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RAK

RAK2470
Wis Node
Bridge
Serial
Prime

RAK2470 Wis Node Bridge Serial Prime User Guide

Contents

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RAK2470 Wis Node Bridge Serial Prime

Specifications

- Product Name: RAK2470 WisNode Bridge Serial Prime
- Power Input: 5 ~ 24 VDC
- Operating System Compatibility: Windows/macOS/Linux

Product Usage Instructions

Hardware and Software Tools Preparation

Before installation, make sure you have the following items ready:

- RAK2470 WisNode Bridge Serial Prime
- USB configuration cable (sold separately)
- Gateway in range (for testing)
- A Windows/macOS/Linux Computer

Installation

1. Fix the RAK2470 to the mounting kit with four (4) M4*20 screws.
2. Using two (2) steel strips, fasten the RAK2470 on the pole. (Pole diameter supported: 55 ~ 80 mm)
3. Link the connector of the RAK2470 to the corresponding port.

Product Configuration

Connect the RAK2470 to the sensor using either direct connection or T-type conversion cable method as described in the manual. Power the device with a 12V DC adapter connected to the DC port of the T-type conversion cable.

Gateway Configuration

1. Access the gateway and navigate to the LoRa menu.
2. Ensure the gateway is set to Built-In Network Server mode. If not, refer to the WisGateOS V2 user manual for mode settings.
3. Create applications within the Built-In Network Server as needed.

Data Interface Connection

The connection to a sensor is made via the L20-4 Port of the T-type conversion cable. Follow the instructions provided in the manual for proper setup.

FAQ

- **Q: How do I power the RAK2470 device?**

  A: The RAK2470 device can be powered with a 5 ~ 24 VDC wide-range input via a 12 VDC adapter. Connect the adapter to the DC port of the T-type conversion cable.

- **Q: What software application is needed for configuring RAK2470 devices?**

  A: IO.Box Desktop is the software application required to configure devices from the RAK24XX series. It is available for download for Windows, Linux, and macOS platforms.

RAK2470 Quick Start Guide Prerequisite

Before going through each and every step in the installation guide of the WisNode Bridge IO Lite, make sure to prepare the necessary items listed below:

Hardware Tools

1. RAK2470 WisNode Bridge Serial Prime
2. USB configuration cable (sold separately)
3. Gateway in range (for testing)
4. A Windows/macOS/Linux Computer

Software Tools

IO.Box Desktop is a software application that will allow you to configure the devices from the RAK24XX series. You can download the application from here:
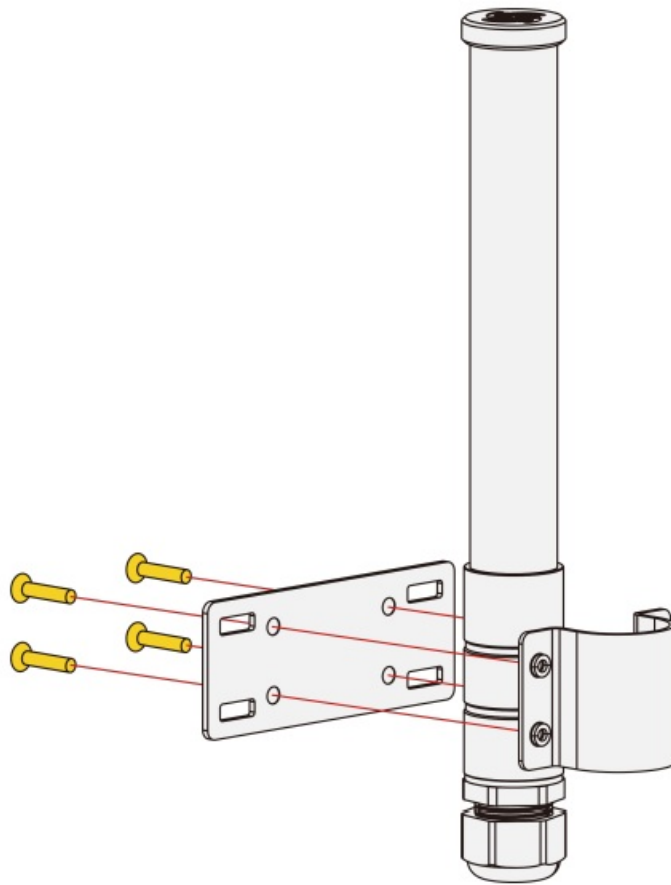
- Windows
- Linux
- macOS

Package Inclusion
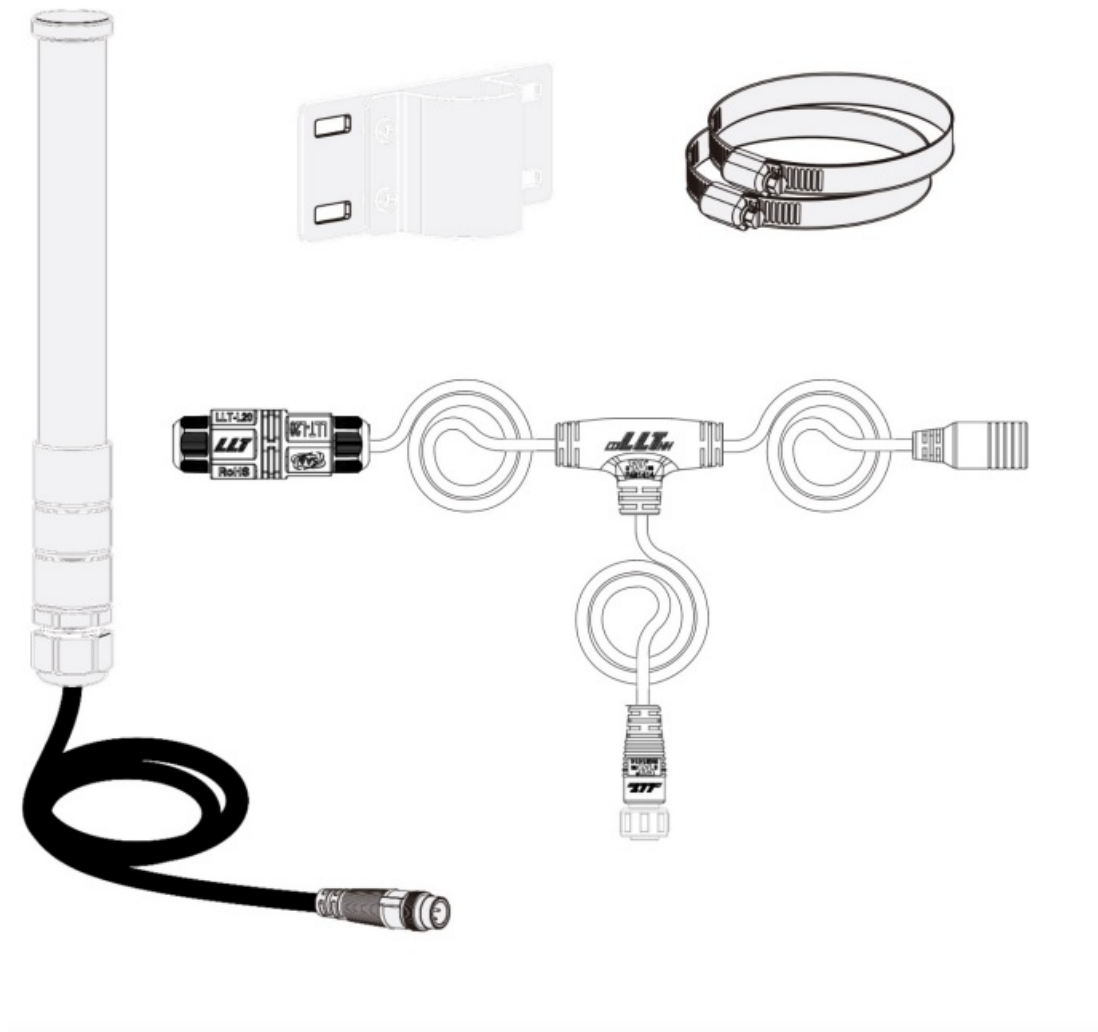
Figure 1: RAK2470 Package Inclusions

- One (1) RAK2470 WisNode Bridge Serial Prime
- One (1) Mounting Kit
- One (1) T-Type Conversion Cable
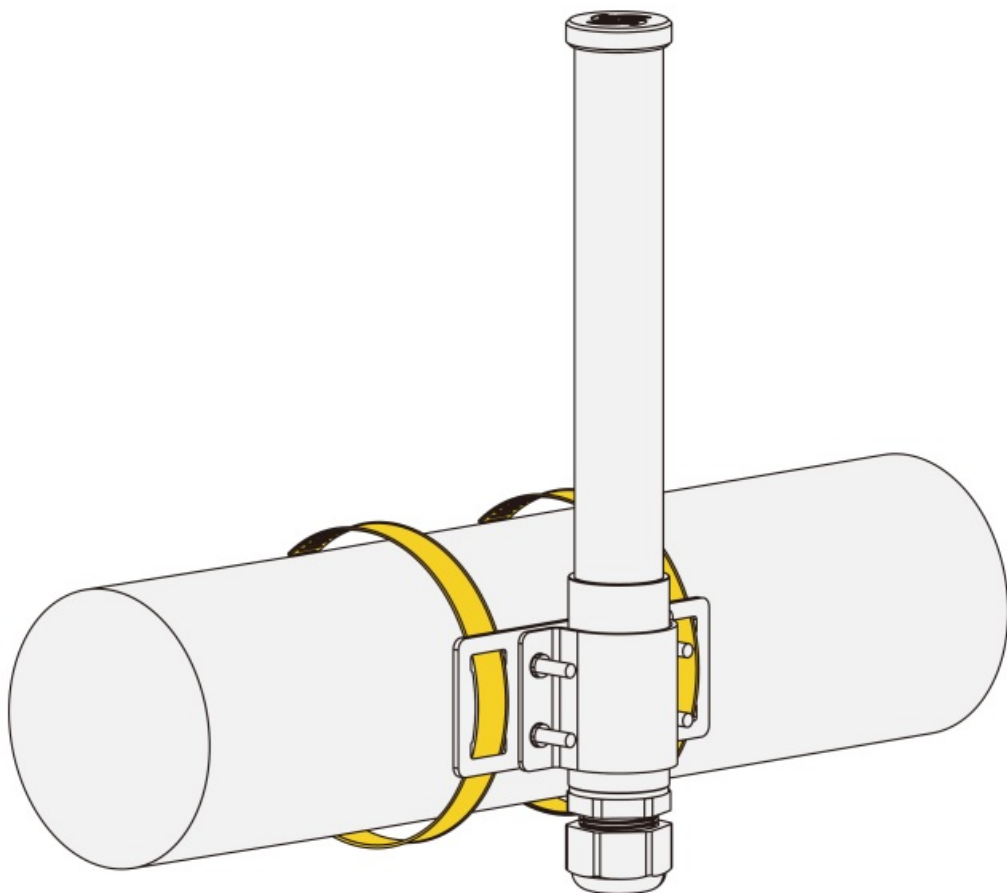- One (1) Power Adapter

Installation

RAK2470 allows for pole mounting. Follow the provided installation steps to ensure secure mounting.

1. Fix the RAK2470 to the mounting kit with four (4) M4*20 screws.

Figure 2: Fixing the device to the mounting kit

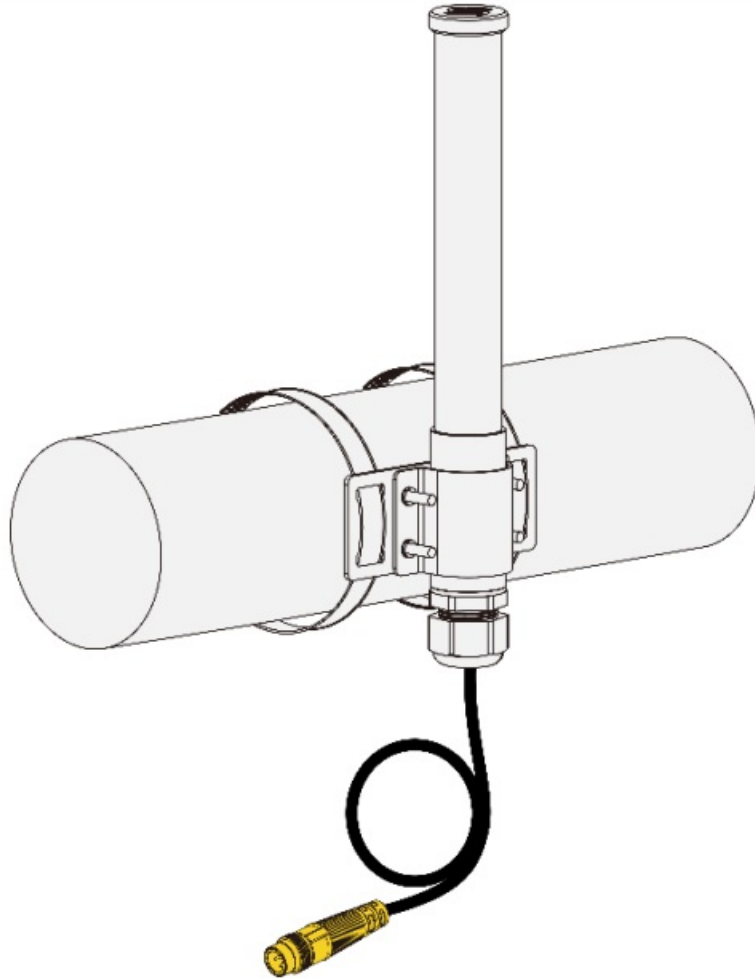2. Using two (2) steel strips, fasten the RAK2470 on the pole.

Figure 3: Using the steel strips

NOTE

The pole diameter supported by the included steel strips is 55 ~ 80 mm.

3. Link the connector of the RAK2470 to the corresponding port.

Figure 4: Adding the connector

Product Configuration

Typical Network Application
RAK2470 WisNode Serial Prime converts data from the RS485 protocol into LPWAN wireless messages and delivers it to a cloud server through an LPWAN gateway. Using the RAK2470, you can connect up to 32 RS485 sensors and convert data from a conventional RS485 wired network to a wireless network. Using RAK2470, what used to be a costly and time-consuming cable line network deployment can be transformed into a rapid and cost-efficient wireless network deployment.
An example would be using the RAK7289V2 WisGate Edge Pro LoRaWAN gateway coupled with the RAK WisDM cloud management platform, to realize an end-to-end industrial field data acquisition and control system. Using the built-in LoRa Server, you could seamlessly achieve transmission of the end device data to any application server. The server comes standard with any RAK LoRaWAN gateway. Furthermore, the MQTT integration allows for high security and efficiency.
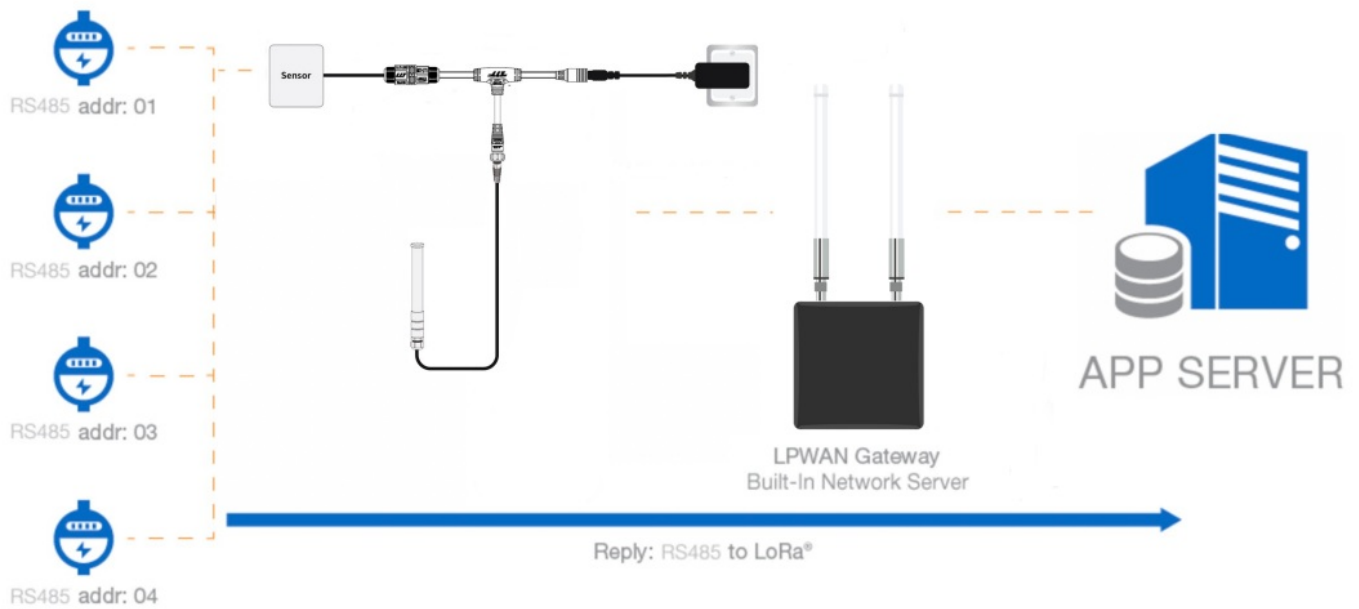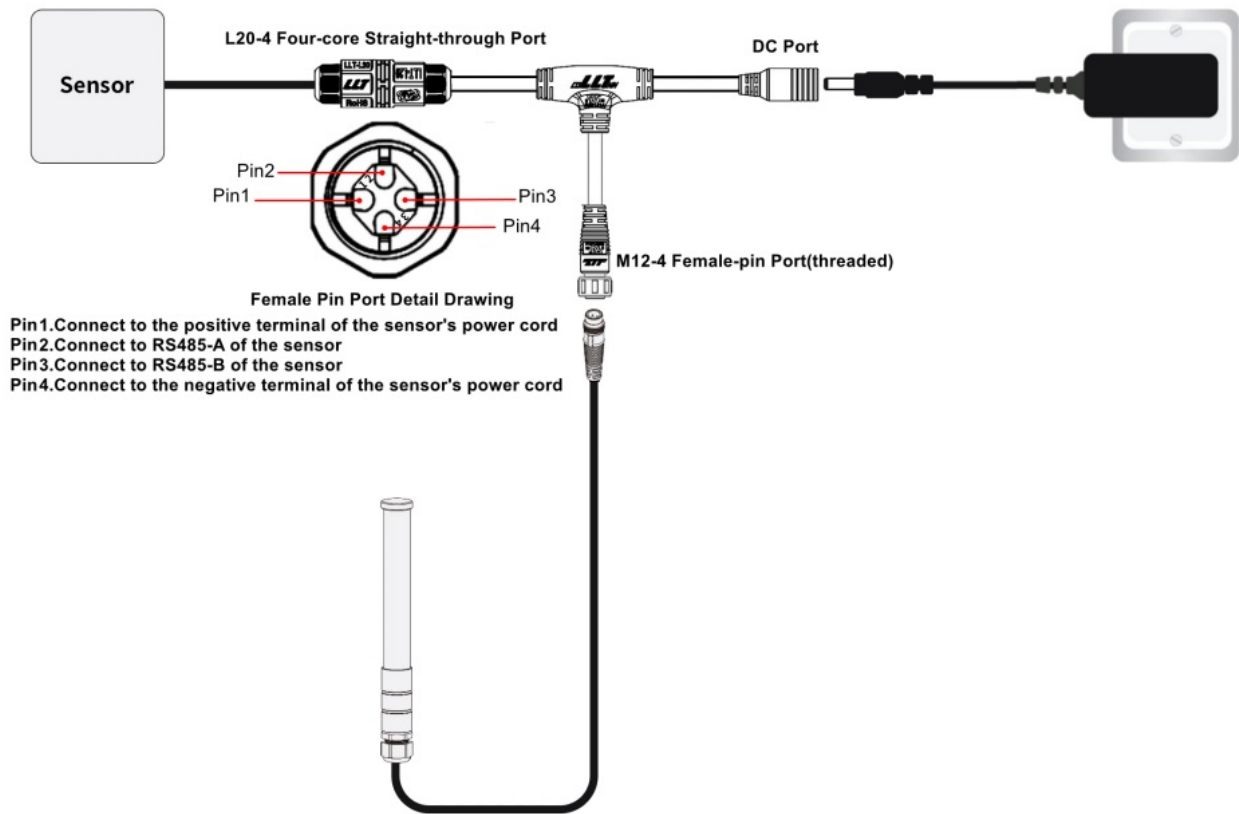
Figure 5: RAK2470 WisNode Bridge Serial Prime network structure

Connect the RAK2470 to the Sensor

There are two ways to connect devices to RAK2470:

- When the device has its own power source (e.g. a MPPT solar charge controller), it can be directly connected to the connector on the RAK2470.
- When the device cannot provide power, it needs to be powered through the T-type conversion cable as follows:

1. The Modbus device or RS485 sensor is connected to the L20-4 four-core straight-through port of the T-type conversion cable.
2. RAK2470 connects to the M12-4 female-pin port (threaded) of the T-type conversion cable.
3. The DC port for connection to a power supply.

L20-4 Four-core Straight-through Port

DC Port

Sensor

Pin2
Pin1
Pin3
Pin4

M12-4 Female-pin Port(threaded)

Female Pin Port Detail Drawing

Pin1.Connect to the positive terminal of the sensor's power cord
Pin2.Connect to RS485-A of the sensor
Pin3.Connect to RS485-B of the sensor
Pin4.Connect to the negative terminal of the sensor's power cord

Figure 6: Connecting the bridge to a device

Power Interface Configuration

The RAK2470 device can be powered with 5 ~ 24 VDC wide-range input via a 12 VDC adapter. Simply connect the adapter to the DC port of the T-type conversion cable.

DC Port

Figure 7: Power interface connection

Data Interface Connection

The connection to a sensor Is via the L20-4 Port of the T-type conversion cable, shown in Figure 8.
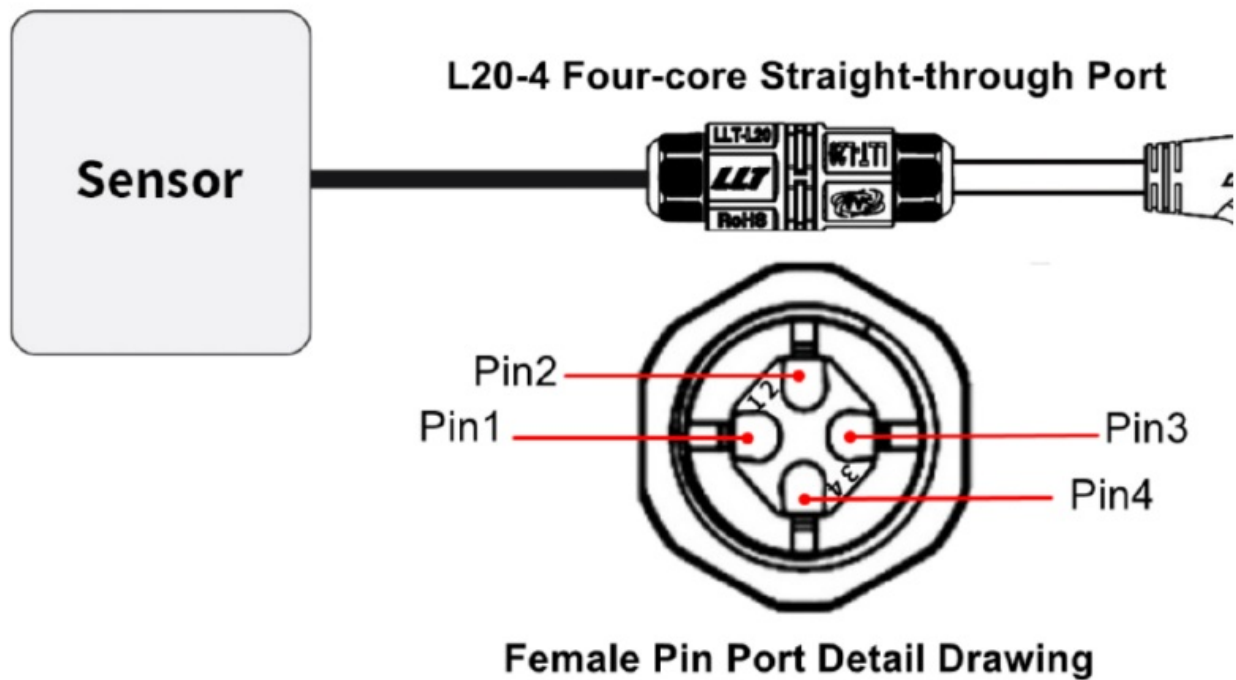
L20-4 Four-core Straight-through Port

Pin2
Pin1
Pin3
Pin4

Female Pin Port Detail Drawing

Pin1.Connect to the positive terminal of the sensor's power cord
Pin2.Connect to RS485-A of the sensor
Pin3.Connect to RS485-B of the sensor
Pin4.Connect to the negative terminal of the sensor's power cord

Figure 8: Data interface connection

Gateway Configuration

Set Up the Built-in Network Server

1. Start by accessing the gateway. You can see how to do it on the WisGateOS V2 user manual.
2.
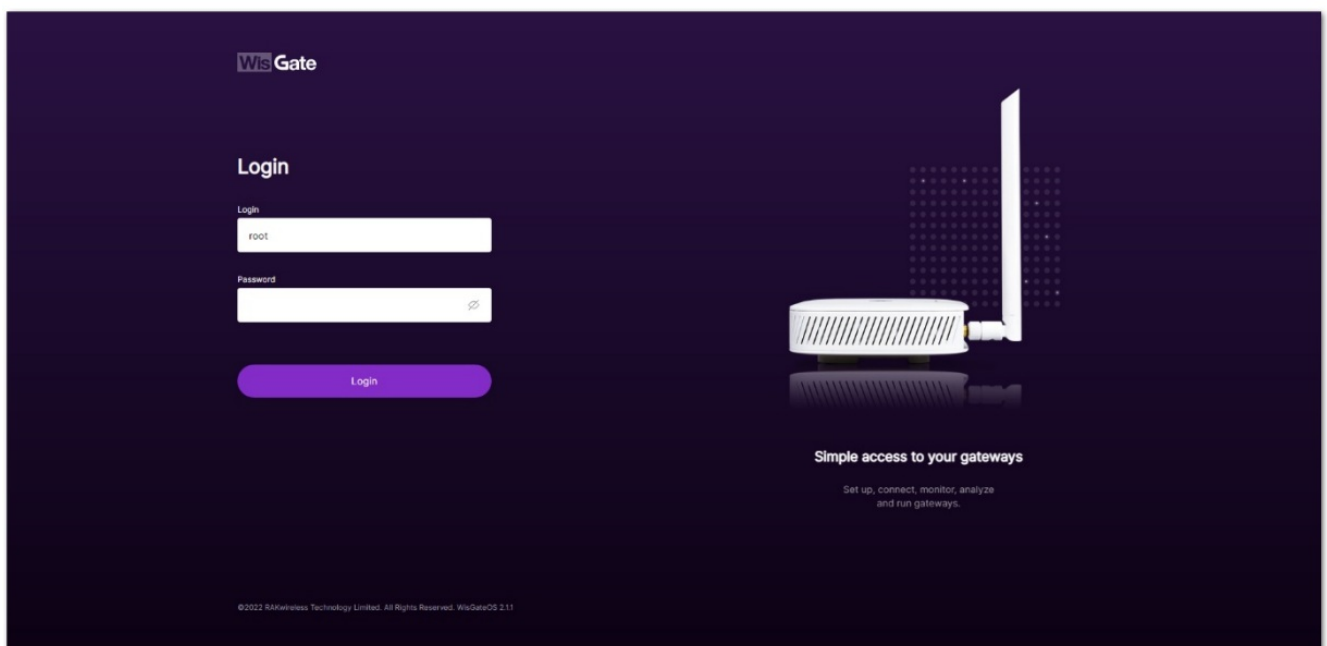
Figure 9: WisGateOS2 login page

Once logged in, head to the LoRa menu.
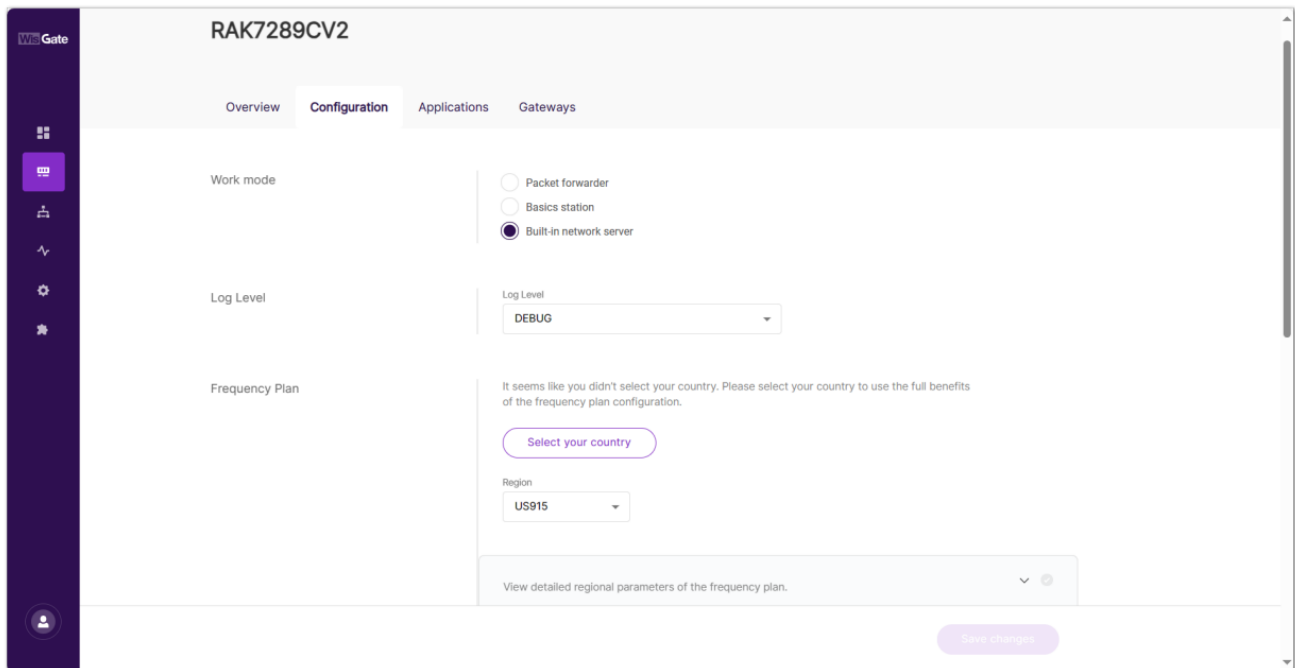
Figure 10: LoRa page

3. By default, the gateway works as a Built-In Network Server. If that is not the case, check the Built-in Network Server Mode Settings on the WisGateOS V2 user manual to switch the mode.

Adding Application

1. Once the gateway is in Built-in network server mode, head to the Applications tab.
2.
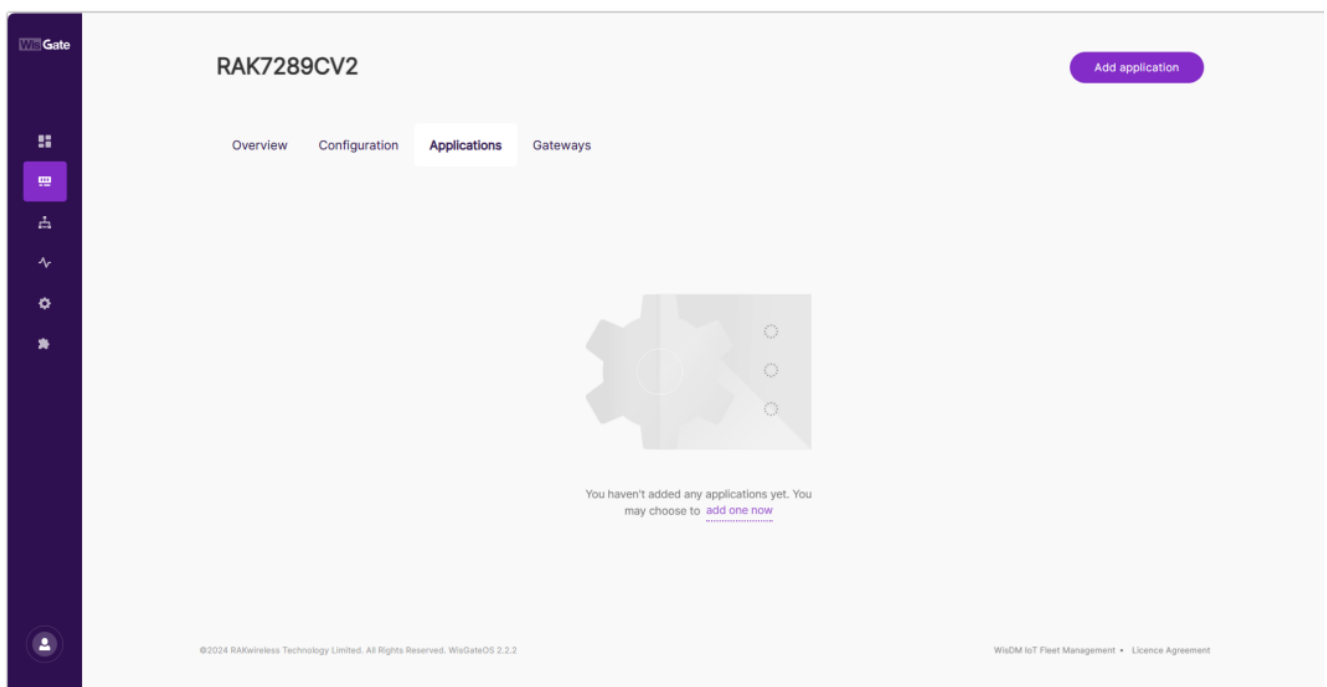
Figure 11: Create Application in the Built-In Network Server

Click the Add application button or add one now link to add a new application. On the new page, fill in the following information:

- Application name – type a name for the application.
- Application description – optionally you can write a description of the application.
- Application Type – from the drop-down menu select the type of application.

- Unified Application key – all devices will use the same application key. Selecting this option pops up an Application Key field. You can type your application key there or use the Autogenerate button to generate one.

Figure 12: Unified application key

The Auto Add Device switch activates the Application EUI field. The device will be automatically added to the application after the application EUI and key verification.

-

Figure 13: Auto add device

Separate Application keys – each device will have its own application key. The key is added when registering the device.

- Payload type – from the drop-down, select CayenneLPP payload type and turn on the Only forward data object feature.

Figure 14: Adding application

3. Once set, click Save application to add the application.

4. After the application is added, head to the End devices tab. The devices should automatically register upon join request if you are using the Auto Add Device feature.
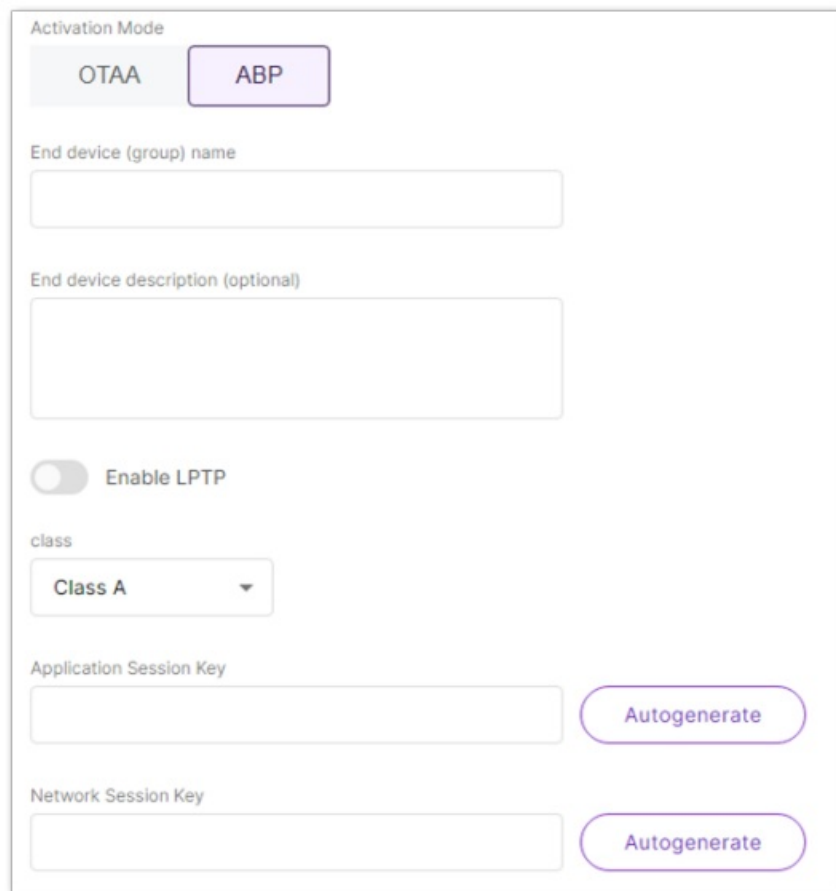
Figure 15: Successfully added end device

If that's not the case, click the Add end device button. On the End device information page fill in the following

information:

Activation Mode – choose the activation mode of your device:

- OTAA
- ABP – This mode pops up two additional fields:
- Application Session
- Key Network Session Key

Figure 16: Adding ABP device

- End device (group) name – the name of the device.
- End device description (optional) – optionally, you can add a description for the device.
- Class – the class of the device.
- Frame Counter width – the width of the frame counter. Leave it as default.
- LoRaWAN MAC Version – the LoRaWAN MAC version. V1.0.2 pops up a LoRaWAN Regional Parameters reversion field where you need to select the reversion of the device.

Figure 17: Successfully created application

Adding the Device

1. Once everything is set, click Add end devices to go to the page and add the device.

Figure 18: Adding end device

2. On the Adding end devices page, type the device EUI at the End Device EUI (main) and click Add to "End Devices list".

- If the EUI is correct, the device will show in the End devices list.
- If the EUI is not correct, the devices will show in the End devices with an error.

3. Once the device is added to the End devices list click Add end devices. Confirm you are adding the device.
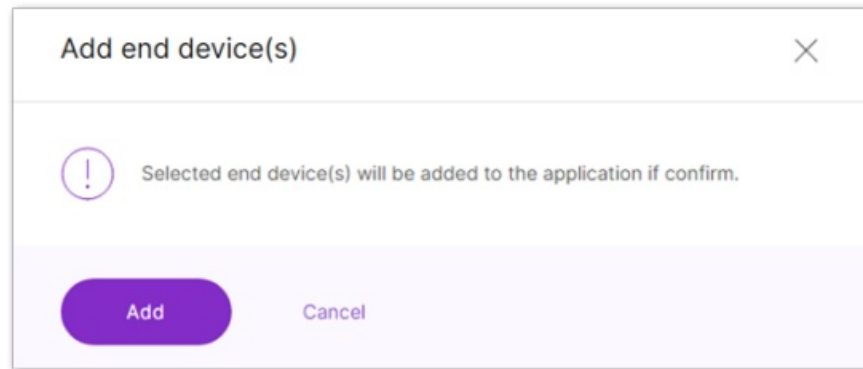
Figure 19: Confirmation message for adding a device

RAK2470 Configuration
Connect the RAK2470 to Your Network

1. Download and open the IO.Box application.
2. Connect the RAK2470 to your PC via the USB splitter cable positioning it between the bridge and the conversion cable
3.
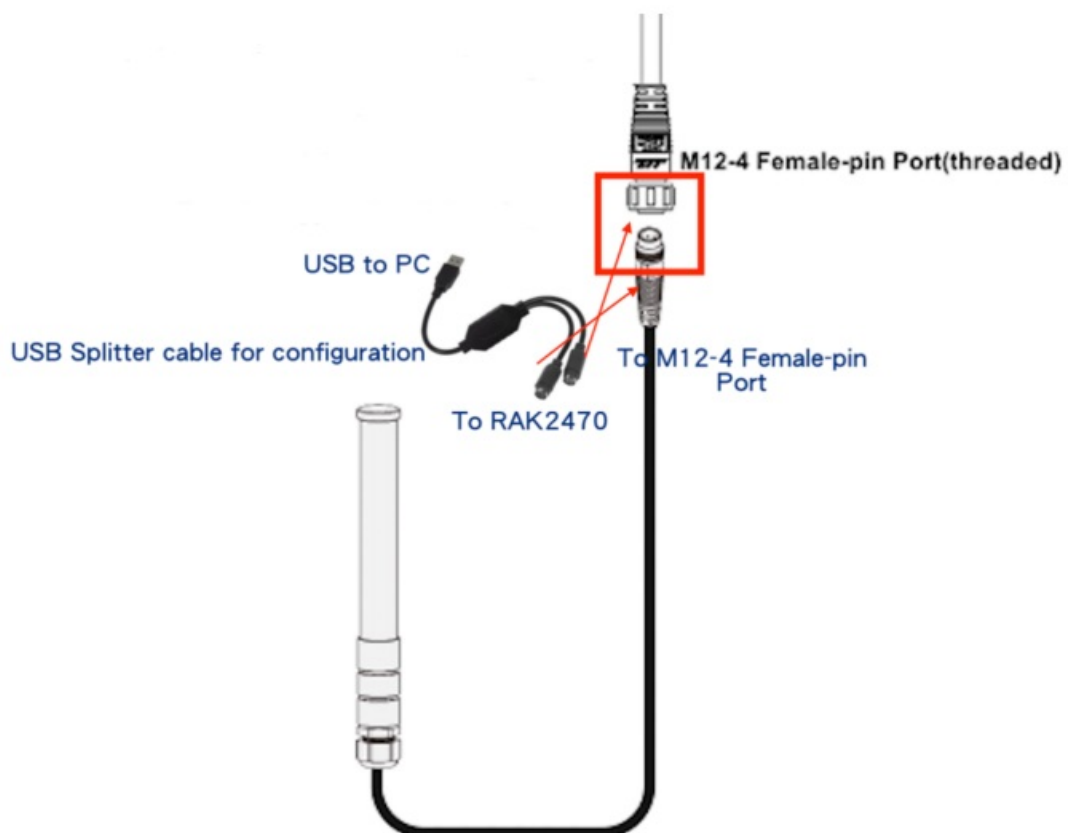
Figure 20: Connecting the USB cable

Click Connect Device in the IO.Box console.
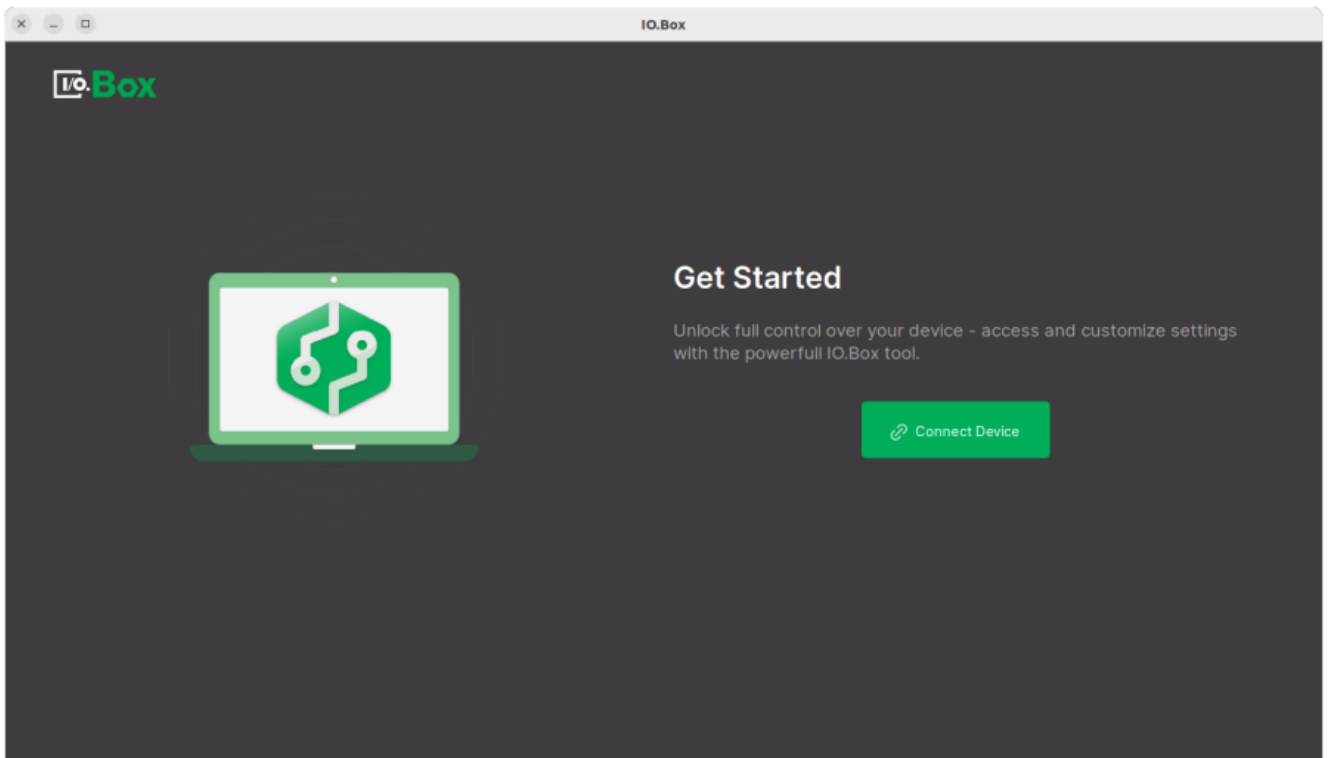
Figure 21: IOBox get started

If an error occurs that shows no device detected, a common issue is that the RAK2470 has been connected to the PC for more than 30 seconds without action and needs to be re-plugged.

4.
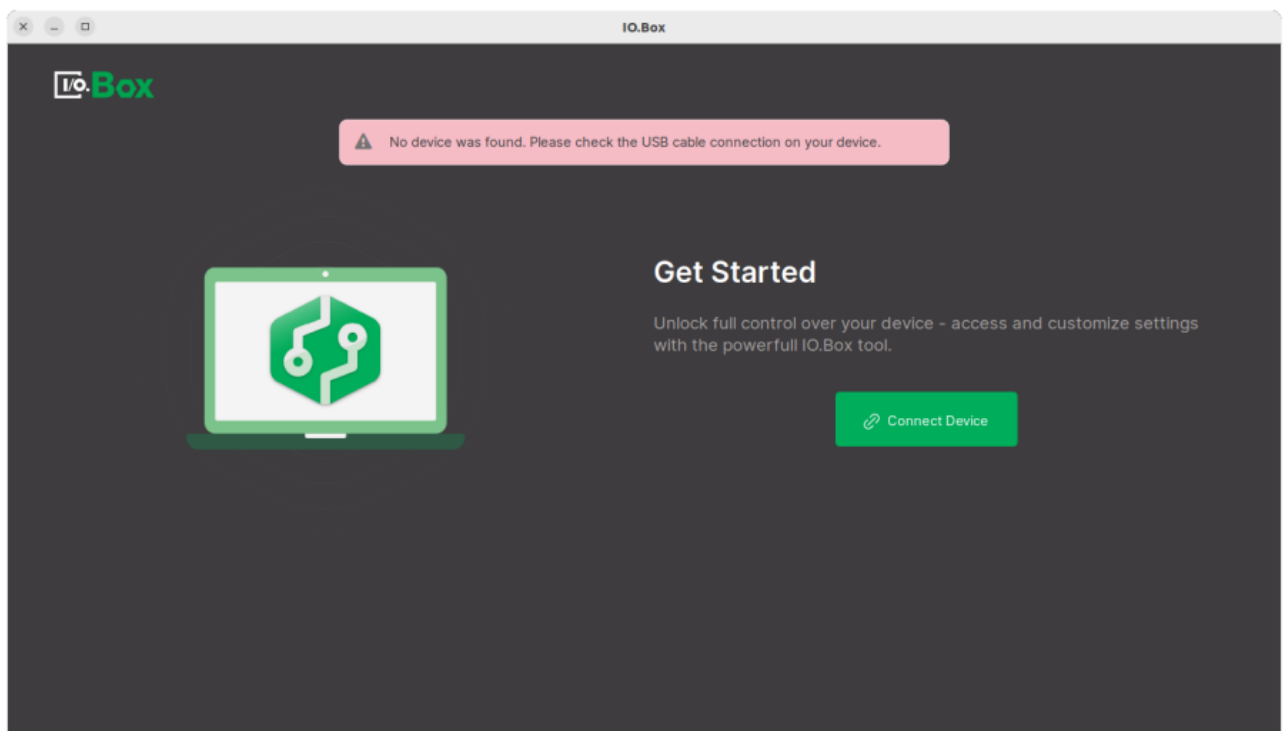
Figure 22: No device error

On the IO.Box dashboard screen, you can see information about the devices connected to the PC in the form ofa list of connected devices with device models and EUIs. Choose the device that you wish to configure via the Connect button next to it.
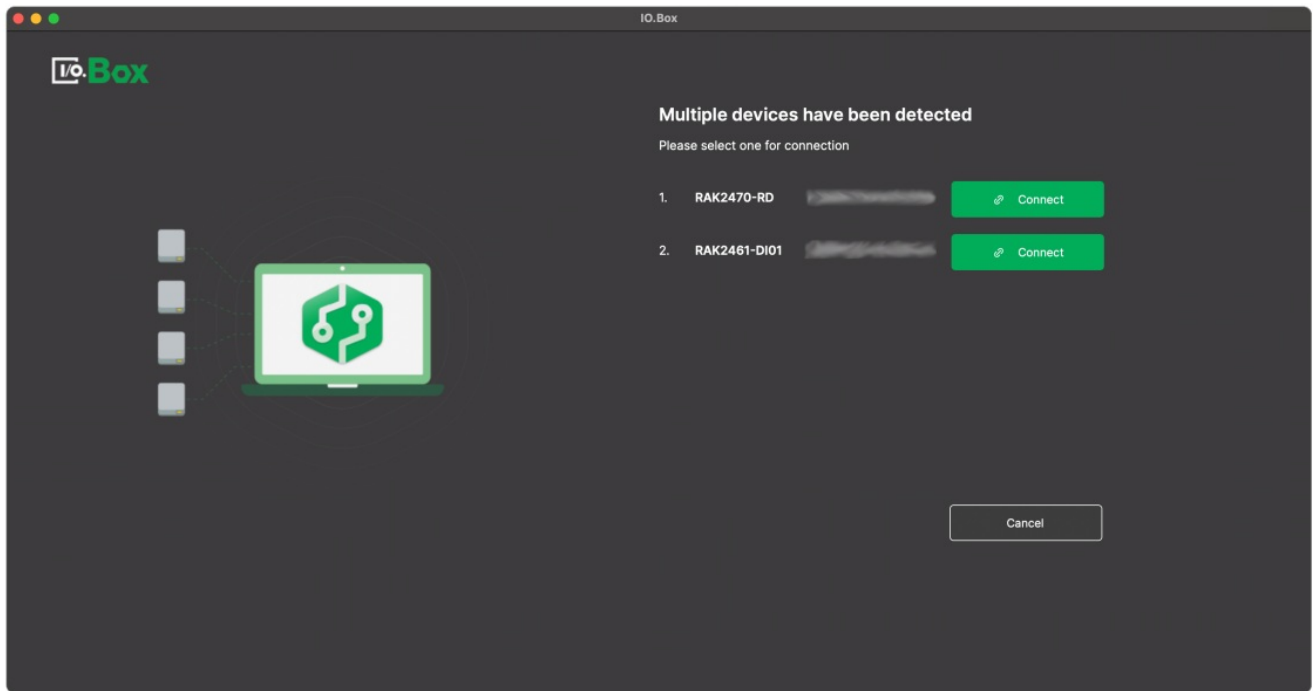
Figure 23: List of connected devices

5. On the main menu to the left, choose LoRaWAN to configure the LoRaWAN settings as needed. Do not forget to click Save below the changes.

- Device EUI – This is the unique identifier provided by RAKwireless.
- Region – The LoRaWAN region/band.
- Class – The LoRaWAN Class (C).
- Join Mode – Choose between OTAA and ABP according to LoRaWAN protocol.
- Application EUI – Enter the unique identifier assigned by the application server.
- Application Key – Enter the unique secure key assigned by the application server.
- Confirm Mode – Activate to receive confirmation messages from the network server for each uplink.
- ADR – Enable Adaptive Data Rate allowing the network server to control the data rate for your device. DataRate – Manually set the data transmission rate. Lower rates extend coverage but increase transmission time and power usage. Choose based on the distance and signal quality to the gateway.
- TX Power Level – Adjust the transmission power level. The lower the number the higher the power. 0 is the maximum allowed in the selected region and each incrementation of 1 to the number reduces the power by 2 dBm.
- Data Report Interval – Set up the global data report period of the device.
- Range: 60–86400 in seconds.
- LoRaWAN Status – Indicates the activity of the device in the LoRaWAN network.
- To check the previously configured Application EUI and Key, run the commands:
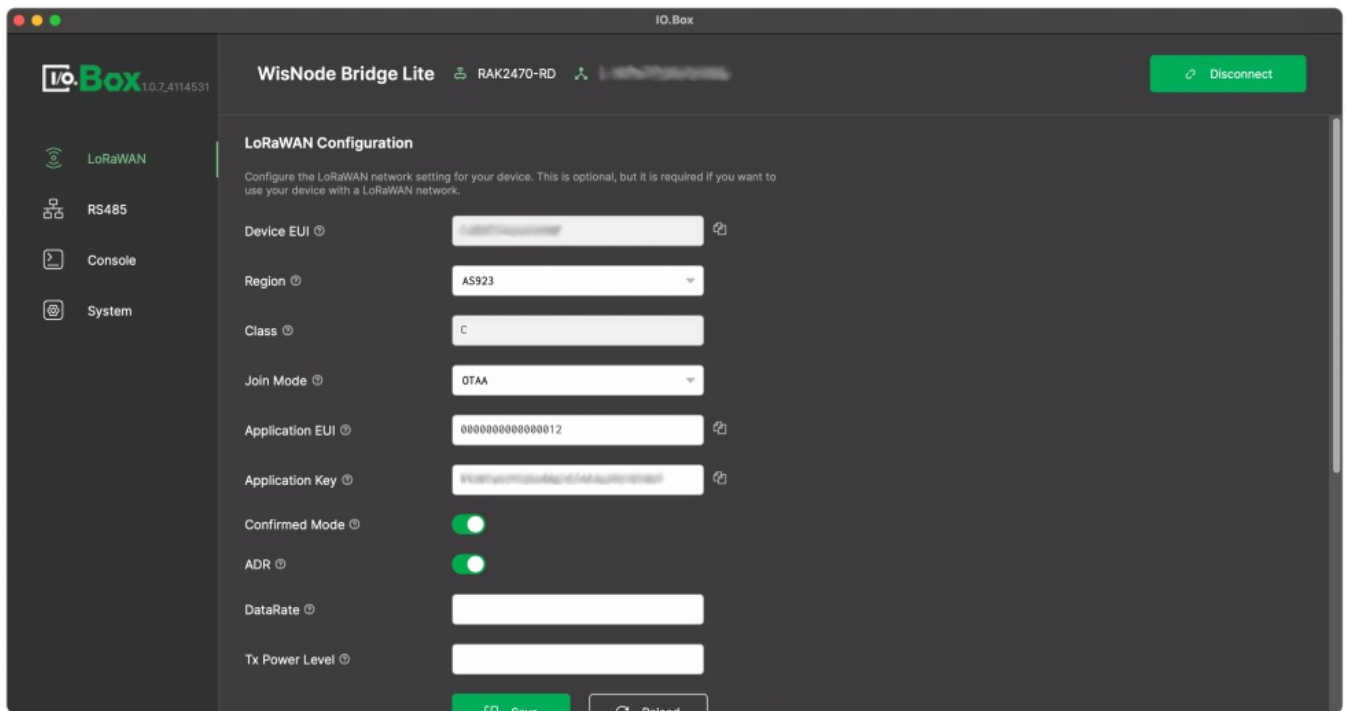
Figure 24: LoRaWAN tab

1. Make sure you've added the RAK2470 Bridge Serial Prime to the LoRaWAN Network Server of choice (Built-in LNS in this example).
2. After the device has successfully joined the LNS, you will see the LoRaWAN status toggle as activated. You might need to refresh the page.
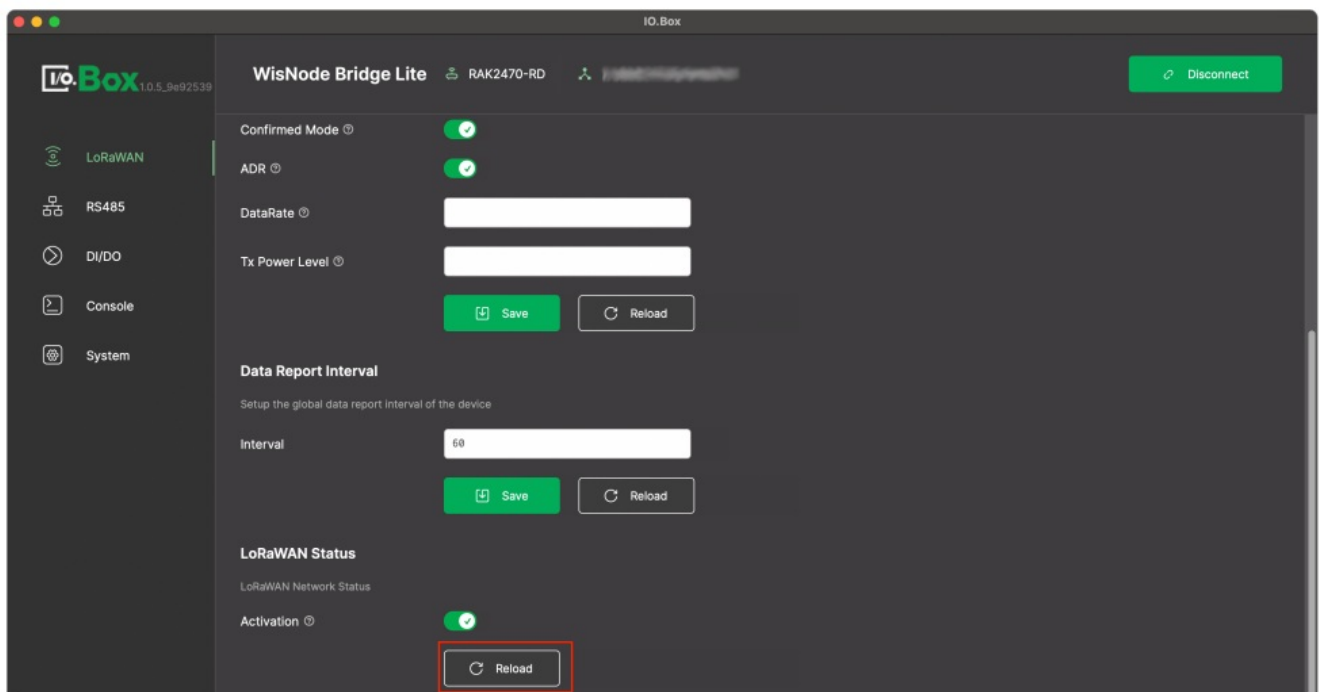

Figure 25: LoRaWAN status

RS485 Configuration

RS485 Interface Configuration
Go to the RS485 tab from the main menu and configure the interface according to the sensor/device you are

connecting to. Do not forget to save your changes. In this tab you will find:

- **Baudrate** – Select the communication speed for the RS485 interface, measured in bits per second. Choose a rate that matches your device's requirements.
- **Databits** – Select the number of data bits for each character in the RS485 communication. Typically, options include 7 or 8 bits, depending on your device's protocol requirements.
- **Stopbits** – Select the number of stop bits used in the RS485 communication. Common options are 1 or 2, depending on your device's data transmission protocol.
- **Parity** – Select the parity setting for the RS485 interface. Options typically include None for no parity, Even for even parity, or Odd for odd parity. Choose based on your device's communication requirements.
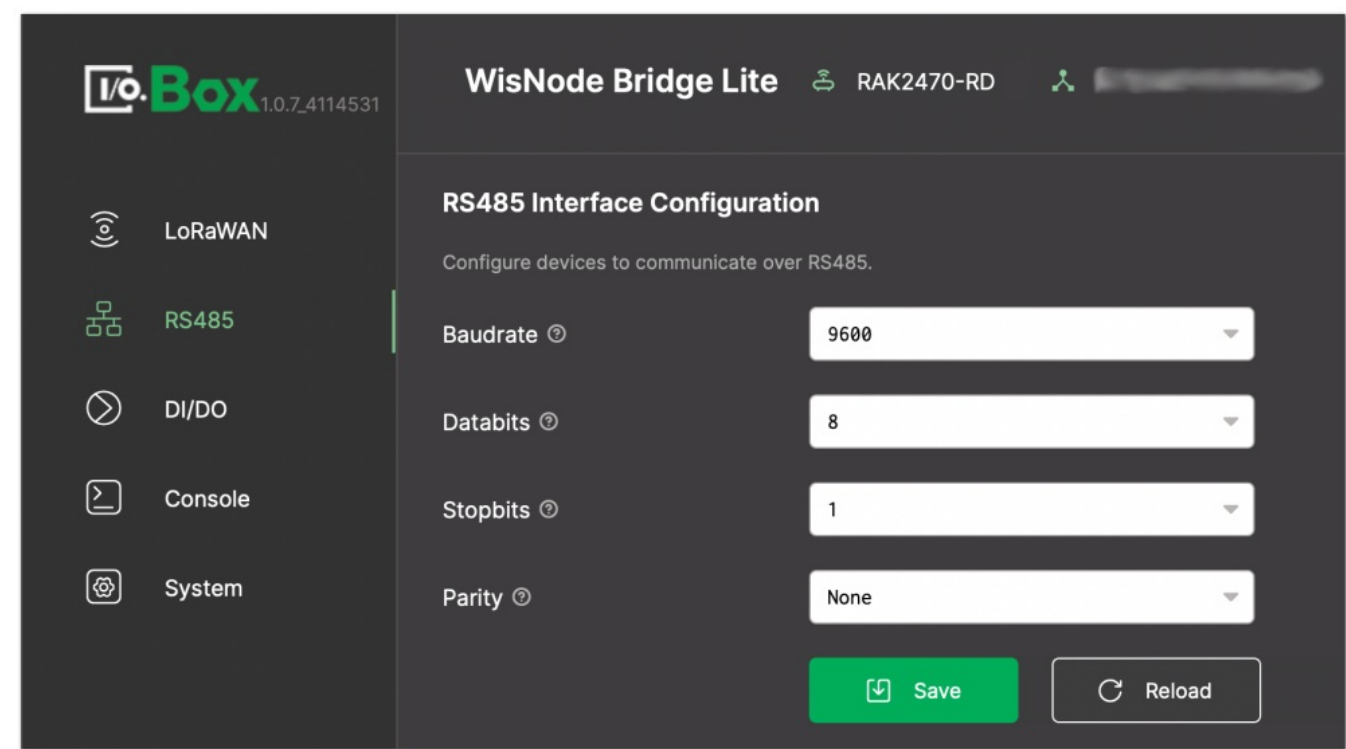
Figure 26: RS485 interface configuration

Add Modbus Poll Task

In the Modbus Poll Task menu click + Add for a new poll. You will see the Polling Task parameters that need to be configured.

-

Figure 27: Add poll task

Task ID – Enter the identifier for the polling task. This ID is included in the device's uplink data to indicate the

task.

- Device Address – The Modbus slave address in decimal format. Range: 1-254.
- Function Code – The Modbus function code defines this poll's operation.
- Register Addr – The address of the register that you wish to access in hexadecimal format.
- Quantity – The number of register addresses that you want to access.
- Data Type – The data type of the Modbus response.
- Scale – To adjust the raw data from the Modbus response to the desired units. For example, to convert kilograms to grams set the scale to X1000.
- Remark – Length: 15 characters.
- Enable – Enable or disable this polling task.
- Sensor Type – Choose the unit of the data obtained from the Modbus slave device. If no exact match is available, select Generic xxxx as a default option.
- Modbus Request – Displays the Modbus command generated based on the settings you've selected above. This command will be used to communicate with the Modbus device.
- Modbus Response – Displays the response received from the Modbus slave device.
- Value – This shows the data extracted from the Modbus Response is parsed according to the above configuration.
- Uplink Data – Displays the data payload format that will be sent to the server, based on the configuration above.
- Check – Modbus CRC check. Before saving the task click Check for automatic validation.
- Save – Save the polling task.

Figure 28: Polling task parameters

NOTE

The RAK2470 WisNode Serial Prime has one channel that is used both for the RS485 communication with the sensor and in the setup procedure. This is why you cannot see the requested data (polled data) from the sensor during setup. You need to remove the configuration cable and connect the bridge and the sensor directly via the conversion cable to be able to take the bridge out of configuration mode and receive data.

Creating a Raw Data in Binary Poll Task

Fill in the register address and other relevant fields according to the specific sensor's datasheet, then after clicking the Check button, you will see the Reply Frame on the IO.Box.

Figure 29: Fill-in sensor specific data

Figure 30: Disconnect the device

After saving the polling task and disconnecting the device to pull it out from configuration mode, wait awhile and you will see the uplink data from the LoRaWAN network in the gateway Web UI. The format of the uplink message would be as follows: TaskID + Sensor Type + Length + Value

```sh
01 + f1(Raw Data in Binary) + 07 + 010302007d7865                                    sh
```
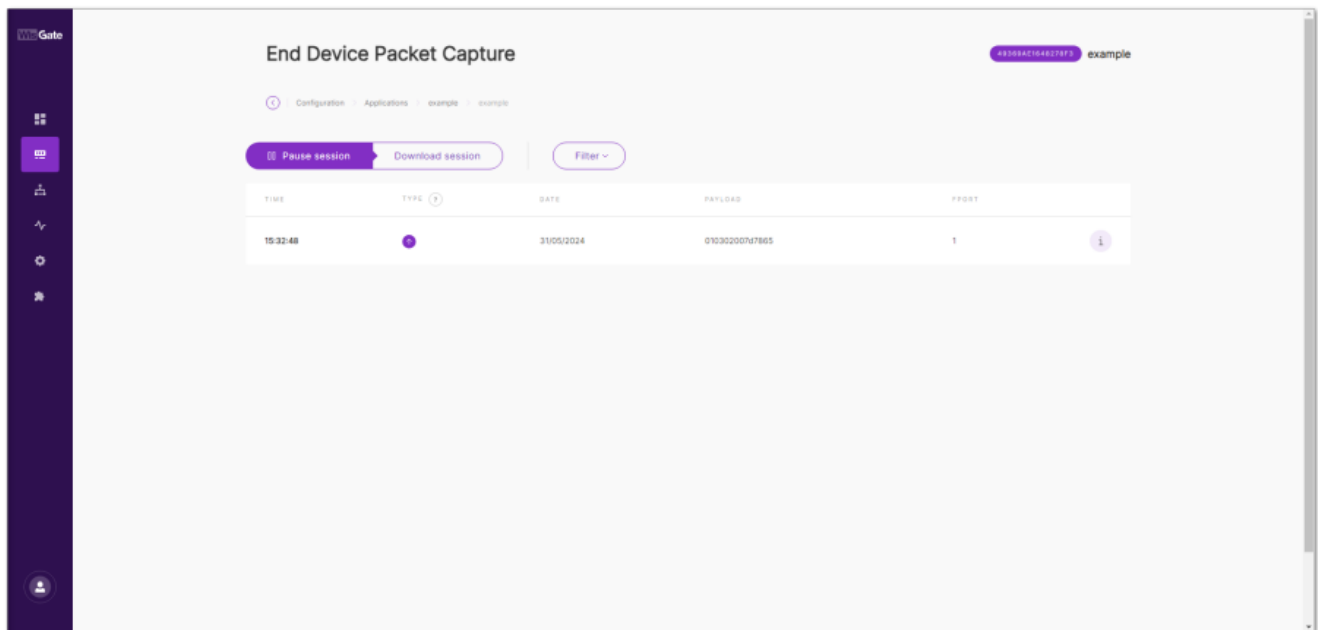

Figure 31: Uplink data

Creating a Wind Speed Poll Task – Example

Fill in the relevant fields according to the specific sensor's datasheet, then after clicking the Check button, you will see the Reply Frame on the IO.Box.

Figure 32: Fill in sensor specific data

Figure 33: Disconnect the device

After saving the polling task wait awhile and you will see the uplink data from the LoRaWAN network in the gateway Web UI. The format of the uplink message would be as follows: TaskID + Sensor type + Value

```sh
02 + 92(Wind Speed) + 007D(Hex) 125(Dec) 1.25m Wind Speed
```
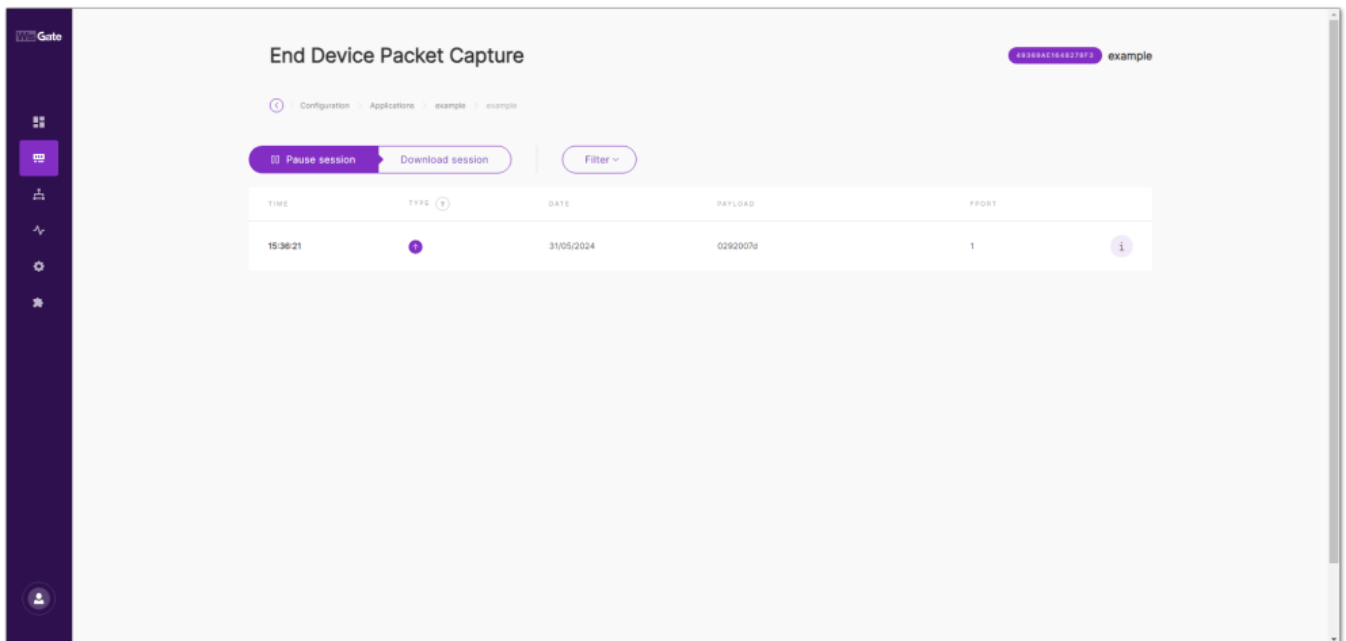
Figure 34: Uplink data

Export an Existing Task List and Import it into Another Node
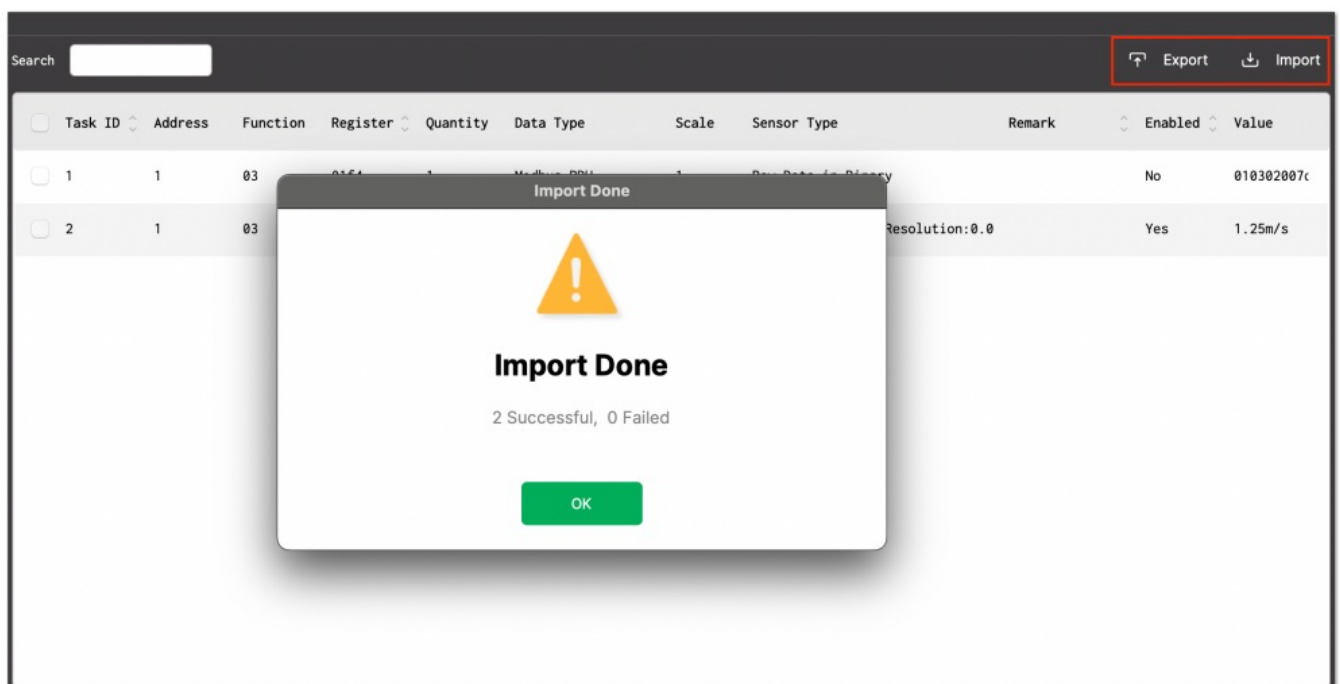
Figure 35: Export/Import task

System
From the main menu of IO.Box, go to the System tab to find device information for the RAK2470 as well as power output toggles and firmware update options. Do not forget to save your changes. In this tab you will find:

- Hardware Version – Displays the specific version of the device's hardware.
- Firmware Version – Displays the device's firmware version.
- Device EUI – Displays the unique identifier assigned by the manufacturer.
- Device Model – Displays the specific model name or number of the device.
- Serial Number – Displays the device's serial number of the device.

- Device Type – Indicates the category or classification of the device, defining its interface types and functionalities. For detailed specifications refer to the device's model information.
- Frequency Band – The device's frequency band.
- DC Vout Output – Toggle to enable or disable the Vout power output. When enabled, Vout passes through the same voltage as the Vin input. (not an option in RAK2470)
- DC 12 V Output – Toggle to enable or disable the 12V_Out power output. When enabled, it provides a 12 V / 0.5 A power output. (not an option in RAK2470)
- DC 5 V Output – Toggle to enable or disable the 5V_Out power output. When enabled, it provides a 5 V / 0.5 A power output. (not an option in RAK2470)

Figure 36: System information overview
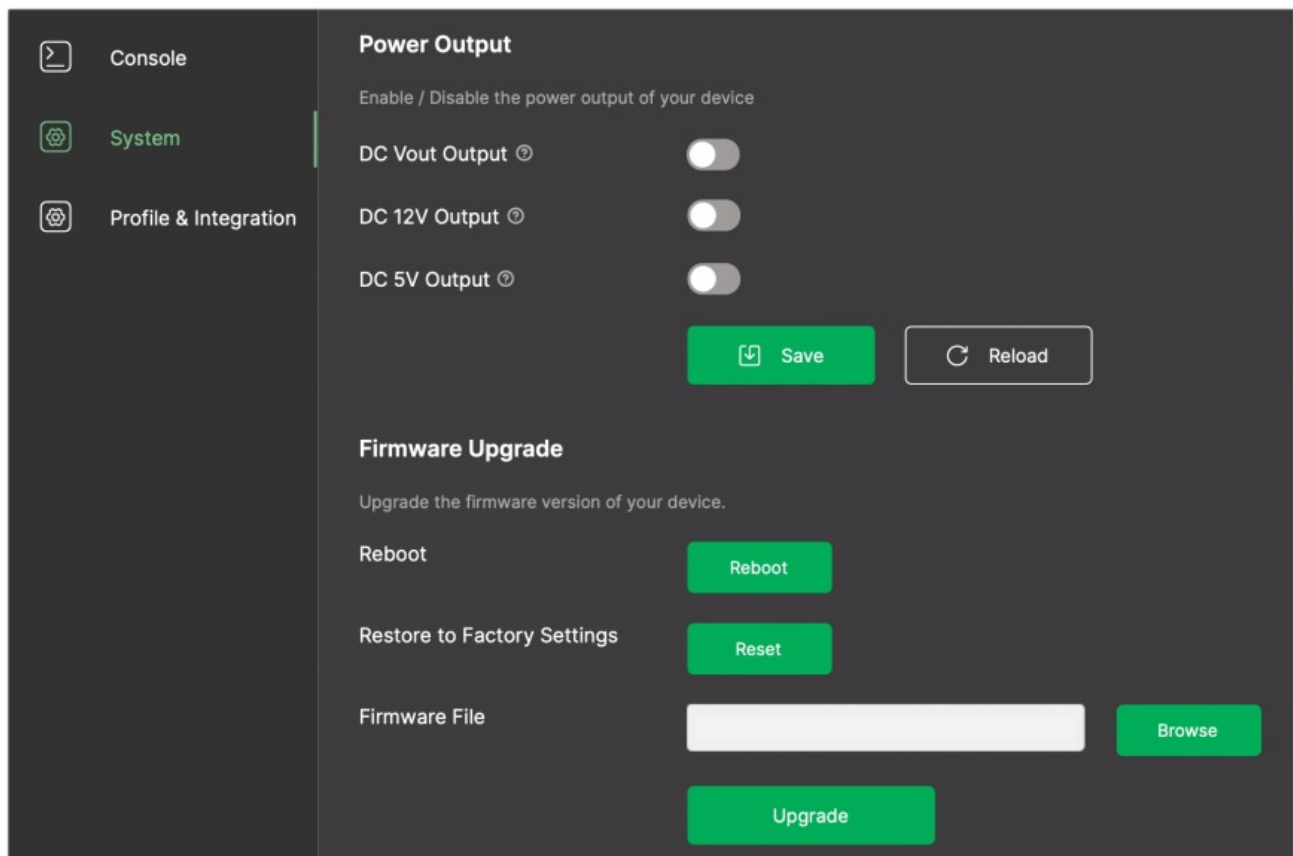
Figure 37: System information overview

Reboot

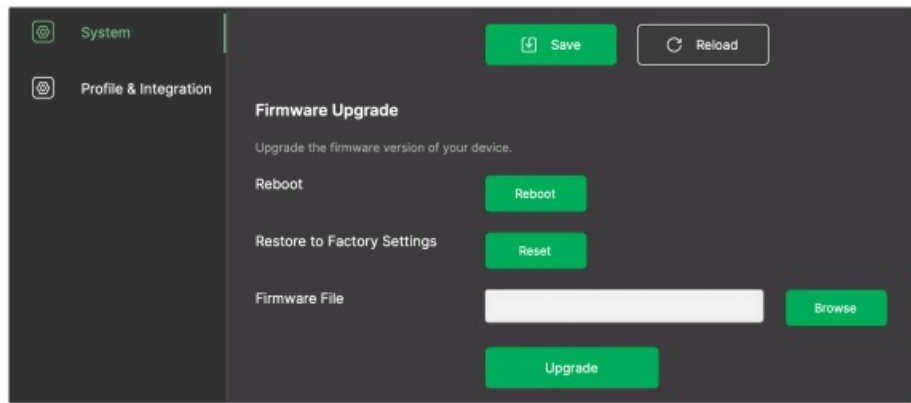Simply press the Reboot button under the Firmware Upgrade section.
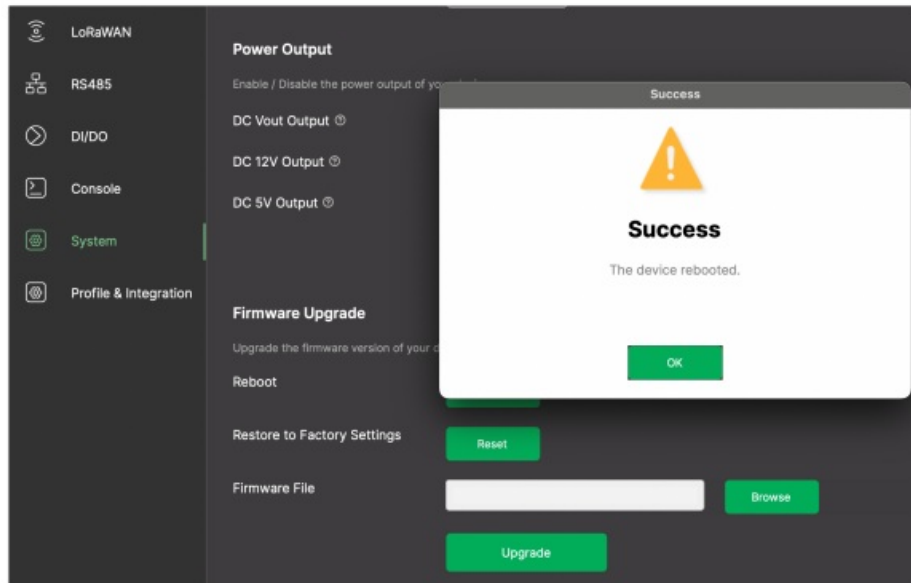
Figure 38: Reboot button

Figure 39: Successful reboot

Factory Reset

To restore the device to factory settings, press the Reset button under the Firmware Upgrade section and wait for the process to be completed.
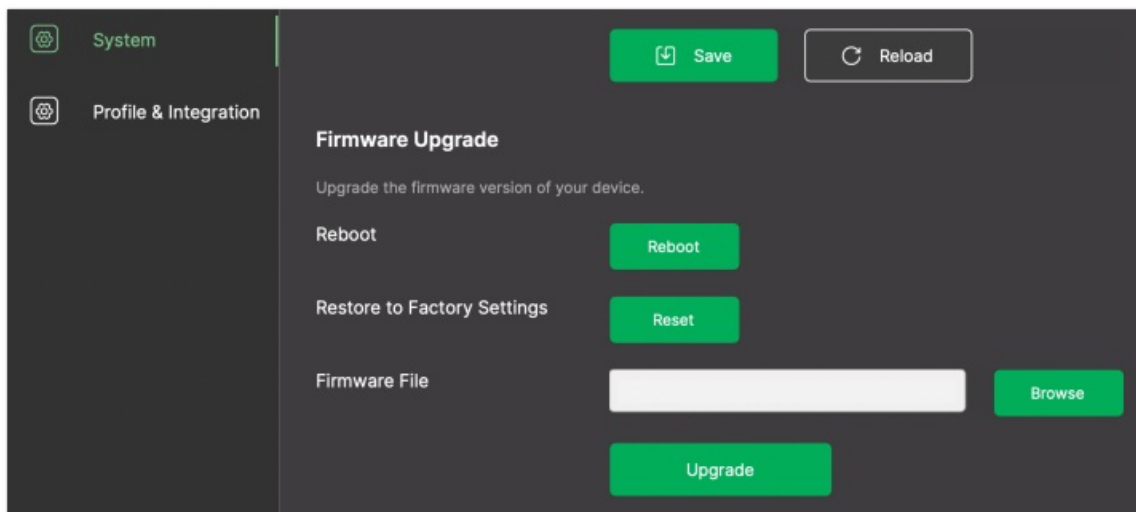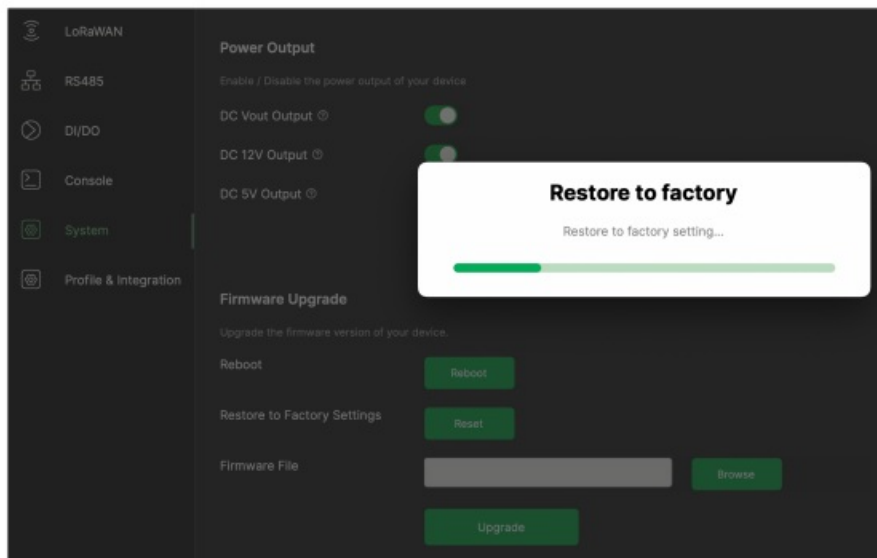

Figure 40: Reset Button
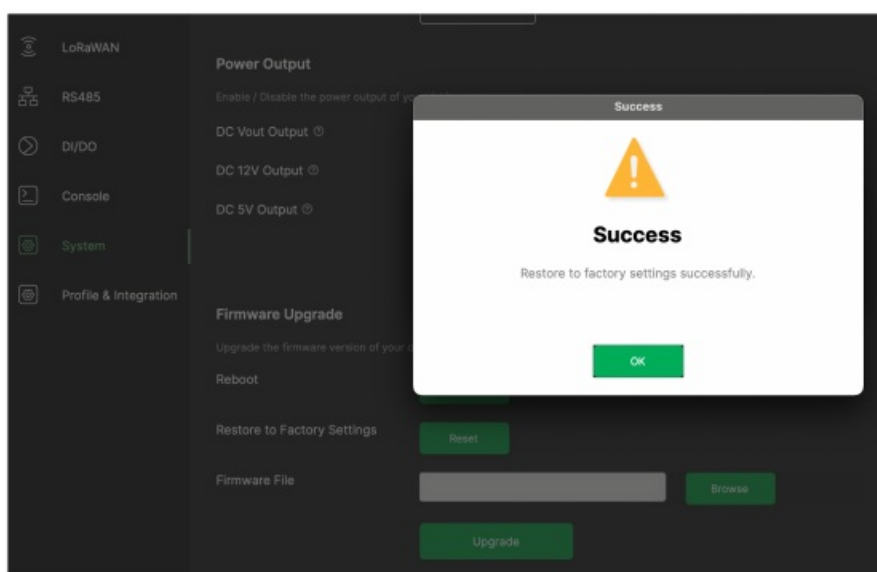
Figure 41: Reset progress

Figure 42: Successful reset

Firmware Update
Normal Firmware Update
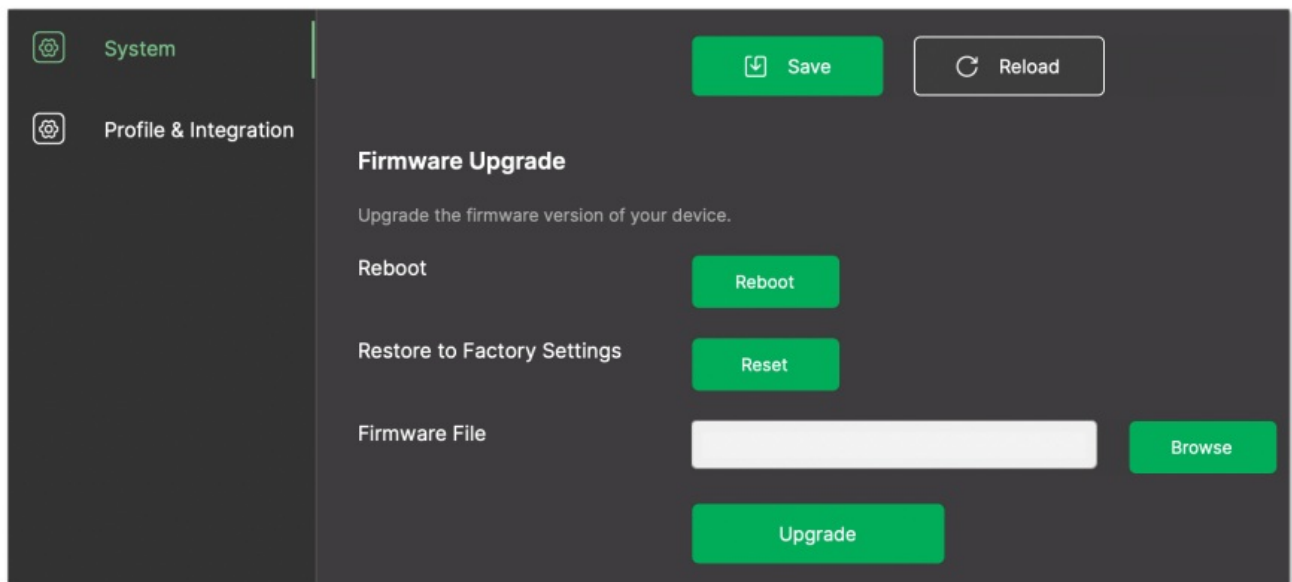
1. After downloading the latest firmware, click Browse.

Figure 43: Browse button
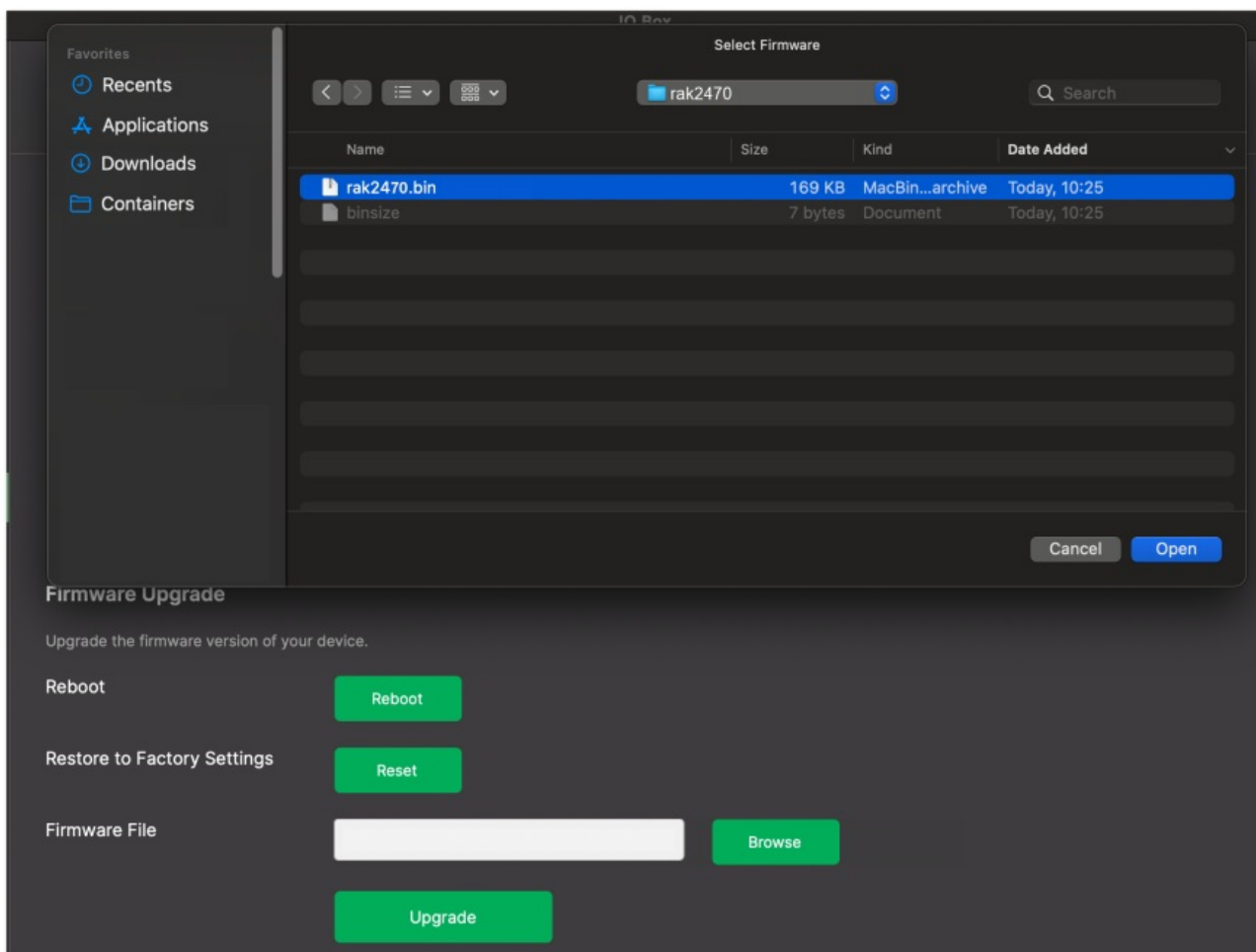
2. Select the correct file.

Figure 44: Selecting the file
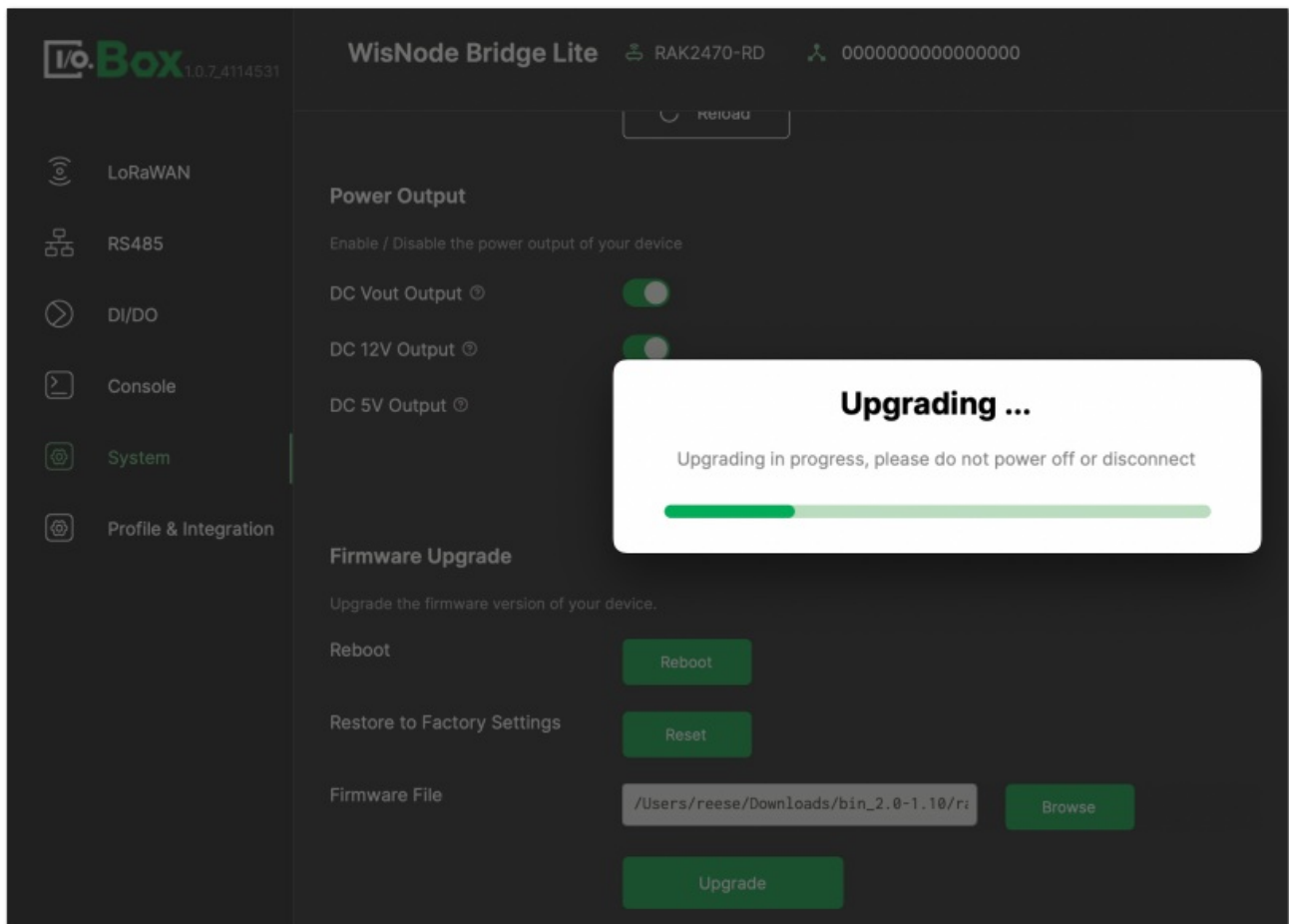
3. Click Upgrade and wait for the procedure to finish.

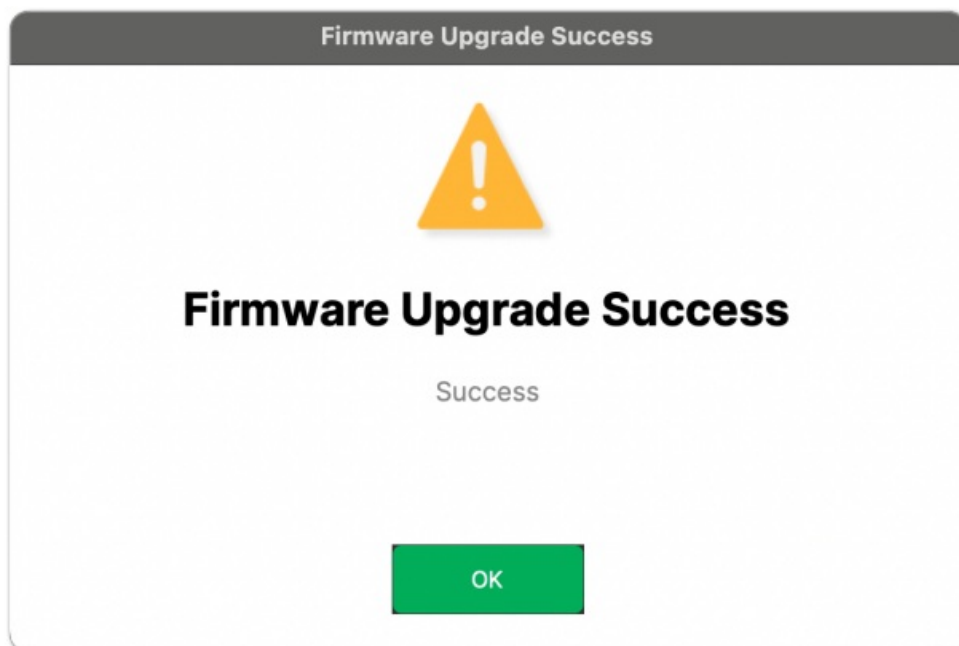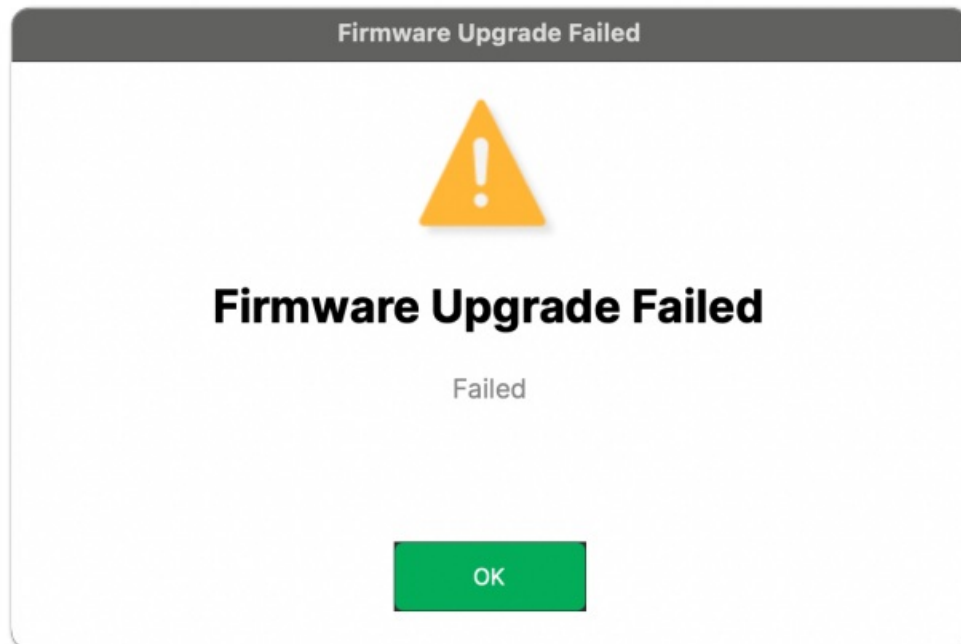**Figure 45:** Upgrading procedure

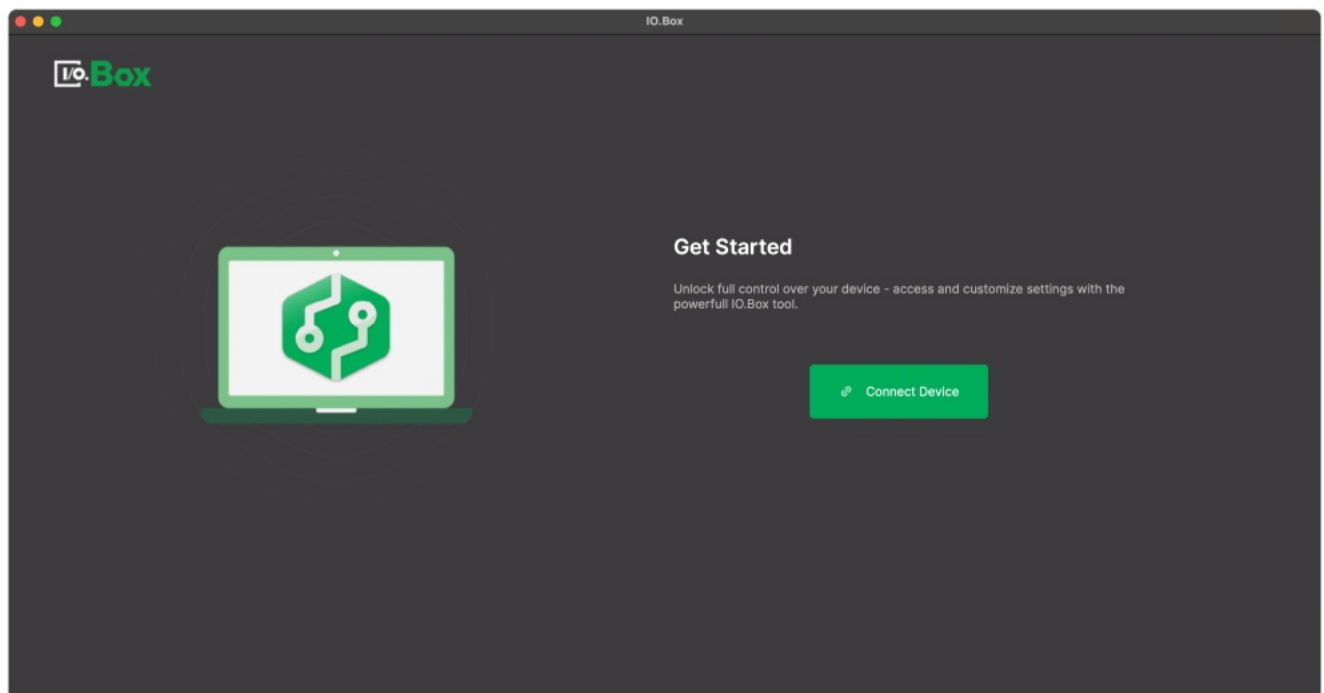**Figure 46:** Successful upgrade

Manual Firmware Update

Follow this procedure if the upgrade process fails unexpectedly, or to upgrade the damaged device in boot mode.
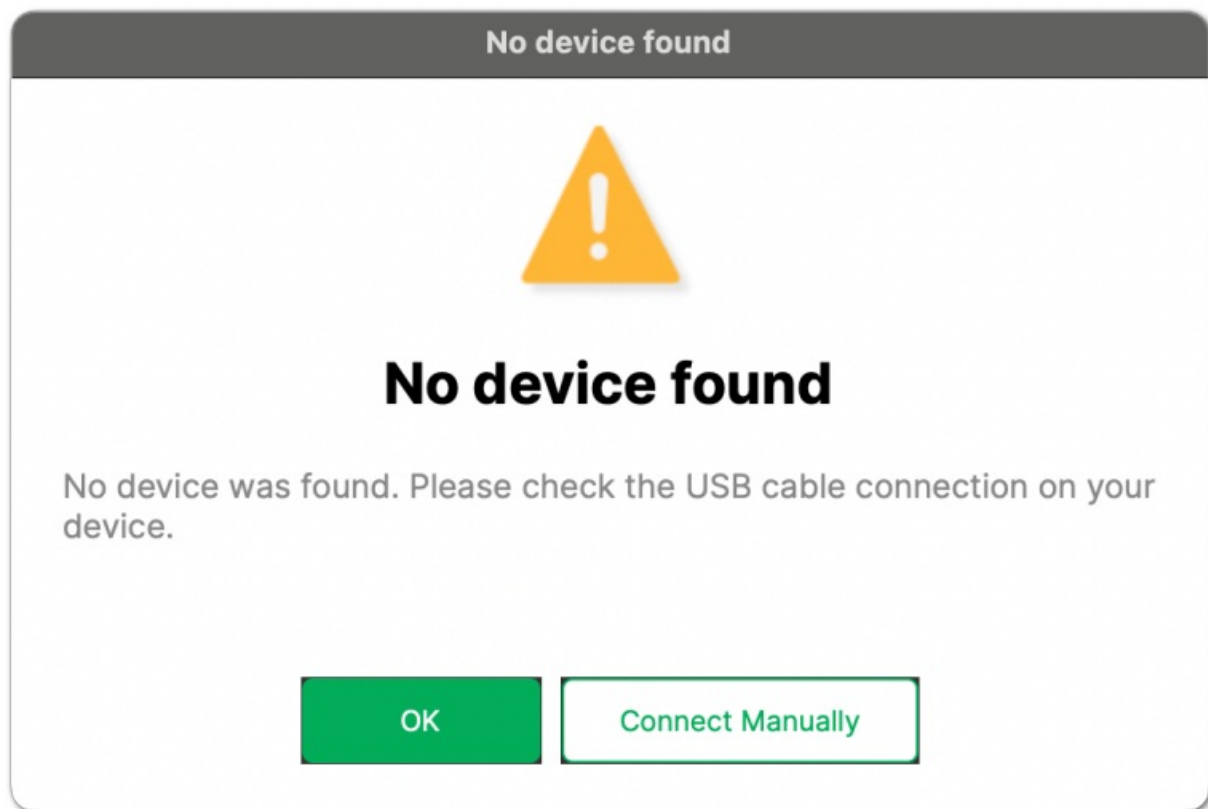
1.

Figure 47: upgrade fail

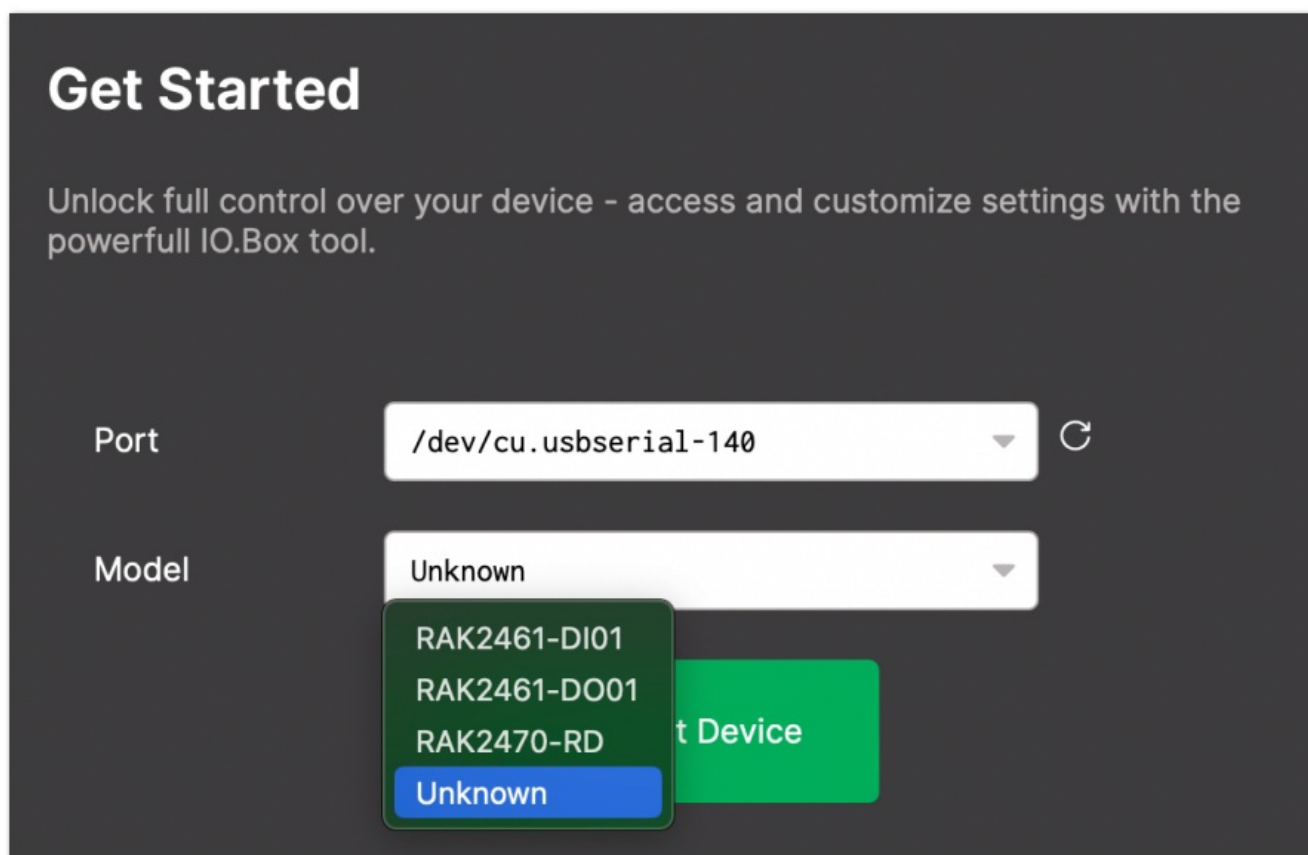Open the IO.Box application and click Connect Device.

Figure 48: IOBox application

2. Select Connect Manually.

Figure 49: No device found

3. Manually input the port and device model.

Get Started

Unlock full control over your device - access and customize settings with the powerfull IO.Box tool.

Port   /dev/cu.usbserial-140

Model   Unknown

RAK2461-DI01
RAK2461-DO01
RAK2470-RD
Unknown

t Device

Figure 50: Manually selecting the device

4. Follow the steps of the normal upgrade procedure above by browsing and selecting the firmware file and so on.
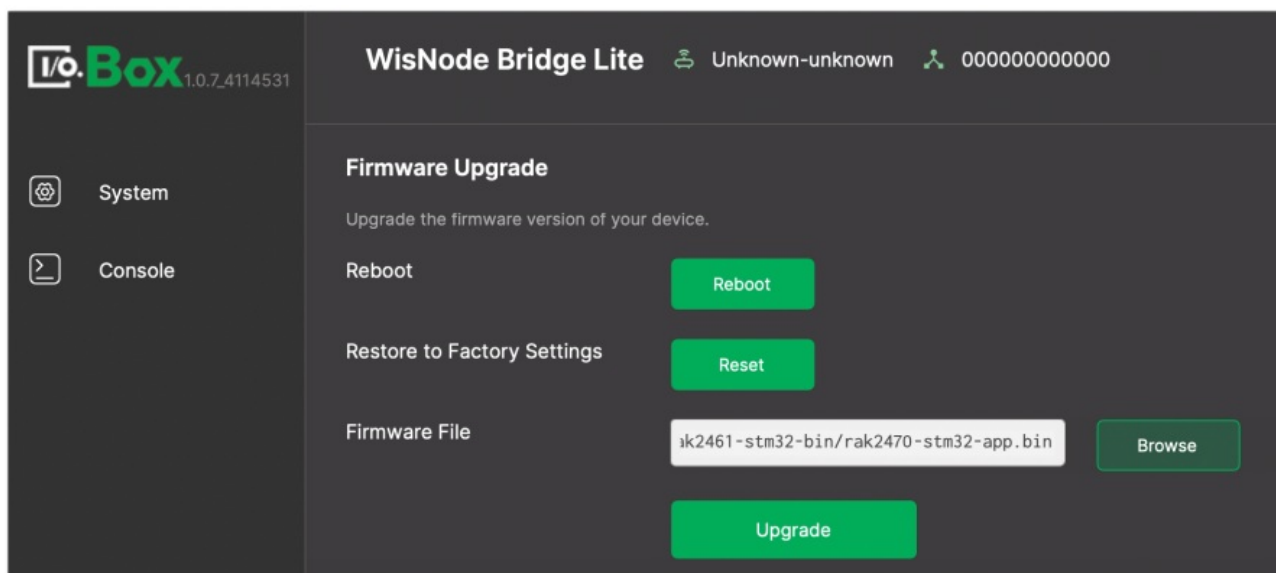
Figure 51: Normal upgrade procedure

Documents / Resources

	RAK RAK2470 Wis Node Bridge Serial Prime [pdf] User Guide RAK2470 Wis Node Bridge Serial Prime, RAK2470, Wis Node Bridge Serial Prime, Bridge Serial Prime, Serial Prime, Prime

References

- 🌐 **WisGateOS2 User Manual | Documentation Center**
- 🌐 **WisGateOS2 User Manual | Documentation Center**
- 🌐 **downloads.rakwireless.com/#WisIO/**
- 🌐 **Industrial outdoor LoRaWAN gateway, LoRa Gateway, 8 channel LoRa Gateway**
- 🌐 **Outdoor RS485 Modbus to LoRaWAN Converter | RAK2470**
- **User Manual**