# SenseCap S2120 LoRaWAN Weather Station integration with the WaziGate

The SenseCap S2120 Weather Station by Seeed Studio is an exceptional addition to your Internet of Things (IoT) solution. This weather station is engineered to provide comprehensive weather data with a focus on meteorological measurements. Equipped with a range of environmental sensors, the S2120 delivers real-time weather information and ensures data accuracy through advanced technology.

The SenseCap S2120 incorporates state-of-the-art sensors for temperature, humidity, air pressure, wind speed, wind direction, rainfall, and more. These sensors work together seamlessly to capture precise meteorological data, which is then transmitted wirelessly to your designated IoT server using LoRaWAN technology. LoRaWAN ensures long-range data communication with minimal power consumption, making it a robust choice for remote and wide-area deployments.

Powered by a long-lasting battery, the S2120 weather station can operate continuously for an extended period, minimizing maintenance and enabling uninterrupted data collection. Its exceptional design and quality construction make it a reliable choice for various environmental monitoring applications.

The SenseCap S2120 Weather Station is the ideal solution for applications such as weather monitoring, environmental research, precision agriculture, and smart city projects. With its accurate and timely weather data, this weather station empowers your IoT infrastructure, enabling data-driven decisions for a wide range of industries and applications. Experience the future of weather monitoring with the SenseCap S2120 Weather Station by Seeed Studio.

# 1) Connecting to WaziGate - OTAA mode

## Step 1 : Setup a WaziGate & Seeedstudio SenseCap S2120

**Recommended Hardware:**

- **WaziGate**
- **RAK 2247 LoRa HAT**: For LoRa Over The Air Activation (OTAA) a multichannel LoRa module is needed. It has benefits in many areas like:Improved Network Accessibility, Robustness, Enhanced Network Capacity, Load Balancing, Compatibility, Future-Proofing
- **Antennas for the selected frequency**
- **Micro SD-Card**

**Setup WaziGate:**

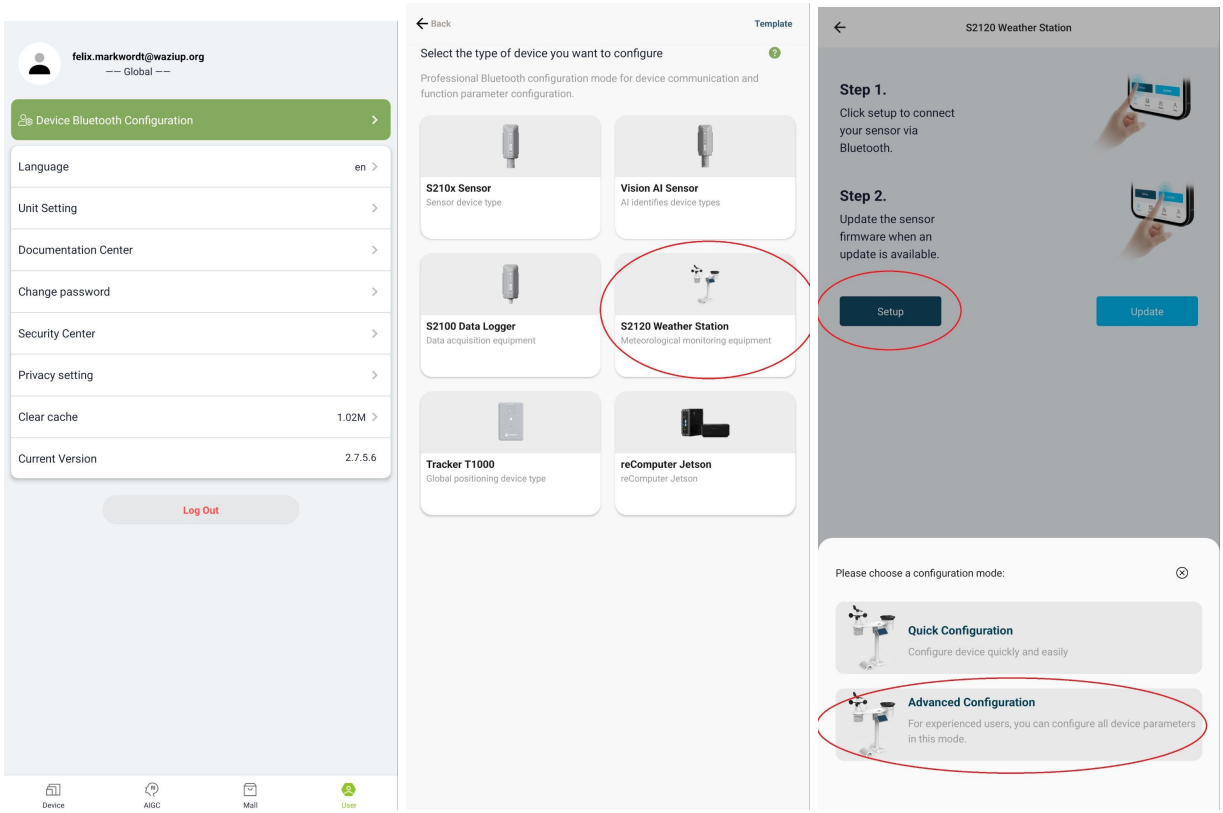
Here is a **tutorial** on how to **setup a Wazigate:**
https://lab.waziup.io/resources/waziup/wazigate#prepare-the-gateway-hardware

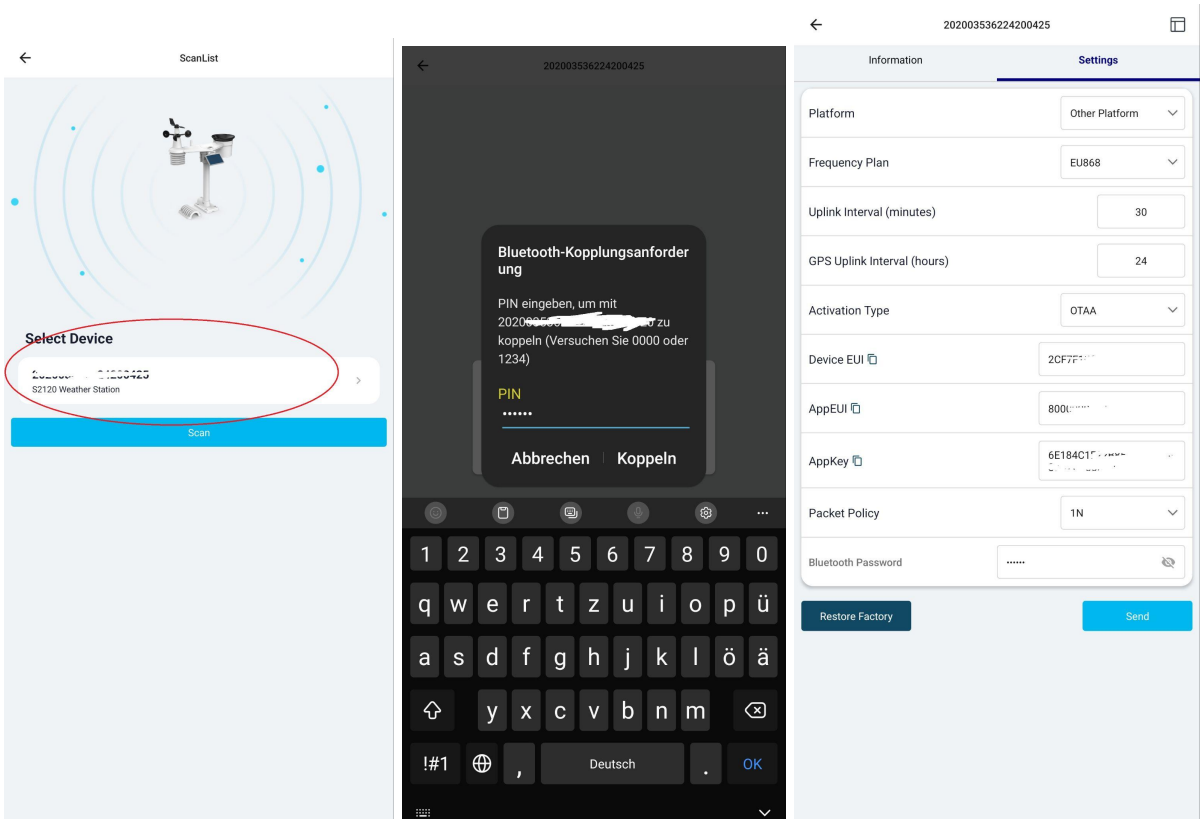
**Setup SenseCap S2120:**

In the following there are the steps explained to **change the connection settings of the SenseCap weather station**. It is done by using an Android or iOS app. The name of the App is SenseCap, you will find it in PlayStore or AppStore.

After installing you can make a connection to the sensor, it is done via bluetooth, so you need to be close to the weather station.

The screenshots below show the procedure:



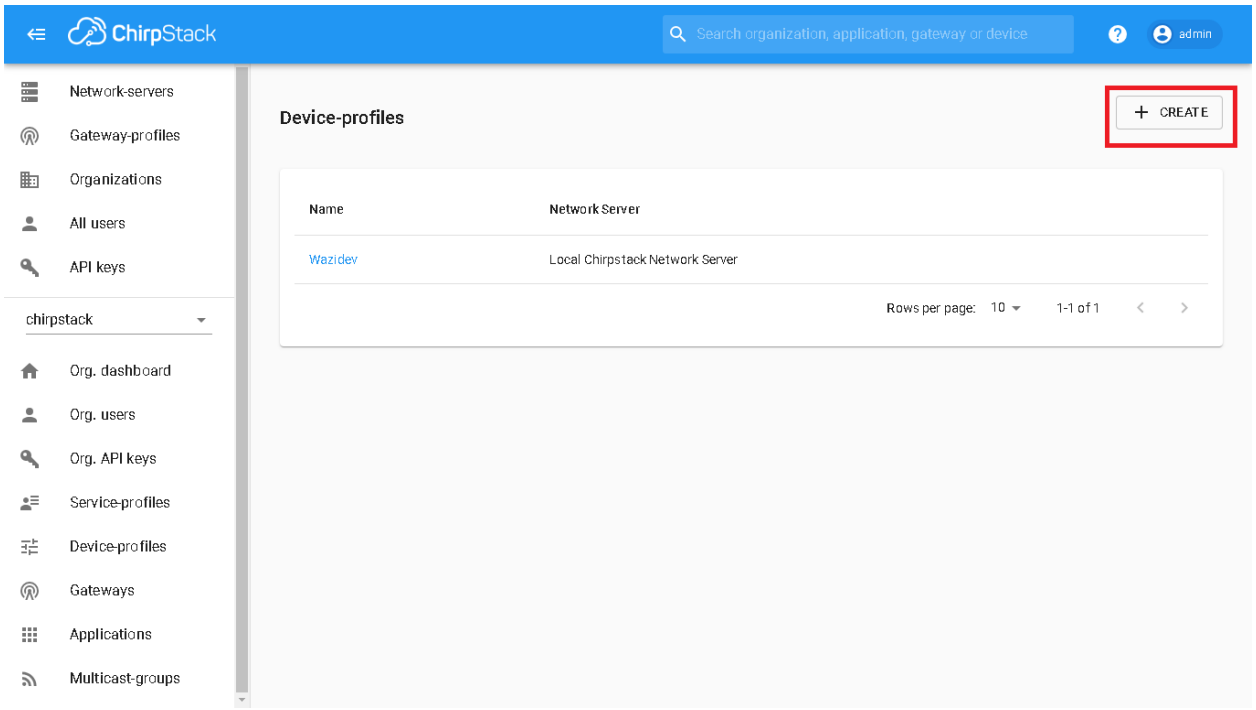




The default pin is : 000000

## Step 2 : Create a new device profile on ChirpStack

Using a Web browser, open ChirpStack UI at [wazigate.local:8080](wazigate.local:8080) . The default username and password is admin admin.

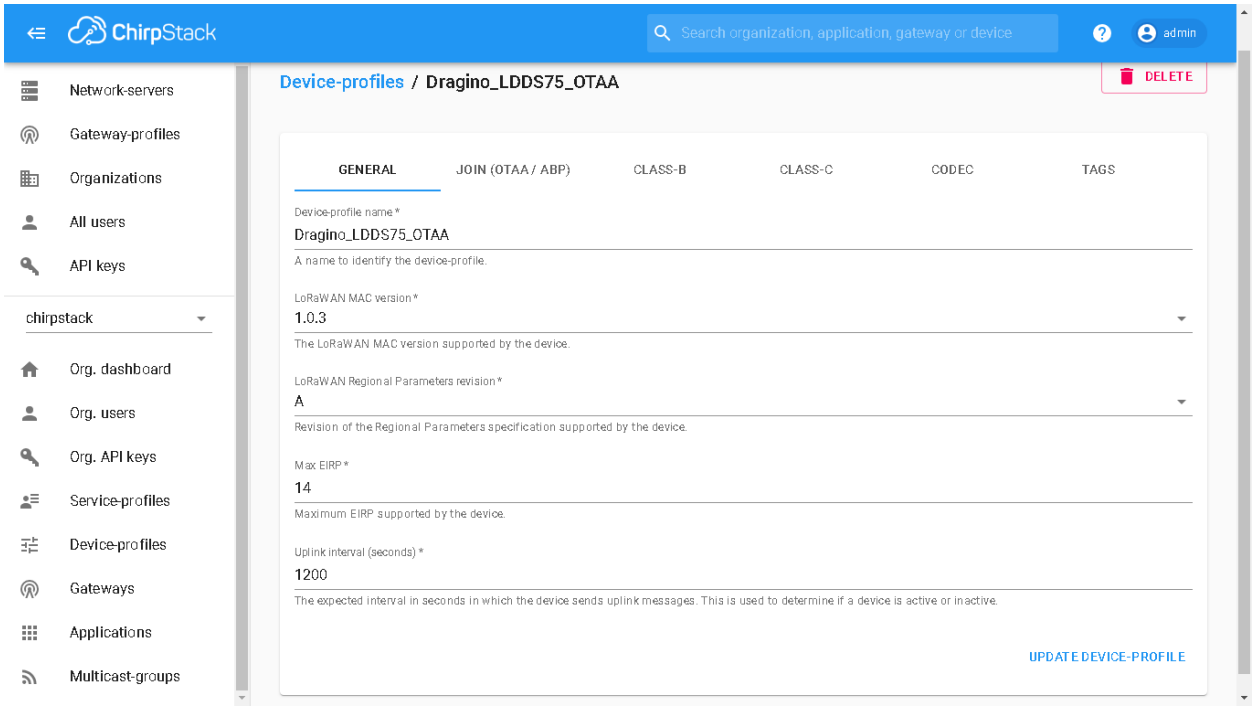
Next, go to the “Device-profiles” and click the  “ + Create” button.



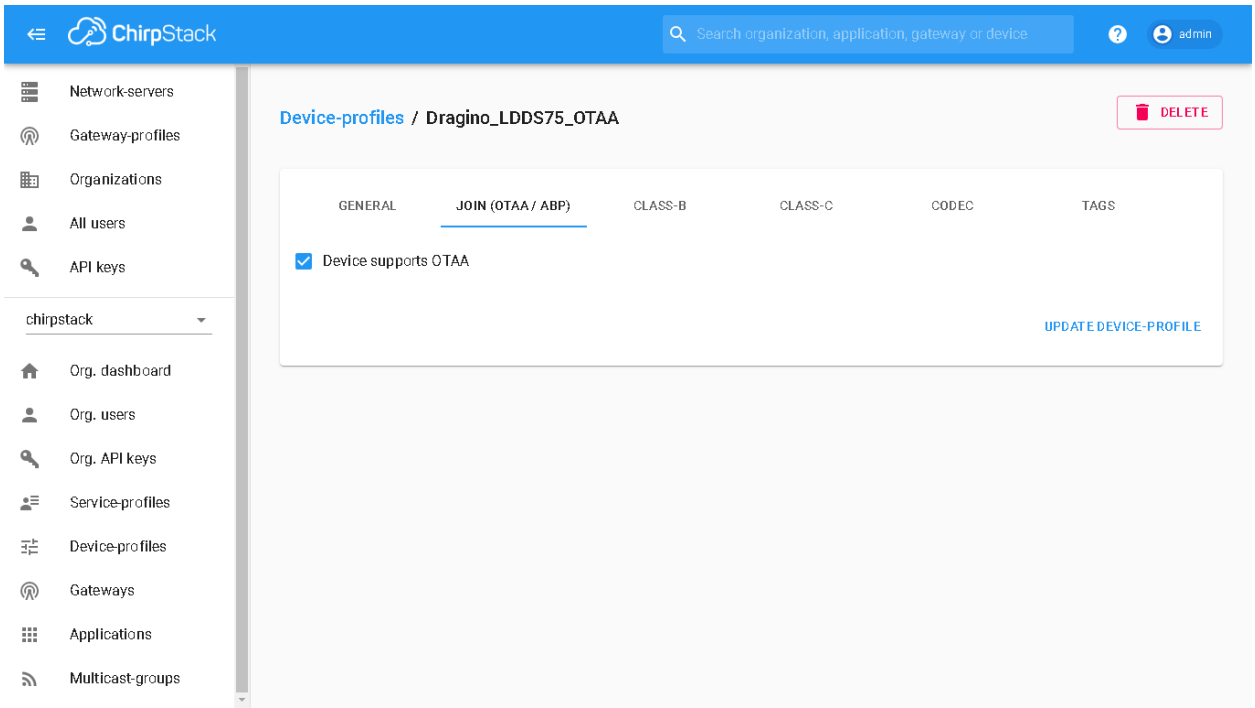

Now we need to enter the following details for the new device profile. Feel free to use a different “Device-profile name”

(a) For “GENERAL” enter the following information:

- Network-server * =  Local ChirpStack Network Server
- LoRaWAN MAC version *  = 1.0.3
- LoRaWAN Regional Parameters revision * = A
- Max EIRP * = 14
- Uplink interval (seconds) * = 1200

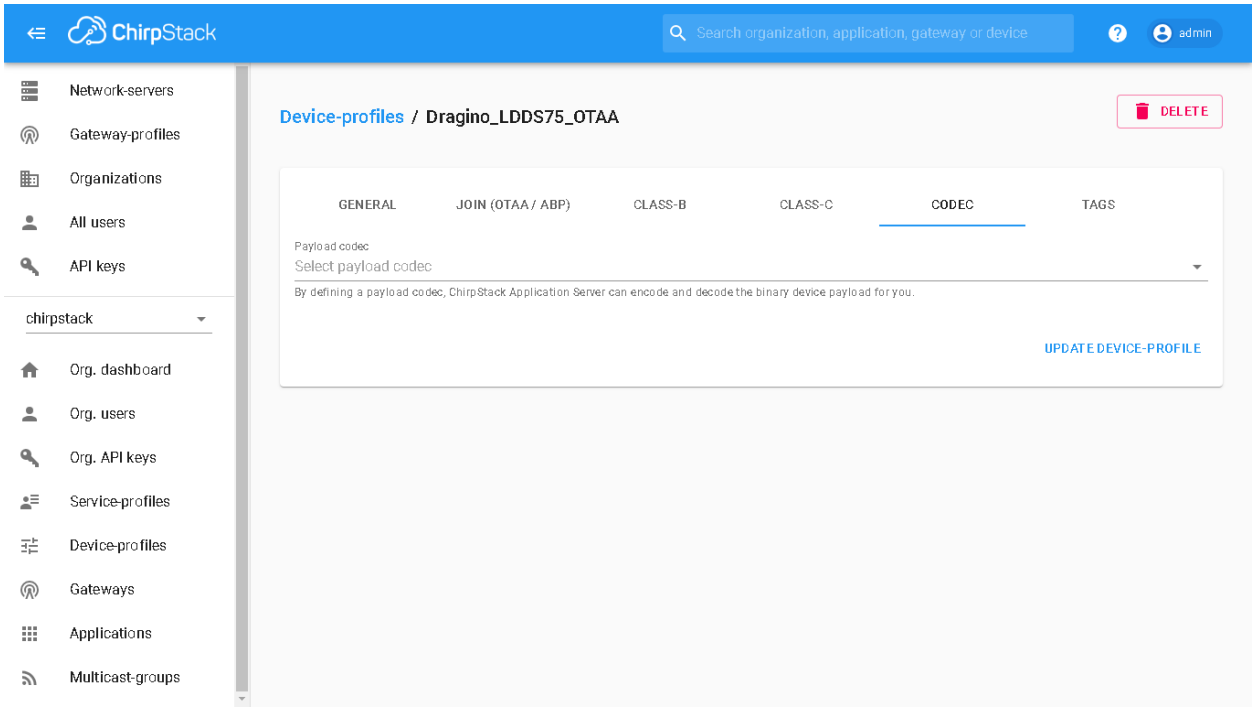



(b) For “JOIN (OTAA/ABP)” check the box “Device supports OTAA”

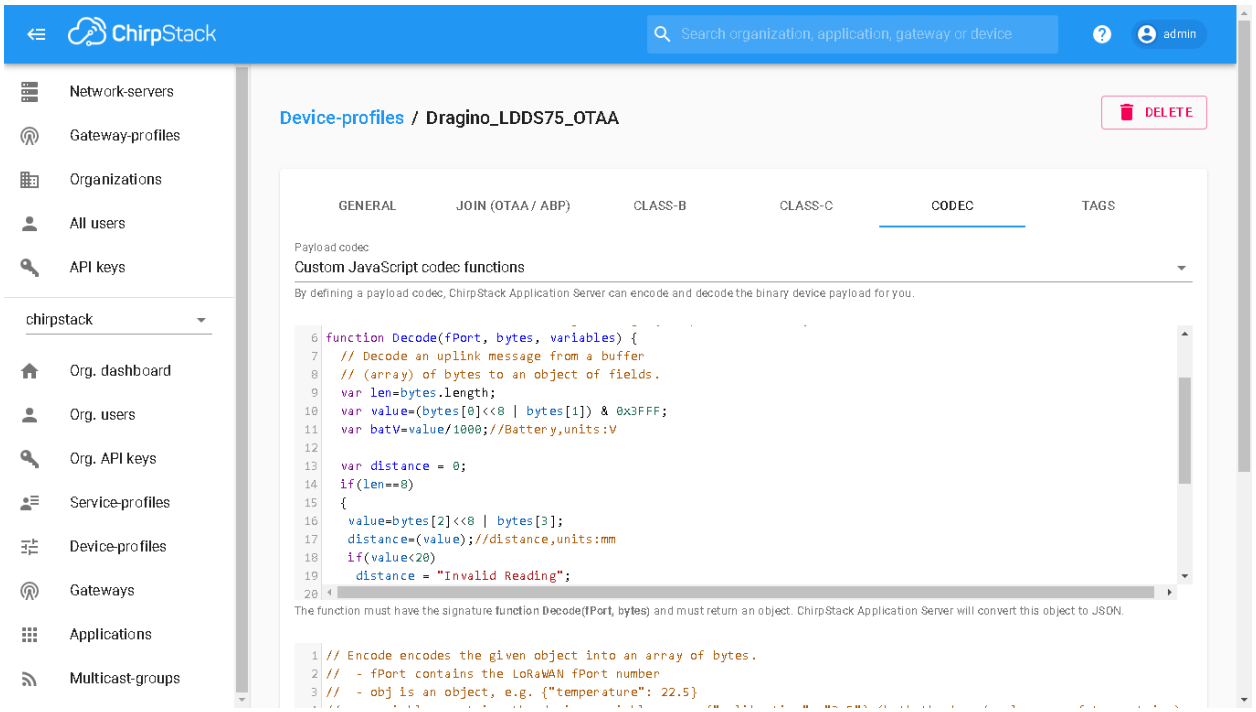



(c) Leave the “CLASS-B” and “CLASS-C” fields unchecked

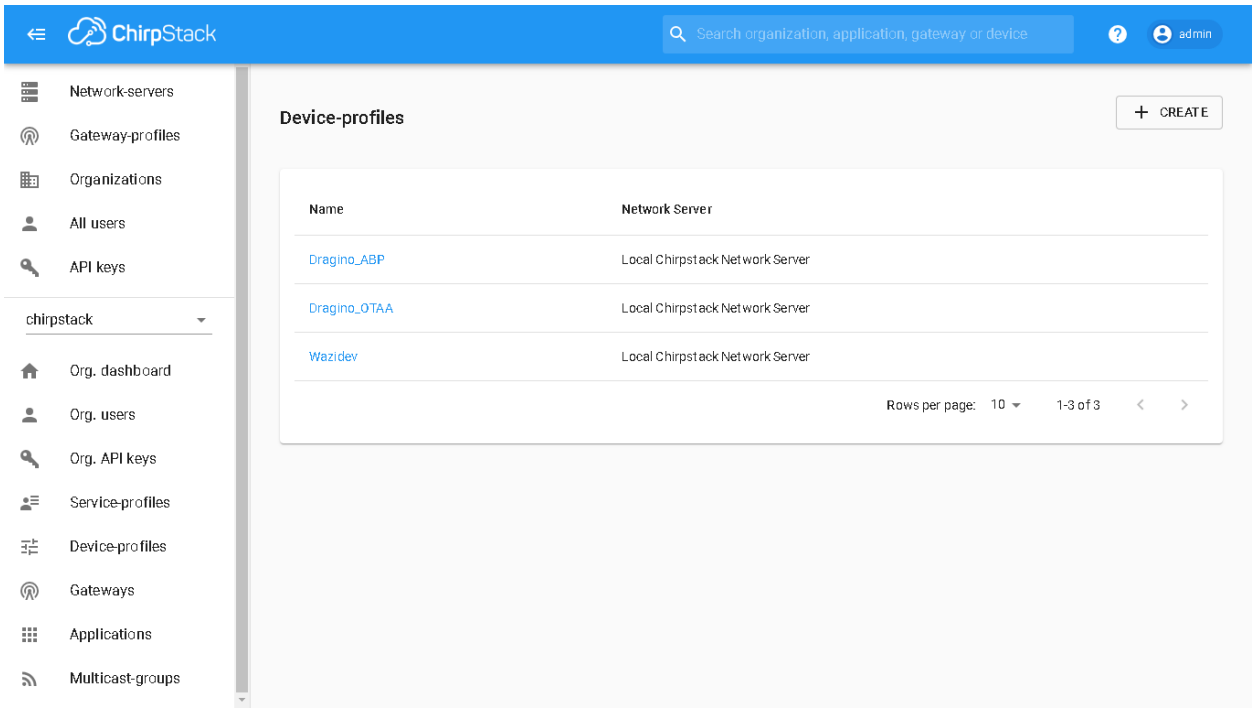
(d) For “CODEC” select “None”. This is because the latest Wazigate version only requires the LoRaWAN bytes for the Decoder function. This decoder function will be executed by WaziGate Edge and it will create the sensor values.




However, if you intend to view the device data on ChirpStack you can select the “Custom JavaScript codec functions” and copy and paste this code into the custom codec section inside the codec tab of the device profile.



(e) Finally, click the “CREATE DEVICE-PROFILE” button. The new device profile will be listed under “Device-profiles”.

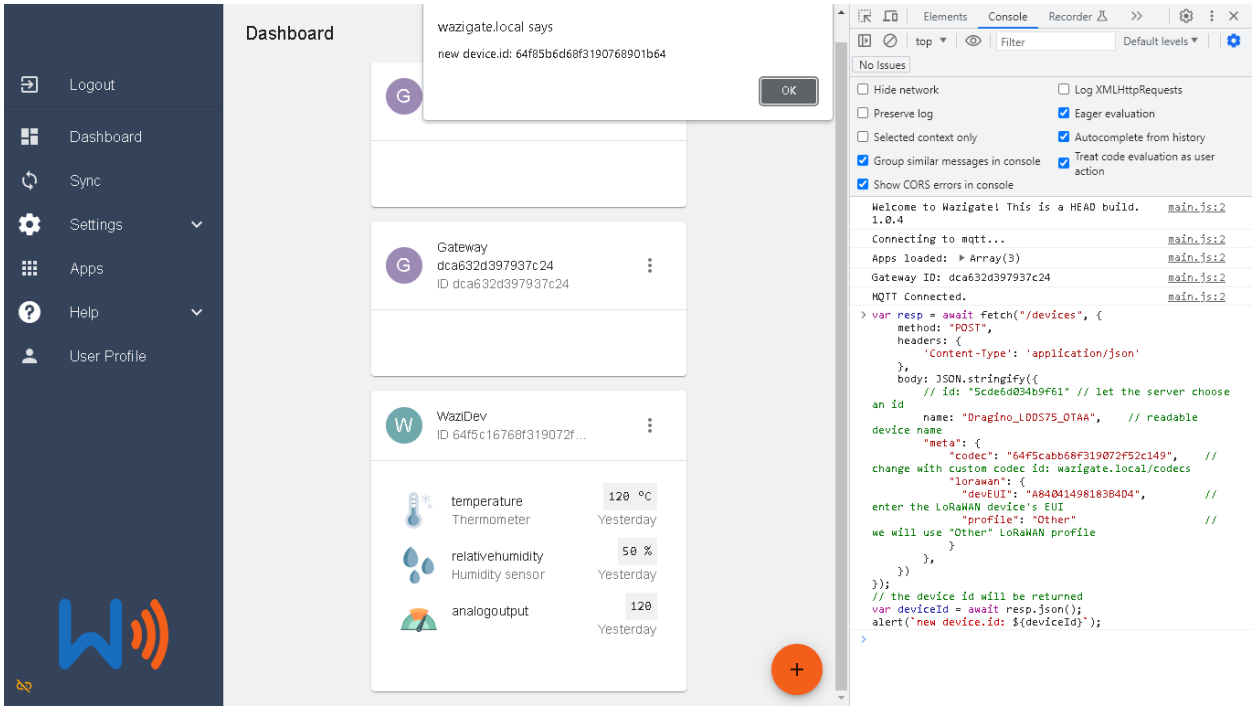


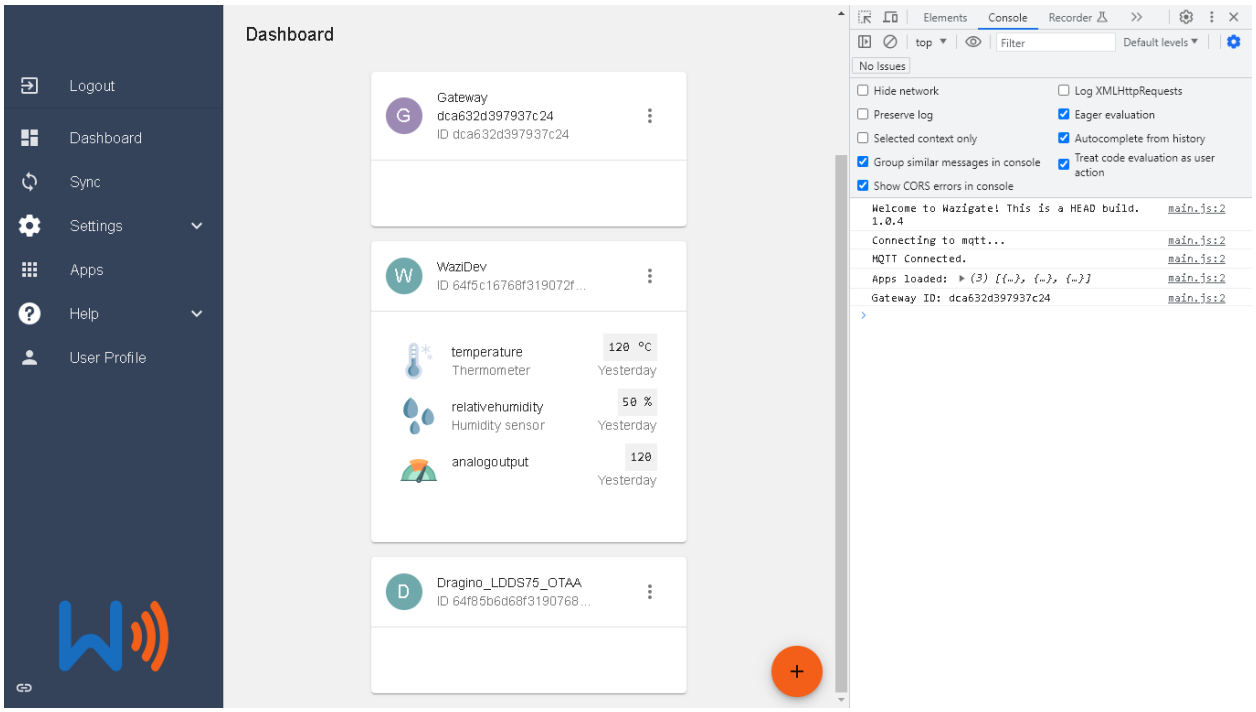

## Step 3 : Create a OTAA device for WaziGate using WaziGate Edge API

Using the WaziGate Edge API, we can create a new device that will be defined by a Device EUI and the “Other” LoRaWAN profile. We can run this JavaScript code to create the device on WaziGate. In the code, we give the Device EUI of the SenseCap S2120 LoRaWAN device.This key can be obtained from the sticker that is on the bottom of the arm that leads to the wind speed sensor. The credentials for connection can also be changed via the SenseCap Mate application, described in Step 1.


The JavaScript code also assigns a custom codec to this device using the WaziGate Edge codec's id. The codec has already been added to the WaziGate for you, you should replace the codec id in the JavaScript code to the one you will find under http://wazigate.local/codecs, if you get a message "Unauthorized", you just have to log in to the UI again (http://wazigate.local).

If you do not have a custom codec on WaziGate, you can still run the JavaScript code. Afterwards add a custom codec on WaziGate and assign this to the respective device.


Dashboard
wazigate.local says
new device.id: 64f85b6d68f3190768901b64
OK
Logout
Dashboard
Sync
Settings
Apps
Help
User Profile
Gateway
dca632d397937c24
ID dca632d397937c24
WaziDev
ID 64f5c16768f319072f...
temperature
Thermometer
120 °C
Yesterday
relativehumidity
Humidity sensor
50 %
Yesterday
analogoutput
120
Yesterday
Elements
Console
Recorder
top
Filter
Default levels
No Issues
Hide network
Log XMLHttpRequests
Preserve log
Eager evaluation
Selected context only
Autocomplete from history
Group similar messages in console
Treat code evaluation as user action
Show CORS errors in console
Welcome to Wazigate! This is a HEAD build. 1.0.4
Connecting to mqtt...
Apps loaded: ▶ Array(3)
Gateway ID: dca632d397937c24
MQTT Connected.
var resp = await fetch("/devices", {
method: "POST",
headers: {
'Content-Type': 'application/json'
},
body: JSON.stringify({
// id: "5cde6d034b9f61" // let the server choose an id
name: "Dragino_LDDS75_OTAA", // readable device name
"meta": {
"codec": "64f5cabb68f319072f52c149", // change with custom codec id: wazigate.local/codecs
"lorawan": {
"devEUI": "A84041498183B4D4", // enter the LoRaWAN device's EUI
"profile": "Other" // we will use "Other" LoRaWAN profile
}
},
})
});
// the device id will be returned
var deviceId = await resp.json();
alert(`new device.id: ${deviceId}`);


Dashboard
Logout
Dashboard
Sync
Settings
Apps
Help
User Profile
Gateway
dca632d397937c24
ID dca632d397937c24
WaziDev
ID 64f5c16768f319072f...
temperature
Thermometer
120 °C
Yesterday
relativehumidity
Humidity sensor
50 %
Yesterday
analogoutput
120
Yesterday
Dragino_LDDS75_OTAA
ID 64f85b6d68f3190768...
Elements
Console
Recorder
top
Filter
Default levels
No Issues
Hide network
Log XMLHttpRequests
Preserve log
Eager evaluation
Selected context only
Autocomplete from history
Group similar messages in console
Treat code evaluation as user action
Show CORS errors in console
Welcome to Wazigate! This is a HEAD build. 1.0.4
Connecting to mqtt...
MQTT Connected.
Apps loaded: ▶ (3) [{…}, {…}, {…}]
Gateway ID: dca632d397937c24

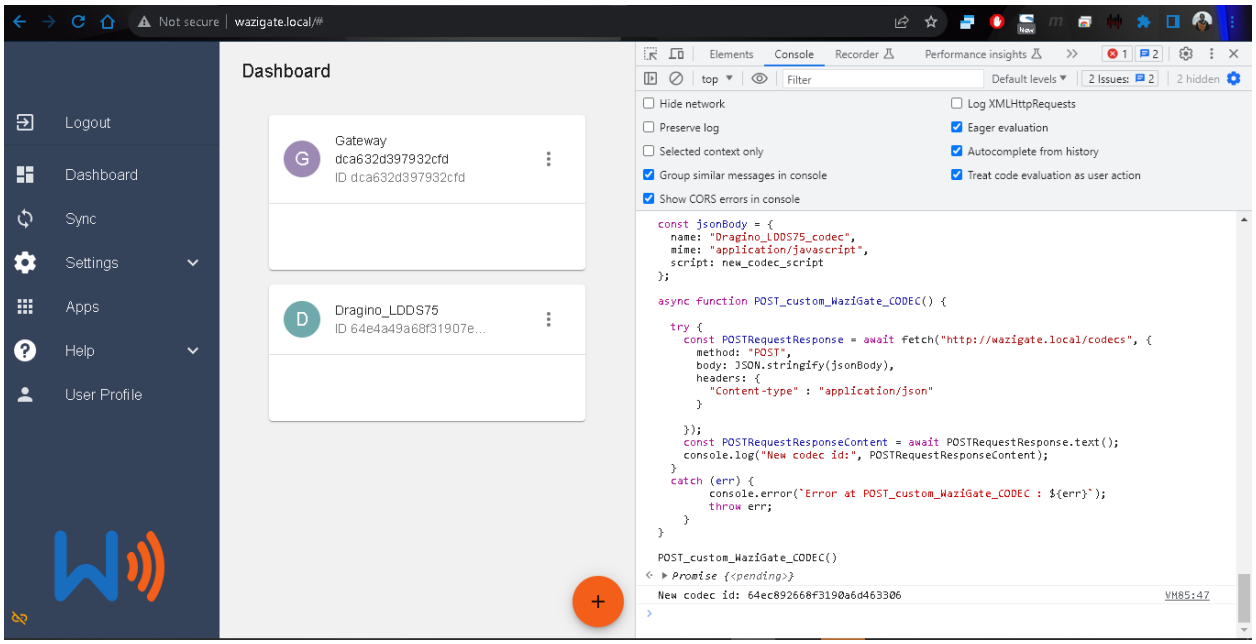
## Step 4 : Select the custom WaziGate codec for the SenseCap

Since the SenseCap S2120 Codec is included in the WaziGate you just have to select it after creating the device.

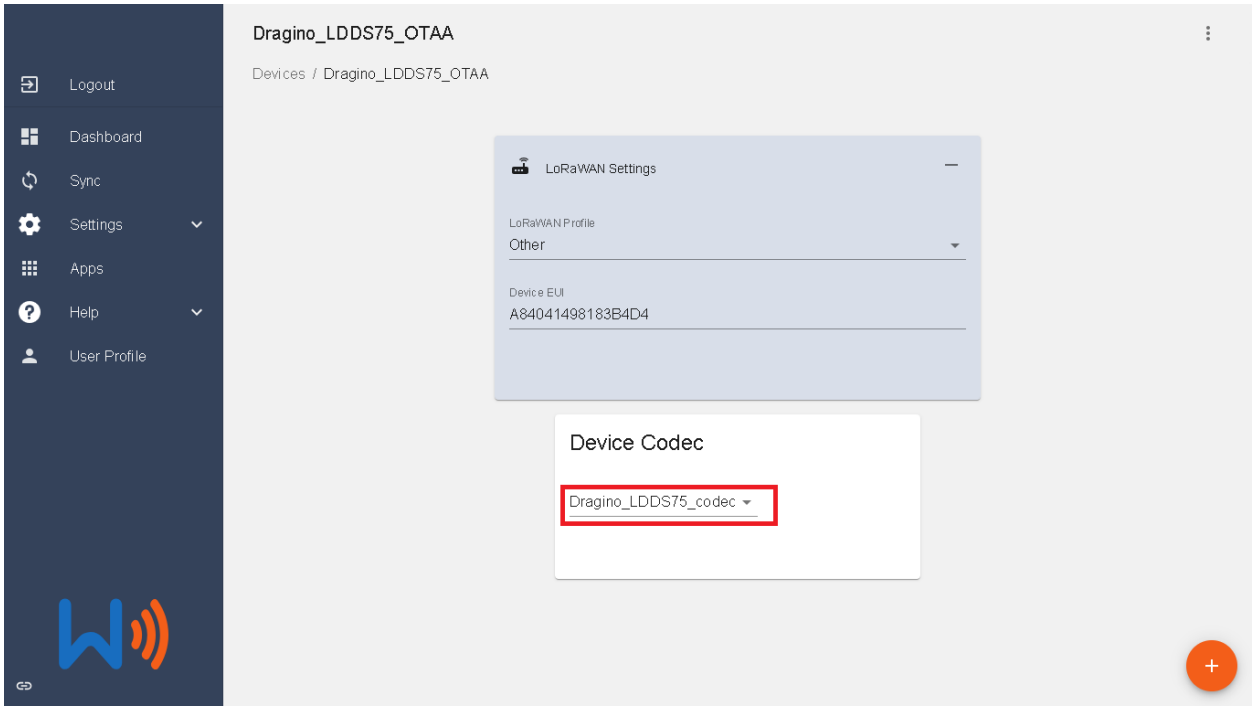
**Upload codecs via the WaziGates API (optional, not needed for Seeedstudio SenseCap S2120):**

Before we can save and view  the sensor data on WaziGate, we need to add a custom decoder function for the bytes that WaziGate is receiving from ChirpStack. The WaziGate Edge GitHub repository has a codec documentation that shows how we can update the codecs.  Note that the custom codec should have a Decoder function that is TTN format (chirpstack codec formats are also supported now).

First we need to add a custom codec to WaziGate. We can use this Javascript code for that. We can run the Javascript code on a web browser's console provided that the WaziGate is connected to the same network as the PC being used.



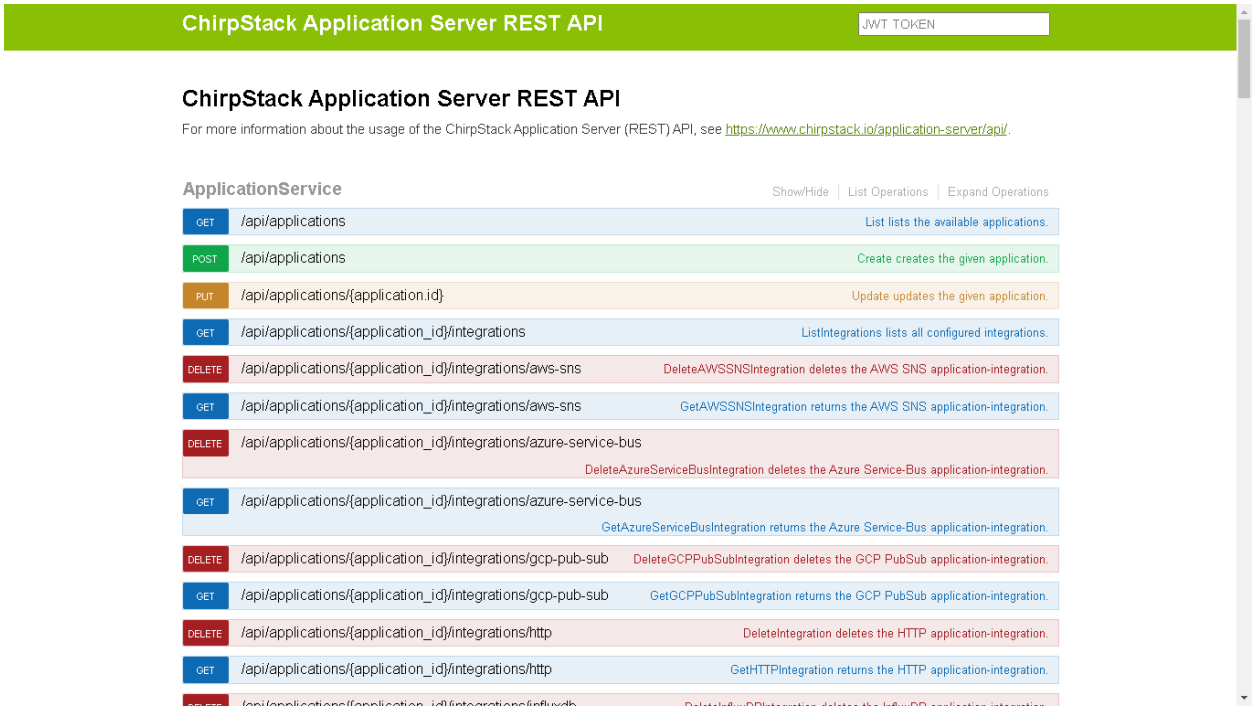

This will add a new codec called **SenseCap S2120** to WaziGate. The last step is to select this codec for the Dragino device that was setup on the WaziGate Dashboard.




## Step 5 : Add the WaziGate device to ChirpStack

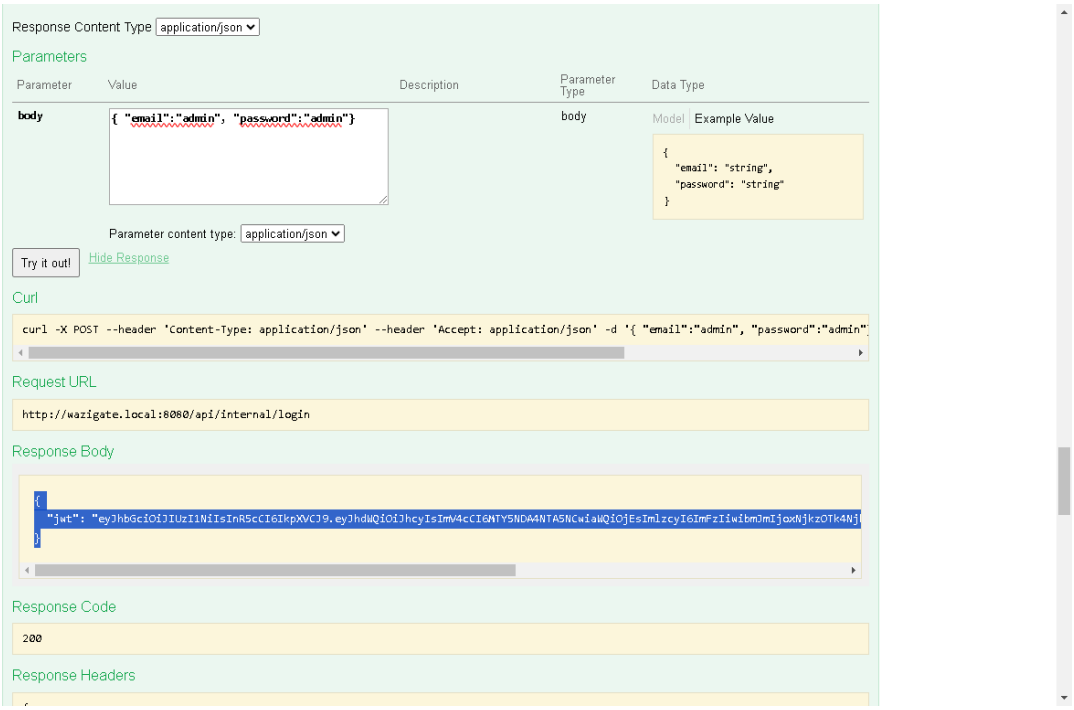
After creating the LoRaWAN device on WaziGate Dashboard, it does not appear on ChirpStack. To fix this we can use ChirpStack REST API to create the device for the Wazigate application.

First, open ChirpStack Application Server REST API Swagger documentation at http://wazigate.local:8080/api

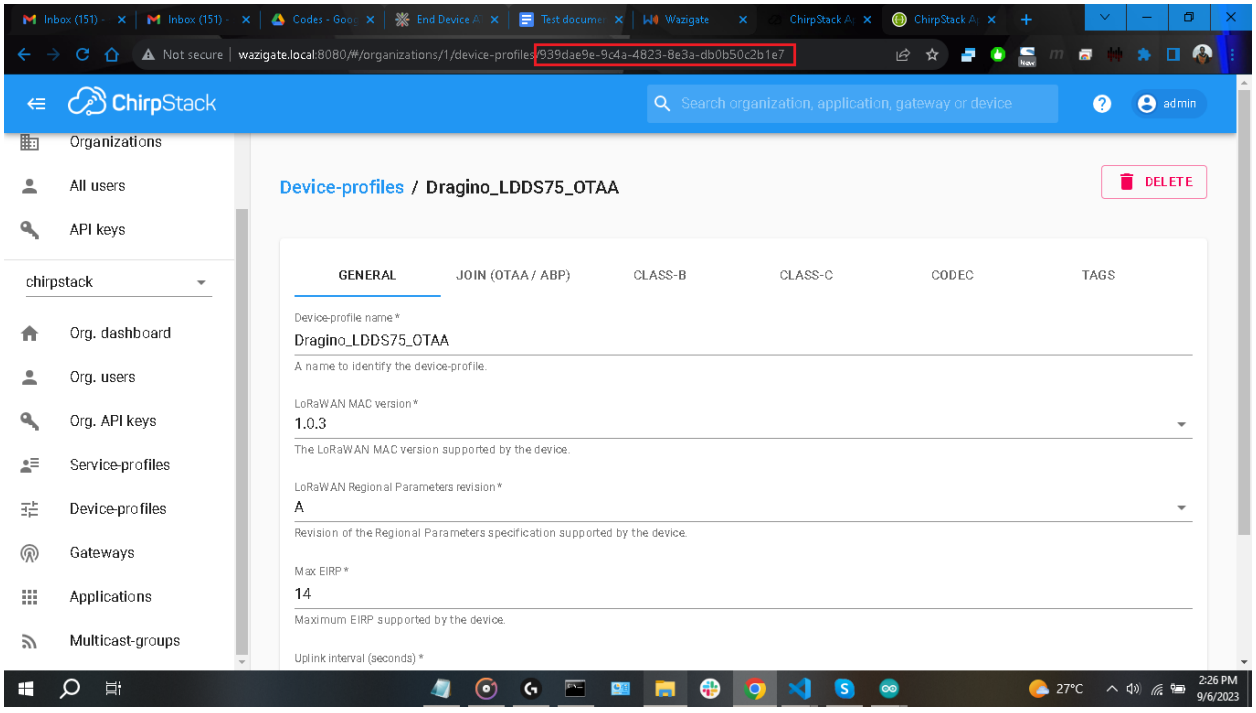



Next, scroll to the section “InternalService” and click “POST /api/internal/login”. Here, we need to provide the login details and a JWT token will be provided if the login credentials are correct. For default login credentials, we can paste the following JSON data in the POST request body.

```
Unset
{"email":"admin", "password":"admin"}
```

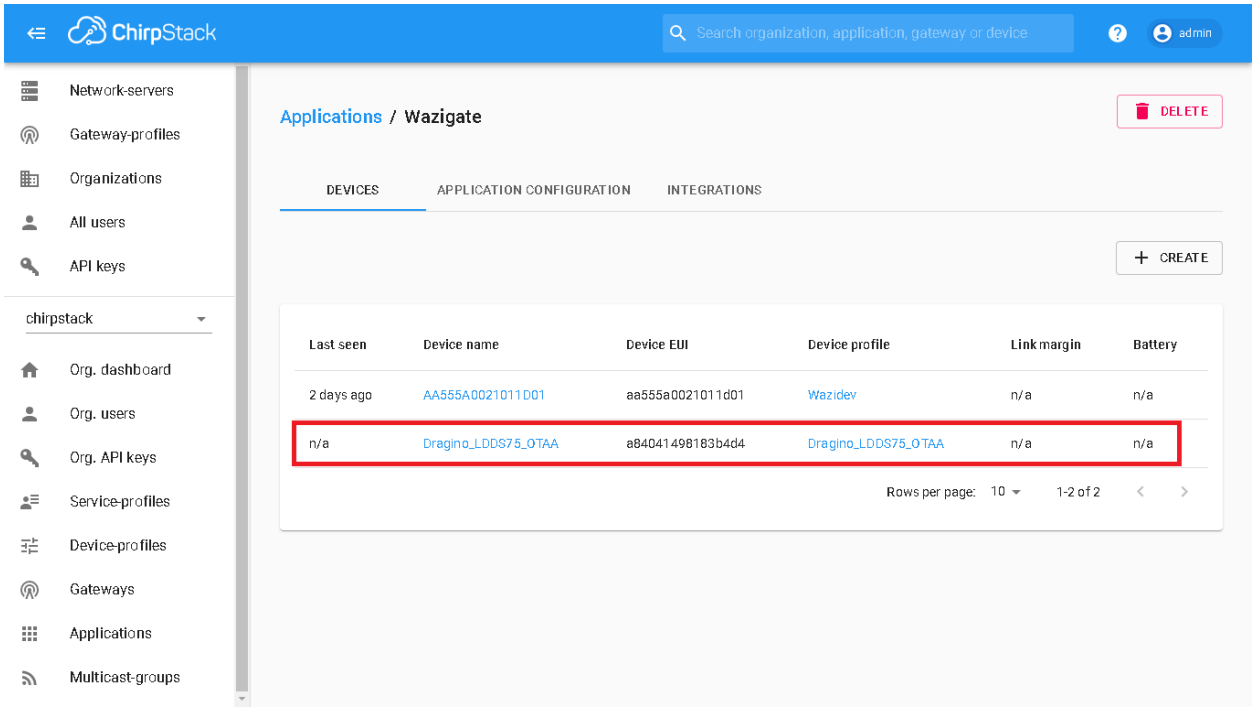



Next we need to copy the JWT token and replace the api_token in this python script with it. Also make sure to change the values of the variables: device_name, dev_eui, app_key and device_profile_id accordingly. The device_profile_id should be the ID of the OTAA device profile that was previously created on ChirpStack.



Finally, run the python script on any computer that is connected to the same subnetwork as the WaziGate. The script will create a device on ChirpStack with the same Device EUI used for the WaziGate device. Afterwards, the script sets the Application Key for this device.

```
PS E:\Work\1. Waziup\WaziGate\Third-party devices test\Dagino LDDS75> python python_ChirpStack_API_integration.py
create_device_response status code :  200
OTAA Device created successfully.
set_otaa_key_response status code :  200
OTAA AppKey set successfully.
PS E:\Work\1. Waziup\WaziGate\Third-party devices test\Dagino LDDS75>
```



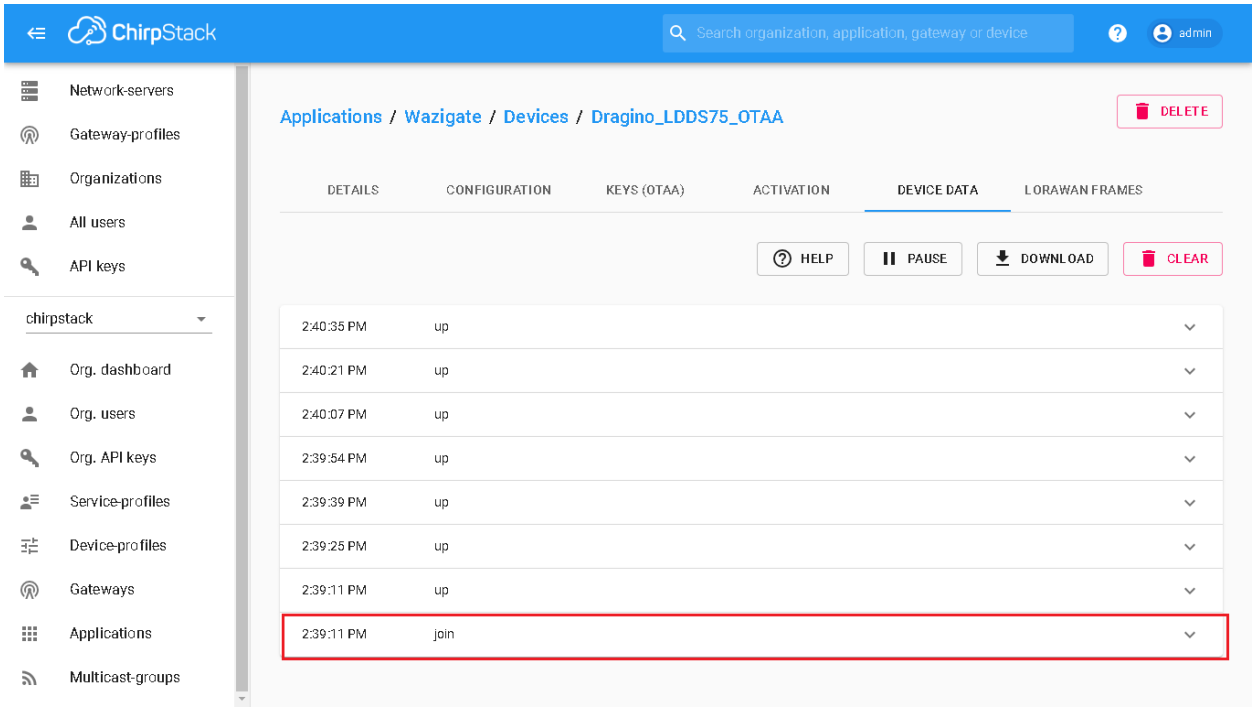

## Step 6 : Power on SenseCap S2120 Weather Station

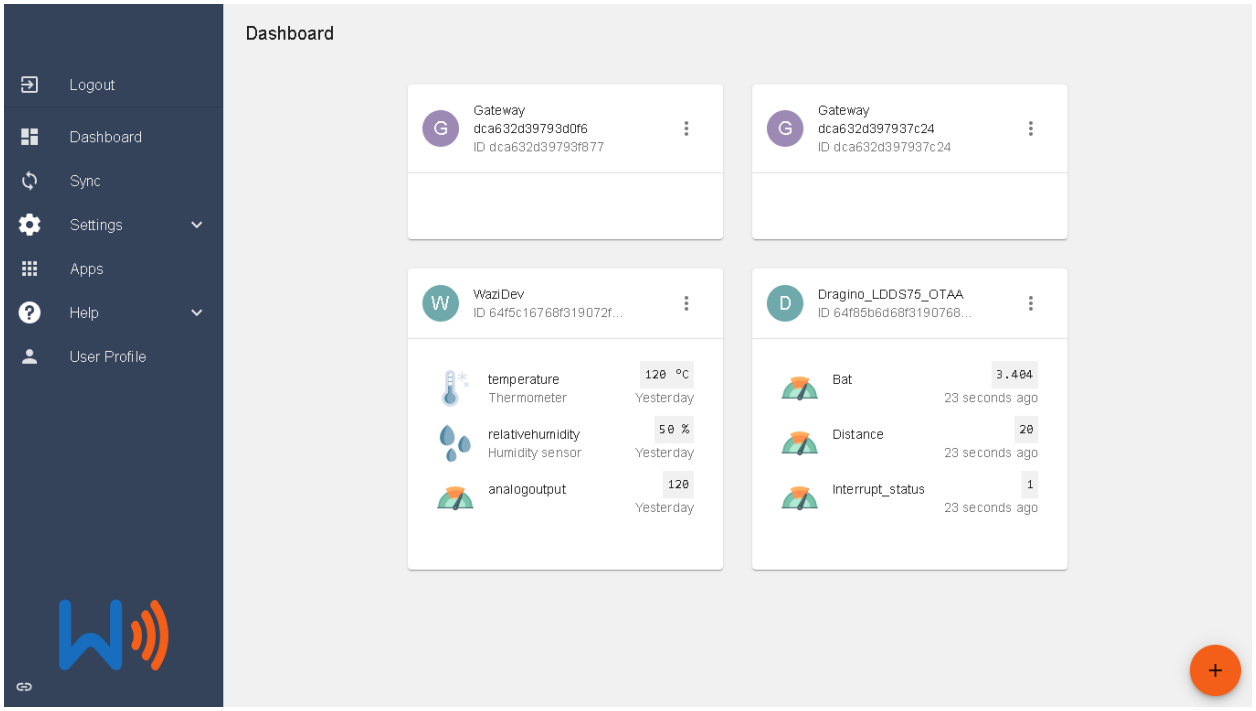
To power the device insert the batteries. To restart the device, press the reset button. The device will send join requests to the gateway afterwards.

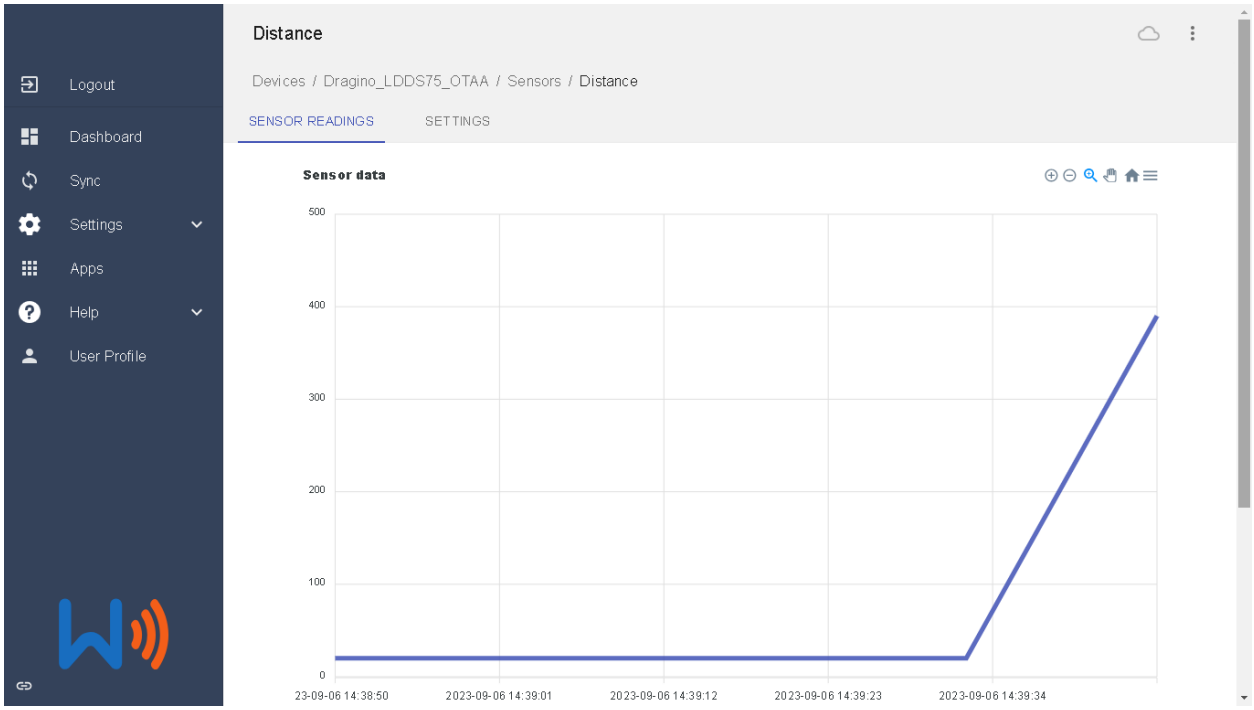
## Step 7 : View SenseCapS2120 Weather Station on the WaziGate Dashboard

The SenseCapS2120 Weather Station join mode should be OTAA. This is the default join mode, but if it was changed, we can use the SenseCAP app to change it.

Once the SenseCapS2120 Weather Station turns on, it will join the WaziGate network and start transmitting sensor data.




Distance
Logout
Dashboard
Sync
Settings
Apps
Help
User Profile
Devices / Dragino_LDDS75_OTAA / Sensors / Distance
SENSOR READINGS
SETTINGS
Sensor data
500
400
300
200
100
0
23-09-06 14:38:50
2023-09-06 14:39:01
2023-09-06 14:39:12
2023-09-06 14:39:23
2023-09-06 14:39:34