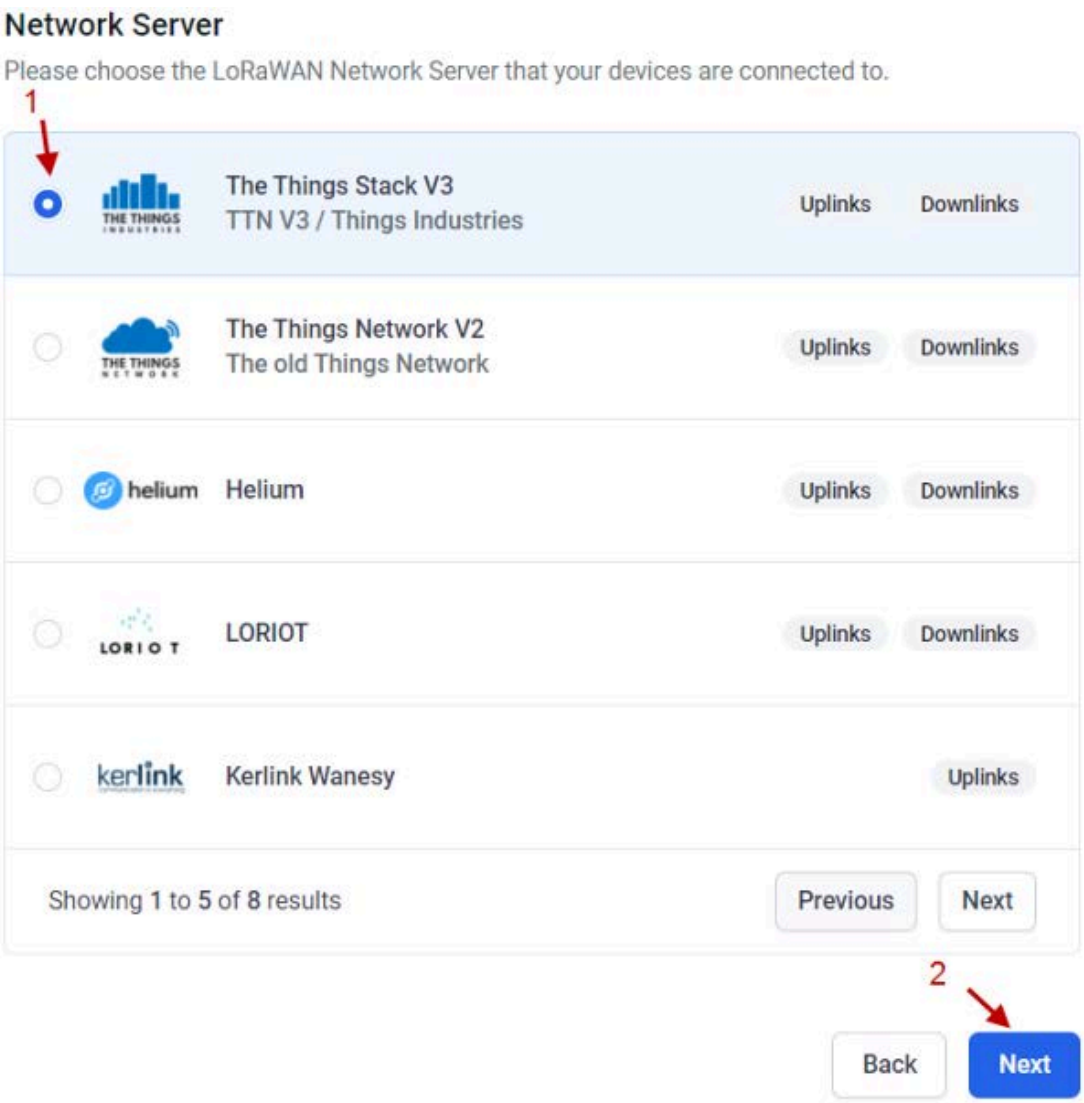
2.5 Show data on Datacake

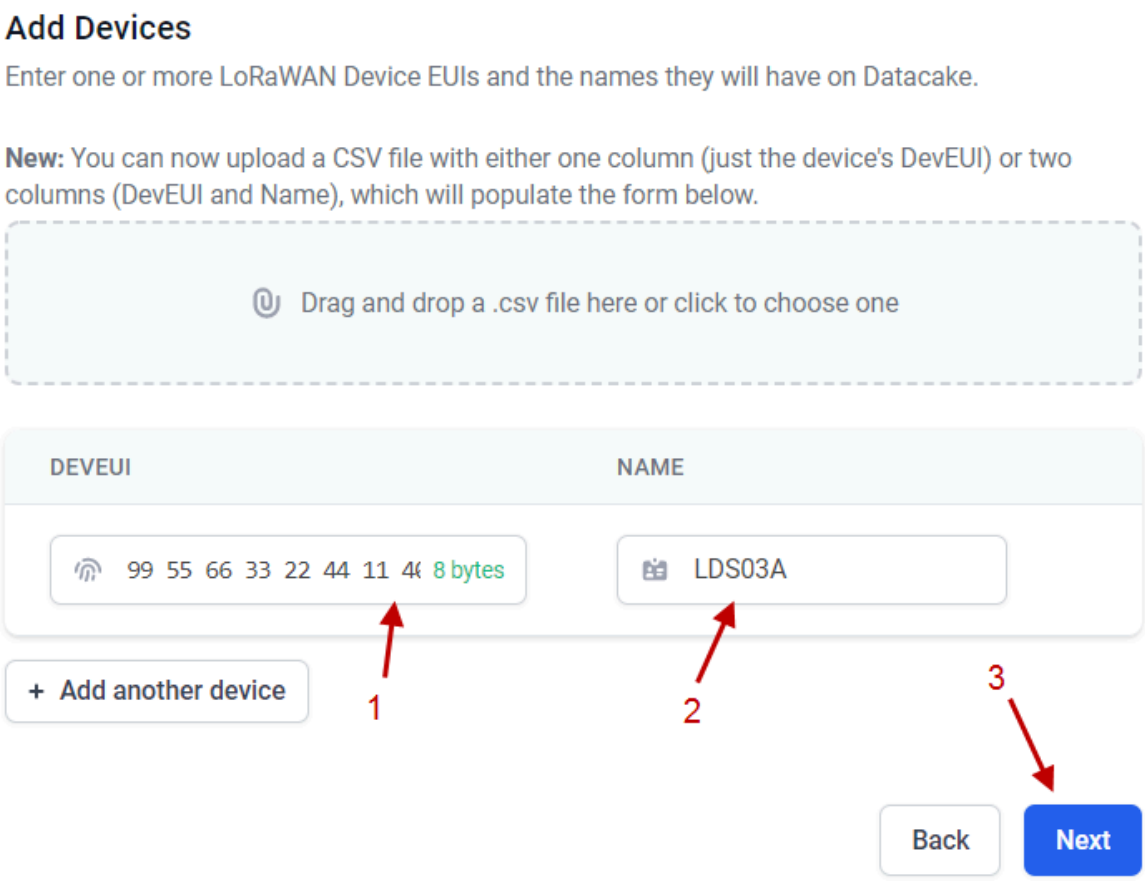
Datacake IoT platform provides a human-friendly interface to show the sensor data, once we have sensor data in TTN V3, we can use Datacake to connect to TTN V3 and see the data in Datacake. Below are the steps:

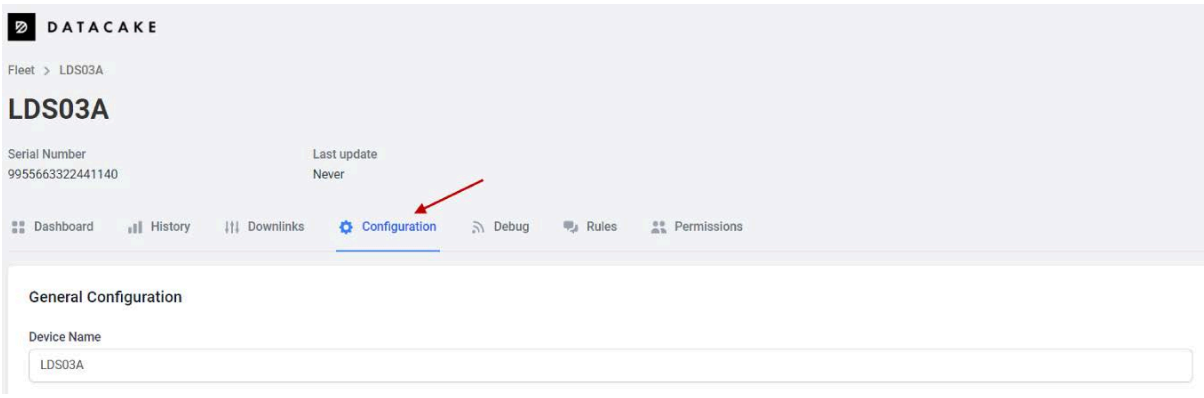
Step 1: Link TTNv3 to Datacake https://docs.datacake.de/lorawan/lns/thethingsindustries#create-integration-on-tti

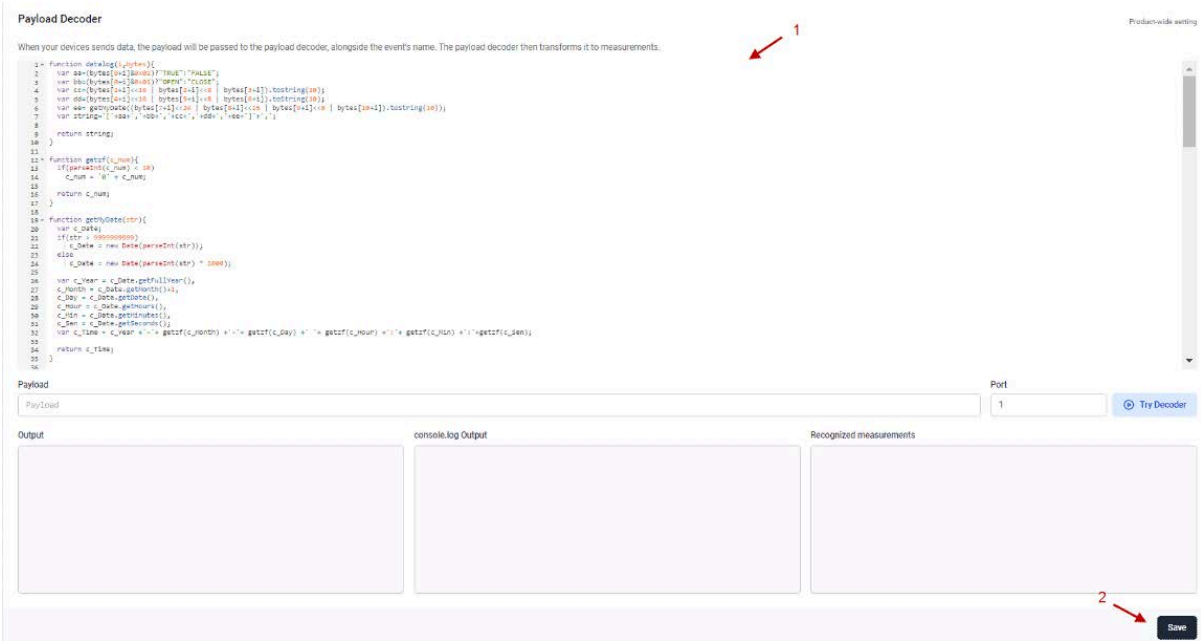
Step 2: Configure SW3L in Datacake

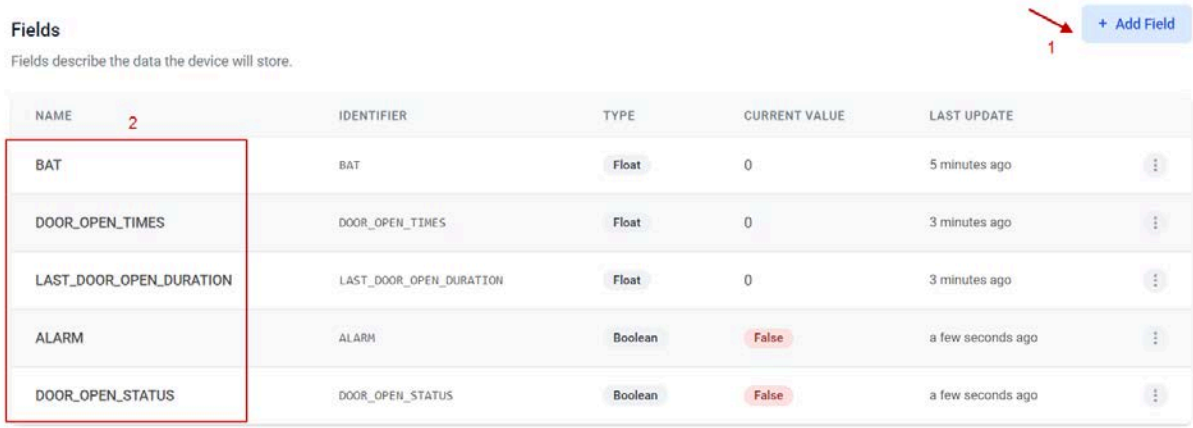


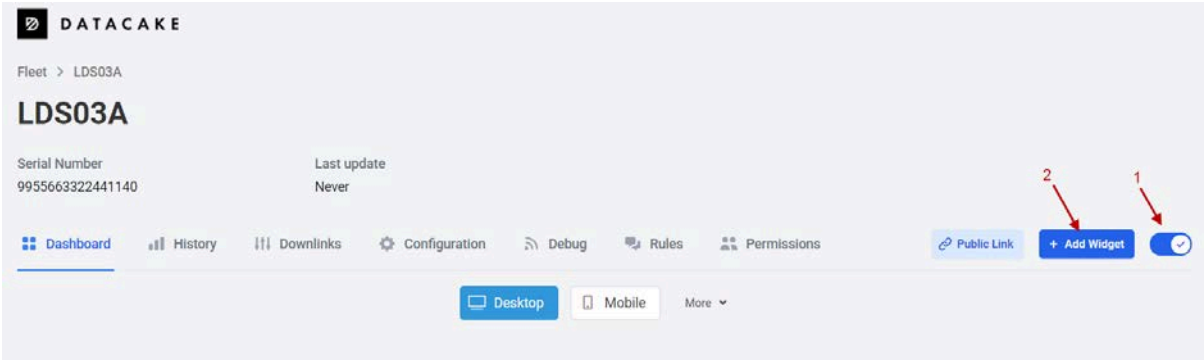

Network Server
Please choose the LoRaWAN Network Server that your devices are connected to.
1
The Things Stack V3
TTN V3 / Things Industries
Uplinks
Downlinks
The Things Network V2
The old Things Network
Uplinks
Downlinks
helium
Helium
Uplinks
Downlinks
LORIOT
Uplinks
Downlinks
kerlink
Kerlink Wanesy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

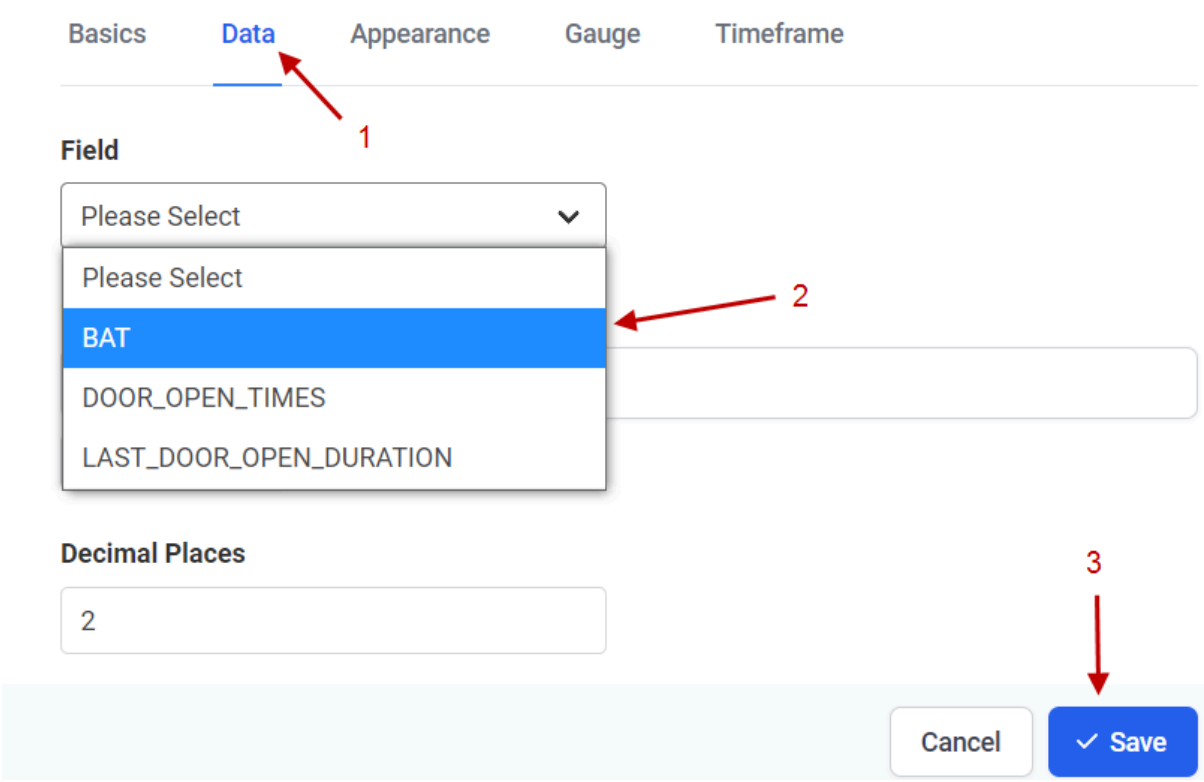

Add Devices
Enter one or more LoRaWAN Device EUIs and the names they will have on Datacake.
New: You can now upload a CSV file with either one column (just the device's DevEUI) or two columns (DevEUI and Name), which will populate the form below.
Drag and drop a .csv file here or click to choose one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

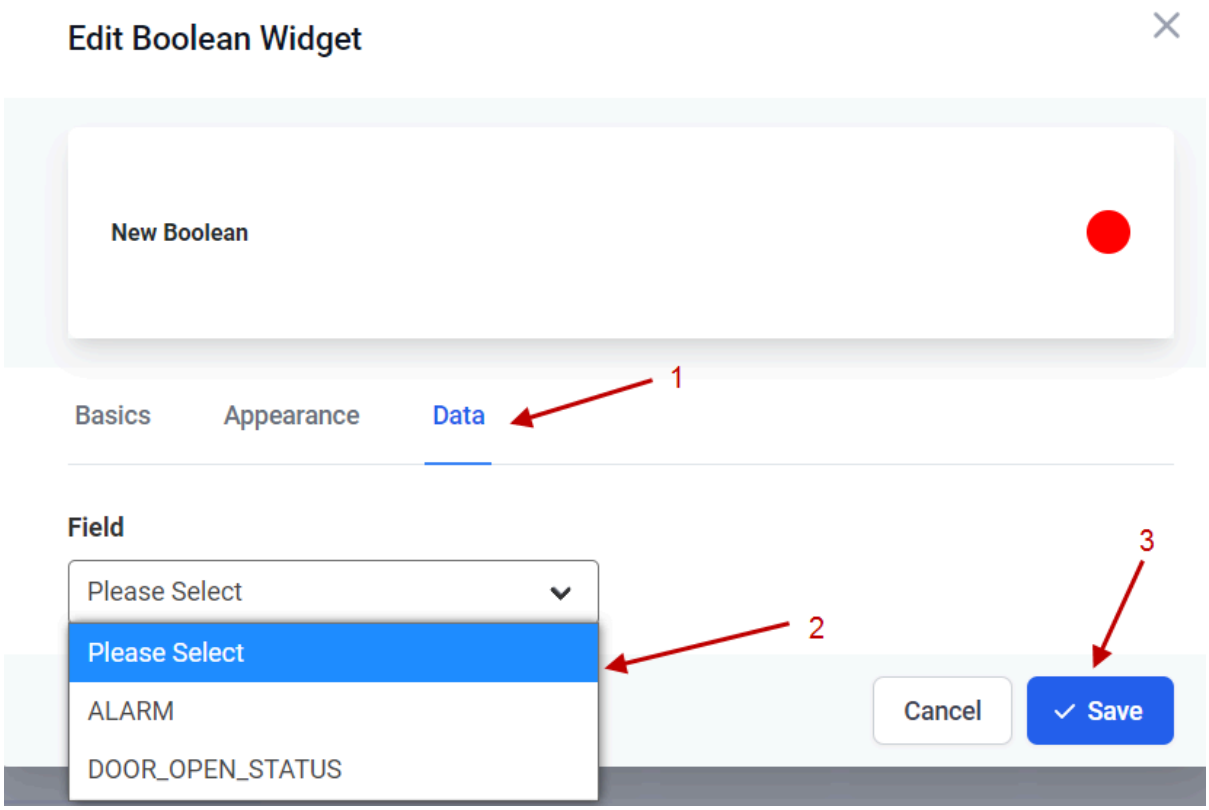

DATACAKE
Fleet > LDS03A
LDS03A
Serial Number
9955663322441140
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
General Configuration
Device Name
LDS03A

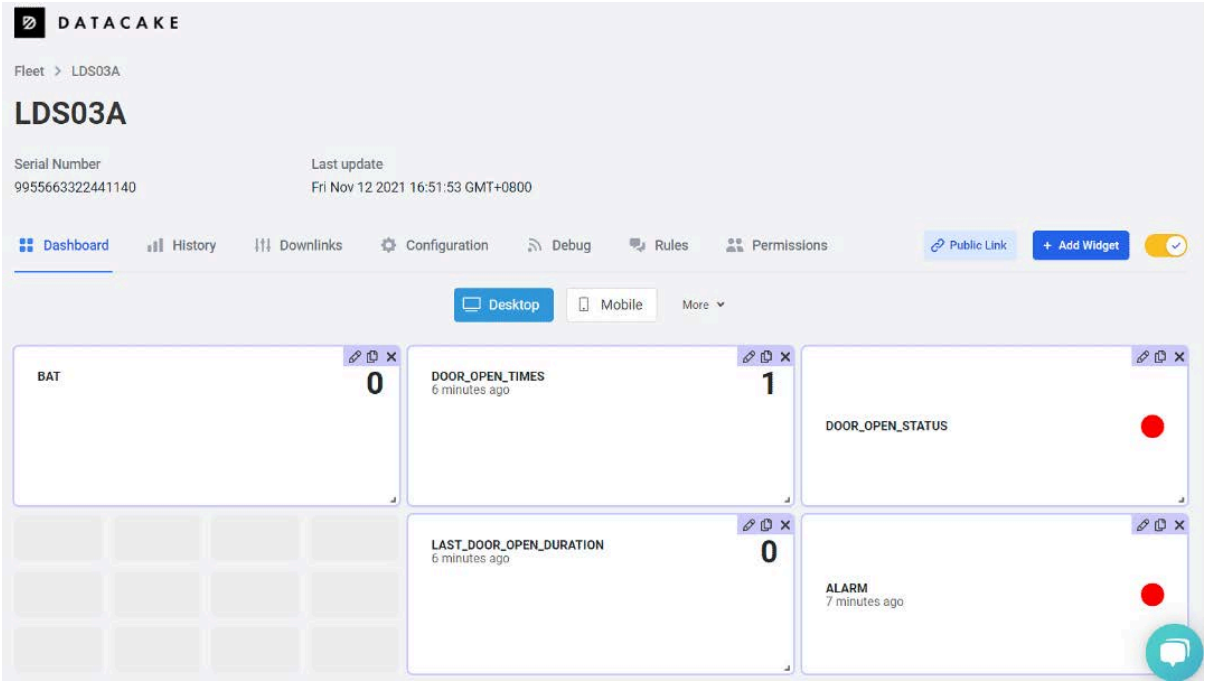

Payload Decoder
Product-wide setting
When your devices sends data, the payload will be passed to the payload decoder, alongside the event's name. The payload decoder then transforms it to measurements.
1
Payload
Port
Try Decoder
Output
console.log Output
Recognized measurements
2
Save


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


Edit Boolean Widget
New Boolean
Basics
Appearance
Data
1
Field
Please Select
Please Select
ALARM
DOOR_OPEN_STATUS
2
3
Cancel
Save



3. Configure SW3L via AT Command or LoRaWAN Downlink

Use can configure SW3L 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 SW3L, 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 SW3L**

These commands are only valid for SW3L, 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 Alarm for continuously water flow

This feature is to monitor and send Alarm for continuously water flow.

Example case is for Toilet water monitoring, if some one push toilet button, the toilet will have water flow. If the toilet button has broken and can't returned to original state, the water flow will keep for hours or days which cause huge waste for water.

To monitor this faulty and send alarm, there are two settings:

- **Stop Duration: Unit: Second**

Default: 15s, If SW3L didn't see any water flow in 15s, SW3L will consider stop of water flow event.

- **Alarm Timer: Units: Minute; Default 0 minutes (means Alarm disable)**

Example: 3 minutes, if SW3L detect a start of water flow event and didn't detect a stop event within Alarm timer, SW3L will send an Alarm to indicate a water flow abnormal alarm.

So for example, If we set stop duration=15s and Alarm Timer=3minutes. If the toilet water flow continuously for more than 3 minutes, Sensor will send an alarm (in Confirmed MODE) to platform.

Note: After this alarm is send, sensor will consider a stop of water flow and count for another new event. So if water flow waste last for 1 hour, Sensor will keep sending alarm every 3 minutes.

AT Command to configure:

- AT+PTRIG=15,3 --> Set Stop duration: 15s, Alarm Timer: 3 minutes.
- AT+ PTRIG=15,0 --> Default Value, disable water waste Alarm.

Downlink Command to configure:

Command: 0xAA aa bb cc

AA: Command Type Code

aa: Stop duration

bb cc: Alarm Timer

If user send 0xAA 0F 00 03: equal to AT+PTRIG=15,3

3.5 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

3.6 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

3.7 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:

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

3.8 Set work mode

Feature: Manually set the work mode

AT Command: AT+MOD

Command Example	Function	Response
AT+MOD=0	Set the work mode to 0.	OK
AT+MOD =1	Set the work mode to 1	OK

Downlink Command:

- **Example:** 0x0A00 //Same as AT+ MOD=0;
- **Example:** 0x0A01 //Same as AT+ MOD =1

4. Battery & how to replace

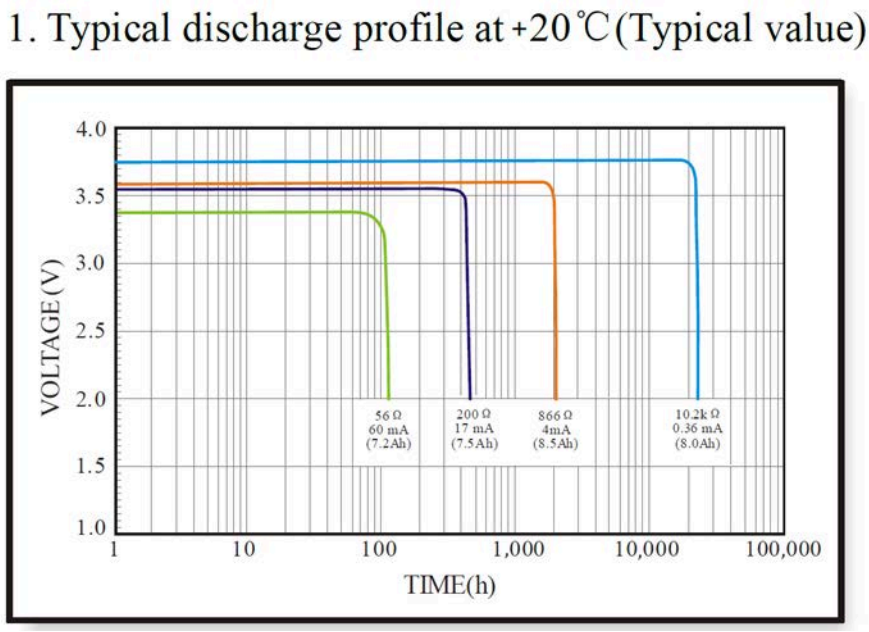
4.1 Battery Info

SW3L is equipped with a 8500mAH ER18505 Li-SOCl2 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 SW3L:

SW3L: 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

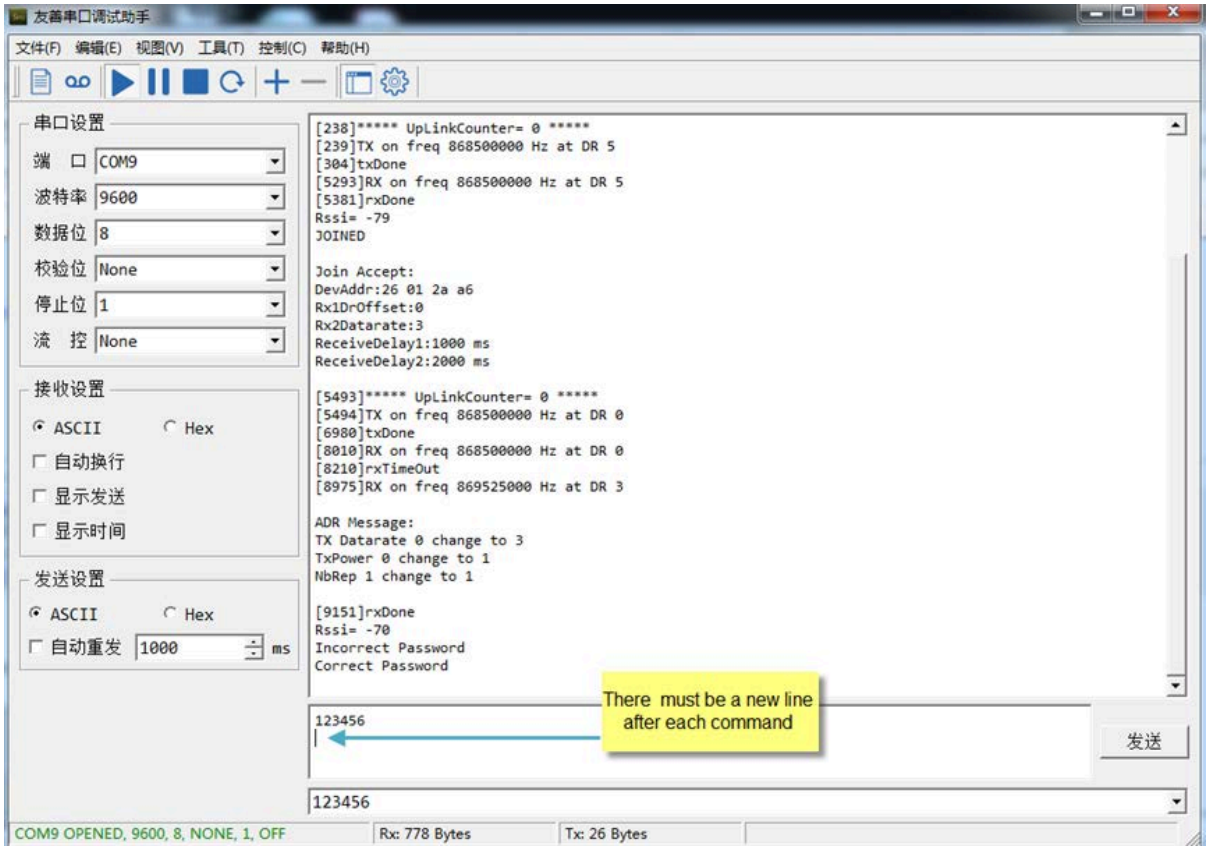
Dragino battery powered products are all run in Low Power mode. User can check the guideline from this link to calculate the estimate battery life:https://www.dragino.com/downloads/downloads/LoRa_End_Node/Battery_Analyze/DRAGINO_Battery_Life_Guide.pdf

5. FAQ

5.1 How to use AT Command to configure SW3

SW3L 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:

https://www.dropbox.com/sh/jktldt8q674i87l/AADqk1zoUEekCjDR_4ic2Tg0a?dl=0

5.3 How to change the LoRa Frequency Bands/Region?

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

5.4 Can I connect 3rd party flow sensor other than the default one?

If a user wants to connect SW3L to a 3rd party flow sensor such as a DN50 flow sensor, that is possible. A flow sensor with pulse output is needed. Below is the notice for the connection:

1. Connect the 3rd party flow meter to the pulse input and GND of SW3L.
2. Make sure the pulse output voltage of 3rd party flow sensor is less than 5v.
3. It is not recommended to use SW3L to power the external flow meter, unless you are sure the external flow sensor is low power (several uA). Otherwise the battery of SW3L will be running out soon.
4. After connection, user needs to set the Calculator Flag and change the payload so to get the correct reading in the platform.

6. Order Info

Part Number: **SW3L-XX-YYY**

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

YYY: Flow Sensor Model:

004: DW-004 Flow Sensor: diameter: G1/2" / DN15. 450 pulse = 1 L

006: DW-006 Flow Sensor: diameter: G3/4" / DN20. 360 pulse = 1 L

010: DW-010 Flow Sensor: diameter: G 1" / DN25. 60 pulse = 1 L

- calculate flag=0: for SW3L-004 Flow Sensor: 450 pulse = 1 L
- calculate flag=1: for SW3L-006 Flow Sensor: 360 pulse = 1 L
- calculate flag=2: for SW3L-010 Flow Sensor: 60 pulse = 1 L

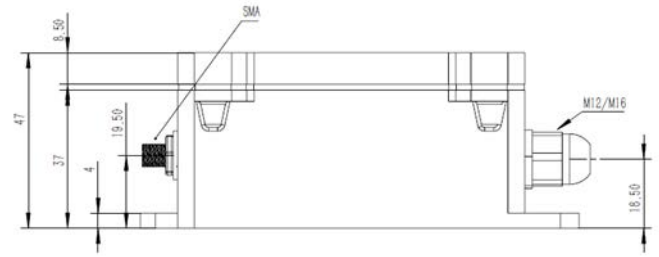
7. Packing Info

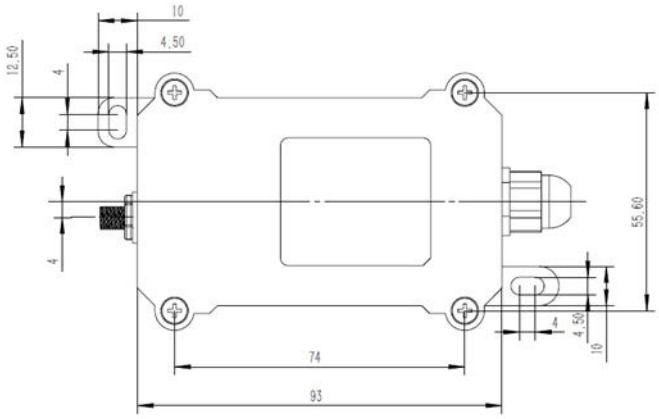
Package Includes:

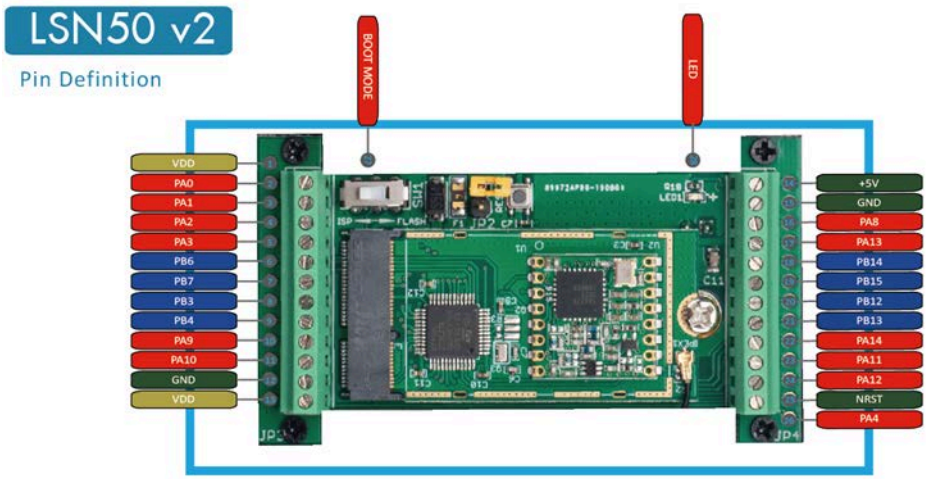
- SW3L Water Flow Sensor x 1

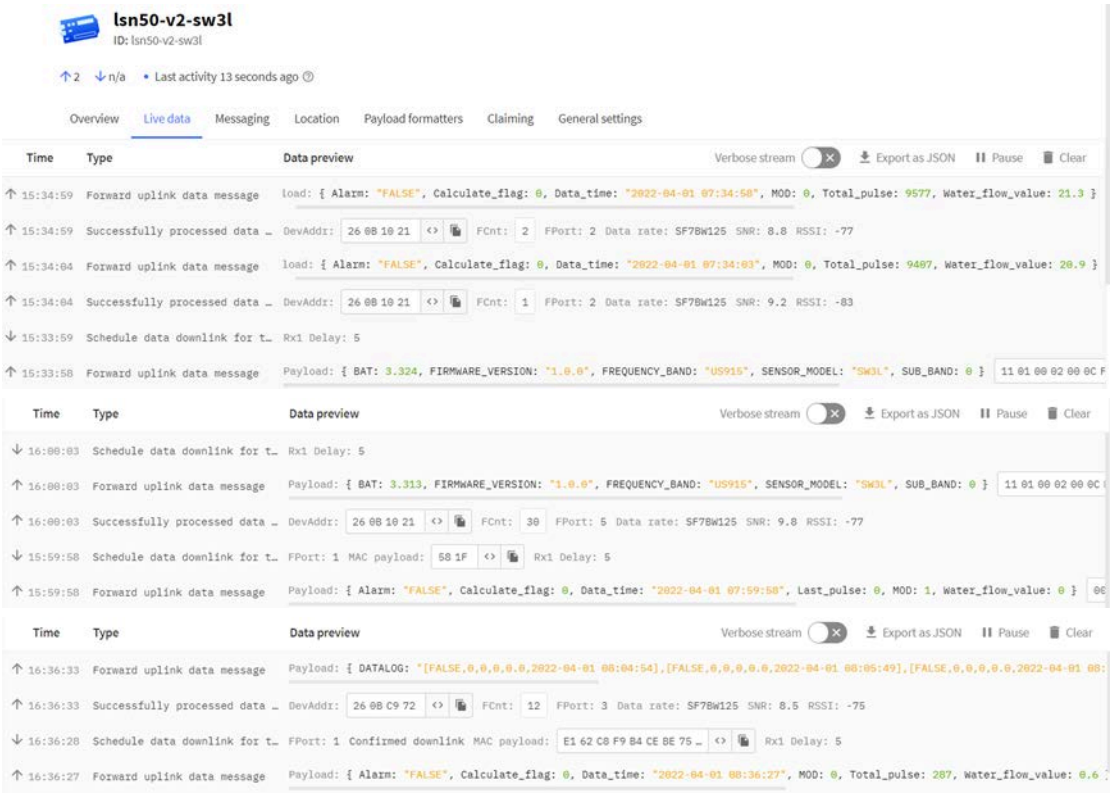
8. Support

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





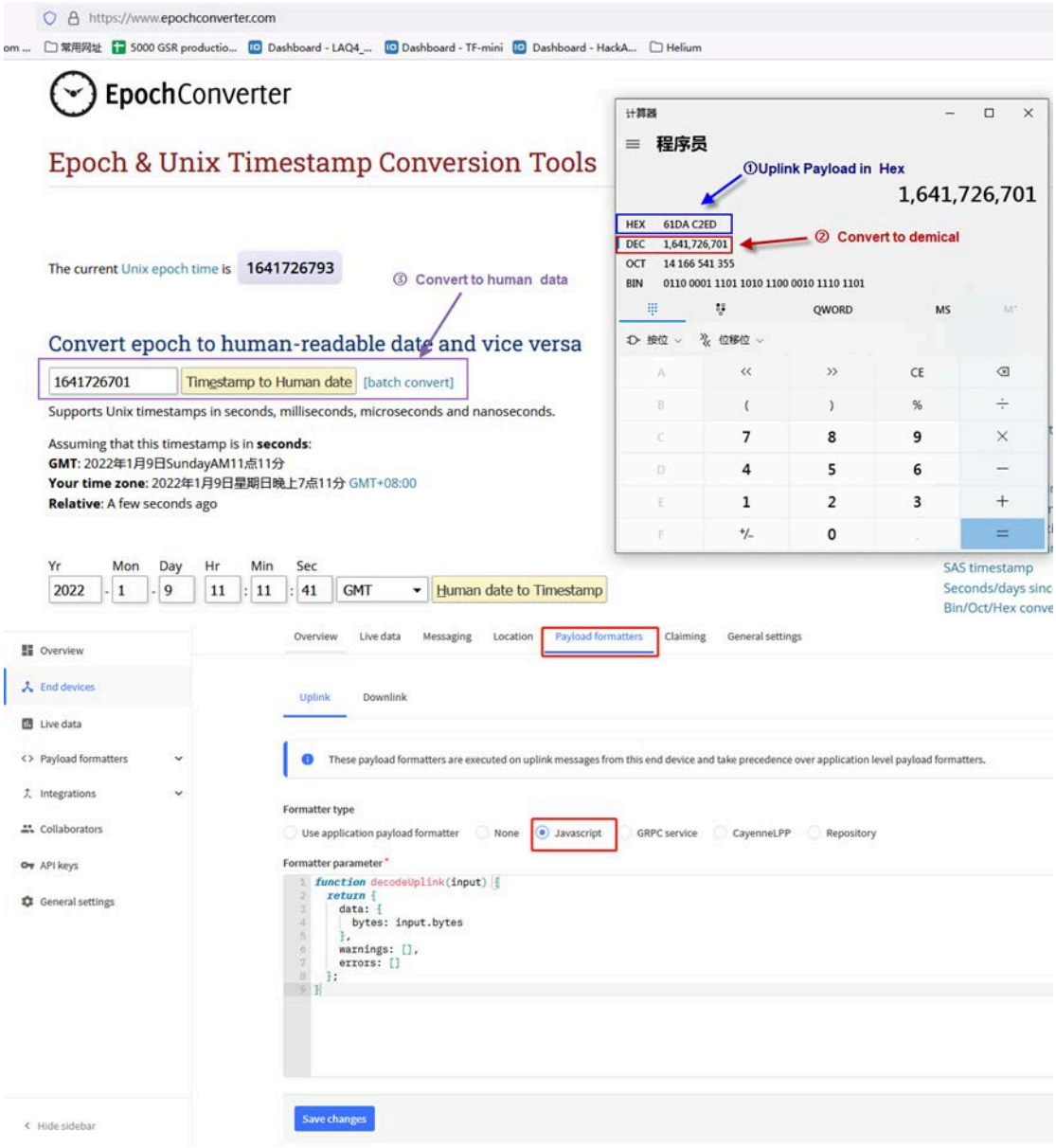




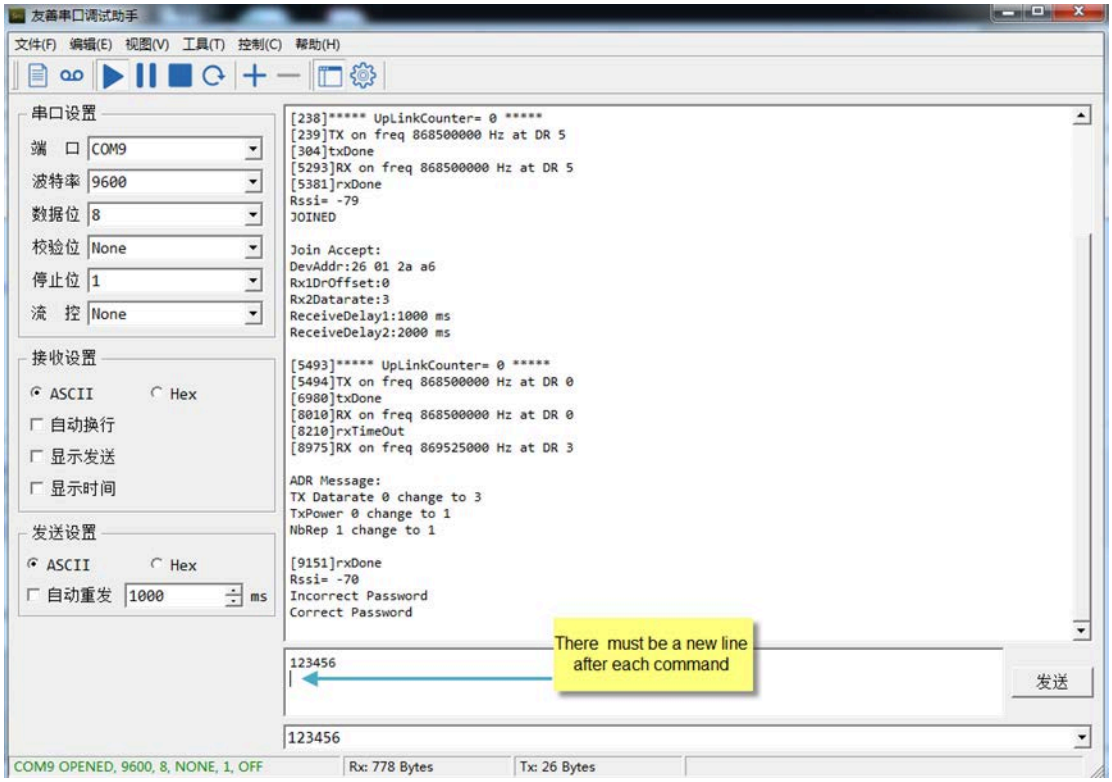

```
AT+PDTA=1,1
Stop Tx events when read sensor data
8016000 22/4/1 08:04:54 bat:3313 mode:0 total_pulse:0 cal_flag:0 water_sum:0.0 alarm:false
8016010 22/4/1 08:05:49 bat:3313 mode:0 total_pulse:0 cal_flag:0 water_sum:0.0 alarm:false
8016020 22/4/1 08:06:49 bat:3316 mode:0 total_pulse:0 cal_flag:0 water_sum:0.0 alarm:false
8016030 22/4/1 08:07:49 bat:3316 mode:0 total_pulse:0 cal_flag:0 water_sum:0.0 alarm:false
8016040 22/4/1 08:08:49 bat:3313 mode:0 total_pulse:277 cal_flag:0 water_sum:0.6 alarm:false
8016050 22/4/1 08:10:38 bat:3313 mode:0 total_pulse:287 cal_flag:0 water_sum:0.6 alarm:false
8016060
8016070

Start Tx events

OK
```

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

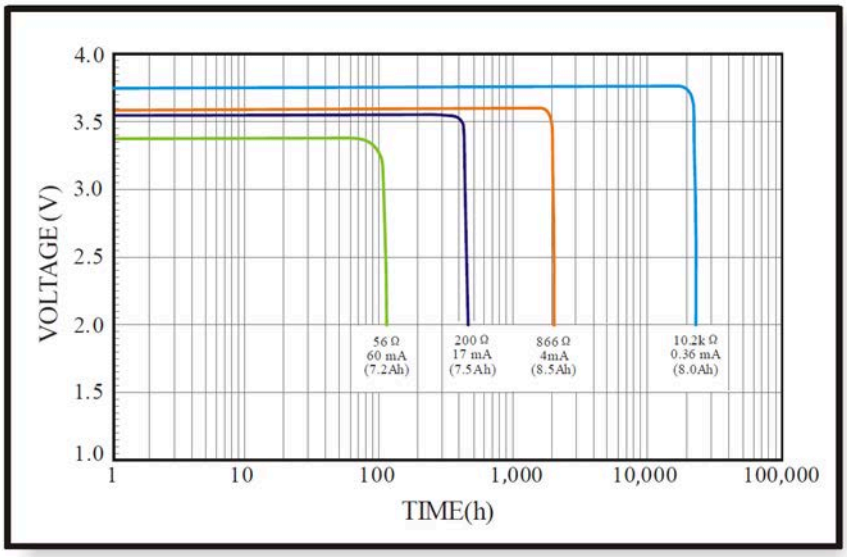
Figure 10 : DeviceTimeAns payload format


https://www.epochconverter.com
EpochConverter
Epoch & Unix Timestamp Conversion Tools
The current Unix epoch time is 1641726793
③ Convert to human data
Convert epoch to human-readable date and vice versa
1641726701
Timestamp to Human date
[batch convert]
Supports Unix timestamps in seconds, milliseconds, microseconds and nanoseconds.
Assuming that this timestamp is in seconds:
GMT: 2022年1月9日SundayAM11点11分
Your time zone: 2022年1月9日星期日晚上7点11分 GMT+08:00
Relative: A few seconds ago
Yr Mon Day Hr Min Sec
2022 1 9 11 11 41 GMT
Human date to Timestamp
计算器
程序员
①Uplink Payload in Hex
1,641,726,701
HEX 61DA C2ED
DEC 1,641,726,701
② Convert to demical
OCT 14 166 541 355
BIN 0110 0001 1101 1010 1100 0010 1110 1101
QWORD
MS
SAS timestamp
Seconds/days sinc
Bin/Oct/Hex conve
Overview
End devices
Live data
Payload formatters
Integrations
Collaborators
API keys
General settings
Hide sidebar
Overview
Live data
Messaging
Location
Payload formatters
Claiming
General settings
Uplink
Downlink
These payload formatters are executed on uplink messages from this end device and take precedence over application level payload formatters.
Formatter type
Use application payload formatter
None
Javascript
GRPC service
CayenneLPP
Repository
Formatter parameter
function decodeUplink(input) {
return {
data: {
bytes: input.bytes
},
warnings: [],
errors: []
};
}
Save changes

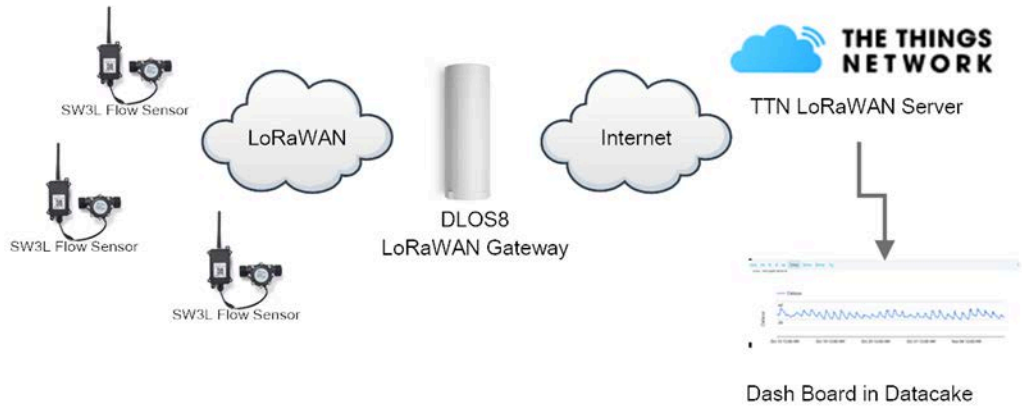
LSN50 v2
in Definition
BOOT MODE
VDD
PA0
PA1
PA2
PA3
PB6
PB7
PB3
PB4
PA9
PA10
GND
VDD
USB TTL to LSE01 Connection
TXD <---- >PA3
RXD <----> PA2
GND <----> GND
SW1 switch to:
1)ISP for program via TTL
2)flash for firmware running

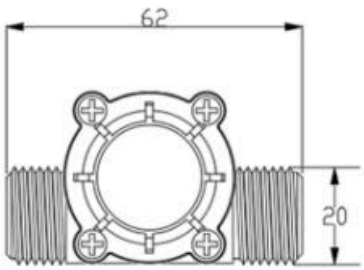

友善串口调试助手
文件(F) 编辑(E) 视图(V) 工具(T) 控制(C) 帮助(H)
串口设置
端 口 COM9
波特率 9600
数据位 8
校验位 None
停止位 1
流 控 None
接收设置
ASCII Hex
自动换行
显示发送
显示时间
发送设置
ASCII Hex
自动重发 1000 ms
[238]***** UpLinkCounter= 0 *****
[239]TX on freq 868500000 Hz at DR 5
[304]txDone
[5293]RX on freq 868500000 Hz at DR 5
[5381]rxDone
Rssi= -79
JOINED
Join Accept:
DevAddr:26 01 2a a6
Rx1DrOffset:0
Rx2Datarate:3
ReceiveDelay1:1000 ms
ReceiveDelay2:2000 ms
[5493]***** UpLinkCounter= 0 *****
[5494]TX on freq 868500000 Hz at DR 0
[6980]txDone
[8010]RX on freq 868500000 Hz at DR 0
[8210]rxTimeOut
[8975]RX on freq 869525000 Hz at DR 3
ADR Message:
TX Datarate 0 change to 3
TxPower 0 change to 1
NbRep 1 change to 1
[9151]rxDone
Rssi= -70
Incorrect Password
Correct Password
123456
There must be a new line after each command
发送
123456
COM9 OPENED, 9600, 8, NONE, 1, OFF
Rx: 778 Bytes
Tx: 26 Bytes

1. Typical discharge profile at +20℃(Typical value)

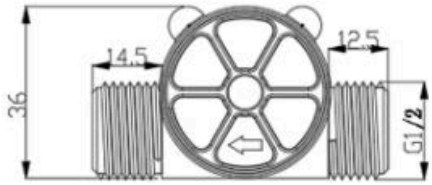


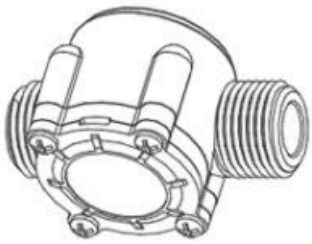
Use SW3L in TTN and Datacake

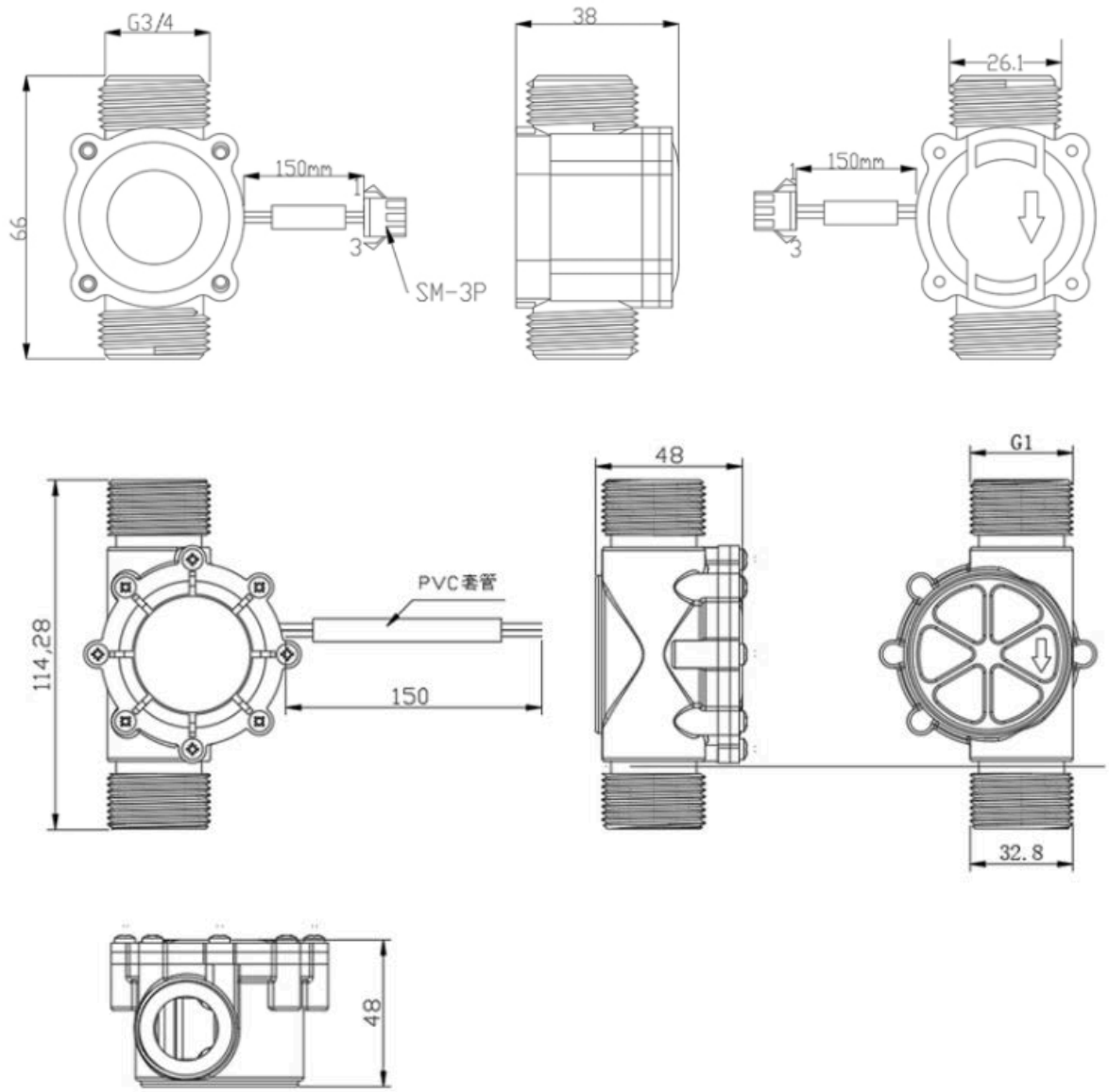


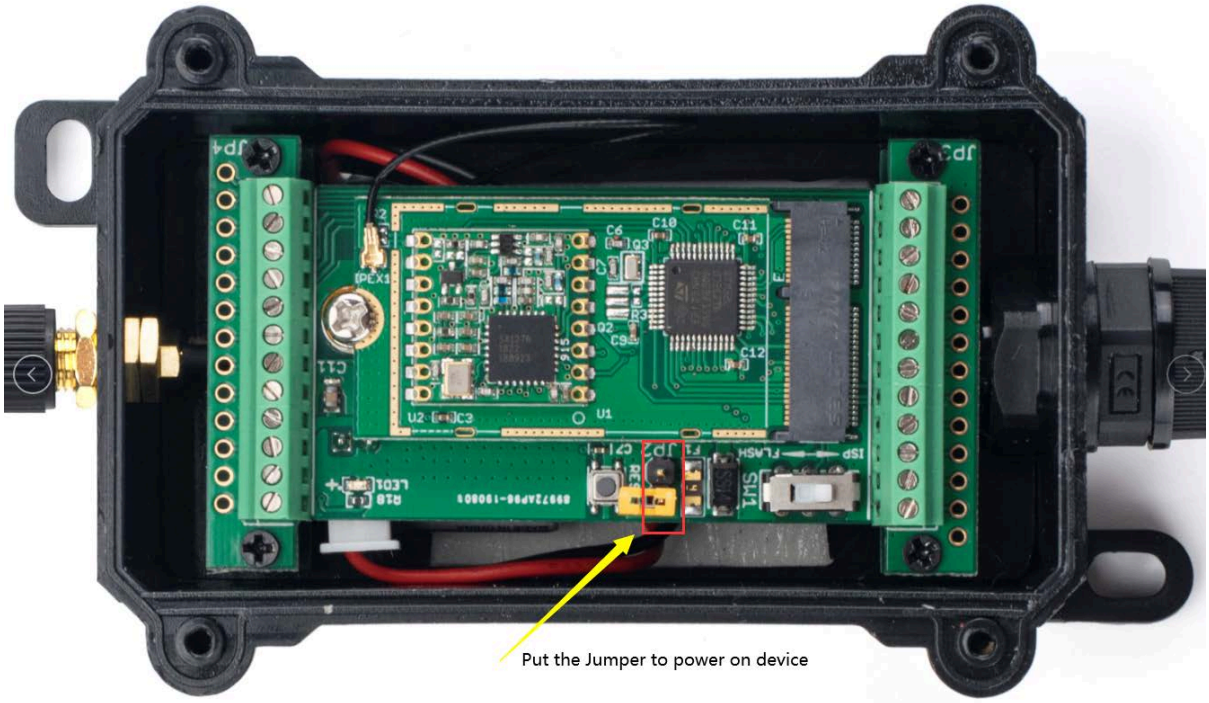

62
20

35.99


36
14.5
12.5
G1/2




G3/4
66
150mm
1
3
SM-3P
38
26.1
150mm
1
3
114.28
PVC套管
150
48
G1
32.8
48



Time	Type	Data preview
15:59:03	Forward uplink data message	Payload: { Alarm_Timer: 1, Stop_Timer: 15, TDC: 60 } 00 00 3C FF 0F 00 01 FF FPort: 4 Data rate: SF7BW125 SNR: 8.2 RSSI
15:59:03	Successfully processed data …	DevAddr: 26 0B 10 21 FCnt: 28 FPort: 4 Data rate: SF7BW125 SNR: 8.2 RSSI: -82
15:58:58	Schedule data downlink for t…	FPort: 1 MAC payload: 9F 58 Rx1 Delay: 5
15:58:58	Forward uplink data message	Payload: { Alarm: "FALSE", Calculate_flag: 0, Data_time: "2022-04-01 07:58:58", Last_pulse: 0, MOD: 1, Water_flow_value: 0 } 00

lsn50-v2-sw3l
ID: lsn50-v2-sw3l

↑4 ↓n/a • Last activity 21 seconds ago

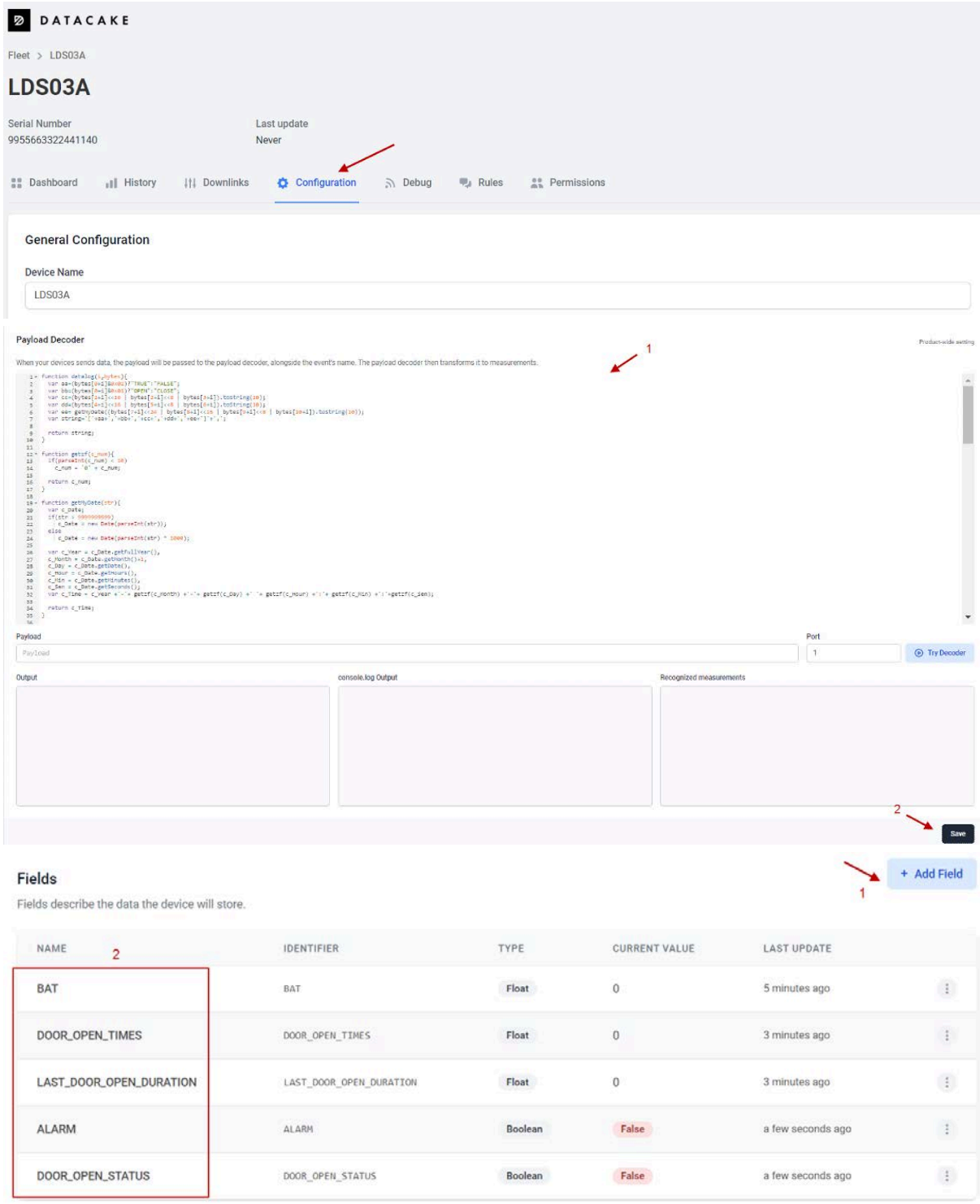
Overview | Live data | Messaging | Location | Payload formatters | Claiming | General settings

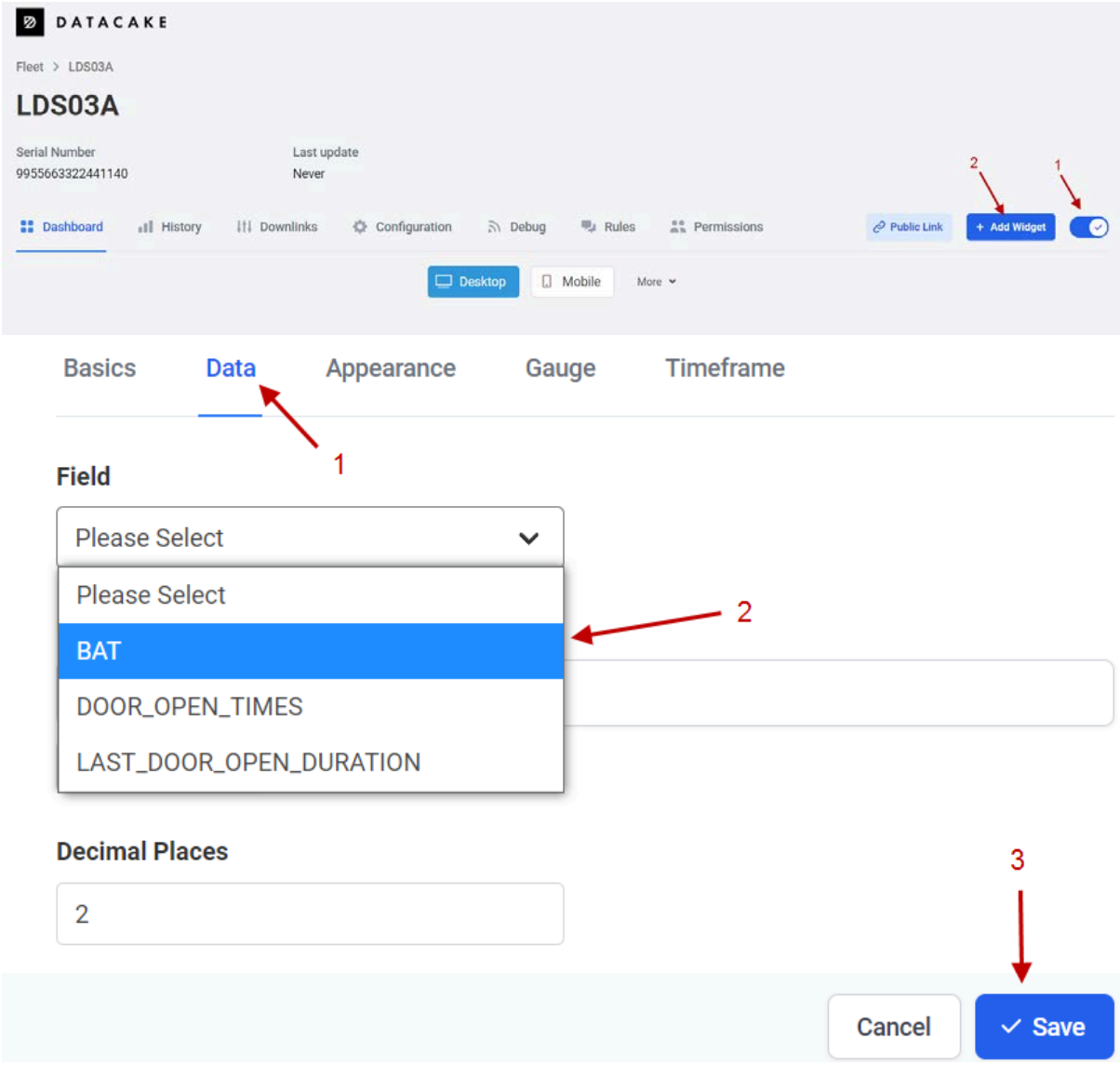
Time	Type	Data preview
15:36:58	Forward uplink data message	yload: { Alarm: "FALSE", Calculate_flag: 0, Data_time: "2022-04-01 07:36:58", MOD: 0, Total_pulse: 9597, Water_flow_value: 21.3 }
15:36:58	Successfully processed data …	DevAddr: 26 0B 10 21 FCnt: 4 FPort: 2 Data rate: SF7BW125 SNR: 9.2 RSSI: -77
15:35:58	Forward uplink data message	load: { Alarm: "FALSE", Calculate_flag: 0, Data_time: "2022-04-01 07:35:58", MOD: 0, Total_pulse: 9577, Water_flow_value: 21.3 }
15:35:58	Successfully processed data …	DevAddr: 26 0B 10 21 FCnt: 3 FPort: 2 Data rate: SF7BW125 SNR: 6.5 RSSI: -85
15:34:59	Forward uplink data message	load: { Alarm: "FALSE", Calculate_flag: 0, Data_time: "2022-04-01 07:34:58", MOD: 0, Total_pulse: 9577, Water_flow_value: 21.3 }
15:34:59	Successfully processed data …	DevAddr: 26 0B 10 21 FCnt: 2 FPort: 2 Data rate: SF7BW125 SNR: 8.8 RSSI: -77
15:34:04	Forward uplink data message	load: { Alarm: "FALSE", Calculate_flag: 0, Data_time: "2022-04-01 07:34:03", MOD: 0, Total_pulse: 9407, Water_flow_value: 20.9 }

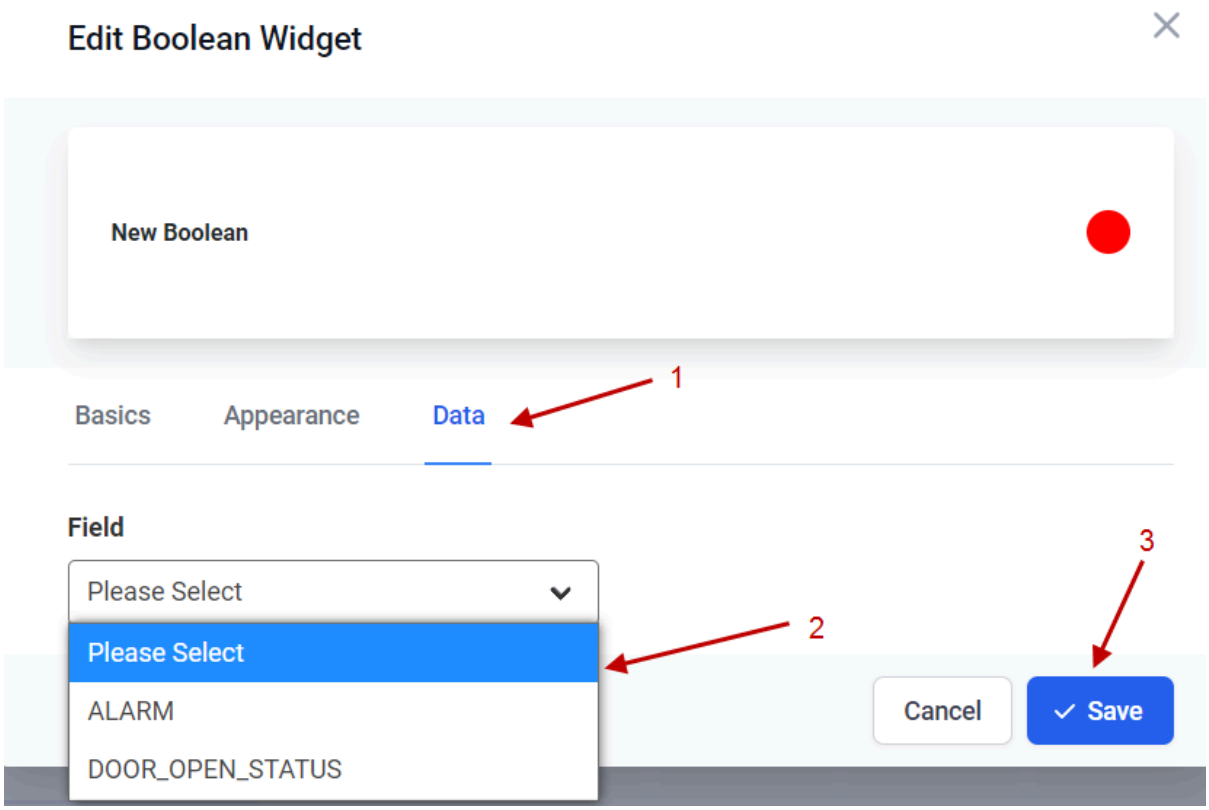
Time	Type	Data preview
15:45:22	Schedule data downlink for t…	Rx1 Delay: 5
15:45:22	Forward uplink data message	Payload: { Alarm: "TRUE", Calculate_flag: 0, Data_time: "2022-04-01 07:45:21", Last_pulse: 14, MOD: 1, Water_flow_value: 0 } 02

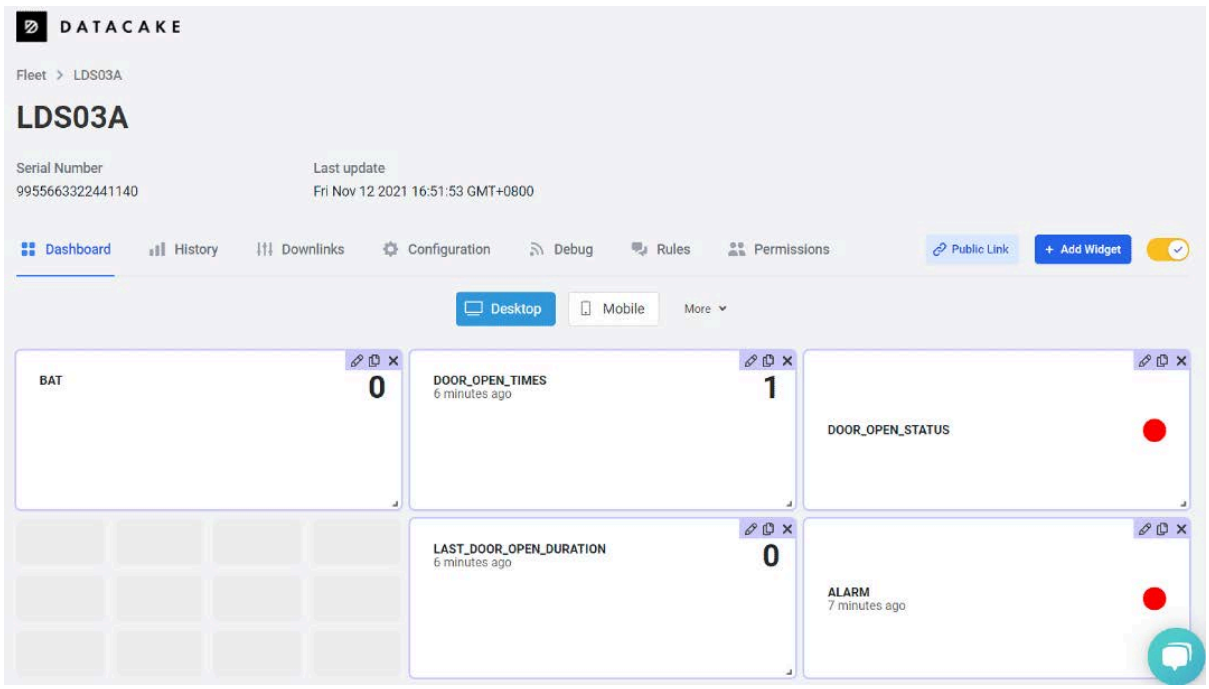
Time	Type	Data preview
15:37:58	Forward uplink data message	load: { Alarm: "FALSE", Calculate_flag: 0, Data_time: "2022-04-01 07:37:58", MOD: 0, Total_pulse: 9597, Water_flow_value: 21.3 }

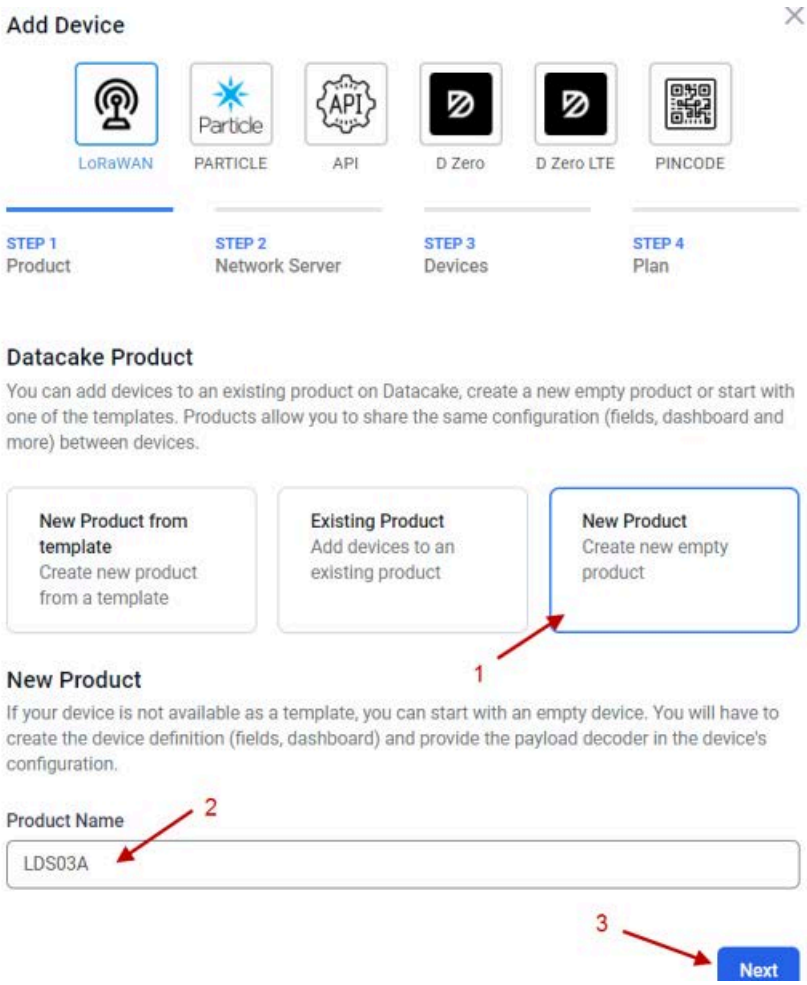
Time	Type	Data preview
15:41:58	Forward uplink data message	Payload: { Alarm: "FALSE", Calculate_flag: 0, Data_time: "2022-04-01 07:41:58", Last_pulse: 79, MOD: 1, Water_flow_value: 0.2 }

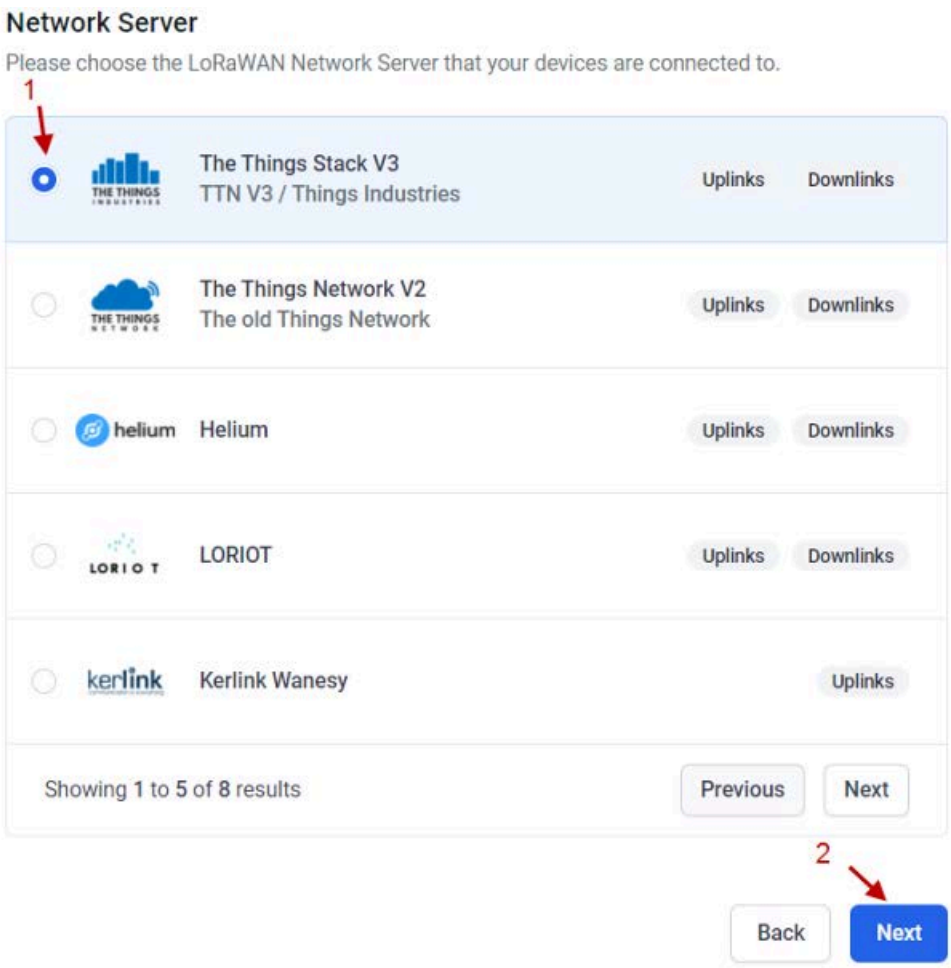

DATACAKE
Fleet > LDS03A
LDS03A
Serial Number
995566332244114O
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
General Configuration
Device Name
LDS03A
Payload Decoder
When your devices sends data, the payload will be passed to the payload decoder, alongside the event's 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.
1
+ Add Field
NAME
2
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

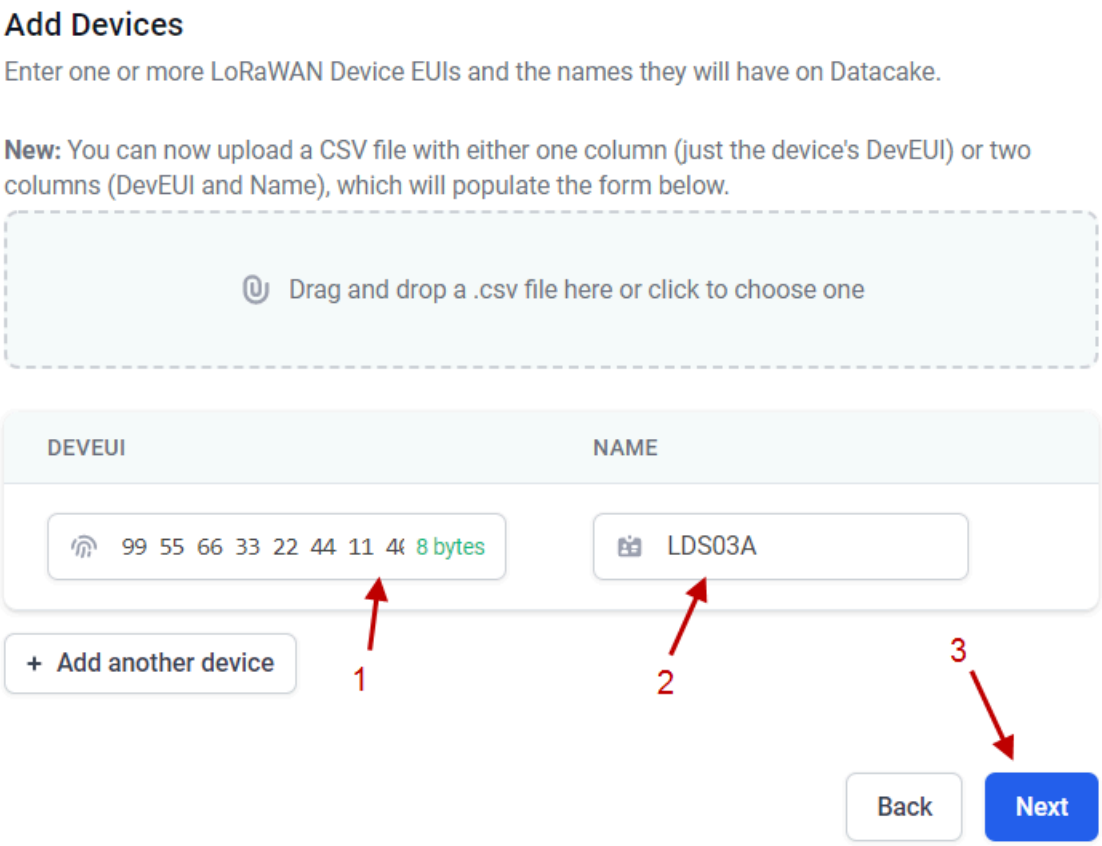

DATACAKE
Fleet > LDS03A
LDS03A
Serial Number
9955663322441140
Last update
Never
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
Public Link
+ Add Widget
Desktop
Mobile
More
2
1
Basics
Data
Appearance
Gauge
Timeframe
1
Field
Please Select
Please Select
BAT
DOOR_OPEN_TIMES
LAST_DOOR_OPEN_DURATION
2
Decimal Places
2
3
Cancel
Save

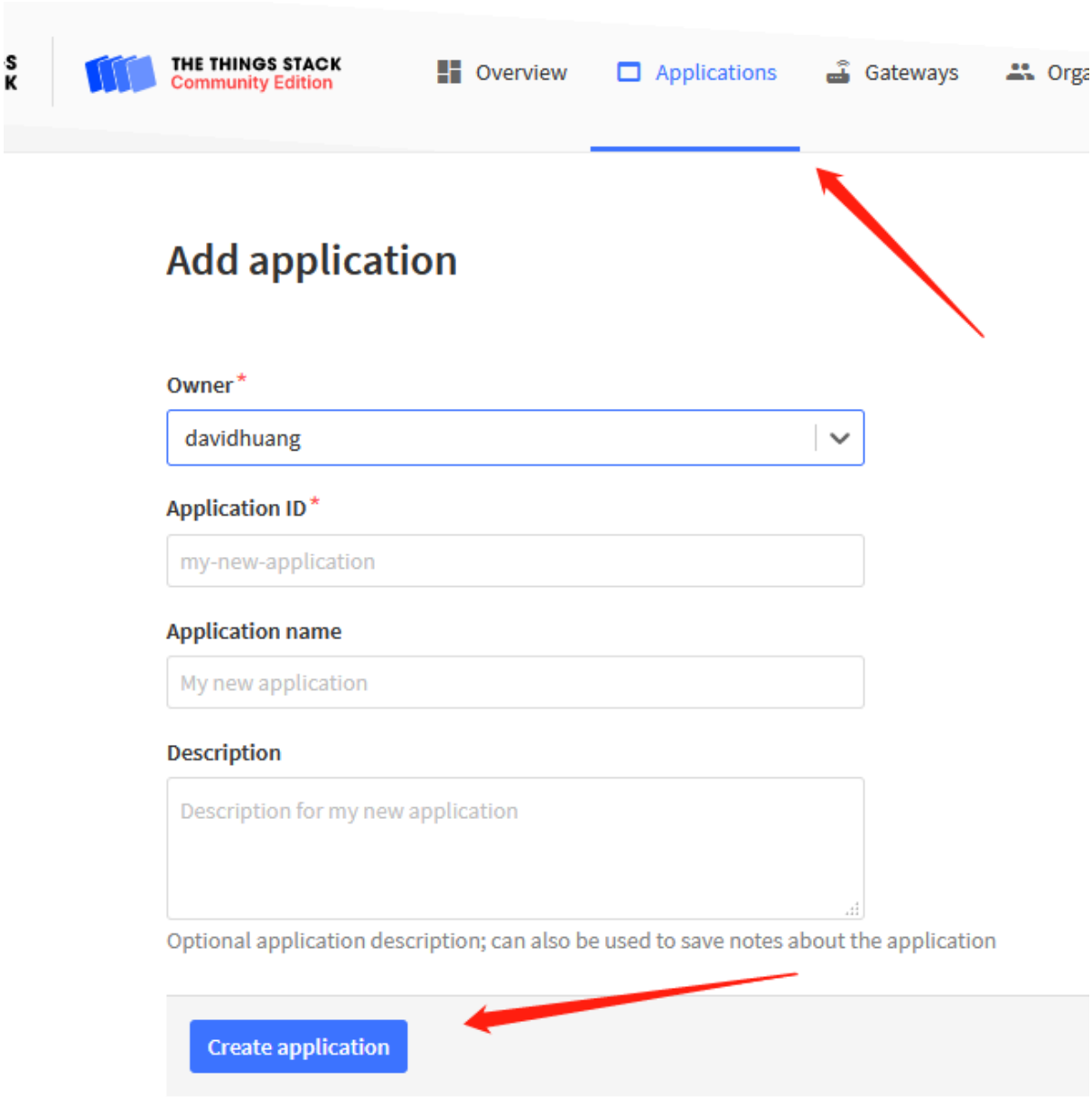

Edit Boolean Widget
New Boolean
Basics
Appearance
Data
1
Field
Please Select
Please Select
ALARM
DOOR_OPEN_STATUS
2
3
Cancel
Save

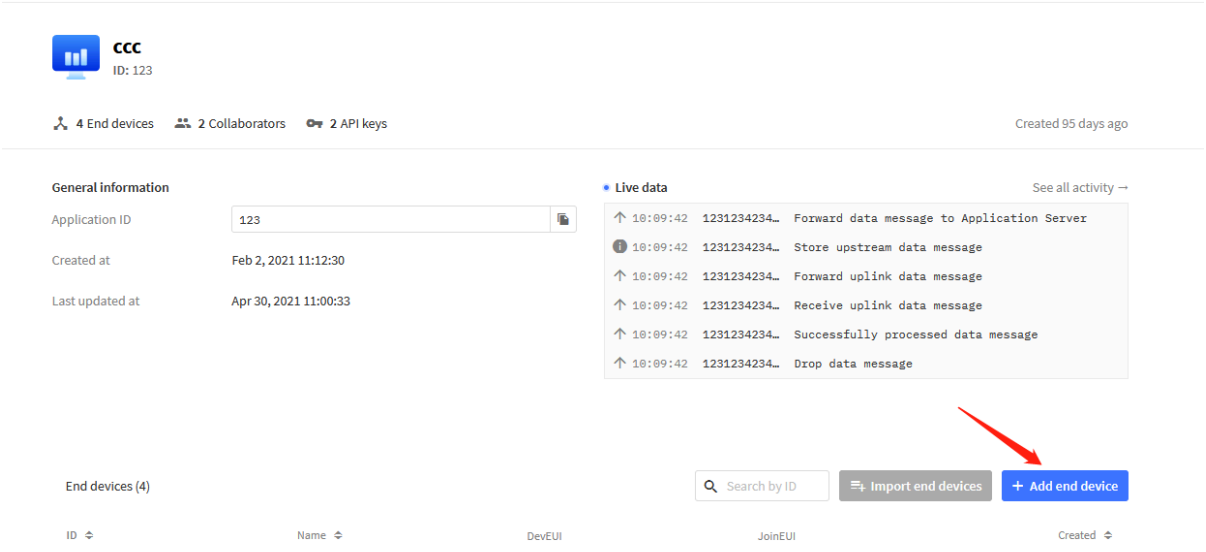

DATACAKE
Fleet > LDS03A
LDS03A
Serial Number
995566322441140
Last update
Fri Nov 12 2021 16:51:53 GMT+0800
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
Public Link
+ Add Widget
Desktop
Mobile
More
BAT
0
DOOR_OPEN_TIMES
6 minutes ago
1
DOOR_OPEN_STATUS
LAST_DOOR_OPEN_DURATION
6 minutes ago
0
ALARM
7 minutes ago

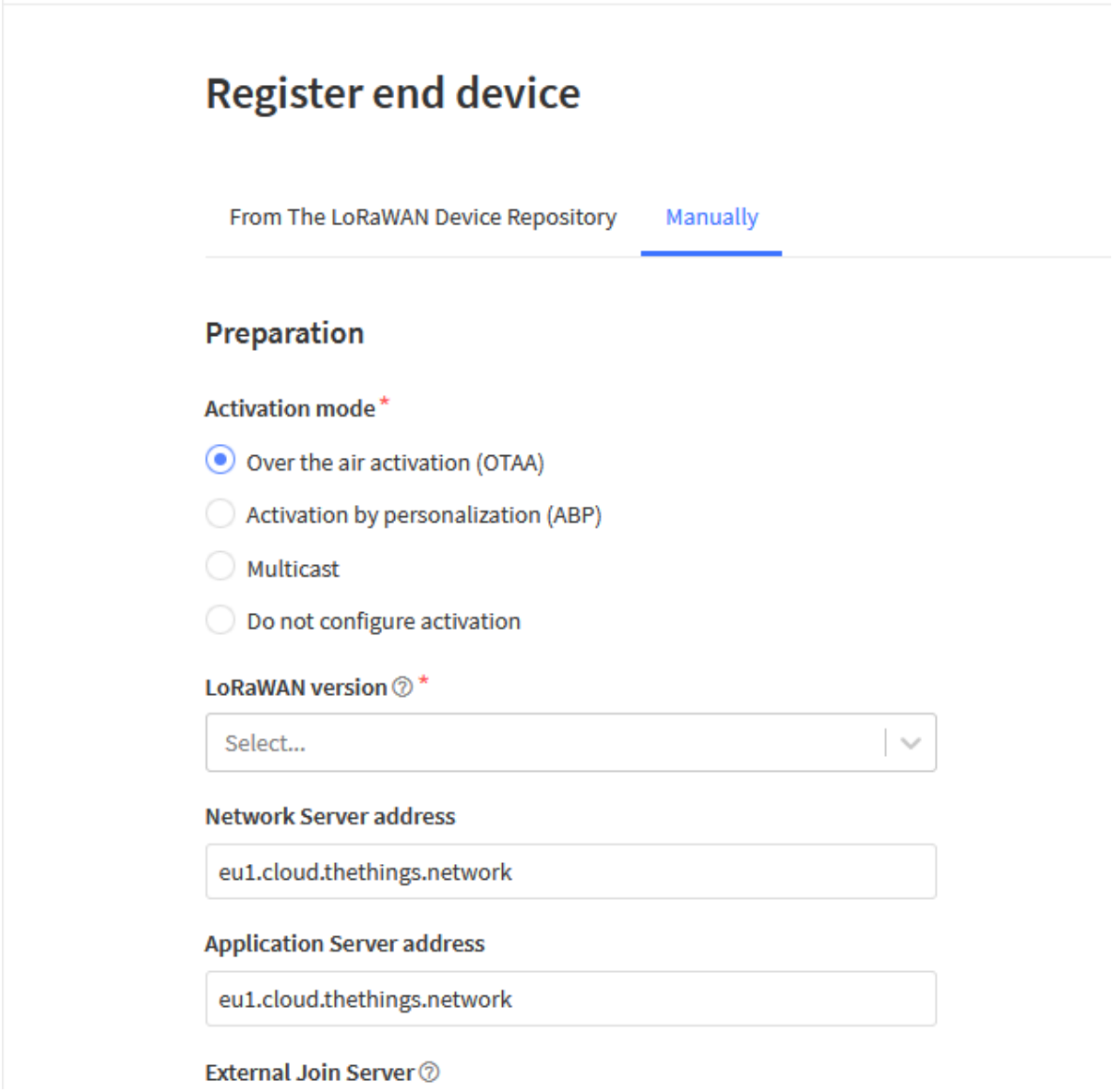

Add Device
LoRaWAN
PARTICLE
API
D Zero
D Zero LTE
PINCODE
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Datacake Product
You can add devices to an existing product on Datacake, create a new empty product or start with one of the templates. Products allow you to share the same configuration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

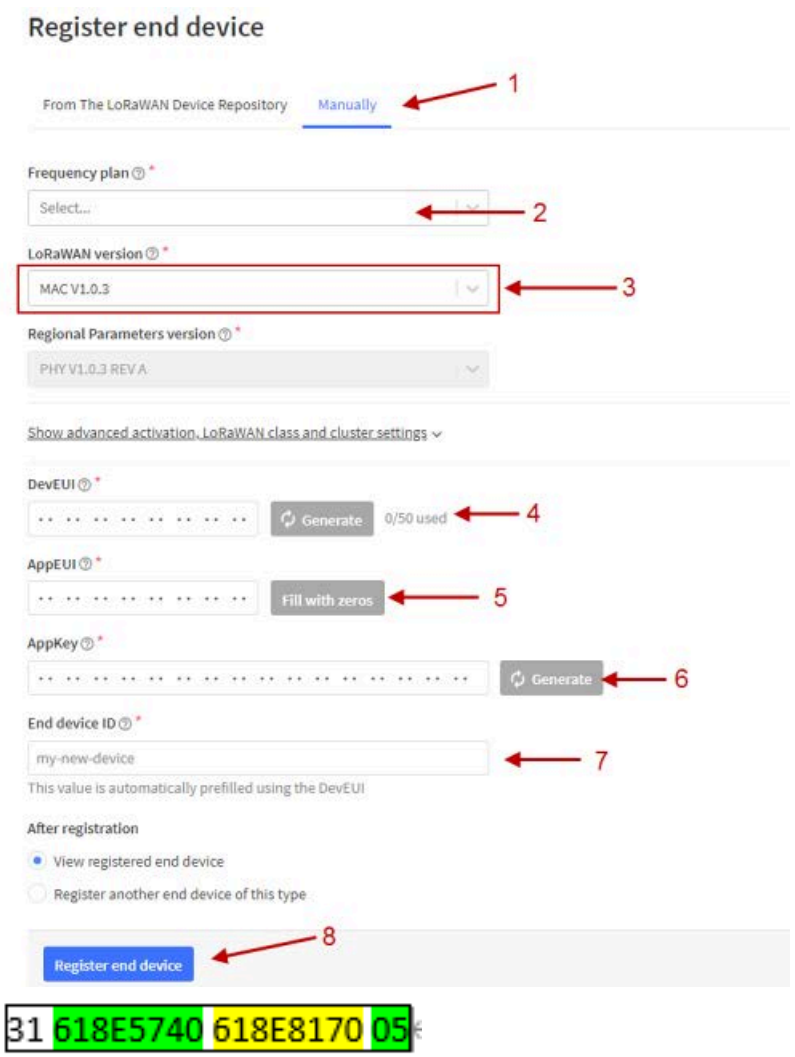

Network Server
Please choose the LoRaWAN Network Server that your devices are connected to.
1
The Things Stack V3
TTN V3 / Things Industries
Uplinks
Downlinks
The Things Network V2
The old Things Network
Uplinks
Downlinks
helium
Helium
Uplinks
Downlinks
LORIOT
Uplinks
Downlinks
kerlink
Kerlink Wanesy
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


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
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


Register end device
From The LoRaWAN Device Repository
Manually
1
Frequency plan *
Select...
2
LoRaWAN version *
MAC V1.0.3
3
Regional Parameters version *
PHY V1.0.3 REV A
Show advanced activation, LoRaWAN class and cluster settings
DevEUI *
Generate
0/50 used
4
AppEUI *
Fill with zeros
5
AppKey *
Generate
6
End device ID *
my-new-device
7
This value is automatically prefilled using the DevEUI
After registration
View registered end device
Register another end device of this type
8
Register end device

31 618E5740 618E8170 05

JST-XH-2P
connector

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

Sensor Configuration FPORT=4					
Size (bytes)	3	1	1	2	1
Value	TDC (unit: sec)	N/A	Stop Timer	Alarm Timer	Reserve

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

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

Yellow: 3.3v Output
Black: Pulse Input
Red: GND

LoRaWAN Sensor Node
Yellow: 3.3v Output
Black: Pulse Input
Red: GND