PTW

Modbus TCP Wi-Fi Gateway

USER GUIDE

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1. Description

The PTW Gateway enables Modbus TCP devices, such as PROMUX/PROLOGIC modules, communicating on RS485 to be connected to a local Wi-Fi network.

The PTW functions as a Wi-Fi gateway converting Modbus TCP messages to Modbus RTU messages. The Gateway includes a web server which enables access to internal parameters for configuration. This allows configuration of IP address, serial data format and to view diagnostics. The web server can be accessed by most web browsers.

The PTW Gateway includes a file storage system which enables the web pages to be customized if required.

Each PTW Gateway has a unique IP address which must be programmed into the PC or PLC. The IP address in the gateway is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The gateways are factory programmed with a default Name allowing for the device to be easily found on the local network (http://procon-io.local). This device name must be changed before adding more Procon-IO Wi-Fi devices to the local network.

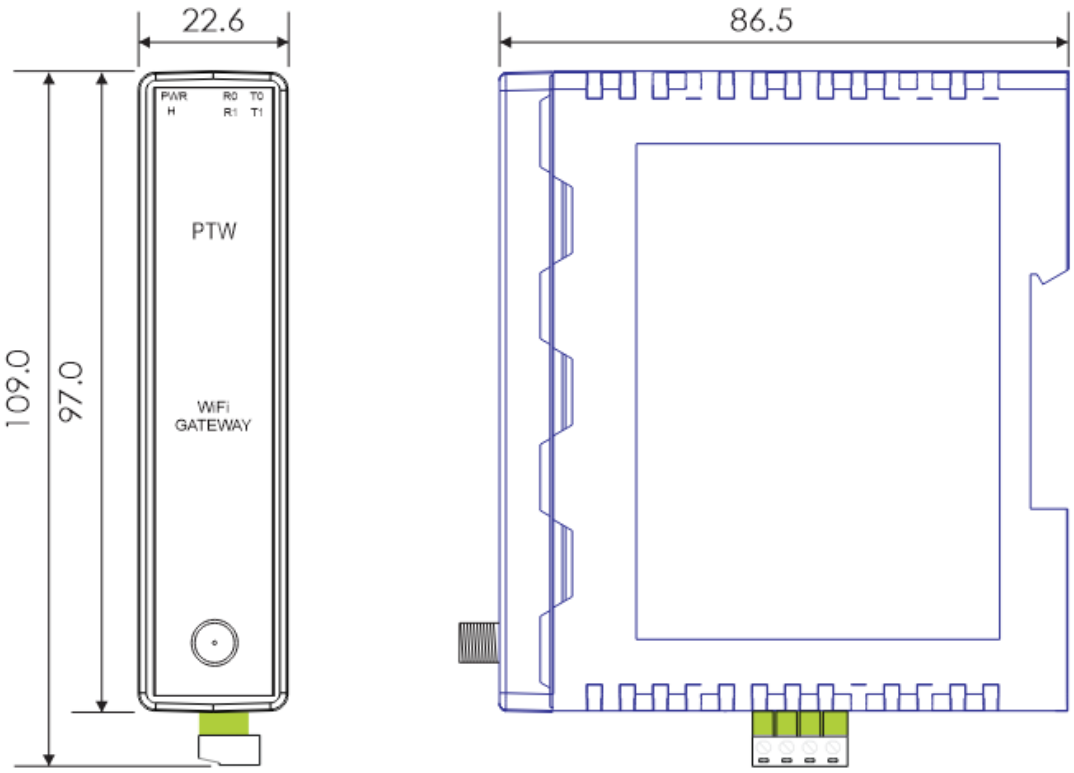
The master device which is polling the modules must be configured with the IP address of the gateway and with the Modbus ID of the Modbus modules. By using more than one PTW gateway, it is possible have multiple RS485 networks on the same network.

All clients must be configured to use **Port 502.** This is a reserved port number for Modbus TCP applications and informs the PTW that it must implement the protocol conversion from Modbus TCP on the Ethernet network to Modbus RTU on the serial communications bus.

2. Physical Dimensions

The PTW gateway enclosure is shown below. The module clips directly onto an industry standard DIN rail. The module power and RS485 communications wiring is on a separate plug-in connector on the underside of the housing, the Wi-Fi antenna screws into the SMA connector on the front of the module.

Allow at least 25mm below and in front of the module to accommodate the wiring and antenna. Ensure that enough space is kept above and below the module for good ventilation.



2.1 Grounding/Shielding

In most cases, the gateway will be installed in an enclosure along with other devices which generate electromagnetic radiation. Examples of these devices are relays and contactors, transformers, motor controllers etc. This electromagnetic radiation can induce electrical noise into both power and signal lines, as well as direct radiation into the module causing negative effects on the system. Appropriate grounding, shielding and other protective steps should be taken at the installation stage to prevent these effects. These protective steps include control cabinet grounding, module grounding, cable shield grounding, protective elements for electromagnetic switching devices, correct wiring as well as consideration of cable types and their cross sections.

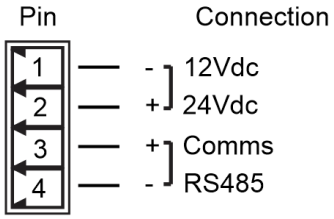
3. Technical Specification

Power Supply	Supply Voltage	12 -24 Vdc
	Logic Supply Power	0.8VA
Wi-Fi	Wi-Fi Standard	IEEE 802.11 b/g/n
	Frequency Band	2.4 GHz
	Connector	SMA (Female)
RS485	RS485	2 Wire Multidrop twisted pair + GND
	Baud Rate	9600, 19200, 38400, 57600, 115200, (1000000 : PTW-PL ONLY)
	Data Bits	8.
	Parity	none, even, odd.
	Stop Bits	1, 2.
Temperature	Operating Temperature.	-20°C to + 75°C
	Storage Temperature	-40°C to + 85°C
Connectors	Power and Comms.	4 Pin Connector on underside of unit
Humidity		Up to 95% non condensing.

4. Configuration

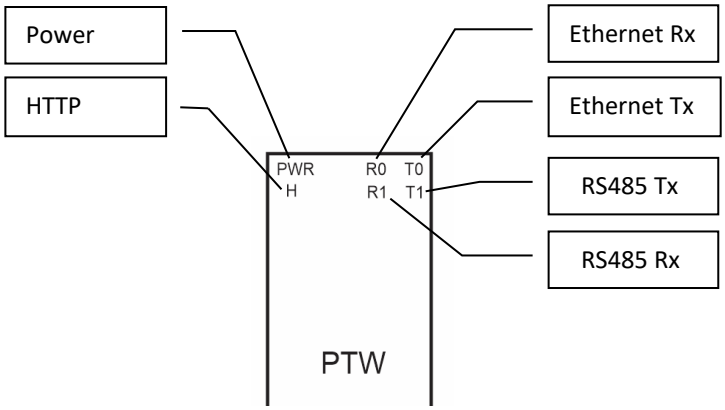
4.1 Power Connections.

The following diagram shows the wiring for the power and RS485 communications.



4.2 Indication LED'S.

Power: Flashes to indicate the CPU is running.
Wi-Fi Rx: Flashes to indicate the unit has received a valid Modbus message.
Wi-Fi Tx: Flashes to indicate the unit has sent a Modbus message.
RS485 Rx: Flashes to indicate the unit has received a valid Modbus message.
RS485 Tx: Flashes to indicate the unit has sent a Modbus message.
HTTP: Flashes to indicate the unit is accessing a web page.



4.3 RS485 Termination

Transmission line effects often present a problem on data communication networks. These problems include reflections and signal attenuation.

To eliminate the presence of reflections from the end of the cable, the cable must be terminated at both ends with a resistor across the line equal to its characteristic impedance. Both ends must be terminated since the direction of propagation is bi-directional. In the case of an RS485 twisted pair cable this termination is typically 120 ohms.

RS485 is designed to be used with a single twisted pair cable. One of the restrictions of this system is that the common mode voltages of the nodes on the network should not exceed -7V or +10V. In order to ensure this condition is met, it is recommended that the 0V connections on the modules be connected together. For modules that are far apart, a second twisted pair should be used as the 0V link. On the PTW gateway the terminal 1 (GND) is used as the 0V connection.

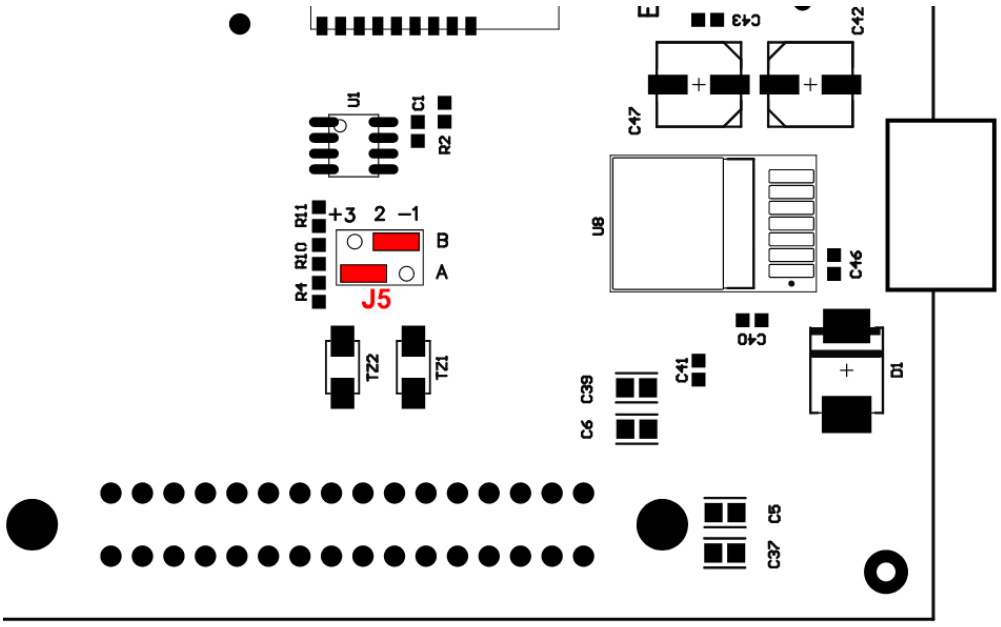
In certain applications where there are strong possibilities of an earth loop being caused by the 0V link, the link should be tied to the 0V terminal on each module through a 100ohm resistor, to limit the earth loop current.

Where earth loop problems exist, it may be necessary to isolate the RS485 network either using optical fiber or an isolated RS485 repeater such as the PM485REP module.

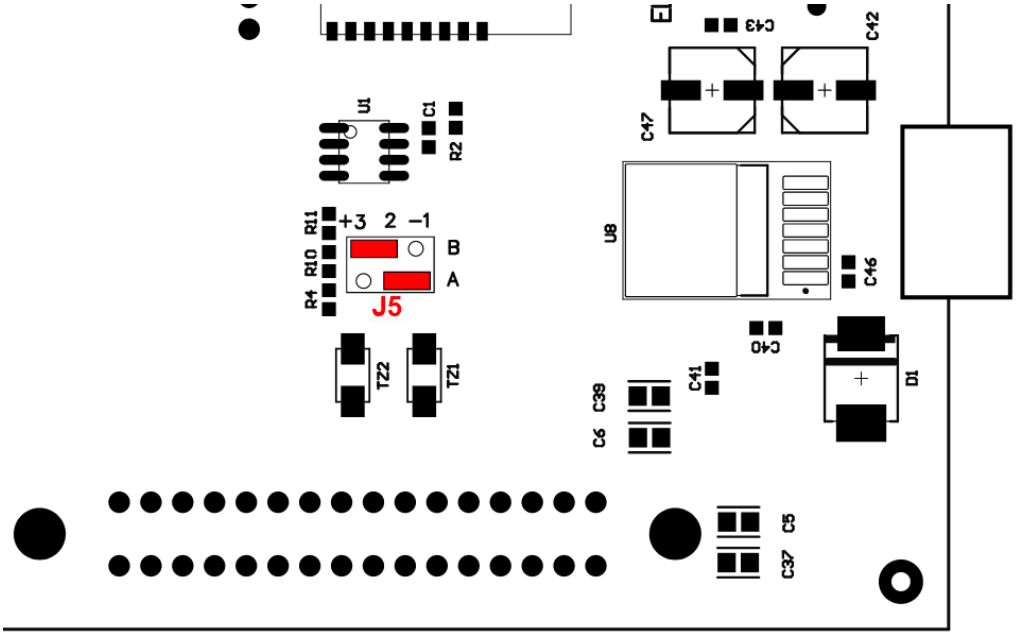
4.3.1 Setting the jumpers for the RS485 Termination (J5).

The circuit has a set of jumpers that can be used to select the termination for the RS485 network. If the jumpers are removed from J5 then no onboard termination will be used and an external termination must be used.

If J5 is setup as shown below, with J5A(2-3) and J5B(1-2) then a 120ohm active termination with **High** Line Idle will be connected to the RS485 network. This is the most commonly used configuration for RS485 networks (Default: High Line on PTW-PL).



If J5 is setup as shown below, with J5A(1-2) and J5B(2-3) then a 120ohm active termination with **Low** Line Idle will be connected to the RS485 network.



4.4 Setting up a new Wi-Fi connection

The following steps are required to add a new PTW to your local Wi-Fi network. By default, the device is shipped in provisioning mode, this provides a Wi-Fi network that is used to add the PTW onto your network.

Step 1:

Ensure that all Power connections have been made and that the antenna has been installed. Power on the PTW module, the PWR led illuminates to show the device is on. On your PC or mobile device, search for and join the **Procon-IO** Wi-Fi Network.

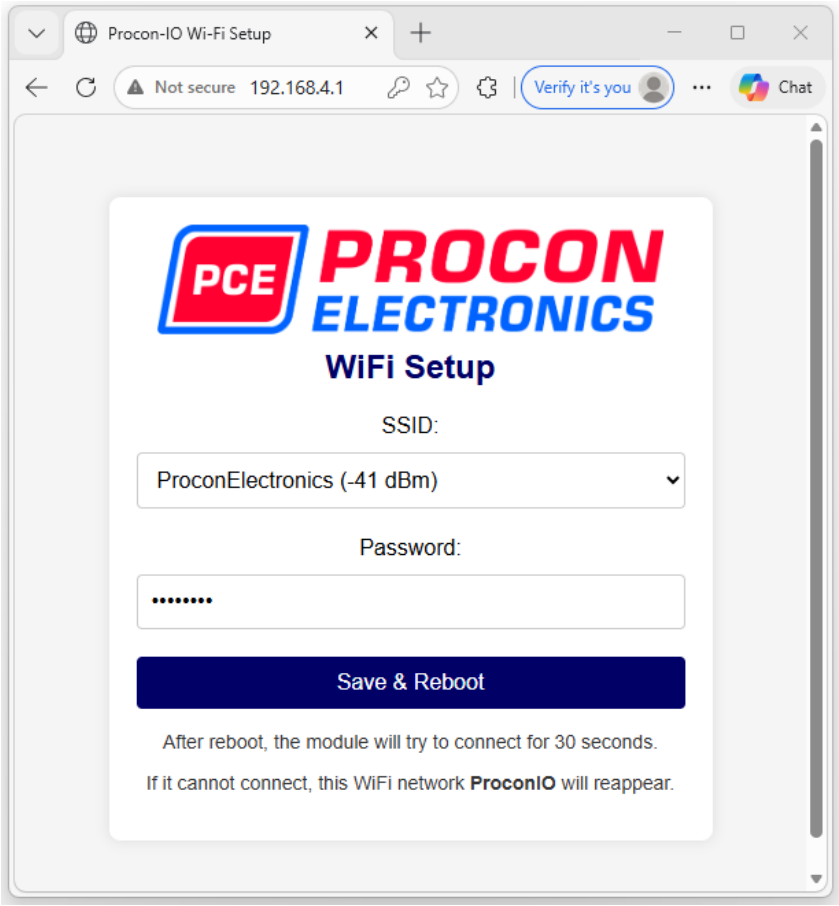
If the network is not visible: ensure that the device has power, move closer to the device to rule out signal strength, ensure that the antenna is attached. If it is still not available: hold in the reset switch located on the back of the module for 10seconds while the device is powered on.

Step2:

A new internet browser will open on your device with the Procon-IO Wi-Fi Setup page, if the page does not load on its own: type **192.168.4.1** into your internet browser.

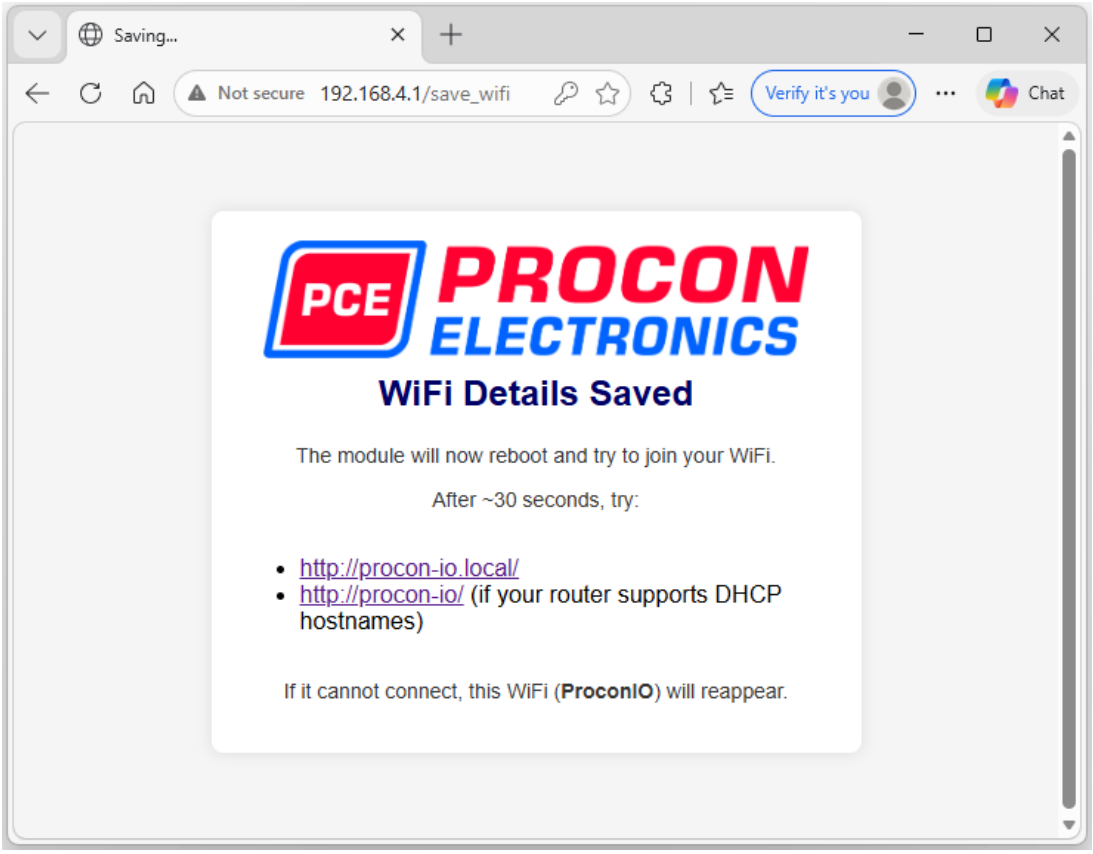
Use the dropdown list to look for the Wi-Fi network that you want the device to join. Select the network and type in the network password, click Save & Reboot.

If your Wi-Fi network is not displayed in the list, the PTW is outside of the stable connection range for that network, consider adding a remote mounted antenna if the PTW is located inside an enclosure.



After clicking Save & Reboot, the PTW will attempt to connect to your chosen network. If the connection is successful, you can rejoin your local network and navigate to the device Login page to continue setting up the PTW. By default, the Login page can be accessed at: http://procon-io.local

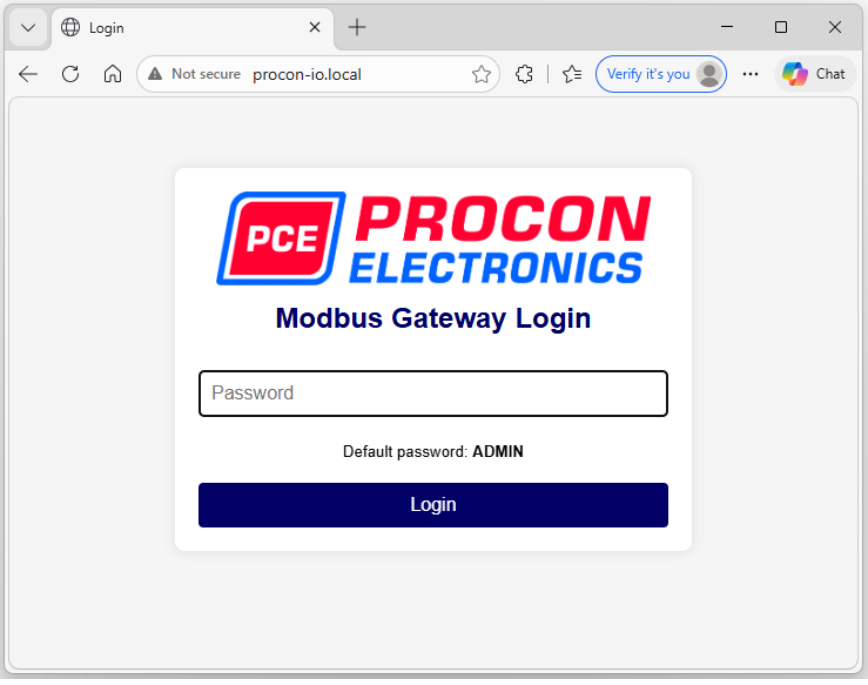
If the PTW cannot connect to your network, the provisioning server, **Procon-IO** Wi-Fi network will re-appear.



Step 4:

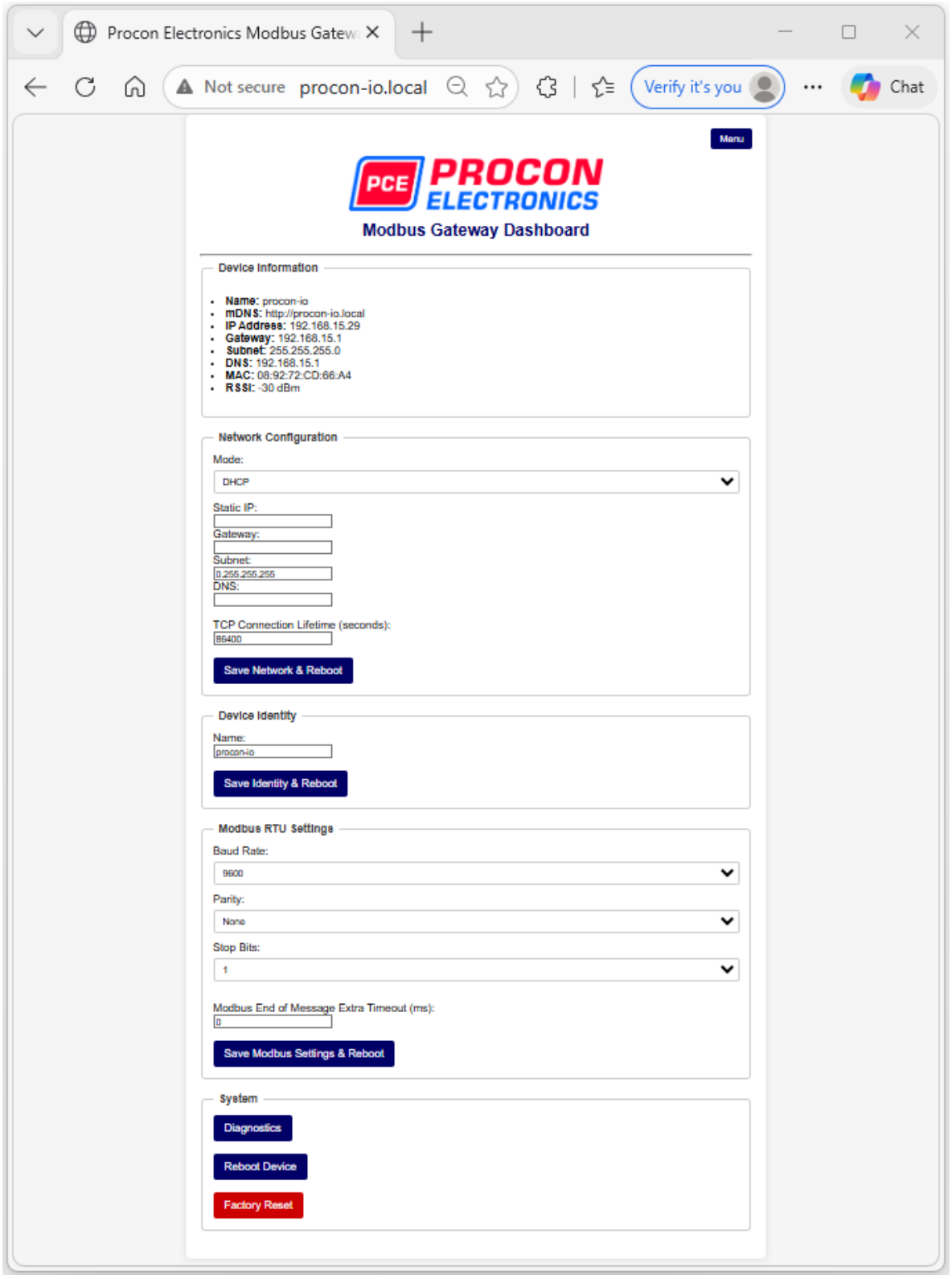
Login to the PTW webserver to configure the device. The default password is **ADMIN**, this can be changed from the menu on the main Dashboard.

If you have already logged into the PTW before and have changed the Device name, the Login web page will now be available at http://Device_Name.local (Device_Name = Name you gave the device), alternatively you can access the login page using the device IP address.

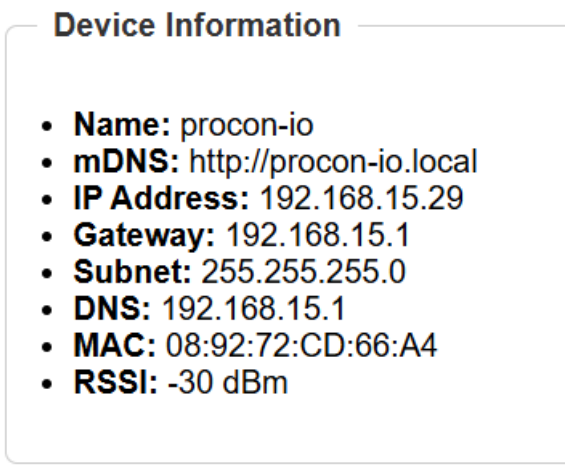


4.5 Configuring settings in Dashboard

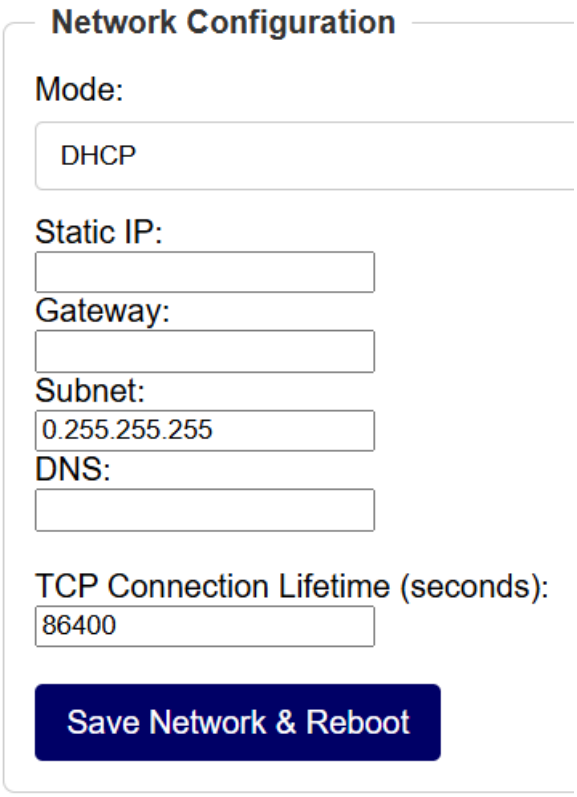
After successfully logging into the device, you will be directed to the Dashboard page. From this page you can view the device information, configure the Wi-Fi network settings, change the device name, configure the Modbus settings, view the diagnostics page, change the password and update the device firmware.



The device information shows all the device network configuration information.



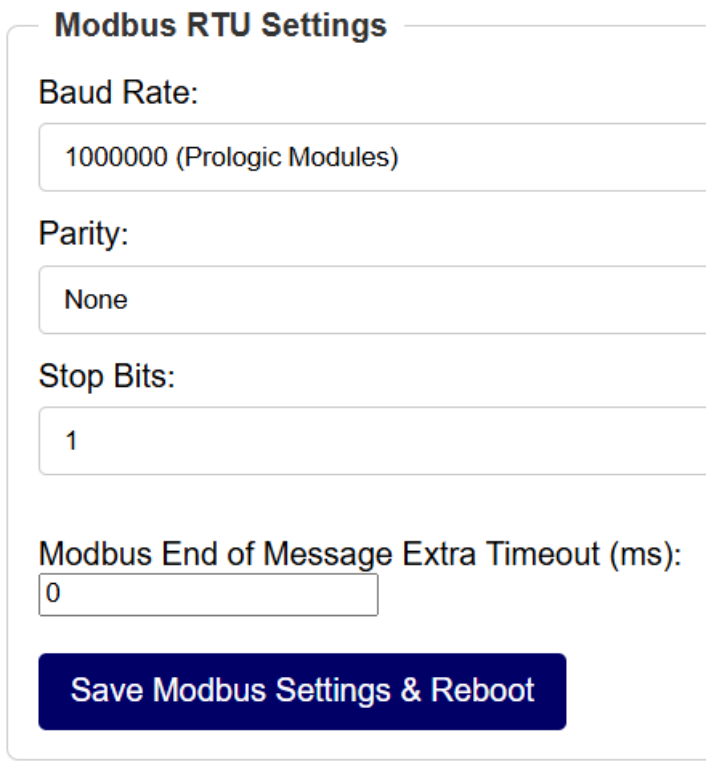
By default, the device will connect to your network via DHCP. You can change the mode to STATIC and configure the IP, Gateway, Subnet and DNS settings. A TCP Connection Lifetime timer is available, by default the timer is set to 24 hours (86400 seconds). To Apply any changes to the settings, click Save Network & Reboot, the device will now reboot. After the device Reboots, it will be necessary to Login again at http://Device_Name.local



The Device name Should be changed from default if more than one Procon-IO Wi-Fi device will be present on the same network. Note that the device will appear in the router table as Device_name followed by a "– " and the 3rd, 4th and 5th suffix of the Mac Address. To Apply any changes to the Name, click Save Identity & Reboot, the device will now reboot. After the device Reboots, it will be necessary to Login again at http://Device_Name.local

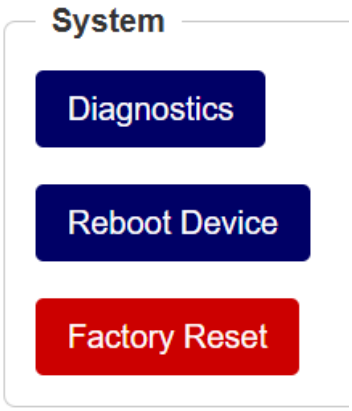
Changing Modbus RTU settings, by default the Baud rate is set to 9600, 8 data bits, No parity, 1 stop bit. The default is compatible with all PROMUX modules. A Modbus End of Message Extra Timeout is also available for slow responding devices. To Apply any changes to the Modbus Settings, click Save Modbus Settings & Reboot, the device will now reboot. After the device Reboots, it will be necessary to Login again at http://Device_Name.local

Note: For the PTW-PL, change the board rate to 1000000 to work with PROLOGIC Modules.

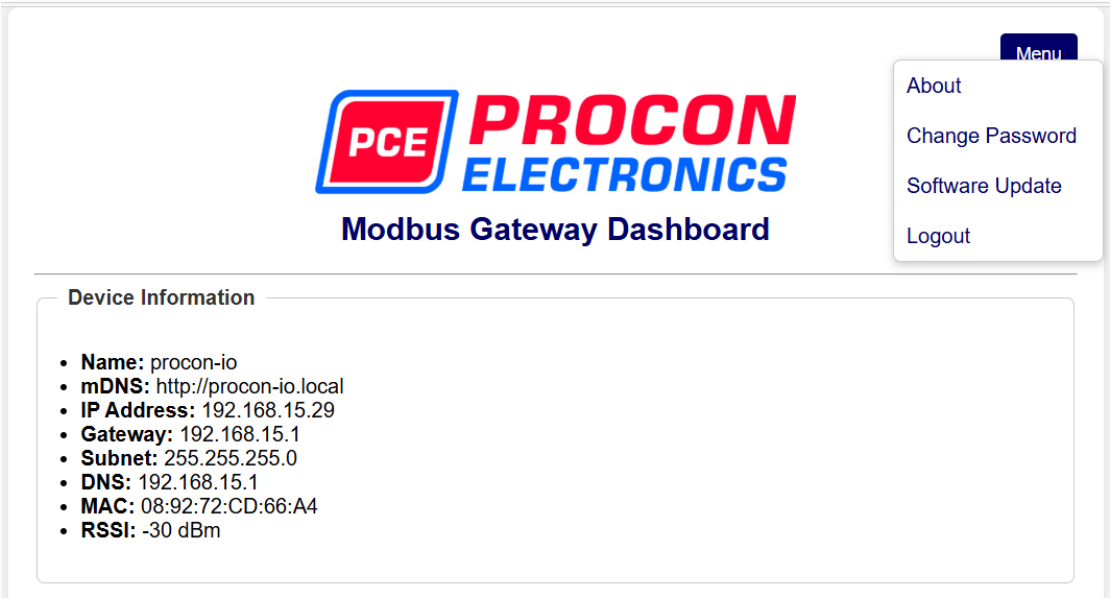


The System section allows for the following: access to diagnostics page, device to be remotely Rebooted and the device to be Factory Reset.

Note: Performing a Factory Reset will clear all settings back to their defaults and will launch the provisioning web server (Procon-IO). If you need to perform a factory reset but do not have access to the Dashboard page, use the reset switch located on the back of the module. Hold in the reset switch for 10seconds with the power turned on.

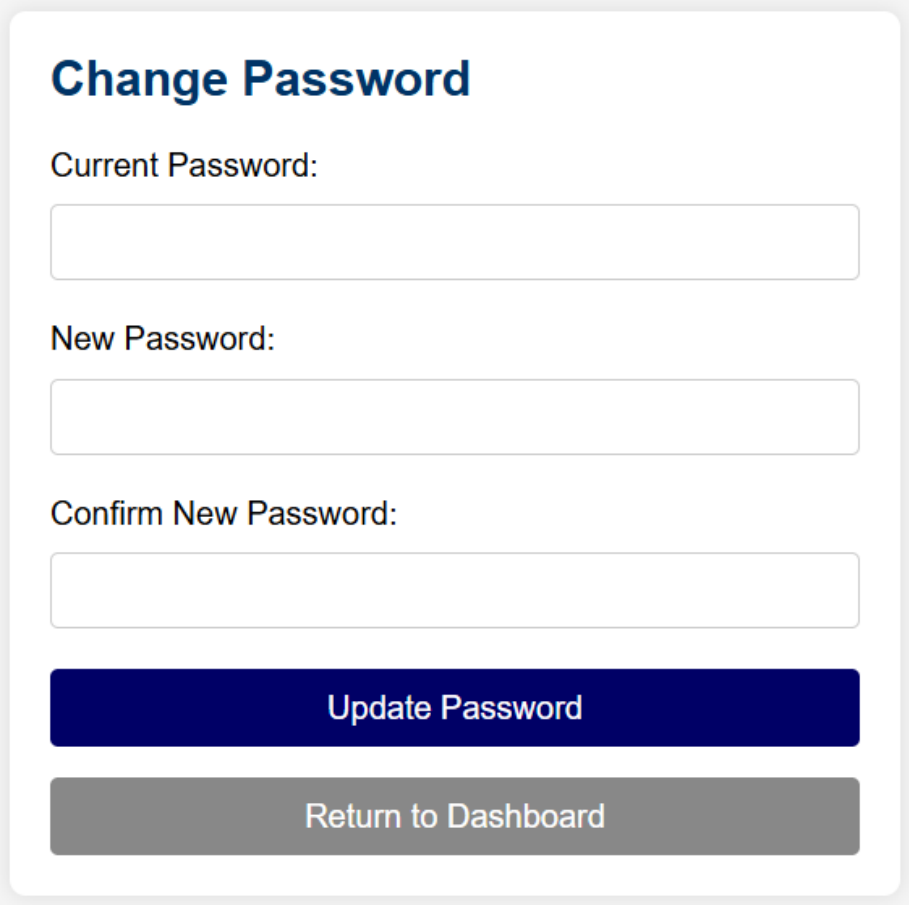


At the top of the Dashboard page, the Menu can be used to display the About page which includes the firmware version number, change the password, update the software and Logout.



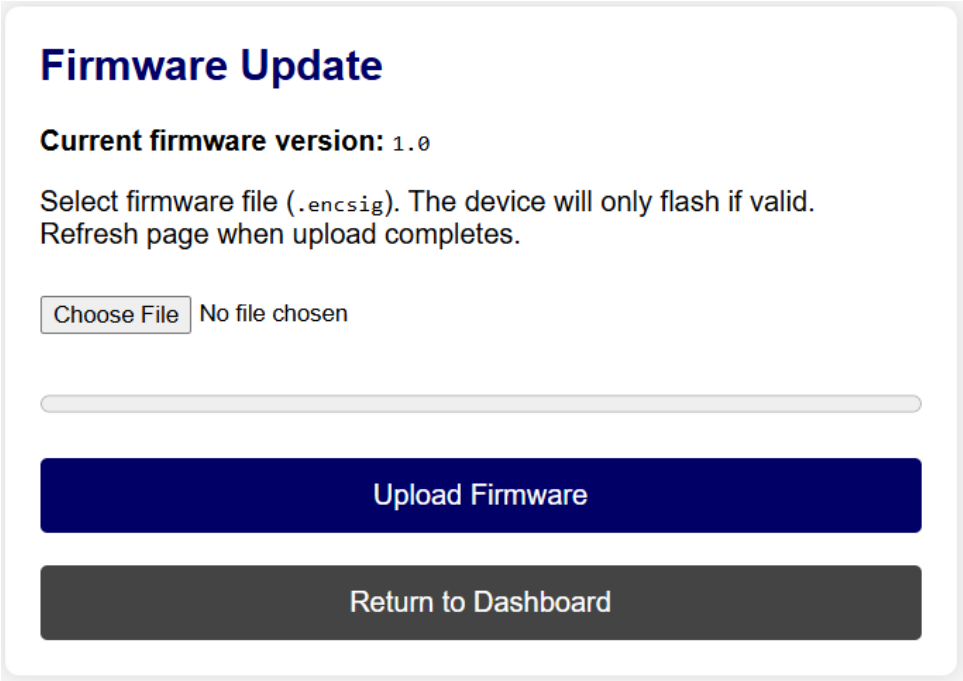
4.6 Changing the Password

To change the password, Navigate to the Change Password option in the Dashboard Menu. Enter the current password (Default: ADMIN) and enter and confirm the new password. Click Update Password to save changes, alternatively return to the Main Dashboard if no changes are required.



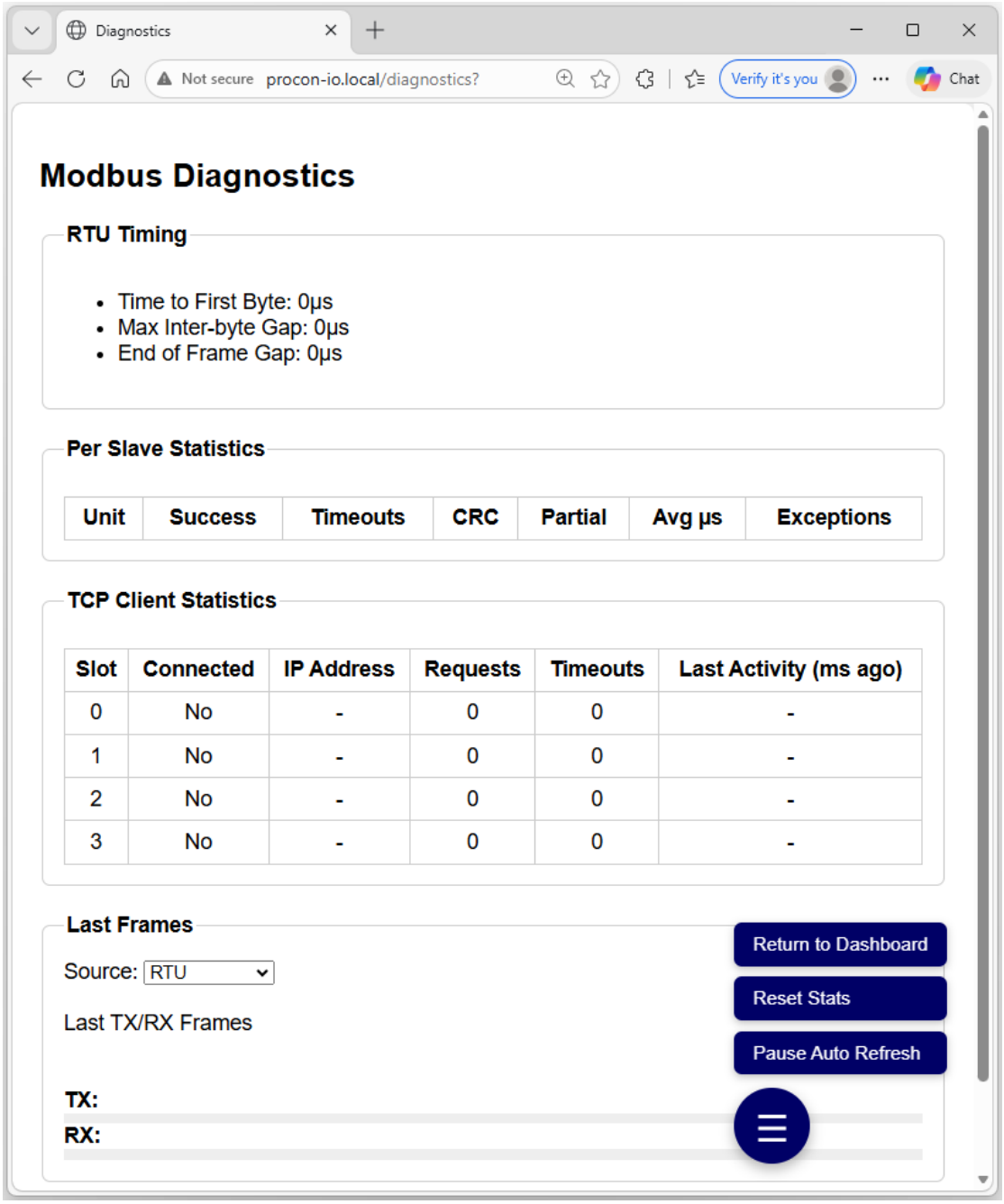
4.7 Updating the Firmware

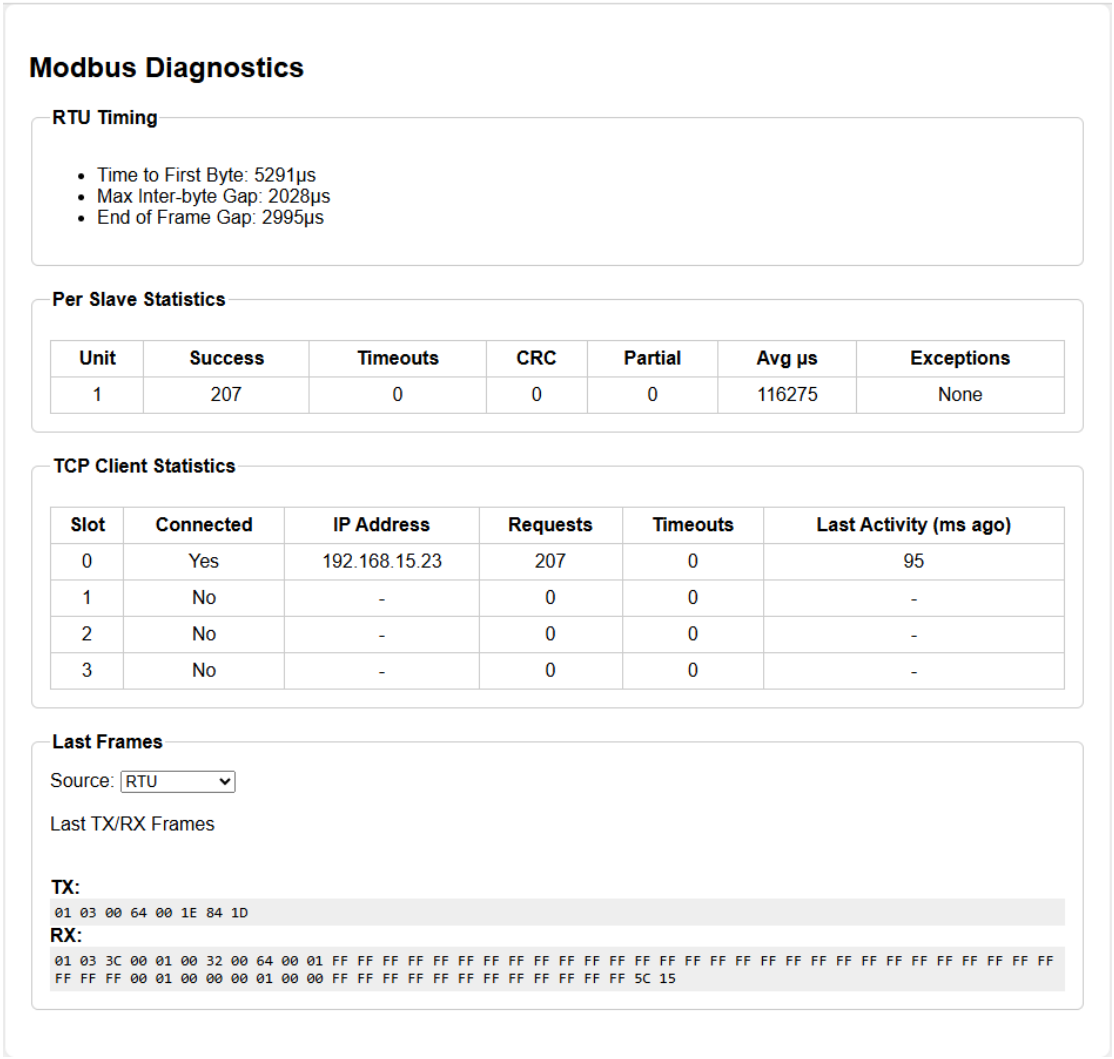
To Update the Firmware, Navigate to the Software Update option in the Dashboard Menu. The Firmware update page displays the current firmware version. To upload new firmware, choose the device firmware file .encsig from your computer and click Upload Firmware. When the Firmware update reaches 100%, the device will now reboot (Note that the page will not autoload, it will stay stuck at 100%). After the device Reboots, it will be necessary to Login again at http://Device_Name.local



4.8 Modbus Diagnostics

The Modbus diagnostics page can be accessed from the System section on the main Dashboard. From the Diagnostics page you can view all connected Slave Devices and all connected TCP clients. Basic information such as successful requests, timeouts and errors can be seen for each connected device. The information is automatically updated every 2 seconds, the Auto Refresh can be paused/resumed as necessary, the stats can also be reset.





4.9 Factory Reset

To Recover a forgotten password, change Wi-Fi networks or to add/remove web pages, you will need to factory reset the device. This can be done by clicking the Factory Reset button located in System section on the main Dashboard, alternatively the reset button on the back of the device can be held in for 10 seconds while the device is powered on.

Factory reset will start the provisioning server **Procon-IO** Wi-Fi, all settings will be restored to default.

5. Updating Webpages

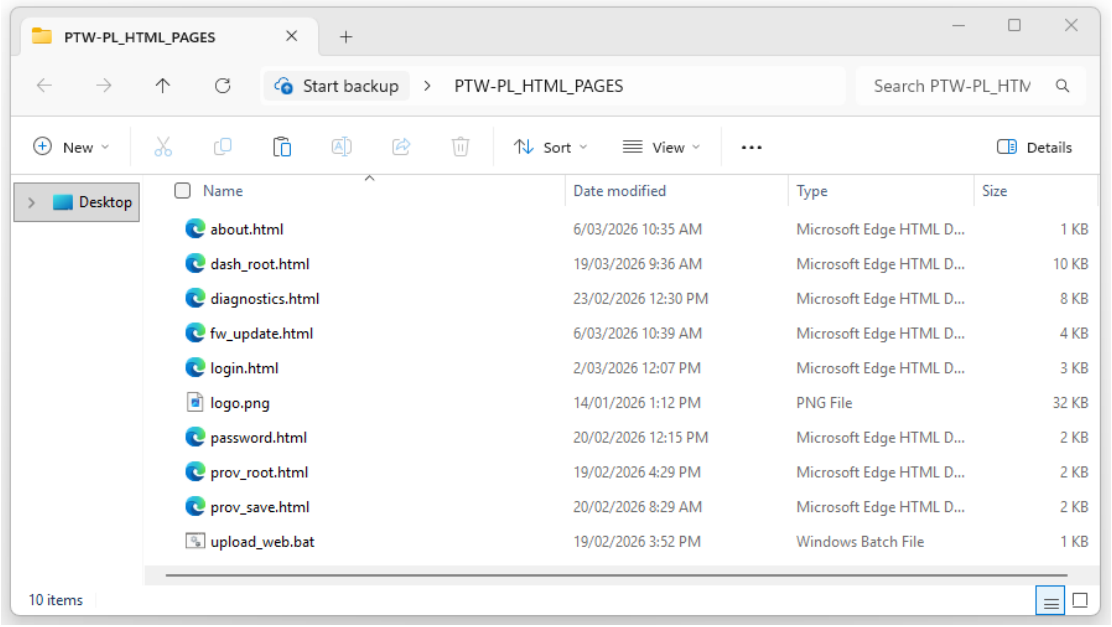
5.1 Updating/replacing Webpages

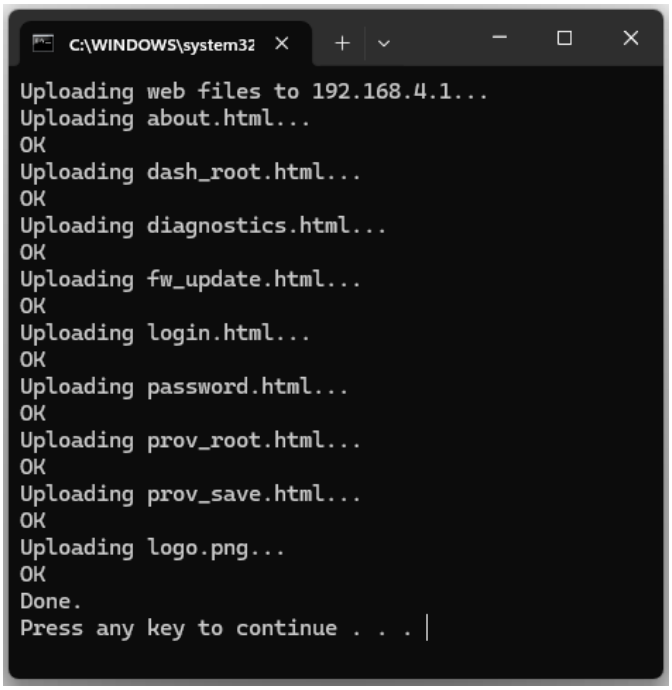
All web pages can be modified by the user to change branding/remove features.

New pages can only be uploaded when the device is in provisioning mode and you have connected to the **Procon-IO** Wi-Fi (see 4.9 Factory Reset).

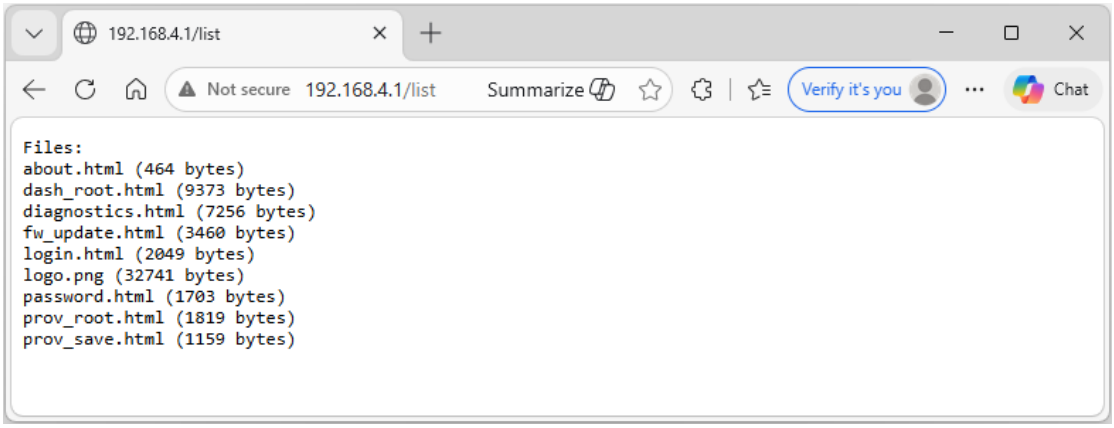
Whilst connected to the **Procon-IO** Wi-Fi, run the windows batch uploader, upload_web.bat. The batch file uploads all compatible files from within the same folder into the flash storage on the device.

(All files available from Procon Electronics on request)

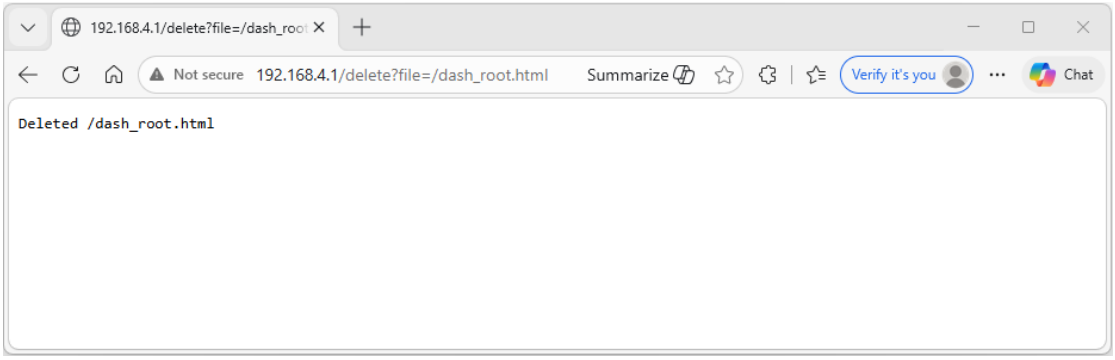




If you want to check which files are currently stored on the device, while in provisioning mode and connected to the **Procon-IO** AP, type: http://192.168.4.1/list ,this will show a list of all files and their size.



5.2 Deleting Webpages

If you want to delete a file from the internal storage, while in provisioning mode and connected to the **Procon-IO** AP, type: http://192.168.4.1/delete?file=/dash_root.html (Replace with the file name you want to delete out of storage).

Note: Uploading new webpages will only overwrite files already in storage with the same name.