USER MANUAL

KTA-396x Wireless IO Extender

Manual version 1.1

2025 Ocean Controls

Record of revisions

Revision 1.1	Added KTA-396RF model
Revision 1.0	Initial Release (KTA-396N model)

1. Introduction

The KTA-396x Wireless I/O Extender series offer a convenient way for analogue and digital signals to span large distances via a wireless radio link. It is offered multiple variants to cover distance of up to 100 meters all the way to 40 kilometres line-of-sight.

The KTA-396x is designed to operate as a pair, where the I/O from one unit “mirrors” the I/O from the other. That is, the digital inputs on one unit trigger the relay outputs on the other unit, and the analogue inputs on one unit sets the analogue outputs on the other.

Each KTA-396x pair consists of a radio controller and a radio node. Packets are sent from the radio controller to update and get status of the other radio node to avoid excessive traffic. A packet will be sent as frequently as the “poll time” to ensure that both devices remain in sync. If there is still no response or request from the other node, the STATUS LED will enter “Comms Down” mode.

1.1 Features

- Extend 2x analogue or 2x digital signals via radio link
- 2 x Analogue inputs (programmable between 0-20mA, 4-20mA, 0-5V, 0-10V)
- 2 x Analogue outputs (programmable between 0-20mA, 4-20mA, 0-5V, 0-10V)
- 2 x Isolated digital inputs (3VDC to 30VDC)
- 2 x Relay outputs (3A @ 250VAC)
- 2 x 300mA Open Collector Outputs
- 9-36 VDC Powered
- Programmable polling time
- DIN rail mountable

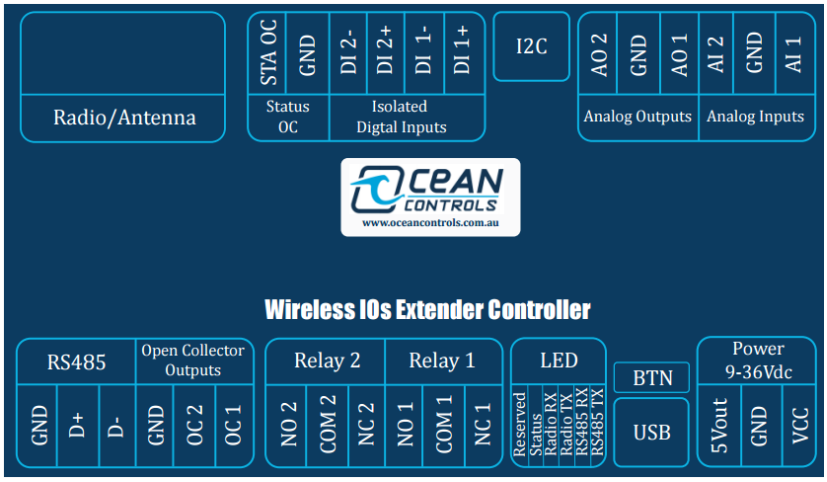
The inputs and outputs are mirrored as followed:

Device 1	Device 2
Digital Input 1	Relay 1 + Open Collector 1
Digital Input 2	Relay 2 + Open Collector 2
Analogue Input 1	Analogue Output 1
Analogue Input 2	Analogue Output 2

1.2 Variants

- **KTA-396N**: 2.4GHz radio with range up to 200 meters line-of-sight.
- **KTA-396RF:** 915MHz RFD900x with range up to 40km line-of-sight.
- **KTA-396L**: LoRa antennas with range up to 10km line-of-sight (upcoming).

2. Connection Pin Assignments and LEDs Indication



2.1 Power Connections

PIN	Details
V+	9-36VDC Power. External power required for analogue I/Os
GND	Common Ground
5Vout	5V DC Output for external signals

2.2 USB and Configuration Button

PIN	Details
USB-C	Communication USB-C, can be used for powering the chip and digital logics (does not power analogue I/Os)
BTN	Configuration Button • Push and hold for 3 seconds: Start internal configuration WiFi • Push and hold for 5 seconds: Radio - USB Passthrough (applicable to KTA-396RF and KTA-396L) • Push and hold for 10 seconds: Factory Reset

2.3 Digital Outputs

PIN	Details
NC 1	Relay 1 Normally Closed Contact (3A 240VAC/30VDC)
COM 1	Relay 1 Common Contact (3A 240VAC/30VDC)
NO 1	Relay 1 Normally Open Contact (3A 240VAC/30VDC)
NC 2	Relay 2 Normally Closed Contact (3A 240VAC/30VDC)
COM 2	Relay 2 Common Contact (3A 240VAC/30VDC)
NO 2	Relay 2 Normally Open Contact (3A 240VAC/30VDC)
OC 1	Open Collector Digital Output 1 (300mA 30VDC)
OC 2	Open Collector Digital Output 2 (300mA 30VDC)

2.4 Digital Inputs

PIN	Details
DI 1+	Positive side of optically isolated digital input 1 (5 to 30VDC)
DI 1–	Negative side of optically isolated digital input 1 (5 to 30VDC)
DI 2+	Positive side of optically isolated digital input 2 (5 to 30VDC)
DI 2–	Negative side of optically isolated digital input 2 (5 to 30VDC)

2.5 Analogue Inputs

PIN	Details
AO 1	Analogue Output 1 (selectable 0-20mA, 4-20mA, 0-5V or 0-10V)
AO 2	Analogue Output 2 0-20mA, 4-20mA, 0-5V or 0-10V
SW1 (Internal)	Toggle Voltage or Current mode
SW2 (Internal)	Toggle Voltage or Current mode

2.6 Analogue Outputs

PIN	Details
AI 1	Analogue Input 1 (0-20mA, 4-20mA, 0-5V or 0-10V)
AI 2	Analogue Input 2 (0-20mA, 4-20mA, 0-5V or 0-10V)
SW3 (Internal)	Toggle Voltage or Current mode
SW4 (Internal)	Toggle Voltage or Current mode

Note on Analogue transmission: the modules will transmit the analogue signals as a percentage ratio. For example, if the input on the sending node is set at 4-20mA and the output on the receiving node is set at 0-10V, when the input signal is at 12mA (50% of 4-20mA), the output of the receiving node will also be at 5V (50% of 0-10V).

2.7 Status Open Collector Output

PIN	Details
STA OC	Radio Link Active Open Collector Output – 300mA maximum • Output Active: Radio Link Normal • Output Unactive: Radio Link Down
GND	Common Ground

2.8 LEDs Indicators

PIN	Details
STATUS	Solid: Device working normally Blinking: Device configuration WiFi on
RS485 TX (RED)	Indicate RS485 message Sent from Device
RS485 RX (GREEN)	Indicate RS485 message Received by Device
RADIO TX (RED)	Indicate Radio Packet Sent from Device
RADIO RX (GREEN)	Indicate Radio Packet Received by Device

2.9 Antenna Connector

Each KTA-396x pair comes with suitable antennas. Users may choose to use their own antennas, provided they comply with their country's regulations. In Australia, the following limits apply:

- For **KTA-396N RP-SMA** connector: maximum **15dBi** 2.4GHz antennas, including cable losses.
- For **KTA-396RF SMA** connector: maximum **3dBi** 915-921MHz antennas, including cable losses.
- For **KTA-396L SMA** connector: maximum **9dBi** 915-921MHz antennas, including cable losses.

If you require custom antennas, please contact us.

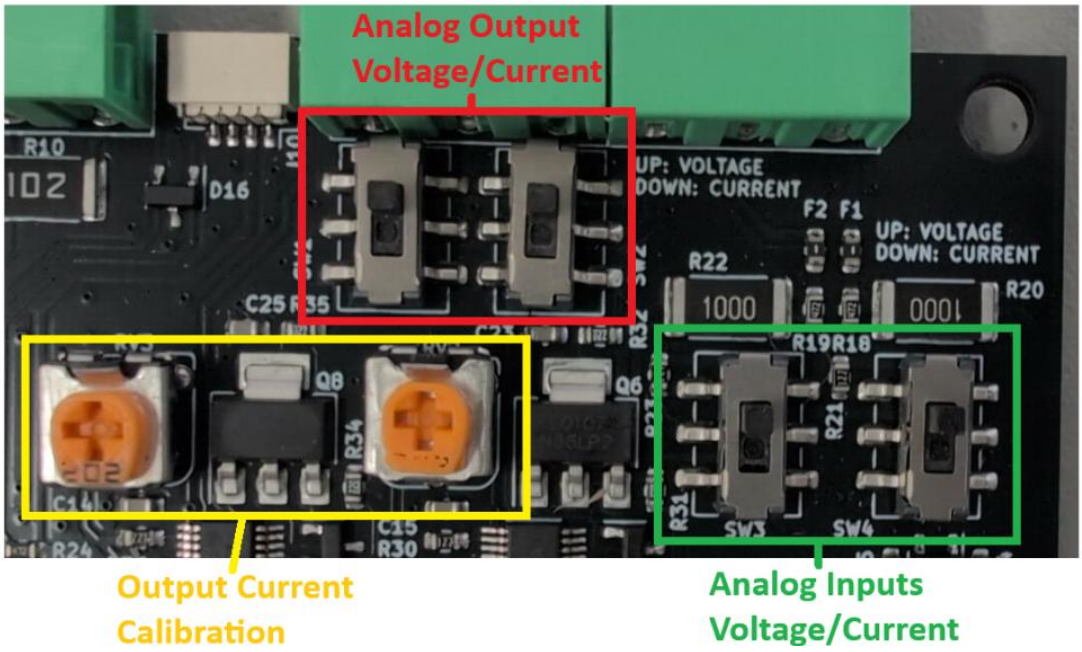
3. Quick Start Guide

The KTA-396x pair has been pre-configured in the factory with default settings. It is recommended to leave the unit at default unless changes are necessary. The default poll time is set at **1 seconds**.

Ensure that antennas are plugged into the radio of each KTA-396x. Apply power. Allow up to 5 minutes for the radios to detect each other and establish a link. The RADIO RX and TX LEDs can be monitored for this purpose; if both red and green LEDs are flashing, the link has been successfully established. An open collector digital output is available to indicate if the link is good.

4. Analogue I/Os switching and Calibration

The KTA-396x's analogue I/Os can operate in voltage or current mode. To switch between these 2 mode, please use the onboard slide switches to the corresponding positions: "Up = Voltage mode" and "Down = Current mode".



Please note that switching the analogue mode will reset the current reading to 0. Therefore, make sure you currently have no active input on the other node while switching the I/Os.

With Analog Outputs in current mode, user can adjust the device's hardware calibration using the yellow trimpots. By default, these are set to output maximum 20mA.

5. Specifications

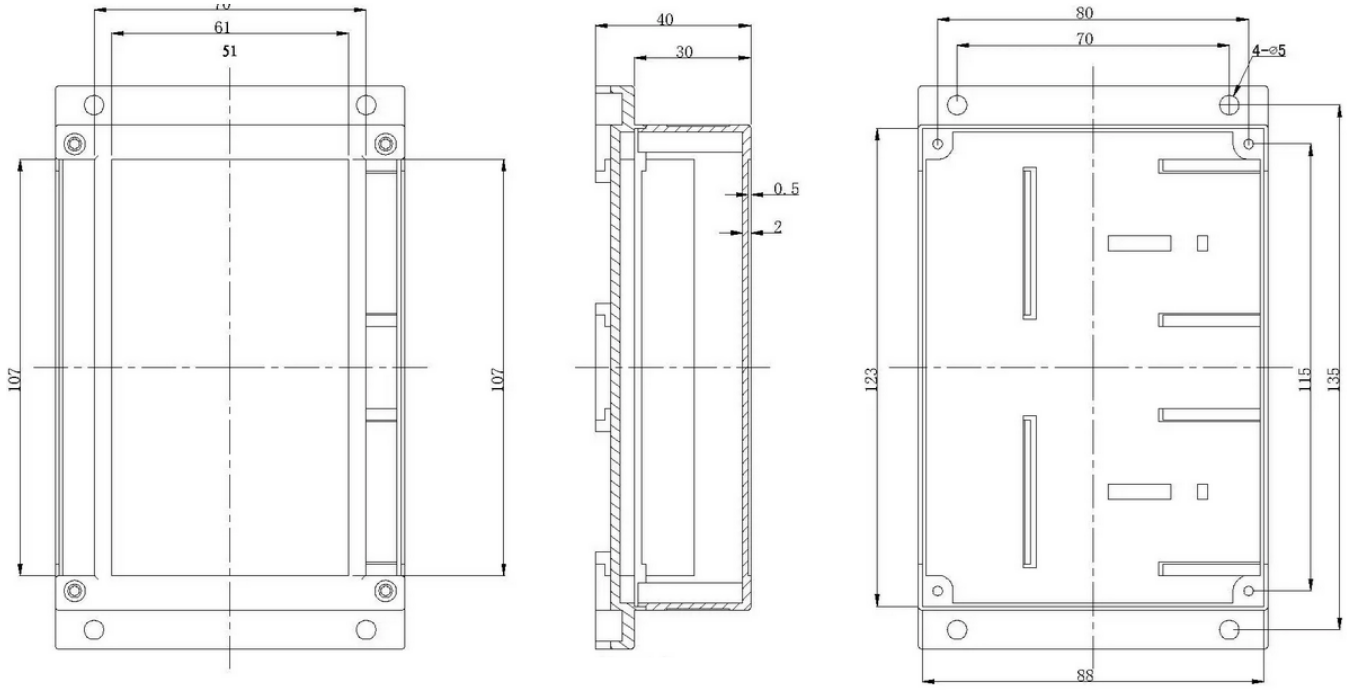
5.1 Electrical Specifications

Parameters	Min	Typical	Max	Unit
Voltage supply	9	--	36	V DC
Power required		1.2		W
Digital Inputs	5		30	V DC
Relay Outputs	3A at 240VAC or 30VDC			
Open Collector Outputs	300mA at 30VDC			
Analogue Inputs	Maximum 0-10V or 0-20mA			
Analogue Outputs	Maximum 0-10V or 0-20mA			

5.2 Environment

Parameters	Min	Typical	Max	Unit
Operating Temperature	-20	25	80	°C

5.3 Physical Dimensions



6. Device Configurations

6.1 ESPNOW Radio Configuration Interface (Applicable to KTA-396N)

To enter configuration for the KTA-396N, we need to activate the device's internal WiFi network. Press and hold Configuration Button (BTN) for 3 seconds until you see 2 green LEDs, then release the button.

The blue STATUS LED will start flashing, indicating that the unit's WiFi is active (note that the WiFi will stay on for 30 minutes then automatically turns off).

From your device, connect to the device's WiFi network (starting with KTA396X_XXXX). If you are using a mobile phone, the configuration page will be open automatically.

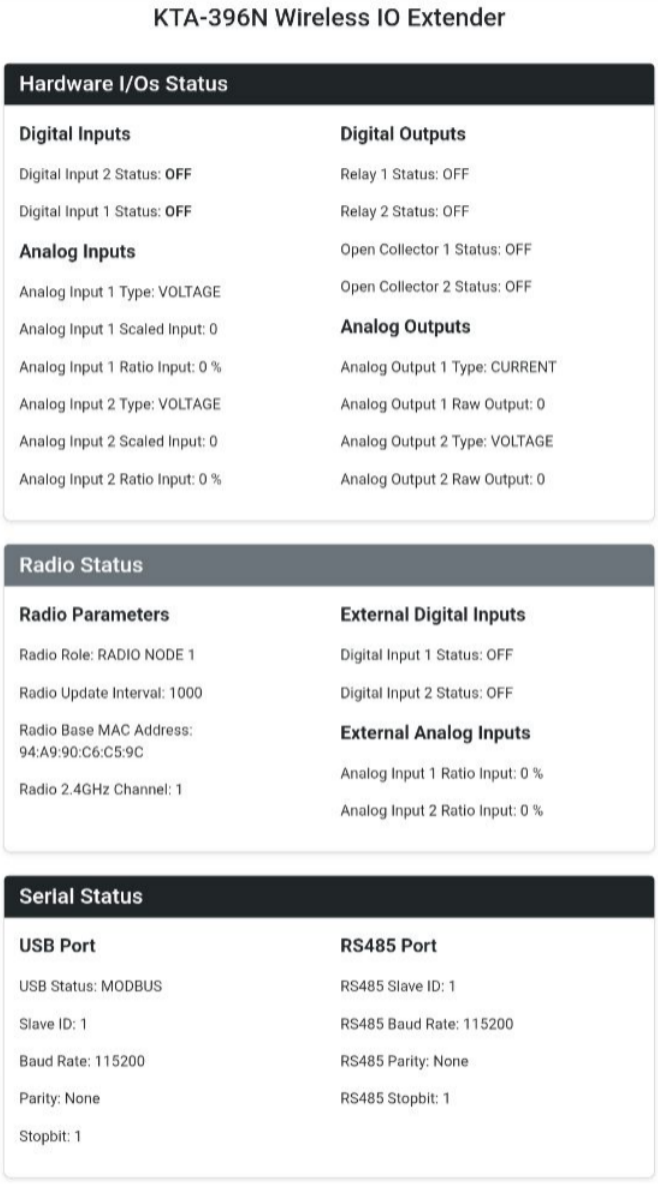
Alternatively, you can also login into this WiFi with the default password: "password".

The configuration interface is shown below.

a. Monitoring Page

This page shows the real-time status of the I/Os and the details of the other radio.

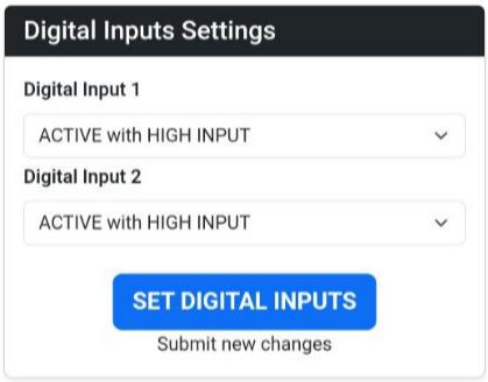
You can also find the unique MAC Address of the module under "Radio Status".



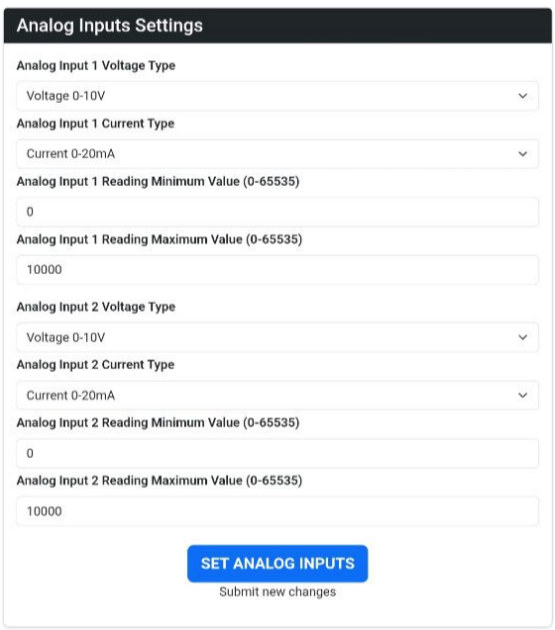
b. Hardware Configs Page

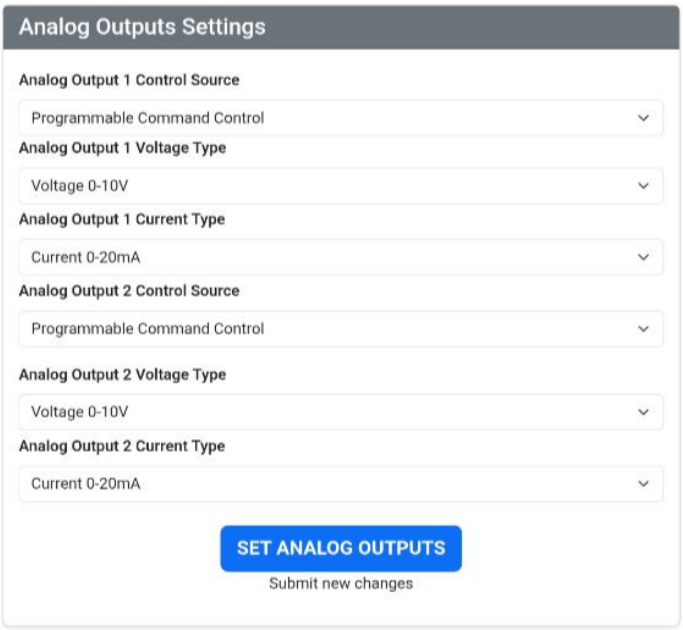
This page allows you to configure the device's hardware I/O behaviors.

For the Digital Inputs, this section allows you to set each Channel to be ACTIVE with LOW or HIGH signal.



For the Analogue Inputs and Analogue Outputs, this section allows you to select the voltage or current type in each mode.





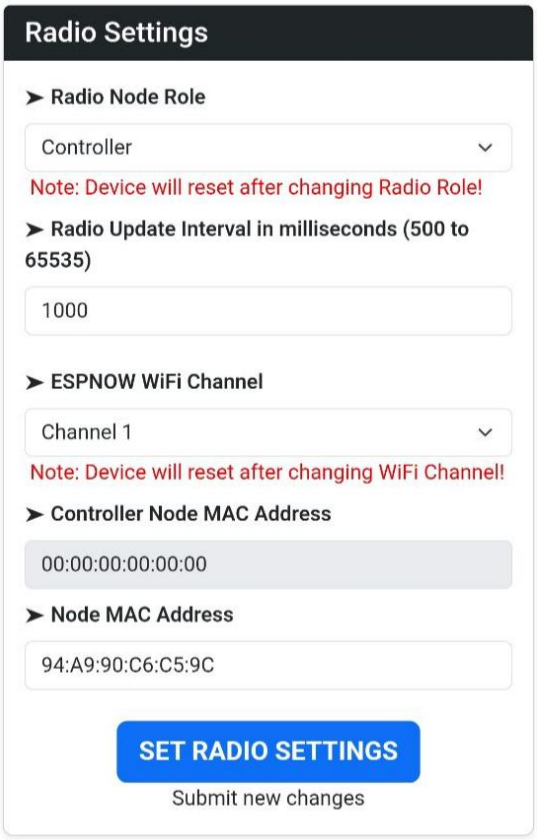
c. Communication Configs Page

This page allows you to configure the radio settings. You can change the Radio Role in the network (controller or node).

You can change the polling interval. The minimum polling period is 500ms. Note that both modules will use this polling period to indicate if the connection is valid (Status Open Collector Output).

You can also change the WiFi channel if you are experiencing interferences issue. You will have to use a 3rd party application to check for congestion in your local area.

You can also program the other node's MAC address to pair with the module. Note that you can put the MAC address without the colons and the webpage will change it to correct format automatically.



6.2 RFDesign Radio Configuration with RFDTools (Applicable to KTA-396RF)

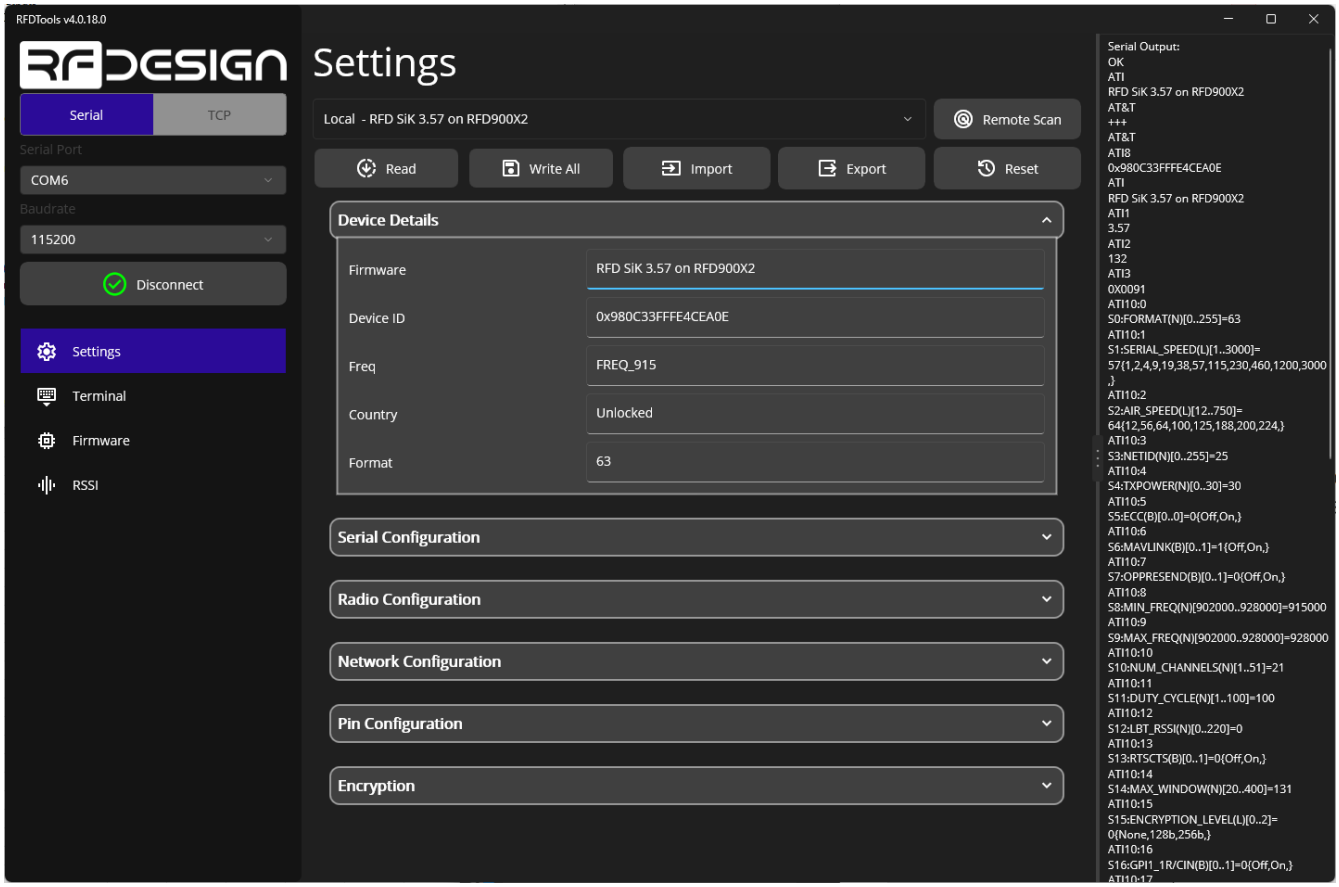
The RFDesign Modem can be configured using the free RFDTools. You can download the latest version at this download link: https://files.rfdesign.com.au/tools/.

In order to connect to the modem, we need to enable serial passthrough on board via these steps:

- Press and hold the Configuration Button (BTN)
- Wait until LEDs cycles to only 1 RED LED (Radio TX) is on (after holding for 5 seconds)
- Release the button while this RED LED is on
- Both Radio TX and RX LEDs will stay on solidly, indicating device is in passthrough mode

Note: In passthrough mode, radio will cease communication with the other node(s). You can exit the passthrough mode by pressing the button once, the unit will start to operate normally again. Alternatively, power cycle the device will also put it back to normal operation.

Once the unit is in passthrough mode, you can then plug the unit into a PC via its USB-C port. Then run RFDTools software. In the example below, I am using version 4.0 of the software.



Under “Serial”, you can select the device COM port. The baud rate is always 115200. Then you can click “Connect”. The software will then attempt to make connection to the RFD modem.

Once connection has been established, you can press “Read” to start downloading the configs of the modem. From here, you can make changes and write new settings to the device (such as Transmission Power or Network NetID).

You are welcome to contact us if you have any specific requirements.