



Enconnex Intelligent Power Distribution Unit (PDU) USER MANUAL



Legal Disclaimer

The information presented in this manual is not warranted by Enconnex to be authoritative, error free, or complete. This publication is not meant to be a substitute for a detailed operational and site specific development plan. Therefore, Enconnex assumes no liability

for damages, violations of codes, improper installation, system failures, or any other problems that could arise based on the use of this publication.

This publication has been compiled in good faith by Enconnex. However, no representation is made, or warranty given, either expressed or implied, as to the completeness or accuracy of the information this publication contains.

In no event shall Enconnex respective officers, directors, or employees be liable for any direct, indirect, consequential, punitive, special, or incidental damages (including, without limitation, damages for loss of business, contracts, revenue, data, information, or business interruption) resulting from, arising from, or in connection with the use of, or inability to use this publication or the content, even if Enconnex has been expressly advised of the possibility of such damages.

Enconnex reserves the right to make changes or updates with respect to or in the content of the publication or the format thereof at any time without notice. Copyright, intellectual, and all other proprietary rights in the content (including but not limited to software, audio, video, text, and photographs) rests with Enconnex or its licensors. All rights in the content not expressly granted herein are reserved. No rights of any kind are licensed or assigned or shall otherwise pass to persons accessing this information.

This Publication shall not be for resale in whole or in part

Table of Contents

Legal Disclaimer.....	1
Tables	8
1. System Overview.....	9
1.1. Intelligent Network Controller	9
1.2. Connecting the PDU to a LAN Ethernet Port	9
1.3. Connecting the PDU to a Computer Serial Port	10
2. Web Graphical User Interface (GUI) Configuration.....	12
2.1. Internet Protocol (IP) Address.....	12
2.2. Web Configuration	13
2.3. Introduction to the Web GUI.....	14
Landing Page	14
2.4. Introduction to the Dashboard	17
3. Simple Network Management Protocol (SNMP)	18
Setup SNMP	18
Setup SNMP Port	19
Define SNMP V1/V2c User	20
3.2. Configuring Users for SNMP v3 Communications	22
4. Command Line Interface (CLI).....	23
4.1. Connecting through CLI connection.....	23
4.2. Connecting to the CLI through the serial interface	24
Logging in with HyperTerminal	25
Serial Cable Pinout to Create Your Own Cable	25
Logging in with SSH via PuTTY.....	25
5. Local Display	26
5.1. OLED Display	26
Menu Mode.....	27
LED Unit Status	27
5.2. OLED Menu Structure	28
Main Menu Selections	28
Setup Menu	28

- Network Submenu29
- Device Submenu29
- Screen Submenu30
- Language Submenu31
- USB Submenu32
- Units Submenu33
- Alarms Menu34
- Power Menu34
- Device Submenu34
- Phase Submenu35
- Breaker Submenu.....35
- Outlet Submenu.....36
- Sensors Menu36
- 6. User Access.....37
 - 6.1. Changing Your Password37
 - Logging Out.....40
 - Access Types40
 - User Accounts.....41
- 7. Daisy Chain Configuration44
 - 7.1 Daisy-Chain Overview44
 - 7.2 Daisy-Chain Setup45
 - 7.3 RNA (Redundant Network Access) Functionality.....45
 - How it Works45
 - 7.4 RNA Setup.....46
- 8. Web GUI configuration.....48
 - 8.1 PDU Outlet Power Sequence Setup48
- 9. Connecting and Configuring Optional Hardware.....50
 - 9.1 Accessory Hardware Overview50
 - 9.2 Configuring Environmental Sensors.....52
- Warranty and Regulatory Information53
 - Product Warranty.....53
- Support and Other Resources.....53
- Acronyms and Abbreviations.....54
- Appendix A: CLI Commands57

Help Commands	57
System Commands	57
Network Commands	58
User Commands	59
Power Commands	60
Appendix B: Firmware Update Procedure	61
USB Method	61
Web Interface Method	61
FTPS Method	63
Bootloader Mode	63
Firmware Recovery with Bootloader Mode	64
Appendix C: System Recovery	64
Appendix D: PDU Alarms	65
Appendix E: Horizontal Intelligent Network Controller Replacement	72
Appendix F: Vertical Intelligent Network Controller Replacement	74
Appendix G: Redfish API	75
Appendix H: Redfish API URLs	80

Figures

Figure 1.2-1: Ethernet Port for Network Connection

Figure 1.3-1: Locate Reset Button

Figure 1.3-2: Port Setup Settings

Figure 2.3-1: Login Page

Figure 2.3-2: Landing Page

Figure 2.4-1: Power Summary Page

Figure 2.4-2: Outlet Monitoring Page

Figure 2.4-3: Environmental Page

Figure 2.4-4: Security Page

Figure 3.1-1: SNMP Management

Figure 3.1-2: SNMP General

Figure 3.1-3: SNMP Port

Figure 3.1-4: Setup SNMP Port and Trap Port

Figure 3.1-5: Define SNMP V1/V2c User

Figure 3.1-6: Edit V1/2c Manager
Figure 3.2-1: SNMP V3 Manager
Figure 3.2-2: SNMP V3 Edit
Figure 4.2-1: Connect the RJ-45 end of the cable to the Serial+RS485-1 connector
Figure 4.2-2: Serial Cable Pinout
Figure 5.1-1: OLED Display Orientation
Figure 5.2-1: OLED Menu Structure
Figure 5.2-2: Main Menu Selections
Figure 5.2-3: Setup Menu
Figure 5.2-4: Network Submenu
Figure 5.2-5: Device Submenu
Figure 5.2-6: Screen Submenu
Figure 5.2-7: Language Submenu
Figure 5.2-8: USB Submenu
Figure 5.2-9: Units Submenu
Figure 5.2-10: Alarms Menu
Figure 5.2-11: Power Menu
Figure 5.2-12: Device Submenu
Figure 5.2-13: Phase Submenu
Figure 5.2-14: Breaker Submenu
Figure 5.2-15: Outlet Submenu
Figure 5.2-16: Sensors
Figure 6.1-1: Changing Your Password
Figure 6.1-2: After Login
Figure 6.1-3: Change User Password
Figure 6.1-4: Change Password
Figure 6.2-1: User Settings
Figure 6.2-2: Radius Configuration
Figure 6.3-1: LDAP Configuration
Figure 6.3-2: Enable Role Privileges
Figure 6.3-3: Test LDAP Configuration
Figure 7.2-1: How to Connect Cables for Daisy Chain
Figure 8.1-1: Control & Manage PDU
Figure 8.1-2: Outlet Control Enabled
Figure 8.1-3: Edit Outlets
Figure 8.1-4: On-Delay Time
Figure 8.1-5: Saved Sequence
Figure 9.1-2: Sensor Ports for vertical PDU
Figure 9.1-3: Sensor Ports for Horizontal PDU
Appendix B Figure 1: Upload Firmware
Appendix B Figure 2: Uploading Firmware
Appendix E Figure 1: Unscrew Intelligent Network Controller
Appendix E Figure 2: Remove Intelligent Network Controller from PDU
Appendix E Figure 3: Inserting New Intelligent Network Controller
Appendix F Figure 1: Removing Top and Bottom Screw from Intelligent Network Controller
Appendix F Figure 2: Disconnecting and Reconnecting the Intelligent Network Controller

Tables

Table 2.3-1: PDU Control Panel Icons

Table 4.1-1 - PDU CLI Commands Table

5.1-1: Menu Mode Buttons

Table 5.1-2: LED State Descriptions

Table 6.1-1: User Permissions

Table 9.1-1: Sensor Descriptions and Measurement

Appendix A Table 1: Help Commands

Appendix A Table 2: System Commands

Appendix A Table 3: Network Commands

Appendix A Table 4: User Commands

Appendix A Table 5: Power Commands

Appendix D Table 1: PDU Alarms

Appendix D Table 2: Trap Codes: Critical Class

Appendix D Table 3: Trap Codes: Warning Class

Appendix D Table 4: Trap Codes: Informational Class

Appendix D Table 5: Trap Codes: Clear Class

1. System Overview

1.1. Intelligent Network Controller

The Enconnex Monitored Input, Monitored & Switched, Monitored per Outlet, and Monitored & Switched per Outlet PDUs have an integral, hot swappable Intelligent Network Controller. The Intelligent Network Controller contains the OLED interface, control buttons, USB, Ethernet, Serial and Sensor ports, and recessed Reset Button.

1.1.1. Reset Button

Pressing the Reset Button only reboots the Intelligent Network Controller. It does not change the Energy (kWh) value and does not affect the output voltage.

1.1.2. Using the Reset Button

Press and hold the Reset Button for 8 seconds to recover from an Intelligent Network Controller communication failure.

1.2. Connecting the PDU to a LAN Ethernet Port

The PDU is defaulted to DHCP. If you are connected to a network with a DHCP server, the PDU automatically gets an IP address and displays it on the OLED screen. If there is no DHCP server, the default IP address is 192.168.0.1, but again this will be displayed on the PDU.

Connecting the PDU to a LAN provides communication through an Internet or Intranet connection. You can monitor the PDU from any computer connected to the same network. The PDU is set to use DHCP (Dynamic Host Configuration Protocol) by default when delivered. If an IP address is successfully assigned, you will see it shown on the OLED display.

- Locate the Ethernet cable.
- Connect one end of the cable to the Ethernet port on the PDU (see Figure 1). Connect the other end of the cable to the Ethernet port on the router (or another LAN device).

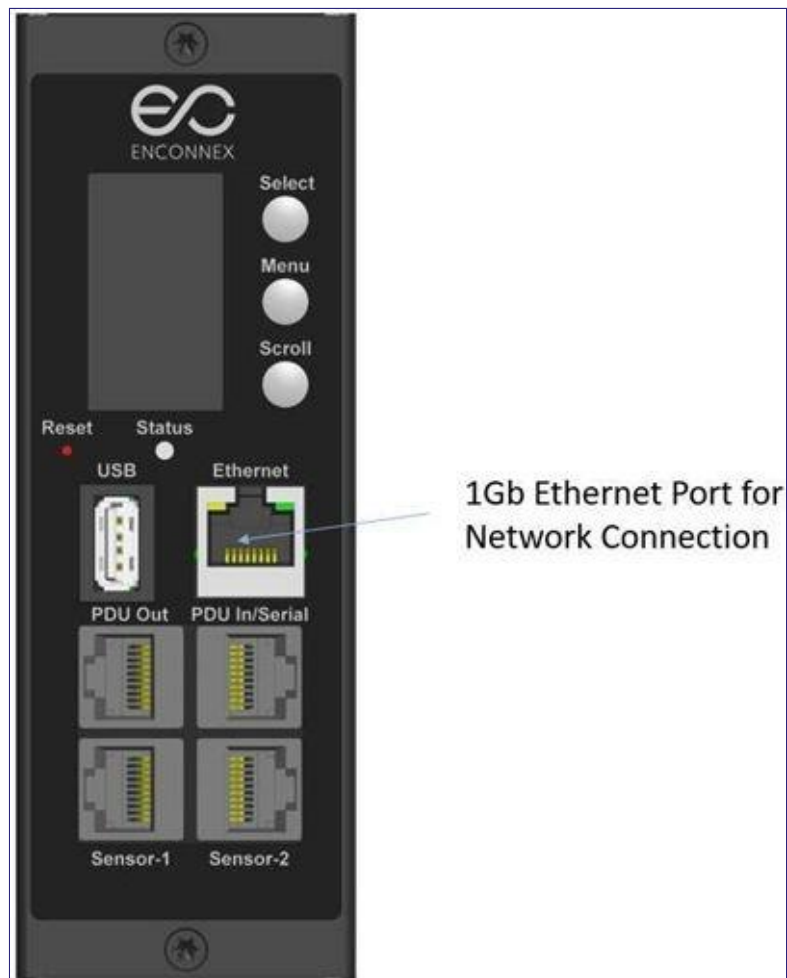


Figure 1.2-1: Ethernet Port for Network Connection

1.3 Connecting the PDU to a Computer Serial Port

If unable to connect to a network, you can change the network settings using the serial interface.

To configure the network settings, perform the following steps:

- Serial connect the PDU to a computer's serial port. Set baud rate for a terminal emulation program.
- Use a CLI command to enable DHCP or set a static IP.
- Verify access to the Web interface. The Ethernet LED on the PDU front panel provides communication status by color and displays activity. The recessed Reset button restarts the PDU (see Figure 2 below).

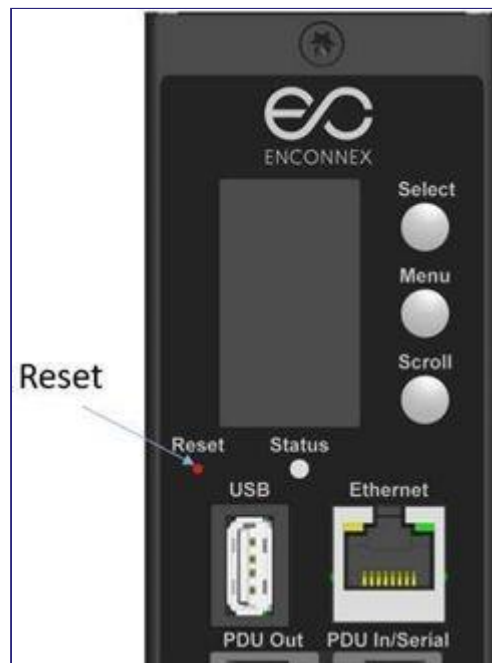


Figure 1.3-1: Locate Reset Button

1.3.1 Setup Serial Communication

You may configure the network settings using the command line interface (CLI) with a serial connection. Users can connect serially using the optional RJ45-DB9 cable (or make your own cable by creating a unique pinout as described below in the “Serial Cable Pinout to Create Your Own Cable” in Section 4).

1. Verify that the computer has a serial port. If your computer does not have a DB9 serial connector, but does have a USB connector, obtain a USB-to-DB9 Adapter to convert the USB to DB9 serial port.
2. Using the optional RJ45-DB9 cable, connect the RJ-45 end to the port labeled “Serial+RS485-1” on the front panel of your PDU model (see Figure 1). Connect the DB9 end of the cable to the computer.
3. Open the terminal emulation program (HyperTerminal or PuTTY) on the computer and select the serial port connection (such as COM1).
4. Set the communications port as follows:
 - Bits per second: 115200
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: None

(See Port Settings example below)

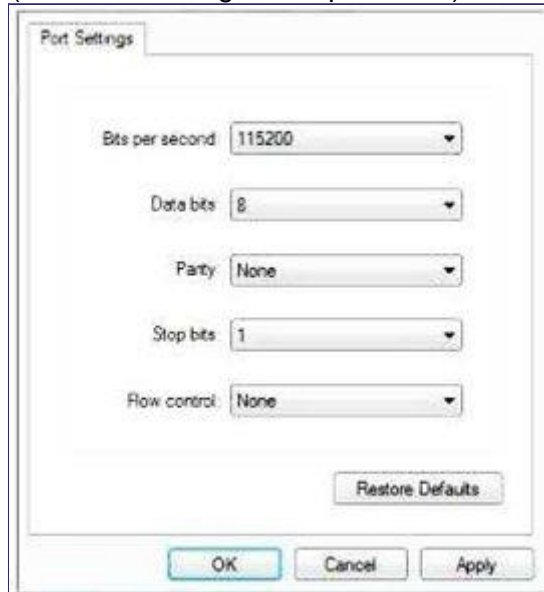


Figure 1.3-2: Port Setup Settings

5. Use the default initial login indicated below. Note that the username and password are both case sensitive:
 - Username: admin
 - Password: 12345678 (or your new password)
6. The “Enconnex>” prompt appears after you have logged in, ready to enter the CLI command.
7. To configure network settings, enter the appropriate “net” command and press Enter. All commands are case sensitive. You can type ? to access the commands.
8. To enable the IPv4 DHCP by default, run:
 - net tcp ip dhcp
 - Enter Y to confirm and the PDUs Intelligent Network Controller will reboot.
9. To set a static IPv4 configuration, run:
 - net tcpip static x.x.x.x (ipaddress) x.x.x.x (netmask) x.x.x.x (gateway)
 - Example: net tcp ip static 192.168.1.100 255.255.255.0 192.168.1.1
 - Enter Y to confirm and the PDUs Intelligent Network Controller will reboot.

2. Web Graphical User Interface (GUI) Configuration

2.1. Internet Protocol (IP) Address

The PDU is by default configured for Dynamic Host Configuration Protocol (DHCP). The PDU automatically obtains an IP address via a DHCP server when connected to a network. The IP address the PDU received is displayed on the OLED screen. After the PDU receives the address, login to the Web interface to configure the PDU and assign a static IP address (if desired). If there is no DHCP server, the default IP address is 192.168.0.1, but again this will be displayed on the PDU.

If the network does not use a DHCP server, see the CONNECTING THROUGH A SERIAL CONNECTION section to configure a static IP address.

1. Connect a standard Ethernet patch cable to the Ethernet port on the PDU.
2. Connect the other end of the Ethernet cable to the LAN.
3. Make sure the Ethernet port on the PDU shows a solid green light on the left and a flashing yellow light on the right to indicate successful connectivity to the network.
4. Use the menu buttons to look up the IP address of the device on the OLED display by selecting Setup > Network > IPv4 or IPv6 as applicable.
5. In a standard web browser, enter the PDU IP address and proceed to configure the PDU as shown in the Web Configuration section.

2.2 Web Configuration

2.2.1 Supported Web Browsers

The supported Web browsers are Windows Firefox, Linux Firefox, Mozilla Firefox, Windows Internet Explorer Version 11, Microsoft Edge, and Google Chrome mobile and desktop, Apple Safari mobile and desktop.

2.2.2 Logging in to the Web Interface

Logging In

- Open a supported web browser and enter the IP address of the PDU.
- If username and password were configured during the Network Configuration Setup: enter the username and password in the appropriate fields. Press Login or Enter.
- If username and password were NOT configured during the Network Configuration Setup, use the default username: admin and password: 12345678. For security purposes, change the password upon login.

2.3 Introduction to the Web GUI

Login Page



Figure 2.3-1: Login Page

Landing Page



Figure 2.3-2: Landing Page

Number	Icon	Description
--------	------	-------------








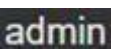
1		The home icon provides an overview of the PDU with access to the Dashboard, Identification, and Control & Manage.
2		The Alarm icon provides details of the active critical alarms and active warning alarms.
3		This icon lets you select a Language. There are seven languages available to choose from: English, Chinese, French, Italian, German, Spanish, Korean and Japanese.
4		This icon provides the logs of the PDU which can be viewed and downloaded.
5		The settings icon allows a user to setup the Network Settings, System Management, SNMP Manager, Email Setup, Event Notifications, Trap Receiver, and Thresholds.
6		The search icon allows you to input keywords and search for the related results.
7		Information about the PDU can be found using this icon. You also can also click user guide and license to ask for help.
8		This icon shows who is logged in (user or admin). Account passwords can be changed, and user accounts managed through this page.

Table 2.3-1: PDU Control Panel Icons

Menu Dropdowns

Overview



Alarms



Help



Menu Dropdowns

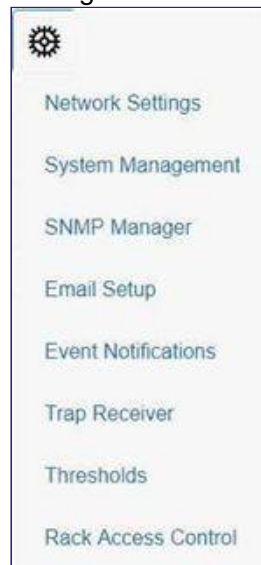
Language



Logs



Settings



Admin



2.4 Introduction to the Dashboard

Power Summary Page

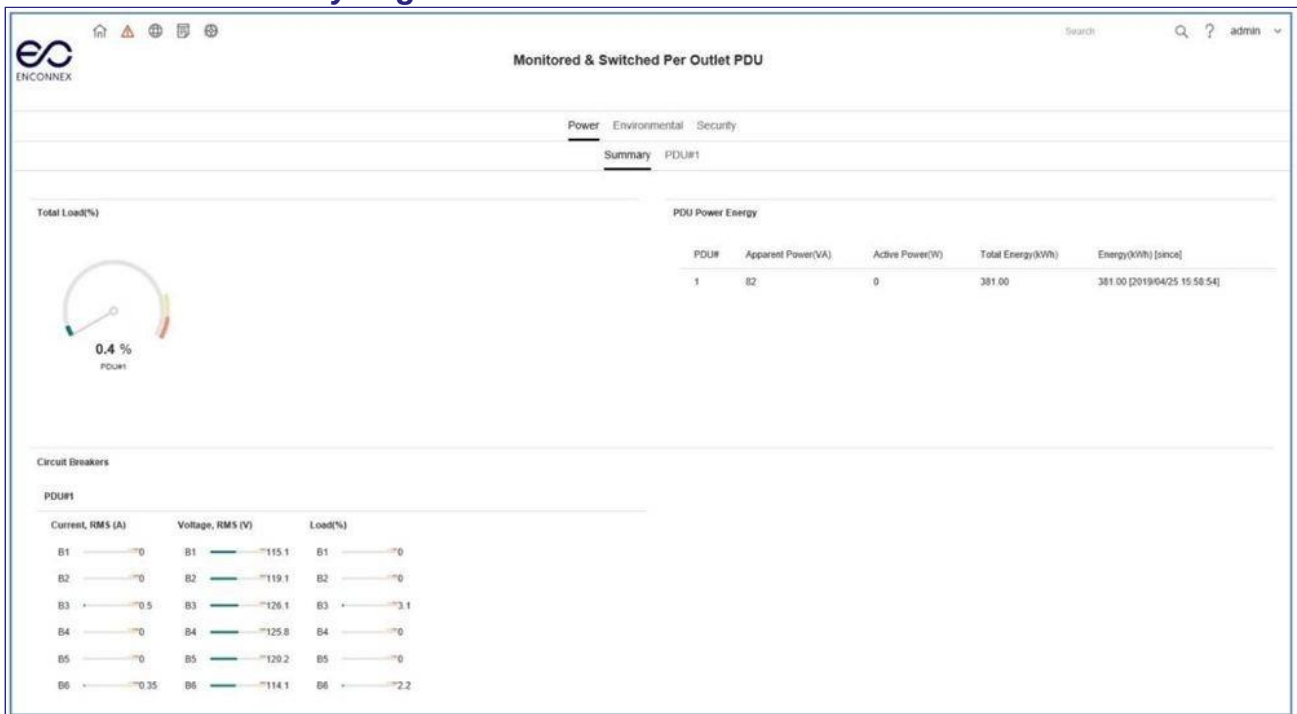


Figure 2.4-1: Power Summary Page

Outlet Monitoring Page

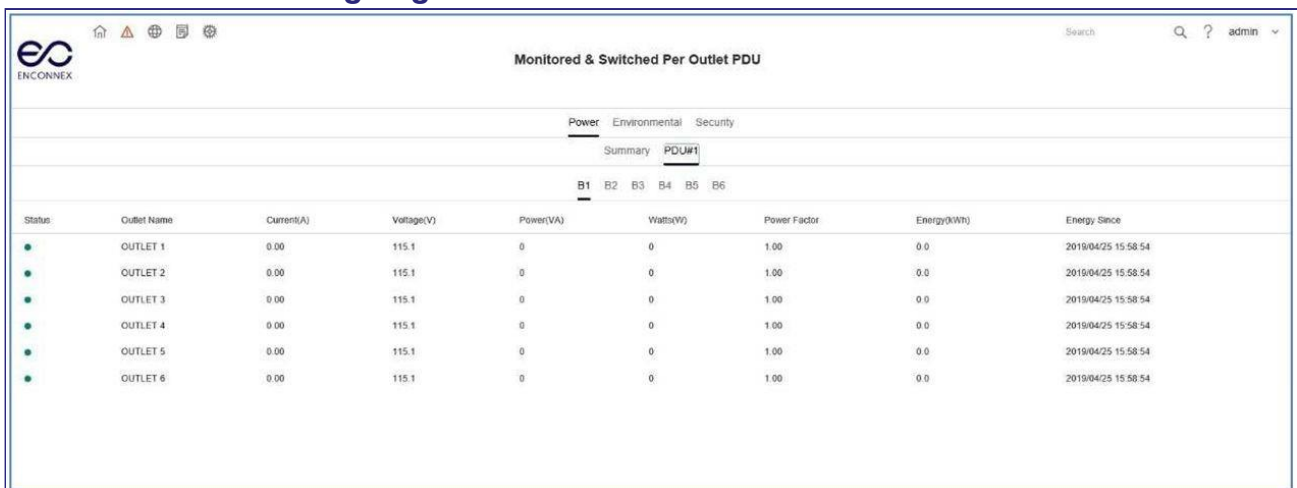
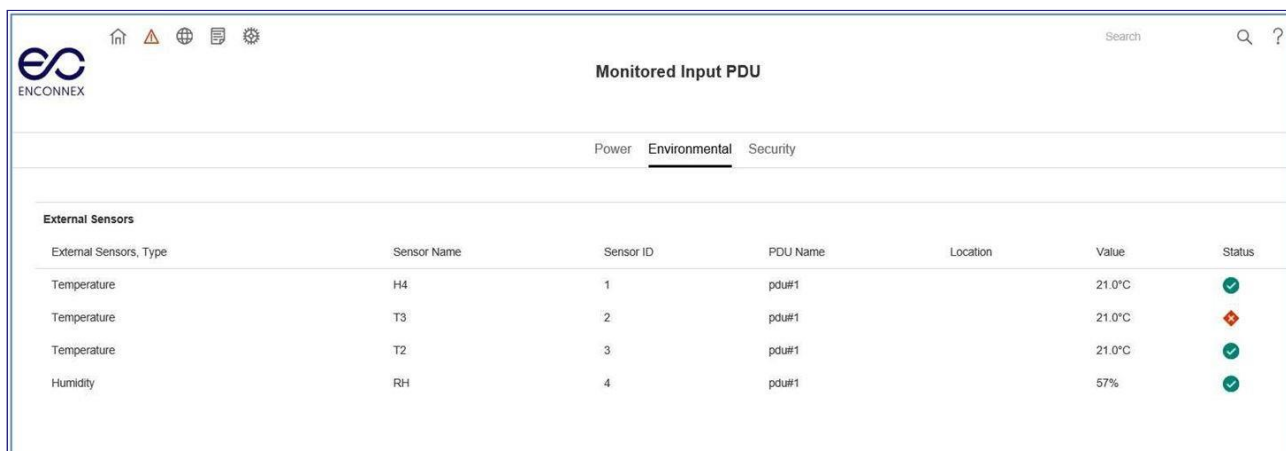


Figure 2.4-2: Outlet Monitoring Page

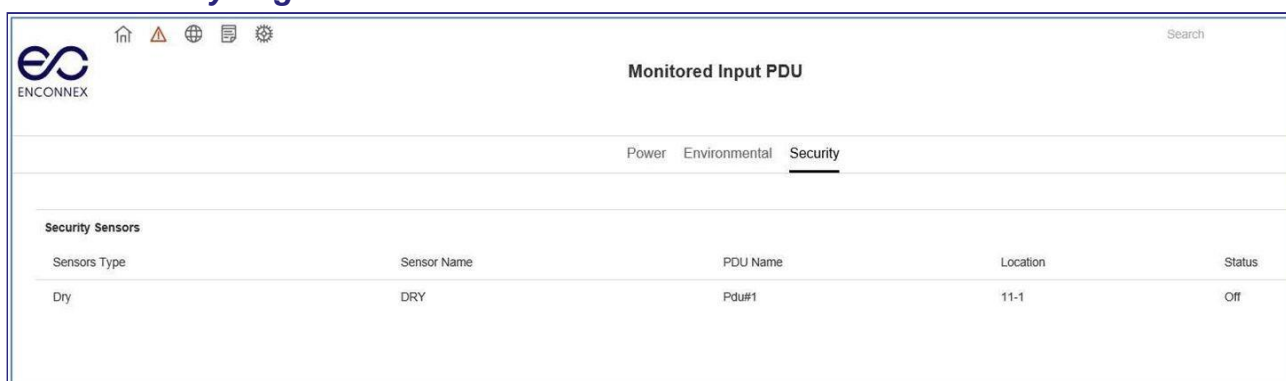
Environmental Page



Monitored Input PDU							
Power <u>Environmental</u> Security							
External Sensors							
External Sensors, Type	Sensor Name	Sensor ID	PDU Name	Location	Value	Status	
Temperature	H4	1	pdu#1		21.0°C	✓	
Temperature	T3	2	pdu#1		21.0°C	✗	
Temperature	T2	3	pdu#1		21.0°C	✓	
Humidity	RH	4	pdu#1		57%	✓	

Figure 2.4-3: Environmental Page

Security Page



Monitored Input PDU				
Power Environmental <u>Security</u>				
Security Sensors				
Sensors Type	Sensor Name	PDU Name	Location	Status
Dry	DRY	Pdu#1	11-1	Off

Figure 2.4-4: Security Page

3. Simple Network Management Protocol (SNMP)

3.1. SNMP Management Configuration

Setup SNMP

1. Access the Web interface and login.
2. Under SNMP Managers, select SNMP General. The SNMP General page displays.

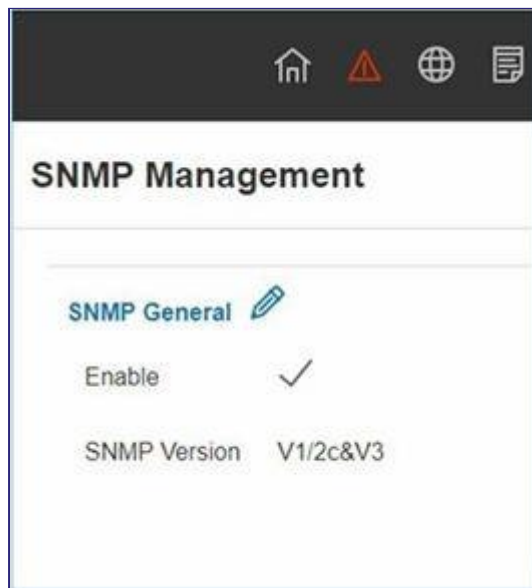


Figure 3.1-1: SNMP Management

3. The SNMP General includes SNMP Access and Version.

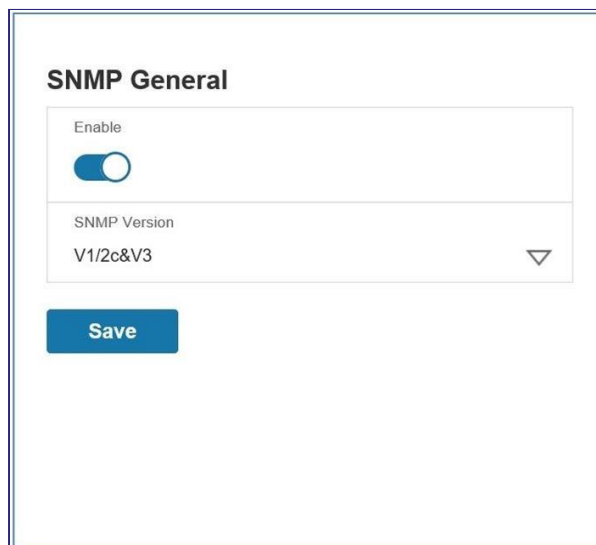


Figure 3.1-2: SNMP General

Setup SNMP Port

1. Access the Web interface and login.
2. Under SNMP Managers, select SNMP Port. The SNMP Port page displays.

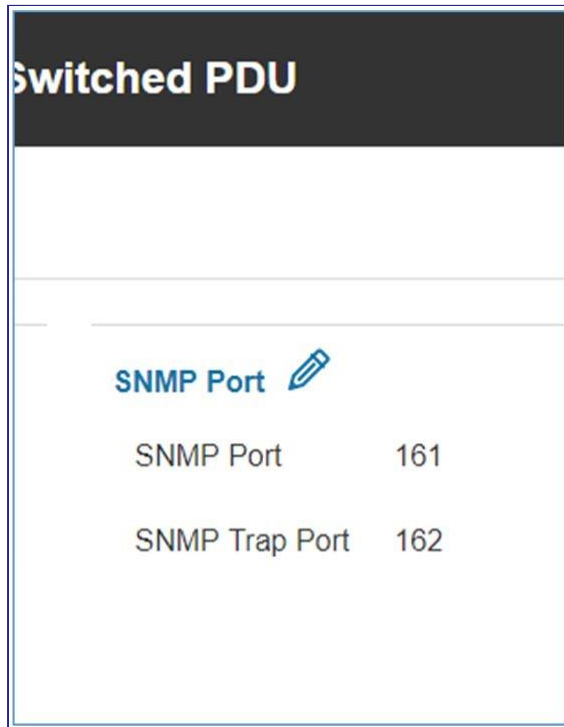


Figure 3.1-3: SNMP Port 3.

Setup SNMP Port and SNMP Trap Port

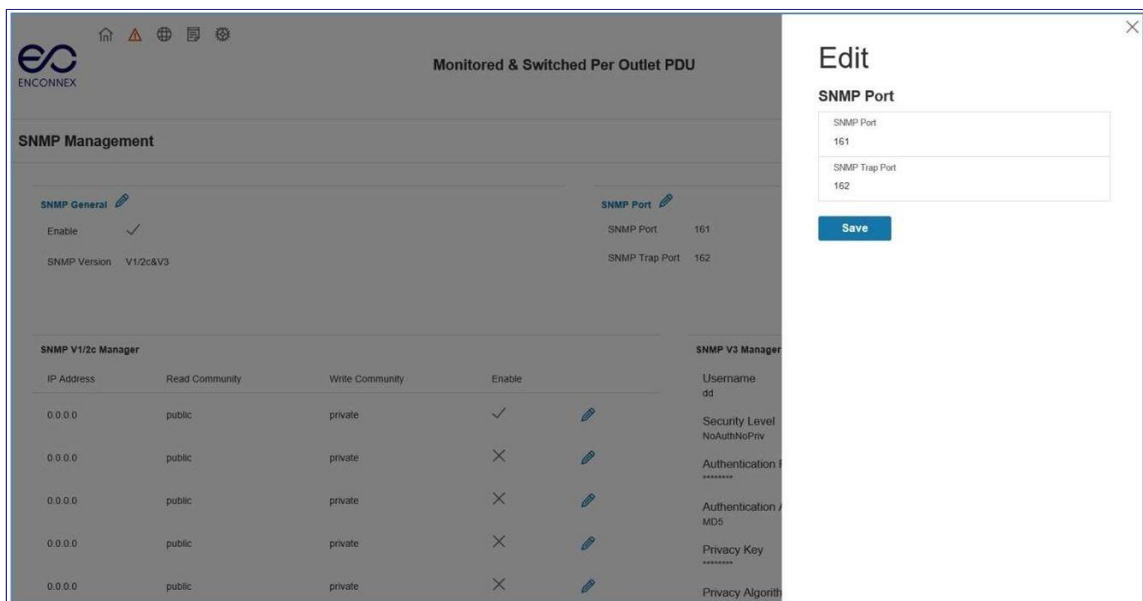


Figure 3.1-4: Setup SNMP Port and Trap Port

Define SNMP V1/V2c User

1. Access the Web interface and login.
2. Under SNMP Manager, select SNMP V1/V2c.
3. In the SNMP V1/V2c panel, select the SNMP V1/V2c manager to configure.

Select the pencil icon in the last column

SNMP V1/2c Manager				
IP Address	Read Community	Write Community	Enable	
0.0.0.0	public	private	✓	
0.0.0.0	public	private	✗	
0.0.0.0	public	private	✗	
0.0.0.0	public	private	✗	
0.0.0.0	public	private	✗	

Figure 3.1-5: Define SNMP V1/V2c User

4. The Edit panel pop up displaying the configurable options.

×

Edit

SNMP V1/2c Manager

IP Address

0.0.0.0

Read Community

public

Write Community

private

Enable

☒

Save

Figure 3.1-6: Edit V1/2c Manager

5. Set the following options:

- IP Address: the IP address of the host for this SNMP V1/V2 manager. Only requests from this address will be acted upon.

Note: An IP address configured to 0.0.0.0 will act as a wildcard and all requests will be acted upon.

- Read Community: the read-only community string to allow an SNMP V1/V2c manager to read a SNMP object.

- Write Community: the write-only community string to allow an SNMP V1/V2c manager to write an SNMP object.
6. Click Enable and Save.

3.2 Configuring Users for SNMP v3 Communications

1. Access the Web interface and login.
2. Under SNMP Managers, select SNMP V3.
3. In the SNMP V3 panel, select the SNMP V3 manager to configure. Select the pencil icon in the last column.






Username	Security Level	Authentication Password	Authentication Algorithm	Privacy Key	Privacy Algorithm	Enable	
dd	NoAuthNoPriv	*****	MD5	*****	DES	×	
	NoAuthNoPriv	*****	MD5	*****	DES	×	
	NoAuthNoPriv	*****	MD5	*****	DES	×	
	NoAuthNoPriv	*****	MD5	*****	DES	×	
	NoAuthNoPriv	*****	MD5	*****	DES	×	

Figure 3.2-1: SNMP V3 Manager

4. The Edit panel pop up displaying the configurable options.

×

Edit

SNMP V3 Manager

Username

Security Level

No Auth No Priv

▼

Authentication Password

Authentication Algorithm

MD5

▼

Privacy Key

Privacy Algorithm

DES

▼

Enable

☒

Save

Figure 3.2-2: SNMP V3 Edit

5. Configure the SNMP username.
6. Choose a Security Level from the dropdown menu:
 - NoAuthNoPriv: No authentication and no privacy. This is the default.
 - AuthNoPriv: Authentication and no privacy.
 - AuthPriv: Authentication and privacy.
7. Enter a new unique password to be used for authentication
8. Select the desired authentication algorithm:
 - MD5
 - SHA
9. Enter a new unique key for privacy algorithm
10. Select the desired privacy algorithm:
 - DES
 - AES-128
 - AES-192
 - AES-256
11. Click Enable and Save.

4. Command Line Interface (CLI)

4.1 Connecting through CLI connection

The Command Line Interface (CLI) is an alternate method used to manage and control the PDU status and parameters, as well as basic admin functions. Through the CLI a user can:

- Reset the PDU
- Display PDU and network properties
- Configure the PDU and network settings
- Switch outlets on/off
- View user information

Connecting to the CLI requires a terminal emulation program such as HyperTerminal or PuTTY

4.1.1 Supported Commands

The PDU CLI command set for managing and monitoring the PDU includes the following commands:

? command:	PDU help query
------------	----------------

sys command:	PDU system configure and setting
net command:	PDU net application configure and setting
usr command:	PDU user operation
dev command:	PDU device setting
pwr command:	PDU power setting

Table 4.1-1 - PDU CLI Commands

NOTE: Command variables are represented in command input syntax surrounded by angle braces (< >). Optional parameters are represented in command input syntax surrounded by straight brackets ([]). For data of type array, the 'x' character as index of array in command input syntax means all indexes. You must be logged into the PDU before commands can be sent. See Appendix A for a list of all CLI commands.

4.2 Connecting to the CLI through the serial interface

Communicating through the serial port requires a specialized optional RJ45-DB9 cable or you can create your own cable as described in the “Serial Cable Pinout to Create Your Own Cable” section.

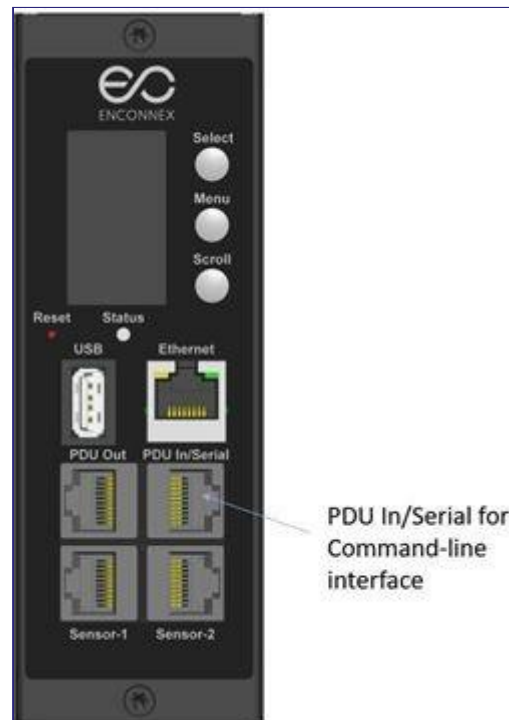


Figure 4.2-1: Connect the RJ-45 end of the cable to the Serial+RS485-1 connector

To connect the PDU to a computer:

Using the optional RJ45-DB9 cable, connect the RJ-45 end to the port labeled “Serial+RS485-1” on the front panel of your PDU model. Connect the DB9 end of the cable to the serial connector on the computer.

Logging in with HyperTerminal

To login through HyperTerminal, set the COM settings to the following parameters:

- Bits per second: 115200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

Serial Cable Pinout to Create Your Own Cable

To make your own RJ45-to-DB9 Serial cable, the connections are wired as shown:

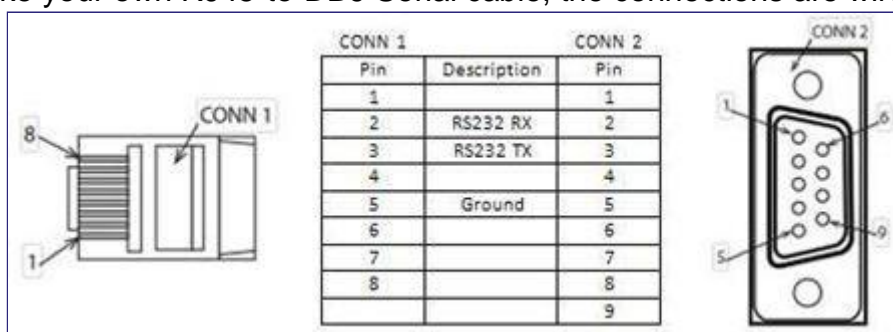


Figure 4.2-2 : Serial Cable Pinout

Logging in with SSH via PuTTY

1. Ensure SSH has been enabled: On GUI, go to Device Configuration > Network Service > SSH. Select the Enable SSH Access checkbox. Select OK.
2. Open an SSH client (PuTTY).
3. Enter the IP address in the Host Name field. Select the connection type: SSH
 - For SSH, enter 22 in the Port field.
4. Select Open.
5. Enter your Username. Press Enter.
6. Enter your password. Press Enter.
7. You are now logged into the SSH. Refer to the CLI Commands table below for available commands.

NOTE: SSH connection is not available when serial connection is enabled.

5. Local Display

5.1 OLED Display

The OLED provides information about the PDU and connected devices. The OLED display orientation can be changed using an OLED setting. The display can be rotated 0° and 180°. The PDU has a three-button, graphical OLED panel (see Figure 4). Use the buttons to change the screen display and retrieve specific performance data.

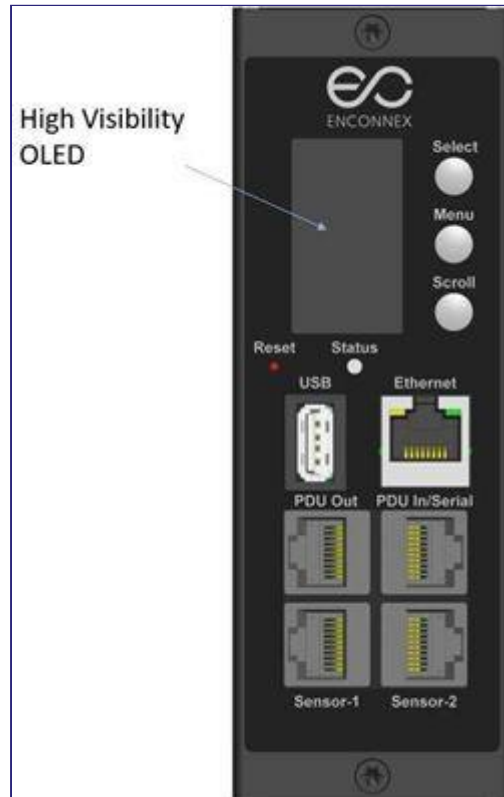


Figure 5.1-1: OLED Display Orientation

The OLED has two modes:

1. **Screensaver mode:** Screensaver mode cycles through a set sequence of screens that display current PDU values. Current values are refreshed every ten seconds. The user cannot select a custom sequence of screens. The screen saver displays automatically after 30 seconds of inactivity from the start-up screen, a menu, or a submenu. Values are refreshed every five seconds.
2. **Menu mode (OLED main menu):** The settings that display under each high level (main) menu depend on your PDU model.

Menu Mode

The table below summarizes how to use the control buttons on the OLED display.

Button	When in Menu Mode:	When in Screensaver Mode:
Menu	Select from the four main menus.	Returns to the previous display screen before entering the screensaver mode.
Scroll	Scrolls down through the list of menu items. NOTE: A highlighted menu item is ready to be selected.	Returns to the previous display screen before entering the screensaver mode.
Select	Opens the selected menu.	Returns to the previous display screen before entering screensaver mode.

Table 5.1-1: Menu Mode Buttons

LED Unit Status

The LED will change colors depending on the state of the PDU.

LED State	Description
Solid Green	Normal Operation
Solid Red	Critical or Warning Alarm
Flashing Orange	No network connection

Table 5.1-1: LED State Descriptions

5.2 OLED Menu Structure

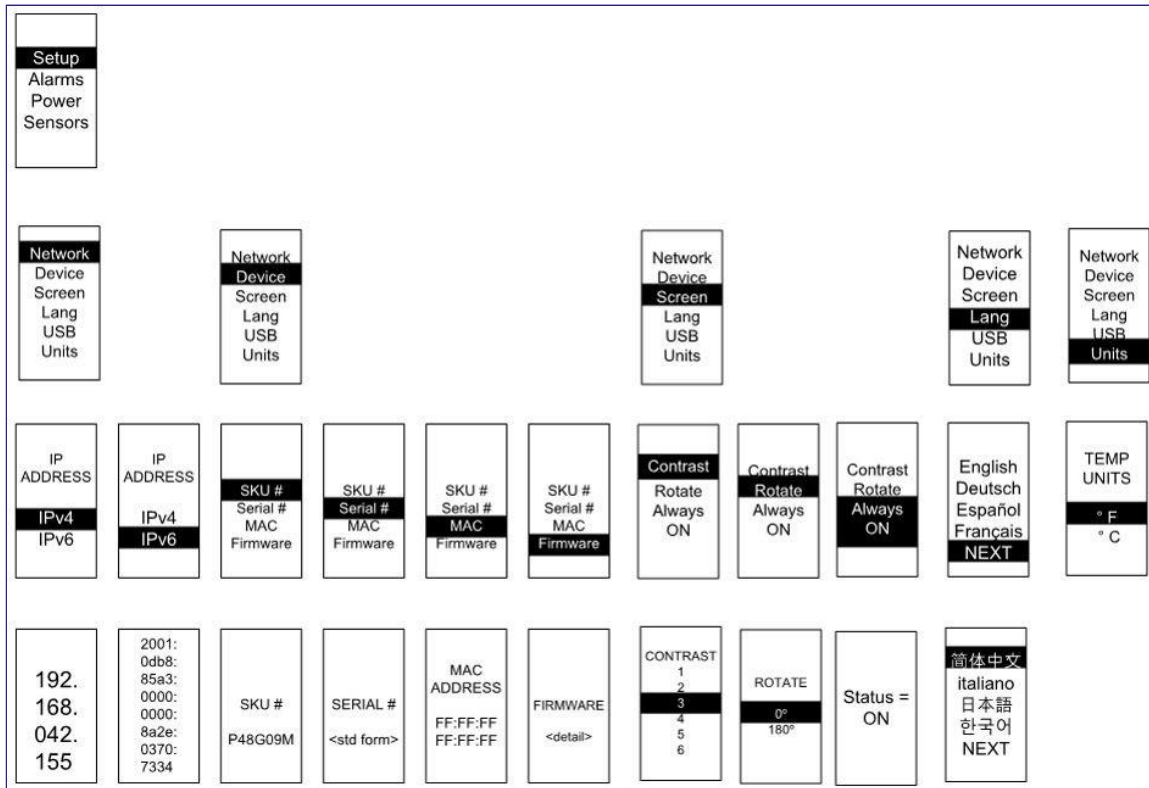


Figure 5.2-1: OLED Menu Structure

Main Menu Selections

The PDU menu selection hierarchy consists of Setup, Alarms, Power, and Sensors. On the main menu, scroll down to highlight Setup. Press Select. Scroll down to select a submenu and press Select to display the submenu options. Press Menu to return to the previous menu.



Figure 5.2-2: Main Menu Selections

Setup Menu

The Setup menu provides user configuration options including Network, Device, Screen, Language, USB, and Units.

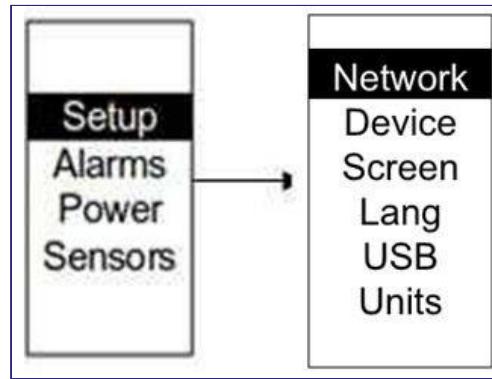


Figure 5.2-3: Setup Menu

Network Submenu

The Network submenu allows you to view IP address IPv4 or IPv6. On the Setup menu, scroll down to Network. Press Select to enter the Network Submenu. Scroll down to highlight the selected option from the menu. Press Select to display the screens that display the IP address. Press Menu to return to the previous menu.

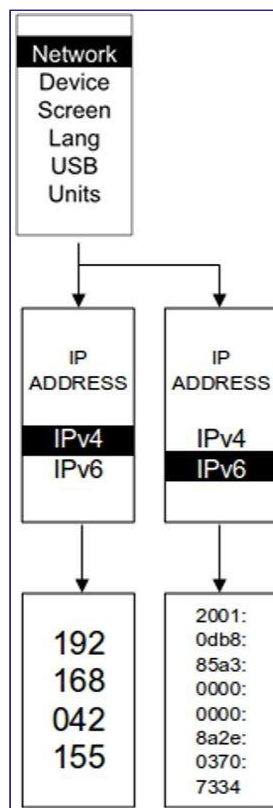


Figure 5.2-4: Network Submenu

Device Submenu

The Device submenu provides the SKU number, Serial number, MAC address and Firmware version. On the Setup menu, scroll down to highlight Device submenu. Press Select to enter the Device Submenu. Scroll down to the item you wish to display and press Select. Press Menu to return to the previous menu.

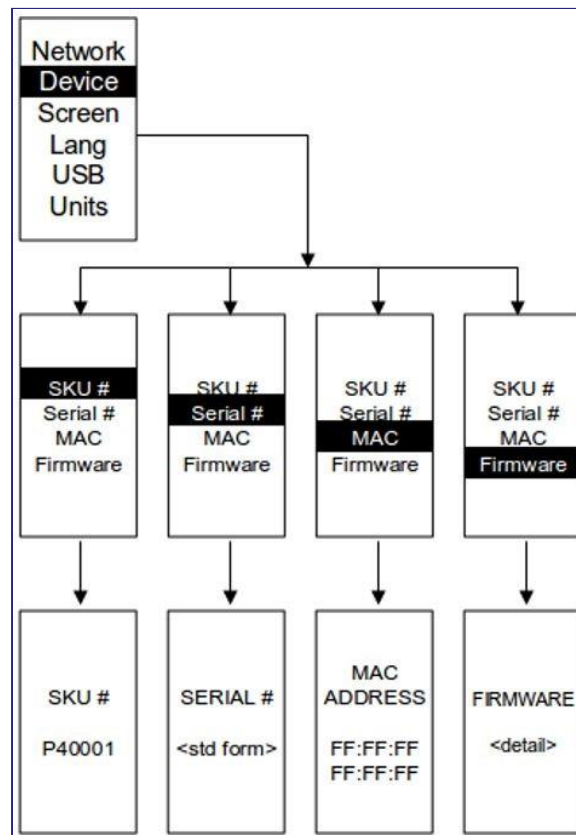


Figure 5.2-5: Device Submenu

Screen Submenu

The Screen submenu allows you to customize settings for Contrast, Rotate, and Always on. On the Setup menu, scroll down to highlight Screen. Press Select to select the submenu. Press Menu to return to the previous menu.

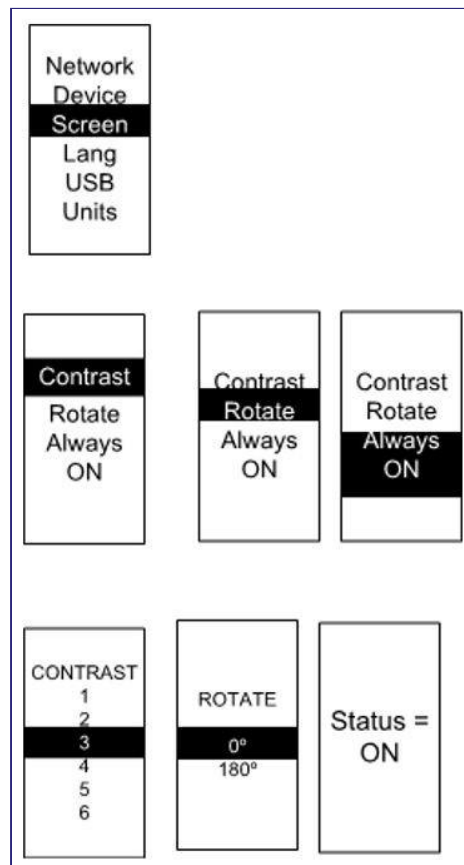


Figure 5.2-6: Screen Submenu

Language Submenu

The Language submenu allows you to select the language you need to use. On the Setup menu, scroll down to highlight Lang. Press Select to display the screen to select the submenu. After you select the values, press Select to set the values as displayed on the screen. Press Menu to return to the previous menu.



Figure 5.2-7: Language Submenu

USB Submenu

The USB submenu allows you to upload a firmware file and download the event log or data log. On the Setup menu, scroll down to highlight USB. Press Select to enter the USB Submenu. You will be asked to verify if you want to enter the USB operation and Configuration Mode. After you select Yes, the system will reset to the USB operation and Configuration Mode, or Boot Loader mode.

Note 1: If a USB drive is not present in the USB slot, the PDU will enter normal operation after the reset.

Note 2: If you are in USB mode and you want to exit USB mode, you must remove the USB drive before exiting USB mode. Otherwise, the PDU will reset and re-enter USB mode.

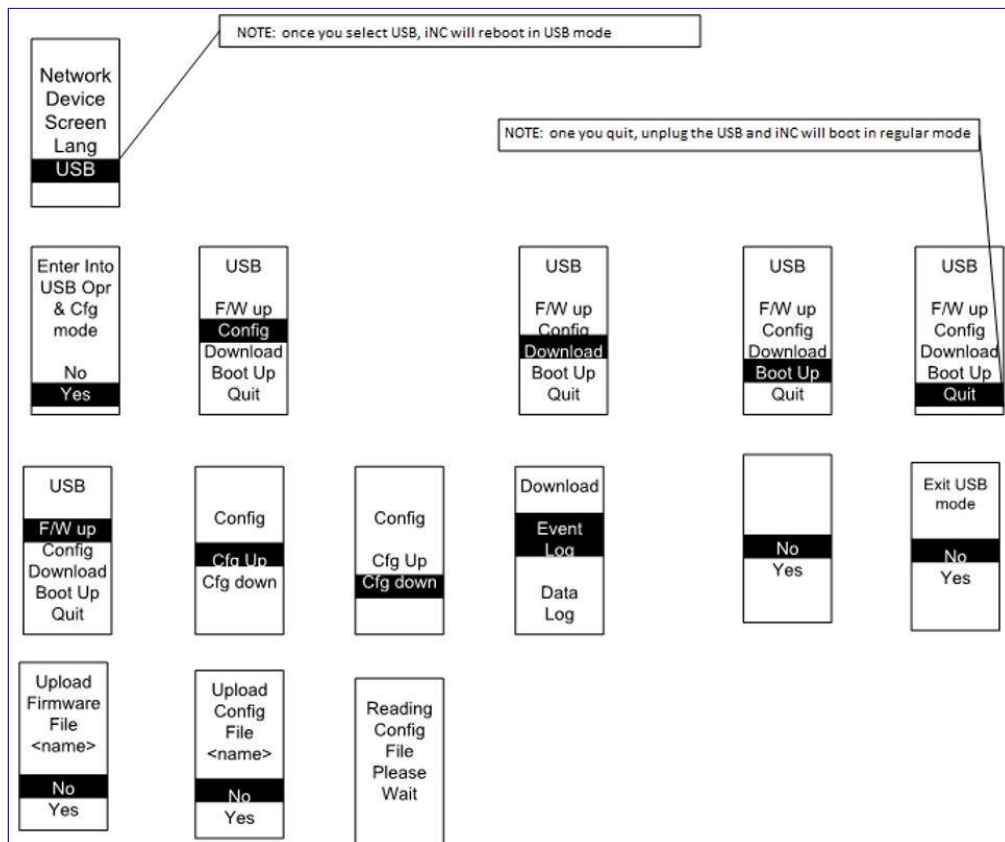


Figure 5.2-8: USB Submenu

Units Submenu

The Units submenu displays the temperature units. On the Setup menu, scroll down to highlight Units. Press Select to enter the Units Submenu. After you select the values, press Select to set the values as displayed on the screen. Press Menu to return to the previous menu.

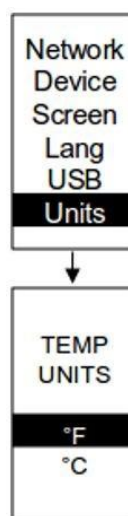


Figure 5.2-9: Units Submenu

Alarms Menu

The Alarms menu displays active alarms for the PDU. On the Main Menu, scroll down to highlight Alarms. Press Select to display the Alarm Screen. When you finish your review, press Menu to return to the main menu.



Figure 5.2-10: Alarms Menu

Power Menu

The Power menu manages device, phase, breaker and outlet. On the Main Menu, scroll down to highlight Power. Press Select. Scroll down to select a submenu and press Select to display the submenu options. Press Menu to return to the previous menu.

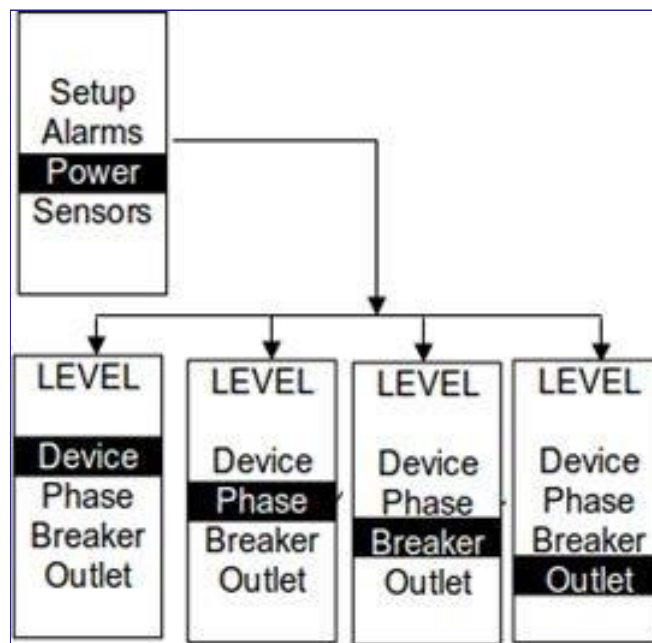


Figure 5.2-11: Power Menu

Device Submenu

The Device submenu is to display current, voltage and power. On the Power menu, scroll down to highlight Device. Press Select to display the power values for the entire PDU. Press Menu to return to the previous menu.

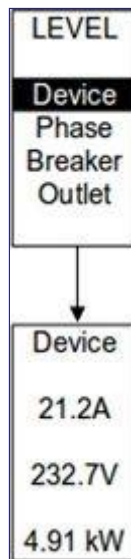


Figure 5.2-12: Device Submenu

Phase Submenu

The Phase submenu is to display the status of 3-Phase circuits. On the Power menu, scroll down to highlight Phase. Press Select to display the screens to set the values for the submenu. After you select the phase, press Select to display the values for that phase on the screen. Press Menu to return to the previous menu.

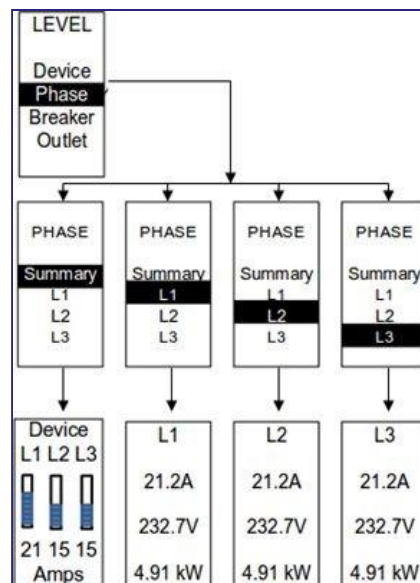


Figure 5.2-13: Phase Submenu

Breaker Submenu

The Breaker submenu is to display power values for the breakers. Press Select to display the values of the first breaker. To go to the next breaker, select next. Press Menu to return to the previous menu.

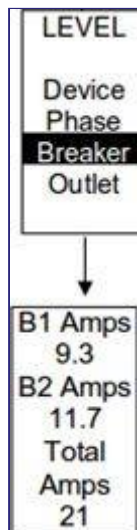


Figure 5.2-14: Breaker Submenu

Outlet Submenu

The Outlet submenu is to display voltage, current and power from outlet number 1 to number n. On the Power menu, scroll down to highlight Outlet. Press Select to display values for the first outlet. To go to the next outlet, select next. Press Menu to return to the previous menu.

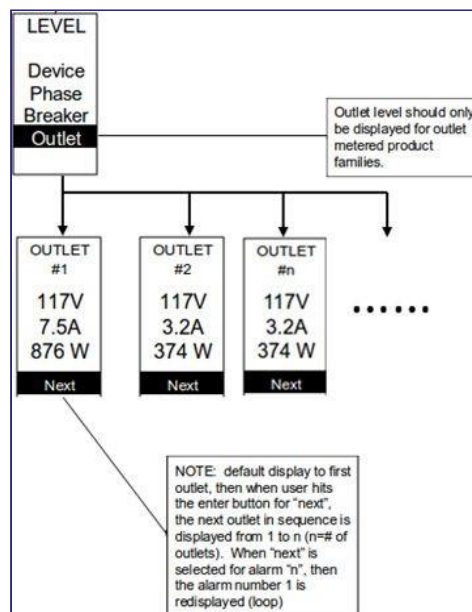


Figure 5.2-15: Outlet Submenu

Sensors Menu

The Sensor menu is to display temperature, humidity, door switch, fluid leak etc. On the Main Menu, scroll down to highlight Sensor. Press Select. This will display the sensor data for the first sensor. To go to the next sensor, select next. Press Menu to return to the previous menu.

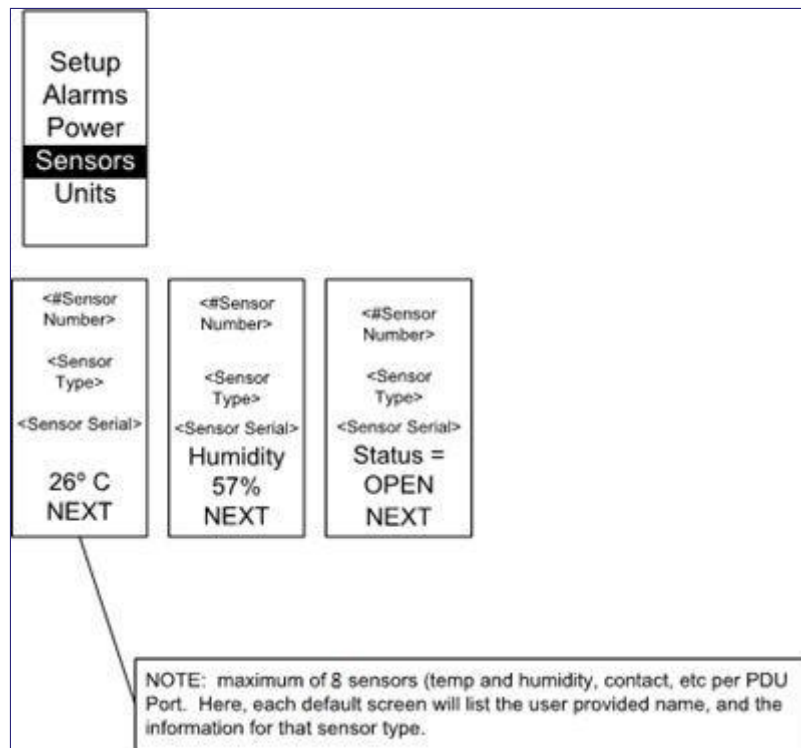


Figure 5.2-16: Sensors

NOTE: Maximum of 8 sensors are configured per PDU.

6. User Access

6.1. Changing Your Password

At the initial login page, change the password:

1. The Change Password window opens directly. Enter the current password and new password twice to confirm. By default, passwords must be between 8 and 32 characters.



Figure 6.1-1: Changing Your Password

2. Click Change Password to complete the password change. After initial login, to change the password:
3. Go to User Name>Change Password.

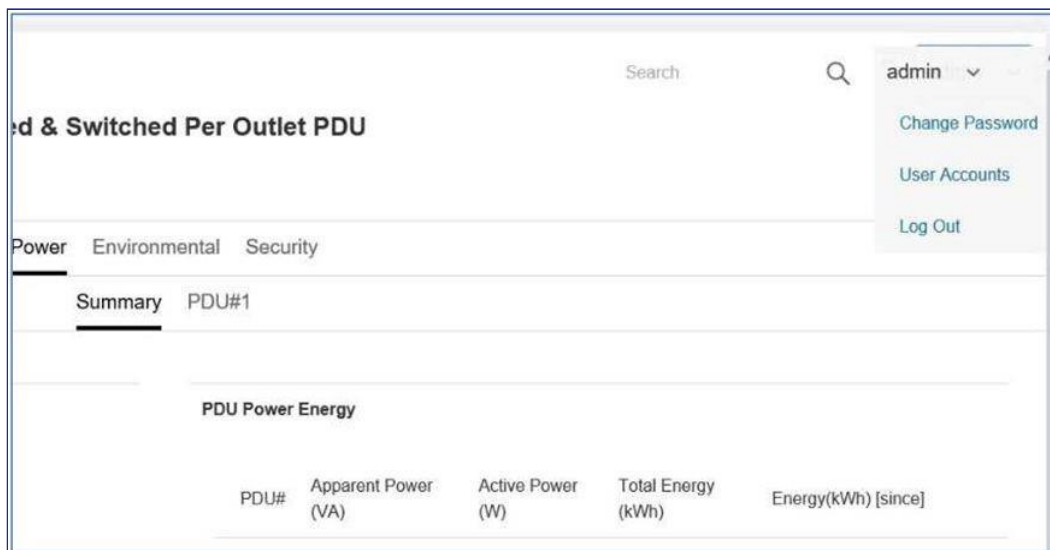


Figure 6.1-2: After Login

4. The Change User Password window opens.

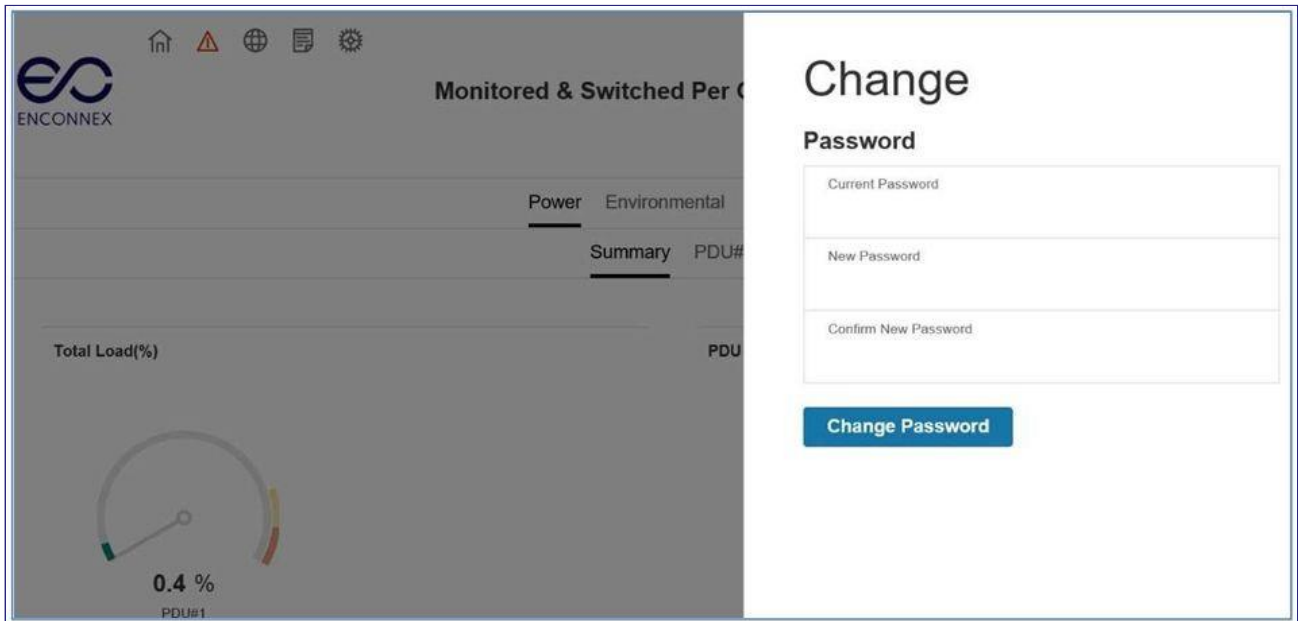


Figure 6.1-3: Change User Password

5. Enter the old password and then new password twice to confirm. By default, passwords must be between 8 and 32 characters.

This is a close-up of the 'Change Password' form. It features a title 'Change Password' at the top. Below the title are three text input fields labeled 'Current Password', 'New Password', and 'Confirm New Password'. At the bottom of the form is a blue button with the text 'Change Password'.

Figure 6.1-4: Change Password

6. Click Change Password to complete the password change.

Logging Out

Users should log out after each session to prevent unauthorized changes to the system.

1. Click the user name icon in the top right corner of the screen (see Introduction to the Web Menu).
2. Click Log Out in the drop-down menu.

Access Types

There are two levels of access privileges:

- Administrator •
- Read Only

The Enconnex PDU comes with a standard Administrator profile and a standard Read Only profile. The “Admin Role” has full operating permissions. By default the “User Role” is a Read Only profile. All other users must be added by a user with administrator privileges. Users are defined by their unique login credentials and by their user role.

The level of access privilege determines what the user will see and what actions the user can perform. The level of access privilege determines which menu items the user can access or which fields display on individual setting and configuration dialogs. Before setting up users, determine the Roles that will be required. Each user must be given a Role. These Roles define the permissions granted to the user.

Role	Default Permissions
Admin	Full permissions that cannot be modified or deleted
User	Read-only permissions. Can monitor the system but cannot change any configuration.
Manager	Full permissions that can be modified and deleted.

Table 6.1-1: User Permissions

User Accounts

Add user profile:

1. Go to User Administration>User Accounts.
2. Select Add User to create a new user profile.
3. Use the Settings tab to enter the following information:
 - User Name (required)
 - Password (required)
 - Confirm Password (required)

NOTE: Set password requirements in the required field. By default, passwords must be 8-32 characters in length, and to have at least one numeric character, and at least one special character.

4. Use the Roles tab to set full or read only privileges.
5. Select “Add User” to save the new user profile.
6. Modify user profile:
 - Go to User Administration>Users.
 - Select the user name.
 - Select Edit. Make changes to the user profile.
 - Select Update.

Delete user profile:

- Go to User Administration>Users.
- Select the red X next to username.

6.2 Setting up the system for Radius Authentication

1. Go to User Accounts > in the admin menu.

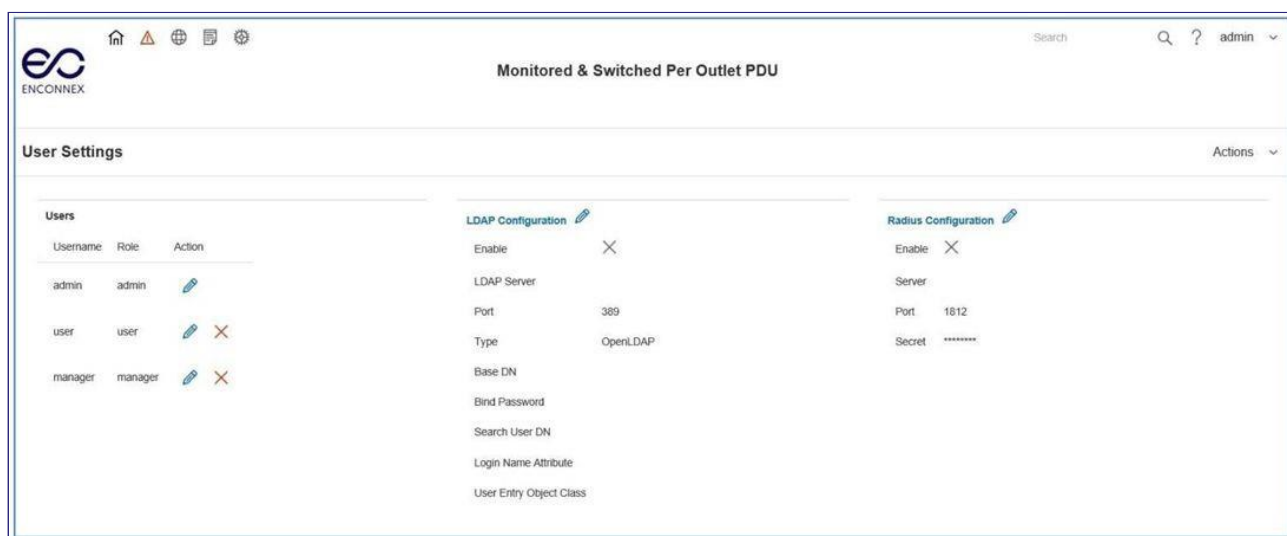
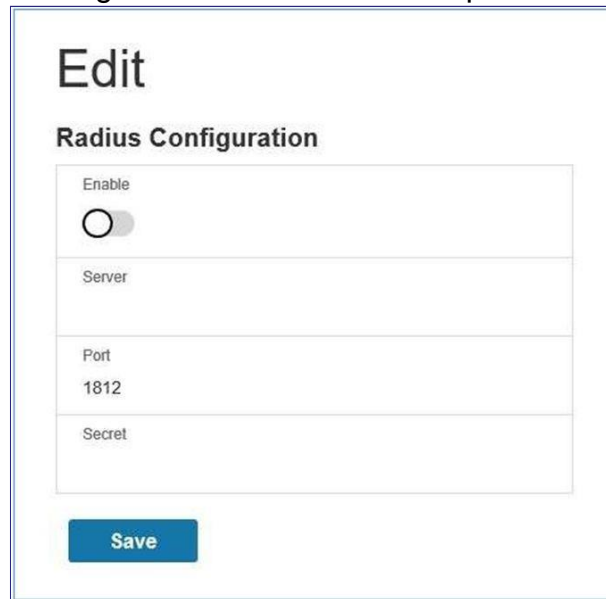


Figure 6.2-1: User Settings

2. Go to Radius Configuration and click the edit pencil.



The screenshot shows a web interface for editing Radius Configuration. At the top, the word "Edit" is displayed in a large font. Below it, the title "Radius Configuration" is shown. The form consists of several fields: an "Enable" field with a toggle switch, a "Server" field, a "Port" field containing the value "1812", and a "Secret" field. A blue "Save" button is located at the bottom of the form.

Figure 6.2-2: Radius Configuration

3. Select the Enable button.
4. Enter Server IP address field, Port number field, and Secret field.
5. Click save and your Radius authentication is complete.

6.3 Configuring the system with LDAP Server Settings

To setup LDAP to access the Active Directory (AD) and provide authentication when logging into the PDU via the Web Interface:

1. Go to User Settings (under the ADMIN Menu) > LDAP Configuration.
2. Select the LDAP Enable checkbox.
3. Use the drop-down menu to choose the Type of LDAP Server. Choose Microsoft Active Directory.
4. Enter an IP Address of the domain controller/Active Directory (AD) Server. i.e.: 192.168.1.101 (example).
5. Enter a Port.

NOTE: For Microsoft, this is typically 389.

6. In the Base DN field, enter in the account to be used to access AD. i.e. CN=myuser, CN=Users, DC=EMEA, DC=mydomain, DC=com
7. Enter the password in the Bind Password and Confirm Password fields.
8. In the Search User DN field, i.e. DC=subdomain, DC=mydomain, DC=com

- 10.
9. In the Login Name Attribute field, enter sAMAccountName (typically)
 10. In the User Entry Object Class field, enter person. With these LDAP settings configured, the Bind is complete. (see screen-shot)

The screenshot shows a web interface titled "Edit" with a sub-header "LDAP Configuration". The form contains the following fields and values:

- Enable:** A toggle switch that is currently turned off.
- LDAP Server:** 192.168.1.101
- Port:** 389
- Type:** Microsoft Active Directory (selected from a dropdown menu)
- Base DN:** CN=idap_auth,OU=Service Accounts,OU=Global,DC= (with a text input field for the domain name)
- Bind Password:** *****
- Search User DN:** DC= (with a text input field for the domain name) DC=com
- Login Name Attribute:** sAMAccountName
- User Entry Object Class:** person

Figure 6.3-1: LDAP Configuration

Once LDAP is configured, the PDU must understand for which group authentication occurs. A role must be created on the PDU to reference a group within Active Directory (AD).

1. Within the Active Directory, create a group for the users that you wish to be PDU administrators. i.e. admins
2. Within the PDU Web Interface, go to User Settings (under admin menu) > Roles. Enter the Role Name that was created in AD. i.e. admins
3. Enable role privileges as needed. (see screen-shot)

Edit

Role

Role Name
admin

Description
admin operation

Privileges
☒ Administrator Privileges

Save

Figure 6.3-2: Enable Role Privileges

4. LDAP authentication is ready to use. To test this, just click save, then click on “LDAP Configuration” again and type an Active Directory user name/password into the test box. Click Test LDAP Configuration. If a box pops up with all green “SUCCEEDED” (no X’s), the LDAP is successfully configured.

Test LDAP Configuration

Test Name
admin

Test Password
.....

Test LDAP Configuration **Save**

Figure 6.3-3: Test LDAP Configuration

NOTE: Be sure to login without a domain name.

7. Daisy Chain Configuration

7.1 Daisy-Chain Overview

In daisy chain mode, up to four (4) PDUs of the same SKU number can be connected via one (1) IP address. This allows users to gather information and data on all daisy- chained PDUs from the master PDU. The daisy chain functionality reduces network cost for PDUs. For example, a standard network switch used in a data center may contain 24 ports. Without using the daisy chain function, each port would supply network-connection to one (1) PDU. However, if using the daisy chain features, a typical network switch with 24 ports can supply network connections for up to 96 PDUs.

7.2 Daisy-Chain Setup

- After the initial PDU is configured, connect an Ethernet cord from the RS485-2 port on the configured PDU to the Serial+RS485-1 port on the second PDU in the daisy chain line.
- Repeat step 2, connecting PDUs from the RS485-2 port to the Serial+RS485-1 port for up to 4 PDUs.

NOTE: The total length of the Ethernet cords connecting the PDUs must be less than 15m (49 ft.).

- Go to the Web interface (or management software) to manage and control the PDUs in the daisy chain.

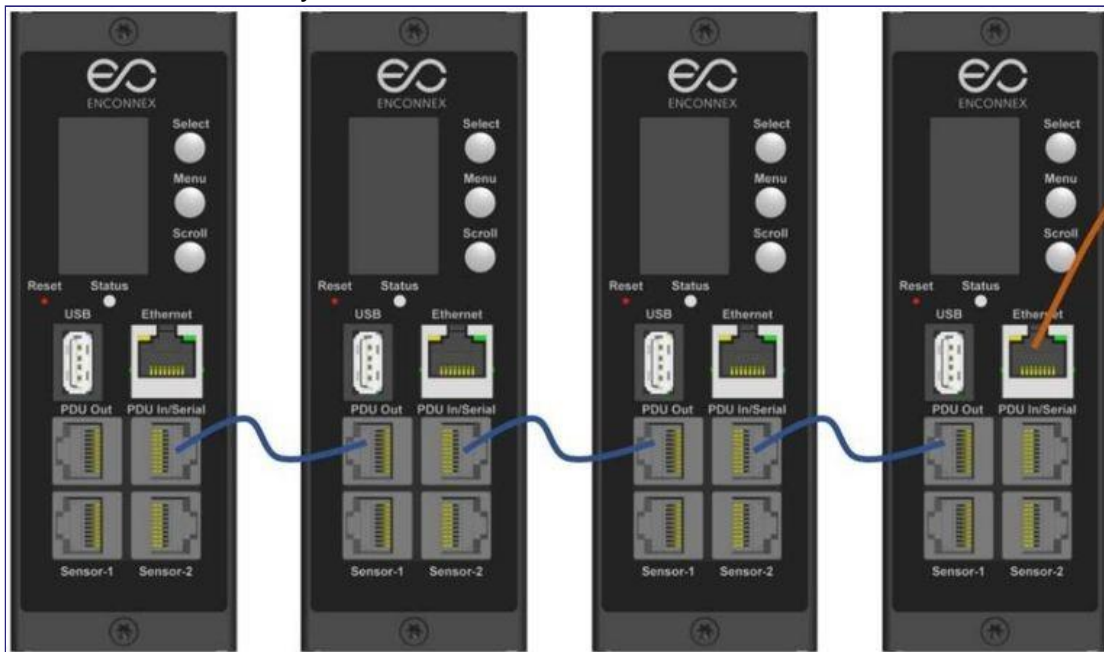


Figure 7.2-1: How to Connect Cables for Daisy Chain

7.3 RNA (Redundant Network Access) Functionality

RNA allows for secure access of PDU data and statistics on 2 separate, private networks. RNA must be used with a redundant power delivery design including two rack PDUs for each IT rack. PDUs used in RNA applications must be the same SKU.

How it Works

Using RNA, the main and expansion unit maintain two separate private networks that do not overlap.

- RNA works using a redundant power delivery design (i.e., two rack PDUs for each IT rack).

- Each PDU is separately connected to the expansion and main's private communications network.
- The two PDUs are connected with a data communications bus to allow PDUs to share user-defined information.
- Each PDU acts like a main PDU to report PDU data to both networks.

7.4 RNA Setup

To setup RNA mode on two PDUs, the user must configure the PDUs for RNA Mode using the CLI and then connect the LAN Network cords and Ethernet cords between PDUs.

To Configure RNA Mode in the CLI

1. Login to the CLI and enter the command 'dev daisy rna.'
2. The following message will appear:
 - Reboot Required for change to take effort.
 - System Reboot now, Are you sure? (Y/N)
3. Enter Y to confirm reboot.
4. After reboot, the PDU will be setup to RNA Mode.
5. Repeat this process for the second PDU.

To Connect the PDUs for RNA Setup

After the PDUs are configured for RNA:

1. Connect an Ethernet cable from the Landlord LAN Network to the Ethernet port of the first PDU. This will have limited access/permissions.
2. Connect an Ethernet cable from the Tenant LAN Network to the Ethernet port of the second PDU. This will have full access to both PDUs.
3. Connect an Ethernet cable from the Serial+Rs485-1 port on first PDU to the RS485-2 port on the second PDU.
4. Connect another Ethernet cable from the Rs485-2 port on the first PDU to the Serial+Rs485-1 port on the second PDU.
5. In RNA mode, the default account username is 'landlord' and the password is '12345678'. This account is configured for proper access and control in RNA mode.
6. To enable this account, login to the CLI with admin credentials.
7. Enter the command 'dev daisy rna init'.
8. The following message will appear to confirm the landlord account is enabled: SUCCESS.

9. RNA is now configured and enabled.

8. Web GUI configuration

8.1 PDU Outlet Power Sequence Setup

1. From the PDU GUI Home menu select Control & Manage.

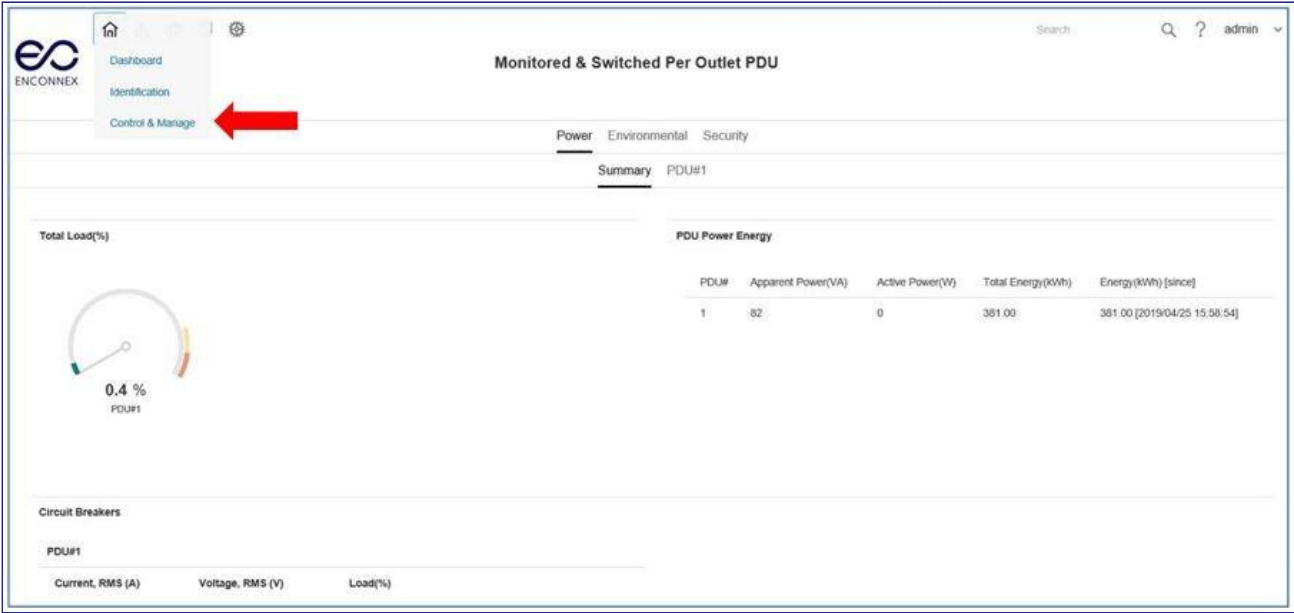


Figure 8.1-1: Control & Manage PDU

2. Select Outlet Control Enabled.

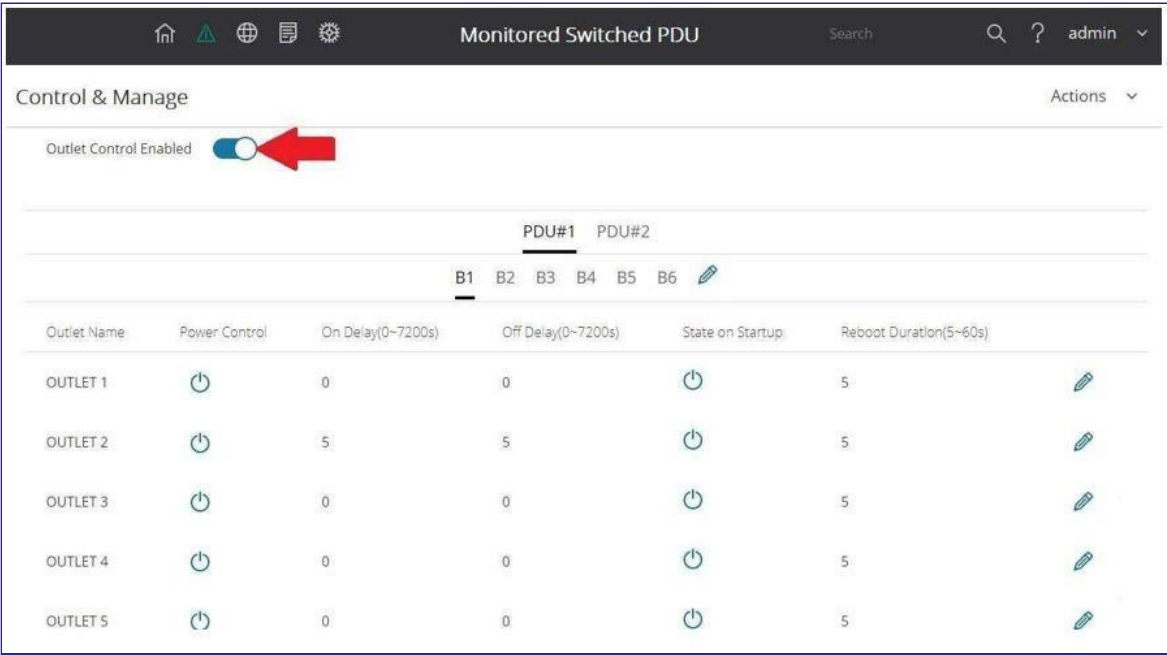


Figure 8.1-2: Outlet Control Enabled

3. For each Outlet select the Edit pencil.

Monitored Switched PDU						
Control & Manage						Actions
Outlet Control Enabled <input checked="" type="checkbox"/>						
PDU#1 PDU#2						
B1 B2 B3 B4 B5 B6						
Outlet Name	Power Control	On Delay(0~7200s)	Off Delay(0~7200s)	State on Startup	Reboot Duration(5~60s)	
OUTLET 1		0	0		5	
OUTLET 2		5	5		5	
OUTLET 3		0	0		5	
OUTLET 4		0	0		5	
OUTLET 5		0	0		5	

Figure 8.1-3: Edit Outlets

4. In the Edit Outlet window enter the On-Delay time (0-7200 seconds) then select Save.

Control & Manage

Outlet Control Enabled ☒

PDU#1 PDU#2

B1 B2 B3 B4 B5

Outlet Name	Power Control	On Delay(0~7200s)	Off Delay(0~7200s)
OUTLET 1		0	0
OUTLET 2		5	5
OUTLET 3		0	0
OUTLET 4		0	0
OUTLET 5		0	0

Edit

Outlet Information

Outlet Name

OUTLET 1

On Delay(0~7200s)

0

Off Delay(0~7200s)

0

State on Startup

On

Reboot Duration(5~60s)

5

Save

Figure 8.1-4: On-Delay Time

5. Your Outlet Power Sequence has been set.

Monitored Switched PDU						
Control & Manage						
Outlet Control Enabled <input checked="" type="checkbox"/>						
PDU#1 PDU#2						
B1 B2 B3 B4 B5 B6						
Outlet Name	Power Control	On Delay(0-7200s)	Off Delay(0-7200s)	State on Startup	Reboot Duration(5-60s)	
OUTLET 1		28	0		5	
OUTLET 2		5	0		5	
OUTLET 3		0	0		5	
OUTLET 4		0	0		5	
OUTLET 5		G:\PDU User Manual\REV 1.docx [Read-Only] - Word			5	

Figure 51: Saved Sequence

9. Connecting and Configuring Optional Hardware

9.1 Accessory Hardware Overview

Enconnex Monitored Input, Monitored Switched, Monitored per Outlet, and Monitored & Switched per Outlet PDUs can monitor environmental conditions of a rack with the addition of optional environmental sensors. Conditions such as temperature, humidity, leak detection, and intrusion can be monitored with the sensors. These are all vital aspects of maintaining an efficient-working data center atmosphere. Users and administrators can monitor the status, view reports, and alarms of specific conditions in and around a PDU, and server rack. (Note, only Enconnex type sensors work with the PDU controller)

The following sensors are available:

- Temperature Sensor
- Temperature + Humidity Sensor
- Three Temperature + Humidity Sensor
- Door Sensor
- Water Rope Sensor
- Sensor Hub
- Water Rope Sensor Extension

Sensor	Description	Sensor Measurement
Temperature Sensor	Monitors the temperature in the rack.	1
Temperature + Humidity Sensor	Monitors the temperature and relative humidity in the rack.	2
Three Temperature + Humidity Sensor	Monitors the temperature in three areas using three separate probes and the relative humidity using one probe.	4
Door Sensor	Sends an alarm or notification when a door on which the sensor is installed has been opened for more than 10 minutes.	1
Water Rope Sensor	Monitors for early detection of liquid with a resistivity of less than 2 megaohms (including distilled water) in the monitored area. The kit includes a 6m rope and optional additional ropes can be added with an option	1
Sensor Port Hub	Allows for up to three environmental sensors to be connected to the PDU.	N/A
Leak Detection Sensor	The kit includes one additional 6m rope to pair with the leak detection sensor. A total of four extensions can be added to the leak detection sensor for a total length of 30m.	N/A

Figure 9.1-1: Sensor Descriptions and Measurement

The optional environmental sensors can be installed before or after completing the PDU installation, startup, and can be installed without turning off power to the PDU or the devices connected. Enconnex Monitored Input, Monitored Switched, Monitored per Outlet, and Monitored & Switched per Outlet PDUs are designed to collect a maximum of eight environmental sensor measurements per PDU. For example, the Environmental Three Temperature + Humidity Sensor collects four sensor measurements. See the table above for the sensor measurement collected from each environmental sensor.

All Enconnex PDUs have two physical sensor ports, and each PDU can collect a total of eight sensor measurements (or readings). For example, if a PDU has a Door Sensor and an Environmental Three Temperature + Humidity Sensor connected, both physical sensor ports are used with a total of five sensor measurements recorded. Up to six physical sensors can be supported per PDU with the addition of the optional sensor hub.



Figure 9.1-2: Sensor Ports for vertical PDU



Figure 9.1-3: Sensor Ports for Horizontal PDU

9.2 Configuring Environmental Sensors

To configure the sensor location, alarms, notifications, and details, open the WEB Interface:

1. Open the Settings.
2. View the Threshold section on the Settings page. Select Threshold to configure sensors.
3. Go to external sensors.
4. Select the Edit button to configure the desired sensors.
5. In the Edit dialog box, type value of up critical, up warning, low warning, and low critical.
6. Select Save to exit the sensor setup. Repeat this process for additional sensors.

Warranty and Regulatory Information

Product Warranty

Complete the online product registration at <https://www.enconnex.com/contact-us/> within 30 days of purchase to extend the standard two (2) year product warranty to a three (3) year product warranty.

Support and Other Resources

Customer Service: sales.usa@enconnex.com or +1 510 651 2205

Technical Support: sales.usa@enconnex.com or +1 510 651 2205

Acronyms and Abbreviations

A

Amps/Amperes

AC

Alternating Current

AES

Advanced Encryption Standard

C

CLI

Command Line Interface

D

DES

Data Encryption Standard

DHCP

Dynamic Host Configuration Protocol

G

Gb

Gigabit

GUI

Graphical User Interface

I

IP

Internet Protocol

K kVA Kilo-Volt-

Ampere kW

Kilowatts

kWH

Kilowatt Hour

L

LAN

Local Area Network

LDAP

Lightweight Directory Access Protocol

O

OLED

Organic Light-Emitting Diode

P

PDU

Power Distribution Unit

R

RNA

Redundant Network Interface

S

SHA

Secure Hash Algorithms

SNMP

Simple Network Management Protocol

T

TCP/IP

Transmission Control Protocol/Internet Protocol

U

USB

Universal Serial Bus

V

Volts

W

Watts

Appendix A: CLI Commands

Help Commands

Command	Description	Example
Enconnex>?	List all available PDU CLI commands.	Enconnex>? sys - PDU system configure and setting. net - PDU net application configure and setting. usr - PDU user operation. dev - PDU device setting. pwr - PDU power setting.

Appendix A Table 1: Help Commands

System Commands

Command	Description	Example
sys ver	Query systems version information including firmware, bootloader, and Web.	Enconnex>sys ver SUCCESS Firmware version: 0.41 Bootloader version: 2.10 LANGUAGE version: 3.01
sys def	Recover PDU to default configuration.	Enconnex>sys def SUCCESS Recover
sys rst	Reset system.	Enconnex>sys rst Reboot required for change to take effect. System Reboot now, Are you sure? (Y/N):Y

sys upd all	Update systems firmware with existing pdu bin file.	Enconnex>sys upd lan SUCCESS system will enter upgrade mode after reboot System Reboot now, Are you sure?(Y/N):Y NOTE 1: There must be a valid file named Enconnex.bin existing under directory/fw. NOTE 2: If in daisy chain configuration, master will.
sys upd reboot	Update systems bootloader.	Enconnex>sys upd boot
		SUCCESS system will enter upgrade mode after reboot System Reboot now, are you sure?(Y/N):Y
sys upd conf	Update systems configuration.	Enconnex>sys upd conf SUCCESS system will enter upgrade mode after reboot System Reboot now, Are you sure?(Y/N):Y
sys log del event	Delete event log file.	Enconnex>sys log del event, SUCCESS
sys log edit date [on<interval> off]	Configure data log collection parameters.	Enconnex>sys log edit data on 1 SUCCESS
sys log del data	Delete data log file.	Enconnex>sys log del data, SUCCESS Enconnex>

Appendix A Table 2: System Commands

Network Commands

Command	Description	Example
net ssh [on/off]	Query or on/off SSH.	Enconnex>net ssh SUCCESS, SSH Port: 22
net ftps [on/off]	Query or on/off FTPs.	Net ftps

net http [on/off]	Query or on/off net http.	Enconnex>ne t http SUCCESS, HTTP Port: 80 HTTPS Port: 443 WEB Protocol: HTTP Enconnex>net http off E801 WEB protocol is changed, Please reboot to validate System Reboot now, Are you sure?(Y/N):Y
net mac	Query MAC Address.	Enconnex>net mac SUCCESS MAC Addr: C8-45-44-66-
net tcp ip	Query networks IP information.	Enconnex>net tcpip SUCCESS
net tcp ip <dhcp>	Set network to dhcp mode.	Enconnex>net tcp ip dhcp SUCCESS Network is reconfigured, Please reboot to validate System Reboot now, Are you sure?(Y/N):Y
net tcp ip <static ip, mask, gateway>	Set static IP, mask and gateway.	Enconnex>net tcp ip static 192.168.30.39 255.255.255.0 192.168.30.1 SUCCESS Network is reconfigured, Please reboot to validate System Reboot now, Are you sure?(Y/N):Y

Appendix A Table 3: Network Commands

User Commands

Command	Description	Example
User List	List all existing user accounts.	Enconnex> usr list SUCCESS Usr Role ----- admin admin

User unlock<username>	Unlock specified user.	Enconnex>usr unlock user SUCCESS Enconnex>usr unlock admin SUCCESS NOTE: 1. Account would be locked temporarily if login failure excess "Maximum number of failed logins". Use this
-----------------------	------------------------	---

Appendix A Table 4: User Commands

Power Commands

Command	Description	Example
pwr unit [idx]	Query device information, Query specified index unit's electric information.	Enconnex> pwr unit SKU: P9S20A , , , , Serial: , , , , , FuncType: PDU Monitored Rating :220-240V, 16A, 3.5-3.8kVA, 50/60Hz Mac :C8:45:44:66:2B:26 Tcp Ip :192:168:30:38 Enconnex>pwr unit 1 SUCCESS PDU UNIT 1 power Feature voltage: 0V current : 0.0A active power: 0W apparent power: 0W power factor: 0.00 energy: 0.000kWh
pwr phase <idx>	Query specified phase's electric information.	Enconnex> pwr phase 1 SUCCESS PDU PHASE 1 power Feature voltage: 0V current : 0.0A active power: 0W apparent power: 0W power factor: 0.00 energy: 0.000kWh

pwr cb <idx>	Query specified circuit breaker's Electric information.	Enconnex> pwr cb 1 SUCCESS PDU CB 1 power Feature voltage: 0V current : 0.0A active power: 0W apparent power: 0W power factor: 0.00 energy: 0.000kWh
pwr outlet <idx>	Query specified outlet's electric information.	Enconnex> pwr outlet 1 SUCCESS PDU OUTLET 1 power Feature voltage: 0V current : 0.0A active power: 0W apparent power: 0W NOTE: For Monitored PDUs, this command is invalid.

Appendix A Table 5: Power Commands

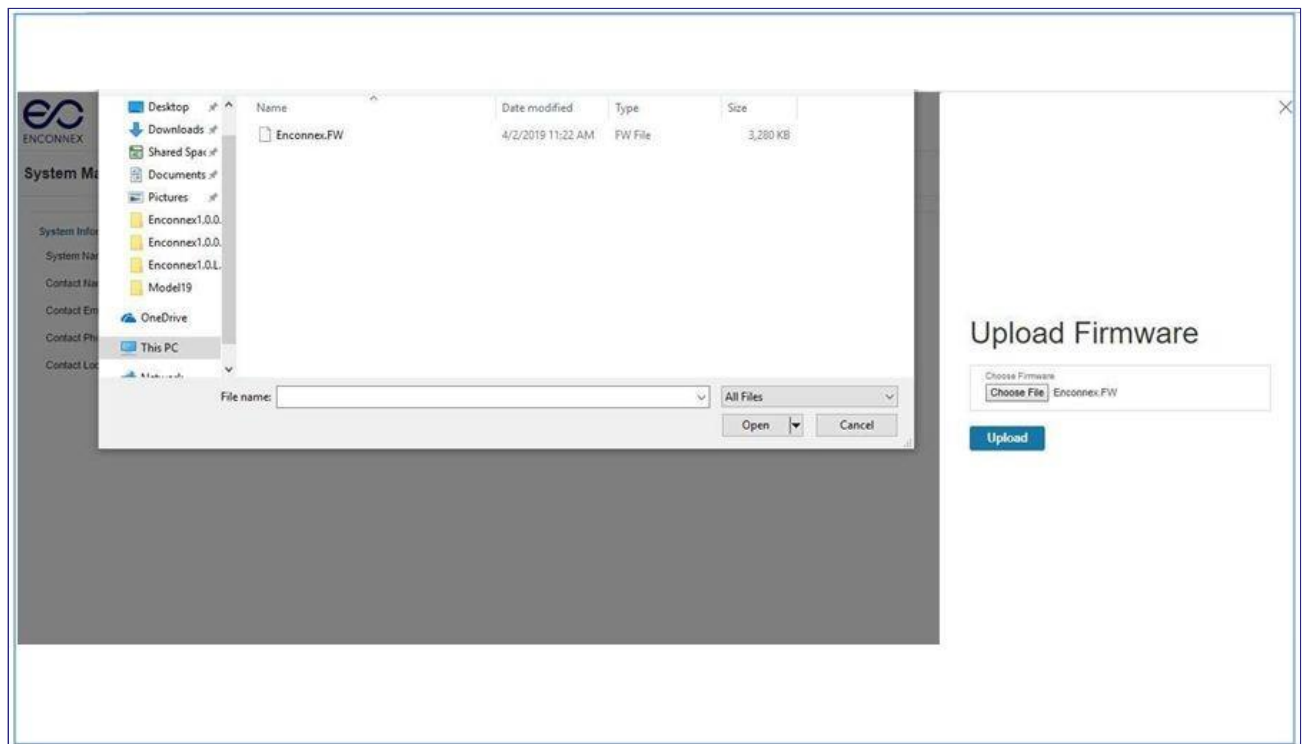
Appendix B: Firmware Update Procedure

USB Method

1. Go to <https://www.enconnex.com/contact-us> / and download the most recent firmware version, enconnex.fw Save this file to a USB drive.
2. Insert the USB drive into the USB port of the Intelligent Network Controller.
3. Enter USB mode on the PDU: Press Select. Go to Setup>USB>Yes. Select Yes to confirm entering USB mode.
4. Select F/W Up>Yes to upload the new firmware.
5. The OLED will show the firmware update progress.
6. When the update is complete, remove the USB.
7. From the USB Menu, select Quit to exit USB mode. Select Yes to confirm exit.
8. The PDU will automatically reboot.
9. To confirm that the firmware was uploaded successfully, go to Setup>Device>Firmware.

Web Interface Method

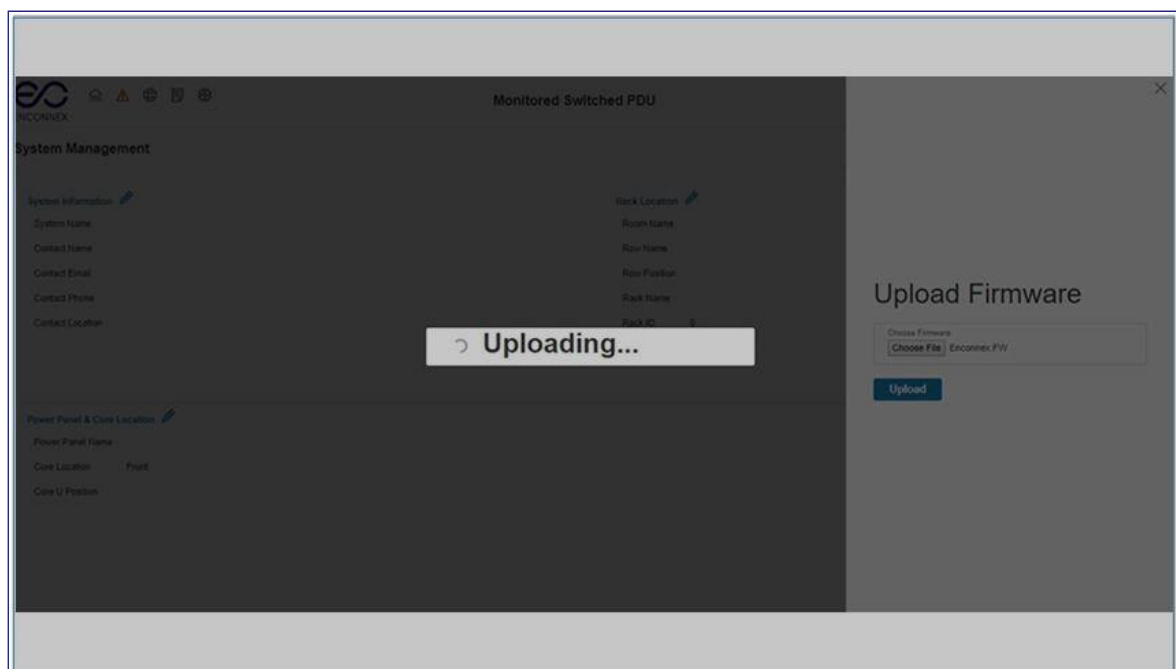
1. Open the User interface in a web browser by entering the PDU IP address.
2. Login to with administration credentials.
3. Go to System Management >Update Firmware.
4. In the Firmware Update dialog box, browse to <https://www.enconnex.com/contact-us/> firmware file.



Appendix B Figure 1: Upload Firmware

NOTE: the firmware file must be named enconnex.fw

5. Select Upload. The system will update the newest firmware to the Intelligent Network Controller.



Appendix B Figure 2: Uploading Firmware

6. When the upload is finished, the system will reboot automatically.

FTPS Method

To access a PDU using a FTPS program, FTPS must be enabled through the PDU Web Interface or CLI. In the Web Interface, go to Network Settings >SSH/FTPS Configuration. Select the check box to enable FTPS Access. In the CLI, login as an administrator and use the command `net tcp ip FTPS open`

1. Login to a FTPS program using a role with administrator privileges.
2. Transfer the updated `enconnex.fw` file to the folder labeled `fw`. Close the FTPS.
3. Connect to the PDU via SSH using a program such as HyperTerm or PuTTY.
4. Login using a role with administrator privileges.
5. Enter the command `sys upd all`.
6. It will show the message: System will enter upgrade mode after reboot, System Reboot now, Are you sure? (Y/N).
7. Enter Y.
8. When the upload is finished, the system will reboot automatically. It is not always required to update Web or Bootloader files when the firmware is updated. However, a user can upload these file types in SSH:
 - a. Login to a FTPS program.
 - b. Overwrite the outdated files with the updated web files (found on the customer login at <https://www.enconnex.com/contact-us/> or from your Enconnex contact).

Bootloader Mode

1. Go to <https://www.enconnex.com/contact-us/> and download the most recent firmware version, `enconnex.fw`. Save this file to a USB drive.
2. Insert the USB drive into the USB port of the Intelligent Network Controller.
3. Enter USB mode on the PDU: Press Select. Go to Setup>USB>Yes. Select Yes to confirm entering USB mode.
4. Select F/W Up>Yes to upload the new firmware.
5. The OLED will show the firmware update progress.
6. When the update is complete, remove the USB.
7. From the USB Menu, select Quit to exit USB mode. Select Yes to confirm exit.
8. The PDU will automatically reboot.
9. To confirm that the firmware was uploaded successfully, go to Setup>Device>Firmware.

Firmware Recovery with Bootloader Mode

Firmware, configuration files, and bootloader files can be updated following the steps above, but each update type must be done separately. Web files can be updated in conjunction with any of the other updates. I.e., a user can update firmware and web files in a single step. But firmware and configuration files must be done separately.

Appendix C: System Recovery

Upgrade Configuration with Bootloader Mode

To make the PDU accessible through the USB port on the unit, you must:

1. Go to Device Configuration > USB Settings.
2. Select the Enable USB Access Checkbox.

To upload configuration, you must:

1. Copy conf.ini to USB.
2. Insert USB to PDU.
3. Enter USB mode in OLED device.
4. Select Conf up.
5. After the operation is completed, remove USB, and quit USB mode.

Appendix D: PDU Alarms

PDU Unit	PDU Unit Active Power Above upper critical PDU Unit Active Power Above upper warning PDU Unit Active Power Below lower warning PDU Unit Active Power Below Lower critical
Input Phase	Input Phase X Voltage Above upper critical Input Phase X Voltage Above upper warning Input Phase X Voltage Below lower warning Input Phase X Voltage Below lower critical Input Phase X Current Above upper critical Input Phase X Current Above upper warning Input Phase X Current Below lower warning Input Phase X Current Below lower critical
Circuit Breaker	Circuit Breaker X Current Above upper critical Circuit Breaker X Current Above upper warning Circuit Breaker X Current Below lower warning Circuit Breaker X Current Below lower critical Circuit Breaker Status ON Circuit Breaker Status OFF
Outlet	Outlet X Active Power Above upper critical Outlet X Active Power Above upper warning Outlet X Active Power Below lower warning Outlet X Active Power Below lower critical Outlet X Immediate ON Outlet X Delayed ON Outlet X Immediate OFF Outlet X Delayed OFF Outlet X Immediate REBOOT Outlet X Delayed REBOOT Outlet X Cancel Pending Command
External Sensor	External Sensor X (numerical) Above upper critical External Sensor X (numerical) Above upper warning External Sensor X (numerical) Below lower warning External Sensor X (numerical) Below lower critical External Sensor X (state) Alarmed External Sensor X (state) Communication Lost

System	System Event log Cleared System Data log Cleared System PDU configuration file Imported System PDU configuration file Exported System Firmware update completed System Firmware update failed System Firmware update started System Firmware Validation failed System an
	LDAP error occurred System Network interface link state is up System Sending SMTP message failed System Intelligent Network Controller reset System Intelligent Network Controller start System Communication Lost Daisy Chain state changed USB Port
User Activity	User Activity User X Authentication failure User Activity User X User logged in User Activity User X Session timeout User Activity User X User blocked
User Administration	User Administration Password changed User Administration Password settings changed User Administration User added User Administration User deleted User Administration User modified
Smart Rack Access	Smart Rack Access Door Open Smart Rack Access Door Closed Smart Rack Access User Card Swiped Smart Rack Access Door Auto Locked

Appendix D Table 1: PDU Alarms

Trap Codes assigned to Alarms List

Trap codes assigned for critical alarms:

Trap Class	Trap Code	Trap Description
Critical	1	The PDU unit power is Above critical threshold value.

Critical	2	The PDU unit active power is BELOW critical threshold value.
Critical	3-5	The phase (1-3) voltage is ABOVE critical threshold value.
Critical	6-8	The phase (1-3) voltage is BELOW critical threshold value.
Critical	9-11	The phase (1-3) current is ABOVE critical threshold value.
Critical	12-14	The phase (1-3) current is BELOW critical threshold value.
Critical	15-26	The circuit breaker (1-12) current is ABOVE critical threshold value.
Critical	27-38	The circuit breaker (1-12) current is BELOW critical threshold value.
Critical	39-50	The circuit breaker (1-12) is in OFF state.
Critical	51-98	The outlet (1-48) active power is ABOVE critical threshold value.
Critical	99-146	The outlet (1-48) active power is BELOW critical threshold value.
Critical	147-154	The sensor (1-8) temperature/humidity is ABOVE critical threshold value.
Critical	155-162	The sensor (1-8) temperature/humidity is BELOW critical threshold value.
Critical	163-170	The sensor (1-8) contact state is in alarm.

Critical	183	User authentication failed.
Critical	186	Power or relay communication lost to main board.
Critical	193	Firmware update failed.

Appendix D Table 2: Trap Codes: Critical Class

Trap Class	Trap Code	Trap Description
Warning	200	The PDU unit active power is ABOVE warning threshold value.
Warning	201	The PDU unit active power is BELOW warning threshold value.
Warning	202-204	The phase (1-3) voltage is ABOVE warning threshold value.
Warning	205-207	The phase (1-3) voltage is BELOW warning threshold value.
Warning	208-210	The phase (1-3) current is ABOVE warning threshold value.
Warning	211-213	The phase 1 current is BELOW warning threshold value.
Warning	214-225	The circuit breaker (1-12) current is ABOVE warning threshold value.
Warning	226-237	The circuit breaker (1-12) current is BELOW warning threshold value.
Warning	238-249	The circuit breaker (1-12) is in OFF state.

Warning	250-297	The outlet (1-48) active power is ABOVE warning threshold value.
Warning	298-345	The outlet (1-48) active power is BELOW warning threshold value.
Warning	346-353	The sensor (1-8) temperature/humidity is ABOVE warning threshold value.
Warning	354-361	The sensor (1-8) temperature/humidity is BELOW warning threshold value.

Appendix D Table 3: Traps Codes:Warning Class

Trap Class	Trap Code	Trap Description
Informational	380-391	The circuit breaker (1-12) is in ON state.
Informational	392-439	The outlet (1-48) IMMEDIATE ON occurred.
Informational	440-487	The outlet (1-48) DELAYED ON occurred.
Informational	488-535	The outlet (1-48) IMMEDIATE OFF occurred.
Informational	536-583	The outlet (1-48) DELAYED OFF occurred.
Informational	584-631	The outlet (1-48) IMMEDIATE REBOOT occurred.
Informational	632-679	The outlet (1-48) DELAYED REBOOT occurred.
Informational	680-727	The outlet (1-48) Cancel Pending Commands occurred.

Informational	728-735	The sensor (1-8) contact state is in cleared state.
Informational	740	Event log Cleared.
Informational	741	Data log Cleared.
Informational	742	PDU configuration file Imported.
Informational	743	PDU configuration file Exported.
Informational	744	Firmware update completed.
Informational	745	Firmware update started.
Informational	746	An LDAP error occurred.
Informational	747	Network interface link state is up.
Informational	748	Communication Module reset.
Informational	749	Communication Module start.
Informational	750	Daisy Chain state changed.
Informational	751	USB Port Enabled.
Informational	752	User xxx logged in.
Informational	753	User xxx session timeout.
Informational	754	User xxx blocked.
Informational	755	User xxx password changed.
Informational	756	User password settings.
Informational	757	User xxx added.

Informational	758	User xxx deleted.
Informational	759	User xxx modified.
Informational	761	Smart Rack Access Door Opened.
Informational	762	Smart Rack Access Door Closed.
Informational	763	Smart Rack Access User Card Swiped.
Informational	764	Smart Rack Access Door Auto-locked.

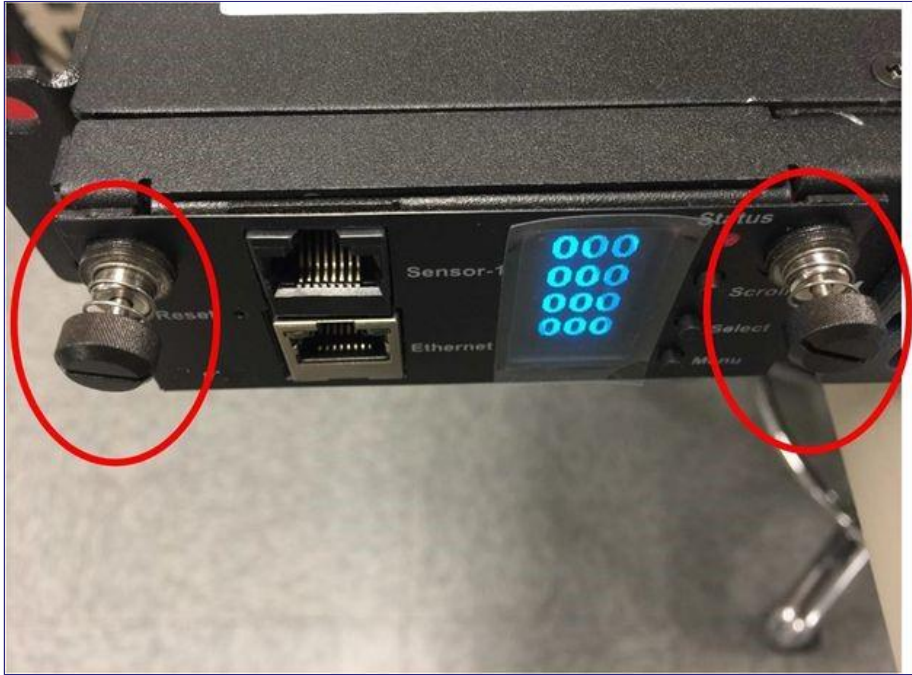
Appendix D Table 4: Trap Codes: Informational Class

Trap Class	Trap Code	Trap Description
Clear	770	The PDU unit active power is alarm clear.
Clear	771-773	The phase (1-3) voltage alarm cleared.
Clear	774-776	The phase (1-3) current alarm cleared.
Clear	777-788	The circuit breaker (1-12) current alarm cleared.
Clear	789-836	The outlet (1-48) active power current alarm cleared.
Clear	837-844	The sensor (1-8) temperature/humidity alarm cleared.

Appendix D Table 5: Trap Codes: Clear Class

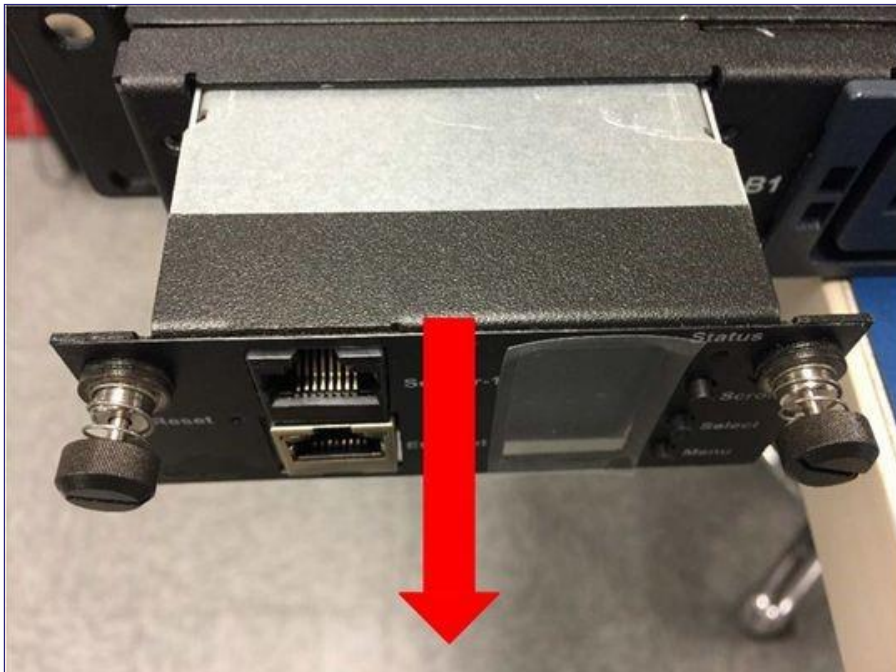
Appendix E: Horizontal Intelligent Network Controller Replacement

1. Unscrew the left and right captive nuts on the Intelligent Network Controller by turning them counter clockwise.



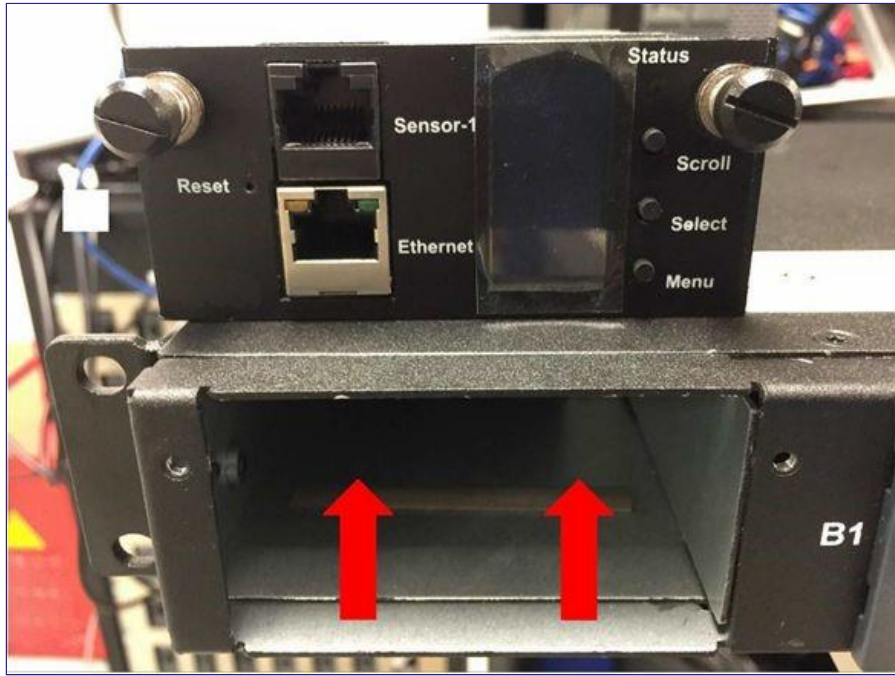
Appendix E Figure 1: Unscrew Intelligent Network Controller 2.

Pull out the Intelligent Network Controller from the PDU.



Appendix E Figure 2: Remove Intelligent Network Controller from PDU

3. Insert the new Intelligent Network Controller.



Appendix E Figure 3: Inserting New Intelligent Network Controller

4. Align the Intelligent Network Controller and tighten the captive nuts by turning them clockwise.

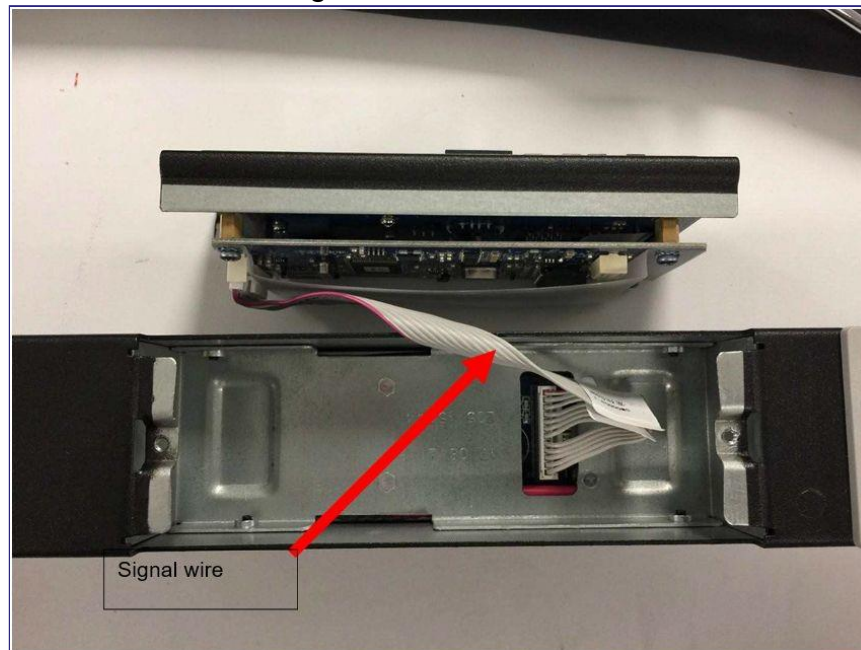
Appendix F: Vertical Intelligent Network Controller Replacement

1. Use a T10 Torx screwdriver to remove the top and bottom screws from the Intelligent Network Controller.



Appendix F Figure 1: Removing Top and Bottom Screw from Intelligent Network Controller

2. Disconnect the existing signal wire from the Intelligent Network Controller. Connect the signal wire to the new Intelligent Network Controller.



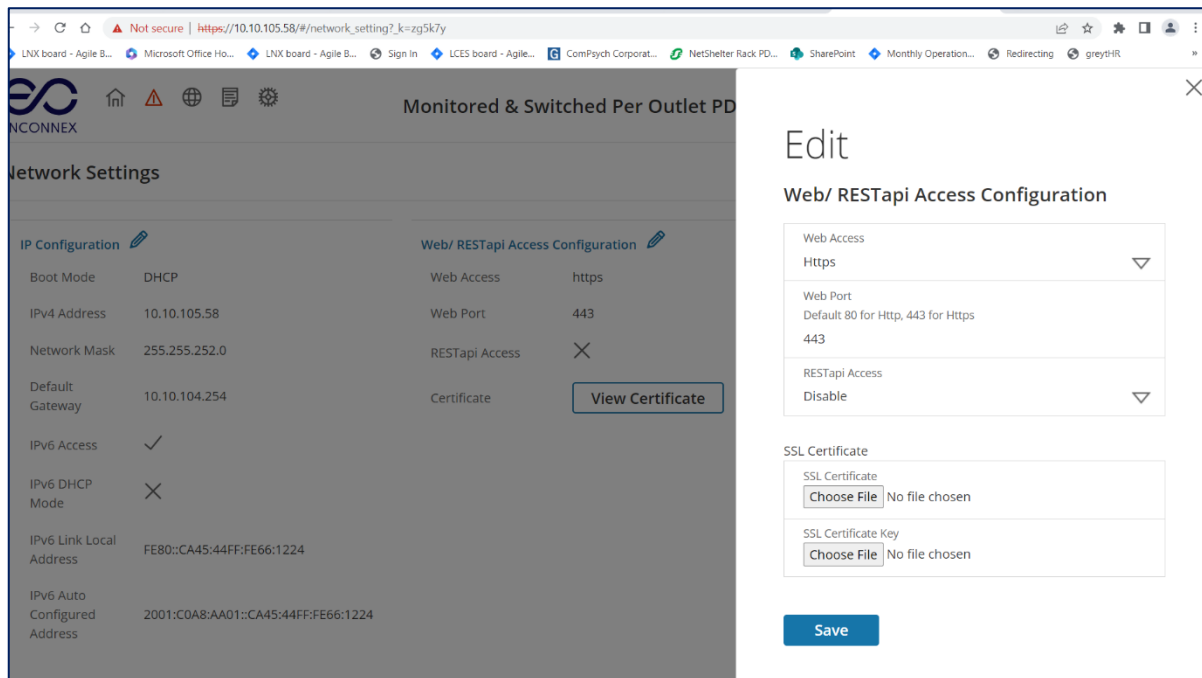
Appendix F Figure 2: Disconnecting and Reconnecting the Intelligent Network Controller

3. Replace and tighten the two screws on the replacement Intelligent Network Controller into the PDU.

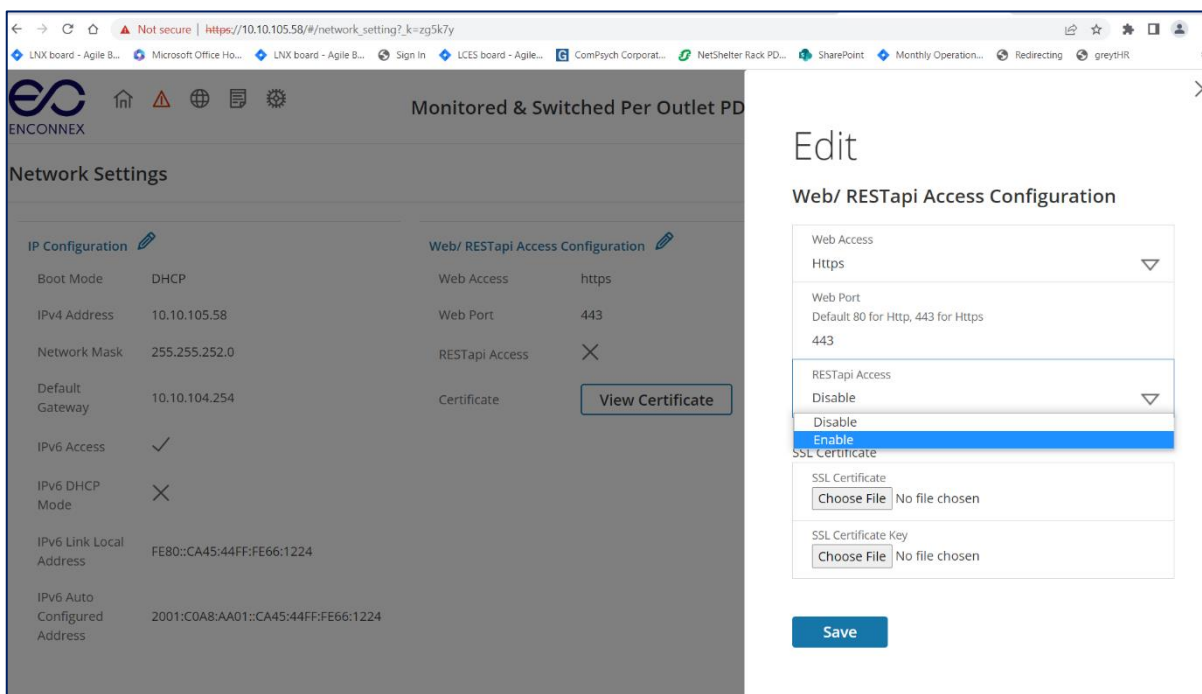
Appendix G: Redfish API

Redfish API is tested using POSTMAN, which is a Google Chrome extension app for GET, POST and DELETE method requests.

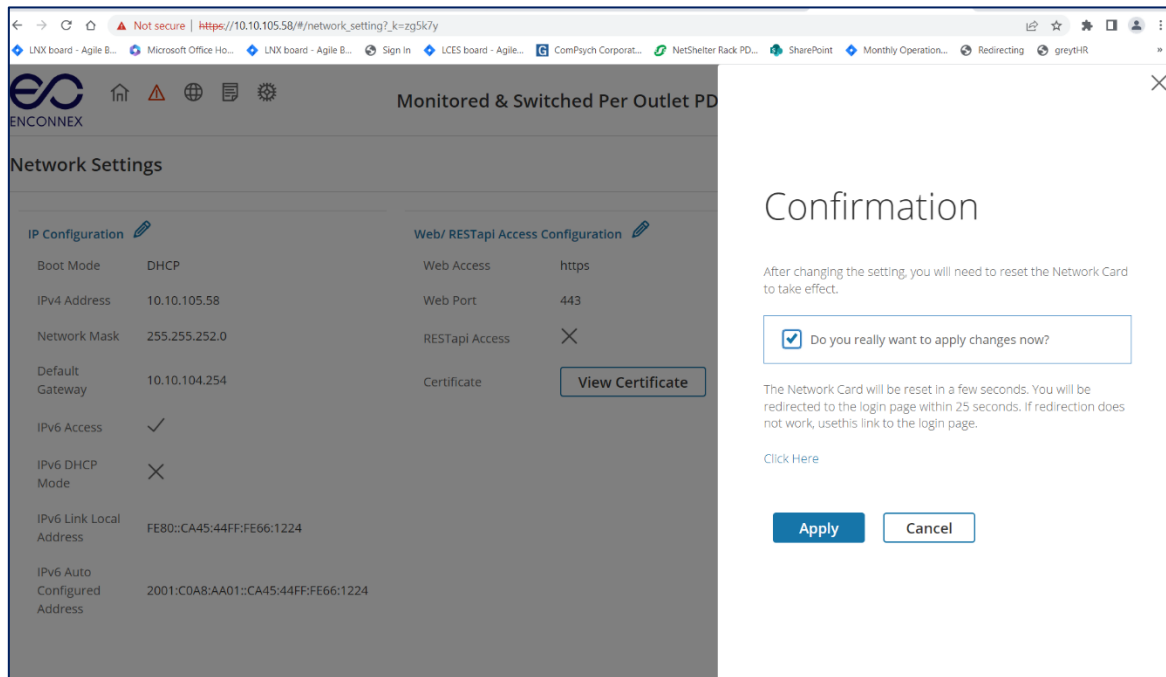
1. To setup Redfish access, type the PDU IP in chrome and login to the PDU using the credentials.
2. Go to Network Settings and enable RESTapi Access Configuration.



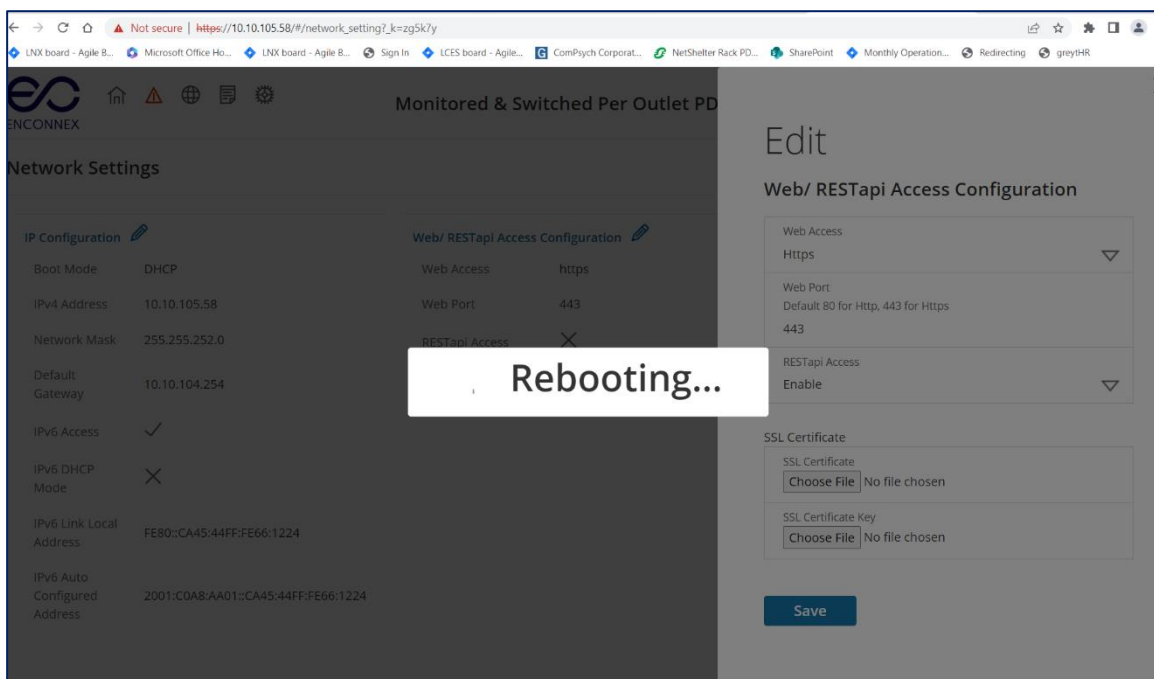
3. In the drop down, select Enable.



4. Click Save, Confirm and apply changes. The PDU will reboot
5. Click Apply, to confirm the changes.



6. The PDU will reboot



7. Login to the PDU using the credentials, the tick mark indicates that RESTapi Access is enabled.

ENCONNEX

Home

Warning

Network

Documents

Settings

Monitored & Switched Per Outlet PDU

Search

admin

Network Settings

Actions

IP Configuration

Boot Mode

DHCP

IPv4 Address

10.10.105.58

Network Mask

255.255.252.0

Default Gateway

10.10.104.254

IPv6 Access

✓

IPv6 DHCP Mode

✗

IPv6 Link Local Address

FE80::CA45:44FF:FE66:1224

IPv6 Auto Configured Address

2001:C0A8:AA01::CA45:44FF:FE66:1224

Web/ RESTapi Access Configuration

Web Access

https

Web Port

443

RESTapi Access

✓

Certificate

View Certificate

SSH/FTPs Configuration

SSH Access

✓

SSH Port

22

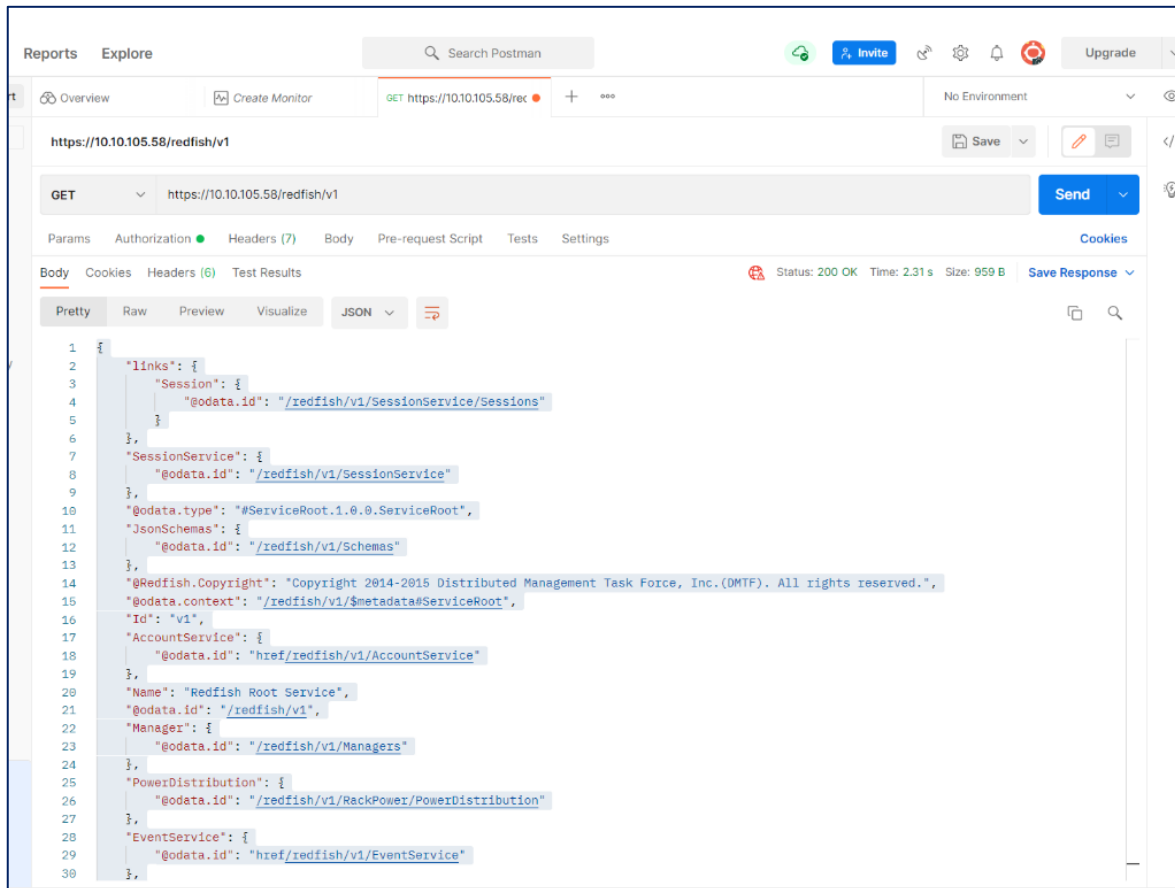
FTPs Access

✓

FTPs Port

21

8. Open POSTMAN app. Add the basic authentication header, which is required for all the query requests.
9. For GET request, type the URL request, basic authentication header with username and password and query the request.



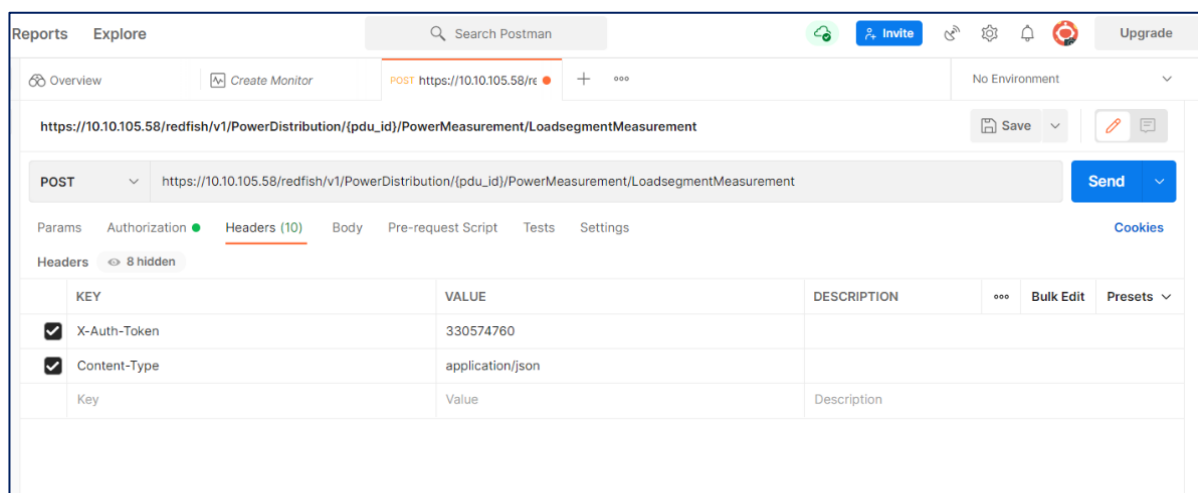
For POST request, include the icon object type along with the basic authentication header

Create a session using POST method:

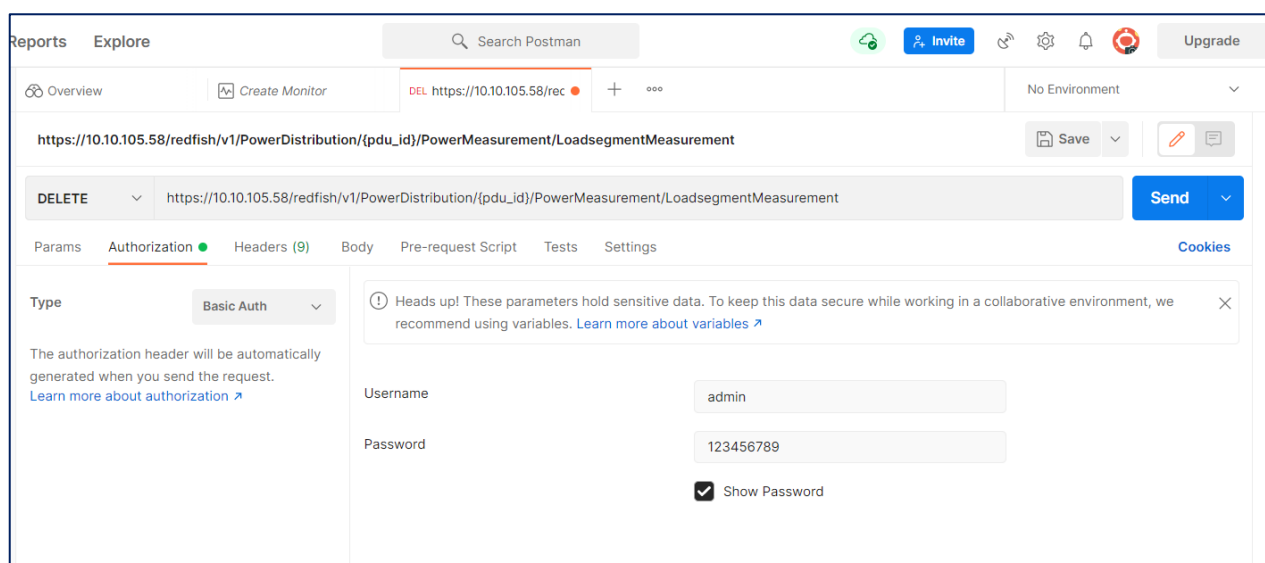
POST query the URL `http://{pdu_ip}/redfish/v1/SessionService/Sessions` along with the two headers (basic auth and json object type) and the body:

```
{
  "username": "admin",
  "password": "123456789"
}
```

Use the X-Auth Token from the response body along with the other two headers and basic authentication for any POST requests (Refer Error! Reference source not found.).



For DELETE request, type the URL for session or users want to delete along with the basic authentication and send.



Appendix H: Redfish API URLs

Redfish API Supported with GET Method

Session Service

S.No	URL
1	/redfish/v1/SessionService
2	/redfish/v1/SessionService/Sessions
3	/redfish/v1/SessionService/Sessions/{session_ids}

Account Service

S.No	URL
1	/redfish/v1/AccountService
2	/redfish/v1/AccountService/Accounts
3	/redfish/v1/AccountService/Accounts/{username}
4	/redfish/v1/AccountService/Roles
5	/redfish/v1/AccountService/Roles/{rolename}

Managers

S.No	URL
1	/redfish/v1/Managers
2	/redfish/v1/Managers/manager
3	/redfish/v1/Managers/1/NetworkService
4	/redfish/v1/Managers/1/LogServices

Power Distribution

S.No	URL
1	/redfish/v1/PowerDistribution/{pdu_id}<1>
2	/redfish/v1/PowerDistribution/{pdu_id}/PowerMeasurement/OutletMeasurement
3	/redfish/v1/PowerDistribution/1/PowerControl/LoadSegmentControl
4	/redfish/v1/PowerDistribution/1/PowerControl/OutletControl
5	/redfish/v1/PowerDistribution/{pdu_id}/PowerMeasurement/Loadsegment/{loadsegment_id}/OutletMeasurement
6	/redfish/v1/PowerDistribution/{pdu_id}/PowerMeasurement/LoadsegmentMeasurement
7	/redfish/v1/PowerDistribution/pdu_id}/PowerControl/Loadsegment/{loadsegment_id}/OutletControl
8	/redfish/v1/EventService

Redfish API Supported with POST Method

POST Response

S.No	URL
1	/redfish/v1/PowerDistribution/{pdu_id}/PowerControl/Loadsegment/{loadsegment_id}/OutletControl
2	Disable/Enable all the outlets using Redfish POST method
3	/redfish/v1/AccountService/Accounts
4	/redfish/v1/SessionService/Sessions

Redfish API Supported with DELETE Method

DELETE Response

S.No	URL
1	/redfish/v1/AccountService/Accounts/{username}
2	/redfish/v1/SessionService/Sessions/{session_id}