AIS01-LB -- LoRaWAN AI Image End Node User Manual

Last modified by Karry Zhuang (/xwiki/bin/view/XWiki/karry) on 2024/10/16 15:02

(https://wiki.dragino.com/xwiki/bin/d
LB--LoRaWAN_AI_Image_End_No
width=412&height=534&rev=1.1)

Table of Contents:

1. Introduction

1.1 What is AIS01-LB

AIS01-LB is a **LoRaWAN AI Image End Node**. AIS01-LB has a **camera and AI processor** in the probe. It can take photo , analyze the photo to get digital reading and se Network.

AIS01-LB is pre-trained to support **image recognized of water meter, gas meter and power meter**. It can be trained to support more image recognized for different app

AIS01-LB can send the digital reading after recognized and it can also send the original photo via LoRaWAN as well.

AIS01-LB is fully compatible with LoRaWAN v1.0.3 protocol, it can work with standard LoRaWAN gateway.

1.2 Features

- LoRaWAN v1.0.3 Class A protocol.
- Low power consumption
- AI Image Sensor.
- Send image to IoT server
- Recognize digits from Image and send data to IoT server
- Trained for common reading for Water Meter, Gas Meter, Power Meter
- Frequency Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915
- Support Interrupt uplink
- Support Bluetooth v5.1 and LoRaWAN remote configure

- Support wireless OTA update firmware
- AT Commands to change parameters
- Uplink on periodically
- Downlink to change configure
- 8500mAh Li/SOCI2 Battery

1.3 Specification

Common DC Characteristics:

- Supply Voltage: Built-in Battery , 2.5v ~ 3.6v
- Operating Temperature: -40 ~ 85°C

Camera:

- Mono: black & white
- Angle: 110°
- Image size：64kb
- Image resolution：640x480
- Power Consumption: 206.1mW
- Supply Voltage: DC5V
- Idel Mode: 6uA
- Take Photo: 41.22 mA and 3171 ms
- Cable Length：150cm
- Dimension：46.2x29x13.8 mm

I/O Interface:

- Battery output (2.6v ~ 3.6v depends on battery)
- +5v controllable output
- 3 x Interrupt or Digital IN/OUT pins
- 3 x one-wire interfaces
- 1 x UART Interface
- 1 x I2C Interface

LoRa Spec:

- Frequency Range, Band 1 (HF): 862 ~ 1020 Mhz
- Max +22 dBm constant RF output vs.
- RX sensitivity: down to -139 dBm.
- Excellent blocking immunity

Battery:

- Li/SOCI2 un-chargeable battery
- Capacity: 8500mAh
- Self-Discharge: <1% / Year @ 25°C
- Max continuously current: 130mA
- Max boost current: 2A, 1 second

Power Consumption:

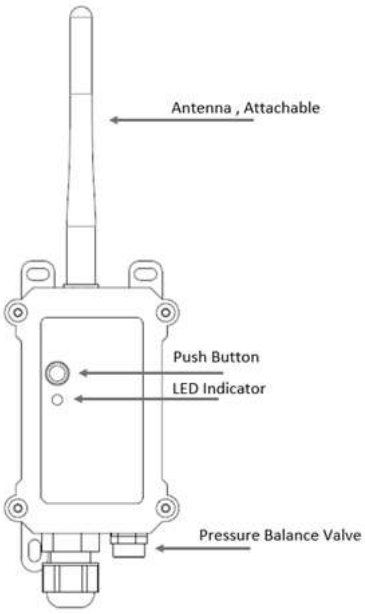
- Sleep Mode: 5uA @ 3.3v
- LoRa Transmit Mode: 125mA @ 20dBm, 82mA @ 14dBm

1.4 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 periodi
IDLE mode, sensor has the same power consumption as Deep Sleep mode.

1.5 Button & LEDs



Behavior on ACT	Function	Action
Pressing ACT 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. Meanwhile, BLE module will be active and user can connect via BLE to configure device.
Pressing ACT 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. Once sensor is active, BLE module will be active and user can connect via BLE to configure device, no matter if device join or not join LoRaWAN network.
Fast press ACT 5 times.	Deactivate Device	**Red led** will solid on for 5 seconds. Means device is in Deep Sleep Mode.

1.6 BLE connection

AIS01-LB supports BLE remote configure.

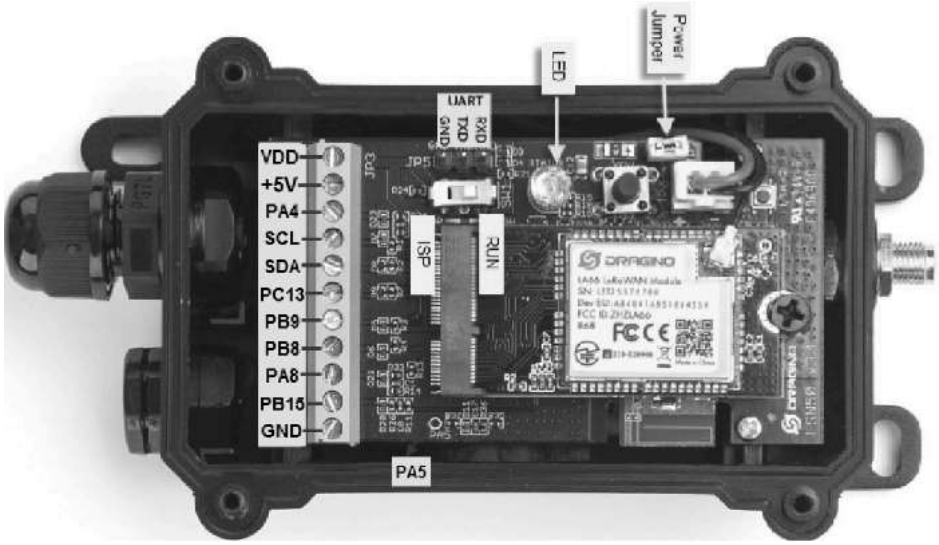
BLE can be used to configure the parameter of sensor or see the console output from sensor. BLE will be only activate on below case:

- Press button to send an uplink
- Press button to active device.
- Device Power on or reset.

If there is no activity connection on BLE in 60 seconds, sensor will shut down BLE module to enter low power mode.

1.7 Pin Definitions

AIS01-LB use the mother board which as below.



1.7.1 Jumper JP2

Power on Device when put this jumper.

1.7.2 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.

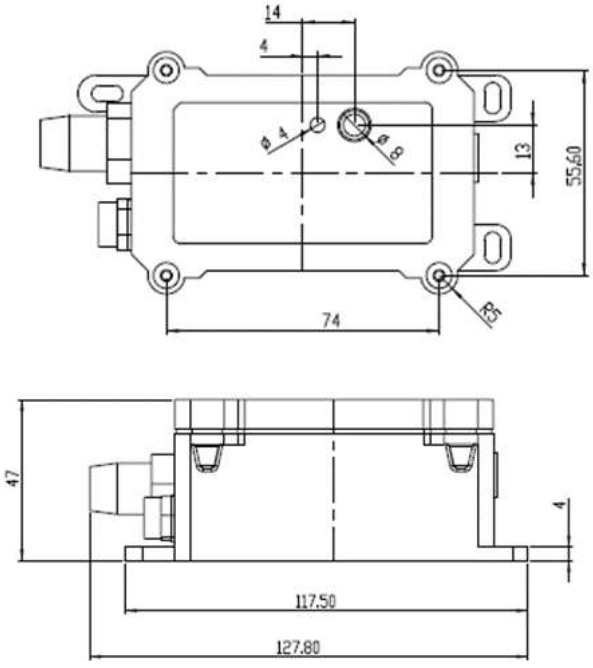
2) Flash: work mode, device starts to work and send out console output for further debug

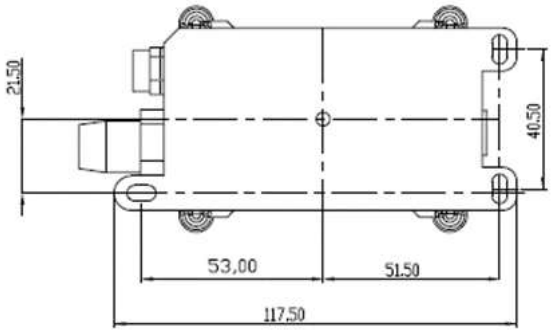
1.7.3 Reset Button

Press to reboot the device.

1.8 Mechanical

1.8.1 for LB version





2. Configure AIS01-LB to connect to LoRaWAN network

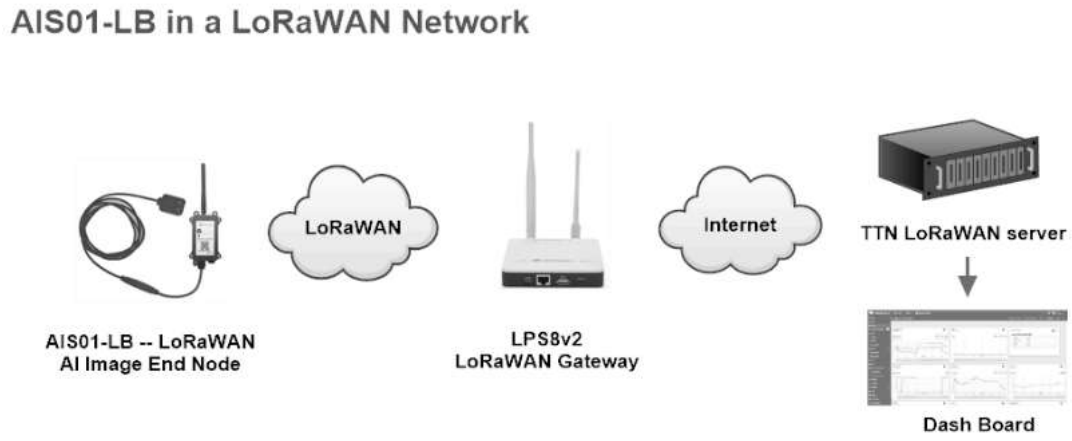
2.1 How it works

The AIS01-LB 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 LoRaWAN IoT server and press the button to activate the AIS01-LB. It will automatically join the network via OTAA and start to send the sensor value. The default uplink i

2.2 Quick guide to connect to LoRaWAN server (OTAA)

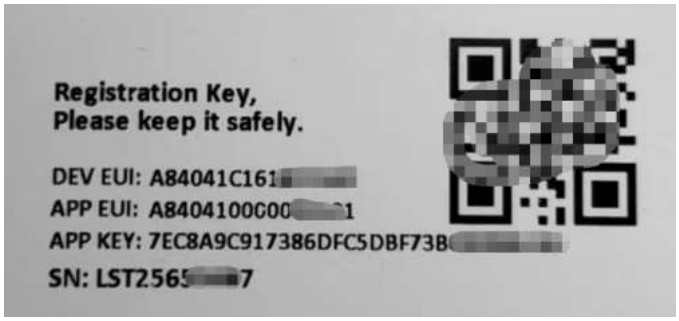
Following is an example for how to join the TTN v3 LoRaWAN Network (https://console.cloud.thethings.network/) . Below is the network structure; we use the LPS8v2 (h lorawan-gateway/item/228-lps8v2.html) as a LoRaWAN gateway in this example.

The LPS8v2 is already set to connected to TTN network (https://console.cloud.thethings.network/) , so what we need to now is configure the TTN server.



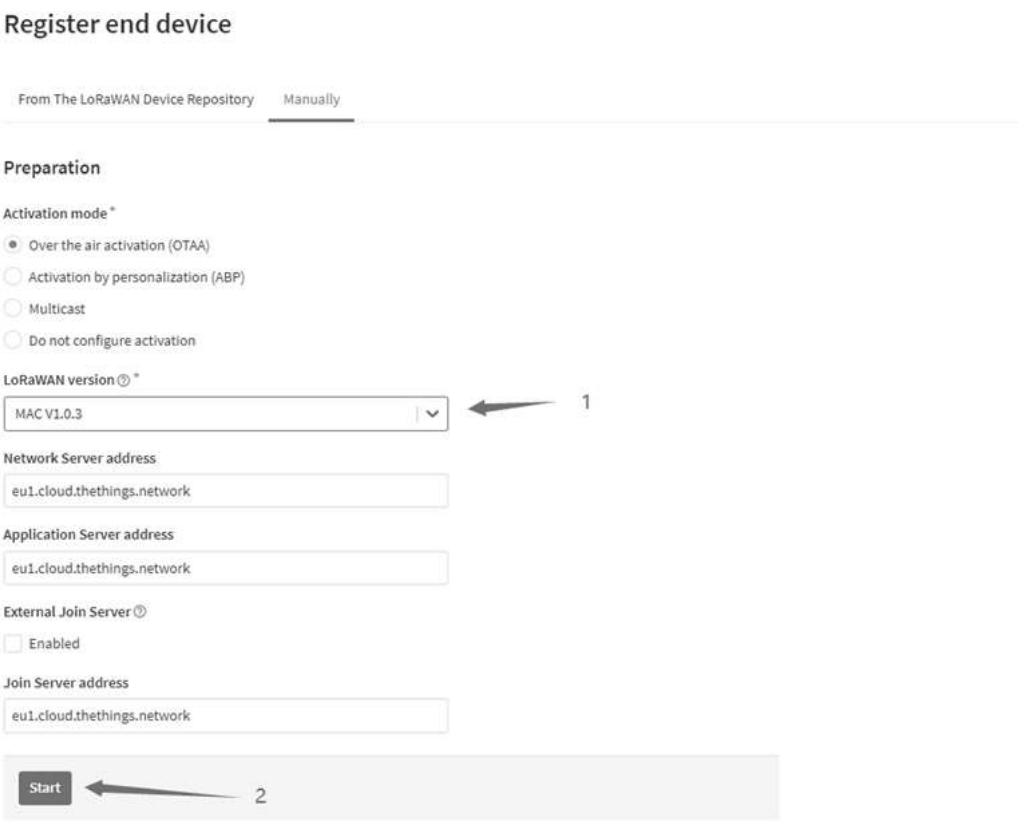
Step 1: Create a device in TTN with the OTAA keys from AIS01-LB.

Each AIS01-LB is shipped with a sticker with the default device EUI as below:

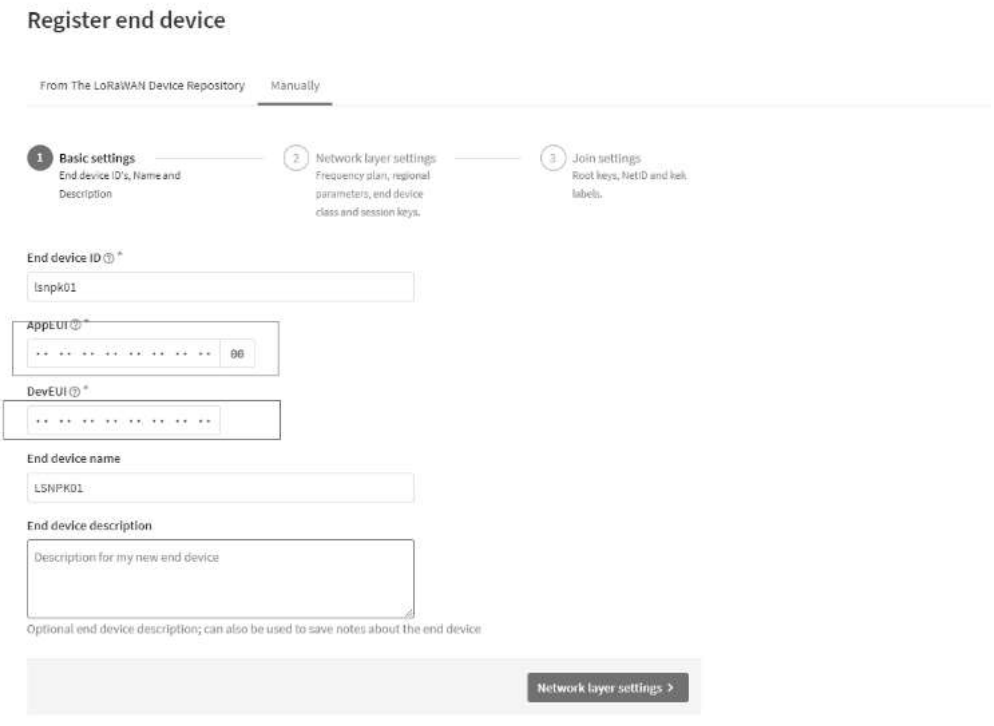


You can enter this key in the LoRaWAN Server portal. Below is TTN screen shot:

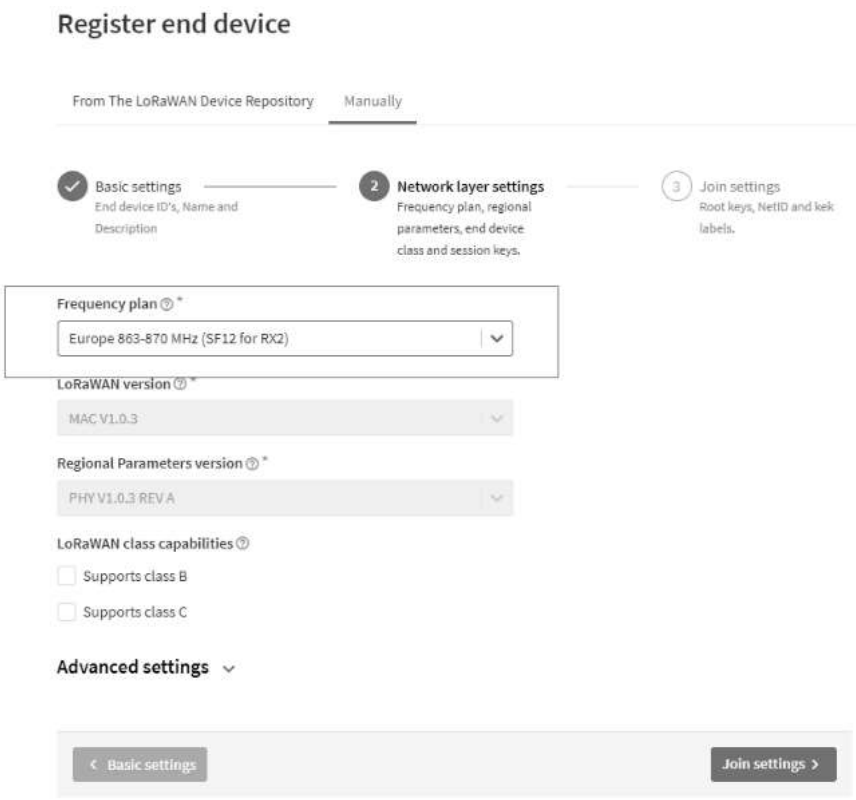
Register the device



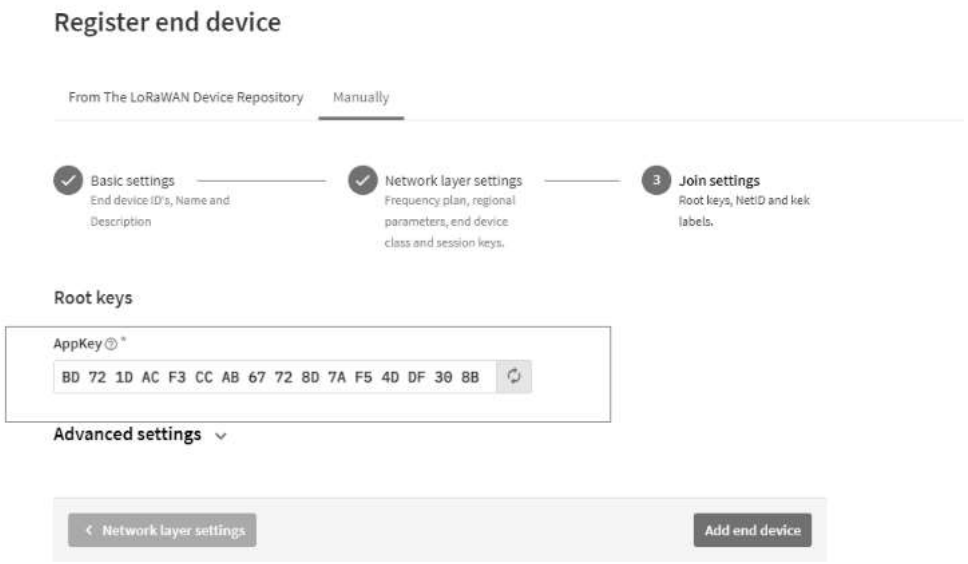
Add APP EUI and DEV EUI



Add APP EUI in the application



Add APP KEY



Step 2: Activate AIS01-LB

Press the button for 5 seconds to activate the AIS01-LB.

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 j

After join success, it will start to upload messages to TTN and you can see the messages in the panel.

2.3 Uplink Payload

2.3.1 Device Status, FPORT=5

Users can use the downlink command(**0x26 01**) to ask AIS01-LB to send device configure detail, include device configure status. AIS01-LB will uplink a payload via FPort

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 TTNv3

Sensor Model: For AIS01-LB, this value is 0x1C

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 Timing upload the identified number and time FPORT=2

The uplink payload includes totally 14 bytes. Uplink packets use FPORT=2 and **every 20 minutes** send one uplink by default.

Size(bytes)	**2**	**4**	**4**	**4**	**1**
Value	BAT	SysTimeCurrent	Integer	Decimal	Detection mark

Payload Example(FPort=2):**0E 1C 66 B5 C1 B0 00 00 7A 15 00 06 BF 6F 01**

2.3.2.1 BAT- Battery information

These two bytes of BAT include the battery state and the actual voltage.

Ex: 0x0E1C = 3612mV

2.3.2.2 SysTime Current

These four bytes contain the year, month, day, hour, minute, and second of the time.

AI Sensor use Unix TimeStamp format based on:

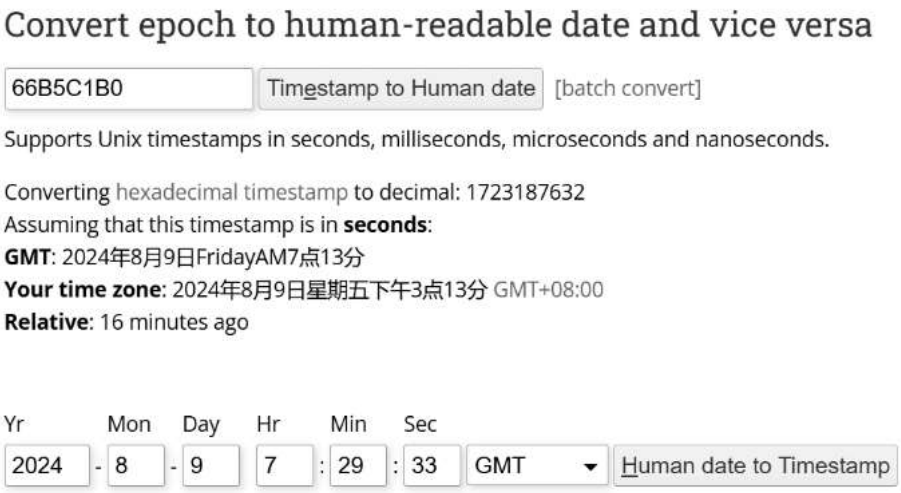
Size (bytes)	4	1
DeviceTimeAns Payload	32-bit unsigned integer : Seconds since epoch*	8bits unsigned integer: fractional-second in ½^8 second steps

Figure 10 : DeviceTimeAns payload format

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

Below is the converter example.

Ex: 66B5C1B0=2024-08-09 07:13:52



So, we can use AT+TIMESTAMP=1723187632 or downlink 66B5C1B0 to set the current time 2024 – August -- 9 Friday 07:13:52

2.3.2.3 Integer

These four bytes display the integers in the digital wheel face.

Read table integer: 0x00007A15=31253

2.3.2.4 Decimal

These four bytes display decimals on the digital wheel.

Read table decimals: 0x0006VF6F/1000000= 0.442223

2.3.2.4 Detection mark

The last byte indicates the camera detection flag. 01 indicates that the camera is connected, and 00 indicates that the camera is not connected.

2.3.3 Image upload function FPORT=3

Size(bytes)	**4**	**2**	**1**	**1**	**200**
Value	SysTimeCurrent	BAT	total_packets	packet number	Image_data

Because Image is very big , around 3K Bytes per image. To send an image, the AIS01-LB has to use highest DR which support more than 210 bytes for each uplink. AIS0 periodically, server can send a downlink command **0x0B 01** to AIS01-LB. When AIS01 get this command , it will starts sending the picture data packets. Each Image will b need to combine these packets together to get the final Image.

Example of the first payload(FPort=3):

663095C00BBE1000FFD8FFE000104A46494600010101004800480000FFDB0043001B12141714111B1716171E1C1B2028422B28252528513A3D3042605565645F55

B586909EA3ABADAB6780BCC9BAA6C799A8ABA4FFDB0043011C1E1E2823284E2B2B4EA46E5D6EA4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4

A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4FFC0000B0800F0014001012200FFC4001F00000105010101010101000000000000000001020304050607

2.3.3.1 SysTime Current

These four bytes contain the year, month, day, hour, minute, and second of the time.

AI Sensor use 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

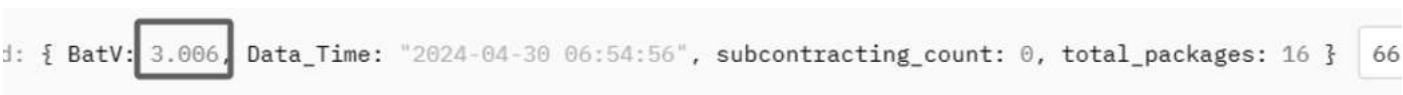
Users can get this time from the link: https://www.epochconverter.com/ (https://www.epochconverter.com/) :

Below is the converter example

EX: 663095C0=2024-04-30 06:54:57.

2.3.3.2 BAT- Battery information

These two bytes of BAT include the battery state and the actual voltage.



Ex: 0X0BBE= 3006 mv

2.3.3.3 total packets

This byte represents the total number of packets for the image.

2.3.3.4 Packet Number

This byte represents the packet position number of the image packet retrieved. Start from 0.

2.3.3.5 Image data

Apart from the eight bytes mentioned above, the next 200 bytes are all image data.

Example: Payload:
663095C00BBE1000FFD8FFE000104A46494600010101004800480000FFDB0043001B12141714111B1716171E1C1B2028422B28252528513A3D3042605565645F55

85B586909EA3ABADAB6780BCC9BAA6C799A8ABA4FFDB0043011C1E1E2823284E2B2B4EA46E5D6EA4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A

A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4FFC0000B0800F0014001012200FFC4001F0000010501010101010100000000000000000102030405060

Image data=FFD8FFE000104A46494600010101004800480000FFDB0043001B12141714111B1716171E1C1B2028422B28252528513A3D3042605565645F555D5B6A7

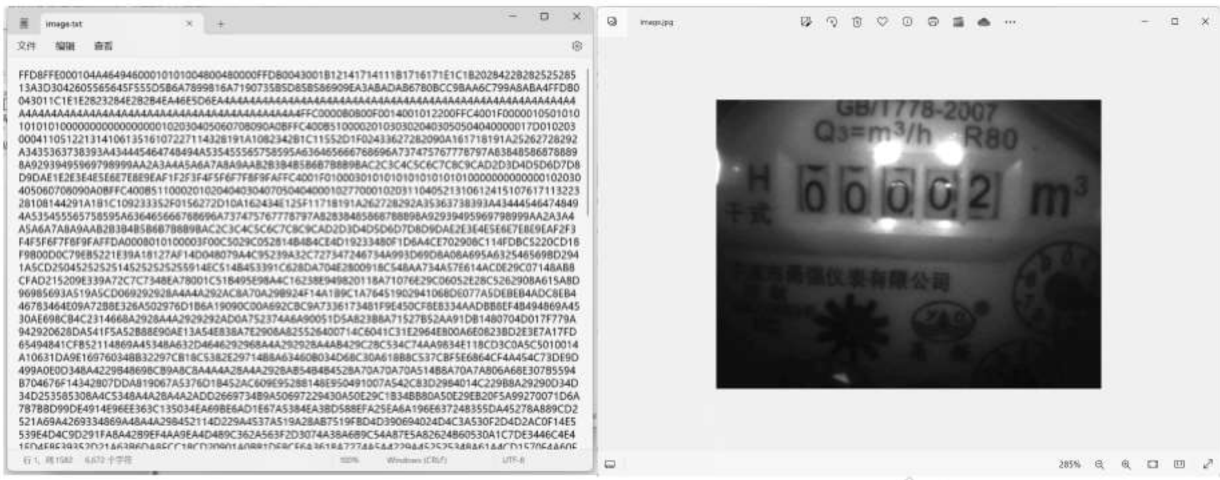
6909EA3ABADAB6780BCC9BAA6C799A8ABA4FFDB0043011C1E1E2823284E2B2B4EA46E5D6EA4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4

A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4A4FFC0000B0800F0014001012200FFC4001F0000010501010101010100000000000000000102030405060

2.3.3.6 Combined image

Combine each data packet obtained from the platform (note: the first 8 bytes of each data packet need to be deleted before combining)
Then use winhex software to convert to get the image, specific tutorial: Combined image (http://8.211.40.43:8080/xwiki/bin/view/Main/AI%20Image%20Sensor%20Calibra

Below is the text of the integrated data and the image of the converted data:



2.3.4 Clock logging function FPORT=4

Size(bytes)	2	4	4	4	4	4	4	......
Value	BAT	SysTimeCurrent	Integer	Decimal	SysTimeCurrent	Integer	Decimal	

FPORT 4 is somewhat similar to FPORT 2 in that how many packets you will receive depends on your CLOCKLOG Settings.

For example:
The AT + CLOCKLOG = 1,65535,1,5
AT+TDC=30000
Five minutes after AIS01-LB is connected to the network, You will receive a payload containing a battery, five times and five meter readings corresponding to the time.

Example: Payload:

0A8C 663C66C6 02000000 3CAE0100 663C65D6 02000000 7A0F0200 663C6612 02000000 3CAE0100 663C664E 02000000 3CAE0100 663C668A 02000000 3CAE0

2.3.4.1 BAT- Battery information

These two bytes of BAT include the battery state and the actual voltage.

Ex: 0x0A8C= 2700 mv

2.3.4.2 SysTime Current

Because this is data from five different times being combined together, it needs to be distinguished.

Ex:

0x663C66C6E="2024-05-09 06:01:42",

0x663C65D6= "2024-05-09 05:57:42",

0x663C6612="2024-05-09 05:58:42",

0x663C664E="2024-05-09 05:59:42",

0x663C668A="2024-05-09 06:00:42"

2.3.4.3 Integer

The five data points of Integer are: 02 00 00 00

Notice that the packet order is reversed here.

Ex：0x02000000=0x00000002=2

2.3.4.4 Decimal

Notice that the packet order is reversed here.

Ex:

0x3CAE0100=0x0001AE3C=11014

0x7A0F0200=0x00020F7A=135034

0x3CAE0100=0x0001AE3C=11014

0x3CAE0100=0x0001AE3C=11014

0x3CAE0100=0x0001AE3C=11014

2.3.5 Datalog FPORT=6

After turning on the ACK function, AIS01-LB will store every piece of data. When AIS01-LB is unable to upload data to the platform at the set time due to network fluctuatic the collected data into flash. When AIS01-LB joins the network, the data will be packaged and sent to the platform.

Size(bytes)	**4**	**4**	**4**	**4**	**4**	**4**	**.....**
Value	SysTimeCurrent	Integer	Decimal	SysTimeCurrent	Integer	Decimal	

FPORT 6 is somewhat similar to FPORT 4 with only two bytes less data about the battery.

Example of Device Status: 664809FC000000020006BF6F 66480A38000000020007A120

2.3.5.1 SysTimeCurrent

These four bytes contain the year, month, day, hour, minute, and second of the time.

AI Sensor use Unix TimeStamp format based on.

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

0x66482503="2024-05-18 01:53:00"

0x6648253F="2024-05-18 01:54:00"

2.3.5.2 Integer

The two data points of Integer are: 00000002

Ex: 0x02000000=0x00000002=2

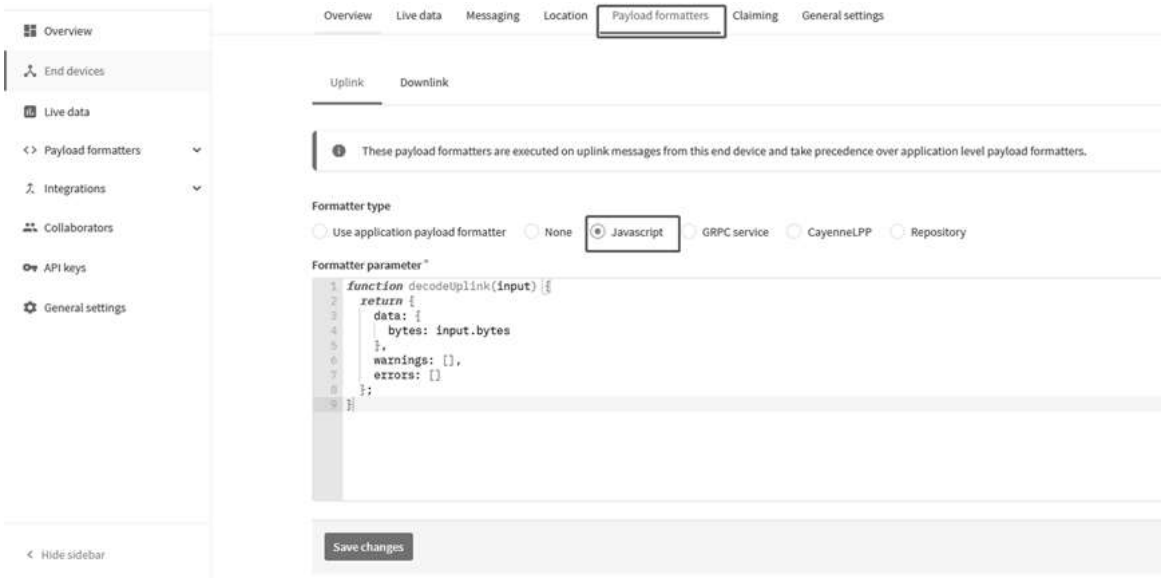
2.3.5.3 Decimal

These four bytes display decimals on the digital wheel.

Read table decimals: 0x0007A120/1000000= 0.5

2.3.6 Decode payload

While using TTN V3 network, you can add the payload format to decode the payload.



The payload decoder function for TTN V3 are here:

AIS01-LB TTN V3 Payload Decoder: https://github.com/dragino/dragino-end-node-decoder (https://github.com/dragino/dragino-end-node-decoder)

2.4 Payload Decoder file

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

In the page **Applications --> Payload Formats --> Custom --> decoder** to add the decoder from:

https://github.com/dragino/dragino-end-node-decoder/blob/main/AIS01/AIS01-LB_TTN_Decoder.txt (https://github.com/dragino/dragino-end-node-decoder/blob/main/AIS(

2.5 Frequency Plans

The AIS01-LB uses OTAA mode and below frequency plans by default. Each frequency band use different firmware, user update the firmware to the corresponding band f

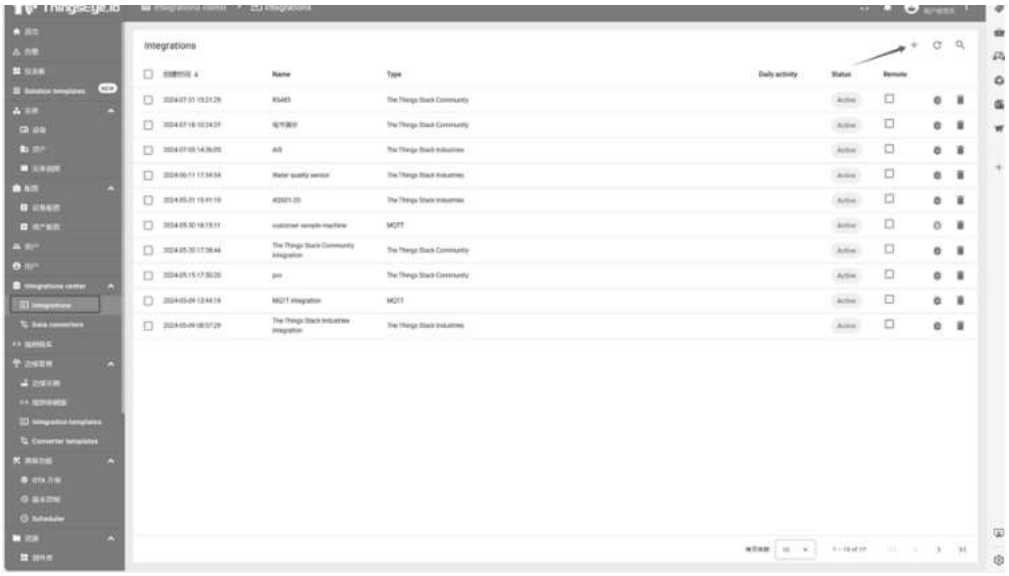
http://wiki.dragino.com/xwiki/bin/view/Main/End%20Device%20Frequency%20Band/ (http://wiki.dragino.com/xwiki/bin/view/Main/End%20Device%20Frequency%20Band/

2.6 ThingsEye Configuration

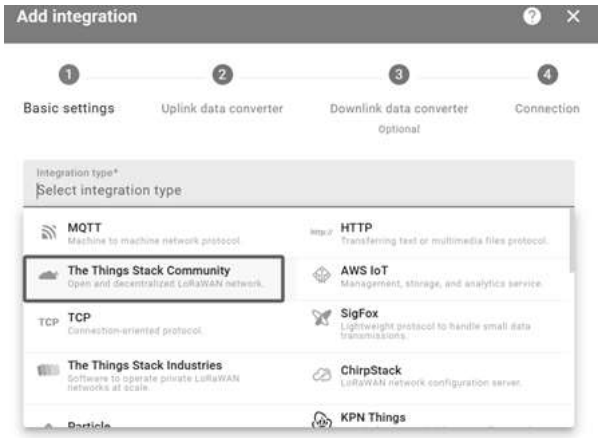
By configuring AIS01-LB on ThingsEye, you can intuitively see the trend of readings and obtain image data to see the real-time data.

Below shows how to Intergrate with ThingsEye with TTN platform to support AIS01-LB.

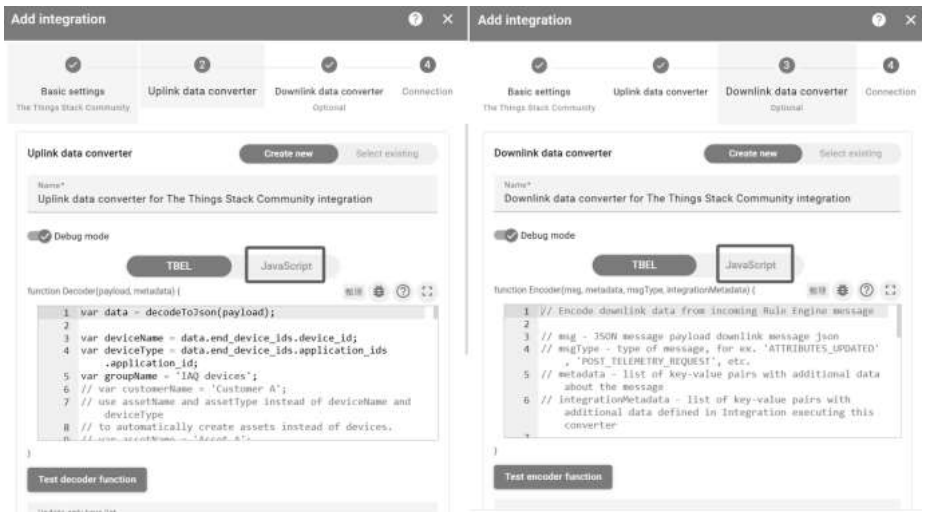
2.6.1 Create new devices in ThingsEye integration



Integration type select **The Things Stack Community**

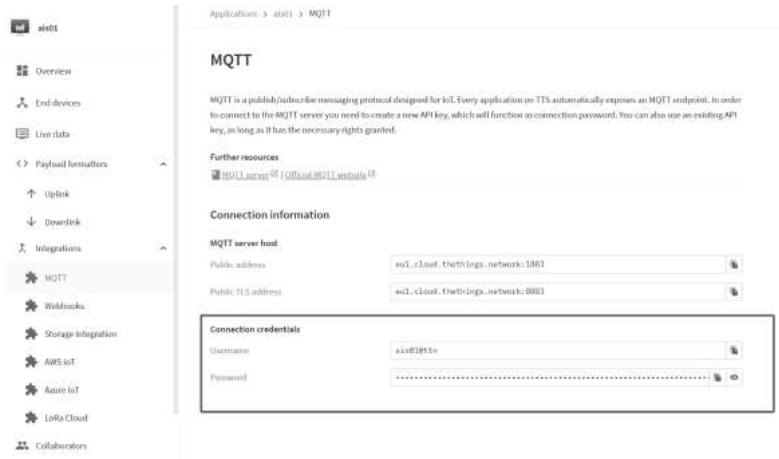


Select JavaScript for Uplink data converter and Downlink data converter, and then fill in the code from the file.Uplink and downlink decoder codes (https://www.dropbox.com/scl/fo/2sg3lt6m1ksi4yfstd6ft/AIWNnOwIYDAsPLITzVkJkY8/thingseye?dl=0&rlkey=msebofkyfozww48iplvov3sv7&subfolder_nav_tracking=1) .



Select JavaScript for Uplink data converter and Downlink data converter, and then fill in the code in the file.

1. Select custom
2. Fill in eu1.cloud.thethings.network
3. Fill in 8883
4. Fill in your TTN- Integrations-MQTT Username and Password

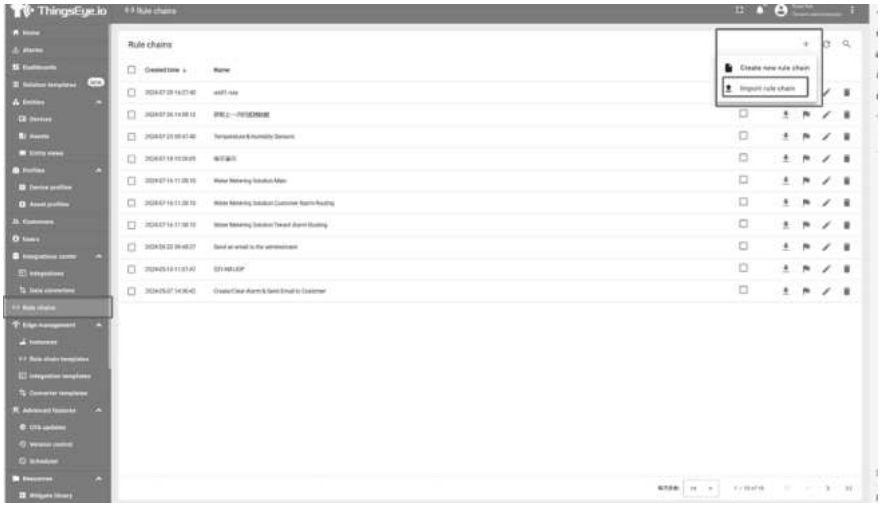


5. Fill in your MQTT Username. (Example: My MQTT Username is ais01 @ttn)

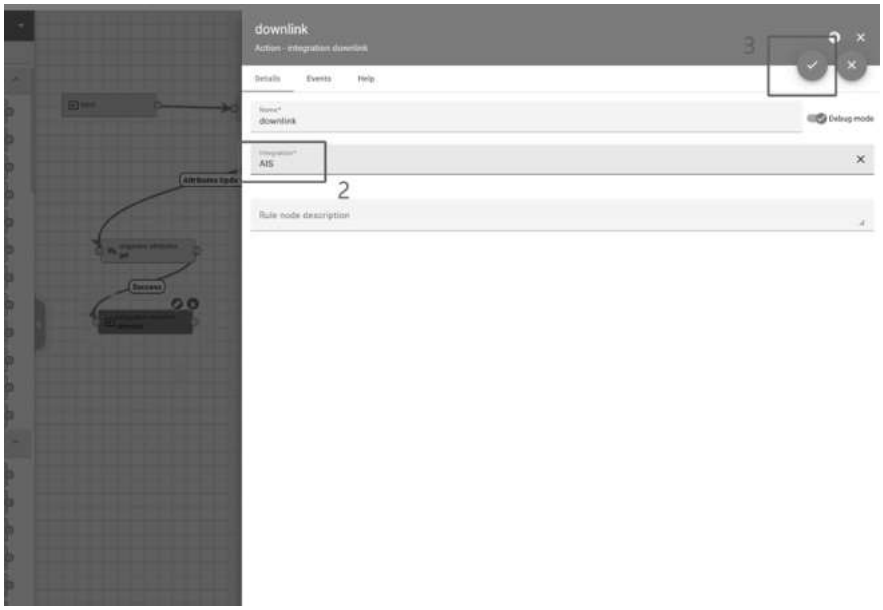
The completed example is shown below.

2.6.2 Import AIS01 rule chain library template

Rule chain library template file."ais01 _rule.json (https://www.dropbox.com/scl/fo/2sg3lt6m1ksi4yfstd6ft/AIWNnOwlYDAsPLITzVkJkY8/thingseye?dl=0&rlkey=msebofkyfozww48iplvov3sv7&subfolder_nav_tracking=1) "

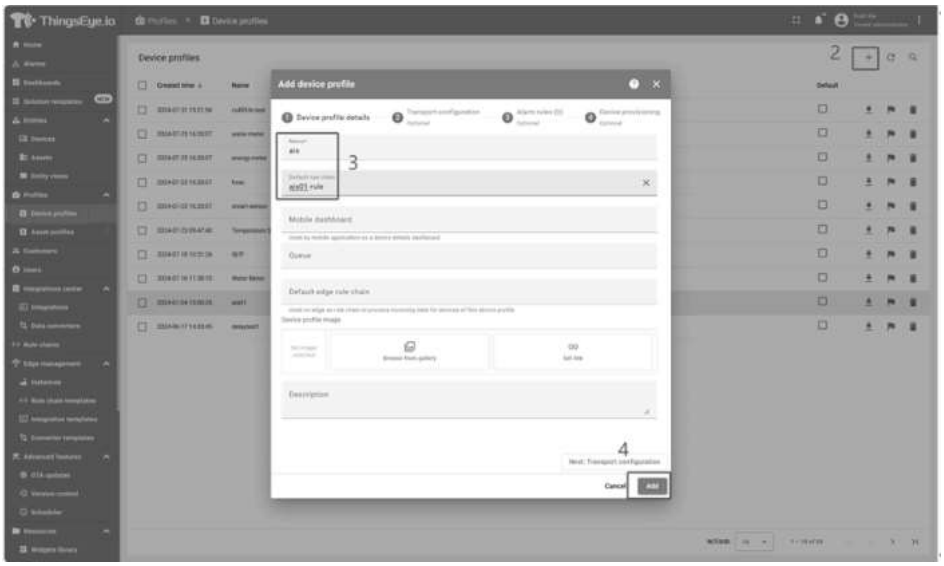


Select the device name you just created and save.



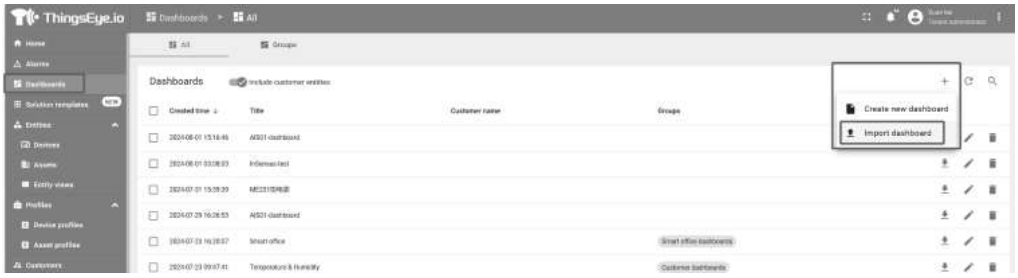
2.6.3 create a device profile

1. Select Device profiles
2. Click "+" to create a device profile
3. Create a name, select the rule chain template name "ais01-rule" just imported in Default rule chain
4. Click Add



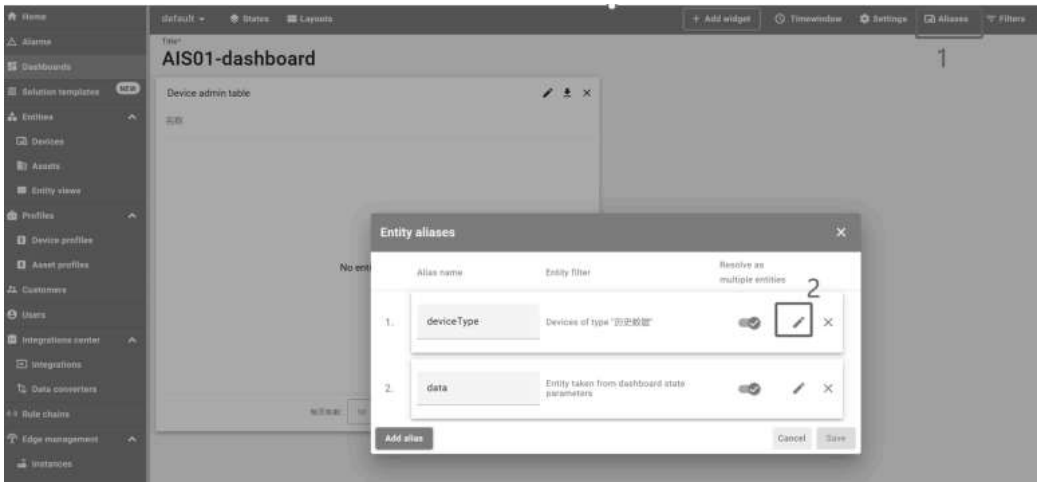
2.6.4 Dashboard Configuration

Click Dashboards, click "+" and select Import dashboard to import the dashboard file.ais01 dashboard.josn (https://www.dropbox.com/scl/fo/2sg3lt6m1ksi4yfstd6ft/AIWNndl=0&rlkey=msebofkyfozww48iplvov3sv7&subfolder_nav_tracking=1)

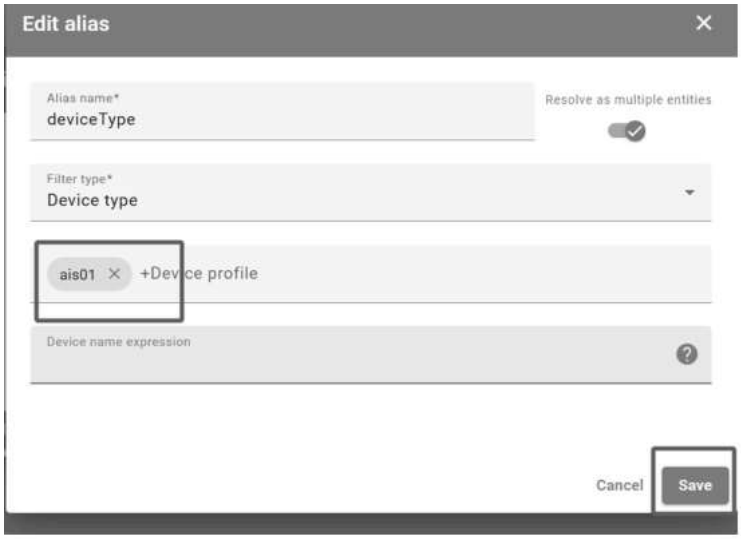


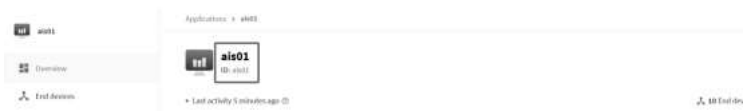
After importing, click edit mode.

Click allases, then click 2 to enter the edit.

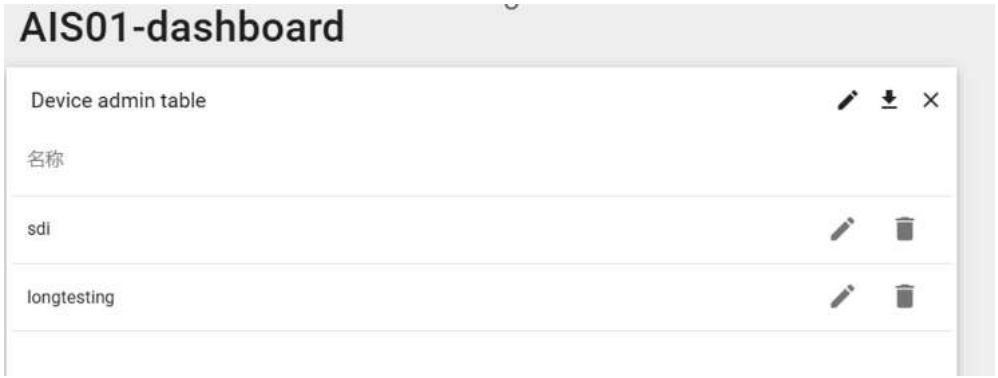


Change to the name of the TTN device group





After clicking save, the device will appear on the table.



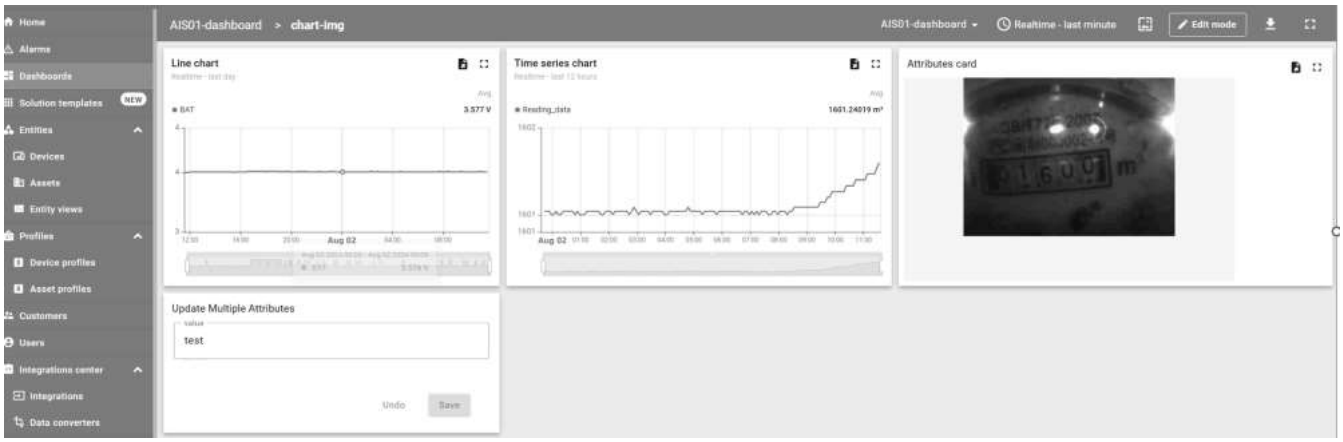
2.6.5 Dashboard Contents

Click on the corresponding device and four modules will be displayed, namely, BAT, reading data, Image, and command issuing module.

You can enter 0B01 in the Update Multiple Attributes module and click Save, AIS01-LB will receive Image Polling Command in next data uplink and upload the image data

There will be multiply packets uplink for the image and ThingsEye will re-built them and You will see the actual image in the Update Multiple Attributes module.

(Note: If you need to use this function, TTN's Payload formatters need to be changed to https://github.com/dragino/dragino-end-node-decoder/blob/main/AIS01/AIS01_Th
(https://github.com/dragino/dragino-end-node-decoder/blob/main/AIS01/AIS01_Thingseyes_Decoder.txt))



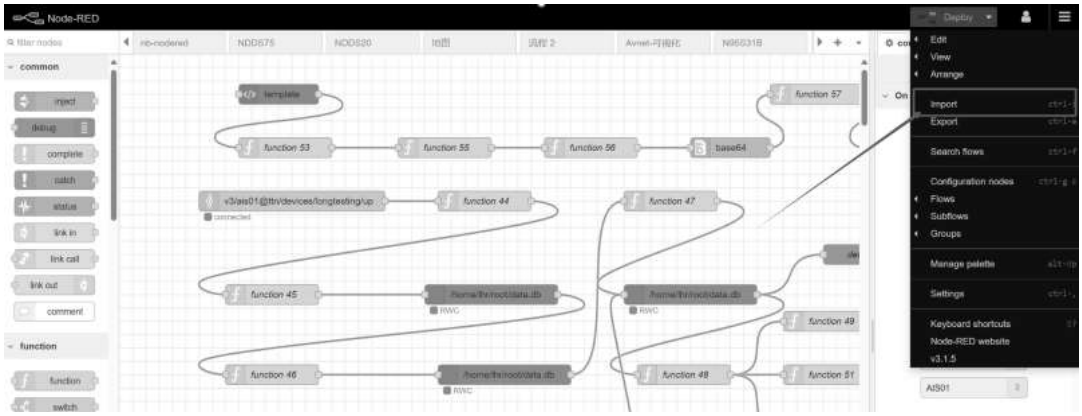
2.7 Node-Red Configuration

By configuring AIS01-LB on node red, you can intuitively see the trend of readings and obtain image data to see the real-time dial.

The prerequisite is that the TTN platform has been configured before configuring the thingseye platform.

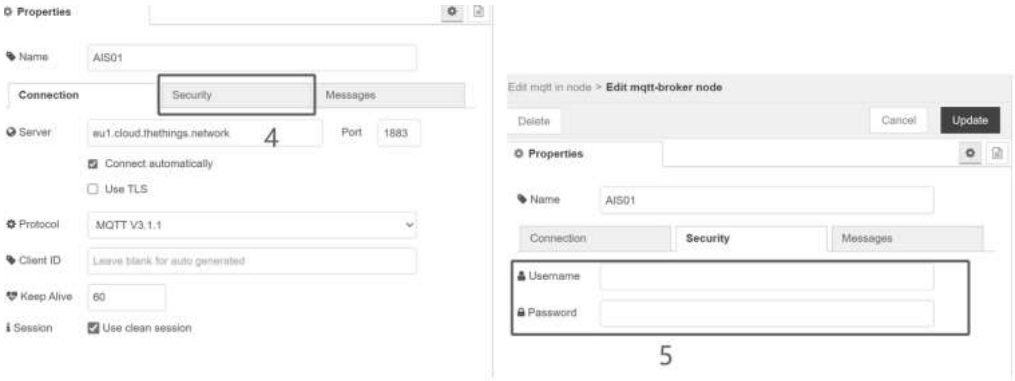
2.7.1 Import file

Click on the upper right corner and click “import” to import the node red AIS01-LB file (https://www.dropbox.com/scl/fo/2sg3lt6m1ksi4yfstd6ft/AAyVR_CghmzIv9kwk4ELj-c
dl=0&rlkey=msebofkyfozww48iplvov3sv7&subfolder_nav_tracking=1) .

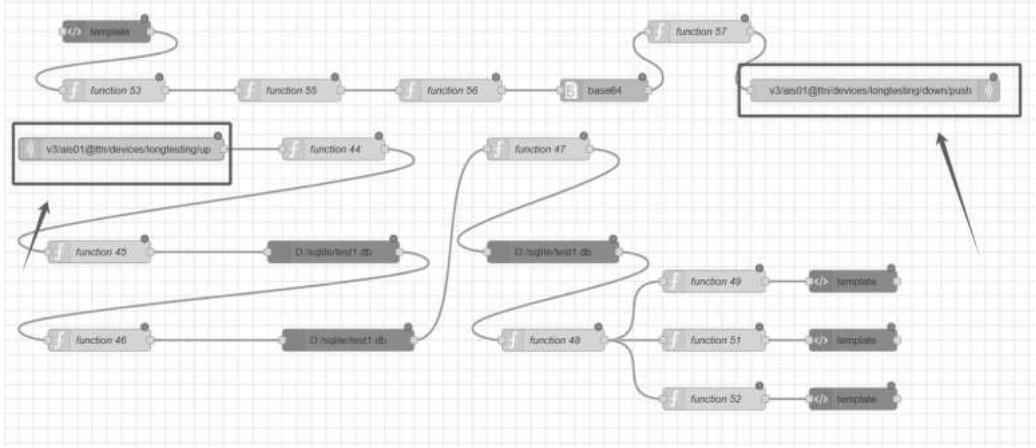


2.7.2 Edit the mqtt out node

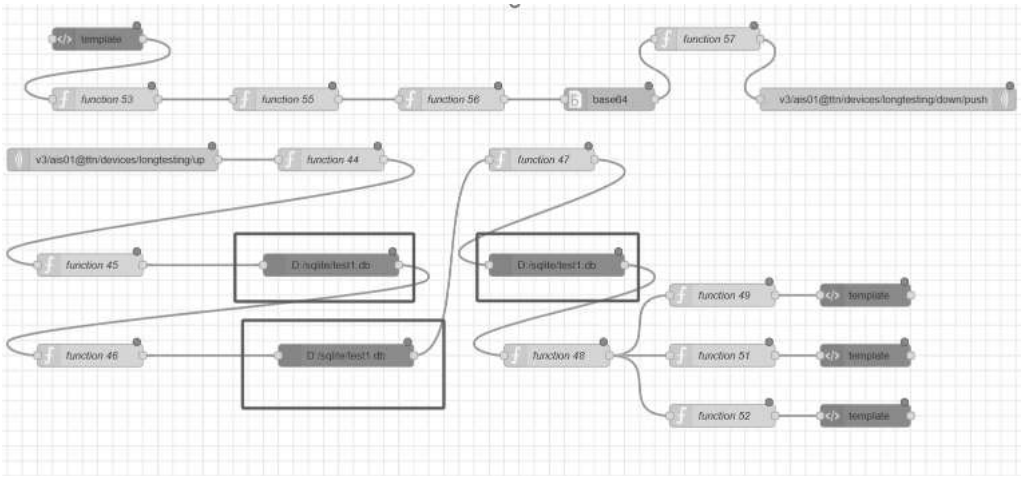
The configurations that need to be modified are as follows:
1. Click this module to enter the edit window
2. Enter the name of your TTN device group and the device name
3. Enter the edit window
4. Select security edit window
5. Enter the username and password of TTN-Integrations-MQTT



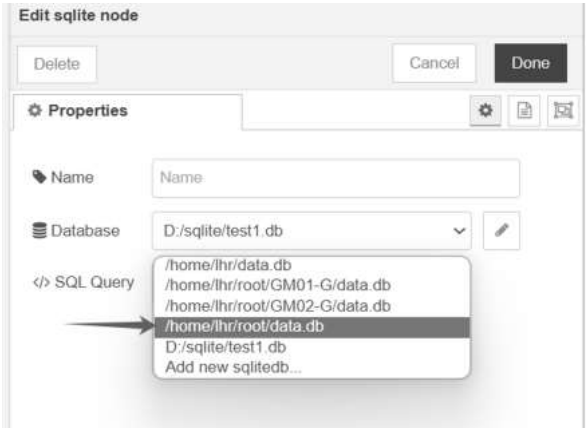
The steps for modifying the content of these two modules are the same.



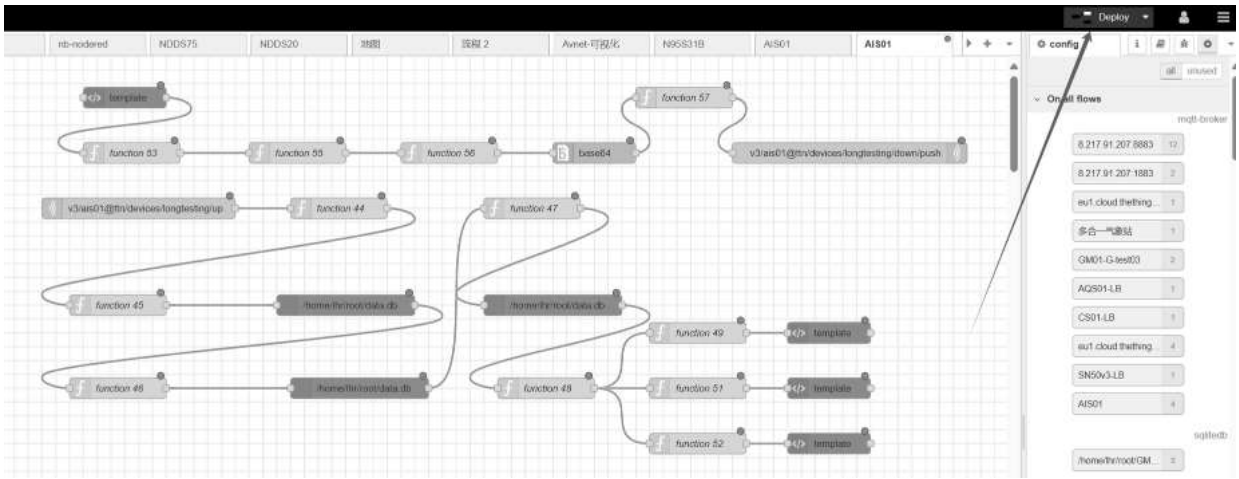
2.7.3 Edit the sqlite node



Select the corresponding database on your server.



Then click deploy



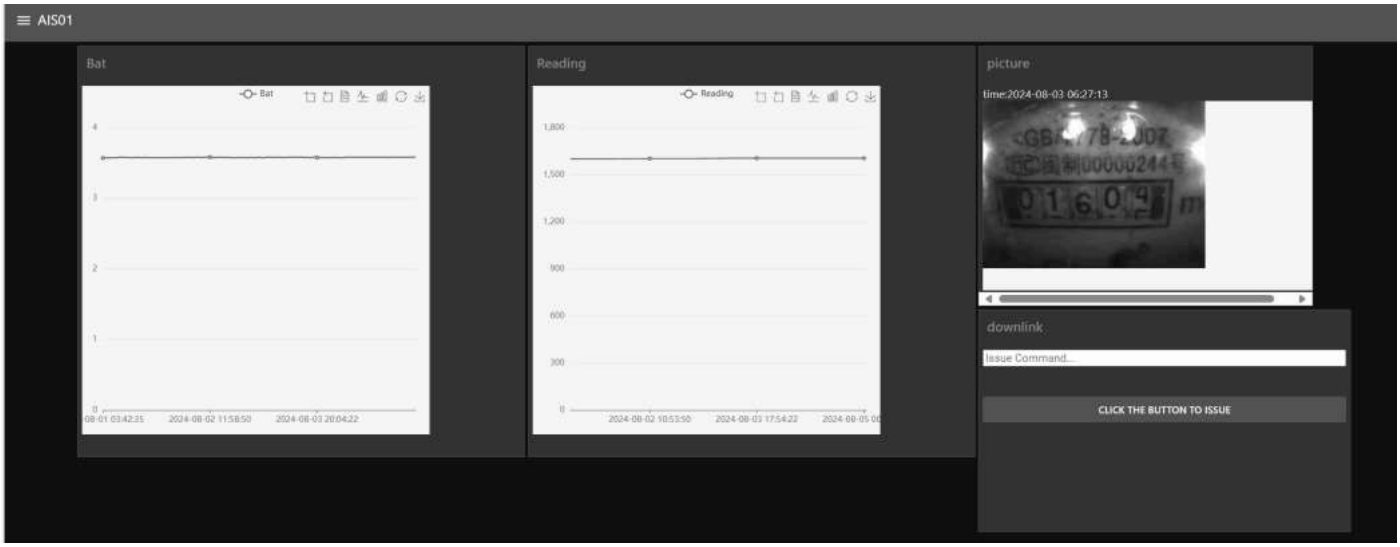
2.7.4 AIS01-LB Node Red UI

Click on the corresponding device and four modules will be displayed, namely, BAT data, reading data, image, and command issuing module.

You can enter 0B01 in the downlink module and click Save, AIS01-LB will receive the command and upload the image data after the next data upload.

You will see the actual image in the picture module.

(Note: If you need to use this function, TTN's Payload formatters need to be changed to https://github.com/dragino/dragino-end-node-decoder/blob/main/AIS01/AIS01_Th (https://github.com/dragino/dragino-end-node-decoder/blob/main/AIS01/AIS01_Thingseyes_Decoder.txt))



For more information about Node Red, please refer to Node-RED_Install and Use (http://wiki.dragino.com/xwiki/bin/view/Main/Node-RED/)

3. Configure AIS01-LB

3.1 Configure Methods

AIS01-LB supports below configure method:

- AT Command via Bluetooth Connection (**Recommended**): BLE Configure Instruction (http://wiki.dragino.com/xwiki/bin/view/Main/BLE%20Bluetooth%20Remote%2
- AT Command via UART Connection : See UART Connection (http://wiki.dragino.com/xwiki/bin/view/Main/UART%20Access%20for%20LoRa%20ST%20v4%20base%20model/#H2.3UARTConnectionforSN50v3basemotherbo
- LoRaWAN Downlink. Instruction for different platforms: See IoT LoRaWAN Server (http://wiki.dragino.com/xwiki/bin/view/Main/) 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:

http://wiki.dragino.com/xwiki/bin/view/Main/End%20Device%20AT%20Commands%20and%20Downlink%20Command/ (http://wiki.dragino.com/xwiki/bin/view/Main/End%20Device%20AT%20Commands%20and%20Downlink%20Command/)

3.3 Commands special design for AIS01-LB

These commands only valid for AIS01-LB, 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	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

3.3.2 Get Device Status

Send a LoRaWAN downlink to ask the device to send its status.

Downlink Payload: 0x26 01

Sensor will upload Device Status via **FPORT=5**. See payload section for detail.

3.3.3 Set Interrupt Mode

Feature, Set Interrupt mode for GPIO_EXIT.

AT Command: AT+INTMOD1,AT+INTMOD2

Command Example	Function	Response
AT+INTMOD1=?	Show current interrupt mode	0 OK the mode is 0 =Disable Interrupt
AT+INTMOD1=2	Set Transmit Interval 0. (Disable Interrupt), 1. (Trigger by rising and falling edge) 2. (Trigger by falling edge) 3. (Trigger by rising edge)	OK
AT+INTMOD2=2	Set Transmit Interval 0. (Disable Interrupt), 1. (Trigger by rising and falling edge) 2. (Trigger by falling edge) 3. (Trigger by rising edge)	OK

Downlink Command: 0x06

Format: Command Code (0x06) followed by 3 bytes.

This means that the interrupt mode of the end node is set to 0x000003=3 (rising edge trigger), and the type code is 06.

- Example 1: Downlink Payload: 06000000 **--->** AT+INTMOD1=0
- Example 2: Downlink Payload: 06000003 **--->** AT+INTMOD1=3
- Example 3: Downlink Payload: 06000102 **--->** AT+INTMOD2=2

3.3.4 Request the server to send an ACK

AT Command: AT+PNACKMD

Command Example	Function	Response
AT+PNACKMD=1	If the node uploads the ACK as confirm, it will request the server to send an ACK. If the server ack is not received, the node will upload the packets that have not received the ACK the next time it receives the ACK	1 OK
AT+PNACKMD=0	off request the server to send an ACK	0 OK

Downlink Command: 0x34

0X34 01 // Same As AT+PNACKMD=1

0x34 00 // Same As AT+PNACKMD=0

3.3.5 Print data entries base on page

Feature: Print the sector data from start page to stop page (max is 416 pages).

AT Command: AT+PDTA

Command Example	Function

AT+PDTA=1,3 Print page 1 to 3	Stop Tx events when read sensor data 8031000 2024/5/18 01:29:00 3054 2.442223 8031010 2024/5/18 01:30:00 3048 2.442223 8031020 2024/5/18 01:31:00 3042 2.442223 8031030 2024/5/18 01:32:00 3036 2.442223 8031040 2024/5/18 01:33:00 3030 2.442223 8031050 2024/5/18 01:34:00 3024 2.442223 8031060 2024/5/18 01:35:00 3024 2.442223 8031070 2024/5/18 01:36:00 3018 2.442223 8031080 2024/5/18 01:37:00 3012 2.442223 8031090 2024/5/18 01:38:00 3000 2.442223 80310A0 2024/5/18 01:39:00 2994 2.442223 80310B0 2024/5/18 01:40:00 2988 2.442223 80310C0 2024/5/18 01:41:00 2982 2.442223 80310D0 2024/5/18 01:42:00 2976 2.442223 80310E0 2024/5/18 01:43:00 2970 2.442223 80310F0 2024/5/18 01:44:00 2964 2.442223 8031100 2024/5/18 01:45:00 2958 2.442223 8031110 2024/5/18 01:46:00 2952 2.442223 8031120 2024/5/18 01:47:00 2940 2.442223 8031130 2024/5/18 01:48:00 2940 2.442223 8031140 2024/5/18 01:49:00 2928 2.442223 8031150 2024/5/18 01:50:00 2922 2.442223 8031160 2024/5/18 01:51:00 2916 2.442223 8031170 2024/5/18 01:52:00 2904 2.442223 Start Tx events OK

Downlink Command:

No downlink commands for feature

3.3.6 Clear Flash Record

Feature: Clear flash storage for data log feature.

AT Command: AT+CLRDTA

Command Example	Function	Response
AT+CLRDTA	Clear date record	Stop Tx events,Please wait for the erase to complete Clear all stored sensor data... Start Tx events OK

Downlink Command:

No downlink commands for feature

3.3.7 Clock logging

Sometimes when we deploy lots of end nodes in field. We want all sensors sample data at the same time, and upload these data together for analyze. In such case, we c

We can use this command to set the start time of data recording and the time interval to meet the requirements of the specific collection time of data.

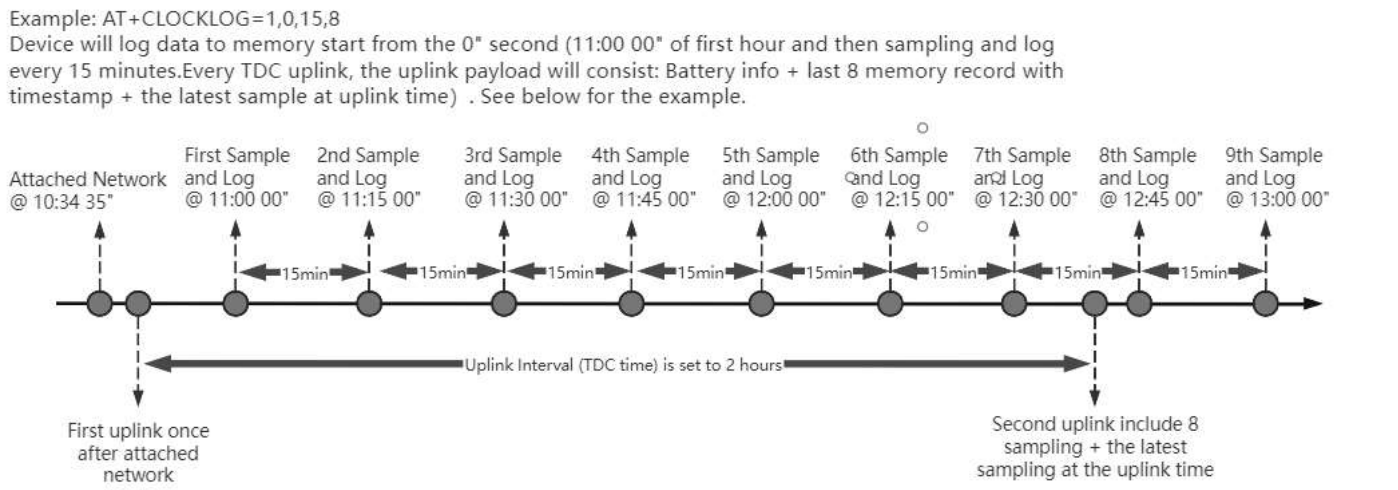
- **AT Command: AT+CLOCKLOG=a,b,c,d**

a: 0: Disable Clock logging. **1:** Enable Clock Logging

b: Specify First sampling start second: range **(0 ~ 3599, 65535)** // **Note:** If parameter b is set to 65535, the log period starts after the node accesses the network and

c: Specify the sampling interval: range **(0 ~ 255 minutes)**

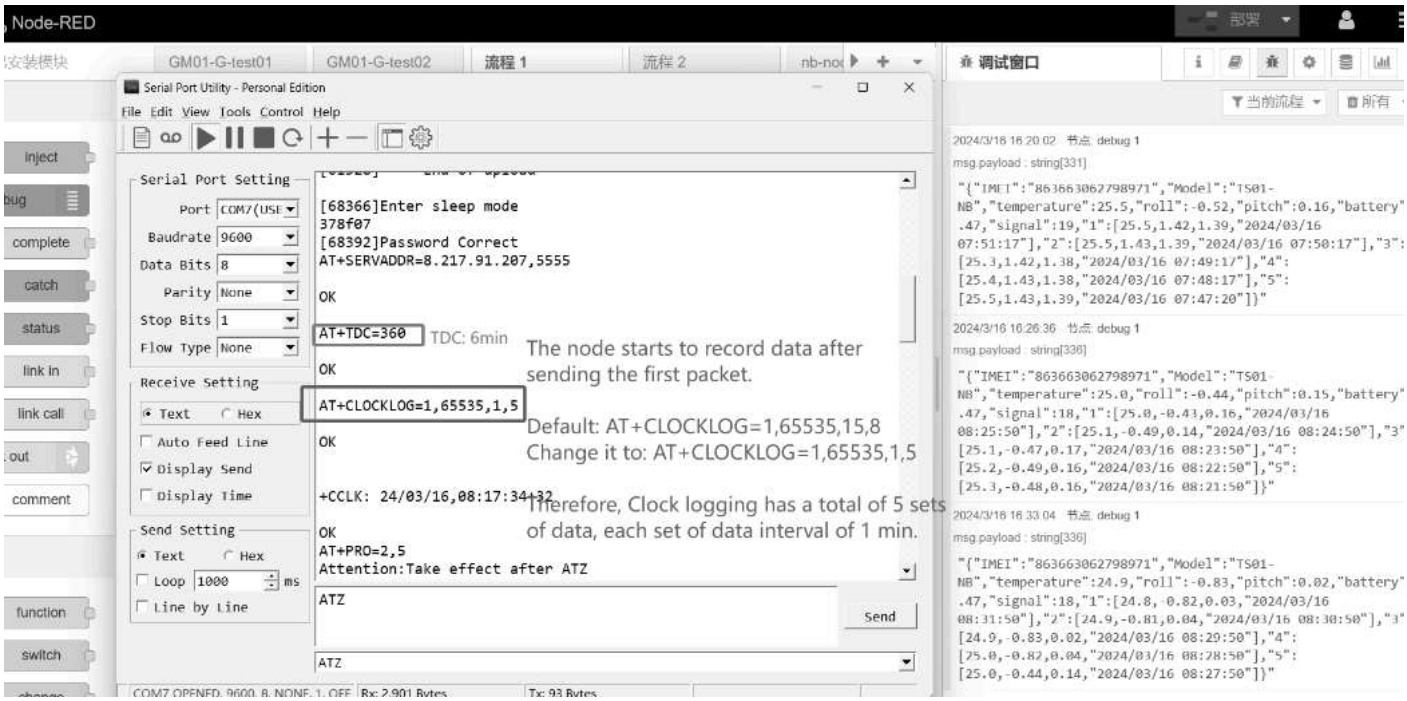
d:How many entries should be uplink on every TDC **(max 32)**



Example:

AT+CLOCKLOG=1,65535,1,5

After the node sends the first packet, data is recorded to the memory at intervals of 1 minute. For each TDC uplink, the uplink load will include: battery information + the la timestamp).



Note: Users need to synchronize the server time before configuring this command. If the server time is not synchronized before this command is configured, the node is reset.

4. Battery & Power Consumption

AIS01-LB use ER26500 + SPC1520 battery pack . See below link for detail information about the battery info and how to replace.

Battery Info & Power Consumption Analyze (http://wiki.dragino.com/xwiki/bin/view/Main/How%20to%20calculate%20the%20battery%20life%20of%20Dragino%20sens

5. Case Study

5.1 Send Image to server to check different situation

Example 1: Users can use cameras to monitor whether the trash can is overflowing

Example 2: Users can use the camera to check whether the fire hydrant is in a safe and closed state.

6. OTA Firmware update

User can change firmware AIS01-LB to:

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

Firmware and changelog can be downloaded from : Firmware download link (https://www.dropbox.com/scl/fo/36lwybl9trog871km5o7y/AFNQGdco3E5YoFMG5rlkey=f1grlhfcwxfuzgjinuopkdzmg&st=sxudgifz&dl=0)

Methods to Update Firmware:

- (Recommanded way) OTA firmware update via wireless: **http://wiki.dragino.com/xwiki/bin/view/Main/Firmware%20OTA%20Update%20for%20Sensors/ (http://wiki.dragino.com/xwiki/bin/view/Main/Firmware%20OTA%20Update%20for%20Sensors/)**
- Update through UART TTL interface: **Instruction (http://wiki.dragino.com/xwiki/bin/view/Main/UART%20Access%20for%20LoRa%20ST%20v4%20base%20model/#H1.LoRaSTv4baseHardware)** .

7. FAQ

7.1 Why does AIS01 automatically restart at every hour?

Please update the firmware, this issue is fixed in version 1.0.2.

8. Order Info

Part Number: **AIS01-LB-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

9. Packing Info

Package Includes:

- AIS01-LB LoRaWAN AI Image End Node

Dimension and weight:

- Device Size: cm
- Device Weight: g

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

10. Support

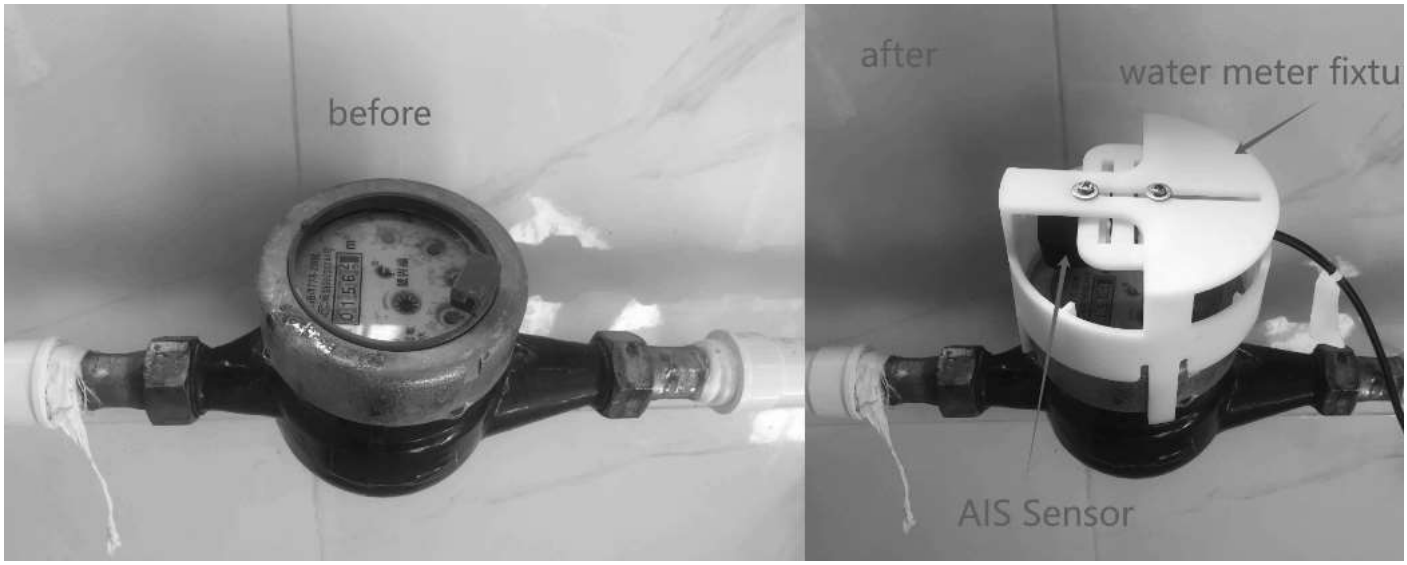
- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answe mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to (http://../../../../../../D:%5C%E5%B8%82%E5%9C%BA%E8%B5%84%E6%96%99%5C%E8%AF%B4%E6%98%8E%E4%B9%A6%5CLoRa%5CLT%E7%B3%BB%

11. Appendix I: Field Installation Photo

Step1:

Find a water meter, install the AIS Sensor on the water meter fixture and install it on the water meter (https://wiki.dragino.com/xwiki/bin/view/Main/AI%20Image%20Senso

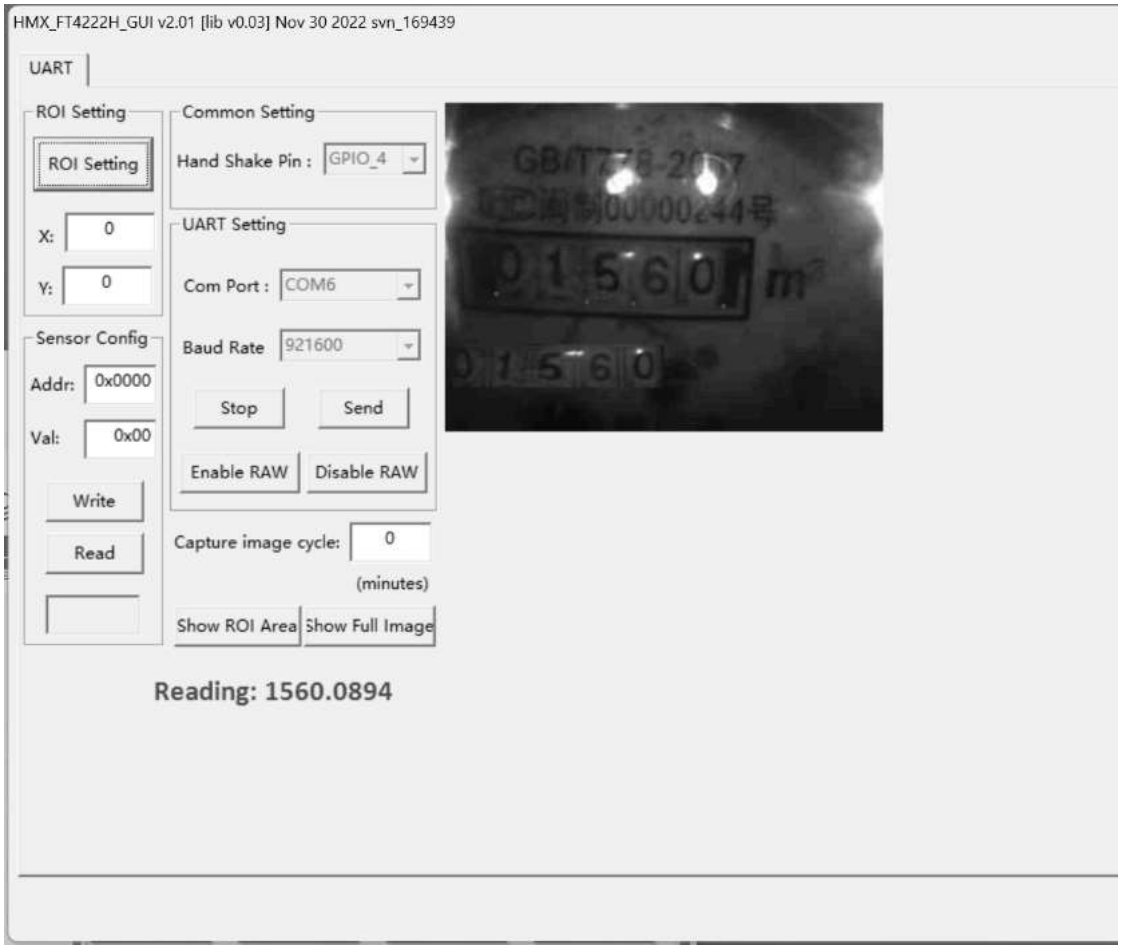
The following is a comparison of before and after installation:



Note: When the ambient brightness is too high, you can use a cover (such as cardboard) to block other light sources (such as the sun, electric lights) to pr causing the AIS sensor to read inaccurate values.

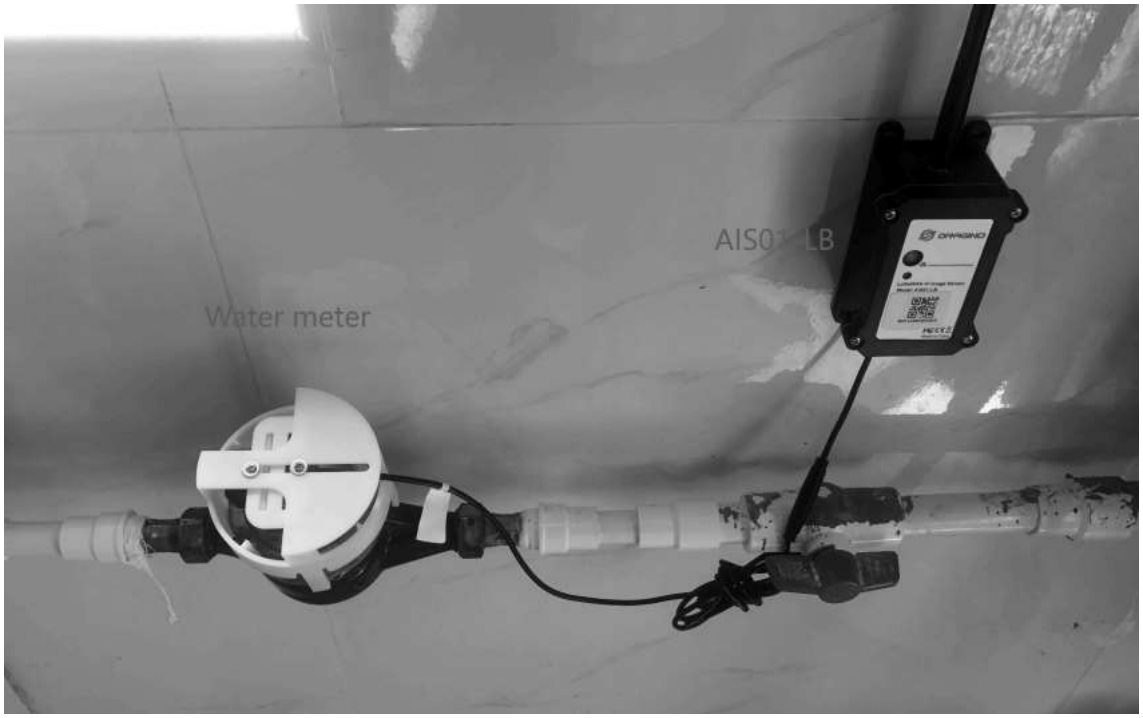
Step2:

Calibrate the AIS (http://8.211.40.43:8080/xwiki/bin/view/Main/AI%20Image%20Sensor%20Calibration/#H2.1.3Calibration) Sensor so that it can accurately read the wat



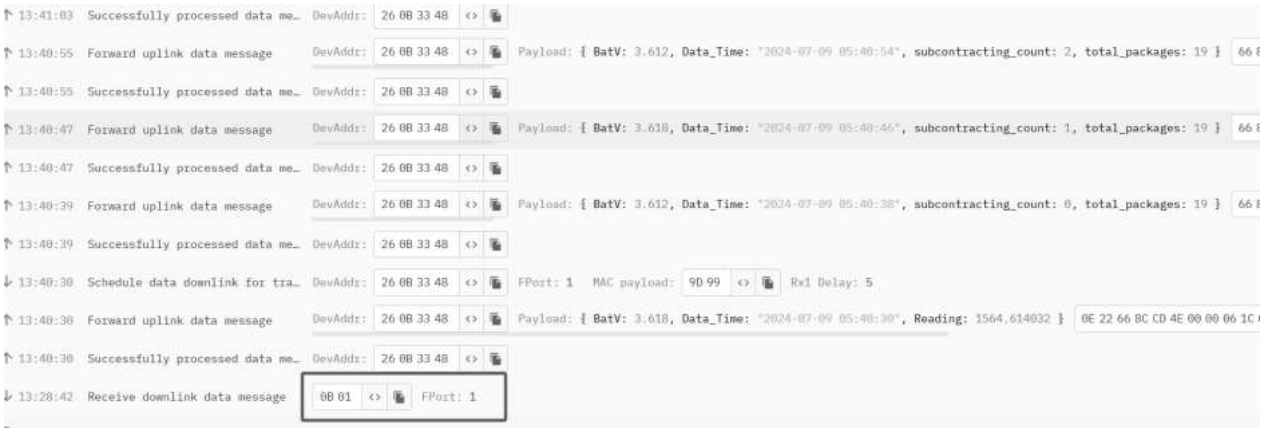
Step3:

Choose a suitable location to place AIS01-LB,overall view



Get image data

When 0B 01 is sent on the TTN platform, the device will execute the command to send image data packet after sending the next data packet.



According to the method in 2.3.3.6, the combined data is converted into binary to obtain the following jpg image.

0 Tags: Created by Xiaoling (/xwiki/bin/view/XWiki/Xiaoling) on 2024/05/08 11:58

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