Polar PDU User's Manual

Version 6.0
May 2014

SUBZERO ENGINEERING

support@subzeroeng.com
www.subzeroeng.com

Rev.7 08/14

Table of Contents

INTRODUCTION

This document is the User's Manual for Subzero Engineering Polar Power Distribution Units (PDU).

Polar PDU User Manual

UL Listed for use in US and Canada

Legal Information

The information contained in this guide is subject to change without notice. Subzero Engineering shall not be liable for technical or editorial errors or omissions contained herein; nor is it liable for any injury, loss, or incidental or consequential damages resulting from the furnishing, performance, or use of this material and equipment.

Warranty

Subzero Engineering guarantees manufactured products and each part or component thereof against all defects in material and/or workmanship. Subzero agrees to remedy any manufacturing defect either through replacement or repair at no charge provided that the defective unit is returned, transportation prepaid, to the Subzero factory.

The warranty extends for a period of one year from the date of installation or initial use, provided that this period shall not exceed 18 months from the original date of shipment from the factory.

Any product that has been repaired or replaced shall be similarly warranted on its repair or replacement for the remaining product warranty period or 90 days from the date of repair or replacement, whichever expires last.

This warranty does not extend to products that have been subjected to neglect, accident or improper use, nor to units that have been altered by non-Subzero personnel.

No warranties other than those set forth in this section are given or implied with respect to the products furnished. Subzero shall, in no event, be liable for consequential damages, for loss, damage or expense directly or indirectly arising from the use of the products, for any inability to use materials or from any other cause.

Nomenclature

PDU: Polar Power Distribution Unit product
Socket/Receptacle/Outlet: Electrical output port
Primary Role: PDUs can be linked to share one network connection. The Primary Role indicates the PDU that is attached to the network and is the beginning of a daisy chain of up to 20 linked PDUs. There is only one Primary PDU in a daisy chain.
Secondary Role: Role assigned to a PDU that is 1) linked to the primary PDU, or 2) a stand-alone PDU.
Alternate Role: a second PDU connected to the network to provide a backup network connection if the Primary PDU looses power.

PRODUCT FEATURES

Footprint:

Type: Vertical Mounted

Product Dimensions: 70.5” x 2.2” x 2.2” (1791 mm x 56 mm x 56 mm)
Shipping Dimension: 82” x 7.5” x 10” (2060 mm x 191 mm x 254 mm)
Shipping Weight: 25 lb (11.3 kg)

Product Dimensions: 72” x 2.4” x 2.2” (1829 mm x 60 mm x 56 mm)
Shipping Dimension: 84” x 9” x 10” (2134 mm x 229 mm x 254 mm)
Shipping Weight: 25 lb (11.3 kg)

Product Dimensions: 75” x 2.7” x 2.2” (1829 mm x 69 mm x 56 mm)
Shipping Dimension: 89” x 10” x 10” (2261 mm x 254 mm x 254 mm)
Shipping Weight: 27 lb (12.2 kg)

Input Voltage:

110 – 415 Volts, varies by part number

Output Voltage:

110 – 240 Volts, varies by part number

Input/Output Configurations:

Single Phase 100-125 Volts input/output:
- Three conductor input cable (P + N + E)
- One or Two branch circuits: Branch A or Branch A and B.

Single Phase 200-240 Volts input/output:
- Three conductor input cable (2P + E)
- One or Two branch circuits: Branch A or Branch A and B.

Three Phase Delta – 208 Volt input/output
- Four conductor input cable (3P + E)
- Three and six branch circuits: Branch XY, YZ, ZX

Three Phase WYE – 208 Volt input/ 208 Volt and/or 120 Volt output
- Five conductor input cable (3P + N + E)
- Three branch circuits: Branch XY, YZ, ZX and/or XN, YN, ZN

Three Phase WYE 380-415 Volts input – 208 Volt output
- Five conductor input cable (3P + N + E)
- Three and six branch circuits: Branch XN, YN, ZN

Power Input Cable:

Length: Standard: 10 ft (3 m)
Gauge: 6 – 12 AWG, varies by part number
Plug type: Current, Voltage and Configuration dependent, varies by part number
Some PDUs have an IEC C20 Input and do not include a power input cable.

Circuit Breakers:

Type: Single or Double Pole Electro-hydraulic UL489 listed Breakers
Quantity: One, Two, Three or Six, varies by part number
Rating: 16 Amperes or 20 Amperes, varies by part number

Receptacles:

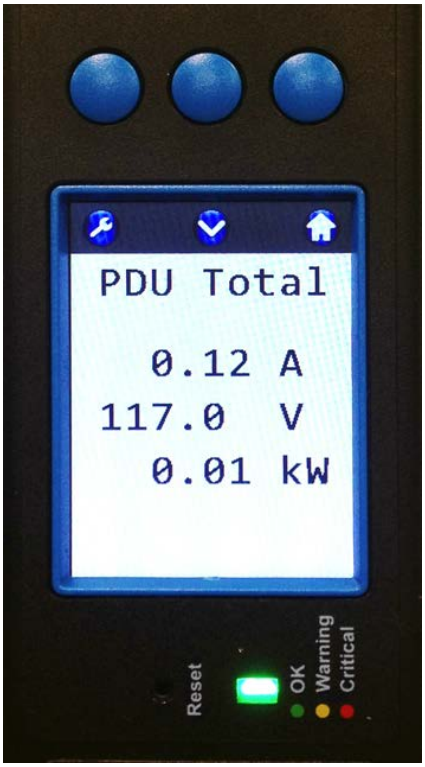
Types: NEMA, IEC, varies by part number
Quantity: 24 to 42, varies by part number
Rating: 15 Amperes or 20 Amperes, varies by part number

Mounting

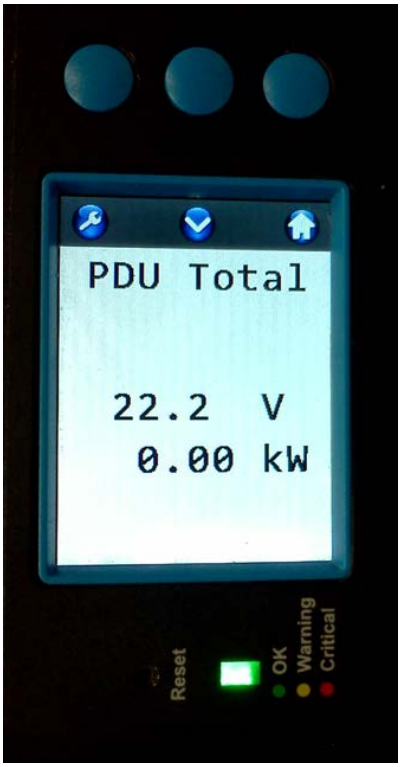
Mounting style: 2 x Tool-less Buttons on the PDU rear cover
Distances: 61.25” (1556 mm) and 64.75” (1645 mm) apart
Positions: 4 mounting positions (A1, A2, B1, B2)

LCD local display with push button control:

Dimension: 1.5” x 2.0” (38 mm x 51 mm)
Resolution: 240 x 320



Single-Phase PDUs



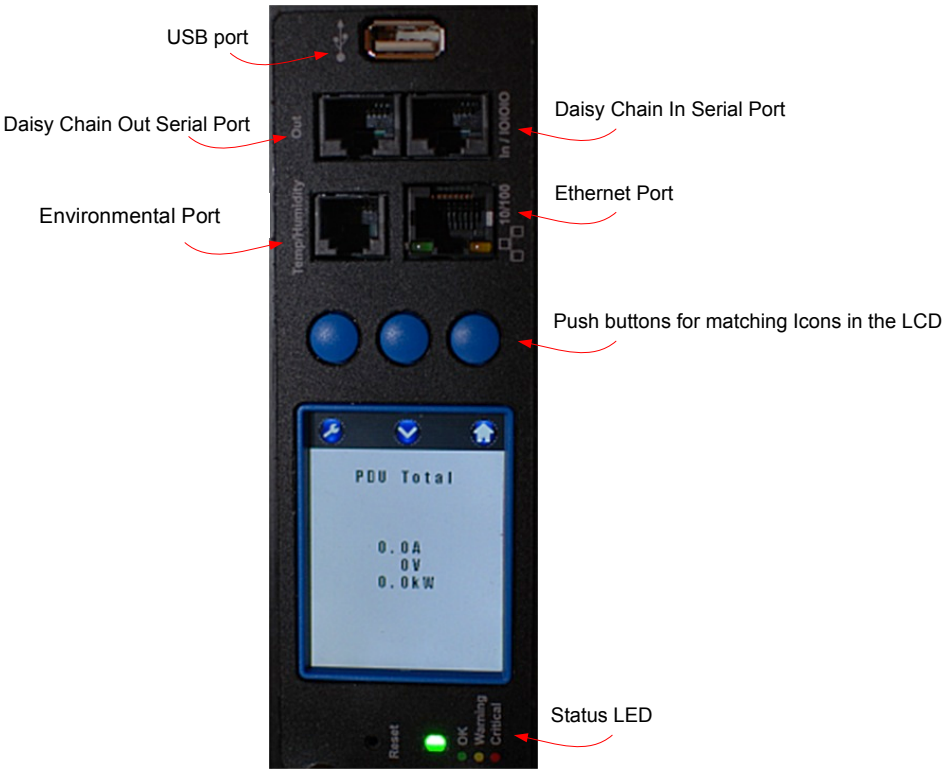
Three-Phase PDUs

USB port:

Quantity: 1
Function: SUBZERO Software and Firmware upgrades

Daisy Chain/PDU Linking/Serial Port:

Connector type: (2) RJ45 (1combo Link In/Serial and 1 Link Out)
Function: Serial Communication and PDU Linking Feature through Cat 5/6 cable



Environmental port:

Connector type: (1) RJ11
Connection: 1 or 2 Environmental probes (ordered separately)
(order two probes with a splitter P/N 6.0.003.001 to connect two probes).
Environmental Sensing: Temperature (°F or °C) and Relative Humidity (%)

Ethernet port:

Connector type: (1) RJ45
Speed: 10/100 Megabit/sec
Support: IPv6; IPv4; SNMP v1, v2, v3.

PRODUCT LABELING AND CERTIFICATIONS

CE	The presence of the CE Mark on equipment means that it has been designed, tested and certified as complying with all applicable European Union (CE) regulations and recommendations.
CSA	An authorized testing laboratory has evaluated a sample of the product to determine that it meets applicable national standards
ETL C US Intertek	Product compliance (electrical, gas and other safety standards) to North American safety standards
FC ICES-003 Class A "I.T.E." Tested to Comply With FCC Standards	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
N	Nemko has tested or certified the product according to national standards official safety regulations in Norway
c UL us LISTED	Samples of this product met UL's safety requirements for US and Canada.
	Do not dispose this product as unsorted municipal waste.

PDU MODELS

Basic (Subzero P/Ns: 6.1.X.XXX.XX.XX):

No local or remote monitoring available. Does not have display or connections.

Monitored (Subzero P/Ns: 6.3.X.XXX.XX.XX):

Local LCD display and remote monitoring via IP, Serial, SNMP
Local and remote monitoring of total PDU Amperage, Power and Voltage on Single-Phase PDUs; Power and Voltage on Three-Phase PDUs.
Local and remote branch circuit monitoring of Amperage, Power, Voltage and Power Factor at each breaker
PDU Linking capability up to 20 units
Optional local and remote environmental monitoring of Temperature and Humidity, requires an external sensor (P/N 6.0.003.001, ordered separately)

Monitored-Plus (Subzero P/Ns: 6.4.X.XXX.XX.XX):

Local LCD display and remote monitoring via IP, Serial, SNMP
Local and remote monitoring of total PDU Amperage, Power and Voltage on Single-Phase PDUs; Power and Voltage on Three-Phase PDUs.
Local and remote branch circuit monitoring of Amperage, Power, Voltage and Power Factor at each breaker
Local monitoring of Amperage at each outlet; remote monitoring of individual outlet Amperage, Power and Voltage at each outlet
PDU Linking capability up to 20 units
Optional local and remote environmental monitoring of Temperature and Humidity, requires an external sensor (P/N 6.0.003.001, ordered separately)

Switched (Subzero P/Ns: 6.5.X.XXX.XX.XX):

Local LCD display and remote monitoring via IP, Serial, SNMP
Local and remote monitoring of total PDU Amperage, Power and Voltage on Single-Phase PDUs; Power and Voltage on Three-Phase PDUs.
Local and remote branch circuit monitoring of Amperage, Power, Voltage and Power Factor at each breaker
Remote outlet control (ON/OFF) capability for every outlet
PDU Linking capability up to 20 units
Optional local and remote environmental monitoring of Temperature and Humidity, requires an external sensor (P/N 6.0.003.001, ordered separately)

Switched-Plus (Subzero P/Ns: 6.6.X.XXX.XX.XX):

Local LCD display and remote monitoring via IP, Serial, SNMP
Local and remote monitoring of total PDU Amperage, Power and Voltage on Single-Phase PDUs; Power and Voltage on Three-Phase PDUs.
Local and remote branch circuit monitoring of Amperage, Power Voltage and Power Factor at each breaker
Local monitoring of Amperage at each outlet; remote monitoring of individual outlet Amperage, Power and Voltage at each outlet
Remote outlet control (ON/OFF) capability for every outlet
PDU Linking capability up to 20 units
Optional local and remote environmental monitoring of Temperature and Humidity, requires an external sensor (P/N 6.0.003.001, ordered separately)

INSTALLATION CHECKLIST

Safety Warnings and Cautions

- DO NOT OPEN THE CHASSIS of a Polar PDU. There are no user serviceable parts within a Polar PDU. Opening or removing covers, receptacle plates, or other access points may expose you to dangerous shock hazards or other risks. Refer all servicing to qualified service personnel.
- Do not spill any liquids on the chassis.
- Do not insert objects of any kind into the Polar PDU chassis via vent holes or any openings as they may contact dangerous voltage points, which can be fatal or cause harmful electric shock, fire or equipment failure.
- Do not place any heavy objects on the power cord. Damage to the cord may cause shock or fire.
- PDU must be installed VERTICALLY in a RESTRICTED ACCESS LOCATION.
  - RESTRICTED ACCESS LOCATION: location for equipment where both of the following apply:
    - Access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken
    - Access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location
-  Hot surface warning label: The equipment may be hot under full load.

Additional Software

The Polar PDU can be configured, monitored and controlled using the built-in software as explained in this manual.

In addition to the software that is built-in to the Polar PDU, there are two other software programs that can be used for PDU configuration, monitoring and control.

- Polar Serial Communicator software allows you to monitor and configure PDUs using a direct serial connection. A Serial Setup Cable (SUBZERO P/N 6.0.000.004) is also required. Download from www.subzeroeng.com/PolarPDUs/Downloads

- Polar Firmware Upgrader software allows you to upgrade firmware over the network for multiple standalone and linked PDUs that have firmware version 1.17.227 or later. Download from www.subzeroeng.com/PolarPDUs/Downloads

INSTALLATION GUIDE

Preparation:

- Prepare a plan identifying where each rack device is to be connected to the PDU receptacle. For ease of power cord management, it is recommended to connect the rack device to the receptacle that is approximately at the same height.

- It is recommended to retain the PDU Ethernet Hardware Address (MAC address) available through the LCD display under PDU Info. It's recommended to record the PDU name, rack/cabinet name, location and MAC address for future reference.

- If the rack device has more than 1 input for power for purpose of redundancy, the power cables should be connected to different PDUs.

External Connections:

- Install the PDU into the cabinet and secure the PDU external ground wire to the cabinet ground stud

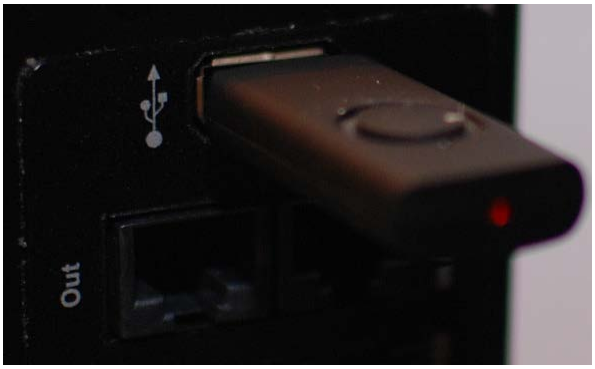
- Optional: In/ Serial Port:
    - For daisy chaining when linking PDUs, use a standard CAT5/6 cable.
    - For running the EPSerial.exe application, use Subzero serial cable (P/N 6.0.000.004).

- Optional: Ethernet Port: Connect to LAN. Use CAT5/6 cable.

- Optional: Environmental Probe Port.
  Use Environmental Probes with Splitter (P/N 6.0.000.001):

- Optional: Out Port: For daisy chaining when linking PDUs.
  Use a standard CAT5/6 cable.

- Optional: USB Port: For firmware upgrades. Use USB Flash Drive

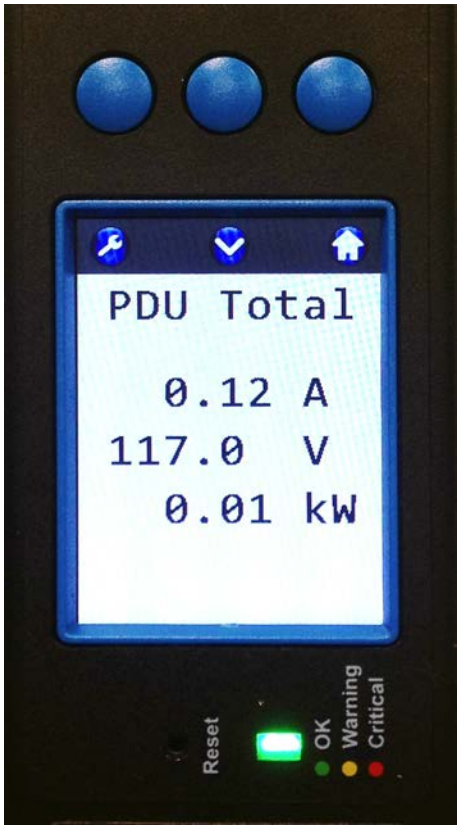


Energizing the PDU

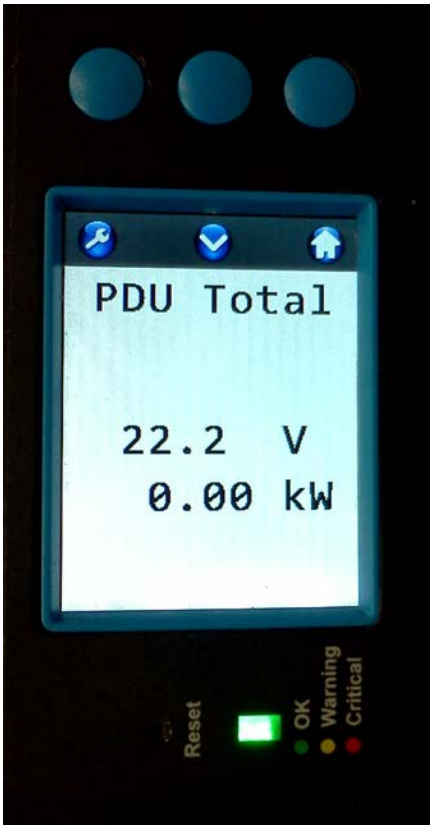
- Attach the input power cord to a matching power source
- The PDU status light will blink Green for approximately 60 seconds as the PDU is booting up
- A solid Green status light will follow with the LCD display coming on and displaying all zeroes
- Once the PDU is energized, connect cabinet devices to their respective outlets

USING THE LOCAL DISPLAY

The Polar PDU's multifunctional LCD display has a 240 x 320 pixel resolution and can be navigated by three soft buttons located immediately above the display.



Single-Phase PDU



Three-Phase PDU

The local interface can display the following information:

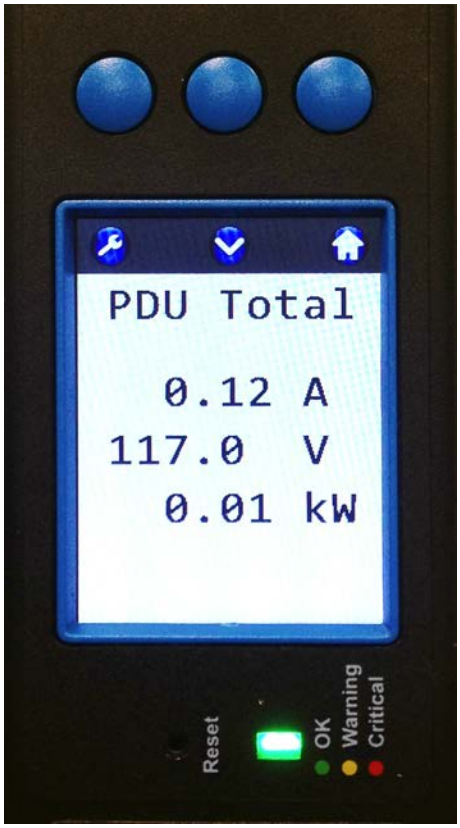
- Sum of Current, Voltage and Power values for Single-Phase PDUs
- Line Input Current and Sum of Voltage and Power values on Three-Phase PDUs
- Current, Voltage, Power and Power Factor values per Branch Breaker
- Temperature and Humidity values when optional environmental probes are attached
- Per Outlet Current on Monitored Plus (6.4.X.XXX.XX.XX) and Switched Plus (6.6.X.XXX.XX.XX) models
- Alarm Notification when pre-defined warning or critical thresholds are reached

The local interface can also be used to set up many functions of a Polar PDU as following:

- Network IP Setup (v4 and v6)
- Display Settings – Brightness, Timeout, Orientation
- PDU Role (Primary or Secondary)
- PDU Info

Basic Menu Navigation

The legend below explains the meaning of each button on the PDU display:



Note: Single-Phase PDU display shown.

Menu Button/Icon Definitions and Functions

Go to the Main Menu

Note: In daisy chained PDUs, the (blue) icon turns (green).

Note: The home icon turns (purple) during a firmware upgrade.

Select the highlighted menu item

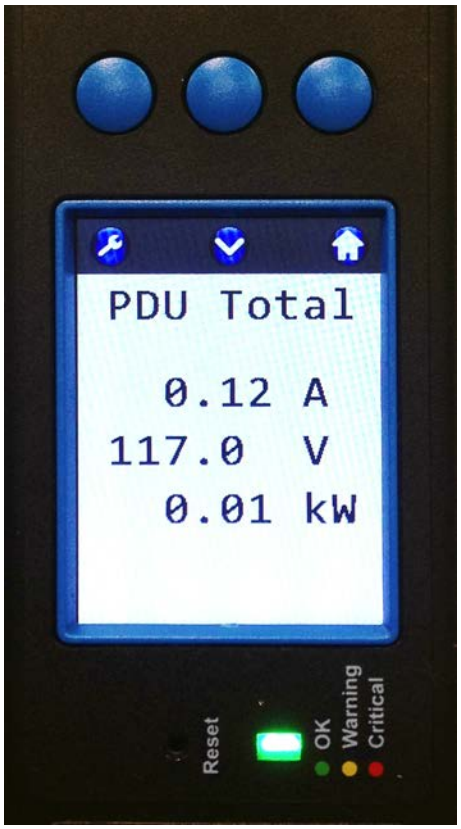
Go to Setup menu

Move highlighted menu item down or to the right

Move highlighted menu item up or to the left.

Monitoring PDU Conditions

The main screen on Single-Phase PDUs list total Amperage, Voltage and Power usage by equipment attached to the PDU. The main screen on Three-Phase PDUs lists total Voltage and Power usage by equipment attached to the PDU.



Single-Phase PDU

Three-Phase PDU

From the Main menu press the:

Left button to set up the PDU
Middle button to view the next data screen
Right button to go back to the Main Menu

On three-phase PDUs, the next screen gives total line input current values for each line.

Click on the middle button to view next data screen

Click on:

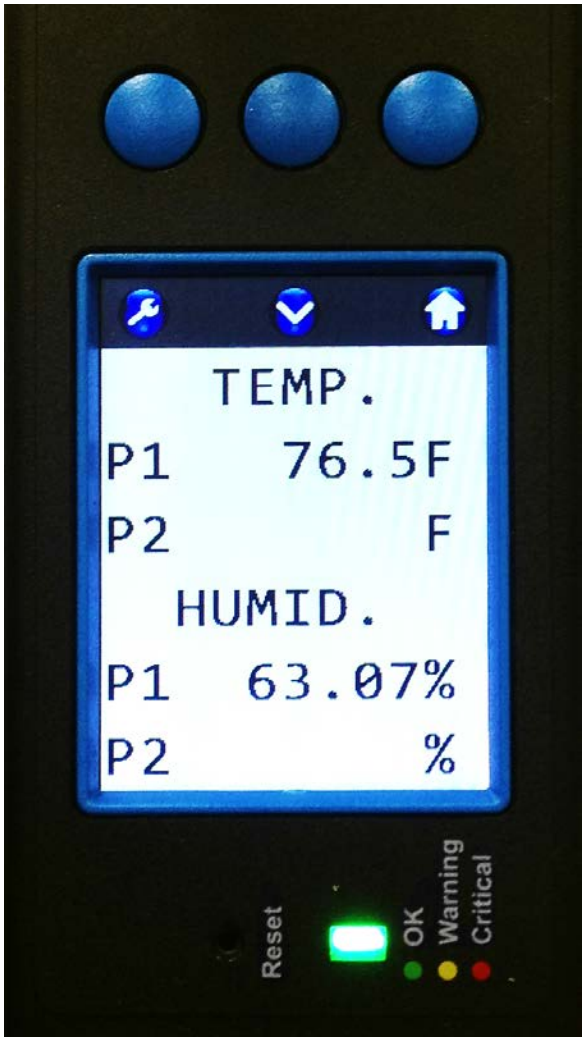
Left button to set up the PDU
Right button to go back to the Main Menu
Middle button to go to the next data screen.

The following screen(s) list branch circuit values (CB1, CB2 or XY, YZ, ZX).
There is one screen per phase/branch.

Click on:

Left button to set up the PDU
Right button to go back to the Main Menu
Middle button to scroll through the remaining screens.

After scrolling through the branch/phase screens, the PDU will display the Environment summary screen. Environmental Probes (P/N 6.0.000.001) must be attached to the PDU for Environmental values to display.



Click on the middle button to view next data screen
This will return to the PDU Total screen.

Click on:

Left button to set up the PDU
Right button to go back to the Main Menu

On Monitored Plus (6.4.X.XXX.XX.XX) and Switched Plus (6.6.X.XXX.XX.XX) PDUs, the following screen(s) list total current use for each outlet. Eight outlets are listed on each screen.

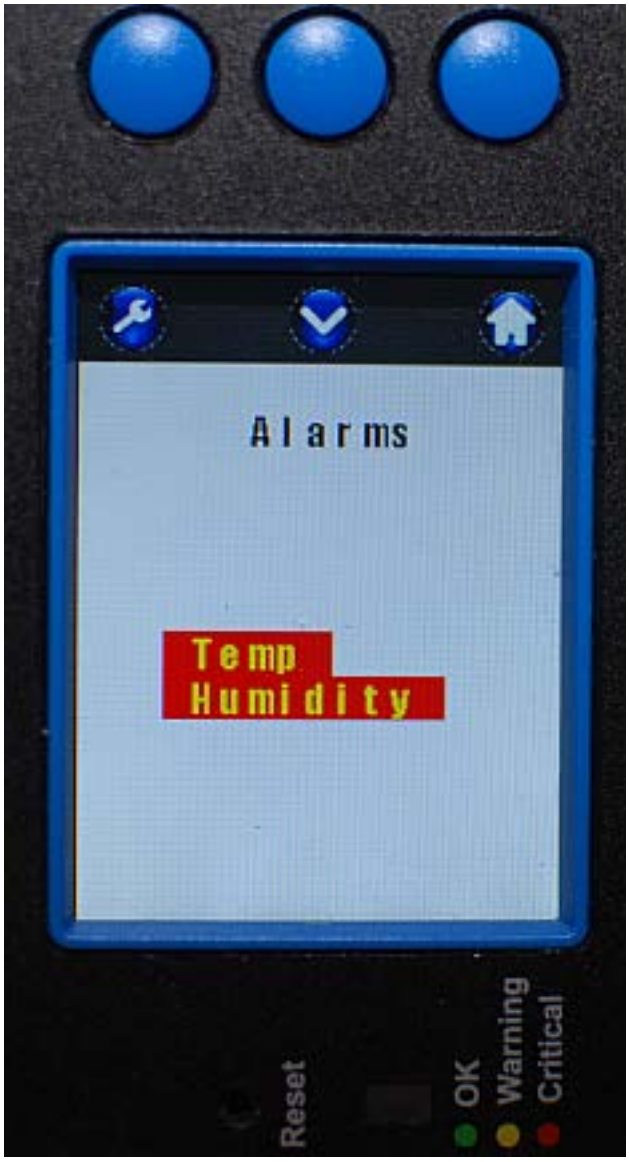
Click on the middle button to view next data screen

Click on:

Left button to set up the PDU
Right button to go back to the Main Menu
Middle button to go to the next data screen.

Alarms

When any alarm or warning threshold is hit, the Alarms summary will be displayed before the PDU Total values when the **Home Icon is selected**.

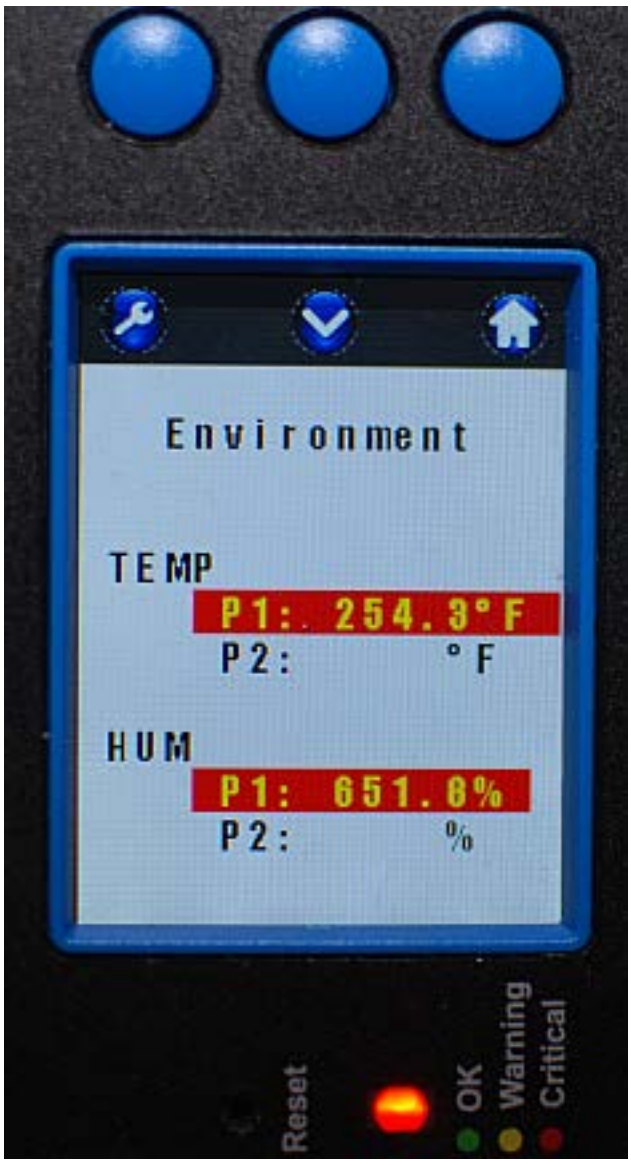


Color codes:
Text with Yellow background: Warning condition was reached
Text with Red background: Critical condition was reached.

Click on:

Left button to access the setup menu
Middle button to view additional summary screens
Right button to return to the home (this) screen

Additionally, when there is an alarm, the out of range measurements are highlighted on the respective summary screen, and the LED next to the display will flash.



Network Configuration

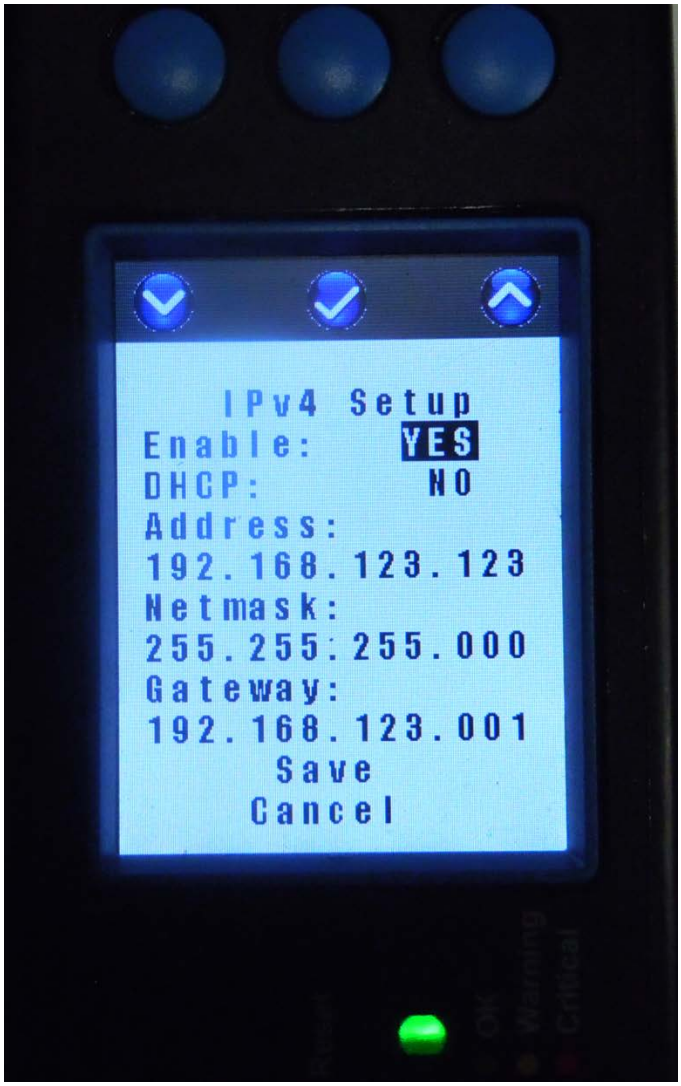
Select the **Left Button** to access the PDU Setup Menu.

Click on:

Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

Select **Exit** to exit this screen.

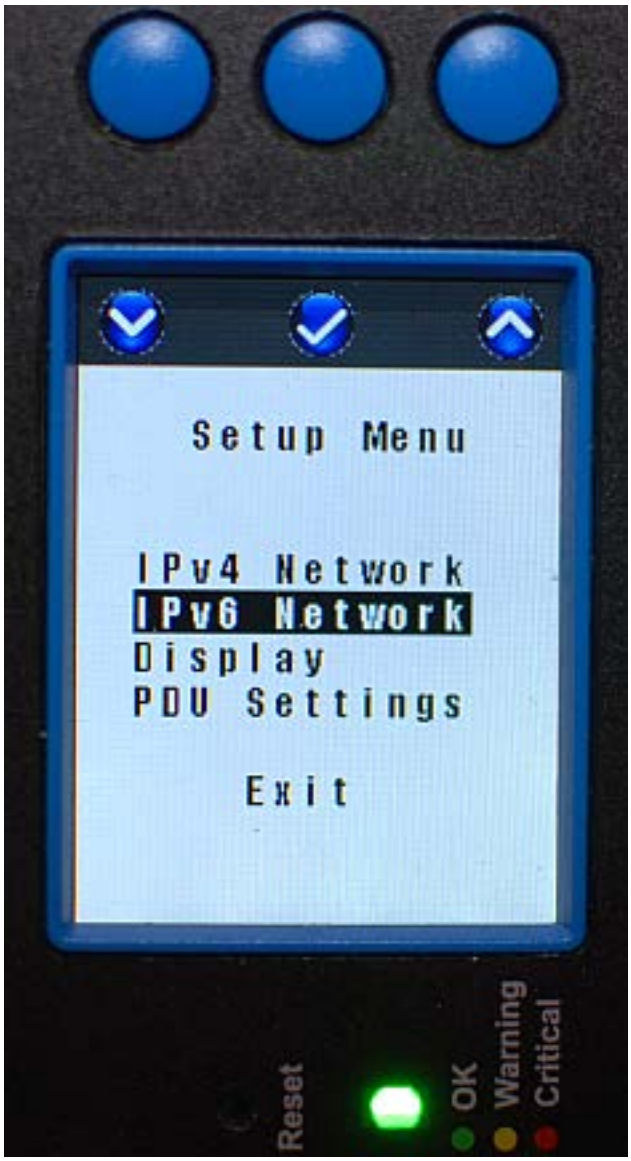
Click on middle button to set up IPv4 Network



Click on:

Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

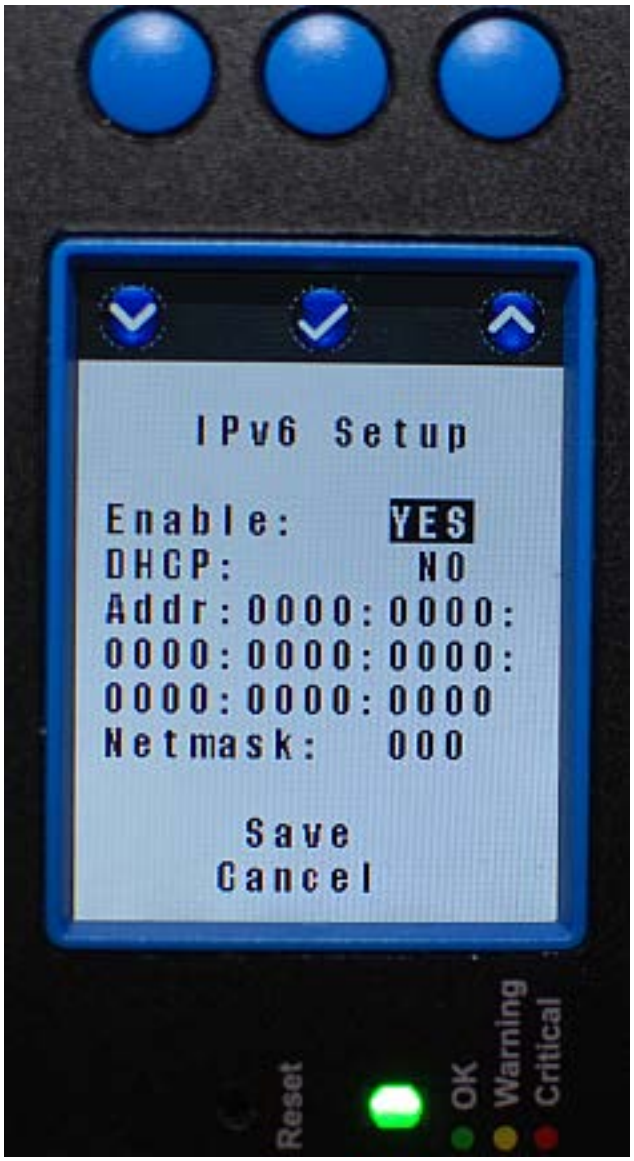
Select **Save** or **Cancel** to exit this screen.
Save updates IP information immediately.
Cancel makes no changes to the setup.



Return to the Setup Menu.
Use the Left Button to select IPv6 Network.
Click on middle button to set up IPv6 Network

Click on:

Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

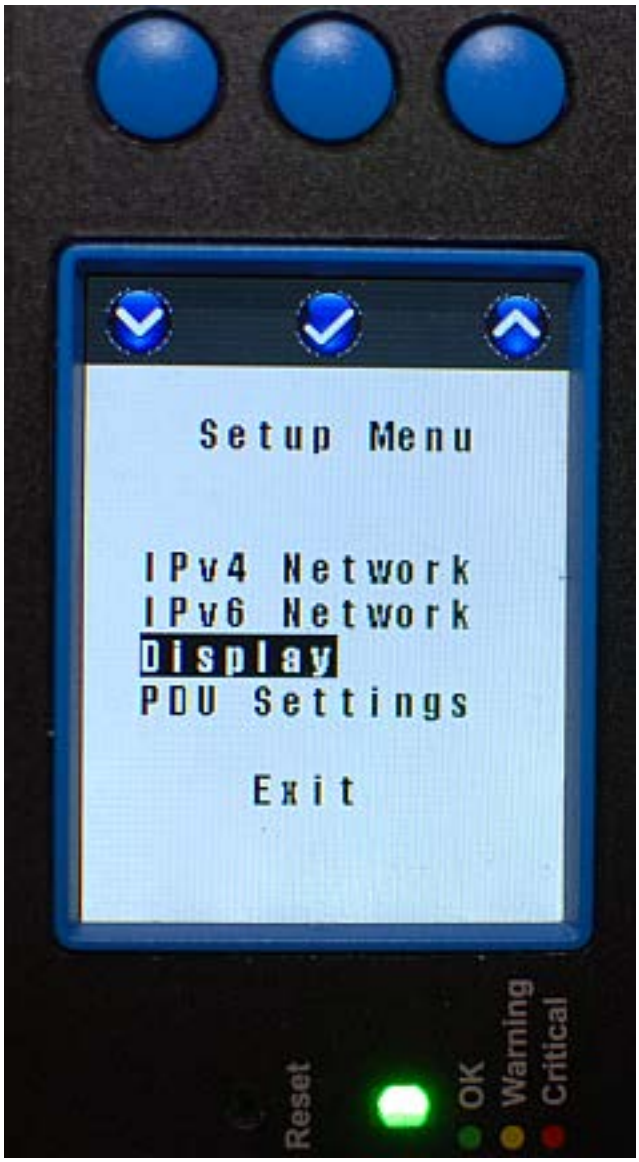


Click on:

Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

Select **Save** or **Cancel** to exit this screen.
Save updates IP information immediately.
Cancel makes no changes to the setup.

Display Setup



Return to the Setup Menu.
Use the Left button to select Display.
Click on middle button to set up the Display

Click on:

Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

Click on:
Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

Timeout – Controls how long display remains on (minutes)
Brightness – Controls display brightness (1-9)
Input Cord – Controls display orientation (TOP or BOT input cord location). This rotates the display 180° so that it can be easily read regardless of whether the PDU is mounted with the cord toward the top or bottom of the cabinet.
Outlet – Controls whether individual outlet current measurements are displayed (Show or Hide) on Monitored Plus (6.4.X.XXX.XX.XX) and Switched Plus (6.6.X.XXX.XX.XX) models.

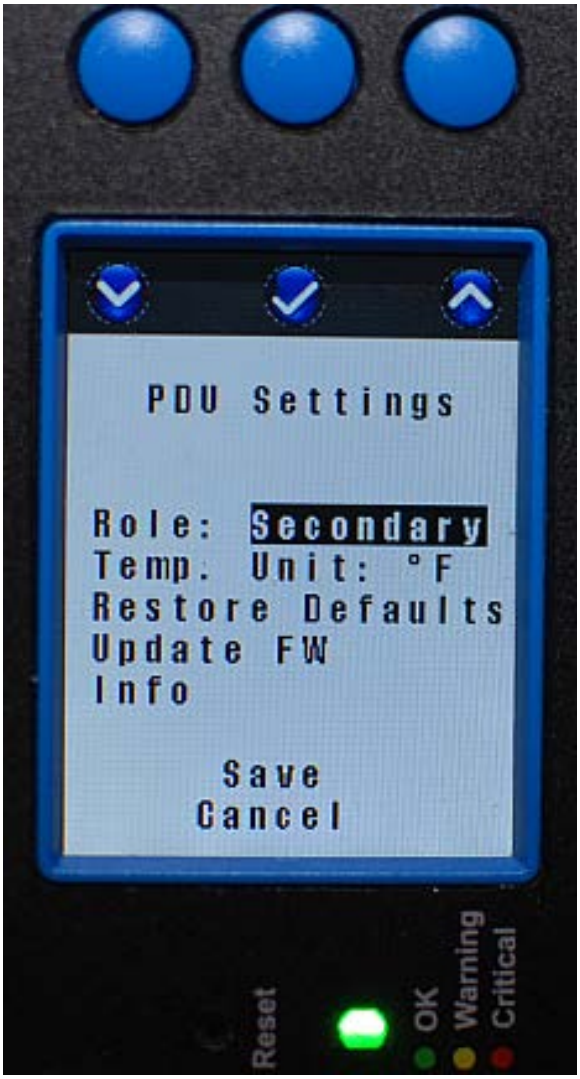
Select **Save** or **Cancel** to exit this screen.
Save updates IP information immediately.
Cancel makes no changes to the setup.

PDU Settings

Return to the Setup Menu.
Use the Left button to select PDU Settings.
Click on middle button to set up advanced info for the PDU

Optional: **Click on:**

Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

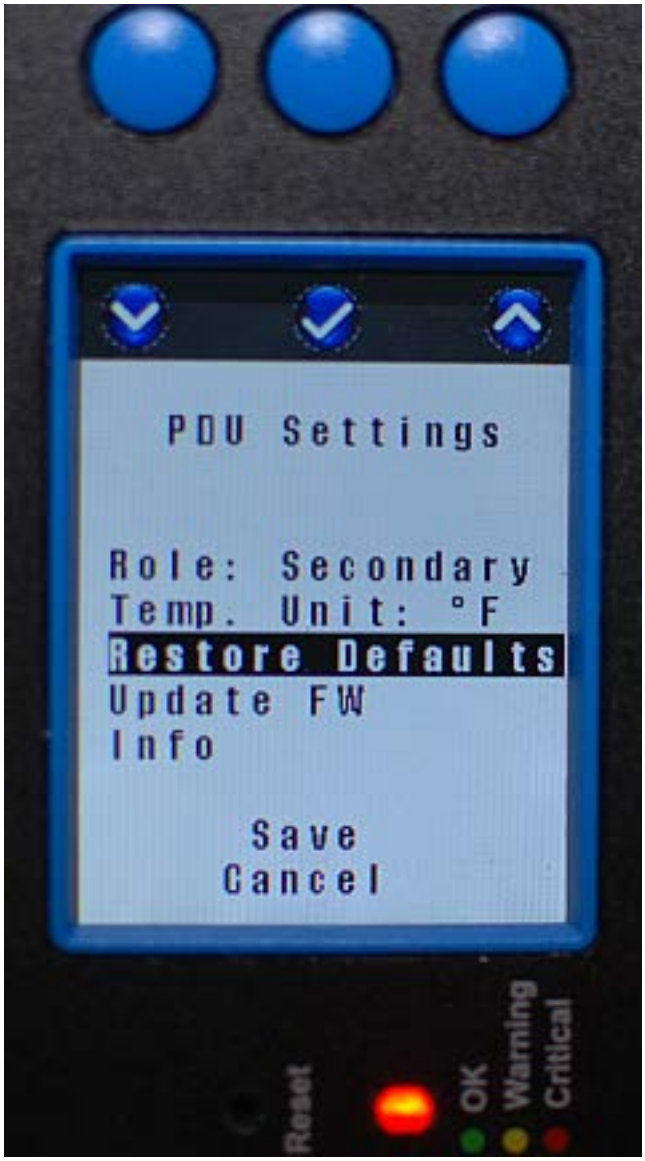


Click on:

Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

Role – Choose **PRIMARY** if PDU is the **FIRST PDU** in a daisy chain PDU linking environment only (only one PDU may be PRIMARY). Choose **ALTERNATE** if the PDU will be a backup to the Primary (only one PDU may be ALTERNATE). Otherwise keep or choose **SECONDARY**. See page 49 for additional details.
Temp – Choose Celsius or Fahrenheit
Restore Defaults – Choose to select which fields will be restored (confirmation needed, see details on the next page)
Update FW – Choose to update firmware locally through USB port

Save – Confirm all changes made in this session
Cancel – Cancel all changes made in this session



Click on middle button to restore Default values for the PDU

Optional: **Click on:**

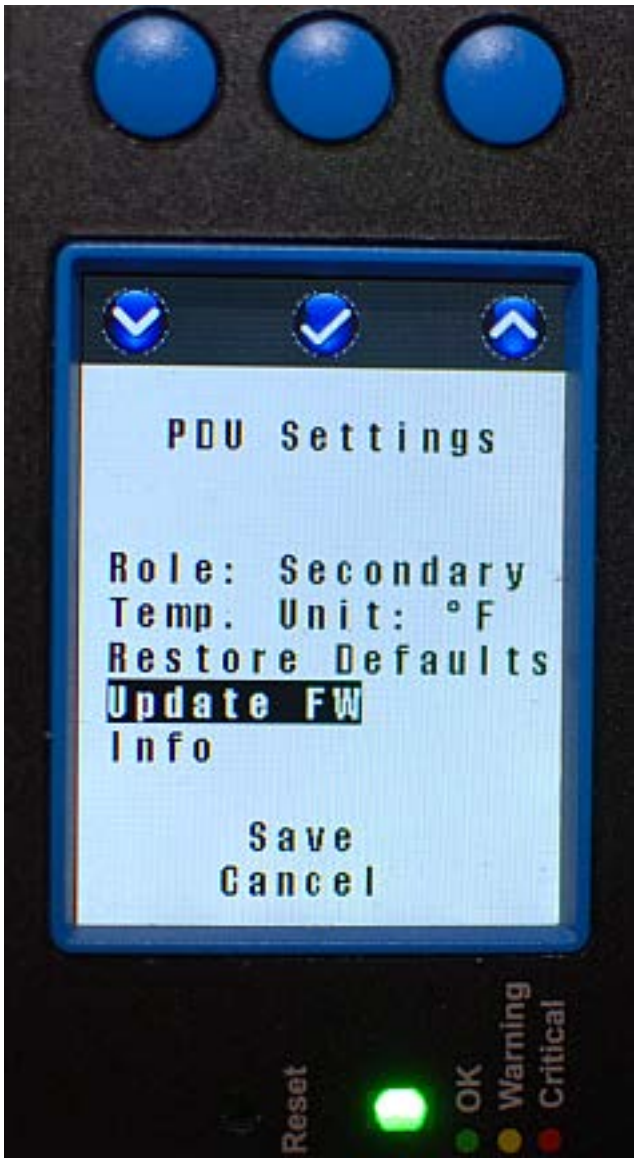
Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

Click on:
Left button to traverse down the list of option
Middle button to select the highlighted option
Right button to traverse up the list of options

Network Only – Will immediately reset the IP Address back to the default address (192.168.123.123).
Config Only – Will immediately reset PDU and outlet names, alarm thresholds, etc. back to defaults.
User Only – Will immediately delete all accounts except the default administrative user account: Admin, admin.
Reset All – Resets Network, Config and User values to defaults.
Reset Device – Resets all values and reboots the main communications module. Outlets will not lose power, but you will lose your network connection and monitoring during reboot.

Note: The physical reset button under the screen will Reset Device and erase all local memory including log files.

Update Firmware



Click on middle button to update firmware for the PDU.

Optional: **Click on:**

Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

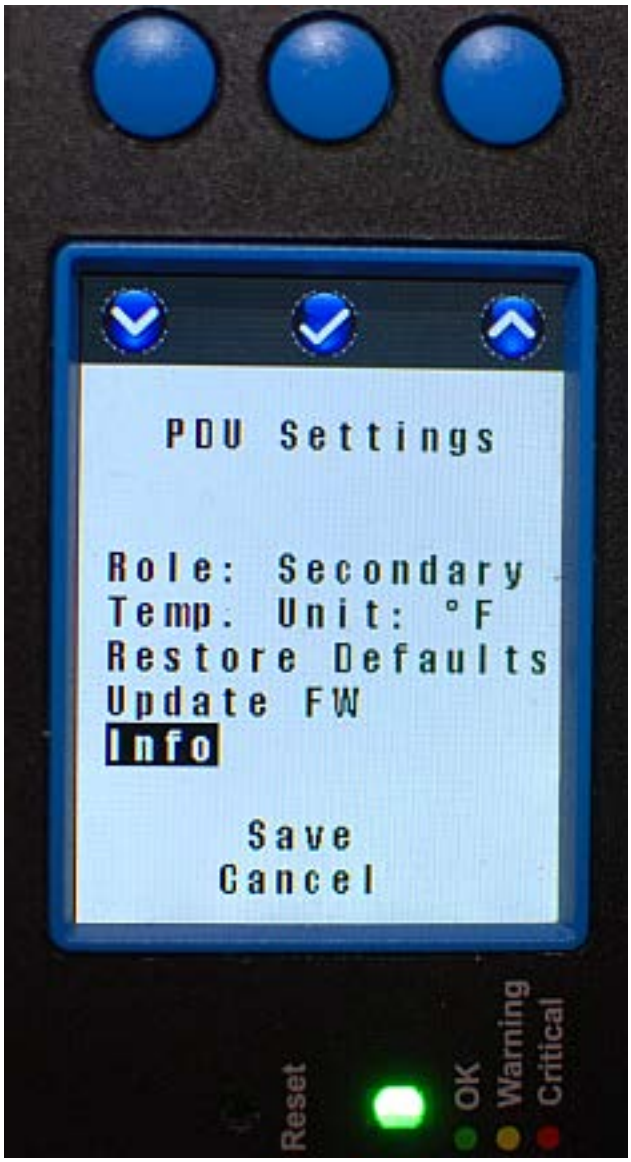
Click on:

Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

Sample of Updating

Sample of Failed updating

PDU Model Information



Click on middle button to display the information of the PDU.

Optional: **Click on:**

Left button to traverse down the list of options
Middle button to select the highlighted option
Right button to traverse up the list of options

Click on middle button to traverse back to the PDU Settings Menu

USING THE BUILT-IN WEB SERVER APPLICATION

Login

All Polar PDUs, excluding Basic models (6.1.X.XXX.XX.XX), are shipped with:
An Ethernet connection and built-in Web Server Application
Default IP address: **192.168.123.123**
Default User name/Password: **admin/admin**

You can access the PDU using the default IP address, or you can use the LCD Local display (see page 23) or the PDUSerial.exe application (see page 69) to change the default IP address to the appropriate IP address.

- To access the PDU, connect the Ethernet port to a network switch
- From Web Browser on a computer that is network accessible to the PDU, type: http://"PDU address". For example, the default would be: http://192.168.123.123

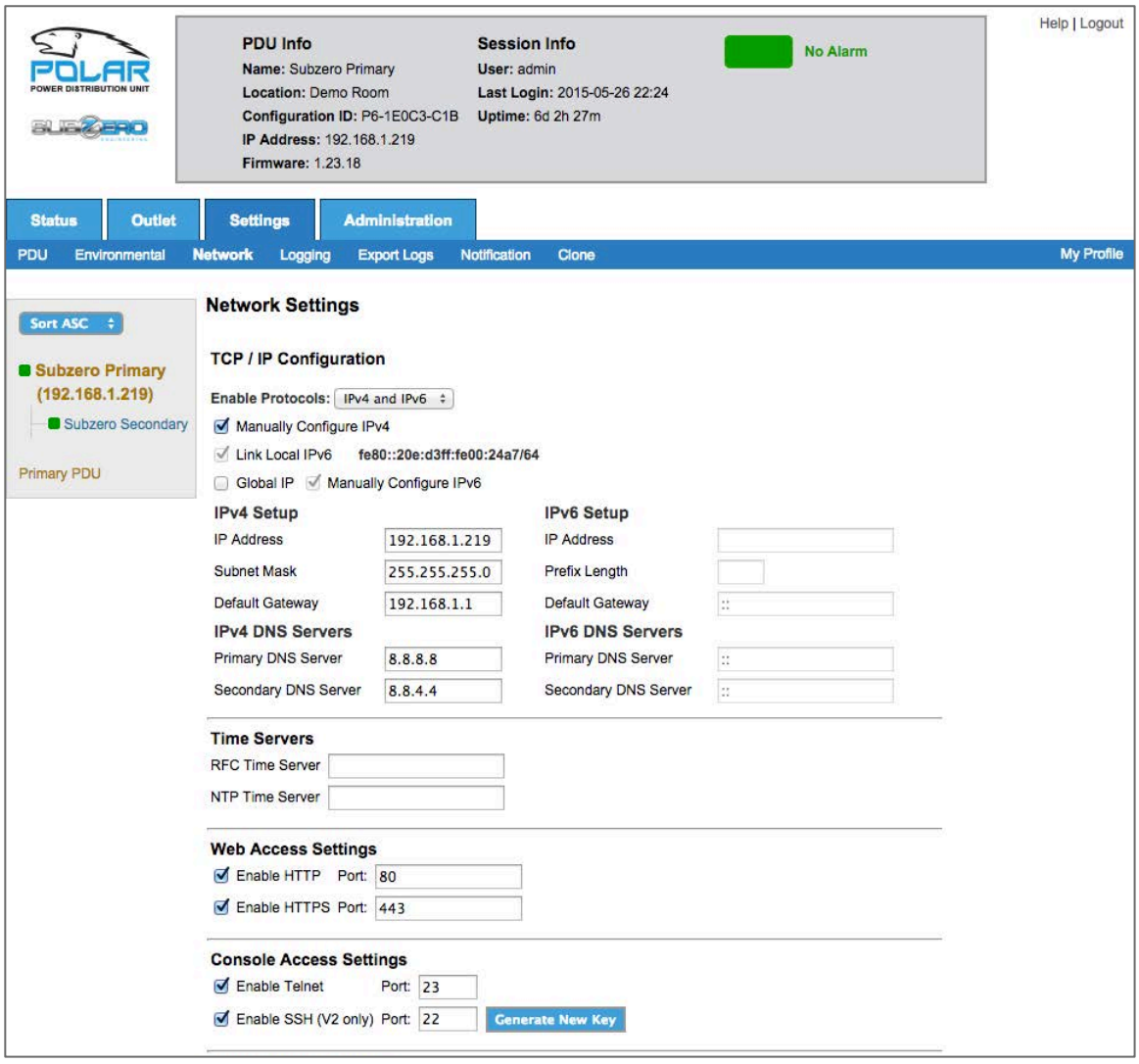
The login screen will display.

Log in using default User name and password: **admin**, **admin** and **click on Login** button or user name and password if it has been created.

First Login – Set Date and Time

The PDU has data logging and alarm notification functions that benefit from a time and date stamp. However, the PDU does not have an internal clock. So, each time you power the PDU, you must manually set the time and date or assign a Time Server to do so automatically.

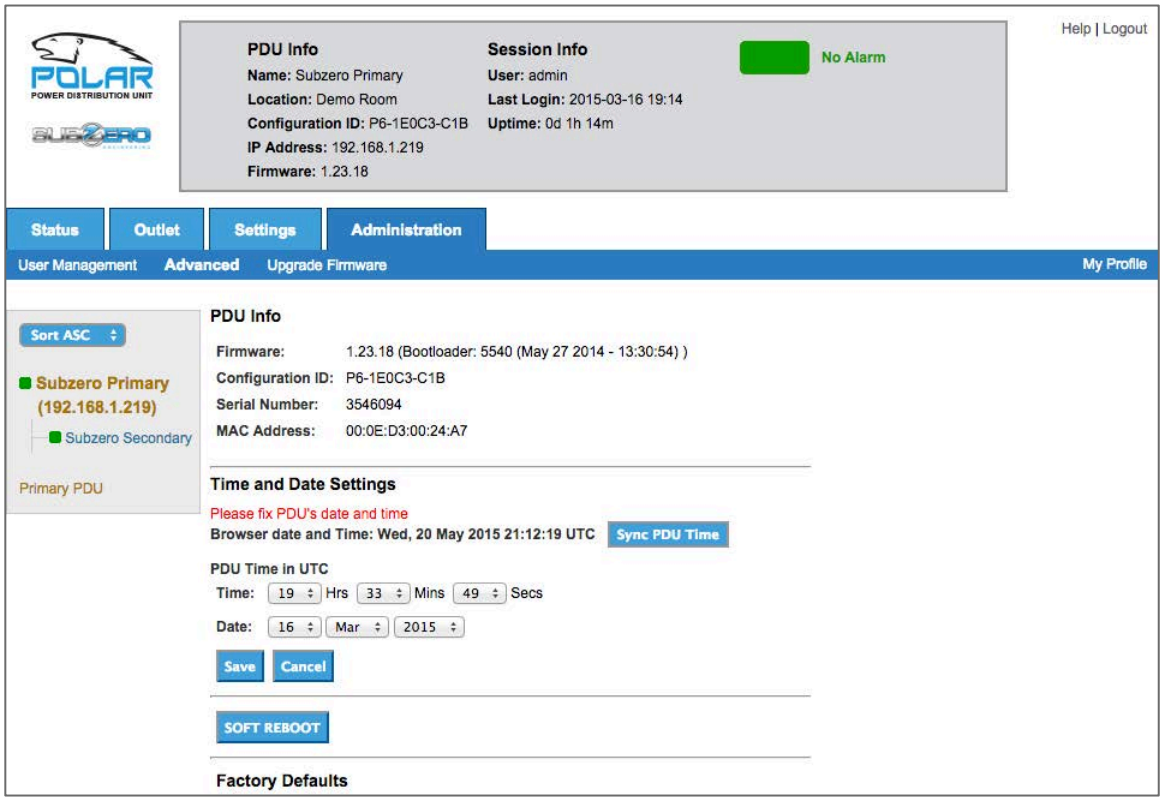
To assign a Time Server, click on the **Settings** tab, **Network** sub menu.
Scroll down the page to the heading **Time Servers.**



Enter the IP Address of the RFC or NTP Time Server.

The PDU must have network access to the time server. For detailed network setup, see **Settings – Network** beginning on page 54.

If you do not utilize a time server or decide to set the time and date manually, click on the **Administration** tab, **Advanced** sub menu.



Click on Sync PDU time and then **Save** button to update the clock on the PDU using the browser date and time or manually set the time with the drop boxes.

Note that if you perform a firmware upgrade, the PDU will reboot and time will need to be manually reset unless you assigned a Time Server.

The remainder of the manual is ordered according to the tabs on the screen displayed above, so the next section is Status and the Status sub menus.

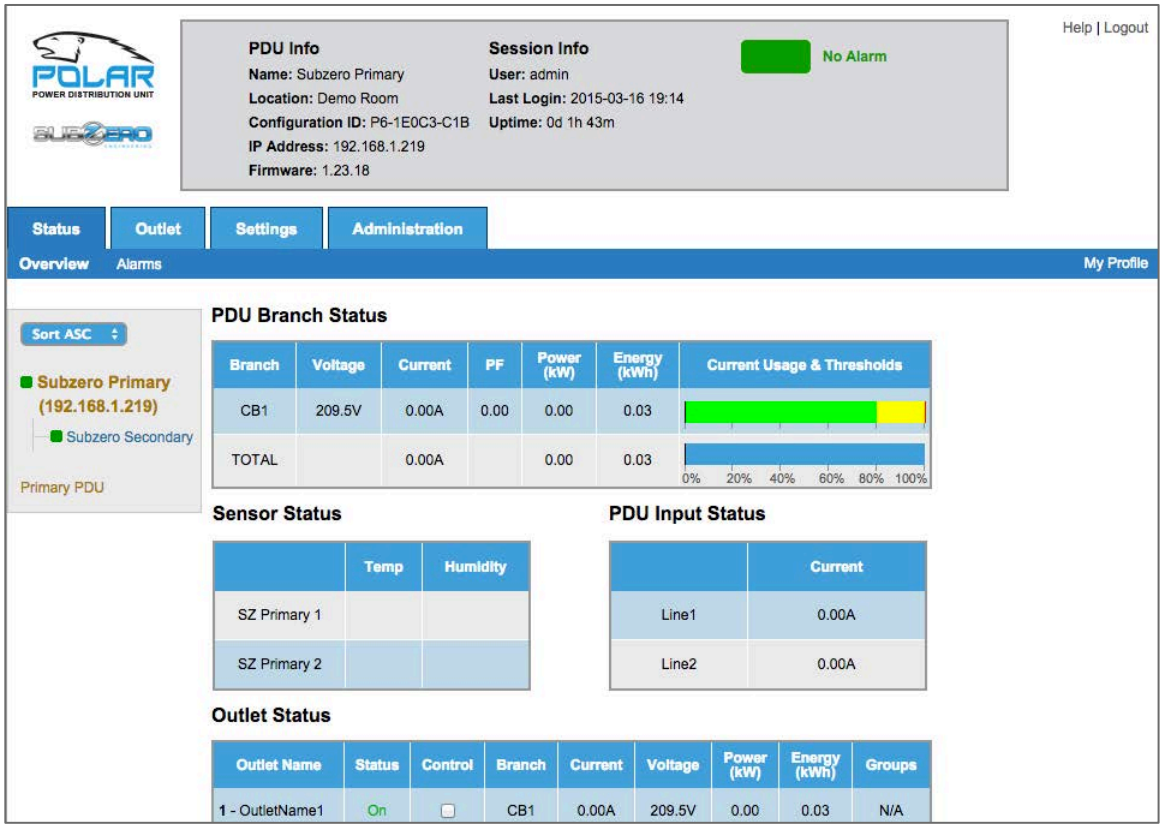
Note that the screenshot above is from a Switched Plus PDU which includes the Outlet Control and Monitoring features. Note that there are tabs for Status, Outlet, Settings and Administration. However, there is no Outlet tab on Monitored models (6.3.X.XXX.XX.XX).

Status – Overview

Click on **Status** tab**, Overview** sub menu to view circuit, sensor, input and outlet status.

All models present branch circuit status and sensor status (when attached).

The screenshot below shows a six breaker model with PDU Circuit Status for branch circuits (XN1, YN1, ZN1, XN2, YN2 and ZN2). Note that there are also single breaker/circuit, two breaker/circuit and three breaker/circuit models. Your model may display fewer circuits.

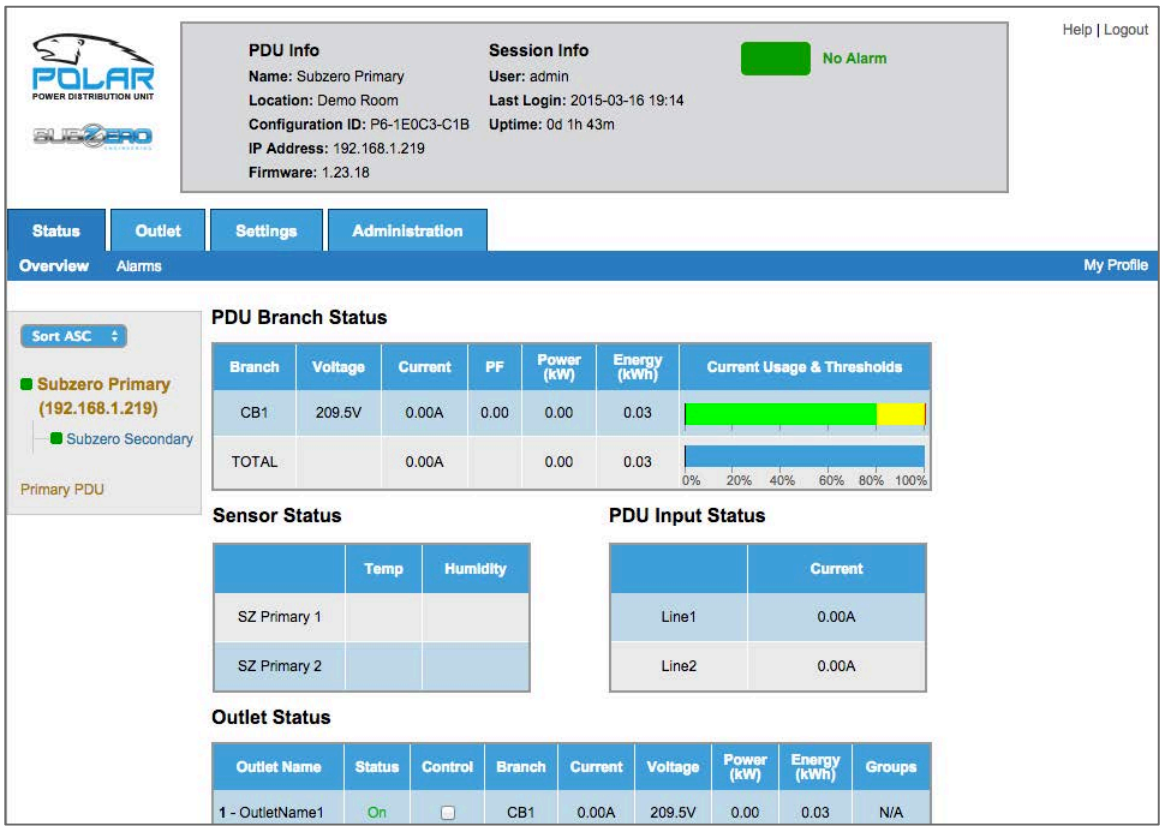


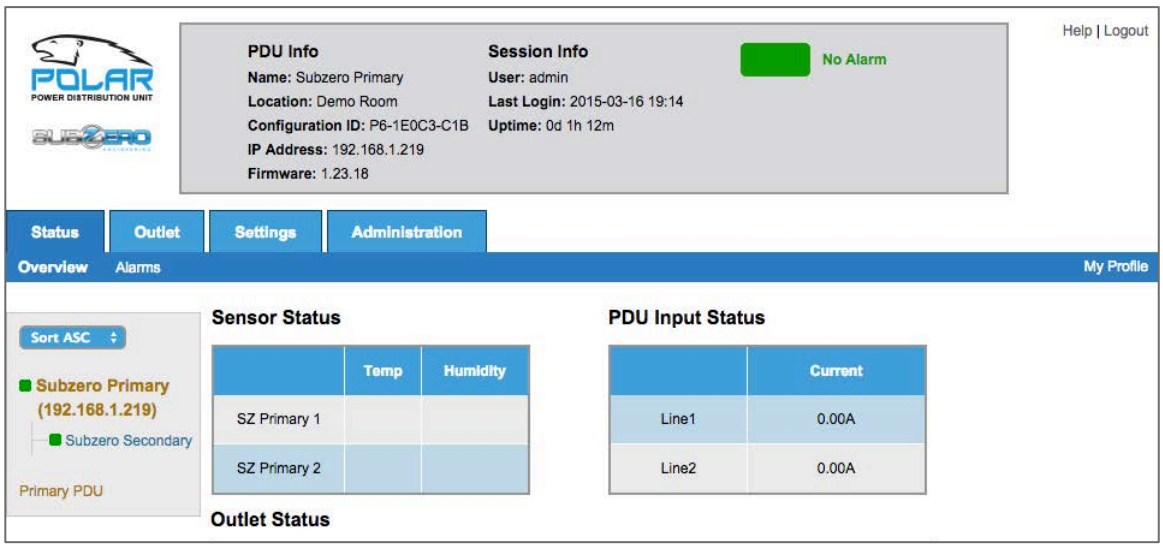
Once alarm thresholds are set (see page 50 and 52), the PDU Circuit Status table under the Status tab, Overview sub menu will show the operating range as a green bar, warning range as a yellow bar, and alarm range as a red bar. The actual measured value will be shown as a black line overlaying the graph. This allows a quick visual reference for available power within the acceptable operating range for each circuit. The total power consumed is also displayed at the bottom of the graph as a percentage of power available.

Scroll down.

If an optional Environmental Probe is attached to the PDU, Temperature and Humidity will be displayed under Sensor Status. You can connect two Probes to each PDU.

Three-phase PDUs will also display PDU Input Status – the amount of current (Amperes) on each line input before the breakers. This value is not logged.





Scroll down.

Monitored Plus (6.4.X.XXX.XX.XX), Switched (6.5.X.XXX.XX.XX), and Switched Plus (6.6.X.XXX.XX.XX) models will also present per outlet status. The image below shows a Switched Plus model. Switched models do not include Current, Voltage, Power or Energy values. Monitored Plus models do not include Status or Control values.

Outlet Status

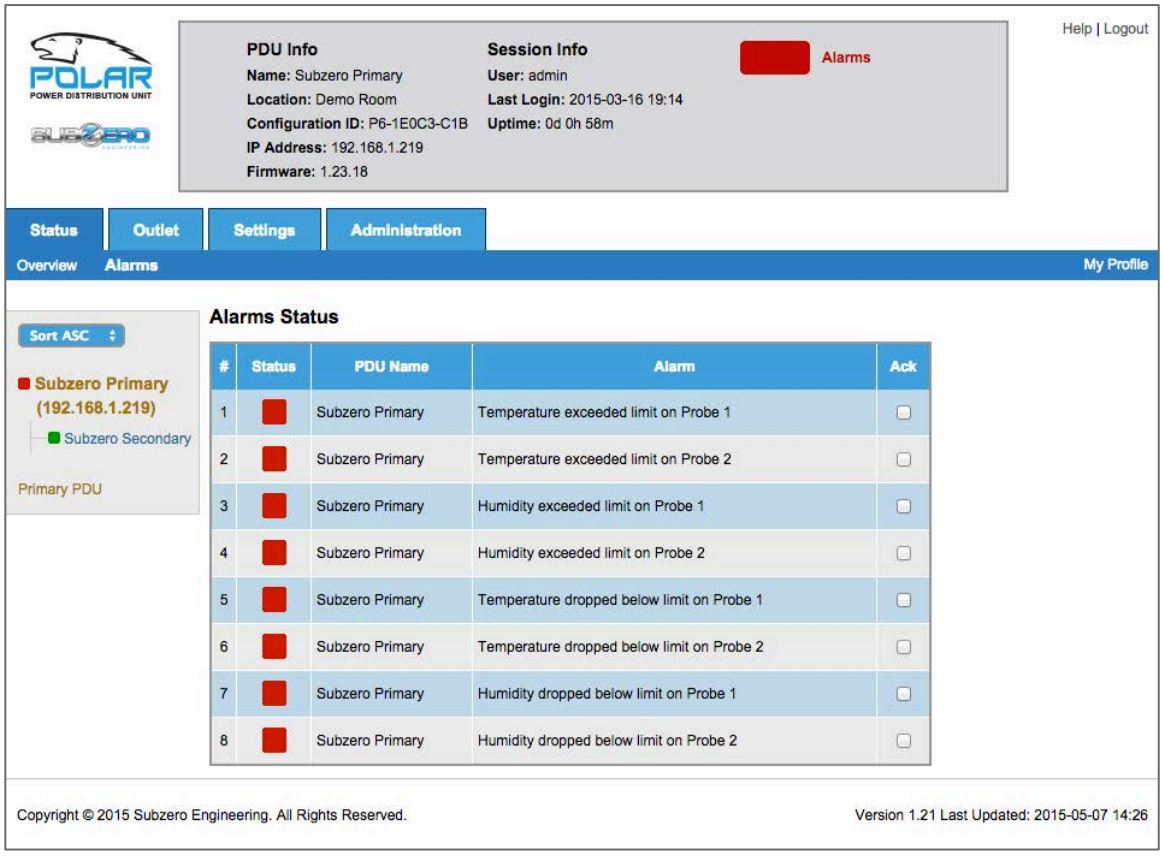
Outlet Name	Status	Control	Branch	Current	Voltage	Power (kW)	Energy (kWh)	Groups
1 - OutletName1	Off	☐	CB1	0.00A	209.6V	0.00	0.03	Group 1
2 - OutletName2	On	☐	CB1	0.00A	209.6V	0.00	0.03	N/A
3 - OutletName3	Off	☐	CB1	0.00A	209.6V	0.00	0.03	N/A
4 - OutletName4	On	☐	CB1	0.00A	209.6V	0.00	0.02	N/A
5 - OutletName5	Off	☐	CB1	0.00A	209.6V	0.00	0.02	N/A
6 - OutletName6	On	☐	CB1	0.00A	209.6V	0.00	0.02	N/A
7 - OutletName7	Off	☐	CB1	0.00A	209.6V	0.00	0.02	N/A
8 - OutletName8	On	☐	CB1	0.00A	209.6V	0.00	0.02	N/A
9 - OutletName9	Off	☐	CB1	0.00A	209.6V	0.00	0.02	N/A
10 - OutletName10	On	☐	CB1	0.00A	209.6V	0.00	0.02	N/A
11 - OutletName11	Off	☐	CB1	0.00A	209.6V	0.00	0.10	N/A
12 - OutletName12	On	☐	CB1	0.00A	209.6V	0.00	0.02	N/A
13 - OutletName13	Off	☐	CB1	0.00A	209.6V	0.00	0.02	N/A
14 - OutletName14	On	☐	CB1	0.00A	209.6V	0.00	0.02	N/A
15 - OutletName15	Off	☐	CB1	0.00A	209.6V	0.00	0.39	N/A

Scroll down to see the rest of the outlets.

Status – Alarms

Click on Alarms to view a summary of Alarm messages if there are any present:

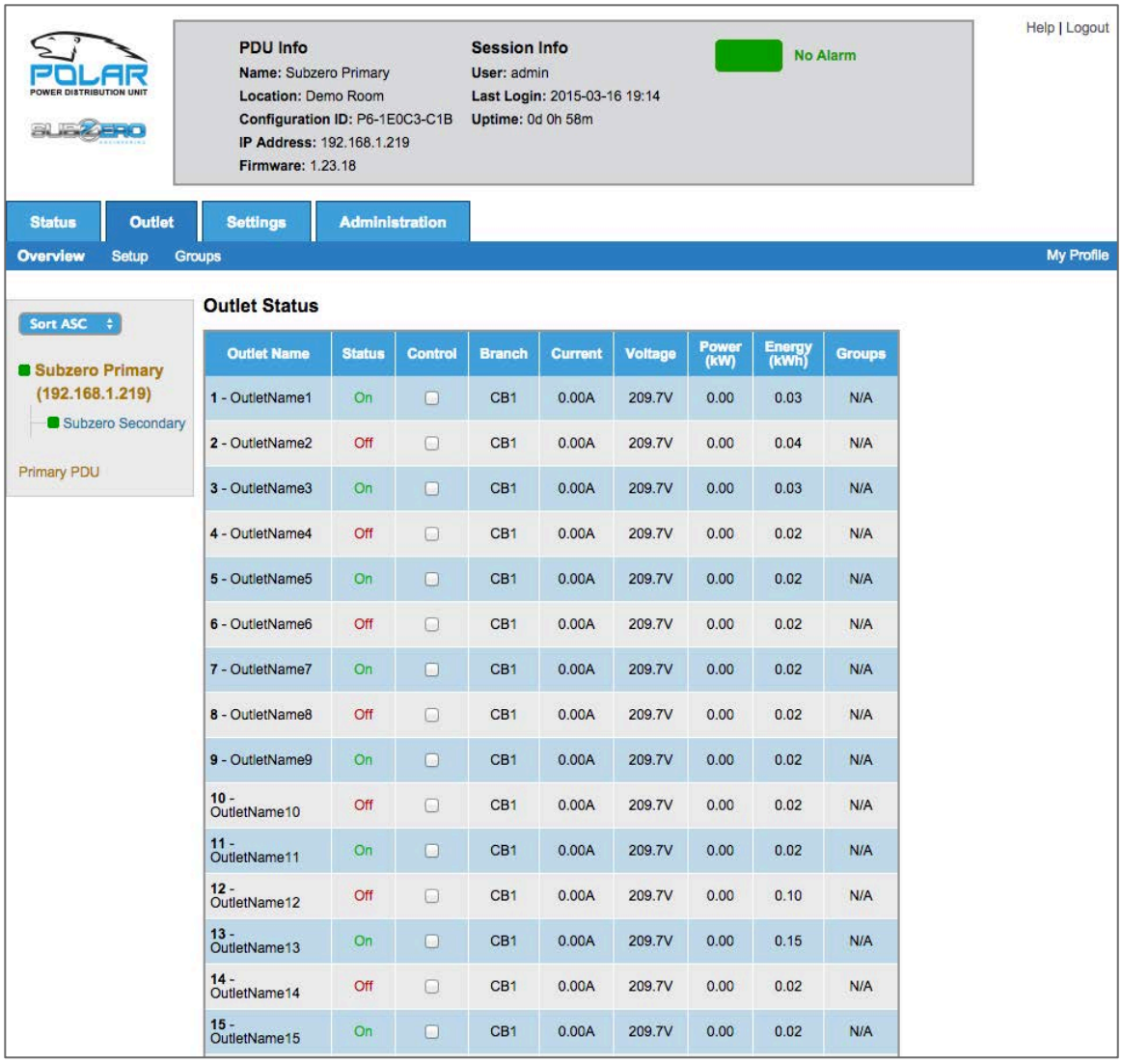
Warning thresholds are indicated by a yellow-colored rectangular alarm status symbol. Critical thresholds are indicated by a red-colored rectangular alarm status symbol.



The ACK buttons can be used to acknowledge that an alarm is present. By acknowledging an alarm, the yellow or red status indicator next to the PDU's display (see page 22) will stop blinking and notification for this particular alarm will no longer be sent out through SNMP. The alarm remains present in the Alarms Status page while the alarm is active. The ACK feature is recommended when the customer is aware of the alarm and in the process of resolving it, and does not want to be notified by PDU any longer.

Outlet – Overview

On Monitored Plus (6.4.X.XXX.XX.XX), Switched (6.5.X.XXX.XX.XX) and Switched Plus (6.6.X.XXX.XX.XX) models, **Click on Outlet, Overview** tab to view Outlet Status on the PDU:



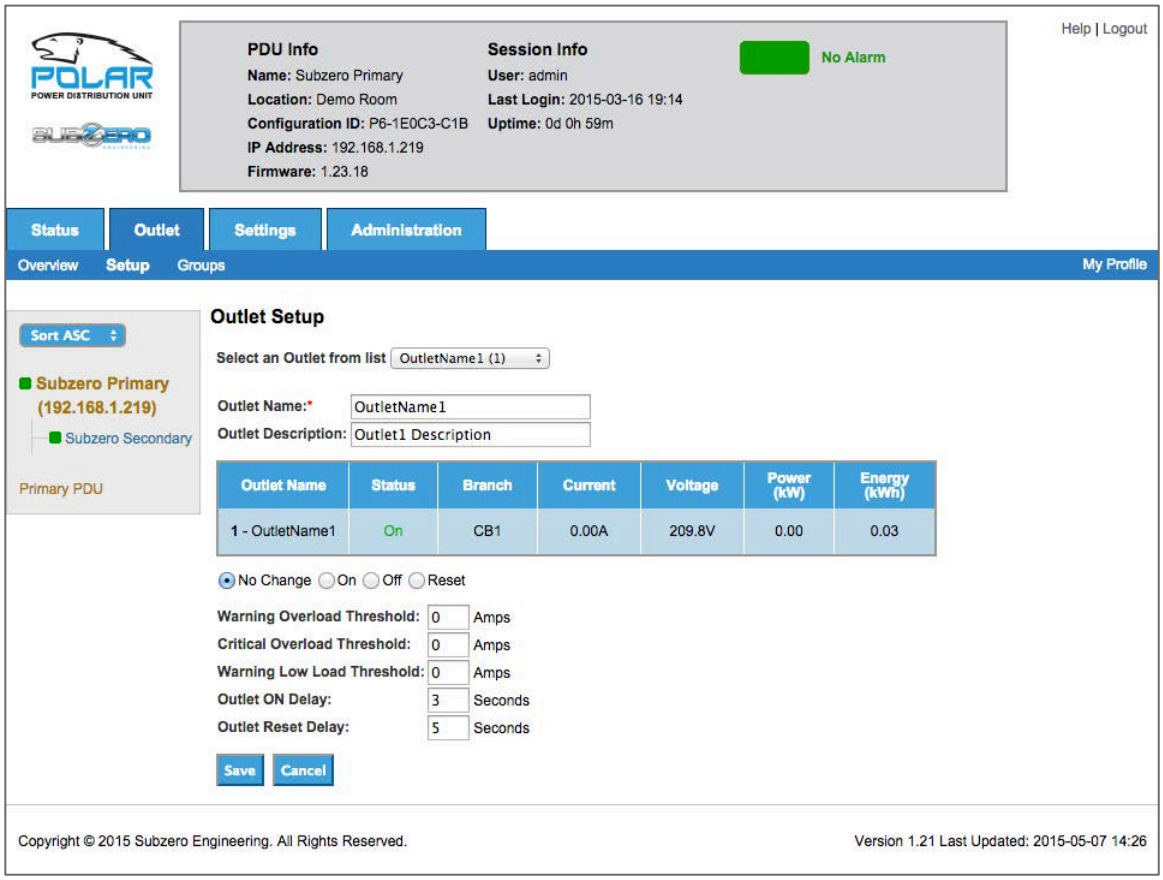
Outlet Name	Status	Control	Branch	Current	Voltage	Power (kW)	Energy (kWh)	Groups
1 - OutletName1	On	☐	CB1	0.00A	209.7V	0.00	0.03	N/A
2 - OutletName2	Off	☐	CB1	0.00A	209.7V	0.00	0.04	N/A
3 - OutletName3	On	☐	CB1	0.00A	209.7V	0.00	0.03	N/A
4 - OutletName4	Off	☐	CB1	0.00A	209.7V	0.00	0.02	N/A
5 - OutletName5	On	☐	CB1	0.00A	209.7V	0.00	0.02	N/A
6 - OutletName6	Off	☐	CB1	0.00A	209.7V	0.00	0.02	N/A
7 - OutletName7	On	☐	CB1	0.00A	209.7V	0.00	0.02	N/A
8 - OutletName8	Off	☐	CB1	0.00A	209.7V	0.00	0.02	N/A
9 - OutletName9	On	☐	CB1	0.00A	209.7V	0.00	0.02	N/A
10 - OutletName10	Off	☐	CB1	0.00A	209.7V	0.00	0.02	N/A
11 - OutletName11	On	☐	CB1	0.00A	209.7V	0.00	0.02	N/A
12 - OutletName12	Off	☐	CB1	0.00A	209.7V	0.00	0.10	N/A
13 - OutletName13	On	☐	CB1	0.00A	209.7V	0.00	0.15	N/A
14 - OutletName14	Off	☐	CB1	0.00A	209.7V	0.00	0.02	N/A
15 - OutletName15	On	☐	CB1	0.00A	209.7V	0.00	0.02	N/A

On Switched (6.5.X.XXX.XX.XX) and Switched Plus (6.6.X.XXX.XX.XX) models, you can turn outlets on or off by clicking the checkbox under the Control column. The indicator in the Status column will change as the outlet switches on or off.

Scroll down to view the rest of the Outlets.

Outlet – Setup

To name and enter alarm limits for a specific Outlet, from the **Outlet** tab, click on the **Set Up** sub menu, and use the drop down list to select the outlet:

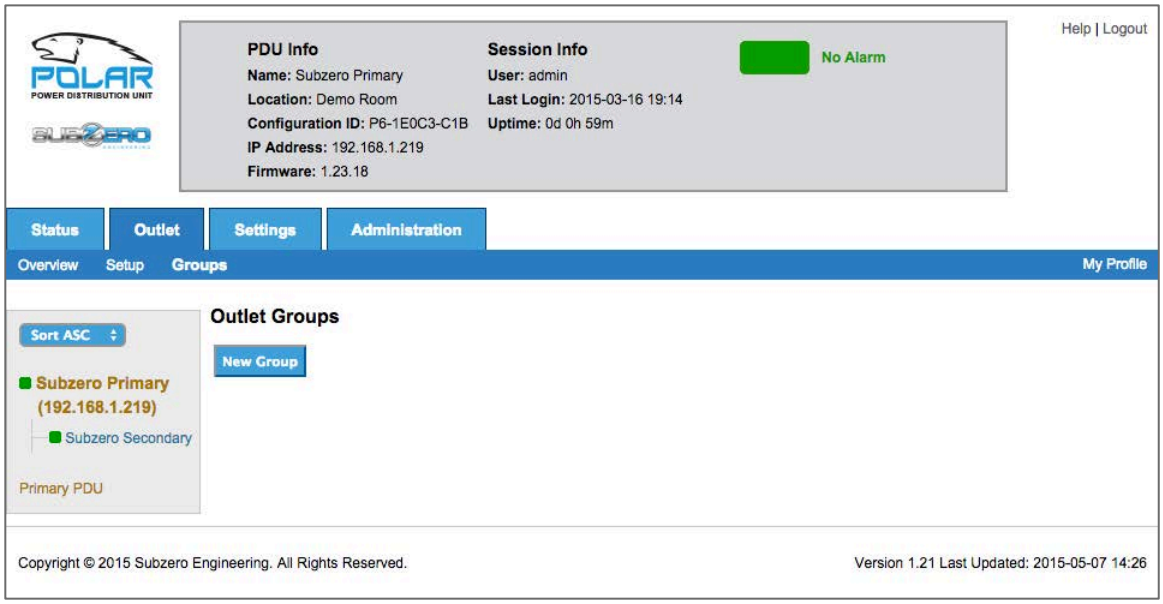


Switched (6.5.X.XXX.XX.XX) and Switched Plus (6.6.X.XXX.XX.XX) models include settings for Outlet ON Delay and Outlet Cycle Delay allowing you to specify a delay when power is cycled.

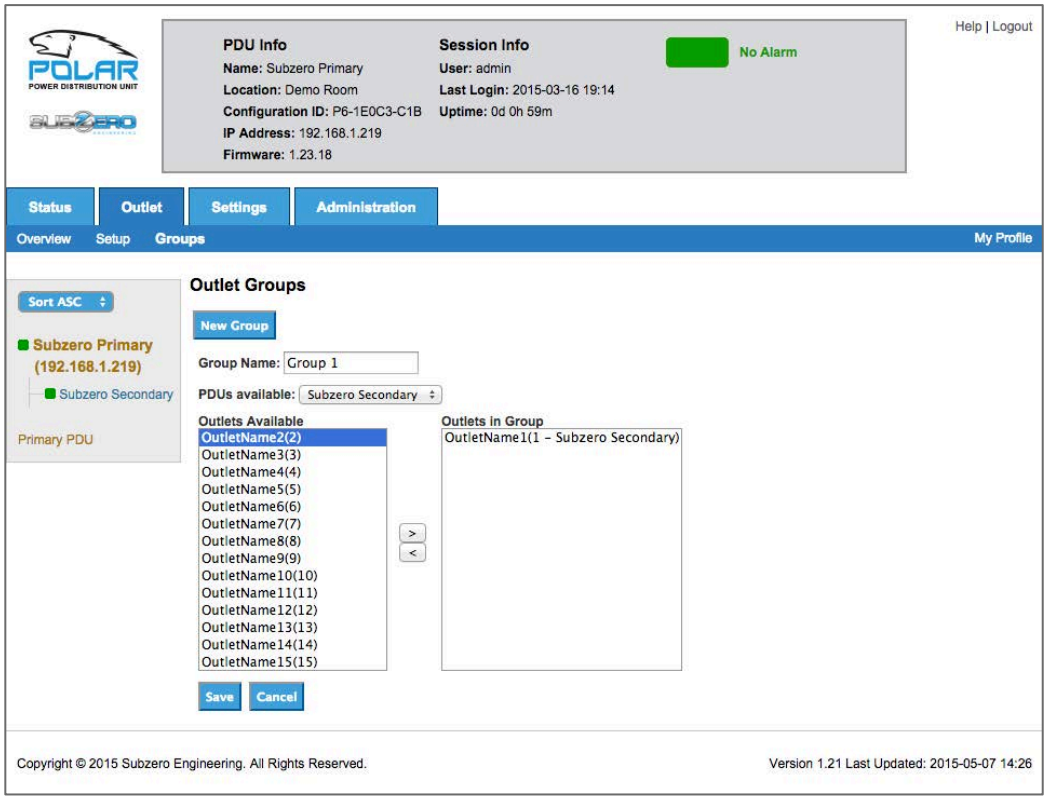
Enter Outlet data and **click on Save** button to save new data.

Outlet – Groups

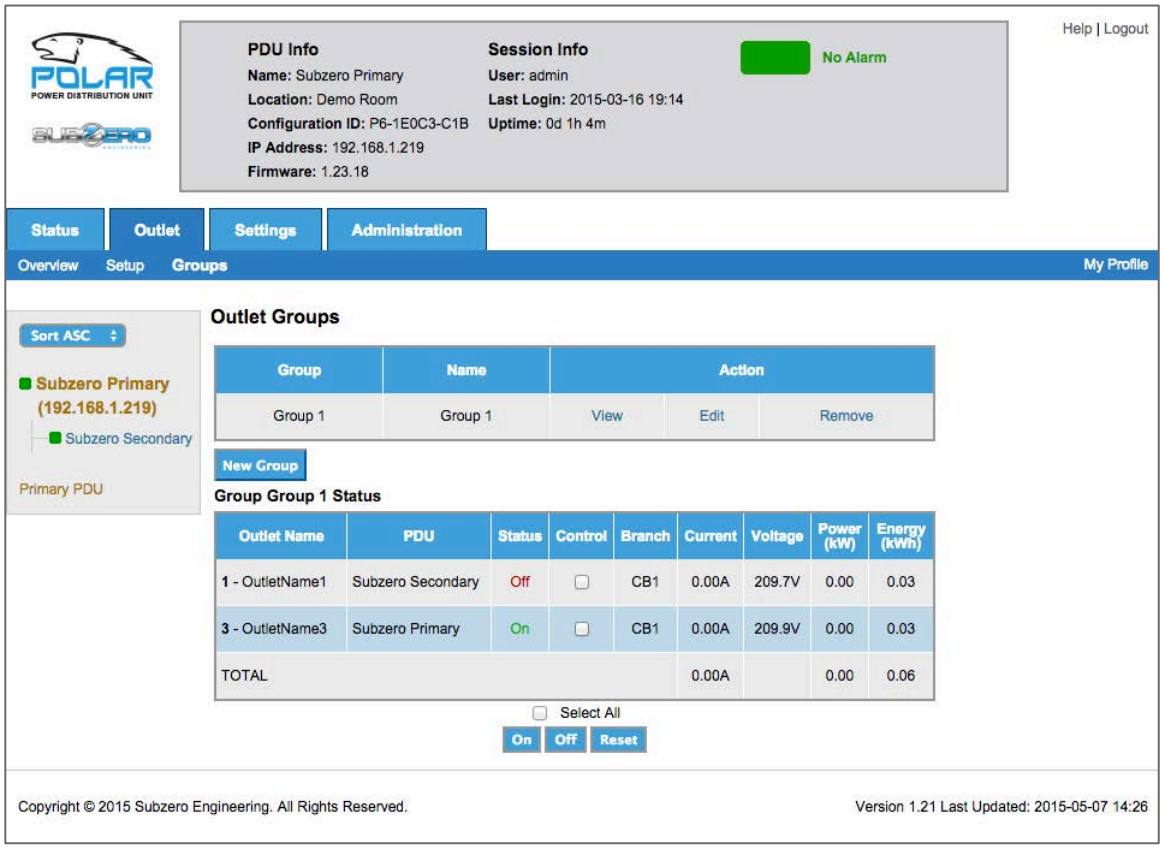
To create a group of outlets from a single PDU or multiple PDUs that are linked together, click on the **Outlet** tab, **Click on the Groups** sub menu, **Click on New Group**:



Name the Group, select PDU(s) and Outlets to be grouped and **click on Save** button:



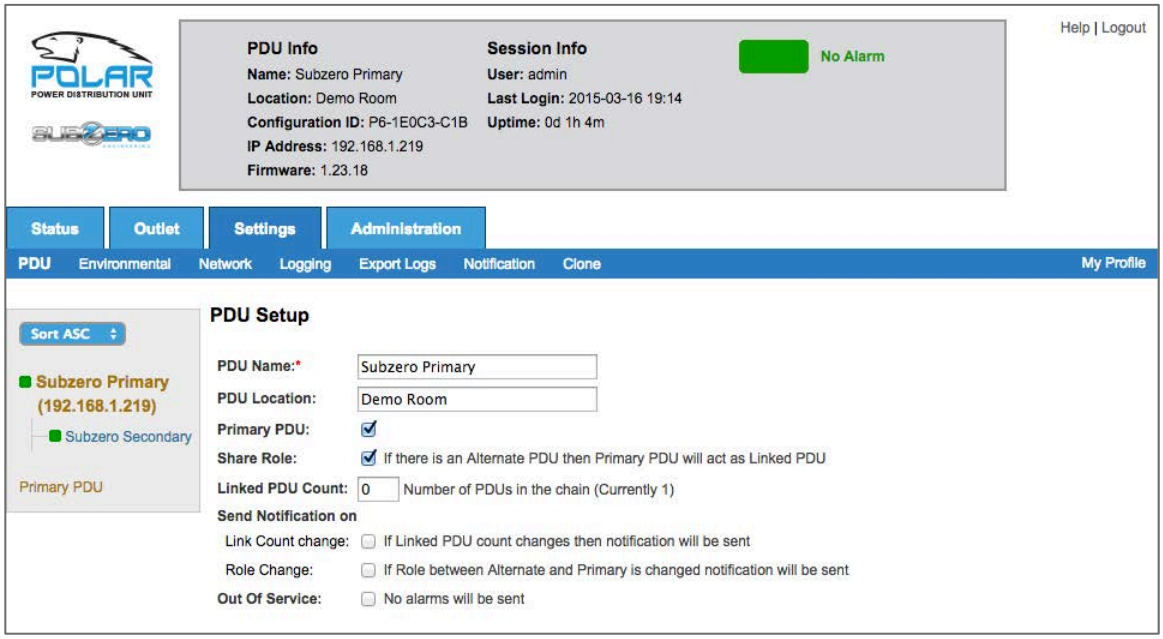
To view, edit or remove an existing group, **Click on View or Edit or Remove** under Action in the Outlet, Groups table:



View provides Group Status. You can see totals and control outlets on Switched and Switched Plus.

Settings – PDU and Branch Alarms

To set identity and alarm conditions for the PDU, click on **Settings** tab**, PDU** sub menu:



Enter desired **PDU name** and **location**. The PDU Name is displayed in the summary information at the top of each web interface screen and on the PDU's LCD screen.

Primary PDU checkbox: Polar PDUs can be linked together to share a single IP Address through a single network connection. The check box for Primary PDU should only be checked if this PDU is linked with other PDUs, and this is the PDU that is attached to the network. If this PDU is not linked to other PDUs, do not check the Primary PDU check box.

Share role checkbox: When linking PDUs, there can also be an Alternate (Primary) PDU to provide a backup network connection (see page 51) if the Primary PDU loses its network connection. Check this box to allow the Alternate PDU to keep the primary network connection after the Primary PDU returns to normal service. Uncheck to switch the primary network connection back to the Primary PDU.

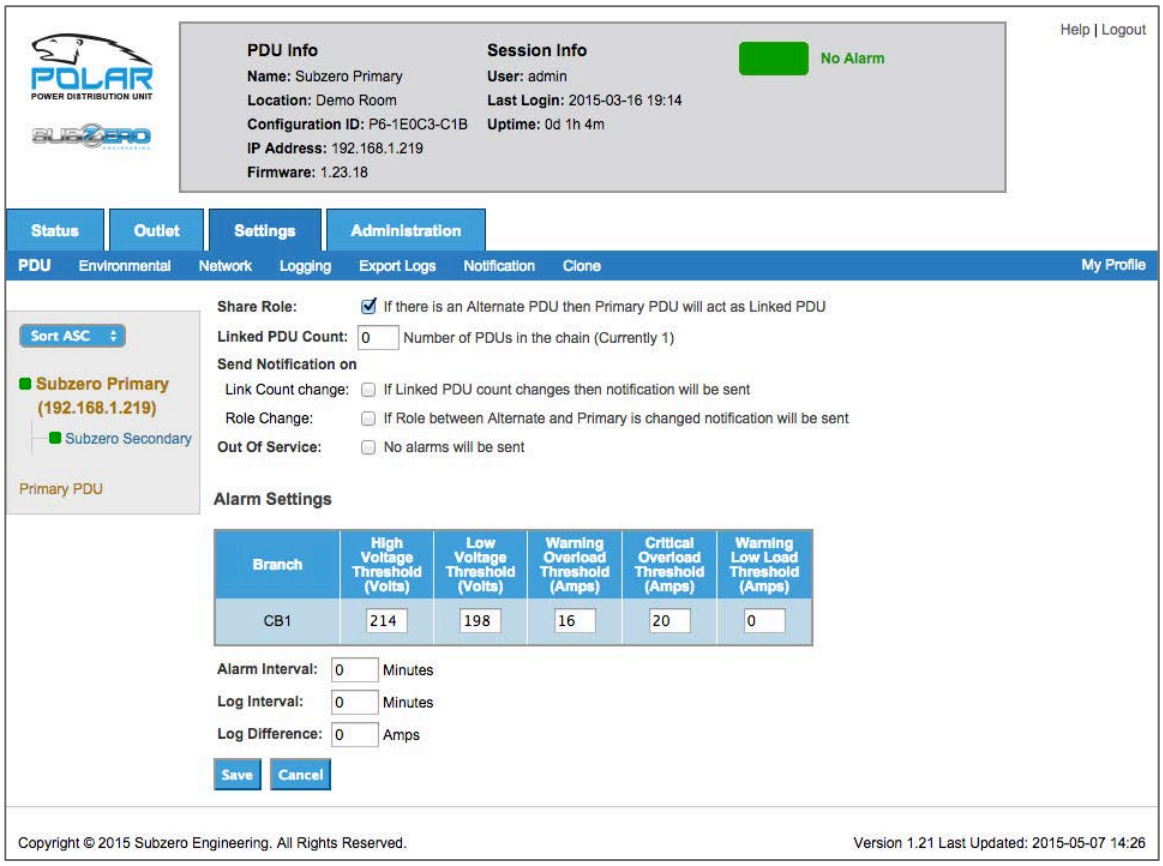
Link Count Change checkbox: Check this box to receive an alarm notification if the number of PDUs that are linked together changes indicating a potential link failure.

Role Change checkbox: Check this box to receive an alarm notification if the Alternate PDU assumes the Primary PDU role indicating a potential primary PDU or network connection failure.

Out of Service checkbox: Check this box to deactivate alarms if a PDU goes offline or becomes "unlinked". Use this checkbox for planned service.

Scroll down.

Alarm Settings: Set alarm thresholds (limits) for each branch circuit in this table. This example is from a PDU with one branch circuit. Your PDU may have more branch circuits.



Set **Alarm Interval**, **Log Interval** and **Log Difference** if you will set the PDU to forward SNMP Traps (see SNMP Access Settings on page 55).

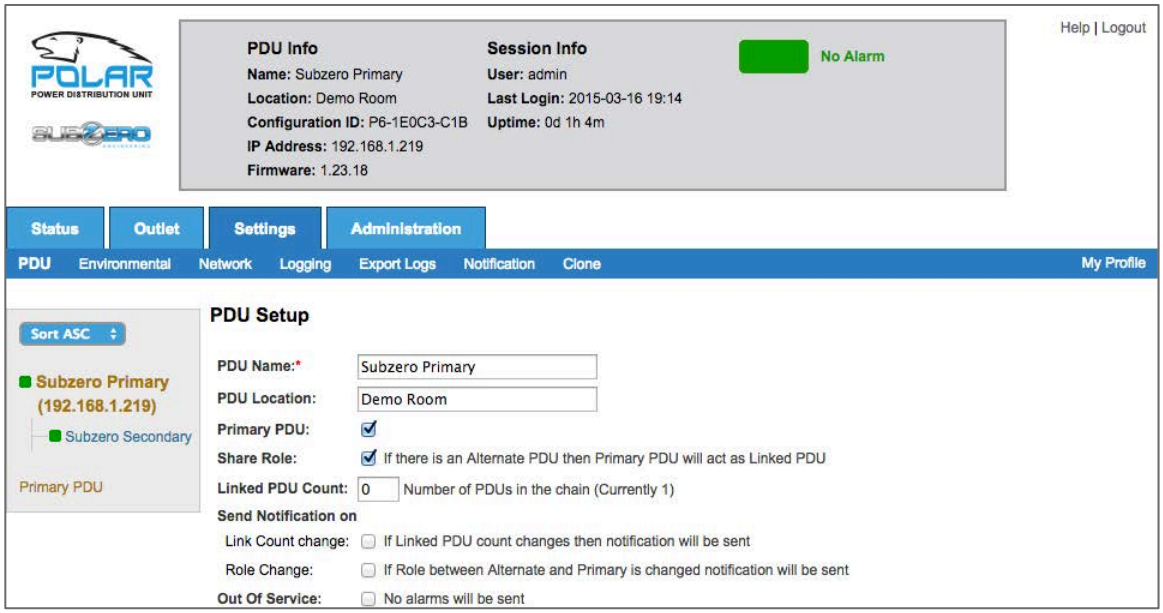
- Alarm Interval – the amount of time before alarm is sent once alarm condition exists.
- Log Interval – how often measurements are sent.
- Log Difference – amount of change in current that prompts an intermediate trap.

Click on Save button.

Settings – Alternate and Linked PDUs

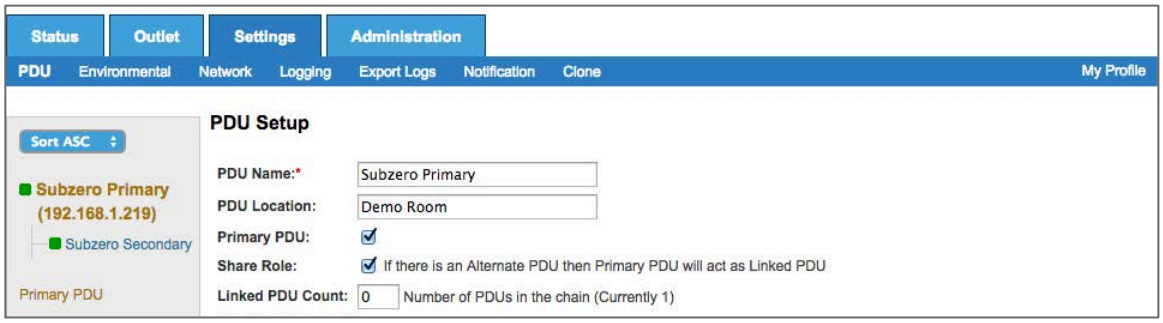
You can designate one of the Linked PDUs as an Alternate PDU. The Alternate PDU serves as a backup to the Primary PDU. It has a second and separate network connection from the Primary PDU and assumes the Primary role, providing the network connection to Linked PDUs, if the Primary PDU loses connection.

The Alternate PDU is designated by an **Alternate Primary checkbox** on the **Settings** tab**, PDU** sub menu, and will be listed with a purple-colored font on the link tree at the left of the screen.



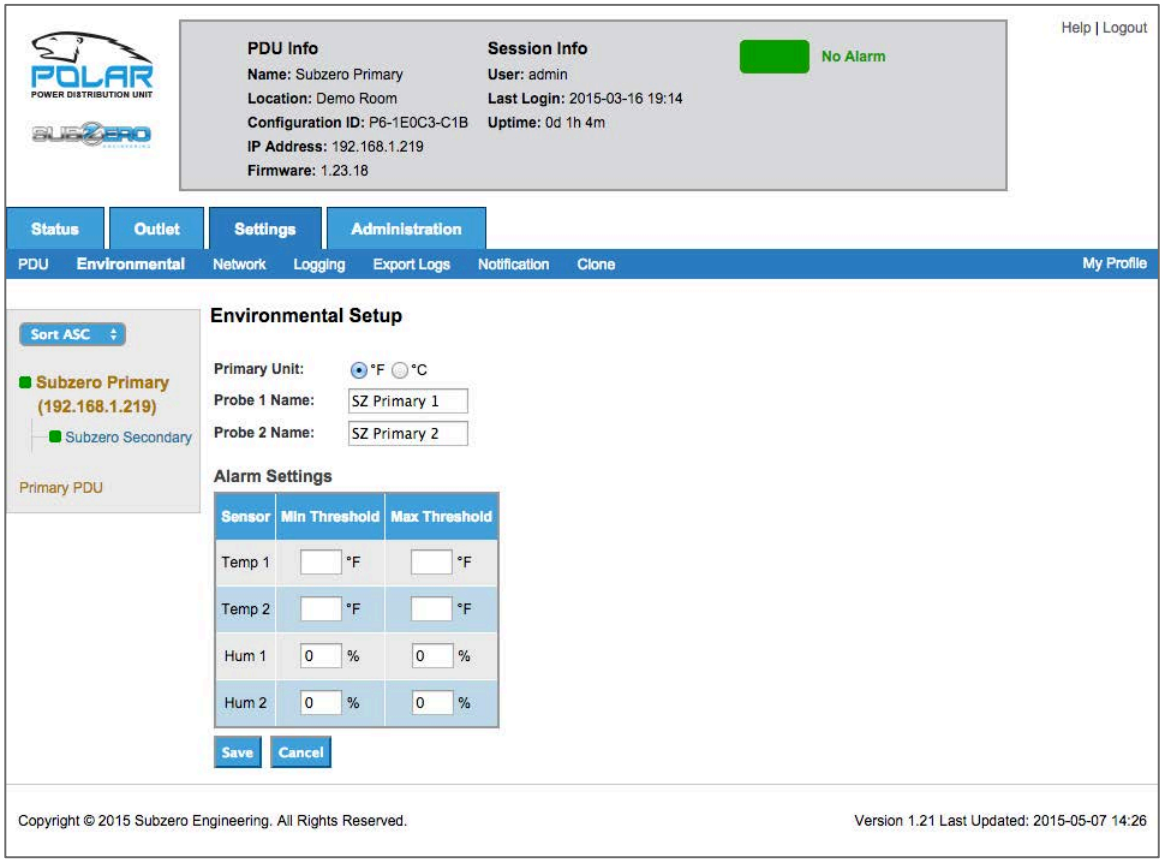
You can click between Primary, Alternate and Linked PDUs using the link tree at the left of the screen. This list can also be sorted using the Sort drop down box by the PDU Names.

Linked PDUs do not have the same role and notification settings as Primary and Alternate PDUs because they connect to the network through the Primary and/or Alternate PDU. However, you can click the **Out Of Service checkbox** to stop alarm notifications when rebooted, firmware is upgraded or temporarily removed from service.



Settings -- Environmental Probes and Alarms

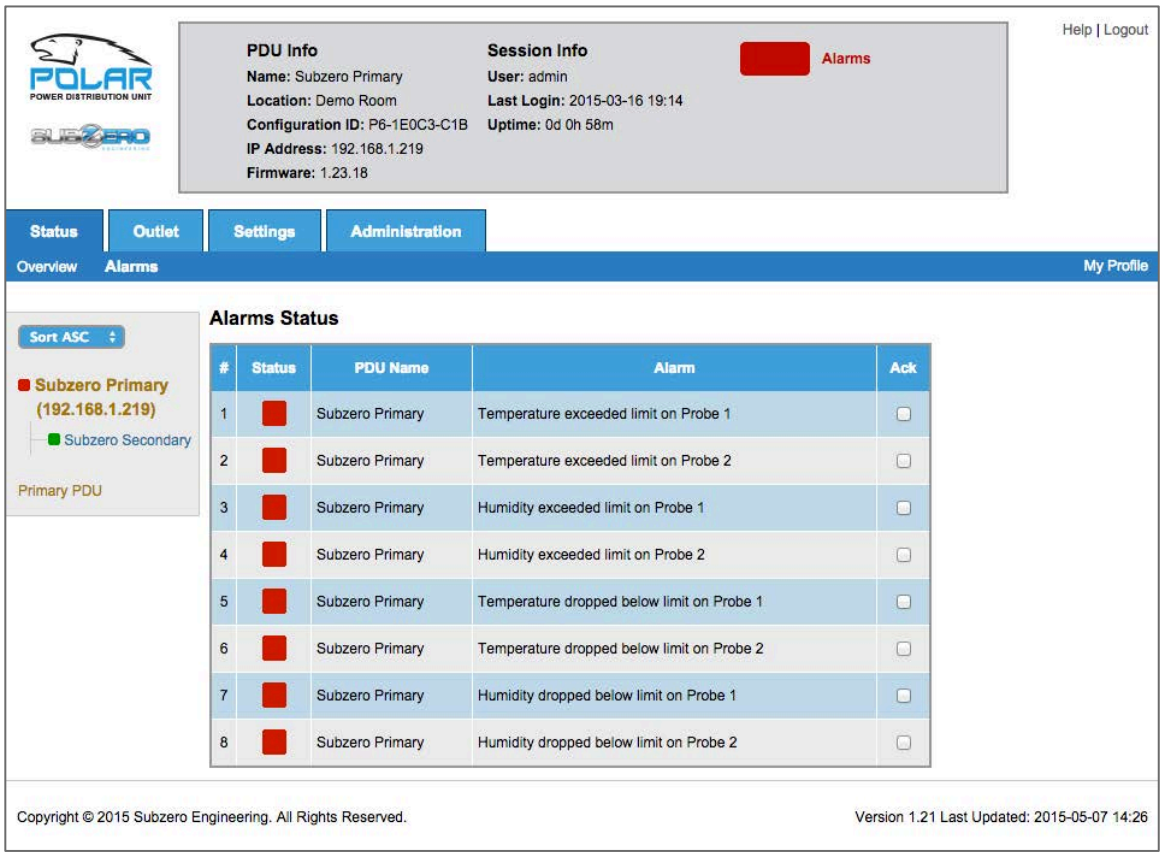
To set threshold for the Environmental Probes, click on the **Environmental** sub menu:



Enter desired data and **click on the Save** button.

Once thresholds are set for branch circuits, temperature and humidity, and/or individual outlets, the PDU will present alarms if a value is measured beyond the threshold.

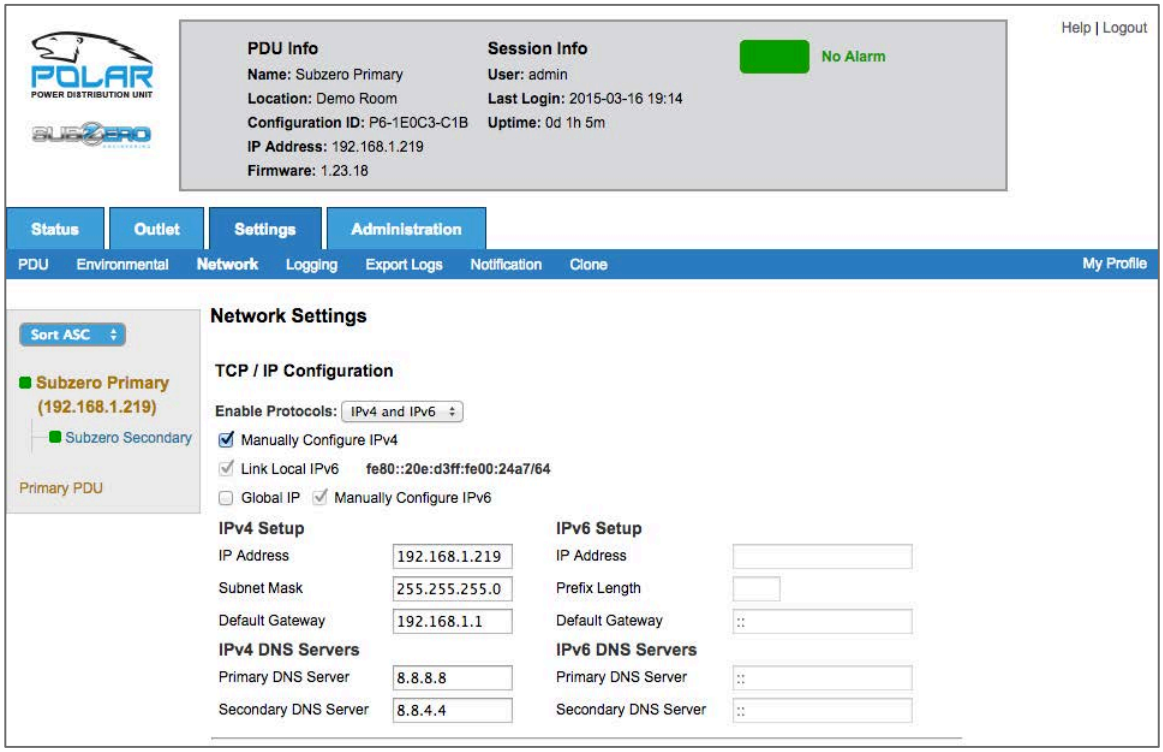
Alarms are summarized for all linked PDUs. Click on the **Status** tab, **Alarms** sub-menu. You must acknowledge alarms to clear alarms. Note that the alarm LED on the PDU's display (see page 22) will continue to flash until alarms are acknowledged.



Email alarm notification is also possible (see page 60).

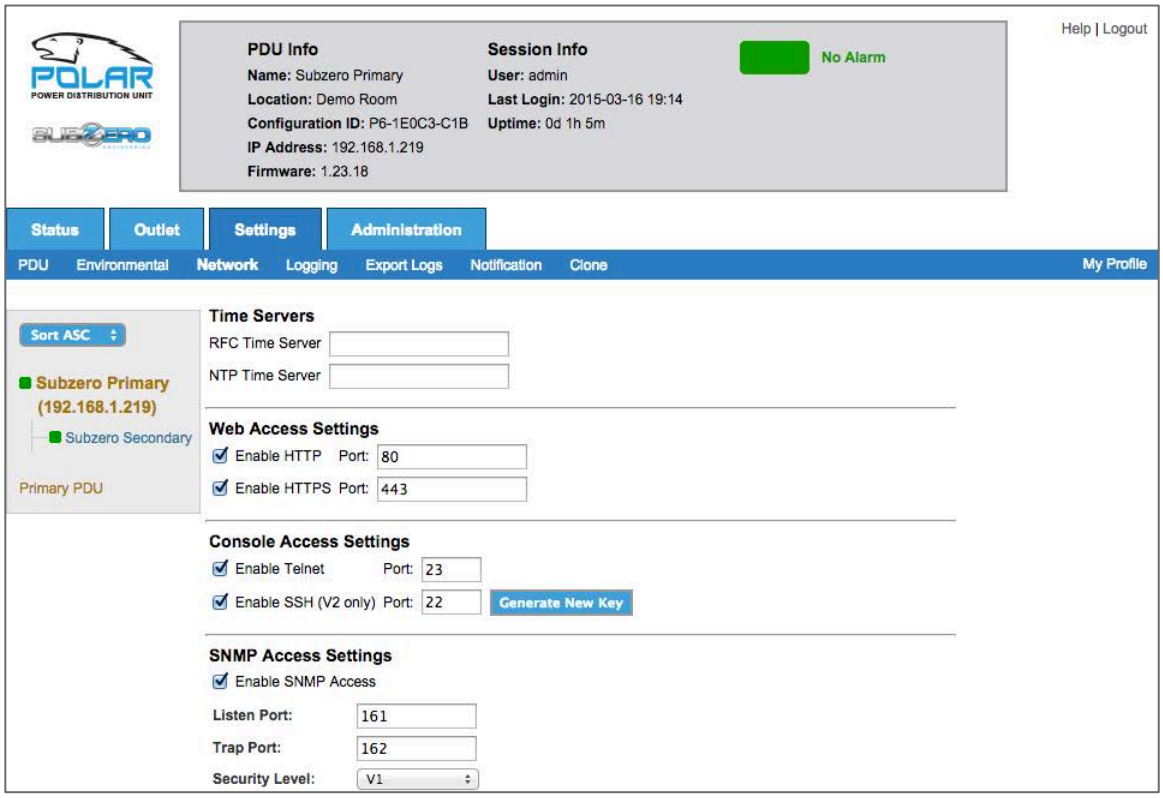
Settings – Network

Click on the Settings tab**, Network** sub menu to set all network related data:



Using the Enable Protocols combo box, select the Network Protocol(s). Enter data for IPv4 and/or IPv6 Networking.

Scroll down to enter the Time Server, Web Access, Console Access and SNMP Access Settings.



- **Time Servers** – Designate a time server as the source for time after each reboot (requires a network connection). As an alternative, you can manually set the time from the Administration tab, Advanced sub menu.

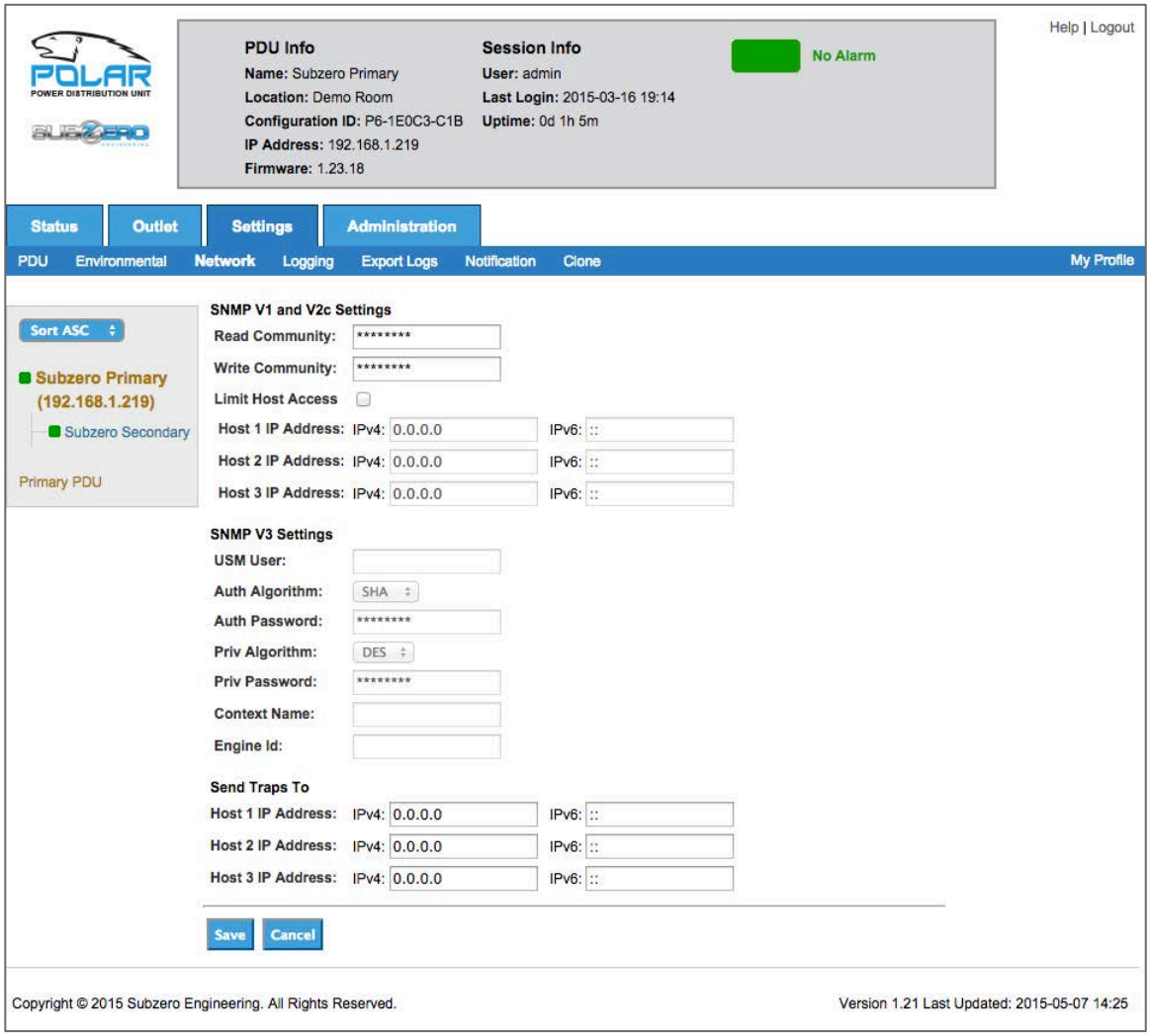
- **Web Access Settings** – Allows you to designate the port for accessing the PDU using a web browser and HTTP or HTTPs.

- **Console Access Settings** – Allows you to designate the port for accessing the PDU using a direct serial connection.

- **SNMP Access Settings** – Allows you to activate SNMP traps and designate where to send traps. See page 50 to set Alarm and Log Intervals for Traps.

Scroll down for more SNMP Access Setting input fields.

SNMP Access Settings continued:

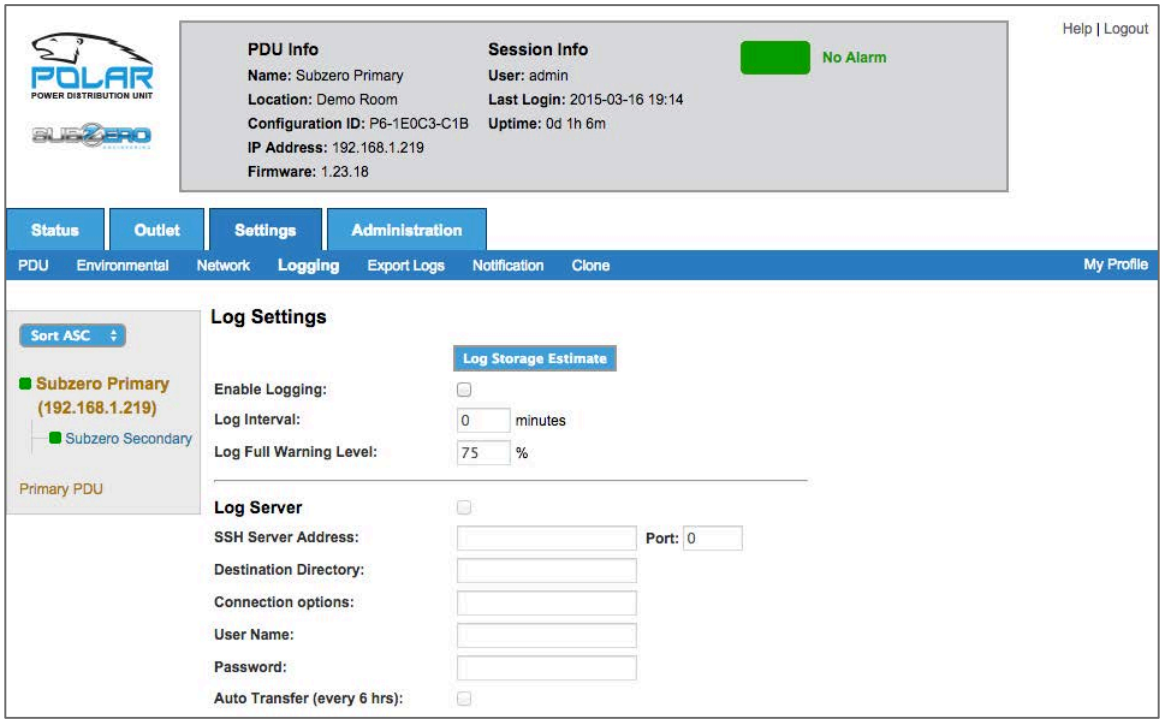


Enter data for SNMP v1, v2c or v3 settings.
Enter the IP Addresses you want to send traps to.

Click on Save button to save all entered data.

Settings – Logging

Click on the Settings tab**, Logging** sub menu to enable logging:

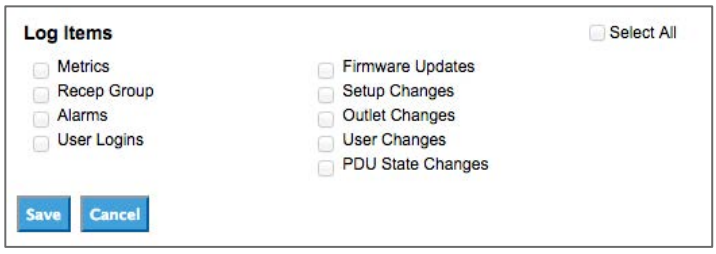


Check the Enable Logging check box to begin logging at the designated interval.

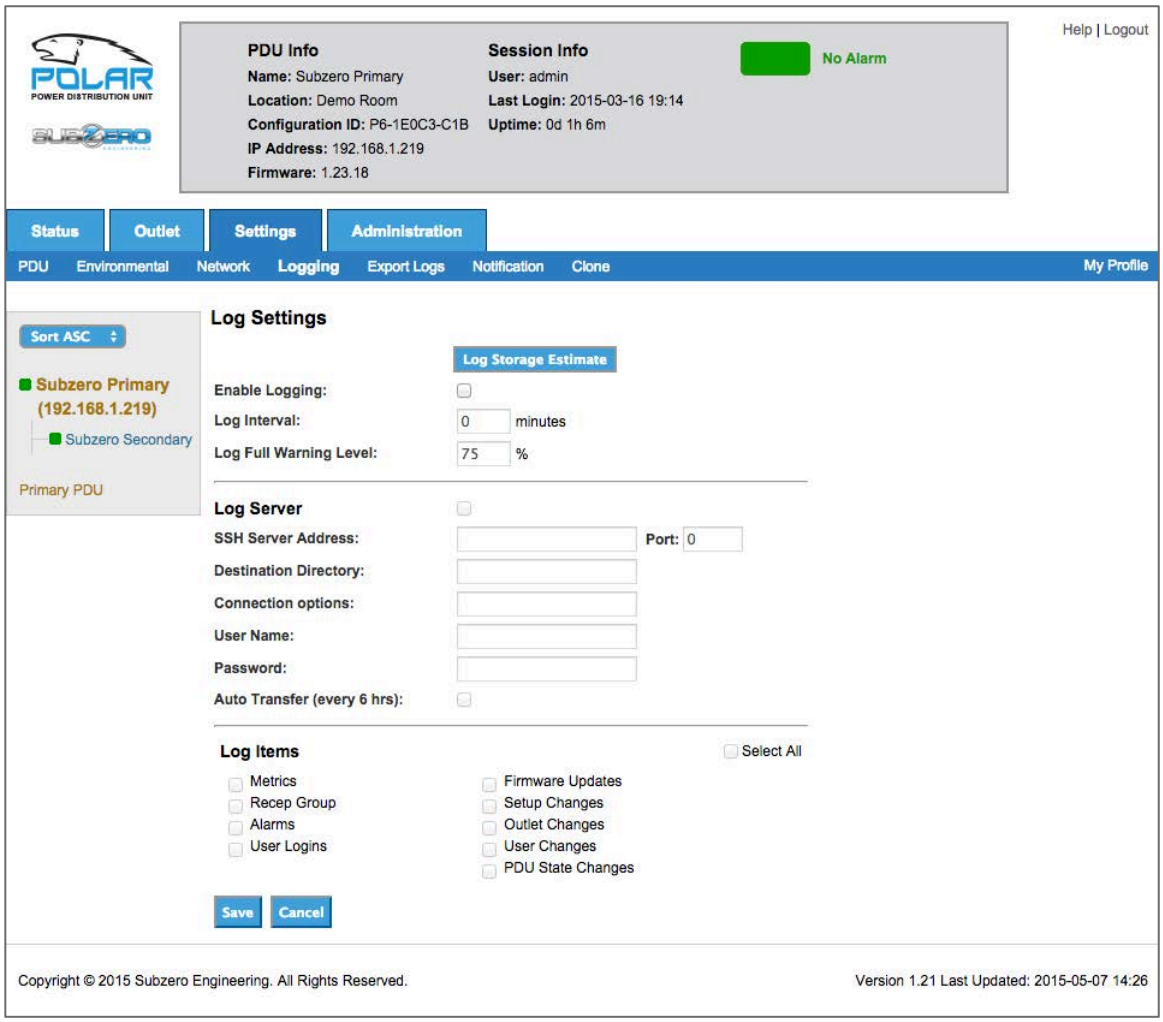
Each log entry includes a date and time stamp based on the time set for the PDU. Note that the PDU does not have an internal clock, so the time must either be reset each time the PDU is unplugged, loses power, or is upgraded/reboots or you must assign a time server to automatically set time.

It is critical that you set and maintain date and time for correct logging. Follow the First Login – Set Data and Time instructions on page 40.

Scroll down to Log Items to select the information that will be recorded.
Metrics are the branch power measurements.



Log Items are recorded on the local PDU memory of the primary unit. Local memory is limited. If you want to be warned when a certain percentage of the memory is used, designate the percentage (%) at Log Full Warning Level (at top of the page).

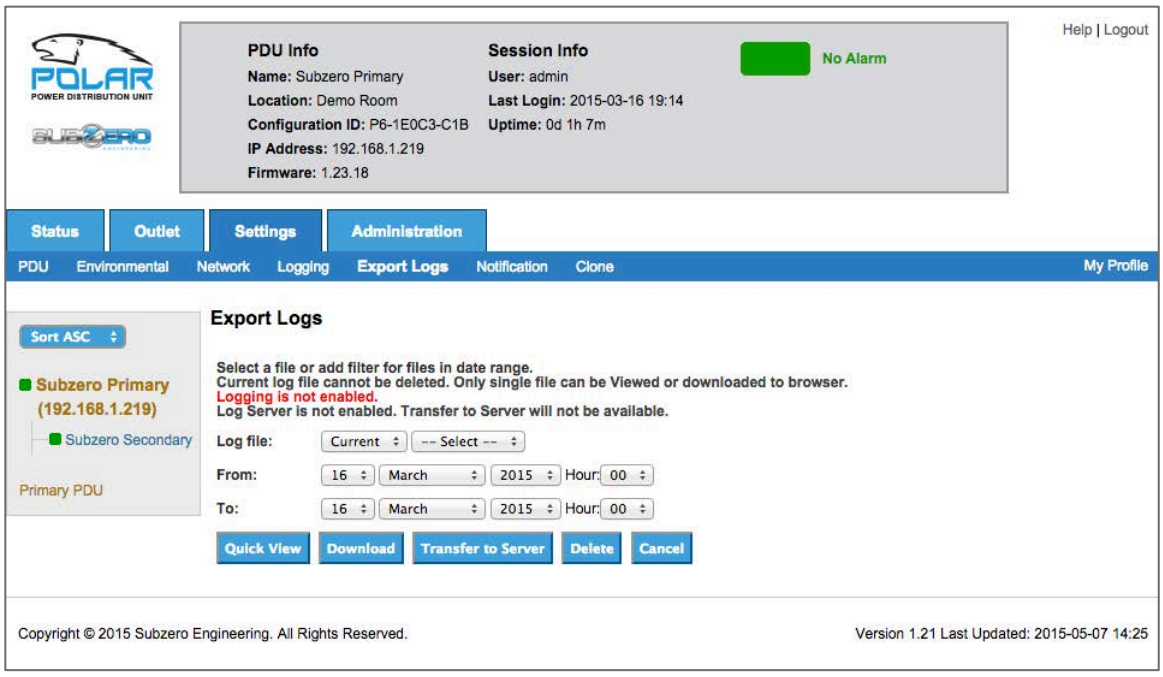


Log files can also be exported from the PDU for archiving.
Enter information under Log Server to store log files on a server location.
Alternately, you can copy log files to a client computer. See the Export Logs sub-menu.

Click on Save to begin logging.

Settings – View and Export Log Files

Click on the Settings tab**, Export Log** sub menu to export a log file for archiving:

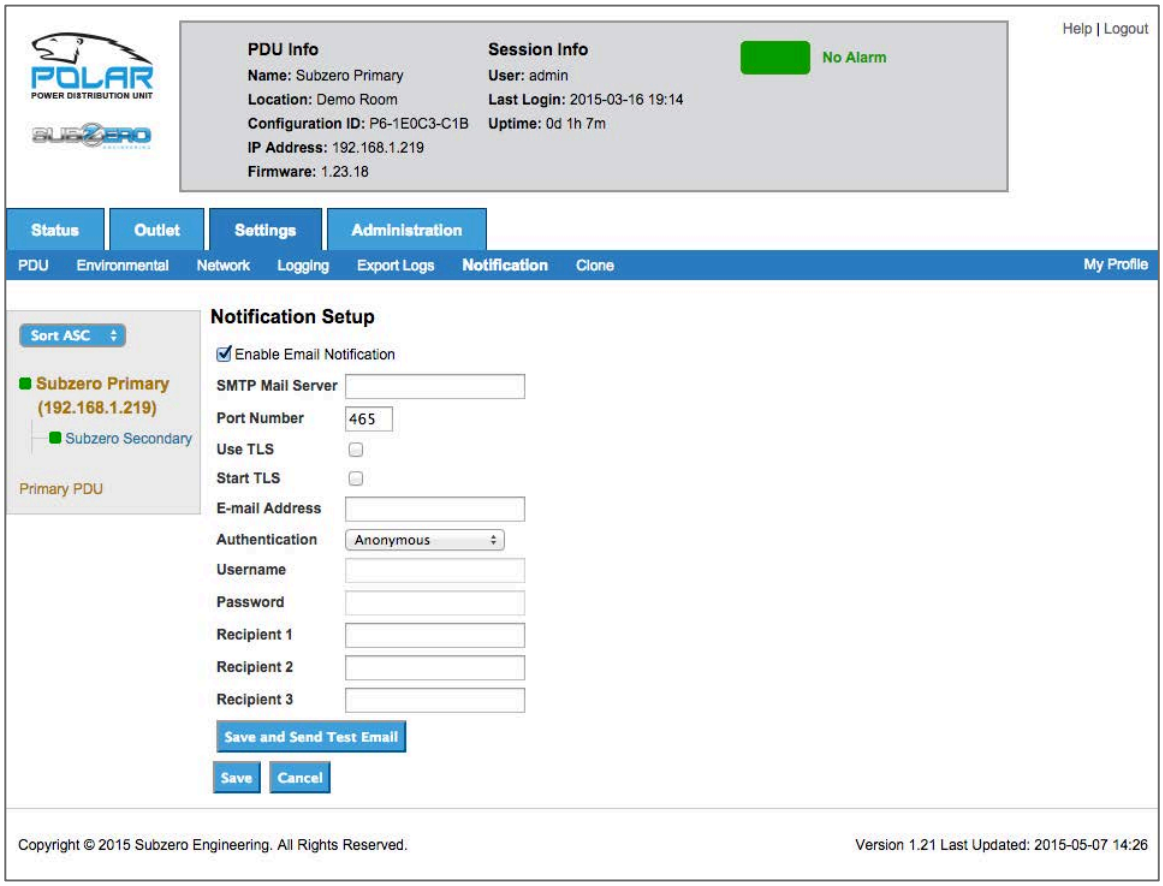


Using the Log File combo box, select the file that you wish to view or export.
Log files are automatically created every six hours.

- Use **Quick View** to view the log.
- Use **Download** to copy the file to your computer.
- Use **Transfer to Server** to copy the file to the Log Server designated on the Logging sub-menu.
- Use **Delete** to erase files. Note that this erases the file from the PDU's memory. If you wish to keep a copy of the file, be sure to export it to a computer or server first.

Settings – Email Alarm Notification

Click on the Settings tab**, Notification** sub menu to setup email alarm notifications:
Click the checkbox Enable Email Notification to setup email alarm notification.



The PDU does not include a mail server. In order to provide email notifications for the PDU, you must first setup an email account for the PDU on an accessible mail server.

- **SMTP Mail Server** – the mail server where the account resides, ex: smtp.google.com
- **Port Number** – the provider's port number, usually 465 or 25
- Check **Use TLS** or **Start TLS** to match your provider's encryption requirements
- **Email address** – the email address assigned to the PDU
  If **Authentication** is required, select **Specify Credentials** from the drop down list.
  Enter the **User Name** and **Password** for the Email account.
  Select Anonymous if no Username and Password are required.
- Enter the email address(es) of the **Recipient**(s). Your technician's email address.

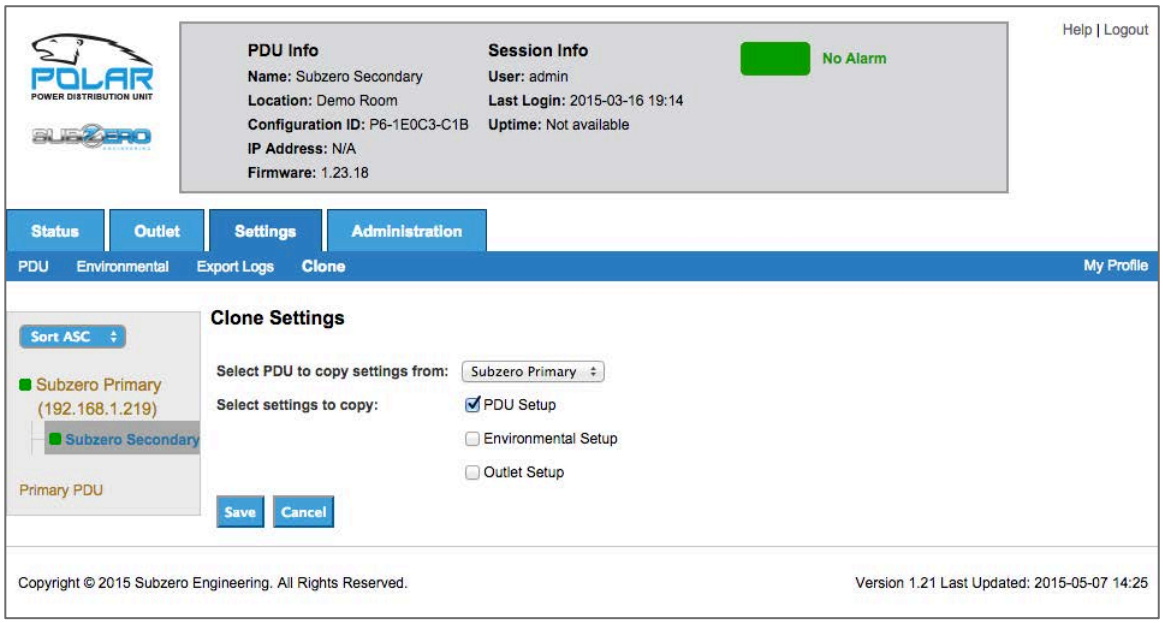
Click on **Save and Send a Test Email** to make sure notification setup is correct.

The PDU must have network access to the mail server.

Settings – Clone

When PDUs are linked you can clone settings from one PDU to another. To clone settings from one PDU to another, first, select the linked PDU from the list on the left of the screen that you wish to copy settings to. Then, **click on the Settings** tab, **Clone** sub menu, and select the PDU and settings to copy.

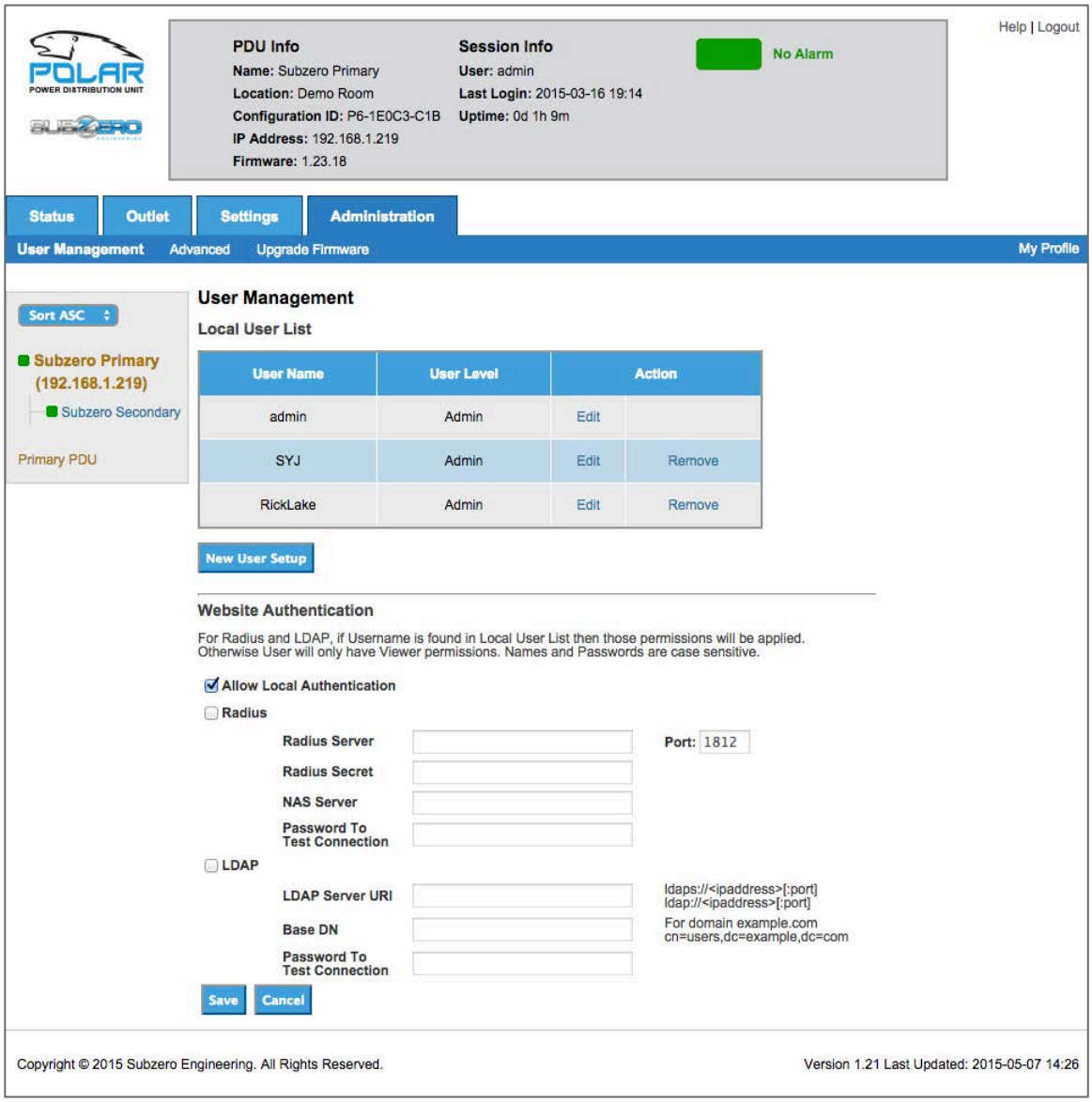
In the example below, PDU Setup settings will be copied from 3P Controlled (the primary PDU) to 3P Port Monitor (one of the linked PDUs).



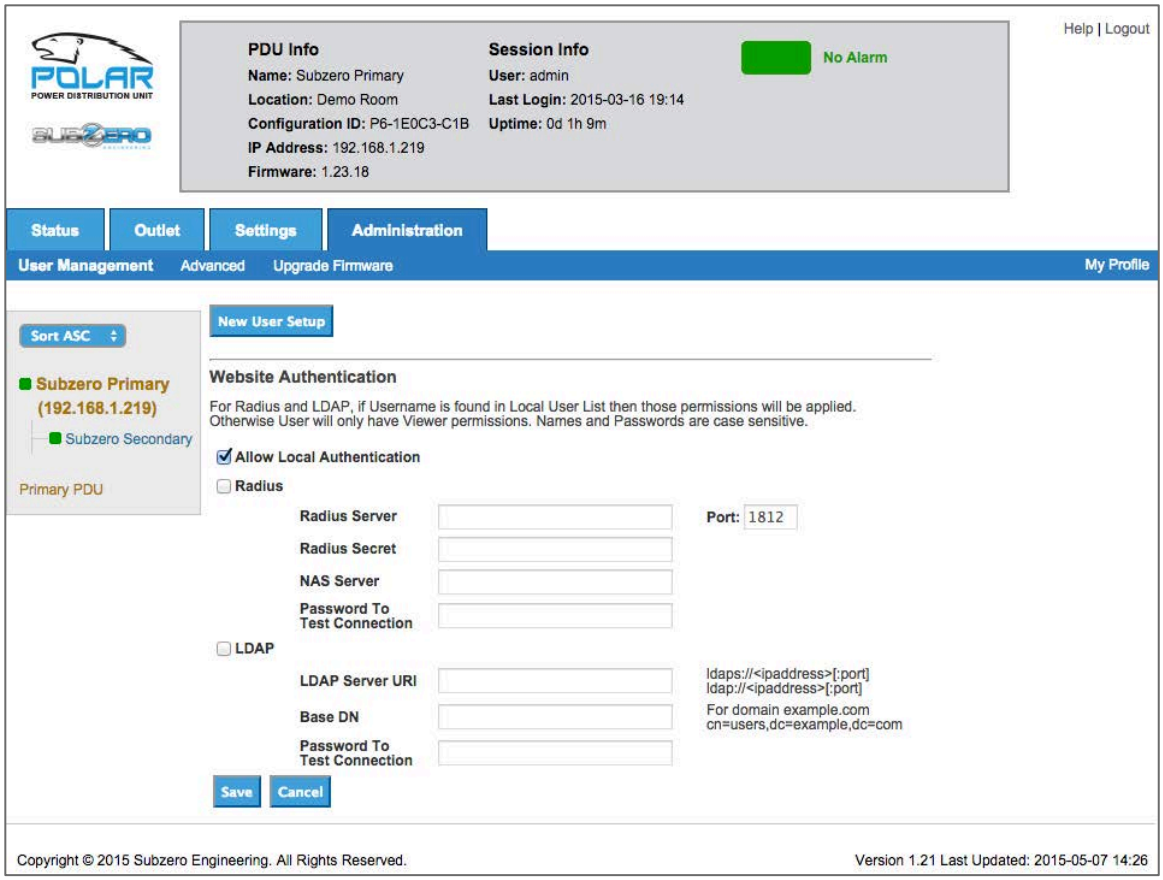
Click Save to copy the settings.

Administration -- User Management and Accounts

To perform User Administration for the PDU, **click on Administration** tab, **User Management** sub menu;



To create a local user login and password, Click on **New User Setup** button.



Enter User Name and Password.

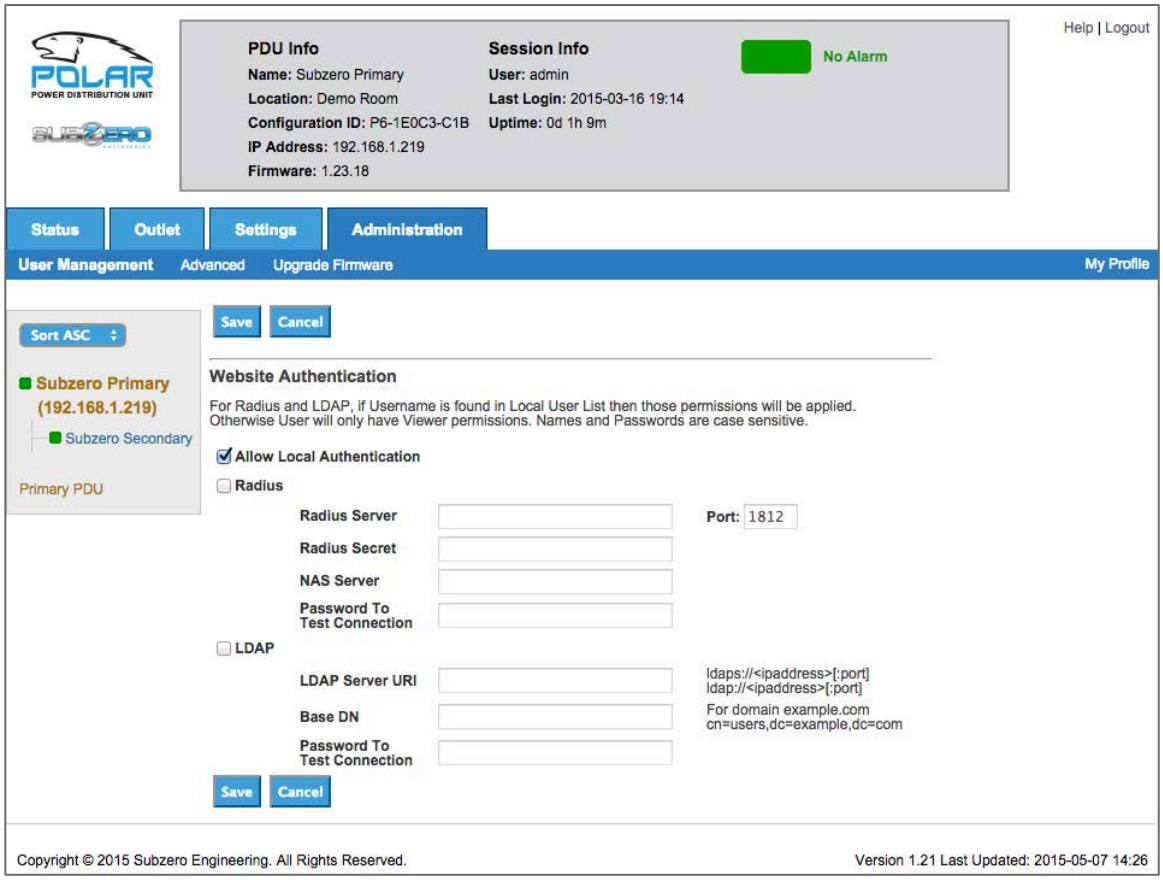
Using the User Level combo box, select user level:

- Viewer – access to Status tab and sub-menus. Can view status and alarms.
- Control – access to Status, Outlets and Settings tabs and sub-menus. Viewer capabilities, plus set alarms/logging/notification, control outlets, create/edit/delete outlet groups, view and archive logs.
- Admin – .access to Status, Outlets, Settings and Administration tabs and sub menus (all menus). Viewer and Control capabilities, plus manage users, update firmware, set time and soft reboot the PDU.
- Disabled – no access – use to temporarily disable an account. You can also remove (delete) accounts.

Click on the Save button.

Note: There is a maximum of four local users. Only user names in the Local User List may have Admin user level rights. Users accessing through Radius and LDAP that are not setup in the Local User List will only have Viewer user level rights.

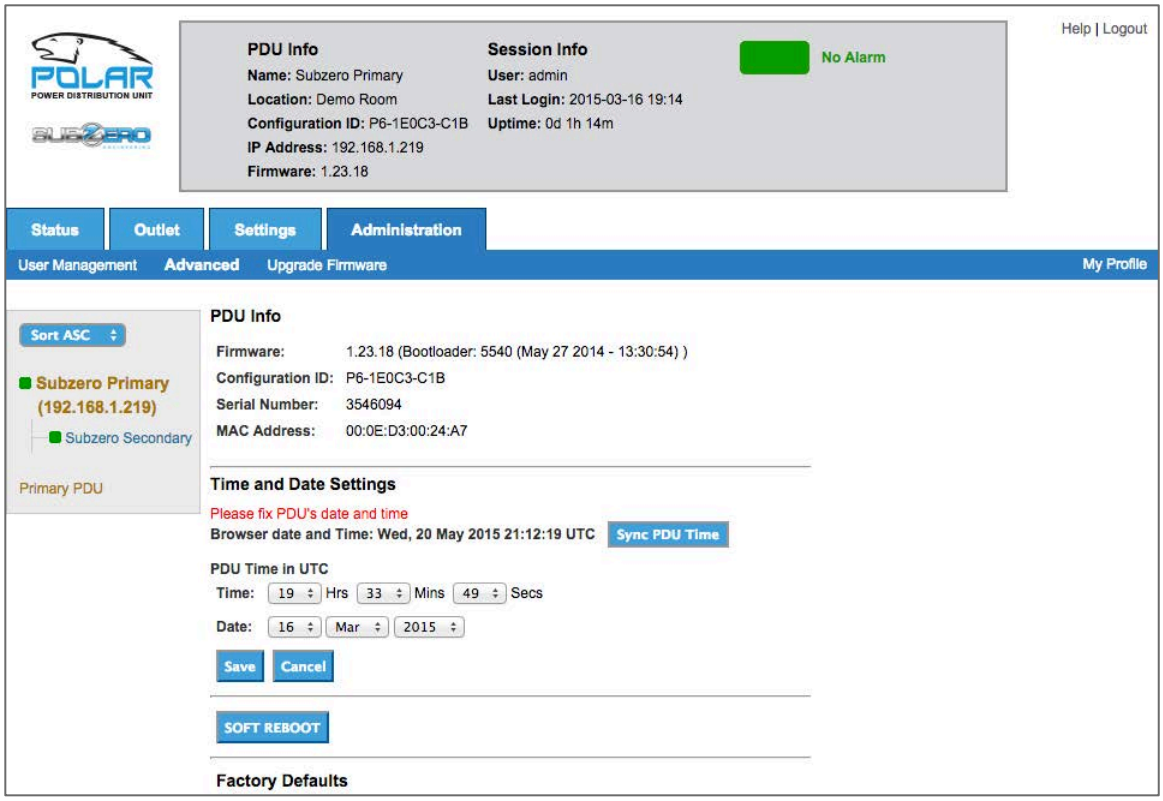
For Network/Website Authentication using Radius or LDAP, check the Radius or LDAP check box, enter the necessary information and save. Note that users will need to be added under the Local User List to have Control or Admin capabilities.



Click on the Save button.

Administration -- Advanced

Click on Advanced to locate PDU info, to change PDU time settings, perform a soft reboot (does not power down equipment) if there are connection problems, or completely reset the PDU to factory defaults:



PDU Info includes serial number and MAC address. Model number and firmware version are also displayed in the gray summary box at the top of each screen.

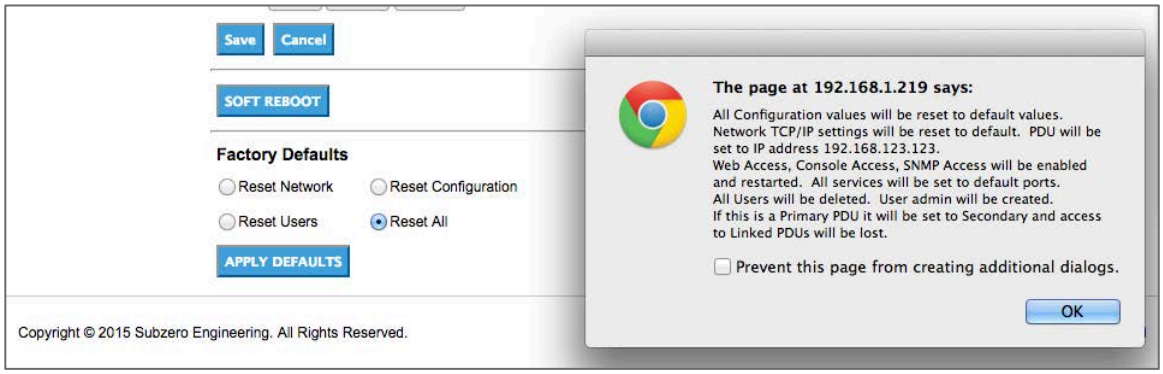
Verify Time and Date Settings to be sure date/time stamps on logs and alarms are correct.

Scroll down for more input fields.

- **Soft reboot** restarts the network connection, but does not power down outlets. Use this if you have connection problems.
-

Factory Defaults reset customer-entered values to the original factory defaults:

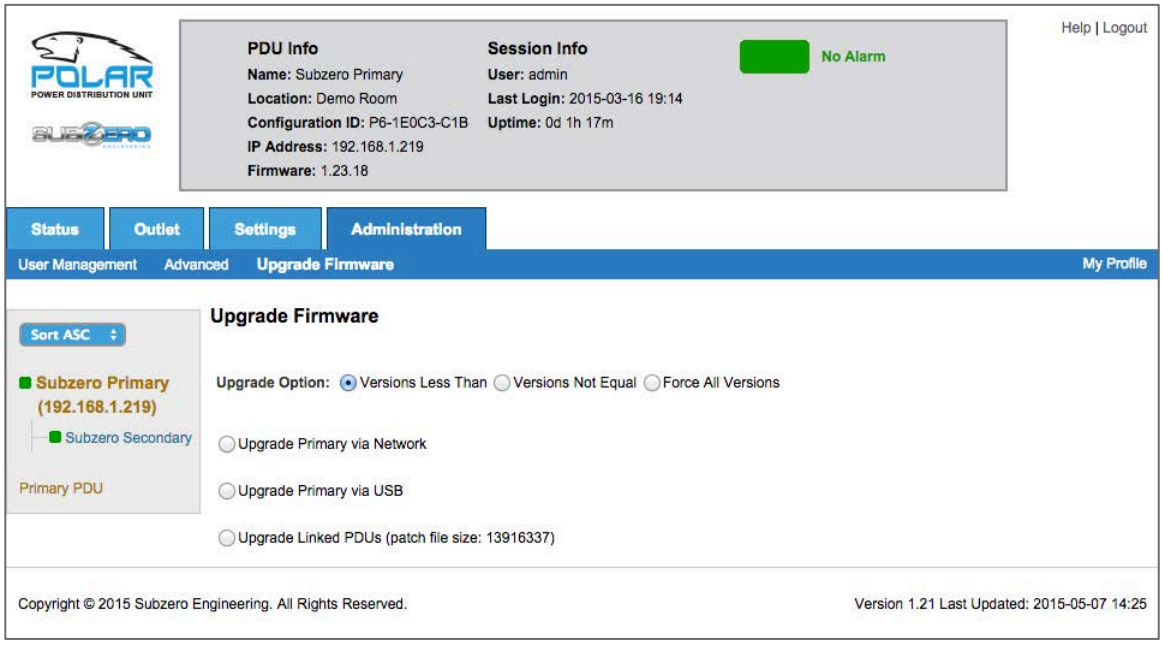
- **Reset Network** – resets PDU Network information to factory defaults including IP address (192.168.123.123). You may lose your network connection.
- **Reset Configuration** – resets PDU Configuration information to factory defaults including PDU name, alarms thresholds, etc. You will lose all configured fields.
- **Reset User** – deletes all users except the single factory default admin user. Login will be reset to admin, admin and this user will have full admin capabilities.
- **Reset All** – resets all fields to factory defaults.



To reset factory defaults, select the appropriate radial button.
Review the warning message.
Resets are applied immediately once the Apply Defaults button is clicked.
Click the **Apply Defaults** button to apply selected defaults.

Administration – Upgrade Firmware

To upgrade firmware, Click on the **Administration** tab, **Upgrade Firmware** sub menu.



Upgrade can be done over the network if the PDU is attached directly to the network or from a USB flash drive.

Note that this procedure is for individual PDUs only. It does not automatically upgrade all linked PDUs. Linked PDUs with firmware version 1.17.227 or later can be upgraded from the network (remotely) using Polar Firmware Upgrader, a separate software program available from www.subzeroeng.com/PolarPDUs/Downloads.

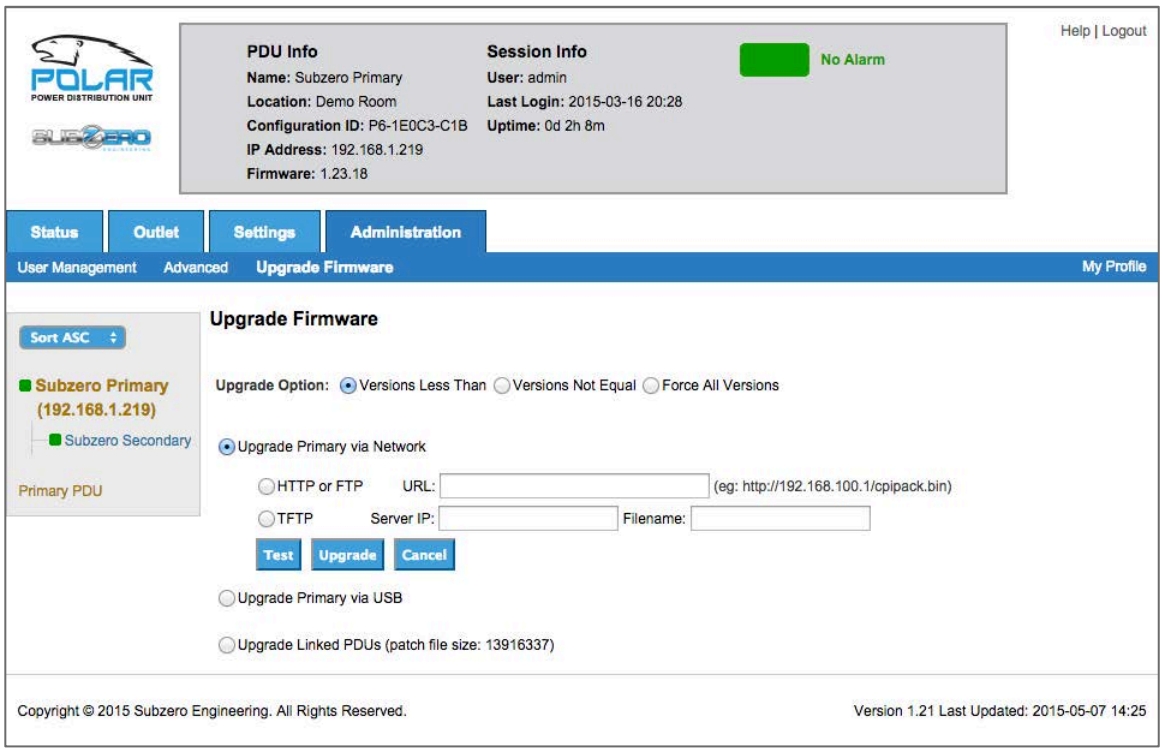
Note that the PDU's main communications module will reboot to complete the firmware upgrade process. Outlets will not lose power, but you will need to manually reset the clock if you have not assigned a Time Server. See First Login – Date and Time Settings on page 40.

Check the current firmware version in the PDU Info box at the top of the PDU interface screen. For example, this screenshot show Firmware version 1.19.206.

Then, download firmware from the SUBZERO website: www.subzeroeng.com/PolarPDUs/Downloads.

Check that the downloaded version is a newer version than the installed version.

To upgrade from the network, choose option **Upgrade Primary via Network**:

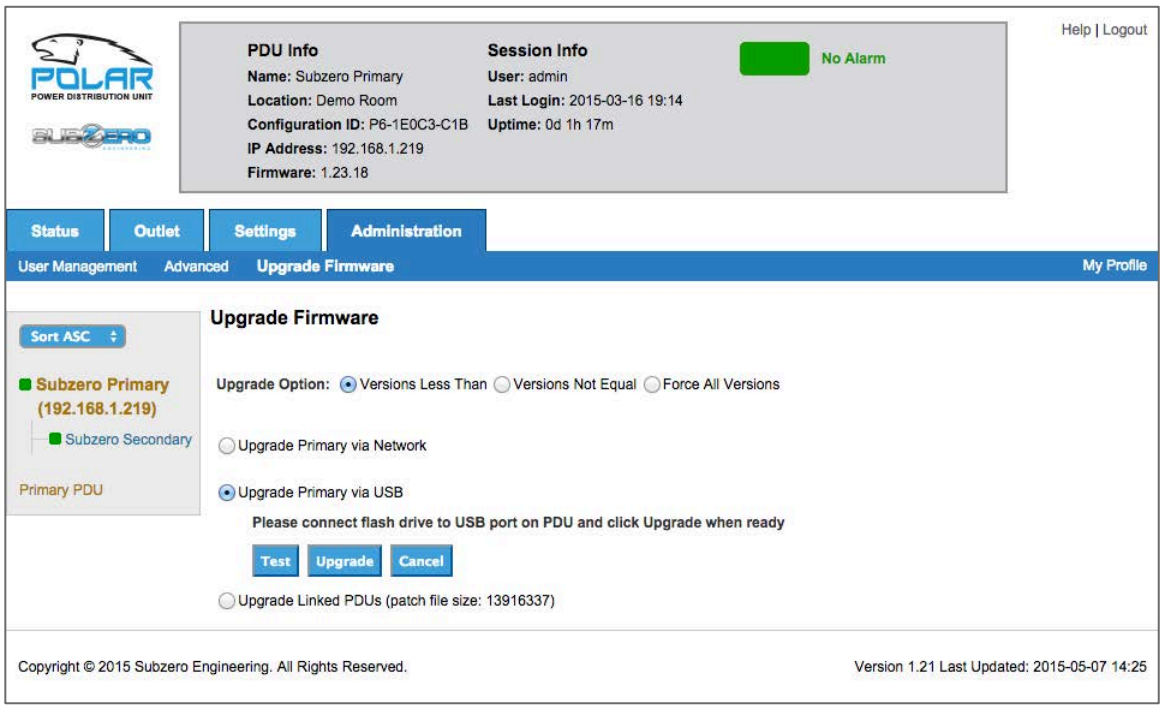


Post the downloaded firmware to an accessible HTTP/FTP or TFPT directory.

Enter HTTP/FTP or TFPT data.
Click on Test button to assure the remote site can be reached.
Click on the Upgrade button to perform the upgrade.

After successful installation, the new firmware version will display in the PDU Info box at the top of the screen.

To upgrade from a USB memory stick, choose option **Upgrade Primary via USB**:



Copy the downloaded firmware to a USB flash drive and insert the drive into the USB port on the front of the PDU.

Click on Test button to test the connection to the USB flash drive.
Click on the Update button if the firmware was found correctly to copy and install the firmware onto the PDU.

After successful installation, the new firmware version will display in the PDU Info box at the top of the screen.

Additional Software

Note: Linked PDUs with firmware version 1.17.227 or later can be upgraded from the network (remotely) using Polar Firmware Upgrader, a separate software program available from www.subzeroeng.com/PolarPDUs/Downloads.

Note: PDUs can also be monitored and configured using a direct serial connection with Polar Serial Communicator, a separate software program available from www.subzeroeng.com/PolarPDUs/Downloads. A Serial Setup Cable (SUBZERO P/N 6.0.000.004) is also required.

TROUBLESHOOTING GUIDE

Local display is blank:

- Check the PDU status LED.
- Make sure the PDU is plugged into a live source.
- Timeout feature might be activated, press the middle button.

Receptacle has no power:

- Check the circuit breaker for the branch. If necessary, switch it off then back on and recheck. (Note that all equipment connected to the branch will lose power.)
- Check power at the source.
- If problem persists, the PDU unit must be replaced.

PDU cannot establish Link to another PDU:

- Verify that proper cable is used to interface PDUs, use a standard Cat 5/6, 4-pair network cabinet with RJ45 connectors on both ends.
- Make sure the connectors are snapped in securely.
- Verify the integrity of the cable.
- If problem persists after a power cycle, the PDU unit must be replaced.

No Ethernet Connection:

- Verify connection with a ping tool from any computer in the network.
- Check that the green LED in the PDU Ethernet port is lit.
- Check that the end connectors are snapped in place.
- Check the integrity of the cabling from the PDU's Ethernet port to the network switch/hub/router.
- Verify the port integrity of the network switch/hub/router.
- Verify via serial port that the network configurations for the PDU are set properly.
- If the Ethernet communication problem persists after power cycling it, replace the PDU unit.

Customer Support:

US Tech Support: 801.810.3500 • support@subzeroeng.com

APPENDIX

Regulatory Information:

ETL
CE
FCC Part 15, Class A
EN 55022
RoHS Compliant
UL & cUL Listed
IEC 60950-1
CSA C22.2

Environmental Conditions:

Operating Temperature: 32 - 149˚F (0 - 65˚C) at Input Power Rating (kW)
Operating Relative Humidity: 5 - 95%
Operating Elevation: 0-10000 ft (0-3000 m)
Storage Temperature: -13 - 149˚F (-25 - 65˚C)
Storage Relative Humidity: 5 - 95%
Storage Elevation: 0-50000ft (0-15000 m)

The Technical Construction File is held by Subzero.