

KOSMOS

Modbus RTU PLC Setup Guide

What will this guide teach me?

 30 minutes

This guide contains step-by-step instructions on how to set up any **Modbus RTU PLC** to connect to the Kosmos industrial IoT platform.

Once you've finished these steps, you'll be ready to start gaining valuable insights from your sensors & actuators using Kosmos' dashboards, alerts, controls, and more.

For questions about setting up your Kosmos IoT System, please email support@temboo.com and we'll get back to you as soon as possible.



What You'll Need



Kosmos Gateway
(Raspberry Pi Model 3 B+)



2 x Ethernet Cable



USB Flash Drive



Raspberry Pi 5V 2.5A
Power Adapter



USB Micro SD
Card Reader



Micro SD Card
(8+GB, U3 Speed)



Modbus RTU PLC



NCD RS-485 Modem
(Emulator Version)



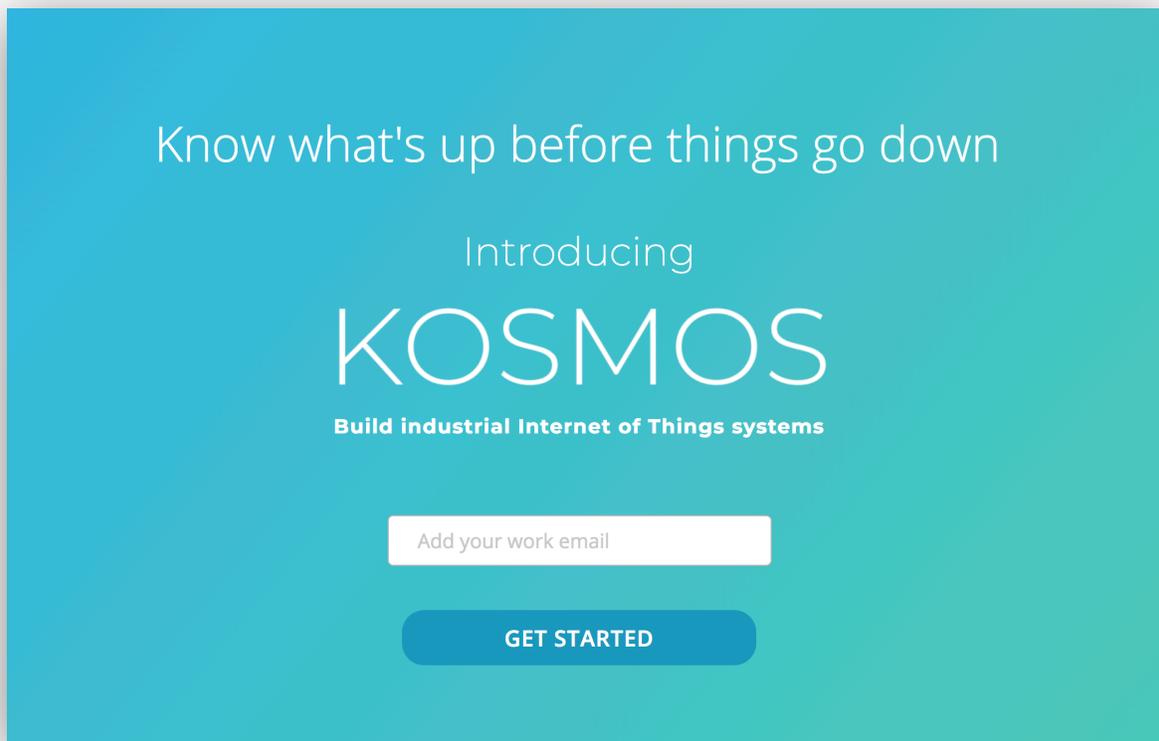
NCD 12V 3A
Power Adapter



NCD Wireless Modem

Before You Get Started

Before moving on to the next steps in this guide, please make sure that you've created your Temboo account and generated your Kosmos application files for your chosen hardware. If you haven't, head to temboo.com and complete those steps now!



Gateway Application Setup

- 1 First, install Etcher so that you can copy the Kosmos gateway application to your micro SD card:
<https://www.etcher.io>
- 2 Insert your micro SD card into your USB SD card reader and connect the card reader to your computer.
- 3 Open Etcher and flash the Kosmos gateway **.xz** file onto your micro SD card (you previously downloaded this file while creating your Kosmos application).



Kosmos Gateway Hardware Setup

1

Insert SD Card

Insert the micro SD card into the underside of the gateway (the metal contacts slide in face up).



2

Power Up The Gateway

Connect the 5V 2.5A power adapter to your Kosmos gateway. Then, plug the adapter into a power outlet.



3

Connect Ethernet Cable

Use the ethernet cable to connect your Kosmos gateway to an ethernet outlet.

See instructions later in this guide if you want to connect your gateway via WiFi.



4

Connect NCD Modem

Connect the NCD modem to your gateway via the USB cable provided.

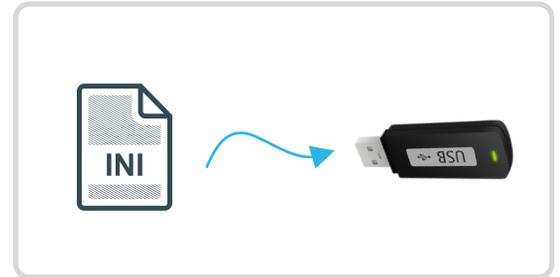


Gateway Hardware Setup (Cont)

5

Prepare USB Drive

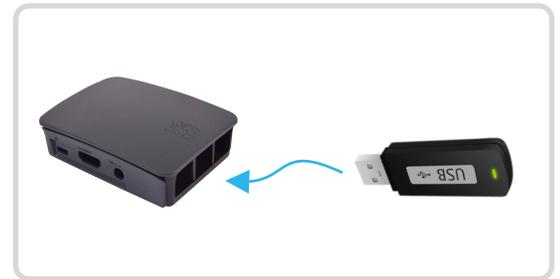
Copy the Kosmos config file `temboo_kosmos_config.ini` onto your USB drive.



6

Insert USB Drive

Insert the USB thumb drive into any available USB port on your Kosmos gateway.



Configure your Modbus RTU PLC

1

Set Baud Rate

Set the baud rate on your PLC to **9600**. This is the rate at which the NCD RS-485 modem expects your PLC to communicate.

2

Set RTU Address

Make sure that the Modbus RTU address on your PLC matches the PLC address that you entered for that PLC when creating your Kosmos application on our website.

3

Set Data Encoding

Your PLC's data encoding must be set to **8n1** i.e., 8 bits, no parity bit, and 1 stop bit.

4

Set Error Handling

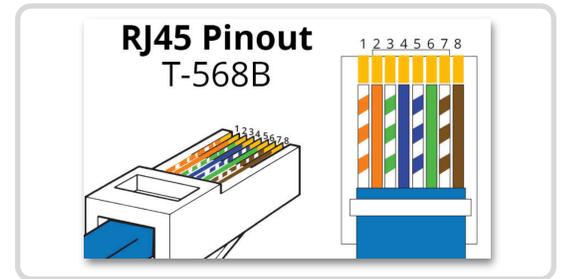
Make sure that your PLC is configured so that it doesn't trigger errors when it loses its Modbus connection.

Connect your PLC to the RS-485 Modem

1

PLC Wiring

Power your PLC off and plug in an RJ45 ethernet cable terminated in the T-568B standard (most common).



2

Wire to RS-485 Modem

Connect the the PLC's RJ45 cable to the A, G, B inputs on NCD RS-485 modem as follows:



- Ethernet blue wire to A (positive)
- Ethernet brown to G (ground)
- Ethernet white/blue to B (negative)

3

Power on RS-485 Modem

Connect the power supply to your NCD RS-485 modem and plug it in.



4

Power on PLC

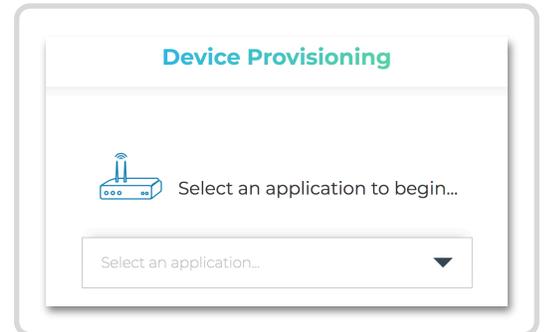
Power back on your PLC.

Provision your RS-485 Modem

1

Log Into Kosmos

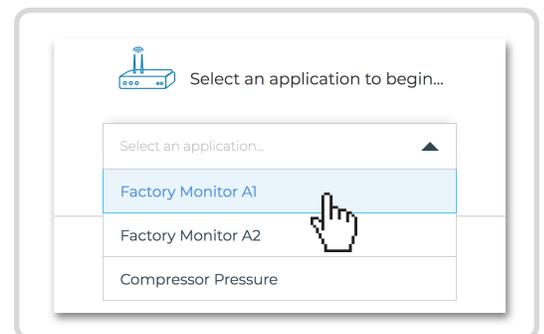
Log in to your Kosmos account and navigate to the [Device Provisioning](#) page.



2

Select Your Application

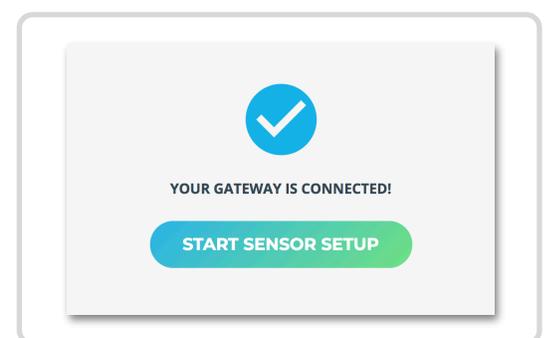
Select the Kosmos application that you want to set up. During this process we'll configure your RS-485 modem to communicate securely at your chosen data frequency.



3

Confirm Connectivity

After selecting an application you'll see a screen displaying your gateway's connectivity status. When your gateway is online you can move on to configuring your modem.



Note: it can take up to one minute for your Kosmos gateway to connect to the internet and show as online on this screen.

Provision your RS-485 Modem (cont)

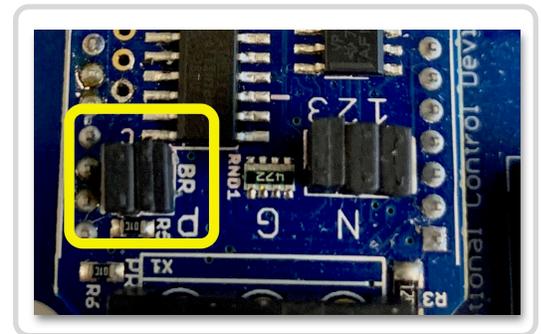
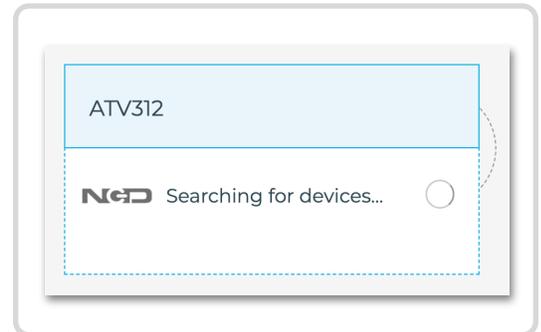
4

Enter Config Mode

Your NCD RS-485 modem must be set to config mode before it can be updated.

To enter config mode, remove power from the RS-485 modem and install the B & R jumpers as shown. Then restore power.

Your RS-485 Modem's MAC address will appear on screen and you can pair with it.

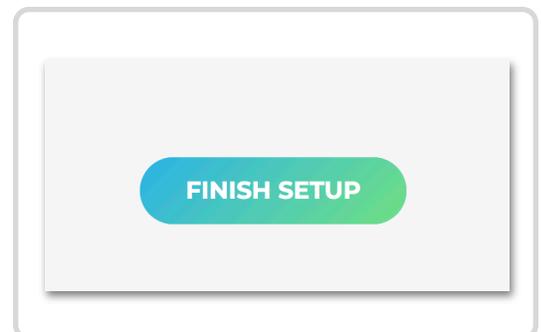


5

Exit Config Mode

Once you've successfully provisioned the RS-485 modem, remove its power supply and remove the BR jumpers to set the modem back to run mode. The modem must be in run mode to send data to Kosmos.

When you've finished the provisioning process you will automatically be taken to your dashboard.



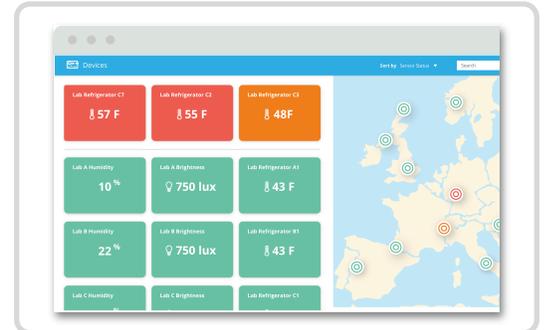
View Your Kosmos Sensor Data

1

Visit Your Dashboard

Log into your Kosmos account and navigate to the dashboard:

<https://temboo.com/devices>



2

Monitor Gateway Status

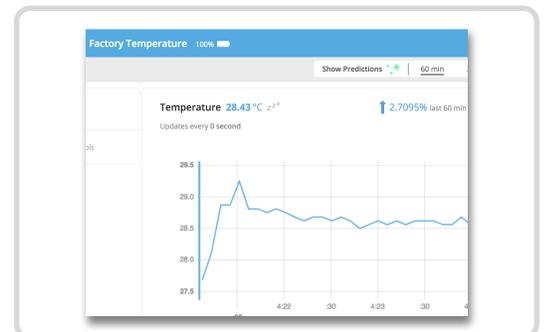
When the gateway connects, a green dot will appear beside the name of your Kosmos application. The gateway takes ~90 seconds to connect.



3

View Modbus Data

Click into your application and then click on your Modbus device. You should see the first data points for any sensors that you have set up.



Connect Your Gateway Via WiFi (Optional)



We recommend using ethernet to connect your gateway to the Kosmos web dashboard.

- ✓ Fastest setup time
- ✓ Most reliable connection



To use WiFi to connect your Kosmos gateway to the internet, first remove the USB thumb drive from your gateway and plug it into your computer.



Locate the **temboo_kosmos_config.ini** file on the USB thumb drive and open it with your favorite text editor.



Add the details of the WiFi network that you want your gateway to connect to (see lines 14 & 15 in the screenshot below), and then save your config file.



Eject the USB drive from your computer and insert it back into your Kosmos gateway. Remove the gateway's power supply and reconnect it. Your Kosmos gateway will power back up and connect via WiFi.

```
kosmos_gateway_config.ini
1 [credentials]
2 account_name = my-kosmos-account
3 appkey_name = myIndustrialIoTApp
4 appkey_value = WBnnvr12Mu5tlw123uZwaF12vpF1EZj
5
6 [cloud_connection]
7 gateway_id = my_gateway
8 auth_type = standard
9 port = 9009
10 websocket_version = 1
11 ws_url = wss://kosmos.temboo.com
12
13 [wifi]
14 ssid = myWifiNetwork
15 password = my-wifi-password
```

⚠ Troubleshooting Tips

Problem	Solution
Gateway isn't powering up.	When your gateway is powered on you'll see a red LED (solid) and green LED (blinking) inside the case. If you don't see those lights, check that the power supply is securely attached at both ends, and that the wall outlet you are using is active.
Your gateway doesn't appear online in your Kosmos dashboard.	Make sure that you wait 10 minutes after powering the gateway on, and that all gateway attachments are connected as described in this guide. If the gateway is still offline after 10 minutes, try restarting the gateway by removing and reinserting the power supply.
Your graphs have no data.	Check that you have created a Modbus table with at least one input row, and that you have explicitly opted to graph this row in the Kosmos dashboard. Wait for at least 10 minutes after powering up your gateway for data to arrive in your graphs. If you still don't see sensor data, confirm that your Modbus devices and Kosmos gateway are on the same network.

Questions?
support@temboo.com

