AcuLink 810
Data Acquisition Server
User's Manual

ACCUENERGY

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Please read this manual carefully before installation, operation and maintenance of the AcuLink810 data acquisition server. The following symbols in this manual are used to provide warning of danger or risk during the installation and operation of the equipment.

Electric Shock Symbol: Carries information about procedures which must be followed to reduce the risk of electric shock and danger to personal health.

Safety Alert Symbol: Carries information about circumstances which if not considered may result in injury or death.

Prior to maintenance and repair, the equipment must be de-energized and grounded. All maintenance work must be performed by qualified, competent accredited professionals who have received formal training and have experience with high voltage and current devices. Accuenergy shall not be responsible or liable for any damages or injuries caused by improper meter installation and/or operation.

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Chapter 1: Overview

The AcuLink 810 is an intelligent data acquisition server and gateway that allows users to collect data from all Accuenergy meters, sensors and other third party devices.

The AcuLink collects and logs time-stamped data from connected downstream devices (serial or Ethernet), and is able to store this data locally in non volatile memory. When using Ethernet it is possible to push or pull data using HTTP or FTP protocols as well as pushing data to different web-based energy management systems or any front end software platform. There is no software required for the AcuLink as all configuration is done from the gateway's web interface.

Chapter 2: Functional Description

2.1 Hardware Specifications

- **Disk Capacity:** 8 GB RAM
- **Interval Recording:** 1-1440 minutes, user selectable
- **LEDs**: Power, Ethernet, WiFi, Modbus TX/RX, AcuMesh

2.2 Power

- **Power Supply:** 24VDC, 500mA

NOTES: *This unit is to be sourced by a Class 2 power supply with the following output: 24VDC, 500mA min not to exceed 8A.*

- **Isolation:** RJ45 Ethernet 1500Vrms
  RS485 2500Vrms
  Digital Input 5000Vrms

2.3 Communication

- **Protocols Supported:** Modbus RTU, Modbus TCP, BACnet MS/TP, BACnet IP, HTTP/HTTPS, FTP, NTP, SMTP, RSTP, MQTT, MBus, SNMP, SunSpec
- **LAN:** 2 x RJ45 10/100 Ethernet, full half duplex, auto polarity
- **WiFi:** 802.11 b/g/n, 2.4GHz
- **USB:** USB expansion port, USB 2.0 Host

2.4 Inputs

- **RS485 Port:** RS485 Modbus, supports up to 32 external devices (expandable)
- **Baud Rate:** 9600-115200 bps
- **USB Port:** Modbus via RS485-USB converter, supports up to 32 external devices

- **Baud Rate:** 9600-115200 bps

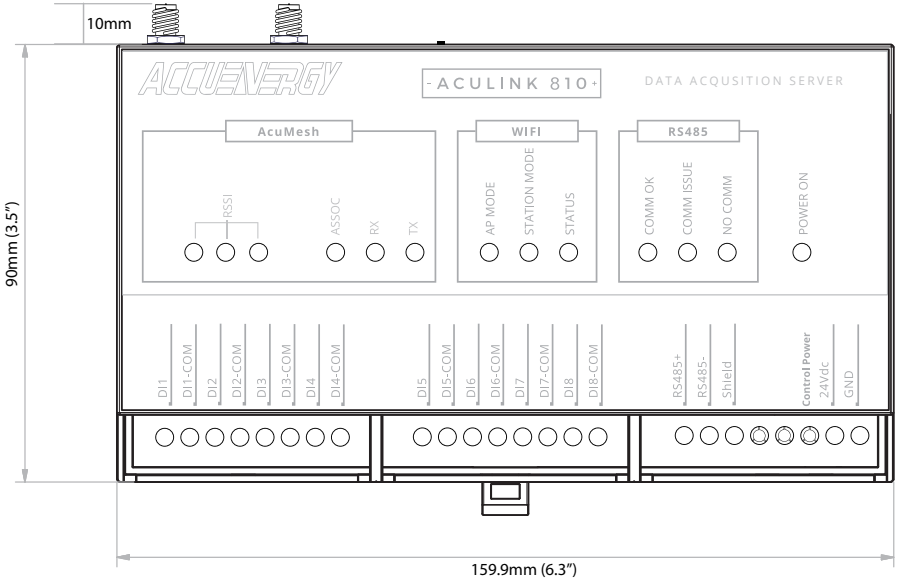
- **Digital Input:** 8 pulse counters
- **Input Voltage Range:** 8-28Vdc
- **Input Current (Max):** 8mA
- **Start Voltage:** 15V
- **Stop Voltage:** 5V
- **Pulse Frequency (Max):** 100Hz, 50% Duty Ratio (5ms ON and 5ms OFF)

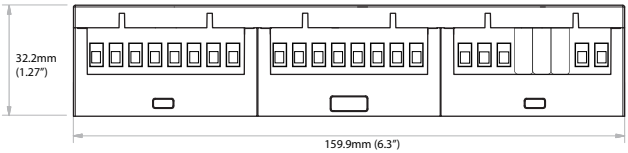
2.5 Environment

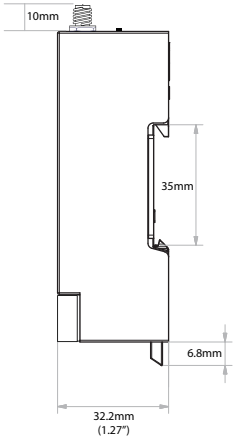
- **North America:** -25 to 70 degrees Celsius, 90% RH, non-condensing

Chapter 3: Appearance and Dimensions

Physical Size: 6.3" x 3.5" x 1.27" (159.9mm x 90mm x 32.2mm)







Chapter 4: Installation

4.1 Installation Checklist

The following materials are required for the AcuLink 810 installation:

- AcuLink 810 Data Acquisition Server
- Ethernet Cat 5 Cable (Required for LAN or direct computer to AcuLink 810 connection)
- Power Supply (24V)
- WiFi Antenna

4.1.1 Optional Hardware:

- Additional Modbus RTU devices
- 2 wire Modbus/RS485 connection

4.1.2 LAN Information

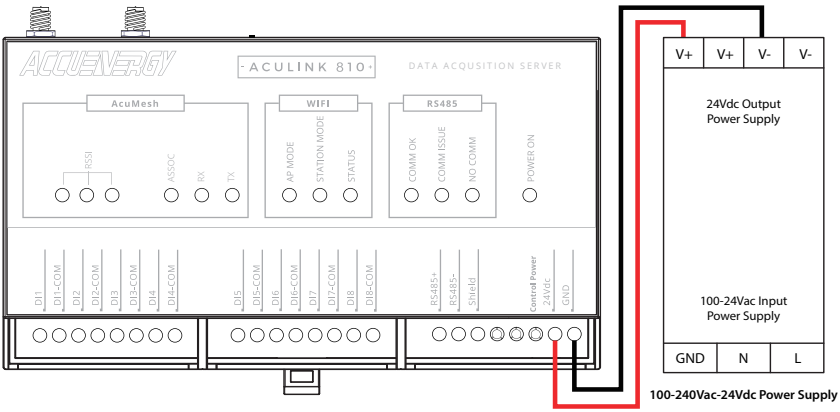
- Ethernet 10/100MB connection point (router/switch)
- IP address and subnet mask (Check with system administrator)
- Gateway Address (Check with system administrator)
- DNS server address (Check with system administrator)

4.1.3 Installation Safety Requirements and Considerations

- Field wiring must have a rating of higher than 70^{o}C; Stranded wiring
- Intended for indoor use
- Altitude: 2000 meters
- Overvoltage Category: II
- Pollution Degree: 2

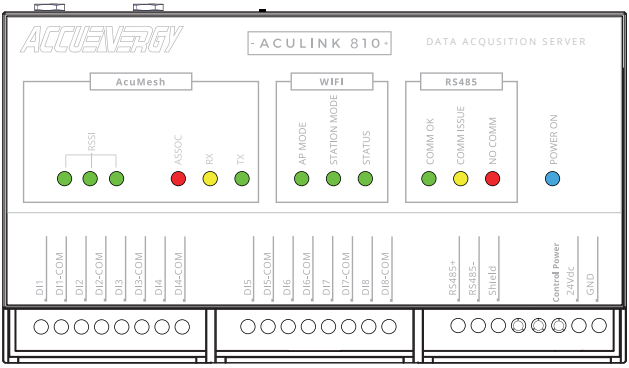
4.2 Powering the unit

- The power supply of the AcuLink 810 is rated for 24Vdc.



Chapter 5: LED Description

There are a total of 13 LEDs on the AcuLink 810 data acquisition server and each represents different functions pertaining to the unit.



With the exception of the blue power LED, the remaining LEDs can be divided into three groups:

5.1 AcuMesh LEDs

The AcuMesh has a total of six LEDs which are related to the AcuMesh status.

RSSI

- There are three RSSI LEDs which indicate the signal strength of the incoming signal.
    - 3 LEDs would indicate Excellent signal strength
    - 2 LEDs would indicate good signal strength
    - 1 LED would indicate poor signal strength
    - 0 LED would indicate bad signal strength

ASSOC

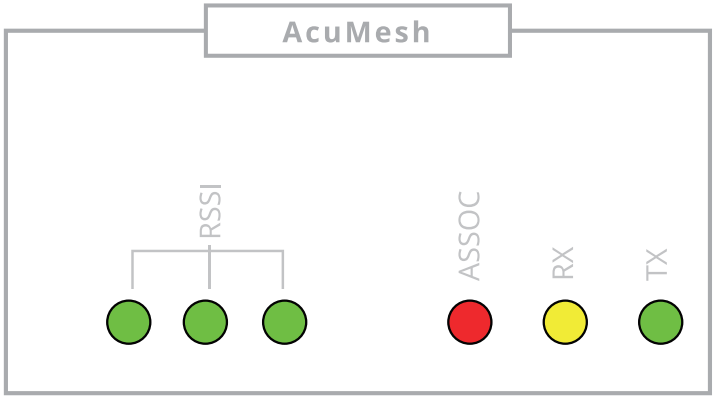
- Indicates that the transceiver is powered on or it is communicating. The Red LED is ON when powered, and briefly ON or flashing during RF transmission.

RX

- Indicates that the transceiver is receiving data.

TX

- Indicates that the transceiver is transmitting data.



5.2 WiFi LEDs

The WiFi has a total of 3 LEDs which are related to the WiFi status.

AP MODE

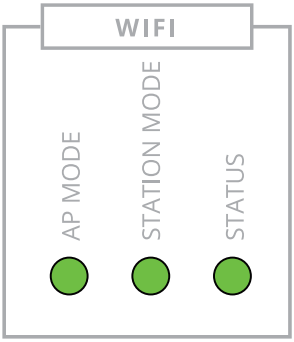
- when ON Indicates that the WiFi is working in Access Point Mode

STATION MODE

- when ON indicates that the WiFi is working in Station Mode

STATUS

- When ON indicates that the WiFi is working and functioning properly.



5.3 RS485 LEDs

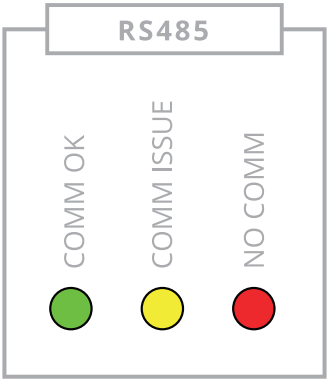
The RS485 has a total of 3 LEDs which are related to the RS485 status.

COMM OK

- When ON indicates that all RS485 and USB devices in RS485 network are online and is represented by a green LED.

COMM ISSUE

- When ON indicates that some of the devices in the RS485 network are offline and is represented by a yellow LED



NO COMM

- When ON indicates that all RS485 devices in the RS485 network are offline and is represented by a red LED

Chapter 6: Initializing the AcuLink 810

The AcuLink 810 has a web interface that users can access to configure the gateway settings and view device data. The AcuLink 810 gateway has two Ethernet ports and also supports communication via WiFi.

The default IP addresses and default modes are:

Ethernet 1: 192.168.8.101

Ethernet 2: DHCP

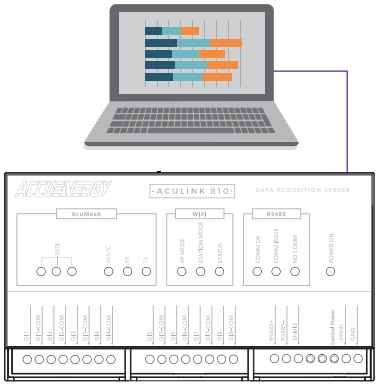
WiFi: Access Point Mode

The following will outline the methods on how to initially access the data acquisition server's web interface using the different methods.

6.1 Accessing the AcuLink 810 Web Interface

6.1.1 Method 1 - Direct Connection via Ethernet

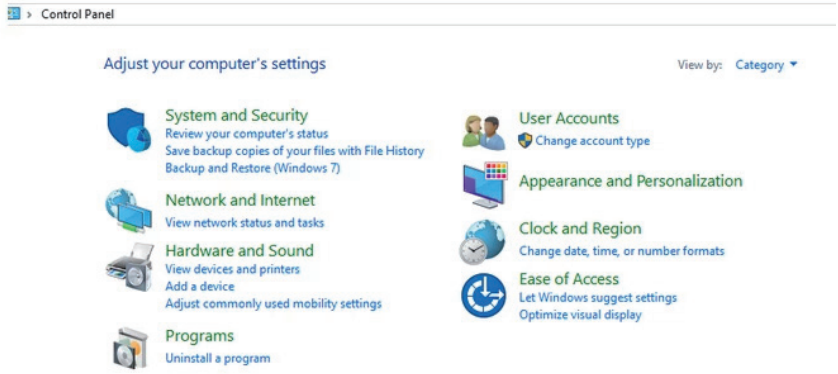
For the direct connection method, there must be an Ethernet connection from the Ethernet 1 port on the AcuLink and a computer.



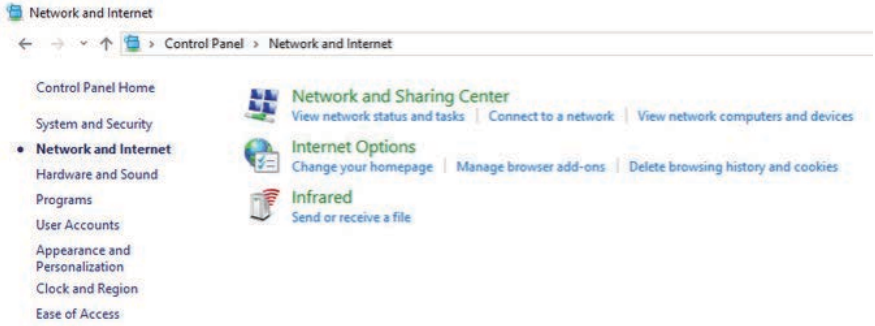
Next in order to access the web interface, the computer's IP address must be configured within the same subnet as the AcuLink Ethernet 1 IP address. The Ethernet 1 port has a default IP address of 192.168.8.101.

The following outlines how to change the computer's IP:

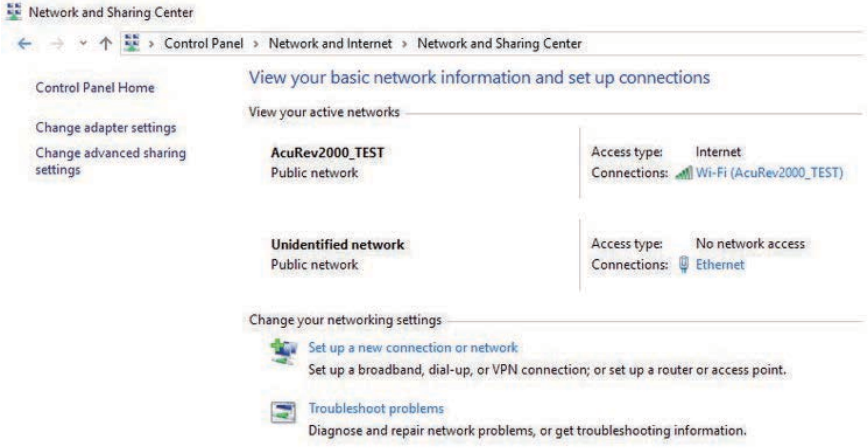
- Start by accessing the control panel of the computer and select ***Network and Internet***.



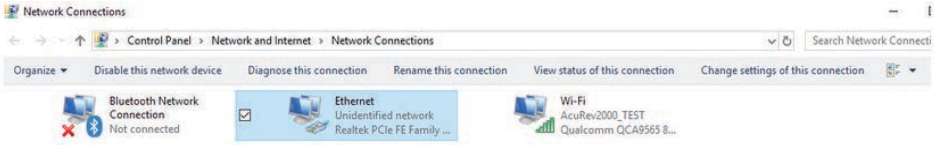
- Select ***Network and Sharing Center***.



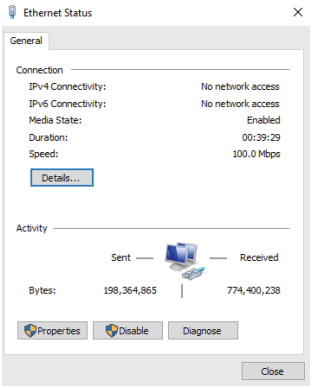
- On the left panel of the screen, select ***Change adapter settings***.



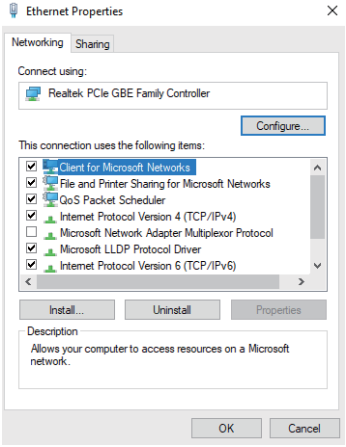
- Double click on ***Ethernet***, or right click on ***Ethernet*** and select ***Properties***.



- The following page will open, click on ***Properties***.

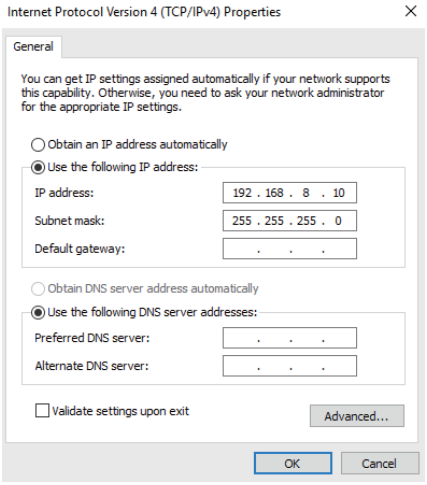


- The following page will open, select ***Internet Protocol Version 4 (TCP/IPv4)*** and click on ***Properties***.



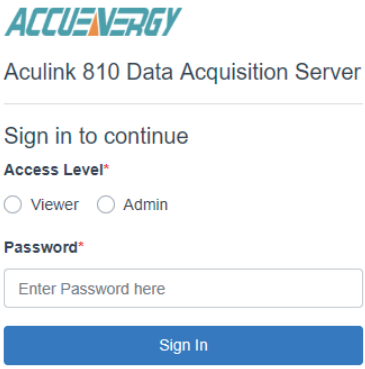
- Select the option ***Use the following IP address***: and change the IP address of the computer. The AcuLink 810 Ethernet 1 address is 192.168.8.101, the computer's IP will need to be within the same subnet. The IP of the computer can be 192.168.8.xxx, where xxx can be any number ranging from 1-254. For the example an IP address of 192.168.8.10 is used.

NOTE: *The computer's IP address and the AcuLink 810 Ethernet 1 IP address cannot be the same.*



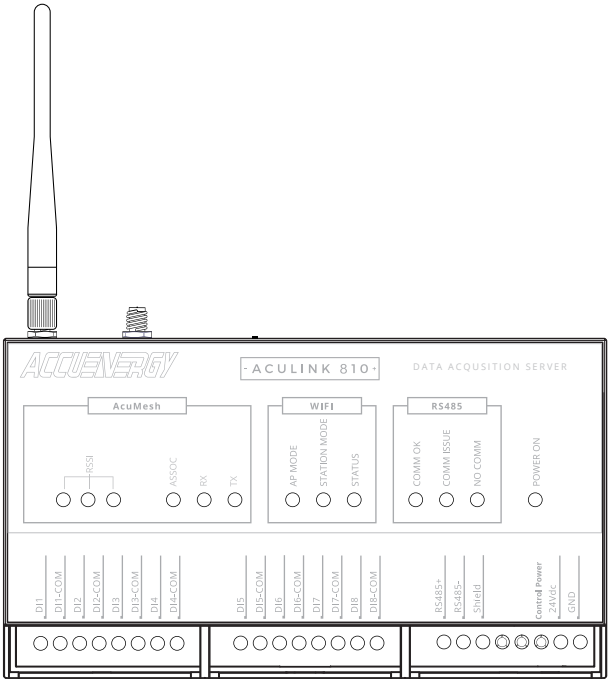
- Once all settings are complete click on ***OK*** to confirm the network changes.
- Then open up an internet browser and type in the AcuLink 810 IP address of ***192.168.8.101***, a login screen will be prompted.
- To login to the web interface, a username and password must be entered.
    - The default username is ***admin***, and the default password is also ***admin***.

NOTE: *The recommended internet browsers to access the 810's web interface are Google Chrome, or FireFox.*



6.1.2 Method 2 - Using WiFi to connect to the data acquisition server's Web Interface

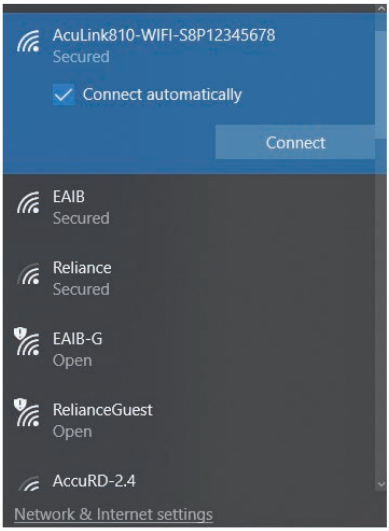
The web interface of the AcuLink can be accessed by WiFi. Ensure that the WiFi antenna is installed on the unit.



By default the AcuLink 810 has its WiFi mode set as AP (Access Point) mode, where the AcuLink 810 acts as a wireless access point allowing other wireless devices to connect and access the gateway.

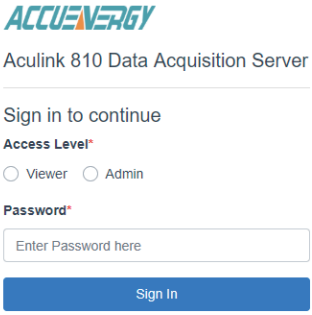
To connect to the AcuLink via AP mode, search for the SSID in the list of available wireless networks.

The SSID will be by default **AcuLink810-WiFi-S8Pxxxxxxxx**, where the ***S8Pxxxxxxx*** is the unique serial number of the AcuLink gateway. The serial number of the AcuLink can be found on the side of the unit. The password for the network is ***accuenergy***.



Once connected to the gateway's wireless network, open up an internet browser and enter in the IP address ***192.168.100.1***. The web server login screen will be prompted.

- To login to the web interface, a username and password must be entered.
  - The default username is ***admin***, and the default password is also ***admin.***

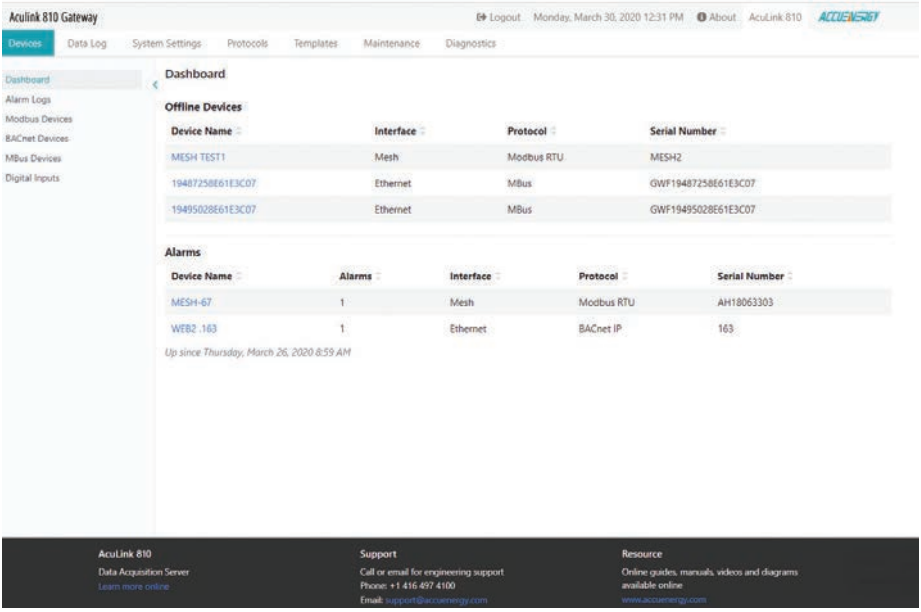


6.2 Dashboard

When logged in the to the AcuLink 810 web interface, users are directed to the ***Dashboard***. The dashboard provides the user with a summary of all the Offline Devices as well as the Devices in Alarm. Under the alarms section of the dashboard the interface includes the ***Up Since*** time, which lets the user know the time the 810 was powered on or rebooted.

The tabs on the top of the interface allows users to access different settings within the gateway.

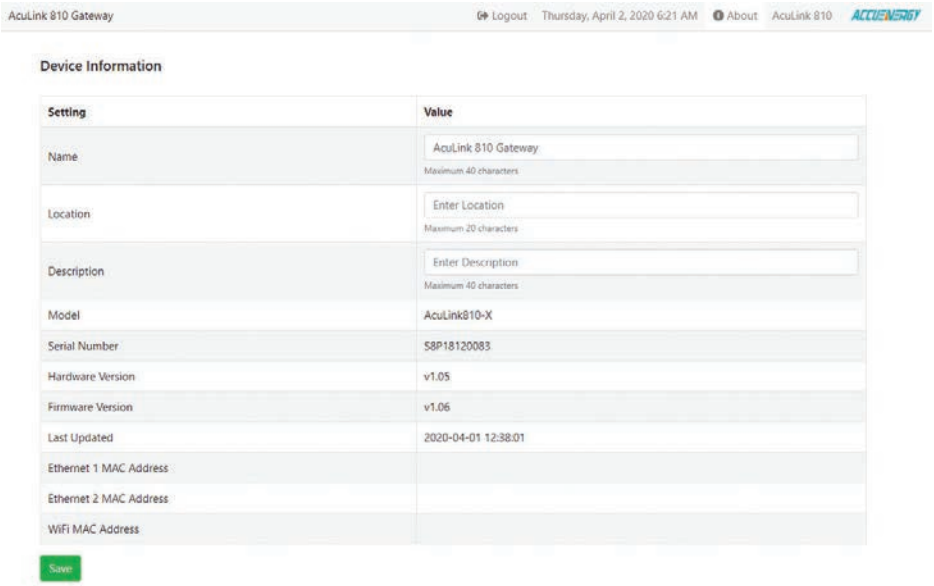
The header at the very top of the page allows users to view the time and date of the AcuLink 810. The footer on the bottom of the web page includes links to the Accuenergy website for further information and details.



6.2.1 About Page

Users can check the AcuLink 810 Device Information on the ***About*** page located on the top right corner of the dashboard. From the About page users are provided with an overview of the AcuLink 810 model number, serial number, Hardware and Firmware versions, and the Ethernet/WiFi MAX addresses.

Users have the option to enter a Name, Location, and Description for the gateway. Once configured click on ***Save***.



Chapter 7: Device Templates

The AcuLink 810 requires a device Template in order to communicate and read data from any Modbus and any BACnet device. The Modbus template supports different Modbus function codes including read coil (Function code 01), read discrete input (Function Code 02), read holding registers (Function Code 03), and read Input registers (Function Code 4). The Modbus device template also supports several data type formats to read different types of Modbus parameters.

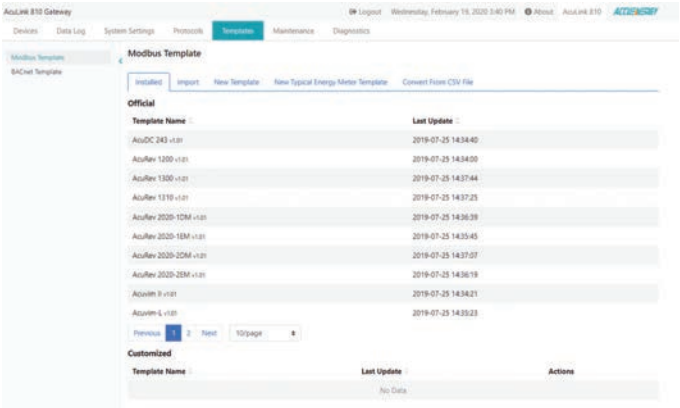
In order for the AcuLink 810 to read device data using either Modbus or BACnet protocols a device template will first need to be installed or created. Within the AcuLink 810 web interface, users can create, modify and convert their own templates from different formats (csv, EPICS, etc). Users can view the template configuration from the ***Templates*** tab, from there they can create/add both Modbus and BACnet templates.

The following sections explain how to create Modbus and BACnet templates for the AcuLink 810.

7.1 Modbus Templates

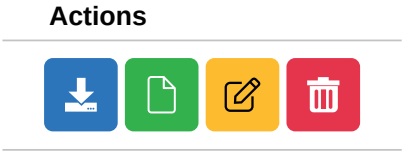
Modbus Templates are used in the AcuLink 810 to correctly read the metering data from Accuenergy and third party Modbus devices. Before a device can be added to the gateway a Modbus template for the device must first be uploaded and installed onto the unit.

In the Modbus templates page users can view the templates and the version number currently installed on to the AcuLink under the ***Installed*** tab.



Customized Templates

If there are customized templates on the AcuLink 810 users have the following action buttons available.



The icons have the following meaning:

The first icon allows users to download the .def template file.

The second icon allows users to create a new template based on that existing template.

The third icon allows users to create a new version based on that existing template.

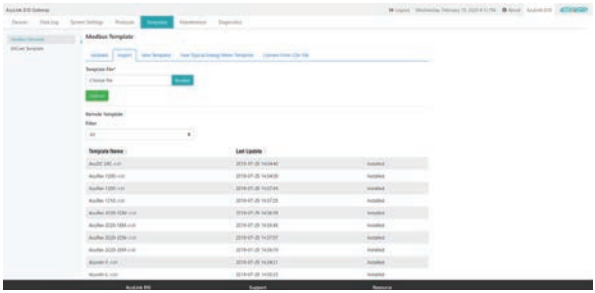
The fourth icon allows users to delete the template.

7.1.1 Import Template

To upload a new device template click on the ***Import*** tab. All Accuenergy device templates can be found in the remote update section of the page. In order to use the remote upload function, users must ensure they have sufficient connection to the Internet.

For third party device templates, users can upload and install templates manually.

NOTE: *Data log and alarm monitoring configurations will be lost after updating an existing device template.*



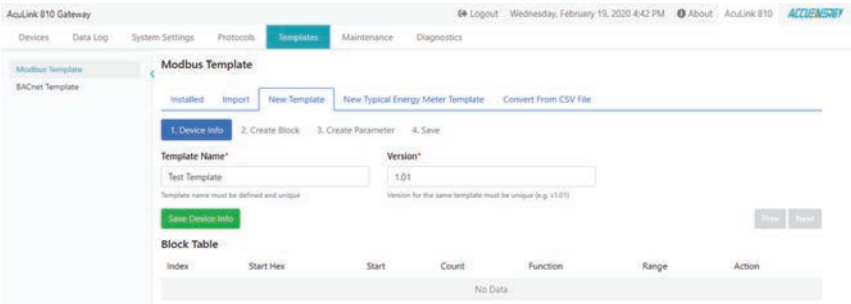
7.1.2 New Template

Under the ***New Template*** tab users can create and build their own Modbus template. There are four steps required in building the template which includes 1) Device Info, 2) Create Block, 3) Create Parameter, and 4) Save

1. Device Information

Users will need to enter in a Device Model, which must be a unique model name. They will also need to enter in a device version that must also be unique.

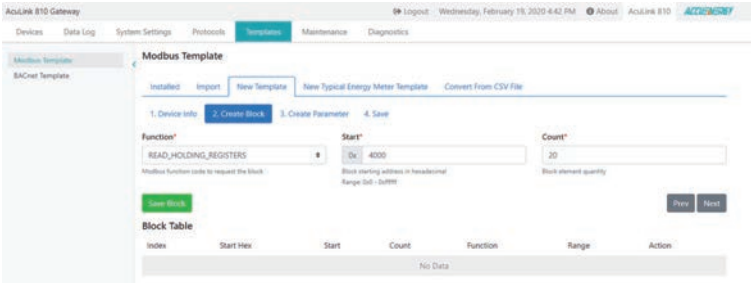
Click on ***Save Device Info*** once the information has been entered correctly.



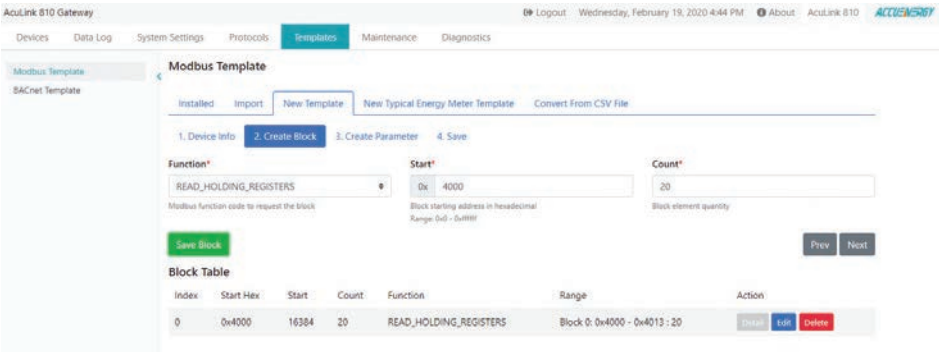
2. Create Block

The second step includes creating the register blocks for the Modbus Device.

- Select the Modbus Function Code of the register block (i.e. Read Holding Registers, Read Discrete Input, Read Coils, read Input Registers)
- Enter in the starting address of the register block, this address must be in hexadecimal.
- Enter the count, i.e. the number of registers in this block.



Once all register block information is configured correctly click on Save Block. The saved block will then appear in the Block Table at the bottom portion of the web page. In the Block Table users have the option to edit, delete or view the details of the register block created.



- If there are multiple register blocks for the Device users can continue creating them. Once all register blocks are complete click on ***Next*** to continue.

3. Create Parameter

The third step includes adding the parameters required to the template.

Users will need to select what block the parameter resides in and also create a display tab to view the parameter once the template is complete.

Block: Select the block for the parameter in the drop down menu

Select display tab(s): In this field enter in a tab that you wish to create and can press enter to create the tab. For example this tab could be named Energy, or Real time data. This tab is where users can find the parameter they have created under once the template is complete. After the tab is created it can be selected from the drop down menu. Users can create multiple tabs in the same manner.

Label: Enter in a label for the parameter, i.e. voltage, current, temperature, etc.

Address: Enter in the Modbus register address for the parameter. This address must be hexadecimal.

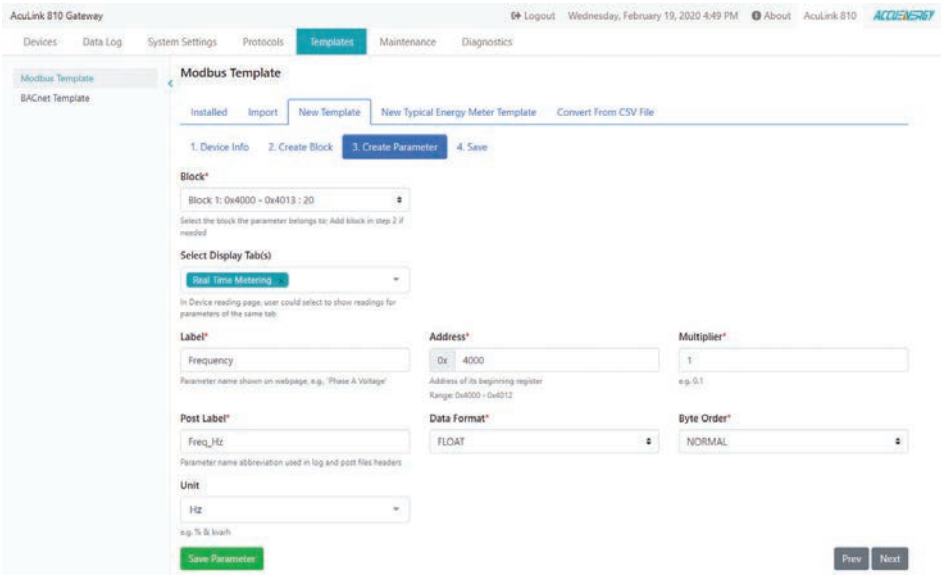
Multiplier: Users can input a multiplier on the parameter.

Post Label: Users can define a post label for the parameter. The post label is used whenever the device data is downloaded or sent to an external server, where the csv file that is generated would have the post label as the header in the file.

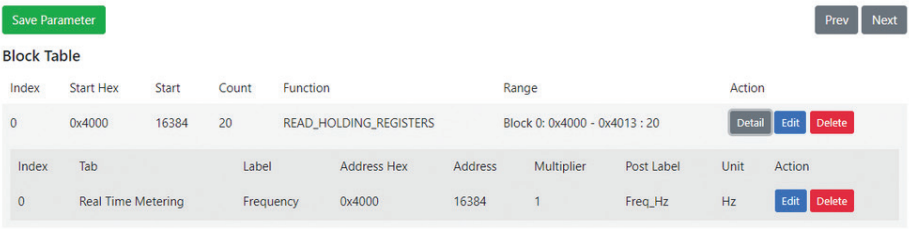
Data Format: Select the data format for the parameter, some typical data types include Int, float, hex, etc.

Byte Order: The byte order for the parameter can be specified, i.e. some devices require the byte order to be swapped in order to read the parameter correctly.

Unit (optional): Users can enter in the preferred unit for the parameter, this setting is optional.



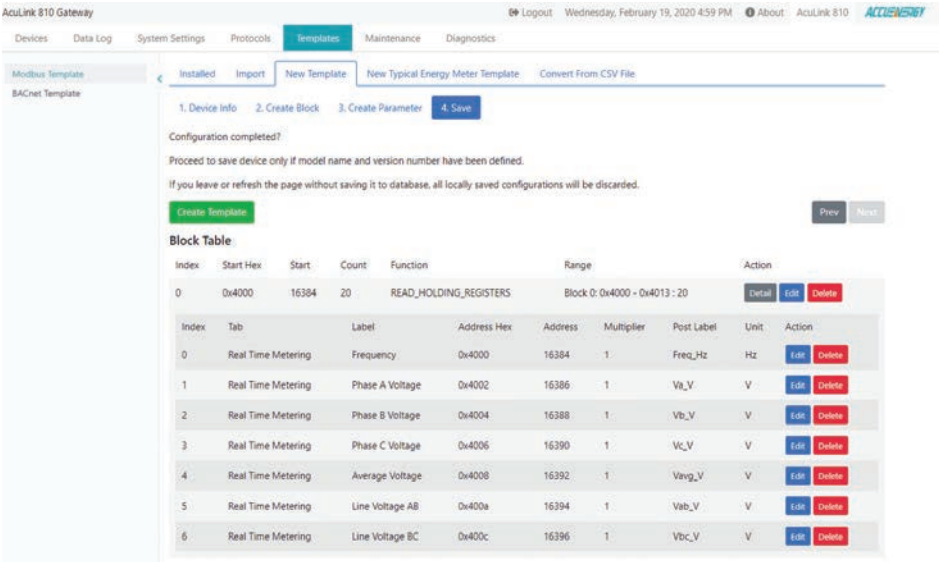
- Once all parameter settings are configured click on ***Save Parameter***. After the parameter is saved users can view the parameter in the Block Table below under the Detail tab. Under the ***detail*** tab users can edit the existing parameter by selecting the ***Edit*** button, and can delete the existing parameter by selecting the ***Delete*** button.



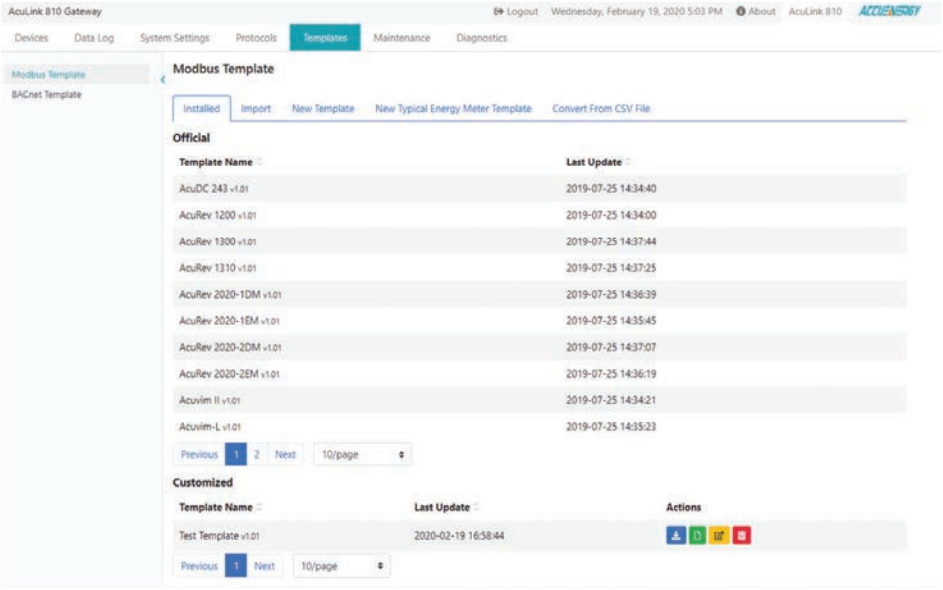
Once Users have added all required parameters to the Modbus Template click on **Next**.

4. Save

The last step is saving the device template. Users can review the Block Table and modify any parameters before saving the template. They can also click on ***Prev*** button to go back and alter any blocks or parameters as needed.



- After reviewing all details of the Modbus Template click on ***Create Template***, users will be redirected to the ***Installed*** tab of the Modbus Template page where the newly created template will be seen under the ***Customized Templates*** at the bottom of the page.



7.1.3 Typical Energy Meter Template

The Typical Energy Meter Template allows users to create a Modbus Template for their third party device and have the ability to post data to our cloud based energy management software ***AcuCloud***. To create a device template that allows third party devices to post data to the AcuCloud software click on the ***Typical Energy Meter Template*** tab.

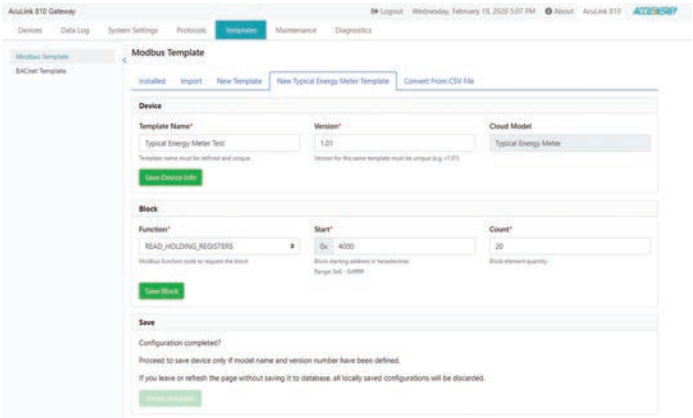
This page will have the following sections:

1. Device

Under the device section users can enter in the Template name and the version number. Once all device settings are configured click on ***Save Device Info***.

2. Block

Users can create the required register blocks for their device, where the function, starting address in hex, and the register count must be specified. Once a block is created click on ***Save Block***, users can create multiple blocks for the device template. All created blocks will appear in the block table located further down the page.

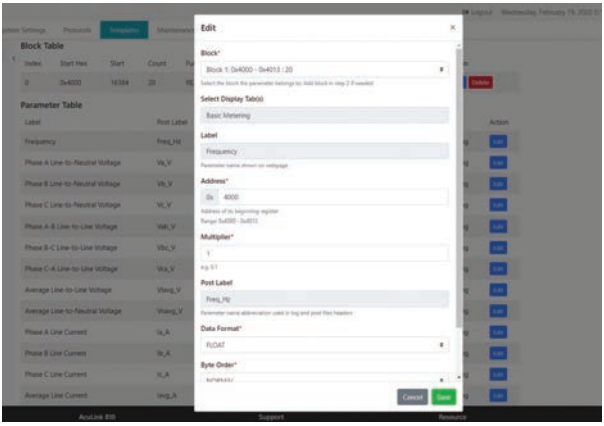


3. Parameter Table

The parameter table has all the parameters that are supported on our cloud based software. Users can find and locate the same parameters within the table that are supported on their third party device and configure it to their template by clicking on the ***Edit*** button next to that parameter.

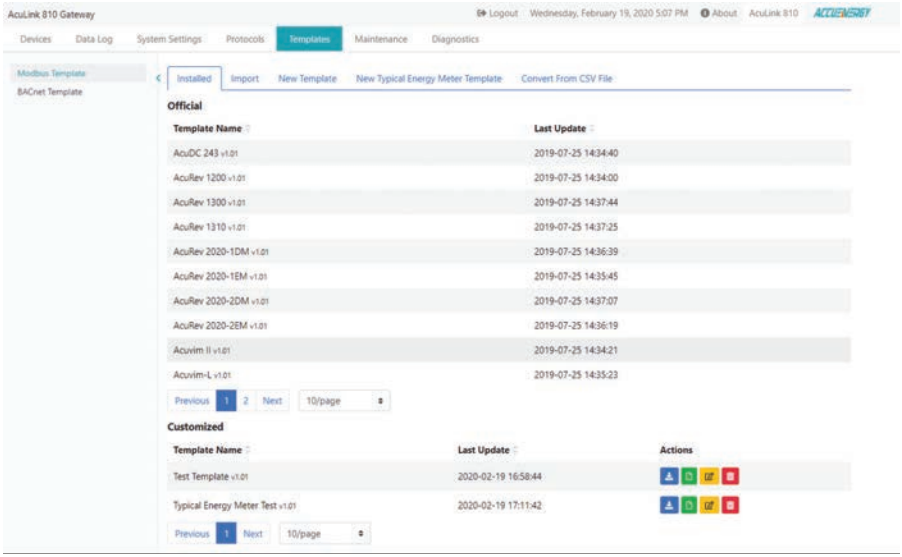
On the edit page users will need to select the block, starting address, multiplier, data type and byte order of the parameter.

After these settings are configured click on ***Save***.



When all desired parameters have been configured and added to the template, click on the Create ***Template*** button.

Users will be redirected to the ***Installed*** tab on the Modbus Template page, where the newly created Typical Energy Meter Template will be seen under the ***Customized*** templates at the bottom of the page.



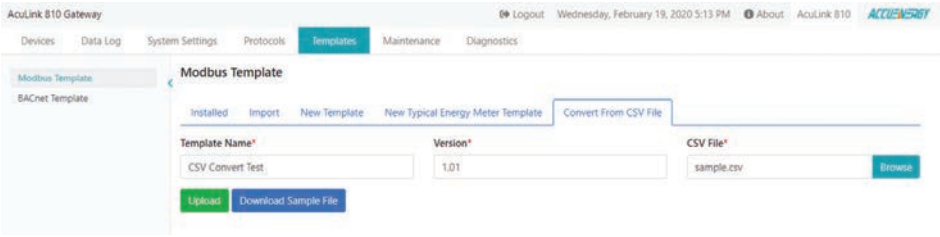
7.1.4 Creating Template from CSV

The AcuLink 810 supports a CSV to Modbus template converter directly from its web interface. To access this converter click on the Convert From CSV File tab on the Modbus Template page.

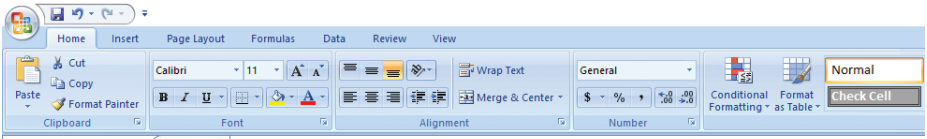
Users can enter in the desired name and version number for the Template.

Under the CSV file section, users will need to upload a CSV file containing all device register information for their device.

A sample CSV file can be downloaded directly from the interface where users can edit and use it to build their own file. The CSV file must be in the same format as the sample file in order to successfully convert the file into a template file.



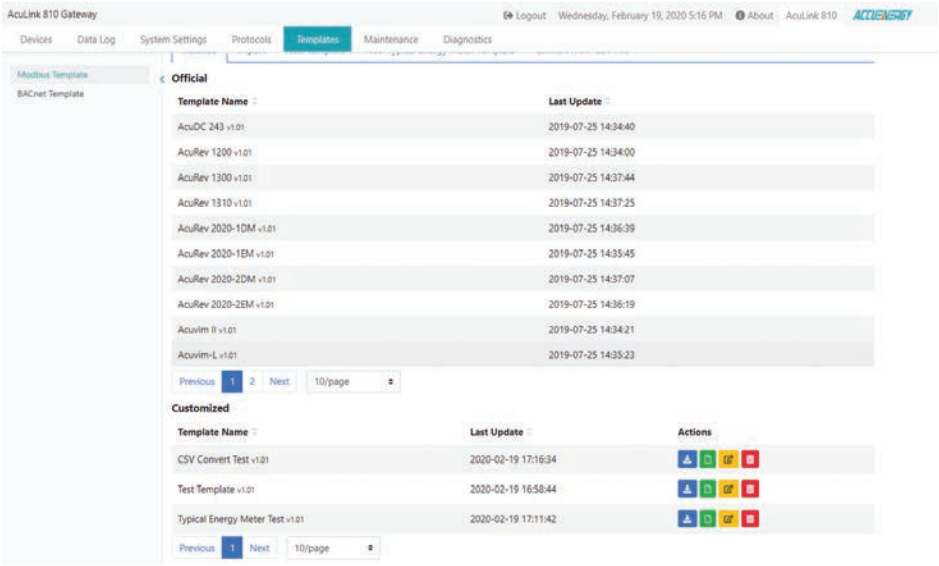
The sample CSV file:



	A	B	C	D	E	F	G	H	I	J	K
1	label	address	dataFormat	byteOrder	slope	postLabel	cloudEnabled	units	block	tab	
2	Frequency	16384	FLOAT	NORMAL	1	Freq_Hz	FALSE	Hz	16384(10)	Basic Metering	
3	Phase A Line-to-Neutral Voltage	16386	FLOAT	NORMAL	1	V1	TRUE	V	16384(10)	Basic Metering	
4	Phase B Line-to-Neutral Voltage	16388	FLOAT	NORMAL	1	V2	TRUE	V	16384(10)	Basic Metering	
5	Phase C Line-to-Neutral Voltage	16390	FLOAT	NORMAL	1	V3	TRUE	V	16384(10)	Basic Metering	
6	Average Line-to-Neutral Voltage	16392	FLOAT	NORMAL	1	Vnavg_V	TRUE	V	16384(10)	Basic Metering	
7	System Active Power Demand	16450	FLOAT	NORMAL	0.001	DMD_P_kW	TRUE	kW	16450(6)	Demand	
8	System Reactive Power Demand	16452	FLOAT	NORMAL	0.001	DMD_Q_kvar	TRUE	kvar	16450(6)	Demand	
9	System Apparent Power Demand	16454	FLOAT	NORMAL	0.001	DMD_S_kVA	TRUE	kVA	16450(6)	Demand	
10	System Import Active Energy	16456	UINT32	NORMAL	0.1	EP_IMP_kWh	TRUE	kWh	16456(18)	Energy	
11	System Export Active Energy	16458	UINT32	NORMAL	0.1	EP_EXP_kWh	TRUE	kWh	16456(18)	Energy	
12	System Import Reactive Energy	16460	UINT32	NORMAL	0.1	EQ_IMP_kvarh	TRUE	kvarh	16456(18)	Energy	
13	System Export Reactive Energy	16462	UINT32	NORMAL	0.1	EQ_EXP_kvarh	TRUE	kvarh	16456(18)	Energy	
14	System Total Active Energy	16464	UINT32	NORMAL	0.1	EP_TOTAL_kWh	TRUE	kWh	16456(18)	Energy	
15	System Net Active Energy	16466	INT32	NORMAL	0.1	EP_NET_kWh	TRUE	kWh	16456(18)	Energy	
16	System Total Reactive Energy	16468	UINT32	NORMAL	0.1	EQ_TOTAL_kvarh	TRUE	kvarh	16456(18)	Energy	
17	System Net Reactive Energy	16470	INT32	NORMAL	0.1	EQ_NET_kvarh	TRUE	kvarh	16456(18)	Energy	
18	System Apparent Energy	16472	UINT32	NORMAL	0.1	ES_kVAh	TRUE	kVAh	16456(18)	Energy	
19	Phase A Import Active Energy	17952	UINT32	NORMAL	0.1	EPa_IMP_kWh	FALSE	kWh	17952(30)	Energy	
20	Phase A Export Active Energy	17954	UINT32	NORMAL	0.1	EPa_EXP_kWh	FALSE	kWh	17952(30)	Energy	
21	Phase B Import Active Energy	17956	UINT32	NORMAL	0.1	EPb_IMP_kWh	FALSE	kWh	17952(30)	Energy	
22	Phase B Export Active Energy	17958	UINT32	NORMAL	0.1	EPb_EXP_kWh	FALSE	kWh	17952(30)	Energy	
23	Phase C Import Active Energy	17960	UINT32	NORMAL	0.1	EPc_IMP_kWh	FALSE	kWh	17952(30)	Energy	
24	Phase C Export Active Energy	17962	UINT32	NORMAL	0.1	EPc_EXP_kWh	FALSE	kWh	17952(30)	Energy	
25	Phase A Import Reactive Energy	17964	UINT32	NORMAL	0.1	EQa_IMP_kvarh	FALSE	kvarh	17952(30)	Energy	
26	Phase A Export Reactive Energy	17966	UINT32	NORMAL	0.1	EQa_EXP_kvarh	FALSE	kvarh	17952(30)	Energy	
27	Phase B Import Reactive Energy	17968	UINT32	NORMAL	0.1	EQb_IMP_kvarh	FALSE	kvarh	17952(30)	Energy	
28	Phase B Export Reactive Energy	17970	UINT32	NORMAL	0.1	EQb_EXP_kvarh	FALSE	kvarh	17952(30)	Energy	
29	Phase C Import Reactive Energy	17972	UINT32	NORMAL	0.1	EQc_IMP_kvarh	FALSE	kvarh	17952(30)	Energy	
30	Phase C Export Reactive Energy	17974	UINT32	NORMAL	0.1	EQc_EXP_kvarh	FALSE	kvarh	17952(30)	Energy	
31	Phase A Apparent Energy	17976	UINT32	NORMAL	0.1	ESa_kVAh	FALSE	kVAh	17952(30)	Energy	
32	Phase B Apparent Energy	17978	UINT32	NORMAL	0.1	ESb_kVAh	FALSE	kVAh	17952(30)	Energy	
33	Phase C Apparent Energy	17980	UINT32	NORMAL	0.1	ESc_kVAh	FALSE	kVAh	17952(30)	Energy	
34											

Once all information and CSV file have been uploaded click on the ***Upload*** button.

Users will be redirected to the ***Installed*** tab on the Modbus Template page where the newly converted Modbus template will be seen under the ***Customized*** templates located at the bottom of the page.

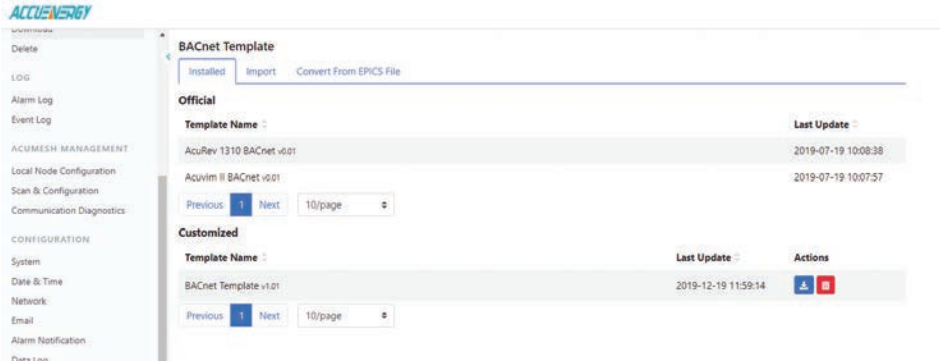


7.2 BACnet Template

BACnet Templates are used in the AcuLink 810 to correctly read the metering data from Accuenergy and third party BACnet devices. Before a device can be added to the gateway a BACnet template for the device must first be uploaded and installed onto the unit.

On the Templates page select ***BACnet Template***.

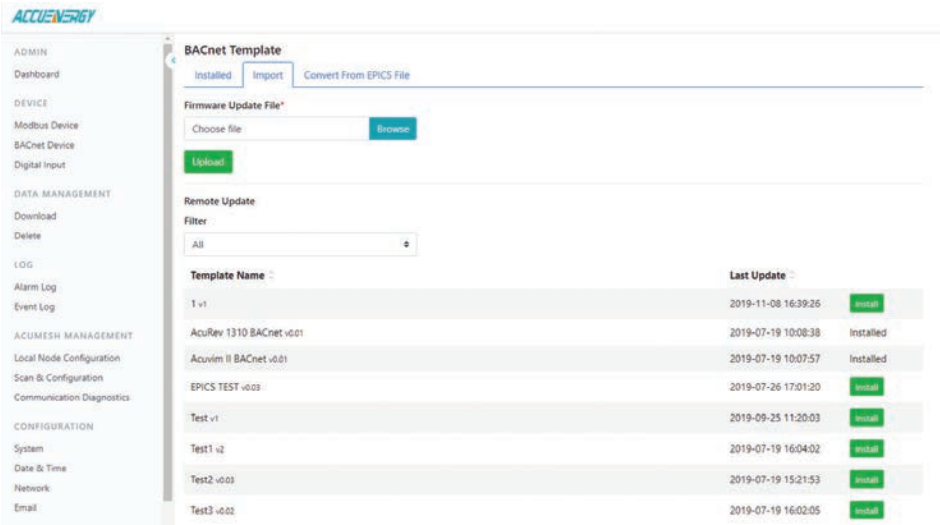
In the BACnet templates page users can view the templates and the version number currently installed on to the AcuLink under the ***Installed tab***.



7.2.1 Import Template

To upload a new device template click on the ***Import*** tab. Users can upload a BACnet template manually or can download templates from our remote server. To import a template manually users must ensure that the device template is in ***.def*** format as no other formats are excepted on the AcuLink 810.

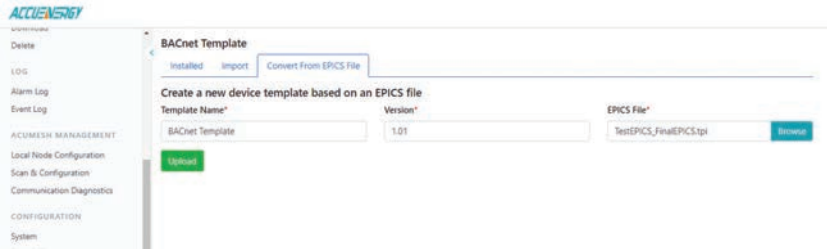
Alternatively users can download a BACnet template from our remote server by clicking on the ***Check*** button. A template can be installed directly from our server to the AcuLink 810.



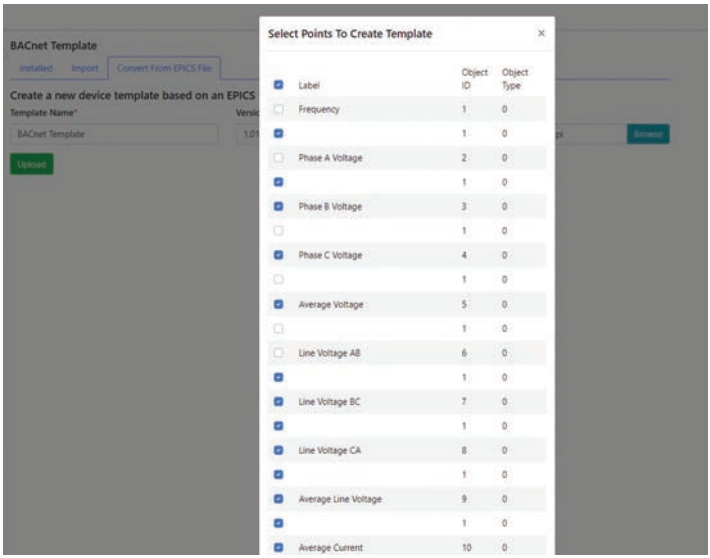
NOTE: *If users are updating or editing an existing template the Data log and alarm monitoring configurations will be lost after updating an existing device template.*

7.2.2 Convert from EPICS File

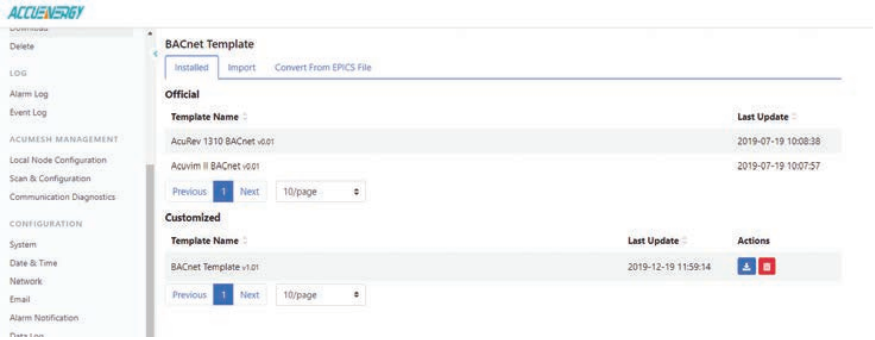
The AcuLink 810 supports a template converter that convert the EPICS file from BACnet devices into a .def BACnet template supported on the AcuLink. Under the ***Convert from EPICS*** File tab users can enter in the template name, version number and upload the EPICS file.



Once the name, version and EPICS file has been uploaded users can click on ***Upload***. Users will be able to configure and specify which parameter they want to include in the BACnet template, once the parameters are configured click on ***Save*** at the bottom of the page.



Users will be redirected to the ***Installed*** tab in the BACnet Template page where the newly converted template file will be seen under the ***Customized*** templates located at the bottom of the page.



Chapter 8: System Settings

8.1 Network

All network related configurations can be found on the ***Network*** page under the ***System Status*** tab. Users can configure all Ethernet (ports 1 & 2), WiFi, DNS, and RSTP configurations from this page.

8.1.1 Ethernet

There are two Ethernet ports on the AcuLink 810, by default Ethernet port 1 has a static IP where as Ethernet port 2 is configured for DHCP.

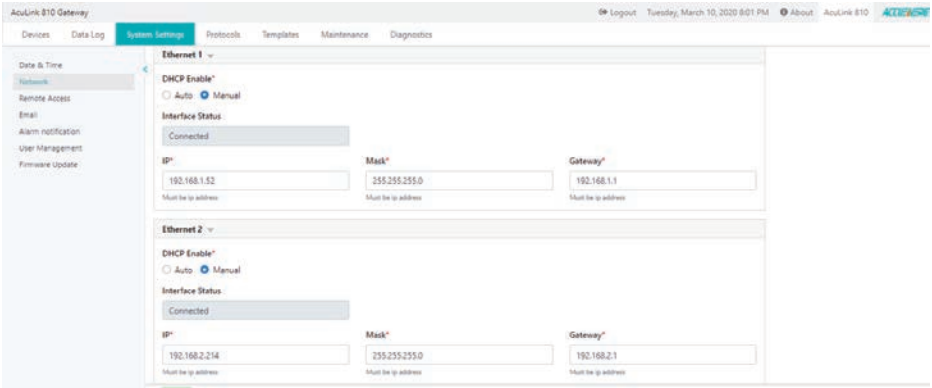
Default Ethernet port 1 settings:

- IP Address - 192.168.8.101
- Submask - 255.255.255.0
- Gateway - 192.168.8.101

Default Ethernet port 2 settings:

- DHCP enabled

The **Interface Status** on the network page lets users know what is connected or disconnected, for example the image below shows both interface status as ***Connected*** which indicates that both Ethernet 1 and Ethernet 2 have an Ethernet cable connected to the port.



8.1.2 WiFi

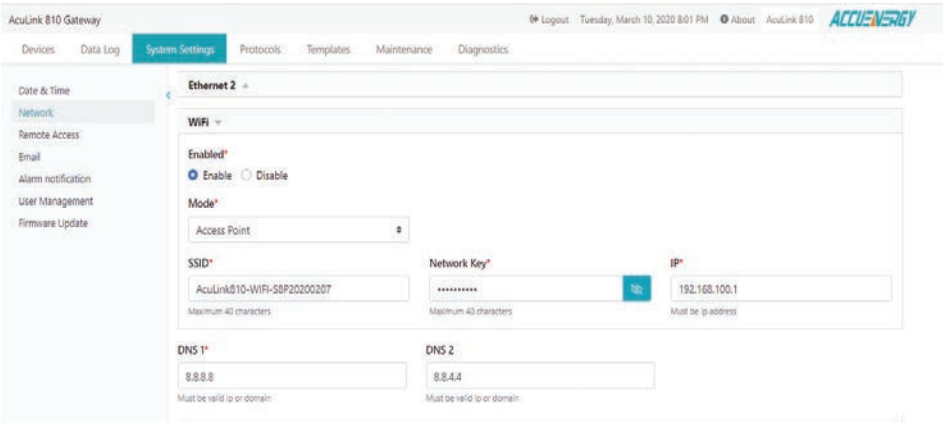
There are two WiFi modes in the AcuLink 810, Access point and station.

NOTE: *When using WiFi ensure that the provided antenna is installed on the AcuLink 810 unit.*

Access Point Mode - Is the default WiFi configuration for AcuLink 810, where the gateway will act as a wireless access point and will allow other wireless devices to connect and access the AcuLink 810.

- In Access Point mode, users can configure the SSID, Network Key and IP of the AcuLink 810 as well as the DHCP DNS servers.
- The default AP mode settings:
    - SSID - ***AcuLink810-WiFi-SERIAL#810***
    - Network Key - ***accuenergy***
    - IP - ***192.168.100.1***

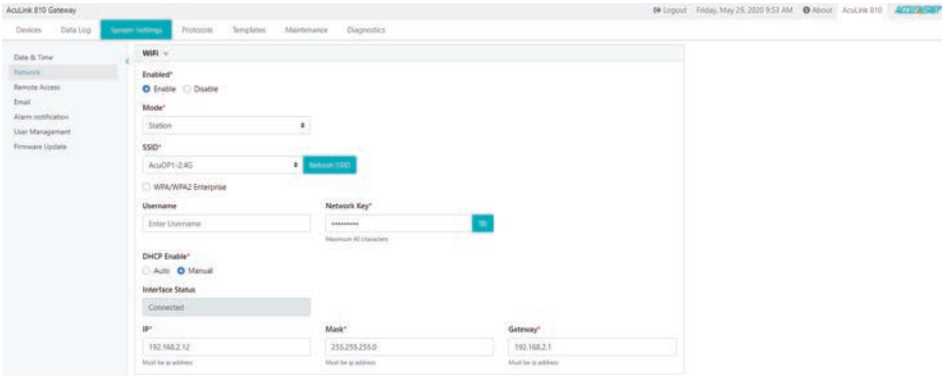
NOTE: *For steps on how to access the web interface via WiFi AP mode refer to chapter 6 section 6.1.2.*



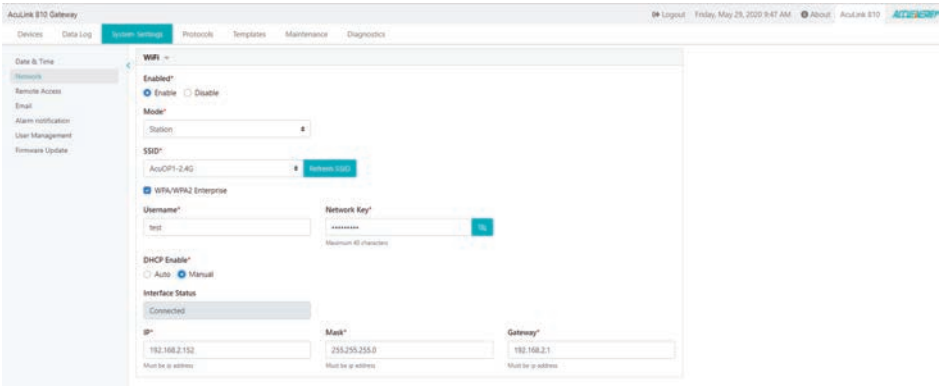
Station Mode: The AcuLink 810 will behave like a wireless client and bridge to another wireless network that is available.

- In Station mode, users can select the Wireless network to connect to in the SSID drop down menu. Once the desired wireless network is configured enter the Network Key for the wireless network that the AcuLink 810 will bridge to.

- Users can configure a static WiFi IP by manually entering in the IP, submask, and gateway of the WiFi network. Alternatively the WiFi can be configured for DHCP where the IP, submask, and gateway of the WiFi network is automatically assigned to the AcuLink 810.



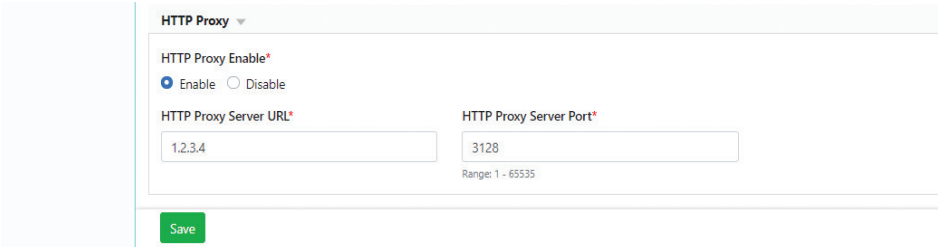
- Enterprise WiFi - The AcuLink 810 supports Enterprise WiFi, where users can connect using an enterprise level WiFi network which is common in many colleges/universities, hospitals, etc. When attempting to connect to an enterprise level WiFi network, select the WPA/WPA2 Enterprise check box and enter in the username and password to connect to the network.



8.1.3 HTTP Proxy

The AcuLink 810 supports HTTP proxy configuration which allows users to post data to their servers via a proxy server.

To configure the HTTP proxy enter in the proxy url and port number.

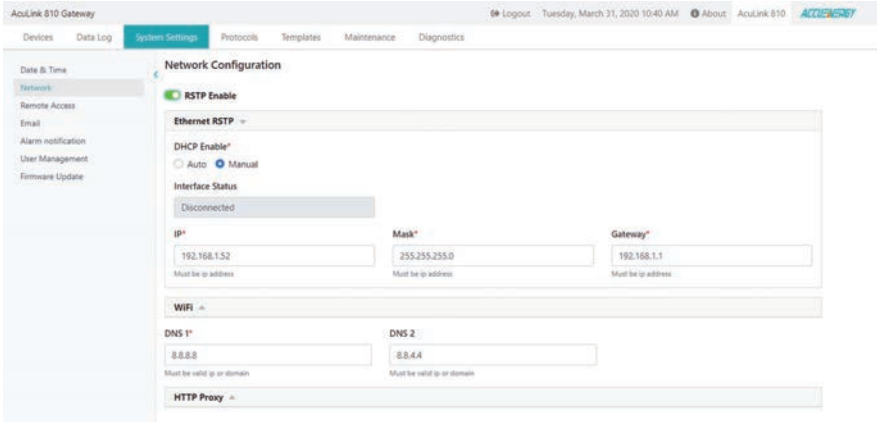


8.1.4 RSTP

The RSTP protocol allows users to create an Ethernet daisy chain using the two Ethernet ports of the AcuLink 810. The 810 can be daisy chained to a network switch/router, other AcuLink 810, and other devices supporting the RSTP protocol.

On the 810 web interface the RSTP protocol can be enabled in the network configuration page. Once enabled users will notice there is only one setting for both Ethernet ports as both ports would now be using the RSTP configured IP address instead of two unique IP addresses.

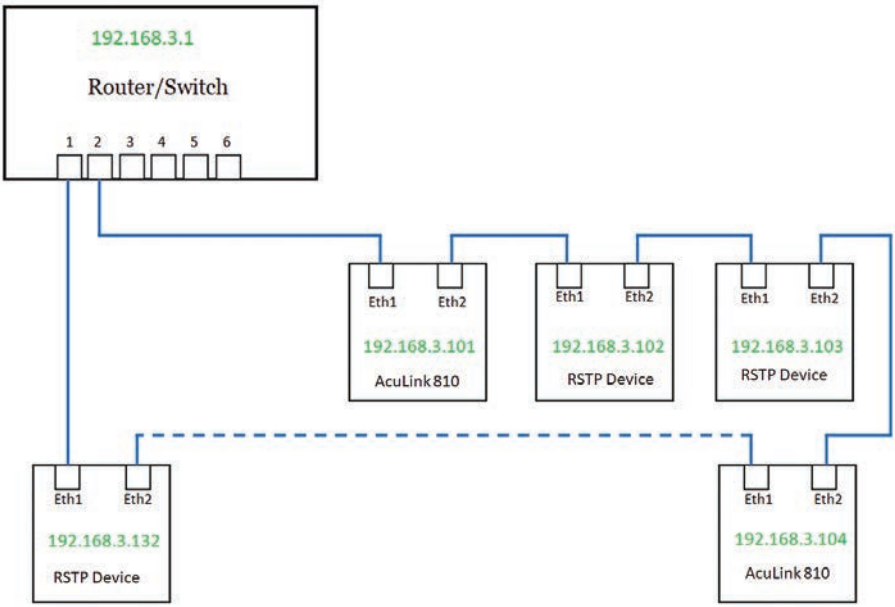
Users can configure the AcuLink IP manually or by setting the DHCP as Auto.



NOTE: *When the RSTP is enabled users will not be able to configure Ethernet 1 and Ethernet 2, there is only 1 IP for the AcuLink using RSTP protocol.*

Network Topology

Users can can daisy chain up to 32 devices using the RSTP protocol. This can cut down the number of network switches required in different applications and allows the use of 1 network switch/router to be used with up to 32 devices. Each device can be accessed by configuring a unique IP address or having the IP addresses assigned automatically by the network.

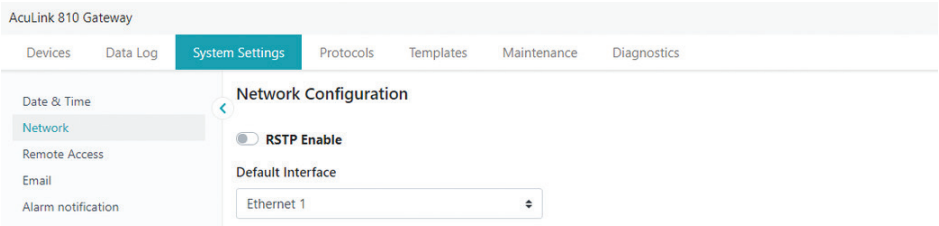


8.1.5 Default Routing Interface

The AcuLink 810 supports a routing default interface setting which allows users to configure which port to use for primary routing to external networks. Since there are multiple ways the user can connect such as Ethernet1/2, WiFi, RSTP, this setting will establish which one is used for the main routing. The other interfaces can be used for local routing if the users has them connected.

Users can select the default routing interface as:

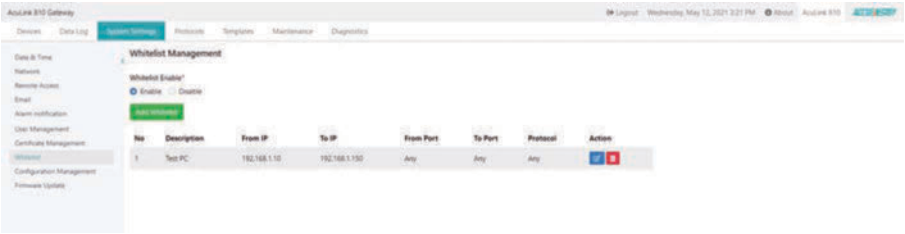
- Ethernet 1
- Ethernet 2
- WiFi - only valid if WiFi is configured for station mode
- Bridge (RSTP) - only valid if RSTP is enabled



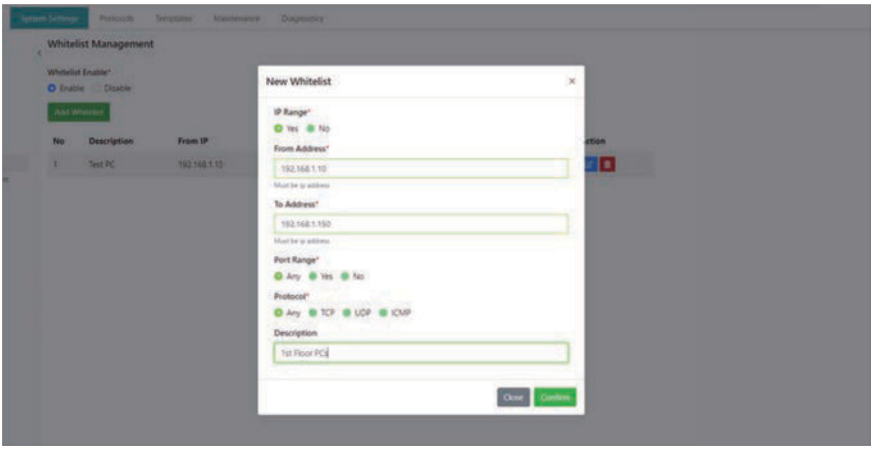
8.2 Whitelist

The AcuLink 810 supports the access control function, also known as the IP whitelist.

When enabled, only the selected IP addresses can access the gateway's web interface. Users can enter in an IPv4 address along with a description for the address. There is a maximum of 20 IP addresses that can be added to the IP Whitelist.



When adding the whitelist users have the option to configure a specific IP or IP range, Port, Protocol, and description.



8.3 Time & Date

The ***Date & Time*** page under the ***System Settings*** tab is where users can configure the local time of the gateway. The AcuLink 810 supports NTP (Network Time Protocol) where it can synchronize its time to NTP servers across the network.

NOTE: *In order to synchronize the AcuLink 810's time to the NTP time servers an internet connection is required.*

If users to not want to sync the device time to an NTP server they can disable the NTP setting and configure the time and date manually.

- **Time Sync:** Users can force the time to update to the NTP on the AcuLink 810 by clicking the Sync button.
- **NTP Time Servers:** The AcuLink 810 supports can be synced with up to 3 time servers. By default the gateway uses 0.u.pool.ntp.org time server. Users can remove and add their own time servers as needed.

Examples of North American NTP servers are:

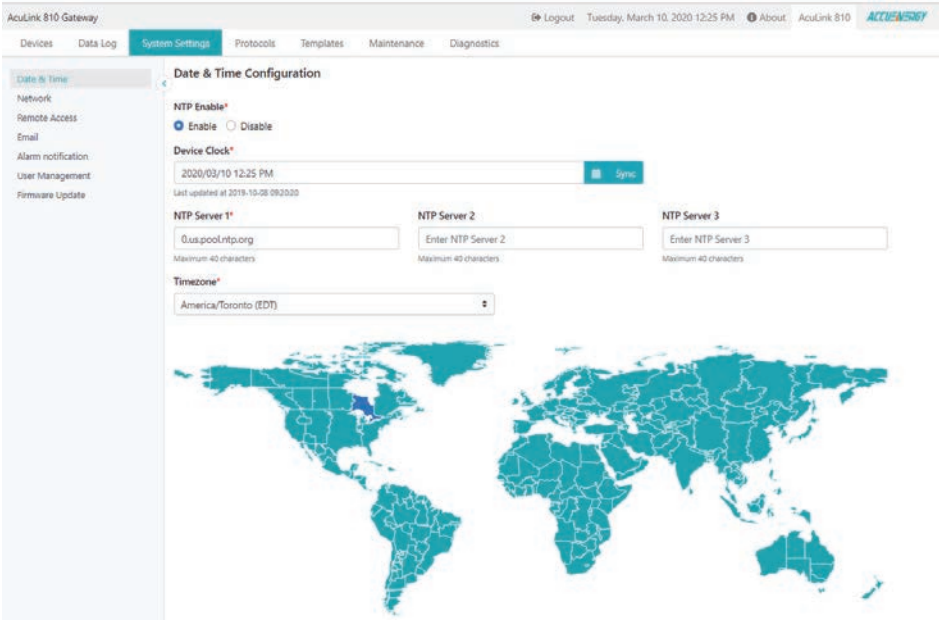
0.us.pool.ntp.org
1.us.pool.ntp.org
2.us.pool.ntp.org
3.us.pool.ntp.org

For more NTP servers based on region, visit the following site:

http://www.pool.ntp.org/en/

- **Time Zone:** Users can select the timezone where the gateway is installed in the drop down menu. Alternatively users can simply click on the region/country on the map displayed to select the desired timezone.

Once the time and date is configured users will notice the desired time displayed on the top right corner of the web interface.



8.4 Remote Access

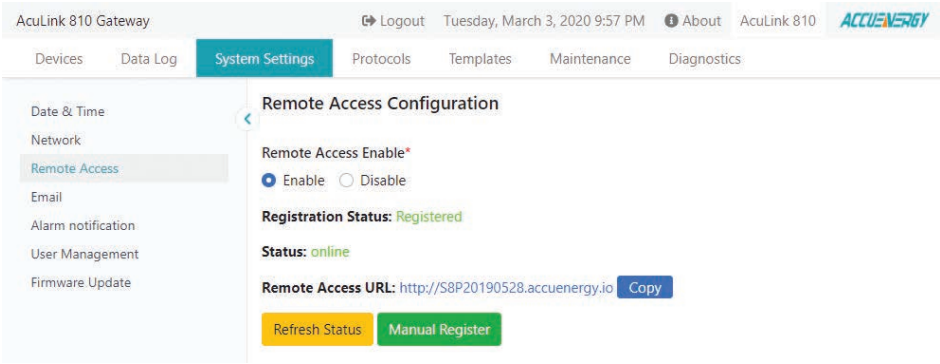
The AcuLink 810 supports a remote access function that allows users to access the AcuLink 810 web interface. By accessing the interface remotely users will have full functionality as well as access to all gateway settings and device readings. This feature allows users to access the AcuLink 810 web interface through an HTTPS web server easily through a URL without any network port forwarding. Users simply register for remote access on the web server and a

remote access URL is provided where they can configure settings and view meter data. This is useful as the gateway device may be installed on remote sites where the end user may be miles away from the actual device.

The remote access configuration can be found on by clicking on the ***System Settings*** tab and selecting ***Remote Access***.

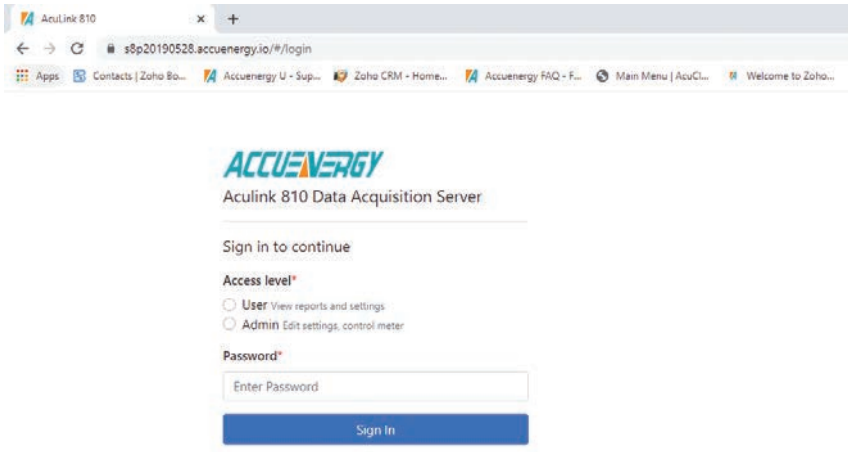
Users must first register for remote access by clicking on ***Manual Register***. Once successfully registered, enable remote access and click on ***Save***.

NOTE: *In order to successfully register for remote access there must be an internet connection provided to the AcuLink 810.*



When first enabling remote access and registering the status will be displayed as offline, users may click on the ***Refresh Status*** button to see the status turn to online. Once the status is online the remote access user interface can be accessed by clicking on the remote access url or by using the copy button and pasting the url into a new tab on the internet browser.

The remote access login credentials are the same as if the user were to login to the interface locally. The default login credentials for the ***User*** access level the password is **view**, and for the ***Admin*** access level the password is **admin**.



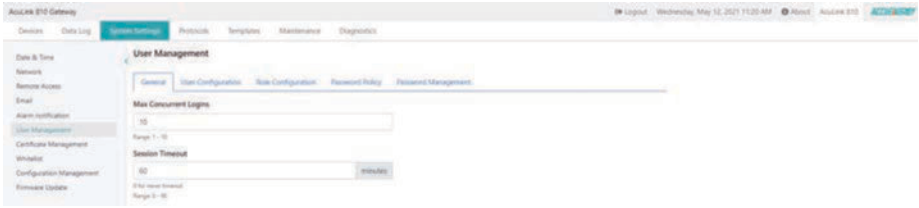
8.5 User Management

The AcuLink 810 supports the creation of different users for the web interface. Each user can have different roles where the role configuration determines what permission and functions users will have when logged in. To access the User configuration page click on the User Management tab.

8.5.1 General

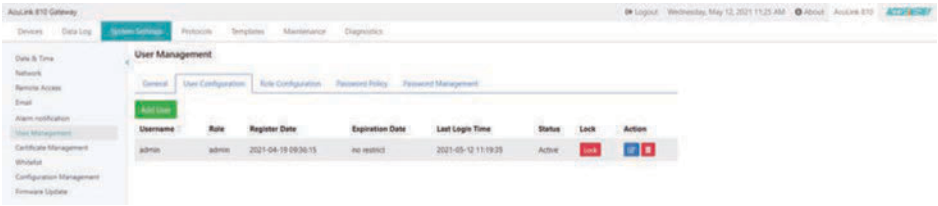
Under the general tab, the maximum concurrent logins and session timeout settings can be configured. The maximum concurrent login setting allows the user to configure how many users can be logged into the web interface at the same time. If the limit is exceeded for users, the user that logged in first would be logged out of the web interface (first in first out method). The range for this setting is from 1-10, the default setting is 1.

The session timeout setting represents how long in minutes the user can access the web interface before it times out. When the session timeout limit is reached users will be logged out of the web interface and redirected back to the login page. The session timeout is set to 10 minutes as default, and can be set from 0-60 where 0 means the web interface will never timeout.

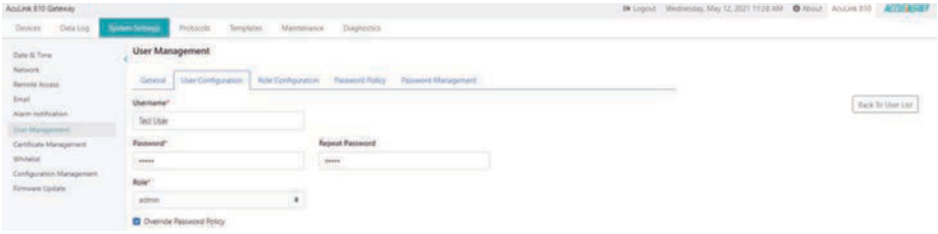


8.5.2 User Configuration

The user configuration table provides information regarding the access level, such as the register date, expiration date and last login time. If the correct permission is available on the account, users have the option to lock an account, and also edit and delete users.



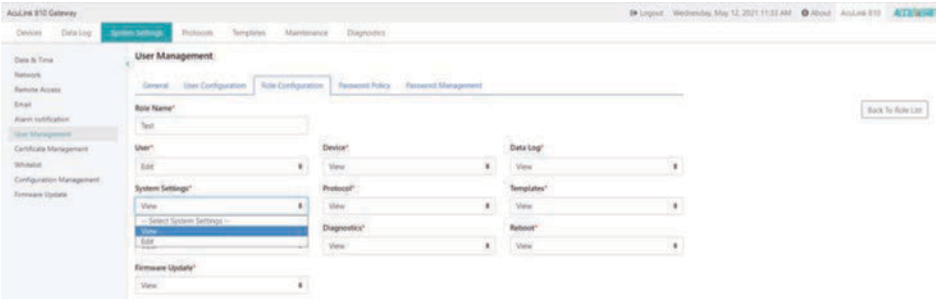
New users can be added where a user name, password, role, and option to override the password policy is available. The role determines the type of access the user will have on the user level created. Users have the option to override the password policy which is a set of rules for allowable passwords on the AcuLink 810 interface, this includes length and complexity of the password (capital letters, number, special characters, etc.).



8.5.3 Role Configuration

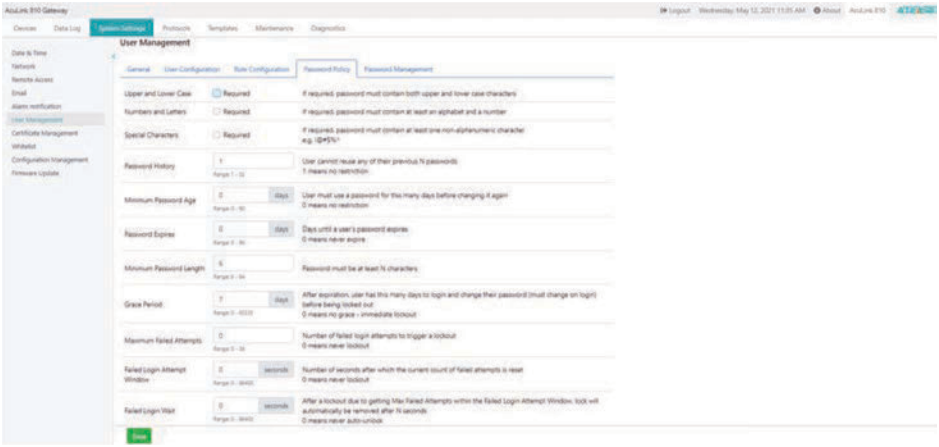
The role configuration allows users to configure and create different roles for user levels. These roles determine whether the user has edit, view or no access to certain features on the web interface. By default there are two roles on the module, **Admin** and **View**. The admin role allows the user to view and configure all settings where as the view role allows users to only view meter readings.

When adding a new role, users can specify which sections of the AcuLink 810 web interface have view or edit access.



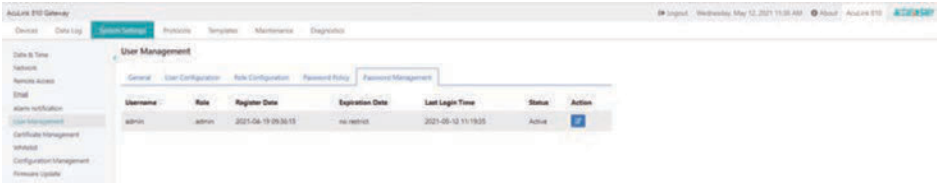
8.5.4 Password Policy

The password policy provides users with a method in ensuring that all passwords created follow specific criteria. The password policy lists specific details relating to the password that some users may find beneficial for security purposes. When creating a user password there is an option to override the password policy if desired.



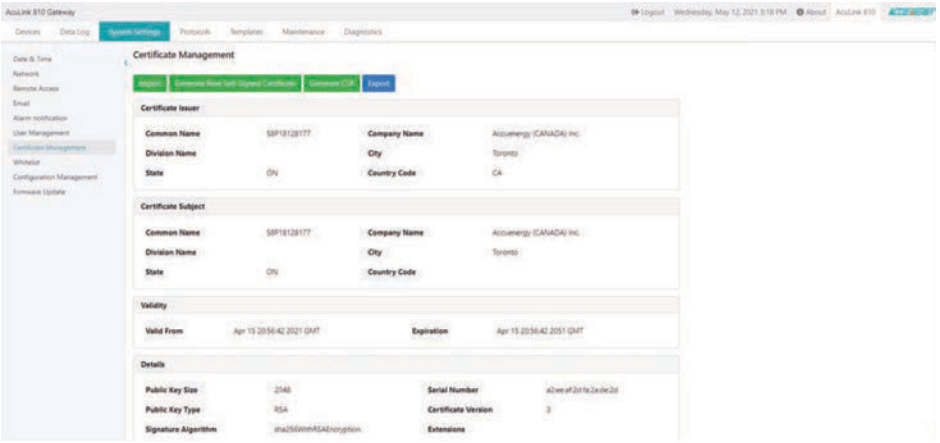
8.5.5 Password Management

The password management page allows users to change the password for the different user levels created.



8.6 Certificate Management

From the AcuLink 810 web interface, there is a certificate management section that allows users to view the web page certificate details. Users can also generate a new self signed certificate, generate a certificate signed request, and import/export the certificates.



8.7 Configuration Management

The AcuLink 810 has a configuration management page that allows users to save all web settings with the exception of a certain settings into a configuration file. This is useful if users have more than one gateway that needs to be programmed with the same settings, and eliminates any error when trying to configure another gateway.

The following settings are saved in the configuration file:

- All Gateway settings (General, IO, Alarm, Custom Read, Waveform)
- Network settings (Only DNS1, DNS2, TCP Port, HTTP Proxy)
- All Email settings
- All Time/Date settings
- All Data Log settings
- All Post Channel settings
- All BACnet settings
- All SNMP settings
- User Management settings (user name/passwords, etc)
- Debug Information (SSH, and Debug Configuration)

The settings that are not included or effected by the Configuration Management file is:

- Most Network settings (RSTP, DHCP, IP, Submask, Gateway, HTTP Port for both Ethernet 1 and 2, All WiFi settings)
- AcuCloud
- IP Whitelist
- Remote Access

Chapter 9: Protocols

9.1 Modbus

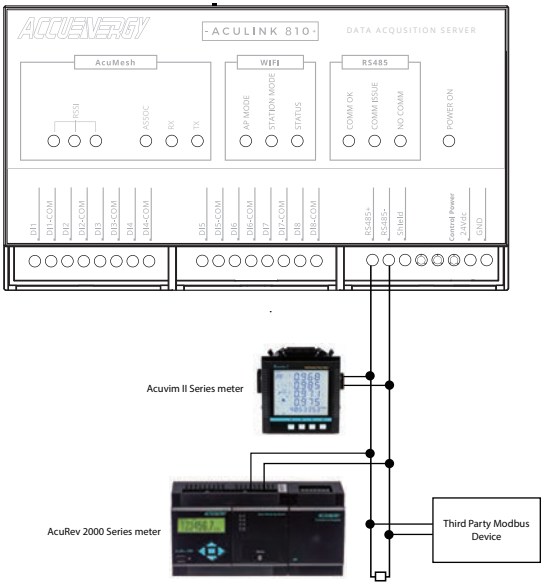
This chapter outlines to users how to add devices from the AcuLink 810 web interface using the Modbus protocol.

The AcuLink 810 supports both Modbus RTU and Modbus TCP protocols.

9.1.1 RS485 Devices

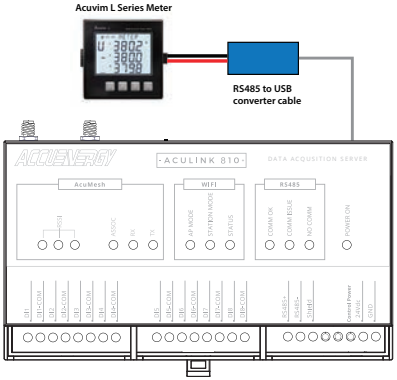
The AcuLink 810 gateway supports RS485 serial communication. Users can set up an RS485 connection to the AcuLink with any Accuenergy or third party device. If connecting multiple devices or 'daisy-chaining' the devices together, ensure that a unique device address (Modbus Slave ID) is configured for each RS485 device. The AcuLink 810 can support up to 32 external RS485 devices.

NOTE: *A termination resistor at the end of the RS485 network is optional when daisy-chaining multiple devices. If using a resistor a termination value of 150 ohms can be used.*



9.1.2 USB Devices

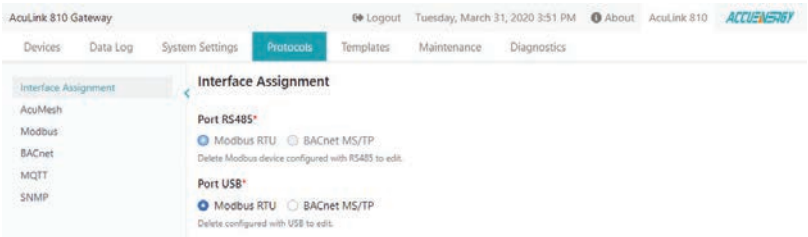
The AcuLink 810 has a USB port that allows for an additional 32 Modbus RTU devices. Users can connect the additional using an RS485 to USB converter cable.



9.1.3 Adding Modbus RTU Device

By default the RS485 and USB port of the AcuLink 810 and configured for the Modbus protocol. Users can configure the protocol of the RS485 and USB ports from the ***Interface Assignment*** page under the ***Protocols*** tab.

NOTE: *Users will not be able to change the Interface assignment of the USB or RS485 port if there is a device added on the 810 with one of the selected protocols. The device must be deleted from the AcuLink in order to change the protocol of the ports.*



With the Modbus RTU protocol selected, to add a Modbus RTU device via RS485 or USB navigate to the ***Modbus Devices*** page under the ***Devices*** tab. Click on ***Add Device***, the following fields will need to be configured:

Device Name: Enter the device name.

Serial Number: Enter the serial number of the device being added, the serial number must be unique consisting of only letters and numbers.

Template: User will need to select the Modbus template for the device. For information regarding the Modbus Device template see section 7.3 of this User's Manual..

Protocol: Select RTU as the protocol

Port: Select either RS485 or USB

Modbus ID: Enter the device address (Modbus Slave ID) of the device, the range is from 1-247

Baud Rate: Select the baud rate of the device, the range is from 9600-115200

Data Bit: Select the number of data bits, either 7 or 8

Parity: Select the parity of the device from the drop-down list

Stop Bit: Select the number of Stop Bits

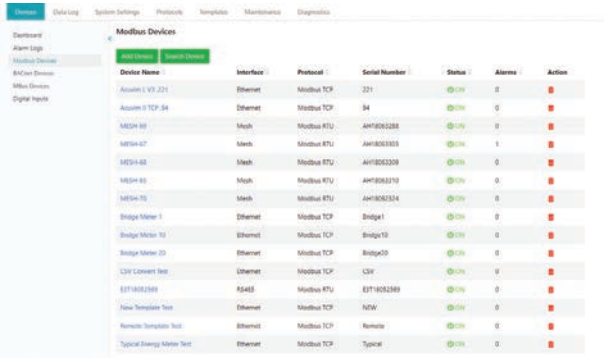
Request Timeout: Select a timeout period for the AcuLink 810 to wait for a response from the device, the range is 1-60 seconds, default for Modbus RTU is 0.5.

NOTE: *Users cannot add device with the same device address (Modbus Slave ID). The device address must be unique for each device in the RS485 network.*

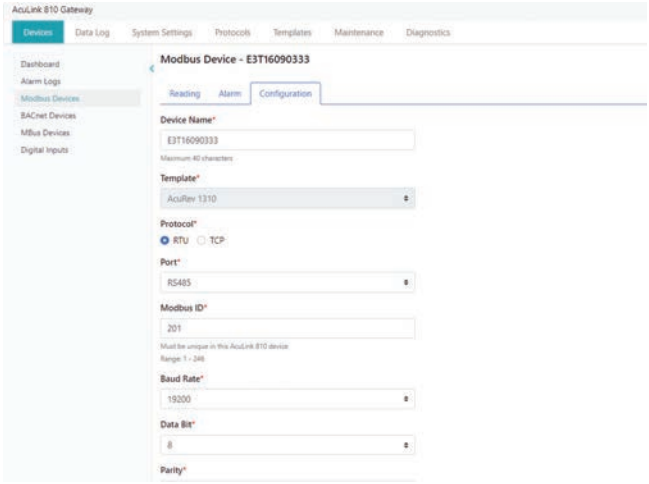
Click **Save** once all settings are entered correctly.

After the device is added, it can be found in the ***Modbus Devices*** pages. A device that is successfully connected and communicating with the gateway will have display a green ***ON*** status under the status column. A device that is offline will display a red ***OFF*** warning symbol under the status menu.

NOTE: *After adding a new device to the gateway it may take up to 3-4 minutes for the status to show 'ON'. If after 3-4 minutes the device is showing an 'OFF' status, double-check the configuration settings to ensure everything is set correctly.*

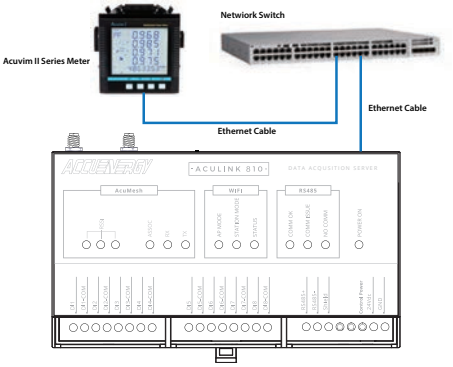


If users need to change the configuration of an added device, they can simply click on the device and then select the ***Configuration***. From this page users can re-configure the device name, port type, baud rate, parity, etc.



9.1.4 TCP Devices

The AcuLink 810 can support up to 100 Modbus TCP devices where the devices will need to be on the same network as the gateway.



9.1.5 Adding Modbus TCP Device

To add a Modbus TCP device click on ***Add Device*** from the ***Modbus Devices*** page under the ***Devices*** tab. The following fields will need to be configured:

Device Name: Enter the device name of the TCP device

Serial Number: Enter the serial number of the device, the serial number must be unique and consisting of only letters and numbers.

Template: Select the Modbus template for the TCP device, for more information regarding Modbus templates see sections 7.3 of this User's Manual.

Protocol: Select TCP as the protocol

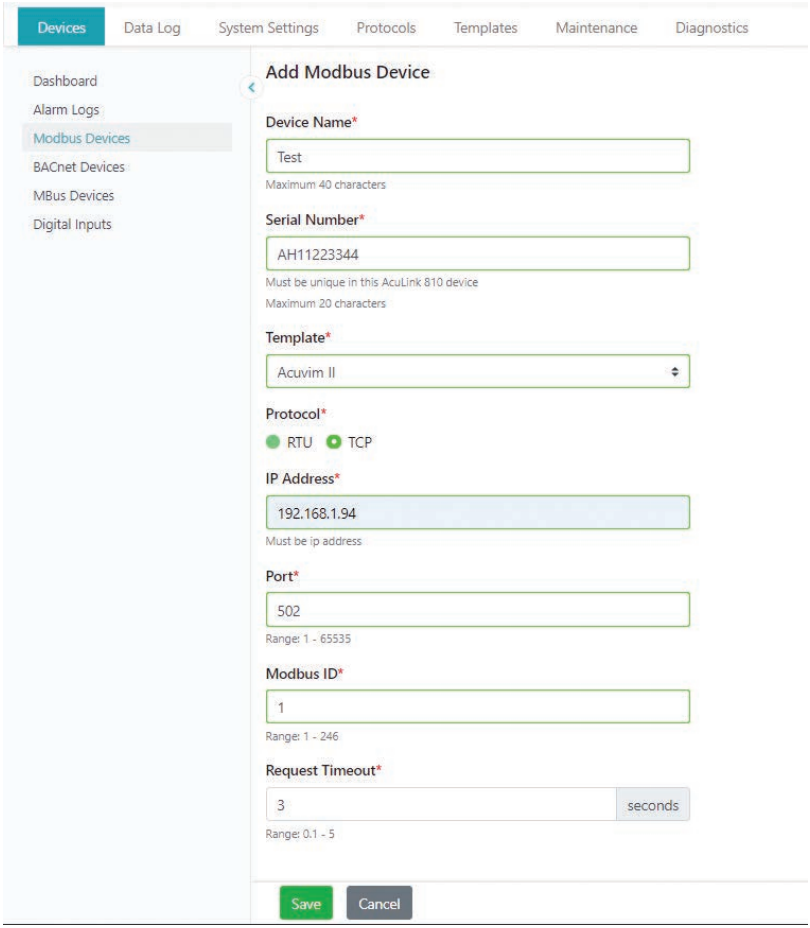
IP Address: Enter the IP address of the device

Port: Enter the Modbus port of the device

Modbus ID: Enter the Modbus address of the device

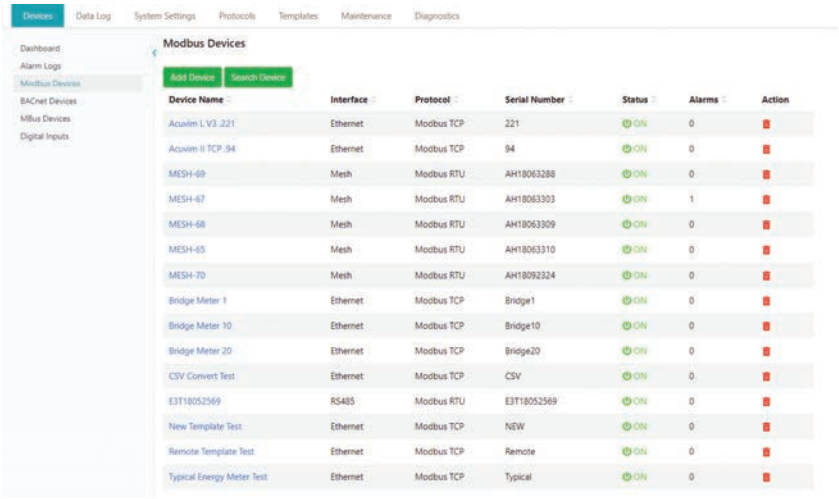
Request Timeout: Enter the timeout setting, default for TCP is 3 seconds

Click ***Save*** once all settings are entered correctly.

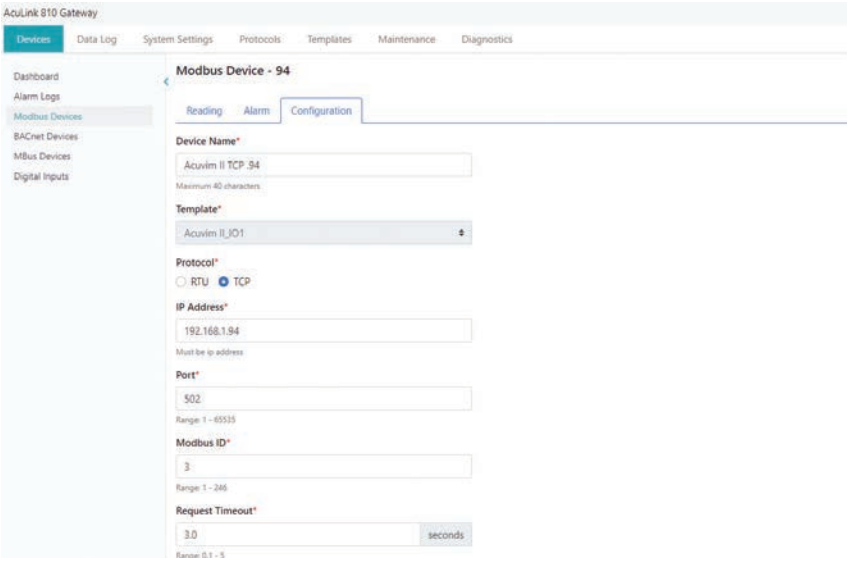


After the device is added, it can be found in the **Modbus Devices** pages. A device that is successfully connected and communicating with the gateway will have display a green ***ON*** status under the status column. Whiles a device that is offline will display a red ***OFF*** warning symbol under the status menu.

NOTE: *After adding a new device to the gateway it may take up to 3-4 minutes for the status to show 'ON'. If after 3-4 minutes the device is showing an 'OFF' status, double-check the configuration settings to ensure everything is set correctly.*



If users need to change the configuration of an added device, they can simply click on the device and then select the ***Configuration***. From this page users can re-configure the device name, port type, IP address, Modbus ID, etc.



9.1.6 Modbus Gateway Function

The AcuLink 810 supports a Modbus Gateway Function, where users can add a Modbus RTU device and use it as a gateway. Users must choose the device template as ***Modbus Gateway Function Only***.

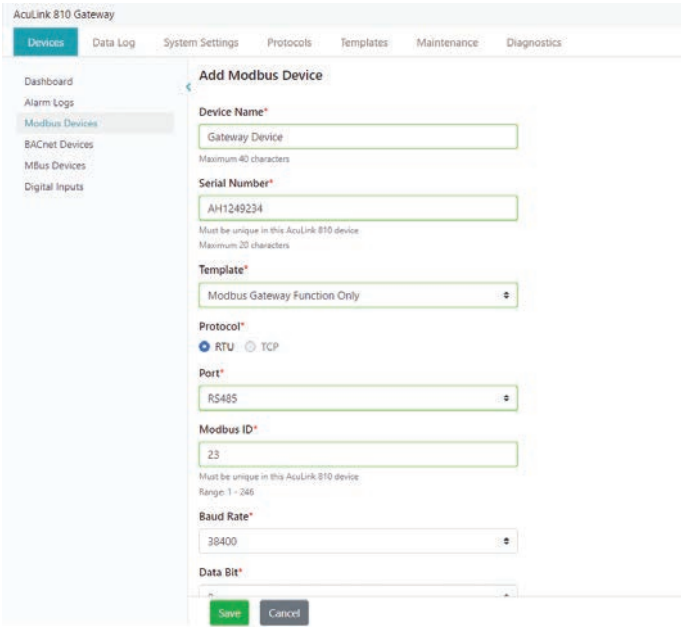
The Modbus Gateway Function allows users to forward a Modbus TCP request to the corresponding meter. A ***Modbus Gateway Function Only*** device allows the user to read/write to the Modbus registers of this device via Modbus Gateway function. Unlike other Modbus devices , the AcuLink 810 does not periodically collect data for Modbus Gateway devices.

Adding Modbus Gateway Device

To add a Modbus Gateway device, select add device. Under the **Template** setting select ***Modbus Gateway Function Only***. Select **RTU** as the protocol and enter in the communication settings for that RTU device (baud rate, parity, Modbus ID, etc).

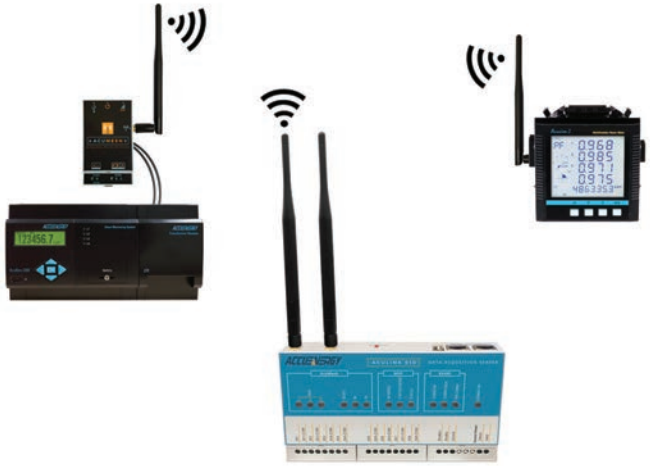
Click on ***Save*** once all information is entered in correctly.

NOTE: *Only Modbus RTU devices can be used as a Modbus Gateway Function on the AcuLink 810.*



9.2 AcuMesh

Certain models of the AcuLink 810 supports AcuMesh which allows for a wireless RS485 network. The gateway has a built in AcuMesh into its hardware which allows the 810 to connect wirelessly via RS485 to gather information from both Accuenergy and third party Modbus devices using AcuMesh transceivers/modules.



There are two AcuMesh models for the AcuLink 810:

- AcuLink-868 (868 MHz) is used mostly in Europe, Middle East, Africa, and certain parts of Asia.
- The AcuLink-900 (900 MHz) is mainly used in North and South America, Oceania, and also certain parts of Asia.

NOTE: *The AcuLink 810-X model does not support AcuMesh*

To configure the AcuMesh settings on the AcuLink 810 click on the ***Protocols*** tab and select ***AcuMesh***.

9.2.1 Local Configuration

In order for the AcuLink to add other AcuMesh devices, the local AcuMesh settings must be configured first. The local configuration page refers to the AcuMesh unit built into the AcuLink 810.

The following can be configured on the local configuration page:

Node Name: Users can configure the name of the AcuMesh node in this settings, the maximum range is up to 14 characters

Local MAC Address: The built in AcuMesh transceiver will have a local MAC address that is used to identify the unit, this is non configurable.

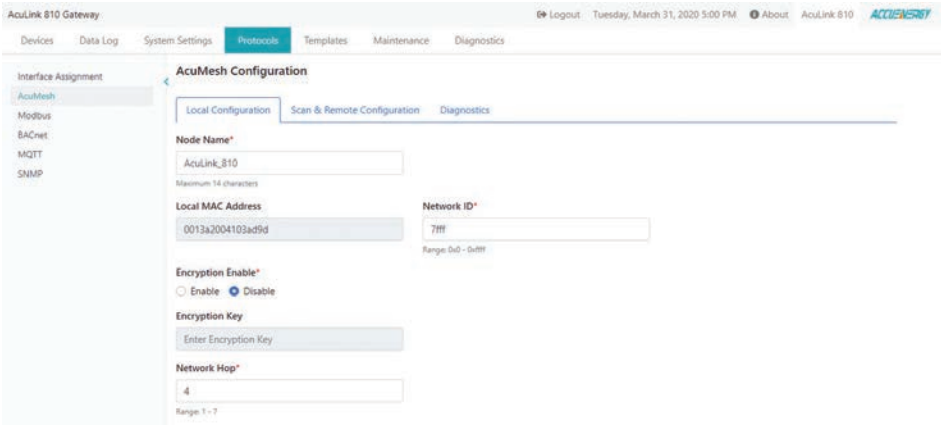
Network Hop: By default the network hop is set to 4 and represents the amount of times the AcuMesh will scan the mesh network for devices. The range for this setting is from 1-7.

Network ID: The network ID is a hex number that is used as an AcuMesh Network Identifier. By default the network ID is 7FFF, and the range is 0-7FFF (Hex).

NOTE: *Only transceivers with the same matching network ID can discover and communicate with each other.*

Encryption Enable: Users have the option to put a password on the AcuMesh device. All radio AcuMesh devices would need to have the same password in order to communicate in the AcuMesh network.

Encryption Key: The encryption key is a hex number where the maximum number of characters is 32.

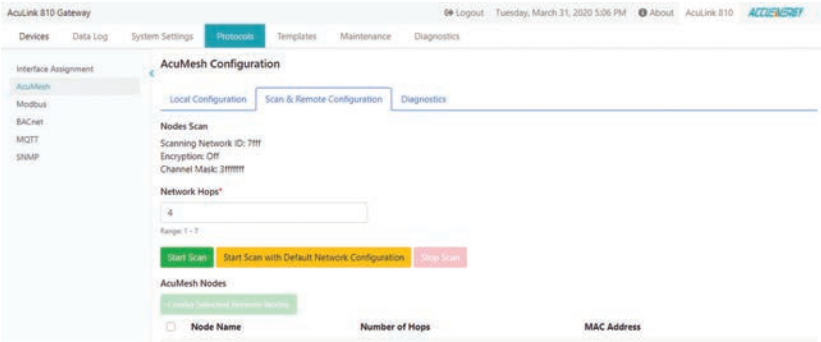


9.2.2 Scan & Remote Configuration

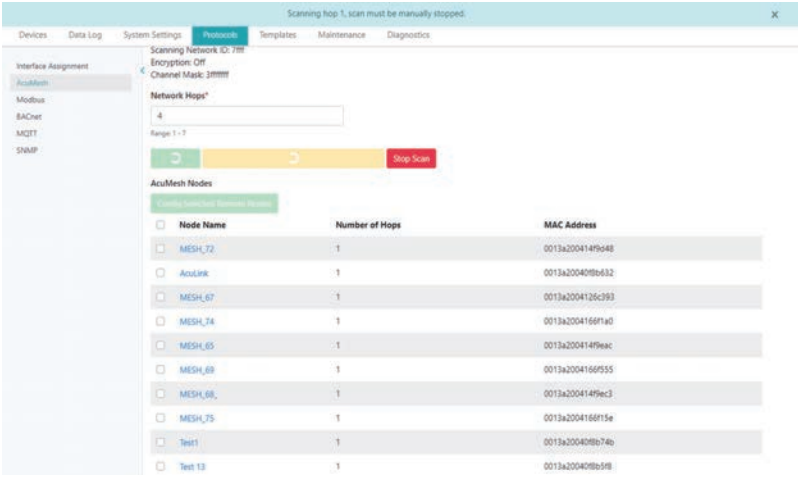
Once the Local Configuration has been set, users can then scan for remote radio AcuMesh transceivers. Click on the ***Scan & Remote Configuration*** tab on the AcuMesh configuration page, users will be directed to the following page.

The Local configuration will appear under the Node Scan section. This will show the Network ID that will be scanned, the Encryption, and the Channel Mask that is being used.

The network Hops configuration is the number of times the mesh network will be scanned, the range is from 1-7 network hops.

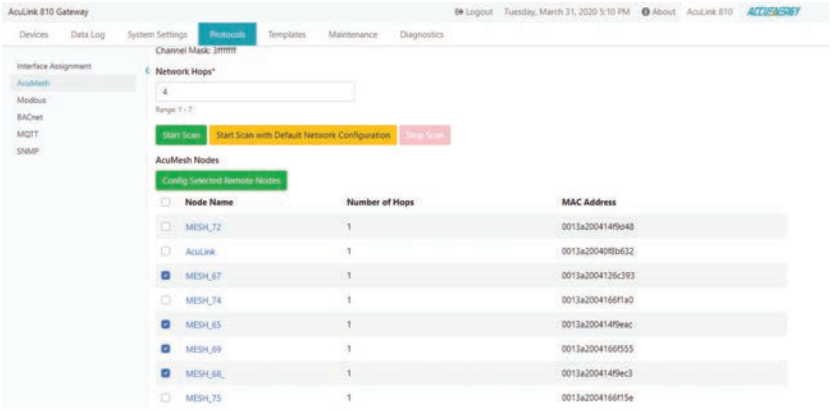


Click on ***Start Scan*** to search for remote AcuMesh transceivers.



All devices found during the scan will have the AcuMesh Node name, the number of network hops that the Mesh device was discovered in, and the MAC address displayed on the interface.

Users can simply click on the check box next to the Node name to configure the radio Mesh transceiver, or if users wish to configure multiple Mesh devices they can select the check box next to the Node name and then click on the ***Config Selected Remote Nodes*** button.



The following settings on the remote AcuMesh transceivers can be configured:

Network ID: The network ID is a hex number that is used as an AcuMesh Network Identifier. By default the network ID is 7FFF, and the range is 0-7FFF (Hex).

NOTE: *Only transceivers with the same matching network ID can discover and communicate with each other.*

Destination MAC Address: The MAC Address of the remote transceivers

Encryption Enable: Users have the option to put a password on the AcuMesh device. All radio AcuMesh would need to have the same password in order to communicate in the AcuMesh network.

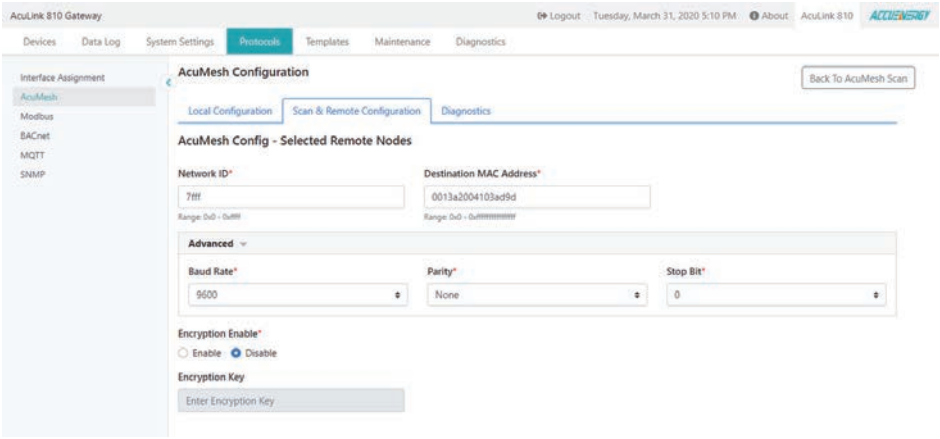
Encryption Key: The encryption key is a hex number where the max amount of characters is 32.

Advanced Options:

Baud Rate: Select the baud rate of the device, range is from 9600-115200

Parity: Select the parity of the device from the drop down list

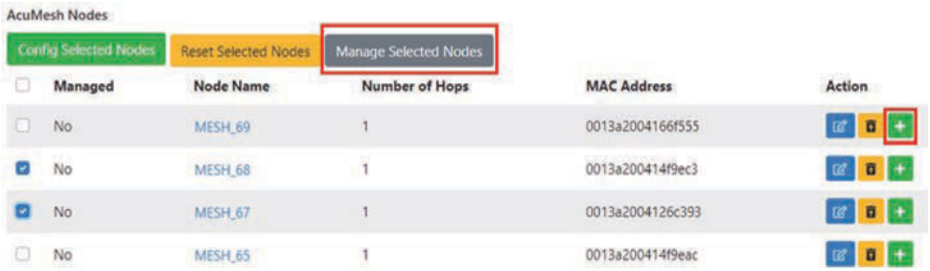
Stop Bit: Select the number of Stop Bits



Managed Nodes

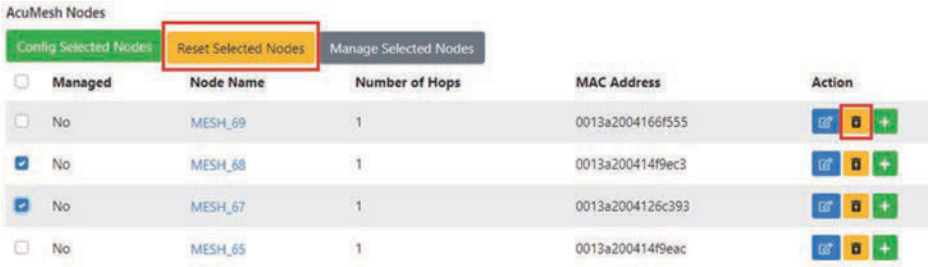
Users can select which module to manage from the list of discovered transceivers. The managed nodes will allow users to only see particular managed transcievers when adding the AcuMesh devices to the AcuLink 810. For example if there is a network of 50 AcuMesh devices, but only 10 AcuMesh devices are required to be added to the AcuLink 810, the user can add these 10 to the managed list. Once added to the managed list only these 10 transicevers will be available when adding an AcuMesh device rather than all discovered transceivers.

Users can click on the green icon under the Action column to add a device to the managed list. Alternatively the check boxes can be used to select multiple transceivers and the ***Manage Selected Nodes*** button can be used to add multiple transceivers to the managed nodes list.



Reset Nodes

Users can perform a soft reboot of the discovered AcuMesh transceivers. This can be very useful as sometimes communication is dropped due to timeouts and requires a reboot to initialize and restore the communication. The yellow button under the Action column will allow users to reset the AcuMesh nodes. If multiple nodes require a reset the check boxes can be used to select multiple transceivers and the ***Reset Selected Nodes*** button can be used to reset all selected nodes.



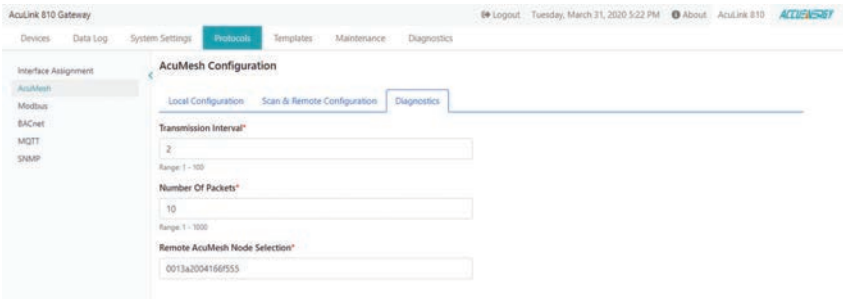
9.2.3 AcuMesh Diagnostics

The AcuMesh diagnostics page allows the user to troubleshoot the AcuMesh connection from the AcuLink 810 to the remote AcuMesh transceivers. The test sends packets at a certain interval and tests whether the AcuLink 810 gets a response from the slave AcuMesh transcievers.

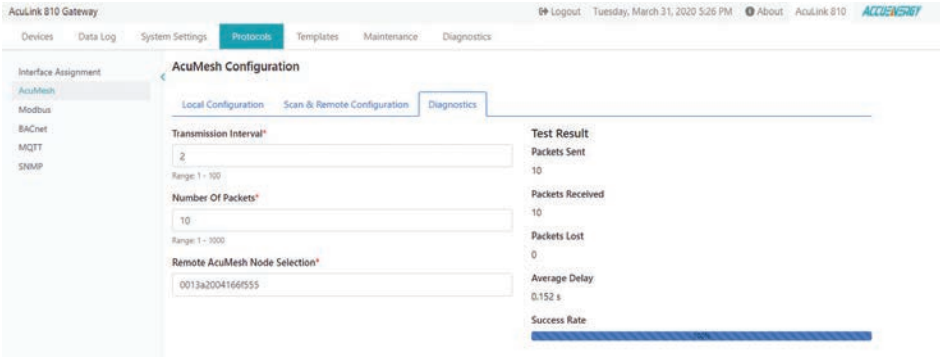
Transmission Interval: Is the sending interval of the packet, the range is 1-100 seconds.

Number of Packets: Is the number of packets sent in each test query.

Remote AcuMesh Node Selection: Users can choose which AcuMesh transceiver they want to test from the drop down selection.



The test result will be displayed showing the success rate and average delay of the packets sent.



9.2.4 Adding AcuMesh Device

To add an AcuMesh device, select ***Add Device*** from the ***Modbus Devices*** page. The following fields need to be configured:

Device Name: Enter a device name

Serial Number: Enter the serial number of the device, the serial number must be unique and consisting of only letters and numbers.

Template: Select the correct device model

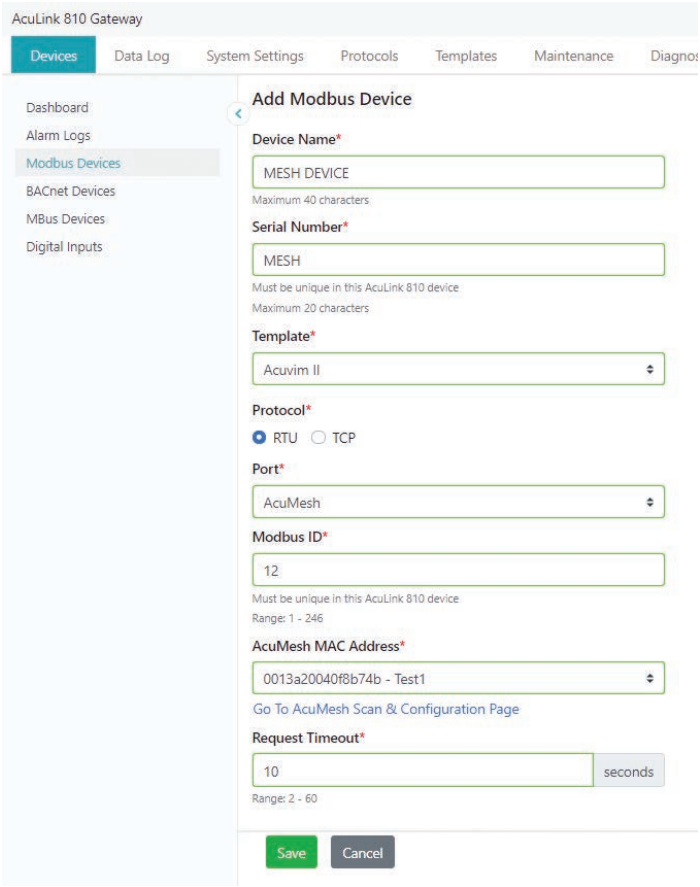
Protocol: Select RTU as the protocol

Port: Select AcuMesh as the port type

Modbus ID: Enter in the Modbus ID that corresponds to the Modbus device

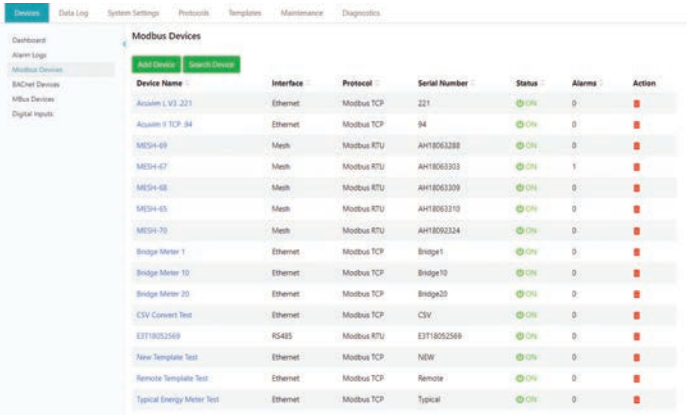
AcuMesh MAC Address: Select the AcuMesh MAC address of the remote mesh transceiver of the Modbus device. Users can click on Go to AcuMesh Scan & Configuration page to discover remote Mesh transceivers.

Request Timeout: The default timeout setting for an AcuMesh device is 10 seconds.

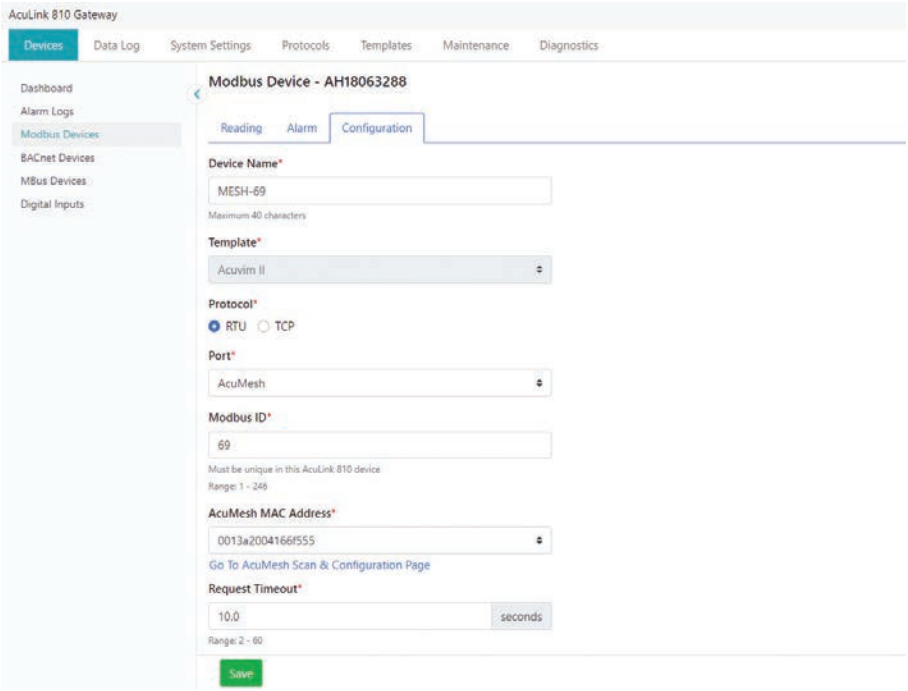


After the device is added, it can be found in the ***Modbus Devices*** pages. A device that is successfully connected and communicating with the gateway will have display a green ***ON*** status under the status column. A device that is offline will display a red ***OFF*** warning symbol under the status menu.

NOTE: *After adding a new device to the gateway it may take up to 3-4 minutes for the status to show 'ON'. If after 3-4 minutes the device is showing an 'OFF' status, double-check the configuration settings to ensure everything is set correctly.*



If users need to change the configuration of an added device, they can simply click on the device and then select the ***Configuration***. From this page users can re-configure the device name, port type, AcuMesh MAC addrees, Modbus ID, etc.



9.2.5 Search Modbus Device

There is a search device function in the AcuLink 810 gateway that allows the user to search for all Modbus devices. The search criteria is based on the template model, Modbus slave ID, baud rate, parity and port. The search function can be useful for adding several devices in a large RS485/USB daisy chain as well as a large Mesh network.

To access the search function click on ***Search Device*** on the ***Modbus Device*** page.

NOTE: *'Search Device' only supports the devices connected via Modbus RTU protocol.*

The following search criteria will need to be specified:

Template: Select the Modbus template for the device

Port: Select the port to scan for the Modbus search, users can select RS485, USB, and AcuMesh.

Modbus ID Start: Specify the starting slave address for the search

Modbus ID End: Specify the ending slave address for the search

Baud Rate: Select the baud rate(s) for the Modbus device search. Users can select multiple baud rates in the search.

Data Bit: Select the data bit, this can be set as 7 or 8.

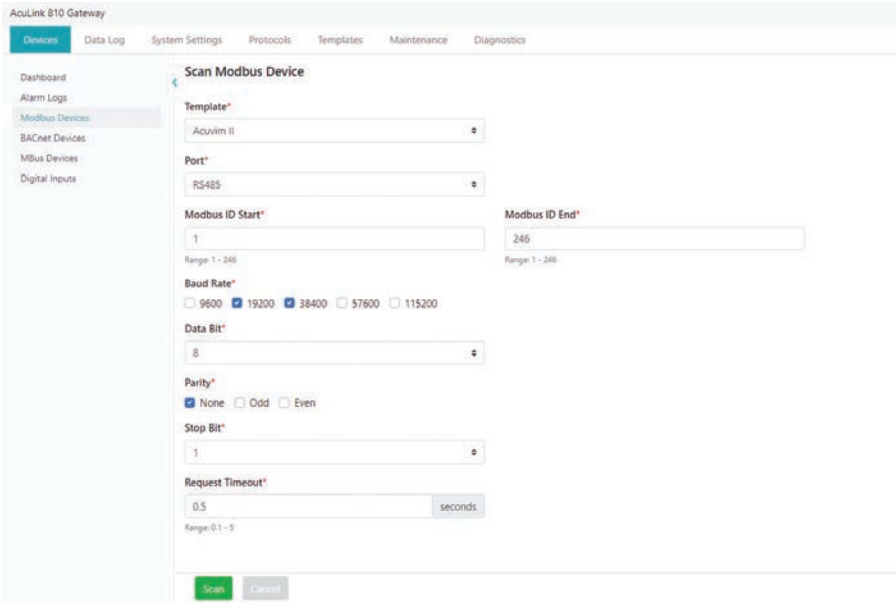
Stop Bit: Select the number of stop bits, can be set as 0 or 1.

Parity: Select the parity for the Modbus search. Users can select multiple parity in the search.

Request Timeout: Select the request timeout, for RS485 and USB the default timeout is 0.5 seconds, for AcuMesh the timeout is 10 seconds.

Click on ***Scan*** once the search credentials are configured.

NOTE: *Depending on the range of Modbus IDs, baud rate and parity selected the search may take several minutes to complete.*

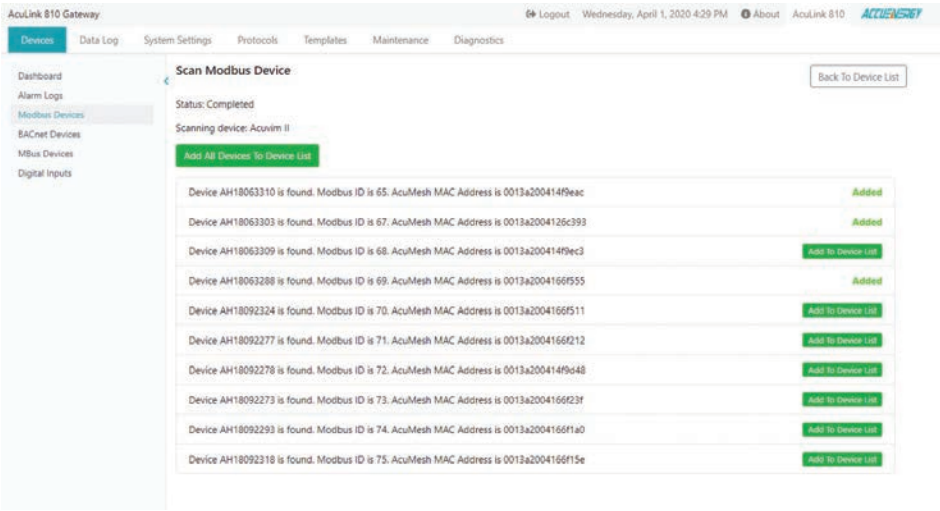


When the scan is complete all devices found will be displayed. Users have the option to individually add each found device and can also add all devices found by clicking on the add all button.

If a device is found that is already added to the AcuLink 810 it will be displayed as ***Added*** in the search.

If a device is found with the same Modbus ID as a device that is already added on the AcuLink 810 it will be displayed as ***Conflict*** in the search.

The search results show the device serial number and Modbus slave ID associated with the device. If the search is done on a AcuMesh network the AcuMesh MAC address is also displayed in the search.

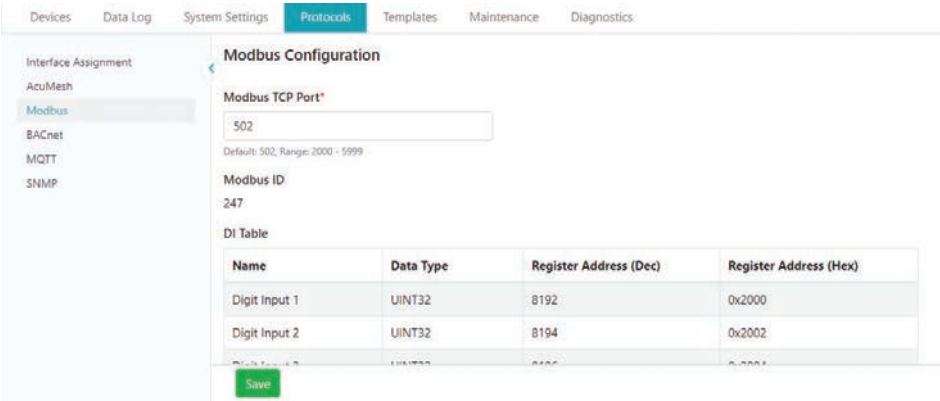


9.3 Modbus Polling

The AcuLink 810 supports Modbus polling for the Digital Input registers. The user can select **Protocols**, then the subheading **Modbus** in order to access the *Modbus Configuration* page.

Modbus TCP Port: The default is 502, the range is 2000-5999. This is also the port used for Modbus Gateway Function devices.

Modbus ID: The Modbus ID for the AcuLink 810 is 247, this cannot be changed.



The DI Modbus Registry Map is listed below:

Name	Data Type	Register Address (Dec)	Register Address (Hex)
Digital Input 1	UINT32	8192	0x2000
Digital Input 2	UINT32	8194	0x2002
Digital Input 3	UINT32	8196	0x2004
Digital Input 4	UINT32	8198	0x2006
Digital Input 5	UINT32	8200	0x2008
Digital Input 6	UINT32	8202	0x200A
Digital Input 7	UINT32	8204	0x200C
Digital Input 8	UINT32	8206	0x200E

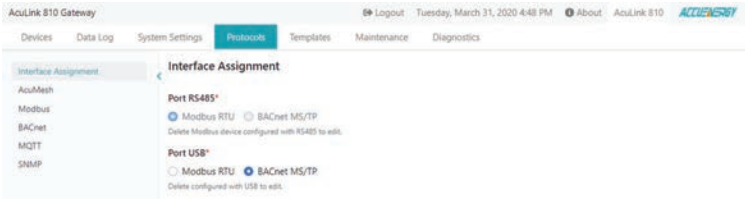
9.4 BACnet

The AcuLink 810 supports the BACnet protocol via the BACnet MS/TP and BACnet IP. The gateway can also be configured as a BACnet gateway, as well as a BBMD (BACnet Broadcast Messaging Device). The following section will provide an overview on configuring the BACnet protocol on the AcuLink 810 from the web interface.

9.4.1 BACnet MS/TP

In order to use the BACnet MS/TP, the protocol must be changed to BACnet for RS485 and/or USB devices. This can be changed from the ***Interface Assignment*** page under the ***Protocols*** tab.

NOTE: *Users can have one port selected as Modbus and the other selected as BACnet.*



From the ***Protocols*** page select ***BACnet***. In the BACnet page under the ***Acquisitor*** tab users can configure the BACnet MS/TP settings pertaining to RS485 and USB.

The following fields can be configured for BACnet MS/TP over both USB and RS485:

Client APDU Timeout: Is the time in seconds that the client will wait for a response after sending a request. The default time is 3 seconds, and the range is 250 milliseconds to 6 seconds.

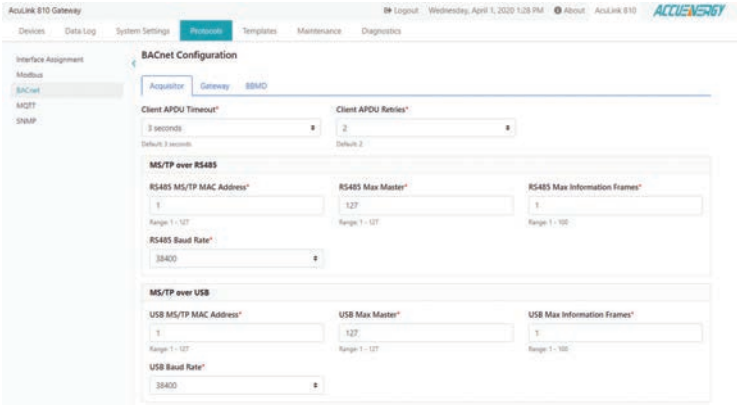
Client APDU Retries: Is the number of time the client will retry a request when a response is not received. The default setting is 2, the range is from 0-10.

MS/TP MAC Address: Is used to address devices on the BACnet network, the default address is 1 and the range is 1-127.

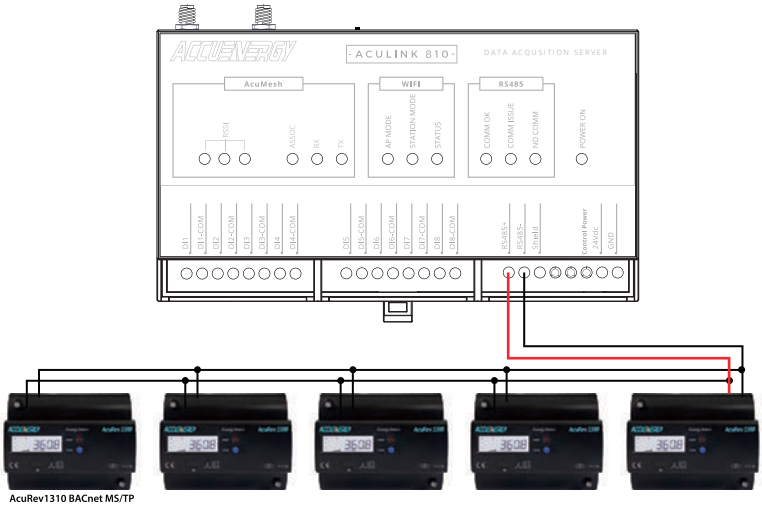
Max Master: Defines the amount of allowable addresses (1-127) for the MS/TP master nodes on the network, the default is 127 and the range is 1-127.

Max Info Frames: Is the maximum amount of information frames sent to a node before it has to pass the token. The default is 1 and the range is from 1-100 information frames.

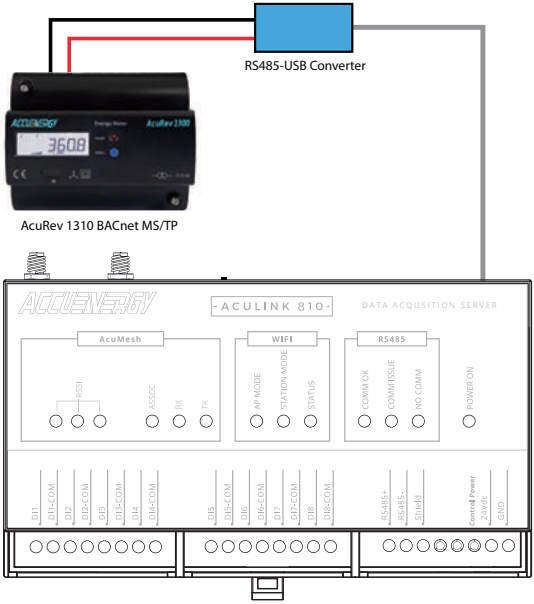
Baud Rate: Select the baud rate, the default is 19200 and the range is from 9600-11520.



BACnet MS/TP via RS485



BACnet MS/TP via USB



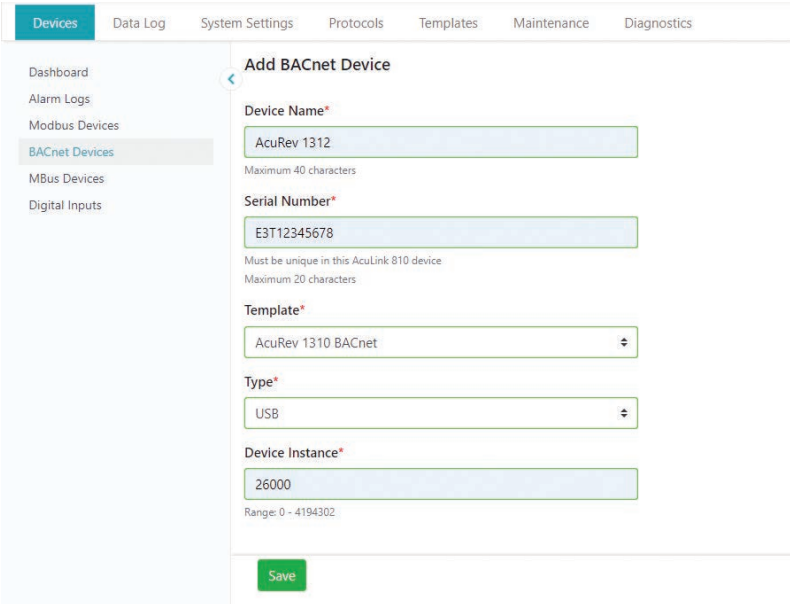
9.4.2 Adding BACnet MS/TP device

With the BACnet MS/TP protocol selected for either USB and/or RS485, users can add a BACnet device to the AcuLink 810 on the BACnet ***Devices*** page located under the ***Devices*** tab.

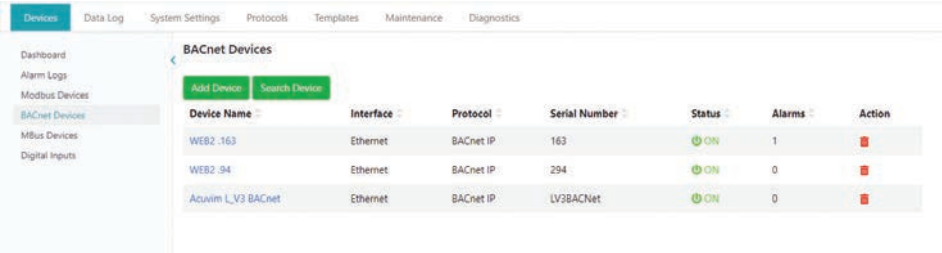
Click on ***Add Device***, the following fields will need to be configured:

- **Device Name:** Enter the device name of the meter
- **Serial Number:** Enter the serial number of the device, the serial number must be unique and consisting of only letters and numbers.
- **Device Model:** Select the device model from the drop-down list
- **Port:** Users can select either RS485 or USB
- **Device Instance:** Enter the device instance number, the range is 0-4194302. It must be unique in this AcuLink 810 device.

Click ***Save*** once all settings are entered correctly.

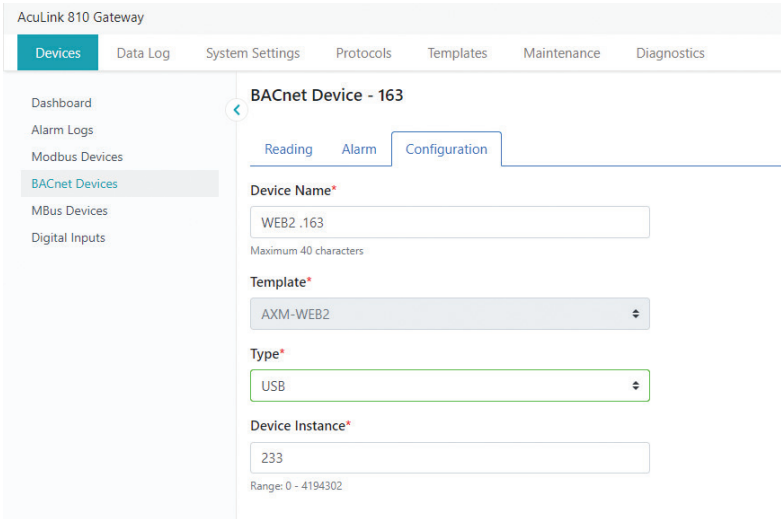


After the device is added, it can be found in the ***BACnet Devices*** section under the ***Devices*** tab.



NOTE: *After adding a new device to the gateway it may take up to 3-4 minutes for the status to show 'ON'. If after 3-4 minutes the device is showing an 'OFF' status, double-check the configuration settings to ensure everything is set correctly.*

If users need to change the configuration of an added device, they can simply click on the device and then select the ***Configuration***. From this page users can re-configure the device name, port type, and Device Instance.

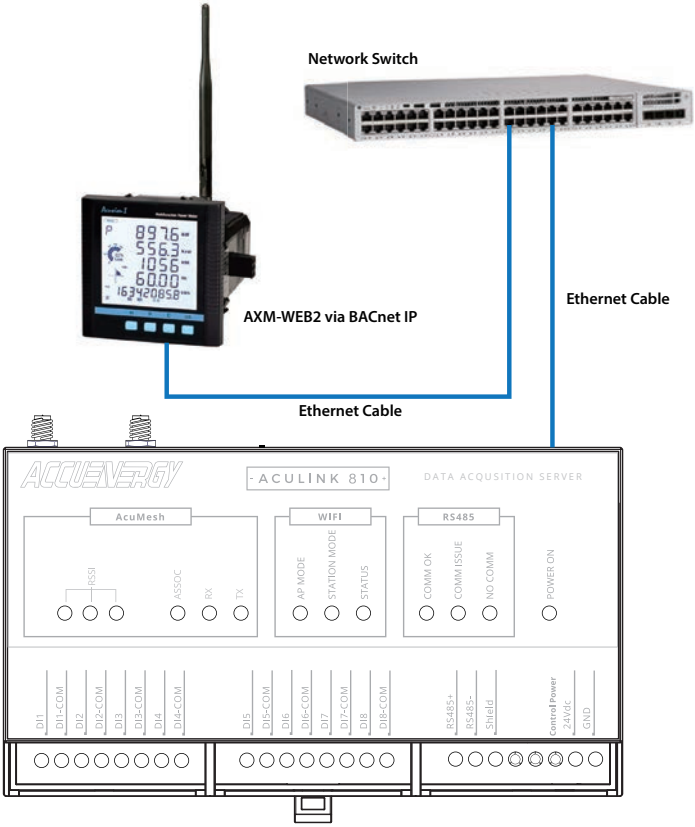


9.4.3 BACnet IP

The AcuLink 810 supports BACnet IP devices, users must configure and enable BACnet IP from the ***BACnet*** page in the ***Protocols*** menu.

BACnet IP Client Enable: Enable BACnet IP

BACnet IP Client Interface: Select which interface the BACnet IP network is on, users can select Ethernet 1, Ethernet 2, or WiFi.



9.4.4 Adding BACnet IP device

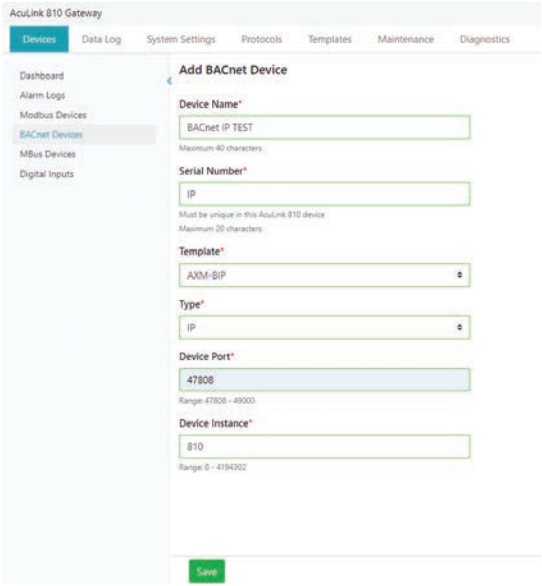
With the BACnet IP enabled, users can add a ***BACnet device*** to the AcuLink 810 on the BACnet ***Devices*** page located under the Devices tab.

Click on Add Device, the following fields will need to be configured:

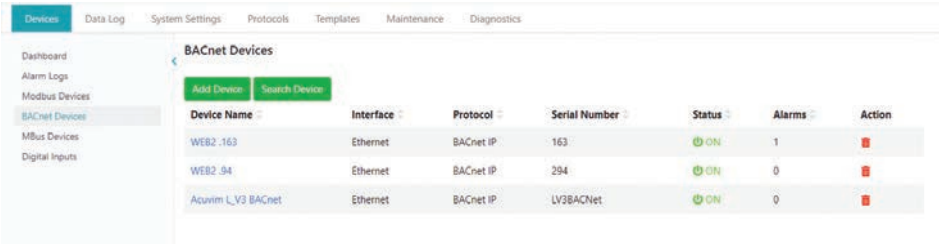
- **Device Name:** Enter the device name of the meter
- **Serial Number:** Enter the serial number of the device, the serial number must be unique and consisting of only letters and numbers.
- **Template:** Select the device model from the drop-down list
- Type: Select the type as IP
- **Port:** Enter in the BACnet port configured for the device, the range is from 47808-49000.
- **Device Instance:** Enter the device instance number, it must be unique in this AcuLink 810 *device. The range is 0-4194302.*

NOTE: *Ensure that BACnet IP Client is enabled in the BACnet Configuration page in order to add a BACnet IP device to the AcuLink 810.*

Click on ***Save*** once all fields are configured.

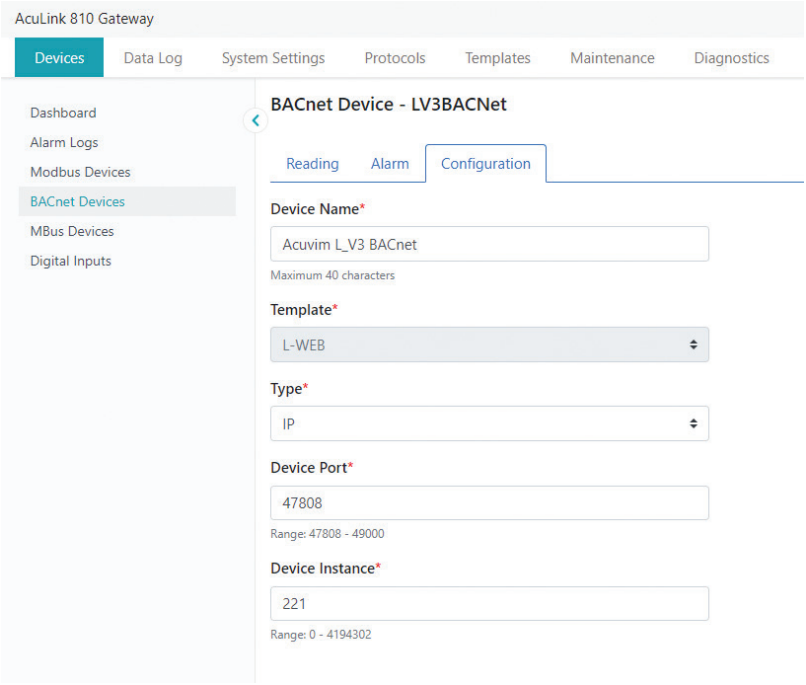


After the device is added, it can be found in the ***BACnet Devices*** section under the ***Devices*** menu.



NOTE: *After adding a new device to the gateway it may take up to 3-4 minutes for the status to show 'ON'. If after 3-4 minutes the device is showing an 'OFF' status, double-check the configuration settings to ensure everything is set correctly.*

If users need to change the configuration of an added device, they can simply click on the device and then select the ***Configuration***. From this page users can re-configure the device name, port type, and Device Instance and Device port.



9.4.5 Search BACnet Device

The AcuLink 810 supports a search function that allows users to add devices to the AcuLink 810 automatically by searching the BACnet network. This feature can be found on the ***BACnet Device*** page under the ***Device*** tab.

Click on ***Search Device***, the following search criteria will need to be specified:

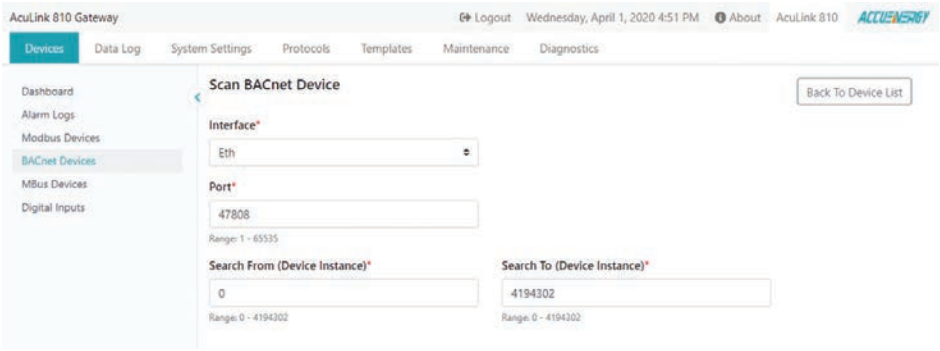
Interface: Users can select Ethernet, RS485, or USB for the device search.

NOTE: *In order to use RS485 or USB for search ensure that the interface assignment is selected as BACnet. Also in order to use Ethernet or WiFi in the BACnet search ensure that BACnet IP is enabled on the AcuLink 810.*

Search From (Device Instance): Enter the starting instance number in the search, the range is 0-4194302.

Search To (Device Instance): Enter the ending instance number in the search, the range is 0-4194302.

Click on ***Scan*** once the search criteria is entered in correctly.

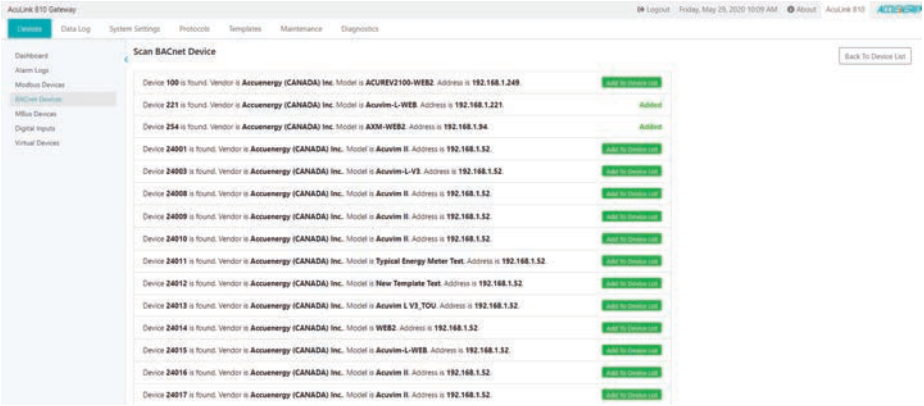


NOTE: *Depending on the range and amount of devices in the network the search may take several minutes to complete.*

Users can individually add the found devices to the BACnet device list after the scan is complete. In order to add the BACnet device the template must be added and installed on to the AcuLink 810. For more information on BACnet template see section 7.4 of this User's Manual.

If a device is found with a Device Instance that is already added to the gateway the search will display ***Conflict***.

If a device is found that is already added the search will display ***Added***.



9.4.6 BACnet Gateway

Aculink 810 can also work as a BACnet gateway device allowing the AcuLink 810 to read both Modbus and BACnet devices simultaneously in a BACnet network. Users have the ability to have both Modbus and BACnet devices simultaneously via USB and RS485 ports on the AcuLink 810, as well as both Modbus TCP, BACnet IP, and MBus devices.

To configure the BACnet gateway setting click on the ***Protocols*** tab and select BACnet. From the BACnet page select the ***Gateway*** tab. The following fields can be configured for the BACnet gateway settings:

Gateway Enable: Select ***Enable*** to set the 810 as a BACnet gateway

UPD Port: The default port is 47808, users can configure from 47808-49000.

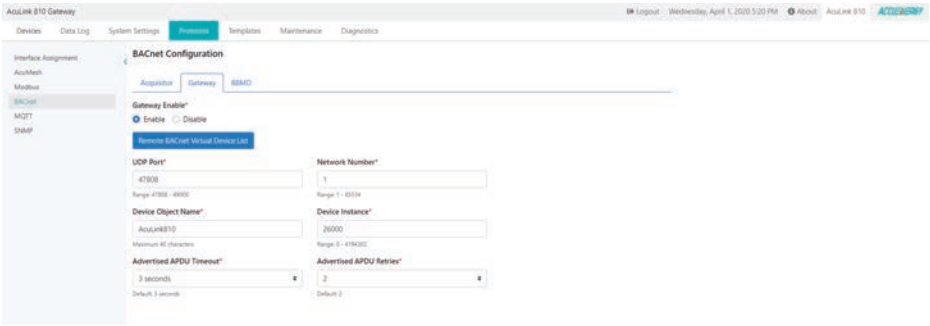
Device Object Name: Users can configure the object name for the gateway

Device Instance: Configure a unique device instance number for the AcuLink 810.

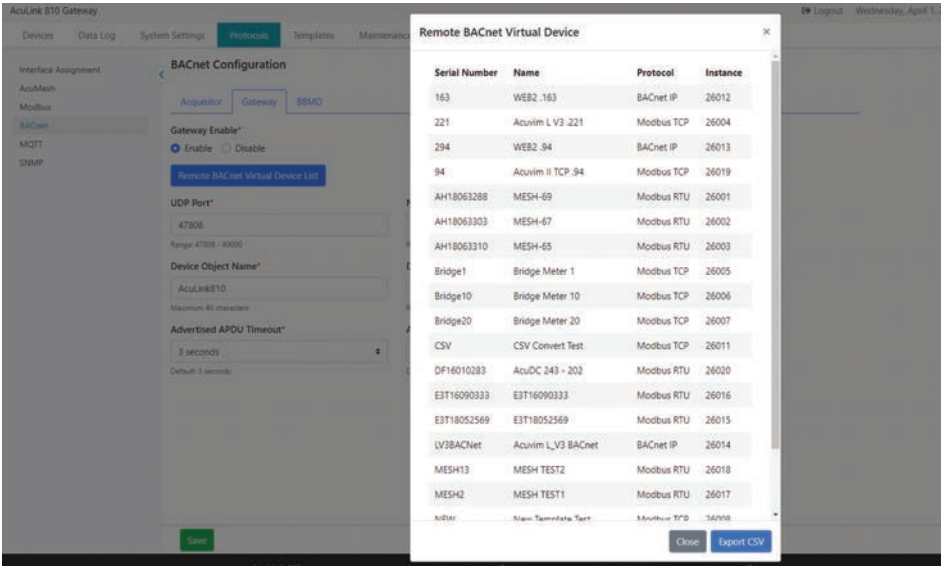
Network Number: The network number identifies a network within a BACnet system. The default number is 1 and the range is from 1-65534.

Advertised APDU Timeout: The default APDU timeout is 3 seconds, and the range is from 3-60 seconds.

Advertised APDU Retries: The default APDU retry is 2, and the range for the setting is 0-10.



The ***Remote BACnet Virtual Device List*** allows users to see what devices are accessible via the BACnet gateway. The list provides the user with the device name, serial number, protocol that it is using via the 810 and the instance number assigned to it in the BACnet network. The BACnet virtual list can be exported as a .csv file for user reference.

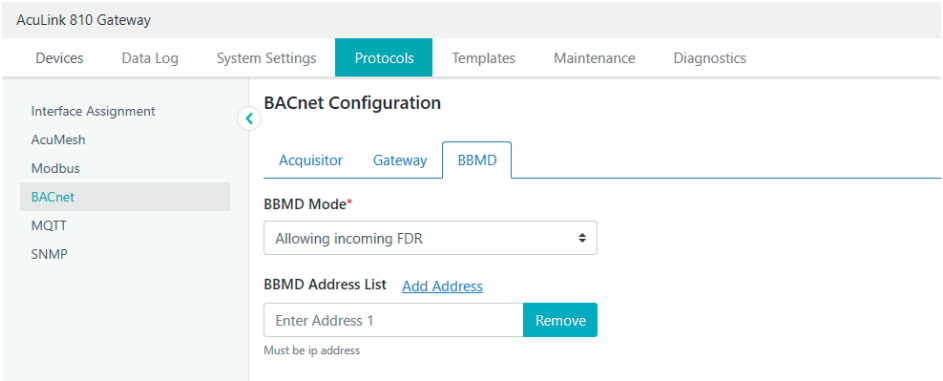


9.4.7 BBMD

In BACnet IP systems there are several broadcast messages that are used, however, these messages are normally blocked since most BACnet IP devices are connected via IP routers. BBMD stands for BACnet Broadcast Management Device and is used to allow for IP broadcasting to locate and communicate with other BACnet devices.

BBMD Mode: Users can select the following options for BBMD:

- **Allowing incoming FDR:** Foreign Device Registration allows the AcuLink 810 to send its broadcast message to a BBMD.
- **Full BBMD:** allows the AcuLink to send broadcast messages to other BBMDs.
- **Disable:** Disables BBMD
- **BBMD Address List:** Users can enter the IP address of the BBMD.



9.5 MQTT Protocol

The AcuLink 810 supports the MQTT protocol where the gateway can publish device data to a subscriber using an MQTT broker. The MQTT broker is a central server where all MQTT clients would connect to. The broker/server manages all message topics and updates new messages to all clients that are subscribed to a particular topic (AcuLink 810). All related MQTT settings can be configured in the ***MQTT*** page under the ***Protocols*** tab.

9.5.1 MQTT General Settings

Under the ***General*** tab in the MQTT page, users can enable the MQTT protocol and configure the broker settings.

Enable MQTT: Select Enable to use MQTT protocol

Broker Address: Enter the broker address of the MQTT server

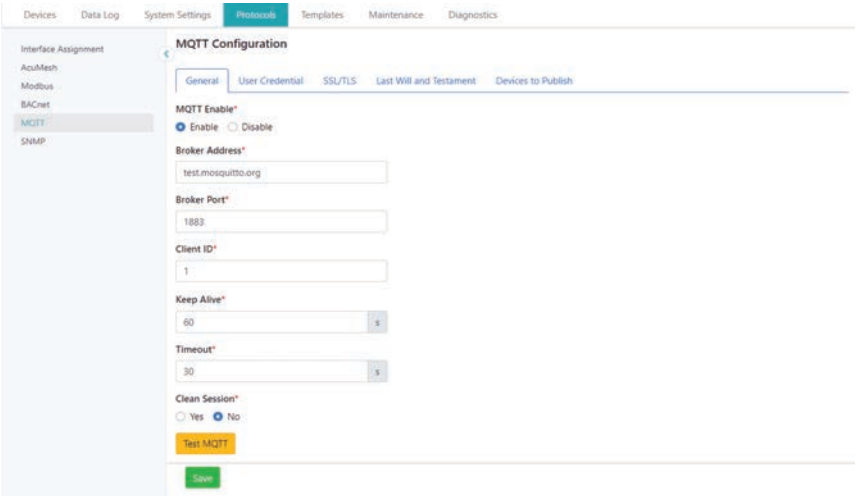
Broker Port: Enter the port number for the MQTT Broker

Client ID: Enter the Client ID for the AcuLink 810; must be a unique ID number

Keep Alive: The client communicates a time interval in seconds to the broker, "Keep-Alive" is the maximum length of time in seconds that the broker and the client cannot communicate with each other.

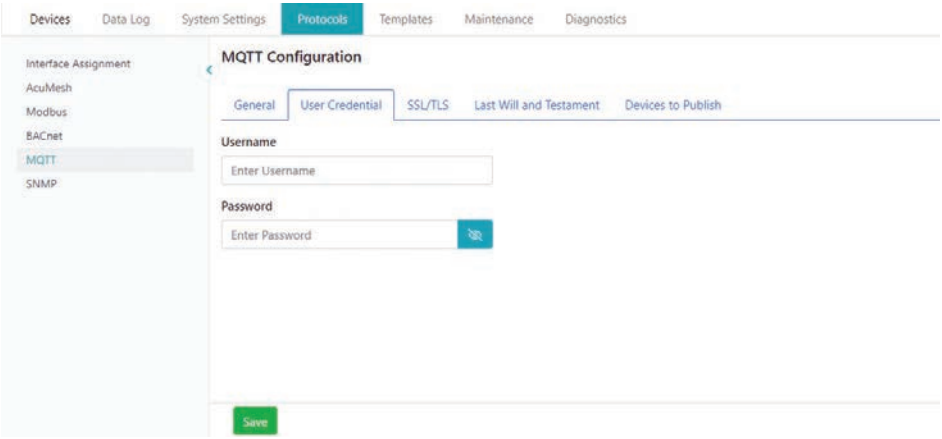
Timeout: Enter the timeout setting time in seconds.

Once all settings are configured click ***Save***. The connection to the broker can be tested by using the ***Test MQTT*** button.



9.5.2 MQTT Authentication

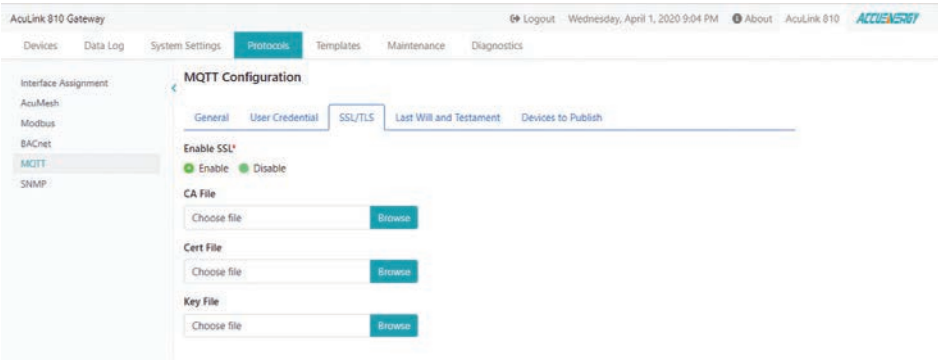
The User Credential tab allows users to configure a User Name and Password authentication if the broker is able to support it.



9.5.3 MQTT Encryption

The ***SSL/TLS*** tab allows users to use the MQTT protocol with encryption.

In this page users will be able to upload the required certificate and key files.



9.5.4 Last Will & Testament

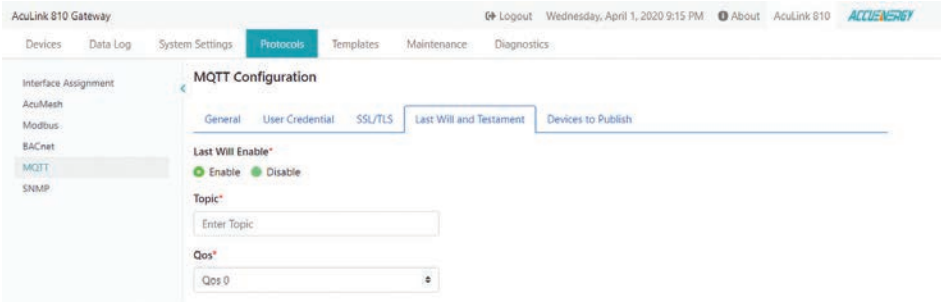
The AcuLink supports Last Will and Testament messages via the MQTT protocol. These settings can be configured under the ***Last Will & Testament*** tab.

The last will and testament message is used to notify other clients regarding other disconnected clients. The message is an MQTT message that contains a topic, a QoS level and a payload.

Topic: Refers to the path used to access the MQTT message.

QoS: Stands for Quality of Service and refers to the reliability of the message delivery between the publisher and subscriber. There are three types of quality of service:

1. **QoS 0** - is the lowest level, and is defined as "at most once" delivery. This level has the fastest message delivery but the success rate of delivery is not reliable.
2. **QoS 1** - is defined as "at least once" delivery. These types of messages are reliable and are guaranteed, however the messaged may be sent as duplicates several times.
3. **QoS 2** - Is the highest level, and is defined as "exactly once" delivery. These messages are more reliable and are guaranteed to be sent once without any duplicates. This type of messaging sends the most reliable message however it has a slower message delivery. Each client can optionally specify its own LWT message when it connects to a broker. The broker stores this message so that if the client disconnects ungracefully, the broker will send the disconnected client's LWT message to all the other clients that are subscribed to that last will message topic.



9.5.5 Device Publishing

Under the ***Devices to Publish*** tab users can configure the sending interval and devices data they want to publish to the broker.

All Meters Use One Topic: If selected as ***Yes*** users can use one topic for reading all published devices, however if ***No*** is selected users will need to configure a base topic.

Topic: Users will enter in the Topic used to read all devices.

Base Topic: Users can enter in the Topic, is usually a base topic followed by the serial number of the device.

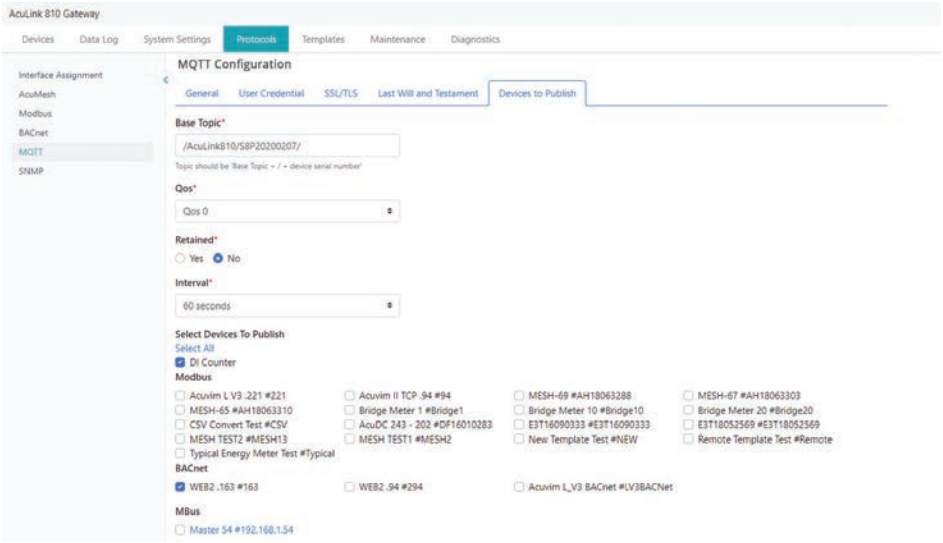
QoS: Users can configure the quality of service level, where Qos 0 is the lowest level and Qos 2 is the highest level.

Retained: Users have the option retain messages or not. If a client retains messages that was published to topic, a second client that is subscribed to the same topic will be able to see the retained message.

Interval: Users can select the publishing interval, the range is from 10-600 seconds.

Payload Format: Users can select from two different payload formats

Select Devices to Publish: Users can select Modbus RTU/TCP devices, BACnet MS/TP or IP devices, MBus devices and the Digital Input counter to publish to the MQTT broker.



9.6 Azure IoT

The **Azure** Internet of Things (**IoT**) is a collection of Microsoft cloud services that allow the user to have reliable device to cloud communication. **Azure IoT hub** is a managed **IoT** service which is hosted in the cloud and allows for bi-directional communication between **IoT** applications and the devices. This cloud-to-device connectivity means that you can receive data from your devices, but you can also send commands back to the device. The AcuLink 810 supports **Azure IoT** device posting where users can send Modbus, BACnet, MBus, and Virtual Devices to the IoT Hub.

Once connected on Azure, users can also configure settings on the AcuLink 810 from Azure via device twin.

The following settings need to be configured.

Azure IoT Enable: Will allow users to enable/disable Azure IoT

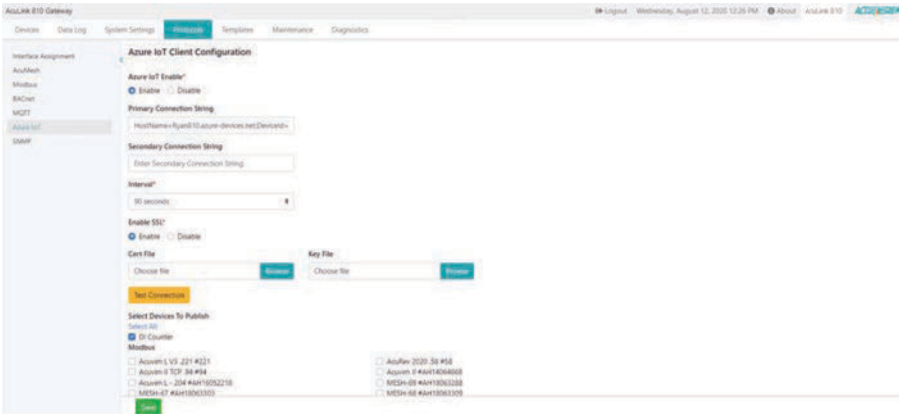
Primary Connection String: Enter in the primary connection string for the IoT Hub

Secondary Connection String: Enter in the secondary connection string for the IoT Hub

Interval: Select how often to post to the IoT Hub, the range is from 10-600 seconds.

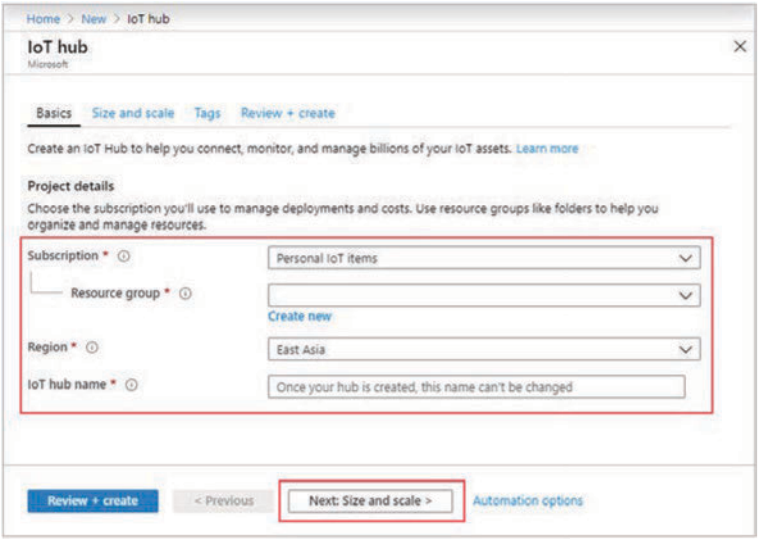
Enable SSL: When 810 connect to Azure X509 IoT device/IoT Edge device, Users can enable SSL where they can upload their own certificate and key file for encryption posting.

Select Devices to Publish: Users can select Modbus RTU/TCP devices, BACnet MS/TP or IP devices, MBus devices and the Digital Input counter to publish to the Azure IoT Server



9.6.1 Creating Azure IoT Device on Azure Portal Server

1. Sign in to the Azure Portal (https://portal.azure.com)
2. From the Azure homepage, select the + **Create a resource** button, and then enter IoT Hub in the **Search the Marketplace** field.
3. Select **IoT Hub** from the search results, and then select **Create**.
4. On the **Basics** tab, complete the fields as follows:
   - **Subscription**: Select the subscription to use for your hub.
   - **Resource Group**: Select a resource group or **create a new** one. To create a new one, select Create new and fill in the name you want to use. To use an existing resource group, select that resource group. For more information, see Manage Azure Resource Manager resource groups.
   - **Region**: Select the region in which you want your hub to be located. Select the location closest to you. Some features, such as IoT Hub device streams, are only available in specific regions. For these limited features, you must select one of the supported regions.
   - **IoT Hub Name**: Enter a name for your hub. This name must be globally unique. If the name you enter is available, a green check mark appears.

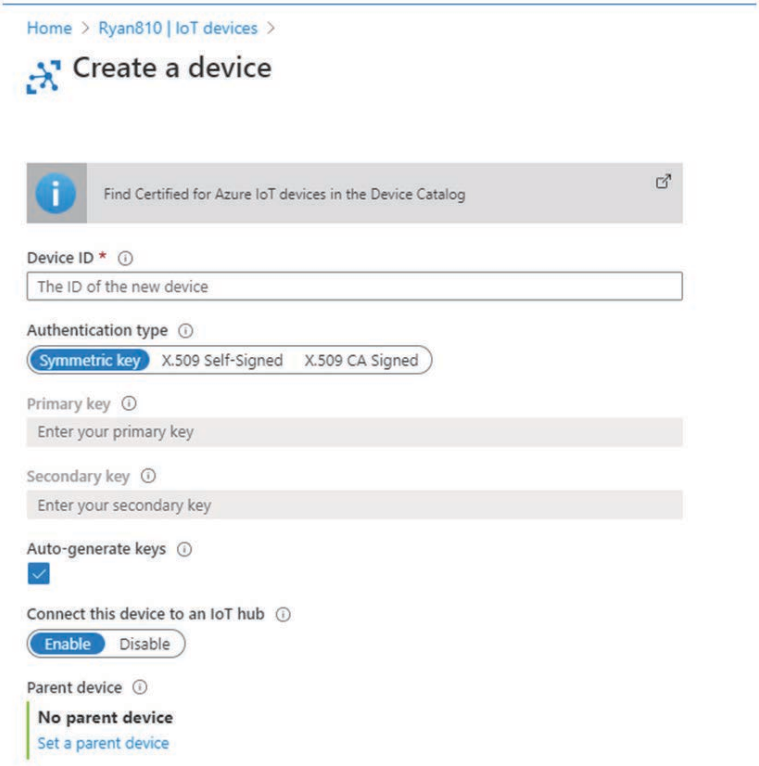


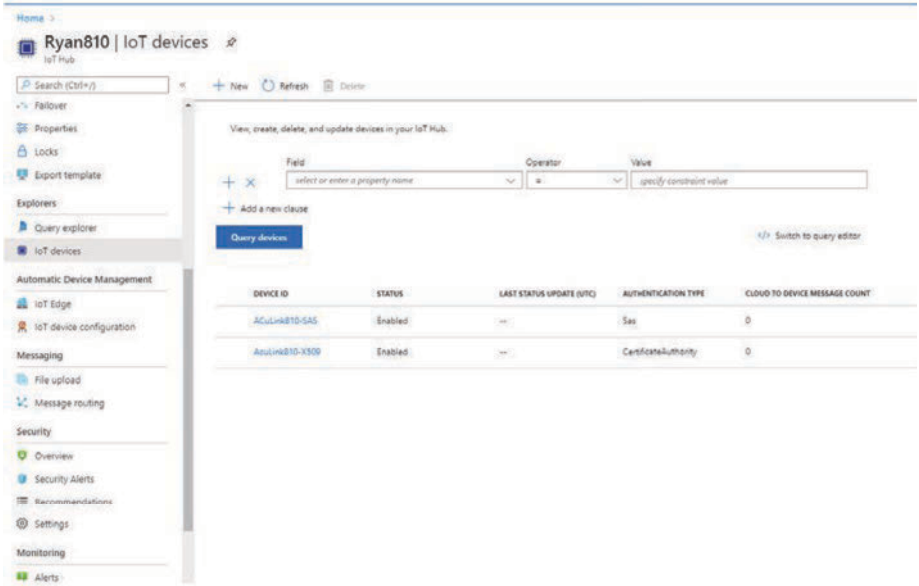
9.6.2 Create an IoT devices /IoT Edge device in the Azure portal

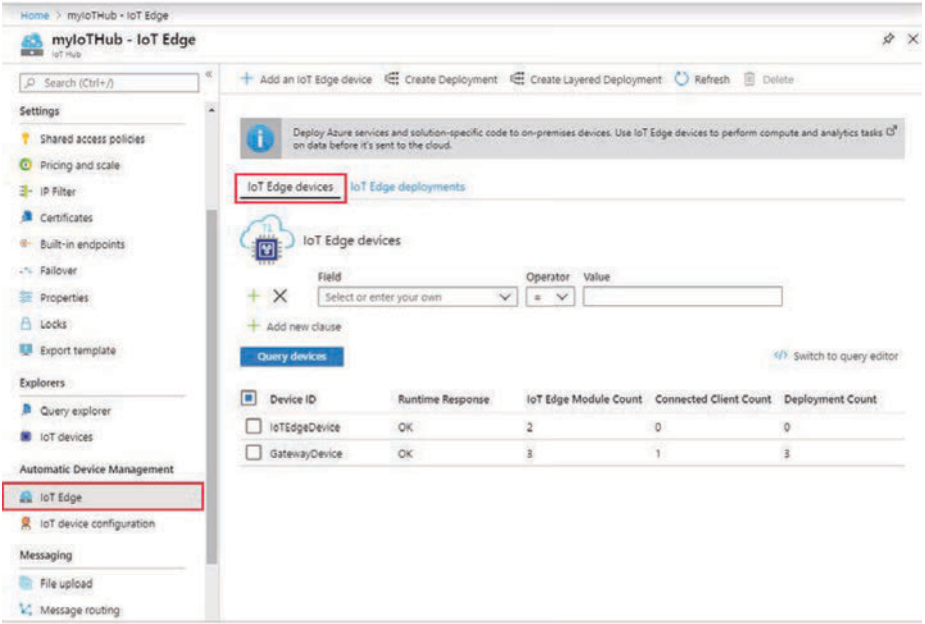
In your IoT Hub in the Azure portal, IoT Edge devices are created and managed separately from IOT devices that are not edge enabled.

1. Sign in to the Azure Portal and navigate to your IoT hub.
2. In the left panel, select **IoT devices/ IoT Edge** from the menu.
3. Select **New/Add an IoT Edge device**.
4. Provide a descriptive device ID. Use the default settings to auto-generate authentication keys and connect the new device to your hub.
5. Select authentication type:

You can select Symmetric key or X.509 CA signed




Home
Ryan810 | IoT devices
IoT Hub
Search (Ctrl+/)
New
Refresh
Delete
Failover
Properties
Locks
Export template
Explorers
Query explorer
IoT devices
Automatic Device Management
IoT Edge
IoT device configuration
Messaging
File upload
Message routing
Security
Overview
Security Alerts
Settings
Monitoring
Alerts
View, create, delete, and update devices in your IoT Hub.
Field
Operator
Value
Add a new clause
Query devices
Switch to query editor
DEVICE ID
STATUS
LAST STATUS UPDATE (UTC)
AUTHENTICATION TYPE
CLOUD TO DEVICE MESSAGE COUNT
Enabled
Sas
CertificateAuthority


Home > myIoTHub - IoT Edge
myIoTHub - IoT Edge
IoT Hub
Search (Ctrl+/)
Settings
Shared access policies
Pricing and scale
IP Filter
Certificates
Built-in endpoints
Failover
Properties
Locks
Export template
Explorers
Query explorer
IoT devices
Automatic Device Management
IoT Edge
IoT device configuration
Messaging
File upload
Message routing
Add an IoT Edge device
Create Deployment
Create Layered Deployment
Refresh
Delete
Deploy Azure services and solution-specific code to on-premises devices. Use IoT Edge devices to perform compute and analytics tasks on data before it's sent to the cloud.
IoT Edge devices
IoT Edge deployments
Field
Operator
Value
Select or enter your own
Add new clause
Query devices
Switch to query editor
Device ID
Runtime Response
IoT Edge Module Count
Connected Client Count
Deployment Count
IoTEdgeDevice
OK
GatewayDevice

9.6.3 Retrieving the connection string in the Azure portal

SAS IoT device/IoT Edge device:

When you're ready to set up your device, you need the connection string that links your physical device with its identity in the IoT hub.

1. From the **IoT devices/IoT Edge** page in the portal, click on the device ID from the list of IoT Edge devices.
2. Copy the value of either **Primary Connection String** or **Secondary Connection String**.

X.509 IoT device/IoT Edge device:

Connection string is defined as:

"HostName=<host_name>;DeviceId=<device_id>;x509=true"

9.6.4 Configure AcuLink 810 from Azure

AcuLink810 support device twins desired properties to synchronize device configuration or conditions, where the 810 can configure the NTP and Azure IoT configuration from the Azure portal.

The configuration is defined in desired properties:

```
{
    "properties": {
        "desired": {
            "ntpConfig": {
                        "enable": true,
                    "ntpServer1": "0.us.pool.ntp.org",
                    "ntpServer2": "",
                    "ntpServer3": "",
                   "timeZone": "America/Toronto",
                  "lastUpdateTimestamp": 1595876093
```

```
            },
            "azureConfig": {
                "azureIoTEnable": true,
                "primaryConnectionString": "HostName=AcuLink810.azure-devic
es.net;DeviceId=810pc;x509=true",
                "secondaryConnectionString": "",
                "sslEnable": true
            },
        "existingProperty": "otherNewValue",
        "otherOldProperty": null
    }
  }
}
```


9.7 SNMP

The AcuLink 810 supports the Simple Network Management Protocol (SNMP) which allows for reporting the 810 device data to the management station. The SNMP settings can be found on the ***SNMP*** page under the ***Protocols*** tab.

SNMP Enable: Select ***Enable*** for the SNMP protocol

SNMP Version: Users can select either SNMPv2c or SNMPv3.

Version 2: requires a read only community string to be configured.

Version 3: requires authentication and privacy protocol.

Port: The default SNMP port is 161, the range is 16100-16199

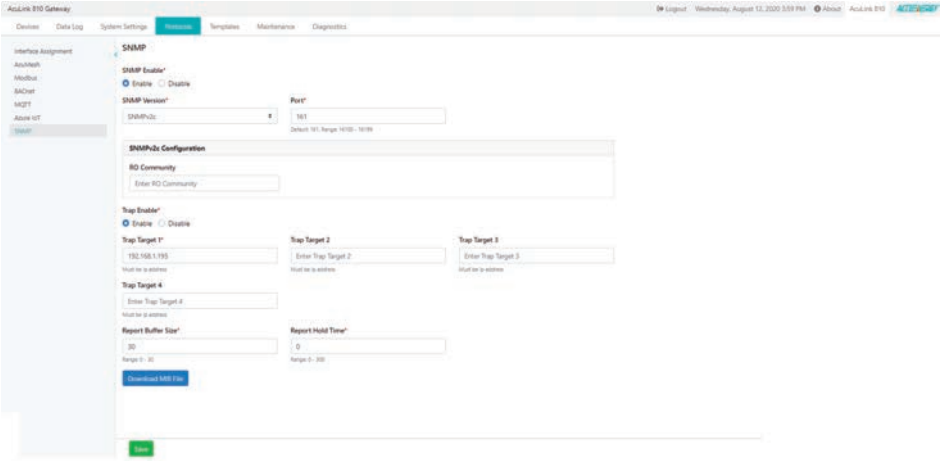
The AcuLink also supports SNMP trap notifications, where the user can receive a trap notification for any alarms that are triggered for devices on the AcuLink.

Trap Enable: Select enable for trap notifications

Trap Target 1-4: Users can configure up to 4 trap targets, where the trap targets must be an IP address.

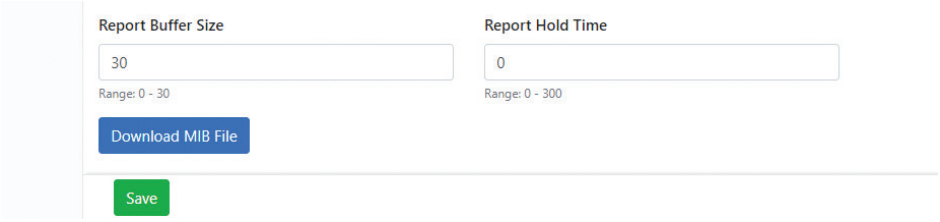
Buffer Size: Enter the size of the buffer for the amount of notifications will be stored before being sent to the management station. A maximum of 30 notifications can be stored.

Report Hold Time: Enter the time in seconds for how long the notification will be in queued before it gets sent to the management station. By default, this setting is configured to 0 so the notification will be sent immediately after an event occurs. This setting could be configured from 0-30 seconds.



9.7.1 MIB File

The SNMP MIB file includes all the device data objects required to read the device on a SNMP system. The MIB file of the AcuLink 810 can be downloaded directly from the web interface in the ***SNMP*** page. When downloading the SNMP file it will be downloaded as a zip folder including the individual MIB files are all device models on the AcuLink 810.



9.8 MBus

The AcuLink supports MBus devices, where the user can add MBus devices to the AcuLink 810 via an Mbus TCP/IP master. Mbus meters are typically used for reading water, gas and electricity.

9.8.1 Adding MBus Device

To add an MBus device select ***MBus*** under the ***Devices*** tab. Users will first need to add the MBus master device, click on ***Add Device***.

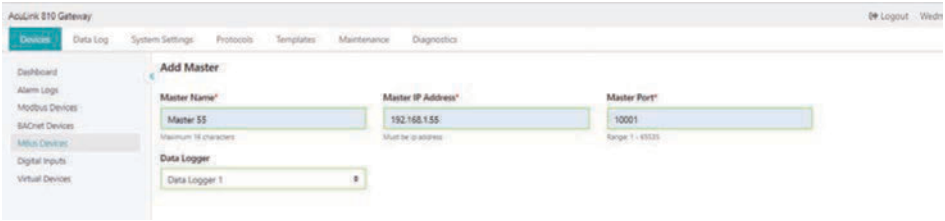
Enter in the following:

Master Name: Enter the master name

Master IP Address: Enter the IP address of the master device

Master Port: Enter the port number for the master device, the range is 1-65535.

Click on ***Save*** once complete.



The added master will show up on the MBus Device page.

Alternatively Users can Search for the master device. Click on ***Search Master***.

The following is required for the search criteria:

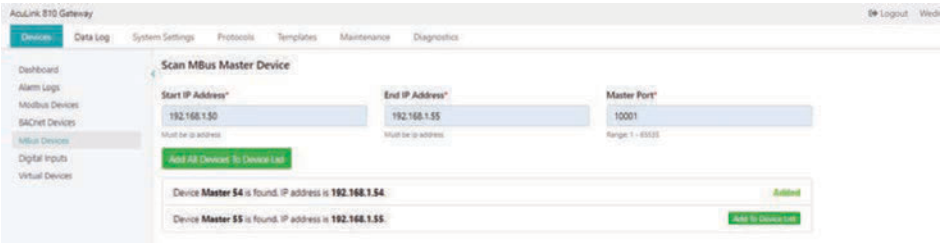
Start IP Address: Enter the starting IP range for the search

End IP Address: Enter the ending IP range for the search

Master Port: Enter the master port, range is 1-65535

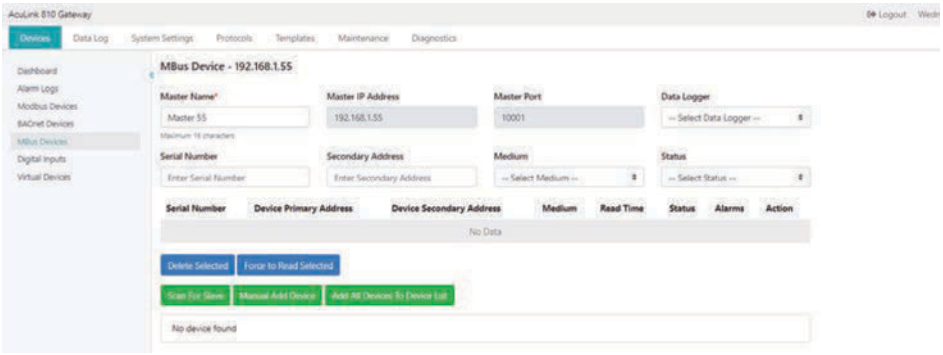
Click on ***Scan*** once the search criteria is completed.

When the scan has completed all masters discovered in the search will appear, users have the option to add them individually or can use the add all button to add all discovered MBus masters.



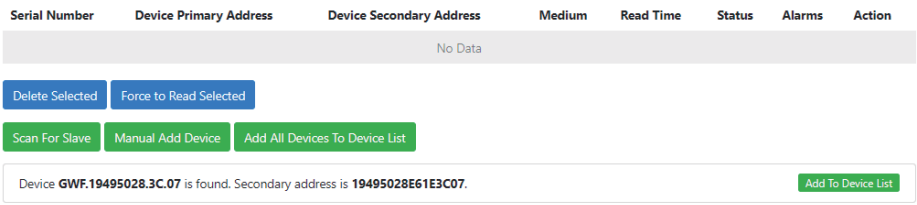
To add the MBus slave devices click on the Master from Mbus page, users will be redirected to the following page.

From this page users can change the Master name, however the IP and master port cannot be modified. From here users can add Mbus devices to the AcuLink 810.



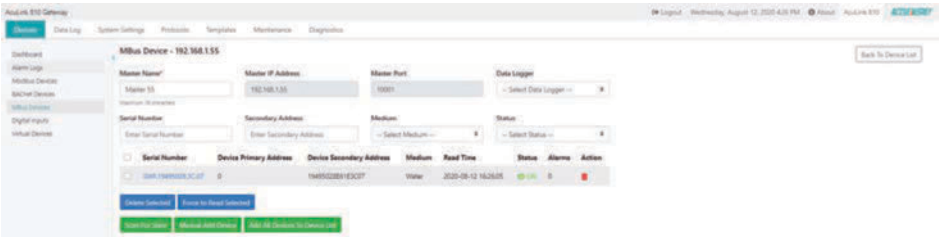
Scanning for MBus Devices

Users can run a scan to search for all available Mbus slaves on the master by selecting ***Scan For Slave***.

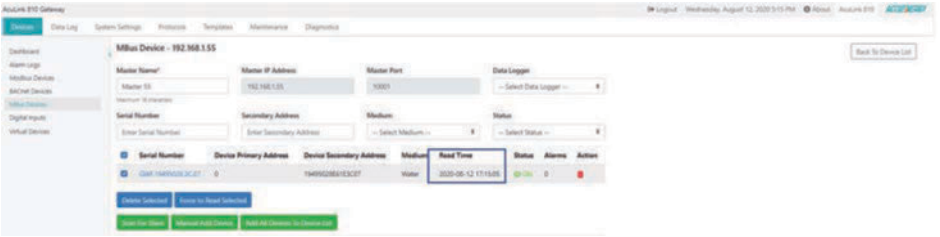


Once the slave device is added it will show up on this page under the ***Added Slaves*** section. The serial number, device primary address, and device secondary address will be displayed. The status ON will indicate the meter is online, OFF will indicate the meter is offline.

Users can delete the device from this page as well by clicking on the delete button under the Action column. If there are several Mbus devices that have been added, users can use the filter credentials to sort and filter the MBus devices, users can sort and filter by serial number, secondary address, medium, and status.

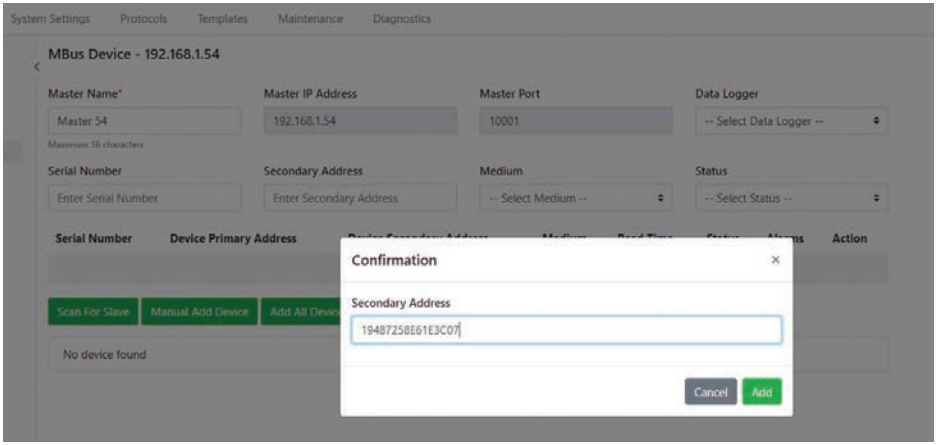


Users can perform a force read for the selected MBus devices, this will provide users with the latest data from the device. The read time will be updated to notify users of the read.



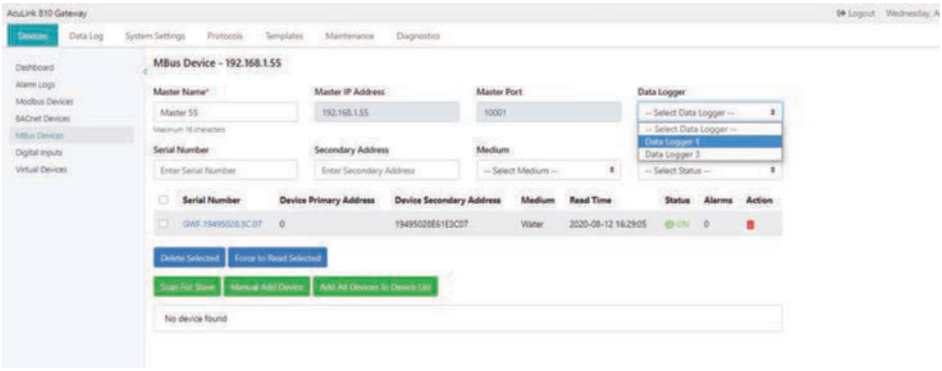
Adding MBus Device Manually

Users can also add Mbus devices manually, using this method the secondary address is required. Once the address is entered, click on ***Add***.



Data Logging for MBus devices

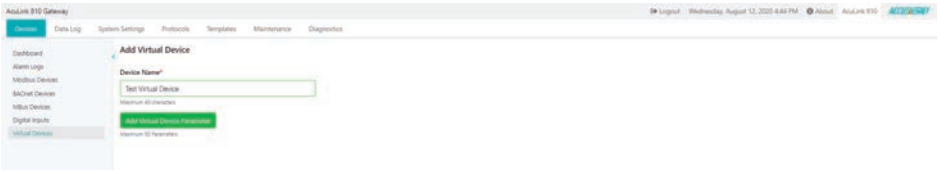
Logging for MBus devices can be done directly from the MBus device page. Under the ***Data Logger*** drop down menu, users can select which data logger to use for the MBus device. Alternatively users can also specify which MBus devices to log under the Data Loggers configuration page (Data Log>Data Loggers).



9.9 Virtual Device

The AcuLink 810 supports the creation of a virtual device which allows users to create a device based on a certain calculations/formulas of devices already added to the AcuLink 810. Select ***Virtual Devices*** under the ***Devices*** tab and click on **Add Virtual Device.**

Users will be required to enter a Device name for the virtual device. Once the name is selected for the device click on ***Add Virtual Parameter*** to start creating and adding the virtual parameters.



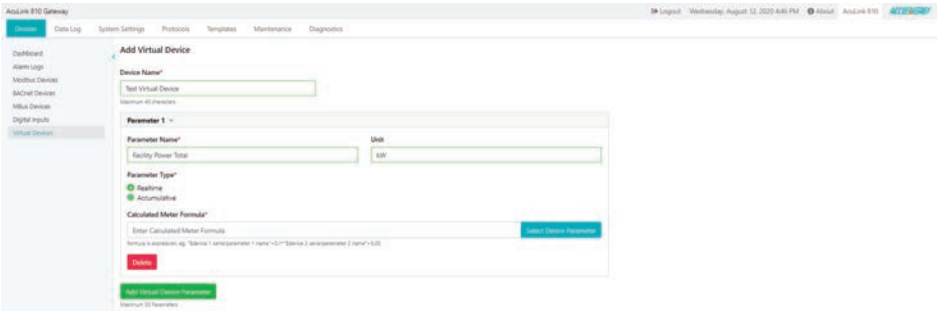
9.9.1 Adding Virtual Parameter

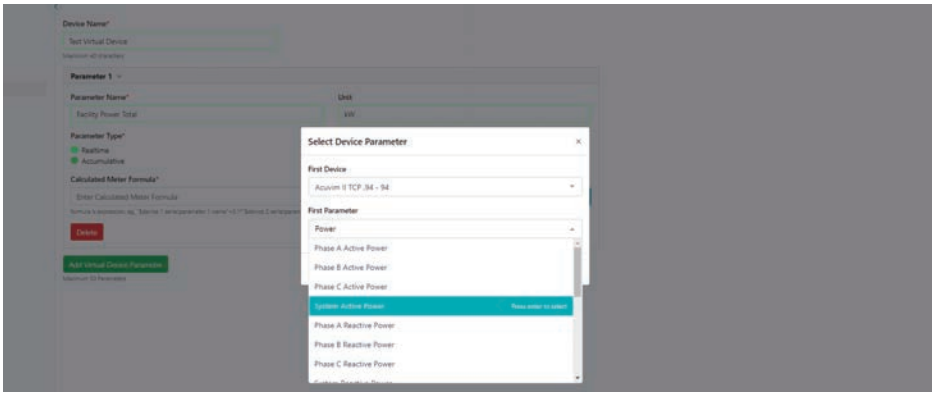
The following settings will need to be configured in order to add the Virtual parameters.

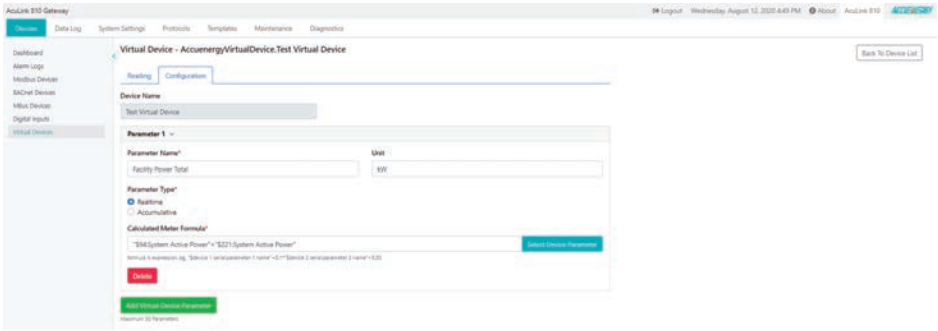
- **Parameter Name** - Enter a parameter name for the virtual device
- **Unit** - Enter the unit that will be used for the virtual parameter
- **Parameter Type** - Can be selected as either Realtime or Accumulative.

Calculated Meter Formula - The meter formula can be created by clicking on the the ***Select Device Parameter*** button. This will allow users to select existing parameters from Modbus, BACnet and MBus devices already added to the AcuLink 810. Once users have the parameters selected from the existing device click on ***Select***, users will notice the parameter is added into the meter formula bar. Users also have the option to add math functions to their calculated meter formula such as addition(+), subtraction(-), multiplication(*), and division(/).

Users can add another parameter by to their Virtual device by clicking on the ***Add Virtual Device Parameter***, and can have up to 50 Virtual Parameters per Virtual Device. Once all parameters are added, click on ***Save***.

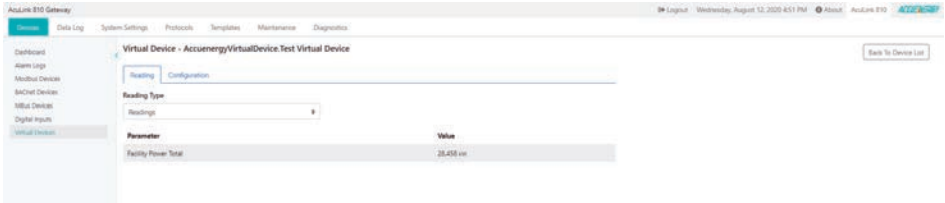






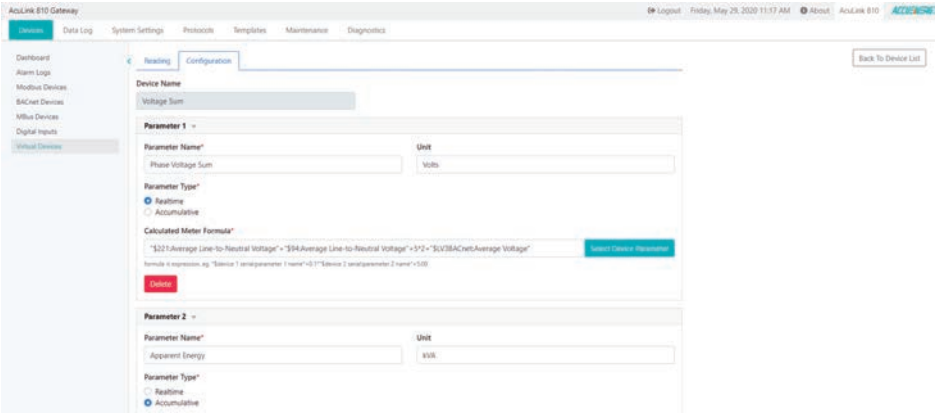
Once the device is created it can be seen from the Virtual device page, to view the readings click on the Virtual Device.

Under the **Readings** tab users can view the virtual device readings.



Users can edit the Virtual Device in the Configuration tab, from here the user can edit the parameter name, unit, parameter type, calculated meter formula, and also delete virtual parameters.

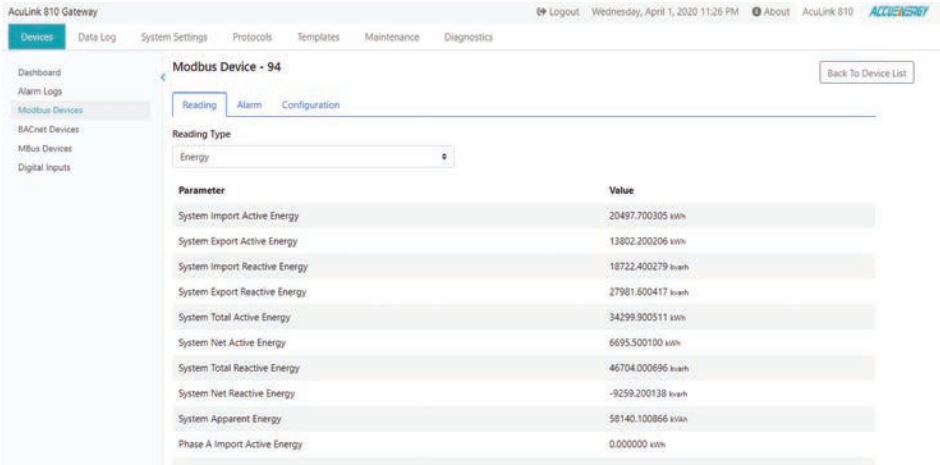
NOTE: *The Virtual Device Name cannot be modified in the Configuration tab.*



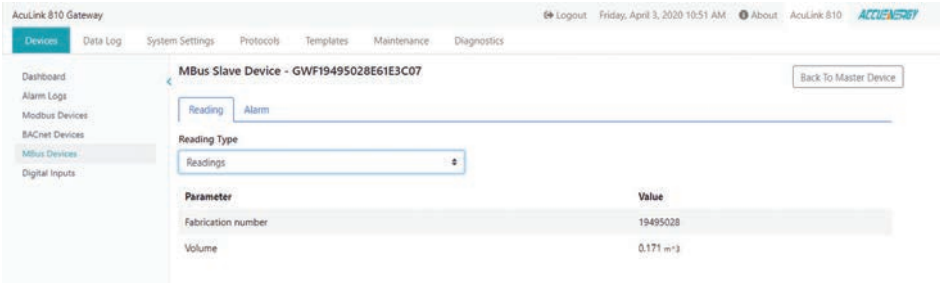
Chapter 10: Device Readings

The device readings can be seen directly on the AcuLink 810 interface. The device data updates every minute on the interface. To view the device readings click on the ***Devices*** tab and select either ***Modbus/BACnet Devices***.

Users can simply click on the device they wish to view the data under the ***Readings*** tab. Depending on the device users can click on the ***Reading Type*** drop-down menu and select different types of parameters to read from the device.

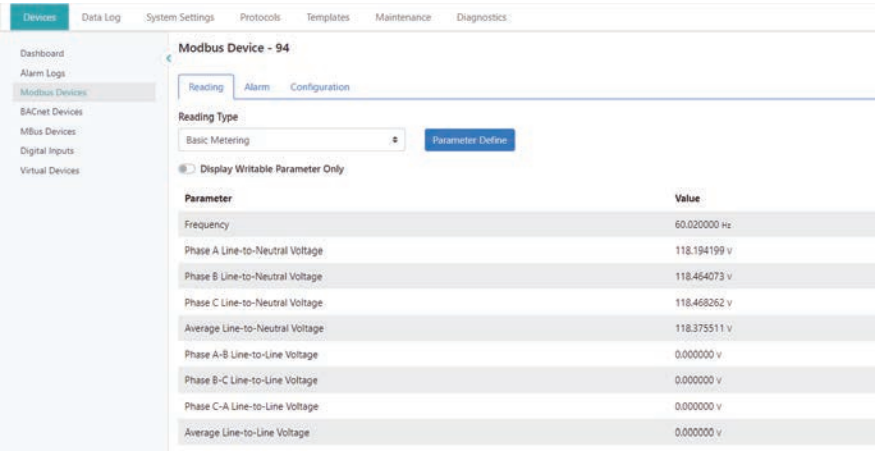


For ***MBus Devices*** users will need to first click on the MBus master and then select the MBus devices they wish to view the readings for.

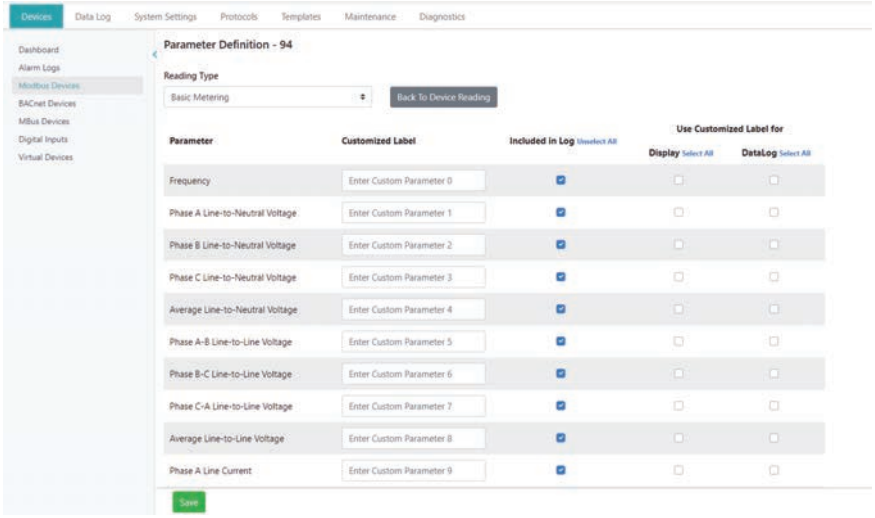


10.1 Parameter Definition

Users can use the ***Parameter Definition*** function to define each parameter on the list and let it display on the AcuLink 810 or on the data log.

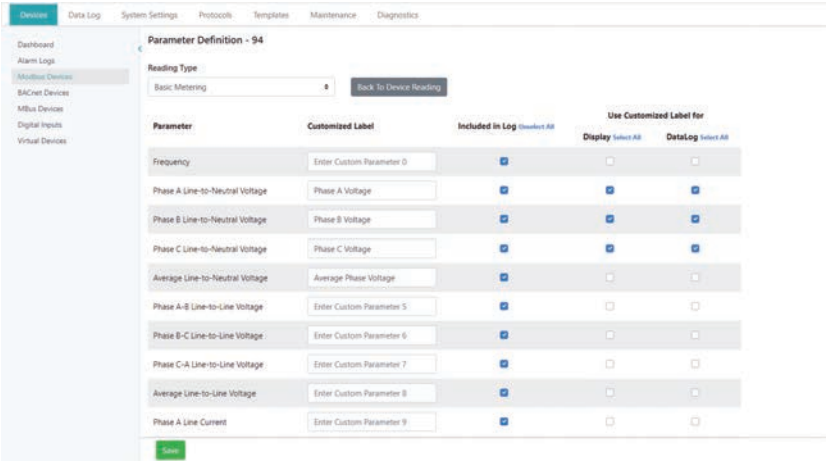


Select the "Reading Type" then click the ***Parameter Define,*** the following page will show up.

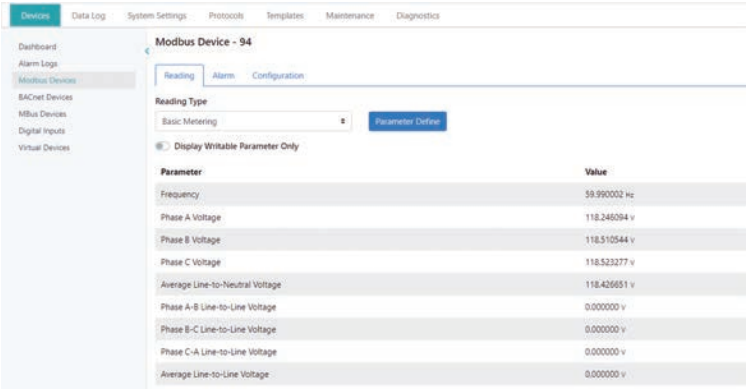


Users can check off which parameters they want included or create their own customized label.

- **Included in Log** - Select if the parameter needs to be included in the data log file.
- **Customized Label** - Where users can create a custom label for the parameter listed in the template
    - Display - Display the customized label on the AcuLink 810 reading interface
    - DataLog - Display the customized label on the AcuLink 810 data log file



Click ***Save*** after everything is set up, then click on the ***Back To Device Reading*** button. In the readings page users will see their customized label implemented.



When downloading the data log file, the name in the header will be changed according the the custom label configured.

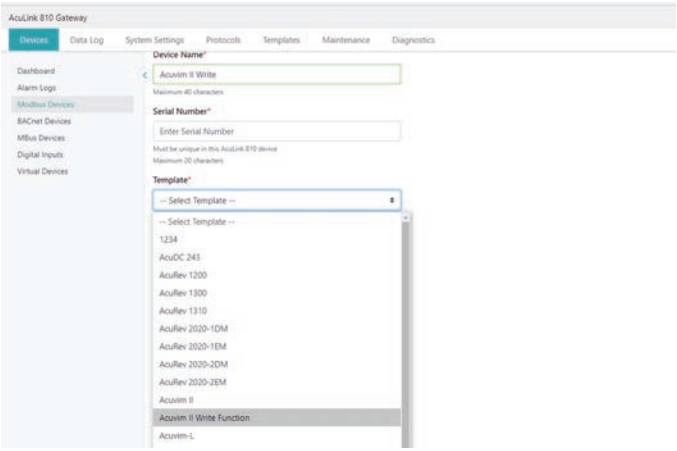
	Time	Freq_Hz	Phase A Voltage	Phase B Voltage	Phase C Voltage	Vnavg_V
2	2020-07-28T00:00:00-0400	60	121.26265	121.529922	121.542236	121.444931
3	2020-07-28T00:01:00-0400	59.99	121.201187	121.476028	121.484512	121.387245
4	2020-07-28T00:02:00-0400	60	121.322754	121.591568	121.608238	121.507523
5	2020-07-28T00:03:00-0400	59.98	121.591873	121.860107	121.876732	121.77623
6	2020-07-28T00:04:00-0400	59.99	121.462952	121.727982	121.74501	121.645309
7	2020-07-28T00:05:00-0400	60	121.439682	121.704102	121.722427	121.62207
8	2020-07-28T00:06:00-0400	60.01	121.604553	121.870628	121.886559	121.787254
9	2020-07-28T00:07:00-0400	60.01	121.575661	121.840652	121.861496	121.759262
10	2020-07-28T00:08:00-0400	60	121.57576	121.844376	121.85714	121.759079
11	2020-07-28T00:09:00-0400	60.01	121.479614	121.743431	121.760193	121.661087
12	2020-07-28T00:10:00-0400	60	121.616409	121.883629	121.894691	121.798241
13	2020-07-28T00:11:00-0400	60.01	121.593796	121.856827	121.872414	121.774353
14	2020-07-28T00:12:00-0400	60.01	121.69957	121.969322	121.985489	121.884804
15	2020-07-28T00:13:00-0400	60.01	121.625816	121.893471	121.908829	121.809372
16	2020-07-28T00:14:00-0400	59.99	121.652328	121.93058	121.94088	121.841263
17	2020-07-28T00:15:00-0400	59.99	121.7798	122.050537	122.061562	121.963966
18	2020-07-28T00:16:00-0400	59.99	121.836487	122.110878	122.123596	122.023643

10.2 Writing To Modbus Device

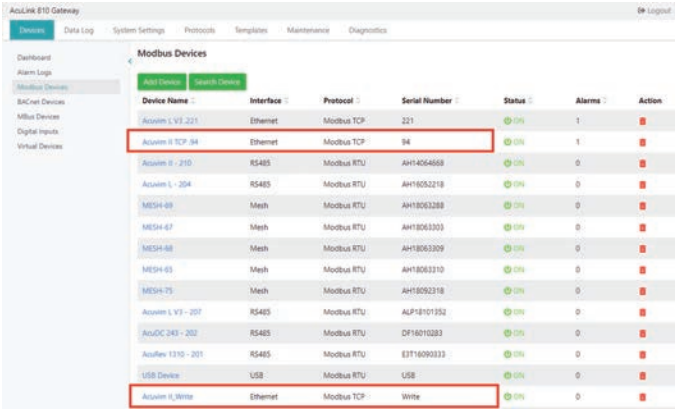
Adding the device

After the template with Function 16/15 is created, add a new device with the template. Then specify the connection method (Protocol) to that Modbus device (Modbus RTU/Modbus TCP).

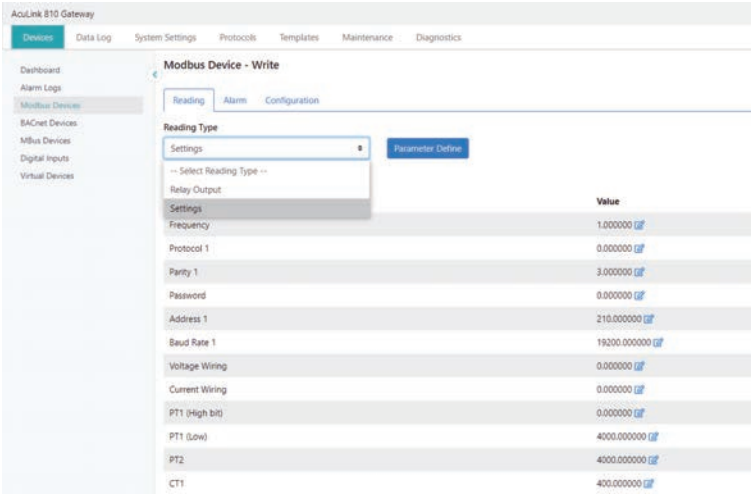
NOTE: *Refer to chapter 7 on how to add/create Modbus Templates on the AcuLink 810.*



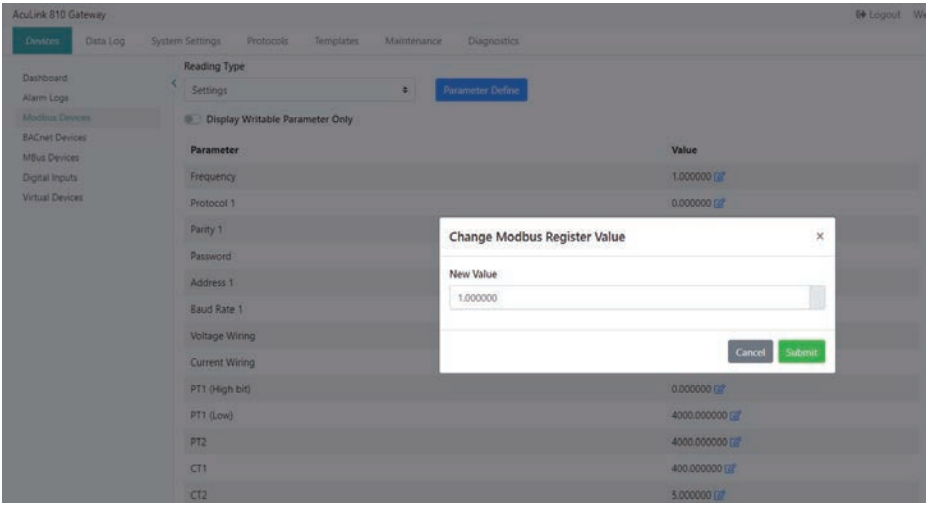
Users will be able to see the device connected under the Modbus device list. In this example, the writing template is connected with ***Acuvim II TCP .94***.

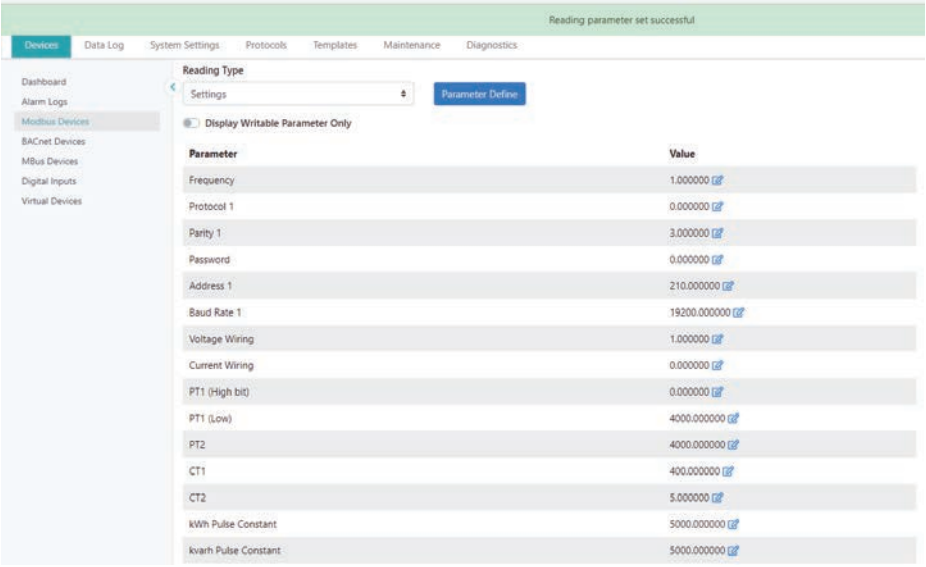


Click on the device to view all parameters, the writable parameters will have the write icon located next to the value as per the image below.



Click the blue write button besides the value to write register values into the device. For example, the “Voltage Wiring” parameter is “0” by default which is “3LN” (three-phase four-wire) connection. By changing the value to “1” will make the voltage wiring to “3LL” (three-phase three-wire).


AcuLink 810 Gateway
Logout
Devices
Data Log
System Settings
Protocols
Templates
Maintenance
Diagnostics
Dashboard
Alarm Logs
Modbus Devices
BACnet Devices
MBus Devices
Digital Inputs
Virtual Devices
Reading Type
Settings
Parameter Define
Display Writable Parameter Only
Parameter
Value
Frequency
1.000000
Protocol 1
0.000000
Parity 1
Password
Address 1
Baud Rate 1
Voltage Wiring
Current Wiring
PT1 (High bit)
0.000000
PT1 (Low)
4000.000000
PT2
4000.000000
CT1
400.000000
CT2
5.000000
Change Modbus Register Value
New Value
1.000000
Cancel
Submit

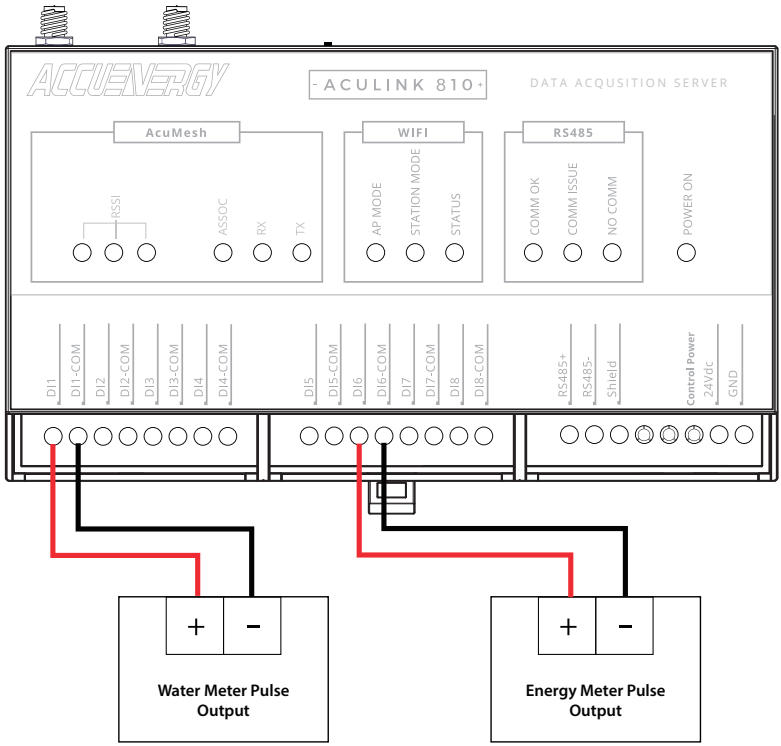

Reading parameter set successful
Devices
Data Log
System Settings
Protocols
Templates
Maintenance
Diagnostics
Dashboard
Alarm Logs
Modbus Devices
BACnet Devices
MBus Devices
Digital Inputs
Virtual Devices
Reading Type
Settings
Parameter Define
Display Writable Parameter Only
Parameter
Value
Frequency
1.000000
Protocol 1
0.000000
Parity 1
3.000000
Password
0.000000
Address 1
210.000000
Baud Rate 1
19200.000000
Voltage Wiring
1.000000
Current Wiring
0.000000
PT1 (High bit)
0.000000
PT1 (Low)
4000.000000
PT2
4000.000000
CT1
400.000000
CT2
5.000000
kWh Pulse Constant
5000.000000
kvarh Pulse Constant
5000.000000

Chapter 11: Digital Inputs

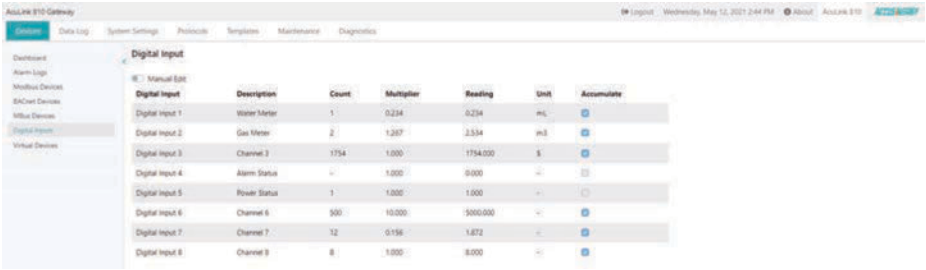
The AcuLink 810 has 8 Digital Input channels. Each Digital Input can be used as an input pulse counter or a digital status monitor.

Each channel has two terminals, a DI terminal and a DI COM terminal. The digital input channels are dry contact inputs, meaning that a voltage supply is requires in generating a pulse or digital status.

In the image below you will see a closed circuit on Digital Inputs 1 and 6. The positive output is connected to the DI channel input and negative output is connected to the DI Common input.

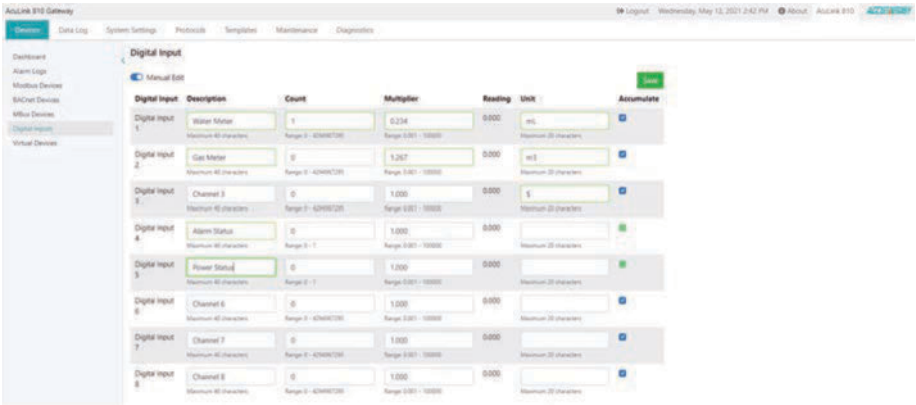


On the AcuLink 810 web interface, the Digital Inputs connected are shown as seen below. The Accumulate column represents if the DI channel is configured for Pulse or Digital Status; if the box is checked the channel is pulse and if unchecked it is status.



Users can switch between pulse counter and digital status by enabling the manual edit button. Once enabled users can check/uncheck the Accumulate box. The digital input channel settings can also be modified, details such as the channel description, count, multiplier, and unit can be configured.

NOTE: *If the user manually edits DI, all changes must be saved in order for them to take effect.*



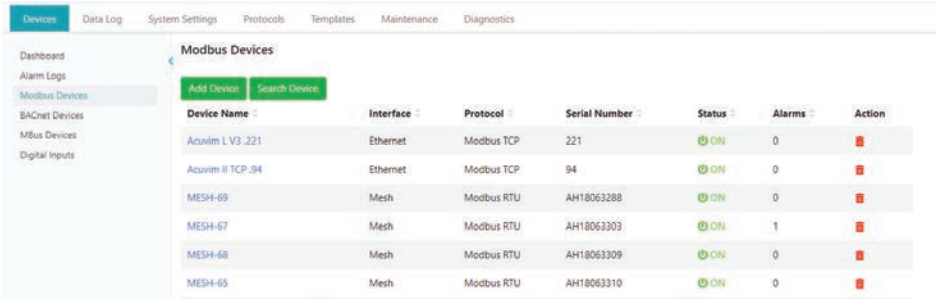
When the ***Manual Edit*** slider is enabled, the user has the ability to manually configure each Digital Input's Description, Count, Multiplier, Reading, and Unit, respectively.

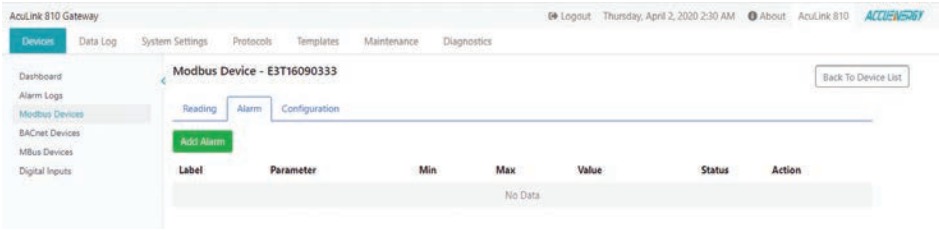
If the user manually edits DI, all changes must be saved in order for them to take effect.

Chapter 11: Alarms

11.1 Device Alarm

To configure over/under alarms in the AcuLink 810, users must log in with Admin access. Alarms can be added to all devices including Modbus, BACnet and MBus devices. To create a device alarm select the device from the ***Devices*** page, then select the ***Alarm*** tab.





Click on ***Add Alarm***

Label: Users can configure the label for the alarm

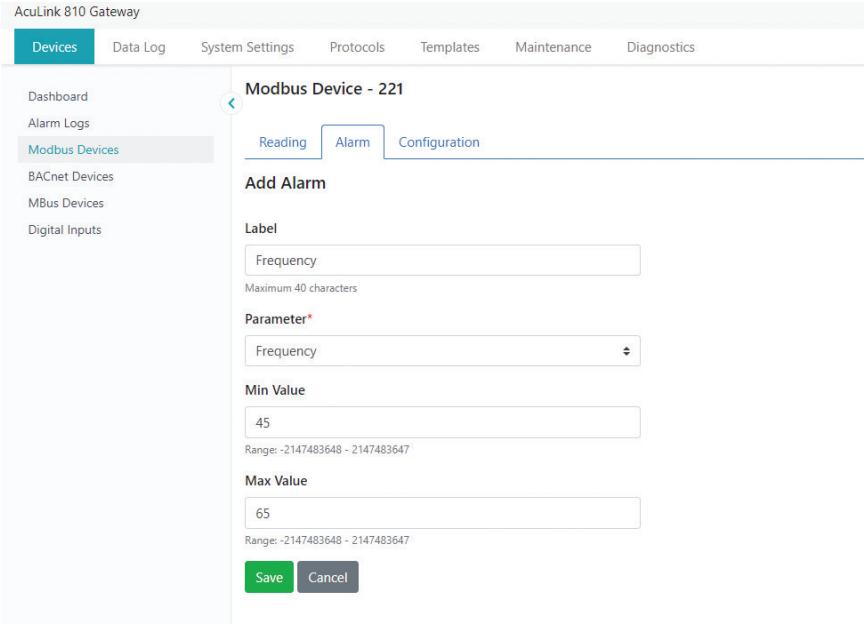
Parameter: Select the Parameter you wish to monitor for over/under limit

Minimum: Enter the minimum value the parameter should be at in the Min field. Any value lower than the Min value will trigger the alarm

Maximum: Enter the maximum value the parameter should have before it triggers the alarm in the Max field

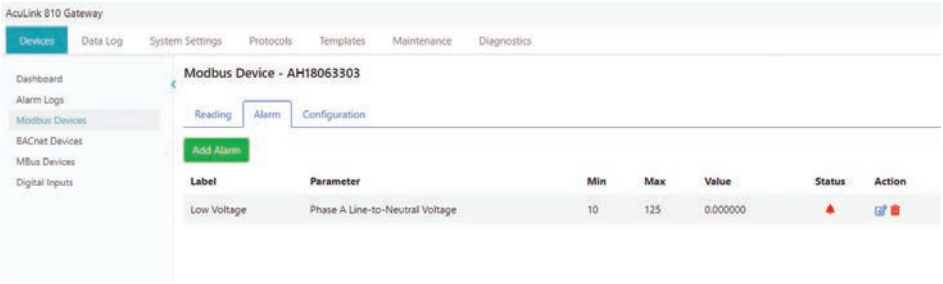
Click on ***Save*** to create the device alarm.

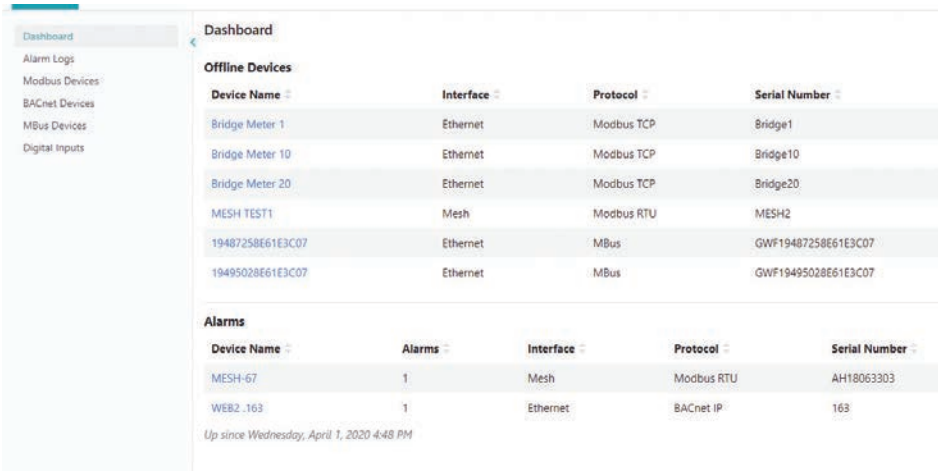
NOTE: *Alarms are scanned every minute, if there is a change in data a couple seconds apart the AcuLink 810 may not be able to register the alarm.*

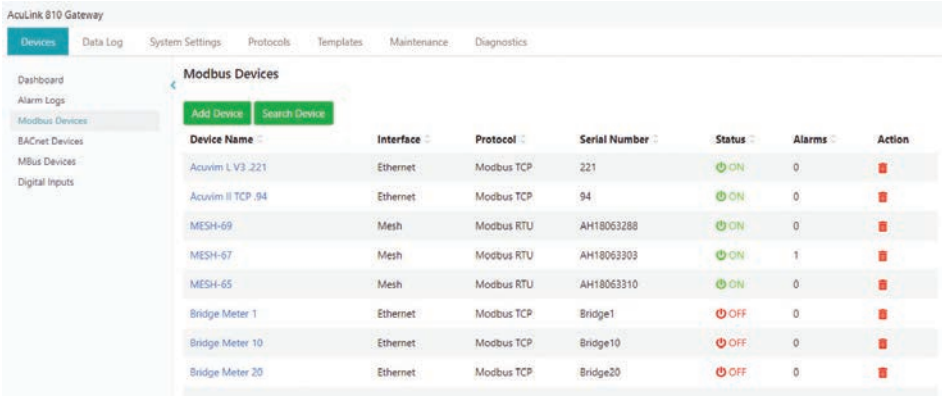


Once the alarm has been configured, it will appear under the Parameter list in the Alarms tab. This page will give you a summary of the alarm and will let users know the alarm max/min, the parameter being alarmed and the status of the alarm. Users can delete the alarm and re-configure the alarm setting under the Action tab.

If the parameter is in alarm mode, the value will be displayed in red and the Alarm status will show a red caution symbol. The AcuLink 810 will also display when devices are in alarm mode from the Dashboard as well as the devices page.



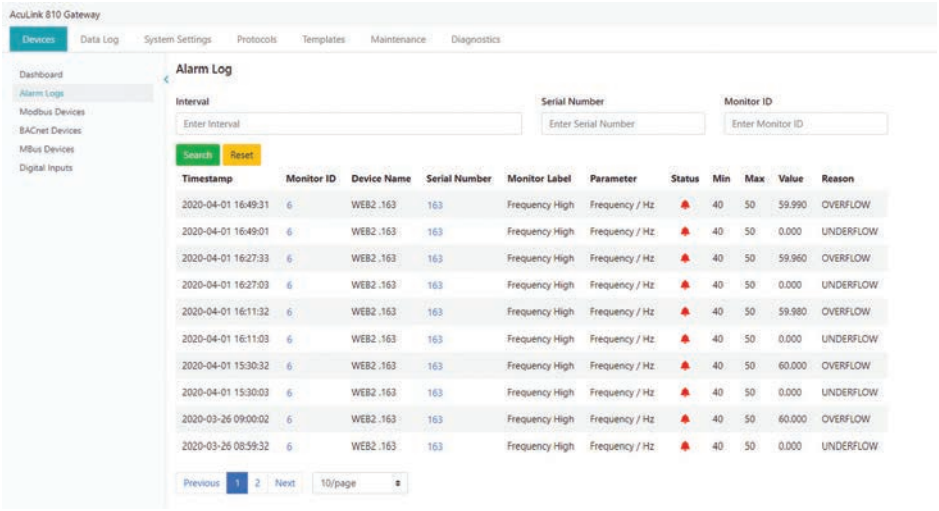




11.2 Alarm Log

When the alarm is triggered, the user will be able to see the triggering detail under the Alarm Logs page.

From here users can search and filter all device alarms by entering in the interval, serial number and monitor ID into the search criteria. Click on reset to clear the filtered search.



11.3 Email Alarm Notifications

The AcuLink 810 can send emails based on Reports or if there is an alarm event. To configure the AcuLink 810 to send emails, log in to the AcuLink 810 web interface with Admin access. To configure alarm emails click on the ***System Settings*** tab and select ***Email***.

The user must first configure their Email server and details in order for the gateway to send the emails.

Email Server: Enter the SMTP Server for the email account

Email Port: Enter the outgoing port number the SMTP uses to send emails

TLS/SSL: Users can choose to turn on/off the TLS encryption or keep it on auto.

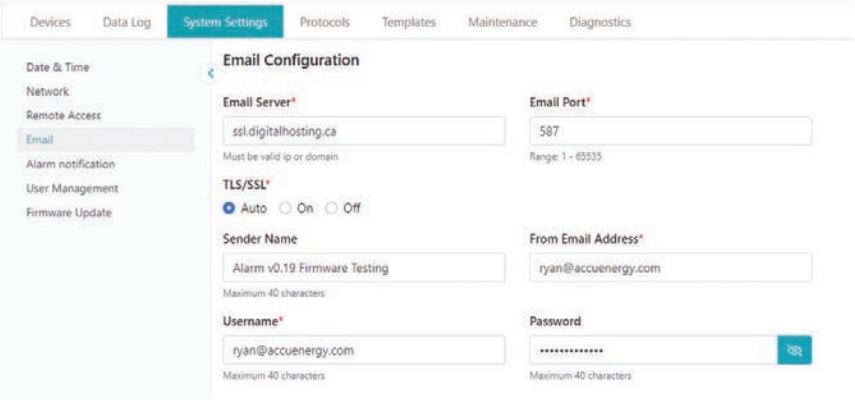
Sender Name: Enter the sender name of the email

From Email Address: Users can specify the email addresss they receive the email from

Username: Enter the email address for the emails authentication

Password: Enter the password for the email address in Username

Click on ***Save*** once all settings are configured.



Next users must configure the alarm notification settings receive the email addresses when the alarm is triggered. This can be done on the ***Alarm notification*** page.

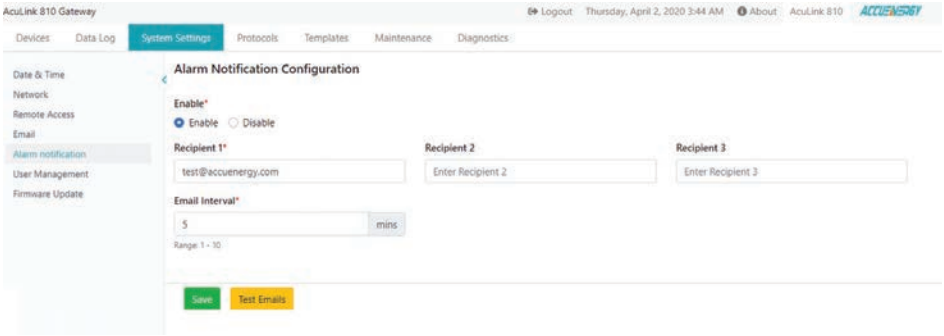
Enable the alarm notification and configure the following:

Recipinets 1-3: Enter the name of the email address in the Email Recipient field. There can be a maximum of 3 email recipients.

Email Interval: Select the email interval, by default it is 5 minutes, the range is from 1-10 minutes.

Click ***Save*** to confirm the settings. Users can test the emails by clicking on the ***Test Emails*** button, this will let the user know if the AcuLink can reach the emails listed in the recipients list or not. If successful a test email will be received.

If emails were configured for alarm events, the recipients will also receive an email to be notified.



Chapter 12: Data Logging

12.1 Data Loggers

The AcuLink 810 supports data logging to its 8GB of internal memory. When the memory is full the oldest data log entries will be overwritten. To configure the AcuLink 810 to log the device data click on the ***Data Log*** tab and select ***Data Loggers***.

The AcuLink 810 has 3 data loggers, where the user can either save device data to its internal memory as well as post the data to an external HTTP/FTP server. The three loggers allow users to have different types of loggers with different logging intervals, log file formats, etc as desired by the user.

- **Data Log Enable:** Select Enable to ***Enable*** the data log
- **Post Channel:** Select the Post Channel from the drop-down list:
    - None: AcuLink 810 will log and store the data on its memory
    - Post Channel 1/2/3: AcuLink 810 will log and push the data to the configured post channel. Users will not be able to select the post channel if it is disabled.

NOTE: *For more information on configuring the Upload Protocol refer to section 7.10.2 of this User's Manual for the post channel configuration.*

- **Timestamp Format:** Select the format of the timestamp for the data that is logged. The format for the timestamp can be based on the Local Time, UTC Seconds or based on ISO8601 Format.
- **Log File Name Format:** Select the format of the log file name for the data that is logged. The format for the log file name can be based on UTC Timestamp or Time interval Format. An example of each file name format is shown next to each setting.
- **Log File Format:** For users sending data external HTTP or FTP servers they have the option to select the type of file format the log file is sent as. The two formats are CSV and JSON.

NOTE: *If users are not sending data to an external server and are only logging data directly to the AcuLink 810 memory, the data will be downloaded as CSV file format. JSON is only supported when posting the log file to an HTTP or FTP server.*

- **Log Interval:** Select how frequently the module will log data to the file from the drop-down list. The logging interval can be from 1 minute to 1 month. For logging intervals faster than 1 minute please see Rapid logger in section 7.10.2 of the user manual.

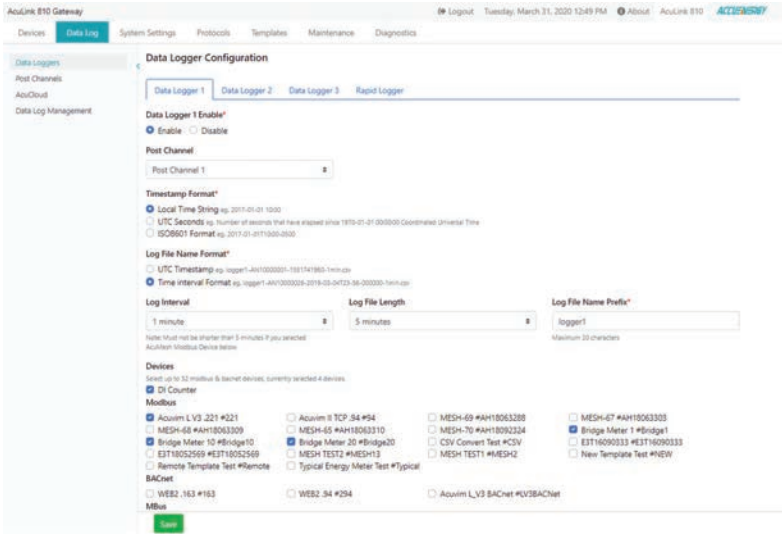
- **Log File length:** Select the length of the log file, it can be from 1 minute to 1 month. The log file length is in reference to the post channels sending interval, for example if the log interval is 1 minute and the log file length is 5 minutes the log file will be sent to the external server every 5 minutes. If the user is only configuring the logger to save data on the 810's internal memory the log file length setting is irrelevant and can be ignored.

NOTE: *The log interval must be less than or equal to the log file length.*

- **Log File Name Prefix:** Provide a name for the log file which will be appended to the beginning of the log file. By default ***logger1*** will be appended to the beginning of the log file. If configuring Data ***Logger 2*** the default name prefix is ***logger2***, and if configuring Data Logger 3 the default name prefix is ***logger3***.
- Select the device(s) to log the data for. Users have the option to log Modbus, BACnet, and MBus devices.

When all of the settings are entered correctly, click on ***Save***.

NOTE: *For more information on downloading and deleting the data logs, please refer to the 'Data Management' section of this User's Manual.*

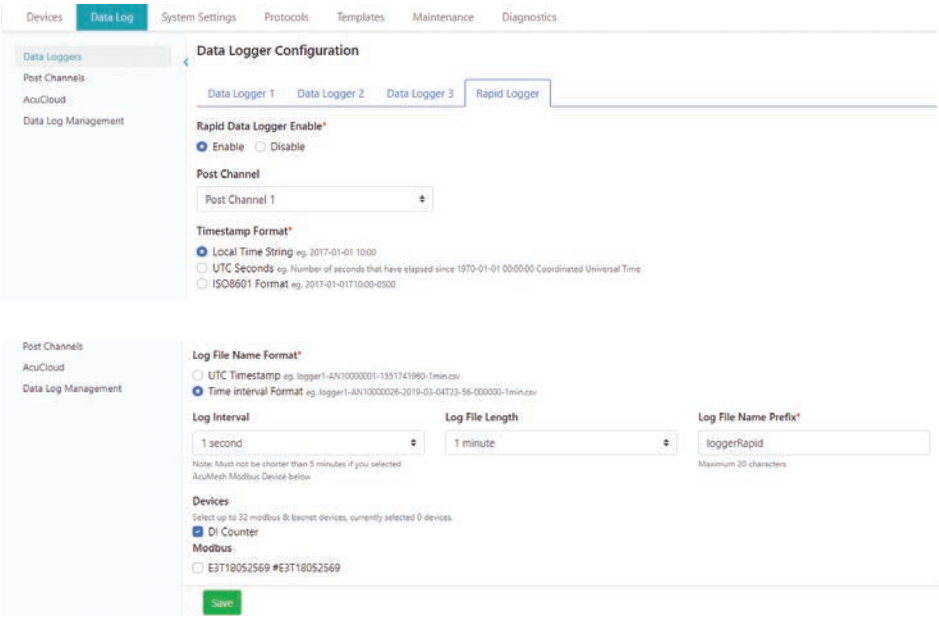


12.1.1 Rapid Logger

The AcuLink 810 supports the rapid logging function, where the user has the ability to log data at intervals as fast as 1 second.

- **Rapid Data Logger Enable:** Select ***Enable*** to begin the rapid logging function
- **Post Channel:** Select the Post Channel from the drop-down list:
- None: AcuLink 810 will log and store the data on its memory
- Post Channel 1/2/3: AcuLink 810 will log and push the data to the configured post channel. Users will not be able to select the post channel if it is disabled.
- **Timestamp Format:** Select the format of the timestamp for the data that is logged. The format for the timestamp can be based on the Local Time, UTC Seconds or based on ISO8601 Format. An example of each time format is shown next to each setting.
- **Log File Name Format:** Select the format of the log file name for the data that is logged. The format for the log file name can be based on UTC Timestamp or Time interval Format. An example of each file name format is shown next to each setting.
- **Log Interval:** Select how frequently the module will log data to the file from the drop-down list. The logging interval can be from 1 second to 30 seconds.
- **Log File Length:** Select the length of the log file, it can be from 1 minute to 1 month. The log file length is in reference to the post channels sending interval, for example if the log interval is 1 minute and the log file length is 5 minutes the log file will be sent to the external server every 5 minutes. If the user is only configuring the logger to save data on the 810's internal memory the log file length setting is irrelevant and can be ignored.
- **Log File Name Prefix:** Provide a name for the log file which will be appended to the beginning of the log file. By default the prefix for the rapid logger is ***loggerRapid***.
- **Devices:** The user can select the device for the rapid logger.

NOTE: *Only Modbus devices connected via RS485 can be logged using the Rapid Logger.*



12.2 Post Channels

The AcuLink 810 supports 3 Post Channels that will allow users to post device data to external HTTP/FTP/SFTP servers. To configure the HTTP/FTP/SFTP data forward from the web interface click on the ***Data Log*** tab and select ***Post Channels***.

To configure the post channels select the corresponding post channel tab.

12.2.1 HTTP Post Method

The HTTP post method allows the user to post meter data to an HTTP/HTTPS server.

Post Channel Enable: Select ***Enable*** to enable the post channel data forward

Post Method: Select HTTP/HTTPS from the drop-down menu

Post Name Fixed: Select Yes or No to enable a fixed post name, if yes selected enter in the post name. There is a maximum of 40 characters allowed for the fixed post name.

HTTP/HTTPS URL: Select HTTP or HTTPS prefix from the drop-down menu before entering in

the URL. Next enter in the URL of the server.

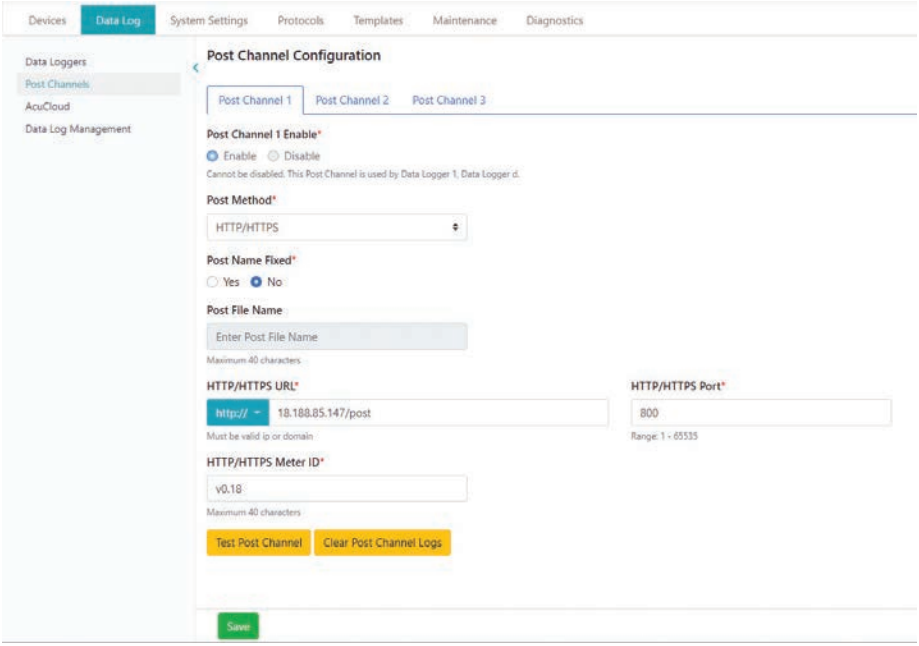
HTTP/HTTPS Port: Enter the correct port for the HTTP server.

HTTP/HTTPS Meter ID: Enter in the meter ID.

Once the settings are entered correctly click on ***Save***. After the settings are saved, users can use the ***Test Post Channel*** button to test whether the AcuLink 810 can successfully reach the HTTP/HTTPS server.

NOTE: *If users receive a fail message, please verify the server URL, port number and double-check the network connectivity.*

If the AcuLink 810 loses its network connection the gateway can back up 3000 post files on its internal memory. After 3000 post files the data will start to over write from the oldest post file. Users can clear the cached post files by using the ***Clear Post Channel Logs*** button.



12.2.2 FTP Post Method

The FTP post method allows the user to post meter data to an FTP server.

Post Channel Enable: Select ***Enable*** to enable the post channel data forward

Post Method: Select FTP protocol

FTP URL: Enter in the FTP URL

FTP Port: Enter the FTP port number

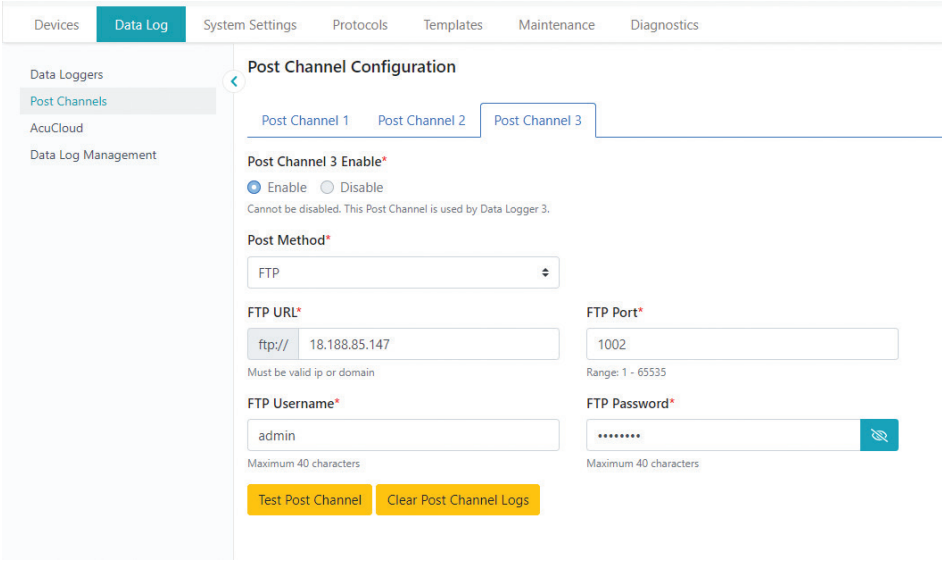
FTP Username: Enter the username to access the FTP server

FTP Password: Enter the password to access the FTP server

Once all settings are entered correctly, click on ***Save***. Users can use the ***Test Post Channel*** button to determine whether the 810 can reach the FTP server.

NOTE: *If users receive a fail message, please verify the server URL, port number, username, password and double-check the network connectivity.*

Similar to the HTTP posting method, for FTP if the AcuLink 810 loses its network connection the gateway can back up 3000 post files on its internal memory, after 3000 post files the data will start to over write from the oldest post file. Users can clear the cached post files by using the ***Clear Post Channel Logs*** button.



12.2.3 SFTP Post Method

The SFTP post method allows the user to post meter data to an FTP server.

Post Channel Enable: Select ***Enable*** to enable the post channel data forward

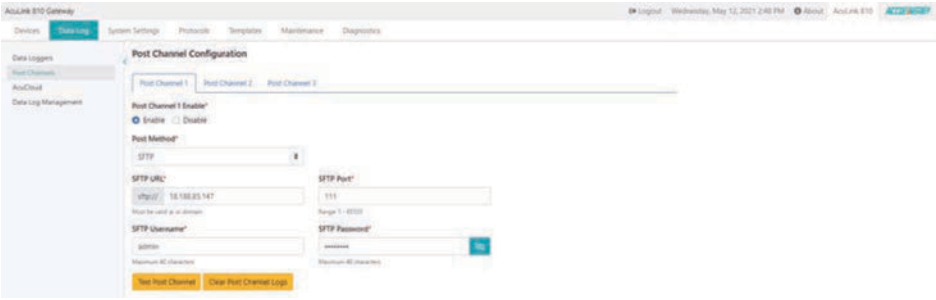
Post Method: Select SFTP protocol

SFTP URL: Enter in the FTP URL

SFTP Port: Enter the FTP port number

SFTP Username: Enter the username to access the FTP server

SFTP Password: Enter the password to access the FTP server

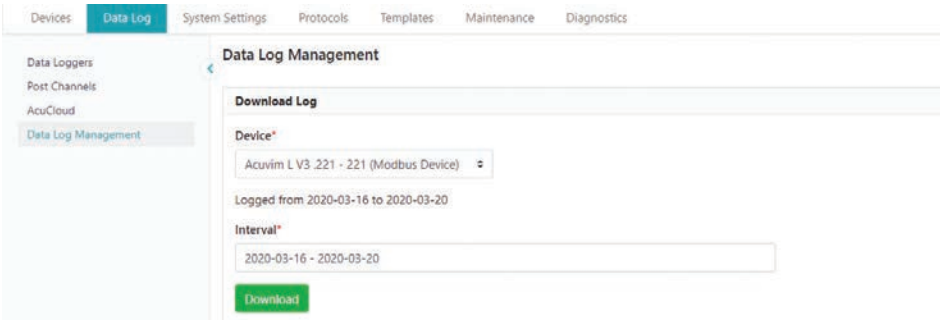


12.3 Downloading Data

Under the **Data Log** tab, the user has the option to download data that has already been logged.

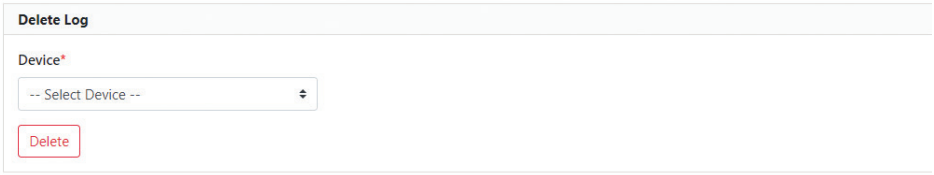
Clicking **Data Log Management (Download Log)**:

- **Device:** The user can select the device to download data from
- **Interval:** The user can choose the interval from which to download
- **Download:** The user can download the selected file from the device (CSV format)



The user also has the ability to delete previously stored logs.

- **Device:** The user can select the device to erase data from
- **Delete:** This will erase all data from the device selected



12.4 AcuCloud

This chapter will provide instructions on connecting the AcuLink 810 gateway device to the AcuCloud EMS software so that the selected devices connected to the gateway can send their data to the software. This process requires the user to have an existing AcuCloud account, if the user does not have an account they can sign up for AcuCloud directly on our website at: https://www.accuenergy.com/products/acucloud-energy-management-software-ems/

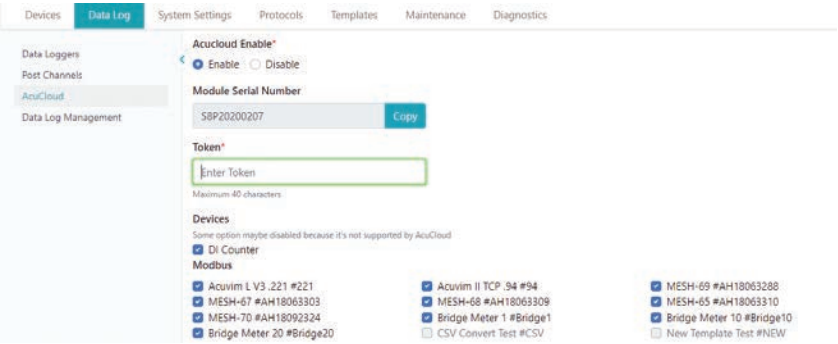
This procedure requires users to add the gateway to the software in which a token will be generated through AcuCloud and will act as verification when sending data from the gateway. Finally this generated token will be used to configure the gateway from the AcuLink 810 web interface.

Once the token has been successfully added, the user will be able to monitor, compare and trend the data from devices connected to the gateway.

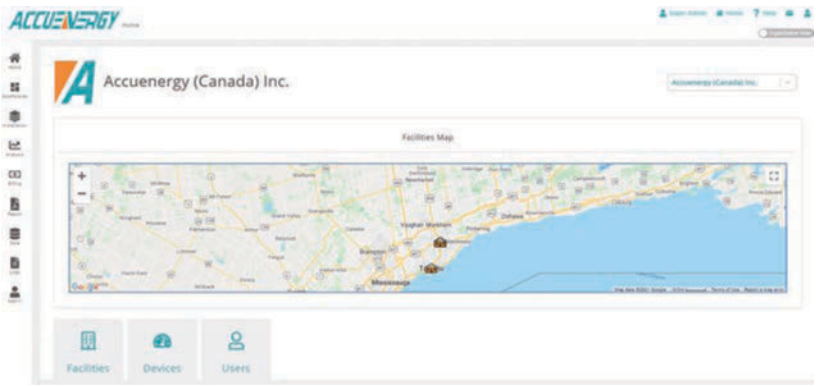
NOTE: *Only Modbus devices connected to the AcuLink 810 can be posted to AcuCloud.*

Under the ***Data Log*** tab select ***AcuCloud***, the user will first need to select **Enable** under AcuCloud Enable.

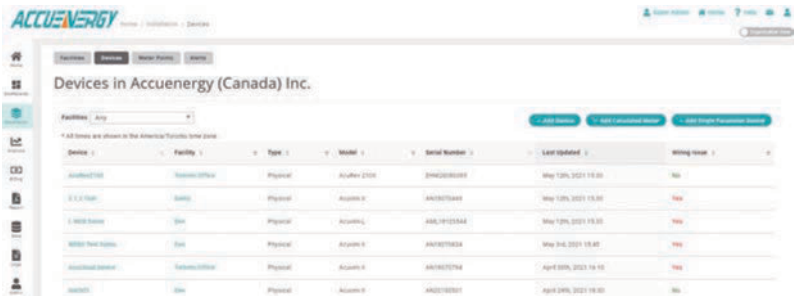
- Then copy the Module Serial Number that appears below.



- Next, the user will need to login to AcuCloud with Admin access in order to add devices.

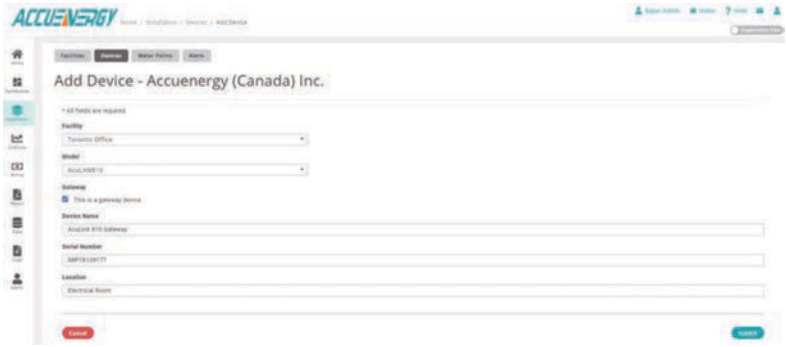


- Adding a new device can be done under the ***Facilities*** tab by selecting the desired facility and clicking on the ***Devices*** tab.

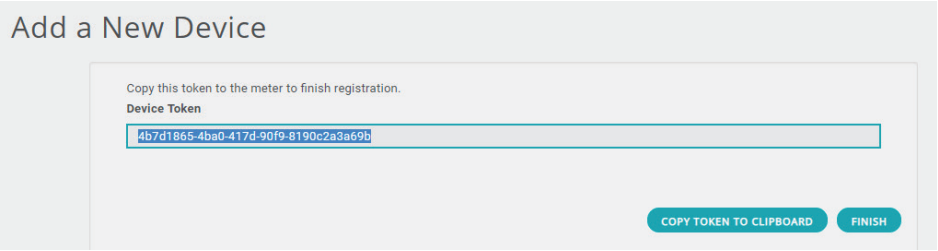


Clicking on the **+ New Device** button, the details need to be entered:

- Select the name of the facility in which the device will belong to from the **Facility** drop down list.
- Select the AcuLink 810 from the **Choose a Model** drop down list.
- Select ***This is a gateway Device*** box.
- Provide a name for the device under **Device Name**.
- Paste the serial number that was copied from the AcuLink 810 web interface under the Serial Number field.
- Provide a description for the location of the device under **Location**.
- Click **SUBMIT**.



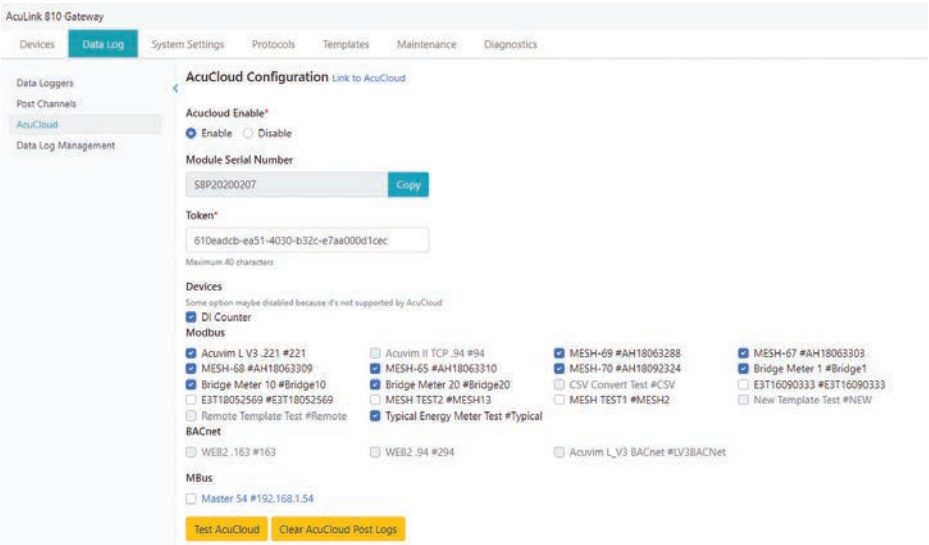
Once the gateway has been successfully added, a token will be returned on the ensuing page. The user will need to copy the token that is provided as it will be used in the next step to configure the gateway to send its data to AcuCloud.



Go back to the AcuLink 810 web interface and paste the token that was generated into the AcuCloud **Token** field.

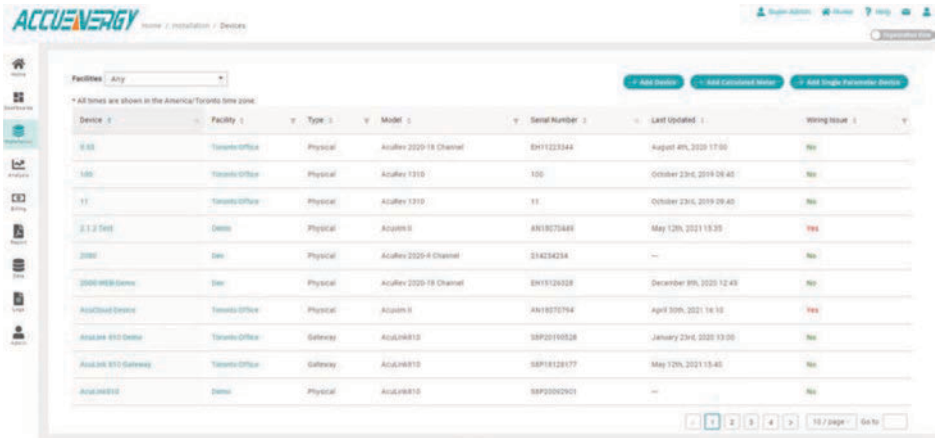
- Click **Save**
- Then click on **Test AcuCloud** to see if the AcuLink can reach the AcuCloud server.

NOTE: *If the test connection fails, please check the network settings of the AcuLink 810 and also make sure the AcuCloud URL and token are entered in correctly.*



The AcuLink 810 gateway is now successfully configured to report to the AcuCloud EMS software. Once a report is created in the AcuLink 810 then the report for the devices it was created for will be posted to AcuCloud.

Check to see if AcuCloud is receiving data from the gateway by going to the **Devices** page in AcuCloud and observing whether the name of the selected devices from the gateway appear in AcuCloud with a Last Received Data timestamp as seen below.

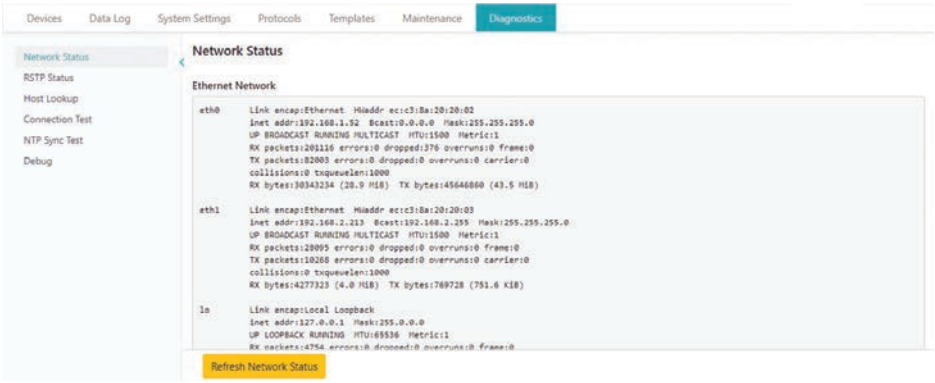


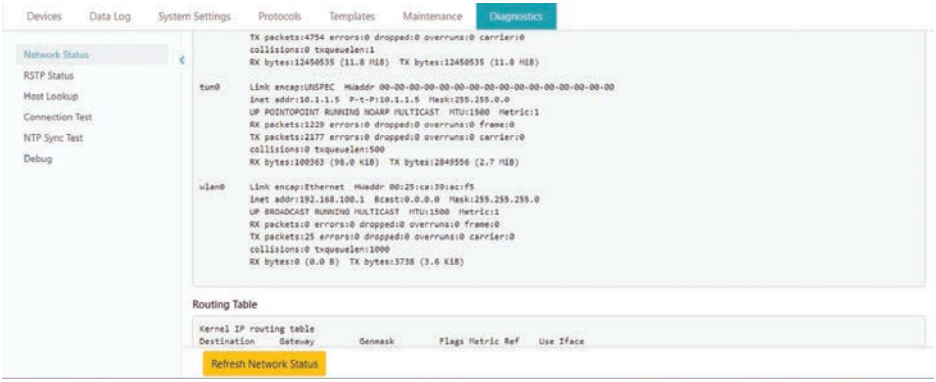
Chapter 13: Network Diagnostics

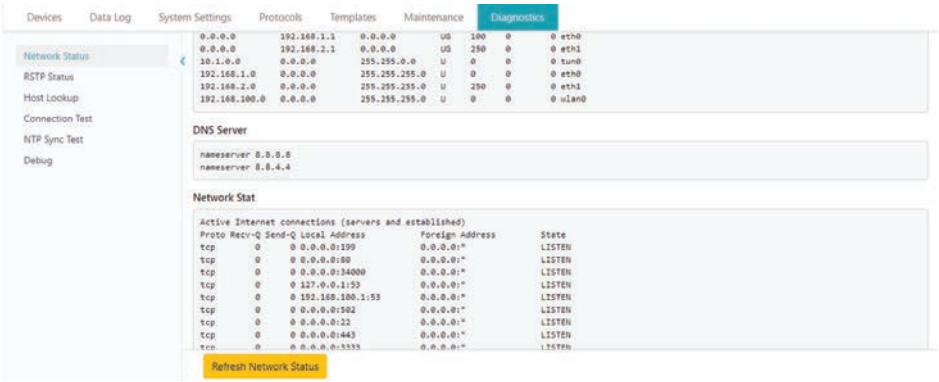
The AcuLink 810 network diagnostics page can be used to monitor the status of the gateway device.

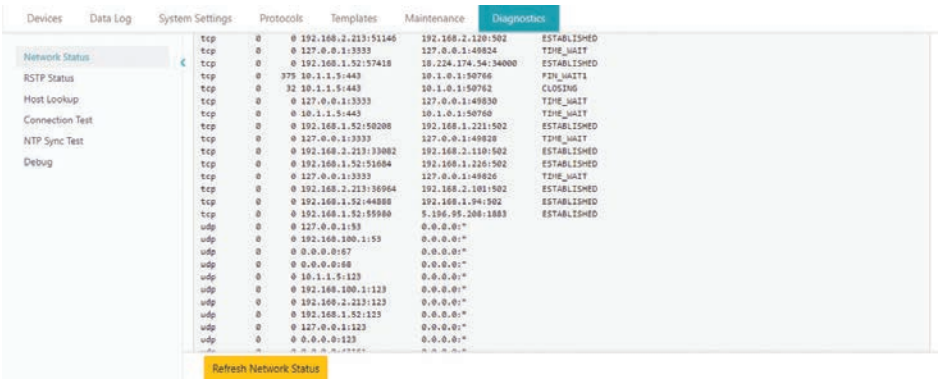
In the **Network Status Tab**, under **Diagnostics**, users can see the **Ethernet Network, Routing Table, DNS Server,** and **Network Status**.

NOTE: *To see the **WiFi Network Status**, the AcuLink 810 must be configured for Station Mode.*

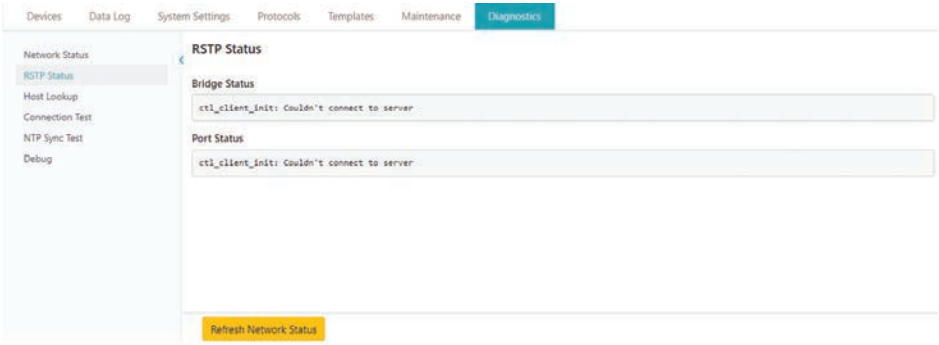




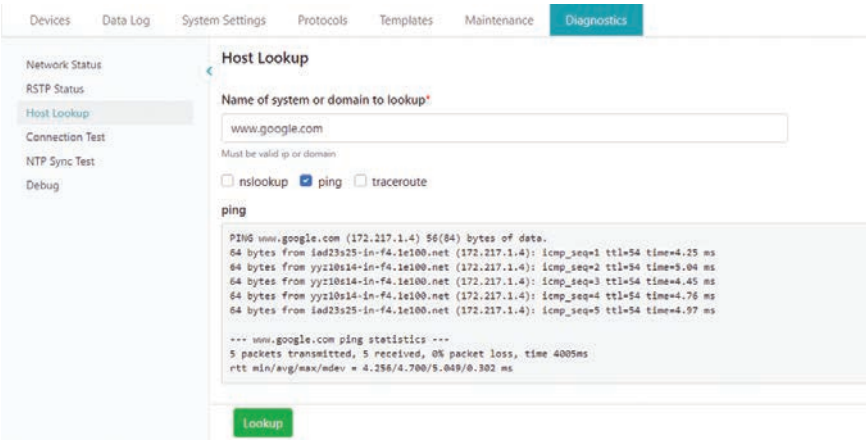




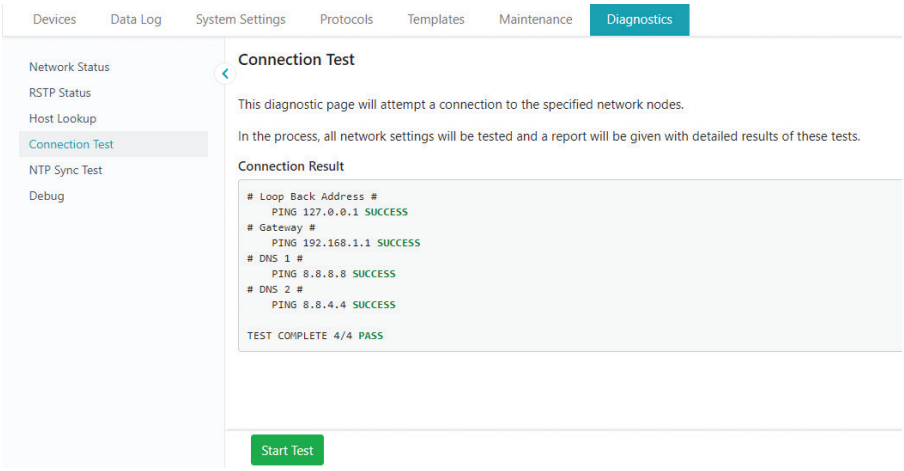
In the **RSTP Status** tab, users can check the status of the Rapid Spanning Tree Protocol, if it is being used for the topology of the Ethernet network.



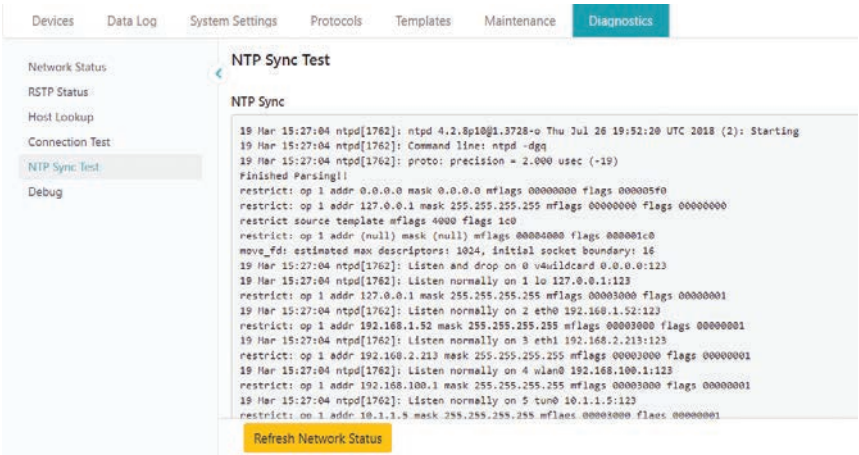
In the **Host Lookup** tab, users can use the ping function to see if the AcuLink 810 can communicate over the network it is connected to.



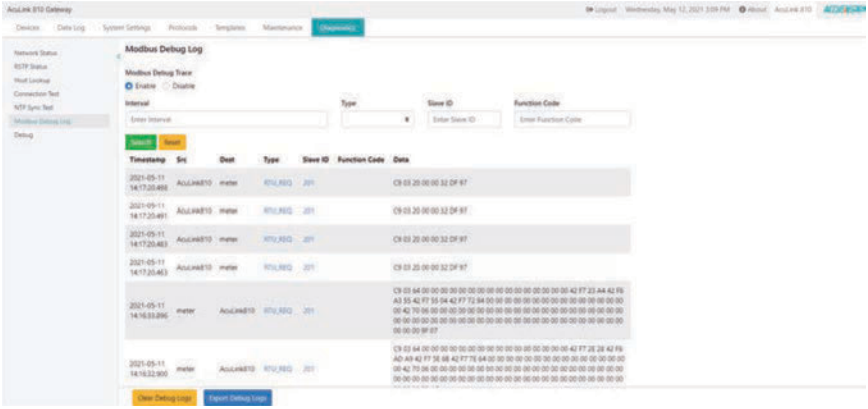
In the **Connection Test** tab, users can test the local network connection of the AcuLink 810. The test will show SUCCESS and PASS as seen below if the network test is successful. Otherwise, the test will show FAIL if network issues are found.



In the **NTP Sync Test** tab, users can determine if the Network Time Protocol is functioning correctly, as seen below.



In the **Modbus Debug Log** users can view the Modbus packet requests from the AcuLink 810 to the connected Modbus devices. The Modbus Debug Trace can be enabled, where users can keep track on the Modbus activity for the AcuLink 810. The Modbus debug logs can be exported and downloaded for further analysis.

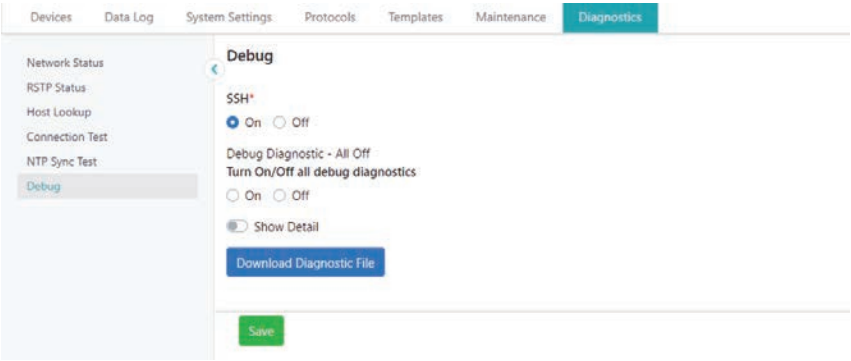


In the **Debug** tab, users can turn ON or turn OFF SSH. From this page, users can also download the AcuLink 810 diagnostic file.

The debug diagnostic options are recommended to be all OFF, as this feature is used for

troubleshooting and can affect the performance of the gateway if turned ON.

By clicking the *Download Diagnostic File* button, users can download a full overview of the AcuLink 810 network. If users are experiencing any issues with the AcuLink 810, the diagnostic file can be sent to Accuenergy technical support for further analysis.



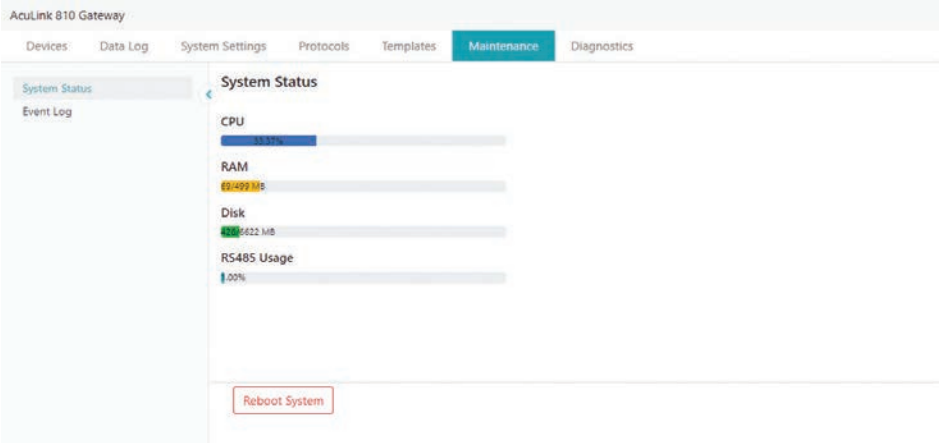
Chapter 14: Maintenance

14.1 System Status

Users can check the AcuLink 810's memory usage under ***System Status*** located under the ***Maintenance*** tab.

The system status page provides users with an overview of the AcuLink 810 internal processing, the CPU, RAM, Disk, and RS485 usage can all be monitored.

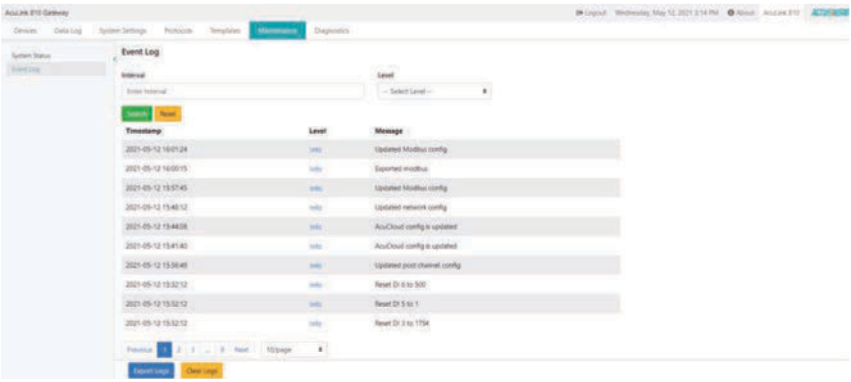
Users can also manually reboot the device by clicking the ***Reboot System*** button at the bottom.



14.2 Event Log

Users can check the historical data of the system event by clicking on ***Event Log*** under the ***Maintenance*** menu. Event logs can be filtered by selecting the interval and level. The level includes either Error and Info.

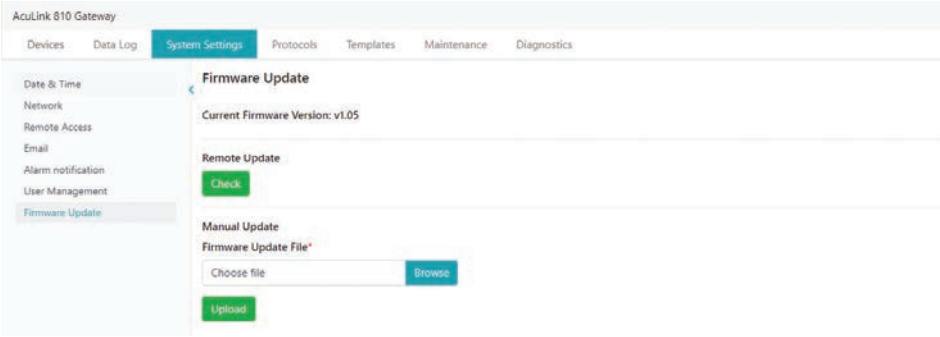
Users can also clear and export the event logs by using the buttons at the bottom of the page.



Chapter 15: Firmware Update

The firmware of the AcuLink 810 can be updated directly from the web interface. To do so click on the ***System Settings*** tab and select ***Firmware Update***.

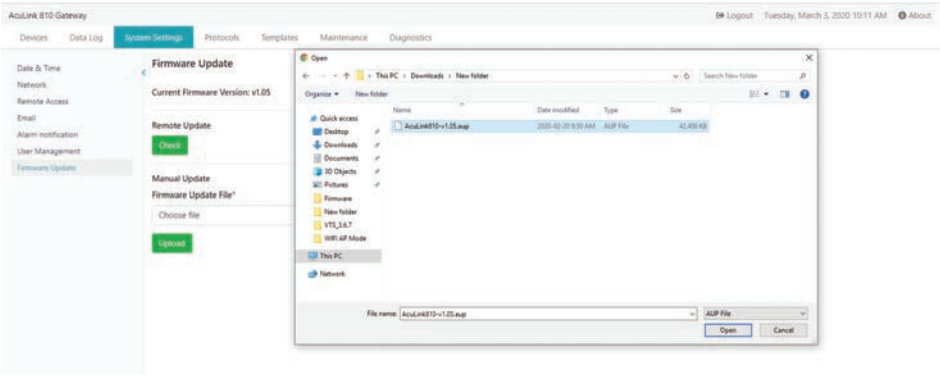
This page lists the current firmware of the gateway. There are two methods in which users can update the firmware of the 810, either by using the remote firmware function or by manually updating the firmware.

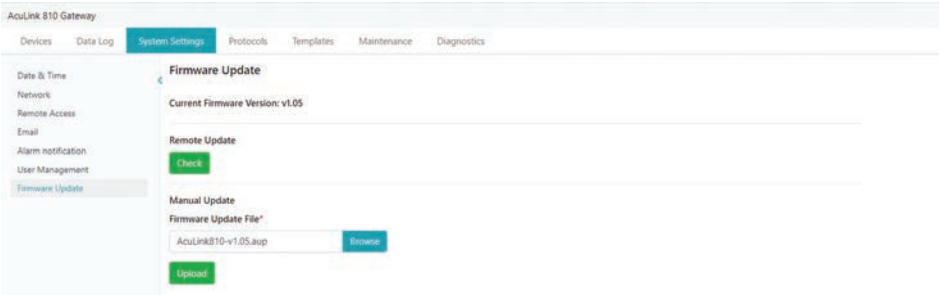


15.1 Manual Update

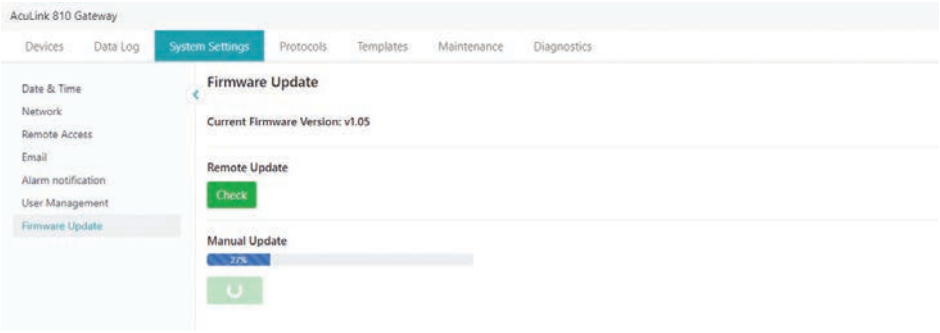
To update the firmware manually users must have the required firmware file. Start by uploading the firmware file, the file type is .aup.

NOTE: *For firmware files please contact* ***Accuenergy Technical Support****.*

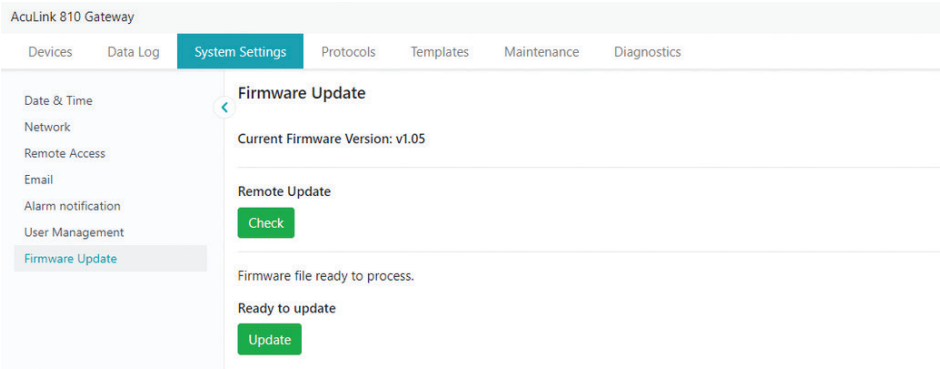




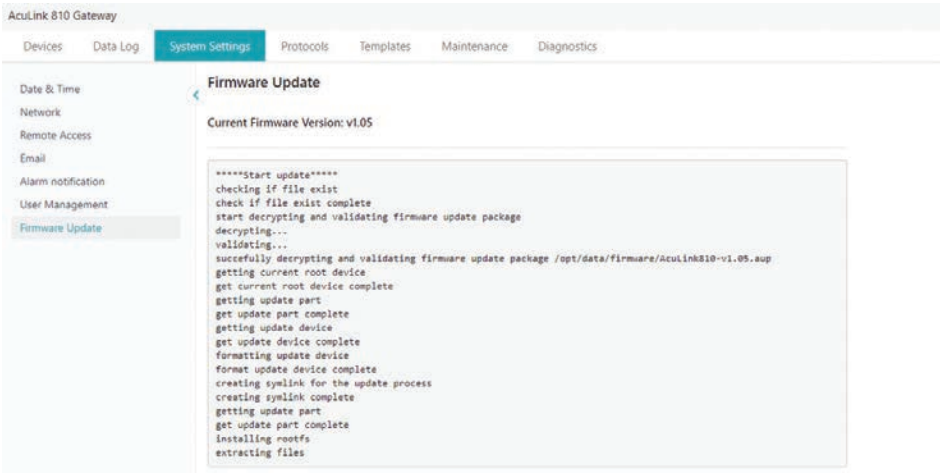
Click on ***Upload*** once the file is selected.



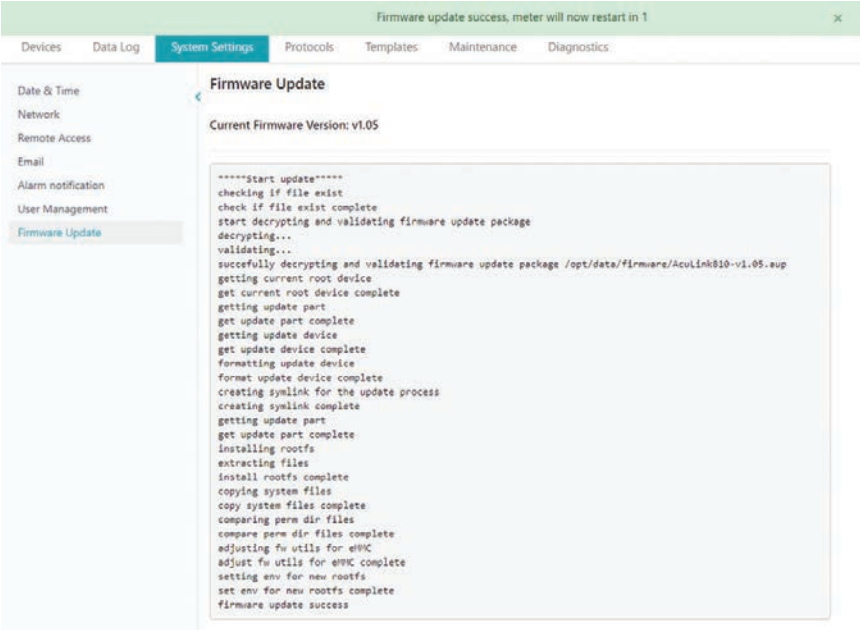
After the firmware has been uploaded successfully, click on ***Update***.



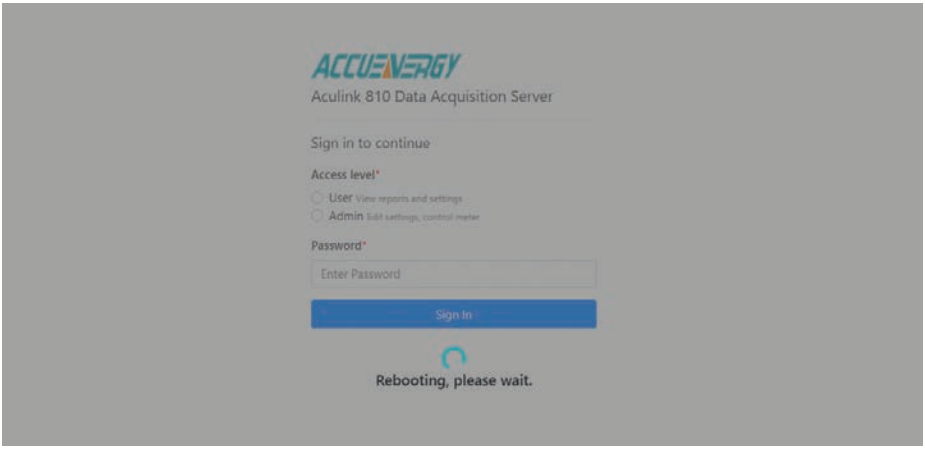
The firmware update will take roughly 2-5 minutes to complete.



A green banner at the top of the page will be seen notifying the user that the update was successful.



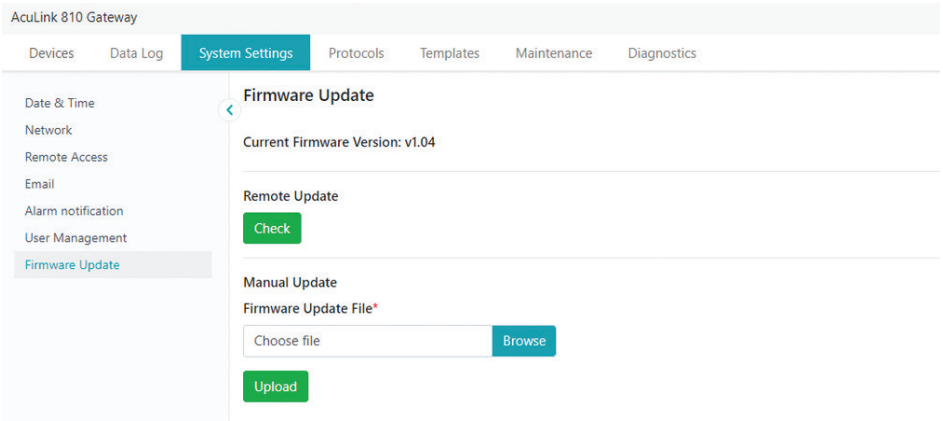
The AcuLink 810 will reboot after the firmware update. The reboot will take approximately 1-2 minutes to complete, the user will be directed to the login screen after the reboot.



15.2 Remote Update

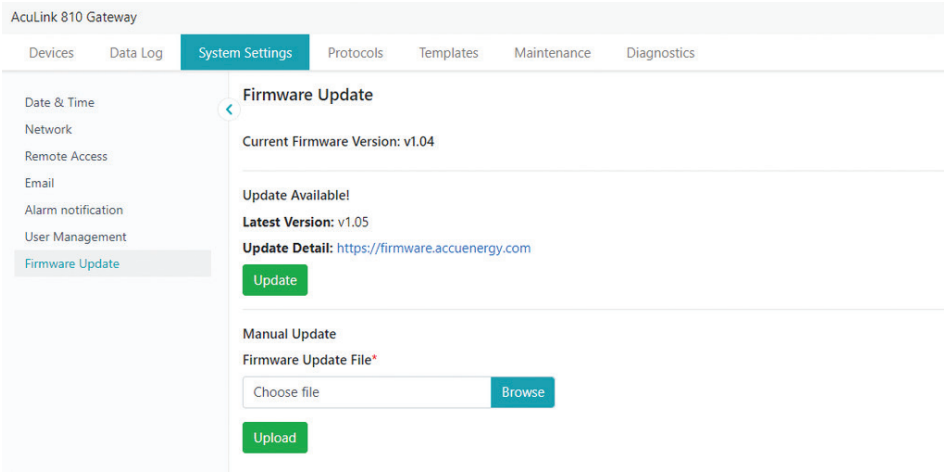
In order to user the remote firmware update there needs to be an internet connection to the AcuLink. Once there is a sufficient connection to the internet users can access Accuenergy's Remote firmware server in order to update the firmware of the AcuLink 810.

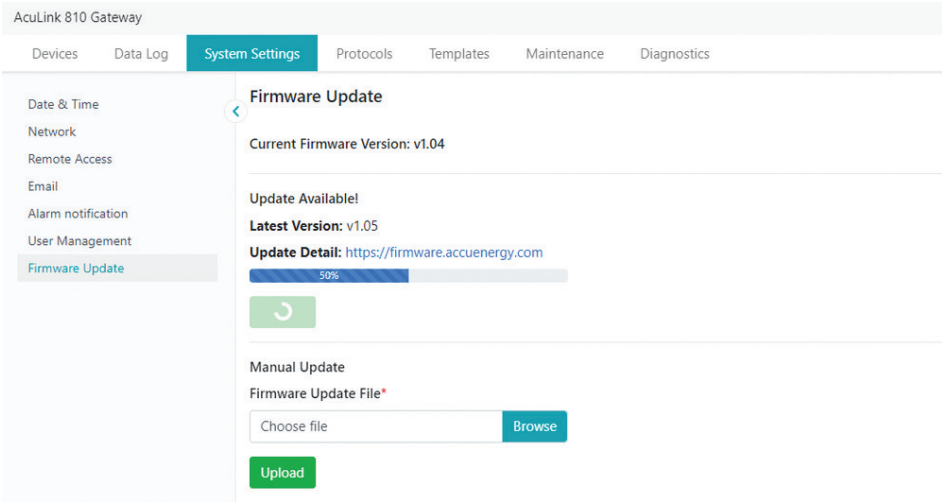
Click on the ***Check*** button.

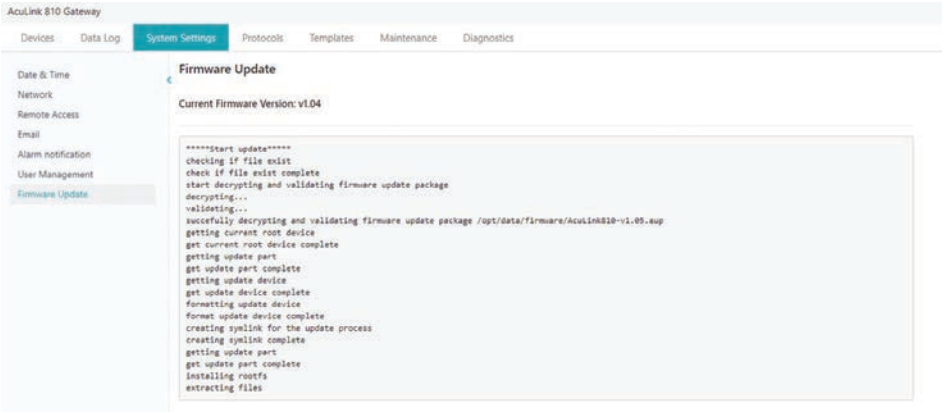


If there is an update found, it will be displayed. It will show the latest version and update detail link for the firmware.

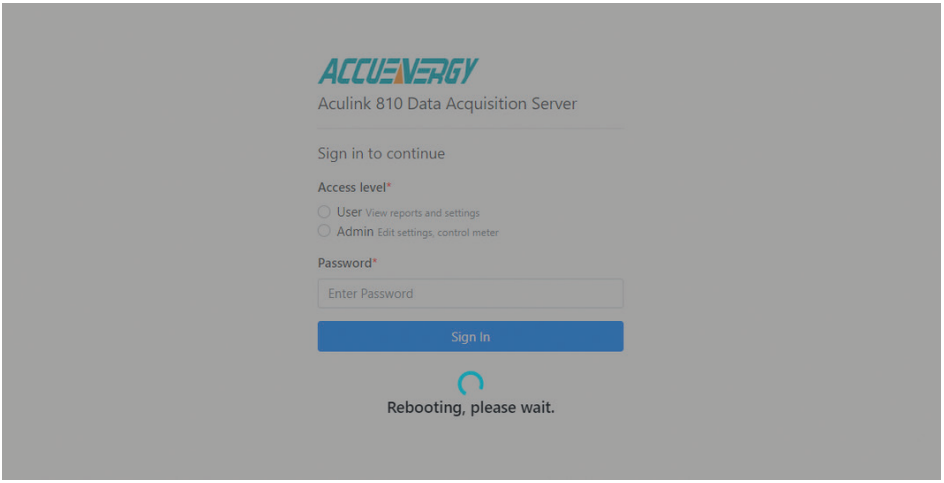
Click on ***Update*** to begin the updating process.







After the update is complete the AcuLink 810 will reboot, and users will be required to login to the web interface again.



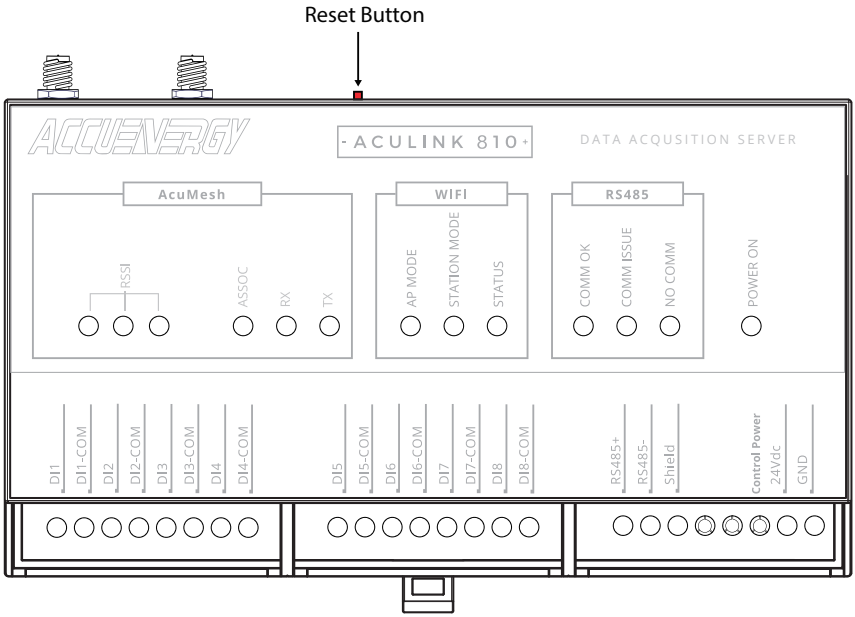
Chapter 16: Reset Button

On the AcuLink 810 unit, there is a reset button located on the back of the unit where the Ethernet and USB ports are. This button resets the AcuLink 810 back to default meaning that all devices, data logs, alarm/event log, and device templates will be deleted. The only Device Template that will remain after the reset is the Modbus Gateway Function, however all other Modbus templates will be removed.

After the reset all network communications will be restored back to default meaning the AcuLink will have the following network settings after the reset:

- WiFi Mode - Access Point (AP) mode
- Ethernet 1 - 192.168.8.101
- Ethernet 2 - DHCP enabled

To successfully perform a reset on the AcuLink 810 gateway press and hold the reset button for 10 seconds until all LED lights on the unit are flashing. The reset will be complete when the LED lights stop flashing.



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